GUIDELINES FOR

SOCIAL AND ENVIRONMENTAL ASSESSMENT

OF IRRIGATION SECTOR PROJECTS

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STRATEGIC PLANNING & REFORM UNIT
PUNJAB IRRIGATION DEPARTMENT
IRRIGATION SECRETARIAT, LAHORE

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LIST OF ABBREVIATIONS

ADP	Annual Development Program
APs	Affected Persons
BMPs	Best Management Practices
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EPA	Environment Protection Agency
EPD	Environment Protection Department
GDP	Gross Domestic Product
GRM	Grievance Redress Mechanism
IEE	Initial Environmental Examination
LAA	Land Acquisition Act 1894
PAP	Project Affected Persons
PEPA	Punjab Environmental Protection Act 1997 (Amended 2012)
PEQS	Punjab Environment Quality Standards
PSDP	Public Sector Development Program
PPE	Personal Protective Equipment
RAP	Resettlement Action Plan
SPRU	Strategic Planning & Reform Unit

GLOSSARY

Archaeological sites: The sites which have significance as built heritage and have historic value

Climate change: It is a change in the statistical distribution of weather patterns when that change lasts for an extended period of time (i.e., decades to millions of years)

Cultural sites: The sites which have educational, artistic, civilizing, literary and intellectual value

Effluent: Any material in solid, liquid, or gaseous form or combination thereof being discharged from any source including vapors, suspension or slurry

Environmental Impact Assessment (EIA): An environmental study that includes the collection of data, prediction of qualitative and quantitative impacts, comparison of alternatives, mitigation measures and public consultation

Geology: It deals with the physical structure and substance of the earth, their history, and the processes which act on them

Health hazards: The hazards which can cause damage to human health either by direct or indirect means e.g. during project activities

Initial Environmental Examination (IEE): A preliminary environmental review of the impacts of a proposed project to know its effect on environment

Punjab Environmental Quality Standards (PEQS): It is conferred under clause (c) of sub section (1) of section 4 of the Punjab Environmental Protection Act 1997, mentioning permissible pollution standards for air, water and noise

Protected area: An area of land especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and is managed through legal or other effective means

Physiography: It aims to understand the description of features / phenomena of nature and the forces that produce and change rocks, oceans, weather, and global flora and fauna patterns

Sustainable development: The development which meets the demands of present generations without compromising the needs of future generations to meet their needs

Smog: It is basically derived from two words; smoke and fog. Smog is also used to describe the type of fog which has smoke or soot in it. It is yellowish or blackish fog formed mainly by a mixture of pollutants in the atmosphere which consists of fine particles and ground level ozone. Smog which occurs mainly because of air pollution, can also be defined as mixture of various gases with dust and water vapor

Water logging: It refers to the saturation of soil with water. Soil may be regarded as waterlogged when the water table of the groundwater is too high

PREFACE

Century old Punjab irrigation system is the largest contiguous irrigation system in the world. This massive system is serving 21 million acres (8.4 million hectare) cultivable command area of the Punjab. Maintenance works of different nature are essential for the sustainability of huge irrigation system and for continuous water supply to irrigate fertile lands of Punjab. These works have social and environmental impacts that requires due considerations during the execution stage. These environmental compliances may result in far-reaching benefits not only to the irrigation projects but also to the nearby community.

The Strategic Planning and Reform Unit (SPRU) has developed social and environmental assessment guidelines for the capacity building of field officers so that they may assess the environmental performance of the project. These guidelines are in line with Punjab Environmental Protection Act, 1997 (Amended 2012). Executing officer will make sure that project is being implemented in conformity with the environmental laws and regulations and as per guidelines specific for developmental activities.

These guidelines briefly describe the categories of development schemes, an overview of the legislations relevant to the environment and baseline information for the project. These guidelines also contain anticipated impacts that may arise from development activities as well as measures to mitigate these issues. Guidelines may serve as a resource material and may provide line of action to the executing officers for the best practices in determining the nature and severity of anticipated impacts and in implementing appropriate mitigation measures.

The assessment of social and environmental impacts, mitigation and monitoring role lies with the executing officer who can make the project environment friendly. The contractor is also responsible for on-field implementation of the environmental compliance. Strategic Planning and Reform Unit (SPRU) is geared towards ensuring the dissemination of these guidelines amongst irrigation staff for their capacity building. The overall objective of this initiative is to ensure the social and environmental compliance in letter and spirit.

