GOVERNMENT OF SINDH

Irrigation Department

PROJECT MANAGEMENT TEAM

SINDH RESILIENCE PROJECT

(IRRIGATION COMPONENT)

CREDIT NO. 5888-PK

ENVIRONMENTAL AND SOCIAL IMPACTS ASSESSMENT (ESIA)

MS, BU, KUKA, PB AND KOTRI GUIDE BUNDS EMBANKMENTS OF INDUS RIVER

PROJECT IMPLEMENTATION SUPPORT AND SUPERVISION CONSULTANT (PISSC) FOR SINDH RESILIENCE PROJECT (SRP)

Revision - V

FEBRUARY 2018

ASSOCIATED CONSULTING ENGINEERS–ACE (PVT) LTD.

Regional Office (South)

Bang low Nr. B-25/25, Maqboolabad Cooperative Housing Society

Block-7&8, Karachi – 75350, Pakistan

Phone Nr. (92-21) 34531171, 34531172, 34531173, Fax (92-21) 34531174

Email Address: acesouth@gmail.com , acesouth@acepakistan.com

ISO 9001 Certified

DOCUMENT ISSUE AND REVISION RECORD

This document and its contents have been prepared and are intended solely for the information and use of Government of Sindh, Irrigation Department in relation to the PROJECT IMPLEMENTATION SUPPORT AND SUPERVISION CONSULTANT (PISSC) FOR SINDH RESILIENCE PROJECT (SRP). The Associated Consulting Engineers – ACE (Pvt.) Ltd (PISSC) assumes no responsibility to any other party in respect of or arising out of or in connection with this document and/or its contents.

DOCUMENT HISTORY:

Job Number:	JB 094-S-MS
Project:	SINDH RESILIENCE PROJECT (SRP)
Client:	GOVERNMENT OF SINDH, IRRIGATION DEPARTMENT
Consultant:	ASSOCIATED CONSULTING ENGINEERS–ACE (PVT) LTD
Document Ref:	SRP – ESIA-01
Document Title:	ENVIRONMENTAL AND SOCIAL IMPACTS ASSESSMENT (ESIA) OF MS, BU, KUKA, PB AND KOTRI GUIDE BUNDS OF INDUS RIVER

Revision	Purpose Description	Originated	Checked	Review	Authorized	Date
0	Draft for Client Review	Farooq Ahmed Memon, Naimatullah Khan Kakar	Rana Ashiq	M. Ibrahim Samoon	M. Ibrahim Samoon	29-09-17
1	Client's Comments incorporated and few improvements in write-up	Farooq Ahmed Memon, Naimatullah Khan Kakar	Rana Ashiq	M. Ibrahim Samoon	M. Ibrahim Samoon	10-10-17
2	World Bank Comments incorporated.	Farooq Ahmed Memon, Naimatullah Khan Kakar	Rana Ashiq	M. Ibrahim Samoon	M. Ibrahim Samoon	13-12-17
3	Additional World Bank Comments incorporated.	Farooq Ahmed Memon, Naimatullah Khan Kakar	Rana Ashiq	M. Ibrahim Samoon	M. Ibrahim Samoon	28-12-17
4	Chapter on 'Alternatives' Revised	Farooq Ahmed Memon, Naimatullah Khan Kakar	Rana Ashiq	M. Ibrahim Samoon	M. Ibrahim Samoon	16-01-18
5	Additional Comments from World Bank	Farooq Ahmed Memon, Naimatullah Khan Kakar	Rana Ashiq	M. Ibrahim Samoon	M. Ibrahim Samoon	27-02-18

TABLE OF CONTENTS

EXECUTIVE SUMMARY 1

1. INTRODUCTION 1
1.1 BACKGROUND 1
1.2 SRP COMPONENTS 3
1.3 AIMS AND OBJECTIVES OF THE ESIA STUDY 3
1.4 SCOPE OF THE STUDY 4
1.5 ESIA METHODOLOGY 4
1.6 STUDY TEAM 5
1.7 ENVIRONMENTAL SOCIAL MANAGEMENT FRAMEWORK AND RESETTLEMENT POLICY FRAMEWORK (ESMF/RPF) FOR LATER YEARS SUB-PROJECTS 5

2. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK 7
2.1 PAKISTAN INSTITUTIONAL FRAMEWORK 7
2.2 NATIONAL DISASTER MANAGEMENT AUTHORITY- CLIMATE CHANGE DIVISION 7
2.3 PAKISTAN ENVIRONMENTAL PROTECTION AGENCY 7
2.4 NON-GOVERNMENTAL ORGANIZATIONS 8
2.5 SINDH ENVIRONMENTAL PROTECTION COUNCIL (SEPC) 8
2.6 SINDH ENVIRONMENTAL PROTECTION AGENCY (SEPA) 9
2.7 SINDH IRRIGATION DEPARTMENT (SID) AND SINDH IRRIGATION AND DRAINAGE AUTHORITY (SIDA) 9
2.8 SINDH WILDLIFE DEPARTMENT 10
2.9 PROVINCIAL DISASTER MANAGEMENT AUTHORITY 10
2.10 FEDERAL ENVIRONMENTAL POLICIES AND GUIDELINES 11
2.10.1 NATIONAL CONSERVATION STRATEGY (1992) 11
2.10.2 THE NATIONAL ENVIRONMENTAL POLICY (2005) 11
2.10.3 GUIDELINES FOR SENSITIVE AND CRITICAL AREAS (1997) 12
2.10.4 THE SOLID WASTE MANAGEMENT POLICY (2000) 12
2.10.5 FACTORIES ACT (1934) 12
2.10.6 ANTIQUITY ACT (1975) 13
2.10.7 NATIONAL ENVIRONMENTAL QUALITY STANDARDS (2010) 14
2.10.8 HIGHWAY SAFETY ORDINANCE (2000) 14
2.10.9 LAND ACQUISITION ACT (LAA)-1894 14
2.10.10 POSSESSION OF LAND 16
2.10.11 EMPLOYMENT OF CHILD ACT, 1991 17
2.11 SINDH PROVINCIAL ENVIRONMENTAL LAWS, POLICIES AND GUIDELINES 17
2.11.1 SINDH STRATEGY FOR SUSTAINABLE DEVELOPMENT (2007) 17
2.11.2 SINDH ENVIRONMENTAL PROTECTION ACT (2014) 17
2.11.3 SINDH IRRIGATION ACT (1879) WITH AMENDMENTS IN 2011 18
2.11.4 SINDH LOCAL GOVERNMENT ACT, 2013 19
2.11.5 MOTOR VEHICLES (AMENDMENT) ACT, 2014 19
2.11.6 SINDH WILDLIFE PROTECTION ORDINANCE (2001) 20
2.11.8 SINDH FISHERIES ORDINANCE (1980) 20
2.12 THE WORLD BANK SAFEGUARDS POLICIES 21
2.13 MULTILATERAL ENVIRONMENTAL AGREEMENTS 23
2.14 NATIONAL PARKS 24
2.15 WILDLIFE SANCTUARIES 24
2.16 GAME RESERVES 24

3. DESCRIPTION OF SUB-PROJECT 25
3.1 LOCATION OF THE SUB-PROJECTS 25
3.2 EXISTING CONDITION AND PROBLEMS OF THE SUB-PROJECTS 26
3.2.1 MULCHAND SHAH BUNDER (M.S) BUND 27
3.2.2 BAGHAR UCHITO (B.U) BUND 27

3.2.3 KUKA LINK BUND, KUKA WARI BUND AND KUKA WARI RETARDED BUND 27
3.2.4 PANNAH BAGHAR (P.B) BUND 27
3.2.5 GUIDE BUND KOTRI BARRAGE 28
3.3 PROPOSED REHABILITATION WORKS 28
3.4 CONSTRUCTION MATERIALS 31
3.5 CONSTRUCTION SCHEDULE 33
3.6 CONSTRUCTION CAMPS 34
3.7 AREA OF INFLUENCE AND CORRIDOR OF IMPACT (COI) 37
3.7.1 PRIMARY IMPACT ZONE 38
3.7.2 SECONDARY IMPACT ZONE 38

4. ANALYSIS OF ALTERNATIVES 39
4.1 GENERAL 39
4.2 THE AVAILABLE ALTERNATIVES FOR SUB-PROJECTS 40
4.2.1 OPTION 0: NO PROJECT ALTERNATIVE 41
4.2.2 OPTION 1: STRENGTHENING, WIDENING AND RAISING OF EXISTING EMBANKMENTS 42
4.2.3 OPTION 2: CONSTRUCT NEW EMBANKMENTS 43
4.2.4 OPTION 3: NEW DESIGN CONFIGURATIONS OTHER THAN EMBANKMENTS 43
4.3 ALTERNATIVES FOR SOURCES OF CONSTRUCTION MATERIALS 44
4.3.1 EARTH MATERIAL 44
4.3.2 STONES 44
4.4 ALTERNATIVE OF STRIP BORROW AREAS VERSUS DEEP PITS 44

5. ENVIRONMENTAL AND SOCIAL BASELINE 49
5.1 PHYSICAL ENVIRONMENT 49
5.1.1 TOPOGRAPHY 49
5.1.2 FLOODS 50
5.1.3 LAND USE 51
5.1.4 WATER RESOURCES 71
5.1.6 AIR QUALITY 77
5.1.7 NOISE 78
5.1.8 SOILS 80
5.2 BIOLOGICAL ENVIRONMENT 80
5.2.1 FLORA 80
5.2.3 FAUNA 82
5.2.4 HABITAT 88
5.2.5 LAKES 89
5.2.6 RIVERINE FOREST 89
5.2.7 FISH 93
5.3 SOCIO–ECONOMIC BASELINE 93
5.3.1 POPULATION 96
5.3.2 LANGUAGES 98
5.3.3 FAMILY SYSTEM 98
5.3.4 RELIGIOUS AFFILIATIONS 99
5.3.5 SOCIAL COHESION AND CONFLICT 99
5.3.6 CONFLICT RESOLUTION WITHIN TRIBES AND VILLAGES 99
5.3.7 HOUSING 99
5.3.8 LITERACY 100
5.3.9 EDUCATIONAL FACILITIES 100
5.3.10 HEALTH 101
5.3.11 TRANSPORT 101
5.3.12 TELECOMMUNICATION 102
5.3.13 ENERGY SOURCE 102
5.3.14 DRINKING WATER AND SANITATION 102
5.3.15 WOMEN IN SUB-PROJECT AREA 102
5.3.17 PRIORITY NEEDS OF MALE COMMUNITY 105
5.3.18 PRIORITY NEEDS OF FEMALE COMMUNITY 105
5.3.19 ARCHAEOLOGICAL AND CULTURAL HERITAGE 106

6. ENVIRONMENTAL AND SOCIAL IMPACTS AND MITIGATIONS 109
6.1 AIR QUALITY 109
6.2 WATER QUALITY 110
6.3 CULTURAL HERITAGE 111
6.5 BIODIVERSITY 112
6.6 BORROWING AND QUARRYING OF MATERIALS 114
6.7 RESETTLEMENT IMPACTS 115
6.8 LOSS OF AGRICULTURAL LAND 117
6.9 LOSS OF HABITATS DUE TO NEW HAUL ROUTES 117
6.10 FISH PRODUCTION PONDS 117
6.11 COMMUNITY DISTURBANCE 118
6.12 HEALTH AND SAFETY OF COMMUNITY AND CONSTRUCTION STAFF/WORKERS 119
6.13 ROAD CONGESTIONS 121
6.14 NOISE 121
6.15 DAMAGE TO PHYSICAL INFRASTRUCTURE 122
6.16 EMPLOYMENT OPPORTUNITIES 122
6.17 REDUCTION OF FLOOD DAMAGES 122

7. STAKEHOLDERS CONSULTATIONS 124
7.1 OBJECTIVES 124
7.2 IDENTIFICATION OF STAKEHOLDERS 124
7.3 PRIMARY STAKEHOLDERS 125
7.4 SECONDARY STAKEHOLDERS 125
7.5 KEY STAKEHOLDERS 125
7.6 PRIMARY STAKEHOLDER CONSULTATIONS 126
7.7 COMMUNITY CONSULTATIONS 126
7.8 FINDINGS OF PUBLIC CONSULTATION WITH MALE COMMUNITY MEMBERS 127
7.9 FINDINGS OF PUBLIC CONSULTATION WITH FEMALE COMMUNITY MEMBERS 128
7.10 INFORMATION DISCLOSURE 129

8. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN 130
8.1 PROJECT MANAGEMENT RESPONSIBILITIES 130
8.2 PROJECT MANAGEMENT OFFICE 130
8.3 PROJECT IMPLEMENTATION SUPPORT AND SUPERVISION CONSULTANT (PISSC) 131
8.4 ENVIRONMENTAL/SOCIAL MONITORING AND EVALUATION (ESMEC) CONSULTANT 132
8.5 CONTRACTOR 134
8.6 ENVIRONMENTAL CODE OF PRACTICES 134
8.7 CONTRACTOR'S PLANS 134
8.8 POLLUTION (AIR, LAND AND WATER) CONTROL PLAN 134
8.9 WASTE MANAGEMENT PLAN 135
8.10 MANAGEMENT PLAN 135
8.11 PLAN FOR HANDLING HAZARDOUS MATERIAL 135
8.12 OCCUPATIONAL HEALTH AND SAFETY PLAN 135
8.13 ENVIRONMENTAL AWARENESS TRAINING PLAN 135
8.14 EMERGENCY RESPONSE PLAN 135
8.15 REFORESTATION/ TREE PLANTATION AND MAINTENANCE PLAN 136
8.16 MITIGATION AND MONITORING 136
8.17 COMPLIANCE AND EFFECTS MONITORING 136
8.18 ENVIRONMENTAL NON-COMPLIANCE AND CORRECTIVE MEASURES 138
8.19 COMMUNICATION, REPORTING AND DOCUMENTATION 138
8.20 ESMP IMPLEMENTATION COST 139

9. GRIEVANCE REDRESS MECHANISM 141
9.1 OBJECTIVES OF GRIEVANCE REDRESS MECHANISM 141
9.2 PRINCIPLES, PROCEDURES AND TIME-LINES 142
9.3 RECORDS AND MONITORING 142
9.4 DISSEMINATION 143
9.5 PROPOSED MECHANISM FOR GRIEVANCE REDRESS 143
9.6 PUBLIC COMPLAINTS CENTER 143

9.7 GRIEVANCE REDRESS COMMITTEE (GRC) **144**
9.8 GRIEVANCE FOCAL POINTS (GFPS) **144**
9.9 ROLE AND RESPONSIBILITIES OF PCC **144**
9.10 GRM STEPS AND TIMEFRAME **145**
9.11 REPORTING **146**

LIST OF ANNEXURES

ANNEX-A: BASELINE EMBANKMENT CONDITIONS 147
ANNEX-B: NOISE DATA 148
ANNEX-C: TREE INVENTORIES 150
ANNEX-D: ENVIRONMENTAL AND SOCIAL IMPACTS ASSESSMENT QUESTIONNAIRES 153
ANNEX-E: SOCIO-ECONOMIC DATA 154
ANNEX-E-1: HEALTH FACILITIES IN EACH SUB-PROJECT AREA 154
ANNEX-E-2: COMMON DISEASE IN THE PROJECT AREA 155
ANNEX-E-3: FLOOD DAMAGES IN THE PROJECT AREA 156
ANNEX-E-4: NGOS WORKING IN THE AREA 157
ANNEX-E-5: EDUCATIONAL FACILITIES IN THE SUB-PROJECT AREA 158
ANNEX-E-6: AVAILABLE FACILITIES IN THE SUB-PROJECT AREA 161
ANNEX-F: CONSULTATION DETAILS 162
ANNEX-G: ENVIRONMENTAL CODE OF PRACTICES (ECOPS) 205
ANNEX-G-1: ECOP 1: WASTE MANAGEMENT 206
ANNEX-G-2: ECOP 2: FUELS AND HAZARDOUS SUBSTANCE MANAGEMENT 207
ANNEX-G-3: ECOP 3: WATER RESOURCES MANAGEMENT 208
ANNEX-G-4: ECOP 4: DRAINAGE MANAGEMENT 211
ANNEX-G-5: ECOP 5: SOIL QUALITY MANAGEMENT 212
ANNEX-G-6: ECOP 6: EROSION AND SEDIMENT CONTROL 213
ANNEX-G-7: ECOP 7: BORROW AREAS DEVELOPMENT AND OPERATION/RESTORATION 214
ANNEX-G-8: ECOP 8: AIR QUALITY MANAGEMENT 215
ANNEX-G-9: EC0P 9: NOISE AND VIBRATION MANAGEMENT 216
ANNEX-G-10: ECOP 10: PROTECTION OF FLORA 217
ANNEX-G-11: ECOP 11: PROTECTION OF FAUNA 218
ANNEX-G-12: ECOP 12: PROTECTION OF FISHERIES 219
ANNEX-G-13: ECOP 13: ROAD TRANSPORT AND ROAD TRAFFIC MANAGEMENT 220
ANNEX-G-14: ECOP 14: CONSTRUCTION CAMP MANAGEMENT 221
ANNEX-G-15: ECOP 15: CULTURAL AND RELIGIOUS ISSUES 225
ANNEX-G-16: ECOP 16: WORKER HEALTH AND SAFETY 229
ANNEX-H: ENVIRONMENTAL AND SOCIAL MITIGATION AND MONITORING PLAN 233

LIST OF TABLES

Table 1: Applicable Provincial Laws and World Bank Safeguard Policies 21
Table 2: Summary of Major Construction Materials 32
Table 3: Site Camps Location 35
Table 4. Determination of Impact Significance 39
Table 5: Analysis of Alternatives: Rehabilitation of Embankments 46
Table 6: Surface Water Quality Analysis (Physical and Chemical Parameters) 73
Table 7: Physical and Chemical Parameters of Groundwater Quality Analysis 75
Table 8: Summary of Micro Organisms in Water Quality Analysis 76
Table 9: Ambient Air Quality Results for Sub-projects in Thatta and Sujawal 77
Table 10: Ambient Air Quality Results for the Sub-projects of Hyderabad 78
Table 11: Ambient Noise Levels in the Sub-project Area 78
Table 12: List of Plant Species Identified in Sub-project Area. 80
Table 13: Large Mammals Recorded in the Area 84
Table 14: Small Mammals Species Recorded in the Sub-project Area 84
Table 15: Avian Species of Study Area 86
Table 16: Reptilian and Amphibian Species in the Project Area 88

Table 17: Reserved Forest, Current Status, and Distance from Sub-project Area 91
Table 18: Fish Species of Commercial Value in the Project Area 93
Table 19: List of Villages included in Socio-economic Baseline Survey 94
Table 20: Extent of Damages due to Flood in the Project Area in 2010 95
Table 21: Population and Tribes on PB Bund 96
Table 22: Population and Tribes on Kuka Wari Bund 97
Table 23: Population and Tribes on Kuka Link Bund 97
Table 24: Population and Tribes on Kuka Retarded Bund 97
Table 25: Population and Tribes on MS Bund 98
Table 26: Population and Tribes on BU Bund 98
Table 27: Population and Tribes on Kotri barrage Guide Bund 98
Table 28: Education Facilities in the Project Area 100
Table 29: Education Facilities in Districts of Thatta and Sujawal 101
Table 30: Location of Cluster Meetings with Females 103
Table 31: Priority Needs of the Male Community Members 105
Table 32: Number of Archaeological Sites in the Project Area 106
Table 33: Number of Archaeological Sites in the Project Area 107
Table 34: Site Wastes 110
Table 35: Summary of Stakeholder Consultations with Male Community Members 126
Table 36: Environmental, Social Management and Monitoring Cost 140

LIST OF FIGURES

Figure 1: Location of the SRP Project Area 2
Figure 2: Location of the Embankments Sub-projects 25
Figure 3: Typical Cross Section of Stone Pitching and Raising of MS Bund 26
Figure 4: Typical Cross Section of Stone Pitching and Raising of BU Bund 26
Figure 5: Tentative Work Schedule for MS Bund 33
Figure 6: Tentative Work Schedule for BU Bund 33
Figure 7: Tentative Work Schedule for Kuka Link Bund 33
Figure 8: Tentative Work Schedule for PB Bund 34
Figure 9: Tentative Work Schedule for Kotri Barrage Guide Bund 34
Figure 10: Camp Site Location of MS Bund 35
Figure 11: Camp Site Location of BU Bund 36
Figure 12: Camp Site Location of PB Bund 36
Figure 13: Camp Site Location of KUKA Bund 37
Figure 14: Camp Site Location of Kotri Barrage Guide Bund 37
Figure 15: Typical Primary Impact Zone 38
Figure 16: Issues of Existing River Embankment Requiring Rehabiliation 40
Figure 17: Layout Plan of Miscelleanous Options 41
Figure 18: Option 1: Strengthning, Widening and Raising of Embankment 42
Figure 19: Option 2: Strengthning, Widening and Raising of Embankment 43
Figure 20: Option 3: Consturction of Sheetpile or Concrete retaining Wall 44
Figure 21: Geological Map of Sindh 50
Figure 22: Land Use Map of MS Bund (Key Map) 52
Figure 23: Land Use Map of MS Bund – Part 1 of 5 (Mile 0/0 – 3/0) 53
Figure 24: Land Use Map of MS Bund – Part 2 of 5 (Mile 3/0 – 6/0) 54
Figure 25: Land Use Map of MS Bund – Part 3 of 5 (Mile 6/0 – 11/0) 55
Figure 26: Land Use Map of MS Bund – Part 4 of 5 (Mile 13/0 – 14/0) 56
Figure 27: Land Use Map of MS Bund – Part 5 of 5 (Mile 22/0 - 24/7) 57
Figure 28: Land Use Map of BU Bund (Mile 3/0 – 5/0) 58
Figure 29: Land Use Map of KUKA Bund – (Key Map) 59
Figure 30: Land Use Map of KUKA Bund – Part 1 of 6 (Mile 0/0 – 6/0) 60
Figure 31: Land Use Map of KUKA Bund – Part 2 of 6 (Mile 6/0 - 11/4) 61
Figure 32: Land Use Map of KUKA Bund – Part 3 of 6 (Mile 11/4 - 16/0) 62
Figure 33: Land Use Map of KUKA Bund – Part 4 of 6 (Mile 16/0 - 20/4) 63
Figure 34: Land Use Map of KUKA Bund – Part 5 of 6 (Mile 3/4 - 7/4) 64
Figure 35: Land Use Map of KUKA Bund – Part 6 of 6 (Mile 0/0 - 3/4) 65

Figure 36: Land Use Map of PB Bund (Key Map) 66
Figure 37: Land Use Map of PB Bund Part 1 of 3 (Mile 0/0 - 4/5) 67
Figure 38: Land Use Map of PB Bund Part 2 of 3 (Mile 7/2 - 8/5) 68
Figure 39: Land Use Map of PB Bund Part 3 of 3 (Mile 11/5 - 15/0) 69
Figure 40: Land Use Map of Kotri Barrage Left Guide Bund (RD 0+000 – 5+700) 70
Figure 41: Monthly Discharges Downstream of Kotri Barrage 71
Figure 42: Typical Vegetation in Sub-project Area 82
Figure 43: Some Avian Species of the Study Area 87
Figure 44: Forest Area of Embankment Sub-project 92
Figure 45: Housing Pattern in the Sub-project Area 104
Figure 46: Archaeological Map of the Sub-project Area 108
Figure 47: Institutional Arrangement for SRP Project 133

LIST OF ACRONYMS

ACE	Associated Consulting Engineers (Pvt) Ltd
BP	Bank Policy
BU	Baghar Achito
CITES	Convention on International Trade in Endangered Species
CoI	Corridor of Impacts
DACREP	Disaster and Climate Resilience Enhancement Project
DC	Deputy Commissioner
DDT	Dichloro-Diphenyl-Trichloroethane
EC	Electrical Conductivity
ECA	Employement of Child Act
EIA	Environmental Impacts Assessment
EMU	Environment Management Unit
EPA	Environmental Protection Agency
ESA	Environmental and Social Assessment
ESIA	Environmental and Social Impacts Assessment
ESMEC	Environmental/Social Monitoring and Evaluation Consultants
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
ESMU	Environmental and Social Management Unit
ESU	Environmental and Social Unit
GFP	Grievance Focal Point
GoS	Government of Sindh
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
IBIS	Indus Basin Irrigation System
IEE	Initial Environmental Examination
ISDS	Integrated Safeguards Data Sheet
IUCN	International Union for Conservation of Nature
KBF	Kalri Baghar Feeder
LAA	Land Acquisition Act
LEAD	Leadership for Environment and Development
MEAs	Multilateral Environmental Agreements
MS	Mulchand Shah Bunder
NCS	National Conservation Strategy
NEP	National Environmental Policy
NEQS	National Environmental Quality Standards
NGO	Non-Governmental Organization
OP	Operational Policy
P&DD	Planning and Development Department
PAP	Project Affected Person
PB	Pannah Baghar
PCC	Public Complaint Centre
PC-I	Pakistan Planning Commission Form – 1 Appraisal of Development Project

PCRWR	Pakistan Council for Research in Water Resources
PD	Project Director
PDMA	Provincial Disaster Management Authority
PEPC	Pakistan Environmental Protection Council
pH	Power of Hydrogen
PID	Project Information Document
PIEDAR	Pakistan Institute for Environmental Development and Research
PISSC	Project Implementation, Support and Supervision Consultant
PIU	Project Implementation Unit
PKR	Pakistani Rupee
PMT	Project Management Team
POPs	Persistent Organic Pollutants
PSC	Project Steering Committee
RAP	Resettlement Action Plan
RD	Reduced Distance
RFP	Request for Proposal
RoW	Right of Way
SCOPE	Society for Conservation and Protection of Environment
SDPI	Sustainable Development Policy Institute
SEPA	Sindh Environmental Protection Agency
SEPC	Sindh Environmental Protection Council
SH	Sunda Hilaya
SID	Sindh Irrigation Department
SIDA	Sindh Irrigation and Drainage Authority
SRP	Sindh Resilience Project
SSSD	Sindh Strategy for Sustainable Development
UNCLOS	United Nation Convention on Laws of the Seas
UNFCCC	UN Framework Convention on Climate Change
WAPDA	Water and Power Development Authority
WB	World Bank
WWF	World Wildlife Fund

EXECUTIVE SUMMARY

The Government of Sindh (GoS) is going to undertake a World Bank financed Project - the Sindh Resilience Project (SRP) through the Sindh Irrigation Department (SID) and Provincial Disaster Management Authority (PDMA) in various parts of Sindh Province. Physical interventions under SRP Irrigation Component include rehabilitation/improvement of existing earthen embankments along River Indus and construction of small rainwater recharge dams in the water-scarce areas of the province. During the second year of the SRP implementation, GoS aims at to rehabilitate and improve Mulchand Shah Bunder Bund (MS), Baghar Uchito Bund (BU), Kuka Bund (Kuka Link, Kuka Wari and Kuka Retarded) Punnah Baghar Bund (PB) and Kotri Guide Bunds of Indus River.

Applicable Laws and Safeguard Policies

In compliance with the national/provincial regulatory requirements of Pakistan Environemnt Protection Act 1997, Sindh Environment Protection Act 2014, and World Bank safeguard policies including OP/BP 4.01, 4.12 and OP/BP 7.50.

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

In addition, 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 a Resettlement Action Plan (RAP) has been prepared.

Further to this, some of the proposed interventions will be carried out in accordance with the Waterways OP/BP 7.50 in/along Indus River which is an international waterway. However; an exception of notification would be sought by the task team.

Moreover, major applicable laws are discussed below,

Sindh Environmental Protection Act (2014) 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, Sujawal and Hyderabad, it falls under the jurisdiction of the Sindh Environmental Protection Agency that will accord the approval of the IEE pertaining to the project.

Sindh Irrigation Act (1879) with Amendments in 2011 The Sindh Irrigation Act (1879) 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.

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 SRP Project will be carried out inside any protected areas defined under the Act. The ordinance also specifies three broad classifications of the protected areas.

Sindh Forest Act, 1927 (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.

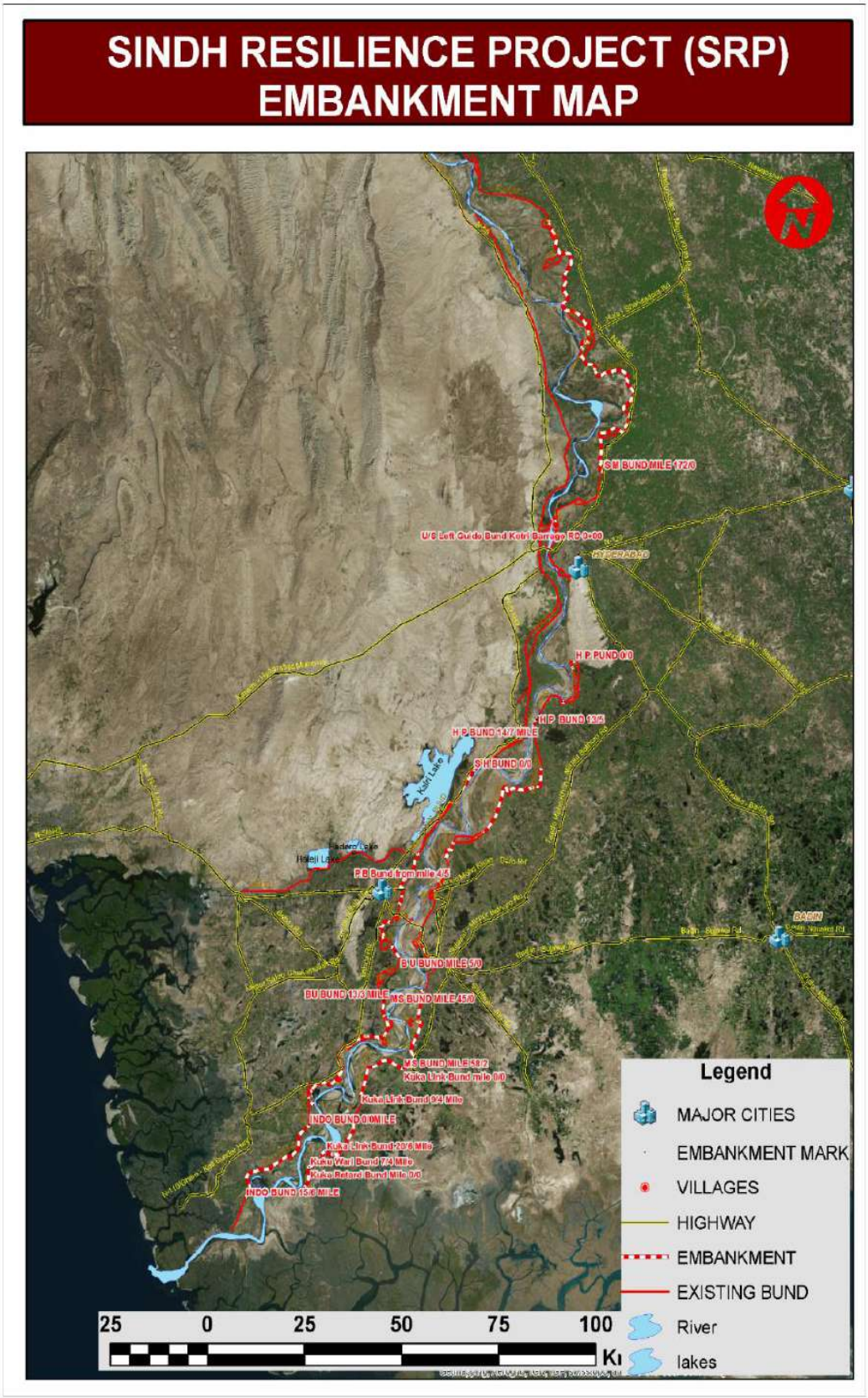
The project activities will have to be carried out in accordance with this Act. No activities will be carried out in any protected forests, and no unauthorized tree cutting will be carried out.
Most of the forest areas are away more than 1km from the primary impact zone of the sub-project's interventions. However; mitigation measures are devised to restrict the contractor activities in these areas. In addition, the proposed sub-project may cause cutting/uprooting of 443 trees out of 1,050 falling in the potential RoW of the embankments. However; it is planned to plant 5 indigenous trees in place of one cut/uprooted tree.

An environmental and social assessment has been carried out to address the potentially negative impacts of the proposed interventions under SRP.
As an outcome of this assessment, the present Environmental and Social Impact Assessment (ESIA) has been prepared for the works to be carried out during the second year of SRP implementation; the ESIA includes an Environmental and Social Management Plan (ESMP). In addition, an Environmental and Social Management Framework and Resettlement Policy Framework (ESMF/ RPF) have been provided for all sub-projects under a separate cover.

Project Description
The MS and Kuka bunds are located in district Sujawal, BU and PB in Thatta district, while Kotri Barrage Guide Bund is located in Hyderabad district. Following is the brief description of sub-projects given below;

S.No	Name of Scheme	Short Names
1	Providing Stone Pitching Along M.S Bund From Mile 0/0 To 14/0 and 22/0 To 24/7 in Upper Pinyari Division Hyderabad	MS Bund (Upper Pinyari)
2	Providing Stone Pitching Along B.U Bund From Mile 3/0 To 5/0 in Kalri Baghar Division Thatta (Baghar Circle Hyderabad)	BU Bund (Kalri Baghar)
3	Providing Stone Pitching Along Kuka Link Bund 0/0 To 20/6, Raising and Strengthening Along Kuka Wari Bund Mile 3/6 To 7/4 and Kuka Wari Retarded Bund Mile 0/0 To 3/0 in Lower Pinyari Division Sujawal	Kuka Link, Kuka Wari (Lower Pinyari)
4	Providing Stone Pitching Along P.B Bund Mile 0/0 To 8/5 & 11/4 To 15/0 in Kalri Baghar Division Thatta	P.B Bund (Kalri Baghar)
5	Earth Work & Repair Damaged Stone Pitching Along Up Stream Left Side Guide Bund From RD 0+000 To RD 5+700 in Kotri Barrage Division, Jamshoro	Left Side Guide Bund (Kotri Barrage)

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. Map of sub- projects is given below;



Location of the Sub-project (Embankments)

Environmental Baseline

The area along the embankments is mostly comprised of 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 Azadiarachta indica, Acacia nilotica, Eucalyptus sp, Magnifera indica, Dalbergia sisoo, Salvadora persica, Cocos nucifera, Ficus religiosa, Albizi lebbeck and Zizyphus jujube, Ficus religiose, Syzygiun, Cumini, Cordia dicotoma, Megnifera indica and Phoenix dectylifere.

Water Resources

River Indus is the major source of water supply in the subproject area while some hand pumps are also installed by the communities along the strip of embankments to get water for drinking purposes. The results of surface water reveal that the pH, Hardness, Nitrate and Arsenic are within permissible limits while the Calcium, Potassium and Nitrite are exceeding the permissible limits. Some of the micro-biological parameters were also exceeding the permissible limits. The results of groundwater reveal that the pH, Carbonate, EC, and Arsenic were within permissible limits of NEQS and WHO standards while Hardness, Calcium, Nitrate, TDS, TSS, and Turbidity and in some cases Potassium was exceeding the permissible limits. Similarly, the micro-biological parameters were also exceeding the limits.

Soils

The soil textures in the sub-project area are generally clay loam while loam and silt loam also exist. The sands are found in river bed. The test reveals that all the parameters are within permissible limits except SAR is exceeding the standards.

Biological Resources

During the field study, seven (7) large mammal species were observed in which Asiatic Jackal and Indian wild boar are common and can be easily seen, while Indus river dolphin, occasionally found near Kotri barrage, is an endangered and rare species. Grey mongoose, Jungle cat, and Bengal fox are also rare wildlife species found in wild areas. In addition to 7 large mammal species mentioned above, 10 small mammals, 16 reptile and amphibians and 61 bird species including resident and migratory birds were observed in the study area. Among the birds, common babbler has become very rare, while the population of pheasant crow, Jungle Babbler, Common Myna, Bank Myna, House Sparrow, Common Crow, Indian Roller and Rose ringed Parakeet is quite satisfactory and that of Chestnut-bellied, sand grouse, Pied crested cuckoo, Red-vented bulbul and Red turtle dove is declining in the region. The trend of migratory water birds' visits especially of water fowl has sharply declined. Even the present survey, conducted in December and January (which are climax months for migratory birds), show that the trend of winter visitors is on decline and have reached to a highly disappointing level.

Riverine Forest

Sindh Forest Department controls an area of 241,198 hectares in the Riverine tract of the province which is 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 25 riverine forest areas in the project area. These areas were distributed in the poor farmers (tenants) of the area for agriculture. Therefore; most of the forest areas have been converted into agriculture land. The forest areas are located out of the sub-project areas at a distance of 1km to 7km and none of the forest is falling within primary impact zone of the embankment sub-projects covered in this ESIA.

Social Baseline

Surveys and consultations were held in 29 villages; 06 on MS Bund, 02 on BU Bund, 04 on Kuka Wari Bund, 05 on Kuka Link Bund, 05 on Kuka Retarded Bund, 05 on PB Bund and 02 on Kotri Guide Bund. All of these villages were within the primary and secondary impact zone. This survey was conducted in the months of December 2015 and January, 2016 in order to establish a social baseline of the project area. According to the results of the survey, total households in these 29 villages of these sub-projects are 6,875 with a total population of 38,565.

There are 22 primary, 3 middle and only one high school for boys in the sub-project areas. For girls, only 06 primary schools exist while no middle or high school has been found. In all boys’ schools total enrollment has been found 3,403, out of which 2,563 is in primary schools, 140 in middle schools and 700 in high school. Girls’ total enrollment is 780, all at primary level. These facilities exist within radius of 1km on both sides of the sub-project area.

It was found that many people have suffered from hepatitis, typhoid, eye problems, and diarrhea and from many other such diseases which spread from unhygienic conditions. 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 six Basic Health Units (BHU), two dispensaries, two midwifery centers and seven medical stores in the project area. The seriously ill patients are taken for treatment to Thatta, Hyderabad and Sujawal district hospitals.

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. Village profile data show that 27 villages (93%) have access to Van/Pickups facility, only one village (3%) has access to Bus facility, 3 villages (10%) have cars and 26 villages (90%) have motor cycles. The farm inputs and outputs are transported through Trucks, Trailers and Tractor Trolleys. The animals from the project area are transported to Hyderabad and Karachi by Trucks. The Firewood and Furniture wood is also transported through Trucks and Trolleys.

Stakeholder Consultation

Stakeholder Consultations were completed in two stages. In the first stage, consultations with a total of 29 villages within the sub-projects were carried out during November 2015 period. During these consultations, the primary stakeholders were briefed on the project components and their

concerns and feedback were recorded and incorporated into this ESIA. During the first round, consultations were carried out with Community living in primary impact zone.

Second round consultations were completed in the project and surrounding area in December 2015 January 2016. Consultations were carried out at household level as part of the socio-economic baseline data collection within 29 villages of the project and surrounding area.

Twenty nine major women consultation events were also held within the project and surrounding area – these were run by the female gender specialist engaged by the consultants for this project. In addition, the gender specialist carried out household level consultations in 29 villages of the project and surrounding area. The second round consultations in the project and surrounding area included details of the proposed project interventions and sought the views of the project affected persons on each aspect.

The main findings from consultations with the stakeholders are as follows:

- Concerns over construction phase related disturbance, especially with respect to the free mobility of women and children, night time disturbance, conflicts arising from a non-local workforce not respecting local community norms and, or restriction of access to, religious structures were raised by community members.
- Employment opportunities for local communities during construction.
- Timely payment of compensation at market rates for any assets lost as a result of project works is required.
- The need to provide grievance redress procedures
- Poor access to health and education facilities were noted in the project and surrounding area and provision of such facilities is required.
- Second round consultations were carried out with affecties of the project area was conducted for to collect socio economic data and previous events losses due to floods.

Archaeological Sites

The archaeological survey was conducted by the Culture and Tourism Department, GoS in 1993 and 1996. Saints and shrines are highly respected by the local communities and there are two graveyards in the CoI of the PB and Kuka Wari sub-projects. 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.

Potential Impacts during Construction Works

The main engineering interventions 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 trees, 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 of embankments 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 felling of an estimated **443** trees. The rehabilitation of the embankments and disposal of surplus material may result in the limited loss of wetlands that exist near the embankments.

Mitigation Measures and Monitoring Plans

As part of the present ESIA, appropriate mitigation measures have been identified. These include: proper disposal of excavated earth; water sprinkling on access paths and construction areas to avoid/minimize dust pollution; use of silencers for the machinery and vehicles; use of ear protection apparatuses 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 embankments and to be properly restored; not selecting productive land for borrow area or for establishing camps/construction areas, no damage to cultivated areas and agricultural crops; 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.

Grievance Redressal Mechanism

A Grievance Redressal 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.

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.

GRM is 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.

GRM will be performed through following steps;

- A Public Complaints Centre (PCC), which will be responsible to receive, log, and resolve complaints;
- A Grievance Redress Committee (GRC), responsible to oversee the functioning of the PCC
- A non-judicial decision-making authority e.g. Project Management Team or Secretary Irrigation Government of Sindh for resolving grievances that cannot be resolved by PCC;

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

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 PMT 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 Support and Supervision Consultants (PISSC). At the third level, the PISSC and ESMU of PMT will produce monthly, quarterly and annual reports for ESIA implementation.

Resettlement Planning

The proposed activities will not require any land to be permanently acquired because all works will be carried out on the land that is already owned by the government. According to latest joint (PISSC & PMT) validation survey, the data has indicated that one residential structure (Wooden and Mud made) on PB Bund is lying within RoW will be affected by project activities. In addition, some community structures like two semi pucca Imam Barghahs and one boys primary School building (Public Structure pucca) of two rooms on MS bund, while one Kacha Mud made Otaq (traditional guest house) are also falling within the RoW on Kuka Wari bund. In addition, there are 37 business structures (mud and wooden made shops) in which 36 on Kuka Link and one on PB bund are also likely to be affected. These structures have been built on the embankment. The affected households will be fully compensated in accordance with the RAP 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.

ESIA Implementation Arrangements

The overall responsibility for implementing the SRP project as well as the present ESIA rests with the Project Management Team (PMT) headed by the Project Director. PMT has hired the services of M/s Associated Consulting Engineers – ACE (Pvt.) Ltd, Karachi, Pakistan as the Project Implementation Support and Supervision Consultant (PISSC). The PISSC has 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 ESIA. Appropriate clauses will be included in the construction contracts for this purpose. Budgetory Cost **PKR. 4,415,000** has been estimated for the implementation of mitigation measures.

1. INTRODUCTION

The Government of Sindh (GoS) intends to undertake World Bank financed Sindh Resilience Project (SRP) through the Sindh Irrigation Department (SID) and Provincial Disaster Management Authority (PDMA) in various parts of Sindh Province. Physical interventions under its irrigation component include rehabilitation/improvement of existing earthen embankments along River Indus and construction of small rainwater recharge dams in the water-scarce areas of the province. During the second year of the SRP implementation, GoS aims at to rehabilitate and improve the Mulchand Shah Bunder Bund (MS), Baghar Uchito Bund (BU), Kuka Bund (Kuka Link, Kuka Wari and Kuka Retarded) Punnah Baghar Bund (PB) and Kotri Guide Bunds of Indus River. In compliance with the national/provincial regulatory requirements and World Bank safeguard policies, an environmental and social assessment has been carried out to address the potentially negative impacts of the proposed interventions under SRP. As an outcome of this assessment, the present Environmental and Social Impact Assessment (ESIA) has been prepared for the works to be carried out during the second year of SRP implementation; the ESIA includes an Environmental and Social Management Plan (ESMP). In addition, an Environmental and Social Management Framework and Resettlement Policy Framework (ESMF/ RPF) have been provided under a separate cover.

The MS and Kuka embankments are located in district Sujawal, BU and PB in Thatta district and Kotri Barrage Guide Bund in Hyderabad 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.

1.1 Background

Pakistan is exposed to a number of adverse natural events and has experienced a wide range of disasters over the past 40 years, including floods, earthquakes, droughts, cyclones and tsunamis. 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 US$ 18 billion; as the population and assets 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 Sindh Resilience Project (SRP) will be

mainly financed by World Bank and will be completed in five year period. The location plan of SRP project is shown in **Figure-1**.

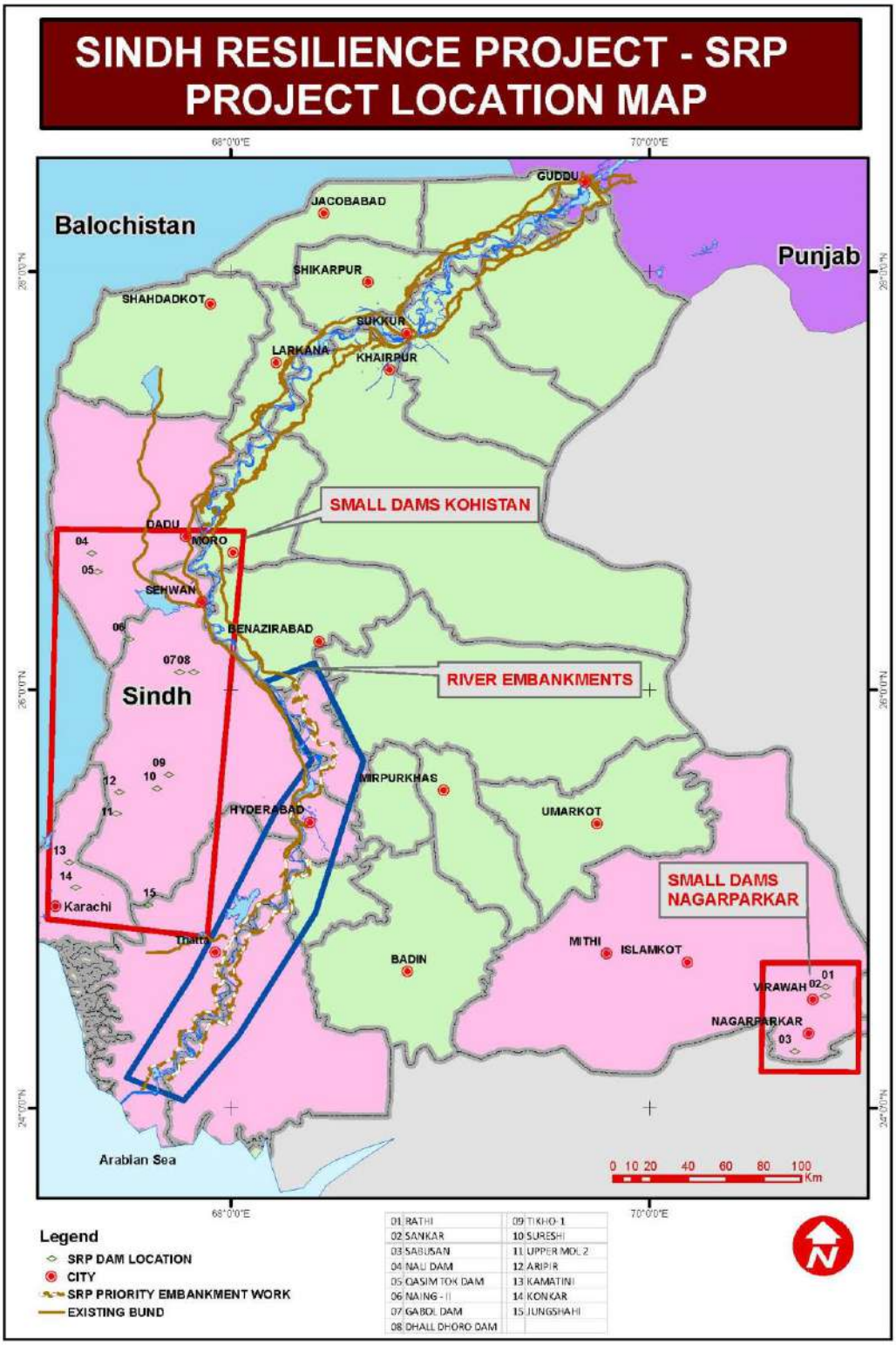


Figure 1: Location of the SRP Project Area

1.2 SRP Components

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

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).

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.

It may be mentioned here that the Preparation of ESIA has relevance only to Component 2 for which the task of Project Implementation Support and Supervision has been assigned to Associated Consulting Engineers – ACE (Pvt) Ltd., Karachi.

1.3 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 plan (ESMP) to mitigate the adverse impacts, and
- Determine tentative costs for implementation of the ESMP.

1.4 Scope of the Study

The present ESIA covers the rehabilitation and improvement of PB, MS, KUKA, BU and Kotri Barrage Guide Bunds of Indus River. 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.

1.5 ESIA Methodology

The initial reconnaissance and detailed environmental and social baseline surveys were 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 December 2015 and January, 2016 under Disaster and Climate Resilience Enhancement Project (DACREP) preparatory study. The previous data has now been updated through supplementary field visits by Mr. Farooq Ahmed Memon (Environmentalist), Mr. Naimatullah Khan Kakar (Senior Sociologist and Resettlement Expert) and Mr. Attaullah Pandrani (Ecologist). The screening criteria for the sub-projects devised in Table 1 of SRP ESMF/RPF (based on the World Bank environmental screening process) have been followed and as a result, the proposed sub-project has been categorized as Category A.

The baseline data has been collected in accordance with the Sindh Environmental Protection Act, 2014 and the Sindh Environmental Assessment Regulations, 2014 as well as applicable WB safeguard policies. The approach and methodology for data collection 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. An instrument to collect village level data profiles 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.

1.6 Study Team

This report has utilised the data collected for environmental and social impact assessment carried out by ACE Pvt Ltd for DACREP project in 2016. The environment and social/resettlement team that carried out that study included Mr. Sardar M. Kakar (Team Leader and Environment Specialist), Mr. Niamatullah Khan (Senior Sociologist and Resettlement Expert), Mr. Allah Bux (Resettlement Expert), Mr. Farooq Ahmed Memon (Environmentalist), Mr. Munir (Asst. Environmentalist), Mr. Attaullah Pandrani (Ecologist), and Ms. Robina (Sociologist). The present report has been prepared by Mr. Naimatullah Khan, Mr. Farooq Memon and Mr. Attaullah Pandrani by updating the data with specific requirements of SRP.

1.7 Environmental Social Management Framework and Resettlement Policy Framework (ESMF/RPF) for Later Years Sub-projects

As mentioned earlier, the SRP project envisages a number of interventions under its Component 2 including improving / rehabilitating the degraded reaches of embankments of Indus River and construction of small detention dams in water scarce districts of the province. The present ESIA has been prepared for the sub-project to be implemented during the second year of SRP implementation.

