Environmental Impact Assessment

July 2017

PAK: Jalalpur Irrigation Project

Project No. 46528-002

Part 8 of 9 of the Main Report

Prepared by Irrigation Department, Government of Punjab for the Asian Development Bank (ADB).

Irrigation Department
Government of Punjab

DETAILED DESIGN OF JALALPUR IRRIGATION PROJECT

ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

MAY 2017

CHAPTER-7 STAKEHOLDER CONSULTATION

7.1. Introduction

393. The basic purpose of conducting the stakeholder consultation was to involve the key stakeholders and locals into the process of Project design and to incorporate the appropriate environmental and social concerns into the process. Moreover, Pak-EPA's IEE/EIA Regulations specify that the stakeholder consultation process shall be an integral part of environmental assessment, and thus makes it mandatory. This Chapter presents the details of the stakeholder consultation process carried out for the proposed Project. Consultations which were initiated at the Project preparatory/feasibility stage for the EIA were continued at the detailed design stage.

394. Stakeholders of the Project were identified, categorized and accessed at selected federal, provincial, district and village levels (including those who will be directly and indirectly affected by the Project). Frequent meetings and consultations were held with the community, Project Affected Persons (PAPs) and other stakeholders' *vis-à-vis* PIDA, Pakistan Railways, Forest, Highways, Agriculture, Wildlife, Local Government Representatives, Local Welfare Societies, Non-Government Organizations and community influential personnel. During the meetings, the Project objectives and potential positive and adverse impacts were explained to the participants. Their concerns and suggestions were documented and addressed wherever applicable and to enhance the Project acceptability among stakeholders. During field visits, a series of public consultations and scoping sessions were carried out at various locations in two rounds (first at feasibility stage and second at detailed design stage) in the Project Area.

7.2. Objectives

395. Basic objective of this activity was to have on board the PAPs, related Government institutions and interested NGOs through:

- Informing stakeholders about the proposed Project;
- Creating awareness about the project including its impacts;
- Ensuring their support for the Project;
- Rapport building with PAPs;
- Involving them in the process of determining the right direction for area development;
- Explain them the requirements of PEPA- 1997 and ADB's SPS 2009;
- Providing an opportunity for the public to influence the Project design; and
- Increasing public confidence in the Project, its proponent, reviewers and decision-makers.

7.3. Project Disclosure

396. ADB's Environmental Safeguards require the engagement of community and institutions. Disclosure of relevant information about the proposed project and its potential impacts will help stakeholders to understand the impacts, risks and opportunities of the project.

397. Consultation with PAPs is, therefore, the starting point for all these activities to allay misgivings and apprehensions about the Project and elicit their acceptability, to ensure their participation in planning and implementation and provide them with opportunity to participate in key decisions of the Project that are likely to affect them.

7.4. Stakeholders Identification

398. The approach adopted by the Consultant consists of the following steps:

Step 1– Preparing list of the various resources (natural and otherwise) within the AOI or in close proximity of proposed Project area e.g. drinking water resources, agricultural lands, other types of lands, infrastructure, urban facilities, transportation facilities, forest etc.
Step 2 – Developing list of the functions and uses of each resource.
Step 3 – Identifying the groups and actors that have a stake/share in any of the functions or use of the various resources. For identification, following questions were asked.

- Who uses/provides the resource(s)?
- Who benefits from the use of the resource(s)? Who wishes to benefit but is unable to do so?
- Who impacts on the resource(s), whether positively or negatively?
- Who has rights and responsibilities over the use/provision of the resource(s)?
- Who would be affected by a change in the status, regime or outputs of proposed project area and its management?
- Who makes decisions that affect the use and status of the resource(s), and who does not?

399. These questions were answered using field observations, discussions with key persons, literature reviews and personal experience.

400. In doing Step 3, it emerged that a number of the same stakeholders (groups) are relevant for a number of the functions and uses. This allowed the Consultant to begin to see the interconnected groups and stakeholders that have an important stake in the site or area. The identified stakeholders at all levels with whom consultations were initiated, are as follows:

Federal and Provincial Level Stakeholders

Environmental Protection Department (EPD), Punjab;
Irrigation Department, Punjab;
Agriculture Department, Punjab;
Forest Department, Punjab;
Fisheries Department, Punjab;
Wildlife Department, Punjab; and
Archaeology Department, Punjab.
Pakistan Railways

District Level Stakeholders

Executive Engineer, LJC Rasul Division, Irrigation Department (Punjab);
Environmental Protection Department (EPD), Punjab District Jhelum, Mandi Bahauddin and Khushab;
District Administration
Town and UC Administration;
Social Welfare Department;
Agriculture Department;
Forest Department;
Fisheries Department;
Wildlife Department;
Archeology Department;
Livestock Department
Academia; and
Irrigation Department.

Village Level Stakeholders

PAPs and local communities within the RoW;
Community Based Organizations (CBOs)

Consultation with local MPA;
Farmers; and
All settlements/villages within the RoW of Canal

Industries and NGOs

NRSP (NGO);
Dandot Cement Works;
Gharibwal Cement Factory;
ICI Khewra;
Shirkat Gah Women Resource Center (NGO); and
World Wide Fund for Nature (WWF)

401. The list of stakeholders in terms of relevance to the information of resource is provided in the **Table 7.1** below;

Table 7.1: Identification of Stakeholders

Resource	Stakeholders
Forest	Environmental Protection Agency
	Nature Conservation NGOs, Academia
	Forest Department
	Wildlife Department
Waterways	Irrigation Department
	Fisheries Department
	Local Communities (fishermen)
Infrastructure / Fixtures	Pakistan Railways
	Provincial Highways Department
	WAPDA
	District Administration DCO
	Local Administration/Tehsil Municipal Administration (TMA)/Assistant Commissioner (AC)
	Community at large
Land	Local Communities in Agriculture and Related Business
	Land Revenue Department
	Pakistan Railways
	Agriculture Department Govt. of Punjab
	Irrigation Department
	Livestock Department
Crops and Vegetation	Provincial Forest Department
	Agriculture Department
	Irrigation Department, Livestock Department
	Local Communities
Access Roads	Local Communities
Live Stock	Local Communities, Livestock Department
Potable water	Local Communities
	Public Health Engineering Department

Resource	Stakeholders
Fire Wood	Provincial Forest Department
	Community at large
Overall Issues & Benefits	Local Communities (through their parliamentary representatives)

7.5. Stakeholders Analysis

7.5.1. Identification of PAPs

402. The project will impact a large number of households falling in the RoW of the main canal and its distribution system. To minimize the project impacts on land and structures, design was reviewed twice in the favour of local communities and to avoid villages, sensitive assets and properties like graves, mosques, temple, large settlements and graveyards etc.

403. As a result of change in design or alignment, a significant project impact was minimized. Nevertheless, about 5,000 farmers will lose their lands while about 225,000 rural people will be benefitted from the proposed project. The project will support the agriculture sector resulting improvement in socio-economic status of local communities. The land acquisition is in process in accordance with Land Acquisition Act (LAA), 1894 for the notification of Section-IV. After issuance of Section-IV, the exact PAPs will be categorized according to their distribution in command area and project RoW.

7.5.2. Organization and Composition

404. Typically, stakeholder consultation is done to manage the resources. Therefore, most literature on the topic suggests classifying and categorizing them, so that more focus could be paid to the more important entities.

405. For this project, the stakeholders can be classified into two broad categories; i.e. Internal stakeholders who have some form of legal contract (in any form or at any level) with the proposed project (the project proponents), and External stakeholders who are made up of other individuals, groups or parties that have an interest in the Project but are not contractually obligated in any way or form.

406. The approach adopted by the Consultant for identification and classification of the project stakeholders is based on a tailored form of Winch Matrix. This approach is being used for its simplicity, and its relevance with the situation at hand. The consultants first developed a blank format of a matrix containing eight cells. For the internal stakeholders, the cells are based on the type of envisaged relationship (supply/demand), and the potential of influence (Direct/ Indirect stake). For the external stakeholders, the cells are based on stakeholder origin (public / private) and again on their potential of influence. Once the matrix structure is created, each cell is filled with potential stakeholders' names. **Table 7.2** maps and classifies the envisioned JIP Project stakeholders.

Table 7.2: Classification of Project Stakeholders

	Internal Stakeholders		External Stakeholders	
	Demand	***Supply***	***Public***	***Private***
Direct stake / Primary Stakeholder	Local Community, PIDA	EPA Agriculture Department, Forest Department	Land & revenue Department, Town/Union Council administration	Fishermen and Farmer of the area; Other communities living or doing business in the

				area
Indirect stake / Secondary stakeholder	Broader Community	Service Providers for this Project (technical vendors, labor force, consultants) ADB and other project financiers	Fisheries Department, Wildlife Department, Livestock Department	NRSP/ Akhuwat Consumers of the Project output

7.6. Consultations during Feasibility Stage

7.6.1. First Round Consultation with Institutional Stakeholders

407. Besides consulting with the people living in or around the sites that are potentially affected by the Project, the consultants also met the major institutional stakeholders, including the Government line departments and the NGOs working in the area at the Project preparatory/ feasibility stage and at the detailed design stage. The Project design team facilitated the consulting team by sending out a letter to all concerned departments, and also helped in getting appointments.

408. Brief account of the discussion during these meetings at the Project preparatory/ feasibility stage is given below:

a) Mr. Imran Raza Abbasi – Additional District Collector, Jhelum

409. The EIA team met Mr. Abbasi in his office on 27th of July, 2015 at feasibility stage. Main ideas shared by him are listed below:

- As far as Jhelum district is concerned, the proposed Project seems to be a public welfare project. It is expected to bring benefits in terms of irrigation water and flood protection;
- The public hearing for the Project should be genuinely conducted. Area people must be apprised of the project beforehand, as much as possible. Some recent projects have faced hindrances due to public outcry during the public hearing, which in turn was a result of insufficient public consultations;
- Public hearing should be conducted at a local place, with room for large audience. TMA or AC office could help in this regard;
- Water user rights will be a key issue. The proposed canal is roughly perpendicular to the surface run-off directions; and
- Address land acquisition and concerns of small land holders. Compensation for all private lands should be judicious and timely.

Figure 7.1: Meeting with Additional District Collector Jhelum at Feasibility Stage

410. Mr. Abbasi inquired about the scope of EIA and relevance of various Departments as stakeholder for this Project. The EIA team responded that Irrigation and Forest Departments are the main stakeholders, besides other departments like wildlife etc. The commissioner office and tehsil administration is a stakeholder, even for EIA, as it will be needed in case there is any issue in smoothly conducting the requisite surveys. Mr. Abbasi advised the team to coordinate with local administration, and inform him if there is a need of any support.

b) Mr. Ali Ejaz – District Environment Officer - Jhelum

411. The EIA team met Mr. Ejaz, District Environment Officer (DEO) in his office on 27th of July, 2015. Team briefly explained the proposed project to Mr. Ijaz. He took special interest in the locations of various industrial units and infrastructure along the proposed route of the canal.

Figure 7.2: Consultation with District Environment Officer Jhelum at Feasibility Stage

412. Main ideas shared by DEO Jhelum are listed below:

- The DEO pointed out that water becomes stagnant in many parts of the area, especially from Khewra to tail end. This issue must be accounted for while designing the canal. He feared that this problem might be accentuated due to underground seepage of water from canal, thereby making the surface runoff even more difficult to percolate;
- DEO suggested that if the flood water channels are properly established, it will not only resolve the issue of water stagnation, it will also benefit the proposed canal by eliminating any potential mixing of large amounts of saline flood waters with the canal water;
- On a query about the Nullah crossing structures, the Consultants informed that proper passages will be provided in the detailed design to ensure that rain and flood water passes through without any problem;
- He strongly recommended that the proponents must embark upon an extensive Tree plantation scheme in collaboration with the Forest Department, once the Project construction is completed; and
- DEO advised the Consultants to study the possible Impacts on wildlife, especially *Urial*, if canal is constructed.

c) Mr. Mumtaz Ahmed – Sub-Divisional Officer (SDO) – Provincial Highways Jhelum

413. The Consultants team comprising Mr. Kashif Masud and Ms. Rukhsana Shahid met Mr. Mumtaz Ahmed (SDO) in his office on 28th of July, 2015. Consulting team briefly explained the proposed Project to him with the help of maps and other relevant documents. Main information shared and concerns raised by SDO are given below:

414. The Highways Department takes this Project as a positive intervention, and therefore, fully supports it.

Figure 7.3: Consultation with SDO Provincial Highways Jhelum at Feasibility Stage

415. For all highway crossings, the Project proponent will need approval from the provincial Highway Department. Chief Engineer of Punjab Highway Authority will provide approval. For approval application will be submitted to SDO of the particular area. The SDO will forward the application of Senior Engineer from where the application will be forwarded to Chief engineer for final approval.

d)	**Mr. Sajid Quddus Awan**	**Divisional Forest Officer (DFO), Jhelum**
	Mr. Tanweer Janjua	**District Wildlife Officer, Jhelum**
	Mr. M. Sualeh	**Range Forest Officer, Pind Dadan Khan**
	Mr. S. M. Yousuf	**Assistant Director, Fisheries, Jhelum**
	Mr. M. Hanif	**Inspector Fisheries, Jhelum**
	Mr. Zafar	**Block Officer Forest**
	Mr. Waqas Karim	**District Wildlife Office, Jhelum**

416. This meeting was held on 28th of July 2015. The consulting team in this meeting included Mr. Rafi ul Haq and Mr. Ibad ur Rehman. This meeting was pre-coordinated; however, to avoid duplication and keeping in view of relevance, the office of the Divisional Forest Officer (DFO), Jhelum was requested to host a Joint meeting by inviting District Wildlife and Fisheries officials, to discuss the ecological sensitivities of JIP.

417. The meeting was chaired by Mr. Sajid Quddus Awan, DFO, Jhelum. It started with a quick round of introduction by the participants.

418. The Consultant gave a brief to the participants on JIP and its spread in the area on a map developed based on the information and field visit of Consultants in the Project Area. The Project Area was fragmented into different zones based on physiographic characters and for better understanding.

Figure 7.4: Meeting with Forest, Wildlife, Fisheries Officials at Feasibility Stage

419. The DFO, Jhelum informed the NEC team about Punjab Forest Act 2010, which has a clear guidance on dealing with the developmental projects, he further referred the map of JIP shared with their office also showing the command area of JIP, spread over 68,000 ha, to be dealt as per departmental policy defined in Punjab Forest Act 2010, and any encroachment outside the defined boundary would be considered as violation.

420. The participants of the meeting representing Forest, Wildlife and Fisheries departments of Jhelum district appreciated the briefing, the general feeling was to know the bench mark of the developmental initiative and the detail dimensions of structures to be built, they show their concerns about how the Project planned to deal the erosion from the mountains, they gave their specific response as follows:

Forest Department

421. The Department informed that the Project is likely to interface the forest jurisdiction in two aspects: 1) the forest department has roadside plantation starting from Misri Mor to Pir Chuk (Jalalpur Shrif) (Protected Forest); 2) the probability of canal crossing the motorway (near Lillah interchange) falling in forest land (Simbli South). The latter needs to be verified through geographical coordinates to be shared by the department.

Wildlife Department

422. There is no protected area within the JIP AOI, however, the mountain range adjacent to JIP is the breeding ground of *Punjab Urial*, and there is an estimated population of over 3,000 heads in the adjacent range. It was also mentioned that department in collaboration with local CBO's is engaged in trophy hunting program.

423. They also mentioned that in drought season, it has been reported that few animals reach the river bank to drink water, they showed their concern about any imminent obstruction on the access for the animals to reach the water source in odd seasons.

Fisheries Department

424. The department has a different information or perhaps misconception about the initiating point of JIP, which would be connecting with Rasul barrage, they understand that the connecting channel has been designed over the adjacent fish ponds (Storage Dams of Rasul Barrage), located on the right side of the road, while going toward Jalalpur sharif from Rasul barrage. The district fisheries department uses this water to stock fish seed and auctions them in August for harvest. This was clarified by the Consultants that those ponds are not in the designed plan of JIP.