1 INTRODUCTION

Agriculture sector contributes 21 % of the total Gross Domestic Product (GDP) and over 90 % of agricultural output in the province comes from farmlands irrigated by one of the largest contiguous irrigation systems in the world. This huge irrigation conveyance network is serving 21 million acres (8.4 million hectare) cultivable command area with 120% cropping intensity.

The Punjab Irrigation system comprises of main canals, branch canals, distributaries, minors and sub minors. It has a length of 23,184 miles (37311 km). The 24 canal systems, which have a total capacity of 1.2 lac cusecs, draw their allocated discharges from 13 barrages of the Punjab. These barrages control diversion of supplies to the inter-river canals which transfer the water from the western rivers to the eastern rivers to cater for irrigation systems off taking from these rivers. The water from the rivers is diverted to main canals / link canals at the Barrages and distributed to the farmer's fields through the lengthy irrigation network.

1.1 Categories of Development Works

Punjab Irrigation Department is undertaking a number of development schemes to enhance the capacity and conveyance efficiency of irrigation systems. The projects under the following categories of work are:

1) Mega projects funded by donor Agencies like Asian Development Bank, World Bank and Japan International Cooperating Agency
2) Projects under Annual Development Program (ADP)
3) Projects under Public Sector Development Program (PSDP)

In addition, Punjab Irrigation Department is carrying out repair and maintenance of its infrastructures and assets every year and sizeable budget is earmarked for operation and maintenance works.

Large-scale projects in irrigation sector which involve heavy investment are undertaken with the financial assistance of donor agencies or foreign-aid. The development of these projects, due to their scale, has several adverse social and environmental impacts. When major or severe impacts are anticipated, a detailed social and environmental study i.e. Environmental Impact Assessment (EIA) or Initial Environmental Examination (IEE) under Punjab Environmental Protection Act, 1997 (Amended 2012) and Punjab Environmental Protection Agency Review of IEE/ EIA Regulations, 2000 is undertaken. Section 12 of Punjab Environmental Protection Act 1997 (Amended 2012) makes it mandatory for the project proponents to carry out an **Initial Environmental Examination (IEE)** if the project impacts are minor and of localized nature. **Environmental Impact Assessment (EIA)** is required**,** if the project impacts are adverse and significant or if the project falls in the protected area. Generally, Project Implementation Unit is established for conducting social and environmental study and for monitoring of the large scale irrigation projects.

Environmental Management Plan is prepared which encompasses institutional arrangements, trainings, consultations, monitoring and implementation cost and Grievance Redress Mechanism (GRM). SPRU coordinates with these units to review their activities related to environmental management.

Projects under ADP schemes are implemented by Irrigation Department through Annual Development Program (ADP) budget. These projects do not normally have significant/ adverse impacts on site or in the area but during the project execution period, they may cause low to moderate level of negative but reversible localized impacts which can be easily managed. The assessment, management, implementation and monitoring role lies with the executing officer who is also responsible for making the project environment friendly.

Projects under Public Sector Development Program (PSDP) are mainly focused on the lining of canals, rehabilitation of drainage systems and management of floods by constructing/ rehabilitating/ maintaining flood protection infrastructures. Funds for PSDP are provided by the Federal Government. The impacts of these projects are minor to moderate in severity and can be easily avoided through good design and better planning or through proper selection of mitigation measures.

Small scale operation and maintenance projects are done with maintenance & repair budget. The impacts of projects under O&M are associated with the execution stage and are minor in nature which can be mitigated easily. Environmental Assessment (EA) requirement of the project is pre-requisite before the start of any work. All the executing officers should ensure the filling of project based social and environmental checklist so that it may be incorporated in the PC-1.

