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PAK: Flood Emergency Reconstruction and Resilience Project, Loan No. 3264

Initial Environmental Examination of

Construction of Jhelum City Flood Protection Bund

Prepared by:

Project Implementation Unit, Punjab Irrigation Department (PID), Government of Punjab, Lahore.

Asian Development Bank

GOVERNMENT OF PUNJAB
IRRIGATION DEPARTMENT

December 2016

INITIAL ENVIRONMENTAL EXAMINATION

CONSTRUCTION OF JHELUM CITY FLOOD PROTECTION BUND ALONG RIGHT BANK OF RIVER JHELUM UPSTREAM GT ROAD BRIDGE

Table of Contents

List of Figures & Tables

List of Abbreviations

AOI	Area of Influence
ADB	Asian Development Bank
EIA	Environmental Impact Assessment
EMMP	Environmental Management and Monitoring Plan
EPA	Environmental Protection Agency
GOP	Government of Punjab
IEE	Initial Environmental Examination
IUCN	International Union for Conservation of Nature
MRS	Market Rate System
NCB	National Contract Bidding
NCS	National Conservation Strategy
NEP	National Environmental Policy (2005)
NEQS	National Environmental Quality Standards
NESPAK	National Engineering services Pakistan
NGO	Non-Governmental Organization
NOC	No Objection Certificate
PC	Planning Commission
PEPA	Pakistan Environmental Protection Agency
PEPC	Pakistan Environmental Protection Council
PID	Punjab Irrigation Department
PIU	Project Implementation Unit
RD	Reduced Distance
RE	Resident Engineer
REA	Rapid Environmental Assessment
SPS	Safeguard Policy Statement 2009
XEN	Executive Engineer

CURRENCY EQUIVALENTS

(as on 06 March 2017)
Currency unit – Pak rupee
1 USD = 104.81 PKR

UNITS AND CONVERSION FACTORS

Length
1 inch = 25.4 millimeters
1 meter = 3.281 feet
1 mile = 1609 meters = 1760 yards = 5280 feet

Area
1 sq. m = 10.76 sq. feet = 1.196 sq. yard
1 hectares = 2.47 Acres = 10,000 sq. m
1 sq. km=100 hectares

Executive Summary

A. Introduction

This report contains the Initial Environmental Examination (IEE) of "Construction of Jhelum City Flood Protection Bund". Rapid Environmental Assessment (REA) has been carried out for environmental screening of the subproject. According to REA, sub project falls in category "B" as per ADB' Safeguard Policy Statement (SPS) 2009. Hence the subproject requires Initial Environmental Examination (IEE).

B. Background

The Punjab irrigation network comprises of 24 main canals fed by 14 Barrages / Headworks and 9 major inter-river link canals, irrigating more than 21 million acres of land. This irrigation network of Punjab Province makes it the most fertile area of Pakistan. More than 50% of the total national agricultural produce comes from this fertile land.

This subproject is one of the 13 subprojects taken up under "Flood Emergency Reconstruction and Resilience Project (FERRP)" being implemented by the Project Implementation Unit (PIU), Punjab Irrigation Department and financed by the Asian Development Bank (ADB). The cost of subproject amounts to Rs. 1672.527 (Million).

In 2014, heavy monsoon rains in the catchment areas of the eastern rivers of Chenab, Ravi, Sutlej and Jhelum, resulted in flash floods and rain-hit areas in various districts of the province damaging community physical infrastructure as well as bringing destruction to private housing and agriculture. The causes of devastation can be classified into two categories in terms of their impact i.e. (a) Flood- affected and (b) Rain-affected. In Punjab, sixteen districts were affected by the floods in the eastern rivers (particularly Chenab River), emanating from across the eastern borders, and twelve additional districts also faced severe damages due to heavy rainfall in catchment areas causing flash floods and damages to the physical public and private infrastructure, agriculture land and communication facilities etc.

C. Project Location

The subproject is located on the right bank of River Jhelum near Jhelum City on Longitude 73^{o} 43` 23`` E and latitude $32^{o}$ 54` 49`` N. Jhelum City is situated at distance of about 100 K.M. South East of Islamabad, (Capital of Pakistan) on the right bank of River Jhelum.

D. Environmental Issues

The subproject activities include construction of a new flood protection bund, which is to

be tied with the existing flood protection bund at RD 20+000. The subproject civil works may cause some disturbance in the RoW at site and at the allied sites involving borrow material area, establishment of camp and material and machinery yard, transportation on link roads and necessary facilities for the staff and labor to be engaged for the execution of the subproject.

E. Policy, Legal and Administrative Framework

The Asian Development Bank's Safeguard Policy Statement (SPS) 2009 requires that environmental considerations be incorporated into ADB's funded project to ensure that the project will have minimal environmental impacts and be environmentally sound. Occupational health & safety of the local population should also be addressed as well as the project workers as stated in SPS 2009. Furthermore, this report also represents the requirements of National and Provincial Environmental Protection Agencies (EPAs).

F. Project Categorization

According to ADB Safeguard Policy Statement 2009, projects are to be categorized into three environmental categories; A, B, or C. All the anticipated adverse environmental impacts of the project are mitigable, temporary, nature and localized. There is no environmentally sensitive or archeological site falling within project area of influence. Rapid Environmental Assessment (REA) Checklist used for the sub project defines the subproject as category "B".

G. Project Description

To protect the population and the infrastructures of Jhelum City, it has been proposed to construct a 6 km long flood embankment starting from New G.T. Road Bridge of River Jhelum to Tahlianwala village upstream Jhelum City. 25 ft top width with 2:1 slope on country side and 3:1 on river side has been proposed. New proposed bund will be tied up with the old existing bund. Stone pitching consists of 2 feet thick with 1 feet filler material and 1 feet stone pitching. Stone quantity in apron is proposed as 500 $ft^{2.}$ To attain a uniform line of apron, at some places there is a deep scour in river bed, quantity of dumping stone has been increased for which provision has also been made. Top of bank is proposed 6ft above HFL which is 758.50 above mean sea level at Railway Bridge (RD 2+000) in Jhelum City. Provision of box culverts is also provided along the bund to dispose of the city effluent/ rain water through gravity flows.

The experience of exceptionally high flood in September 2014 demonstrates that the existing free board is less to provide safeguard against high flood. It may be revisited in purview of flood heights of recent flood of September 2014 to make the bund strong enough to provide foolproof and risk free safety to local abadies/settlements,

infrastructures, livestock, properties and human lives in particular.

The proposed Jhelum City Flood Protection Bund is to be constructed in open river bed along its right bank where certain depth of River flow remains persistent. The construction will start with proceeding with a solid stone boom at the toe of River side slope. In the shadow of the said boom earthwork will be carried out for raising the embankment. In this way stone apron & earthen embankment will be constructed side by side in the shortest possible time.

H. Environmental and Social Baseline

a. Physical Environment

Jhelum district is part of Potohar Plateau. It stretches from the river Jhelum almost to the River Indus. Salt is quarried at the Mayo mine in the Salt Range. There are two coal-mines in the district from which the North-Western from where railway obtains partial supply.

There is a long strip of very rich and virgin soil along the river which could be made a paradise of citrus plantation by drip irrigation if the local people are motivated and the Government of Punjab expressed some interest in it.

On an average, within the direct influence of the river and in the immediate vicinity of the subproject area, 40% of the land is under agriculture. About 30% is under settlements, 20% wetlands, and 10 percent forest / range land.

Jhelum has a humid subtropical climate (Köppen climate classification Cfa) and is extremely hot and humid in summer, and cold and generally dry in winter.

Currently, there are no noise issues in the area. However, movement of equipment and machinery will cause noise on temporary basis. The area has no history of any serious damages due to earthquake. The area lies in Zone 2B which is a Minor Hazard Region.

No sites of archeological, historical, cultural, or religious significance are known to exist in the areas where construction will take place.

b. Biological Environment

The forests of Jhelum Division are burdened with right of grazing browsing and firewood. Under settlement out of total area 93,566 acres (378.65 km2) only 5,468 acres (22.13 km2) about (45%) are right free. Remaining 55% are open to grazing. Some other species such as eucalyptus, sheesham, keekar and mulberry are also present.

Agricultural crops like wheat in Rabi season and rice and pulses in Kharif season are

grown. The rugged and rough terrain, low rainfall, the scantly cover of vegetation and the burning passions of the increasing number of hunters, all have their share in limiting the animal kingdom in the District. The riverine offers a better environment than elsewhere though the hills support a more interesting wildlife. Urial and Chinckara are spot aids while wild bores are found in the Salt Range. Wolves, Foxes and Wild Cats are also found. Hare is fairly common. Chikor grey and black Partridge are also found in the parts of the district. There are no endangered, extinct or rare species reported / pertaining to AoI.

The subproject area is famous for buffaloes known as one of highest milk producing animals. About 80% of the population of subproject area depends upon agriculture. Most of the area is well cultivated. Rice is the main kharif crop.

c. Socio-Economic and Cultural Aspects

Jhelum district is in the Punjab province of Pakistan. It is located in the north of the Punjab province, Jhelum district is bordered by Sargodha to its south, Gujrat and the Jhelum River to its south and east, Chakwal to its west, Mirpur to its east and Rawalpindi to its north.

According to Punjab Development Statistics 2011 total population of Jhelum district is 1,148 thousand persons out of which 574 thousand are males and 574 thousand are female. Density of population in the district is 320 persons per square Kilometer. The district of Jhelum stretches from the river Jhelum almost to the Indus. Salt is quarried at the Mayo mine in the Salt Range. The prime center of the salt trade is Pind Dadan Khan. Jhelum is known for providing a large number of soldiers to the British and later to the Pakistan armed forces. Due to which it is also known as city of soldiers or land of martyrs and warriors. The district is crossed by the main line of the North-Western railway, and also traversed along the south by a branch line.

The major castes of the district are the Awan, Akra, Bharat, Gakhar, Gujar, Janjua Rajput, Jalap, Jat (Cheema, Dhamial, Gondal, Ghuman, Sipra, Nagyal, thathal, Kashmiris, Khokhars, Lilla Qureshi, Phaphra Mughal,Bhakral, Bhatti, Chib, Minhas, Narma and Sohlan.

Jhelum District has a total area of 858,767 acres, out of which 316,815 acres are cultivated. It has four Tehsils i.e. Jhelum, Pind Dadan Khan, Dina and Sohawa. The area is located on the eastern part of Potohar upland along with River Jhelum.

There are numbers of industry in and around Jhelum City. Major industries include a tobacco factory, wood, marble; glass, flour mills, cement and soda ash manufacturing

units are operating in the district.

The major profession of people is service in Armed Forces, hence they are generally disciplined and law abiding.

Literacy is a basis for lifelong learning and plays a foundational role in the creation of sustainable, prosperous and peaceful societies. The Literacy ratio (10 years age and above) of Jhelum District was 63.9 % percent in 1998 on an overall basis. The literacy ratio for males calculated 77.66 % percent as against 50.47 % percent for females.

I. Public Consultation

The public consultation process with various stakeholders has been carried out so as to create awareness, information dissemination and to involve them in the designing, planning and execution of subproject. The viewpoints of the stakeholders have been taken into account and their concerns and suggestions for possible improvements have been included where appropriate.

During the field survey, significant efforts were made to identify the possible categories of stakeholders. Stakeholders at site were notified villagers, local residents, government officials, shop owners, public representative, NGO's and general public. All those stake holders had different types of stakes according to their professions.

J. Environmental Impact Assessment and Mitigation Measures

The Initial Environmental Examination (IEE) study has identified that the subproject is not likely to have any adverse / negative impacts on the environment and people of the area. All the potential impacts which have been identified during the present assessment are associated with the construction stage of the subproject, and minor to moderate in severity; and can easily be avoided (through good design and construction planning) or mitigated (through proper implementation of the EMP.

No acquisition of permanent land will be involved. All the other impacts like soil erosion, soil contamination, water contamination, air pollution, high noise level, etc. are of temporary nature and can be controlled and mitigated. There is no environmentally sensitive area in the vicinity of the project area. No indigenous people and women headed households have been identified in the subproject. The other social issues like safety of general public and workers, security problems, risk of communicable diseases, vector borne diseases etc. are of temporary nature.

On the other hand, the subproject will create job opportunities particularly for the local population during construction stage and extremely beneficial for safety of the public,

land and other infrastructures.

K. Environmental Management Plan

Environmental Management Plan (EMP) is produced as a complementary part of IEE and bidding documents of subproject. It also ensures consideration of all relevant environmental factors in designing, planning, implementation and identification of linkages to safeguard policies relating to the subproject.

Based on the preliminary assessment, key mitigation measures are recommended under this Environmental Management Plan (EMP). Overall responsibility for Environmental Management and Monitoring will rest with the Project Implementation Unit (PIU) which is headed by a Project Director and Project Management Consultant (PMC).

L. Conclusion and Recommendations

Based on the preliminary plans, environmental and social field surveys, and impacts assessment of the proposed project, it may be concluded that there are insignificant, short term and reversible impacts of the subproject. In the light of the above discussions, it may be concluded that the proposed subproject is environment friendly and will cause the least effects on the area's existing in sense of Safety for peoples, agricultural land and infrastructure.

Although comprehensive mitigation measures have been proposed in the report to minimize the negative impacts and to enhance the positive impacts of the subproject, however, major recommended mitigation measures are summarized as under:

1. Temporary labor camp will be established on state land and facilitated with proper drainage facilities.
2. Soil erosion and contamination, water contamination, air pollution and high noise levels should be controlled with the use of good engineering practices.
3. Contractor will develop plans such as site specific environmental management and monitoring plan (SSEMMP), Traffic Management Plan, Solid Waste Management and Material Management Plan etc. before starting the construction activities.
4. Contractor will warn the workers not to hunt the birds, fish resources, etc.
5. Contractor will take due care of the local community and its sensitivity towards local customs and traditions.
6. EMP proposed in the report will be implemented in the true letter and spirit.

1. INTRODUCTION

1.1 General

1. Pakistan has been victim of flood for the last few decades and millions of people face sufferings from its effect. It not only damages infrastructures etc but also the livelihood of the people. Punjab province is the most affected province of Pakistan due to presence of main rivers pass through this province. Flood affects land and farmers as well as badly devastates the on-farm sources of livelihoods and services. The heavy monsoon rains in 2014 resulted in flash floods in catchment areas of eastern rivers (Chenab, Ravi, Sutlej and Jhelum). The rain-hit areas in various districts of the province damaged community infrastructures as well as brought destruction to private housing and agriculture. The causes of destruction can be classified into two categories in terms of their impact i.e. (a) Flood- affected and (b) Rain-affected. In Punjab, sixteen districts were affected by the floods in the eastern rivers (particularly Chenab River), emanating from across the eastern borders, and twelve additional districts also faced severe damages.

2. Government of Punjab (GoPb) is keenly interested in protecting people and their properties from flood. For this purpose, the GoPb is implementing the Flood Emergency Reconstruction and Resilience Project (FERRP) with financial assistance of Asian Development Bank (ADB). It is one of the subproject under FERRP and being implemented by the Project Implementation Unit (PIU), Punjab Irrigation Department. The FERRP will provide support for the restoration of resilient flood protection infrastructure and strengthening of government capacity to manage disasters and climate variability and will contribute to the economic and social recovery of flood affected areas in Punjab Province.

3. The objective of the Project is to reduce the human sufferings and socio-economic effects of floods in Punjab, to improve social, economic, and ecological benefits of floods, and to foster safer human settlements near flood plains.The cost of subproject amounts to PKR 1335.358 millions and will be funded by ADB.

1.2 Background of the Subproject

4. The Jhelum is one of the most important cities of Pakistan, by virtue of strategic location being on G.T. Road, Trade & Industry and Cantonment area. During 1992 monsoon season, there was heavy rain fall in the catchments area which resulted in wide spread flooding in river Jhelum and caused flood havoc in and around Jhelum City. Jhelum is an important commercial and Industrial city with profound population. Any flood event in the River Jhelum can create catastrophic situation in the area. Whenever, high flood in River Jhelum crosses the limit of 250,000 Cs, the

flood water of River Jhelum enters into the Jhelum City, causing flooding of the city area.

5. To protect the population and the infrastructures of Jhelum City, it has been proposed to construct a flood embankment 6.0 K.M long starting from New G.T. Road Bridge of River Jhelum to Tahlianwala village, upstream Jhelum City. 25 ft top width with 2:1 slope on country side and 3:1 on river side has been proposed. New proposed bund will be tied up with the old existing bund. Stone pitching consist of 2 ft thick with 1.0 ft filler material and 1 ft stone pitching. Stone quantity in apron is proposed as 500 feet^2. To attain a uniform line of apron and to avoid scouring. Top of bank is proposed 6ft above HFL which is 758.50 above mean sea level at Railway Bridge (RD 2+000) in Jhelum City. Provision of box culverts is also provided along the bund to dispose off the city effluent/ rain water through gravity flows.

1.3 Purpose of the Subproject

6. The Government of Punjab is focusing on emergent restoration and flood mitigation through its early recovery efforts. Need was recognized for achieving an integrated and sustainable recovery during the post-floods rehabilitation and reconstruction phase which led to Government's close interaction with Asian Development Bank (ADB). The dialogue at various levels has finally resulted in materializing commitment from ADB for its financial and technical assistance to Government of Punjab for resilience or risk reduction in all rehabilitation and reconstruction works.In order to minimize the damages of the flood on Jhelum city, a new Flood Protection Bund has been proposed to be constructed in open river bed along its right bank where certain depth of river flow remains persistent. After implementation of the subproject, agricultural lands, livestocks, valuable public and private infrastructure and human lives shall be saved against flood hazards. The beneficiaries will be more secured and the implementation of the subproject shall bring a remarkable progress and prosperity to the inhabitants of the subproject area.

1.4 Purpose of Initial Environmental Examination (IEE)

7. This Initial Environmental Examination (IEE) study report is prepared for the subproject namely "Construction of Jhelum Flood Protection Bund along the right bank of River Jhelum". The subproject has been classified as environmental category "B" subproject according to ADB's Safeguards Policy Statement (SPS), 2009.

8. The IEE study takes into account exmaination of of physical, biological and human envrionment of the subproject area. This examination includes assessment of impacts air, water, land, flora, fauna, human health and safety. This study evaluates the subproject's potential environmental risks and impacts in its area of influence and outlines planning, designing and implementation mechanism for preventing,

minimizing or mitigating adverse environmental impacts and enhancing positive impacts throughout subproject implementation.

9. The Social Assessment (SA) has been conducted to evaluate the subproject's potential positive and adverse effects on the affected people and to examine subproject alternatives where adverse effects may be significant. The width, depth and type of analysis in the social assessment is proportional to the nature of the subproject and scale of its potential effects, positive or adverse, on the affected people.

10. The baseline data was developed and analyzed to identify potential environmental impacts of the subproject. Rapid Environmental Assessment (REA) through prescribed REA Checklist was carried out to identify the high risk activities and to suggest their mitigation measures. An approach of eliminating the risk by altering the scope or method of execution of work, where possible, was preferred over the method of minimizing the risk with control measures.