Since the list of remaining sub-projects and their locations is not finalized, therefore a framework approach has been adopted for the subprojects to be implemented during the later years of SRP implementation. Under this approach, an Environmental and Social Management Framework (ESMF) along with a Resettlement Policy Framework (RPF) has been prepared to identify the potential but generic adverse environmental and social impacts of the subprojects to be implemented during the later years of SRP implementation, propose mitigation measures to address these potential impacts, and finally, to provide basic screening criteria on the project level for selecting the subprojects to be undertaken during later years. ESMF/RPF has already been developed for entire project and provided under separate cover.

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

2. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

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

2.1 Pakistan Institutional Framework

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

2.2 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.

2.3 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 29th June, 2011 "Pakistan Environmental Protection Agency" was assigned to the Capital Administration and Development Division under National Disaster Management Division.

2.4 Non-Governmental 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, in 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.

2.5 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 on his 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 SEPA Act, 2014 and other laws relating to the environment in the Province;

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

Coordinate integration of the principles and concerns of sustainable development into socio-economic and development policies, plans and programs at the provincial, district and local levels; Deal with inter-provincial and federal-provincial issues, and liaise and coordinate with other Provinces through appropriate inter-provincial forums regarding formulation and implementation of standards and policies relating to environmental matters with an inter-provincial impact, provide guidelines for biosafety and for the use of genetically modified organisms; and,

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

2.6 Sindh Environmental Protection Agency (SEPA)

The Sindh Environmental Protection Agency (SEPA) was established under Pakistan Environmental Protection Act 1997. It is headed by a Director General who exercises powers delegated previously to him by the Pakistan Environmental Protection Agency and now the Environmental and Alternate Energy Department, Government of Sindh. Sindh EPA is the relevant agency for the review and approval of the present ESIA.

2.7 Sindh Irrigation Department (SID) and Sindh Irrigation and Drainage Authority (SIDA)

Major tasks performed by the SID are the operation and maintenance of the irrigation and flood protection system and regulation of flows in rivers and canal systems. Execution of development schemes and mega projects is also one of the major responsibilities. The embankment sub-projects under SRP are under the jurisdiction of the Chief Engineer Irrigation, Kotri Barrage Region, Hyderabad.

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.

2.8 Sindh Wildlife Department

Sindh established the 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. Sindh Wildlife Department is the main organization responsible for the protection of wildlife in Sindh.

2.9 Provincial Disaster Management Authority

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

- To formulate the provincial disaster management
- Coordinate and monitor the implementation of the National Policy, National and Provincial Plans
- Examine the vulnerability of different parts of the Province to different disasters and specify prevention or mitigation measures
- Lay down guidelines to be followed for preparation of disaster management plans by the Provincial Departments and District Authorities
- Evaluate preparedness at all governmental or Non-Governmental levels to respond to disaster and to enhance preparedness
- Coordinate response in the event of disaster;
- Give directions to any Provincial department or authority regarding actions to be taken in response to disaster
- Promote general education, awareness and community training in this regard;
- Provide necessary technical assistance or give advice to district authorities and local authorities for carrying out their functions effectively
- Advise the Provincial Government regarding all financial matters in relation to disaster management

- Examine the construction in the area and if it is of the opinion that the standards laid down have not been followed and it may direct the following same to secure compliance of such standards
- Ensure that communication systems are in order and disaster management drills are being carried out regularly; and
- Perform such other functions as may be assigned to it by the National or Provincial Authority.
- PDMA is one of the proponent and implementing agency of SRP.

2.10 Federal Environmental Policies and Guidelines

2.10.1 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

2.10.2 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.

2.10.3 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.

2.10.4 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.

2.10.5 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 'Industry', 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.

2.10.6 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.

2.10.7 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 [1]NEQS 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.

2.10.8 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 ESIA.

2.10.9 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. The LAA and its implementation rules require that

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

before implementation of any development project the privately owned land and crops are compensated to titled landowners and/or registered tenants/users.

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 relevant 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.

2.10.10 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.

2.10.11 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.

2.11 Sindh Provincial Environmental Laws, Policies and Guidelines

2.11.1 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.

2.11.2 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, Sujawal and Hyderabad, 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 and 13 (Import and 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 and 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.

2.11.3 Sindh Irrigation Act (1879) with Amendments in 2011

The Sindh Irrigation Act (1879) 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:

- 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.
- 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.
- 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.
- The offences under the Act can be tried before the Magistrate.
- As the reaches of Indus River embankment considered for rehabilitation under SRP Project is to be implemented by the Sindh Irrigation Department, therefore; this act is applicable to the sub-projects.

2.11.4 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.

2.11.5 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.

2.11.6 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 SRP Project will be carried out inside any protected areas defined under the Act. The ordinance also specifies three broad classifications of the protected areas:

2.11.7 Sindh Forest Act, 1927 (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 14 riverine protected forest areas in the embankment sub-project areas. Out of 14, 11 have been converted into agriculture land and do not exist anymore while 3 of them exist with thin tree population due to cutting of trees by the local people and washing out due to change in the Indus River course. All of the said forest areas are out of the proposed sub-project primary impact zones. The details of the forest areas and its location are given in Table. No impacts of the sub-projects are anticipated. 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 **443** trees out of **1,050** falling in the potential RoW of the embankments. However; it is planned to plant 5 indigenous trees in place of one cut/uprooted tree.

2.11.8 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 primary impact zone of sub-projects, 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.

2.11.9 Sindh Cultural Heritage (Preservation) Act - 1994

The Sindh Cultural Heritage (Preservation) Act 1994 provides rule and regulations to preserve and protect ancient places and objects of agricultural, historical, archaeological, artistic, ethnological, anthropological and national interest in the province of Sindh. Therefore; this act may be applicable in specific situation. The Act however does not cover Chance find explicitly. Hence, the provisions of the Antiquity act 1975 are applicable at the provincial level in the case of Chance find.

2.11.10 Sindh Prohibition of Employment of Children Act 2017

The Sindh prohibition of employment of children Act 2017 provides rule and regulations to prohibit the employment of children and to regulate employment of adolescents in certain occupations and work. This act defines “adolescent” means person who has completed his fourteenth but has not completed eighteenth year of his age. According to the act “child” means a person who has not completed his fourteenth years of age.

2.12 The World Bank Safeguards Policies

The World Bank is the donor of the project. Therefore it is obligatory for Sindh Irrigation Department (SID), Government of Sindh (GoS), to abide by the World Bank Safeguard polices. In the light of the World Bank OP: 4.01, the Sindh Resilience Project (SRP) 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-1**.

Table 1: Applicable Provincial Laws and World Bank Safeguard Policies

Sr. Nr.	Description	Law / Policy Reference	Triggered	Not Triggered	Remarks
1	Environmental Assessment	Sindh Environmental Protection Act, 2014	✓		Since the proposed activities under SRP are likely to have adverse environmental and social impacts, this OP is triggered. 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 or reversible; therefore, this sub-project falls under category A in accordance with characterization criteria given in OP 4.01. The present ESIA has been prepared accordingly to meet the Category A 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 a

					Resettlement Action Plan (RAP) has been prepared.
4	Project Inter-national 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.

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 SRP 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 A 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

Involuntary Resettlement (OP 4.12)

This policy pertains to any World Bank financed project, which directly or indirectly involves partly or as a whole Resettlement (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 a Resettlement Action Plan (RAP) has been prepared.

Projects on International Waterways (OP 7.50)

OP 7.50 is related to the types of projects falling within the ambit of international waterways. This policy applies to the following types of international waterways:

- (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, whether Bank members 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, Industrial facilities, and similar projects that involve the use or potential pollution of international waterways as described in Para. 1 above; and
- Detailed design and engineering studies of projects under Para. 2(a) above, including those to be carried out by the Bank as executing agency or in any other capacity.

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

2.13 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 the Seas (UNCLOS),
- 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.

2.14 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.

2.15 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 is no wildlife sanctuary in the project area.

2.16 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.

3. DESCRIPTION OF SUB-PROJECT

3.1 Location of the Sub-Projects

The location of five embankments MS, B.U, KUKA, PB and Kotri Barrage Guide Bunds of Indus River to be undertaken under the proposed sub-project is shown in Figure-2. The MS and Kuka embankments are located in district Sujawal, BU and PB Bunds in Thatta district and Kotri Barrage Guide Bund is located in district Hyderabad.

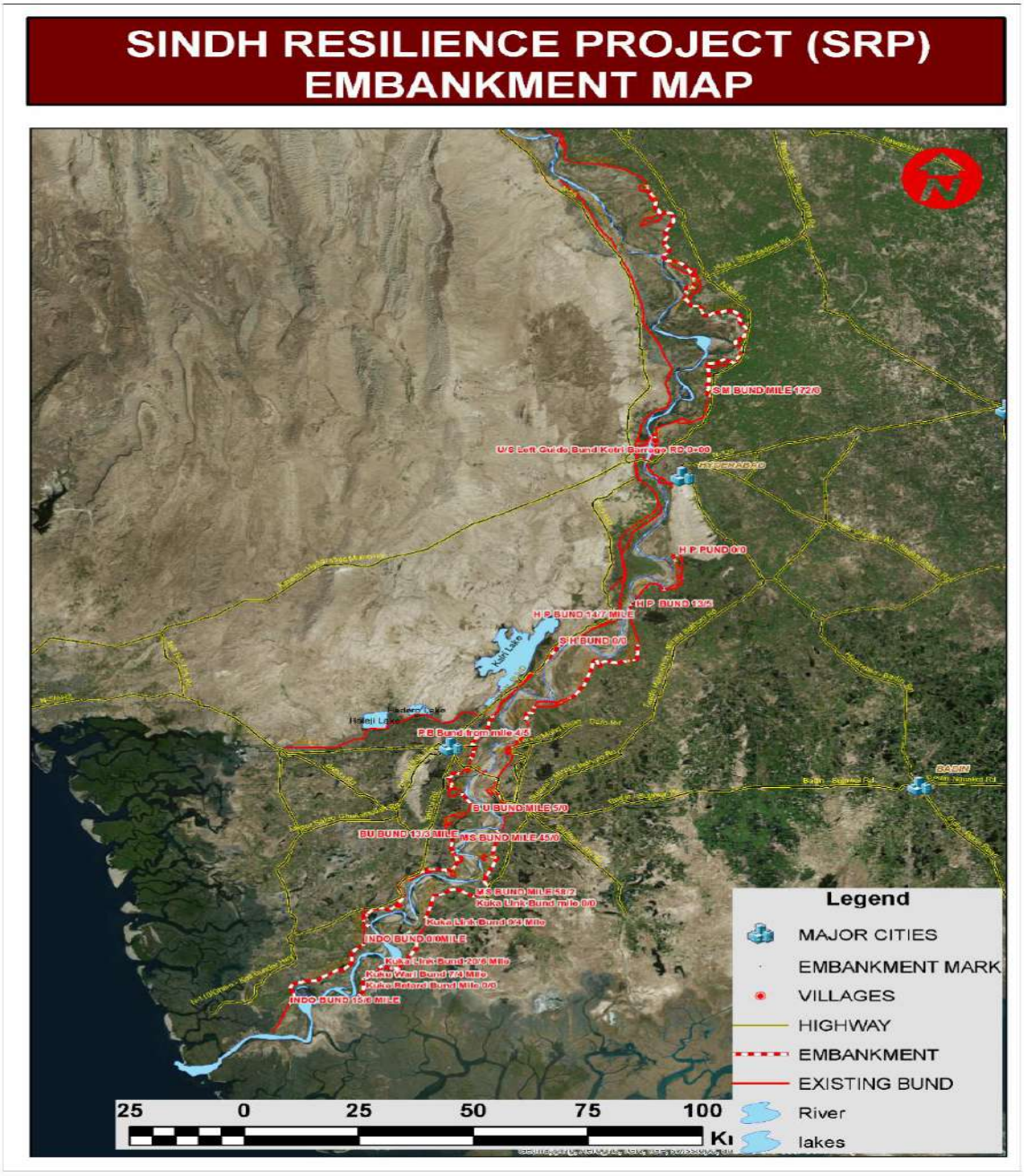


Figure 2: Location of the Embankments Sub-projects

3.2 Existing Condition and Problems of the Sub-Projects

The Indus flood protection 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 ft wide with a freeboard of 4 to 5 ft above the maximum observed flood level, slopes are kept quite gentle and 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 faces damages during high floods. Animal and human activity is another source of disturbance. The typical cross-section of embankment indicating project works is shown in **Figures 3 and 4.**

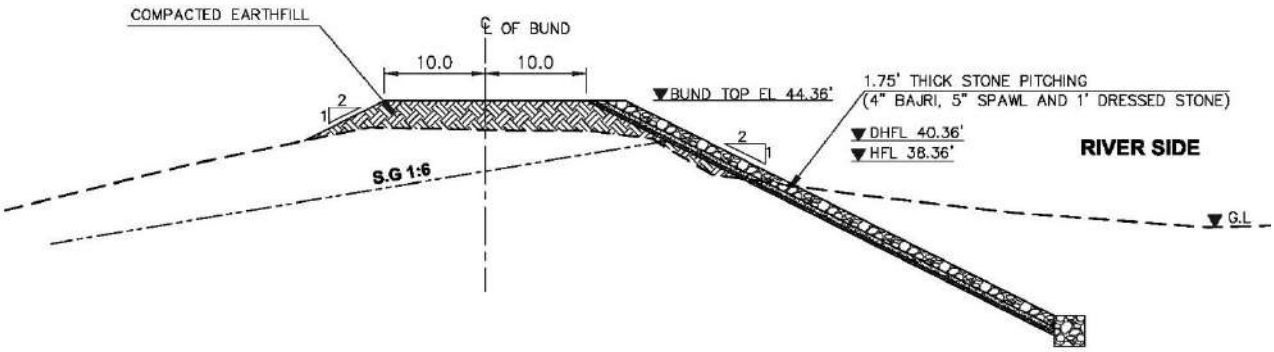


Figure 3: Typical Cross Section of Stone Pitching and Raising of MS Bund at Mile 36/5+440

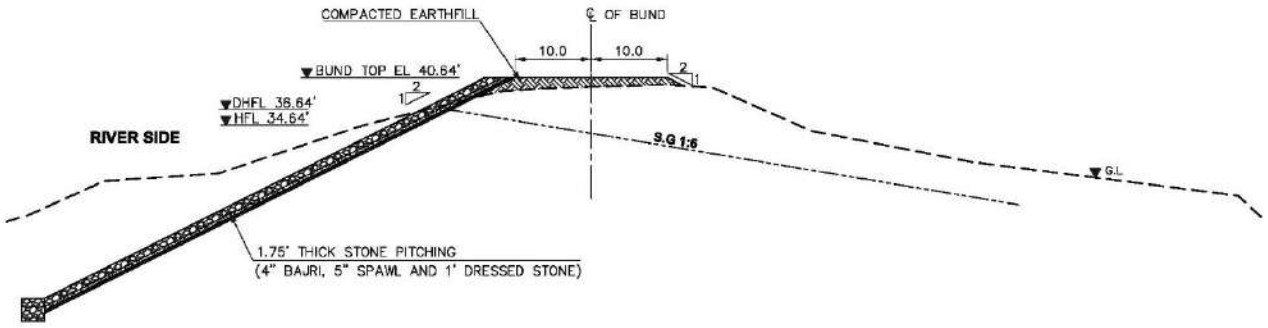


Figure 4: Typical Cross Section of Stone Pitching and Raising of BU Bund at Mile 14/3+220

The condition of embankments of sub-projects is described below. Some photographs of the embankments are given in **Annex-A.**

3.2.1 Mulchand Shah Bunder (M.S) Bund

Mulchand Shah Bunder starts at the end of Hajipur bund and stretches to length of 58/2 mile near Chuhar Jamali. Mulchand was renowned forest in Kacha in which now land is heavily cultivated and forest in no more there. Throughout its history it 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.

Geographically due to hills on right side up to Thatta town, river has tendency to exert its pressure on left side. M.S bund 0/0 to 14/0 and 22/0 to 24/7 is lying in the same location which is called wind corridor. Wind blows from south west to east and plays great havoc with earthen bunds. When water level was maximum during 12-08-2015 to 20-08-2015 and gusty wind blew for many days, continuously. Dashing waves eroded the bund severely from mile 0/0 to 14/0 and 22/0 to 24/7.

3.2.2 Baghar Uchito (B.U) Bund

Baghar Uchito (B.U) bund is located near Thatta and Ghorabari vicinity, which is important first line of define to protect the lower Kalri Baghar Feeder (K.B.F): Government and Private properties become valuable with protection the river flood.

The B.U bund was badly damaged due to heavy wave wash during the 2015 flood and almost the river side slope was badly damaged. It is pertinent to provide stone pitching from mile 3/0 to 5/0 along the Bund in order to save it from wave wash action in future floods.

3.2.3 Kuka Link Bund, Kuka Wari Bund and Kuka Wari Retarded Bund

Kuka Link bund, Kuka Wari bund and Kuka Wari retarded bund are left Bank River bunds located in the Lower Pinyari Division in Sujawal district. Kuka Link bund will be provided stone pitching at different reaches between miles 0/0 to 20/6. And it is proposed that raising and strengthening of Kuka Wari bund from mile 3/6 to 7/4 and Kuka Wari retarded bund from mile 0/0 to 3/0 would restore stability of bund and let pass upcoming flood safely.

3.2.4 Pannah Baghar (P.B) Bund

The Pannah Baghar (P.B) Bund is located in Thatta and Chato Chand Town, which is an important first line of defence to protect lower Kalri Baghar Feeder (K.B.F), villages, valuable public and private properties from the river flood. Due to Heavy Wave wash and erosion along the subject bund, it is earnestly required to strengthen the bund according to Bund Manual Specifications.

The work of stone pitching was essential from mile 0/0 to 8/5, and Mile 11/4 to 15/0 along P.B bund.

3.2.5 Guide Bund Kotri Barrage

During super flood 2010 almost the entire length of Guide Bund was under heavy pressure and seepage and wave wash out of the 3 leaks were found the strong erosion. Many pore holes were found of different sizes. Due to heavy seepage the entire vicinity including many Government and private residents remained under tension. Therefore it is necessary to repair damaged earth work and stone pitching along Upstream Left Side Guide Bund from R.D 0+000 to R.D 5+700 in Kotri Barrage Division Jamshoro to avoid any mishap during upcoming flood.

3.3 Proposed Rehabilitation Works

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

- Widening and raising 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 groynes
- Construction of huts (landhis) for inspection and monitoring staff.

M.S Bund

The proposed for flood protection works including construction of Providing Stone Pitching Along M.S Bund from Mile 0/0 To 14/0 and 22/0 To 24/7 in Upper Pinyari Division Hyderabad according to specifications, drawings and as directed by the Project Manager. Following major activities will be carried out.

i. Contractor's mobilization: After awarding the contract the selected contractor shall be mobilized in the field and arrange the camp for their staff and labor. The machinery and other necessary equipment shall be shifted.

ii. The borrow areas will be excavated as per specifications. The borrow material will be loaded and transported by tractor trolleys through approved routes to the bund/ embankment.

iii. Restoration of embankments/ bund with the soil obtained from borrow areas. Activities involve unloading the soil on embankment, leveling, and compaction of soil in layers.

iv. The stone shall be loaded and transported from Khathar quarry to the site through trucks and unloaded/stacked at designated places.

v. 1.75' ft. thick stone pitching layer (4" Bajri, 5" spawl and 1' dressed stone) will be carried out at desired reaches of the embankment/bunds i.e. at M.S Bund from Mile 0/0 To 14/0 and 22/0 To 24/7 in Upper Pinyari Division Hyderabad.

B.U Bund

The proposed works for flood protection works including construction of Providing Stone Pitching along B.U Bund from Mile 3/0 to 5/0 in Kalri Baghar Division Thatta (Baghar Circle Hyderabad) according to these specifications, drawings and as directed by the Project Manager. Following major activities will be carried out.

i. Contractor's mobilization: After awarding the contract the selected contractor shall be mobilized in the field and arrange the camp for their staff and labor. The machinery and other necessary equipment shall be shifted.
ii. The borrow areas will be excavated as per specifications. The borrow material will be loaded and transported by tractor trolleys through approved routes to the bund/ embankment.
iii. Restoration of embankments/ bund with the soil obtained from borrow areas. Activities involve unloading the soil on embankment, leveling, and compaction of soil in layers.
iv. The stone shall be loaded and transported from Chilya quarry to the site through trucks and unloaded/stacked at designated places.
v. 1.75' ft. thick stone pitching layer (4" bajri, 5" spawl and 1' dressed stone) will be carried out at desired reaches of the embankment/bunds i.e.at B.U Bund from Mile 3/0 to 5/0 in Kalri Baghar Division Thatta (Baghar Circle Hyderabad).

Kuka Link Bund, Kuka Wari Bund and Kuka Wari Retarded Bund

The Proposed works for flood protection works including construction of Providing Stone Pitching along Kuka Link Bund 0/0 to 20/6 Raising and Strengthening along Kuka Wari Bund Mile 3/0 to 7/4 and Kuka Wari Retarded Bund Mile 0/0 to 3/0 in Lower Pinyari Division Sujawal according to these specifications, drawings and as directed by the Project Manager. Following major activities will be carried out.

i. Contractor's mobilization: After awarding the contract the selected contractor shall be mobilized in the field and arrange the camp for their staff and labor. The machinery and other necessary equipment shall be shifted.
ii. The borrow areas will be excavated as per specifications. The borrow material will be loaded and transported by tractor trolleys through approved routes to the bund/ embankment.
iii. Restoration of embankments/ bund with the soil obtained from borrow areas. Activities involve unloading the soil on embankment, leveling, and compaction of soil in layers.
iv. The stone shall be loaded and transported from Khatharquarry to the site through trucks and unloaded/stacked at designated places.
v. 1.75' ft. thick stone pitching layer (4" bajri, 5" spawl and 1' dressed stone) will be carried out at desired reaches of the embankment/bunds i.e. at Kuka Wari Bund Mile 3/0 to 7/4 and Kuka Wari Retarded Bund Mile 0/0 to 3/0 in Lower Pinyari Division Sujawal

P.B Bund

The proposed works for flood protection works including construction of Providing Stone Pitching Along P.B Bund Mile 0/0 to 8/5 & 11/4 to 15/0according to these specifications, drawings and as directed by the Project Manager.

Following major activities will be carried out,

i. Contractor's mobilization: After awarding the contract the selected contractor shall be mobilized in the field and arrange the camp for their staff and labor. The machinery and other necessary equipment shall be shifted.

ii. The borrow areas will be excavated as per specifications. The borrow material will be loaded and transported by tractor trolleys through approved routes to the bund/ embankment.

iii. Restoration of embankments/ bund with the soil obtained from borrow areas. Activities involve unloading the soil on embankment, leveling, and compaction of soil in layers.

iv. The stone shall be loaded and transported from Chilyaquarry to the site through trucks and unloaded/stacked at designated places.

v. 1.75' ft. thick stone pitching layer (4" bajri, 5" spawl and 1' dressed stone) will be carried out at desired reaches of the embankment/bunds i.e. at Kuka Wari Bund Mile 3/0 to 7/4 and Kuka Wari Retarded Bund Mile 0/0 to 3/0 in Lower Pinyari Division Sujawal.

Guide Bund Kotri Barrage

The proposed works for flood protection works including construction of Earthwork & Repair Damaged Stone Pitching along Upstream Left Side Guide Bund from RD 0+000 to R.D 5+700 in Kotri Barrage Division, Jamshoro according to these specifications, drawings and as directed by the Project Manager.

Following major activities will be carried out,

i. Contractor's mobilization: After awarding the contract the selected contractor shall be mobilized in the field and arrange the camp for their staff and labor. The machinery and other necessary equipment shall be shifted.

ii. The borrow areas will be excavated as per specifications. The borrow material will be loaded and transported by tractor trolleys through approved routes to the bund/ embankment.

iii. Restoration of embankments/ bund with the soil obtained from borrow areas. Activities involve unloading the soil on embankment, leveling, and compaction of soil in layers.

iv. The stone shall be loaded and transported from Chilya quarry to the site through trucks and unloaded/stacked at designated places.

The repair work of Damaged Stone Pitching along Upstream Left Side Guide Bund from RD 0+000 to R.D 5+700 in Kotri Barrage Division, Jamshoro.

3.4 Construction Materials

The quantities of the main construction materials are given in the **Table-2** below. The fill for earthwork will be obtained from uncultivated land from river side which is state own land/property. Whereas, Contractor shall be restricted to obtain the fill material from private lands, hence no compensation will be required. The sandy and organic soils shall be avoided. Water for compaction of earth work will be obtained from river through water bowsers and ground water will be utilized for domestic purpose.

The stones for pitching and launching aprons shall be obtained from limestone quarries of Chilya and Khanote that are located at distance of about 40 and 130 km from the site respectively. The gabion meshes shall be obtained from Karachi. The stones will be moved directly from the stone quarries.

Table 2: Summary of Major Construction Materials

Material	M.S Thatta		BU Sujawal		Kuka Sujawal		Kotri Guide bund		PB Bund	
	Quantity	Source	Quantity	Source	Quantity	Source	Quantity	Source	Quantity	Source
Clearance Work			1032504 sft		7,128,000 (sft)		798000 (Sft)		356,022 sft	
Plowing and leveling			0.8				2.9(Acre)		7.6(Acre)	
Earth work Excavation	801900.00 (Cft)		2466921.60 (Cft)		1052420 (cft)		47025 (Cft)		6747823.50 (Cft)	
Extra lead 50'			2458896.00 (Cft)						3373911 (Cft)	
Dressing and Leveling			2458896.00 (Cft)		19749691 cft		1306035.00(Cft)		6679388.10 (Cft)	
Formation dressing and Preparing Sub-base	3296700.00(Cft)		475200.00(Cft)		1991400 sft		455600.00(Sft)		2006400 (cft)	
Stone filling	801900.00(Cft)	Chiliya/Khathar	87120.00(Cft)	Chiliya	1052420 cft	Chiliya	47025.00 (Cft)	Chilya	413820.00 (Cft)	Chiliya
Stone Pitching including sub-base. 3 chains	4945050.00(Cft)	Chiliya/Khathar	883159.20(Cft)	Chiliya	3484950 cft		722600.00(Cft)	Chiliya	4007486.18(Cft)	Chiliya
Supply boulders 9" 5 chains										
Dismantling Stone pitching top layer	59400.00 (Cft)						78006.50 (Cft)			
Supply boulders 9" and above	29700 cft	Chilya					39003.25 (Cft)	Chilya		
Providing murrum or fine murrum			105600.00(Cft)	Thatta						
Construction of pacca landhies			2.00(NOS)							
Borrow pit Excavation in 100ft			174525	1 mile	19748681 cft	1 mile	1282522	1 mile	3305476 cft	I mile
Carriage Material 100ft/ 5tons all material							1282522 Cft)	1 Mile		
Earth work compaction by Sheet foot roller			2458896 cft		19748681		1306035.00(Cft)		6679388 cft	
Earth work compaction (Soft ordinary 6" layer)			2458896 cft		19748681 cft		1306035			

3.5 Construction Schedule

The works on the sub-project are scheduled to be completed in six months as shown in **Figures 5 to 9.** The works in these sub-projects will be carried out when flows in river are low.

Stone Pitching Along M.S. Bund from Mile 0/0 to 14/0 and 22/0 to 24/7

Implementation Schedule

S. No.	Activities	1st Month	2nd Month	3rd Month	4th Month	5th Month	6th Month
1	Mobilzation of Contractor						
2	Excavation						
3	Borrow Pit Excavation						
4	Stone Pitching						

Figure 5: Tentative Work Schedule for MS Bund

Stone Pitching Along B.U. Bund from Mile 3/0 to 5/0

Implementation Schedule

S. No.	Activities	1st Month	2nd Month	3rd Month	4th Month	5th Month	6th Month
1	Mobilzation of Contractor						
2	Jungle Clearance						
3	Excavation						
4	Borrow Pit Excavation						
5	Stone Pitching						

Figure 6: Tentative Work Schedule for BU Bund

Stone Pitching Along KUKA LINK from 0/0 to 20/6. Raising and Strengthning of Along KUKA WARI Bund & KUKA WARI RETARDED Bund from Mile 3/6 to 7/ & 0/0 to 3/0

Implementation Schedule

S. No.	Activities	1st Month	2nd Month	3rd Month	4th Month	5th Month	6th Month
1	Mobilzation of Contractor						
1	Jungle Clearance						
2	Excavation						
3	Borrow Pit Excavation						
4	Stone Pitching						
5	Construction of Pacca Landhi						
6	Earth Work (Raising and Strengthening)						

Figure 7: Tentative Work Schedule for Kuka Link Bund

Stone Pitching Along P.B. Bund from Mile 0/0 to 8/5, 11/4 to 15/0

Implementation Schedule

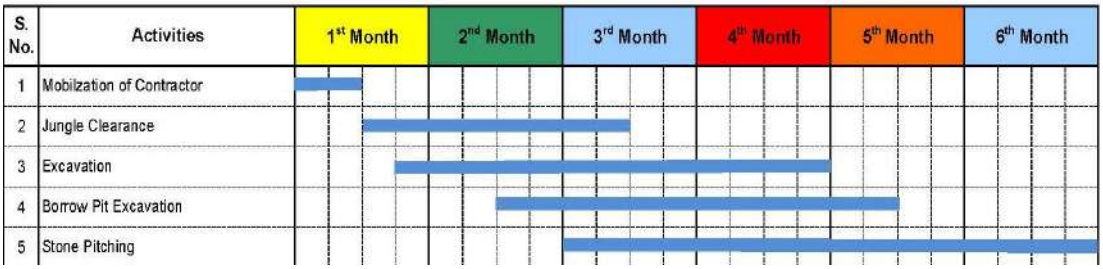


Figure 8: Tentative Work Schedule for PB Bund

Earth work and Stone Pitching Along Left side of Kotri Guide Bund from R.D 0+000 to 5+700

Implementation Schedule

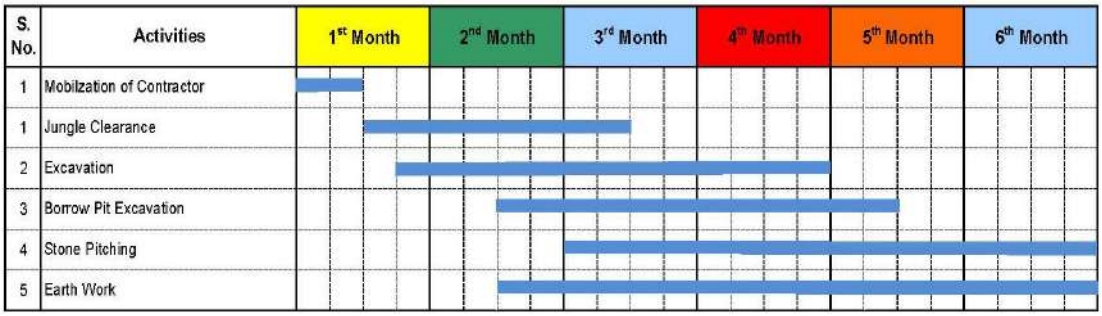


Figure 9: Tentative Work Schedule for Kotri Barrage Guide Bund

3.6 Construction Camps

The main camps shall be in Sujawal, Thatta and Hyderabad cities to be in a rented compound for the contract period of six months. While site camps are to be established for each embankment separately. Each site camp will accommodate 40-50 persons. Site camps shall be established in uncultivated areas within RoW. The cutting of trees as well as establishment of camp within agriculture productive land shall be avoided. These site camps shall be 500m away from the settlements. The site camps will include following facilities.

- Staff accommodation
- Sanitation facilities
- Sewage disposal system
- Parking of vehicles or machinery
- Generators
- Medical facilities
- Dining areas.

The areas and location wise details of all proposed camp sites are provided in following **Table-3.**

Table 3: Site Camps Location

S. No	Sub-project	Co-ordinates		Approx. Area Sq. ft.	Location Mile
		N	E		
1	MS Bund	24°51'26.60"N	68° 9'16.66"E	174240	14/0
2	BU Bund	24°29'30.50"N	67°52'21.69"E	174240	11/2
3	PB Bund	24°40'11.43"N	67°55'24.69"E	174240	12/2
4	KUKA Bund	24°15'52.72"N	67°50'52.72"E	174240	9/4
5	Kotri Barrage Guide Bund	25°27'52.28"N	68°19'35.65"E	130660	5+700 RD

Locations of all sub-project site camps are given in **Figures 10 to 14.**

Figure 10: Camp Site Location of MS Bund

Figure 11: Camp Site Location of BU Bund

Figure 12: Camp Site Location of PB Bund

Figure 13: Camp Site Location of KUKA Bund

Figure 14: Camp Site Location of Kotri Barrage Guide Bund

3.7 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 could be on businesses and livelihood due to removal or relocation of commercial structures, houses, 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.

3.7.1 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-15**.

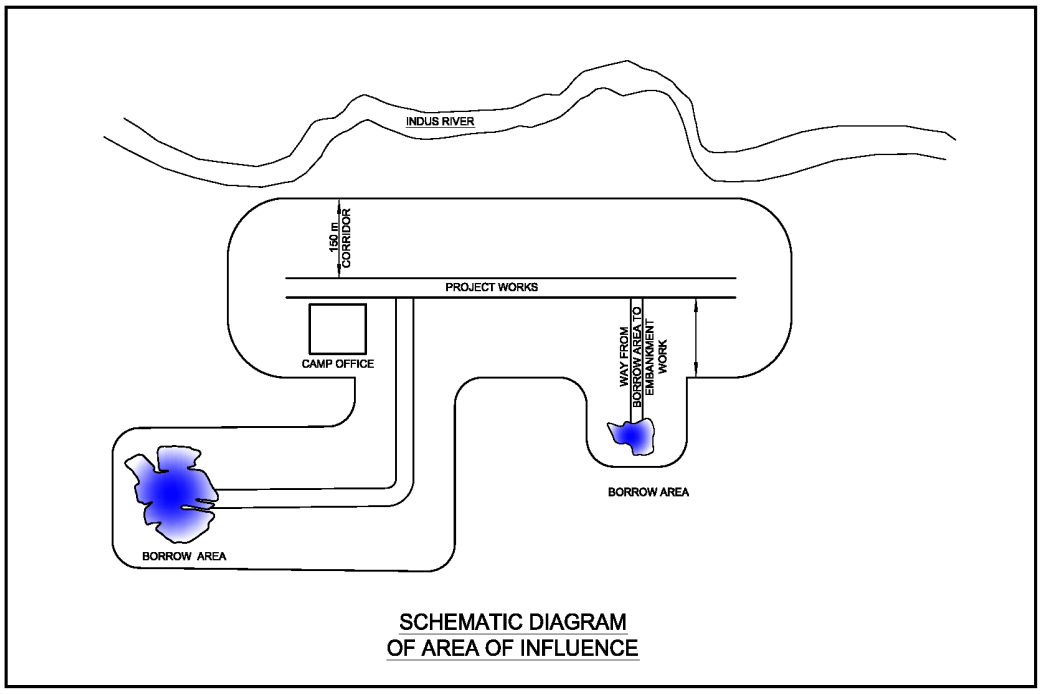


Figure 15: Typical Primary Impact Zone

3.7.2 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. ANALYSIS OF ALTERNATIVES

4.1 General

An analysis of alternatives has been perform to review and assess different ways of meeting the project objectives that might have fewer environmental or socio-economic 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 option(s) that are deem to be environment 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 PB, MS, KUKA, BU and Kotri Barrage Guide Bunds of Indus River are a result of an iterative design approach in which alternatives have been review, against for their functionality and socio-environmental impacts. The alternative project activities have been considered and the reasons for their rejection are discussed under the following headings.

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

- Economic;
- Environmental; and
- Social

The assessment considers the magnitude and duration of both positive and negative impacts to assign impact significance as given in **Table 4.**

Table 4. Determination of Impact Significance

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

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

4.2 The Available Alternatives for Sub-projects

The River Indus in its lower part while passing through Sindh flows on a ridge, with river water level higher than the land beyond both banks. In 1940 a system of earthen embankments (levees) was constructed to contain spread of water within river waterway. These embankments are 20 to 50ft higher than the adjacent landside ground levels. The river side slope of these embankments is protected with stone-pitching and stone aprons. The landside slope is made sufficiently flat to avoid seepages emerging on the embankment face. The crest level (top) of embankments was kept to provide ample freeboard against wave overtopping. The following problems have arisen in some reaches of river embankments with passage of time (see Figure 16):

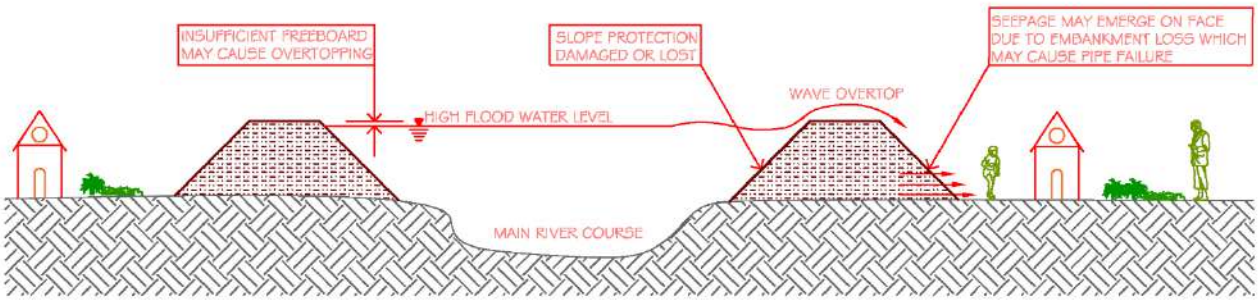


Figure 16: Issues of Existing River Embankment Requiring Rehabiliation

i) Due to climate change the flood peak discharges have increased in River Indus resulting in insufficient freeboards against overtopping
ii) Damages in stone protection works due to factors such as again of stone, poor quality and erosion due to high flood velocities
iii) Local erosion of embankment body have reduced seepage path, which may cause piping failure.

Due to these shortcoming, in past at a number of places breaches of embankments have occurred causing catastrophic loss of human life, property and crops.

To develop resilience against floods intervention is required on river embankments. The following alternatives may be considered.

Option 0: Do nothing
Option 1: Strengthening, Widening and Raising of Existing Embankment (The Project)
Option 2: Abondon exiting embankment and construct new embankment
Option 3: Construction of Steel Sheet Pile or Concrete Retaining Wall

These options are shown in Figures 17 to 20 and discussed below.

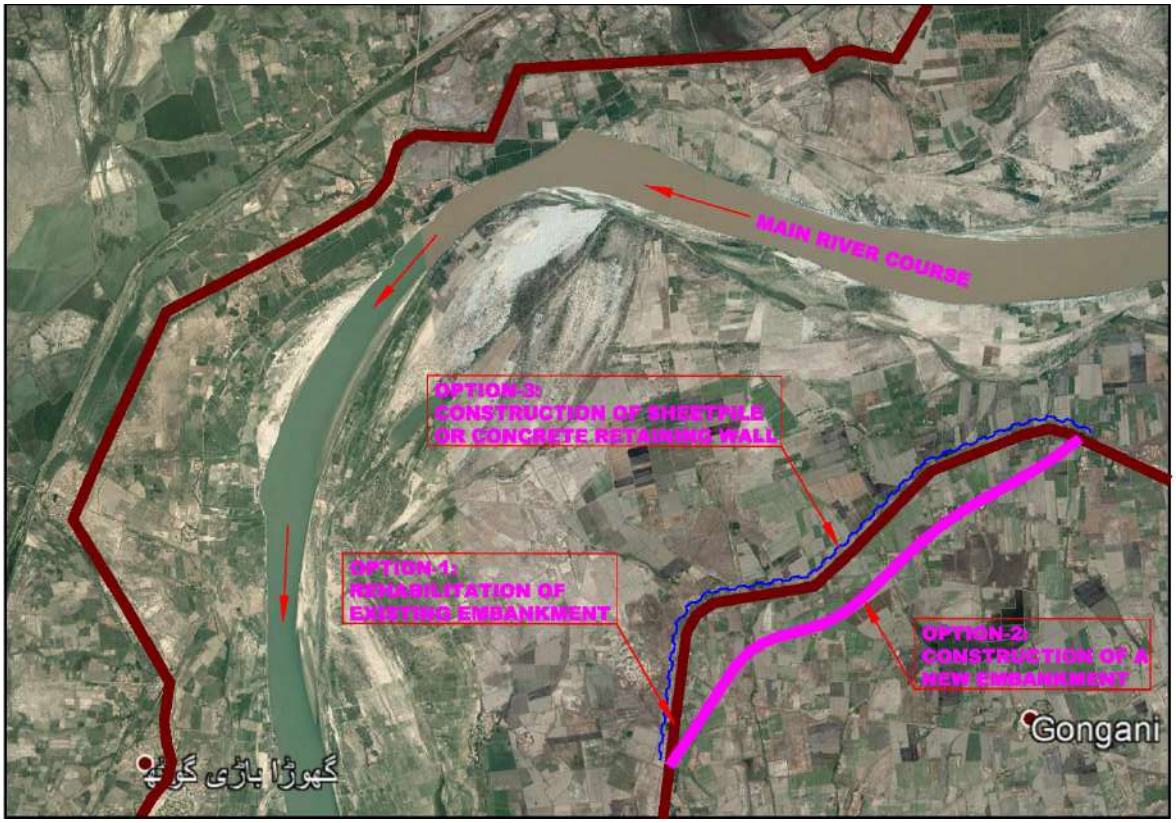


Figure 17: Layout Plan of Miscelleanous Options

4.2.1 Option 0: No Project Alternative

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 No project scenario, the performance of the embankments is considered to be continued as has been recorded since commissioning of the embankment, as such the following issues are expected to continue:

- Catastrophic breaches of the embankments during high floods season.
- 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 and the same losses are expected as described above.
- 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 season.
- Erosion of the embankments due to wave washes during high flood season.

In all the above-mentioned cases, there is a threat of breach of the embankment during high flood in Indus River. As the province of Sindh has already experienced major floods in 1975, 1976, 1992, 1994, 1995, 2003, 2005, 2007, 2010, 2011, 2012, 2013 and 2015. Floods in 2010 displaced 7.2 million people and affected 11,992 villages. The impact on the economy of Sindh was estimated at PKR. 372 billion (US$ 4.4 billion), with agriculture, livestock and housing contributing to major losses. This risk may be further increased due to frequent occurrence of supper floods as a result of climate change and deteriorating condition of embankments. As such, without implementation of this project to provide flood protection, the widespread damage in the region resulting from super floods is expected. Therefore; this option has been dropped.

4.2.2 Option 1: Strengthening, Widening and Raising of Existing Embankments (The Project)

This alternative involves the strengthening of slope protection, reinstating the required design width of the embankments and raising the level of the existing MS, BU, PB, KUKA and Kotri Barrage Guide bunds to provide ample freeboard against overtopping. All embankments have the same type of technical issues and scope of works.

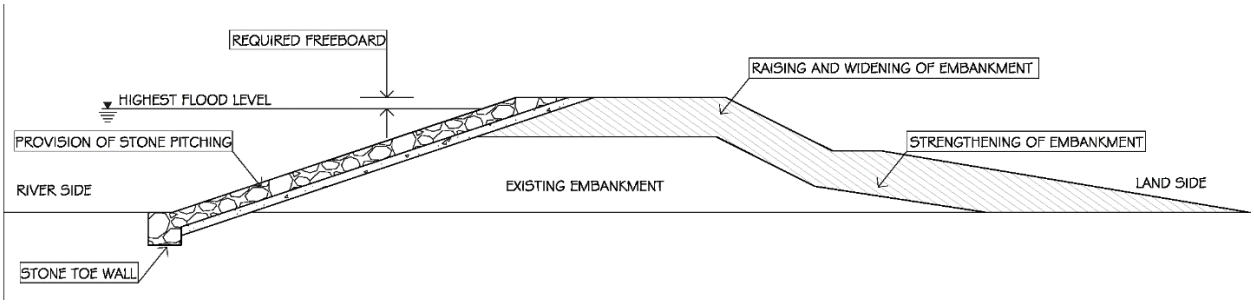


Figure 18: Option 1: Strengthning, Widening and Raising of Embankment

The earthfill material to raise and widen the embankments would be obtain from borrow areas situated within the riverine areas of Indus on government owned land. Stone pitching would be added to the riverside face of the rehabilitated embankments to protect from becoming undermined by erosion during flood flows. The materials for stone pitching will be acquired from commercial quarries approved by Government of Sindh.

As part of these works, the structures (including houses) and trees situated on the embankments would be removed.

The existing embankments are generally in good condition expect some local erosion and loss of protective works. Their rehabilitation and replenishing will not only be an economical solution but will have minimum negative environmental and social impacts involving minimum resettlement and no land acquisition is required.

4.2.3 Option 2: Construct New Embankments

This alternative would require the construction of new embankments on the river-side or land-side of the existing embankments to reduce the requirement to resettle those who are currently living on the existing bunds. But a major part of required area, which in most cases is located on landside, is generally used for agriculture and covered with trees and vegetation and there are temporary and permanent villages also.

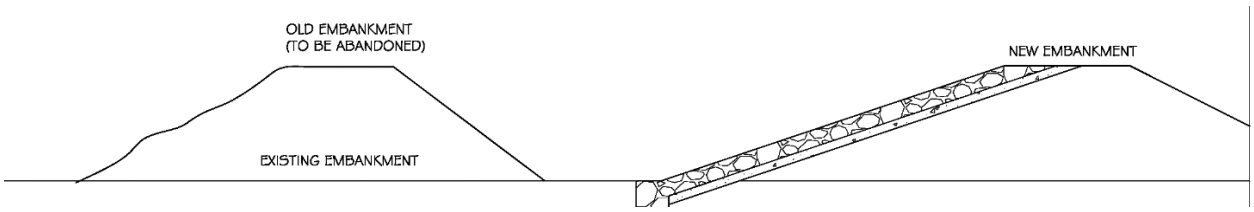


Figure 19: Option 2: Strengthning, Widening and Raising of Embankment

The environmental and social impacts associated with the construction of new embankments are clearance of vegetation, removal / uprooting of trees, disturbing water bodies, defacing the landscape, land acquisition and relocating the settlements, requiring additional areas and cost. These impacts are certainly high during construction of new embankments as compared to rehabilitation work.

Also this alternative will involve high costs of construction. Therefore, option of contruction of new embankments has been rule out. Forgoing above reason It is preferable to rehabilitate the existing structures rather than replacing of existing embankments.

4.2.4 Option 3: New Design Configurations other than Embankments

There are some other alternatives for flood protection systems, which are may be adopted in place of embankments, such as flood protection by providing retaining walls, anchored sheet piles, etc. These options are normally utilize in restricted areas where river passes through urban developments, however these options require high costs, specialized technologies and and having negative environmental impacts. On the other hand, the embankments 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 by using locally available earth and rock. In the given situation, the rehabilitation of embankments is the best option from technical as well as economical, environmental and social point of view.

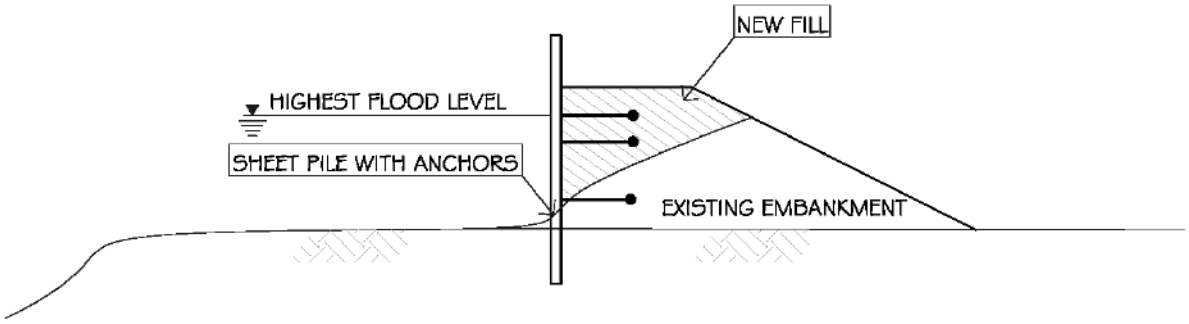


Figure 20: Option 3: Consturction of Sheetpile or Concrete retaining Wall

4.3 Alternatives for Sources of Construction Materials

The rehabilitation work requires earth for raising, widening and replenishing of embankment bodies and stones for slope pitching and riverside aprons. The alternate sources of these materials are discussed below.

4.3.1 Earth Material

The earth material for embankment rehabilitation can be obtained either (i) from riverbed side or (ii) from area beyond river-bank at both sides suitable material is available. The material will be obtain from outside riverbed 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 planned to obtain from uncultivated riverine areas.

4.3.2 Stones

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

4.4 Alternative of Strip Borrow Areas versus Deep Pits

In order to reduce the total acquired land associated with the formation of borrow areas, the option of using only deep borrow pits has been consider. The maximum depth of such borrow pits would be 1.5 m (5ft) due to limitations of the excavators which must operate from ground level and could not operate from within a borrow area (as the high water table would flood any borrow area established). As discussed earlier, these borrow pits shall be established within uncultivated lands along the riverside of the embankment. This option is environmentally and socially preferable as

the proposed borrow areas like (a) these areas are the ownership of the project proponent (b) there is opportunity for natural rehabilitation of the proposed borrow pits during super flood and (c) acquisition of land is not required. In addition, a guideline/mitigation measures relevant to the development and rehabilitation of borrow areas is prepared in the ESIA and ESMP.

In order to reduce haulage costs that shall be incurred in transporting borrow material from borrow areas to the embankments, consideration was given to establishing strip borrow areas within the RoW of the embankment for their entire length. However, this alternative was rule out for the following reasons:

- It would not be possible to establish deep borrow pits within the RoW due to seepage losses which would result from the Indus River into the borrow pits and ultimately jeopardise the structure. In addition, the Bund Manual prepared by SID does not allow any kind of excavation within RoW.
- If the RoW is already dominated by agriculture land, ponds and wetlands there are insufficient suitable area within the RoW to establish the required area of shallow borrow areas.
- As much of the project area beyond the RoW is cultivated, this would result in the permanent loss of productive agricultural land due to flooding of the borrow areas. Due to the high water table in the areas adjacent to the RoW, there is a risk of flooding to even shallow borrow areas. This option was rule out due to its negative socio-economic impacts associated with the loss of agricultural land and the cost of the permanent land acquisition would be require.