1.2 Objectives of the Guidelines

Development schemes generate social and environmental issues that create nuisance for general public, water users and irrigation department. The objective of the *Guidelines for Social and Environmental Assessment of Irrigation Sector projects* is to provide a roadmap for the best practices and to increase the knowledge base of the field officers on social and environmental issues of irrigation sector projects. The guidelines would:

- Make Irrigation Department environmentally responsible by adopting the best environmental management practices for development projects
- Make canal officers responsive about the social and environmental issues and mitigation measures
- Enhance capacity of the field officers for filling of Environmental Assessment checklist related to all types of development projects
- Enable the canal officers in identifying and managing social and environmental issues of development works/ schemes
- Protect environmental resources and minimize the negative impacts by putting into practice proper mitigation measures

1.3 Punjab Environmental Protection (Amendment) Act, 2012 and Environmental Guidelines

The Punjab Environmental Protection Act, 1997 (Amended 2012) establishes the procedures and steps related to Environmental Assessment (EA) for development projects in different sectors. The requirement for environmental assessment is laid out in Section 12 (1) of the Act. Under this section, no project involving construction activities or any change in the physical environment can be undertaken unless an Initial Environmental Examination (IEE) or an Environmental Impact Assessment (EIA) is conducted and approval is received from the provincial Environmental Protection Agency (EPA). Section 12 (6) of the Act states that the provision is applicable only to such categories of projects as may be prescribed. The categories are defined in the Punjab Environmental Protection Agency Review of IEE and EIA Regulations, 2000 which state that projects falling under any category specified in Schedule I, require the proponent to file an IEE while projects falling in category specified in Schedule II or in protected areas require the proponent to file an EIA **(Annexure-A).**

Large irrigation investment projects require IEE/ EIA in accordance with National/ Provincial legislation. Donors have their own environmental and social safeguard measures and policies which are to be fulfilled by the executing agencies for project implementation. Environmental and social assessment report is prepared as per specific requirements of the project.

Several small and medium irrigation, drainage and flood sector projects, financed with provincial and federal resources, are not covered under the categories defined in the Punjab Environmental Protection Agency Review of IEE and EIA Regulations, 2000. SPRU of Irrigation Department prepared "Guidelines for Social and Environmental Assessment of Irrigation Sector Projects" and checklist to fulfill social and environmental needs of these development projects. Execution of projects by using these guidelines and checklist may ensure timely mitigation of adverse social and environmental impacts that ultimately may improve the environmental management of the project area. These guidelines/ checklists are developed to facilitate executing officer and to fulfill the social and environmental requirements of small scale development projects. Social and environmental wing of SPRU will assist in reviewing the checklist according to nature of project/ magnitude of impacts, suggesting mitigation options and guiding the executing officer for its implementation during project execution stage.

1.4 Guidelines- Towards Good Practice

The "Guidelines for Social and Environmental Assessment of Irrigation Sector Projects" have been developed after lessons learnt from field experiences and consultations with field officers. These guidelines comprise of details regarding identification and management of social and environmental issues of irrigation sector projects and may serve as a resource material. These guidelines may possibly provide direction to the executing officers in determining the nature and severity of anticipated adverse impacts and in selecting appropriate mitigation measures.

2 SOCIAL AND ENVIRONMENTAL BASELINE INFORMATION

Baseline represents brief description of existing environmental setting of the project area. Social and environmental baseline information includes: physical, biological and socio-economic data. On the basis of baseline information, impact assessment is made and mitigation measures are suggested. Baseline also helps indicate the specific issues to be monitored during construction phase of the project. There are various tools like Checklist, Questionnaire, Interview and Discussion that can be used for generating social and environmental baseline data.

The environmental baseline data is comprised of:
Physical Environment,

- Land (Physiography, geology, seismicity and soils)
- Water (Water resources, water availability, water quality)
- Air (Meteorology and air quality)
- Noise (Noise levels)

Biological Environment,

- Ecology covers Flora i.e. trees, forest, vegetation, plants etc. and fauna i.e. animals, birds, fisheries etc.)

Social Environment,

- Socio-economic conditions (Demography/ Socio-economics, settlement, population, agriculture, hospitals, schools, industries, infrastructure, public health, land use pattern etc.)

2.1 How to Collect Baseline Data

Data collection is a process of gathering information in a systematic fashion that enables proponents for the evaluation of outcomes. For collection of information, screening and scoping process is imperative. Screening through project based checklist will help the executing officer in determining the project categorization requirement. Scoping process helps to anticipate social and environmental issues and to uphold discussion with community and other stakeholders regarding evaluation and assessment of these issues. It also ensures that the proponent is aware of the anticipated issues and has an understanding of their mitigation costs. It is also necessary to involve the communities from the very beginning in the scoping process so that their concerns about the potential impacts of project development may be addressed. Two types of questionnaires are used for baseline data collection i.e. village profile survey Form and household survey Form to prepare impact assessment reports. The data collection must be focused on project actions and their impacts to make comprehensive decision about project. Primary and secondary sources may be used for data collection.