1.5 Subproject Location

11. The subproject is located on the right bank of River Jhelum near Jhelum City at longitude 73^{o} 43` 23`` E and latitude 32$^{o}$ 54` 49`` N. Jhelum City is situated at distance of about 100 km southeast of Islamabad (Capital of Pakistan) on the right bank of River Jhelum. Location on Map has been indicated in figure 1.1

1.6 Project Categorization

12. All the anticipated adverse environmental impacts of the project are mitigable, temporary, and localized. Also there is no environmentally sensitive or archeological site falling within subproject area of influence. Therefore the subproject falls in the category "B" as per SPS 2009 categorization guidance. The assessment for defining the category is based on the Rapid Envrinmental Assessment (REA) checklist used for screening of the subproject. The same is placed at Annexure-III.

Figure 1.1: Project Location

1.7 Objectives of the Report

13. The main objectives of this report are as follows:

i. The application of environmental administrative and legal framework on the subproject.
ii. Develop environmental baseline data for the subproject Area of Influence (AoI).
iii. Assessment of potential environmental impacts and minimization/mitigation measures to cater adverse impacts.
iv. Preparation of framework of Environmental Management Plan (EMP) and envisaged EMP implementation cost for this subproject.

1.8 Methodology for Performing the Study

14. The environmental and social data was collected and analyzed from the Area of Influence (AoI). Data was collected during site visits and through stakeholder consultation.The concerned departments and institutions like Wildlife, Forestry, Irrigation and Revenue Department etc. were consulted. The baseline data was developed to identify potential environmental impacts of the subproject. A risk based methodology was adopted to identify the high risk activities and suggest the mitigation measures. Where possible, approach of eliminating the risk by altering the scope or method of execution of work was preferred over minimizing the risk with control measures. Public consultations were also undertaken including consultation with women to take the public viewpoints about the subproject.

15. Mr. Shabir Ahmad Khan Environment Specialist, Mr. Ali Salman & Muhammad Shakil Environmental Inspectors from Barqaab Consultanting Services and Project Implementation Unit (PIU), Irrigation Department, Government of Punjab conducted the study.

1.9 Environmental Issues

16. The subproject activities include construction of 20,000 feet long bund on the right bank of River Jhelum near Jhelum city. The subproject may cause some disturbance in the subproject Right of Way (RoW) at site and the allied sites involving borrow material area, establishment of camp, material/ machinery yard, transportation on link roads and necessary facilities for the staff and labour to be engaged for the construction of the subproject.

17. The materials and labourers shall be transported from the depot / camp to the work sites. As such, there is no irreversible adverse environmental impact of the subproject, but construction impacts such as air pollution, noise and use of community resources can be well mitigated through the proper implementation of the mitigation measures, which have been identified in this report. Moreover, no private land acquisition will be involved.

2. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

2.1 General

18. This section provides an overview of the policy framework and national legislation that applies to the proposed sub-project. The project is expected to comply with all national legislation relating to environment in Pakistan and ADB Safeguard Policy Statement (SPS) 2009.

2.2 National Policy and Legal Framework

19. The Pakistan's National Conservation Strategy (NCS), that was approved by the Federal cabinet in March 1992, is the principal policy document on environmental issues in the country (EUAD/IUCN, 1992). The NCS outlines the country's primary approach towards encouraging sustainable development, conserving natural resources, and improving efficiency in the use and management of resources. The NCS has 68 specific programs in 14 core areas in which policy intervention is considered crucial for the preservation of Pakistan's natural and physical environment. The core areas, that are relevant in the context of the proposed sub-project, are pollution prevention and abatement and increasing energy efficiency while conserving biodiversity.

20. Prior to the adoption of the 18th Constitutional Amendment, the Pakistan Environmental Protection Act (PEPA) 1997 was the governing law for environmental conservation in the country. Under PEPA 1997, the Pakistan Environmental Protection Council (PEPC) and Pak Environmental Protection Agency (EPA) were primarily responsible for administering PEPA 1997. After the adoption of the 18th Constitutional Amendment in 2011, the subject of environment was devolved and the provinces have been empowered for environmental protection and conservation. Subsequently, the Punjab government amended PEPA 1997 as Punjab Environmental Protection Act (PEPA) (Amendment) 2012, and Punjab EPA - is responsible for ensuring the implementation of provisions of the Act in Punjab's territorial jurisdiction. PEPA is also required to ensure compliance with the NEQS and establish monitoring and evaluation systems.

2.3 Regulations for Environmental Assessment, Pakistan EPA

21. Under Section 12 (and subsequent amendment) of the PEPA (1997), a project falling under any category specified in Schedule I of the IEE/EIA Regulations (SRO 339 (I0/2000), requires the proponent of the project to file an IEE with the provincial EPA. Projects falling under any category specified in Schedule II require the proponent to file an EIA with the provincial agency, which is responsible for its review and accordance of approval or request any additional information deemed necessary.

2.4 Regulatory Clearances, Punjab EPA

22. In accordance with provincial regulatory requirements, an IEE/EIA satisfying the requirements of the Punjab Environmental Protection Act (Amendment 2012) is to be submitted to Punjab Environmental Protection Agency (EPA) for review and approval, and subsequent issuance of NOC before the commencement of construction.

2.5 Guidelines for Environmental Assessment, Pakistan EPA

23. The Pak-EPA has published a set of environmental guidelines for conducting environmental assessments and the environmental management of different types of development projects. The guidelines that are relevant to the proposed sub-project are listed below:

- Guidelines for the Preparation and Review of Environmental Reports, Pakistan, EPA1997;
- Guidelines for Public Consultations; Pakistan EPA May 1997;

2.6 National Environmental Quality Standards (NEQS) 2000

24. The National Environmental Quality Standards (NEQS) were first promulgated in 1993 and have been amended in 1995 and 2000. They have been revised and the latest NEQS were issued in 2010. ADB's SPS 2009 requires application of pollution prevention and control technologies, and practices consistent with international good practice, as reflected in internationally recognized standards (such as IFC, . The SPS states that when host country regulations differ from these standards, the project will achieve whichever is more stringent. Therefore, NEQS will be used in this subproject.The following standards that are specified in the NEQS are relevant to the proposed Subproject (See detailed Tables in Annexture). Air and Noise NEQS are also compared in the following Table 2.1, while the drinking water quality Standards is already been compared in Table 5 of Annex V.

Table 2.1: Comparison of Air & Noise NEQS with IFC/WHO EQS

Pollutants	USEPA		WHO/IFC		Pak. NEQS	
	Avg. Time	Standard	Avg. Time	Standard	Avg. Time	Standard
SO_2	3 hrs 1 hr	0.5 ppm 75 ppb	24 hr 10 min	20 ug/m^3 500 ug/m^3	Annual Mean 24 hrs	80 ug/m^3 120 ug/m^3
CO	8 hrs 1 hr	9 ppm (11 mg/m^3) 35 ppm (4 mg/m^3)	-	-	8 hrs 1 hr	5 mg/m^3 10 mg/m^3
NO_2	Annual Mean	100 ug/m^3 (53 ppb)		40 ug/m^3	Annual Mean	40 ug/m^3

	1 hr	100 ppb		200 ug/m^3	24 hrs	80 ug/m^3
O_3	8 hrs	0.07ppm (148 ug/m^3)	8 hrs	100 ug/m^3	1 hr	130 ug/m^3
TSP	-	-	-	-	Annual Mean 24 hrs	360 ug/m^3 500 ug/m^3
PM_{10}	4 hrs	150 ug/m^3	1 yr 24 hr	20 ug/m^3 50 ug/m^3	Annual Mean 24 hrs	120 ug/m^3 150 ug/m^3

25. NEQS for Ambient Air – November, 2010 states the Maximum allowable concentration of pollutants (9 parameters) in gaseous emissions from vehicle exhaust. In the case of most pollutants, the NEQS standards for ambient air quality are more stringent in comparison to USEPA and WHO/IFC standards. except for the polllutant PM_{10} in which the 'Annual mean' and '24 hour' standards from the WHO/IFC are more stringent in comparison to the NEQS. In this particular case of the pollutant PM_{10}, the WHO/IFC guidelines are 20 ug/m^3 (1 year period) and 50 ug/m^3 (24 hour period) in comparison to NEQS standards of 120 ug/m^3 (1 year period) and 150 ug/m^3 (24 hour period). The applicable and most stringent parameters for each respective pollutant are highlighted.

26. NEQS for Drinking Water Quality – 2010 describes the drinking water properties by outlining the defined physical and chemical parameters.

27. NEQS for Noise – November 2010 states the maximum allowable limit of noise arising from vehicles in decibels (dB) separately for day and night times.

28. NEQS for Waste Effluents –2000 states the Maximum allowable concentration of pollutants (32 parameters) in municipal and liquid industrial effluents discharged to inland waters, sewage treatment facilities, and the sea.

29. These standards apply to the gaseous emissions and liquid effluents discharged by, campsites and construction machinery. The standards for vehicles will apply only during the construction phase of the subproject. Standards for ambient air quality have also been prescribed.

2.7 ADB's Safeguard Policy Statement (SPS), 2009

30. The Asian Development Bank's Safeguard Policy Statement (SPS) 2009 requires that environmental considerations be incorporated into ADB's funded project to ensure that the project will have minimal environmental impacts and be environmentally sound. Occupational health & safety of the local population as well as the project workers should also be addressed as stated in SPS-2009.

31. All loans and investments are subject to categorization to determine environmental assessment requirements. Categorization is to be undertaken using Rapid Environmental Assessment (REA) checklists, consisting of questions relating to (i) the sensitivity and vulnerability of environmental resources in subproject area, and (ii) the potential for the subproject to cause significant adverse environmental impacts. Projects are classified into one of the following environmental categories:

Category A: A project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment (EIA) is required.

Category B: A project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A projects. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An initial environmental examination (IEE) is required.

Category C: A project is classified as category C if it is likely to have minimal or no adverse environmental impacts. No environmental assessment is required although environmental implications need to be reviewed.

Category FI: A project is classified as category FI if it involves investment of ADB funds to or through a financial intermediary (FI).

32. As per results of Rapid Environmental Assessment (REA) checklist used for the subproject, it has been placed in Category ‘‘B’’. Therefore a detailed and comprehensive IEE report including the EMP has been prepared.

2.8 Other Environment Related Legislations

33. The **Table 2.2** provides a summary of all legislations, guidelines, conventions and corporate requirements.

Table 2.2: Environmental Guidelines and Legislations

Legislation/Guideline	Description
Punjab Environmental Protection Act, 2012	Post adoption of the 18th Constitutional Amendment in 2011, the subject of environment was devolved and the provinces have been empowered for environmental protection and conservation. Subsequently, the Punjab government amended PEPA 1997 as Punjab Environmental Protection Act 2012, and Punjab EPA (EPA) is responsible for ensuring the implementation of provisions of the Act in Punjab’s territorial jurisdiction. PEPA is also required to ensure compliance with the NEQS and establish monitoring and evaluation systems.
Pakistan Environmental Protection Act (PEPA) 1997	Basic legislative tool empowering the Government of Pakistan to frame and enforce regulations for the protection of environment. The PEPA 1997 is broadly applicable to air, water, soil, marine and noise pollution, and handling of hazardous wastes. Penalties have been prescribed for those contravening provisions of the Act.

Legislation/Guideline	Description
	Under section 12 of the PEPA 1997, no project involving construction activities or any change in the physical environment can be undertaken unless an IEE or EIA is conducted and a report submitted to the federal or provincial EPA.
Pakistan Environmental Protection Agency Review of IEE and EIA Regulations, (2000)	The Regulation classifies projects on the basis of expected degree of adverse environmental impacts and lists them in two separate schedules. Schedule I lists projects that may not have significant environmental impacts and therefore require an IEE. Schedule II lists projects of potentially significant environmental impacts requiring preparation of an EIA. The Regulations also require that all projects located in environmentally sensitive areas require preparation of an EIA. It also lists projects not requiring either an EIA or an IEE.
National Environmental Quality Standards (1993 and 2000)	The NEQS specify standards for industrial and municipal effluents, gaseous emissions, ambient air requirements and emission levels for Sulfur dioxide and Nitrogen oxide, vehicular emissions and noise levels. The PEPA specifies the imposition of a pollution charge in case of non-compliance with the NEQS. The standards were last revised in 2000.
National Environmental Policy (2005) (NEP)	NEP is the primary policy of Government of Pakistan addressing environmental issues. The broad Goal of NEP is, "to protect, conserve and restore Pakistan's environment in order to improve the quality of life of the citizens through sustainable development". The NEP identifies a set of sectoral and cross-sectoral guidelines to achieve its goal of sustainable development. It also suggests various policy instruments to overcome the environmental problems throughout the country.
The Forest Act (1927)	The Act empowers the provincial forest departments to declare any forest area as reserved or protected. It empowers the provincial forest departments to prohibit the clearing of forest for cultivation, grazing, hunting, removing forest produce, quarrying and felling, lopping and topping of trees, branches in reserved and protected forests
Punjab Wildlife Protection Ordinance, 1972	It empowers the government to declare certain areas reserved for the protection of wildlife and control activities within in these areas. It also provides protection to endangered species of wildlife. As no activities are planned in these areas, no provision of this law is applicable to the proposed project.
The Antiquities Act (1975)	It ensures the protection of Pakistan's cultural resources. The Act defines "antiquities" as ancient products of human activity, historical sites, or sites of anthropological or cultural interest, national monuments, etc. The Act is designed to protect these 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 GOP to prohibit excavation in any area that may contain articles of archaeological significance. Under the Act, the subproject proponents are obligated to ensure that no activity is

Legislation/Guideline	Description
	undertaken in the proximity of a protected antiquity, report to the Department of Archaeology, GOP, any archaeological discovery made during the course of the project.
Pakistan Penal Code (1860)	It authorizes fines, imprisonment or both for voluntary corruption or fouling of public springs or reservoirs so as to make them less fit for ordinary use.
Canal and Drainage Act 1873	This Act binds the public water users to restore the environment of the water bodies, users be it the communities, individuals, industries or a government concern.
Pubic Local Government Ordinance 1979	This empowers Zilla council to control environmental pollution by preparing and implementing appropriate schemes to protect air, water and land.
The West Pakistan Fisheries Act 1961	The Fisheries Act requires protection of public waters as habitat of fish and other aquatic life. This is helping the Fisheries Department to provide effective protection to the fish and other aquatic. Fish is a food to a good number of migratory birds.
The Public Health (Emergency Provision) Act 1954 read with West Pakistan Epidemic Control Act 1958	These two laws cover the presentation and spread of human diseases, safeguarding the public health and providing and maintaining adequate medical services and other services essential to the health of the communities in the project area.
Explosives Act 1884	Under the Explosives Act 1884, the Project Contractors are bound by regulation on properly and securely handling, transporting and using explosive during quarrying, blasting and other purposes.
NATIONAL ENVIRONMENTAL AND CONSERVATION STRATEGIES	
National Conservation Strategy	Before the approval of NEP, the National Conservation Strategy (NCS) was considered as the Government's primary policy document on national environmental issues. At the moment, this strategy just exists as a national conservation program. The NCS identifies 14 core areas including conservation of biodiversity, pollution prevention and abatement, soil and water conservation and preservation of cultural heritage and recommends immediate attention to these core areas.
Biodiversity Action Plan	The plan recognizes IEE/EIA as an effective tool for identifying and assessing the effects of a proposed operation on biodiversity.
Environment and Conservation	There is a well-established framework for environmental management in Pakistan. The Ministry of Environment deals with environment and biological resources. Within the ministry, the NCS unit established in 1992 is

Legislation/Guideline	Description
	responsible for overseeing the implementation of the strategy. Two organizations, the Pakistan Environmental Protection Council (PEPC) and the Pak EPA are primarily responsible for administering the provisions of the PEPA, 1997. The PEPC oversees the functioning of the Pak EPA. Its members include representatives of the government, industry, non-governmental organizations and the private sector. The Pak EPA is required to ensure compliance with the NEQS, establish monitoring and evaluation systems, and both identify the need to and institution of legislations whenever necessary. It is thus the primary implementing agency in the hierarchy. The Provincial Environmental Protection Agencies are formed by the respective provinces.
INTERNATIONAL CONVENTIONS	
The Convention on Conservation of Migratory Species of Wild Animals (1983)	The Convention was enforced in 1983 requires countries to take action to avoid endangering migratory species. The term "migratory species" refers to the species of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries. The parties are also required to promote or cooperate with other countries in matters of research on migratory species. There are no endangered species of plant life or animal life in the vicinity of the Project.
Convention on International Trade in Endangered Species of Wild Fauna and Flora (1973)	The convention requires Pakistan to impose strict regulation (including penalization, confiscation of the specimen) regarding trade of all species threatened with extinction or that may become so, in order not to endanger their survival further.
International Union for Conservation of Nature and Natural Resources Red List (2000)	Listed wildlife species experiencing various levels of threats internationally. Some of the species indicated in the IUCN red list are also present in the wetlands of Pakistan.
Convention on wetlands of international importance, especially as Waterfowl Habitat (RAMSAR 1971)	Pakistan is signatory to the RAMSAR convention. This Convention enjoins upon signatory factions to provide and protect the habitats of migratory waterfowl. However, this convention is not applicable on the site under study.
Convention on Conservation of Migratory species of Wild Animals (signed in Bonn 1979), as a follow up to RAMSAR 1971	This convention came up as a follow up to RAMSAR 1971 and took care of the specifics.
ADB's Policies	
Safeguard Policy Statement (SPS), 2009	ADB's Safeguard Policy Statement (SPS), 2009 provides guidelines for environmental assessments of development projects. These guidelines help prospective projects identify impacts they will have on various environmental receptors. The guidelines call for carrying out EIAs or IEEs of projects based on severity of their impacts.

Legislation/Guideline	Description
Public Communication Policy (PCP), 2011	The PCP aims to enhance stakeholders' trust in and ability to engage with ADB, and thereby increase the development impact of ADB operations. The policy promotes transparency, accountability, and participatory development. It establishes the disclosure requirements for documents ADB produces or requires to be produced.
Accountability Mechanism (AM) Policy 2012	The objectives of the Accountability Mechanism is providing an independent and effective forum for people adversely affected by ADB-assisted projects to voice their concerns and seek solutions to their problems, and to request compliance review of the alleged noncompliance by ADB with its operational policies and procedures that may have caused, or is likely to cause, them direct and material harm. The Accountability Mechanism a "last resort" mechanism.