Table-5 reviews the alternative interventions considered to improve the protection against flooding of land and communities in vicinity of proposed embankment sub-projects.

Table 5: Analysis of Alternatives: Rehabilitation of Embankments

	Action	Economic Impacts		Environmental Impacts		Social Impacts	
		Positive	Negative	Positive	Negative	Positive	Negative
1	Without project	None	• Cost of recovery from frequent flooding (Moderate long term). • Maintenance of existing embankments (Moderate long term)	• Extension of seasonal wetlands (Minor long term).	Flooding of established dry land habitat (Minor long term).	None	Regular flooding, destruction of structures and infrastructure, loss of life, loss of business and displacement of people (Moderate long term)
2	Strengthening widening and raising of the existing embankments	• Reduced occurrence of flooding (Major long term). • Employment during construction (Moderate short term)	• Moderate capital cost to implement (Moderate short term); • Moderate on-going maintenance costs (Moderate long term)	None	• Felling trees on bunds (Moderate short term); • Quarrying of stone (Minor long term) • Transport of earth material within project area (Minor short term); • Greenhouse gas emissions from heavy machinery during construction (Minor short term)	• Reduced frequency of large scale flooding and associated risks to life and property and loss of business (Major long term)	• Minor loss of displacement of people due to stone pitching and widening of bunds (Minor long term) • Construction stage disturbance (Moderate short term)
3	Construction of new embankments	As for # 2	• Moderate capital cost to implement – higher than alternative #2 (Moderate short term); • Moderate on-going maintenance costs (Moderate long term)	None	• Felling trees on new alignment (Moderate short term); • Quarrying of stone (Minor long term) • Transport of earth material	As for #2	• Moderate loss of land to be acquired and displacement of people due to establishment of borrow areas and realignment of embankments (Major long term);

	Action	Economic Impacts		Environmental Impacts		Social Impacts	
		Positive	**Negative**	**Positive**	**Negative**	**Positive**	**Negative**
					(Minor short term); • Greenhouse gas emissions from heavy machinery during construction (Minor short term)		• Construction stage disturbance (Moderate short term)
4	New Design Configuration other than embankment	• As for # 2	• High capital cost to implement – higher than alternative #2 (High short term); • High on-going maintenance costs (High long term) • Special technologies are required for construction	• None	• Felling trees on new alignment (Moderate short term); • Quarrying of stone (Minor long term) • Transport of earth material (Minor short term); • Greenhouse gas emissions from heavy machinery during construction (Minor short term)	• As for option #2	• Moderate loss of land to be acquired and displacement of people due to establishment of borrow areas and realignment of embankments (Major long term); • Construction stage disturbance (Moderate short term)
5	Deep borrow areas (River side)	• The land for deep borrow areas are the ownership of the project proponent and therefore; no acquisition of land is required.	• Need capital cost for transportation (Moderate short term);	• Establishment of temporary wetlands and will rehabilitate naturally after flooding.	• Non	• The land for deep borrow areas are the ownership of the project proponent and therefore; no acquisition of	• None

	Action	Economic Impacts		Environmental Impacts		Social Impacts	
		Positive	Negative	Positive	Negative	Positive	Negative
						land is required.	
6	Deep borrow areas (Community side)	• None	• Need capital cost for transportation (Moderate short term);	• None	• Establishment of permanent pits.	• None	• None
7	Strip borrow	• No major capital cost for transportation (Moderate long term);	• None	• None	• Jeopardize the integrity of the structure. • Clearance of trees and flora	• Damage to the standing seasonal crops like (Banana, sugarcane)	• None
8	Stone pitching (from existing commercial quarries)	• No major additional capital cost	•	• None	• None	• None	• None
9	Stone pitching (from new areas)		• Need additional cost for land acquisition ((Moderate short term);	• None	• Change in landscape	• None	• None

5. ENVIRONMENTAL AND SOCIAL BASELINE

This chapter describes 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. (Social baseline is described in section 5.3 on page 90.)

5.1 Physical Environment

5.1.1 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-project covered in this ESIA is located in the Indus Delta zone. This area consists of the distributaries of the Indus River which starts spreading out near Thatta across the deltaic flood plain in the sea. The even surface is marked by a network of flowing and abandoned channels. A coastal strip 10 to 40 kilometers wide is flooded at high tide and contains some mangrove swamps. Geological map of Sindh is shown in Figure-16.

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

The districts of Hyderabad, Thatta and Sujawal geologically belong to early Eocene Laki formation. The Laki formation is dominantly composed of cream colored white fossiliferous limestone of massive and nodular character with subordinate calcareous sandstone, shale and marl. Structurally the region belongs to Karachi Arc zone that comprises a series of about 200km long and 50km wide parallel to sub parallel, small, rounded dome shaped, anticline hills with corresponding wide synclinal valleys and Piedmont plains. The River Indus and its banks are alluvial deposits of fine sands and non-plastic silts.

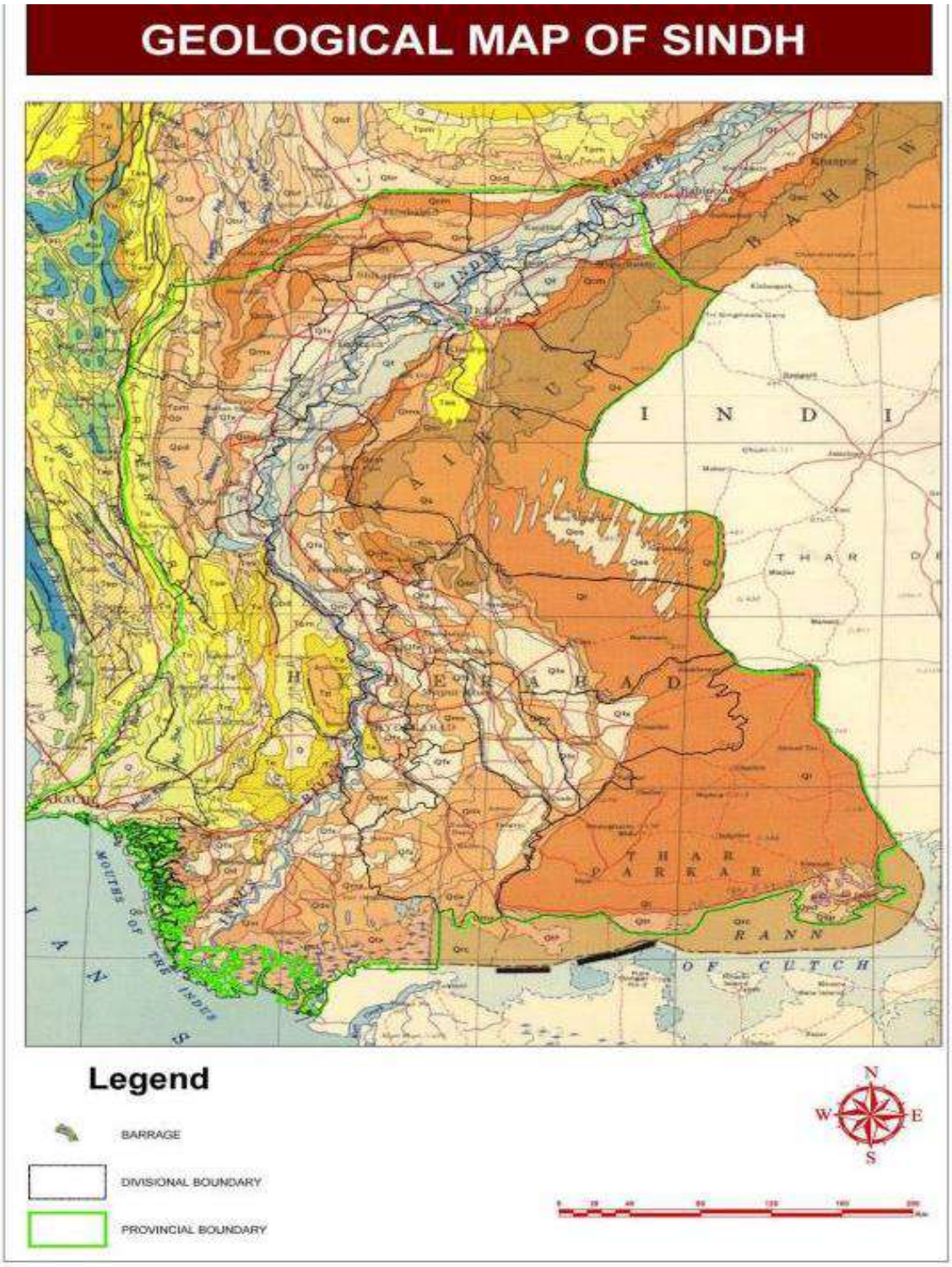


Figure 21: Geological Map of Sindh

5.1.2 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 and 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 had wiped out farmer's present and future sources of food and income, 300 people were reported dead and more than 7 million were affected directly and indirectly.

According to different reports, over five hundred thousand houses had been destroyed and millions were damaged. Crops of cotton, banana, dates, chilli and sugarcane over a cultivated area of 2.8 million acres were destroyed or affected.

5.1.3 Land use

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:

- Existing Indus River embankments;
- Indus River (active channels 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 Filed inspection is given in **Figures 22 to 40**.

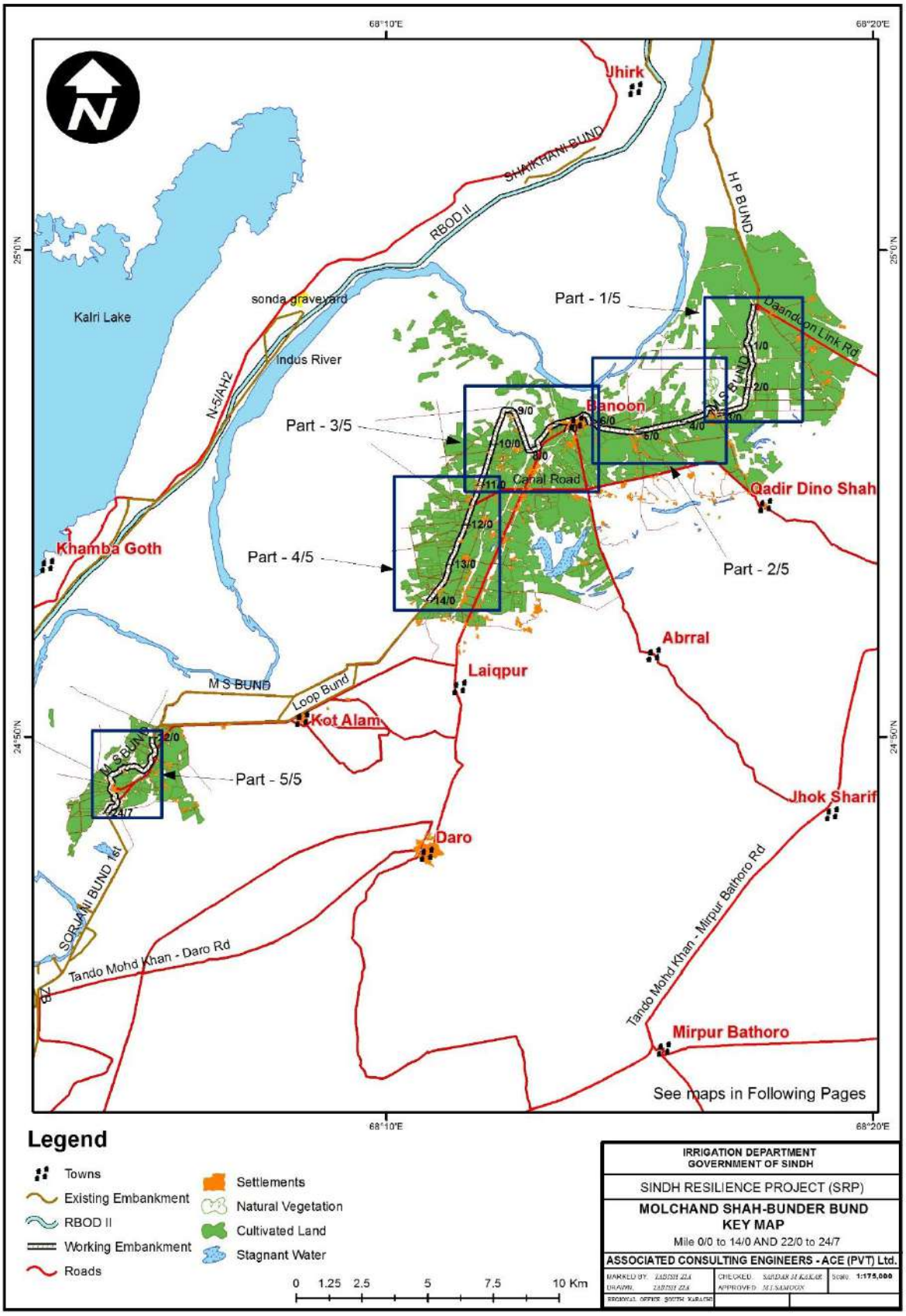


Figure 22: Land Use Map of MS Bund (Key Map)

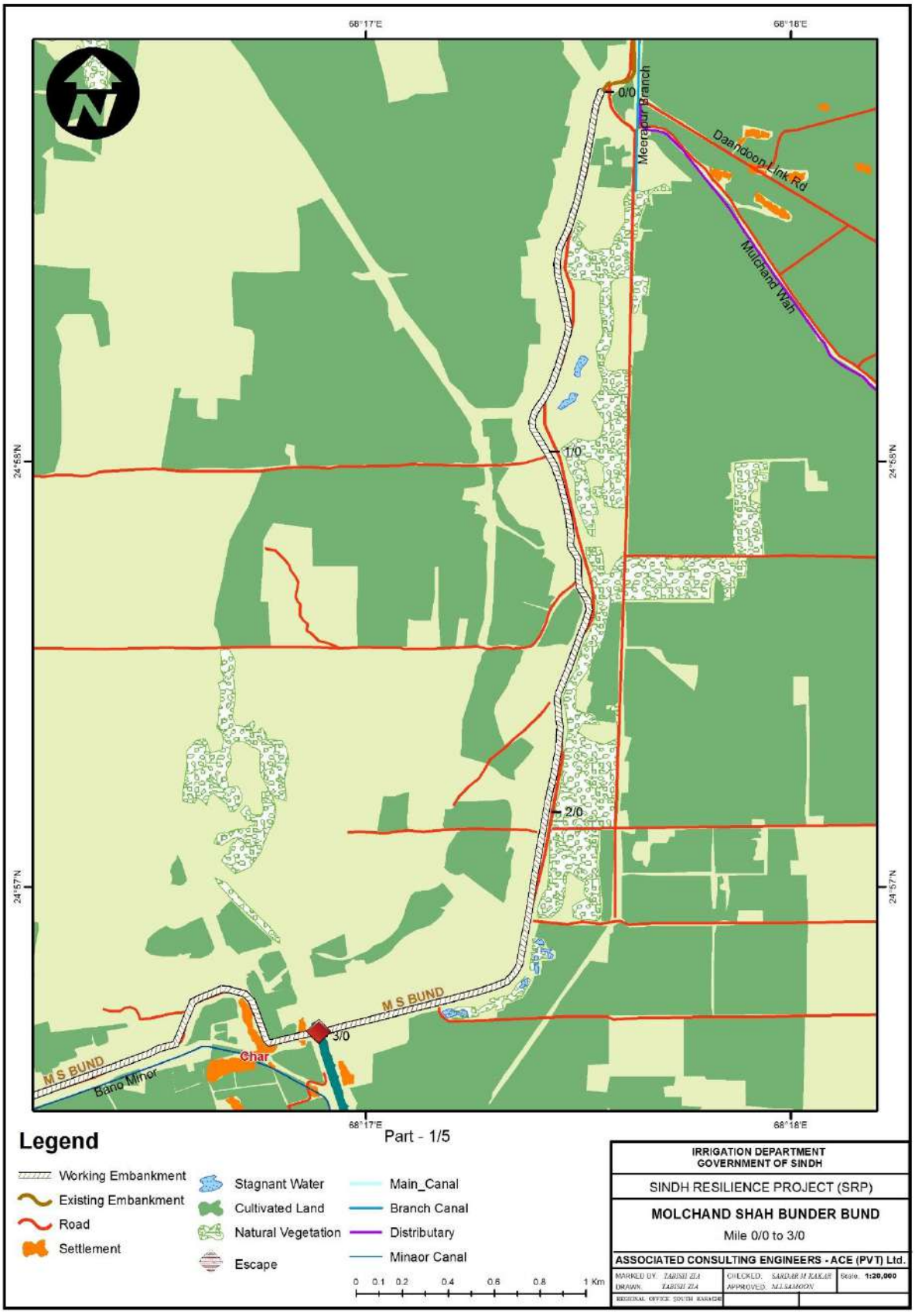


Figure 23: Land Use Map of MS Bund – Part 1 of 5 (Mile 0/0 – 3/0)

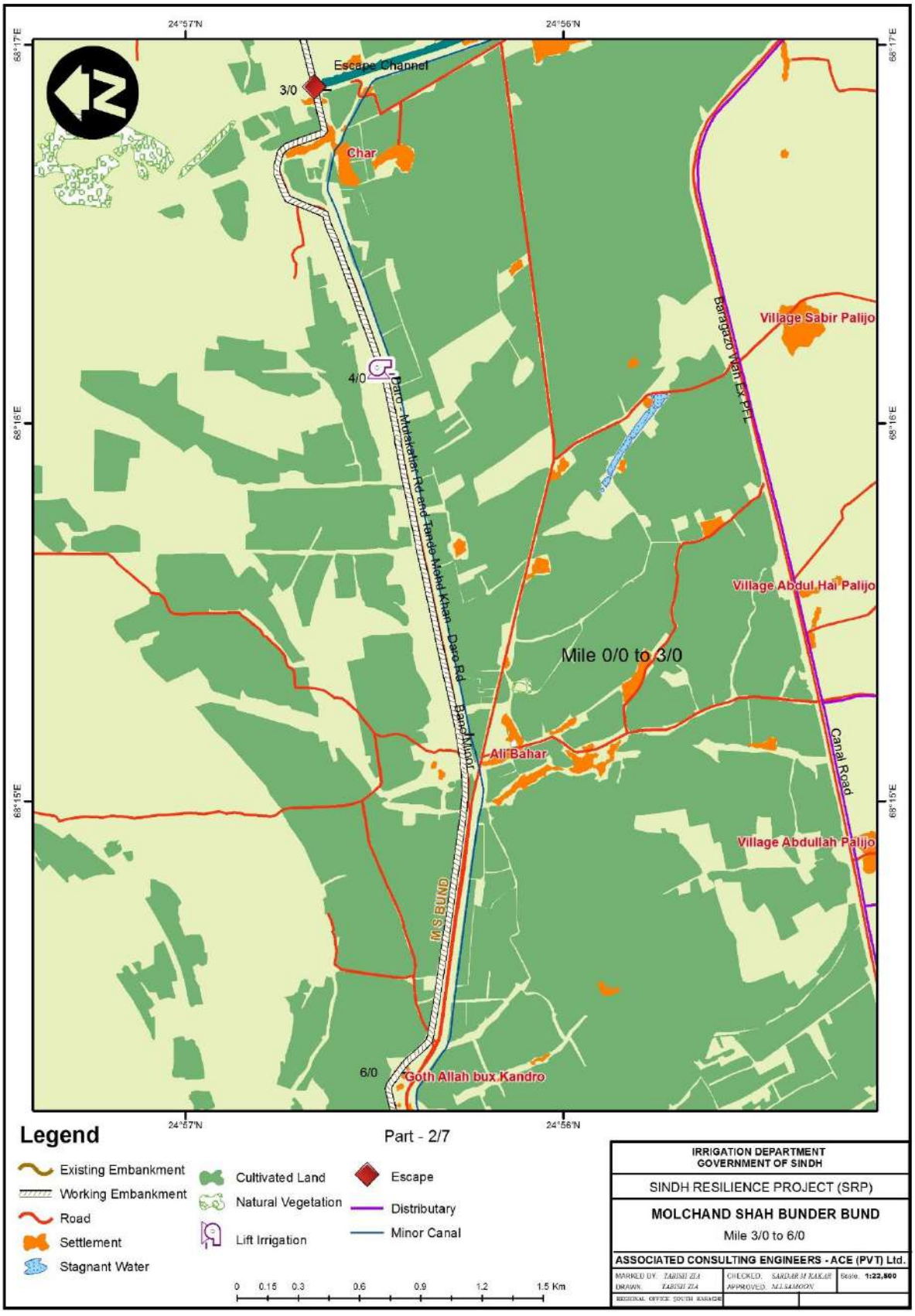


Figure 24: Land Use Map of MS Bund – Part 2 of 5 (Mile 3/0 – 6/0)

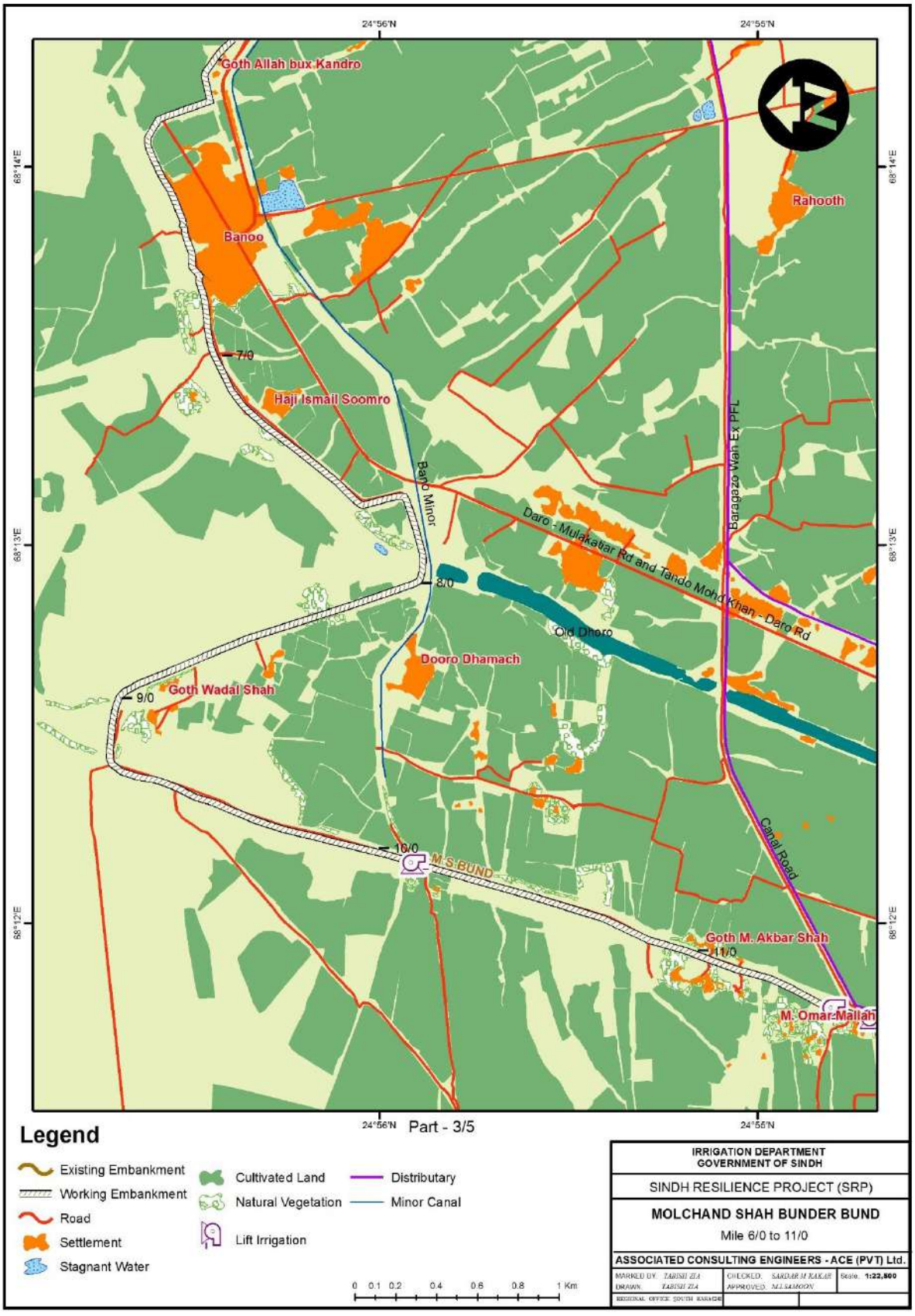


Figure 25: Land Use Map of MS Bund – Part 3 of 5 (Mile 6/0 – 11/0)

Figure 26: Land Use Map of MS Bund – Part 4 of 5 (Mile 13/0 – 14/0)

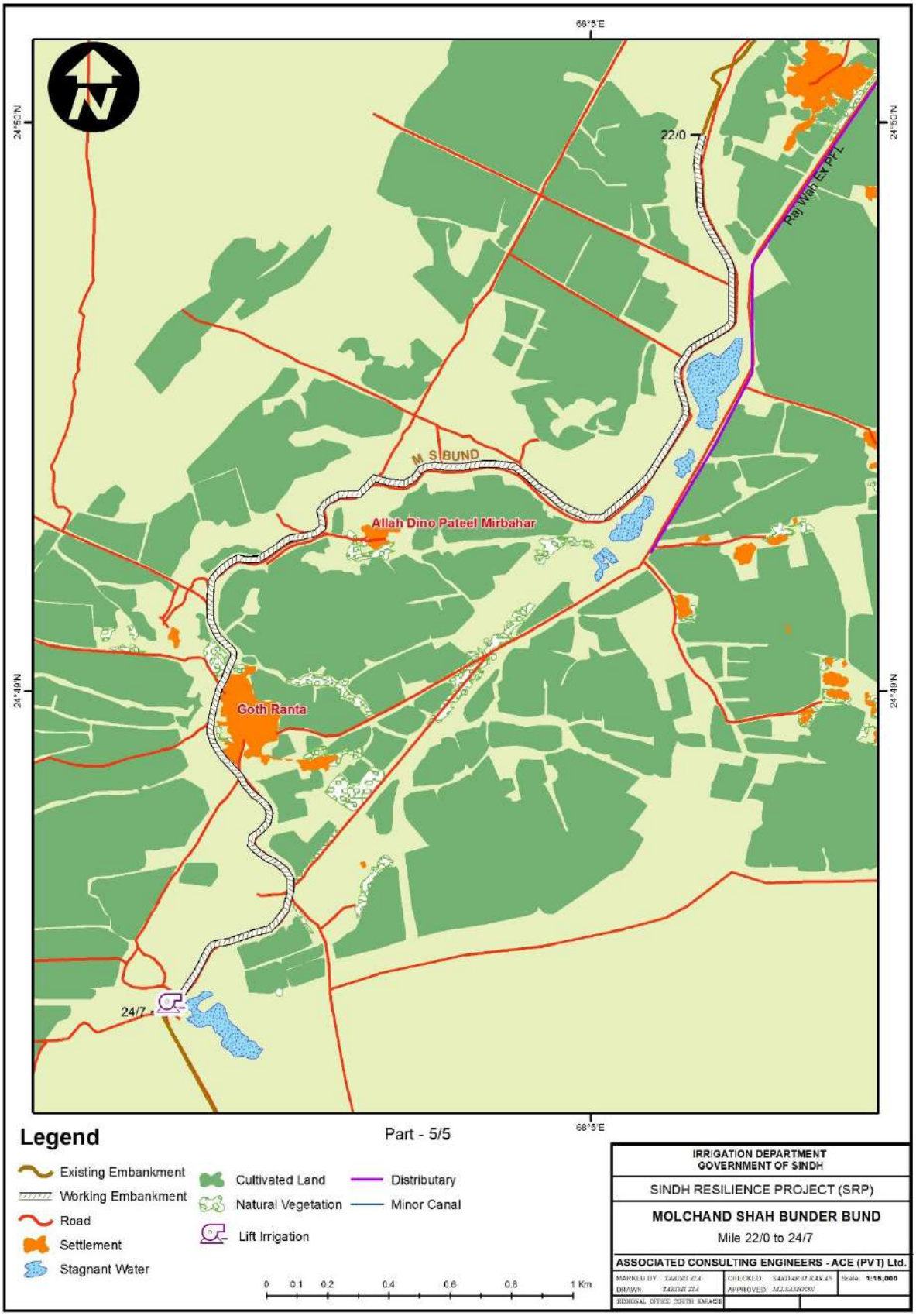


Figure 27: Land Use Map of MS Bund – Part 5 of 5 (Mile 22/0 - 24/7)

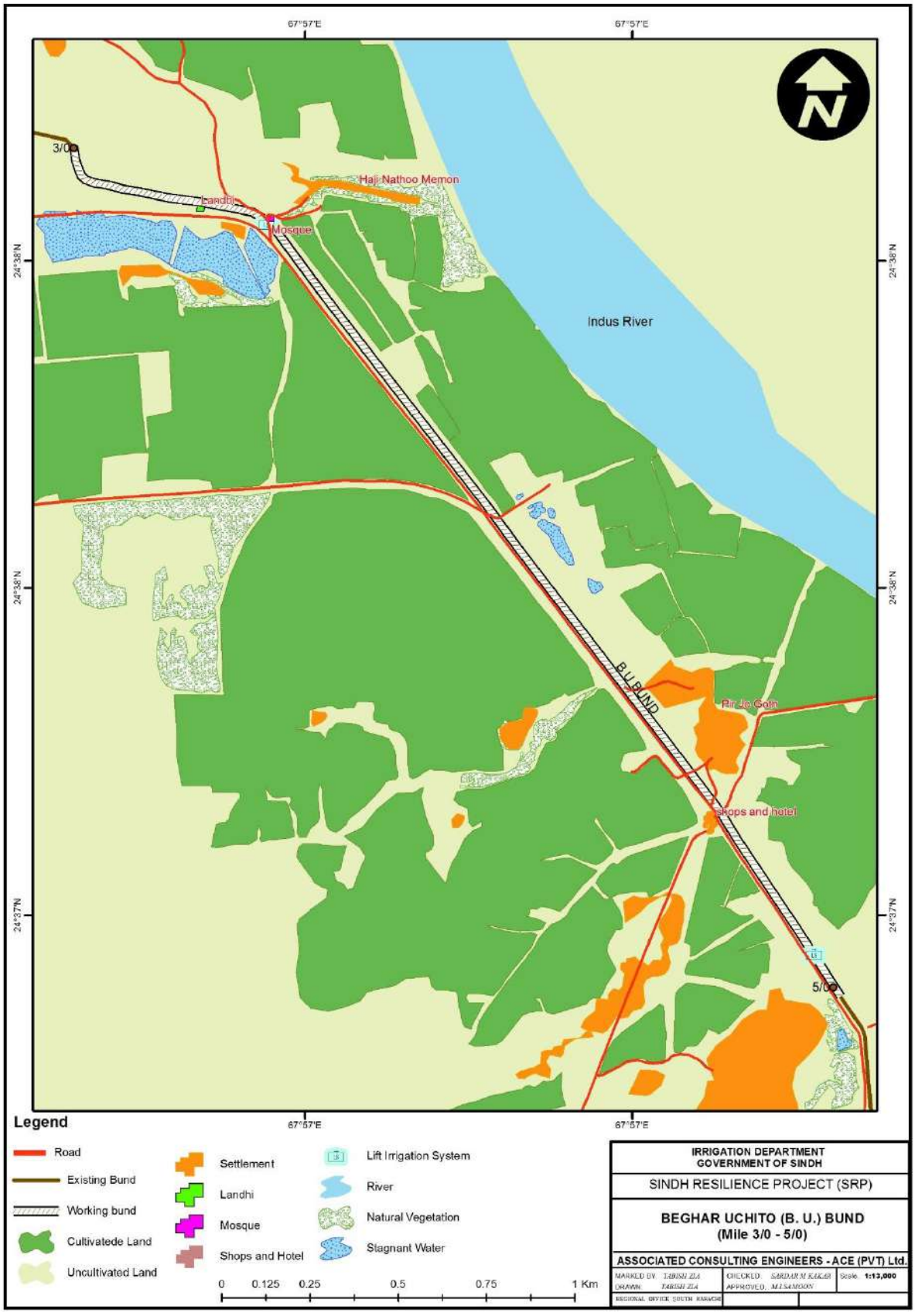


Figure 28: Land Use Map of BU Bund (Mile 3/0 – 5/0)

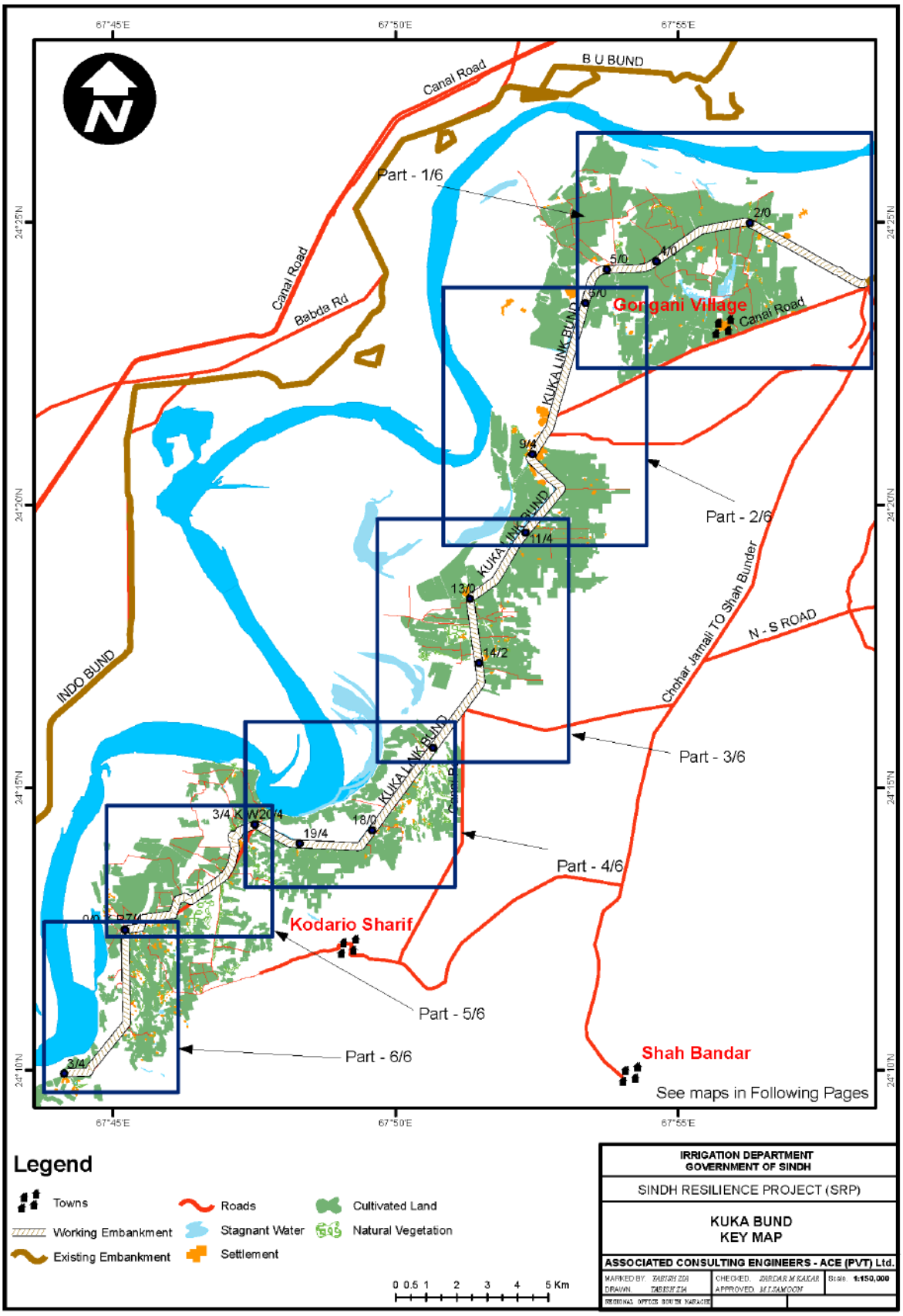


Figure 29: Land Use Map of KUKA Bund – (Key Map)

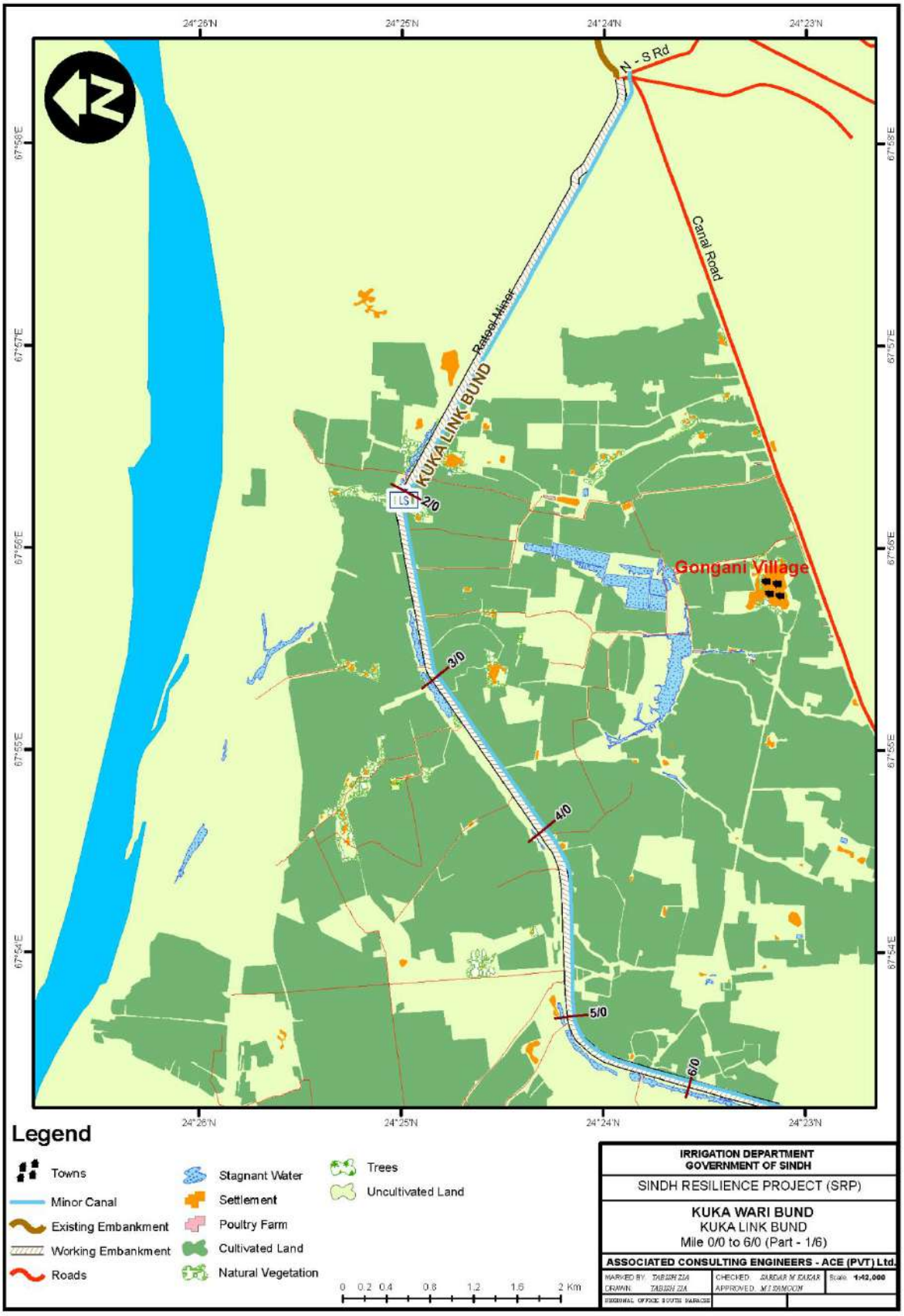


Figure 30: Land Use Map of KUKA Bund – Part 1 of 6 (Mile 0/0 – 6/0)

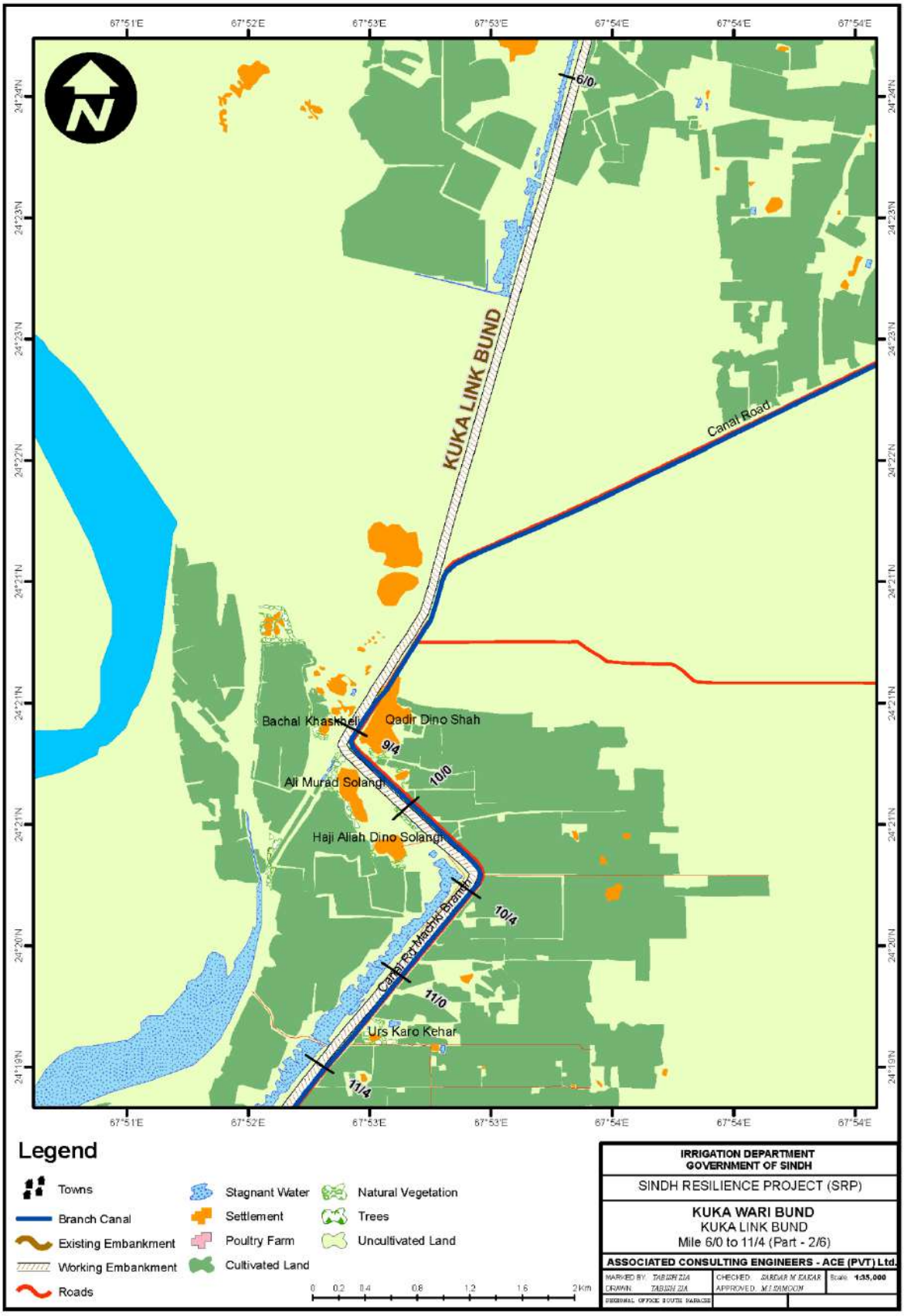


Figure 31: Land Use Map of KUKA Bund – Part 2 of 6 (Mile 6/0 - 11/4)

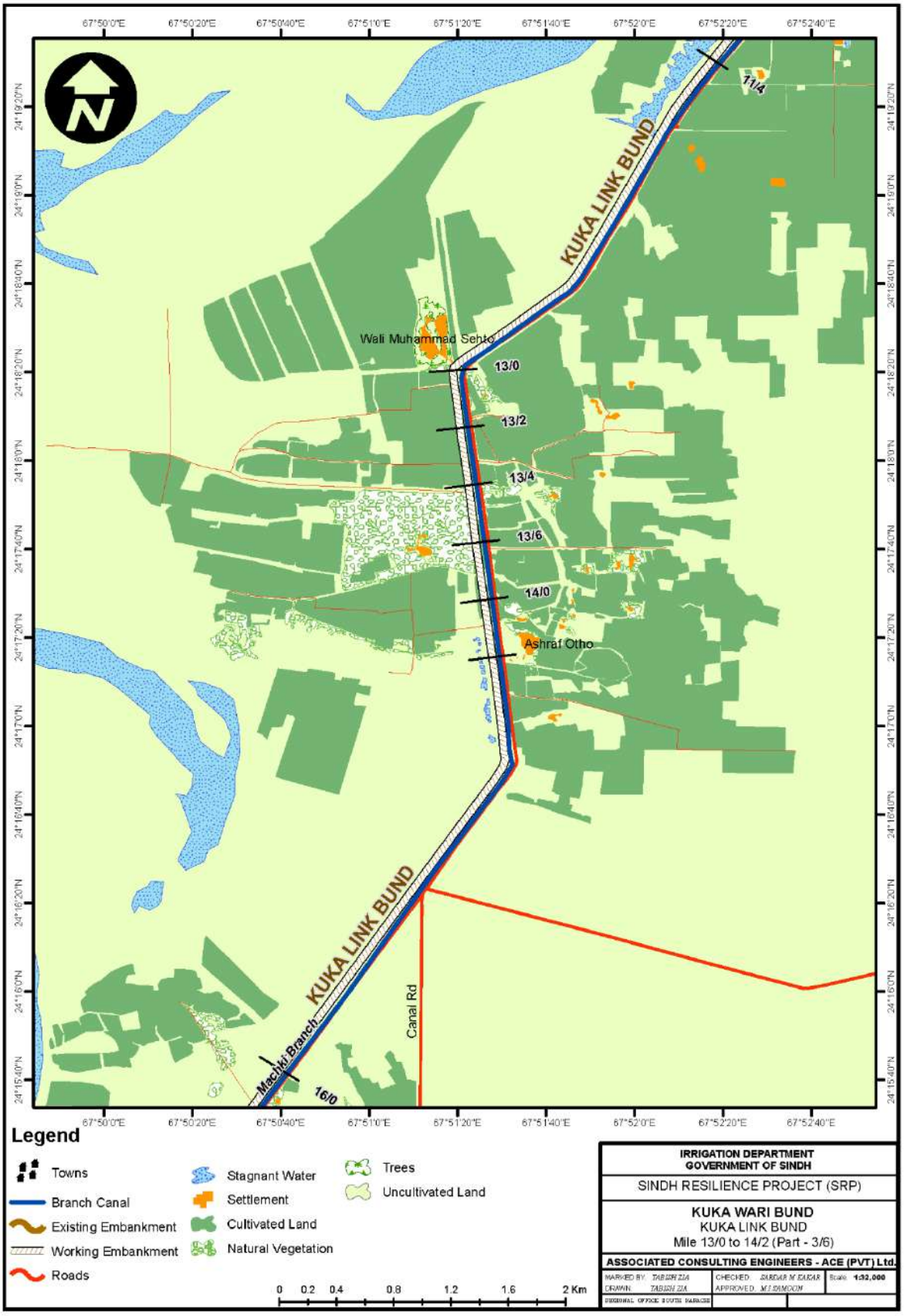


Figure 32: Land Use Map of KUKA Bund – Part 3 of 6 (Mile 11/4 - 16/0)

Figure 33: Land Use Map of KUKA Bund – Part 4 of 6 (Mile 16/0 - 20/4)

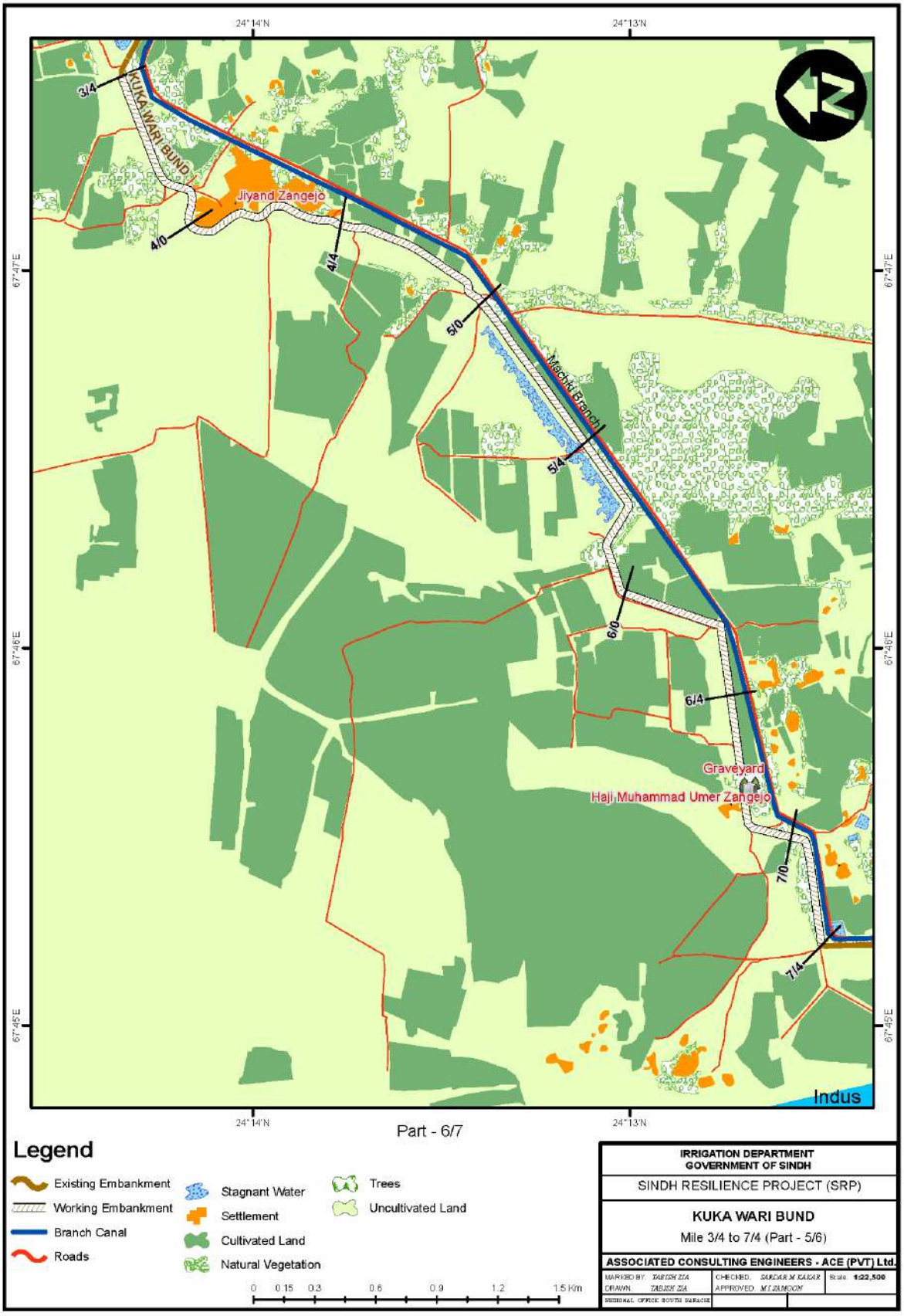


Figure 34: Land Use Map of KUKA Bund – Part 5 of 6 (Mile 3/4 - 7/4)