2.1.1 Primary Source of Data

Primary baseline environmental data of the project area should be collected from first-hand sources through screening and scoping process. The impact should be identified keeping in view the project actions that are required to be carried out. Once impact has been identified, the need for further in-depth study can be clearly understood. Collection of primary data is an important component of any Environmental Assessment process. It is also useful for preparing environmental base maps at planning stage. Data collected during stakeholder consultation may also be helpful in filling up checklist.

Environmental baseline data includes physical, biological and socio-economic data. Project based checklist has been prepared for gathering the same baseline information of the project area. Based on such information, the major actions and their impacts i.e. requirement of land either voluntary or involuntary / resettlement or displacement of people resulting loss of structures, loss of assets, loss of livelihood etc. / disturbance to vulnerable groups / water availability hindrance for human, agriculture and livestock/ social conflicts that are likely to be emerged, are identified. Such type of information/ data should be collected by executing officer/ staff during planning stage and recorded on checklist for making a part of the PC1.

2.1.2 Secondary Source of Data

The executing officers may also collect environmental baseline data from different relevant departments and other stakeholders. The data from other resources is secondary sources data like land use data to be collected from the Agriculture Department or meteorological data (weather, rainfall, temperature etc.) may be collected from meteorological office. Some of the social data sources are provincial and district census reports, Punjab development statistics and reports of various projects. Additional data relating to forests, protected areas/ parks/ wildlife, wetlands, vegetation resources of special significance, archaeological/ cultural heritage sites, water availability or quality and water table depth may be collected from various reports, literatures, books or from different organizations. The executing officer may seek SPRU assistance for primary and secondary data collection if needed.

2.2 Role of Community

Project actions may have negative impacts on local population/ community, therefore, consultation and information dissemination about the project actions is very necessary at all stages. Consultation with community is a continuous process. Executing officer should inform the community about the purpose, nature and outcome of the project. Their views should be documented and options should be sought to avoid land acquisition/ displacement while planning the project. This may support the executing officer during filling up checklist. Executing officer should train field staff about the environmental considerations of the project so that they may collect right information from the nearby communities.

3 SOCIAL & ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Development projects are generally intended to improve the economic and social condition of people and uplift of the area but at the same time project activities may have significant negative impacts on nearby communities and the natural environment.

Punjab province is vulnerable to climate change threats. It is directly affecting the water resources in terms of disasters. The impact of climate change on development projects also needs due consideration during the planning and execution phases. Water sector infrastructures are under the threat of natural hazards like earthquakes, landslides and floods. Climate resilient infrastructures are very necessary for sustainable development of water sector projects.

Potential issues need mitigation measures to enhance the environmental and social values of the area. It is very important to understand the nature and severity of social and environmental issues of development works so that timely and effective measures for mitigation of identified social and environmental issues may be taken.

The negative social and environmental issues that arise from construction/ rehabilitation/ modernization of the projects/ schemes due to land acquisition, land leveling and clearance, construction of camp site/ machinery and stock yards/ bridges, desilting, excavation, diversion, lining, stone pitching and closure of canal etc. may be avoided with good design and management practices. Social and environmental checklist has been devised to assess these impacts, to propose mitigation measures and to ensure that all impacts have been identified or mitigated. Executing officer may identify the adverse social and environmental impacts at the planning stage, analyze their nature, magnitude, extent and then record the suggested mitigation measures in the checklist including its mitigation cost, implementation and monitoring responsibility.

In order to overcome the negative impacts on social, physical and biological condition of the project area, mitigation measures against each impact have also been suggested for uninterrupted work on projects. The executing officers should implement these measures to make the project environment friendly. The executing officer has the responsibility to allocate sufficient budget as environmental cost in the PC-1 prior to its submission for approval so that the proposed mitigation measures may be properly implemented.