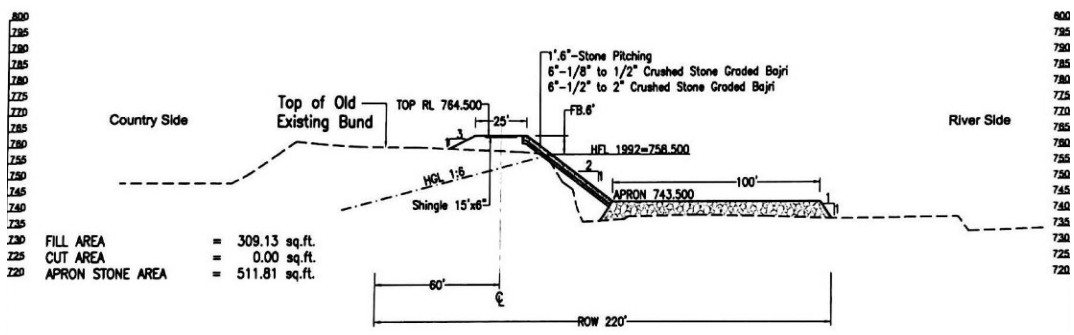
3. SUBPROJECT DESCRIPTION

3.1 Jhelum Flood Protection Bund

34. Due to severe floods during the last few decades in Punjab Province, millions of people have been affected, besides a large number of infrastructures either damaged or destroyed. The floods not only adversely affected land and farmers but also badly devastated the on-farm sources of livelihoods and services. The heavy monsoon rains in 2014, resulted in flash floods in catchment areas of eastern rivers (Chenab, Ravi, Sutlej and Jhelum). Heavy rains in various districts of the province have damaged community infrastructure and destroyed private housing and agriculture. The causes of devastation can be classified into two categories in terms of their impact i.e. (a) Flood- affected and (b) Rain-affected. In Punjab, sixteen districts were affected by the floods in the eastern rivers (particularly by Chenab River), emanating from across the eastern borders. Twelve more districts also faced severe damages due to heavy rainfall leading to devastation in catchment areas causing flash floods and damaging physical public and private infrastructure and communication facilities in flood hit areas.

35. To protect the population and the infrastructures of Jhelum City, it has been proposed to construct a flood embankment 6.0 km long starting from New G.T. Road Bridge of River Jhelum to Tahlianwala village upstream Jhelum City. New proposed bund will be tied up with the old existing bund as shown below in the cross section at RD 20+000. 25 feet top width with 2:1 slope on country side and 3:1 feet on river side has been proposed. The proposed design for stone pitching consist of 2 ft thick with 1.0 ft filler material and 1.0 ft stone pitching. Stone quantity in apron is proposed as 500 ft^2. To attain a uniform line of apron and to avoid scouring. Cross sections at different RDs are attached at Annexure-I.

JHELUM FLOOD BUND
PACKAGE-II
X-SECTION AT RD 20+000



36. Top of bank is proposed as 6ft above HFL which is 758.50 above mean sea level at Railway Bridge (RD 2+000) in Jhelum City. Provision of box culverts is also provided along the bund to dispose off the city effluent/ rain water through gravity flows.Subproject estimates have been split into two packages. Package I of the subproject starts from RD 0+000 to RD 10+000 and package II starts from RD 10+000 to RD 20+000.

3.2 Need for Subproject

37. The experience of exceptionally high floods in 1992, 2010 and September 2014 proved that the existing free board is less to provide safeguard against high flood. It may be revisited in purview of flood heights of flood in 1992 and September 2014 to make the bund strong enough to provide foolproof and risk free safety to local settlements, infrastructure, livestock, properties and particularly human lives.

3.3 Objectives of Subproject

38. During 1992 monsoon season, there was heavy rainfall in the catchment area, which resulted in widespread flooding in River Jhelum and caused flood havoc in and around Jhelum City. Any flood event in the River Jhelum can create a catastrophic situation with colossal loss of lives and private property, vital public infrastructure installations and a serious challenge for the Government at Federal and Provincial level.

39. Whenever high flood in River Jhelum crosses the limit of 250,000 cusecs, the flood water of River Jhelum enters into the Jhelum City, and for protection from this,a flood protection bund is necessary. The construction of the said flood embankment will also improve the environment of Jhelum city by protecting settlements, agricultural land, buildings, roads and other infrastructures etc. By providing flood embankment, devastation that occurs every year due to high flow river will be controlled in that area. The proposed Jhelum City Flood Protection Bund is to be constructed in the open river bed along its right bank where certain depth of river flow remains persistent. The construction will start with a solid stone boom at the toe of the river side slope. In the shadow of the said boom, earthwork will be carried out for raising the embankment. In this way the stone apron and earthen embankment will be constructed side by side in the shortest possible time.

40. New proposed bund will be tied up with the old existing bund. The proposed design for stone pitching consist of 2 ft thick with 1 ft filler material and 1 ft stone pitching. At some places there is a deep scour in the river bed, hence provision has been made to increase the quantity of dumping stone to attain a uniform line of apron. Top of bank is proposed at 6 ft above HFL which is 758.50 above mean sea level at Railway Bridge (RD 2+000) in Jhelum City. Figure 3.1 shows the subproject area and the proposed Bund.

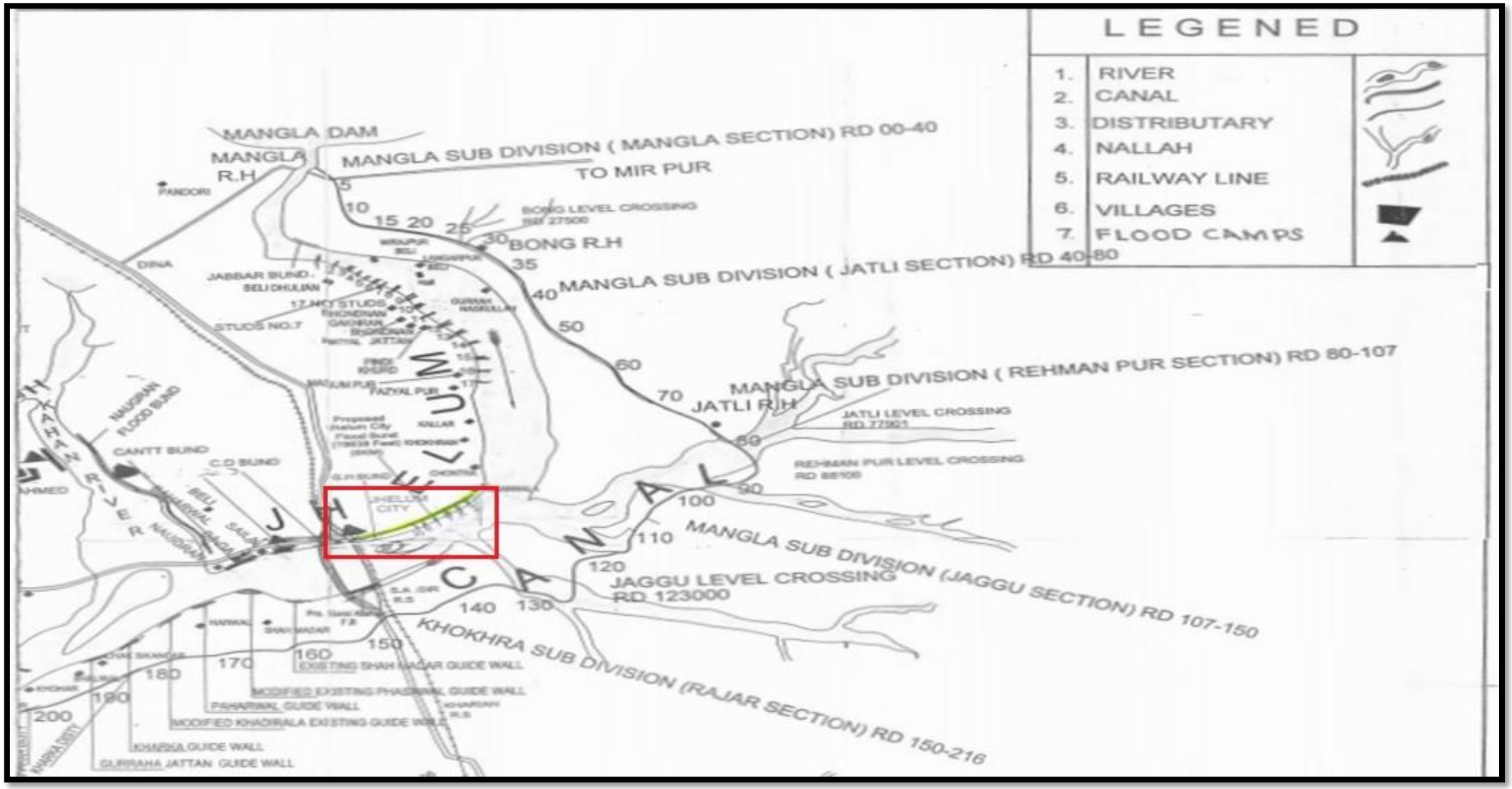


Figure 3.1: Map showing the proposed Bund Location (Highlighted)

3.4 ALTERNATIVES

41. Due to experience for the last many years, the Jhelum river flood, particularly at right bank location, caused a great loss to the surrounding area, including damage to agricultural crops, infrastructures and sometimes loss of lives. There was no flood embankment in this reach from RD 0+000 to RD 20+000 along the Jhelum city. During flood season, flood water enters in the city through this portion and damages public/ private infrastructures, settelments, crops, most fertile agricultural lands. Flood water also damages the local flora and fauna of the area. Services including electricity, telephone, education and communication are also disrupted. After the implementation of subproject, flood threat will totally be eliminated. No other option will be feasible to avoid the damages of flood and to provide foolproof and risk free safety to the populations and properties.Therefore, it is very imperative to construct the flood embankment in accordance with Federal Flood Commission (FFC) criteria.

42. Not taking up the subproject, will result in damaging the public/ private infrastructures, settelments, crops, most fertile agricultural land etc. Therefore, "No Project option" is not recommended.

3.5 Environmental Assessment Area

43. The subproject Area of influence (AoI) is the area likely to be affected by the project. This includes Rright of Way (RoW), nearby areas and all its ancillary aspects such as access roads, borrow areas, waste disposal sites and labor camp as well as unplanned development induced by the project.

3.6 Consultant's Residence/ offices

44. Residences/ offices for consultants will be required. The consultants will be accommodated in the existing staff colony of Irrigation Department in Jhelum City.

3.6.1 Contractor's Facilities

45. Sufficient barren land away from settlement is available for contractor and labour camps in the vicinity of the subproject area owned by Irrigation Department, which will be used for the establishment of contractor's facilities. The contractor facilities would include messing, material storage area and labor camp. Contractor's camp would be fenced.

3.6.2 Borrow Area

46. Barren land / spoil bank exists in many places at RD 135 of Upper Jhelum canal within distance of 8 miles from RoW for transportation of earthen material. The borrow areas will be inspected by the Consultant and will require approval by the Consultant before being used.

3.6.3 Works and Materials

3.6.3.1 Estimated Quantities of Works

47. The subproject envisages "Construction of Jhelum City Flood Protection Bund" as explained above in subproject objectives. Subproject estimates are according to the approved Market Rate System (MRS) notified by Finance Department of the MRS Biannual (1st July 2016 to 31st December 2016). Subproject civil work includes excavation, loading/ unloading of earth, providing / laying shingle on the bund and transportation of materials like stone aggregate. The arrangements will be made through National Contract Bidding (NCB). Following is the estimate of physical activities and the implementation schedule.

Table 3.1: Estimate of physical activities

Items	**Unit**	**Quantity**
Earthwork Cut Fill	Million Cft	 1.09 44.29
Stone Pitching and Apron	Million Cft	15.55
Culverts	5 Nos	0.29

Table 3.2: Availability of Raw Materials

Sr. No.	**Raw Material Availability**	**Source**
1	Borrow Material / Earth	Barren areas/ spoil bank at a distance of 8 miles from subproject site.
2	Stone / shingle	Available in Sikhanwali quarry Sargodha 200 Km away from site
3	Sand	Available locally
4	Clean water for specific uses	Available locally
5	Other water for compaction etc.	Available locally

4. ENVIRONMENTAL AND SOCIAL BASELINE

4.1 General

48. This chapter describes the environmental, social and biological baseline conditions of the subproject area.The baseline conditions have been established on the basis of the data collected from the field, and through unstructured interaction with the local communities as well as the officials from various departments. In addition, the published data (secondary data) was also used to provide background information about the subproject area.

4.2 Area of Influence

49. The extended area of influence of the subproject is part of Jhelum City, in Jhelum District. The area of influence of the subproject is Right of Way (RoW), surrounding areas, labour camps and stack yard etc.

50. The subproject Area of influence (AoI) is referred to as all those areas which may be affected directly or indirectly by the subproject activities. This includes the following :

- The 20000 Feet area in the city along the Jhelum River
- The labor camp site offices, equipment and vehicle yards;
- Haul tracks to transport construction material;
- Borrow areas, from where the fill material will be obtained;
- Waste disposal sites; and
- Unplanned development induced by the subproject

4.3 Physical Environment

4.3.1 Alluvial Deposits

5 1 . Subproject site is located in District Jhelum, which is situated entirely on the alluvium plain. Kanker is found all over the district. Sediment deposits are visible in the low velocity area of the river where initial plant colonizers can be seen at the early serial stages of succession of vegetation. Along the banks of the river, gradual accumulation of sediments has resulted in “Bela” formation, which supports tree growth and hence named as “Zakeeras”.

4.3.2 Physiography

52. Jhelum district is part of Pothohar Plateau. The district stretches from the River Jhelum to the vicinity of River Indus. Jhelum distrcit consists of salt range

consisting of Mayo mines. There are two coal-mines in the district. From the north-western coal-mine railway obtains partial supply.

4.3.3 Soil Type

53. There is a long strip of very rich and virgin soil along the river which could be made a paradise of citrus plantation by drip irrigation if the local people are motivated. The types of soil commonly found are silt loam, loam, sandy loam, sandy clay loam and riverine silt.The immediate subproject area soil is riverine alluvial silt tending to fall in sandy loam and silt loam with kankers.

4.3.4 Land Use

54. On an average, within the direct influence of the river and in the immediate vicinity of the subproject area, 40% of the land is under agriculture. About 40% is under settelments, 20 % wetlands and 10 percent forest/range land.

55. About 80% of total population depends upon agriculture. Most of the agriculture land is under cultivation. Rice is the main Kharif (summer) crop. Wheat is the main Rabi (winter) crop while fodder is the other crop. The cropping intensity is over 100% and multi cropping is quite common.

Table 4.1: Land Use in Jhelum District

LAND USE	**AREA (Ha)**	**% of Total Distt. Area**
Total Geographical Area	750	100
Area Reported	359	47.86
Area Under Forest	45	6.0
Not Available for Cultivation	133	17.73
Culturable Waste	56	7.46
Current Fallow (C.F)	59	7.86
Net Sown (N.S)	66	8.80
Area Sown more than once (A.S.M.T.O)	32	4.26
Net Cultivated Area (C.F + N.S)	125	–
Net Cropped Area (N.S + A.S.M.T.O)	98	–

4.3.5 Water Resource in the Vicinity of subproject Area

a. Surface Water

56. Main source of surface water in the nearest vicinity of subproject area is river Jhelum itself. However, the surface water consists of several Nullahs (torrents) and discharge from Mangla Dam. These seasonal Nullahs on both sides of the river carry rainwater from the hills and other adjoining areas into the river during period of heavy rain. The surface water supply plays an important role in irrigation and drainage of the extended subproject area. Major source of irrigation water is River Jhelum. It is considered to be suitable for irrigation purposes. Discharge data is collected, from the guage installed at Jhelum Bridge on Lahore-Islamabad G.T. road, during two months i.e.September and October of every year. Detail of peak discharges at Jhelum Bridge is given in Table- 4.2.

Table- 4.2:Peak Discharges in River Jhelum

YEAR	Peak Discharges at Jhelum Bridge Guage (Cusecs)
2000	31,000
2001	30,000
2002	40,000
2003	78,000
2004	42,000
2005	92,000
2006	86,000
2007	41,000
2008	37,000
2009	72,000
2010	2,26,000
2011	1,20,000
2012	82,950

2013	41,000
2014	4,80,000
2015	1,29,000
2016	56,700

b. Ground Water

57. The ground water aquifer is recharged by surface water. The sub-soil ground water table within the immediate subproject area is about 30-60 feet. The quality of the groundwater is such that it is suitable for domestic use. It is sweet and of drinkable quality. By and large, the tube wells are owned privately by people of the area.

4.3.6 Climate

58. Jhelum has a humid subtropical climate (Köppen climate classification *Cfa*) and is extremely hot and humid in summer, and cold and generally dry in winter.

59. The maximum recorded temperature in the pre-monsoon season of April to June is 49.2 °C (120.6 °F), whereas in winter the minimum temperature recorded is −0.6 °C (30.9 °F). Average annual rainfall is about 850 millimetres (33 inch). Nevertheless, in the rainy season water torrents flow from the north to Jhelum River very rapidly and cause damage to the crops, bridges and roads. This is responsible for the soil erosion in the district.

Table 4.3: Average Rainfall & Temperatures in District Jhelum

MONTHS	J	F	M	A	M	J	J	A	S	O	N	D	Avg.
Mean Rainfall	39	32	28	20	14	42	95	95	44	18	15	39	40.0
Max. Temp.	16	20	25	31	36	38	35	34	33	30	25	18	28.4
Min. Temp.	3	5	9	16	21	24	24	24	21	15	9	5	14.6

4.3.7 Ambient Quality of Environment

- ***Ambient Air Quality***

60. Field visit observations indicate that ambient air quality is generally acceptable. There will be mechanical equipment to be used in the construction works which may generate gaseous emissions. However, it is anticipated that these emissions will not be a threat to the environment in the subproject area since it can be managed through proper implementation of Environmental

Management Plan. It is also anticipated that Carbon Monoxide and Oxides of Sulphur and Nitrogen derived from powered vehicles can also be managed through proper implementation of environmental Management Plan. Contractor will be responsible for instrumental measurement of air quality during construction.

- ***Noise Level***

61. Field visit observations indicate that ambient noise levels are within permissable limits as there is neither any mobility of vehicles nor industrial units exist in the subproject area. It is anticipated that powered mechanical equipment and vehicle to be used during construction period can generate noise of moderate level. This can be minimized through proper implementation of Environmental Management Plan. Contractor will be responsible for instrumental measurement of air quality during construction.

4.3.8 Natural History Event / seismic hazards

62. The area has no history of any serious damages due to earthquake. The area lies in Zone 2B which is a Minor Hazard Region.