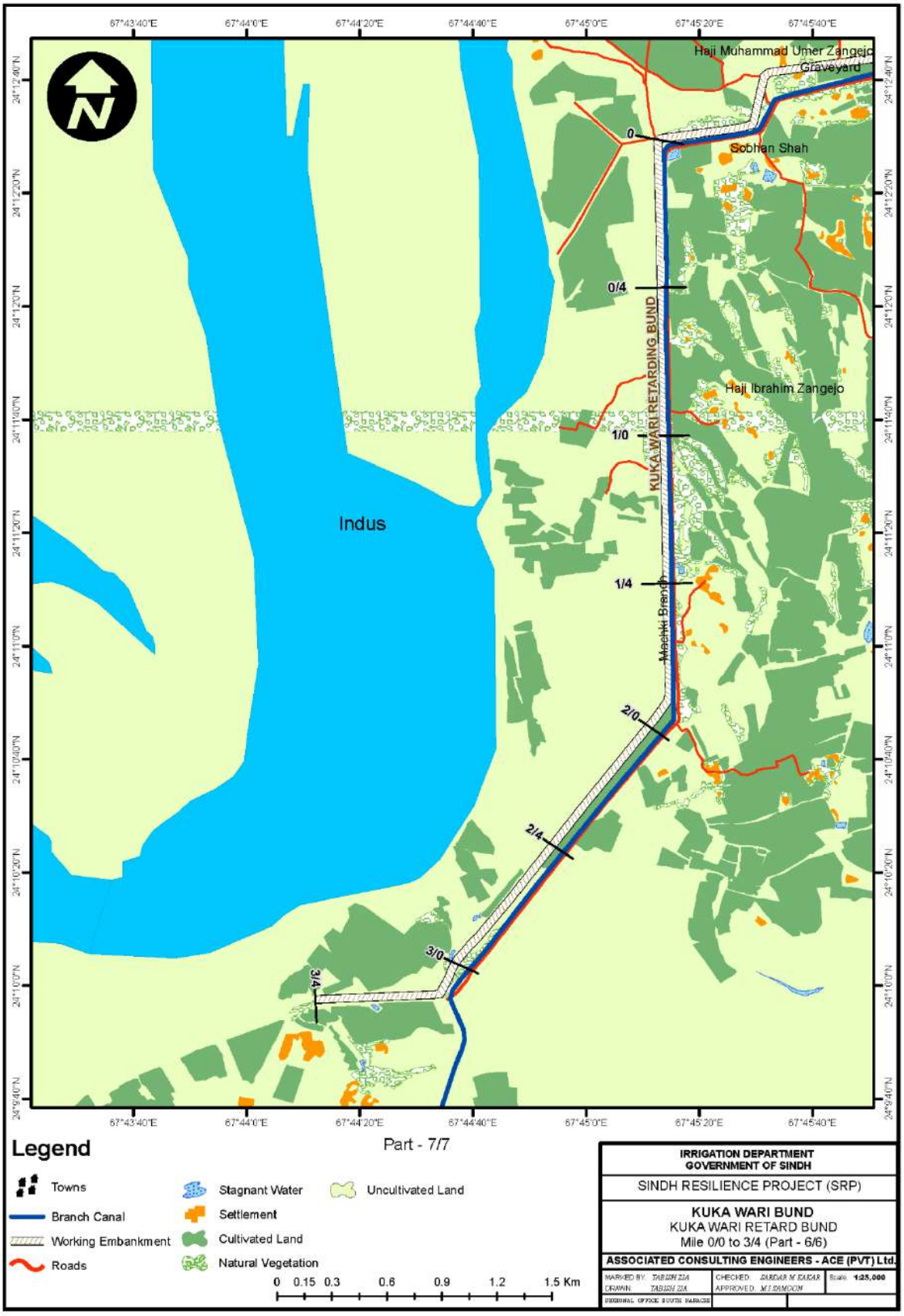


Figure 35: Land Use Map of KUKA Bund – Part 6 of 6 (Mile 0/0 - 3/4)

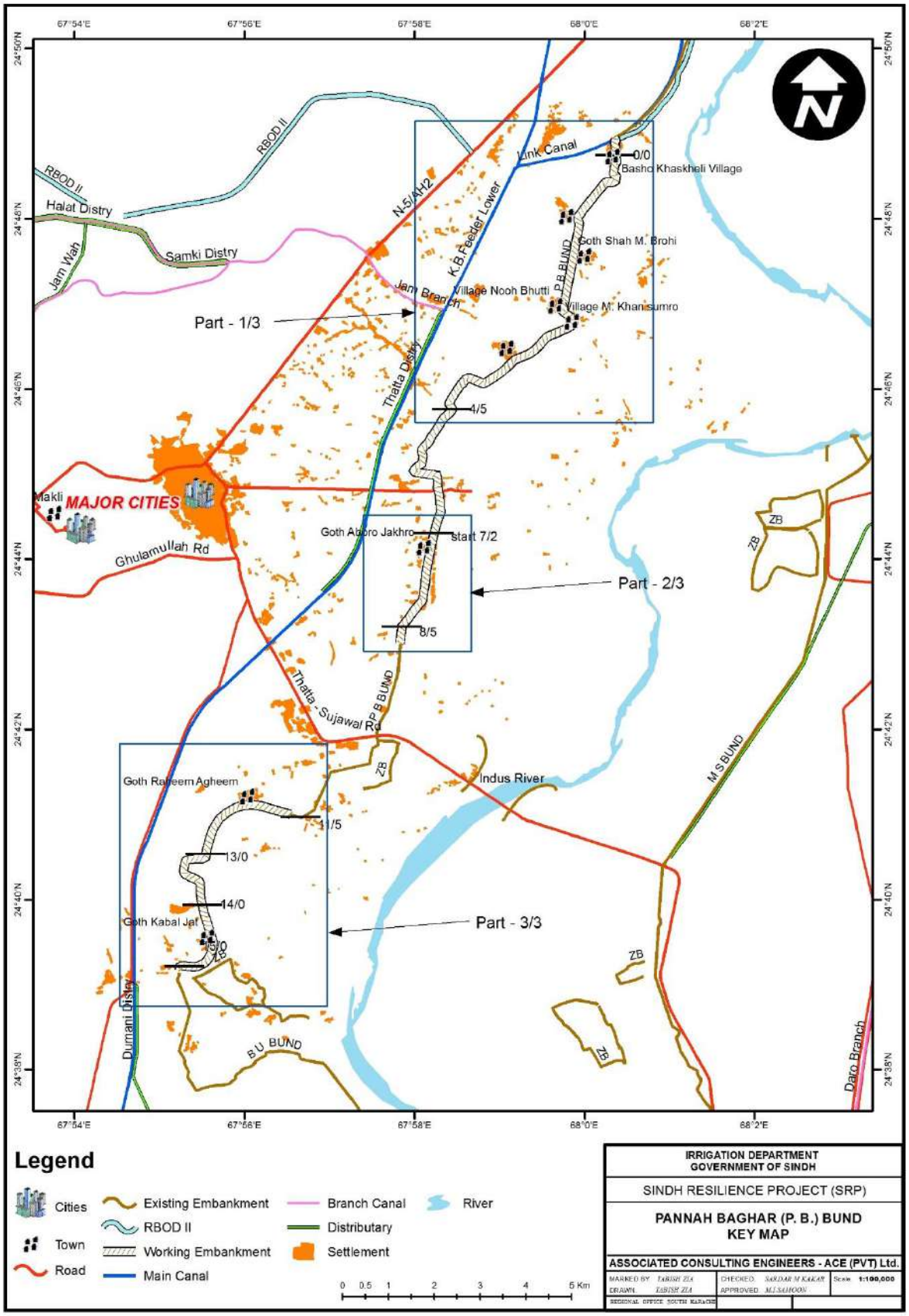


Figure 36: Land Use Map of PB Bund (Key Map)

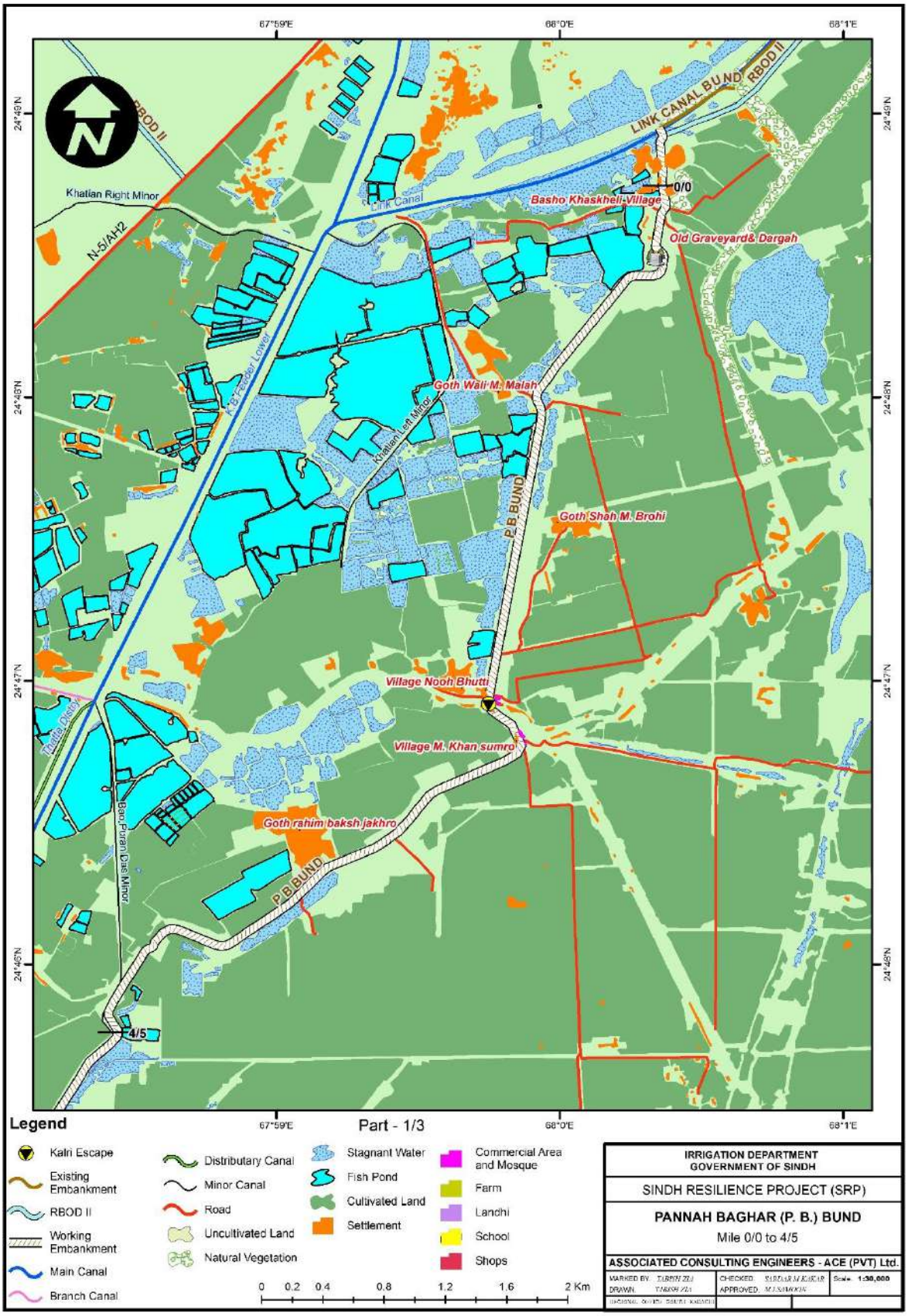


Figure 37: Land Use Map of PB Bund Part 1 of 3 (Mile 0/0 - 4/5)

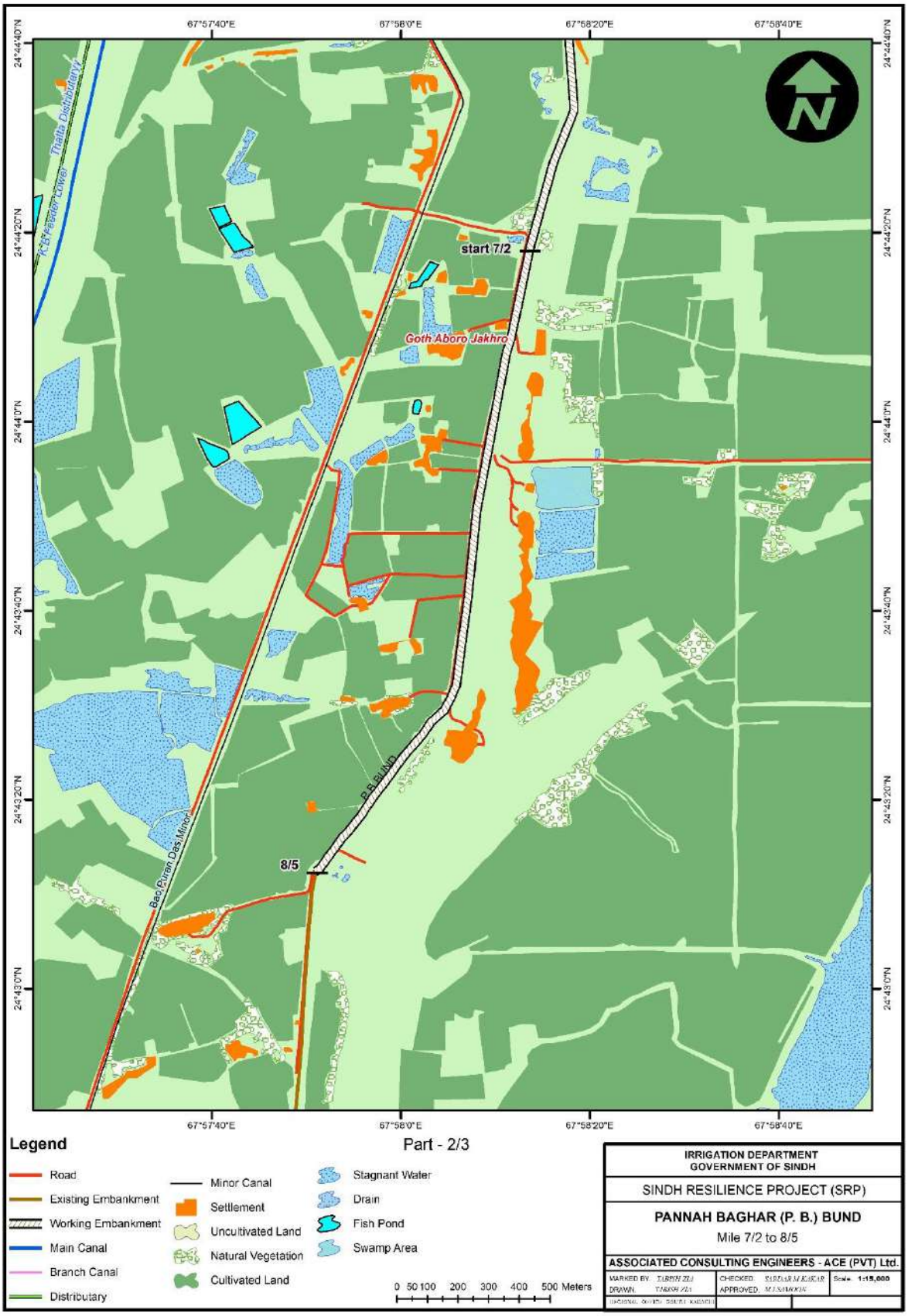


Figure 38: Land Use Map of PB Bund Part 2 of 3 (Mile 7/2 - 8/5)

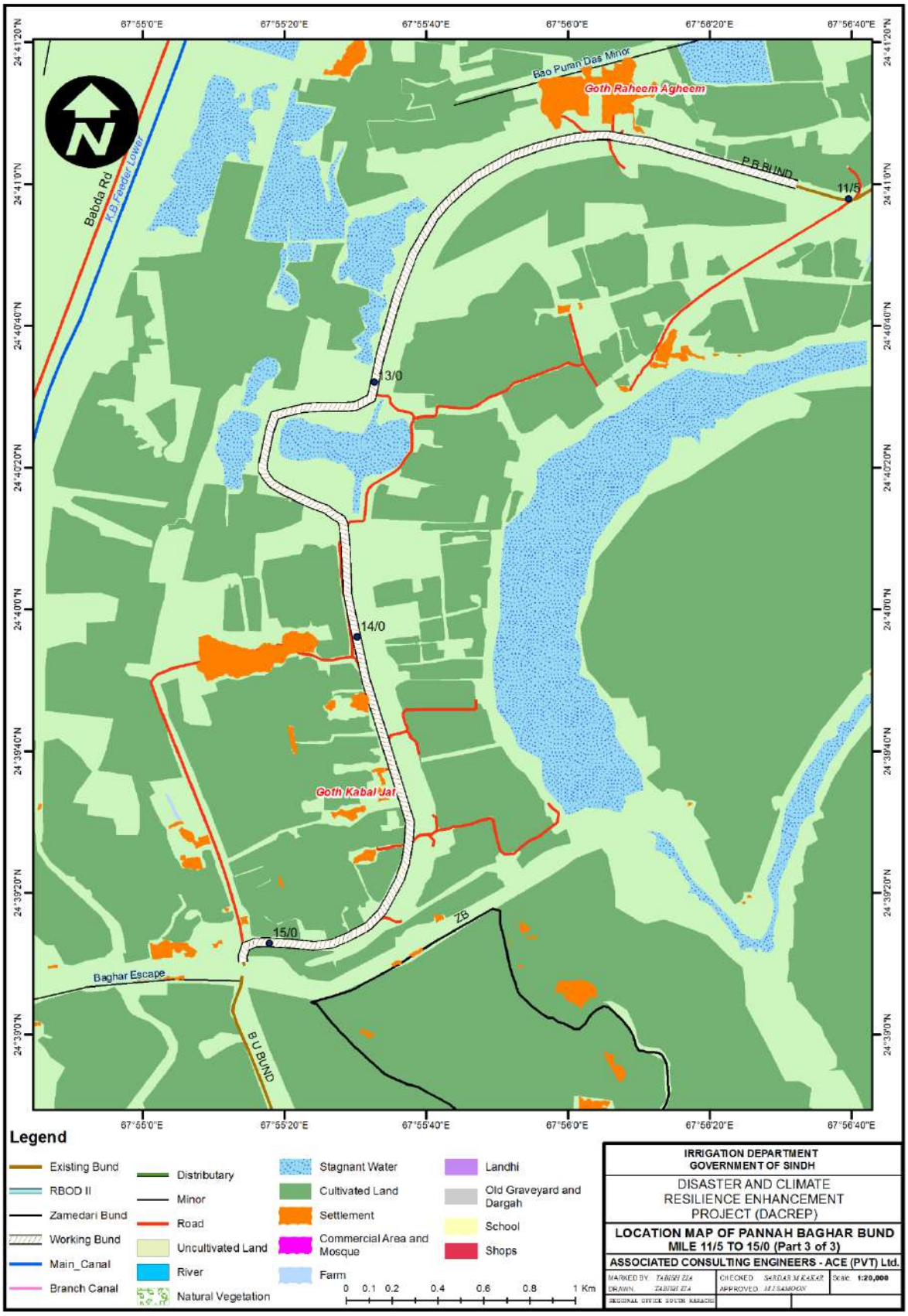


Figure 39: Land Use Map of PB Bund Part 3 of 3 (Mile 11/5 - 15/0)

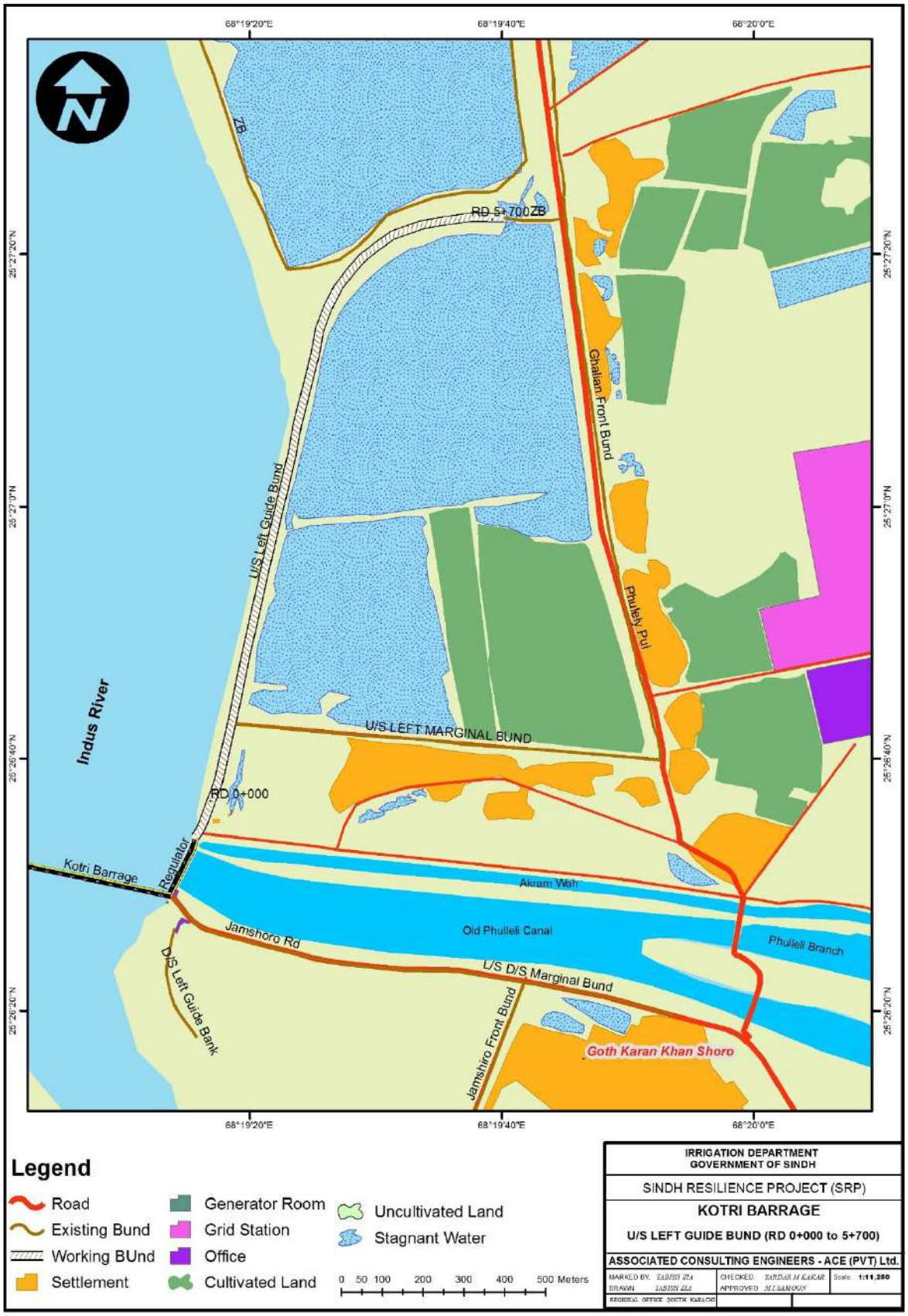


Figure 40: Land Use Map of Kotri Barrage Left Guide Bund (RD 0+000 – 5+700)

5.1.4 Water Resources

a) Surface Water

Indus River and other several fresh and brackish water lakes exist in project area and are the source of surface water. These include the Keenjhar, Haleji, Hadero lakes and Jubho lagoon. 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 Keenjhar 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.

Keenjhar Lake is an important source of drinking water for Thatta District and Karachi city which is 18 kms away from Thatta city and 15 kms away from PB bund. Haleji Lake is an artificial freshwater lake with marshes and a brackish seepage lagoon 40 kms away from PB bund. Hadero Lake is also brackish water wetland which is also 15 km away from sub-project area. These lakes are away from primary impact zone of the sub-project area.

Sujawal 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 at Kotri Barrage, showing before and after commissioning of super structures scenario is given in **Figure-41.**

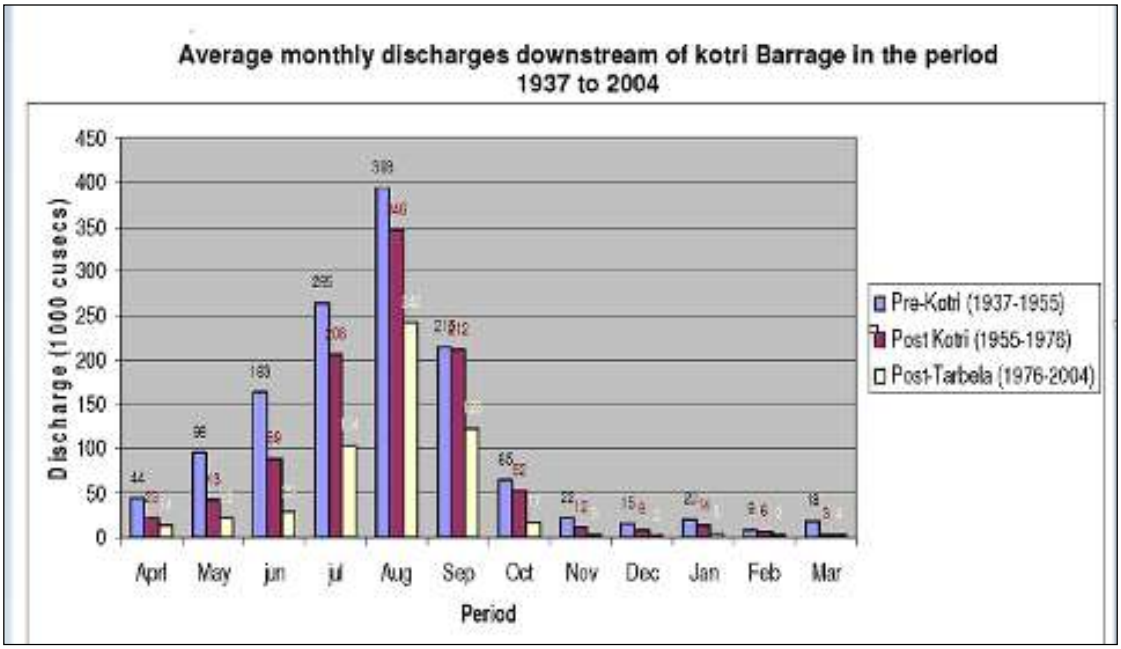


Figure 41: Monthly Discharges Downstream of Kotri Barrage

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, Nitrate and Arsenic are within permissible limits while the Turbidity,Conductivty, Calcium, hardness, TDS, COD, TSS Coliforms and fecal coli are exceeding the permissible limits.the reason for exceeding the limits is due to the untreated domestic and Industrial wastewater is being disposed from various cities located along the River Indus. The detailed results are given in the **Table-6.**

Table 6: Surface Water Quality Analysis (Physical and Chemical Parameters)

Surface Water Quality Test Results

S. Nr	Location	Physical Partners						Chemical Partners									
		Color	Odor	Taste	Conductivity System	Turbidity (NTU)	pH	Bicarbonate	Carbonate	Calcium	Hardness $CaCO_3$ (mg/l)	Potassium (mg/l)	TDS (mg/l)	Nitrate	Nitrite (mg/l)	Phosphate (mg/l)	Arsenic (ppb)
	Permissible limit	Colorless	Un-objectionable	Un-objectionable	NGVS	5	6.5-8.5	NGVS	NGVS	75	500	12(EC)	1000	10	0.02	NG/S	50
1	Surface water, guide bund Kotri barrage (RD 0+00)	Colorless	Un-objectionable	Un-objectionable	1075	17	7.64	150	nil	56	280	8	688	1.846	0.005	0.12	0
2	Surface water, guide bund Kotri barrage (RD 5+700)	Turbid	Un-objectionable	Un-objectionable	553	64	7.63	150	nil	52	210	6	354	2.629	0.055	0.19	0
3	Surface water MS BUND(MILE 3/0)	Colorless	Un-objectionable	Un-objectionable	1238	8.3	7.02	180	nil	84	300	10	792	1.696	0.04	0.14	0
4	surface water MS BUND MILE 24/7	Colorless	Un-objectionable	Un-objectionable	1069	7.5	7.54	150	nil	92	280	9	684	2.004	0.058	0.13	0
5	surface water BU BUND(MILE 3/6)	Colorless	Un-objectionable	Un-objectionable	8380	####	7.07	160	nil	216	1250	38	5363	2.758	0.036	0.19	0
6	surface water P.B BUND(MILE 0/0)	Colorless	Un-objectionable	Un-objectionable	663	16	7.55	160	nil	52	270	4	424	1.842	0.033	0.16	10
7	surface water P.B BUND(MILE 2/0)	Colorless	Un-objectionable	Un-objectionable	9720	27	7.08	110	nil	3430	1700	29	6221	3.142	0.056	0.19	5
8	surface water P.B BUND(MILE 13/0)	Muddy	Un-objectionable	Un-objectionable	9860	36	6.55	180	nil	420	1970	45	6310	3.025	0.026	0.15	5
9	surface water Kuka link bund (mile 4/0)	Colorless	Un-objectionable	Un-objectionable	3030	6.5	7.32	450	nil	104	350	14	1939	21.9	0.19	0.13	0
10	surface water Kuka retarded bund	Muddy	Un-objectionable	Un-objectionable	948	64	7.14	160	nil	52	250	8	607	2.325	0.333	0.026	0

b) Groundwater

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. Ground water samples were collected during field survey and were analysed from PCRWR Karachi in January 2016. The laboratory tests reveal that the pH, Carbonate, EC, and Arsenic were within permissible limit of NEQS and WHO standards while Hardness, Calcium, Nitrate, TDS, TSS, and Turbidity and in some cases Potassium was exceeding the permissible limit in both surface and ground water samples. Similarly, the micro-biological parameters were also exceeding the limit. 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 **Tables 7 and 8**.

Sindh Environmental Quality Standards (SEQS) for Drinking Water Quality in Pakistan are set out and available on the website of the Sindh Environmental Protection Agency[2]**.**

5.1.5 Waterlogging and Salinity

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

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

Currently, almost 43% of the area in the IBIS[3] is classified as waterlogged having depth to water table of <3 m. The province of Sindh is having largest percentage of the IBIS's area (81%) classified as waterlogged. In the last few decades the waterlogged area has increased in the province of Sindh, whereas the province of Punjab has experienced

[2] http://epasindh.gov.pk/Rules/SEQS%202016.pdf

[3] *Salinity and Waterlogging in the Indus Basin of Pakistan: Economic Loss to Agricultural Economy by Sumia Bint Zaman and Dr. Shahid Ahmad.*

Table 7: Physical and Chemical Parameters of Groundwater Quality Analysis

GROUND WATER QUALITY RESULTS																
		Physical Parameters			Chemical Parameters											
Serial No	Location	Color	Odor	Taste	Conductivity System	pH	Bicarbonate	Carbonate	Calcium	Hardness caco3 mg^	Potassium (mg^)	TDS (mg^)	Nitrate	Nitrite mg^	Phosphate (mg^)	Arsenic (ppb)
	Permissible limit	colorless	un-objectionable	un-objectionable	NGVS	6.5-8.5	NGVS	NGVS	75	500	12(EC)	1000	10	0.02	NGVS	50
1	Ground water MS bund (mile 3/5)	colorless	un-objectionable	un-objectionable	1143	7.05	310	nil	88	350	8	731	1.6	0.041	0.5	10
2	Ground water MS bund (mile 6/5)	colorless	un-objectionable	un-objectionable	2470	6.78	390	nil	216	840	6	1581	1.5	0.036	0.42	0
3	Ground water BU bund (mile 4/5)	colorless	un-objectionable	un-objectionable	933	7.36	230	nil	72	330	9	597	1.5	0.395	0.16	0
4	Ground water PB bund (mile 7/2)	colorless	un-objectionable	un-objectionable	1946	6.93	360	nil	160	710	28	1245	1.8	0.031	0.12	0
5	Ground water KUKA LINK bund (mile 9/4)	colorless	un-objectionable	un-objectionable	945	7.1	200	nil	92	330	5	605	1.9	0.031	0.13	0
6	Ground water KUKA LINK bund (mile 10/6)	colorless	un-objectionable	un-objectionable	875	7.27	220	nil	44	300	12	560	1.4	0.108	0.26	50
7	Ground water KUKA WARI bund (mile 4/2)	colorless	un-objectionable	un-objectionable	1252	7.43	270	nil	76	370	15	801	1.7	0.036	0.22	10

Table 8: Summary of Micro Organisms in Water Quality Analysis

WATER QUALITY ANALYSIS RESULTS							
S#	Location	Water quality parameters			Microbiological Parameters		
		Dissolved Oxygen (mg/L)	COD (mg/L)	TSS (mg/L)	Presumptive Coliforms/ 100mL	Fecal Coliforms/ 100mL	E-coli
	Permissible limit	**No limit listed**	**15**	**200**	**0/100**	**0/100**	**cfu/100**
1	Ground water MS bund miles(3/5)	5.3	0	67	500	110	0
2	Ground water MS bund miles(6/5)	4.8	0	13	0	0	0
3	Ground water BU bund miles(4/5)	4.7	0	165	900	70	0
4	Ground water PB bund miles(7/2)	5.7	0	239	50	0	0
5	Ground water KUKA link bund miles(9/4)	4.7	0	63	14	0	0
6	Ground water KUKA link bund miles(10/6)	5.7	0	306	900	80	0
7	Ground water KUKA Wari bund miles(4/2)	5.3	0	180	300	33	0
8	Surface water, guide bund Kotri barrage (RD0+00)	5.7	11	170	-	-	-
9	Surface water, guide bund Kotri barrage (RD5+700)	5.6	15	130	-	-	-
10	Surface water MS bund miles (3/0)	4.4	0	149	-	-	-
11	Surface water MS bund miles (24/7)	4.9	0	201	-	-	-
12	Surface water BU bund (mile 3/6)	4.6	6	326	-	-	-
13	Surface water P.B BUND (MILE 0/0)	5.1	0	372	-	-	-
14	Surface water P.B bund (2.0)	4.8	38	288	-	-	-
15	Surface water P.B BUND (13/0)	5.3	40	464	-	-	-
16	Surface water Kuka link bund (mile 4/0)	5.6	54	157	-	-	-
17	Surface water Kuka retarded bund	5.3	0	472	-	-	-

considerable reduction in the waterlogged area mainly attributed to the abstraction of large amount of groundwater both from public and private tube wells (WAPDA 2005).

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

5.1.6 Air quality

The project area consists of a Bund 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 area and there is no major road network 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. The ambient air quality tests were carried out in April 2015 by M/S Renewable Resources Pvt Ltd through Environmental Research Center, Bahria University Karachi. These analyses were carried out in the sub-projects of Thatta and Sujawal districts **(Table-9)**. Results reveals that all parameters are within permisable limits except particulate matters, which is due the wind corridor and dusty environment, project area has no major source of air pollution.

Whereas ambient air quality tests were carried out in near Hyderabad Toll Plaza near M-9 by M/S SUPARCO for M-9 Motorway Construction project (Karachi to Hyderabad) as given in **Table-10**. Laboratory results reveals that all parameters are within permisable limits except Carbon Monooxide, which is due heavy transport of M-9 highway.

Table 9: Ambient Air Quality Results for Sub-projects in Thatta and Sujawal

S. No	Parameters/Analysis	NAAQS Limits	Units	Results			UTM Co ordinates (m)
				Min.	Max.	Avg.	
1	Sulphur Dioxide (SO_2)	120.0	µg/m³/24 hrs	1.0	1.0	1.0	411921.38 E 2761473.28 N
2	Nitrogen Oxide (NO)	40.0	µg/m³/24 hrs	0.8	1.0	0.9	

3	Oxides of Nitrogen (NO_2)	80.0	µg/m³/24 hrs	23.0	51.0	42.0	
4	Carbon Monoxide (CO)	5.0	µg/m³/18hrs	BDL	BDL	BDL	
5	Particulate Matter (PM_{10})	15.0	µg/m³/24 hrs	18.0	23.0	21.0	

Table 10: Ambient Air Quality Results for the Sub-projects of Hyderabad

S. No	Parameters/Analysis	Pak NEQS	Units	Results
1	Sulphur Dioxide (SO_2)	120	µg/m³/24 hrs	111.2
2	Nitrogen Oxide (NO)	40	µg/m³/24 hrs	39.6
3	Oxides of Nitrogen (NO_2)	80	µg/m³/24 hrs	54.8
4	Carbon Monoxide (CO)	5	µg/m³/18hrs	6.63
5	Particulate Matter (PM_{10})	150	µg/m³/24	91.20

5.1.7 Noise

Environmental noise is unwanted or harmful outdoor sound created by anthropogenic activities, including noise emitted by means of transport-road traffic, rail traffic, and air traffic and from construction site machinery, or industrial activities. Proposed sub-project areas are in sparsely populated areas where traffic is less and no presence of other sources. The noise level readings were undertaken through Sound Level Meter at different miles of MS, BU, PB KUKA and Kotri Barrage guide bunds of Indus River during field survey in Dec 2015 and found within permissible limits of SEQS and WHO standards. The details are provided in given **Table-11.**

Table 11: Ambient Noise Levels in the Sub-project Area

Name of Bund	Location-I		Location-II		Location-III		Date	Time
	GPS Coordinates	Noise Level (dB)	GPS Coordinates	Noise Level (dB)	GPS Coordinates	Noise Level (dB)		
MS Bund	N 24 57.203 E 068 17.428	50	N 24 52.792 E 068 10.860	50	N 24 48.443 E 068 04.256	52	01st jan 2016	Day time
PB Bund	N 24 44.301 E 067 58.219	52	N 24 40. 534 E 067 55.544	54	N 24 39.380 E 067 55.617	50	25th Dec 2015	Day time
BU Bund	N 24 28.428 E 067 54.743	48	N 24 33.064 E 067 56.990	50	N 24 37.284 E67 57.540	50	26th January 2016	Day time

Name of Bund	Location-I		Location-II		Location-III		Date	Time
	GPS Coordinates	Noise Level (dB)	GPS Coordinates	Noise Level (dB)	GPS Coordinates	Noise Level (dB)		
Kuka Bund	N 24 24.987 E 067 56.273	49	N 24 20.907 E 067 52.426	52	N 24 09.961 E 067 44.238	50	27th Dec 2015	Day time
Kotri Barrage Guide Bund	N 25 20 40.02 E 068 19 17.95	52	N 25 26 55.76 E 068 19 21.02	49	N 25 27 22.80 E 068 19 38.87	49	3rd jan 2016	Day time

5.1.8 Soils

Large quantitative of sediments is brought by Indus River and is deposited along the Indus River banks and especially in the deltaic zone. Further hill torrents also bring silt and clay deposits in the lower reaches. These silts provide a highly fertile layer of soil to the region. The soil textures in the sub-project areas are generally clay loam while loam and silt loam also exist. The soil samples were collected from some of the sub-projects and were analysed by Pakistan Council for Research in Water Resources (PCRWR) Karachi. The soil samples were analysed by considering the following sub-parameters, Soil texture; pH; EC; Phosphorous; Potassium; Soluble and Exch Na; Soluble Ca+Mg; and Sodium Adsorption Ratio (SAR).The test results reveals that all the parameters are within permissible limit except SAR is exceeding the standards.

5.2 Biological Environment

5.2.1 Flora

The dominant plant communities are Pluchea, Dipterygium and Salsola and plant species are herbs/shrubs including Coldenia procumbent, Farsetia hamiltonii, Aristolochia bracteolata are common herbs and Amaranthusvirdis, Aristidaadscensionis, Brachiaria eruciformis, and Celosia argentia. The detailed floral profile of the project area is given in the **Table-12** followed by some photographs of the typical vegetation in the area in **Figure-42.**

Table 12: List of Plant Species Identified in Sub-project Area.

S.#	Family	Plant species	Habit	Status by IUCN
1.	Avicenniaceae	*Avicennia marina*	Tree	Common
2.	Boraginaceae	*Coldenia procumbens*	Herb	Common
3.	Boraginaceae	*Cordia gharaf*	Tree	Common
4.	Boraginaceae	*Heliotropium calcareum*	Sub-shrub	Common
5.	Boraginaceae	*Heliotropium curassavicum*	Sub-shrub	Common
6.	Boraginaceae	*Heliotropium strigosum*	Herb	Common
7.	Boraginaceae	*Sericostoma pauciflorum*	Sub-shrub	Common
8.	Boraginaceae	*Trichodesma indicum*	Sub-shrub	Common
9.	Brassicaceae	*Farsetia hamiltonii*	Herb	Common
10.	Caesalpiniaceae	*Senna italic*	Sub-shrub	Common
11.	Capparidaceae	*Cadaba fruticosa*	Shrub	Common
12.	Arecaceae	*Phoenix sylvestris*	Tree	Common
13.	Aristolochiaceae	*Aristolochia bracteolata*	Herb	Common
14.	Asclepiadaceae	*Calotropis procera*	Shrub	Common
15.	Asclepiadaceae	*Caralluma edulis*	Herb	Common
16.	Asclepiadaceae	*Glossonema varians*	Herb	Common
17.	Asclepiadaceae	*Leptadenia pyrotechnica*	Shrub	Common
18.	Asparagaceae	*Asparagus dumosus*	Shrub	Common

Calotropis Procera on BU Bund

Wild Plant in Kuka Retarded Bund Area

Accia Nilotica Tree on MS Bund

Wild Habitat of BU Bund

39.	Capparaceae	*Cyandropsis gynandra*	Herb	Common
40.	Fabaceae	*Trifolium alexandrinum*	Herb	Common
41.	Salviniaceae	*Salvinia molesta*	Herb	Common
42.	Solanaceae	*Solanum cordatum*	Stragglin Shrub	Common
43.	Solanaceae	*Solanum nigrum*	Herb	Common
44.	Solanaceae	*Solanum surattense*	Herb	Common
45.	Tamaricaceae	*Tamarix alii*	Shrub	Common
46.	Tamaricaceae	*Tamarix indica*	Shrub	Common
47.	Tamaricaceae	*Tamarix sp*	Shrub	Common
48.	Typhaceae	*Typha dominghensis*	Reed	Common
49.	Verbenaceae	*Phyla nodiflora*	Herb	Common
50.	Violaceae	*Viola stocksii*	Herb	Common
51.	Zygophyllaceae	*Fagonia indica*	Herb	Common
52.	Poaceae	*Paspalum vaginatum*	Grass	Common
53.	Poaceae	*Phragmites australis*	Large Grass	Common
54.	Poaceae	*Phragmites karka*	Large Grass	Common
55.	Poaceae	*Saccharum benghalense*	Large Grass	Common
56.	Poaceae	*Saccharum griffithii*	Large Grass	Common
57.	Poaceae	*Saccharum spontaneum*	Large Grass	Common
58.	Poaceae	*Sporobolus nervosus*	Grass	Common
59.	Poaceae	*Sporobolus sp. nov.*	Grass	Common
60.	Poaceae	*Tetrapogon tenellus*	Grass	Common
61.	Poaceae	*Tragus roxburgii*	Grass	Common
62.	Portulacaceae	*Portulaca oleracea*	Herb	Common
63.	Potamogetonaceae	*Potamogeton lucens*	Herb	Common

64.	Potamogetonaceae	*Potamogeton natans*	Herb	Common
65.	Potamogetonaceae	*Potamogeton perfoliatus*	Herb	Common
66.	Rhamnaceae	*Ziziphus nummularia*	Shrub	Common
67.	Rubiaceae	*Kohautia retrorsa*	Sub-shrub	Common
68.	Salicaceae	*Populus euphratica*	Tree	Common
69.	Salvadoraceae	*Salvadora oleoides*	Tree	Common
70.	Salvadoraceae	*Salvadora persica*	Tree	Common
71.	Hydrocharitaceae	*Hydrilla verticillata*	Herb	Common
72.	Hydrocharitaceae	*Ottelia alismoides*	Herb	Common
73.	Malvaceae	*Abutilon bidentatum*	Sub-shrub	Common
74.	Malvaceae	*Abutilon muticum*	Sub-shrub	Common
75.	Malvaceae	*Hibiscus micranthus*	Sub-shrub	Common
76.	Malvaceae	*Senra incana*	Sub-shrub	Common
77.	Malvaceae	*Sida ovata*	Sub-shrub	Common
78.	Mimosaceae	*Acacia nilotica*	Tree	Common
79.	Mimosaceae	*Prosopis cineraria*	Tree	Common
80.	Mimosaceae	*Prosopis juliflora*	Large Shrub	Common
81.	Molluginaceae	*Glinus lotoides*	Herb	Common

Figure 42: Typical Vegetation in Sub-project Area

5.2.2 Tree Cover

Annex-C 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 12/0 to 13/0 on MS Bund, 0/0 to Mile 20/6 on Kuka Bund, Mile 0/0 to 8/5 on PB Bund and Mile 0/0 to 14/0 of the BU Bund, and no trees were found during field survey on Kotri Barrage Guide Bund.

The majority of the existing trees on the berms and embankments where stone pitching or raising/strengthening of the embankments is going to be undertaken will be lost during the construction works and site clearance. The contractors will have to replant five times as many trees as lost during construction and it will be a part of the Contracts to be awarded for these Works. An inventory of cut trees shall be maintained by the Contractor and PISSC on site during execution of the Works in order to enforce this.

5.2.3 Fauna

Natural habitat of the area is potential for wildlife species. Fallow land around MS bund is providing refuge to various bird species and mammals like Jackal, Wild boar and rodents. Marshy areas near sea coast provide potential roosting grounds of waders and other water birds. 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 potential hotspot of water fowls and other migratory bird species. During the field study seven (7) large mammal species were observed in which two were common and four were

rare species. While 10 small mammals within the very limited period were recorded. In the field, 16 reptile and amphibians were recorded. Asiatic Jackal is commonly found in the area and Indian wild boar Sus Scrofa is also common. Felis chaus are very rare species. Whereas Velpes bengalonsis and Herpestes javanicus are very rare in the area. Herpestes edwardsi Grey mongoose is also rare species. The Indian desert cat Felis sylvestris ornate is endangered (E); Fishing cat Prionailurus viverrinus and Jungle cat Felis chaus are vulnerable (VU), Grey Mongoose Herpestes edwardsi nar-threatened (NT), Small Indian mongoose Herpestes javanicus is leastconcern (LC) Indian wild boar Sus scrofa and Asiatic Jackal Canis aureus common species (C). During field study large mammals found different local habitats of MS Bund, Kuka bund, BU bund and PB bund.

Large Mammals: In the month of December 2015 a total of seven animals of different species, belonging to seven families (Carnivora and Artiodactyla) were recorded from the project area as given in the **Table-13**.

Table 13: Large Mammals Recorded in the Area

S/N	Large mammals						
	Species Recorded	Conservation Status by IUCN	MS	BU	Kuka	PB	Kotri
1.	Asiatic jackal	LC	+	+	+	+	+
2.	Jungle cat	LC	+	-	+	+	+
3.	Bengal fox	LC	+	-	+	+	-
4.	Small Indian mongoose	LC	+	+	+	+	+
5.	Grey mongoose	LC	-	-	-	+	-
6.	Indian wild boar	LC	+	+	+	+	+
7.	Indus Blind Dolphin	EN	-	-	-	-	+
Total Species Recorded			5	3	5	6	5

Note: (+) means species recorded and (–) means not recorded.
LC = Least concern, EN = Endengered

Asiatic Jackal and Indian wild boar are common and can easily be seen, while Indus river dolphin which is occasionally found in River near to Kotri barrage, it is endangered species and very rare, main population of Indus dolphin is found between Guddu and Sukkur barrage. Grey mongoose, Jungle cat, and Bengal fox are also rare wildlife species found in wild areas. Indian wild boar Susscrofa and Asiatic Jackal Canis aureus are common species according to the IUCN Red List of Pakistan Mammals 2005.

Along MS Bund in upper Pinyari division Hyderabad, foot prints of wild boar were found frequently throughout the study area. Similarly, Asiatic Jackal could be observed in bushy areas along the Bund, field Mouse and Parcupine physical marks were identified on three different locations of MS Bund. A Common bat was observed flying in Gahna Magsi village in evening time. Palm Squirrel was observed throughout in the study area. Most of the species at this area were recorded from bushy areas and agriculture field areas.

Small Mammals: The small mammals found in the sub-project area are given in the following **Table-14.**

Table 14: Small Mammals Species Recorded in the Sub-project Area

S/N	Small Mammals						
	Species	Conservation Status by IUCN	MS	BU	Kuka	PB	Kotri
1.	Sindh Rice Rat	LC	+	+	+	+	+
2.	Palm Squirrel	LC	+	+	+	-	+
3.	House Mouse	LC	-	+	-	+	+
4.	Indian crested Porcupine	LC	+	-	+	+	+
5.	Little Indian field- mouse	LC	+	-	+	+	+
6.	Indian Hedgehog	LC	+	+	+	+	+
7.	Common Rat	LC	-	-	+	+	+
8.	House shrew	LC	+	+	-	+	+

9.	Kuhls' bat	LC	-	+	+	-	-
10.	Indian Gerbil	LC	-	-	-	+	+
Total Species Recorded			**6**	**6**	**7**	**8**	**9**

Note: (+) means species recorded and (–) means not recorded.