425. The department also auctions angling rights in the season, which starts from August, and they have concentrated activity downstream along the river bank. They showed their concern about the loss in opportunities for the department, in case of limited or access to presently used angling areas.

426. There were some suggestions shared by the participants to reap the maximum benefits from JIP as listed below:

- In-time integration of line departments in JIP, for aligning their departmental processes (Managing NOC's) and developmental programs (Initiating PC1 for canal side plantations);
- Identification of frequent routs used by *Urial* in odd season to reach the river bank; and
- Identification of opportunities for fisheries department for income generation in compensation to the opportunity likely to be compromised.

427. For supporting the consulting team in their current assignment, the DFO Jhelum and his team very kindly consented to accompany the Consultants to JIP area at 14:00 hrs on the same

day. The trip concluded at Kalar Kahar around 20:30 hrs.

e) Mr. Zia ur Rehman – District Coordination Officer (DCO) Khushab
Mr. Atif Raza – Additional District Collector (ADC) Khushab
Mr. Rana Muhammad Hussain – Assistant Commissioner (AC) Khushab
Executive Engineer (XEN), Irrigation Department, Khushab

428. The consulting team met Mr. Zia ur Rehman (DCO) in his office on 29th of July, 2015. Mr. Zia ur Rehman had also summoned ADC Mr. Atif Raza, AC Mr. Rana Muhammad Hussain, and Executive Engineer (XEN) to attend the meeting. EIA team briefly explained the proposed Project to them with the help of maps and other relevant documents.

429. The Khushab Administration team welcomed the development of the area through this Project. However, the development should also take into account the sensitivities of indigenous ecosystem, and should not result in unsustainable harvesting of any natural resources.

430. They informed the EIA team that various forms of this Project have been in discussion since very long. After rejection of other alternatives for irrigating the area on technical grounds, a canal is in planning since 1948.

Figure 7.5: Meeting with DCO, ADC, AC, XEN Khushab at Feasibility Stage

431. The EIA team explained that Khushab tehsil lies at the tail end of the proposed command area. The DCO and his team informed that the identified area is low lying, and a mix of Barani and canal fed. They hoped that the proposed Project would greatly improve the agricultural productivity of the entire area, as the soils are good and only consistent water supply is needed to enhance agricultural performance.

f) Mr. Malik M. Ilyas – District Officer (DO) Agriculture Jhelum

432. The EIA team met Mr. Malik Ilyas in his office on 30th of July, 2015. The EIA team briefed him about the Project. The DO pointed out that though a major portion of land in the proposed command area is currently saline, these are washable salts. He opined that once the canal is operational, its flushing effect will improve the ground water quality also. He lamented that currently the cropping intensity is quite low in Kharif at 10 to15%. It improves a little in Rabi and reaches up to 30%. However, there is a big room for improvement. He informed that due to low productivity, the area people are also not giving due importance to cultivating their lands. In fact, some of the people have also sold their lands to invest the amount in other pursuits.

433. The DO mentioned that the management of flash floods will be a key concern and should be considered in design. On the question of potential grazing activity on the currently uncultivated land, he was of the opinion that with improved agricultural productivity, fodder could

be much easily available in and around the farmed lands, and hence grazing utility of fallow lands should diminish with the project.

Figure 7.6: Consultation with DO Agriculture at Feasibility Stage

g) Mr. Rana Farooq — DFO, Khushab
Mr. Malik Khalid — District Wildlife Officer, Khushab
Mr. M. Tariq — DFO – Gujrat (Ex DFO Khushab)

434. This meeting was pre-coordinated; however, to avoid duplication and keeping in view of relevance, the office of the DFO, Khushab was requested to host a Joint meeting by inviting District Wildlife officer- Khushab, to discuss the ecological sensitivities of JIP. The meeting took place on 30th of July 2015.

Proceedings:

435. The meeting was coordinated and led by Mr. Rana Farooq, Divisional Forest Officer, Khushab after a short introduction.

436. The Consultants gave a brief to the participants on JIP and its spread in the area on a map. The Project Area was fragmented into different zones based on physiographic characters and for better understanding. Khushab occupies some 5% of JIP.

Figure 7.7: Meeting with DFOs and Wildlife Officer Khushab at Feasibility Stage

437. After a careful review and analysis, the forest department Khushab, did not find any of its stake compromised in JIP in terms of its jurisdiction. The wildlife office of Khushab, stated that no wildlife sanctuary or game reserve lies in JIP defined area in Khushab, therefore in short, no concerns notified by these departments in Khushab district.

h) Mr. Yousuf Chhahal - Executive District Officer (EDO) Agriculture Khushab

438. The meeting with Mr. Chhahal took place in his office on 31st of July 2015. After the briefing on project by the consulting team, Mr. Chhahal gave valuable ideas and suggestions. The main points of his deliberations are given below:

- Runoff from salty mountains must be channelized and disposed of in Jhelum River;
- Canal will regenerate the ground water and situation of salinity will be better;
- As per the EDO, channelization of runoff from salty mountain is essential otherwise the project will not be feasible;
- Project will enhance the lifestyle of project area population;
- Proper drainage system should be provided with irrigation system hence area current water logging will be improved;
- Underground water from Daiwal onwards in Khushab will improve; and
- Maize & Potato at Pinanwal have very high production.

Figure 7.8: Consultation with EDO Agriculture Khushab at Feasibility Stage

i) Mr. Chowdhary Muhammad Ashraf – AC Pind Dadan Khan
Mr. Nazar Muhammad Gondal – Member Provincial Assembly (MPA) Pind Dadan

439. The meeting with Mr. Ashraf took place in his office on 31st of July 2015. Upon his request, the area MPA Mr. Gondal also joined the meeting. After the briefing on Project by the EIA team, both gentlemen gave valuable ideas and suggestions. The main points of their deliberations are given below:

Figure 7.9: Consultation with AC & MPA Pind Dadan Khan at Feasibility Stage

- Some sensitive installations are located close to Jalalpur. This is a restricted area, as per GoP, therefore, project boundaries should remain outside the limits of sensitive area;
- ICI Soda Ash Plant ponds has salinity impacts up to Dafar village;

- Wells installed at Jhelum river to provide water to Khewra & ICI also have brackish water when the flow in Jhelum river is low (March & April);
- Old canal could be aligned with new irrigation network – the old canal covers 10-15 villages in the area;
- Runoff drains coming from mountains should be channeled properly to Jhelum River;
- If possible provide provision of flood water accommodation in the Jalalpur irrigation network.;
- Maximum area should be irrigated;
- Underground water considerations to be taken into account while finalizing the alignment;
- A new city is planned close to Lillah interchange. The proposed canal might in future provide support to new city water supply;
- There is a new Coal Fired Power plant planned in Pind Dadan Khan. It's water requirement 12 cusec/day;
- Design the canal on maximum gradient to cover the upstream area; and
- If possible design the canal for full year.

j) Mr. Asjid Mirza Divisional Engineer – I, Pakistan Railways
Mr. Mateen Ahmed Divisional Engineer – II, Pakistan Railways

440. The meeting took place in the office of Mr. Asjid Mirza in Rawalpindi on 3rd of August 2015. Mr. Mateen Ahmed was also present in the meeting. After personal introductions, the EIA team briefed the Pakistan Railway officials about the Project. The Pakistan Railway people informed that Pind Dadan Khan to Khushab branch line of PR is currently non-operational. However, the Project proponent will need an NOC from PR wherever there is any crossing of railway track, irrespective of whether the track is operational or otherwise. The Divisional Engineers informed that currently, railway traffic is operational on following two sections:

- Pindi – Lala Musa – Malik wall – Haranpur – Pind Dadan Khan (Passenger Transport); and
- Pind Dadan Khan – Malakwal – Sargodha – Faisalabad (Goods Transport).

Figure 7.10: Consultation with Pakistan Railways at Feasibility Stage

441. Goods traffic is more profitable after commencement of Gharibwal cement which takes in coal and sends cement. PR is also planning to revive railway traffic to Khushab in future.
The procedure for approval of railways crossings by the proposed canal (or distributaries) is given below:

- Irrigation department applies to railway department;
- Technical design of bridge will be submitted to railways;
- Temporary line charges;
- Design vetting by third party;
- 1-2 years for approval;
- All crossings will be dealt separately; and

- Governing statute is Railways Act 1890.

442. It was suggested that since separate approval will be needed for each crossing, the proponents should go for approval of active line first.

k) Mr. Malik Naseer Ahmed – Director (Projects) Pakistan Agricultural Research Council

443. This meeting took place in PARC building Islamabad on 3rd August. Mr. Naseer Ahmed deliberated upon the following points:

- Fruit trees such as Dates, Guava, Jamun could be very suitable in the Project Area;
- Plantation at the hill side will stop saline water to spread in Project Area;
- Wastewater of ICI – industry continuously destroying the land owing to location at upstream;
- PARC is planning a Bio-saline agriculture project in similar areas;
- Kinno farms at foot hills with active involvement of NRSP & Sargodha University;
- Inhabitants have started migration;
- Salt resistant crops can be grown; and
- Bio remediation is available for ICI wastewater.

Figure 7.11: Meeting with Director Project PARC at Feasibility Stage

l) Mr. Nawabzada Iqbal Mehdi – Member National Assembly (MNA - NA 63)

444. Nawabzada Iqbal Mehdi has been the parliamentary representative of this area for almost 30 years. He drew the attention of EA team to a number of pertinent issues that are to be considered while finalizing the Project.

Figure 7.12: Meeting with MNA at Feasibility Stage

- Project (JIP) in papers since 1903 and still nothing done on ground;
- Pind Dadan Khan is worse affected area from salinity point of view;

- Seepage will affect groundwater quality and the report should spell out salinity issues related to water;
- In rainy season water demand reduces to 15% to 20%;
- Tehsil Pind Dadan Khan only ⅓ area covered by the Project;
- Operation of Rasul barrage reduces the flow in Jhelum River;
- ICI evaporation ponds are polluting the area and have increased the salinity in the area as the ponds are not lined; and
- Open pit mining also damaging the area in term of salinity & erosion.

m) Mr. Tahir Qureshi –IUCN

445. The EIA team met Mr. Tahir Qureshi in his office in Karachi on November 03, 2015. Mr. Qureshi is amongst the most senior professionals working for IUCN. The purpose to meet him was to confirm the validity of the positive perceptions about the project benefits shown by the people of Project Area. EIA team briefly explained the proposed project to them with the help of maps and other relevant documents.

446. Mr. Qureshi has been working on the various themes of environment since a very long time and is well versed with the ecosystem sensitivities of Pakistan.

Figure 7.13: Consultation with IUCN at Feasibility Stage

447. Mr. Qureshi was of the view that the wildlife in general, and *Punjab Urial* in particular, is not likely to be found in the proposed JIP Project Area due to it being an anthropologically active settled area. There might be sporadic wandering incidents however, during draught conditions. In his opinion, if the natural routes for the animals from the hills to watering holes are not interfered with, the Project is not likely to have any adverse impact on biodiversity. On the other hand, if the scope of agriculture increases in the area, it might lead to reduced pressure on the surrounding forest resource.

n) Dr. Masood Arshed –WWF , Lahore, Pakistan

448. After personnel introduction, Dr. Masood Arshad, Director Climate, Energy and Water WWF-Pakistan was briefed about the proposed JIP Project. It was stated that two protected areas namely Jalalpur Wildlife Sanctuary and Rasul Barrage Game Reserves are located at fair distance from proposed canal Project. There is no chance of any negative impact on the ecosystem of these protected areas from the construction activities. It was further told that *Punjab Urial*, a key wildlife species of Salt Range, is found on small hills opposite to the proposed regulatory head for Jalalpur Irrigation System. The animals walk down the hills during dry season to drink water from water points at Jhelum River. Dr. Masood stated that endemic *Punjab Urial* is classified as vulnerable by IUCN and is protected under provincial laws. Its distribution is not uniform throughout the Salt Range but it flourishes in some isolated pockets.

Figure 7.14: Consultation with WWF-Pakistan at Feasibility Stage

449. He appreciated the assessment team that these pockets of *Punjab Urial* in Salt Range have been identified using GIS map developed by WWF – Pakistan. He was also briefed about the proposed mitigation plan keeping in view of all the phases of the Project (construction and operations). He offered his full institutional support if required at any point.

7.6.2. First Round of Community Consultations

450. This activity was initiated by the Consultant at the Project preparatory/feasibility stage during June and August 2014, and in February 2015 along with the socio-economic survey.. The consultation was done through meetings held in 30 villages. Mostly people who were consulted included village elders, school teachers/government employee living in a particular village, or owner of a reasonable size of land. All the villages which were consulted, are located in the Project area i.e. both in Pind Dadan Khan and Khushab Tehsils. Besides contributing to the EIA, the mentioned activity resulted in a comprehensive "Initial Poverty & Social Assessment" report carried out at the Project preparatory/feasibility stage. The IPSA report covers poverty analysis, social profile, gender survey and public concerns regarding the project. it has separately been submitted to ADB and other relevant entities. However, LARP has been updated along with EIA as the companion document during the detailed design of the JIP.

451. During field survey performed at the Project preparatory/feasibility stage, the Consultants discussed the basic requirements of Project with the local residents and got their views and perceptions about this Project. Following opinions were shared by the people of respective areas:

- Local residents have a very encouraging opinion regarding this activity, they are very positive about the project as they assume that it will provide not only water for irrigation purpose but will also improve their quality of life, livelihood, live stocks, and infrastructure like roads etc;
- Total twenty villages were visited for initial social assessment. Respondents of nineteen villages (95%) opined that the proposed Project will be highly beneficial for the area. The respondents of only one village (Chitti) reported that the project will have limited utility, because in that area, farmers had installed their private tube wells to irrigate their lands. However, they supported the project perceiving that water will be available at cheaper rate and they would save reasonable amount being spent on tube wells fuel etc. which can be spent on the education of their children or to enhance the cultivated area and agricultural production;
- Another ten villages were surveyed to identify gender issues, and to get information about the perceptions of female population. All the female respondents of ten villages were satisfied with the proposed Project except one female respondent. They thought that the project will bring a major social change to the area in general, and to the farming community in particular. The disagreed case was reported in Pinnanwal village. She was non farmer and was annoyed with farmers' community due to their mal-attitude;

- Some people had shown concerns regarding design and alignment of the main canal. They thought that shifting it further above towards mountain will benefit more lands;
- Most of the villagers from the area raised their concerns about the high water table, and saline underground water;
- Some people showed their interest in the rehabilitation of existing structure like an old canal from Jhelum River close to proposed distributary – 2; and
- Many people showed their concerns about the implementation of the project. They were skeptic about the performance of Government departments, and said that already many plans were made but nothing on ground took place.

7.6.3. Public Consultation Workshop

452. Two consultative workshops were organized one in October 2014 and another in August 2015 at the Project preparatory/ feasibility stage.

453. The Workshops were attended by over 50 participants from the following relevant departments, NGOs, private sector and beneficiaries:

- Punjab Irrigation Department (PID);
- On-Farm Water Management and Agriculture Extenson directorates of Punjab Agriculture Department;
- Agriculture Service Provider;
- National Rural Support Program (NRSP);
- Local Community Organizations;
- Farmers of the project area; and
- International Center for Agricultural Research in the Dry Areas (ICARDA) consultants.

454. It was concluded in the workshops that:

- Regarding historical perspective of this project, the farmers were somewhat having a view that this canal may not after all be constructed once again. However, the Consultants and the government officials assured them that this time this would not be the case;
- Water shortage and seepage are some of the major problems in the area. In some areas water table is very high for which steps like lining the canal was recommended;
- Training programs for farming communities in new agricultural and water management practices and technologies should be organized. This can be done through lectures, films, videos, farmers field schools, and demonstration projects;
- Steps should be taken to ensure that pollution of water bodies and good agricultural lands by effluents from nearby industries is controlled by enforcing existing legislation under the Environmental Protection Act; and
- There was some disagreement on who is to operate and maintain the irrigation systems and water distribution. However in lined water courses areas the consensus was that the KPs may operate and maintain the irrigation systems at Watercourse level while the main irrigation system should be left to the Government.