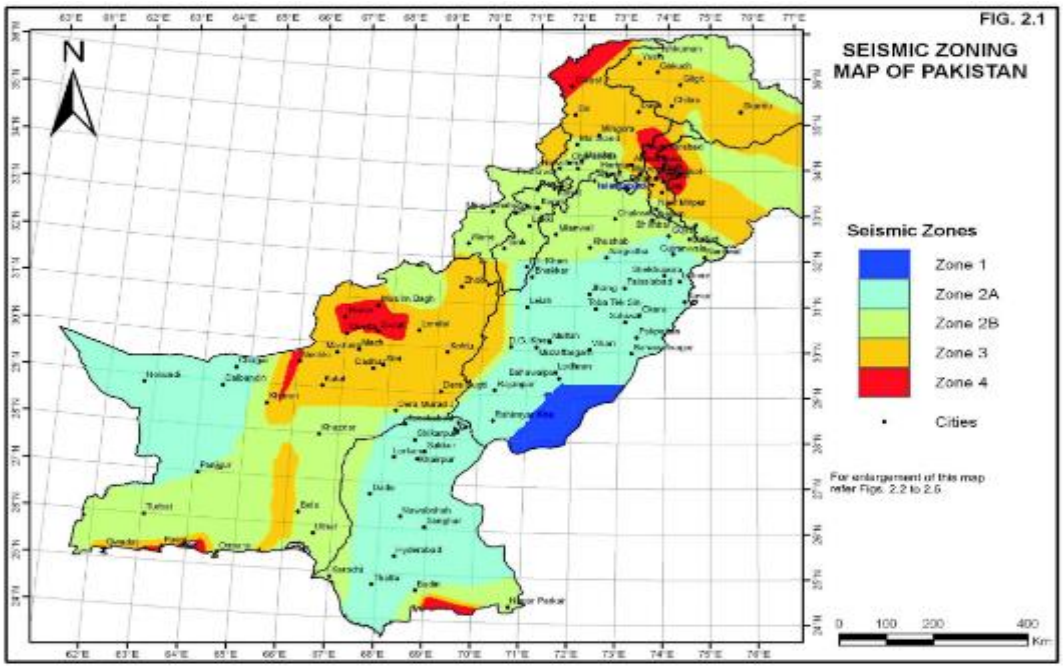


Figure 4.1: Seismic Hazard Zones of Pakistan

4.3.9 Floods

63. The biggest flood in Jhelum in recent years was in 1992. Jhelum city and its surrounding was submerged under flood waters. Subsequently in 2010 and 2014 floods have also damaged a lot of adjacent areas near Jhelum River.

4.3.10 Archaeological Sites/Chance Finds

64. No sites of archeological, historical, cultural,or religious significance are known to exist in the areas where construction will take place or where different project facilities will be established / located. In case, if any such site is found during the subsequent phases of subproject construction, it can be handled as per Law and Procedures.

4.4 BIOLOGICAL ENVIRONMENT

4.4.1 Forests and Flora

65. Vegetation of the Jhelum Forest Division is dry deciduous scrub type, Phulai, Kau and Sanatha are the main species. The stocking on the whole is poor and the forests are open. Vegetation is poor on sandstone and redmarl. The southern slopes are often devoid of vegetation while north western slopes carry good forests. The forests of Jhelum Divisions are burdened with right of grazing, browsing and firewood. Under settlement out of total area 93,566 acres (378.65 km^2) only 5,468 acres (22.13 km^2) about (45%) are right free. Remaining 55% are open to grazing. Some other species such as eucalyptus, sheesham, keekar and mulberry are also present.

66. Agricultural crops like wheat in Rabi season and rice and pulses in Kharif season are grown.

67. The riverian as well as the inland flora plays a significant role in the local economy by way of timber and fuelwood production, protection from wind and water erosion, habitat of birds and animals, environmental balance, cultural identification and rehabilitation of soils affected by water logging and salinity.

4.4.2 Fauna

68. The fauna of the District is mostly indigenous, restricted (confined), like the vegetation, but similarly varied. The rugged and rough terrain, low rainfall, the scanty cover of vegetation and the increasing number of hunters, all have their share in limiting the fauna in the District. The riverine area offers a better environment than elsewhere though the hills support a more interesting wildlife. Urial and Chinckara are spot aids while wild bores are found in the Salt Range. Wolves, Foxes and Wild Cats are also found. Hare is fairly common. Chikor grey and black Partridge are also found in the parts of the district. Migratory ducks like Teal Pintail and Mallard and some geese visit during winter.

69. Fish such as Teal, Sohal, Silver Carp, Sanghara Rahu and Grass Carp have been reportedly found.

4.4.3 Endangered Species

70. There are no endangered or rare species reported in the AoI.

4.4.4 Livestock and Agriculture

71. The subproject area is famous for buffaloes known as one of highest milk producing animals. Livestock such as goats/sheep, camel and other cattle are also reared by the locals. The livestock includes cattle, buffaloes, sheep, goats, camels, horses, asses and mules. Nearly 25% of the farmer's income is from livestock. At least 10% of the population is landless, cattle raisers and their living comes from cattle milk marketing. On the average each family possesses 5-6 cattle and 7-10 sheep and goats.

72. Jhelum District has a total area of 858,767 acres, out of which 316,815 acres are cultivated. Agriculture in the District Jhelum depends mainly on rainfall. The average rainfall of the area varies from 20 to 40 inches. The irrigated area at present is limited but the emphasis on construction of small Dams and Mini Dams is gradually increasing. Besides, Wheat, Sugarcane, Rice, Moong, Mash, Masoor, Gram, Ground Nut, Jawar, Oil Seed Such as Rape/Mustard and Sun Flower are grown in the district. About 80% of the population of subproject area depends upon agriculture. Most of the area is well cultivated. Rice is the main kharif crop. The area and production under different crops is given as follows:

Table 4.4: Area, Production and Cropping Intensities of Main Agriculture

	Wheat	Rice	Fruits	Vegetables	Fodder
In Tones	99100	3400	460	23909	97000
Area (Hec)	48600	1600	63	1449	5200
Tones / Hec	2.04	2.13	7.30	16.50	18.65

Source: Crops Area and Production Volume I, Food and Cash Crops Federal Bureau of Statistics, GoP, 2013-14.

4.5 Socio-Economic and Cultural Aspects

73. This section provides an overview of the socio-economic conditions and cultural norms in the subproject area. Socio economic conditions of the area encompasses population, employment level, trade and business, customs, religion, social activities, occasions and social cohesion of local people.

4.5.1 Methodology

74. The subproject area mostly falls along the city area where local people are demanding for the implementation of the subproject since long. In order to collect data/ information on socio-economic aspects of the subproject area,

consultative meetings were held with the local communities at various locations. Moreover, secondary data was also explored to get information about the subproject area.

75. Three consultative meetings were held in the different towns. Detail is given in Chapter 7 under heading Public Consultation..

4.5.2 Data Collection

76. In order to have comprehensive and detailed information, the data was collected by exploiting both primary and secondary sources.

4.5.2.1 Secondary Source

77. Exisitng secondary soruce data was reviewed and relevant infromation related to subproject area was extracted. District Census Report 1998 of Jhelum District, Multiple Cluster Indicator Survey (MICS) 2014, Punjab Development Statistics 2011 and other statisitcal data of Bureau of Statistic was used for drawing information. PC-1, engineering estimates, cross section indicating RoW, area Map showing location of flood bund were obtained from the Technical section of PIU and consultant's office and reviewed by the social team members to identify different parameters and yardsticks regarding scope of work and to conduct field survey so as to make the study more systematical and reflective of ground situation. Offices of different Government Officials were also visited for seeking subproject area specific information.

4.5.2.2 Primary Source

78. The primary quantitative and qualitative data was collected through interviews and Focused Group Discussion (FGD). The questionnaire was designed regarding FGD and gender survey to include information related to demographic characteristics, existing socio-economic condition, impact assessment, people's perceptions about the subproject and remedial measures in case of adverse impact of the subproject (if any). The data collection tool was also pretested theoretically in a group during orientation of the team before actual field

survey and modified as per requirement of the subproject area and cultural traditions.

4.5.3 Socio-Economic Aspects of the subproject Area

79. Socio-economic aspects of the subproject area were studied on the basis of Focus Group Discussions and by exploiting the availbale secondary data. The results of survyes carried out has been drawn which are presented in the section below.

4.5.3.1 Jhelum City

80. The district headquarter of Jehlum is Jhelum City. This is situated on the right bank of Jhelum River. Grand Trunk Road constructed intially in 16th century passes through the city. Jehlum is the 35th largest city of Pakistan in terms of population. A cantonment was built during the British rule, which has grown up into a Garrison with an Infantry Division commanded by a Major General. In the past few years, the city has experienced rapid expansion and has become a vibrant economic and cultural centre. The old city has narrow streets and crowded bazaars.

4.5.3.2 District Jhelum

81. Jhelum district locates in the Punjab province of Pakistan. It is located in the northern part of the province., Jhelum district is bordered by Sargodha to its south, Gujrat and the Jhelum River to its south and east, Chakwal to its west, Mirpur to its east and Rawalpindi to its north.

82. According to Punjab Development Statistics 2011, total population of Jhelum district is 1,148 thousand persons out of which 574 thousand are males and 574 thousand are female. Density of population in the district is 320 persons per square Kilometre. The district of Jhelum stretches from the river Jhelum to the vicinity of River Indus. Salt range exists in the distrcits including Mayo mine from where salt is quarried. The prime centre of the salt trade is Pind Dadan Khan. Jehlum is known for providing a large number of soldiers to the British and later on to the Pakistan armed forces. That is why the distrcit is also known as city of soldiers or land of martyrs and warriors. The district is crossed by the main line of the North-Western railway, and also traversed along the south by a branch railway line.

4.5.4 Major Castes in the District

83. The major castes of the district are Awan, Akra, Bharat, Gakhar, Gujar, Janjua Rajput, Jalap, Jat (Cheema, Dhamial, Gondal, Ghuman, Sipra, Nagyal,

thathal, Kashmiris, Khokhars, Lilla Qureshi, Phaphra Mughal,Bhakral, Bhatti, Chib, Minhas, Narma and Sohlan.

4.5.5 Language

84. Punjabi language is spoken by the majority of the population in the District Jhelum.

4.5.6 Minerals

85. Jhelum has very rich reserves of mineral resources. Minerals like Rock Salt, Brine, Gypsum, Coal, Bentonite and Silica Sand are being exploited commercially by private and public sector agencies in the district. Khewra Salt mine also located in district Jhelum.

4.5.7 Industry

86. There are numbers of industry in and around Jhelum City. Major industries include tobacco factory, wood, marble, glass, flour mills, cement and soda ash manufacturing units..

4.5.8 Major Profession

87. The major professions adopted by local people are service in Armed Forces. A large number of people of this district are settled in foreign countries particularly Western Europe. Agriculture and labour (workers on daily wages in construction, agricultural and other sectors) are also siginficant professions of the people living in Jhelum district.

4.5.9 Source of Drinking Water

88. Ground water is the main source of drinking water in the district. Households residing along the project area mostly have water supply in their houses for domestic use. Ground water is sweet and fit for drinking.

4.5.10 Literacy Level

89. Literacy is a basis for lifelong learning and plays a foundational role in the creation of sustainable, prosperous and peaceful societies. The Literacy ratio (10 years age and above) of Jhelum District was 63.9 % percent in 1998 on an overall basis. The literacy ratio for males calculated 77.66 % percent as against 50.47 % percent for females.

4.5.11 Impacts on Land

90. During the impact assessment survey, data regarding the impacts of subproject was collected. However, the field investigations revealed that overall adverse impacts of the subproject on the local people, land, structure, crops, trees, business, and employment etc. are not significant as all the subproject activities will be carried out within RoW (220 ft) of subproject, owned by PID. On the other hand, the construction of subproject will save settlements of Jhelum city, infrastructures and fertile agricultural land.

4.5.12 Indigenous People

91. There are no indigenous people in the sub-project area. No notable migration of any tribe inside the area was observed for many decades. So, the subproject does not fall in the categorization of indigenous people.

5. ENVIRONMENTAL IMPACT ASSESSMENT AND MITIGATION MEASURES

92. This chapter categorizes the potential impacts of the Construction of Jhelum City Flood Protection Bund on the physical, biological and social environment of the subproject area and recommended mitigation measures for the negative impacts.

5.1 Impact Assessment - Overview

93. The Initial Environmental Examination (IEE) study has identified that the subproject is not likely to have any severe negative impacts on the environment and people of the area. All the potential impacts which have been identified during the present assessment, are associated with the construction stage, and are minor to moderate in severity; they can easily be avoided (through good design and construction planning) or mitigated (through proper implementation of the EMP).

94. On the other hand, the subproject will be beneficial particularly for the local population on creation of job opportunities and extremely beneficial for safety of the public, land and other infrastructure. Significant social indicators of the subproject benefits are mentioned below:

- The safety of the public, Lands, crops and infrastructure.
- The socio - economic prosperity of the public.
- Living standard of beneficiaries of the subproject will improve.
- Environmental condition will also be improved.

5.2 Pre-Construction/Design Stage

5.2.1 Bid Documents Preparation

95. Bidding documents will be prepared. It will include general and particular conditions of contract specifications, IEE report including EMP, drawings and area map. Contractor will implement all conditions and requirements in true letter and spirit.

5.2.2 Potential Positive Impacts and damages to the existing infrastructure and facilities

96. Jhelum city is situated on right bank of River Jhelum. No flood bund exists to protect the City from havoc of flood in River Jhelum during high period. With the implementation of the sub-project human lives, public properties as well as infrastructure will be protected from floods. The subproject will generate sense of protection amongst the local inhabitants. It will create a rise in the trend of investment in the area. The construction of Jhelum city flood protection bund will also encourage the business development in the area. Moreover, the local people will get indirect employment during the implementation of the sub-project. The subproejct construction activites may disturb existing underground installations, (water supply and sewerage pipeline etc.), if any. The position of infrastructure will be located and handled with care in close coordination with the relevant departments .

5.3 Construction Phase

5.3.1 Land Resources

5.3.1.1 Site for disposal for waste construction material

97. The cutting of earth will generate material which will be used for filling of embankment. There will be no disposal of earth. Negligible construction waste is anticipated , it will be disposed off in low lying areas or depression on other side of protection Bund, where water becomes stagnant and becomes a breeding place for disease vectors like malarial mosquitoes. Dumping waste material in these ponds will achieve two purposes: disposing off waste material and filling the pond to make the sites more health friendly. This is a moderately significant but mitigable factor.

Mitigation

98. The contractor through provision in the contract document, will be obligated to dispose off the construction waste material in the low lying area or depression in the surroundings of subproject area.

5.3.1.2 Location of Labor Camps, Material Depots, Equipment yards and approach roads

99. There is ample area.lying uncultivated along the right bank of river. The land in which the subproject is to be carried out is owned by the Punjab Irrigation Department. RoW of the embankment is 220 feet wide from RD0+000 to RD 20+000 while the construction activity will be confined within 100-155 feet. The land has been identified for the location of labour camps, material yards, equipment yards and approach roads. This will not cause any serious problem. So this is a matter of slight significance and is easily mitigable and manageable.

Mitigation

100. The contractor will, in consultation with RE, resolve the exact location of all these facilities within the land of Irrigation Department and labour camps will be located at least 500 m away from the residential areas.

5.3.1.3 Contamination from diesel and other oil spills from construction machinery

101. At places, oil spills might be inevitable and would exceed from the maximum permissible limit (spills of volume greater than 200 liters). In case it is allowed to be as per rule rather than an exception, the dumping of oil will permanently create contamination along with allied physical, biological and social losses. This is mitigable through effective application of the maximum spill regulations.

102. "Guidelines for Oil Spill Waste Minimization and Management issued by International Petroleum Industry Environmental Conservation Associate are as follows:

103. ***Soil contaminated by minor spills/ leakages*** (defined as leaks from vehicles, machinery, equipment or storage containers such that the area and depth of contaminated soil is less than 10 sq ft and 3 inches respectively) is to scraped and burnt in a burn pit.

104. ***Moderate spills defined*** as spills of volume less than or equal to 200 liters is to be contained and controlled using shovels, sands and native soil. These equipment's and materials are to be made available at camp sites during the operation. The contaminated soil is to be excavated and stored in a burn area lined with an impermeable base. Depending on the volume, the contaminated

soil is either disposed-off through specialized treatment such as bioremediation or through approved contractor.

105. ***Major spills*** (defined as spills of volume much greater than 200 liters) require initiation of Emergency Response Procedures and Oil Spill Contingency Plan. These spills are to be handled and controlled according to the Plan and require special treatment such as bioremediation through approved contractors.

Mitigation

106. Contractor's contractual obligation is to impose strict rules on workers and labour and ensures that no spills are generated. If the spills take place,it must be followed treatment prescribed above as per the degree of spill. The contractor should prepare a spill contingency plan and familiarize its staff with this plan. The storage of fuel, oil and lubricants should be on impervious surfaces.

5.3.1.4 Damage to roads, cross drainages by machinery

107. Subproject may cause additional wear and tear of roads and cross drainage. Such situation can arise through carelessness of the heavy machinery drivers / operators. A considerable damage to paths, roads and drainages may occur if the drivers/operators are not made aware, trained and bound to be careful. It is a concern of moderate significance but is mitigable through care and enforcement of regulation.

Mitigation

108. Contractor's contractual obligations is to impose strict control over operators and drivers of all types of vehicles. Awareness and training must be given to them and speed limits should be enforced. Should the damage take place, the contractor will be bound to carry out repair immediately.

5.3.1.5 Discharge from unstable slope or leakage on construction

109. Such an impact can destroy the structure leading to unprecedented damage. Though significant, it can be set aside through a careful planning of the work. If such a situation does appear, it becomes highly significant but a mitigable impact.

Mitigation

110. Contractor's contractual obligation is to ensure that such leakage does not develop. Should such leakage develop, the contractor must remain fully prepared to immediately control the discharge. Material to emergency control of

the discharge i.e stones, jute bags and other earthen material must be kept stored with emergency labour force at all time.

5.3.1.6 Impact of taking borrow material from earth borrow site

111. A large quantity of earth fill material will be obtained. Excavation and cutting activities could cause adverse environmental impacts including sliding, soil erosion and drainage on the surrounding areas.

Mitigation

- No private land will be acquired for the borrow areas.
- The Contractor will ensure that selected borrow areas located on irrigation land are clearly demarcated and approved by the engineer including the allowed depth of the excavation before starting excavation.
- The borrow areas will be leveled. The Contractor will not leave the borrow pits in such a condition that they are unsuitably filled with rainwater and cause problems for the community.
- If the borrow area is near the settlements, and then it should be fenced totally.
- The borrow earth, barren land will be used. If agriculture land needs to be used as borrowing area, then the Contractor will adopt the following methods during the digging process:
    - Fix the location of excavation.
    - Remove thirty centimeters of the top soil and keep it on reserved site for re-spreading in the field.
- Excavate up to one-meter depth.
- Maintain the slope as far as possible.
- Place the top soil back during the restoration process.
- Pay compensation for any damages/ crop losses.

5.3.1.7 Impact of stone quarrying

112. Stones shall be procured from some quarry located within the district. This will not cause any impact on the immediate subproject area except that the vehicles carrying the stone shall exert additional traffic load on the roads leading to the subproject. Crushed stone can fall on roads. Unloading of material may become hazards on site.

Mitigation

113. Contractor's contractual obligations will use the road network carefully and repair it immediately if any damage occurs. During transportation, vehicle will be convered to avoid spillage of material on the roads. Unloading will be done on designated sites.