Two Gecko species were observed on the roof of the shops on the Bund site near Umar village, a rat snake found in canal water near 14/0 mile. Reptiles are mostly carnivore or insectivore; insects are main food source of herpeto-fauna, therefore lizard and toad prefer to live in prey area. During field survey 2 amphibians and two fresh water turtles were recorded around the study sites. Indian Monitor Lizard and House Gecko were also found from Bund site.

Most of the species at this area were recorded from sandy and agriculture fields areas with one species being recorded in village on road side and another (bat) species found roosting in a tree. The book, "Animal Tracks and Traces" is very useful field guide for identifying wild animals by its physical makes, therefore, for time constrains field team used this book as field guide, however it was convenient 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-15** (also see **Figure-43** for some photographs of key species). 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 61 bird species by interviewing and through personal observations. 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 co-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 has highly declined, even the present survey has been conducted in December and January which is climax of migratory birds, but the trend of winter visitors was 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 fowls, which prefer to roost in very shallow and fresh flooding land and waders roost on water bodies along bund.

Table 15: Avian Species of Study Area

S. No.	Birds Common Name	Conservation status by IUCN	MS	BU	Kuka	PB	Kotri
1.	Black Bittern	LC	-	+	-	-	-
2.	Ashy crowned finch-lark	LC	+	-	-	-	-
3.	Bank Myna	LC	+	+	+	+	-
4.	Black Shouldered Kite	LC	-	-	-	+	+
5.	Grey Shrike	LC	+	+	-	-	-
6.	Black Drongo	LC	+	+	-	+	+
7.	Black Redstart	LC	+	+	-	+	+
8.	Blue Rock Pigeon	LC	+	+	+	+	+
9.	Black winged Stilt	LC	-	+	-	+	
10.	Blue-cheeked Beeater	LC	+	-	+	-	+
11.	Blue-throat	LC	+	+	+	-	-
12.	Caspian tern	LC	+	+	+	+	+
13.	Blue-cheeked Beeater	LC	-		-	+	+
14.	Cattle Egret	LC	+	-	-	-	+
15.	Collared Dove	LC	+	-	-	+	+
16.	Common Babbler	LC	+	+	+	-	-
17.	Common Crow Pheasant	LC	+	-	+	-	+
18.	Kingfisher	LC	+	+	-	-	-
19.	Common Moorhen	LC	+	+	+	-	-
20.	Common Myna	LC	+	+	+	-	+
21.	Common or Black Coot	LC	+	+	+	-	+
22.	Eastern Pied Wheatear	LC	-	+	-	-	-
23.	Crested Lark	LC	+	-	+	+	-
24.	Greenshank	LC	-	+	-	-	+
25.	Eastern Pied Wheatear	LC	+	-	-	+	-
26.	Eurasian sparrow hawk	LC	+	-	-	-	-
27.	Grey Heron	LC	+	+	+	-	+
28.	Glossy ibis	LC	-	-	+	+	+
29.	Hoopoe	LC	+	+	-	-	+
30.	Indian Collared Dove	LC	+	+	+	+	-
31.	Indian house crow	LC	+	+	+	+	+
32.	Indian House Sparrow	LC	+	+	+	+	+
33.	Indian Pond Heron	LC	+	+	+	+	+
34.	Indian River Tern	NT	+	+	-	-	+
35.	Indian Roller	LC	+	+	+	+	
36.	Jungle Babbler	LC	+	+	-	+	+
37.	Little Cormorant	LC	+	+	+	-	+
38.	Little Egret	LC	+	-	-	+	+
39.	Black Redstart	LC	-	-	+	-	+
40.	Brahminy Kite	LC	-	-	+	-	+
41.	Caspian tern	LC	-	-	-	-	+
42.	Cattle Egret	LC	-	-	+	-	+
43.	Collared Dove	NA	-	-	-	-	+
44.	Common buzzard	NA	-	-	-	-	+
45.	Common Crow Pheasant	LC	+	+	+	+	+
46.	Common Moorhen	LC	-	-	-	-	+
47.	Common or Black Coot	LC	+	-	+	-	+
48.	Common Teal	LC	-	-	-	-	+
49.	Grey Heron	LC	-	-	-	-	+
50.	Indian Pond Heron	LC	-	-	+	-	+
51.	Indian River Tern	LC	-	-	-	-	+
Total Species Recorded			33	27	25	21	35

Note: (+) means species recorded and (–) means not recorded.

King Fisher in PB Bund area

Grey Partridge near SM Bund

Indian Cobra

Tree Pie found on SM Bund

Water birds near Kotri guide bund project area

Green Bee eater in PB Bund area

Figure 43: Some Avian Species of the Study Area

Reptiles and Amphibians: The common reptile species in project area are shown in **Table-16,** Natural habitat of the area is potential for wildlife species. Fallow land around MS bund is providing refuge to various bird species and mammals like Jackal, Wild boar and rodents. Marshy areas near sea coast provide potential roosting grounds for waders and other water birds. Crop fields are also 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 potential hotspot for water fowls and other migratory bird species.

Table 16: Reptilian and Amphibian Species in the Project Area

S/N	Reptiles & Amphibians						
	English /Vernacular Name	Conservation status by IUCN	MS	BU	Kuka	PB	Kotri
1	Bull Frog	LC	+	-	-	+	+
2	Marbled Toad	LC	-	+	+	+	+
3	Skittering frog	LC	-	+	-	-	+
4	Bengal monitor	LC	+	+	-	-	+
5	Indian sand boa	LC	+	+	+	+	
6	Indian Cobra	LC	+	-	+	-	+
7	Rate Snake	LC	+	-	+	-	-
8	Grass skink	LC	-	-	+	-	-
9	Saw scale viper	NA	-	-	-	+	-
10	Indian garden lizard	NA	-	-	+	-	-
11	Spiny-tailed ground lizard	NA	-	-	-	+	-
12	Spotted Indian house gecko	LC	+	+	+		+
13	Yellow-bellied house gecko	LC	+	+	+	+	+
14	Spotted pond turtle	VU	-	-	+	+	-
15	Common river turtle	VU	-	+	+	-	+
16	Brown river turtle	VU	-	-	-	-	+
Total Species Recorded			7	8	10	7	**9**

Note: (+) means species recorded and (–) means not recorded.

Varanus bengolensis Indian monitor lizard, *Acanthodactylus cantoris* Indian fringe-toad lizard, *Lissemys punctata andersoni* Indian flap-shell turtle, *Hemidacty lusbrookii* Spotted Indian house gecko are the common species of the sub-project area. While *Trapelusagilis pakistanensis* Brilliant agama, *Naja naja* Black Cobra, *Ophisops jerdonii* Punjab snake-eyed Lacerta are the rarest reptiles. While *Echis carinatus sochureki* Sochurek's saw-scaled viper, *Bufo stomaticus* Marbeld toad and *Eucalyptus c. cyanophlyctis* Skittering frog is in abundance in the area, but *Hoplobatrac hustigerinus* Bull-frog is becoming rare in Sindh.

5.2.4 Habitat

Both Kacha (riverine) and Paka (cultivated) of river land have been converted into cultivated land. The soil in the land is essentially very fine sandy loam, well drained and strongly calcareous, containing Calcium carbonate. Soil is mainly silty-clay loam and silty-clay. 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 *Acacia nilotica* are also grown in the area. Reptile species which may be found here are *aranus bangalansis.* The snake species which include non-poisonous Colubrids and *leptotyphlopids* and poisonous vipers, Cobra and Kariat may also be found in the area.

Bufo stomaticus and *Euphlyctis cyanophlyctis*, which represent amphibians, have also been found in the fresh water pools, irrigation water channels.

5.2.5 Lakes

Several fresh and brackish water lakes exist in project districts. These include the Keenjhar, Haleji, Hadero lakes and Jubho 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.

5.2.6 Riverine Forest

Sindh Forest Department controls an area of 241,198 hectares in the Riverine tract of the province which is 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, Naushahero 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 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 Lai (*Tamarix aphylla*) are gradually disappearing from the tract. Apart from overall degradation of these forests, there occurred sizeable blanks within them due to which the required forest density has diminished.
(Source: http://www.sindhforests.gov.pk)

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:

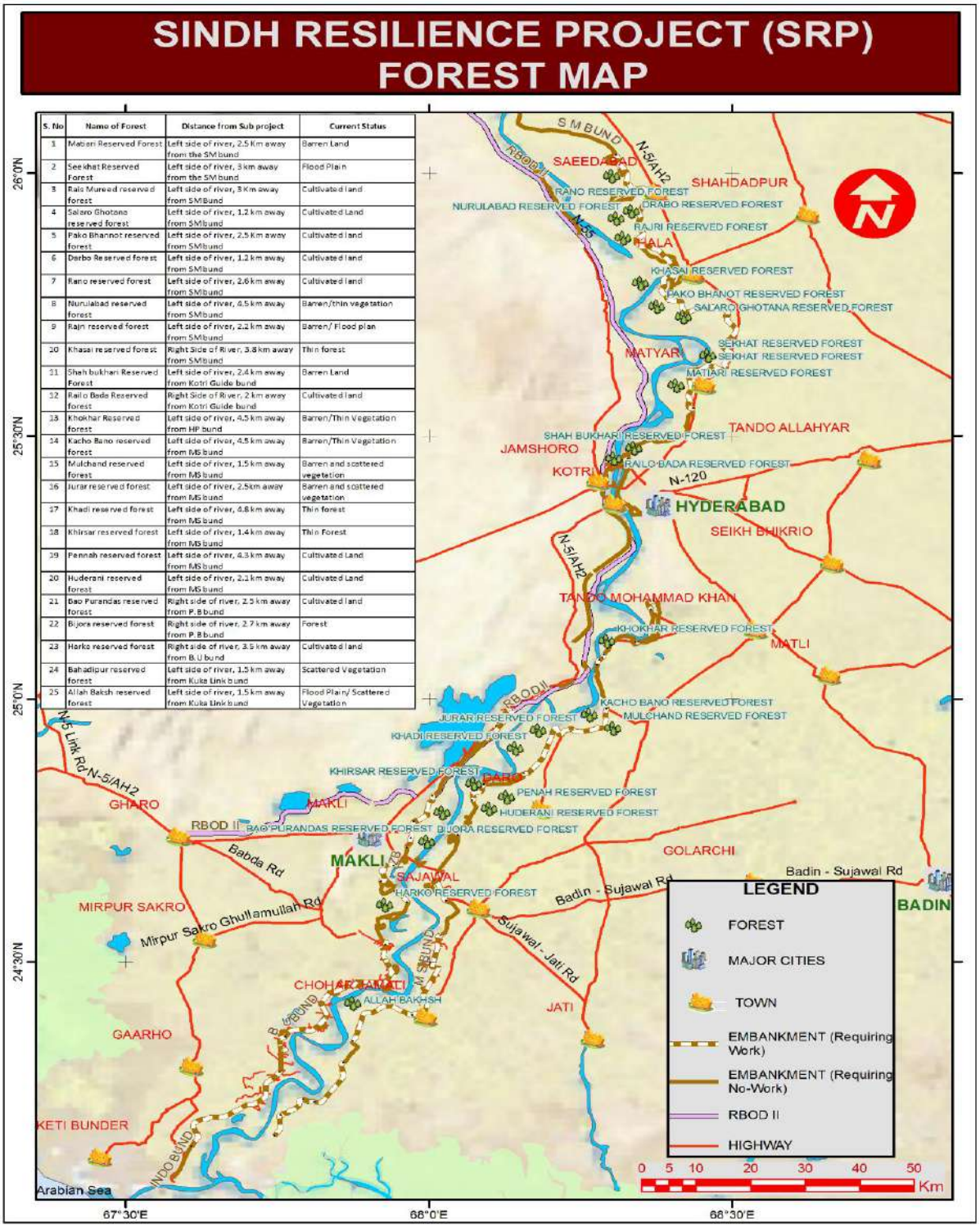
- Severe reduction in flow of fresh water in Indus through floods.
- Population pressure for meeting the local needs of the people.
- Increase in the high lying areas due to low floods.

In the embankments sub-project areas, there are at least a large numbers of protected forests in Thatta and Sujawal districts. Now many of the land of the riverine forests has been converted in agriculture land. A summary of reserve forests in the area is presented in **Table-17** below.

Table 17 : Reserved Forest, Current Status, and Distance from Sub-project Area

S. No	Name of Forest	Distance from sub-project	Current Status
1	Shah Bukhari Reserved Forest	Left side of river, 2.4 km away from Kotri Guide bund	No forest exist, Barren Land observed
2	Railo Bada Reserved Forest	Right Side of River, 2 km away from Kotri Guide bund	Forest has been converted in agricuture land
3	Kacho Bano Reserved Forest	Left side of river, 4.5 km away from MS bund	Barren/Thin Vegetation
4	Mulchand Reserved Forest	Left side of river, 1.5 km away from MS bund	Barren and scattered vegetation
5	Jurar Reserved Forest	Left side of river, 2.5km away from MS bund	Barren and scattered vegetation
6	Khadi Reserved Forest	Left side of river, 4.8 km away from MS bund	Thin forest
7	Khirsar Reserved Forest	Left side of river, 1.4 km away from MS bund	Thin forest
8	Pennah Reserved Forest	Left side of river, 4.3 km away from MS bund	Forest has been converted in agricuture land
9	Huderani Reserved Forest	Left side of river, 2.1 km away from MS bund	Forest has been converted in agricuture land
10	Bao Purandas Reserved Forest	Right side of river, 2.5 km away from P.B bund	Forest has been converted in agricuture land
11	Bijora Reserved Forest	Right side of river, 2.7 km away from P.B bund	Forest exist
12	Harko Reserved Forest	Right side of river, 3.5 km away from B.U bund	Forest has been converted in agricuture land
13	Bahadipur Reserved Forest	Left side of river, 1.5 km away from Kuka Link bund	Scattered Vegetation observed
14	Allah Baksh Reserved Forest	Left side of river, 1.5 km away from Kuka Link bund	Flood Plain/ Scattered Vegetation

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 area is shown in **Figure-44**.



S. No	Name of Forest	Distance from Sub project	Current Status
1	Mabari Reserved Forest	Left side of river, 2.5 Km away from the SM bund	Barren Land
2	Seekhat Reserved Forest	Left side of river, 3 km away from the SM bund	Flood Plain
3	Rais Murad reserved forest	Left side of river, 3 Km away from SM Bund	Cultivated land
4	Salaro Ghotana reserved forest	Left side of river, 1.2 km away from SM bund	Cultivated Land
5	Pako Bhannot reserved forest	Left side of river, 2.5 km away from SM bund	Cultivated land
6	Darbo Reserved forest	Left side of river, 1.2 km away from SM bund	Cultivated land
7	Rano reserved forest	Left side of river, 2.6 km away from SM bund	Cultivated land
8	Nurulabad reserved forest	Left side of river, 6.5 km away from SM bund	Barren/thin vegetation
9	Rajri reserved forest	Left side of river, 2.2 km away from SM bund	Barren/ Flood plan
10	Khasai reserved forest	Right Side of River, 3.8 km away from SM bund	Thin forest
11	Shah bukhari Reserved Forest	Left side of river, 2.4 km away from Kotri Guide bund	Barren Land
12	Railo Bada Reserved forest	Right Side of River, 2 km away from Kotri Guide bund	Cultivated land
13	Khokhar Reserved forest	Left side of river, 4.5 km away from HP bund	Barren/Thin Vegetation
14	Kacho Bano reserved forest	Left side of river, 4.5 km away from MS bund	Barren/Thin Vegetation
15	Mulchand reserved forest	Left side of river, 1.5 km away from MS bund	Barren and scattered vegetation
16	Jurar reserved forest	Left side of river, 2.5km away from MS bund	Barren and scattered vegetation
17	Khadi reserved forest	Left side of river, 4.8 km away from MS bund	Thin forest
18	Khirsar reserved forest	Left side of river, 1.4 km away from MS bund	Thin Forest
19	Pennah reserved forest	Left side of river, 4.3 km away from MS bund	Cultivated Land
20	Huderani reserved forest	Left side of river, 2.1 km away from MS bund	Cultivated Land
21	Bao Purandas reserved forest	Right side of river, 2.5 km away from P.B bund	Cultivated land
22	Bijora reserved forest	Right side of river, 2.7 km away from P.B bund	Forest
23	Harko reserved forest	Right side of river, 3.5 km away from B.U bund	Cultivated land
24	Bahadipur reserved forest	Left side of river, 1.5 km away from Kuka Link bund	Scattered Vegetation
25	Allah Baksh reserved forest	Left side of river, 1.5 km away from Kuka Link bund	Flood Plain/ Scattered Vegetation

Figure 44: Forest Area of Embankment Sub-project

5.2.7 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-18.**

Table 18: Fish Species of Commercial Value in the Project Area

Local Name	Scientific Name
Palo	Tenualosa ilisha
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
Singhari	Sperata sarwari
Malli	Wallago attu
Luhur	Heteropneustes fossilis
Chitti Mundi	Notopterus spp
Jerko	
Popri	Puntius ticto

5.3 Socio–economic Baseline

Thatta and Sujawal districts have been consecutively hit by floods 2010 and 2011. The floods of 2010 had a devastating effect on both districts as all the union councils were affected. Most of the sources of livelihood were destroyed for the population, particularly for those whose livelihood was dependent on agriculture and related sectors. Moreover, 68,200 hectares of rice crop was damaged which caused yield loss of 2,788 kg/ha. Sugarcane crop was also severely damaged as 29,400 hectares of crop was lost, which caused a yield loss 51.3 tons/ha. Besides, cotton crop and fodder were also adversely affected.

Similarly, sources of livelihood were severely affected due to floods in 2011 as the damages to households and livelihoods were enormous. The damage of crop due to floods 2011 was quite significant as 84% of the cotton crop was damaged along with 65%

of the rice crop, 26 % sugarcane and 78% of other crops. 65 livestock heads died due to floods.

In order to establish a social baseline of the project area, surveys and consultations were carried out in all villages lying within the primary impact zone of CoI, while public consultation process was not carried out in secondary impacts zone, which is considered within the radius of 1km on each side of the embankments. Those falling out of primary impact zone on PB bund 6 villages and BU Indo, 2 villages in Thatta district, MS bund, 5 villages and Kuka Link, Kuka Wari, 14 villages falling in Sujawal district. While Guide bund Kotri Barrage 2 villages were in Hyderabad district within their primary and secondary impact zone during the month of November and December 2015. According to the community, out of total 29 surveyed villages, only in 1 village of MS bund, the flood damages of households and livelihood reported **Table -19**. While in 7 villages of Kuka link, Kuka Wari and Kuka retarded also the flood damages of houses and standing crops were reported (In 2010 flood).

Table 19: List of Villages included in Socio-economic Baseline Survey

S. No.	Sub-Project Name	Name of District	Name of Tehsil	Name of UC	Name of Village	Out/Inside the River
1	PB Bund	Thatta	Thatta	Chuto Chand	Basho Khaskheli	Outside
2	PB Bund	Thatta	Thatta	Chuto Chand	Sher Muhammad Brohi	Inside
3	PB Bund	Thatta	Thatta	Chuto Chand	Wali Muhammad Mallah Goth	Outside
4	PB Bund	Thatta	Thatta	Chuto Chand	Goth Nooh Bhatti/ Khan Soomro	Both sides
5	PB Bund	Thatta	Thatta	Kalan Kot	Goth M. Rahim Ageem	Outside
6	PB bund	Thatta	Thatta	Kalan Kot	Abro Jakro Goth	Outside
7	Kuka Wari	Sujawal	Shah Bundar	Doulatpur	Ahamad Magsi	Outside
8	Kuka Wari	Sujawal	Shah Bundar	Doulatpur	Ghulam M. Goth	Outside
9	Kuka Wari	Sujawal	Shah Bundar	Tongo Jalbani	Qadir Dino Shah Goth	Outside
10	Kuka Wari	Sujawal	Shah Bundar	Doulatpur	Ashraf Otho	Outside
11	Kuka Link	Sujawal	Shah Bundar	Doulatpur	Goth Wali M. Sehto	Inside
12	Kuka Link	Sujawal	Shah Bundar	Tongo Jalbani	Goth Urs Karo	Outside
13	Kuka Link	Sujawal	Shah Bundar	Tongo Jalbani	Goth Bachal Khaskheli	Inside
14	Kuka Link	Sujawal	Shah Bundar	Tongo Jalbani	Goth Ali M.	Inside
15	Kuka Link	Sujawal	Shah Bundar	Tongo Jalbani	Goth Allah Dino	Inside
16	Kuka Retarded	Sujawal	Shah Bundar	Doulatpur	Goth M. Ibrahim Zangeja	Outside
17	Kuka Retarded	Sujawal	Shah Bundar	Doulatpur	Haji M. Omar	Inside
18	Kuka Retarded	Sujawal	Shah Bundar	Doulatpur	Goth Jiyand Zangeja	Outside
19	Kuka Retarded	Sujawal	Shah Bundar	Tongo Jalbani	Goth Ali Baran	Inside
20	Kuka Retarded	Sujawal	Shah Bundar	Doulatpur	Goth Subhan Shah	Outside
21	MS Bund	Sujawal	Mir Pur Bathoro	Bijora	Goth Rantha	Outside
22	MS Bund	Sujawal	Mir Pur Bathoro	Bijora	Vikio Machi	Outside

S. No.	Sub-Project Name	Name of District	Name of Tehsil	Name of UC	Name of Village	Out/Inside the River
23	MS Bund	Sujawal	Mir Pur Bathoro	Mir Pur Bathoro	Goth Ghana Magsi	Outside
24	MS Bund	Sujawal	Mir Pur Bathoro	Mir Pur Bathoro	Omar Mallah	Inside
25	MS Bund	Sujawal	Mir Pur Bathoro	Bano Sher	Bano Sher	Outside
26	BU Bund	Thatta	Memon	Kokar	Goth Haji Natho Memon	Inside
27	BU Bund	Thatta	Mammon Sarai	Kokar	Goth Haji Lala Memon	Inside
28	Kotri Barrage Bund	Hyderabad	Hyderabad	Mallah	Goth Achar Mallah	Outside
29	Kotri Barrage Bund	Hyderabad	Hyderabad	Samo	Goth Muhammad Ali Samo	Outside

The questionnaires used during the study are provided in **Annex-D**. The information collected 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) were also collected.

In each village visited during the study, the female sociologist arranged meetings with women of all ages in a separate room where local males were discouraged to enter. Meetings were conducted in Sindhi language.

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.

List of flood damages in villages of sub-project area is provided in **Table -20.**

Table 20: Extent of Damages due to Flood in the Project Area in 2010

S. Nr	Name of Bund	Total No of Villages	Estimated Households	Estimated Population	No of Villages Affected in the Flood	Type of Losses
1	PB	6	1,030	7,650	-	-
2	MS	5	1674	14060	1	Houses and Standing Crops
3	Kuka Link/Kuka Wari	14	3801	13905	7	Houses and Standing Crops
4	BU Indo	2	230	1550	0	0
5	Guide Bund Kotri	2	140	1400	0	0
Total		**29**	**6,875**	**38,565**	**8**	

5.3.1 Population

According to the results of the survey, total households of sub-projects PB-bund, Kuka Wari-bund, Kuka link, Kuka Retarded, SM bund, Kotri barrage guide bund and BU bund are 6,875 with a total population of 38,565. PB and BU bunds are in Thatta district, MS, Kuka Wari, Kuka link and Kuka Retarded bunds are in district Sujawal, while Kotri barrage Guide bund is in district Hyderabad.

Total population of the Project area is 38,565, belongs to the Khaskheli, Brohi, Mallah, Bhatti, Shoro and Jakhro on PB-bund, Magsi, Syed, Kehar, Mallah, Memon, Pashtun and Othao on Kuka Wari bund, Sehto, Khaskheli, Kehar and Solangi on Kuka link bund, Barani, Zangeja and Syed on Kuka Retarded bund, while Machhi, Kholi, Ranta, Magsi, Palejo and Khaskheli were found on MS Bund. Sindhi is the main language in the Sub-Project area whereas most of the people particularly male can also speak Urdu and Saraiki.

The dominant ethnic group in the project area is the Khaskheli. The sub-project wise detail is given in the**Tables 21 to 27.**

Table 21 : Population and Tribes on PB Bund

Name of Village	Population and Housing		Tribe and Religion		Occupation		Main Language Spoken
	Population (No.)	House-holds	Tribes/ Clan	Religion	Primary	Secondary	
Basho Khaskheli	150	20	Khaskheli	Islam	Agriculture	Labour	Sindhi
Sher Muhammad Brohi	700	107	Brohi	Islam	Agriculture	Labour	Sindhi
Wali Muhammad Mallah Goth	300	38	Mallah	Islam	Agriculture	Labour	Sindhi
Goth Nooh Bhatti / Khan M. Soomro	3500	415	Bhatti, Khaskheli, Shoro, Mallah	Islam	Agriculture	Labour	Sindhi
Goth M. Rahim Agheem	2000	250	Agheem, Shorha	Islam	Agriculture	Labour	Sindhi
Abro Jakro Goth	1000	200	Jakro	Islam	Agriculture	Labour	Sindhi
Total	**7650**	**1030**					

Table 22 : Population and Tribes on Kuka Wari Bund

Name of Village	Population and Housing		Tribe and Religion		Occupation		Language Spoken
	Population (No.)	House holds	Tribes/ Clan	Religion	Primary	Secondary	
Ahamad Magsi	600	200	Magsi	Islam	Agriculture	Labour	Sindhi
Ghulam M. Goth	500	100	Syed, Kehar, Mallah	Islam	Agriculture	Labour	Sindhi
Qadir Dino Shah Goth	3000	500	Memon, Kehar, Pashtun, Mallah	Islam	Agriculture	Labour	Sindhi
Ashraf Otho	180	25	Otho	Islam	Agriculture	Livestock	Sindhi
Total	**4280**	**825**					

Table 23: Population and Tribes on Kuka Link Bund

Name of Village	Population and Housing		Tribe and Religion		Occupation		Language Spoken
	population (No.)	House holds	Tribes/ Clan	Religion	Primary	Secondary	
Goth Wali M. Sehto	480	60	Sehto	Islam	Livestock	Labour	Sindhi
Goth Urs Karo	105	20	Kehov	Islam	Agriculture	Livestock	Sindhi
Goth Bachal Khaskheli	200	50	Khaskheli	Islam	Agriculture	Labour	Sindhi
Goth Ali M.	500	120	Solangi	Islam	Agriculture	Labour	Sindhi
Goth Allah Dino	500	130	Solangi	Islam	Agriculture	Labour	Sindhi
Total	**1785**	**380**					

Table 24: Population and Tribes on Kuka Retarded Bund

Name of Village	Population and Housing		Tribe and Religion		Occupation		Language Spoken
	Population (No.)	House holds	Tribes/ Clan	Religion	Primary	Secondary	
Goth M. Ibrahim Zangeja	200	25	Zangeja	Islam	Agriculture	Livestock	Sindhi
Haji M. Omar	40	9	Zangeja	Islam	Agriculture	livestock	Sindhi
Goth Jiyand Zangeja	3000	1500	Zangeja	Islam	Agriculture	Labour	Sindhi
Goth Ali Baran	4000	1000	Barani	Islam	Fishing	Agriculture	Sindhi
Goth Subhan Shah	600	62	Zangeja, Sayed	Islam	Agriculture	Labour	Sindhi
Total	**7840**	**2596**					

Table 25: Population and Tribes on MS Bund

Name of Village	Population and Housing		Tribe and Religion		Occupation		Language Spoken
	Population (No.)	House holds	Tribes/ Clan	Religion	Primary	Secondary	
Goth Rantho	2500	250	Ranta	Islam	Agriculture	Labour	Sindhi
Vikio Machi	110	14	Machhi	Islam	Labour	Labour	Sindhi
Gana Magsi	1200	120	Magsi, Syed	Islam	Labour	Labour	Sindhi
Omar Mallah	250	40	Kandra	Islam	Agriculture	Labour	Sindhi
Bano Sher	10000	1250	Palejo, Mallah, Syed, Khaskheli	Islam	Tenant	Labour	Sindhi
Total	**14060**	**1674**					

Table 26: Population and Tribes on BU Bund

Name of Village	Population and Housing		Tribe and Religion		Occupation		Language Spoken
	Population (No.)	House holds	Tribes/ Clan	Religion	Primary	Secondary	
Goth Haji Natho	250	30	Mallah	Islam	Fisheries	Livestock	Sindhi
Haji Lala Memon	1300	200	Memon Sarai	Islam	Agriculture	livestock	Sindhi
Total	**1550**	**230**					

Table 27: Population and Tribes on Kotri barrage Guide Bund

Name of Village	Population and Housing		Tribe and Religion		Occupation		Language Spoken
	Population (No.)	House holds	Tribes/ Clan	Religion	Primary	Secondary	
Goth Achar Mallah	1200	120	Mallah	Islam	Fisheries	Livestock	Sindhi
Goth Muhammad Ali Samo	200	20	Mammon Sarai	Islam	Agriculture	livestock	Sindhi
Total	**1400**	**140**					

Source: Socio-Economic and Social Impacts Assessment Survey of SRP, 2015-16.

5.3.2 Languages

Sindhi is the dominant language spoken by all the people in the project area. In about 95 per cent villages Urdu is also spoken and understood.

5.3.3 Family system

The majority of those in the study area live together with their extended families (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 their own individual families.

5.3.4 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.

5.3.5 Social Cohesion and Conflict

Social organization in all villages is strongly based on Biradari (tribal) system, where each tribe has a tribal head. The tribe heads 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 mostly applies to marriages, where it is the preferred for young tribal members to marry the member of the same tribe.

Interactions between different tribes are not 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 the residents.

5.3.6 Conflict Resolution within Tribes and Villages

According to the socio-economic survey, there is no major inter or intra tribal disputes among the people in the project area. The conflict resolution pattern in the project area is mainly about the right of vote, marriage settlements and other matters which 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 heads 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 village head or tribal leader, matters may go to the police and ultimately to the court of law. The police and the court of law are the last options and these are rarely exercised.

5.3.7 Housing

The project area consists of rural population living comparatively in 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 of goods or grains. 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.

5.3.8 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 2014 to June 2015. The report reveals that in Sindh the percentage of educated people dropped by 4% to 56% in 2014-15. Just over about 5% of those living in project area have received education to any level

5.3.9 Educational Facilities

There are 22 boys and 6 girls Primary schools, 3 middle schools for boys and a high school for boys exist within radius of 1km on both sides of the sub-project area. Education facilities in the Project Area are given in **Table-28.**

Table 28: Education Facilities in the Project Area

Description	Boys Primary Schools	Girls Primary Schools	Boys Middle Schools	Girls Middle Schools	Boys High Schools
No of Schools	22	06	03	0	01
Enrolment	2563	780	140	0	700

Source: Socio-Economic and Social Impacts Assessment Survey of SRP, 2015-16.
District level education facilities are given **Table-29** while details of village wise educational and other facilities are given in **Annex-E**.

Table 29: Education Facilities in Districts of Thatta and Sujawal

S. No	Education Facilities	Thatta		Sujawal	
		Male	Female	Male	Female
1	Primary School level Enrolment	33,735	20,582	35,106	21,156
2	Teachers/ Staff in the Primary Schools	1,497	347	1,822	211
3	Number of Middle Schools By Sex	43		28	
4	Enrolment of Middle Schools by Sex	908	711	436	868
5	Teaching Staff in Middle Schools by Sex	100	58	78	54
6	Elementary Schools by Sex	5		0	0
7	No of enrolment of Elementary Schools by Sex	628	522	0	0
8	Secondary Schools by Sex	38		20	
9	Enrolment in Secondary Schools by Sex	6632	3888	5042	2028
10	Higher Secondary by Sex	7		7	
11	Enrolment Of Higher Secondary Schools by Sex	3825	796	3570	1254
12	Teaching Staff of Higher Secondary Schools by Sex	142	27	149	28

5.3.10 Health

It is found that many of the people have suffered from hepatitis, typhoid, eye problems, diarrhoea and other hygiene related diseases. Details may be seen in **Annex-E1 and E2**. Some of women expire during their delivery. Majority of the women are malnourished usually being the last ones to eat their meals in the family. There are two dispensaries and three Basic Health Units (BHU) in the project area; one each in MS bund area, Kuka Wari and Kuka Retarded area of Sujawal District. The seriously ill patients are taken for treatment to Thatta, Sujawal, and Hyderabad district hospitals.

5.3.11 Transport

Most of surveyed villages have village tracks or unsurfaced (Kacha) tracks that are in bad condition except of thesome 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, Sujawal, Hyderabad 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. Village profile data show that 27 villages (93%) have access to Van/Pickups facility, only one village (3%) has access to Bus facility, 3 villages (10%) have cars and 26 villages (90%) have motor cycles. The farm inputs and outputs are transported through Trucks, Trailers and Tractor Trolleys. The

animals from the project area are transported to Hyderabad and Karachi by Trucks. The Firewood and Furniture wood is also transported through Trucks and Trolleys.

5.3.12 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 outside the CoI of the project area.

5.3.13 Energy Source

The Electricity is available in 12 (41%) villages as may be seen in **Annex-E6**. This energy source is being utilized mainly for lighting of the houses and operation of tube wells for drinking water supplies and irrigation etc. In addition to it, people also collect the firewood from the surrounding area and some people purchase firewood from nearby town.

5.3.14 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 1913 hand pumps exist in the project area and overall average ground water depth in sample area was 25 to 50 ft in project area for hand pumps. In 10 villages out of 29 where the ground water is saline and unsuitable for drinking purposes, the population relies on the canals for the supply of drinking water. Within the project area people drain out used water in open places and dump solid waste in the open.

5.3.15 Women in Sub-project 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 29 villages. **Table-30** randomly along the Indus River embankment. A detailed results/description of the survey is presented in the following sections.

Table 30: Location of Cluster Meetings with Females

Name of Villages	Name of Bund (location)	No of Participants	Inacom an skills	Education level	Women Rights	Health and hygiene	WAS (yes/no)	Income source
Ahamad Magsi	Kuka Wari, Kuka Link and Kuka Retarded Bunds	17	Embroidery	0%	Poor	Poor	No	Embroidery
Ghulam M. Goth		9	Embroidery	0%	Poor	Fair	No	Embroidery
Qadir Dino Shah Goth		13	Embroidery	0%	Poor	Fair	No	Embroidery
Ashraf Otho		11	Embroidery	0%	Poor	Poor	No	Embroidery
Goth Wali M.Sehto		26	Embroidery	0%	Poor	Fair	No	Embroidery
Goth Urs Karo		10	Embroidery	0%	Poor	Fair	No	Embroidery
Goth Bachal Khaskheli		32	Embroidery	0%	Poor	Poor	No	Embroidery
Goth Ali Murad		54	Embroidery	0%	Poor	Fair	No	Embroidery
Goth Allah Dino		12	Embroidery	0%	Poor	Fair	No	Embroidery
Goth M. Ibrahim Zangeja		26	Embroidery	0%	Poor	Fair	No	Embroidery and Agriculture
Haji M. Omar		13	Net Making	0%	Poor	Poor	No	Net Making and Agriculture
Goth Jiyand Zangeja		21	Embroidery	0%	Poor	Poor	No	Embroidery
Goth Ali Baran		31	Embroidery Tailoring	0%	fair	Fair	Yes	Embroidery and Agriculture
Goth Subhan Shah		17	Tailoring/Raly Making	0%	Poor	Poor	No	Agriculture and Rally Making
Basho Khaskheli	PB Bund	38	Embroidery	0%	Poor	Fair	No	Embroidery / Rally Making
Sher Muhammad Brohi		45	Embroidery	0%	Poor	Fair	No	Embroidery / Rally Making
Wali Muhammad Mallah Goth		13	Embroidery	0%	Poor	Fair	No	Embroidery / Rally Making
Goth Nooh Bhatti/ Khan M. Soomro		22	Embroidery	0%	Poor	Fair	No	Embroidery / Rally Making
Goth M. Rahim Agheem		10	Embroidery	0%	Poor	Fair	No	Embroidery / Rally Making
Abro Jakro Goth		8	Embroidery	0%	Poor	Fair	No	Embroidery / Rally Making
Goth Rantho	MS Bund	53	Embroidery	5%	Poor	Fair	No	Embroidery / Rally Making
Vikio Machi		10	Embroidery	10%	Poor	Fair	No	Embroidery / Rally Making
Goth Ghana Magsi		30	Embroidery	0%	Poor	Fair	No	Embroidery / Rally Making
Omar Gandra		20	Embroidery	0%	Poor	Fair	No	Embroidery / Rally Making
Bano Sher		14	Embroidery	0%	Poor	Fair	No	Embroidery / Rally Making
Goth Haji Natho Memon	BU Bund	17	Embroidery	0%	Poor	Fair	No	Embroidery / Rally Making
Goth Pohnu Khan Sirai		20	Embroidery	0%	Poor	Fair	No	Embroidery / Rally Making
Village Achar Mallah	K.Guide Bund	20	Embroidery and Fishing	0%	Poor	Fair	No	Embroidery and Fishing
Village Muhammad Ali Samo		14	Embroidery and Fishing	0%	Poor	Fair	No	Embroidery and Fishing

The status of women in the project area is classified as low class. Gender specialists visited the 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 Katcha house (Figure 40). 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 in embroidery. Many women spend their free time in embroidering. There is the opportunity for women to use these skills for the source of income.

Figure 45: Housing Pattern in the Sub-project Area

Majority 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 level. Of the total educated population of the project area, only 16% are female.

The health and hygiene condition of females and children is very poor. Many diseases are identified within the CoI, i.e. skin diseases, diarrhea, hepatitis, typhoid, and flue. Many women are suffering from endemic diseases.

5.3.16 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-E4.**

5.3.17 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 Link roads construction.
- Demanded for the provision of health facilities in the project area.
- Electricity connections for houses.
- Employment for the jobless and educated youths.
- It was observed that the clean drinking water was the key requirement during consultation.

The sub-project wise needs are given in the following **Table-31.**

Table 31: Priority Needs of the Male Community Members

S. No	Name of Bund	Drinking Water	Education	Link Road	Health	Electricity	Gas	Employment
1	MS Bund	23.1	84.6	15.4	46.2	38.5	7.7	15.4
2	PB Bund	83.3	66.7	16.7	16.7	16.7	16.7	0
3	BU Bund	0	50	0	0	0	0	50
4	Kuka Wari Bund	25	50	50	50	75	0	0
5	Kuka Link Bund	40	100	0	40	20	0	20
6	Kuka Retarted Bund	0	80	20	20	20	0	0
7	Kotri Guide Bund	0	25	0	5	15	12.0	50

5.3.18 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 basic living facilities including (health, education and drinking water, electricity and road communication).
- Demanded for water and sanitation water and sanitation facilities in the villages.
- Demanded for hand pumps in the villages
- Demanded alternate plot for shift settlement to safe place

- Requested for provision of separate school for girls where girls school is not available
- Demanded for health facilities like (Maternity homes) in each village
- Female community members demanded for provision of proper inclined path on embankment for livestock.
- Main livelihood of this village is fishing; they demanded that the project should provide fishing nets to them.
- The female community members requested that engage male members as daily labor during project work.

5.3.19 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 22 archaeological sites situated in the area. The names and number of the archaeological sites are given in the **Table-33.**

Saints and shrines are highly respected by the local communities. Two graveyards observed in the CoI of the PB and Kuka Wari bunds sub-projects. Graveyard on PB Bund is at 6/7 Mile at Village Musa Jakhro UC Kalan Kot and graveyard on Kuka Bund is at 5/1mile, village Jiyand Zangejo UC Dolatpur taluka Shah Bundar. Both are on outer slope of embankment RoW. These two graveyards and mosque does not fall in the scope of work, so these are not affected by project interventions. Further details are given in **Table 32.**

Table 32: Number of Archaeological Sites in the Project Area

S. No	Sub-project Name	Location	Village/UC/Taluka	Community Belongs
1	PB Bund	6/7 Mile N-24 44 06.0 E- 067 58 16.2	Village Musa Jakhro, UC Kalankot Taluka and District Thatta	Jakhro and Mallah
2	Kuka Bund	5/1 Mile N- 24 14 06.0 E-067 47 11.4	Village Jiyand Zangejo, UC Dolatpur, Taluka Shah Bundar, District Sujawal	Zangeja

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. The archaeological map of the subproject area is provided in **Figure-46**.

Table 33: Number of Archaeological Sites in the Project Area

S. No	Name/Description	Location	District	Estimated Distance (km) from the Sub-Project Area
1	Makli Graveyard (On UNESCO World Heritage	Makli Hill	Thatta	15 km from PB Bund 30 km from BU Bund
2	Sonda graveyard	Village Sonda	Thatta	15 km from PB Bund and 55 km from BU Bund
3	Kalan Kot	Makli Hill	Thatta	14 km from PB Bund and 35 km from BU Bund
4	Nawab Amir Khan's mosque	Makli Hill	Thatta	14 km from PB Bund and 35 km from BU Bund
5	Building with two domes	Near Civil Hospital, Thatta	Thatta	10 km from PB Bund and 35 k from BU Bund
6	Jama Masjid	Makli Hill	Thatta	14 km from PB Bund and 35 km from BU Bund
7	Sasian-Jo-Takar	Mirpur Sakro	Thatta	25 km from PB Bund
8	Jama Masjid	Thatta city	Thatta	10 Km from PB Bund and 35 km from BU Bund
9	Hyderabad Fort	Hyderabad	Hyderabad	15km from Kotri Barrage Guide Bund
10	Badshahi Bungalow	Hyderabad	Hyderabad	15 km from Kotri Barrage Guide Bund
11	Battle ground of Dubo	Hyderabad	Hyderabad	15 km from Kotri Barrage Guide Bund
12	Tomb of Mian Ghulam Muhammad Kalhoro	Hyderabad	Hyderabad	15 km from Kotri Barrage Guide Bund
13	Old office of Mirs	Hyderabad	Hyderabad	15 km from Kotri Barrage Guide Bund
14	Tajar (Treasury) of Mirs	Hyderabad	Hyderabad	15 km from Kotri Barrage Guide Bund
15	Tomb of Ghulam Nabi Khan Kalhora	Hyderabad	Hyderabad	15 km from Kotri Barrage Guide Bund
16	Buddhist Stupa	Hyderabad	Hyderabad	15 km from Kotri Barrage Guide Bund
17	Haram of Talpur Mirs	Hyderabad	Hyderabad	15 km from Kotri Barrage Guide Bund
18	Tombs of Talpur Mirs	Hyderabad	Hyderabad	15 km from Kotri Barrage Guide Bund
19	Tower (Now used as water tank)	Hyderabad	Hyderabad	15 km from Kotri Barrage Guide Bund
20	Mosques and tomb	Hyderabad	Hyderabad	15 km from Kotri Barrage Guide Bund
21	Tomb of Sarfaraz Khan Kalhora	Hyderabad	Hyderabad	15 km from Kotri Barrage Guide Bund
22	Nasar-ji- Mosque	Hyderabad	Hyderabad	15 km from Kotri Barrage Guide Bund

Source: http://www.sindh.gov.pk/dpt/antiquities

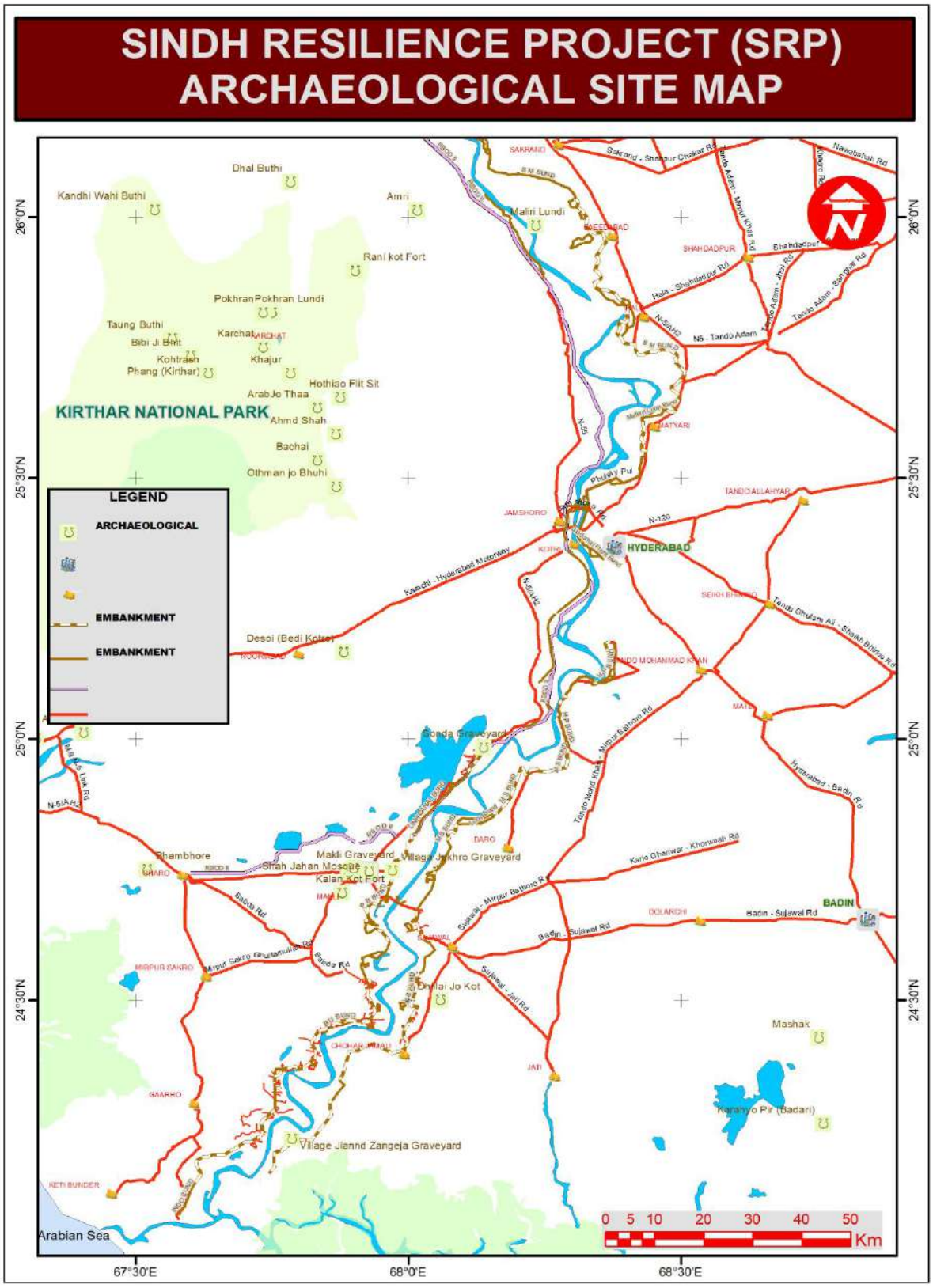


Figure 46: Archaeological Map of the Sub-project Area

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: The major dust generation would be during construction phase in undertaking the earthworks, transportation of borrow and other construction materials along the embankments. As contracts/works are estimated to last between six months and the dust raising potential is high, the impact magnitude is judged to be major during this period.

Mitigation: Water sprinkling will be carried out to suppress the dust in work areas and on the access routes, especially on the top of the embankments of PB Bund where sizeable number of settlements exists. In addition, the top of the remaining embankments shall also be sprinkled during working hours which will be used frequently. Water sprinkling will particularly be carried out near the villages. Moreover, frequency of water sprinkling would vary as per requirement and would be adjusted to accommodate suppression of dust. Also under traffic management plan, speed limit would be enforced. Community liaison will be maintained and grievance redress mechanism (GRM) (discussed later in the document) will be established to address complaints related to air quality.

The Contractor will prepare and submit a traffic management plan before commencement of the physical works. The movement of the Contractor machinery shall be restricted beyond the routes 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: As discussed in the chapter 5 about surface water, tested parameters of surface water are under acceptable limits except Calcium and nitrate. During stone pitching and earth works activities (raising and widening) of embankments 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. 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 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-34.**

Table 34: 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

Above types of waste may contaminate surface water and surrounding eco system through improper disposal. Contaminated surface water also holds potential health hazards if the contaminated is exploited for drinking purpose.

Tested parameters of ground water are within acceptable limits of SEQS and WHO except hardness, calcium, nitrate, TDS, TSS and turbidity. The groundwater which is a source of drinking in some areas may be potentially contaminated by the release of untreated sewage from construction camps and offices

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 get their

drinking water from multiple sources such as hand pumps, river creeks, canal and ponds etc. However, hand pumps are the main source for drinking water in the project area, so it should 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: Latrines; Lined washing areas; and Septic tanks and soaking pits for toilet waste.
Key mitigation measures are listed below.

- Septic systems are to be used at the Contractor's camp for treatment using septic systems. Contractor will submit a plan of camp location in which location of septic tank will be showed for the approval of Engineer.
- A sewerage system will be constructed for disposal of the waste water from Contractor's camps; the quality of the sewage water shall be monitored on quarterly basis against NEQS.
- Camps site shall be provided with all necessary drainage of storm water away from the camp & construction areas and community settlements.
- Vehicles will only be washed in designated areas within camp site.
- All hydro-carbons and other potential pollutants should be properly bunded.
- Regular monitoring of water quality shall be carried out by the PISSC and ESMU of PMT.
- Appropriate arrangements will be made to stop stones and soil to slip in the river water.
- Community liaison will be maintained and GRM will be established to address complaints related to waste disposal.

6.3 Cultural Heritage

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 PCRs identified and marked in the Figures all works (including haulage) shall be excluded from the areas. Contractor will prepare maps showing these areas and display them in the construction office/camps. In the light of RAP findings, the residential, commercial, community and public structures shall be relocated to clear the original RoW. In the event of a discovery of an unidentified PCR (i.e., Chance Find), the Contractor shall notify the Engineer who will make the required design changes. The Contractor activities shall be restricted from the graveyard identified about 200 m away from the working areas situated at Kuka Wari Bund on 02 Mile and PB Bund 6/7 Mile. These graveyards were identified during walk through survey.

Community liaison will be maintained during construction stage and GRM will be established to address complaints related to any damage to PCRs (e.g., graves).

6.4 Chance Find Strategy

The sites or items of heritage significance could be found in the course of development work. The “chance finds” procedure covers the actions to be taken from the discovery of a heritage site or item, to its investigation and assessment for siting and designing a project to avoid significant adverse impacts to cultural the client is responsible heritage.

It would be ensured that any chance find further is not disturbed until an assessment by competent professionals is made and actions consistent with the requirements of this Performance Standard are identified.