3.1 Socio- Economic Impacts & Mitigation Measures

Change in land use pattern, change in command area and change in access to canal water or stress on local water resources may cause social issues which may lead to economic loss too. Land acquisition/ displacement and resettlement activity, degradation of cultural/ archaeological sites, conflicts on ethnic matters, and deterioration of scenic beauty of the area, and health / safety issues may have negative impacts on the socio-economic conditions. Anticipated socio-economic impacts with mitigation measures are outlined as follows:

Impacts	Mitigation
Displacement and Resettlement • Development induces displacement and resettlement. People may leave their homes or land as a result of development. • Displacement/ Resettlement of vulnerable groups may lose access to the resources to meet their daily needs. • Sometimes small land in strips is acquired. In such case, small land holders may lose their land and become Affected Persons (APs) or Project Affected Persons (PAPs). • Large scale projects i.e. construction of barrages/ Headworks, excavation of new canals/ drains and construction of small dams may have the issue of land acquisition or resettlement at larger scale. • There are risks of displacement that include homelessness, joblessness, landlessness, marginalization, food insecurity, increased morbidity & mortality, loss of access to the resources and social dislocation. These issues need due attention.	• Public consultations should be done with all landholders in project area prior to start of work for avoiding forced land acquisition/ resettlement. • Small land holders should be given due considerations. • Land acquisition should only be carried out in the areas where it is inevitable. • Transparent land acquisition process should be adopted. • Resettlement of the displaced people and restoration measures for their livelihood should be guaranteed. • If deemed necessary for larger scale land acquisition, it must be dealt in the planning phase with the procedures as laid down in Land Acquisition Act (LAA) 1894 and should prepare Resettlement Action Plan (RAP) or Resettlement Plan (RP). • The estimated cost of resettlement for implementation of mitigation measures should be allocated in project PC-1. • Executing officer should avoid taking private land. • Government land (belonging to irrigation department) should be used for project actions/ activities. • If land of other department is involved then NOC is required to be obtained. • Ensure that acquired land has been transferred to irrigation department.
Encroachment/ Illegal Settlement • Encroachment on the land belonging to Irrigation department is a common problem especially in remote areas. • Flood protection infrastructures etc. are	• In order to avoid encroachment/ illegal settlement on irrigation department land, the executing officers should be vigilant about this menace.

Impacts	Mitigation
encroached heavily. Illegal occupants at some places make permanent structures like houses, shops, mini shops and grow crops, vegetation or fodder etc. It may cause problem during construction, rehabilitation, maintenance & remodeling of infrastructure.	• Irrigation infrastructures should be regularly visited/ monitored through field staff. In case of illegal possession by any person, administrative or legal action should be taken immediately so that such practices may be discouraged. • During rehabilitation and maintenance of work on canal/ drain/ river or flood protection structures, already settled people must be properly managed and compensated.
Impact on Vulnerable Groups • Project action/ activities may affect vulnerable groups like women, children, destitute persons, old age people, tribal communities, squatters, and landless people. As these people normally do not hold any title of land or other property, they are treated as vulnerable groups. The change in land use pattern deprives them from their traditional means of livelihood. Indigenous people are also considered as vulnerable groups. • The squatters/ nomads become settled in or near public lands due to availability of better livelihood opportunities. Acquisition of such public lands in the project activity may deprive them from living place.	• Consultation is the only solution to avoid disturbance during project execution so that their livelihood may not affect. • They can be engaged as labor with the contractor staff for better livelihood opportunities. • If relocation of such people occurs, they should be compensated with their entitlement.
Health and Safety Issues • Improper execution and management of irrigation sector projects may cause health hazards for the nearby localities. • Disposal of municipal /industrial wastes into canals and drains deteriorates the water quality, making water unfit for drinking and agriculture purposes. It may cause unsafe and unhygienic living environment. Mostly the health problems relate to water borne and vector diseases. • During construction phase, the issue of	• Awareness for potential health and safety hazards should be done. • Proper disposal of rubbish and wastes from camp or construction site to avoid pooling of water in or around the area must be managed. • Safe drinking water, proper sanitation, medical facilities, firefighting equipment and safe storage for hazardous material should be provided to labor. • To prevent water borne diseases and to