5.3.2 Hydrology and Water Resources

5.3.2.1 Source of construction water

114. Groundwater extracted from bore holes / pumps and river water is the main source for the construction which will be utilized. Irrigation department has ownership of River water which will be available free of cost.

Mitigation

115. It will be Contractor's contractual obligation to obtain water. The contractor will install pumps/ bore holes in the subproject area at proper place.

5.3.2.2 Source of Potable Water

116. Contractor's labour will use groundwater to be extracted by the Contractor through boreholes for washing and bathing purposes. Disposal of waste water may cause impact.

Mitigation

117. Contractor's contractual obligation is to supply running tap water, pit latrines/ flush latrines near the camp. It must be ensured that solid and liquid waste of about 20 persons is not allowed to fall into the river. All sewage should be treated through septic tanks and/or soakage pits.

5.3.2.3 Source of drinking water

118. Communities along the banks of Jhelum river are sufficiently advanced to install tube wells and hand pumps for obtaining good quality drinking water. Similar arrangements can be made by the contractor for his labour camps. The water will be tested to ensure that it is of drinkable quality. Drawing water for drinking from aquifer shall neither cause any significant change in the underwater reservoir, nor the river which recharges it. This impact can be considered as slight. If the surface water is not drinkable, the sub soil water should be tapped and used after being tested.

Mitigation

119. The contractor should tap the underground reservoir and install hand pumps or tube well with over head tank to supply drinking water to the labour and workers. The quality of drinking water should be monitored periodically. The distance of drinking water source i.e. hand pumps etc. must be atleast 50 m away from the toilets or septic tanks.

5.3.3 Air Quality and Noise Pollution

5.3.3.1 Dust /smoke and other pollutants from construction

machinery

120. The air quality could be affected by the subproject activities such as dust, smoke and other pollutants from construction machinery and vehicles; dust or other pollutants from machinery/ movement of vehicles; and smoke from vehicles/ generators/ burning of waste materials or burning firewood. Subproject is more than 500 feet away away from settlements and access roads, hence would not lead to any impact on local population. However, the impact on workers is inevitable, moderately significant but mitigable.

Mitigation

121. Contractor's contractual obligation is to keep the dust and smoke low by using machinery, which is well maintained and is almost noiseless and all unpaved roads and paths are sprinkled with water several times a day depending on weather conditions.

5.3.3.2 Dust or other pollution from stored material

122. Deterioration of air quality through dust and other pollutants from stored materials may occur. Material depot will be established on the Irrigation land to be located away from the settlements and access roads. Wind direction is usually from North to West with speed of 3 km/h. This is also inevitable, moderately significant and mitigable.

Mitigation

123. Contractor's contractual obligation is to keep the dust and smoke at a minimum by carefully storing and distributing the construction material. The stockpiles should be covered or kept moist in dry weather, and are to be located upwind of communities at such a distance that the communities are not affected by wind blown material..

5.3.3.3 Smoke from burning of waste material or burning fire wood

124. A large number of big and small fires in the labour camp can produce smoke and smog which can reduce visibility, hinderence in traffic mobility and may cause respiratory track diseases.

Mitigation

125. Contractor's contractual obligation is to use clean and smoke free fuel in the labour camp. Cutting and burning trees / shrubs for fuel shall be prohibited. Instead LPG gas cylinders should be used in the labour camp for cooking purposes.

5.3.3.4 Noise from use of old or outdated machinery

126. Old and poorly maintained machinery generates higher decibels of noise and may cause noise pollution for workers in the close vicinity of heavy machinery.

Mitigation

127. Contractor's contractual obligation is to use new, well maintained and low noise machinery preferably during day time and to monitor the noise level with NEQS and IFC/WHO standards for occupational health and saftey compliance. The drivers, operators and workers working on or near the heavy machinery must be provided ear plugs.

5.3.3.5 Soil Compaction due to labour camps, and machinery yards

128. The human and mechanical activity normally compacts the soil and turns it non productive which leads to social impacts.

Mitigation

129. Contractor's contractual obligation is to rehabilitate the site used for labor camp or machinery yard in to condition prior to the commencement of the subproject. Pictures of the area should be taken before handing it over to contactor which will help the RE to ensure an acceptable state of soil while getting the area back from the contractor.

5.3.3.6 Impact on Building and Structure

130. The survey data identified that there is no building or any other structure in the RoW of Jhelum City Flood Protection Bund. Thus, there will be no impact on building and structures due to implementation of the sub-project activities.

5.3.3.7 Impacts on Land

131. During the impact assessment survey, data regarding the impacts of subproject was collected. However, the field investigations revealed that overall adverse impacts of the subproject on the local people, land, structure, crops, trees, business, and employment etc. are not significant as all the subproject activities will be carried out within RoW (220 ft) of subproject, owned by PID. On the other hand, the construction of subproject will save settlements of Jhelum city, infrastructures and fertile agricultural land.

5.4 Biological Resources

5.4.1 Damage to biological resources Flora, and Fauna (Biota)

132. Since the water level of river will not rise or fall significantly and reservoir shore line will not change, so no major change is expected in the habitat of the natural flora or fauna. Small readjustment of place may be made by some birds and rodents.

Mitigation

133. About one percent of the total cost of subproject PC- I has been allocated for new plantation, as per instruction of the Punjab Government. In this context different species will be planted according to the Tree Plantation plan.Careful planning of works will be made to avoid unnessary logging of trees.

134. Contractor's obligation is to completely avoid any additional damage to Flora and Fauna of the area by respecting the limits of construction site and not to enter other territories. Training of workers may be ensured for not disturbing flora and fauna.

135. No unauthorized tree or bush cutting should be allowed. Should it be necessary, it should not be done without permission of the RE.

5.4.1.1 Impact on migratory birds

136. The subproject area is not on the route of migratory birds in routine, but it is expected that occassionally birds may pass through the subproject area. Since the water to land ratio is not going to change, there shall be no or may be a slight influence of subproject on the temporary habitat of the migratory water birds.

Mitigation

137. Contractor's contractual responsibility is to facilitate a regular inspection by the Wildlife Department to ensure that the process of construction does not cause any hindrance to the movment of migratory birds.

138. Generally birds pass through the subproject area occassionaly. Contractor's staff should be strictly prohibited from hunting any migratory birds.

5.4.2 Impact on Trees

139. The sub-project will not disturb any tree,. No tree will be cut for the construction of subproject

5.5 Socioeconomic, Cultural and Archaeological Issues

5.5.1 Loss of livelihood

140. There will be no loss of livelihoods due to implementation of the sub-project as all subproject activities will be executed within RoW.

5.5.2 Impacts during Construction stage

141. The following impacts during construction can be :

- Access to other construction materials.
- Problems to Health and Safety of labour and employees on construction work and provision of safety equipment to workers on site.
- Employment of locals on the subproject.
- Possibility of spread of HIV/AIDS amongst the subproject labour and adjoining population.
- Risk of injuries and accidents.ender Issues.

Mitigation

142. For matters pertaining to social obligation and benefits of the communities, if needed, a Social Framework Agreement shall be signed by the RE with communities to ensure their participation and full satisfaction in matters pertaining to them.

143. All matters where contractor is involved, these should be made as his contractual obligations.

5.5.3 Impacts during Operational and Management Phase

144. For operational phase, the consultant shall develop a comprehensive operational and Management Manual and an effective monitoring plan. Mistakes at operational level or handling of operations by untrained staff can prove very risky and costly. Important points to be attended at operational stage are as follows:

- Comprehensive O&M Rules as per International Organization for Standardization (ISO) standards. Strict application of prescribed M&E plan. Continuous evaluation of design efficiencies.
- Understanding and training of Operational and Maintenance Manual.
- Annual Environmental Audit.
- Regular maintenance of engineering works (mechanical as well as civil).
- Staff Welfare.
- Continued Public consultation and feedback if any of the social issues.

- Continued attention towards gender issues and women consultation.
- Refresher Training Courses for operational staff.

6. ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

145. This EMMP document is produced as a complementary part of IEE and bidding documents of subproject. It also ensures consideration of all relevant environmental factors in designing, planning, implementation and identification of linkages to safeguard policies relating to the subproject.

146. Based on the preliminary assessment, key mitigation measures recommended under this Environmental Management Plan (EMP)are listed as follows:

a. Identify and locate on project plans any sensitive natural resources in the subproject area including but not limited to patches of natural habitat, bird colonies, and wetlands, unique plant communities etc. (consult with local nature protection authorities).
b. Identify local access routes through and around cultivated land and pasture.
c. Minimize requirements for temporary or permanent alteration of lands outside the embankment right of way.
d. Provide zones for preliminary accumulation of wastes that will cause no damage to the vegetation cover and other components of the environment.
e. Transport construction concrete rubble, debris and spoils in approved paths and landfills/ dumpsites for proper disposal.
f. Delineate access roads/ work areas carefully and prevent their expansion.
g. Rehabilitate access roads and work areas after work completion (scratch soil with special engine, put fertile topsoil in place, etc.).
h. Use closed/covered trucks for transportation of construction materials.
i. Clean the surrounding area from dust by water sprinkling, removal of excess materials and cleaning of sites upon completion of activities.
j. Restore original conditions of landscape after completion of construction and rehabilitation works.
k. Arrange necessary preservation measures (establish protection zones, by-pass these areas during transportation and other).
l. Cease the works at once, historical and cultural monuments are encountered during earth works and provide relevant information to the relevant provincial department responsible for the protection of historical and cultural monuments.
m. Conduct mid-term and end-of-project inspections to the sites during construction and rehabilitation works.

147. The parameters, mitigation measures and monitoring plan affixing responsiblities have been discussed in detail in the EMMP.

6.1 Institutional Arrangements

6.1.1 Management Responsibilities

148. Overall responsibility for Environmental Management and Monitoring will rest with the Project Implementation Unit (PIU) which is headed by a Project Director and Project Management Consultant (PMC). The ESU of PIU will be supported by environmental team of Project Management Consultant during implementation and monitoring of the EMP. Environment and Social consultants will review periodical reports prepared by the Project Management Consultant (PMC) as well as raising inspection notes based upon their visit to subproject site. This information shall make a basis for PIU for further reporting or visiting site. The specific responsibilities of the institutions involved in the EMP implementation are described below:

6.1.1.1 Project Implementation Unit (PIU)

149. Project Implementation Unit (PIU) will be responsible for implementation of EMP throughout the subproject duration. PIU would also support community participation and consultations from the subproject identification to completion stage. The environmental team of PIU (supported by Environmental and Social Consultant) will assist in implementation of EMP.

6.1.1.2 The Consultant

150. The Project Management Consultant (PMC) will ensure the implementation and regular monitoring of the EMP in true letter and spirit during execution of the civil works and shall submit periodic reports to PIU regarding the EMP implementation status. The Consultant Environmental Specialist and Social Specialist will be responsible for EMP implementation and reporting any non-compliances to the Engineer of the Project and the PIU.

6.1.1.3 The Contractor

151. The contractor will be responsible for on-site implementation of the EMP of the subproject environmental protection liabilities. He will also be responsible for compliance of EMP provisions under contractual obligations. The contractor will train his crew/ staff in implementation of the EMP through capacity building interventions.

152. The EMP will be an integral part of the contract document. The bid should include a detailed environmental mitigation budget as part of the engineering costs of the respective works. Contractor will engage social and environmental managers to realize the above requirements.

6.2 Environmental Management & Mitigation Plan

153. The mitigation plan, being a key component of EMP includes measures to mitigate potential negative impacts and enhance its positive impacts during construction phase of the subproject. The contractor is responsible for implementation of EMP with the co-operation of executing and implementing agencies, PIU staff, socio-environmental consultants and local community of the subproject.

154. Table 6.1 states the environmental management plan for the impacts along with mitigation plan, as well as the institutional responsibility.

Table 6.1: Environmental Management (Mitigation) Plan

Problem / Activity Impact	Mitigation Measures	Institutional Responsibility [1]
Planning/ Designing		
Assure compliance with relevant construction field legislation.	• Acquire construction permit. • Provide water management guidelines if subproject is executed near surface watercourse.	***PIU/ Consultant***
Potential damages to the existing infrastructure and facilities, especially underground installations (water supply and sewerage pipeline etc.) which cause obstacles in the provision of services to consumers.	• The position of infrastructure will be located and handled with care in cooperation with the relevant institutions. • Close liaison with local relevant authorities	***Consultant / PIU in cooperation with concerned Department.***
Increased possibility of employment and income in the local community.	• Prioritize qualified local population in employment.	***Contractor/ consultant***
Waste Management	• Proper waste Management at construction sites and Labour camps. • Dispose off construction waste material in the low lying area or depression.	***Contractor with the cooperation of consultant.***

Problem / Activity Impact	Mitigation Measures	Institutional Responsibility [1]
Construction		
Conflict due to use of privately owned agriculture land for camp construction	• Establishment of camp on government leveled land 500m away from population. • Approval of camp site will be obtained from the Engineer.	***Supervised by PMC***
Social conflicts due to influx of external workforce	• Establishment of camp on government leveled land 500m away from population . • Contractor need to obtain approval from the Engineer regarding hiring of workforce. • Hiring of work force from local communities; • Awareness raising of residents for safety protection. • Awareness raising of labor to ensure respect for local customs and norms. • Maintain record of all resources usage like water, fuel, manpower, machinery, equipment, etc. • Preference to provide jobs to local job seekers. • Motivation to the workers for a peaceful work environment.	***Contractor & Supervised by PMC***
Social Protection of Work Force	• • Child labour will be prohibited at sub-project sites. • The work force will be provided with all the benefits (medical insurance, leaves etc.) according to prevailing laws.	***Contractor/ PMC***

Problem / Activity Impact	Mitigation Measures	Institutional Responsibility [1]
Conflict with local water demand	• The contractor will install pumps/ bore holes in the subproject area at proper place. ***Prior approval to be obtained from Project Engineer for water usage.***	***Contractor/ PMC***
Supply of material	• Use the existing quarries for the supply of material. • Use licensed suppliers for materials. • Prior approval to be obtained from project engineer.	***Contractor & Supervised by PMC***
Transport of material	• During the transportation of soil, the trucks must be covered with Tarpaulin. • Use earth material with the approval of the Engineer • Procure shingle/ stone from quarry site approved by the Engineer. • Regular inspection, tuning, and maintenance of transport vehicles. • Avoid night time activity. • Maintain liaison with communities; • Repair of damaged roads/ other infrastructure. • Transportation of material during off peak hours.	***Contractor & Supervised by PMC***

Problem / Activity Impact	Mitigation Measures	Institutional Responsibility [1]
Emission of dust from the landfill of earth material, due to vehicles movement on roads and construction works execution.	• Compact deposited earth material. • Sprinkle dust sources with water in order to reduce impacts on the surrounding population and vegetation. • Control the speed of vehicles in order to reduce dust rising. • Prepare and implement a plan for the construction site organization that includes good construction management practices. • The stock piles to be used should be kept moist in dry weather and to be transported in such a way that the communities are not affected by upwind of the stockpiles.	***Contractor & Supervised by PMC***
Emission of gases, smoke and particles from vehicles, mechanization and generators.	• Use of well-maintained equipment/ vehicle and their regular maintenance. • Use of clean and smoke free fuel. • Avoid cutting and burning trees / shrubs for fuel. • The contractor is bound to submit evidence of vehicle roadworthiness in line with the regulations on the hazardous gases emission. • Prepare and implement the construction site organization plan that incorporates good construction practice measures.	***Contractor & Supervised by PMC***

Problem / Activity Impact	Mitigation Measures	Institutional Responsibility [1]
Noise in the operation of heavy mechanization and generators.	• Observe law-defined working hours at the construction site. • Use new, well maintained and low noise machinery. • Monitor the noise level with NEQS and IFC/WHO standards • Make the generator casings sound proof if they are located near residential units. • Ensure muffles for heavy machinery. • Prepare and implement the construction site organization plan that incorporates good construction practice measures. • Regular inspection of equipment and machinery.	***Contractor & Supervised by PMC***
Increased water turbidity as a consequence of the works.	• Construction works should be executed in a way that river water is not getting turbid. • Works should be executed in dry weather. • Prepare and implement a construction site organization plan.	***Contractor & Supervised by PMC***

Problem / Activity Impact	Mitigation Measures	Institutional Responsibility [1]
• Smoke and dust generation. • Dispersal of un-covered/unsecured construction material during transportation. • Damage to access roads/ other infrastructure due to transportation of construction material	• Use earth material with the approval of the Engineer. • Procure shingle/ stone from quarry site approved by the Engineer. • Regular inspection, tuning, and maintenance of transport vehicles. • Material transport in closed containers or covered with canvas (Tarpal) sheets. • Avoid night time activity. • Maintain liaison with communities. • Repair of damaged roads/ other infrastructure.	***Contractor & Supervised by PMC***
Soil, groundwater and surface water pollution, with oils and lubricants due to equipment poor maintenance, repairs and refuelling at the construction site.	• Avoid servicing and re-fuelling at the site. • Use protective foils during possible vehicle re-fuelling and maintenance at the construction site. • Provide absorbing material in case of fuel spills. • Used oil/ oily materials and agents should be managed in line with the Waste management plan. • Procedure must be in place for actions in case of incidental oil and lubrication spills. • Prepare and implement the Construction Site Organization Plan that incorporates good construction practice measures, measures from the Water management plan.	***Contractor & Supervised by PMC***

Problem / Activity Impact	Mitigation Measures	Institutional Responsibility [1]
Soil erosion, contamination and compaction	• Restrict vehicle speed up to 30km/h.; • Restriction on repair of vehicles and equipment in the field. • Rehabilitate the site used for labor camp or machinery yard in to same condition. • Stones, jute bags and other earthen material must be kept stored for emergency erosion or discharge.	***Contractor & Supervised by PMC***
Loss of natural vegetation and associated fauna	• No cutting or removal of trees without permission. • As per Punjab Government policy, sufficient amount has been allocated for tree plantation to improve environment. For this purpose a tree plantation plan will be prepared including the type of species, location for plantation and other necessary information. This plan will also compensate any unlikely tree cutting involved during subproject implementation. Selection of borrow area with least vegetation cover. Soft start for allowing time to reptiles to move away from the subproject site. • Restriction and prohibition on hunting, shooting, trapping, and poaching of wild species. • No night time activity. • Photographs of pre and post project.	***Contractor & Supervised by PMC***

Problem / Activity Impact	Mitigation Measures	Institutional Responsibility [1]
Reduced possibility of traffic through the area where the works are executed.	• Plan the relocation of equipment at time when daily traffic is not jammed; provide alternative passage for pedestrians and vehicles in cooperation with local authorities or provide a safe passage through the construction site. • Avoid use of roads in inhabited areas especially near schools and hospitals. • Prepare and implement the Construction Site Organization Plan that incorporates good construction practice measures.	***Contractor & Supervised by PMC***
Potential pollution of soil and water due to the discharge of waste sanitary waters from the construction site	• Provision of field toilets for workers	***Contractor & Supervised by PMC***
Population at increased risks of traffic accidents and construction works.	• Assure adequate warning signs, lighting, protective fencing etc. • Preparation of Traffic Management Plan and observe traffic rules through training of staff • Clean construction waste from the construction site during the construction phase and after works completion, when closing the construction site. • Assure medical supplies and aid through institutional and administrative arrangements with hospitals at the construction site.	***Contractor & Supervised by PMC***