1. In the case of the chance find, the contractor will secure site and report immediately to PISSC. Works may not recommence until approval is given by the Engineer
2. PISSC will report to PMT for intimation to Archeologically Department.
3. Meanwhile the contractor will cease their operations and due caution will be ensured for archaeological remains.
4. Archaeology department to inspect, identify, advice management, and recover remains.
5. Site visit of Archaeological Department will be facilitated. Further works will be carried out on such sites only after obtaining clearance from the Archeologically Department.

6.5 Biodiversity

Impacts

Habitats

The primary impact to the existing habitat will be during the implementation of the proposed works. The most notable impact shall be due to the establishment of borrow areas, involving the clearance of vegetation prior to excavation of the land – this shall result in a permanent change in the habitat of vegetated areas.

Moreover riverine forests given in the **Table-17** exists no more, all riverine forest near the sub-projects area have been converted into agricultural land.

Flora

Specie like Prosopis juliflora is present in uncultivated land, along the embankment and around the settlements in the sub-project area. This specie is fast spreading and covering most of the bare land of the area. The potentially negative environmental will be associated with the clearance of vegetation beyond the existing toes of embankments is

required to prepare the area for formation of the embankments. About 443 trees of *Acacia nilotica, Azadirachta indica*, *Eucalyptus camaldulensis and Zizyphus numularia* to be felled or relocated during execution of the work.

Fauna

As for as fauna of the sub-projects area will disturb due to project activities like dumping and moving of heavy materials, human movement, cutting of trees and removing of vegetation from embankment site and barrow area. Wildlife is highly sensitive to human disturbance especially during breeding period; these activities may cause to influence the rate of breeding particularly nesting activity of birds. Excavation and dumping activities may destroy barrows of Rodents and jackals. Also Illegal hunting and shooting of birds and mammals by working staff be possible. However adverse impacts related to operation phase are mostly of temporary nature but some of them are may be significant.

Mitigation:

The following mitigations shall be proposed during the establishment of borrow areas and embankments works. The mitigation measures for impacts from borrow pits which may cause negative impacts on biodiversity are discussed below.

- The area required for the camp site, borrow sites, and dumping sites will be kept to the minimum required.
- The establishment of any borrow areas and camps in agricultural land shall be strictly prohibited in the Contract documents. Approval from Engineer shall be required before clearance of vegetation.
- Dumping of construction materials should be avoided where large number of terrestrial trees, shrubs, herbs, grasses observed.
- Night travelling will be strictly prohibited within the protected areas to reduce the risk of striking fauna on access routes.
- The speed of project vehicles shall be limited to 30km/hr. as per Traffic management plan.
- The construction camp site(s) should be avoided in wildlife sensitive area to minimize Impacts on wildlife during construction stage.
- The contractor shall ensure a 3 m (10 ft.) wide strip shall remain unexcavated at 300 m (1,000 ft.) intervals in order to maintain access across the borrow areas.

Flora

About 443 trees to be felled or relocated during execution of the works, inventory has been prepared. Priority will be given to relocation of the trees those will come under impact. Tree inventory of the trees felling shall be maintained during construction period. For each tree felled, five saplings of approved tree species will be planted. The felling of trees for the establishment of borrow areas shall not be allowed.

Fauna

Contractor shall be prohibited from felling any tree which houses an active nest. Following identification and marking of trees to be cut a member of PISSC's environment team shall complete an inspection of those trees to be cut and identify any trees housing an active nest.

There shall be a ban on hunting, poaching or trapping built into each contract with specific instructions for avoiding the clearance of nesting areas of mammals, reptiles and amphibians. The contractor's staff shall be required to sign a code of conduct prohibiting hunting, poaching or trapping.

6.6 Borrowing and Quarrying of Materials

Impacts: About 11,116,089.5 cft earth material forraising and widening of the embankments under the proposed sub-project and about 16,445530.38 cft stones will be required for slope pitching, horizontal aprons and gabions.

The stones will be obtained from commercial limestone quarries at Khanote and Jamshoro Petaro located in hilly areas in Thatta and Jamshoro districts. These Chilya commercial quarries are source of stone and gravel for projects in Sindh and do not create any specific impacts for SRP 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 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 150 m 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 0.6 m (2 ft.) 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.

Community consultations will be carried out while selecting the borrow areas particularly near the settlements. GRM will be established to address any related complaints.

6.7 Resettlement Impacts

Impacts: The proposed activities will not require any land to be permanently acquired because all works will be carried out on the land that is already owned by the government. However, based on the Social Assessment, it is anticipated that the project may have some adverse social impacts associated with the displacement of a limited number of settlements, structures as well as the sources of income of the peoples.

The data has indicated that about 1 residential structures on state land (Mud and wooden made), on PB Bund are lying within CoI will be affected by project activities. In addition, some community structures like 2 Imam Bargahs (semi pacca) on MS Bund, and 1 *Kacho Otaq* (rest house) on Kuka Wari bund are also falling within RoW. In addition, there is one school building on MS Bund with two rooms (Public Structures) is also likely to be affected. These structures have been built by encroachers on the embankment.

Mitigation: To address the above-described resettlement impacts, a Resettlement Action Plan (RAP) yet to be prepared in accordance with the government regulations and WB OP 4.12.

RAP includes the entitlement matrix, list of the affectees, compensation amount, payment procedures, institutional arrangements for RAP implementation, and monitoring arrangements. A grievance redress mechanism (GRM) will be established to address community complaints relating resettlement issues. The compensation amount for the above-described resettlement impacts will be estimated as per GoS and World Bank Guide lines.

This section gives the glimpse of compensation and assistance cost estimates for the buildings /structures, income disturbance and shifting for the affected persons.

On the basis of the cost estimation, after consultation with the affected persons and mutually agreed/prevailing rates, compensation cost includes the cost of building /structures etc., livelihood assistance in shape of disturbance allowance for three months, transfer and subsistence allowance and assistance in shape of shifting charges.

Calculations of Compensation Amounts

For Business and Commercial Structures:

Entitlement cost has been calculated @ PKR 120 per square foot. Subsistence allowance has been worked out for three months @ PKR 15,000 per month. Cash compensation for business interruption has been given equal to the three months' profit. Relocation cost is paid @ PKR 5000 per affectee.

For Residential Structures:

Entitlement cost has been calculated @ PKR 120 per square foot. Subsistence allowance has been worked out for three months @ PKR 15,000 per month. Relocation cost is paid @ PKR 5000 per affectee. Cost of re-sinking hand pump has been given @ PKR 15000 per hand pump.

For Community Structures:

As in case of residential and commercial structures, relocating and subsistence (displacement) cost has also been paid at the same rate for community structures as well. Cost of re-sinking of hand pumps is also the same. Entitlement cost has also been calculated @ PKR 120 per square foot except for public buildings for which cost has been estimated as per their present condition.

Resettlement Budget

Total estimated cost for the implementation of this Resettlement Action Plan is expected to be **PKR: 4,731,989 (4.73 million**). The details of estimated resettlement budget are as follows:

Crop Compenstaion	Total estimated cost is PKR. 2,288,929
Residential Structures	Total estimated cost is PKR 230000
Public/Community Structures	Total estimated cost is PKR 364160
Business Structures	Total estimated cost is PKR 1,418,720
10% contingency allowance	Total estimated cost is PKR 430180

Grand Total PKR **4,731,989**

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

6.9 Loss of Habitats due to New Haul Routes

Impacts: As new haul routes will be established for access of material. With the movement of the Contractor machinery some native shrubbery and vegetation may be disturbed.

Mitigation: Preference will be given to use of existing tracks within the routes. Construction of haul routes through the forest is prohibited (if any in the area). Traffic management plan will be prepared by Contractor detailing proposed routes to access the site.

Community liaison will be maintained during construction stage and GRM will be established to address complaints related to any damage to crops or cultivated lands.

6.10 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 shall not be effected by the Works. Moreover no any commercial fish pond observed in the impact zone of the sub-project.

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 PISSC and PMT of the stagnant water bodies located along the embankments. In addition, the Contractor will prepare a code of conduct, signed by his crew and get approval from the PISSC engineer.

Community liaison will be maintained during construction stage and GRM will be established to address complaints related to any damage to fishing or fish ponds.

6.11 Community Disturbance

Impacts: On some reaches, the CoI outside and inside of the RoW of embankments is inhabited. 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. Some impacts will arise due to migration of the workforce to the area and their interaction with the community.

In addition, local communities rely on groundwater for their drinking water needs, and excessive use of these resources by the contractor shall adversely impact upon the availability of local drinking water. Where ground water testing identifies that groundwater quality is suitable for drinking purposes it is expected that the contractor shall fulfil his domestic water requirements for labour camps through groundwater extraction by installing motor operated pumps for extraction of groundwater.

As well as impacts in the form of noise and air pollution etc., construction works within the proximity of settlements also give rise to a risk of an accidents resulting in injury to members of the public, such as collision with vehicles or machinery. There shall also be a risk to community health from HIV/AIDS or other transmitted infections as a result of the presence of a migrant construction labour.

Moreover, the Gender Based Violence is pervasive across class, religion, ethicnicty and the urban -rural divide in Pakistan and has its roots in partriarchcal social stsructure in which women are subservient to men and are viewed as property. There could be risk of gender based violence from the migrant labour, who often remain away from home on the site. This may lead to inapproprtaite behaviour including sexual harrsassment of women girls and boys of the local community.

Mitigation: The contractors shall locate/ construct camps for their staff at least 500 meter away from communities in order to avoid social conflict in using the natural resources such as water or to avoid the possible adverse impacts of the construction camps on the surrounding communities. The contractor shall submit detailed layout plan to PISSC for approval of development of construction camps showing the relative locations of all temporary buildings and facilities that are to be constructed together with the location of site roads, fuel storage areas (for use in power supply generators), solid

waste management, septic tank and drainage facilities, prior to the development of the construction camps.
The use of community water pumps shall not be permitted by the Contractor and the use of groundwater for construction works shall be strictly prohibited. Contractor shall fulfil his domestic water requirements for labour camps through groundwater extraction by installing motor operated pumps.

The Contractor's Health and Safety Plan should include plans for the emergency transfer of members of the public to suitable medical facilities in the event of a serious accident resulting from the construction works.

Details of transport and medical treatment route are to be included. The contractor shall include information about HIV/AIDS and the spread of sexually transmitted diseases within the workers code of conduct. The contractor shall also include proposals for awareness on HIV/AIDS and the spread of sexually transmitted diseases in the Contractor's training plan, to be undertaken in a culturally sensitive manner.

Community liaison will be maintained during construction stage and GRM will be established to address complaints related to any disturbance caused by the construction works. Contractor will prepare and implement a code of conduct of its workers.

The contractor will train the workers regarding (Gender Based Voilance GBV) and also train workers about sexual harassment, child abuse, human trafficking for reducing the risk of GBV. The contractor will also raise awareness among workers regarding coordination with local law enforcement and code of conduct.

6.12 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: 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.

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 Environmental Code of Practices (ECoPs) (discussed later in the document); submit to the PISSC and PMT for review and approval. When approved, the contractor will implement the OHS plan during construction period. This plan will need to describe all jobs, their risks, and the controls that will reduce risks; these controls may include PPE, restrictions on activities or locations, and other measures. The plan also needs to describe what training will be given to what workers. Those who work near water, at heights, with heavy equipment will need special training so those hazards can be managed.
- The contactor will ensure the use of Personal Protective Equipment (PPE) for his labours during construction period;
- The contractor will hire only licenced and trained operators for his machinery and vehicles.
- The contractor will train his crews on the aspects covered in the above described OHS Plan;
- 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;
- No private property without permission of the owner will be used for transportation;
- Drivers will fix net on containers while transporting stones and soil etc.
- Community liaison will be maintained during construction stage and GRM will be established to address complaints related to safety hazards.
- Contractor will prepare an emergency response plan to address events such as fire, floods, earthquakes, injury/death, and accidents

6.13 Road Congestions

Impacts: 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. It is roughly estimated that about 30-40 number of vehicles and machinery would move on construction sites and haulage routes on daily basis. 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 shall produce a traffic management plan for the approval of the Engineer and the Client to reduce stress on the transport system. Speed limit of contractor's vehicles will not be more than 30km/hour. Regular water sprinkling will be carried out by the contractor on haulage routes and construction sites. GRM will be established to address complaints related to the traffic management issues. Community Liaison officer will be engaged by the contractor to address the community concerns.

6.14 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 construction machinery like (Excavators, dozers, Compactors and Graders) and Generators placed in the site camps. All machinery shall only be permitted to operate six days a week between the hours of 8am and 6pm except generators and 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. On-demand noise monitoring will be carried out in case of any complaint or request by the affected communities. Additional mitigation measures will be identified and implemented in case the noise levels exceed the permissible limits. Community liaison will be maintained to ensure that complaints and grievances are addressed as soon as possible. Community liaison will be maintained during construction stage and GRM will be established to address complaints related to noise generation.

6.15 Damage to Physical Infrastructure

Impacts: The construction works can potentially damage existing infrastructure such as roads, culverts, and electricity lines. Some of this infrastructure may need to be relocated to allow the proposed works to be carried out.

Mitigation: Electricity transmission line would be shifted to the outer toe of the embankment where line comes under impact. Currently no any transmission line observed which creates hindrances in the execution of the work. All damaged/removed infrastructures will be repaired/ restored to original or better condition. Liaison with the community will be maintained and GRM will be established to address any related complaint.

6.16 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. The majority of the personnel shall be unskilled labours, semi-skilled, drivers, equipment operators and secondary support staff and it shall be possible to draw this labour force from communities within the sub-project area.

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).Temporary employment within the area has the potential to contribute to a reduction in the local poverty level, especially if vulnerable groups (such as landless farmers, encroachers living in the CoI and those living below the poverty line) are engaged.

6.17 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 photographs of stakeholder consultations are provided in Annex-E.

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 as described below.

7.3 Primary Stakeholders

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

7.4 Secondary Stakeholders

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

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

7.5 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.

7.6 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.

7.7 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-35** shows a summary of stakeholder consultations with male community members.

Table 35: Summary of Stakeholder Consultations with Male Community Members

Sr. Nr.	Name of Village	Date	No: of Participants
M.S Bund			
1	Ranta	31/12/2015	06
2	Akbar Shah	01/01/2016	06
3	Umar Mallah	01/01/2016	12
4	Qasim Palijo/ Laiq Dino Palijo	01/01/2016	06
5	Umar Kandra	01/01/2016	10
6	Allah Dino Patel Mirbahar	01/01/2016	13
7	Goth Haji Umar Magsi	01/01/2016	14
8	Ali Bahar	01/01/2016	07
9	Allah Bux Kandra	01/01/2016	06
10	Bano Town	02/01/2016	11
B.U Bund			
1	Goth Haji Natho Memon	23/12/2015	11
2	Goth Haji Lala	23/12/2015	24
1	Goth Basho Khaskheli	22/12/2015	10
2	Goth M. Raheem Agheem	23/12/2015	09
3	Goth Aboro Jakhro	23-12-2015	15
4	Nooh Bhatti/ Shidi Stop/ M. Khan Soomro	22/12/2015	49

Sr. Nr.	Name of Village	Date	No: of Participants
5	Muhammad Khan Soomro	25/12/2015	27
Kuka Wari Bund			
1	Ghulam Muhammad Kehar	27/12/2015	10
2	Qadir Dino Shah/Ali Muhammad Memon	27/12/2015	06
3	Ahemd Magsi	27/12/2015	14
4	Ashraf Otho	27/12/2015	08
Kuka Link Bund			
1	Ali Baran	26/12/2015	06
2	Ali Murad Solangi	27/12/2015	14
3	Haji Allah Dino Solangi	27/12/2015	16
4	Bachal Khaskheli	27/12/2015	08
5	Muhammad Urs Kehar	27/12/2015	09
6	Wali Muhammad Sehto	27/12/2015	07
Kuka Retarted			
1	Sohban Shah	27/12/2015	06
2	Jiand Zangejo	27/12/2015	11
P.B Bund			
1	Goth Basho Khaskheli	22/12/2015	10
2	Goth Mohd Raheem Agheem	23/12/2015	09
3	Goth Aboro Jakhro	23-12-2015	15
4	Nooh Bhatti/Shidi Stop/Mohd Khan Soomro	22/12/2015	49
5	Muhammad Khan Soomro	25/12/2015	27
Kotri Barrage Guide Bund			
1	Aachar Mallah	03/01/2016	20
2	Muhammad Ali Samoon	03/01/2016	14

7.8 Findings of Public Consultation with Male Community Members

Key findings of consultation with male community members on sub-projects are summarized below which have also been given in **Annex-F** along with participant's lists and photographs.

PB Bund:

Villagers told that this project will leave positive impacts on the communities. Project will provide safety to their village. They also expect some development and social work for their village under this project fund. The villagers expect that the project will protect their village roads, schools and other assets from flood in future. They demanded for employment during construction period. The people of the Goth Nooh Bhatti shared their concerns that in each flood season they feel themselves unsafe. They have requested for

urgent repair works or stone pitching works along the bund so that they can live with peace during flood time in their village.

BU Bund:
Villagers of the Goth Haji Natho Memon and Goth Haji Lala were happy to know about the SRP project, and the villagers expect positive impacts of the project if completed successfully.

Kuka Link, Kuka Wari and Kuka Retarded Bund:

The villagers expect safeguard due to the proposed rehabilitation works of the bund in flood season. Some villagers of the area (inside the bund) told about the project and requested the government support to relocate their houses and other structures on some feasible locations to protect form floods. They mentioned during discussion, that in flood season most of the villagers migrate to temporary safe places but if government rehabilitate this bund they will not migrate in future. The villagers expressed willingness and pleasure about the project, that the project is not only beneficial for their village but for the entire area. Furthermore; they requested for preference to be given to the villagers in hiring unskilled labours.

MS Bund:

People of the Ranta, Bano and other villages were happy about the proposed rehabilitation works and requested for good quality works as well as completion of works before flood season. They also offered possible coordination in the project. During consultation, the villagers expressed concern that each year they have to face the devastated flood. After completion of the proposed works, their concerns will be decreased.

Kotri Barrage Guide Bund:

People of the Aachar Mallah village were happy about the proposed rehabilitation works and requested for good quality works as well as completion of works before flood season. During consultative meeting, the villagers expressed willingness and pleasure about the projects. They have requested for employment opportunities during construction period.

7.9 Findings of Public Consultation with Female Community Members

Key findings of consultation with female community members on sub-projects are summarized below while these also have been given in **Annex-F** along with photographs.

- The female members of the community expressed concern that their houses are inside the Bund and are facing flood problem each year. Major problem of this village relocation of the houses falling within RoW.

- Collectively, all the female villagers were happy about the proposed project. They understood that due to raising of Bund and stone pitching they will be safe from flood danger.
- During asking about project impact on women activities, mostly they were favoring it and also having expectations to get benefits.

- Some of the communities were much interested for social benefits and jobs and some of the communities were neither showing interest about the project nor opposing the project.
- They expressed happiness that their villages will be safe due to the proposed stone pitching and raising of bund.

- Some female members shared their reservation that construction activities will disturb their daily activities like movement of women family members. Women of this area were not aware about the project; though they fear that government may displace them from their homes.

- Some of the female community member requested for the construction of water collection points and washing ghats on the river side.

- The women also requested for the provision of latrine facility wherever this facility is not available in the sub-project areas and expressed concern when the project's works commenced they will face problem to go out for latrine need.

- Some of the female members of the communities expressed concern over relocation wherever, their houses were located within RoW.

- Those women who have handicraft skill and they have demanded to provide marketing support for their local products.

7.10 Information Disclosure

The Sindh Irrigation Department will disclose the ESIA to the local communities in the sub-project 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 PLAN

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

8.1 Project Management Responsibilities

Implementation of the ESMP will be a contractual obligation between the Contractor and PMT, SRP. 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.

PISSC in coordination with ESMU-PMT 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 firm as third party validation will routinely 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 SRP project as well as Environmental and Social Management and Monitoring will rest with the Project Management Team (PMT), 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 PMT 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 PMT and Project Implementation Support and Supervision Consultants (PISSC) respectively reporting to the Project Director, Sindh Resilience Project. The specific responsibilities of the institutions involved in the ESMP and RAP implementation are shown in the **Figure-42** and described below.

8.2 Project Management Office

The overall responsibility for the supervision of ESMP and RAP will rest with the Project Management Team (PMT) or Project Management Team (PMT) under Irrigation Department and PDMA 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 PMT under the supervision of Additional Director Coordination and Technical Assistant (AD).

Key positions within the ESMU shall include: Environment Specialist; Social and Resettlement 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) SRP. 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.

8.3 Project Implementation Support and Supervision Consultant (PISSC)

The Project Implementation Support and Supervision Consultant (PISSC) 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 through PMT during execution of the Civil Works for sub-projects under the SRP and shall submit monthly reports to the PMT regarding the ESMP and RAP implementation status. The ESMPs prepared or to be prepared shall be part of the Contract documents. In general the PISSC has the following responsibilities pertaining to the environmental and social 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 PISSC shall be established and include the following key positions:

    a. Environmental Specialist
    b. Ecologist
    c. Environmental Assistants
    d. Social and Resettlement Specialist
    e. Assistant Sociologist (s)

The ESU of PISSC shall be responsible for monitoring the contractor's compliance with the ESMPs. The role of the ESU-PISSC shall be day to day monitoring of the supervision of the ESMP with the assistance of social and environmental staff of the Contractor and reporting any non-compliances to the PISSC Chief Resident Engineer, Resident Engineers as well as PMT.

8.4 Environmental/Social Monitoring and Evaluation (ESMEC) Consultant

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

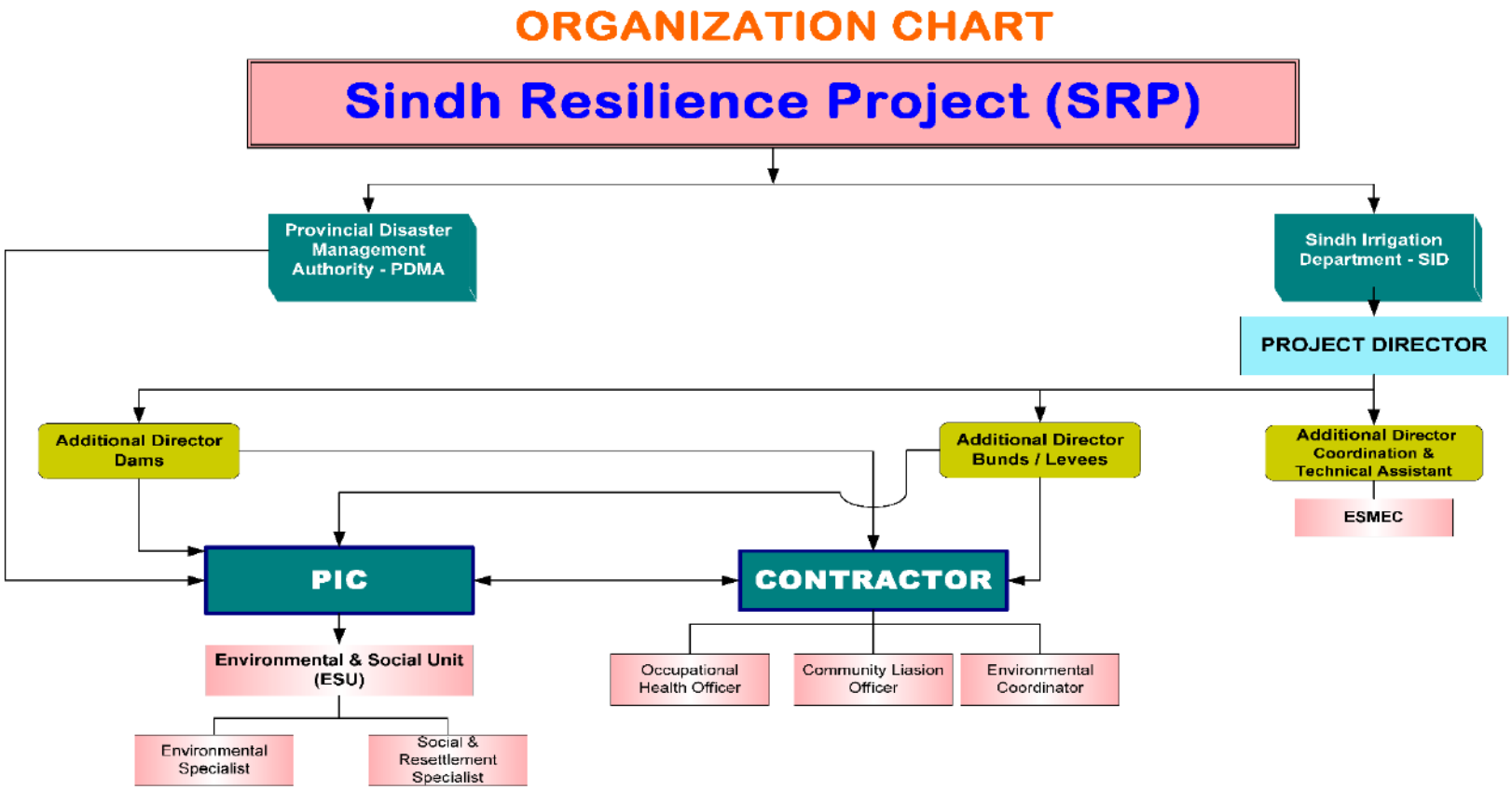


Figure 47: Institutional Arrangement for SRP Project

8.5 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 on all aspects and implementation of the ESMP. The bid should include an environmental and social mitigation budget as part of the engineering costs of the respective works. The key positions to be filled within the contractor's staff for implementation of the ESMP include: Environmental Coordinator(s); Occupational Health and Safety (OHS) Officer; and Community Liaison Officer.

8.6 Environmental Code of Practices

The objective of preparation of the Environmental Code of Practices (ECoP) is to address less significant environmental impacts and all general construction related impacts for the proposed SRP project implementation. The ECoPs will provide guidelines for best operating practices and environmental management guidelines to be followed by the contractors for sustainable management of all environmental issues. This ECoP will be annexed in the general conditions of all the contracts to be carried out under the SRP project. ECoPs are provided in **Annex-G** of this ESIA.

8.7 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. All site specific plans must be submitted to the PMT/PISSC for the review and clearance within 30 days of the signing of the contract or before mobilization onsite whichever date is earlier. Therefore, it is required that the Contractor shall produce and implement the plans described below with the help of mitigation measures discussed in **Chapter 6** and ECoPs given in **Annex-G**. Once approved by the Engineer and Environment Specialist of PISSC, these documents will become part of the ESMP for the Contract.

8.8 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.

8.9 Waste Management Plan

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

8.10 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).

8.11 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).

8.12 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.

8.13 Environmental Awareness Training Plan

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

8.14 Emergency Response Plan

The contractor will prepare an emergency plan to address emergencies/events such as fire, floods, earthquake, accidents, and death/injury. The Plan will include the following details:

- Contacting the relevant agency (e.g., Fire Brigade)
- 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.

8.15 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 PISSC and PMT staff, submit a detailed tree plantation plan, defining the proposed plantation methodology, species and plantation locations. The plantation location shall be approved by the PISSC Engineer and PMT 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.

8.16 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**. **Annex-H** presents the mitigation and monitoring plan.

8.17 Compliance and Effects Monitoring

PISSC 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**.**

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 PISSC 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 PISSC and take action to mitigate various violations to ESMP.
- Regularly submit Reports to PISSC Engineer and Environment Specialists about the compliance to the ESMP and various issues related to the HSE including but not limited to the following:
- OHS Measures adopted (OHS statistics)
- Fuel and hazardous material consumption
- Workforce statistics (employment/deployment etc.)
- 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 PISSC and ESMU-PMT with independent monitoring by ESMEC. The effects monitoring shall be the responsibility of PISSC.

Examples of compliance and effects monitoring parameters are included in **Box 8.1**. Both approaches will be conducted using the monitoring parameters given in **Annex-H** 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 PISSC and SEMU of PMT during the project implementation.

Box 8.1: Example Indicators to Monitor Environmental Effectiveness

(i) Compliance Monitoring:

- Frequency of anti-dust water sprays during construction period;
- Safety at workplaces and working hours during construction;
- Incidence of child labour 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, diarrhoea, respiratory ailments during construction phase
- Noise levels (in dBA), monitored at fixed locations and planed schedule during construction
- Extent and degree of functionality of diversion channels to ensure un-interrupted water supply

8.18 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; PISSC discusses the problem with PMT and Contractor to work out mitigations together and record the facts and the decision implemented.

Step 2: A more serious infringement is observed and PISSC 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: PISSC/PMT 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 PMT may institute against the Contractor.

8.19 Communication, Reporting and Documentation

The following environmental meetings are proposed:

- Primary meeting between ESMU-PMT, PISSC 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-PMT, PISSC 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 PISSC and ESMU environmental and social teams and measures recommended for their remedy.

The Contractor and PISSC 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 PMT, 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, PISSC and ESMU-PMT. 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 PISSC, ESMU of PMT 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 PMT. 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 PISSC, ESMEC and ESMU of PMT.

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 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 PISSC 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 PISSC and Contractor.

8.20 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-36** below. A budget

of about **PKR 4.41 million** 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. Appropriate clauses will be added to the Construction Contract(s) to ensure a mechanism for compliance and payment.

Table 36: Environmental, 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*443	2,215,000
Traffic Management		200,000
Total Cost		**4,415,000**

9. GRIEVANCE REDRESS MECHANISM

Broadly speaking, 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:

- Open channels for effective communication with relevant communities through discussion with men and women by sharing and identification of new environmental and social issues of concern arising during the project implementation in timely manners particularly prior to construction works;
- Demonstrate concerns about community members and their environmental well-being; and
- Prevent and mitigate any adverse environmental impacts on communities caused by project implementation and operations.
- The GRM will be accessible to diverse members of the community, including more vulnerable groups such as women and youth. Illiterate men and women will be linked up to the male and female schools in order to provide access for lodging complaints. PICCS through the contractor will remain in contact with the communities during the implementation phase. 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 Support and Supervision Consultant (PISSC) are unable to resolve will be referred to the Grievance Redress Committee, with a final provision for appeal to Project Director PMT, SRP and the Project Management Team (PMT) 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 PMT or Secretary, SID within 1 week.
- The cases that prove impossible to resolve through Grievance Redress Committee may be referred to the PMT to be established under the SID and PDMA, Government of Sindh.
- 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 (PMT) 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, Sujawal and Hyderabad.

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

9.6 Public Complaints Center

In its capacity as the Project Implementation Body, the PMT, in consultation with the Secretary Irrigation, Government of Sindh will establish a Public Complaints Centre (PCC) in the PMT, SRP office. The PMT 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 Sujawal and Thatta.

The PCC will be staffed by a full-time officer from the PMT and will be independent of the PISSC 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, PISSC 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 PMT 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 PMT, Senior Engineer from PMT, Representative of DC office of Sujawal, Thatta and Hyderabad, also senior members from civil society from Indus River Embankment sub-project areas. Decisions or findings taken in the Grievance Redress Committee would be binding upon the contractor.

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 PMT/PISSC 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:

- The PCC will log complaint and date of receipt onto the complaint database and inform the PISSC and the Contractor;
- The PCC will instruct Contractors and PISSC to refer any complaints that they have received directly to the PCC. Similarly, the PCC will coordinate with local government to “capture” complaints made directly to them;
- The PCC, with the PISSC and the Contractor, will investigate the complaint to determine its validity, and to assess whether the source of the problem is due to project activities, and identify appropriate corrective measures. If corrective measures are necessary, PCC, through the PCI, will instruct the Contractor to take necessary action;
- The PCC will inform the Complainant of investigation results and the action taken;

- If complaint is transferred from local government agencies, the PCC will submit interim report to local government agencies on status of the complaint investigation and follow-up action within the time frame assigned by the above agencies;
- The PCC will review the Contractors response on the identified mitigation measures, and the updated situation;
- The PCC will undertake additional monitoring, as necessary, to verify as well as review that any valid reason for complaint does not recur.

During the complaint investigation, the PCC should work together with the Contractor and the PISSC. If mitigation measures are identified in the investigation, the Contractor will promptly carry out the mitigation. PISSC 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, PMT, PISSC, 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, PMT and Contractor. The PCC will, as necessary, through PISSC; 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 PMT 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, PMT, 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 PMT 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 PMT 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 PMT 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 PMT and including PCC reports into the monthly ESMP Compliance monitoring report to the World Bank.

ANNEX-A: BASELINE EMBANKMENT CONDITIONS

Pre-project View of M.S Bund

Another View of M.S Bund

Pre-project Condition of B.U Bund

Another View of B.U Bund

Pre-project View of Kuka Link Bund

Another View of Kuka Link Bund

Pre-project View of Kuka Wari Bund

Another View of Kuka Wari bund

ANNEX-B: NOISE DATA

Mile	Sub-Projects				Mile	Sub-Projects			
	MS. Bund	B.U BUND	Kuka Link Bund	P B BUND		MS. Bund	Kuka Link Bund	P B BUND	Kotri Barrage Guide Bund
	Noise Level (dB)						Noise Level (dB)		
0 Mile 0 F	50-52			52-54	11 Mile 7 F	51-52			

Pre-project View of Kuka Wari Retarded Bund

Another View of Kuka Wari Retarded Bund

Pre-project Condition of P.B Bund

Another View of P.B Bund

Pre-project View of Kotri Guide bund

Another View of Kotri Guide Bund

ANNEX-C: TREE INVENTORIES

MS BUND										
Mile#	Common Name	Name of Species Scientific	Existing Trees				Trees Likely to be cut			
			Inside		Land side		Inside		Land side	
			Mature	Young	Mature	Young	Mature	Young	Mature	Young
5/0 to 6/0	Nim		5	1	5	0	5	1	0	0
	Babur		2	0	0	0	2	0	0	0
6/0 to 7/0	Nim		7	0	0	0	7	0	0	0
	Beer		2	0	0	0	2	0	0	0
	Siral		1	0	0	0	1	0	0	0
7/0 to 8/0	Nim		5	2	90	0	5	2	0	0
	Babur		0	0	5	0	0	0	0	0
	Gadoori		1	0	0	0	1	0	0	0
11/0 to 12/0	Nim		0	1	0	0	0	1	0	0
	Babur		1	0	0	0	1	0	0	0
	Gadoori		0	0	1	0	0	0	0	0
12/0 to 13/0	Babur		10	370		260	10	370	0	0
	Beer		0	0	1	0	0	0	0	0
13/0 to 14/0	Nim		0	0	14	4	0	0	0	0
	Kekar		0	0	1	0	0	0	0	0
23/0 to 24/0	Nim		4	0	5	2	4	0	0	0
TOTAL			**38**	**374**	**122**	**266**	**38**	**374**	**0**	**0**

B U BUND										
Mile#	Common Name	Name of Species Scientific	Existing Trees				Trees Likely to be cut			
			Inside		Land side		Inside		Land side	
			Mature	Young	Mature	Young	Mature	Young	Mature	Young
3/0 to 5/0	Nim		0	0	1	0	0	0	0	0
	Babur		0	0	1	0	0	0	0	0
TOTAL			**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**

P.B Bund										
Mile#	Common Name	Name of Species Scientific	Existing Trees				Trees Likely to be cut			
			Inside		Land side		Inside		Land side	
			Mature	Young	Mature	Young	Mature	Young	Mature	Young
15/0	Mango		0	0	4	0	0	0	0	0
	Nim		3	4	0	0	0	0	0	0
TOTAL			**3**	**4**	**4**	**0**	**0**	**0**	**0**	**0**

KUKA LINK BUND, KUKA WARI BUND & KUKA WARI RETARDED BUND										
Mile#	Common Name	Name of Species Scientific	Existing Trees				Trees Likely to be cut			
			Inside		Land side		Inside		Land side	
			Mature	Young	Mature	Young	Mature	Young	Mature	Young
2/0 to 4/0	Nim		3	0	3	0	3	0	0	0
	Babur		1	0	0	0	1	0	0	0
4/0 to 5/0	Babur		1	0	3	0	1	0	0	0
9/4 to 10/0	Babur		1	0	1	0	1	0	0	0
10/0 to 12/0	Nim		10	3	8	2	3	2	0	0
	Sufedo		0	0	8	0	0	0	0	0
	Sirhan		1	0	6	0	0	0	0	0
	Burr		3	0	1	0	0	0	0	0
12/0 to 14/0	Tali		0	0	2	0	0	0	0	0
	Toot		0	0	1	0	1	0	0	0
	Nim		0	0	0	0	0	0	0	0
	Jamo		8	1	0		8	1	0	0
16/0 to 19/4	Sufedo		0	0	82	0	0	0	0	0
	Nim		0	0	27	0	0	0	0	0
	Babur		0	0	12	1	0	0	0	0
3/4 to7/4	Sufedo		0	0	1	0	0	0	0	0
	Nim		8	0	7	0	8	0	0	0
	Babur		0	0	15	0	0	0	0	0
	Beer		1	0	1	0	1	0	0	0
	Coconut		0	0	1	0	1	0	0	0
0/0 to 3/4	Nim		0	0	9	0	0	0	0	0
	Babur		0	0	4	0	0	0	0	0
	Burr		0	0	1	0	0	0	0	0
TOTAL			**37**	**4**	**193**	**3**	**28**	**3**	**0**	**0**

ANNEX-D: ENVIRONMENTAL AND 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-E: SOCIO-ECONOMIC DATA

ANNEX-E-1: HEALTH FACILITIES IN EACH SUB-PROJECT AREA

SINDH RESILIENCE PROJCT (SRP)								
S. No.	Village Name	Sub-Project	Health Facilities in Project Area					
			Rural Health Center RHC	Basic Health Unit BHU	Dispensary	Homeopathic Clinic	Midwifery	Medical Store
1	Basho Khaskheli	PB bund	0	0	0	0	0	0
2	Sher Muhammad Brohi	PB bund	0	0	0	0	0	0
3	Wali Muhammad Mallah Goth	PB bund	0	0	0	0	0	0
4	Goth Nooh Bhatti/Khan M . Soomro	PB bund	0	0	0	0	0	0
5	Goth M. Rahim Agheem	PB bund	0	0	0	0	0	0
6	Abro Jakro Goth	PB bund	0	0	0	0	0	0
7	Goth Haji Lala Memon	BU bund	0	0	1	0	0	0
8	Goth Haji Natho Memon	BU bund	0	0	0	0	0	0
9	Goth Haji Omar Kandra	MS bund	0	0	0	0	0	0
10	Goth Haji Omar Magsi	MS bund	0	0	0	0	0	0
11	Goth Ranta	MS bund	0	0	1	0	0	0
12	Goth Allah Bux	MS bund	0	0	0	0	0	0
13	Bano Town	MS bund	0	1	0	0	2	5
14	Ahamad Magsi	Kuka wari	0	0	0	0	0	0
15	Ghulam M. Goth	Kuka Wari	0	0	0	0	0	0
16	Qadir Dino Shah Goth	Kuka Wari	0	1	0	0	0	0
17	Ashraf Otho	Kuka Wari	0	0	0	0	0	0
18	Goth Wali M. Sehto	Kuka Link	0	0	0	0	0	0
19	Goth Urs Karo	Kuka Link	0	0	0	0	0	0
20	Goth Bachal Khaskheli	Kuka Link	0	0	0	0	0	0
21	Goth Ali M.	Kuka Link	0	0	0	0	0	0
22	Goth Allah Dino	Kuka Link	0	0	0	0	0	0
23	Goth M. Ibrahim Zangeja	Kuka Retarded	0	0	0	0	0	0
24	Haji M. Omar	Kuka Retarded	0	0	0	0	0	0
25	Goth Jiyand Zangeja	Kuka Retarded	0	1	1	0	0	0
26	Goth Ali Baran	Kuka Link	0	0	0	0	0	0
27	Goth Subhan Shah	Kuka Retarded	0	0	0	0	0	0
28	Kotri Guide bund Aachar Mal	Kotri Guide bund	0	0	0	0	0	0
29	Muhammad Ali Samo	Kotri Guide bund	0	0	0	0	0	0
Total			**0**	**3**	**2**	**0**	**2**	**5**

ANNEX-E-2: COMMON DISEASE IN THE PROJECT AREA

SINDH RESILIENCE PROJCT (SRP)									
S. No	Village Name	Sub-Project	Common Diseases in Sub-Project Areas						
			Flu /fever	Malaria	Chicken Pox	Typhoid	Diarrhea	TB	Others
1	Basho Khaskheli	PB bund	1	1	0	1	1	0	0
2	Sher Muhammad Brohi	PB bund	1	1	0	1	1	1	0
3	Wali Muhammad Mallah Goth	PB bund	1	1	0	1	1	1	0
4	Goth Nooh Bhatti/ Khan M. Soomro	PB bund	1	1	0	1	1	1	0
5	Goth M. Rahim Agheem	PB bund	1	1	0	1	1	1	0
6	Abro Jakhro Goth	PB bund	1	1	0	1	1	1	0
7	Goth Haji Lala Memon	BU bund	1	1	0	1	1	1	0
8	Goth Haji Natho Memon	BU bund	1	1	0	1	1	1	0
9	Goth Haji Omar Kandra	MS bund	0	1	0	0	1	0	0
10	Goth Haji Omar Magsi	MS bund	1	1	0	1	1	1	0
11	Goth Ranta	MS bund	1	1	0	0	1	0	0
12	Goth Allah Bux	MS bund	1	1	0	1	1	1	0
13	Bano Town	MS bund	1	1	0	1	1	0	0
14	Ahamad Magsi	Kuka Wari	1	1	0	0	1	0	Jaundice
15	Ghulam M. Goth	Kuka Wari	1	1	0	0	1	0	Jaundice
16	Qadir Dino Shah Goth	Kuka Wari	1	1	0	0	1	0	Jaundice
17	Ashraf Otho	Kuka Wari	0	1	0	1	1	0	Jaundice
18	Goth Wali M. Sehto	Kuka Link	0	1	0	0	1	0	Jaundice
19	Goth Urs Karo	Kuka Link	0	1	0	0	1	0	Jaundice
20	Goth Bachal Khaskheli	Kuka Link	0	1	0	0	1	0	0
21	Goth Ali M.	Kuka Link	0	1	0	0	0	1	Jaundice
22	Goth Allah Dino	Kuka Link	0	1	0	0	0	1	Jaundice
23	Goth M. Ibrahim Zangeja	Kuka Retarded	0	1	0	0	1	0	0
24	Haji M. Omar	Kuka Retarded	0	1	0	0	0	0	Jaundice
25	Goth Jiyand Zangeja	Kuka Retarded	0	1	0	1	1	0	Jaundice
26	Goth Ali Baran	Kuka Link	0	1	0	0	1	0	Jaundice
27	Goth Subhan Shah	Kuka Retarded	0	1	0	1	1		Jaundice
28	Aachar Mallah	Kotri Guide bund	1	1	0	1	1	1	0
29	Muhammad Ali Samoon	Kotri Guide bund	1	1	0	1	1	1	0
	Percentage		**59**	**100**	**0**	**55**	**90**	**45**	**41**

ANNEX-E-3: FLOOD DAMAGES IN THE PROJECT AREA

S. No	Name of Village	Sub-Project Name	Flood Damages		Type of Damages
			Yes	No	
1	Basho Khaskheli	PB bund	0	1	0
2	Sher Muhammad Brohi	PB bund	0	1	0
3	Wali Muhammad Mallah Goth	PB bund	0	1	0
4	Goth Nooh Bhatti/ Khan M. Soomro	PB bund	0	1	0
5	Goth M. Rahim Agheem	PB bund	0	1	0
6	Abro Jakhro Goth	PB bund	0	1	0
7	Goth Haji Lala Memon	BU bund	0	1	0
8	Goth Haji Natho Memon	BU bund	0	1	0
9	Goth Haji Omar Kandra	MS bund	0	1	0
10	Goth Haji Omar Magsi	MS bund	0	1	0
11	Goth Ranta	MS bund	1	0	houses
12	Goth Allah Bux	MS bund	0	1	0
13	Bano Town	MS bund	0	1	0
14	Ahamad Magsi	Kuka Wari	0	1	0
15	Ghulam M. Goth	Kuka Wari	0	1	0
16	Qadir Dino Shah Goth	Kuka Wari	1	0	houses
17	Ashraf Otho	Kuka Wari	0	1	0
18	Goth Wali	Kuka Link	0	1	0
19	Goth Urs Karo	Kuka Link	0	1	0
20	Goth Bachal Khaskheli	Kuka Link	1	0	houses
21	Goth Ali M.	Kuka Link	1	0	houses
22	Goth Allah Dino	Kuka Link	1	0	houses
23	Goth M. Ibrahim Zangeja	Kuka Retarded	1	0	houses
24	Haji	Kuka Retarded	0	1	0
25	Goth Jiyand Zangeja	Kuka Retarded	1	0	houses
26	Goth Ali Baran	Kuka Retarded	1	0	houses
27	Goth Subhan Shah	Kuka Retarded	0	1	0
28	Aachar Mallah	Kotri Guide bund	0	1	0
29	Muhammad Ali Samoon	Kotri Guide bund	0	1	0
AVERAGE			**0.3**	**0.7**	

ANNEX-E-4: NGOs WORKING IN THE AREA

SINDH RESILIENCE PROJECT (SRP)								
Sr. No.	Name of Village	Sub-Project Name	NGO working in the village		Area of Interest			
			Yes	No	Health	Education	Micro credit	others
1	Basho Khaskheli	PB Bund	0	1	0	0	0	0
2	Sher Muhammad Brohi	PB Bund	0	1	0	0	0	0
3	Wali Muhammad Mallah Goth	PB Bund	0	1	0	0	0	0
4	Goth Nooh Bhatti/ Khan M. Soomro	PB Bund	0	1	0	0	0	0
5	Goth M. Rahim Agheem	PB Bund	1	0	0	1	0	0
6	Abro Jakhro Goth	PB Bund	0	1	0	0	0	0
7	Goth Haji Lala Memon	BU Bund	1	0	0	1	0	0
8	Goth Haji Natho Memon	BU Bund	0	1	0	0	0	0
9	Goth Haji Omar Kandra	MS Bund	0	1	0	0	0	0
10	Goth Haji Omar Magsi	MS Bund	0	1	0	0	0	0
11	Goth Ranta	MS Bund	1	0	1	1	0	0
12	Goth Allah Bux	MS Bund	0	1	0	0	0	0
13	Bano Town	MS Bund	0	1	0	0	0	0
14	Ahamad Magsi	Kuka Wari	0	1	0	0	0	0
15	Ghulam M. Goth	Kuka Wari	0	1	0	0	0	0
16	Qadir Dino Shah Goth	Kuka Wari	0	1	0	0	0	0
17	Ashraf Otho	Kuka Wari	0	1	0	0	0	0
18	Goth Wali	Kuka Link	0	1	0	0	0	0
19	Goth Urs Karo	Kuka Link	0	1	0	0	0	0
20	Goth Bachal Khaskheli	Kuka Link	0	1	0	0	0	0
21	Goth Ali M.	Kuka Link	0	1	0	0	0	0
22	Goth Allah Dino	Kuka Link	0	1	0	0	0	0
23	Goth M. Ibrahim Zangeja	Kuka Retarded Bund	0	1	0	0	0	0
24	Haji	Kuka Retarded Bund	0	1	0	0	0	0
25	Goth Jiyand Zangeja	Kuka Retarded Bund	0	1	0	0	0	0
26	Goth Ali Baran	Kuka Retarded Bund	0	1	0	0	0	0
27	Goth Subhan Shah	Kuka Retarded Bund	0	1	0	0	0	0
28	Aachar Mallah	Kotri Guide Bund	0	1	0	0	0	0
29	Muhammad Ali Samoon	Kotri Guide Bund	0	1	0	0	0	0
AVERAGE			**0.1**	**0.9**	**0.0**	**0.1**	**0.0**	**0.0**

ANNEX-E-5: EDUCATIONAL FACILITIES IN THE SUB-PROJECT AREA

Sr. No.	Name of Village	Sub-Project Name	Section 4: Educational Facilities																			
			Boys Primary School (in nos.)	Teachers (nos.)	Enrollment	Girls Primary School (In nos.)	Teachers (nos.)	Enrollment	Boys Middle School	teachers (nos.)	Enrollment	Girls Middle School	Teachers (nos.)	Enrollment	Boys High School	Teachers (nos.)	Enrollment	Girls High School	Teachers (nos.)	Enrollment	Boys College	Girls College
1	Basho Khaskheli	PB Bund	1	1	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	Sher Muhammad Brohi	PB Bund	1	1	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	Wali Muhammad Mallah Goth	PB Bund	1	1	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	Goth Nooh Bhatti/ Khan M. Soomro	PB Bund	1	4	300	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Goth M. Rahim Agheem	PB Bund	1	6	170	1	1	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Abro Jakhro Goth	PB Bund	1	2	150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	Goth Haji Lala Memon	BU Bund	1	6	300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	Goth Haji Natho Memon	BU Bund	1	1	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	Goth Haji Omar Kandra	MS Bund	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	Goth Haji Omar Magsi	MS Bund	2	2	140	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Sr. No.	Name of Village	Sub-Project Name	Section 4: Educational Facilities																		
			Boys Primary School (in nos.)	Teachers (nos.)	Enrollment	Girls Primary School (In nos.)	Teachers (nos.)	Enrollment	Boys Middle School	teachers (nos.)	Enrollment	Girls Middle School	Teachers (nos.)	Enrollment	Boys High School	Teachers (nos.)	Enrollment	Girls High School	Teachers (nos.)	Enrollment	Boys College	Girls College
11	Goth Ranta	MS Bund	2	2	150	1	0	0	1	2	40	0	0	0	0	0	0	0	0	0	0	0
12	Goth Allah Bux	MS Bund	1	2	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	Bano Town	MS Bund	4	15	500	1	5	400	0	0	0	0	0	0	1	25	700	0	0	0	0	0
14	Ahamad Magsi	Kuka Wari	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	Ghulam M. Goth	Kuka Wari	1	1	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	Qadir Dino Shah Goth	Kuka Wari	1	1	500	0	0	0	1	3	100	0	0	0	0	0	0	0	0	0	0	0
17	Ashraf Otho	Kuka Wari	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	Goth Wali	Kuka Link	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	Goth Urs Karo	Kuka Link	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	Goth Bachal Khaskheli	Kuka Link	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	Goth Ali M.	Kuka Link	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	Goth Allah Dino	Kuka Link	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	Goth M. Ibrahim Zangeja	Kuka Retarded	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	Haji	Kuka Retarded	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	Goth Jiyand Zangeja	Kuka Retarded	1	1	50	1	1	300	1	7	0	0	0	0	0	0	0	0	0	0	0	0
26	Goth Ali Baran	Kuka Retarded	1	1	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	Goth Subhan Shah	Kuka Retarded	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Sr. No.	Name of Village	Sub-Project Name	Section 4: Educational Facilities																		
			Boys Primary School (in nos.)	Teachers (nos.)	Enrollment	Girls Primary School (In nos.)	Teachers (nos.)	Enrollment	Boys Middle School	teachers (nos.)	Enrollment	Girls Middle School	Teachers (nos.)	Enrollment	Boys High School	Teachers (nos.)	Enrollment	Girls High School	Teachers (nos.)	Enrollment	Boys College	Girls College
28	Aachar Mallah	Kotri Guide Bund	1	2	25	1	2	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	Muhammad Ali Samoon	Kotri Guide Bund	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total			**22**	**49**	**2563**	**6**	**9**	**780**	**3**	**12**	**140**	**0**	**0**	**0**	**1**	**25**	**700**	**0**	**0**	**0**	**0**	**0**

ANNEX-E-6: AVAILABLE FACILITIES IN THE SUB-PROJECT AREA

Sr. No.	Name of Village	Sub-Project Name	Available Facilities							
			Electricity	Since year	Market/Shops	Police Station / Police Check Post	Since year	Link Road	Pacca (km)	Katcha (km)
1	Basho Khaskheli	PB bund	0	0	1	0	0	2	0	2
2	Sher Muhammad Brohi	PB bund	1	2000	0	0	0	5	0	5
3	Wali Muhammad Mallah Goth	PB bund	0	0	0	0	0	3	0	3
4	Goth Nooh Bhatti/ Khan M. Soomro	PB bund	1	2000	25	0	0	7	0	7
5	Goth M. Rahim Agheem	PB bund	1	2000	3	0	0	5	5	0
6	Abro Jakhro Goth	PB bund	1	2000	5	0	0	4	0	4
7	Goth Haji Lala Memon	BU bund	0	0	12	0	0	8	8	0
8	Goth Haji Natho Memon	BU bund	1	2000	0	0	0	7	0	7
9	Goth Haji Omar Kandra	MS bund	0	0	0	0	0	1.5	0	1.5
10	Goth Haji Omar Magsi	MS bund	0	0	0	0	0	2	0	2
11	Goth Ranta	MS bund	0	0	8	0	0	9	0	9
12	Goth Allah Bux	MS bund	0	0	0	0	0	0	0	0
13	Bano Town	MS bund	1	1977	130	1	Un-known	18	18	0
14	Ahamad Magsi	Kuka Wari	0	0	0	0	0	4	4	0
15	Ghulam M. Goth	Kuka Wari	0	0	0	0	0	10	0	10
16	Qadir Dino Shah Goth	Kuka Wari	1	1988	5	1	2005	13	13	0
17	Ashraf Otho	Kuka Wari	0	0	0	0	0	4	0	4
18	Goth Wali	Kuka Link	0	0	0	0	0	5	0	5
19	Goth Urs Karo	Kuka Link	0	0	0	0	0	8	1	7
20	Goth Bachal Khaskheli	Kuka Link	0	0	0	0	0	1	0	1
21	Goth Ali M.	Kuka Link	1	2006	0	0	0	3	0	3
22	Goth Allah Dino	Kuka Link	1	2006	0	0	0	3	0	3
23	Goth M. Ibrahim Zangeja	Kuka Retarded	0	0	0	0	0	15	0	15
24	Haji	Kuka Retarded	0	0	0	0	0	10	0	10
25	Goth Jiyand Zangeja	Kuka Retarded	0	0	7	0	0	6	0	6
26	Goth Ali Baran	Kuka Retarded	1	1988	0	0	0	5	0	5
27	Goth Subhan Shah	Kuka Retarded	0	0	0	0	0	8	0	8
28	Aachar Mallah	Kotri Guide bund	1	2015	1	0	0	1	0	1
29	Muhammad Ali Samoon	Kotri Guide bund	1	2015	1	0	0	2	0	2
TOTAL			**12**		**198**	**2**		**170**	**49**	**120.5**

ANNEX-F: CONSULTATION DETAILS

Findings of Public Consultations

Name of Sub-Project	Name of the Village	Date	Total Number of Participants	Names of Participants	Key Issues Discussed
PB Bund	Goth Basho Khaskheli	22/12/2015	10	Attached	○ Villagers told that this project will leave positive impacts on the communities. Project will provide safety to their village. ○ Villagers also expect some development and social work for their village under this project fund.
PB Bund	Goth Muhammad Raheem Agheem	23/12/2015	09	Attached	○ The villagers were happy about the project and they expect that the project will protect their village roads, schools and other assets from flood in future. ○ They also expect that project will create many employment opportunities for unskilled villagers.
PB Bund	Aboro Jakhro	23-12-2015	15	Attached	○ During consultative meeting, project activities were discussed with the villagers on which villagers shared their views that they are very happy about the project and these types of projects should start before the flood season. ○ They were also looking forward for the social works in their village under this project.
PB Bund	Nooh Bhatti/Shidi Stop/Mohd	22/12/2015	49	Attached	○ People of the Goth Nooh Bhatti shared their concerns that in each flood season they feel themselves unsafe. They have requested for

Name of Sub-Project	Name of the Village	Date	Total Number of Participants	Names of Participants	Key Issues Discussed
	Khan Soomro				urgent repair works or stone pitching works along the bund so that they can live with peace during flood time in their village.
PB Bund	Muhammad Khan Soomro	25/12/2015	27	Attached	○ During consultative meeting, the SRP team shared the purpose of the project in the reply villagers shown their willingness about the project. ○ They demanded for employment during construction period.
BU Bund	Goth Haji Natho Memon	23/12/2015	11	Attached	○ Villagers of the Goth Haji Natho Memon were happy to know about the SRP project, and the villagers expect positive impacts of the project if completed successfully.
BU Bund	Goth Haji Lala	23/12/2015	24	Attached	○ In consultative meeting, the villagers expressed pleasure that rehabilitation work of bund is most important for their protection and due to poor condition of the existing Bunds, in every flood season, they are disturbed mentally.
Kuka Wari Bund	Ghulam Muhammad Kehar	27/12/2015	10	Attached	○ The villagers expect safeguard due to the proposed rehabilitation works of the bund in flood season.
Kuka Wari Bund	Qadir Dino Shah/Ali Muhammad Memon	27/12/2015	06	Attached	○ People of the Village Qadir Dino Shah were happy about the project and requested for government support to relocate their houses and other structures on some feasible locations to protect form floods.