455. Detailed Proceedings and Photographs of the workshops are attached as **Appendix-XI** of this report.

7.7. Consultations during Detailed Design Stage

7.7.1. Consultation with Institutional Stakeholders

456. As mentioned above, the Environment team has conducted the second stage Stakeholder's Consultation during detailed design with relevant departments. During the field visits in December 2016, January and February 2017, Environment team has consulted again with all the government departments, NGOs, in District Jhelum, Distrcict Mandi Bahauddin,

District Khushab, Project area, including those which were consulted at feasibility stage as well, to get their views/concerns for the proposed Project. **Figure 7.15** shows the consultations carried out with DFO and DO Environment Jhelum. **Figure 7.16** shows the record of consultation with DFO and DO Environment Khushab.

Figure 7.15: Departmental Consultation with DFO and DO Environment at Jhelum

Figure 7.16: Departmental Consultation with DFO and DO Environment at Khushab

457. Table 7.3 below presents the details of consultations including stakeholders name/department, their concerns and redressal by EIA team.

Table 7.3: Details of Institutional Stakeholder Views/Concerns and Redressal

Sr. No.	Departments	Stakeholder Views/Concerns	Redressal
1.	Divisional Forest Officer, Jhelum	Well aware about the JIP and mentioned that the Thill Sharif Forest is in vicinity.	Proposed Project is in planning since long. Thill Sharif is unclassed forest and out of the Project's AOI.
		Bio-engineering techniques should be applied for the main Canal slope stabilization because of sandy loom soil of the area.	Tree plantation is proposed on the banks of the River.
		Plantation should be carried out within the RoW of the Canal and maintained properly and must be monitored periodically.	Tree plantation will be carried out within the RoW of the Canal and will be looked after by the Irrigation Department in collaboration with Forest Department.
2.	District Wildlife Officer, Jhelum Punjab Wildlife and Parks	Project will be very beneficial for the people of the area.	Direct and indirect impacts of the Project will be beneficial for the people of the area.
		During drought periods in hill ranges *Urial* survival becomes challenging due to water scarcity. Drinking water facilities should be provided for *Urial* from the	Provision in design has been made to provide the drinking facilities along the Canal.

Sr. No.	Departments	Stakeholder Views/Concerns	Redressal
	Department	main Canal.	
		On Canal *operation* in command area public awareness will be raised through special training programs by Agriculture and Wildlife department. Training programs will be beneficial for the conservation and protection of the wildlife habitat.	Farmers *Association* will be formed on Canal operation as included in the scope of the JIP. Irrigation Department will be responsible to train and engage the farmers for the wildlife and habitat protection.
		During construction of canal, care must be taken not to cut any unnecessary vegetation even mesquite and other bushes, which provide protection to partridges and wild hares.	EMP of this EIA report proposed mitigations to minimize the removal of vegetation.
3.	District Officer Livestock , Jhelum Livestock Department	Long-awaited Project for the people of the area. It is suggested to be constructed and operated as soon as possible.	Project is at detailed design stage and smoothly progressing towards implementation.
		Some of the area is used for grazing purposes within Jhelum River close to foot hills so people's rights and privileges must be safe-guarded. Directly or indirectly JIP will be beneficial for the livestock farming in the command area.	Construction of the Canal will be confined within the ROW and involve small strip of land for the Canal construction. However, large area will still be available for livestock grazing.
4.	District Officer (Agriculture), Jhelum, Agriculture Department	People are eagerly waiting for the construction of the Canal always keen to know the updated progress on JIP.	Proposed Project is currently at detailed design stage and as per schedule construction will start in the end of 2018.
		Command area land is quite suitable for the cultivation of all type of crops.	Suitable crop cultivation is recommended in Agriculture studies.
		Command area is suffering severally due to the brackish water and most of the tube wells bores are of brackish water and marginally fit for irrigation.	On Canal operation the surface water irrigation will be provided in the command area for the agricultural lands.
		Construction and operation of the JIP will be quite beneficial for the welfare of the farmers.	People will be benefited by the Project socially and economically.
5.	Regional Officer, Tehsil Officer and Community Activist NRSP, Jhelum	NRSP is working with Govt. of Pakistan for the wellbeing of the people. The proposed Project will also support the local development and livelihood improvement of the people of the area.	Financial benefits of the Project will improve the livelihood of the people.
		NRSP is presently working on the micro finance schemes for the uplift of the poverty in district Jhelum.	It is just a comment.
		Most of the people of the area belong to farming and labour communities.	On Canal construction farming and labour communities will be benefited.
6.	District Officer	Most of the Project Area falls in district Jhelum except the inlet of the main Canal alignment at the Head Rasul Barrage.	This is a comment/information about the project.

Sr. No.	Departments	Stakeholder Views/Concerns	Redressal
	(Forest), Mandi Bahauddin	Removal of trees and vegetation should be minimized as much as possible during construction.	Removal of vegetation will be minimized by proposing the firm mitigation in EMP.
		Proper tree plantation plan should be developed to compensate the removal of trees during construction.	Vegetation removal will be minimized as proposed in the EMP. Tree plantation plan has also been developed to compensate the removal of trees during construction.
7.	District, Wildlife Officer, Mandi Bahauddin	Most of the Project Area falls in district Jhelum except the Head Rasul Barrage.	This is a comment/information about the Project.
		Overall the Project will be beneficial for the people of the area.	This is a comment in favor of the Project.
		Conservation of wildlife should be the top priority, while assessing the impacts of construction and operation of the proposed Project.	Consultant has proposed fauna specific mitigation measures to protect the wildlife in the EMP.
8.	District Officer Environment, Mandi Bahauddin	Consultant should recommend firm measures to mitigate adverse impacts during construction and operation of the proposed Project.	Impacts for the all stages of the Project have been assessed for physical, biological and socio-economic environment and mitigation have been proposed in the impact assessment chapter of this EIA.
		EMP should be based on the practical and feasible monitoring mechanism.	EMP has been developed on the best applicable management practices and on practical approach for the implementation of the mitigation measures.
		Population, settlements and agriculture land should be avoided to extent possible	Route optimization criterion has been developed and conveyed to the design team to minimize the land acquisition and resettlement.
9.	Sub-Divisional Officer (SDO), Rasul Division, Lower Jhelum Canal, Irrigation Department	Proposed canal is non-perennial and to feed Jalalpur Canal water allocation will be given from Mangla through Jhelum River.	This is a comment about the Project.
		A small 20MW hydropower project is also proposed for the installation on the Jalalpur Canal.	This is a comment about the Project.
		Number of trees removed should be planted with the ratio of 1:10.	Tree plantation on both bank of the Canal has been proposed.
		Overall the Project will be beneficial for the welfare of the farmers.	On completion of Canal crop intensity will improve in the area and ultimately benefit the farmers.
10.	Secretary Union Council Jalalpur Sharif	Project Area and command area have brackish water quality with the construction of Canal ground water quality will be improved.	Ground water quality might improve on Canal operation due to groundwater recharge with fresh river water.
		Government should construct this Project as soon as possible for the wellbeing of the people of the area.	Detailed design of the Project is in progress and construction is expected in the end of 2018.
		Project completion will bring economic prosperity in the area and will also enhance GDP of the country.	This is a comment in the favor of the Project.

Sr. No.	Departments	Stakeholder Views/Concerns	Redressal
11.	Government Boys Higher Secondary School Jalalpur Sharif	It is assumed by general public of this area that water will not be provided to the farmers of Jhelum District for agricultural purposes but will be distributed directly in District Khushab.	18 distributaries all along the main Canal are proposed in design to distribute water in the command area.
		Least disturbance should be done to the population, settlements and residential houses as the Jalalpur Sharif and surrounding villages are in between Jhelum River and Hills.	Consultant has adopted the approach of ADB's SPS 2009 to avoid, minimize, reduce or to compensate for the land acquisition and resettlement for the proposed Project.
		Job opportunities should be provided to the locals and not to the outsiders.	Contractor at all three packages for the JIP are bound through EMP to employ the local people.
		Water distribution should be fair and firm for farmers.	Warabandi system has been proposed by the Consultant as part of this Project and will be implemented by the Irrigation Department.
		Government should train and educate locals along with students of the area to preserve trees and wildlife, while the Canal is constructed and operational.	During Canal operation Irrigation Department through Farmers Association will train the local people and academia for the preservation of tress and wildlife.
12.	District Officer Environment, Jhelum	Quality of land in Canal command area is suitable for agriculture.	These are comments in the favour of the Project.
		People of the area are in favor of the Canal.	This is a comment in the favor of the Project.
		EIA study is required considering the scale and scope of the Project.	Pakistan Environmental Protection Agency, Review of IEE and EIA Regulations, 2000 categories the Project for the EIA study. EIA is being carried out for the project.
		During EIA study flora and fauna of the Project's AOI should be catered properly.	Flora and Fauna has been catered properly by proposing the mitigation measures in EMP.
		Displacement of people should be minimized.	Canal alignment has been selected to minimize the displacement of people.
		Leakage/seepage of the Canal should be controlled.	Cana will be lined to minimize the seepage.
		Fugitive dust should be minimized by sprinkling of water during construction.	Mitigation measures have been proposed in the EMP and Contractor has been bound through Environmental Monitoring Program for the implementation of the mitigation measures.
		Tree cutting should be minimized and tree plantation should be proposed along the bank of the Canal.	Mitigation measures in the EMP have been proposed to minimize the tree cutting and plantation has been proposed along the bank of the Canal.
13.	Archaeology Conservator	Project is beneficial for people of the command area.	This is a comment in favor of the Project.

Sr. No.	Departments	Stakeholder Views/Concerns	Redressal
	and SDO, Archaeology Department Rohtas Fort	No archaeological monument comes along the main Canal alignment.	Archaeological survey has been conducted all along the main Canal alignment with the official of the Archaeology Department, Punjab.
		It is suggested to take consent of the Directorate General (DG) of Archaeology Department in black and white for the confirmation if there is any protected archaeological monument within the Project Area.	Archaeology Department was taken on board for the identification of the protected areas along the main Canal alignment. As per report submitted by officers of DG of Archaeology, GoPb, no archaeological site or monuments comes under the proposed alignment of the route of Canal. The notification of consent issued by Archaeology Department for JIP is attached as **Appendix-XII.**
		Baghanwala is not included into the list of the protected monuments, which is also outside of Project's AOI.	Baghanwala is not in the Project's AOI for the main Canal alignment.
14.	Assistant Director Fisheries Department Gujrat	Project is beneficial as long as water availability is ensured.	PID has taken care of this aspect.
		Head Rasul fisheries activities are controlled through Fisheries Department Gujrat.	No action required
		Most of the fish species at Head Rasul is Gulfam. However, Malhi, Singara, Sol, Khagga, Sariya are also found.	No action required
		No adverse impact is envisaged on fish due to the construction of the Canal, as provision in existing barrage has already been provided.	No action required
15.	Divisional Forest Officer, Khushab	In order to generate revenue for the Canal operation and maintenance water should be supplied to the cement industry in the Project Area.	Decision will be made by the Irrigation Department, Punjab once the Canal becomes operational. Water availability for the agricultural land will also need to be ensured prior to the water allocation for the local industry.
		In case of Canal lining, provision of the aquifer recharge should also be considered at some points.	Design team will assess this possibility.
		Drinking water facilities should be provided along the main Canal for livestock of the area and water supply should also be provided to the locals as the ground water quality of the area is highly brackish.	Concern is conveyed to the Project design team for the redressal.
		Tail end areas are in very much need of water along the main Canal alignment due to brackish water.	Water will be provided to the farmers on Warabandi system
		During rainfall period, nullahs/drains intersecting the main Canal alignment carry flash floods from hill torrents. Flood protection structures should be provided along the Canal.	Hydrological studies have been conducted by the Consultant and proper provision in design has been made to provide flood protection structures. The design team also need to ensure the provision of flood protection structures. Design team also need to ensure the structural

Sr. No.	Departments	Stakeholder Views/Concerns	Redressal
			stability of the canal as most of the canal is constructed in fill.
		Overall Project is very beneficial for the people of the area and must be implemented.	Detailed design of the Project is in progress and construction is expected in the end of 2018.
16.	District Wildlife Officer, Khushab	Daiwal, Mangwal and Jaiswal are falcon hunting areas. Canal will serve as water source for wildlife fauna.	Jalalpur Canal will be non-perennial and water will be available during Kharif period only.
		Wildlife of the area such as wild hare, grey and black partridges may be disturbed temporarily during construction phase.	Construction activities will be confined within the RoW of the Canal. Consultant has proposed flora and fauna specific mitigation measures to protect the wildlife in the EMP.
		Habitat of the wildlife may also be disturbed in the Project Area during construction activities.	Contractor labour will be bound through EMP mitigations not to remove vegetation for cooking or other purposes.
		Construction activities should confine within the RoW of the Canal.	Construction activities will be confined within the RoW to the extent possible.
		Protection measures should be proposed during construction for the wildlife and habitat conservation.	Specific mitigation measures in EMP has been proposed to protect the wildlife and habitat of the area,
17.	District Agriculture Officer, Khushab	Water logging and seepage problem may arise during Canal operation.	Major part of the main canal is lined to avoid the seepage problem.
		Overall the Project will be beneficial from agricultural prospective and no other adverse impact can be foreseen at this stage.	JIP is the irrigation Project and will benefit the area with the increase in crop rotation and intensity.
		Canal construction in this area is highly recommended.	This is a comment in favor of the Project.
		Cropping intensity of the command area will be increased with the use of river water.	On completion of Canal crop intensity will improve in the area and ultimately benefit the farmers.
		Vegetation cover and planation are expected to be increased in Project Area on Canal operation.	Water availability in the Project Area will improve the vegetation and plantation.
18.	Head Master, Government High School Daiwal Tehsil Khushab	Project is very beneficial for the people of the area.	JIP is the irrigation Project and will benefit the area with the increase of agriculture in the area.
		Water supply to this school for drinking and planation purposes is strongly suggested.	Local people may use Canal water once operated in consultation with permission from the Irrigation Department, Punjab.
		Proposed Project should be constructed on fast track basis.	Project is progressing as per schedule.
19.	District Officer Environment, Khushab	Project is very beneficial for the development of the area.	Water availability is the major issue in the area and JIP is well deserved for the people of the area.
		Slight length of the main Canal alignment comes under District Khushab, major portion of the Canal remains in District Jhelum.	Just a comment.

Sr. No.	Departments	Stakeholder Views/Concerns	Redressal
		Canal might also be beneficial for the cement and other industry near the Project Area.	JIP is the irrigation Project. Demands for other industries for will depend upon water availability and Irrigation Department, Punjab will take the decision to supply water for other industries or not.
		Project is well deserved for the command area, as the water quality and water shortage is the main bar for the development of the area.	Project Area soil is suitable for various crops as per Agricultural studies Presently, Detailed design is in progress and Canal construction is expected in the end of 2018.
		Jalalpur Irrigation Project might serve as public welfare project, when completed.	Agriculture through JIP will improve the livelihood of the local people.

458. Consultation with Pak Railways was not carried out at detailed design stage as previous consultation during feasibility stage was good enough to fulfill the requirements. NOC procedure was already shared with EIA team during first round of consultation; details are given under Section 7.6.3. j.

7.7.2. Community Consultations

459. Consultations with communities were done at detailed design stage covering the public in settlements within AOI of JIP. Local people in villages such as Baganwala, Rawal, Mariala, Shah kamir, Pippli, Wara Phapra, Chal Shafi, Malakpur, Dhok Bagh, Ladwa, Ratwari, Chakri Karam Khan, Daiwal, Mangwal, Duddhi Thal and Bhelowal were consulted. The overall feedback about the project was positive. The locals admired the project and considered it beneficial for the development of area. They showed their expectations that that basic facilities such as provision of clean drinking water, gas for cooking/domestic use, education & health facilities, wastewater drainage and solid waste management in the area will be improved.