Problem / Activity Impact	Mitigation Measures	Institutional Responsibility [1]
Risk of injuries at work	• Prepare and implement the Construction Site Organization Plan. • Preparation and implementation of HSE Plan. • Provision and usage of PPEs. • Provision of first aid kits and emergency vehicle. • Availability of Emergency response teams.	***Contractor & Supervised by PMC***
	•	

Problem / Activity Impact	Mitigation Measures	Institutional Responsibility [1]
	•	

Problem / Activity Impact	Mitigation Measures	Institutional Responsibility [1]
Health risks due to unsafe and unhygienic living environment. Disposal of wastes	• Preparation and implementation of HSE Plan. • Safety measures taken by the contractor such as installation of firefighting equipment, • safe storage of hazardous material, fencing • Provision of first aid facilities etc.; • Contingency measures in case of accidents; • Obligatory insurance of contractor's staff and laborers against accidents; • Provision of adequate sanitation, washing, lighting, cooking and dormitory facilities. • HSE trainings to construction and camp staff.	***Contractor & Supervised by PMC***
EHS Training	• Arrange training, • Provide guidelines and brochures in Urdu to staff and laborers about the Environment, Health and Safety.	***Contractor and PMC***
Damage to archaeological site that are of importance in terms of cultural heritage	• In case of detecting any archaeological artifact, structure or tomb, the contractor will be required to immediately stop all works at the site and brief the Engineer and PIU about the site. • Upon receiving information from the contractor, the Engineer shall bring up the issue and notify the Archaeological Department within one working day. • In the event of chance finding, the contractor has to secure the site against any intrusion until the Archaeological Department decides further action.	Contractor / PMC/ PIU

Problem / Activity Impact	Mitigation Measures	Institutional Responsibility [1]
• ***Construction site closure***		
Construction material leftovers after the closure of construction sites	• All shivers and material that remain after the closure of temporary construction sites are to be removed from the location and re-used/re-cycled where possible. • All remains are to be disposed off in a manner that will not be harmful to environment.	***Contractor*** ***Supervised by PMC & PIU***
• Change in land use pattern • Soil erosion. • Visual sores in landscape. • Dust pollution. • Public health risks due to mosquito-breeding places. • Land disputes. • Loss of potential crop land. Loss of vegetation. • Loss of fauna due to excavation of Borrow Area.	• Preparation and implementation of Restoration and Environmental enhancement plan. • Use of borrow areas with Engineer's approval at specified depth. • Limited movement of machinery. • Documentation of area. • Ensuring that areas under crops are not used as borrow areas. • Levelling and dressing of borrow areas; • Water sprinkling. • Rescue of any encountered species.	***Contractor*** ***Supervised by PMC & PIU***

1 Institutional Responsibility: Environment Specialist of Project Management Consultant, ESU of Project Implementation Unit and Contractor Environmental, Health and Safety Officer (EHS Officer).

6.3 Monitoring Activities

155. For each of the environmental components, the monitoring plan specifies the parameters to be monitored; location of the monitoring sites and duration of monitoring. The monitoring plan also specifies the applicable standards, implementation and supervising responsibilities.

156. In addition to the critical locations selected during design stage, the environmental monitoring will also be done at the construction camp site and any other plant site as determined relevant during rehabilitation works stage.

6.3.1 Monitoring Plan

157. Monitoring Plan is also associated with mitigation plan during the different stages of the sub-project. It ensures that mitigation measures are being effectively implemented. The monitoring of the subproject is very imperative for implementation of the EMP. The Project Management Consultant through environmental Inspector will carry out the monitoring at the field level on a continuous basis. The PIU staff will carry out periodic monitoring during their site visits.

158. Monitoring will be carried out to ensure that the mitigation plans are regularly and effectively implemented. It will be performed at three levels. At the PIU level, the environmental team will do EMP monitoring to ensure that the mitigation plans are being effectively implemented. At Consultant level, the environmental team of Project Management Consultant will regularly monitor the EMP implementation by the contractor. At contractor's level, the Environmental monitoring checklist will be filled on daily basis by their Environmental Manager and countersigned by the representative of Project Management Consultant.

159. Table 6.2 states the monitoring parameters, location and the agency responsible for monitoring those parameters.

Monitoring Parameter	Monitoring Location	Monitoring manner / monitoring equipment	Frequency	Why is monitoring necessary	Responsibility	
					Planning	Implementation.
Supply of material						
Possession of environmental Permits for Plants of quarries and concrete bases from which material is supplied	Legal entities that own the plants	Insight into the documentation	During material supply	Assure that the plants conform to the requirements of environment protection and human safety	Contractor	PMC /PIU
Transport of material						
If trucks are covered during material transport	At the construction site and transport roads	Visual supervision	During material transport	See that no dust is emitted into the air and material spilled into environment	Contractor	PMC /PIU

Construction						
Conflict due to use of privately owned agriculture land for camp construction	Camp Site	Supervision	Weekly	To avoid conflict	Contractor	PMC
Social conflicts due to influx of external workforce	Construction/ Camp Site	Supervision	Fortnightly	For peaceful work environment.	Contractor	PMC
Water Demand at Camp Site	Camp & Construction Site	Visual supervision	Fortnightly	To ensure that water supply to locals and the nearby communities remain unaffected.	Contractor	PMC

Transport of Material	Construction Site and access roads	Regular inspection and supervision	Daily	Safe logistics of material.	Contractor	PIU/ PMC
Degradation and soil pollution	At the construction site and directly around the construction site	Visual supervision	Weekly	To establish if liquid oil derivative leaked, soil erosion and landside occurred due to construction works	Supervising body	PMC
Occurrence of noise and air pollution	At the works execution location and near settlements	Standard air quality and noise level through instruments at site.	Monthly / When required	In order to establish the level of air pollution and noise and make comparison with legal limits values. In case of aberration additional mitigation measures.	Contractor	PMC
Destruction of crops, woods, meadows flora/ fauna etc.	At the works execution location and in the vicinity	Visually	Upon received citizens' complaints	In order to establish that works are only executed at project-envisaged locations	Supervising body	PMC
Injuries at work, accidents etc.	Work Site	Site and material inspections,	Daily	To reduce work related injuries and promote good OHS practices.	Contractor	PMC

Water Quality	Camp Site/ Construction Site/ Adjoining Areas	Water Quality Tests	At the beginning on water uses source and quarterly testing.	To control the water quality of the area.	Contractor	PIU/ PMC
Waste management during the works execution	At the construction site according to the Waste Management Plan.	Visually	Permanently	Are containers/bins for communal waste installed, is hazardous waste treated in adequate manners, in order to prevent uncontrolled waste disposal	Contractor	PMC
Number of registered accidents of Existence of hygienic conditions for workers, Protective equipment application	At the construction site	Visually and insight into the register	Permanently during the works execution	In order to establish that protection at work measures implemented.	Contractor	PMC

Quality of executed works Quality of material that is installed	At the construction site	Visual monitoring and through register	Permanently during the works execution and construction site removal	Poor monitoring and works execution quality assessment can cause damages to environment, bad quality structures and usage of poor quality material, can result in damages to structures and expose inhabitants to risks and possible accidents	Contractor	PMC
Construction site closure						
Waste remnants and soil degradation/ contamination	At the project location	Visually	After the works completion	In order to establish whether all waste was removed from the construction site.	Contractor	PMC

• Restoration and Environmental enhancement plan implemented for barrow/quarry area, etc. • Change in land use pattern • Soil erosion. • Visual sores in landscape. • Loss of potential crop land. Loss of vegetation. • Loss of fauna due to excavation of Borrow Area	At the project location	Visually	After the works completion	For entire satisfaction of EMP.	contractor	PMC / PIU

6.4 Sub project Enhancement Plans

6.4.1 Tree Plantation Plan

160. Tree cutting/uprooting is not anticipated during the course of the sub-project. However in case the requirement of tree cutting intervened during construction phase of the sub-project, the impact shall be mitigated by re-plantation in the vicinity of the subproject area. It is proposed to plant five (05) new trees for each tree uprooted on site. If no trees will be affected, the contractor will still plant trees to offset the small vegetation to be lost. Local indigenous floral specie shall be plant in the project area by the contractor.

161. Moreover, according to the noitification of Government of Punjab for tree plantation in the new/rehabilitation irrigation projects, an amount of Rs. 16.73 million (1 % of total construction budget) has been allocated for tree plantation at the project area.

6.4.2 Restoration Plan

162. Construction of embankment / flood bund will require sufficient soil material to fill. If material is required for raising of bund or contractor needs to borrow material from any other site, then the contractor can acquire private land in accordance with the lease agreement with the land owner. Photographic record will be kept before and after the land use as borrowing area. The contractor will not leave borrowing pit in such a condition that they are unusable and could be filled with rain water and provide breeding place for mosquitoes or cause any health and safety issues. Agricultural land should be restored such that it can be re-used for the agricultural purpose. The topsoil of agricultural land, if used as borrow area, should be removed up to 6 inches and kept separate on site for its re-spread back on the levelled borrow area. After removal of top soil, excavation may be done up to maximum 3 feet. Then the site area should be levelled for placing the topsoil back.

6.5 Reports

163. The Environmental Specialist of the Project Management Consultant shall produce periodical reports as well as inspection notes based upon the visits to the subproject site. This information shall make a basis for PIU for their further reporting or visiting the site. All reports shall be location and activity specific. The reports shall especially identify areas of contractor's noncompliance with the EMP and provide guiding remarks on actions to be taken. The significance of the non-compliance shall also be noted. Copies of these reports shall be sent to the Resident Engineer (RE) who shall forward them to the team leader, Head PIU, Irrigation Department and the contractor for their action(s). The RE will include, in routine reports, a summary status of activities relating to the EMP. Supplemental reports on issues should also be

prepared as and when required. The consultant's environmental team will produce daily, monthly reports, as well as a final report of the project based on the information collected. The list of distribution reports is given in **Table 6.3**.

Table 6.3: Distribution of Reports

Report	Prepared by	Reviewed by	Distribution
Daily	Contractor's HSE officers	Reviewed by environmental officer and Consultant's Environmental Specialists	Resident Engineer
Monthly	Environmental team of the Project Management Consultants	Reviewed by ESU of PIU	Resident Engineer, PIU, ADB
Effects Monitoring	Environmental team of the Project Management Consultants	Reviewed by & ESU of PIU	Resident Engineer, PIU, ADB
Change Management	Environmental team of the Project Management Consultants	Reviewed by ESU of PIU	Resident Engineer, PIU, ADB
Final	Environmental team of the Project Management Consultants	Reviewed by ESU of PIU	Resident Engineer, PIU, ADB

6.6 Training Schedule

164. Environmental training will form part of the Environment Management Plan. The training will be conducted for all personnel involved in the project works. The key objective of training program is to ensure that the requirements of the EMP are clearly understood and followed throughout the subproject. The trainings to the staff will help in communicating environmental related restrictions specified in the EMP. The contractors will be primarily responsible for providing environmental training to all project personnel on potential environmental issues of the subproject. Responsibility of trainings related to public safety lies with PIU. In addition to the training specified in the training log, special/ additional trainings will be provided during the subproject activity.

6.7 Implementation Estimated Budget

165. Contractor will be responsible for the implementation for environmental mitigation plan. Most of the mitigation measures are covered in the engineering costs of the respective works. However, cost for some of the mitigation and monitoring activities are estimated below in **Table 6.4.**

Table 6.4: Implementation Estimated Budget

Sr. #	Description	Cost (PKR)	Cost ($ USD)
1	Environmental Monitoring of air, water and noise (through environmental Kit and noise meter, while water testing in the lab)	150,000	1431
2	Implementation of OHS requirements (preparation of Plan, PPEs, first aid boxes, others)	250,000	2385
3	Environmental awareness and EMP training for staff	350,000	3339
4	I% Tree Plantation	16,238,129	154907
Total		**16,988,129**	**$ 162062**

7. PUBLIC CONSULTATION

7.1 General

166. The purpose in holding consultations is to share relevant information with stakeholders on the project interventions including potential environmental and social, (positive and negative) impacts. The consultation process consists of dialogue with the stakeholders and they are generally able to understand the implications of the project activities. This chapter describes the project stakeholders and their attitude towards the project construction and the process adopted in consulting the affected households and communities on relocation and resettlement, impacts assessment, socio-economic and physical losses due to project interventions

167. The public consultation process with various stakeholders has been undertaken so as to involve public and other stakeholders from the earliest stages. Public consultation has taken place during the planning and design stage and viewpoints of the stakeholders have been taken into account and their concerns and suggestions for possible improvements have been included where appropriate. Much of the public consultation process to date has revolved around concerns for the mitigation of construction impacts and the possible side effects from the proximity of the proposed subprojects.

7.2 Objectives

168. The main objectives of public participation and consultation are to achieve the following:

- Ensure public and community participation in the subproject environmental policy objectives and decision making.
- Ensure public confidence in the administration of the environment by demonstrating the role of government to enforce the environmental stewardship of government agencies and organs, corporate citizens and elite organizations;
- Grant the citizenry access to environmental information and data, thereby promoting the quality of environmental management and compliance monitoring.
- Provide key project information and create awareness among various stakeholders about project intervention;
- Keep liaison with project affectees and other stakeholders for primary and secondary data collection;

- Begin establishing communication and an evolving mechanism for the resolution of social and environmental problems at local and project level;
- Involve project stakeholders in an inclusive manner; and
- Receive feedback from primary stakeholders on mitigation and enhancement measures for environmental and social impacts.

169. Community engagement provides a valuable link between the stakeholders of the project and serve by;

- Enabling the community to be better informed
- Reducing the level of misconception/ misinterpretation or deception
- Ensuring commitment and greater ownership of the final decision by the community
- Strengthening relationships between project cycle and the community
- Encouraging the community to put forward ideas
- Assembling better understanding of local needs
- Helping to identify issues which may not otherwise have been considered

7.3 Identification of Stakeholders

170. Stakeholders are persons or groups who are directly or indirectly affected by a project, as well as those who may have interests in a project and / or the ability to influenceits outcome, either positively or negatively. Stakeholders for the subroject include locally affected communities and their formal and informal representatives, nationalor local government authorities, civil society organisations and groups with special interests, the academic community,or businesses. **(Figure 7.1)**.

171. During the field survey different stakeholders identified were the villagers, local residents, government officials, shop owners, public representative, NGOs and general public. All those stakeholders had different types of stakes according to their professions.

172. Two types of the stakeholders were identified: the primary stakeholders, who would be directly affected by the subproject; and the secondary stakeholders, who would be indirectly affected by the subproject.

173. These stakeholders were contacted by the consultants and took into consideration their views and reservations/concerns about the subproject.

Consultants also interacted with the community based organizations that can support the community during the execution of the subproject.

Figure 7.1: Identification of Stakeholders

7.4 Methodology

174. To carry out stakeholder consultations, the consultants adopted a strategic and flexible approach, where influential/ elected representatives were earlier briefed and taken into confidence for holding community level meetings and followed by candid meetings with residents and small group meetings with men and women separately.

175. A series of comprehensive consultations were carried out with the subproject stakeholders at various locations during the preparation of environmental and social impact assessment. The consultation and scoping sessions were designed specifically to provide subproject information to the public. These sessions were informal so as to encourage friendly social environment in which participants were comfortable in raising questions, expressing their opinion and concerns about the subproject besides seeking clarification regarding their concerns. The focus group discussions were instrumental in the process, whereas one-to-one meetings were also held with the institutional stakeholders.

176. Three consultative meetings were held in the following towns as given below in Table 7.1.

Table 7.1: Locations and Participants' Numbers in Public Consultation

Sr. #	Settlements	Number of Male Participants	Number of Female Participants
1	Mohalla Peeran Ghaib	13	9
2	Mohalla Suleman Paras	17	13
3	Noorpur Sharif (Purana Jhelum)	13	23
	Total	43	45

7.4.1 Community Consultations

177. Community Consultation is a process to "think and work" collectively and helps in smooth implementation of the Project. It brings new ideas and information to the consulter, in a dynamic and integrated way. It also educates the community towards type and objectives of the Project and persuades them to be rational to participate in the Project activities. Moreover, due to consultation, many doubts and difficulties are overcome. A detailed list of participants has been attached as Annex-Iv.

178. During field survey, the following consultations were conducted:

7.4.1.1 Focus Group Discussions

179. Public consultation plays a vital role in studying the affect and impacts of the Project on the stakeholders. These consultations have vital role in obtaining the views and perception of the possible affected community for preparing the useful and sustainable policy to implement the Project. In this regard, Focus Group Discussions (FGDs) were conducted with the male group in the sub-project area at urban and peri-urban communities. The discussions focused on impacts of the floods on the local communities and impacts of the proposed sub-project. The main purpose of the consultation process was:

a) To provide key sub-project information to the stakeholders, and to solicit their views on the sub-project and its potential or perceived impacts;
b) To identify problems and needs;
c) To collaborate in problem solving;
d) To develop and maintain communication links between the sub-project proponents and stakeholders;

e) To ensure that views and concerns of the stakeholders are incorporated into the sub-project design and implementation with the objectives of reducing offsetting the negative impacts and enhancing benefits of the proposed sub-project;
f) To create a sense of ownership among the stakeholders regarding the sub-project; and
g) To develop confidence about the proponents, reviewers and decision makers.

180. During the flood seasons, people of Jhelum always remain under threat due to the chance of entering water into city area. The people of the sub-project area were pleased to know about the construction of Jhelum bund. They were of the view that with the construction of the flood protection bund, their houses, structures, businesses and other infrastructures will become safer and they can flourish their livelihood and small business with faith and trust. According to the participants of the consultations, following positive impacts were anticipated by the implementation of the proposed sub-project:

a) Chance of entering of water from the Jhelum River near the Jhelum City will reduce;
b) Fear of flood damages will be reduced due to control of flood flows within river boundaries;
c) Minimize the damages of existing infrastructure in the flood plain area;
d) Proposed mitigation measures will provide an additional sustainable life and enhancement in socio-economic conditions of the local people with uplift of general public economies; and
e) Save and protect the lives of their livestock which is important source of livelihood.

181. In addition to this, execution of the proposed sub-project will generate employment opportunities in the area and will contribute in poverty reduction. Due to reduction of fear of flood and protection of their infrastructures, the local people will improve their agriculture and other business resulting creation of new jobs and services for the local poorer. Moreover, it will reduce the soil erosion. This will go a long way to ensure security and prosperity in the area.