Name of Sub-Project	Name of the Village	Date	Total Number of Participants	Names of Participants	Key Issues Discussed
Kuka Wari Bund	Ahemd Magsi	27/12/2015	14	Attached	○ The villagers expressed pleasure that the rehabilitation works of bund is most important for their protection and requested for commencement of the works on urgent basis before the flood season.
Kuka Wari Bund	Ashraf Otho	27/12/2015	08	Attached	○ During discussion, villagers told that in flood season most of the villagers migrate to temporary safe places but if government rehabilitates this bund they will not migrate in future. ○ They expected that project will create many employment opportunities for unskilled villagers.
Kuka Link	Ali Baran	26/12/2015	06	Attached	○ The villagers were happy about the proposed scope of work and they reported that each year the flood submerge their houses and create shortage of animal fodder problem.
Kuka Link	Ali Murad Solangi	27/12/2015	14	Attached	○ The villagers expressed willingness and pleasure about the project, that the project is not only beneficial for their village but for the entire area.
Kuka Link	Haji Allah Dino Solangi	27/12/2015	16	Attached	○ Villagers of the Goth Haji Allah Dino Solangi were happy to know about the SRP project. In response, the villagers expect that if the project is completed successfully, it will bring happiness to villagers. ○ Villagers requested for employment as labors during construction period.

Name of Sub-Project	Name of the Village	Date	Total Number of Participants	Names of Participants	Key Issues Discussed
Kuka Link	Bachal Khaskheli	27/12/2015	08	Attached	○ The villagers were happy and willing for the project and requested for employment opportunities during the project works.
Kuka Link	Muhammad Urs Kehar	27/12/2015	09	Attached	○ People of the Goth Muhammad Urs Kehar expressed pleasure and willingness about the project and requested for immediate commencement of the proposed works before flood season that they could live in peace this year and in future.
Kuka Link	Wali Muhammad Sehto	27/12/2015	07	Attached	○ The villagers reported that protection bund near to their village is in poor condition and in flood season they work voluntarily with irrigation officers. After successful completion of the proposed rehabilitation works, they will feel themselves secure.
Kuka Retarted	Sohban Shah	27/12/2015	06	Attached	○ The villagers were happy and willing about the proposed rehabilitation works.
Kuka Retarted	Jiand Zangejo	27/12/2015	11	Attached	○ People of the Village Jiyand Zangejo were happy to know about the project. In response of the project briefing by the SRP Team, the villagers requested for completion of the proposed rehabilitation works before flood season. ○ Furthermore; they requested for preference to be given to the villagers in hiring unskilled labours.

Name of Sub-Project	Name of the Village	Date	Total Number of Participants	Names of Participants	Key Issues Discussed
MS Bund	Ranta	31/12/2015	06	Attached	○ People of the Ranta village were happy about the proposed rehabilitation works and requested for good quality works as well as completion of works before flood season. ○ They also offered possible coordination in the project.
MS Bund	Akbar Shah	01/01/2016	06	Attached	○ During consultation, the villagers expressed concern that each year they have to face the devastated flood. After completion of the proposed works, their concerns will be decreased. ○ Villagers also requested for some development and social work for their village under the SRP project.
MS Bund	Umar Mallah	01/01/2016	12	Attached	○ People of the village Umar Mallah shown their willingness and hope that some unemployed youths of their village may be given employment during construction period of the project.
MS Bund	Qasim Palijo/ Laiq Dino Palijo	01/01/2016	06	Attached	○ The villagers reported that protection bund near to their village is in poor condition. In flood season, they work voluntarily with irrigation officers. ○ They expect that after completion of the proposed rehabilitation works, they would feel relax during flood season. ○ The villagers expressed their willingness to work as labor during the project works.

Name of Sub-Project	Name of the Village	Date	Total Number of Participants	Names of Participants	Key Issues Discussed
MS BUND	Umar Kandra	01/01/2016	10	Attached	○ During consultation the villagers reported that in flood season, most of the villagers migrate temporarily to safe places. If the Bund is rehabilitated, they will not migrate in future.
MS BUND	Allah Dino Patel Mirbahar	01/01/2016	13	Attached	○ Labors and farmers of village Allah Dino Patel were happy to hear about this project and offered every possible cooperation.
MS BUND	Goth Haji Umar Magsi	01/01/2016	14	Attached	○ During consultative meeting, the villagers express willingness and pleasure about the projects. ○ They have requested for employment opportunities during construction period.
MS BUND	Ali Bahar	01/01/2016	07	Attached	○ In consultative meeting villagers of Ali Bahar village said that in flood season seepage water ruin their agriculture land and their houses. If under this project, the embankments were strengthened, it will be beneficial for their lands and houses. ○ It was also discussed that local unemployed youths may be given opportunity as a labor.
MS BUND	Allah Bux Kandra	01/01/2016	06	Attached	○ During consultative meeting in village Allah Bux Kandra appreciated the project and offered cooperation during project implementation works.

Name of Sub-Project	Name of the Village	Date	Total Number of Participants	Names of Participants	Key Issues Discussed
MS BUND	Bano Town	02/01/2016	11	Attached	○ In consultative meeting, the villagers reported that the rehabilitation work of bund is most important for their protection. In each flood season, they could not live in peace.
Left Bank Guide Bund	Aachar Mallah	03/01/2016	09	Attached	○ Labors and farmers of village Aachar Mallah were happy to hear about this project and offer every possible cooperation.
	Muhammad Ali Samoon	03/01/2016	07	Attached	○ During consultative meeting in village Muhammad Ali Samoon, participants appreciated the project and offered cooperation after commencement of project works.

P.B BUND

Disater & Climate Resilince Enhancement Project (DACREP)

Attendence of Participants of public Consultation in Village ..Basho Khaskhely
Sub-Project ...P..B.....Bund.........

S.No	Name of Participants	Fathers/Husband Name	Contact: No	Signature/Tumb Impression
1	Mitta	Sulaman	03213479734	Metta
2	Lakano	Ali		
3	Ai Ghafoor	A. Azeem		
4	Ishfaq	Allah Bachyo		
5	Manzoor	Marwar		منظور احمد
6	Ali Shar	Ghulam Ali	03213884263	علی شیر
7	Lokmis	Amis Bushkh		
8	Amis Bux	Kiho	41409-12806123	[illegible]
9	Chane Sal	Nikio	—	
10	Nabi Bux	Ghulam Ali		

2

Consultation meeting at Village Basho Khaskheli While Consultation at village Basho Khaskheli

Disater & Climate Resilince Enhancement Project (DACREP)

Attendence of Participants of public Consultation in Village Noor Bali Goth on

Sub-Project ..... P.B. bund .....

S.No	Name of Participants	Fathers/Husband Name	Contact: No	Signature/Tumb Impression
1	Gul Shar	Babek Khan		
2	Fathah M	Lutaf Ali		
3	Allah Warayo	Ibrahim		
4	Ghulam Mustafa	Mohd Khan	0322 3058279	
5	Data	M. Essa		
6	A. Jabbar	Allah Dewn		
7	Ibrahim	M. Essa		
8	Alam	Allah Noor		
9	M. Ashraf	Ahamad Khan		
10	Zulfaqar	M. Rahim		
11	Shakeel Ahamad	M. Jumman		
12	Rasool Bux	Haji		
13	Haji	M. Ibrahim		
14	Ghulam Rasool	M. Khan		
15	Ghulam Haider	M. Khan		
16	Qadar Bux	Noor M.		
17	Ali Akbar S/o Soomar Qureshi			ALI AKBAR

Disater & Climate Resilince Enhancement Project (DACREP)

Attendence of Participants of public Consultation in Village Goth Norah Batti / Goth on (M Khan Soomro

Sub-Project .... P.B. band

S.No	Name of Participants	Fathers/Husband Name	Contact: No	Signature/Tumb Impression
18	Ramazan Mallah	Lado Mallah		
19	Jamal Bhatti	Allah dino		
20	Sikdar Bhatti	Ghulam Hussain		
21	Raif Bhatti	M. Ramzan		
22	Imam Bux	Esso Bhatti		
23	Mohd Urs	A. Hamid		
24	Gulban Ali	Masri		
25	Ghulam Sarwar	Nabi Bux		
26	Sikandar Sharif	M. Sharif		
27	Mubarak	Soomar		
28	Noor Mohd.	Jan Mohd.		
29	Qamaruddin	Ahmed Ali		
30	Hafiz	Haji Wali Shoro		
31	Haji Allah dino	Mohd Ismail		

32 Sher Khan s/o Ramzan
33 Abdul Qadir Faqir Mohd
34 Abdullah s/o M. Ramzan
35 Kalhoro s/o Ladho Mir

2

Disater & Climate Resilince Enhancement Project (DACREP)

Attendence of Participants of public Consultation in Village Goth Nooh Batti on Goth M. Khan Soomro
Sub-Project ....P.B....bund.....

S.No	Name of Participants	Fathers/Husband Name	Contact: No	Signature/Tumb Impression
36	Ghullam Hyder	Qadir Bux		
37	Asghar Mallah	Ali Muhd;		
38	Moharam	Mohd Uris		
39	Manthar Mallah	Muhd Usman		
40	Ahmad Mallah	Allah Dino Abro		
41	Abdul Majeed	M. Siddique Shoro		
42	Asif Ali	Zulfiqar		
43	Hisam	Pir Muhd;		
44	Mumtaz Ali	Khan Muhd; Bhatti		
45	Siraj Ali	Khan Muhd;		
46	Anwar Sdangi	M. Ibrahim		
47	Hayat	Haji Sulem		
48	Rahim Bux	M. Qasim Shoro		
49	Abdul Aziz	M. Soomar		

2

Consultation at Nooh Bhatti/ Shidi Stop

B.U BUND

Disater & Climate Resilince Enhancement Project (DACREP)

Attendence of Participants of public Consultation in Village Goth Haji Natho on
Sub-Project ..... B.U. ..... Bund ..... 3/3 .....

S.No	Name of Participants	Fathers/Husband Name	Contact: No	Signature/Tumb Impression
1	Amanat.	Gul Mohd		
2	Kamro	Alu		
3	M. Rahim	Loung		
4	Achar	Sajan		
5	Juman	Kamo ,		
6	Sharif	Achar		
7	Khamiso	Gul. M		
8	Y. ousaf	Achar		
9	A. Majeed	Abdullah	0324 2438421	
10	Pozho	Abdullah.		
11	Noor M	Abdullah		

2

Consultation at village Haji Natho Memon

Disater & Climate Resilince Enhancement Project (DACREP)

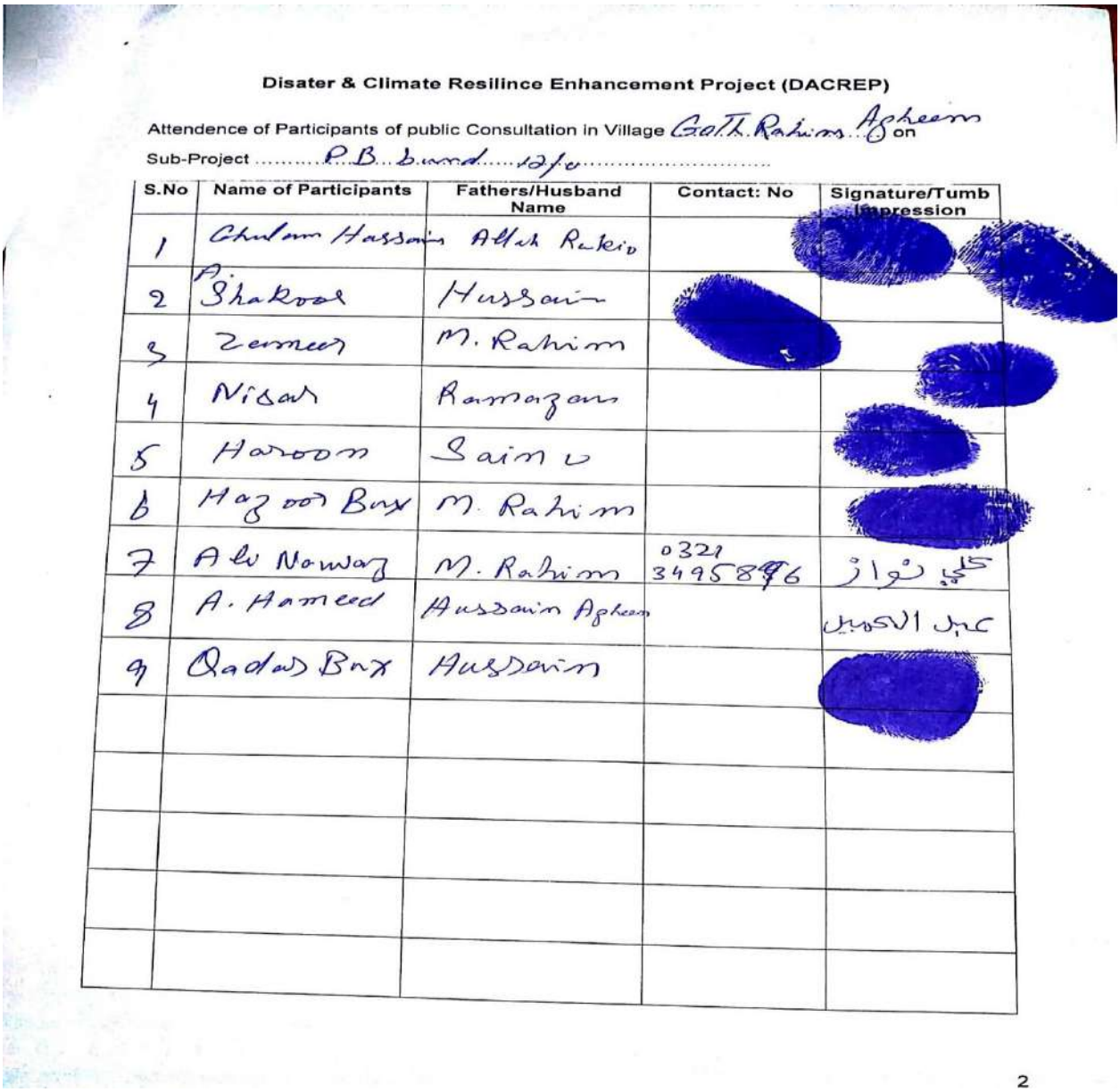
Attendence of Participants of public Consultation in Village .Goth Lala... on

Sub-Project ........B.A...

S.No	Name of Participants	Fathers/Husband Name	Contact: No	Signature/Tumb Impression
18	Ahamad Farooq	Manno		03233090114
19	Usman	Ahamad		
20	Ramezan	Palah		
21	Nazeer	Salah		
22	Mumtaz	Suleman		
23	M. Hanif	Suman		
24	Qadir Bux	Pir Mohd		
	~~Manno~~			

2

Consultation at village Haji Lala



Disater & Climate Resilince Enhancement Project (DACREP)

Attendence of Participants of public Consultation in Village Gath. Rahim Agheem on

Sub-Project ..... P.B. bund ..... R/c .....

S.No	Name of Participants	Fathers/Husband Name	Contact: No	Signature/Tumb Impression
1	Ghulam Hassain	Allah Rakio		
2	P. Shakoor	Hussain		
3	Zameer	M. Rahim		
4	Nisar	Ramazan		
5	Haroon	Saimu		
6	Hazoor Bux	M. Rahim		
7	Ali Nawaz	M. Rahim	0321 3495896	
8	A. Hameed	Hussain Agheem		
9	Qadar Bux	Hussain		

2

Consultation at village Raheem Agheem

Disater & Climate Resilince Enhancement Project (DACREP)

Attendence of Participants of public Consultation in Village Aboro Jakhro on

Sub-Project ..... P.B ..... Bund .....

S.No	Name of Participants	Fathers/Husband Name	Contact: No	Signature/Tumb Impression
1	M. Aslam	Mataer	0321 3287116	
2	M. Mussa	Soomo	—	
3	M. Hussain	Abro	0323 3555 0941	
4	Ursss	Abdo		
5	Akram	Jalal		
6	Tufail	M. Hussain		Tufail
7	Haji	Tayib		
8	Karim	Abdullah	0322 2294588	—
9	Noor Salam	Rahmatullah		Noor Salam
10	Jiyando	Hussain		
11	M. Essa	Abro		
12	Ali Dost	Usman	0334 2472780	
13	Nazeer	Rabo		
14	Rahmatullah	Mussa		
15	Soomo	Laung		

2

Consultation at village Aboro Jakhro

Disater & Climate Resilince Enhancement Project (DACREP)

Attendence of Participants of public Consultation in Village Mohammad Khan Soomro on
Sub-Project ...P.B. Bund...

S.No	Name of Participants	Fathers/Husband Name	Contact: No	Signature/Tumb Impression
	M. Urs	M. Achar	03443 40[illegible]	
	Shakeel Ahmed	M. Siddique	0321 2478279	
	Edoo Ghambir	Jumo		
	Irshad Ahmed	M. Suman	0322 3912884	
	Shafi Muhammad	Jumo Khan	0321 32[illegible]	
	~~Shahjahan~~	~~Abdul Rahim~~	~~[illegible]~~	
	Jahangir	Rasool Bux		
	Faleh Muhammad	Wasan	0321 37[illegible]	
	Shahjahan	Abdul Rahim	0321 3028770	
	Munawar	Mataro		
	Alinawaz	Bashro		
	Ghulam Ali	Babek Ali		
	Atta Muhammad	Wasand		
	Mola Bux	Muhammad		

Consultation at Village Muhammad Khan Soomro

KUKA WARI BUND

Disater & Climate Resilince Enhancement Project (DACREP)

Attendence of Participants of public Consultation in Village G. Mohd: Kehar - on

Sub-Project ..... KUKA Wari Bund .....

S.No	Name of Participants	Fathers/Husband Name	Contact: No	Signature/Tumb Impression
1	Ghulam Rasool	Ali Mohd Kehar	0312 3578433	
2	Rab Dino Shah	Sajan Shah	0300 2753628	
3	M. Qasim	Ali Mohd Kehar	0340 3790580	
4	Sikandar Shah	Qasim Shah	0305 2091553	
5	Ahmad Kehar	Suleman Kehar	0300 2753628	
6	M. Hanif Kehar	Umar Kehar	0316 3160974	
7	Abbas Ali Shah	Haji Shah	—	
8	Nawaz Ali Kehar	Ali Mohd	0340 3722633	
9	Khadim Hussain	Ali Mohd Kehar	—	
10	Anwar Shah	Jalab Shah	0308 3146632	

Village Ghulam Muhammad Kehar

Disater & Climate Resilince Enhancement Project (DACREP)

Attendence of Participants of public Consultation in Village Qadir Dino Shah/ Ali Mohd Memon on

Sub-Project Kuka Link Bund.

S.No	Name of Participants	Fathers/Husband Name	Contact: No	Signature/Tumb Impression
1	Ali Mohammad Malah.	M. Siddique Malah.	—	
2	Ghulam Hussain	M. Siddique Memon.	0334-2058789.	
3	Abdul Shakoor Memon.	Qadir Memon.	0336 3574783	
4	Abdul Lateef Shah.	Maboob Shah.	03128936409.	
5	Ghulam Qadir Memon.	Ali Mohammad Memon	0333 2719288.	
6	Abdul Shakoor Memon.	Ali Mohammad Memon.	03003536680	
7				

Village Ghulam Qadir Dino Shah/ Ali Muhammad Memon

Disater & Climate Resilince Enhancement Project (DACREP)

Attendence of Participants of public Consultation in Village Ahmed Magsi on
Sub-Project Kuka Weir

S.No	Name of Participants	Fathers/Husband Name	Contact: No	Signature/Tumb Impression
	Yaqoob	Idrees Magsi	03003651505	
	Ibrahim Dal	Esso Dal		
	Ahmed	M. Hashim		
	Wali Muhammad	Khan Mahd		
	Ghulam Qadir	Ahmed Magsi	03013142577	
	Suleman	Ismail Magsi		
	Mumtaz	Shadi Magsi		
	Khameeso	Muhammad		
	Ibrahim Magsi	M. Hashim		
	Ali Asghar	Wali Muhammad		
	Abdul Hakeem	Idrees		
	Zawar Adeli	Abdullah		
	Ghulam Hussain	Sher Muhammad		
	Shadi Magsi	Ali Muhammad		

While Consultative meeting in Village Ahmed Magsi

Disater & Climate Resilince Enhancement Project (DACREP)

Attendence of Participants of public Consultation in Village Ashraf Otho ..... on
Sub-Project Kuka wari Bund.

S.No	Name of Participants	Fathers/Husband Name	Contact: No	Signature/Tumb Impression
1.	Abbas Otho	M. Achar.	—	
2.	Ali Mohammad Otho	Ahmed Otho	0304 3104693	
3.	Haroon Otho	Saleh Mohammad Otho	0331 2566489	
4.	Sulemar Otho	Hamro Otho	0558 312686	
5.	Abdul Raheem Otho	Bachu Otho	03076926011	
6.	Ghulam Hussain	Mohammad Otho.	0300 3083092	
7	Aachar	Mohammad Raheem	0312 3843 547	
8.	M. Ashraf Otho	Sabzo Dino Otho	—	
9.				

Consultation at Village Ashraf Otho

KUKA LINK BUND

Disater & Climate Resilince Enhancement Project (DACREP)

Attendence of Participants of public Consultation in Village ...Ali Baran... on Sub-Project ...KUKA Link Bund...

S.No	Name of Participants	Fathers/Husband Name	Contact: No	Signature/Tumb Impression
1.	M. Achar	Ali Baran	03323326164 M.A.e.m	
2.	Sumar	Ghulam		
3.	Obhaio	Haji		
4.	Yar Muhammad	Khameeso	033208541/3	
5.	M. Ashraf	Ramzan	03333352303	
6.	Balhal Shoro	Kamo Shoro		

Consultation at Village Ali Baran

Disater & Climate Resilince Enhancement Project (DACREP)

Attendence of Participants of public Consultation in Village Ali Mohammad Solangi on

Sub-Project Kuka Bund.

S.No	Name of Participants	Fathers/Husband Name	Contact: No	Signature/Tumb Impression
1	Azeez	Jafar Solangi	0304-2599512	عزیز
2	M. Ramzan	Gul Mohammad Solangi	0304 3288984	رمضان
3	Hayato	Mazhar Solangi	–	
4	Ahmed	Gulam Mohd Solangi	–	
5	Soomar	Mazhar Solangi	–	
6	Luqman	Mihar	–	لقمان
7	Sikandar	Ahmed	–	سکندر
8	Abdul Raheem Solangi	Mazar Solangi	–	
9	Allah Dino	Uneed Ali Solangi	–	
10	Ahsan Ali	Mazhar Solangi	0305 3077164	
11	Bachayo Solangi	Aabo Solangi	–	
12	Allah Wasayo	Ahmed Solangi	–	
13	Mehboob Ali Solangi	Saeed Khan Solangi	0308 2377352	
14	Ali Anwar Solangi	Shah Dino Solangi	–	

2

Village Ali Muhammad Solangi

Disater & Climate Resilince Enhancement Project (DACREP)

Attendence of Participants of public Consultation in Village Haji Allah Dino Solangi on

Sub-Project Kuka Link.

S.No	Name of Participants	Fathers/Husband Name	Contact: No	Signature/Tumb Impression
1	M. Essa Solangi	Haji Solangi	–	
2	Ghulam Solangi	M. Hashim Solangi	–	
3	Ibraheem Solangi	Abdullah Solangi	033222218 15	
4	Haji Solangi	Allah Dino Solangi	–	
5	Allah Dio Solangi	Ramzan Solangi	–	
6	Ismaeel Solangi	Mevo Solangi	–	
7	Ramzan Solangi	M. Usman Solangi	–	
8	Angaro Solangi	Umeed Ali Solangi	03312-86-2578	
9	Ismaeel Solangi	Abdullah Solangi	0333 2523 28	
10	Hussain	Sumo Solangi	–	
11	Abdul Rasheed Solangi	Abdul Rehman Solangi	–	
12	Gul Mohd. Solangi	Sumo Solangi	–	
13	Ahmed Solangi	Faiz Mohd. Solangi	–	
14	M. Usman Solangi	Umeed Ali Solangi	–	
15	Abdul Rahoon Solangi	Saleh Solangi	0333 2776 634	
16	Abdul Ghani	Soomar Solangi	–	

Village Haji Allah Dino Solangi

Disater & Climate Resilince Enhancement Project (DACREP)

Attendence of Participants of public Consultation in Village Bachal Khaskheli on
Sub-Project Kuka link Bund.

S.No	Name of Participants	Fathers/Husband Name	Contact: No	Signature/Tumb Impression
1	Ghulam Hussain Khaskheli	Feroz Khaskheli	0334263 2 156	
2	Qadir Bux	M. Umar Heta Mallah	–	
3	M. Soomar Khaskheli	Kandu Khaskheli	–	
4	Abdullah Khaskheli	Jafar	–	
5	Ramzaan Khaskheli	Salim Khaskheli	0334 3801103	
6	Bhai Khan Khaskheli	Feroz Khaskheli	0333 2710830	
7	Gul Sher	Siddique Khaskheli	–	
8	Qadir Bux	Bachal Khaskheli	0332 1123966	

Village Bachal Khaskheli

Disater & Climate Resilince Enhancement Project (DACREP)

Attendence of Participants of public Consultation in Village M. Urs Kara Kahar on

Sub-Project Kutca Link Bund

S.No	Name of Participants	Fathers/Husband Name	Contact: No	Signature/Tumb Impression
1	Ghulam Hussain Kahar	M. Usman Kahar	-	
2	Wahid Bux	Aarij Kahar	03323484125	
3	M. Ilyas Baran	Yaqoob Baran	—	
4	Kalu	Amb Baran	0336-3893074	
5	Abdul Rehman	Natho Kahar	-	
6	M. Urs Kahar	Abdullah Kahar	033680 644923	
7	Mohdd: Urs	M. Siddique		
8	Aaru Kahar	Wahid Dino	—	
9	M. Hussain Kahar	M. Soomar	—	

Village Muhammad Urs Kenhar

Disater & Climate Resilince Enhancement Project (DACREP)

Attendence of Participants of public Consultation in Village Wali Mohammad Sehto. on

Sub-Project Kuka & Bund

S.No	Name of Participants	Fathers/Husband Name	Contact: No	Signature/Tumb Impression
1.	Noor Mohammad Charan	Hameed Charan	03333464608	
2.	Dato Sehto	Usman Sehto	—	
3.	Ahmed Malah	~~Siddique~~ Mano Malah.	—	
4.	Mohammad Sehto.	Wali Mohammad Sehto	03337136826	
5.	Hussani Sehto	Aachar Sehto	03333256726	
6.	M. Hassan Malah	Abdullah Malah.	—	
7.	M. Haneef	Hamza Charan	—	
8.				

Village Wali Muhammad Sehto

KUKA RETORTED

Disater & Climate Resilince Enhancement Project (DACREP)

Attendence of Participants of public Consultation in Village Soban Shah on
Sub-Project Kuka Retarted. Bund.

S.No	Name of Participants	Fathers/Husband Name	Contact: No	Signature/Tumb Impression
1	Ali Mohammad Zangejo	Sehth Bacho Zangejo	—	[illegible]
2	Hussain Ali	Ali Mohammad Zangejo	0308 2044593	
3	Anwar Ali Zangejo	Mohammad Zangejo	—	[illegible]
4	Dost Mohd:	Bachu Zangejo	03004369 018	
5	Faiz Mohd:	Hassan Zangejo	03802908587.	[illegible]
6.	Ghulam Mustafa Zangejo	Ali Mohammad	—	

Consultation in Village Sobhan Shah

Disater & Climate Resilince Enhancement Project (DACREP)

Attendence of Participants of public Consultation in Village Jiand Zangejo: on
Sub-Project Kuka Retarked Bund.

S.No	Name of Participants	Fathers/Husband Name	Contact: No	Signature/Tumb Impression
1	Iqra Ali Zangejo	Mohammad Ibraheem	0306-0138485	
2	M. Essa Zangejo	M. Hussain Zangejo	0301 3648747	
3	Usman	Mohammad Zangejo	-	
4	Usman	Wali Mohd. Zangejo	-	
5	Shah Nawaz	M. Ismaeel Zangejo	03062032 -900	
6	Mohd Anwar	Ghulam Qadir	0300 280 6584	
7	Kareem Bux.	M. [illegible] Kalhoro	0306-5054 327.	
8	Mushtaq	M. Juman Zangejo	0303 3179900	
9	Qasim Zangejo	Allah Bachayo	-	
10	Mehmood Zangejo	Dodo Khan	-	
11	Ali Hasan	Dodo Khan	03062216 392	

Village Jiand Zangejo

M.S BUND

Disater & Climate Resilince Enhancement Project (DACREP)

Attendence of Participants of public Consultation in Village Village Ranta on
Sub-Project M.S Bund

S.No	Name of Participants	Fathers/Husband Name	Contact: No	Signature/Tumb Impression
1	Yaqoob	Yousaf Ranto	0311 8772761	
2	Hajikhan	Kamal Jakhro	0321 3478806	
3	Mangho	Ali Dost Jakhro	0321 3482979	
4	Raza Mohammad Ranto	Rab Dino Ranto	0323 3024245	
5	Karam Ali	Ismaeel Jakhro	0322 8182803	
6	Yousaf Malah	Mohammad Malah	—	
7	Bilawal Ranto	Raza Mohammad	0312 3806653	
8	M. Yaqoob Ranto	Mohammad Ranto	0321 3087485	
9	Belari Malah	Ali Mohammad	—	
10	Ghulam	M. Dawood Ranto	0321 3496015	
11	Yar Mohammad	Ahmed Ranto	0322 3014667	
12	Hyder	Rab Dino Ranto	—	
13	Safar	M. Ishaq Dars	0306 2380524	
14	Shahrukh Khan Ranto	Ghulam Ranto	0312 3540715	

Consultation in Village Ranta

Disater & Climate Resilince Enhancement Project (DACREP)

Attendence of Participants of public Consultation in Village Akbar Shah. on
Sub-Project M.S Bund.

S.No	Name of Participants	Fathers/Husband Name	Contact: No	Signature/Tumb Impression
1.	Sobharo Kandra.	Saleh	0303 3520059	
2.	Salim Shah	Siddique M. Shah.	—	
3.	Mehar Kandra	Saleh	—	
4.	Aslim Shah.	Siddique Shah.	0300 2388454	
5.	M. Raheem Shah	Siddique Shah.	—	
6.	Qasim Shah	Siddique Shah.	—	

Village Akbar Shah

Disater & Climate Resilince Enhancement Project (DACREP)

Attendence of Participants of public Consultation in Village Umar Malah on
Sub-Project MS Bund.

S.No	Name of Participants	Fathers/Husband Name	Contact: No	Signature/Tumb Impression
1.	Soomar Malah	Allah Dino Malah.	—	
2.	Allah Dino Malah.	Angaro Malah.	—	
3.	Ramzan Malah.	Nim Malah.	—	
4.	Haroon Malah.	Ramzan Malah.	0310 3012977	
5.	Mohammad Malah.	Pacho Malah.	0312 2826165	
6.	MS-Moomal	Ghulam Mohammad	—	
7.	Aziz Malah	Nim Malah.	—	
8.	MS Roozan	Randero Malah.		
9.	Khuda Bux Malah.	Allah Jurio	—	
10	Darya Khan Malah	Basar Malah.	0313 4630620	
11	Mohammad Ameen Malah	Gul Mohammad	—	
12	Haji Malah.	Jaro Malah.	—	

Consultation in Village Umar Mallah

Disater & Climate Resilince Enhancement Project (DACREP)

Attendence of Participants of public Consultation in Village Qasim Palejo on
Sub-Project M.S Bund

S.No	Name of Participants	Fathers/Husband Name	Contact: No	Signature/Tumb Impression
1	Basheer Ahmed Palejo	Ali. Mohammad Palejo	0320 3542844	
2	M. Ilyas Palejo.	M. Qasim	0342 0375470	
3	Allah Dino Palejo	M. Hasan Palejo	—	
4	M. Raheem Palejo	Sulaman	—	
5	Ramzan Palejo	M Juman	—	
6	Rasheem Hasan	Allah Dino Palejo	0307 3053682	

Village Qasim Palejo

Disater & Climate Resilince Enhancement Project (DACREP)

Attendence of Participants of public Consultation in Village Umar Kandra... on Sub-Project ....M.S-Bund.....

S.No	Name of Participants	Fathers/Husband Name	Contact: No	Signature/Tumb Impression
1.	M. Juman Kanda	ALi	—	
2.	Aasu Kandra	MalooK	—	
3	Habi'b	Laalu Kandra	—	
4	Haji Allah Dito Khaskheli	Hafiz Khalik Dino	—	
5.	Kheero Kandra	Khamiso Kandra	—	
6	Syed Akhtar	Syed Baag Ali	0308 2604915	
7	Khan Mohammad Kandra	Dunhu Kandra	0300 2328276	
8	Hamza (Papu) Kandra	Raheem Dino	0306 2809726	
9	Peer Mohammad Kandra	Sooraj Mehmood Kandra	—	
10	Wazeer Ali	Aasu Kandra.	—	

2

Village Umar Kandra

Disater & Climate Resilince Enhancement Project (DACREP)

Attendence of Participants of public Consultation in Village Allah Dino Patel Malah on

Sub-Project M.S Bund 23/0 mile

S.No	Name of Participants	Fathers/Husband Name	Contact: No	Signature/Tumb Impression
1	Allah Dino Mirbahar	Ali Mohammad	0321 3553257	
2	Ghulam Qadir	Siddique Mirbahar	0	
3	M. Hashim Mirbahar	Jafar Mirbahar	0323 3654936	
4	Aashiq Ali	Haji Mirbahar	—	
5	Haji S-	Jafar. Malah.	—	
6	Nazar Ali	Haji Malah -	—	
7	Turk Ali	Belai Mirbahar	—	
8	Gulai Mirbahar	Belai Mirbahar	—	
9	Ghulam Ali	Siddique Mirbahar	0320 3136112	
10	Ali Mohammad	Allal Dino Mirbahar	—	
11	Qasim Mirbahar	Baag	—	
12	Baag Mirbahar	Qasim	—	
13	Wasayo Mirbahar	Hussain	—	

Village Allah Dino Patel Mirbahar

Disater & Climate Resilince Enhancement Project (DACREP)

Attendence of Participants of public Consultation in Village Goth Haji Omar Magsi on

Sub-Project .... M.S. bund ..... 13/6 mile ....

S.No	Name of Participants	Fathers/Husband Name	Contact: No	Signature/Tumb Impression
1	Bachal Shah	Umaid Ali Shah	0300 3036085	(signature)
2	M. Khan Magsi	M. Raheem Magsi	0321 3009096	(signature)
3	Gahiro Khan	Dhani Bux Magsi	0308 2909566	گہیرو خان
4	Aashiq Ali Magsi	Haji Umar Magsi	0305 2464833	عاشق علی
5	M. Siddique Dhamo	M. Usman	0306 3218433	محمد صدیق
6	Orangzeb Magsi	M. Siddique	0306 3515598	اورنگزیب
7	Riaz Ahmed Magsi	Niaz Magsi	0308 3047435	RIAS
8	Mashooq Ali Magsi	Haji Umar	0306 2389049	معشوق علی
9	Didar Hussain [illegible]	Siddique Shah	0304 2706424	دیدار حسین
10	Hakim Ali Magsi	Ali Mohammad Magsi	0305 3238716	(thumb impression)
11	Mohammad Naeem	Mohammad Raheem Magsi	—	محمد نعیم
12	Ghulam Mustafa Magsi	Orangzeb	—	(thumb impression)
13	Ghulam Rasool Magsi	Orangzeb	—	(thumb impression)
14	Dhani Bux	Gaino Khan	—	دھنی بخش

Village Haji Umar Magsi

Disater & Climate Resilince Enhancement Project (DACREP)

Attendence of Participants of public Consultation in Village ...Bano Goth... on Sub-Project ...M.S Bund...

S.No	Name of Participants	Fathers/Husband Name	Contact: No	Signature/Tumb Impression
1	Suleman Shah	Ali Mohammad Shah.	0308 3430342	Suleman Shah
2	Yar Mohammad Shah.	Saleh Mohammad Shah.	0305 2857903	
3	Allah Bux Shah.	M. Ali Shah	0306 315 2286	
4	Nazeer Shah	Mohammad Ali Shah.	—	
5	Bisharat Ali Shah.	Suleman Shah	—	
6	Sudheer Ahmed	Khuda Bux Shah.	—	
7	Mohammad Soomar	Suleman Mirbahar	—	
8	Waryo	Usman Mirbahar	—	
9	Mohammad Hassan	Ali Mohammad Soomro	—	
10	Imdad Hussain Shah.	Saindino Shah.	0315 3573980	
11	Rajib Malah.	Lakha Dino Malah.	—	
.				
.				

Consultative meeting at Bano Town

Disater & Climate Resilince Enhancement Project (DACREP)

Attendence of Participants of public Consultation in Village Ali Bahar on
Sub-Project ..... M-5 Bund.

S.No	Name of Participants	Fathers/Husband Name	Contact: No	Signature/Tumb Impression
1.	Ramzan	Urs Malah.	[illegible]	[illegible]
2.	Yousaf	M. Ramzan Malah	0345 08 33316	M. Yousif
3.	Mola Bux	Yousaf Malah.	[illegible]	[illegible]
4.	M. Aslam Malah.	Long	030[illegible] 304[illegible]	ASLam
5.	Yaseen	Mohammad Malah	0348 0344139	[illegible]
6.	M Essa	Amb Malah	0346 2498685	[illegible]
7.	Wasyo	Usman Malah	-	[illegible]

Village Ali Bahar

Disater & Climate Resilince Enhancement Project (DACREP)

Attendence of Participants of public Consultation in Village Allah Bux Kandra on
Sub-Project M.S Bund

S.No	Name of Participants	Fathers/Husband Name	Contact: No	Signature/Tumb Impression
1	Abdul Sattar Kandra	Allah Bux	0315 3135699	
2	Allah Bux	M. Ramzan	-	
3	Rasool Bux	Allah Bux	0315 1305887	
4	M. Bux Kandra	M. Juryo	0301 2532544	M. Bux
5	Pir Mohammad Lashari	Haji Khan	—	
6	Shah Nawaz	Allah Bux	—	
7				

Consultation in Village Allah Bux Kandhra

Public Consultations with Female Community Members

Name of the Project	Name of the Village	Name of Sub-Project	Number of Participants	Key Issues Discussed
Sindh Resilience Project	Village Rais Rawat Khan Jamali	Kuka Bund	32	○ During the asking about project impact on women activities, mostly they favouring it and also having expectations to get benefits. ○ Villager getting water from irrigation channels, no hand pumps installed in the village, school and health centre no available near by the village. ○ They were demanding for jobs and basic needs like hand-pumps for drinking water, road access is not available for inhabitants.
Sindh Resilience Project	Village Arab Baran	Kuka Bund	31	○ Very deprived community, no basic living facilities availability in village. ○ They were much interested for social benefits and jobs. They were not showing interest about the project. But they were not opposing the project.
Sindh Resilience Project	Village Ali Murad Solangi	Kuka Bund	54	○ Women of the village happy with project ○ Female facing basic health problems, girls have no school, they are working handicraft making ○ They have reservations regarding to project work, during their daily life activities will interrupted to construction work. ○ They said mostly contractors bring their own labor for work, this is unfair. The labor jobs should give to villagers.
Sindh Resilience Project	Village Wali Muhammad Sahto	Kuka Bund	26	○ During the asking about project impact on women activities, mostly they favouring it and also having expectations to get benefits, but some male members share their reservation that construction activities will disturbed their daily activities like movement women family members. Women of this were not aware about the project; after briefing about the project they were happy to know that they will be safe from the flood effect.

Name of the Project	Name of the Village	Name of Sub-Project	Number of Participants	Key Issues Discussed
Sindh Resilience Project	Village Mamo Kehr	Kuka Bund	13	○ They were happy with project, that their home will be safe by strengthening of Bund. ○ Inhabitants of the area have no road access, if they will provide road to locals they can travel other big town for getting education, health and other facilities.
Sindh Resilience Project	Village Haji Saleh Khaskheli	Kuka Bund	15	○ Female were not aware about the rehabilitation of protected Bund, 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 Bund.
Sindh Resilience Project	Village Alo Dal	Kuka Bund	12	○ This area is living below to poverty line; they have no drinking water, women fetching water for household use from ditches and ponds situated far from the village. Living facilities including health, education and jobs are not available. ○ The villagers were very happy about the rehabilitation of protected Bund. ○ They understood that due to raising of bund and stone pitching they will be safe from flood.
Sindh Resilience Project	Village Ahmad Magsi	Kuka Bund	17	○ Villagers have no living facilities including school, health and drinking water, women collecting water for their household use from ditches and pons outside from the village ○ 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.
Sindh Resilience Project	Village Rais Muhammad Ali Zangajo	Kuka Bund	21	○ Zangijo village has about 600 households. They have no basic living facilities including (health, education and drinking water), electricity and road communication is not available in the village.
Sindh Resilience Project	Village Habib Mendhro	Kuka Bund	24	○ This Village is flood affected, they were happy to know that project is strengthening the flood Bund.
Sindh Resilience Project	Village Ranto	M.S. Bund		○ This is biggest settlement on upper MS Bund at about 300 households inhabiting in the village, Ranto village is effected by flood of 2010, the villager were very happy to project. Both male and female community members are active and participate in an NGO group work.

Name of the Project	Name of the Village	Name of Sub-Project	Number of Participants	Key Issues Discussed
				○ The villagers also active in politics, though they have no electric and road communication.
Sindh Resilience Project	Village Wikio Machhi	MS. Bund		○ During the asking about project impact on women activities, mostly they favouring it and also having expectations to get benefits, but some male members share their reservation that construction activities will disturbed their daily activities like movement women family members. ○ Women of this were not aware about the project; though they were fear that government may displace them from their homes.
Sindh Resilience Project	Village Gahna Magsi			○ A small village situated outside the Bund, this village was also affected by 2010 flood effect. ○ They were glade to know that project is pitching on bund
Sindh Resilience Project	Village Umar Gandra			○ Umer Gandra is situated on outside the Bund and also affected 2010 flood, after our briefing about strengthening of Bund by raising and stone pitching, they were very happy and thanking.
Sindh Resilience Project	Village Bano Shar			○ Bano village is big village at 400 households, villages is divided different ethnics/sects (Syed, Manghar, Palijo, Soomro) ○ Collectively all the villagers happy with the stone pitching project. They understood that due to raising of bund and stone pitching they will be safe from flood danger.
Sindh Resilience Project	Village Bashu Khaskheli	PB Bund	38	○ During the asking about project impact on women activities, mostly they favouring it and also having expectations to get benefits, they were demanding for jobs and basic needs like hand-pumps for drinking water, passage or road for movement, and requesting for no displacement. ○ Construct a platform for getting water from river side and washing of cloths. ○ Latrine facility is not available in the village, female going outside the village for use, during the project activity they will face problem to go out for latrine need
Sindh Resilience Project	Village M. Khan Soomro	PB Bund	45	○ This village situated outside of the Bund, belonging to very poor households, no living facilities. ○ No health and education facility available in the village, however an NGO (Human Appeal International) is providing hand pumps to the village.