460. **Figures 7.17 & 7.18** show few glimpses of consultations carried out with locals in Project AOI. Table 7.4 shows the summary of major concerns raised by community at detailed design stage and their addressal by consultants.

Figure 7.17: Consultation with locals in Wara Phapra and Dhok Jumma near Jalalpur sharif


Figure 7.18: Consultation with locals in Chal Shafi and Mangwal

Table 7.4: Concerns Raised by Community at Detailed Design Stage

Task	Stakeholder Views/Concerns	Redressal
Community Consultation in Project AOI	Fair compensation on market based rates should be provided to PAPs.	LARP is being prepared for the JIP in compliance with LAA, 1894 and ADB's SPS 2009 guidelines.
	There have been many studies conducted for JIP but the implementation/construction has not been started over the years.	Project is currently in detailed design stage under ADB funding and expected to commence construction work in 2018.
	Overall proposed irrigation Project is very beneficial for the people of the area as rain-fed agriculture is in practice with low crop yield.	River water irrigation will increase crop yield in the command are and will directly benefit the farmers.
	Bridges and culverts should be provided on canal crossings to facilitate local people and traffic.	At detailed design stage, 30 number of pedestrian footbridges and 125 road bridges/culverts have been proposed.

7.8. Stakeholders Concerns Summary

461. **Table 7.5** provide a summary of stakeholders' concern, and proposed mitigation measures raised at the Project preparatory/ feasibility stage.

Table 7.5: Concerns Raised by Stakeholders at the Project Preparatory/ Feasibility Stage

Concerns	Proposed Mitigations
These schemes will only benefit some influential personnel of the area.	Geographical dispersion of interventions to ensure equitable distribution of benefits.
There might be no compensation for displacement of resident.	Project to ensure due compensation to all APs, if there are any.
If the major amount of water is utilized in the upstream areas, then the water in the downstream areas will decrease.	Ensure geographical dispersion of interventions to avoid this.
Many plans are made but nothing on ground takes place.	Ensure consistent communication with local communities, even if there are hurdles in project implementation.
The project should plan ahead for at least 20 years.	Expected life of project is 50 years.
Flawed designs of such schemes have in the past not only resulted in public money, but have also caused	Best design practices to be adopted; designs to be wetted by independent

Concerns	Proposed Mitigations
havoc to the local population.	experts.
People living close to the proposed intervention sites will be the major beneficiaries. It should be ensured that those living at a distance also benefit from it.	Ensure traditional water rights are not altered. Accommodate some small benefits (e.g. potable water supply tank) for downstream communities.
Water calculation should be rechecked before going ahead with the project.	Best design practices to be adopted; designs to be whetted by independent experts.
Independent monitoring mechanism should be put in place for the project.	Formulate project steering committee; engage IMC for environmental monitoring.

7.9. Continual Engagement with Stakeholders

462. Notwithstanding the efforts so far put in for public participation, this activity will have to be pursued through the construction and implementation phases of the Project. In particular, the focus will be on the improvement and modification of the proposed intervention designs.

463. Participation mechanisms facilitate the consultative process and include information sharing and dissemination, disclosure, and participation of affected people and other stakeholders in the project related activities. In the peculiar social set-up of the Project Area, it is also important to involve the religious leaders as representatives of the public as well as part of effective communication process. They can provide a very effective medium to bring information to the affected male population through Friday prayers. Local business community, specially the affected one, should also be brought into the process of awareness and participation.

464. The related institutional arrangements has also been proposed in the EMP during construction and operation of the JIP for continuous consultation throughout the process. However, Grievance Redress Mechanism (GRM) is given below..

7.10. Grievance Redress Mechanism

465. This section describes mechanism to receive and facilitate the resolution of PAPs' concerns and grievances. It explains how the procedures are accessible to APs including women. A Grievance Redress Mechanism (GRM) will be established to allow affected persons/families appealing against any decision, practice or activity arising out of survey, data collection, compensation rates/awards, and resettlement-related benefits (grievances could also be caused by other social and environmental impacts/issues). PAPs will be fully informed of their rights and of the procedures for addressing complaints under GRM during Project information disclosure at various villages/community meetings.

7.10.1. Need for Establishing a Grievance Redress Mechanism

466. LAR relating issues will be identified in the LARP and mitigation measures will be suggested to address these issues vide of Entitlement Matrix (EM). However, in spite of best efforts, there may be chance that the individuals/communities affected by the project will be dissatisfied with the measures adopted and they look forward some platform for the resolution of their grievances. Some of the grievances that may arise are listed as follows:

- Name of the PAP is missing from the list,
- Losses (such as damage to crops/ assets) not identified correctly,
- Inadequate or inappropriate assessment of compensation.

- Improper distribution of compensation in case of joint ownership
- Dispute on ownership of the affected asset
- Problems in the relocation of infrastructure
- Delays in the payment of the compensation
- Owners' reluctance to allow commencement of works on their affected property before payment of compensation
- Any other issues arising during the project implementation.

467. The policy of the project management is to prevent the grievances rather than going through a redress process. An effort towards this end will be made carefully by developing the compensation procedure and its implementation; by ensuring full participation and consultation with the PAPs, as per provisions of EM; and by maintaining effective communication and coordination between the community, project management, contractors, the Land Acquisition Collector (LAC) and local governments.

468. However, to address any un-avoidable situations and in order to ensure the timely and successful implementation Resettlement Plan, a GRM will be established, as per guidelines of the ADB. The objective of this mechanism will be to address the grievances of the aggrieved at the root level. The GRM will allow an AP to appeal against any decision, practice or activity, he disagrees with. Thus, the main objective of the GRM would be to mediate conflict and cut down on lengthy litigation, which often delays such infrastructure projects. The organogram of the complaint procedure through different forum is depicted in Figure 7.19.

7.10.2. Grievance Redress Procedure (GRP)

469. The following modus operandi of the GRM has been envisaged for its efficient and effective functioning.

(i) Formation of a Grievance Redress Committee (GRC)

470. The formation of a Grievance Redress Committee (GRC) 1st Tier and 2nd Tier will be constituted at project level as part of institutional arrangements for successful implementation of the project.

471. The Committee will meet at least twice a month and provide decision to resolve the issues at the end of the meeting. The non–official members will be provided logistics for the committee meetings. The committee may request the complainant to attend and present his case. The representative of the Contractor will attend the proceedings of the Committee if some matter relating to the Contractor's behavior is put before the committee. In case of disagreement of the PAP with the decision of the GRC, the case will be referred to the Project Director, PMU by the Committee with their observations and recommendations. The PD, PMU is the final authority at the project level to decide a case. However, the aggrieved person will have the right to go to proper court of law, in case he is not satisfied with the decisions of the PD. The members of the GRC may be included as follows:

1st Tier GRC at local level.

1- Resident Engineer (Civil)	Convener
2- Deputy Director (ESMMC)	Member
3- Environmentalist, JIP Consultants	Member
4- Displaced person representatives, male/female	Member
5- Representative of the Contractor	Member

2rd Tier GRC at PMU level:

1-Director Technical/Deputy PD PMU	Chairman
2-Director ESMMC, PMU	Member
3-Environmentalist JIP Consultants	Member
4-Social Safeguards Specialist Consultants	Member

(ii) Maintenance of a Social Complaint Register (SCR)

472. Deputy Director- PIU, assisted by the Assistant Director-PIU will maintain the Social Complaint Register (SCR) at site to document all complaints received from the local communities. The information recorded in the Register will include date of the complaint, particulars of the complainant, description of the grievance, actions to be taken, the person responsible to take the action, movement of the document (forwarded to whom/which Committee), follow up requirements and the target date for the implementation of mitigation measure. The register will also record the actual measures taken to mitigate these concerns. All complaints received in writing or received verbally will be (written), properly recorded and documented.

(iii) Conflict Resolution Procedure

473. The PD, PMU has the overall responsibility for ensuring compliance with the LARP provisions for satisfactory project implementation through Land Acquisition and Resettlement Unit (LARU). The PD, PMU will be supported by the Deputy Director (Resettlement), PMU; in turn assisted by the Dy. Director and Assistant Director, Project Implementation Unit (PIU) stationed at project site office to attend matters relating to resettlement.

474. The DD-PIU will be the initiating authority to address the issues. He will be bound to resolve the issue within 7 days in accordance of the provisions of the LARP and will inform the complainant. However, if in some case, policy matters are involved, the case will be referred to the appropriate authority or committee appointed by the Project Director to decide the matter.

475. If complainant is not satisfied with his decision / action, the DD will refer the case to GRC. The complainant will be kept associated with the proceedings of the GRC. The GRC will take a decision within 15 days and will intimate the decision to the complainant. In case some response on the complaint is not received within 21 days of the lodging of the complaint, the complainant may send a reminder to the GRC with 07 days' notice to take legal remedial measures.

476. In case of complainant's disagreement with the decision of the GRC, the Deputy Director, as Chairman of the Committee, will send the case to PD, PMU through DD, Resettlement, LARU-PMU. The DD (Resettlement) will submit the case to PD, PMU with his observations on the matter and will respond within 07 days of the receipt of case in the PD office. If the complainant is not satisfied, the complaint will have the option to go to the court of law.

477. In case of such eventualities, all affected persons will be exempted from legal and administrative fees made / paid / incurred pursuant to the grievance redress procedures.

The conflict resolution process at project level is provided in the following Table 7.6:

Table 7.6: Conflict Resolution Process at Project Level

Stage	Action	Location	Responsible Body	Complaint Resolution Period
1.	Complaint is received and registered	PD Office / Project site office	DD, PIU	07 days from the date of registration (if not settled then Stage – 2)

Stage	Action	Location	Responsible Body	Complaint Resolution Period
2.	Passed on to Grievance Redress Committee	At project site	GRC	Within 15 days (if not settled then Stage–3)
3.	Referred to PD, PMU by the GRC	DD, LARU-PMU	PD, PMU, through Dy. Director, LARU-PMU	07 days from the date of receipt of case in the PD office. If AP is not agreed with the mitigation/decision provided, he has the option to go to court of law.

478. ADB also entertains complaints and grievances of PAPs in the light of ADB's Accountability Mechanism 2012. PAPs may contact ADB through email or post and share their problems, if their issues are not resolved any level of Project GRM. If any PAP contacts the ADB without using the project GRM, ADB will refer the case to project GRM for resolution.

7.10.3. Organogram for LARP & GRM

479. An Organogram showing the institutional arrangements for the implementation of LARP is illustrated through a diagram presented in **Figure 7.19**.

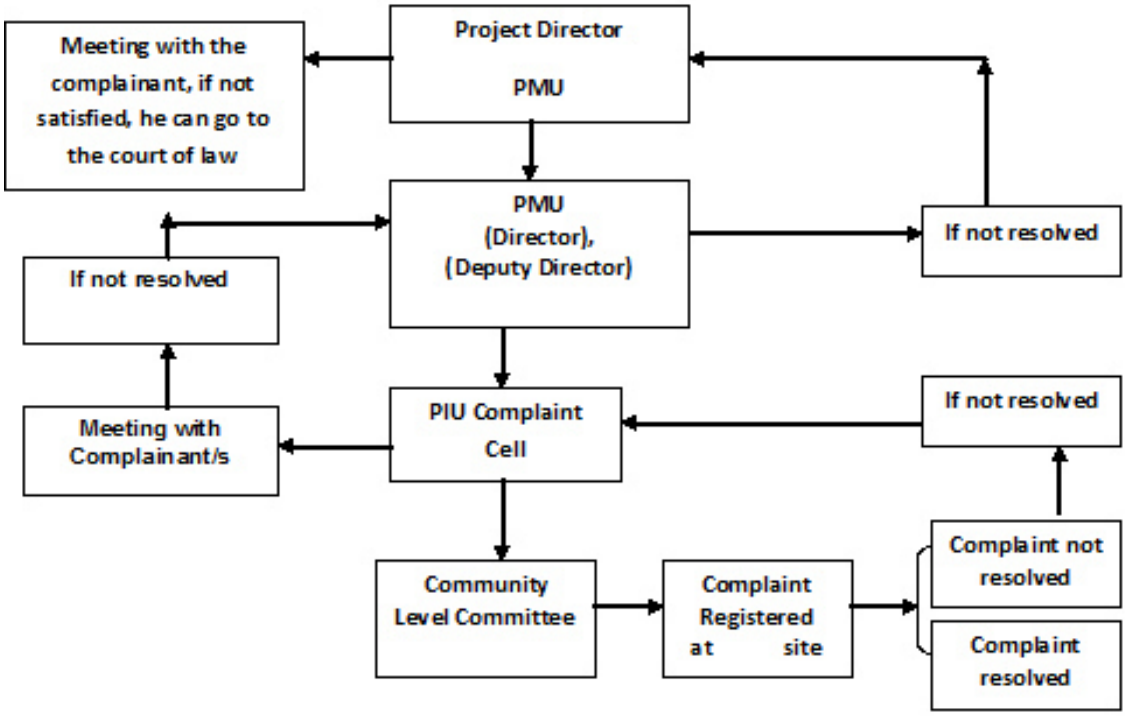

Figure 7.19: Organogram for LARP and GRM

CHAPTER 8
POTENTIAL ENVIRONMENTAL IMPACTS & MITIGATIONS

8.1. General

480. This chapter identifies the potentially significant beneficial as well as adverse environmental and social impacts due to design/pre-construction, construction and operation of the proposed project on the physical, ecological and socio-economic domains of the environment. The appropriate mitigation measures are also discussed in this chapter. A project impact evaluation matrix has been developed to evaluate the potential impacts of the proposed project. A brief qualitative description of each aspect and the affected environment in both project area and project's AOI is presented in upcoming sections.

8.2. Scoping of Impacts

481. Potential environmental impacts from JIP on key environmental features in the Project area were identified by EIA team through the following actions:

- Environmental quality baseline monitoring of air, noise, surface and ground water;
- Detailed review and analysis of primary and secondary data available for all environmental parameters in Project area such as physical, ecological and social resources;
- Desk Study of engineering investigations, studies and designs;
- Socio-Economic survey to assess the extent of land acquisition and resettlement, occupation, income and poverty levels of the affected households;
- Consultations with executing and implementing agencies, local government, affected community, traditional and religious leaders of community;
- Stakeholder consultations with relevant departments, government agencies at local and provincial level;
- Construction noise modeling using "FHWA equation for Noise Prediction" to predict the noise levels due to construction; and
- Knowledge assimilation of international best practices on environmental assessment of irrigation projects.

8.3. Notion of Significance

482. The term ***"Environmental Impact"*** or simply *"**Impact**"* covers the negative, adverse or harmful as well as positive, desirable or beneficial impacts of the project on environmental settings. Prediction of impacts of the proposed activity is based on factual data; however, the significance of these impacts involves a value judgment technique. The nature of the impacts may be categorised in terms of:

Direction	-	Positive or Negative
Duration	-	Long or Short Term
Effect	-	Direct or Indirect
Extent	-	Wide or Local

483. Impact significance depends on both the nature of the impact and on the sensitivity of the receptor. The more sensitive the receptor the greater will be the significance of impact from that proposed activity. For this EIA, activities and nature of impact are combined with the sensitivity of the receptor to evaluate the significance of the impact. The significance of impact is characterized as very low, low, moderate, high and very high. Environmental issues having "moderate", "high" and "very high" significance are provided with mitigation measures.