7.4.1.2 Gender Consultation

182. Like many other persistent developmental issues in Pakistan, gender issues are also less explored along with its marginal position in the planning process, policy formulation and implementation of various development activities ranging from national, provincial to local level. It is need of the time to reinterpret gender incorporating local value and cultural system of the female focus group discussion revealed important finding about their responsibilities and their needs. The majorly of participants is involved in household activities and child caring and their involvement in income generation activities is very low. There is no representation of women in politics and business activities. Only one

vocational centre by the name of Sanat zar was recorded. Females wanted more community based training/ vocational centres. In sub-project area there is a healthy and emerging trend of girl education. Women are semi-dependent to take decisions regarding education, health, number of children and economic self-sufficiency.

183. During the focus group discussion, it was observed that there is no gender based violence prevailed among the targeted community. Participants of FGDs mostly were housewife and few were students. Women of Noorpur Sharif were also working as a maid in the city area on daily and monthly basis to support their families.

184. Literacy level of the female participants in female FGDs is shown in Figure. 7.2.

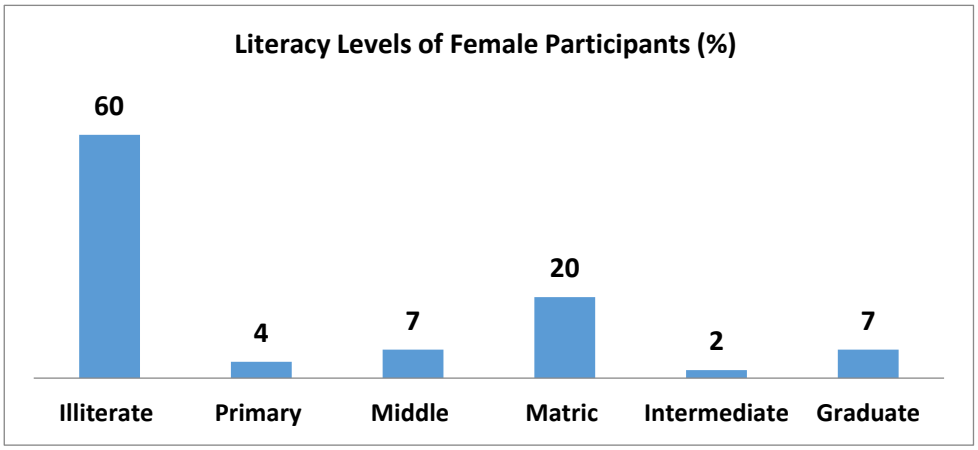


Figure 7.2: Literacy levels of Female participants

7.4.1.3 Consultation with Other Stakeholders

185. The potential stakeholders were inhabitants, Punjab Irrigation Department (PID) field staff working in the sub-project area. During the consultation, information about the sub-project was shared in detail. Consultation was also held with PID officials (Executive Engineer, Sub Divisional Officer and other relevant staff) for design parameters and scope of work of sub-project.PID staff pointed out that the construction of Jhelum City Flood Protection Bund is very essential to control and minimize the flood damages. The subproject will provide safeguard against the exceptionally high flood. This will also reduce the human sufferings and socio-economic effects of floods and will save settlements and infrastructures.

7.4.2 Cut-off Date

186. Field survey was carried out with the local community. The survey was completed on August 10, 2016 and the same date was announced as the cut-off-date.

Table 7.2: List of Government Official Contacted

Sr. No	Name	Designation	Department/Contact No.
1	Mr. Sajid Qudoos	Divisional Forest Officer	Forest Office Jhelum/ 0544-9270032
2	Mr. Sadheer	Sub Div Forest Officer	Forest Office Jhelum/ 0343-5366853 03014610600
3	Mr. Muhammad Nadeem	Agriculture Officer (Technical)	Agriculture Office Jhelum/ 0322-5907633
4	Dr. Irfan Ullah Warraich	Divisional Officer Agriculture	Agriculture Office Jhelum/ 0300-6205841
5	Mr. Asim Bashir Cheema	District Wildlife Officer	Wildlife Office Jhelum/ 0544-9270344

Figure 7.3: Photographs of meetings with Government Officials

8. GRIEVANCE REDRESS MECHANISM

8.1 General

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

8.2 Institutional Arrangement

8.2.1 Management Responsibilities

188. Overall responsibility for environmental management will rest on Project Implementation Unit (PIU) of the Irrigation Department, Government of the Punjab.

i. The Executing Agency: Punjab Irrigation Department (PID)

ii. Supervising and Monitoring: Environmental unit of PIU.

iii. General Assistance to all: Head PIU/The Project Director, Irrigation, above agencies in their Department will facilitate communications, respective tasks logistics and data collection as and when required.

iv. Logistic Support: Head PIU/The Project Director, Irrigation Department shall provide the logistic support and shall be the focal point for the construction activity.

(i) Project Implementation Unit (PIU)

189. The overall responsibility for the implementation of Environmental management/Monitoring Plan rests with Environmental and social unit of the Project Iimplementation Unit (PIU). The Environmental unit onsists of Director Environment & Social safeguard, Deputy Director Environment and Deputy Director Social safeguard.

190. PIU will assume overall responsibility for ensuring that while executing the contract and undertaking the construction all environmental norms, regulations and requirements promulgated by Pakistan Environmental Protection Council (PEPC), Punjab Environmental Protection Act (Amendment 2012)(Environmental Protection Agency (EPA) Punjab and Environmental Safeguard Policy of Asian Development Bank , with respect to the work site and adjacent areas are fully respected and implemented.

191. Overall responsibility for implementation of EMP is to ensure that Contractor and Project Management Consultants appoint a dedicated environmental officer and allied staff.

192. PIU will also ensure that all environmental personnel are authorized to implement the socio- environmental policies and requirements of the EMP. PIU also coordinate with relevant government departments and stakeholders on concerned environmental and social issues, inspect and monitor residual impacts of the rehabilitation work, observe documentation of the impacts during the construction phase and inspect the significance of impact in case of unanticipated change in the project. Project Management Consultants will assist and advise PIU in implementation of EMP, inspect and monitor residual impacts of the rehabilitation work and observe documentation of the impacts during the construction phase and the significance of impact in case of unanticipated change in the project.

(ii) Social & Environment and Social Unit (ESU) of PIU

a. The ESU within PIU will monitor Project performance.

b. The ESU will function in coordination with the Project Management Consultants and will receive reports from them on behalf of PIU.

c.ESU will prepare and submit biannual Environmental Monitoring Reports to ADB.

(iii) Head PIU/The Project Director

193. The Project Director shall provide or arrange the logistics including communication, transport and accommodation to all visiting persons/teams experts from any of the above monitoring units and shall coordinate with the contractor(s) to facilitate the visits/inspections.

(iv) Contractor

194. The Contractor will be responsible for implementation of the project EMP. The Contractor will ensure that EMP for the project is implemented fully and must be integrated into the Project implementation and made integral part of the contract document. For any default/ damages so caused will be remediated by the contractor at his own cost and expenses. In case the contractor fails to rectify the damage the PIU will remediate at the risk and cost of the contractor. The amount will be determined by the Project Management Consultants, which will be adjusted from amount due to the Contractor. The Contractor will develop a Health, Safety & Environment (HSE) Plan and get it approved from Project Management Consultants, before the commencement of the Physical works on site.

(v) Project Management Consultants

195. The Project Management Consultants will be responsible to ensure quality of work and fulfillment of contractual obligations. Environmental Specialist of the Project Management consultants will ensure that all the environmental and social provisions comply with the applicable standards. He/She will confirm that day-to-day construction activities are carried out in environment friendly manner; and periodic environmental training programs organized for the consultant's and contractor's staff. It would be responsibility of the Project Management Consultant to submit monthly environmental report to PIU.

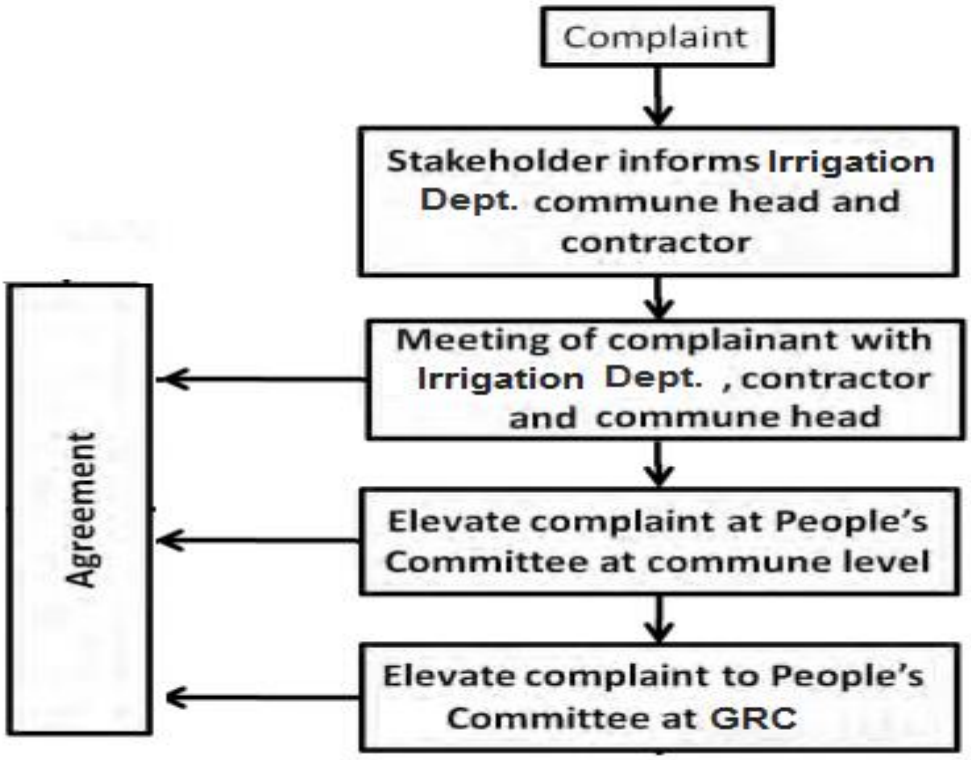


Figure 8.1: Flow Sheet Diagram of GRM

9. CONCLUSION & RECOMMENDATIONS

9.1 Conclusion

196. Based on the preliminary plans, environmental and social field surveys, and impacts assessment of the proposed project, it may be concluded that there are insignificant, short term and reversible impacts of the subproject. The major impacts of the subproject are summarized as under:

- No acquisition of permanent or temporay land will be involved.
- All the other impacts like soil erosion, soil contamination, water contamination, air pollution, high noise level, etc. are of temporary nature and can be controlled and mitigated.
- It is expected that no trees will be cut during the subproject activities. However, 1 % of the project cost will be spent on the new plantation according to Governmentt of Punjab Policy.
- No indigenous people and women headed households have been identified in the subproject.
- The other social issues like safety of general public and workers, security problems, risk of communicable diseases, vector borne diseases etc. are of temporary nature and manageable through good engineering practices and none of these are irreversible.
- A comprehensive EMP has been developed to identify the impacts, mitigation measures, agencies responsible for implementation and monitoring of the proposed measures. EMP also describes the environmental and social monitoring responsibilities of related authorities.

197. In the light of the above discussions, it may be concluded that the proposed preliminary subproject is environment friendly and will cause the least effects on the area's existing social and environmental settings which will be mitigated through EMP.

9.2 Recommendations

198. Although comprehensive mitigation measures have been proposed in the report to minimize the negative impacts and to enhance the positive impacts of the Project, however, major recommended mitigation measures are summarized as under:

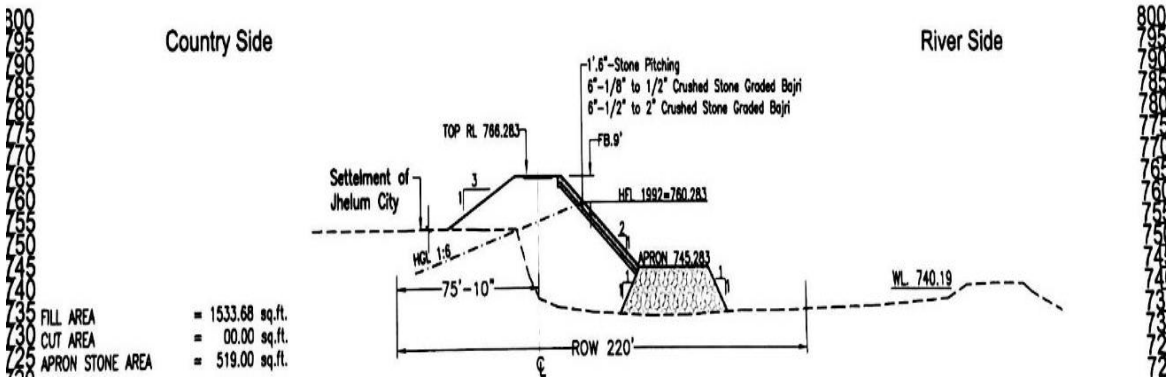
- Temporary labour camps should be developed within Government land and should be facilitated with proper drainage facilities.

- Soil erosion and contamination, water contamination, air pollution and high noise levels should be controlled with the use of good engineering practices.
- Contractor should develop plan such as traffic management, Solid waste management and material management etc. before starting the construction activities.
- Contractor should warn the workers not to hunt the birds, fish resources, etc.
- Contractor should take due care of the local communities and its sensitivity towards local customs and traditions.
- EMP proposed in the report should be implemented in its true letter and spirit.

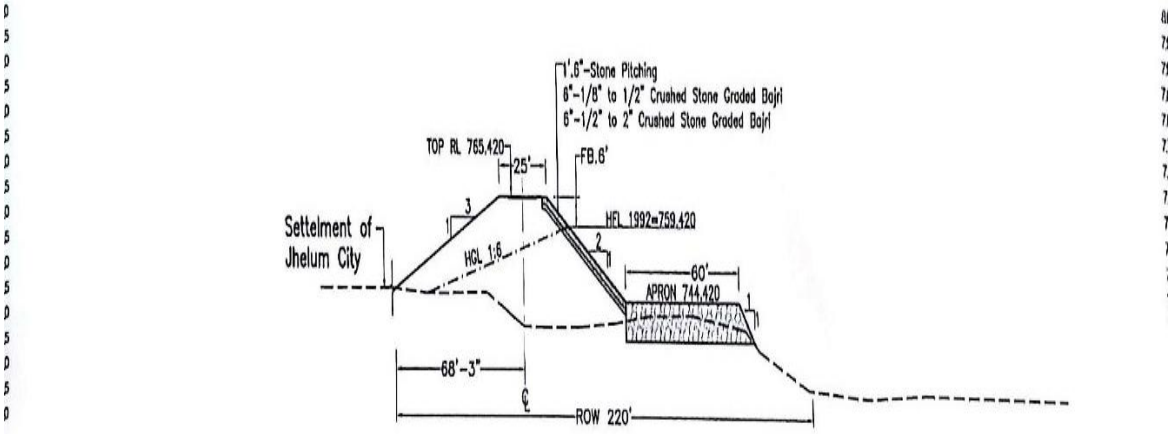
10. ANNEXURES

ANNEX 1 CROSS SECTION DETAIL

JHELUM FLOOD BUND
PACKAGE-I
X-SECTION AT RD 4+500



JHELUM FLOOD BUND
PACKAGE-II
X-SECTION AT RD 12+000



ANNEX II PHOTOLOG

Meeting with DFO Jhelum

Meeting with Agriculture Officer Jhelum

Meeting with Wildlife Officer

Meeting with SDO Irrigation Jhelum

Focus Group Discussions with Locals

Focus Group Discussions with Locals

Focus Group Discussions with Locals

Focus Group Discussions with Locals

Subproject Site

Subproject Site

Subproject Site

Subproject Site

ANNEX III RAPID ENVIRONMENTAL ASSESSMENT CHECKLIST

All the subprojects will be screened through Rapid Environmental Assessment (REA) checklist to determine their environmental categorization. The Flood Emergency Reconstruction and Resilience Project has been categorized as Environment Category B. However, the proposed subproject, "Construction of Jhelum City flood bund on right bank of River Jhelum" is new protection bund having length of 19638 ft that will be constructed and tied up with the old existing bund of 1970 ft to save Jhelum city. The environmental and social rapid screening depicts that: (i) the subproject will not require any land acquisition; (ii) the subproject will not involve any involuntary resettlement; and (iii) the subproject does not fall in any protected area. After review of environmental and social assessment checklist, the sub*-project* is placed under environmental Category 'B' due to new construction of flood bund and lesser/ insignificant environmental and social impacts.

Country/Project Title: Flood Emergency Reconstruction & Resilience Project (FERRP)

Subproject: Protection of Jhelum City from the floods of River Jhelum

Screening Questions	Yes	No	Remarks
A. **Project Siting** Is the Project area adjacent to or within any of the following environmentally sensitive areas?			
▪ Protected Area		✓	
▪ Wetland		✓	Located on right bank of river Jhelum
▪ Mangrove		✓	
▪ Estuarine		✓	
▪ Buffer zone of protected area		✓	Not located in buffer zone of wildlife or forest protected area
▪ Special area for protecting biodiversity		✓	
B. **Potential Environmental Impacts** Will the Project cause…			
▪ loss of precious ecological values (e.g. result of encroachment into forests/swamplands or historical/cultural buildings/areas, disruption of hydrology of natural waterways, regional flooding, and drainage hazards)?		✓	The subproject activities does not encroach into other land. Raw material will be obtained from sites approved by the Engineer.
▪ conflicts in water supply rights and related social conflicts?		✓	
▪ impediments to movements of people and animals?		✓	
▪ potential ecological problems due to increased soil erosion and siltation, leading to decreased stream capacity?		✓	
▪ Insufficient drainage leading to salinity intrusion		✓	

Screening Questions	Yes	No	Remarks
▪ over pumping of groundwater, leading to salinization and ground subsidence?		✓	Limited use of water for sub-project activities which will not be significant
▪ impairment of downstream water quality and therefore, impairment of downstream beneficial uses of water?		✓	
▪ dislocation or involuntary resettlement of people?		✓	No dislocation or involuntary resettlement of people will occur
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		✓	
▪ potential social conflicts arising from land tenure and land use issues?		✓	No land acquisition will be required
▪ soil erosion before compaction and lining of canals?			N.A
▪ noise from construction equipment?	✓		It will be managed through mitigation measures and will be documented in EMP
▪ dust during construction?	✓		It has moderate Impact for labors during construction, but It will be managed by water sprinkling and wet earth. Dust generated will be managed through sound planning and good management practices with implementation of EMP
▪ waterlogging and soil salinization due to inadequate drainage and farm management?		✓	
▪ leaching of soil nutrients and changes in soil characteristics due to excessive application of irrigation water?		✓	
▪ reduction of downstream water supply during peak seasons?		✓	
▪ soil pollution, polluted farm runoff and groundwater, and public health risks due to excessive application of fertilizers and pesticides?		✓	
▪ soil erosion (furrow, surface)?		✓	
▪ scouring of canals?		✓	
▪ clogging of canals by sediments?		✓	
▪ clogging of canals by weeds?		✓	
▪ seawater intrusion into downstream freshwater systems?		✓	
▪ introduction of increase in incidence of waterborne or water related diseases?		✓	

Screening Questions	Yes	No	Remarks
▪ dangers to a safe and healthy working environment due to physical, chemical and biological hazards during project construction and operation?		✓	The subproject does not have usage of any hazards during construction. However, health and safety measures for laborers will be taken to implement HSE Plan that will be developed and documented in EMP
▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		✓	Local people will be employed as much as possible from close by villages/ towns and the same will be documented in EMP
▪ social conflicts if workers from other regions or countries are hired?		✓	Priority will be given to local for employment and the same will be documented in EMP
▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?		✓	Earth work / stone pitching will not lead to any risk for community during construction time, however, Health and safety Plan and Emergency response procedures will be prepared and implemented. The same will be documented in EMP.
▪ community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., irrigation dams) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?	✓		Safety measures for community will be taken to avoid any risk and consequence. It will be documented in EMP. However, It has major positive impact, because the construction of the new bund will save community along with infrastructures from flood threat.