Name of the Project	Name of the Village	Name of Sub-Project	Number of Participants	Key Issues Discussed
				○ They were happy to hear about project and hope to be safe from flood threats. ○ Community of this village living below to poverty line, no livelihood options for them, they were hope to project that they were revived jobs from the project.
Sindh Resilience Project	Village Abro Jakhro	PB Bund	13	○ Women of this were not aware about the project; after briefing about project they were happy and hoping safety from flood and jobs.
Sindh Resilience Project	Village M. Rahim Agheem	PB Bund	22	○ This village is deprived. No living basic facilities. Villager getting water from hand pump installed in the village, they are going outdoor for latrine need. ○ They were not aware about the project, after the briefing about the work; they were happy and hoping to get benefit from the project work in terms of labor jobs. ○ Some male members share their reservation that construction activities will disturbed their daily activities like movement of women family members.
Sindh Resilience Project	Village Haji Nathu Memon	PB Bund	17	○ Most of households are landless agriculture labor, and living below to poverty line. ○ During 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 those jobs during the construction work.
Sindh Resilience Project	Village Punhu Khan Sirai	PB Bund	20	○ Female were not aware about the rehabilitation of protected Bund, after briefing they about the project, they were much happy; they expressed their views that, they find safeguard during flood.
Sindh Resilience Project	Village Achar Mallah	Kotri Barrage guide bund	20	○ Achar Mallah village is situated on zero RD comprises 80 households and all of the households involved in fishing business, fishing is main livelihood of the community, but now they are facing problem due to grabbing of riverine land by landlords, they have no permit to go for fishing in Kacha area.
Sindh Resilience Project	Village Muhammad Ali Samoo	Kotri Barrage guide bund	14	○ Samoo village is situated outside the Bund, during the flood village is facing seepage water problem ○ Village is engaged in mate forming, mates are formed by aquatic plant (Typha) leaves. Villagers have limited access for collecting reed leaves.

		
Kuka Bund: Village Rais Rawat Khan Jamali	Kuka Bund: Village Ali Murad Solangi	MS Bund: Village Ranta
		
Kotri Guide Bund: Village Muhammad Ali Samoon	MS Bund: Village Ranta	Kuka Bund village

ANNEX-G: ENVIRONMENTAL CODE OF PRACTICES (ECoPs)

Introduction

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

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

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

ANNEX-G-1: ECOP 1: WASTE MANAGEMENT

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

ANNEX-G-2: ECOP 2: FUELS AND HAZARDOUS SUBSTANCE MANAGEMENT

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

ANNEX-G-3: ECOP 3: WATER RESOURCES MANAGEMENT

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

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Soil Erosion and siltation	Soil erosion and dust from the material stockpiles will increase the sediment and contaminant loading of surface water bodies.	The Contractor shall: o Stabilize the cleared areas not used for construction activities with vegetation or appropriate surface water treatments as soon as practicable following earthwork to minimize erosion o Ensure that roads used by construction vehicles are swept regularly to remove sediment. o Water the material stockpiles, access roads and bare soils on an as required basis to minimize dust. Increase the watering frequency during periods of high risk (e.g. high winds)
Construction activities in water bodies	Construction works in the water bodies will increase sediment and contaminant loading, and effect habitat of fish and other aquatic biology.	The Contractor shall: • Dewater sites by pumping water to a sediment basin prior to release off site – do not pump directly off site • Monitor the water quality in the runoff from the site or areas affected by dredge plumes, and improve work practices as necessary • Protect water bodies from sediment loads by silt screen or bubble curtains or other barriers • Minimize the generation of sediment, oil and grease, excess nutrients, organic matter, litter, debris and any form of waste (particularly petroleum and chemical wastes). These substances must not enter waterways, storm water systems or underground water tables. • Use environment friendly and nontoxic slurry during construction of piles to discharge into the river. • Reduce infiltration of contaminated drainage through storm water management design • Do not discharge cement and water curing used for cement concrete directly into water courses and drainage inlets.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Drinking water	Groundwater at shallow depths might be contaminated and hence not suitable for drinking purposes.	The Contractor shall: • Control the quality of groundwater to be used for drinking water on the bases of NEQS and World Bank standards for drinking water. Safe and sustainable discharges are to be ascertained prior to selection of pumps. • Tube wells will be installed with due regard for the surface environment, protection of groundwater from surface contaminants, and protection of aquifer cross contamination • All tube wells, test holes, monitoring wells that are no longer in use or needed shall be properly decommissioned
	Depletion and pollution of groundwater resources	• Install monitoring wells both upstream and downstream areas near construction yards and construction camps to regularly monitor and report on the water quality and water levels. • Protect groundwater supplies of adjacent lands

ANNEX-G-4: ECOP 4: DRAINAGE MANAGEMENT

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

ANNEX-G-5: ECOP 5: SOIL QUALITY MANAGEMENT

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

ANNEX-G-6: ECOP 6: EROSION AND SEDIMENT CONTROL

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Clearing of construction sites	Cleared areas and slopes are susceptible for erosion of top soils that affects the growth of vegetation which causes ecological imbalance.	The Contractor shall: • Reinstate and protect cleared areas as soon as possible. • Mulch to protect batter slopes before planting • Cover unused area of disturbed or exposed surfaces immediately with mulch/grass turfings/tree plantations
Construction activities and material stockpiles	The impact of soil erosion are (i) Increased run off and sedimentation causing a greater flood hazard to the downstream, (ii) destruction of aquatic environment in nearby lakes, streams, and reservoirs caused by erosion and/or deposition of sediment damaging the spawning grounds of fish, and (iii) Destruction of vegetation by burying or gullying.	The Contractor shall: • Locate stockpiles away from drainage lines • Protect the toe of all stockpiles, where erosion is likely to occur, with silt fences, straw bales or bunds • Remove debris from drainage paths and sediment control structures • Cover the loose sediments and water them if required • Divert natural runoff around construction areas prior to any site disturbance • Install protective measures on site prior to construction, for example, sediment traps • Control drainage through a site in protected channels or slope drains • Install 'cut off drains' on large cut/fill batter slopes to control water runoff speed and hence erosion • Observe the performance of drainage structures and erosion controls during rain and modify as required.

ANNEX-G-7: ECOP 7: BORROW AREAS DEVELOPMENT AND OPERATION/RESTORATION

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Development and operation of borrow areas	In case, the borrow pits developed by the Contractor, there will be impacts on local topography, landscaping and natural drainage.	The Contractor shall: • Reuse excavated or disposed material available in the project area to the maximum extent possible • Identify borrow pits in consultation with the local governments and PISSC as well as PMT. • Obtain the borrow material from: • barren land or land without tree cover outside the road reserve; • Do not dug the borrow pits within 5m of the toe of the final section of the road embankment. • Dig the borrow pits continuously. Ridges of not less than 8 m widths shall be left at intervals not exceeding 300 m and small drains should be cut through the ridges to facilitate drainage • Borrow areas should not excced 0.6 m (2ft.) in depth. • Slope the bed level of the borrow pits, as far as possible, down progressively towards the nearest cross drain, if any, and do not lower it than the bed of the cross-drain, to ensure efficient drainage. Follow the below for restoration of borrow areas are: • Return stockpiled topsoil to the borrow pit if is used for agriculture; • Return stockpiled topsoil to the borrow pit and all worked areas to be stabilized through re-vegetation using local plants. • Control at each site by ensuring that base of the borrow pit drains into a sediment trap prior to discharging from the site.

ANNEX-G-8: ECOP 8: AIR QUALITY MANAGEMENT

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

ANNEX-G-9: EC0P 9: NOISE AND VIBRATION MANAGEMENT

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

ANNEX-G-10: ECOP 10: PROTECTION OF FLORA

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

ANNEX-G-11: ECOP 11: PROTECTION OF FAUNA

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

ANNEX-G-12: ECOP 12: PROTECTION OF FISHERIES

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

ANNEX-G-13: ECOP 13: ROAD TRANSPORT AND ROAD TRAFFIC MANAGEMENT

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction Vehicular Traffic	Increased traffic use of road by construction vehicles will affect the movement of normal road traffics and the safety of the road-users.	The Contractor shall: • Prepare and submit a traffic management plan to PISSC and PMT for their approval at least 30 days before commencing work on any project component involved in traffic diversion and management. • Include in the traffic management plan to ensure uninterrupted traffic movement during construction: detailed drawings of traffic arrangements showing all detours, temporary road, temporary diversions, necessary barricades, warning signs/lights, road signs. • Provide signs at strategic locations of the roads complying with the schedules of signs contained in the Sindh and Pakistani Traffic Regulations. • Install and maintain a display board at each important road intersection on the roads to be used during construction, which shall clearly show the following information in Urdu: • Location: chainage and village name • Duration of construction period • Period of proposed detour/alternative route • Suggested detour route map • Name and contact address/telephone number of the concerned personnel • Name and contact address/telephone number of the Contractor • Inconvenience is sincerely regretted.
	Accidents and spillage of fuels and chemicals	• Restrict truck deliveries, where practicable, to day time working hours. • Restrict the transport of oversize loads. • Operate road traffics/transport vehicles, if possible, to non-peak periods to minimize traffic disruptions. • Enforce on-site speed limit

ANNEX-G-14: ECOP 14: CONSTRUCTION CAMP MANAGEMENT

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Siting and Location of Construction Camps	Campsites for construction workers are the important locations that have significant impacts such as health and safety hazards on local resources and infrastructure of nearby communities.	The Contractor shall: • Locate the construction camps at areas which are acceptable from environmental, cultural or social point of view. • Consider the location of construction camps away from communities in order to avoid social conflict in using the natural resources such as water or to avoid the possible adverse impacts of the construction camps on the surrounding communities. • Submit to the PMT for approval a detailed layout plan for the development of the construction camp showing the relative locations of all temporary buildings and facilities that are to be constructed together with the location of site roads, fuel storage areas (for use in power supply generators), solid waste management and dumping locations, and drainage facilities, prior to the development of the construction camps. • Local authorities responsible for health, religious and security shall be duly informed on the set up of camp facilities so as to maintain effective surveillance over public health, social and security matters. • Code of Conduct to be prepared by the Contractor, signed by his workers and approved by the PMT of SRP.
Construction Camp Facilities	Lack of proper infrastructure facilities, such as housing, water supply and sanitation facilities will increase pressure on the local services and generate substandard living standards and health hazards.	Contractor shall provide the following facilities in the campsites: • Adequate housing for all workers • Safe and reliable water supply. Water supply from tube wells that meets the national standards • Hygienic sanitary facilities and sewerage system. The toilets and domestic waste water will be collected through a common sewerage. Provide separate latrines and bathing places for males and females with total isolation by wall or by location. Female toilets should be clearly marked in language understood by the persons using them to avoid miscommunication. The minimum number of toilet facilities required is one toilet for every ten persons. • Treatment facilities for sewerage of toilet and domestic wastes • Storm water drainage facilities. Both sides of roads are to be provided with shallow v drains to drain off storm water to a silt retention pond which shall be sized to provide a minimum of 20 minutes retention of storm water flow from the whole site. Channel all discharge from the

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		silt retention pond to natural drainage via a grassed swale at least 20 meters in length with suitable longitudinal gradient. • Paved internal roads. Ensure with grass/vegetation coverage to be made of the use of top soil that there is no dust generation from the loose/exposed sandy surface. Pave the internal roads of at least haring-bond bricks to suppress dusts and to work against possible muddy surface during monsoon. • Provide child crèches for women working on the construction site. The crèche should have facilities for dormitory, kitchen, indoor/outdoor play area. Schools should be attached to these crèches so that children are not deprived of education whose mothers are construction workers • Provide in-house community/common entertainment facilities. Dependence of local entertainment outlets by construction camps to be discouraged/prohibited to the extent possible.
Disposal of waste	Management of wastes is crucial to minimize impacts on the environment	The Contractor shall: • Ensure proper collection and disposal of solid wastes within the construction camps • Insist waste separation by source; organic wastes in one pot and inorganic wastes in another pot at household level. • Store inorganic wastes in a safe place within the household and clear organic wastes on daily basis to waste collector. Establish waste collection, transportation and disposal systems with the manpower and equipment's/vehicles needed. • Dispose organic wastes in a designated safe place on daily basis. At the end of the day cover the organic wastes with a thin layer of sand so that flies, mosquitoes, dogs, cats, rats, are not attracted. One may dig a large hole to put organic wastes in it; take care to protect groundwater from contamination by leachate formed due to decomposition. Cover the bed of the pit with impervious layer of materials (clayey, thin concrete) to protect groundwater from contamination. • Locate the garbage pit/waste disposal site min 500 m away from the residence so that peoples are not disturbed with the odor likely to be produced from anaerobic decomposition of wastes at the waste dumping places. Encompass the waste dumping place by fencing and tree plantation to prevent children to enter and play with. • Do not establish site specific landfill sites. All solid waste will be collected and removed from the work camps and disposed in approval waste disposal sites.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Fuel supplies for cooking purposes	Illegal sourcing of fuel wood by construction workers will impact the natural flora and fauna	The Contractor shall: • Provide fuel to the construction camps for their domestic purpose, in order to discourage them to use fuel wood or other biomass. • Make available alternative fuels like natural gas or kerosene on ration to the workforce to prevent them using biomass for cooking. • Conduct awareness campaigns to educate workers on preserving the protecting of biodiversity in the project area, and relevant government regulations and punishments on wildlife protection.
Health and Hygiene	There will be a potential for diseases to be transmitted including malaria, exacerbated by inadequate health and safety practices. There will be an increased risk of work crews spreading sexually transmitted infections and HIV/AIDS.	The Contractor shall: • Provide adequate health care facilities within construction sites. • Provide first aid facility round the clock. Maintain stock of medicines in the facility and appoint fulltime designated first aider or nurse. • Provide ambulance facility for the labourers during emergency to be transported to nearest hospitals. • Initial health screening of the labourers coming from outside areas • Train all construction workers in basic sanitation and health care issues and safety matters, and on the specific hazards of their work • Provide HIV awareness programming, including STI (sexually transmitted infections) and HIV information, education and communication for all workers on regular basis • Complement educational interventions with easy access to condoms at campsites as well as voluntary counselling and testing • Provide adequate drainage facilities throughout camps to ensure that disease vectors habitats (stagnant water bodies, puddles) do not form. Regular mosquito repellent sprays in monsoon. • Carryout short training sessions on best hygiene practices to be mandatorily participated by all workers. Place display boards at strategic locations within the camps containing messages on best hygienic practices
Safety	In adequate safety facilities to the construction camps may create security problems and fire hazards	• The Contractor shall: • Provide appropriate security personnel (police / home guard or private security guards) and enclosures to prevent unauthorized entry in to the camp area. • Maintain register to keep track on a head count of persons present in the camp at any given time.

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

ANNEX-G-15: ECOP 15: CULTURAL AND RELIGIOUS ISSUES

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction Activities near Religious and Ccultural sites	Disturbance from construction works to the cultural and religious sites, and contractors lack of knowledge on cultural issues cause social disturbances.	The Contractor shall: • Communicate to the public through community consultation and newspaper announcements regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restriction. • Do not block access to cultural and religious sites, wherever possible • Restrict all construction activities within the foot prints of the construction sites. • Stop construction works that produce noise (particularly during prayer time) should there be any mosque/religious/educational institutions close to the construction sites and users make objections. • Take special care and use appropriate equipment when working next to a cultural/religious institution. • Stop work immediately and notify the site manager if, during construction, an archaeological or burial site is discovered. It is an offence to recommence work in the vicinity of the site until approval to continue is given by the PMT. • Provide separate prayer facilities to the construction workers. • Show appropriate behaviour with all construction workers especially women and elderly people • Allow the workers to participate in praying during construction time • Resolve cultural issues in consultation with local leaders and supervision consultants • Establish a mechanism that allows local people to raise grievances arising from the construction process. • Inform the local authorities responsible for health, religious and security duly informed before commencement of civil works so as to maintain effective surveillance over public health, social and security matters
Best Practices	Construction works may pose health and safety risks to the construction workers and site visitors	The Contractor shall: • An Occupational, Health and Safety Plan shall be prepared by the Contractor and submitted to ESU of PISSC and ESMU of PMT for review and approval. The plan shall be approved by the ESU of PISSC. The OHS shall include a job hazard analysis and safety

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

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

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

ANNEX-G-16: ECOP 16: WORKER HEALTH AND SAFETY

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Best Practices	Construction works may pose health and safety risks to the construction workers and site visitors leading to severe injuries and deaths. The population in the proximity of the construction site and the construction workers will be exposed to a number of (i) biophysical health risk factors, (e.g. noise, dust, chemicals, construction material, solid waste, waste water, vector transmitted diseases), (ii) risk factors resulting from human behaviour (e.g. STD and HIV) and (iii) road accidents from construction traffic.	The Contractor shall: • An Occupational, Health and Safety Plan shall be prepared by the Contractor and submitted to ESU of PIC and ESMU of PMU for review and approval. The plan shall be approved by the ESU of PIC. The OHS shall include a job hazard analysis and safety precautions (like PPEs, barriers, change to design) and make ensure use of the PPEs and other measures during construction time. • The contractor will train his workers and project management staff in (not limited to) first aid and basic infection control at work, transportation and handling of hazardous wastes, use of PPEs, fire safety etc. • Implement suitable safety standards for all workers and site visitors which should not be less than those laid down on the international standards (e.g. International Labour Office guideline on 'Safety and Health in Construction; World Bank Group's 'Environmental Health and Safety Guidelines') and contractor's own national standards or statutory regulations, in addition to complying with the national acts and rules of the Government of Sindh • Provide the workers with a safe and healthy work environment, taking into account inherent risks in its particular construction activity and specific classes of hazards in the work areas, • Provide personal protection equipment (PPE) for workers, such as safety boots, helmets, masks, gloves, protective clothing, goggles, full-face eye shields, and ear protection. Maintain the PPE properly by cleaning dirty ones and replacing them with the damaged ones. • Safety procedures include provision of information, training and protective clothing to workers involved in hazardous operations and proper performance of their job • Appoint an environment, health and safety manager to look after the health and safety of the workers • Inform the local authorities responsible for health, religious and security duly informed before commencement of civil works and establishment of construction camps so as to maintain effective surveillance over public health, social and security matters.
	Child and pregnant labor	The Contractor shall:

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		• Not hire children of less than 14 years of age and pregnant women or women who delivered a child within 8 preceding weeks, in accordance with the Pakistani Labour Laws and Employment of Child Act (1977).

	Gender Based Voilence	• The contractor shall:
		  • Train the workers regarding (Gender Based Voilance GBV) and also train workers about sexual harassment, child abuse, human trafficking for reducing the risk of GBV.
		  • The contractor will also raise awareness among workers regarding coordination with local law enforcement and code of conduct.

Accidents	Lack of first aid facilities and health care facilities in the immediate vicinity will aggravate the health conditions of the victims	• The contractor will arrange first aid facilities at the site. A trained first-aider should be present at the site and arrangements made with a local doctor to be available on call. Appropriately equipped first-aid stations should be easily accessible throughout the place of work • Contact numbers and location of the nearest healthcare/emergency centre should be displayed at the worksite. • Document and report occupational accidents, diseases, and incidents. • Prevent accidents, injury, and disease arising from, associated with, or occurring in the course of work by minimizing, so far as reasonably practicable, the causes of hazards. In a manner consistent with good international industry practice. • Identify potential hazards to workers, particularly those that may be life-threatening and provide necessary preventive and protective measures. • Provide awareness to the construction drivers to strictly follow the driving rules • Provide adequate lighting in the construction area and along the roads
Construction Camps	Lack of proper infrastructure facilities, such as housing, water supply and sanitation facilities will increase pressure on the local	The Contractor shall provide the following facilities in the campsites to improve health and hygienic conditions as mentioned in ECoP 14 Construction Camp Management: • Adequate ventilation facilities • Safe and reliable water supply. Water supply from deep tube wells that meets the national standards

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	services and generate substandard living standards and health hazards.	• Hygienic sanitary facilities and sewerage system. The toilets and domestic waste water will be collected through a common sewerage. • Treatment facilities for sewerage of toilet and domestic wastes • Storm water drainage facilities. • Recreational and social facilities • Safe storage facilities for petroleum and other chemicals in accordance with ECoP 2 • Solid waste collection and disposal system in accordance with ECoP1. • Arrangement for trainings • Paved internal roads. • Security fence at least two m height. • Sick bay and first aid facilities
Water and Sanitation Facilities at the Construction Sites	Lack of Water sanitation facilities at construction sites cause inconvenience to the construction workers and affect their personal hygiene.	• The contractor shall provide toilets at the construction sites. • Location of toilet facilities should be at least six meters away from storm drain system and surface waters. These toilets should be cleaned once a day and all the sewerage should be pumped from the collection tank once a day and should be brought to the common septic tank for further treatment. Alternatively, each toilet facility should have septic tank and soaking pit. • Contractor should provide clean drinking water facilities to the construction workers at all the construction sites.
Other ECoPs	Potential risks on health and hygiene of construction workers and general public	The Contractor shall follow the following ECoPs to reduce health risks to the construction workers and nearby community: • ECoP 2: Fuels and Hazardous Substance Management • ECoP 4: Drainage Management • ECoP 8: Air Quality Management • ECoP 9: Noise and Vibration Management • ECoP 13: Road Transport and Road Traffic Management
Trainings	Lack of awareness and basic knowledge in health care among the construction workforce, make them susceptible to potential diseases.	The Contractor shall: • Train all construction workers in basic sanitation and health care issues (e.g., how to avoid malaria and transmission of sexually transmitted infections (STI) HIV/AIDS. • Train all construction workers in general health and safety matters, and on the specific hazards of their work Training should consist of basic hazard awareness, site specific hazards, safe work practices, and emergency procedures for fire, evacuation, and natural disaster, as appropriate.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		• Commence the malaria, HIV/AIDS and STI education campaign before the start of the construction phase and complement it with by a strong condom marketing, increased access to condoms in the area as well as to voluntary counselling and testing. • Implement malaria, HIV/AIDS and STI education campaign targeting all workers hired, international and national, female and male, skilled, semi- and unskilled occupations, at the time of recruitment and thereafter pursued throughout the construction phase on on-going and regular basis. This should be complemented by easy access to condoms at the workplace as well as to voluntary counselling and testing.

ANNEX-H: ENVIRONMENTAL AND SOCIAL MITIGATION AND MONITORING PLAN

Sr. No.	Project Activities	Section	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	SRP 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			Plans should be prepared prior to mobilization. The Contractor shall take full care to preserve and protect from damage trees, native shrubbery and vegetation. Preparation of following plans: • Restoration and Tree Plantation and Maintenance Plan	Contractor	PISSC	Approved Plans	Once before mobilization	-	Construction stage

Sr. No.	Project Activities	Section	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
		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	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC			Along the embankment	Construction Period
				Photographs of pre-construction state of camps	Contractor	PMT-ESMU and PISSC	Photographs taken	Once	Along the embankments	Construction Period
				Biodiversity monitoring	PMT	PMT-ESMU and PISSC	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 SRP Consultant will be verified and updated and trees likely to be cut down shall be marked in advance and approved by PISSC and PMT	Contractor	PMT-ESMU and PISSC	Written approval for cutting of marked trees prior to cutting	Weekly	Along the embankments	Construction Period
				Cutting only of trees approved by PISSC Engineer, Environmentalist and PMT SRP	Contractor	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	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	PISSC	PMT-ESMU and PISSC	Status of terrestrial and avifauna	Quarterly	Along the embankments	Construction Period
				Areas having thick/dense vegetation will be avoided as far as possible.	Contractor	PMT-ESMU and PISSC	Vegetation are avoided	Monthly	Along the embankments	Construction Period

Sr. No.	Project Activities	Section	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
		B.1.2.2	Loss of habitats due to Sitting of new haul routes	use of existing accessing tracks	Contractor	PMT-ESMU and PISSC	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		PMT-ESMU and PISSC	Use of existing access tracks and width of new access tracks not more than 3m	Monthly	Haul routes	Construction Period
B.1.3	Disposal of Excavated Material	B.1.3.1	Identification of re-use of excavated material on site, to reduce off site effects	All excavated materials to be disposed of in designated sites.	Contractor	PMT-ESMU and PISSC	Surplus material are disposed of in designated place	Monthly	Along the embankments	Construction Period
		B.1.3.2	Community Disturbance	Community liaison will be maintained during construction stage and GRM will be established to address complaints related to noise generation.	Contractor	PMT-ESMU and PISSC	Surplus material are disposed of in designated place	Monthly	Along the embankments	Construction Period
			noise	Limiting working hours to between 6am and 6pm, six days a week. The camp sites shall be situated at least 500m from any settlement. On-demand noise monitoring will be carried out in case of any complaint or request by the affected communities. Additional mitigation measures will be identified and implemented in case the noise levels exceed the permissible limits. Community liaison will be maintained to ensure that complaints and grievances are addressed as soon as possible.	Contractor	PMT-ESMU and PISSC	Community complaints; Monitoring record	Monthly	All work sites and camp sites	Construction phase
		B.1.3.3	Disturbance of marsh and swamps	No disposal in the marsh and swamps	Contractor	PMT-ESMU	Surplus material are disposed of in designated place	Monthly	Along the embankments	Construction Period

Sr. No.	Project Activities	Section	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
						and PISSC				
			Damage to existing infrastructure Need to relocate infrastructure such as electricity transmission lines	Contractor will repair/restore all damaged infrastructures. Concerned department will be contacted for the relocation of electricity transmission lines. Community liaison to be maintained. GRM to be established to address related complaints.	Contractor	PMT-ESMU and PISSC	Evidence of restored infrastructure; Number of related complaints	Regularly	All works areas	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 Community consultations will be carried out and liaison will be maintained GRM to be established to address related complaints.	Contractor	PMT-ESMU and PISSC	Review of Camp layout plan	Once	Camp site	Before camp construction
				Employment of Community Liaison Officer	Contractor	PMT-ESMU and PISSC	Community Liaison Officer Employed	Once	Camp site	After mobilization of Contractor
				Compensation for loss of land and standing crops	PMT	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	Contractor	PMT-ESMU and PISSC	Construction of camp site: do not begin before approval of the layout plan.	Once before camp establishment.	All Camp site	Before Camp construction.
			Surface water pollution	Locate camps away from the embankments of drainage line, watercourses and Indus River		PMT-ESMU,PISSC and ESMEC	Surface water quality at camp and construction sites.	Monthly	Camps and construction site.	Throughout construction phase

Sr. No.	Project Activities	Section	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	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	Drainage provided in camps	Monthly	Construction Camp	Following the camp construction
				Camp shall be located above or beyond the river/tributary	Contractor	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	Drainage provided in camps	Monthly	Construction Camp	Throughout construction phase
				Camp shall be located above or beyond the river/tributary	Contractor	PMT-ESMU and PISSC	Review of Camp layout plan	Once		Before camp construction
				Hazardous material storage area shall be covered	Contractor	PMT-ESMU and PISSC	Covered storage of hazardous materials	Once	Construction Camp	Following the camp construction
				Run-off from refuelling and wash down areas collected from treatment	Contractor	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	Solid flooring and surfaces are provided	Once	Construction Camp	Following the camp construction
				Contractor shall regularly clean camps	Contractor	PMT-ESMU	Regular cleaning in all areas of camps	Monthly	Construction Camp	Throughout construction phase

Sr. No.	Project Activities	Section	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
						and PISSC				
				Suitable latrines and washing facilities provided in the camps	Contractor	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	Suitable washing facilities provided at each camp	Once	Construction Camp	Following the camp construction
B.2.4	Health, Safety and Wellbeing of Work Force.	B.2.4.1	Wellbeing of staff	Provision of electricity and lighting	Contractor	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	Provision of adequate kitchen	Once	Construction Camp	Following the camp construction
				Provision of on-call doctor	Contractor	PMT-ESMU and PISSC	Doctor visiting camp site regularly	Monthly	Construction Camp	Throughout construction phase
				Adequately stocked dispensary shall be provided Trained first-aider to be available on site on fulltime basis	Contractor	PMT-ESMU and PISSC	Adequately stocked dispensary available to all site staff	Monthly	Construction Camp	Throughout construction phase
		B.2.4.2	Trees cutting	Contractor shall supply staff with cooking fuel like LPG Cylinders	Contractor	PMT-ESMU and PISSC	Tree wood not used in kitchen	Monthly	Construction Camp	Throughout construction phase
		B.2.4.3	Signing of Code of Conduct.	The contractor will prepare a code of conduct and sign by his work crews		PMT-ESMU and PISSC	Code of conduct signed by all staff	Monthly	Construction Camp	Throughout construction phase
				Include awareness raising on HIV/AIDS and sexually transmitted disease and prevention and treatment of vector borne disease in Contractor training plan	Contractor	PMT-ESMU and PISSC	Approval of Contractor training plan	Once		At mobilization

Sr. No.	Project Activities	Section	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
						PMT-ESMU and PISSC	Training as per approved plan	Monthly	Construction Camp	Throughout construction phase
		B.2.4.3	Community Conflicts	Set up a complaint register at Contractor and Engineer office	Contractor	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	Code of conduct approved by Engineer	Once	Contractor and Engineer's Offices	At mobilization
				Contractor shall deliver training on cultural sensitivity to all workforce during induction	Contractor	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	No complaint received regarding mobility of women and girls	Monthly		Throughout construction phase
				Migrant staff prohibited to from entering local villages	Contractor	PMT-ESMU and PISSC	No complaint received regarding migrant staff entering the local villages	Monthly		Throughout construction phase
		B.2.4.4	Hunting and loss of Fauna	Ban on hunting, poaching and trapping of all fauna by all project personnel's	Contractor	PMT-ESMU and PISSC	No hunting reported/observed	Monthly	Project area	Throughout construction phase
				Biodiversity monitoring of impacts of fauna	Contractor	PMT-ESMU and PISSC	Status and behaviour of terrestrial and avia-fauna	Quarterly	Project office	Throughout construction phase
		B.2.4.5	Accidents and Emergencies	Contractor shall prepare a shutdown procedure and evacuation plan	Contractor	PMT-ESMU and PISSC	Plan submitted to Engineer			
				Emergency Response Plan to man-made and natural disasters (including floods, fire, etc.)		PMT-ESMU and PISSC	Annual evacuation drill	Annually	Construction Camp	Throughout construction phase

Sr. No.	Project Activities	Section	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
				Emergency access routes shall be signed and maintained	Contractor	PMT-ESMU and PISSC	Emergency access routes clear and signed	Monthly	Construction Camp	Throughout construction phase
				Fire extinguishers to be provided through out camp	Contractor	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	Plan submitted to Engineer include evacuation procedure of public in event of major fire	Once		At mobilization
B.2.5	Camp Planning	B.2.5.1	Community Disturbance	Camp layout plan to be submitted to Engineer	Contractor	PMT-ESMU and PISSC	Review of Camp layout plan	Once	Construction Camp	Before camp construction
		B. 2.5.2	Loss of Flora and Fauna	Locate camps away from the embankments of Watercourses.	Contractor	PMT-ESMU and PISSC	Commencement of works not before approval of plan	Once	Construction Camp	Before camp construction
		B.2.5.3	Environment and Social conflicts due to influx of external workforce	Preference will be given to local labours from adjacent communities. Awareness raising of residents for safety protection. Awareness raising of labor to ensure respect for local customs.	Contractor	PMT-ESMU and PISSC	Camp will be established at least 500 m away from community, Local hired workforce, any complaint from local community, presence of CNIC or relevant documents.	Fortnightly		During construction
B.2.6	Security	B.2.6.1	Conflict with local communities, attack on staff	Security for avoiding any conflict with local communities	Contractor	PMT-ESMU and PISSC	Fencing and security shall be provided by Contractor at all camps. Entrance to camp shall be monitored and restricted	Monthly	Construction Camp	Throughout construction phase
				Preparation and Implementation of communication strategy	Contractor	PMT-ESMU and PISSC	Approval of Contractor's Communication Strategy	Once		At mobilization

Sr. No.	Project Activities	Section	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
						PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	Plan submitted and approved	Once		At mobilization
							Annual evacuation drill	Annual	Construction camps	Throughout construction period
		B.2.6.2	Change in Landscape after closure of works	All temporary facilities shall be removed by Contractor after completion of the works	Contractor	CSC,EMECs and EMU	Temporary facilities are removed on completion of works	Once	Construction camps	at completion of works
			noise	The camp sites shall be situated at least 500m from any settlement. On-demand noise monitoring will be carried out in case of any complaint or request by the affected communities. Additional mitigation measures will be identified and implemented in case the noise levels exceed the permissible limits. Community liaison will be maintained to ensure that complaints and grievances are addressed as soon as possible. Community liaison will be maintained during construction stage and GRM will be established to address complaints related to noise generation.	Contractor	PMT-ESMU and PISSC	Community complaints; Monitoring record	Monthly	All work sites and camp sites	Construction phase

Sr. No.	Project Activities	Section	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
	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	PMT-ESMU and PISSC	No dust generated from stockpiles	Monthly	Stockpiles	Throughout construction period
		B.3.1.2	Ground and surface water pollution	Locate storage area away from water courses, drain and transport routes	Contractor	PMT-ESMU and PISSC	Review of camp layout plan	Once		Before camp construction
				Locate storage area above or beyond the flood plain	Contractor	PMT-ESMU and PISSC	Review of camp layout plan	Once		Before camp construction
				Use only designated storage areas	Contractor	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	Untrained personnel's are not accessing hazardous storage areas	Monthly	Hazardous material storage areas	Throughout construction period
				Provide hard compacted impervious and bunded flooring or secondary storage containers to stop run-off and seepage into the soil/ground/river from hazardous material storage areas.	Contractor	PMT-ESMU and PISSC	Hazardous material storage must be provided impervious flooring or secondary containment.	Monthly	Hazardous material storage areas	Throughout construction period
				Hazardous material sites identified on site	Contractor	PMT-ESMU and PISSC	Signs provided to identify hazardous material storage area	Once	Hazardous material storage areas	Following camp construction
				Provide fire extinguishers	Contractor	PMT-ESMU and PISSC	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	PMT-ESMU	PPEs used	Monthly	Hazardous material storage areas	Throughout construction period

Sr. No.	Project Activities	Section	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
						and PISSC				
		B.3.2.2	Ground or Surface Water Pollution	Storage areas for fuels and other hazardous substances shall have masonry or concrete secondary containment bund with 120% capacity of fuel stored	Contractor	PMT-ESMU and PISSC	Bunding provided at fuel bowsers	Once	Fuel tanks	Following camp construction
				Hazardous material storage areas shall be covered and provided with concrete floor	Contractor	PMT-ESMU and PISSC	Concrete flood and cover to hazardous material storage areas and generators	Once	Hazardous material storage areas	Following camp construction
				Concrete or masonry bunding provided at perimeter of hazardous material storage area	Contractor	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	Spill kits provided	Monthly	Hazardous material storage areas and fuel tanks	Throughout construction period
				Spill prevention and contingency plan prepared by Contractor	Contractor	PMT-ESMU and PISSC	Approval of Plan	Once		At mobilization
				Hazardous material storage area or fuel tank not be situated adjacent to watercourse	Contractor	PMT-ESMU and PISSC	Review of camp layout plan	Once		Before construction camp
				Space maintained between containers to allow inspection	Contractor	PMT-ESMU and PISSC	Containers spaced to allow inspection	Monthly	Hazardous material storage area	Throughout construction period
				Select access roads to avoid run-off to river.	Contractor	PMT-ESMU and PISSC				

Sr. No.	Project Activities	Section	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
				The materials should be stored away from sunlight and direct exposure to air/wind	Contractor	PMT-ESMU and PISSC	Material storage must be sheltered	Monthly	Hazardous material storage area	Throughout construction period
		B.3.2.3	Health and Safety and Pollution	Oil designated storage area used	Contractor	PMT-ESMU and PISSC	Stockpiles only in storage areas identified in camp layout plan	Monthly	Project area	Throughout construction period
				Training on handling, use and disposal of hazardous material must be given to all those with access to hazardous material area	Contractor	PMT-ESMU and PISSC	Training as per Contractor's approved training plan	Monthly	Hazardous material storage area	Throughout construction period
				Covered transportation of hazardous material	Contractor	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	Excess construction material removed	Once	Project area	at completion of works
				Community liaison to be maintained. GRM to be established to address related complaints.	Contractor	PMT-ESMU and PISSC	Number of complaints	regular	Project area	Construction phase
B.4. WASTE MANAGEMENT										
B.4.1	Generation of Sanitary Wastes	B.4.1.2	Surface and Groundwater Pollution and Health of Staff	Provide latrines at the camps and prohibit staff from fouling the camp. Provide septic tank for collection and treatment of septic sanitary waste.	Contractor	PMT-ESMU and PISSC	Provision of latrines and septic tank for collection and treatment of sanitary waste.	Monthly	Camp site	Up to 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	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	Consent submitted	Once		At mobilization

Sr. No.	Project Activities	Section	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
		B.4.2.2	Use of municipal system which falls below NEQS standards	Only government approved system to be approved	Contractor	PMT-ESMU and PISSC	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	Camps and offices to have septic tanks and soaking pits to treat sewage Only sanitary wastes treated in septic tanks	Contractor	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	Monitoring of effluents against NEQs	Quarterly	septic tanks	Throughout construction period
				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	PMT-ESMU and PISSC	Plan submitted and approved	Once		Throughout construction period
		B.4.3.3	Overflow of septic system surface	Location of system to ensure overflow shall not reach surface water bodies. Camp shall be located away from water course or water body. Monitoring will be carried out on weekly basis.	Contractor	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	Provision of bins	Monthly	Construction camps	Throughout construction period
		B.4.4.2	Regular collection and disposal of wastes	Regular collection and disposal of wastes	Contractor	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	Used construction material not disposed of	Monthly	Landfills and burns sites	Throughout construction period
				Use of recycling Contractor	Contractor	PMT-ESMU and PISSC	Recyclable material not disposed of	Monthly	Landfills and burns sites	Throughout construction period

Sr. No.	Project Activities	Section	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
				Sell steel of the old gates to contractor through auction as per procedure prescribed by the Government of Sindh		PMT-ESMU and PISSC		Monthly	Landfills and burns sites	Throughout construction period
				Reuse of domestic wastes (if applicable)	Contractor	PMT-ESMU and PISSC	Demolition wastes not disposed of where use available elsewhere	Monthly	Landfills and burns sites	Throughout construction period
				Community liaison to be maintained. GRM to be established to address related complaints.	Contractor	PMT-ESMU and PISSC	Number of complaints	Monthly	Landfills and burns sites	Throughout construction period
B.4.6	Disposal of domestic wastes using Municipal facilities.	B.4.6.1	Ground and groundwater pollution, spread of disease	Domestic waste shall be collected from waste bins on alternate days and transport through tractor trolley to dispose of in nearby Municipal facility. A written agreement shall be made in between Municipal operator and contractor for disposal of domestic waste.	Contractor	PMT-ESMU and PISSC	Licence or Written agreement b/w Municipal operator and Contractor checked.	Monthly	Licenced site.	Throughout construction period
				Domestic wastes only to be disposed of in licenced site.	Contractor	PMT-ESMU and PISSC	No hazardous waste, medical waste or sanitary in licenced site	Monthly	Licenced site.	Throughout construction period
B.4.7	Disposal of medical wastes	B.4.7.1	Surface water pollution, health and safety of staff and public.	Medical wastes will be stored on site Contractor will engage third party contractor for treatment and ultimate disposal of medical waste in controlled manner.	Contractor	PMT-ESMU and PISSC	No medical wastes in municipal facility.	Monthly	Collection point	Throughout construction period
B.4.8	Disposal of hazardous wastes	B.4.8.1	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	PMT-ESMU and PISSC	Approval of Plan	Once		At mobilization

Sr. No.	Project Activities	Section	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
B.4.9	Transport of wastes	B.4.9.1	Littering, pollution	Wastes shall be covered (e.g. with a tarpaulin) during transport	Contractor	PMT-ESMU and PISSC	No wastes littering the project area	Monthly	Routes from camps landfill	Throughout construction period
B.4.10	Disposal of washout	B.4.10.1	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	PMT-ESMU and PISSC	Approval of Plan	Once		
B.4.11	Closure of works	B.4.11.1	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		PMT-ESMU and PISSC	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 on site	B.5.1.1	Air pollution	All vehicles are regularly services as per manufacturers requirements	Contractor	PMT-ESMU and PISSC	Black smoke not observed emitting from Vehicles/plant	Monthly	Project area	Throughout construction period
						PMT-ESMU,PISSC and ESMEC	Monitoring of ambient air quality as per NEQS as shown in Box 8.1	Bi-annual	Project area	Throughout construction period
				Efficient driving practices included in Contractor's training plan	Contractor	PMT-ESMU and PISSC	Submittal and approval of plan	Once		At mobilization
						PMT-ESMU and PISSC	Training as per approved plan	Monthly	Project area	Throughout construction period
		B.5.1.2	Generation of dust	Access road to be adequately compacted or regularly sprinkled to prevent dust generation during use	Contractor	PMT-ESMU, PISSC and ESMEC	Dust not reaching the settlements in the project area Frequency of anti-dust water sprays during movement of vehicles	Monthly	Settlement in the project area	Throughout construction period
				Construction traffic limited to work area and established tracks	Contractor	PMT-ESMU and PISSC	Construction traffic use only established tracks	Monthly	Project area	Throughout construction period

Sr. No.	Project Activities	Section	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
		B.5.1.2	Soil and Groundwater pollution	Vehicles/plants will be checked daily for fuel oils and leaks and fixed as required	Contractor	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	No vehicle observed parked outside the approved areas	Monthly	Project area	Throughout construction period
				Movement of vehicles/plant restricted to work hours	Contractor	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	Submittal and approval of plan	Once		At mobilization
				Safe driving practices included in Contractor's training plan	Contractor	PMT-ESMU and PISSC	Training as per approved plan	Monthly	Project area	Throughout construction period
				All Drivers hold a valid license	Contractor	PMT-ESMU and PISSC	Drivers able to show valid license	Monthly	Project area	Throughout construction period
				Flag persons to be provided where plant cross/meet village road	Contractor	PMT-ESMU and PISSC	Flag persons provided	Monthly	Road approaching and crossing	Throughout construction period
				Contractor's Community Liaison Officer to collaborate with communities to identify sensitive areas and inform communities prior to movement of large plant	Contractor	PMT-ESMU and PISSC	No complaint received from communities	Monthly	Settlement in the project area	Throughout construction period
				Vehicles with restricted rear visibility to be fitted with audible back-up alarm or provided with banks men	Contractor	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	No mud on public roads	Monthly	Project area	Throughout construction period

Sr. No.	Project Activities	Section	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
				Driving in project area after nigh fall is prohibited except on public highways	Contractor	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	No damage to roads/infrastructure	Monthly	Public roads	Throughout construction period
				Use of horns is prohibited near the settlement	Contractor	PMT-ESMU and PISSC	Nor horns heard at settlement	Monthly	Settlement in the project area	Throughout construction period
			Disturbance of Fauna	Biodiversity monitoring of impacts on fauna	Contractor	PMT-ESMU and PISSC	Status and behaviour of terrestrial and avia-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	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	Queuing vehicles engines are not idling	Monthly	Construction camp	Throughout construction period
		B.5.2.2	Dust	Covered transportation of loose materials	Contractor	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	Submittal and approval of plan Delivery vehicles are following designated routes	Once		At mobilization
				Deliveries should be carried out during the normal working hours and prohibited at night.	Contractor	PMT-ESMU and PISSC	No deliveries carried out in night.	Monthly	Construction camp	Throughout construction period
				Delivery vehicles are prohibited form queuing on public roads	Contractor	PMT-ESMU and PISSC	No queuing delivery vehicles on public roads	Monthly	Construction camp	Throughout construction period

Sr. No.	Project Activities	Section	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
				Vehicles to be unloaded off	Contractor	PMT-ESMU and PISSC	No unloading on public roads	Monthly	Construction camp	Throughout construction period
B.5.3	Road Closure/Congestions	B.5.3.1	Community disturbance increase in traffic	Flag persons to be provided where plant cross/meet village road.	Contractor	PMT-ESMU and PISSC	Flag persons provided	Weekly	At road partial closure	During partial road closure
				Contractor's Community Liaison Officer to collaborate with communities to identify sensitive areas and inform communities prior to movement of large plant	Contractor	PMT-ESMU and PISSC	No complaint received	Monthly	Settlement in the project area	Throughout construction period
				Traffic by-pass should be provided and signed	Contractor	PMT-ESMU and PISSC	By-pass provided and signed	Monthly	At road full closure	During road closure
				Request for road closure must be approved by relevant authority	Contractor	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	No fuel spillage from refuelling operations	Monthly	Project area	Throughout construction period
B.5.5	Noise Levels	B.5.5.1	Health of Community	Limiting working hours to between 6am and 6pm, six days a week. On-demand noise monitoring will be carried out in case of any complaint or request by the affected communities. Noise levels should be measured where work is undertaken or where sensitive locations and settlements exist. Additional mitigation measures will be identified and implemented in case the noise levels exceed the permissible limits. Community liaison will be maintained during construction stage and GRM will	Contractor	PMT-ESMU and PISSC	Community complaints; Monitoring record	Monthly	Where work is undertaken, camp sites and other sensitive locations.	Throughout construction period

Sr. No.	Project Activities	Section	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
				be established to address complaints related to noise generation.						
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 safety plan. This plan will need to describe all jobs, their risks, and the controls that will reduce risks; these controls may include PPE, restrictions on activities or locations, and other measures. The plan also needs to describe what training will be given to what workers. Those who work near water, at heights, with heavy equipment will need special training so those hazards can be managed. 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 covered in the above described OHS Plan; 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	PMT-ESMU and PISSC	Submittal and approval of plan. Number of reported accidents. Number of reported near-misses. Non-compliance observed. Community complaints.	Regularly		During construction phase

Sr. No.	Project Activities	Section	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
				Contractor will arrange a rescue team and first-aid facility in case of any accident; No private property without permission of the owner will be used for transportation; Drivers will fix net on containers while transporting stones and soil etc. Community liaison will be maintained during construction stage and GRM will be established to address complaints related to safety hazards.						
				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	PMT-ESMU and PISSC	Submittal of accident report	Monthly	Project area	Throughout contract period
				Qualified health and safety manager will be appointed by Contractor	Contractor	PMT-USMU and PISSC	Qualified health & safety manager present on site	Monthly	Project area	Throughout contract period
				Contractor shall engage a full time first-aider on site Contractor to have on-call doctor	Contractor	PMT-ESMU and PISSC	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 will maintained the record of patients regarding patients suffering from malaria, cholera, diarrhoea, respiratory ailments during construction phase.	Contractor	PMT-ESMU, PISSC and ESMEC	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	PMT-ESMU and PISSC	First aid facilities provided at each work site	Monthly	Project area	Throughout contract period

Sr. No.	Project Activities	Section	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	PMT-ESMU and PISSC	Submittal and approval of plan	Once		At mobilization
							Provision of resources required for implementation	Monthly	Project area	Throughout contract period
				Community liaison to be maintained. GRM to be established to address related complaints.	Contractor	PMT-ESMU and PISSC	Number of complaints	Regularly	All areas	During construction
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		PMT-ESMU and PISSC	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 PISSC	PMT-ESMU and PISSC	Tree inventory prepared	Weekly	Project area	Throughout contract period
				Compensatory tree plantation is proposed	Contractor	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	alternative drainage is provided	Monthly	Project area	Throughout contract period
		B. 7.3.2	Resettlement/ Relocations of public, private and commercial structures.	ARAP has been prepared according to WB policy 4.12 to compensate the relocation.	PMT and PISSC	PMT ESMEC	Compansation amount received before the relocation.	Once	Project area	Before relocation
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	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	Material are not borrowed from the toe of the embankments	Weekly	Project area	Throughout contract period
		B.7.4.3	Borrow area in environmental sensitive sites	Borrow areas shall not be established in the wetlands, forest and any other environmental and social sensitive areas	Contractor	PMT-ESMU and PISSC	Borrow areas are not established in the environmental and social sensitive sites	Weekly	Project area	Throughout contract period

Sr. No.	Project Activities	Section	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
		B.7.4.4	Restoration/rehabilitation of borrow areas	Restoration of borrow areas	Contractor	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC	A clearance of 5m is maintained	Weekly	Project area	Throughout contract period
			Noise	Limiting working hours to between 6am and 6pm, six days a week. On-demand noise monitoring will be carried out in case of any complaint or request by the affected communities. Additional mitigation measures will be identified and implemented in case the noise levels exceed the permissible limits. Community liaison will be maintained to ensure that complaints and grievances are addressed as soon as possible. Community liaison will be maintained during construction stage and GRM will be established to address complaints related to noise generation.	Contractor	PMT-ESMU, PISSC and ESMEC	Noise levels (in dBA), monitored at fixed locations and planed schedule during construction Community complaints; Monitoring record	Monthly	All work sites and camp sites	Construction phase
B.7.5	Access to Borrow Areas	B.7.5.1	Impacts on flora and fauna	available/existing access routes shall be followed	Contractor	PMT-ESMU and PISSC	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

Sr. No.	Project Activities	Section	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
		B.7.5.3	if access rout in the agriculture land is unavoidable, the owner of the land and crop shall be compensated	Compensation to the affected person shall be paid			the affected person is compensated	Weekly	Project area	Throughout contract period
B.7.6	Loading lorries/dump trucks	B.7.6.1	Disturbance of ambient air	Minimize height between loader (excavator) and bed of lorry/dump truck	Contractor	PMT-ESMU and PISSC	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	PMT-ESMU and PISSC		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	PMT-ESMU and PISSC		Weekly	Project area	Throughout contract period
		B.7.7.3	Landscape change	Grade sides of borrow areas to 1:3	Contractor	PMT-ESMU and PISSC		Weekly	Project area	Throughout contract period
				Community liaison to be maintained. GRM to be established to address related complaints.	Contractor	PMT-ESMU and PISSC	Number of complaints	Regularly	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	PMT-ESMU and PISSC	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 mosques and Graveyards at Kuka Wari and PB Bunds (Spiritual Place for local people).	Contractor	PMT-ESMU and PISSC	All works excluded from the identified locations			Throughout contract period
				Works do not block access to sites	Contractor	PMT-ESMU and PISSC	access to the sites is not blocked			

Sr. No.	Project Activities	Section	Environmental Impacts	Mitigation Measures	Responsibility		Key Performance Indicators	Monitoring Frequency	Location	Time Frame
					Execution	Monitoring				
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	PMT-ESMU and PISSC	Engineer informed of discovery of unidentified cultural or religious sites	Monthly	Project Area	Throughout contract period
				Community liaison to be maintained. GRM to be established to address related complaints.	Contractor	PMT-ESMU and PISSC	Number of complaints	regularly	Project Area	Throughout contract period
C. OPERATION PHASE										
C.1	Spoil heaps	C.1.1	Change in landscape	Use of surplus excavated material in agricultural fields or for construction of homes by the farmers to increase fertility and raising of low lying fields	SID	SID	Spoil heaps are used by the farmers	Continues	Entire project area	Continuous
C.2	Care of newly planted trees	C.2.1	Mortality of newly planted saplings	The Contractor shall be responsible for after care of the newly planted trees for the first year, after which trees will become responsibility of SID	Contractor and SID	SID	Survival of trees	Once	Entire project area	Continuous