8.4. Methodology for Impact Evaluation

484. The methodology adopted for the evaluation of the impacts included the following assessment tools, (i) project impact evaluation matrix and (ii) overlays. These tools were used to identify the significance and magnitude of the impact as well as the nature, reversibility, extent etc.

a) Project Impact Evaluation Matrix

485. The Impact Evaluation Matrix was developed by placing project activities along one axis (i.e. Y-axis), and on the other axis (i.e. X-axis) the different environmental parameters likely to be affected by the proposed Project actions grouped into categories i.e. physical, ecological and socio-economic environment. For the impact assessment, project impact evaluation matrix was used by dividing the project action into different phases (design/pre-construction, construction and operational phases). A Project Impact Evaluation Matrix is attached as **Appendix- XIII**.

b) Overlays

486. In order to identify spatial based impacts, overlays were used. An overlay is based on a set of transparent maps, each of which represents the spatial distribution of an environmental characteristic (for example, land acquisition). Information for an array of variables such as land use, infrastructure, vegetation etc. was collected for the standard geographical units within the project's AOI, recorded on a series of maps, typically one for each variable. These maps were overlaid to produce a composite map. The resulting composite maps characterize the Project area's land use, physical, social, ecological and other relevant parameters related to proposed intervention.

8.5. Positive Impacts due to JIP Interventions

487. Positive impacts due to JIP interventions are presented in **Table 8.1** with their enhancement measures:

Table 8.1: Positive Impacts of JIP Interventions

Positive Impacts	Enhancement Measures
An anticipated positive impact on socio-economic conditions during construction phase is the creation of limited-time employment opportunity for the local population. Since the project interventions will require substantial input from manual labour, even people with relatively lower levels of education or skills could get short term employment.	The contractor will be liable to engage at least 50% of its required (unskilled) labour force from within or around the Project Area.
Another positive impact will be creation of other small scale income generation opportunities, e.g. tuck shops, tea shops or mechanics.	Provision of area for such activities shall be provided by the construction contractors near Camp Sites.
The current underground water is saline for 6% of the Project Area, and unfit for irrigation purposes. The sweet water table is quite deep, up to 500 feet, which is very difficult to be extracted and used for agriculture. The unlined canal is expected to improve the quality of upper water table, gradually reducing its salinity.	It could be further enhanced by disseminating and supporting other on-farm soil improvement measures, such as use of gypsum to reduce salinity, or cultivation of salinity reducing crops.
It is difficult to exactly quantify the extent of this increase, but due to the fact that the current land utilization for agriculture is very low, despite agriculture being the social norm, it could be deduced that the increase will be substantial. It	Increase in the cultivated area will also mean reduction in pastoral lands. However, the livestock would still benefit by using farm residue and mostly by availability of fodder crops. The project will work with the Agriculture department

Positive Impacts	Enhancement Measures
could be assumed that up to 70% proposed command area may come under agriculture.	to ensure that stall feeding practices take root for livestock, so that the remaining pastoral lands are available for the wild animals.
Other similar projects in the region have found that the average household income increases substantially with the construction of canals and other irrigation improvement measures. This is mainly on account of improved crop yields, increase in the number of animals, and availability of other occupational opportunities.	The periodic project monitoring could keep the level of disposal income of the beneficiary population as a parameter for monitoring. If this potential improvement trend could be tracked, other community development measures e.g. schools etc. could be introduced into the area at the right time.
The proposed Project is expected to have both direct and indirect impacts on the current social status of women. The impacts will be far reaching, resulting from a general improvement in living conditions.	A detailed women profile survey has been conducted in the Project's AOI to assess the status of the women social life. Results of survey revealed that the social life of the women in Project Area will be improved on construction of the proposed Project. In addition to that a comprehensive Gender Development Plan has already been prepared at the PPTA stage. Implementation of this plan will eliminate the need for any other enhancement measure at this stage.
The Agriculture Report of JIP prepared at Feasibility Stage (2015), clearly indicates that with the execution of the Project, the cultivated area will be increased significantly by 44.2%. There will be green revolution in the agriculture sector affection positive impacts on all social aspects of the local communities.	A detailed socio-economic survey/village profile of 20 villages was conducted. Moreover 10 villages were visited to conduct gender study. The findings of these both survey indicated that a significant positive effects will be on the socio-economic condition of the farming communities directly as well as on non-farming communities indirectly. With the involvement of local agriculture departments/ agencies, the agriculture production and income will be increased causing positive impacts on social infrastructure/ living standard, social mobility, education of the children, expenses on quality food & nutrition, care of health, linkage development with the institutions, agriculture sale entrepreneurs and relatives, to attend social ceremonies, adoption of new agriculture practices, adoption of modern social norms and life style and participation of men and women in development activities due to increase in income, awareness and interests.
The major crops cultivated currently are wheat, cotton, bajra, jowar and maize. After the farms are irrigated by the water available through the proposed Project, some new crops may be cultivated, such as vegetables including chili, tomato, okra, potato, onion, and round gourd. Besides this, the production and yield of crops already under cultivation will increase. During the survey of Project Area conducted by consultant's team it was observed that most local farmers give priority to grow those crops that have low water dependence. However, farmers of some areas are growing high value crops; these are grown on tube wells being water intensive. It shows that the land is fertile and productive enough to grow these crops. On the other hand farmers also have good perspective to grow high	One thing that will need to be monitored is any change in the cropping pattern should be in line with the overall climatic conditions of the area.

Positive Impacts	Enhancement Measures
value crops. After the project implementation water will be available to all the land in command area. Farmers will have option to grow high value market intensive crops as mentioned above. In addition to being source of water, the proposed flood water channels will also help to protect the cropped area/farmland from flood damages. This will further encourage farmers to grow high value crops.	
JIP intervention would facilitate flood irrigation in salt range which would result in reclamation of soil salinity and conversion of relatively barren land into fertile, by flashing away the salt cover. As the Project operations start, dilution from fresh water of irrigation will replenish the soil quality and will grow crops profusely thus benefit the command area.	Measures should be taken to prohibit the flooding water becoming stagnant or flowing speedily at some places as it would ultimately be falling into River Jhelum.

8.6. Summary of Assessed Impacts

488. For identification of potential impacts due to Project, screening of activities causing impacts in different phases of the project life had been carried out. In the impact assessment exercise, major Project activities with their associated environmental issues were identified and then their impacts on the relevant physical, ecological, and socio-economic elements of the area were evaluated.

489. In broader spectrum, the project activities could be categorized in the following three phases:

- Planning & Design Phase;
- Implementation & Construction Phase; and
- Operations & Maintenance Phase.

490. During the first phase, the focus will be not only on the engineering design, but also on laying the foundation for integrated planning for water resources management. Extensive inter-departmental coordination will be necessary at this stage for improvement in institutional arrangements and capacity in the areas of environmental and social management and monitoring. Development of decision support systems and training to develop local expertise is expected to substantially improve the management and monitoring of social and environmental impacts.

491. The planning, information management, and capacity-building activities are all intended to facilitate increased awareness-raising to foster ownership, understanding and mainstreaming of environmental and social considerations. Such activities are to be planned and partly to be implemented.

492. The construction phase mainly entail construction of new canal and other irrigation structures. Construction of the proposal canal and distributaries are expected to introduce direct significant benefits to the local population. This phase will be very sensitive in terms of environmental and social implications, because of a wide range of issues including land acquisition, cutting of trees, and the very extent of construction activities etc. The interventions planned under this component will become less damage to environment, if the EMP is implemented in letter and spirit.

493. Operations & Maintenance will be another stage where major impacts, both positive and negative, can surface, and the earlier predictions could be validated. This phase will comprises commissioning the newly constructed canal and distributaries. While the operation phase mostly consists of engineering activities, it has an equally important requirement of continued inter-departmental coordination, for harvesting the full potential of positive impacts of the project.

494. **Table 8.2** below presents the screening activities of JIP interventions for design, construction and O&M phases:

Table 8.2: Screening of Activities

Proposed Sub-activities	Screening Results			Significance Prior to Mitigation			Potential Impacts
	Very Low Risk	Moderate Risk	High Risk	Low	Moderate	High	
Construction of Main Canal, Distributaries & Minor and Irrigation Structures							
A. Design & Planning Phase							
Permanent land acquisition			✓			✓	• Social Issues • Delay in project implementation and cost overruns
Loss of crops			✓			✓	• Social issues
Topographical survey and Geotechnical investigation of the area	✓			✓			• No potential Impact
Assessment of water availability			✓			✓	• Failure of design
Route selection (alignment)		✓			✓		• Social issues • Resettlement/relocation of assets and displacement of people
Water rights issues in the area			✓			✓	• Social issues
Public disclosure of final design		✓			✓		• Social issues
Coordination with all relevant departments for NOCs		✓			✓		• Delay in project implementation & cost overruns
Disruption to public life			✓			✓	• Social issues
Disruption to wildlife			✓		✓		• Conservation issues
B. Implementation & Construction Phase							
Continued stakeholder engagement		✓			✓		• Social issues
Construction contractor		✓			✓		• Changes in land use pattern • Influx of external work force

Proposed Sub-activities	Screening Results			Significance Prior to Mitigation			Potential Impacts
	Very Low Risk	Moderate Risk	High Risk	Low	Moderate	High	
mobilization and establishment of campsite and machinery/ equipment Yard							• Social conflicts • Workshop facilities may spread oils & chemicals • Deterioration of air quality due to machinery & equipment • Noise • Land degradation due to solid waste disposal of camp site • Water contamination • Loss of vegetation • Health and Safety issues
Transportation of construction material		✓			✓		• Soil erosion and contamination • Air pollution • Noise pollution • Health and Safety issues • Damage to infrastructure
Excavation, backfilling and compaction works		✓			✓		• Soil erosion • Site overburden • Borrow pit • Loss of natural vegetation • Damage to infrastructure • Sites of Historical, Cultural, Archeological or Religious Significance • Noise pollution • Air pollution • Health and safety issues • Blocked of access due to earth works and stockpiling of excavated material
Lining of Main Canal		✓			✓		• Noise pollution • Air pollution • Health and safety issues • Blocked of access due to construction works
Construction of structures		✓			✓		• Noise pollution • Air pollution • Water contamination • Health and safety issues • Blocked of access due to construction works
C. Operation & Maintenance Phase							
Unavailability or improper distribution of irrigation water in the area			✓			✓	• Social issues
Breaching of canal, distributaries and structures			✓			✓	• System sustainability

Proposed Sub-activities	Screening Results			Significance Prior to Mitigation			Potential Impacts
	Very Low Risk	Moderate Risk	High Risk	Low	Moderate	High	
Use of irrigation water for drinking purposes		✓			✓		• Health issues Social issues
Ground water contamination in command area		✓			✓		• In case of improper drainage ground water will be contaminated
Disposal of waste (connection of waste streams) in the canal			✓			✓	• Health issues
Use of fertilizers & pesticides			✓			✓	• Banned fertilizer & pesticides will cause health issues • Contamination of fresh water through surface runoff
Increase of agricultural lands		✓			✓		• Loss of pastoral lands
Periodic cleaning and maintenance of the system			✓			✓	• Solid waste generation
Community Participation for management and operation of the irrigation system		✓			✓		• Social issues • System sustainability

495. The following sections dilate upon the environmental issues and the assessment of their impacts. It is to be noted that since most impacts will be similar irrespective of the Project components, the description follows a phase wise approach. However, whenever any particular impact is envisaged to be linked to a specific component, the description has been adjusted accordingly.

496. Some of the issues, and some of the proposed mitigation measures, are of an overarching nature, independent of the project component. Such elements are discussed in Chapter 9, under the head of Cumulative Impacts.

8.7. Impacts during Planning and Design Phase/ Pre Construction

497. Understandably, the potential environmental impacts, in a physical sense, of the design stage are quite low. Since the design stage involves only limited physical activity, its direct impact on environment will be low. The various surveys carried out at the planning level may result in short term impacts on air and soil quality. If the design is carried out without regard to the environmental considerations, it will lead to long term negative implications for local flora, fauna, water quality, water resources, land acquisition etc.

8.7.1. Land Acquisition

Potential Impacts

498. The proposed JIP comprises of two major components, the main canal and the distributaries. As per the initial environmental assessment made at the feasibility stage the total area required for the permanent acquisition is 1,214 ha (3,000 acres) keeping in view the RoW of 274 ft (84 m) for main canal of 110 km length and 131 ft (40 m) for the distributaries of a total length of 176 km. Permanent acquisition of various categories of land, i.e. agricultural, residential and barren land for the main Canal and distributaries will be required. Permanent land required for the main canal and distributaries by land use categories is summarized in **Table 8.3**. In addition, about 5 ha (12.35 acres) will be required temporarily for contractor's camps/ office/ labour colonies, batching plant, material storage etc. The majority of the population will be affected due to acquisition of agricultural land. This impact would be of high significance.

Table 8.3: Land Acquisition (Tentative Estimates[1])

Canal	Agricultural	Residential	Barren	Hilly	Total
Main Canal	980	5.2	696.12	18.68	1700
Distributaries	845	5	450	-	1300
Total	1825	10.2	1146.12	18.68	3000
ha	738.55	4.2	463.81	7.55	1214.05
%	60.84	0.34	38.2	0.62	100

499. Details of land need to be acquired tehsil and district wise is given in **Table 8.4**.

Table 8.4: Land Acquisition by Tehsil and District

Location		Land need to acquired (acres)	Land need to be acquired (ha)
Tehsil	**District**		
Main Canal			
Jhelum	Jhelum	233	94.29
Pind Dadan Khan	Jhelum	1376	556.84
Khushab	Khushab	91	36.82
	Sub-total	**1700**	687.95
Distributaries			
Pind Dadan Khan	Jhehlum	1127	456.08
Khushab	Khushab	173	70.02
	Sub-total	**1300**	**526.10**
	Total	**3000**	**1214.05**

Mitigation Measures

500. Appropriate efforts were made and route optimization criterion has been adopted by design experts to minimize the impacts of land acquisition and resettlement. Where avoidance is not possible, the impacts are reduced, minimized and mitigated in accordance with the ADB's SPS, 2009. The land acquisition will be carried in accordance with the LAA 1894 and ADB's SPS, 2009 requirements. The acquisition process will follow the general guidelines for land acquisition as stipulated in LARP document. A reasonable package for compensation under the updated LARP will be provided for all the land owners and affected people. Market rates of land

[1]The width of RoW for main canal is 274 ft (distance from centre line is 118 ft left side and 156 ft right side) and 131 ft in case of distributaries (distance from centre line is 118 ft left side and 156 ft right side).

will be obtained from the concerned district revenue department. Fair monetary compensation, with due consideration of mandatory acquisition, will be given to the owners of land. LARP estimated compensation for different categories of land is provided in **Table 8.5**.

Table 8.5: Fair Monetary Compensation

Land	Unit	Quantity	Unit Rate (Rs.)	Amount (Million Rs.)
Land Acquisition				
Agricultural land [2]	Acres	1825	480,000	876
Residential land[3]	Acres	10.2	7,200,000	73.44
Barren land[4]	Acres	1146.12	220,000	252.15
Government barren/ hilly land	Acres	18.68	150,000	2.8
Sub Total		3000	-	1,204.38
Compulsory Acquisition Surcharge (15%)	-	-	-	180.66
Total Land				1,385.05

501. However, this compensation will need to base on current market rates. The budgetary estimates will be revalidated after finalization of design. The proponent will ensure duly payment of compensation to the Project affectees before implementation of the Project to avoid social conflicts. Moreover, fair agreements shall be made with owners of temporary acquired lands i.e. land for borrow areas and construction camps etc.

8.7.2. Loss of Crops

Potential Impacts

502. The Project will involve acquisition of around 1,050 ha (2,625 acres) of cultivated land. Besides loss of land and crop, the owners will also lose the immediate economic benefits of the crops on such lands. The impact would be of high significance.

Mitigation Measures

503. The Project will compensate for the economic loss due to loss of crops on the lands to be acquired. The LARP estimates that around Pak Rs. 99.456 million will be paid in compensation. In general, there is one crop in a year either during winter or summer season or depends upon the rainfall. In general, the major crop is wheat in the Project area with an average yield of 30maunds (40 kgs.)/acre and the average price per kg is 3,250 (as per **Appendix-XIV**) making a total value per acre Rs. 38,8400/ acre as of Jan. 2015. The measure will step down the significant impact to non-significant.