Climate Change and Disaster Risk Questions The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.	**Yes**	**No**	**Remarks**
• Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes.	✓		Subproject area is prone to hazard like flood. The construction of the new bund will save the community/ Jhelum city from high flood threats.

▪ Could changes in temperature, precipitation, or extreme events patterns over the Project lifespan affect technical or financial sustainability (e.g., increased glacial melt affect delivery volumes of irrigated water; sea level rise increases salinity gradient such that source water cannot be used for some or all of the year).		✓	
▪ Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (e.g., high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)?		✓	
▪ Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., by diverting water in rivers that further increases salinity upstream, or encouraging settlement in earthquake zones)?		✓	

Note: Hazards are potentially damaging physical events.

ANNEX IV LIST OF COMMUNITY CONSULTATION PARTICIPANTS

1-Mohalla Peera Ghaib				
Sr. No.	**Name**	**Father's Name**	**NIC**	**Occupation**
1	Muhammad Faisal	Muhammad Khan		Business
2	Iftikhar Ahmad	Muhammad Ramzan		Business
3	Abdul Khaliq	Muhammad Khaliq		Business
4	Muhammad Kashif	Talib Hussain		Business
5	Muhammad Touqeer	Abdul Shakoor		Business
6	Raja Ali Moin	Moin Shabir		Business
7	Qamar Hayat	Raja Khizar Hayat		Labour
8	Raja Asim	Raja Muhammad Khan		Labour
9	Rana Allah Hayat	Umer Hayat		Farmer
10	Sabir Hussain	Akbar Ali		Driver
11	Mulazim Hussain	Muhammad Anwar		Labour
12	Muhammad Bashir	Maqbool Ahmad		Labour
13	Muhammad Jameel	Maqbool Ahmad		Labour
2-Mohalla Suleman Paras				
1	Ch. Nasir Mehmood	Qasim Din Butt	37301-1401433-7	Business
2	Raja Muhammad Aslam	Raja Muhammad Hussain	37301-1852986-7	Labour
3	Raja Muhammad Ishaq	Raja Munshi Khan	37301-2338778-9	Mason
4	Ch. Muhammad Latif	Ch. Sakhi Muhammad	37301-2363454-1	Labour
5	Mumtaz Ahmad	Nizam Din	Not Available	Labour
6	Ch .Manzoor Ahmad	Ahmad Din	37101-2219525-3	Labour
7	Raja Muhammad Jameel	Raja Mufeed Ahmad	Not Available	Driver
8	Ch. Hannan	Tariq Mehmood	37301-1325639-5	Labour
9	Muhammad Arsalan	Shoukat	37301-7535125-9	Labour
10	Haji Muhammad Azam	Raja Munshi Khan	37301-2277523-7	Labour

11	Abdul Majeed	Ch. Abdul Ghani	37301-2210460-9	Labour
12	Muneer Ahmad	Muhammad Din	37301-2244301-7	Business
13	Muhammad Sadiq	Sain Khan	37301-2199811-5	Labour
14	Tasneem Abbas	Haji Muhammad Sharif	37301-6158799-5	Labour
15	Raja Aftab	Muhammad Hafeez	37301-2290526-5	Labour
16	Shakeel Ahmad	Hafiz Bashir Ahmad	37301-0692640-9	shopkeeper
17	Muhammad Hussain	Hussan Muhammad	37301-2203748-7	Govt. Servant (R)
3- Noorpur Sharif (Purana Jhelum)				
1	Muhammad Bashir	Ameer Hussain	37301-6551261-9	Business
2	Muhammad Punno	Sher Muhammad	36501-6858184-5	Labour
3	Muhammad Imran	Bashir Muhammad	Not Available	Labour
4	Muhammad Javed	Channan Din	34603-8774903-7	Labour
5	Nadir Ali	Muhammad Javed	Not Available	Labour
6	Nadir Ali	Zulfiqar Ali	Not Available	Labour
7	Muhammad Waqas	Muhammad Hussain	Don't have ID Card (0340-5114653)	Labour
8	Wasim Ali	Muhamma Javed	Not Available	Labour
9	Muhammad Aamir	Habib Muhammad	Don't have ID Card (0345-7069144)	Student
10	Abdul Rashid	Muhammad Yousaf	37301-0647422-9	Farmer
11	George Masih	Laal Din	37301-2116087-9	Labour
12	Munir Ahmad	Muhammad Sadiq	Not Available	Livestock
13	Muhammad Nasir	Danial	37301-2313725-9	Private Job

List of Female Participants

1-	**Mohalla Suleman Paras**			
Sr No.	**Name**	**Age**	**Education**	**Occupation**
1	Noshabah Saleem	35	Illiterate	House wife
2	Rimshah Hassan	21	B.sc	Student
3	Quart-ul-ain	25	Matric	House Wife
4	Saima	33	Middle	House Wife
5	Mrs. Khaliq	52	Matric	House Wife
6	Fouzia	35	Matric	House Wife
7	Sattar	40	Matric	House Wife
8	Asia	30	Middle	House Wife
9	Shakeela	38	Matric	House Wife
10	Shazia Perveen	35	Illiterate	House Wife
11	Farkhanda	40	Matric	House Wife
12	Sograh Bibi	65	Illiterate	House Wife
13	Arshad Begum	55	Middle	House Wife
2-	**Mohalla Peera Gaib**			
1	Moona Khan	32	Matric	House Wife
2	Shahzadi Khanam	65	BA	Social Worker
3	Khalida	45	Primary	House Wife
4	Lubna Waqas	29	Matric	House Wife
5	Shumaila	27	Primary	House Wife
6	Bushra Bibi	43	Illiterate	House Wife
7	Shahida Sabar	50	Illiterate	House Wife
8	Afshah Durani	36	FA	House Wife
9	Salma	32	Matric	House Wife
3-	**Village Noorpur Sharif (Puran Jehlum)**			
1	Mai Sakena	55	Illiterate	House Wife
2	Zahida Perveen	60	Illiterate	House Wife

3	Sariya Bibi	30	Illiterate	House Wife
4	Kosure Yasmeen	45	Illiterate	House Wife
5	Noora Bibi	40	Illiterate	House Wife
6	Ayesha Bibi	50	Illiterate	House Wife
7	Razaq Bibi	55	Illiterate	House Wife
8	Abida Bibi	35	Illiterate	House Wife
9	Ruksana Bibi	30	Illiterate	House Wife
10	Ghazala Bibi	55	Illiterate	House Wife
11	Nosheen	32	BA	House Wife
12	Lubna	30	Illiterate	House Wife
13	Ales Bibi	90	Illiterate	House Wife
14	Rani Bibi	28	Illiterate	House Wife
15	Shazia Bibi	26	Illiterate	House Wife
16	Mai Phangan	80	Illiterate	House Wife
17	Kosure Bibi	22	Illiterate	House Wife
18	Asia Bibi	30	Illiterate	House Wife
19	Sumera	25	Illiterate	House Wife
20	Sumiya	23	Illiterate	House Wife
21	Sumera	30	Illiterate	House Wife
22	Nasreen Bibi	18	Illiterate	House Wife
23	Ruksana	28	Illiterate	House Wife

ANNEX V NATIONAL ENVIRONMENTAL QUALITY STANDARDS (NEQS),

Table 1: Effluent Discharge Standards (NEQS 2000) Applicable to the Works

Sr. No.	Determinant	NEQS
1	Temperature	40 ^{O}C =≤3 deg.
2	pH	6 – 9
3	BOD5	80 mg/l
4	Chemical Oxygen Demand (COD)	150 mg/l
5	Total Suspended Solid (TSS)	200 mg/l
6	Total Dissolved Solids	3500 mg/l
7	Grease and Oil	10 mg/l
8	Phenolic compounds (as phenol)	0.1 mg/l
9	Ammonia	40 mg/l
10	Chlorine	1.0 mg/l
11	Chloride	1000.0 mg/l
12	Sulphate	600 mg/l
13	Manganese	1.5 mg/l
14	Fluoride	10 mg/l
15	Cyanide (as CN') total	1.0 mg/l
16	An-ionic detergents (as MB As)	20 mg/l
17	Sulphide (S-2)	1.0 mg/l
18	Pesticides	0.15 mg/l
19	Cadmium	0.1 mg/l
20	Chromium trivalent and hexavalent	1.0 mg/l
21	Copper	1.0 mg/l
22	Lead	0.5 mg/l
23	Mercury	0.01 mg/l
24	Selenium	0.5 mg/l
25	Nickel	1.0 mg/l
26	Silver	1.0 mg/l
27	Total Toxic metals	2.0 mg/l
28	Zinc	5.0 mg/l
29	Arsenic	1.0 mg/l
30	Barium	1.5 mg/l
31	Iron	8.0 mg/l
32	Boron	6.0 mg/l

Table 2: National Environmental Quality Standards (NEQS) for Gaseous Emission (mg/Nm^3, Unless Otherwise Defined)

Sr. No.	Parameter	Source of Emission	Existing Standards	Revised Standards
1	2	3	4	5
1.	Smoke	Smoke Opacity not to exceed	40% or 2 Ringlemann Scale	40% or 2 Ringlemann Scale or equivalent smoke number
2.	Particulate Matter (I)	(a) Boilers and Furnaces (i) Oil fired (ii) Coal fired (iii) Cement Kilns (b) Grinding, crushing, clinker coolers and Related processes, Metallurgical Processes, converter, blast furnaces and cupolas.	 300 500 200 500	 300 500 200 500
3.	Hydrogen Chloride	Any	400	400
4.	Chlorine	Any	150	150
5.	Hydrogen Fluoride	Any	150	150
6.	Hydrogen Sulphide	Any	10	10
7.	Sulphur Oxide (2) (3)	Sulfuric acid/ Sulphonic acid plants Other plants except power plants operating on oil and coal	 400	 1700
8.	Carbon Monoxide	Any	800	800
9.	Lead	Any	50	50
10.	Mercury	Any	10	10
11.	Cadmium	Any	20	20
12.	Arsenic	Any	20	20
13.	Copper	Any	50	50
14.	Antimony	Any	20	20
15.	Zinc	Any	200	200
16.	Oxides of Nitrogen (3)	Nitric acid manufacturing unit. Other plants except power plants operating on oil or coal: Gas fired Oil fired Coal fired	 400 - -	 400 600 1200

Explanations:-

1. Based on the assumption that the size of the particulate is 10 micron or more.
2. Based on 1 percent sulphur content in fuel. Higher content of Sulphur will case standards to be pro-rated.
3. In respect of emissions of sulphur dioxide Nitrogen oxides, the power plants operating on oil and coal as fuel shall in addition to National Environmental Quality Standards (NEQS) specified above, comply with the following standards.

Table 3: National Environmental Quality Standards (NEQS, 2009) for Vehicular Emission

Sr. No.	Parameter	Standard (Maximum permissible Limit)	Measuring Method	Applicability
1	Smoke	40% or 2 on the Ringlemann Scale during engine acceleration mode.	To be compared with Ringlemann Chart at a distance of 6 meters or more	Immediate effect
2	Carbon Monoxide (CO)	6%	Under idling condition: Non-dispersive infrared detection through gas analyzer.	
3	Noise	85 dB(A)	Sound Meter at 7.5 meters from the source	

Table 4: National Environmental Quality Standards (NEQS, 2010) for Noise

Sr. No.	Category of Area / Zone	Effective from 1st July, 2010		Effective from 1st July, 2013	
		Limit in dB (A) Leq*			
		Daytime	Night-time	Daytime	Night-time
1	Residential Area (A)	65	50	55	**45**
2	Commercial Area (B)	70	60	65	**55**
3	Industrial Area (C)	80	75	75	**65**
4	**Silence Zone (D)**	**55**	**45**	**50**	**45**

Note:

1. Daytime hours: 6:00 a.m. to 10:00 p.m.
2. Night-time hours: 10:00 p.m. to 6:00 a.m.
3. Silence Zone: Zones which are declared as such by the competent authority. An area comprising not less than 100 meters round hospitals, educational institutions and courts.
4. Mixed categories of areas may be decided as one of the four above mentioned categories by the competent authority.

**dB (A) Leq: Time weighted average of the level of sound in scale "A" which is relatable to human hearing.*

Table 5: National Environmental Quality Standards (NEQS, 2010) for Drinking Water

Sr. No.	Properties/Parameters	Standard Values for Pakistan	WHO Standards	Remarks
BACTERIAL				
1	All water is intended for drinking (E.Coli or Thermotolerant Coliform bacteria)	Must not be detectable in any 100ml sample	Must not be detectable in any 100ml sample	Most Asian Countries also follow WHO Standards
2	Treated water entering the distribution system (E.Coli or Thermotolerant Coliform and total Coliform bacteria)	Must not be detectable in any 100ml sample	Must not be detectable in any 100ml sample	Most Asian Countries also follow WHO Standards

Sr. No.	Properties/Parameters	Standard Values for Pakistan	WHO Standards	Remarks
3	Treated water entering the distribution system (E.Coli or Thermotolerant Coliform and total Coliform bacteria)	Must not be detectable in any 100ml sample. In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12-month period.	Must not be detectable in any 100ml sample. In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12-month period.	Most Asian Countries also follow WHO Standards
PHYSICAL				
4	Colour	≤15 TCU	≤15 TCU	
5	Taste	Non Objectionable/ Acceptable	Non Objectionable/ Acceptable	
6	Odour	Non Objectionable/ Acceptable	Non Objectionable/ Acceptable	
7	Turbidity	<5 NTU	<5 NTU	
8	Total hardness as $CaCO_3$	<500mg/l	---	
9	TDS	<1000	<1000	
10	pH	6.5-8.5	6.5-8.5	
RADIOACTIVE				
11	Alpha Emitters bq/L or pCi	0.1	0.1	
12	Beta Emitters	01	01	
CHEMICAL				
Essential Inorganics		**mg/litre**	**mg/litre**	
13	Aluminum (Al) mg/l	≤0.2	0.02	
14	Antimony (Sb)	≤0.005	0.02	
15	Arsenic (As)	≤0.05	0.01	Standard for Pakistan similar to most Asian developing Countries
16	Barium (Ba)	0.7	0.7	
17	Boron (B)	0.3	0.3	
18	Cadmium (Cd)	0.01	0.003	Standard for Pakistan similar to most Asian developing Countries
19	Chloride (Cl)	<250	250	
20	Chromium (Cr)	≤0.05	0.05	
21	Copper (Cu)	2	2	
Toxic Inorganics		**mg/litre**	**mg/litre**	
22	Cyanide (CN)	≤0.05	0.07	Standard for Pakistan similar to most Asian developing Countries

Sr. No.	Properties/Parameters	Standard Values for Pakistan	WHO Standards	Remarks
23	Fluoride (F)	≤1.5	1.5	
24	Lead (Pb)	≤0.05	0.01	Standard for Pakistan similar to most Asian developing Countries
25	Manganese (Mn)	≤0.5	0.5	
26	Mercury (Hg)	≤0.001	0.001	
27	Nickel (Ni)	≤0.02	0.02	
28	Nitrate (NO_3)	≤50	50	
29	Nitrite (NO_2)	≤3	3	
30	Selenium (Se)	0.01	0.01	
31	Residual Chlorine	0.2-0.5 at consumer end 0.5-1.5 at source	---	
32	Zinc (Zn)	5.0	3	Standard for Pakistan similar to most Asian developing Countries
Organics				
33	Pesticides mg/L	---	PSQCA No. 4629-2004, Page No.4, Table No. 3, Serial No. 20-58 may be consulted	Annex-II
34	Phenolic Compounds (as Phenols) mg/L	**---**	≤0.002	
35	Poly nuclear aromatic hydrocarbons (as PAH) g/L		0.01 (By GC/MS method)	
****PSQCA: Pakistan Standards Quality Control Authority*				

Table 6: National Environmental Quality Standards (NEQS, 2010) for Ambient Air

Pollutants	Time-weighted average	Concentration in Ambient Air		Method of Measurement
		Effective from 1st July 2010	Effective from 1st January 2013	
Sulphur Dioxide (SO_2)	Annual Average*	80µg/m^3	80µg/m^3	Ultraviolet Fluorescence Method
	24 hours**	120µg/m^3	120µg/m^3	
Oxides of Nitrogen as (NO)	Annual Average*	40µg/m^3	40µg/m^3	Gas Phase Chemiluminescence
	24 hours**	40µg/m^3	40µg/m^3	
Oxides of Nitrogen as (NO_2)	Annual Average*	40µg/m^3	40µg/m^3	Gas Phase Chemiluminescence
	24 hours**	80µg/m^3	80µg/m3	
Ozone (O_3)	1 hour	180µg/m^3	130µg/m^3	Non disperse UV absorption method
Suspended Particulate Matter (SPM)	Annual Average*	400µg/m^3	360µg/m^3	High Volume Sampling, (Average flow rate not less than 1.1m^3/minute)
	24 hours**	550µg/m^3	500µg/m^3	

Pollutants	**Time-weighted average**	**Concentration in Ambient Air**		**Method of Measurement**
		Effective from 1st July 2010	**Effective from 1st January 2013**	
Respire able Particulate Matter (PM_{10})	Annual Average*	200µg/m^3	120µg/m^3	ß-Ray Absorption Method
	24 hours**	250µg/m^3	150µg/m^3	
Respire able Particulate Matter (PM_{25})	Annual Average*	25µg/m^3	15µg/m^3	ß-Ray Absorption Method
	24 hours**	40µg/m^3	35µg/m^3	
	1 hour	25µg/m^3	15µg/m^3	
Lead (Pb)	Annual Average*	1.5µg/m^3	1µg/m^3	AAS Method after sampling using EPM 2000 or equivalent Filter paper
	24 hours**	2µg/m^3	1.5µg/m^3	
Carbon Monoxide (CO)	8 hours**	5µg/m^3	5µg/m^3	Non-Dispersive Infrared (NDIR) method
	1 hour	10µg/m^3	10µg/m^3	
**Annual arithmetic mean of minimum 104 measurements in a year taken twice a week 24 hourly at uniform intervals.*				
***24 hourly/8 hourly values should be met 98% in a year. 2% of the time, it may exceed but not on two consecutive days.*				