8.7.3. Borrow Pits Selection

Potential Impacts

504. Embankments fill material will be borrowed from surrounding areas. Wrong selection of borrow pits for extraction of fill material may cause serious issues to communities, ecology, land stability and loss of fertile topsoil. The impact would be of high significance.

[2]Unit price is based the price assessment by Revenue Department for year 2014-15 for agricultural land at off-road at Jalalpur is Rs. 480,000 per acre
[3]In case of residential land near Abadi is Rs. 9000/ marla or Rs. 1,440,000/ acre at Tehsil Pind Daden Khan
[4]Half of the agricultural land (i.e. Rs. 220,000/ acres) as above is assumed the rate of barren land in the project area

Mitigation Measures

505. Borrow pits/areas were selected on the basis of following criteria:

- Proximity to canal alignment with easy approach;
- Availability of good quality and sufficient quantity of fill material;
- Favorable topographic conditions for exploitation of materials;
- Avoiding the requirement of blasting to extract materials;
- Suitable landuse preferably selection of barren land to minimize disturbance to cultivation or agricultural land;
- Minimum impact on trees;
- Avoiding heritage and archaeological sites;
- Avoiding the environmentally sensitive areas; and
- Maintaining safe distance from the communities.

506. Selection of borrow pits following above criteria minimized the impact to low significance. Twenty number of potential borrow pits/sites for fill material have been identified by design team, following the above criteria as shown in Figures 8.1 & 8.2.

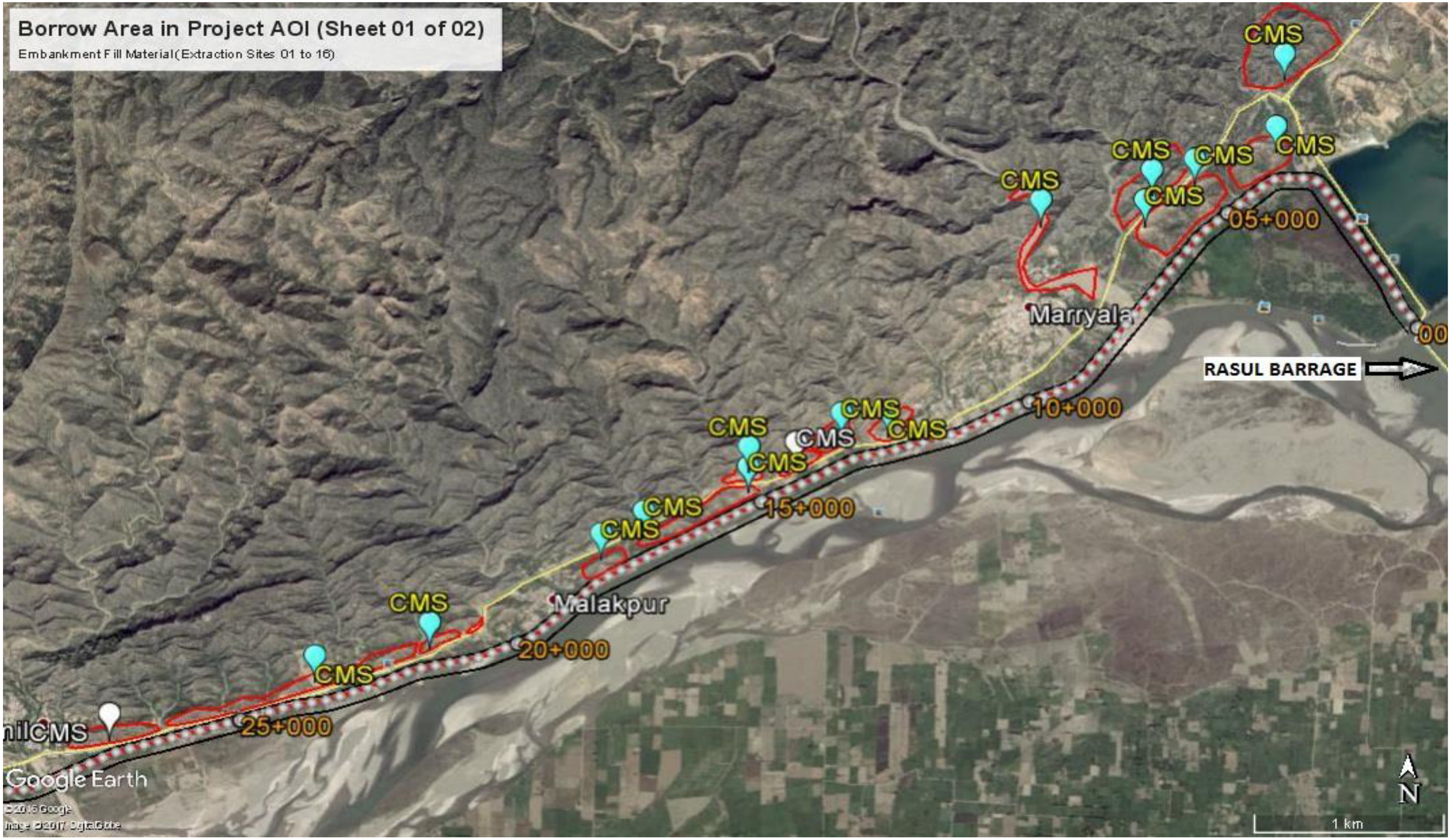

Figure 8.1: Proposed Borrow Areas in Project Area (1-16)

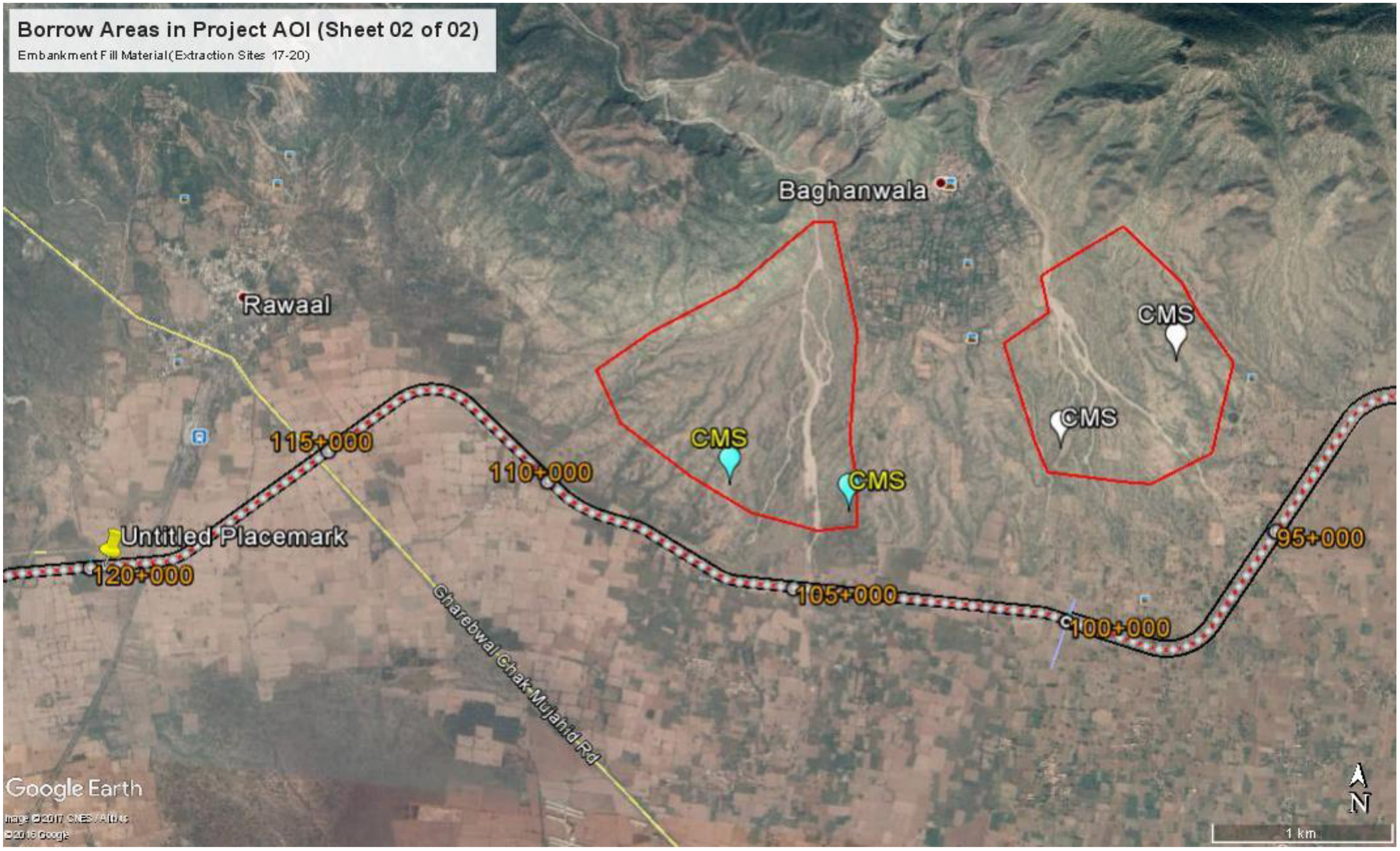

Figure 8.2: Proposed Borrow Areas in Project Area (17-20)

8.7.4. Disruption to Public Life

Potential Impacts

507. A total number of 408 structures/ assets were found within the RoWs of main Canal and distributaries, out of which 159 are residential/ farm deras, 13 commercial buildings, three (03) mosques, 104 tubewells, 77 electric poles, 30 cattle sheds and 22 other structures/ assets (like, hand pumps etc.). Most of these structures are permanent (pacca) and semi-permanent. Most of the people would be affected due to the disturbance of residential structures. The impact would be of high significance. Number and type wise distribution of structures falls within the RoW of main Canal and distributaries are summarized in **Table 8.6**.

Table 8.6: Number and Type of Structures located within RoW

Location	Houses/ Deras	Shops/ hotel	Tubewell	Mosque	Graveyard	Shrine/ Janazgah	Electric Poles/ T/L	Cattle Shed	Other	Total
Main Canal (No.)	99	7	64	03	0	0	46	17	13	249
Distributaries (Nos.)	60	6	40	0	0	0	31	13	9	159
Total (Nos.)	159	13	104	3	0	0	77	30	22	408

Mitigation Measures

508. By adopting following measures, impact would be finally of low significance:

- Project should relocate the community structures at the cost of the proponents, as described in LARP;
- Fair compensation for private structures should be provided as outlined in LARP;
- Immaculate construction planning and extensive inter-departmental coordination will be ensured to minimize the disruption to public life during the period of construction;
- While finalizing construction schedules, special consideration will be given to the calendar of social and religious events. It will be ensured that the construction work does not cause undue impediments to the general public life close to, and during, such events; and
- A bypass route should be constructed at the Project site to divert the traffic, thus avoiding the public traffic passing through the site.

8.7.5. Assessment of Water Availability

Potential Impact

509. The proper assessment of the water availability is required at the Head Rasul Barrage to feed the proposed Jalalpur Canal. All the historical data for low and peak flows along with water availability studies need to be evaluated and considered although the proposed Canal is non-perennial and will be operated during monsoon season. Improper assessment of water availability will not meet the Project objectives and also risks the whole investment. This impact would be of high significance.

Mitigation Measures

510. Design works will ensure the proper assessment of water availability. PID will ensure the supply of 1,350 cusecs (38.22 cumecs) of irrigation water from Rasul Barrage to JIP. Studies show that average canal withdrawal of Punjab province for Post Accord Period (1999-2012) system use was 33.16 MAF[5] (40.90 BCM[6]). As per Water Apportionment Accord 1991, the allocation for the Punjab system uses is 37.07 MAF (45.72 BCM). It is clear that Punjab can still use 3.90 MAF water for further projects.

511. IRSA has approved supplies for the Jalalpur Canal as it will be non-perennial and will require only 0.41 MAF. This water is available as depicted by water study carried out in 1980 by WRMD of WAPDA for 10 years period from 1967-68 to 1977-78, which confirmed that the availability of 1,374 cusecs for Jalalpur Canal during Kharif is almost always assured either directly or through regulation at Mangla according to its requirements. Moreover as per the study by NDC, 1,350 cusecs are available for Jalalpur canal for more than 150 days of Kharif with 100% probability. The abovementioned facts will step down the high significance of impact to non-significance level.

8.7.6. Route (Alignment) Optimization

Potential Impact

512. Improper route selection of main canal and distributaries will lead to social issues of resettlement/relocation of assets and displacement of people. This impact would be of moderate significance.

Mitigation Measures

513. Most of the significant environmental impacts of the Project have been addressed at the design phase. Environment team has closely worked with design team for the route optimization. In order to minimize environmental and social issues at the detailed design stage, following considerations have been made:

- Avoided dense settlements particularly between RD 0+000 to 35+000;
- Avoided religiously sensitive structures (graveyards, shrines etc.,) as far as possible;
- Avoided reserved forests, wildlife sanctuaries, protected areas; and
- Any other environmentally sensitive hotspots identified during the Project have been avoided.

514. All these above environmental and social parameters have been considered by the design team during the finalization of the main Canal alignment at the detailed design stage.

515. The location and layout of the various distributaries and other irrigation structures, type of construction technology etc. predominantly determine the environmental implications of the Project. Despite having examples of other similar projects, the exact quantum of environmental impacts cannot be predicted at times. Hence, the efficacy of the design will finally be tested only when the results of follow up monitoring become available.

516. The Design engineers must also add all features for safety of the workers during O&M of the Project. Special considerations will be made for the selection of routes for both main canal and distributaries which ensure proper distribution of water for all, alignment must be avoided from any controversial land, and alignment selection must be justified to all stakeholders.

[5] MAF = Million Acre Feet
[6] BCM = Billion Cubic Meter

517. PMU of PID and Land Revenue Department to ensure that the LAA, 1894 procedures are followed in a transparent manner. Complete records should be maintained, particularly for asset valuation and compensation payment. The communities' grievances associated with the land acquisition and compensation should be addressed on priority basis, in order to avoid any unrest/mistrust among the communities towards the Project.

518. By adopting the aforementioned measures, the impact would be of low significance.

8.7.7. Water Allocations for Jalalpur Canal Project[7]

Potential Impact

519. The review of system wise canal allocations for various canal systems reveals that there is no allocation provided for the small future projects in inter-provincial accord except the Greater Thal canal project. However, there is no restriction on the provinces to undertake new projects within their agreed shares. JIP is a small project requiring 0.33 Million Acre Feet (MAF[8]) for non-perennial supply during flood season which the Punjab province may afford to allocate with internal adjustments and out of its share of balance river supplies and future storages. The JIP impact on minimum environmental flow requirements was assessed extensively.

Mitigation Measures

520. Water Resources Management Directorate (WRMD) of Water and Power Development Authority (WAPDA) analyzed the flow data for 10 years period from 1967-68 to 1977-78 to check the availability of water for Jalalpur canal. The analysis confirmed that the availability of 1,374 cusecs for Jalalpur canal during Kharif is almost always assured either directly or through regulation at Mangla according to its requirements.

521. As per the study carried out by National Development Consultant (NDC), 1,350 cusecs are available for Jalalpur canal for more than 150 days of Kharif with 100% probability.

522. According to the NESPAK study for water availability as conducted in 2005, the average annual outflows to sea work out to 30.47 MAF. The historical canal withdrawals of the Punjab in the post-Tarbela regime, ranges from 37.05 MAF in 2001-02 to 58.19 MAF during 1990-91 with an average of 52.20 MAF. Average Kharif and Rabi season canal withdrawals of Punjab are 33.68 MAF and 18.52 MAF respectively.

523. As per balance river supplies, provided in the NDC feasibility report the average D/S Kotri Barrage flows during post-Tarbela period for the Kharif season ranged from 0.20 MAF (year 2004) to 88.18 MAF during the year 1994 with an average of 30.47 MAF. These flows below Kotri have been further adjusted in the following manner to determine the balance supplies to be shared by the Provinces as per the Water Apportionment Accord. Out of total annual net surplus of 15.92 MAF, Punjab shares out 37% i.e. 5.76 MAF which can be utilized for the new irrigation projects.

524. Finally taken into consideration the mentioned studies and accounting for losses in main canal and distribution system, the required canal discharge at head regulator at Rasul Barrage is 1,350 cusecs (38.15 cumecs). The crop consumptive requirement is 0.192 MAF (237 million cubic meters) of water. Additional allowance of 0.138 MAF has been made for reclamation of saline areas. Thus total canal withdrawal will be 0.33 MAF (407 MCM) during

[7] Source: NDC Report and Feasibility Report Jalalpur Irrigation project (NESPAK-ICS Joint Venture)

[8] 1 MAF = 1,233 Million Cubic Meter

the Kharif Season. The approval of IRSA authorizing water supply for Jalalpur canal system is given as **Figure 8.3**.

INDUS RIVER SYSTEM AUTHORITY
Government of Pakistan
35- Mauve Area, G-10/4
Islamabad

Tel: 051-9108008
Fax: 051-9108007

No. IRSA/CE(O)/297/1244-46
09th September 2014

The Secretary
Irrigation Department
Government of the Punjab
Lahore.

SUBJECT: **JALALPUR CANAL PROJECT — CERTIFICATE OF WATER AVAILABILITY FROM IRSA**

Reference: Director Regulation (IWT&R), Irrigation Department, Government of the Punjab, letters No. IWT&R/14/718/6/92 and IWT&R/14/1022/6/92 dated 30th April, 2014 and 27th August, 2014, respectively.

I am to inform that IRSA has no objection to the subject project provided that the province shall remain within its allocated share under the meaning of Para-8 and 14(d) of Water Apportionment Accord 1991.

(Muhammad Khalid Idrees Rana)
Secretary

Copy for information:
1. All IRSA Members, Islamabad.
2. Director Regulation (IWT&R), Irrigation Department, Government of the Punjab. Lahore.

Figure 8.3: IRSA Approval Letter

525. The Jalalpur canal is designed as a non-perennial canal system to be operated during flood season only. The Consultants collected data for flows of the Jhelum River below Rasul Barrage for 23 years from 1991-2013. Perusal of discharge data shows that the design discharge of Jalalpur canal of 1,350 cusecs (38.15 cumecs) is available at Rasul Barrage as per canal requirements with 100% probability. Average releases below the Rasul Barrage and requirement of JIP is shown in **Figure 8.4.**

526. It is clear from the **Figure 8.4** that JIP water requirement can easily be fulfilled from the Rasul Barrage as that forms a fraction of downstream releases. JIP required flows as percentage of average total releases below Rasul Barrage is shown in Figure.

527. A maximum of 11.71% percent of average releases below the Rasul Barrage is required for sustainable and smooth operation of JIP at the mid of September every year.

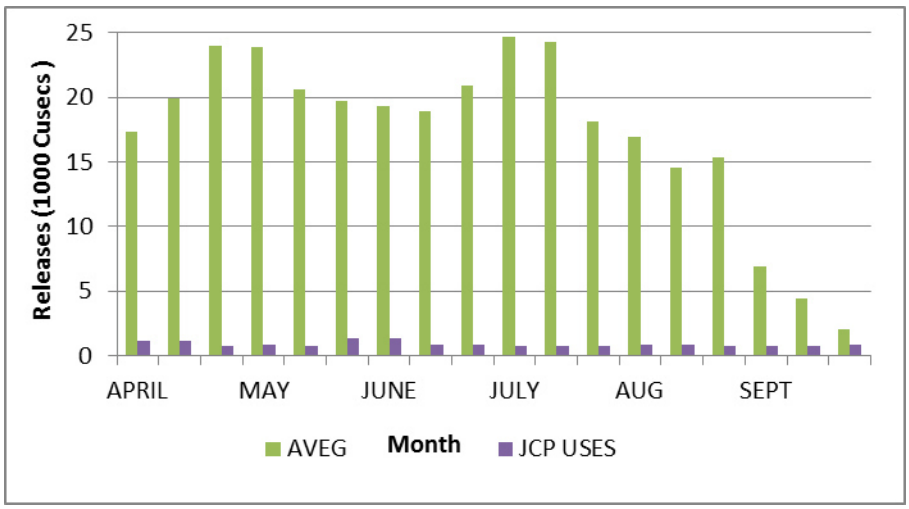

Figure 8.4: Average Releases below the Rasul Barrage and JIP Water Requirements

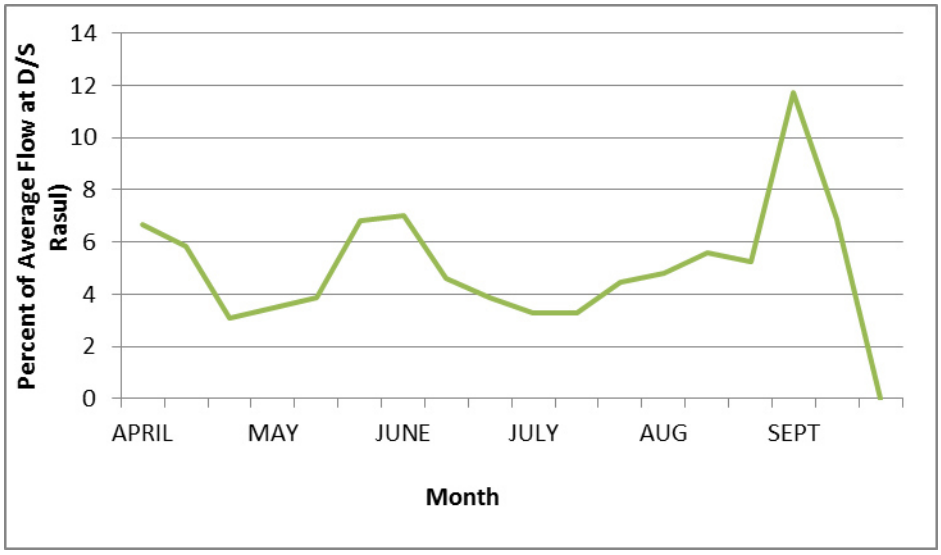

Figure 8.5: Percent of JIP Releases of Average Releases below Rasul Barrage

8.7.8. Water Rights Issues in the Area

Potential Impact

528. The EIA team found that generally people in the area are living in harmony without any major social fault lines based on ethnicity, religion, caste or creed. Water being the most precious commodity in the area, its usage rights has been established traditionally. Any perceived or real disturbance to these water rights will almost certainly lead to social disturbance in the area. This impact would be of high significance.

Mitigation Measures

529. As proposed during feasibility, judicious water distribution through "Warabandi System" engaging KPs, communities and PID has been carried out at detailed design stage. Traditional water rights have also been taken into account during the detailed design. In this regard, continual two-way communication has been carried out with the local population to ensure that their perceptions about the Project remain realistic, rational, and positive. In addition to that, social surveys have been carried out to involve local public to tackle their issues so as to maximally benefit them from the proposed Project. By adopting these measures, the impact would be of low significance.

8.7.9. Community Fragmentation

Potential Impacts

530. During community consultations performed at feasibility and detailed design stage local people raised their concerns on fragmentation of land of many farmers on both sides of proposed main canal and distributaries. This will result in difficulties in managing agricultural practices for a single landholder owning pieces of land on both sides of canal and distributaries. The farmers may lose control over their split lands. Another issue forwarded by the communities was that canal may divide the communities and they may loss accessibility to schools, graveyards, dispensaries etc. falling on the other side of canal. The impact would be of moderate to high significance depending upon the quantum of fragmentation.

Mitigation Measures

531. Due consideration has been given to this aspect at detailed design stage. Inter-Community fragmentation has been avoided during optimization of canal alignment. In addition, 30 numbers of footbridges for pedestrian have been proposed for main canal and distributaries.

8.7.10. Public Disclosure of Final Design

Potential Impact

532. Many respondents during the public consultation expressed their concerns about the design and construction quality of the proposed interventions. Failure of any intervention due to inappropriate design or sub-quality construction, will lead to malfunctioning of the system, and may cause localized disaster (e.g. breach of canal). Similarly, many people stressed that maximum possible area should be included in the direct command area by taking the main Canal to maximum possible elevation. This impact would be of moderate significance.

Mitigation Measures

533. Design team was fully involved in stakeholder's consultation for the public disclosure of the detailed design with the assistance of EIA, Social and other technical teams. People of the area are well aware of the proposed Project and are in favour of early construction of the Project. Canal alignment has been shared with the identified stakeholders and local public through public consultations and departmental meetings. Public awareness during the Canal

alignment finalization and detailed design helped to decrease the significance of impact from moderate to low.

8.7.11. Coordination with all Relevant Departments for NOCs

Potential Impact

534. Considering the updated alignment of the main Canal and distributaries under the current mandates of various departments, the proposed Project needs approvals and NOCs from numerous line departments e.g. provincial highways, National Highway Authority, Pakistan railways, EPD etc. These government departments' approvals might take substantial time as well. If the inter-departmental coordination is not strong in the case of getting approvals, this might cause delays in Project implementation and result in undue cost overruns. This impact would be of moderate significance.

Mitigation Measures

535. The most important mitigation measure, however, remains satisfactory level of inter-departmental coordination. Once the main Canal and distributaries alignment has been finalized, the PID being the proponent, should call a meeting of all major stakeholder departments and share the route of the main canal and distributaries for the major crossings including the salient features of the proposed Project. The meeting should discuss and finalize the role and contribution of various departments in the Project. By adopting the above measure the impact would be of low significance.

8.7.12. Disruption to Wildlife

Potential Impacts

536. During the establishment of baseline environmental study at detailed design stage, common wildlife species were found. However, *Punjab Urial*, a large ungulate which is being protected for propagation is distributed in hilly areas of salt range and their habitat falls outside Project's AOI. As ungulates and urial habitat is not in Project AOI so these animals will not be disturbed by the project activities. All National Parks and Game Reserves are out of AOI. However, common wildlife would be disturbed due to project intervention. The impact significance regarding disruption of wildlife will be moderate.

Mitigation Measures

537. During baseline surveys at detailed design stage, it has been assessed that chances of Ungulates visits particularly *Punjab Urial* to Jhelum River in dry season for drinking water are negligible due to the human settlements along the edge of the foothills and the vehicular traffic along the Pind Dadan Khan-Mandi Bahauddin Road. Besides that, the proposed canal will be lined all over and provision in design has already been made to provide drinking water facilities and elevated structures along the canal. The variation in conduit structure, considering the torrential run off will not interfere with the natural flow from the neighboring hills, keeping the structure prevented from erosion.

538. By taking the above measures, the impact on wildlife will be low.

8.8. Impacts during Construction Phase

8.8.1. Soil Erosion/Stability

Potential Impacts

539. Significant excavation and slope cutting is expected from the Project to uphold level differences. Construction works may temporarily change the grading of the natural ground surfaces and due to instability of top soil surface, soil erosion may occur. Soil erosion may also occur during the construction phase in the Project area as a result of improper runoff drawn from the equipment washing-yards and improper management of construction activities. Unmanaged material extraction at quarry areas may also cause soil erosion. **Table 8.7** gives the estimated cut/fill volume of the main Canal and its distributaries:

Table 8.7: Cut/ Fill Volume of Proposed JIP

Sr. #	Description	Quantities (ft^3)
1	Excavation	347,907,000
2	Filling	402,141,000
3	Borrow	54,234,000

540. While every effort should be made to minimize the excavation by optimal utilization of the existing contours, the cutting and filling operations may lead to erosion due to loosening of topsoil. Excavation of soil may alter the topography and may also lead to soil erosion. Excavation may also result in loss of top fertile soil. Apart from soil erosion, cut and fill designed channels mostly result in high risk and damage to canal stability. This impact would be of high significance.

Mitigation Measures

541. By adopting following measures, impact would be finally of low significance:

- The stability of canal must be ensured by contractors by provision of safe support structures wherever cuts and fills are vulnerable, canal banks/embankments are unstable or not sustainable;
- Keep minimum land clearance;
- Avoid, wherever possible, clearing areas of highly erodible soils and steep slopes which are prone to water and wind erosion;
- Erosion control measures such as ramming of topsoil immediately after excavation and silt controls should be provided to minimize erosion;
- Construction work should not be carried out during heavy monsoon rains;
- Construction activities should be planned in a manner that minimum area of soil is exposed during times of the year when the potential for erosion is high, for example during summer when intense rainstorms are common;
- Keep vehicles/traffic/machinery on well-defined haul roads;
- It should be ensured that no soil is left unconsolidated after completion of work;
- Photographic record should be maintained for pre-project, during-construction and post-construction condition of the sites;
- Monitoring during the project execution will ensure compliance to the above mitigation measures and their adequacy;
- Contractor would prepare material borrowing and disposal plan;
- Avoid cultivation fields for borrowing material to the extent possible;
- Obtain written consent of the land owner for material (soil) borrowing;
- Keep photographic record (before, during, after) for borrow and disposal areas;
- Leveling of borrow sites;

- As far as possible wasteland or natural areas with a high elevation should be demarcated for borrowing earth material;
- Strip and stockpile the top 300 mm of the plough layer for redressing the land where the use of agriculture land is unavoidable;
- Where deep ditching is to be carried out, the top one (01) m layer of ditching area should be stripped and stockpiled. The ditch will be initially filled with scrap material from construction and then leveled with the stockpiled topsoil;
- The fertile topsoil should be removed with due care and preserved safely for reuse purpose;
- Ditches or borrow pits that cannot be fully rehabilitated should be landscaped; and
- Land owners should be compensated according to the terms of lease agreement.

8.8.2. Soil Contamination

Potential Impacts

542. Soil may be contaminated as a result of fuel/oils/chemicals spillage and leakage, and inappropriate disposal. The waste would be generated from site clearance, excavation, concrete batching, concrete conveyance and construction of substructures and superstructures. This impact would be of moderate significance. The generated solid waste would be in the form of:

- Excavated soil;
- Residual from construction material (construction debris etc.);
- Residual from equipment cleaning (oiled rags, used oil, worn out spare parts etc.); and
- Domestic solid waste from labor camps.

543. Solid waste left on open places give rise to obnoxious smells and air pollution and also spoil the aesthetic values of the area. It is also unhygienic and can facilitate the spread of pathogens and disease. Solid waste generation with an expected influx of workers from offices, residential colonies and contractor camps at the peak of construction are estimated to produce about 0.45 kg/capita/day[9] of solid waste. Three construction camps proposed with 300 number of workers in each camp. **Table 8.8** below shows an average estimate of the number of workers during the construction phase and estimated solid waste generated.

Table 8.8: Estimated Solid Waste Generated by Workers

No. of Workers	Estimated Solid Waste Generated per day
900	405 kg/day

Mitigation Measures

544. By adopting following measures, impact would be finally of low significance:

- Surplus soil from the excavation activity may be reused within the site or recycled to other intervention sites;
- Clearance waste and construction debris should be sent to designated disposal site while waste from equipment cleaning and maintenance should be segregated and stored in color coded containers, these can be sold again or reprocessed. No accumulation of solid waste at site shall be allowed;
- Avoid vehicular traffic on unpaved roads as far as possible;
- Vehicles and equipment shall not be repaired in open fields;
- If unavoidable, impervious sheathing shall be used to avoid soil and water contamination;

[9] Source: The World Bank Report 2012 – What a Waste: A global review of solid waste management. Based on UNEP estimates for waste generation in the Asia Pacific. Average is 0.45 kg/capita/day.

- Solid waste should be disposed of at designated places and contractor to obtain NOC from district governments for disposal of any material in existing disposal points; and
- Contractor to prepare a primary and secondary solid waste collection system within the premises of contractor camps and get it approved by PID.

545. In addition to that, proper storage and collection should be arranged in the residential camps, workshops, material storages and all the other solid waste generating locations. Best management practices should be adopted to minimize the solid waste generation and for that three 'R' policy i.e. Reduce, Recycle and Reuse policy should be adopted. A site specific solid waste management system should be developed by the contractor for the safe disposal of solid waste during construction.

8.8.3. Water Quality

Potential Impacts

Surface Water:

546. The construction of the proposed project may have impact on the surface water quality, in the form of increased turbidity of water, from potential discharge of anthropogenic or construction wastes. Details of potential sources of water quality contamination are as follows:

- Runoff generated from crushed gravel wash and ground rock materials due to drilling, blasting and quarrying activities;
- Waste water effluents and sewage from workshops and construction camps;
- Accidental spillage, improper handling, storage and use of hazardous and toxic materials (e.g. lead acid batteries; explosive material and fuse material; acids; varnishes and paints; and hydrocarbons including petrol, diesel, and lubricants) can pollute the water;
- Washing of vehicles and other machinery can pollute the river water with oils, grease and other mud material;
- Dumping of spoiled material too close to the river, where it can be washed out during floods;
- Chemical additives in concrete and the empty containers (the chemical are added to concrete are used as setting-time retarders, these are polymers compounds).

547. Contamination with receiving water bodies (i.e. river and torrents) may also result due to spilling of construction materials. There may be increase in the turbidity levels due to the surface runoff from the construction sites. Results of tested water quality of hill torrents revealed that water is neither good for irrigation purpose nor fit for human consumption at all, so the significance of impact is assessed as moderate. **Table 8.9** below shows an estimate of the wastewater to be generated from construction camps during the course of the construction phase of the project assuming that on average the water demand per person is 100 litres per day and that 80% of the water demand will become wastewater.

Table 8.9: Estimated Wastewater Generated by Workers in Construction Camps

No. Of Workers*	Estimated Total Water Demand (litres/day)	Estimated Wastewater Generated (litres/day)
900	90,000	72,000

* 300 number of workers in each construction camp

Ground Water:

548. Water will be required for the construction purposes although the quality of the water is not good. Groundwater quality is brackish at all construction camps except Misri More construction camp, where ground water will possibly be used for construction and other

purposes by labourers. Groundwater shall not be used for construction at construction camps 2 & 3 i.e. near Pind Dadan Khan and Dudhi Thal. The contractors shall arrange water for construction at these two camps. At construction camp 1 i.e. Misri More, there will be negative effect on the available water quality and quantity. Water required for construction may result in increase in original use of water. It is also expected that groundwater supplies, which need to be tapped to meet campsite and construction requirements will lower the water table in the Project area.

549. Moreover, earth works like soil excavation may affect groundwater resources, but as the groundwater quality is already quite low and groundwater extraction is not largely proposed for the construction activities of the Project, no further impacts are envisaged on the groundwater quality. Ground water pollution can take place, if chemical substances and oily waste get leached by precipitation of water and percolate to the ground water table. The activities mentioned above will deteriorate the quality of water, which is already brackish; hence the significance of impact is assessed as moderate.

Mitigation Measures

550. International best practices should be adopted to limit and control the release of pollutants to the surface water from the construction site. Any discharges into the surface water bodies should be preliminary treated, which can be achievable mostly by sedimentation/settling tanks before discharging. All fuel and oil storage sites should be surrounded by a catcher drain and oil water separators to capture the spills. For the ground water, efforts should be made to draw water from deep aquifer which does not influence the top unconfined aquifer which is being exploited by the local community. However, this should be done by carefully adopting the recommendations of Hydrogeological Study. It will be the responsibility of the contractor to ensure safe supply of water for construction purposes.

551. The following mitigation measures will be implemented onsite to minimize the risk of surface and groundwater contamination:

- Construction activities such as excavation and earth filling and construction of embankment should be scheduled during non-monsoon season;
- Surplus earth should be transported from the construction site and no other disposal should be allowed;
- Work sites and access roads should be carefully selected so that surface runoff does not enter the river;
- Provision of storm water drainage system at site should be confirmed;
- Silt fences, sediment barriers or other devices should be provided to prevent migration of silt during construction within river, streams or nullahs;
- Provision of soakage pits for domestic discharges at construction camp sites;
- Accidental spills and leakages that may occur during construction would be avoided by taking proper safety measures, such as the construction of bunds around oil tanks and storages of chemicals;
- Hydrocarbons will be stored minimum 100 m away from rivers and nullahs within the bunded areas.
- Spillage of fuel/oils and other construction materials shall be contained with best handling/construction practices and strict skilled supervision;
- Appropriate sanitation system and water supply facilities should be provided in the labor camps; and
- Proper sewerage disposal arrangements to be provided such as septic tanks and soaking pits at Camp Sites.

8.8.4. Air Quality

Potential Impacts

552. The potential sources of air pollution from construction activities include excavation works, exhaust gases from motor vehicles, operation of construction machinery and dust. The main effect on air quality during construction is caused by increased dust and emission levels from construction machinery, earth moving activities, excavation, batching plant operations and construction vehicles. Due to loading/unloading and stocking of construction material, the air quality over the immediate influence area will be affected and the PM levels in ambient air might increase, though not in significant levels. Expected emissions due to construction activities comprise CO, NO_x, SO_x and PM_{10}, these emissions will be mainly restricted to the Project site. The emissions from diesel generator sets, construction equipment/machinery and vehicles may deteriorate the air quality in the area.

553. Pollution causing activities during the construction phase are as follows:

- Emissions from automobiles and construction equipment consist of the gaseous and particulate products of engine fuel combustion (exhaust emissions) and evaporation and leaks from vehicles (fugitive emissions).
- Transportation of construction and excavated material to and from the site in diesel fueled trucks would cause the production of combustion gases (CO, CO_2, NOx, SOx). Considering the scale of construction, the population size, and relatively clean environment, moderate impact is expected from this activity. However, the emissions would be of temporary nature.
- Considerable amount of dust would be generated from slope cutting activity and also from other activities such as site clearance, excavation and transportation of excavated and construction material and concrete batching, but its effect would be of localized and temporary nature; and
- The concrete mixer used during concreting also causes above mentioned emissions. Based on the scale of construction and frequency of the operation, the impact of emissions is also assessed to be moderate but temporary.

554. Exhaust gasses and dust caused by moving vehicles, windblown sand and dust from construction activities can be blown in to residential and grazing areas and cause a nuisance to the local population and animals. This is not only a potential nuisance to the adjacent or nearby occupants (particularly sensitive land uses such as schools, hospitals or residential areas) but in some instances also poses potential health risk.

Mitigation Measures

555. Presently the air quality of the Project area is good and within the required limits of PEQS. In order to reduce the airborne dust emissions in the construction area due to material transport and construction activities, provisions will be made for sprinkling of water in the area where earth filling and excavation is being carried out. It will be ensured that the construction debris is removed daily. All construction related impacts can be mitigated by adopting sound environmental practices during construction. By adopting following measures, impact would be finally of low significance:

- Ensure that all vehicles and machinery are fitted with appropriate emission control equipment, maintained properly and serviced according to the manufacturers' specifications;
- Smoke from internal combustion engines should not be visible for more than ten seconds;
- Fit and maintain appropriate mufflers on earth-moving and other vehicles on the site;

- During windy conditions stockpiles of fine material should be wetted or covered with plastic;
- Take dust suppression measures, such as promptly watering exposed areas when visible dust is observed
- Implement a programme for sprinkling water on the roads under use for movement of construction machinery / equipment/ labour.
- Personal Protective Equipment (PPEs) such as dust masks will be made available to the construction workers at the site to avoid potential health hazards;
- Schedule deliveries to the site in day time so that disruption to local community and traffic are minimized;
- Idling of delivery trucks or other equipment should not be permitted during periods of unloading or when they are not in active use;
- In no case, loose earth will be allowed to pile up along the approach roads;
- All vehicles and other equipment's used during construction should be properly and regularly tuned and maintained;
- All permanently deployed vehicles exhausts should be monitored against PEQS; and
- Possibility of excessive dust generation may be reduced by adopting the best construction practices, precautions such as periodic watering, covering of construction material and usage of low emission equipment's during construction.

8.8.5. Ambient Noise

556. Construction Noise modeling is done using "FHWA equation for Noise Prediction" to predict the noise levels due to construction activities. The equation is as follows:

$$L_{eq}\ equipment = E.L. + 10 \log U.F. - k \log D/D_0$$

Where:

L_{eq} = Equivalent sound level at a receptor resulting from the operation of a single piece of equipment over some time period

E.L.= Noise emission level of the particular piece of equipment based on its work cycle

K=Constant that accounts for topography and geometric spreading

D=Distance from the receptor to the piece of equipment

D_0 =Reference distance at which the noise emission level was measured from the piece of equipment.

U.F. =Usage factor that accounts for the percent time that the equipment is in use over the time period

557. This modeling has been done based on the rated noise potential of the common construction equipment. Noise modeling for the prediction of noise on sensitive receptors during construction phase is attached as **Appendix-XV** of this report.

Potential Impacts

558. During baseline survey, the recorded ambient noise level was found to vary between 48 to 85 dB (A). When the Project activities would start, it is very likely that the existing noise level would be amplified. The major sources of noise pollution during construction activities would be during slope cutting, excavation, loading, transportation, loading/unloading of materials and operation of construction equipment etc. The vibrators used for concreting also produce noise. The amplified noise levels will be temporary in nature and easily mitigated. At most of the construction sites, there are no major sensitive receptors except for some native reptiles that may inhabit the proposed sites. Schools and Basic Health Units do no fall in RoW of canal and are at reasonable distance from construction camps. There will be insignificant impact on schools. Four main hospitals exist in project AOI, which are Regional Health Unit (RHU) Jalalpur, Civil Hospital Pind Dadan Khan, Civil Hospital Khewra

and RHU Lillah. The hospitals are at safe distance from construction camps and there would be no noise issues. Table **8.10 & 8.11** provide the details of effected receptors (settlements) along main canal and distributaries alignment within 500 m distance, which may face noise during construction phase due to noise emitted by construction equipment.

Table 8.10: Noise Generated by Construction Equipment at Receptors Located Near Main Canal

Sr. No.	Receptors Near Main Canal	Distance from Construction Camp/Site (m)	Estimated Noise of Construction Equipment dB (A)
1.	Marryala	100	76.7
2.	Shah Kamir	183	71.4
3.	JalalpurSharif	280	67.7
4.	Ladwa	350	65.8
5.	Ratwal	300	67.1
6.	Pipili	280	67.7
7.	Kharidpur	440	63.8
8.	Pir Chak	360	65.5
9.	Nathial	327	66.4
10.	Chakri Karam Khan	180	71.6
11.	Thill Sharif	215	70.0
12.	Wara Phapra	163	72.4
13.	Sadhowal	260	68.4
14.	Wara Buland Khan	140	73.7
15.	Dhok Malka	211	70.2
16.	Kahana	200	70.6
17.	Daiwal	470	63.2
18.	RHU Jalalpur	Approximately 10 km from Camp 1 and 600 m from canal alignment	60.4
19.	Civil Hospital Pind Dadan Khan	Approximately 1.8 km from Camp 2 and 4 km from canal alignment	<55
20.	Civil Hospital Khewra	Approximately 4 km from Camp 2 and 1.7 km from canal alignment	<55
21.	RHU Lillah	Approximately 4.12 km from Camp 3	<55

Table 8.11: Noise Generated by Construction Equipment at Receptors Located Near Distributaries

Sr. No.	Distributaries & Minors	Distance from Construction Site (m)	Estimated Noise of Construction Equipment dB (A)
1.	Saiyidanwala (D-01)	110	75.8
2.	Pindi Saidpur (D-02)	352	65.7

Sr. No.	Distributaries & Minors	Distance from Construction Site (m)	Estimated Noise of Construction Equipment dB (A)
3.	Arain Abad (D-02)	350	65.8
4.	Karimpur (D-02)	190	71.1
5.	Dhingawal (D-02)	310	66.8
6.	Aadoawal (D-02)	400	64.6
7.	Haran Pur (D-02)	350	65.8
8.	Hattar (D-02)	338	66.1
9.	Samanwala (D-05)	218	69.9
10.	Daffar (D-06)	100	76.7
11.	Saroba (D-07)	300	67.1
12.	Said Rahman (D-10)	215	70.0
13.	Kot Lakhiar (D-10)	410	64.4
14.	Kotla Saidan (D-10)	100	76.7
15.	Jandran (D-10)	230	69.4
16.	Kot Baran (D-10)	152	73.0
17.	Kallah (D-11)	436	63.9
18.	Rai Shahr (D-12)	110	75.8
19.	Bugga Sharif (D-13)	390	64.8
20.	Jaswal (D-16)	330	66.3
21.	Talokar Kurar (D-18)	108	76.0

559. The above results of modeling depict that use of construction equipment will not change the noise levels in nearby settlements except the settlements from where the distance of construction site is less than 100 m. However, in comparison with residential area noise, PEQS values are high for day time as well as night time. This impact would be of moderate significance.

Mitigation Measures

560. Enhanced noise levels should be prevented and mitigated by careful planning of machinery operations, use of low noise equipment and scheduling of operations only during the daytime in order to reduce these levels. Though the impact of noise may be of temporary nature, the following measures shall be considered and implemented:

- Construction contract will clearly specify the use of equipment emitting noise of not greater than 75 dB(A) for the eight hour operation shift;
- High noise emitting equipment, if any, should be fitted with noise reduction devices such as mufflers and silencers wherever possible;
- For protection of construction workers, earplugs would be provided to those working very close to the noise generating machinery;
- High noise emitting equipment, if any, should be used during regular working hours so as to reduce the potential of creating a noise nuisance during the night;
- Slope cutting activity should be carried out during fixed hours (preferably during mid-day). The timing should be made known to all the people within 500m from the site in all directions;
- Regular inspection and maintenance of the construction vehicles and equipment should be carried out;

- Replacement of worn out and noise producing parts of construction machinery should be timely done;
- In case of severe noise, sound barriers should be used to avoid dispersion of sound waves into the nearby community; and
- In case construction activities may disturb any school or RHUs, hospitals; the construction material transportation routes and camps location should be shifted away after consultations with the schools and hospitals. Moreover, construction activities will be conducted during vacation time of schools (if any).

561. The implementation of the above measures will generate impacts of low significance.

8.8.6. Construction Material Transportation

Potential Impact

562. Approximately 17, 951,500 cubic feet of concrete will be needed for canal lining, piling work and for construction of allied structures. The cement, sand and aggregates for concrete and other construction material for the JIP would be transported to the project site. The construction material transportation may cause damage to existing roads and inconvenience to public. The impact would be of moderate significance.

Mitigation Measures

563. EIA team in collaboration with design team worked on construction material transportation routes for safe haulage of construction materials. The project area, being 120 km long and 7 to 8 km in width, can be accessed through M-2 bisecting the project in center at Lillah Interchange. On eastern side, the project area is accessible through GT Road (Jhelum, Kharian and Gujrat) after crossing over Rasul Barrage. The project area is connected with Katha-Sagral road at its tail end. Inside the project area, various points can be reached through a district road and village roads network. The stone quarry at Baghanwala village will be used for flood protection works during the construction. There are three cement factories located at less than 20 km distance from the project area and having district roads access. The cement would be transported via existing road network in the project. Other construction material such as steel, crush and sand which would be transported from outside the project area through M-2 or GT road depending upon the freight charges and easiness. The project area can also be accessed from Mandi Bahuddin through railway line.

564. The main roads i.e. M-2, GT Road and district road crossing through the project area along its length, have enough capacity to bear the traffic load transporting the construction materials. Minimum road carrying capacities of M-2, GT roads and district road through the project area are more than 2000 vehicle/hour/day. Similarly, the road carrying capacities in term of load are designed for carrying axel load of 25 kip (HL-93, AASHTO). The internal roads are also adequate to carry the construction material throughout the project area. Therefore, as such no traffic jams are anticipated due to project activities as project activities are spread in the 120km by 10km stretch. However, the contractors would be required to prepare and implement Traffic Management Plan for better and smooth transportation through district and village roads. Figure 8.6 shows the network of existing roads and railway lines for construction material transportation.