Impacts	Mitigation
noise, air and dust can create health hazards for the labor and nearby communities. • Labor and local population, living within/ near the project, especially women, children and elderly people may also face safety issues like accident risks etc. during the work.	disinfect the drinking water from big reservoir like barrages/ Headworks or canals, the quality of water should be improved at the source. • Personal Protective Equipment (PPEs) for the labor i.e. safety shoes, gloves, masks, safety belt, goggles and ear muffs etc. should be provided. • Sprinkling of water should be ensured on site and on routes near communities. • Material should be transported in closed containers or covered with tarpaulin (Tarpal) sheets. • Burning of residue wastes, fuel and hazardous material in foggy weather must be banned to avoid Smog.
Gender Issues • Presence of outsiders in the area for project execution may cause Pardah issue. • Women landowners may be affected due to land acquisition and their life may be at stake in development process. • Project execution may confine / obstruct the access of women to sanitation, water points, washing areas and health care facilities. • Decreased employment opportunities, inequality in job opportunities and lesser role in decision making are gender related issues which normally don't have much importance.	• Labor camp should be located away from population. • Preference should be given to local workers to avoid entry of outsiders in their area. • Uninterrupted access for women to do household tasks and farm chores should be provided. • Employment opportunities to women especially to vulnerable women should be provided. • Awareness and education programs for women should be included to boost their social status and earning opportunities.
Damage to Infrastructure/ Utilities • The project actions/ activities i.e. land clearance and leveling, desilting and excavation, diversion etc. may damage public infrastructures/ utilities (schools, hospitals, deras, water supply, gas, telephone, and sewerage pipeline) which	• During project activity, threatened utility lines (water supply, gas, and telephone and sewerage pipeline) may be saved and maintained by proper management. • Efforts should be made to avoid damages to infrastructures/ utilities.

Impacts	Mitigation
may lead to disruption of public services and inconvenience to the local residents. • Movement of construction machinery on poorly maintained roads further deteriorates the road quality. • Animal burrowing and rain cuts may also damage embankment / canal banks.	• All public utilities likely to be affected by the proposed actions should be relocated before the commencement of the construction work. • Executing officer should make provision in the budget for the relocation of the threatened utilities/ infrastructures wherever required and coordinate with the concerned departments. • Executing officer should regularly monitor the infrastructures.
Damage to Historic/ Archaeological Sites • Rehabilitation/remodeling/maintenance and construction works on irrigation infrastructure like canals, drains, bunds, small dams or barrages etc.), may disturb, damage or affect heritage, historic or archaeological sites, graveyards, religious places etc. that are of important values. It may lead to major impacts which should not be overlooked by the executing officer.	• If any historic or archaeological site comes in the project Right of Way, it should be dealt as per law and procedures mentioned in Antiquities Act 1975. The Act ensures the protection of Pakistan's cultural resources. It defines "antiquities" as ancient products of human activity, historical sites, or sites of anthropological or cultural interest, national monuments, etc. It prohibits new construction in the proximity of a protected antiquity and empowers the Government to prohibit excavation in any area that may contain articles of archaeological significance. However, care should be taken to avoid such sites. It can be mitigated by change in design.
Deterioration of Aesthetic/ Scenic Quality • The development works may slightly change the visual look and destroy the original condition. If the area is not redressed or no disposal is done, the scenic quality of the area ultimately remains disturbed.	• Aesthetic/ scenic quality should be restored to its original landscape at all costs by removing all types of material after project completion. • Efforts should also be made to improve that area by developing it as a tourist spot. • Tree plantation may enhance the aesthetic value as well as the environmental conditions of the area.
Hindrance in Traffic • Construction activities may cause traffic	• It is the contractor's responsibility to

Impacts	Mitigation
hindrance. • The movement of vehicles or tractor trollies may face difficulties while transporting the material. • The blockage of road may also occur during project execution.	manage the traffic during execution of project and prepare Traffic Management Plan. • Movement of machinery, vehicles or tractor trollies should be allowed only on designated haulage routes. • Awareness campaign through displaying sign boards at site and haulage routes is necessary. • Involvement of community for traffic management is essential before start of work. • Dumping of earth, stone or shingle on road or road side should be strictly monitored.
Conflicts during Work • Earth material and hiring of labors for the execution of projects is source of conflict. • Use of privately owned agriculture land for establishing camp or for borrowing areas is the major issue that may cause conflicts. • The influx of external workforce, mixing of local & outsiders and hiring of child as labor also cause eruption of conflicts. • Local water demand for construction usage is another issue. • Security related conflicts with local community may also arise.	• To avoid conflicts during work, camp or borrowing areas should be fixed at designated sites or at alternative suitable sites on Government land. • Workers should be hired from local communities. • Labor should be motivated for a good workmanship. • Awareness of laborers must be given to ensure respect for local customs. • Child labor should not be allowed. • It must be ensured that water availability and supply to nearby communities is unaffected. • Deployment of guards may resolve security related conflicts. • Material should be disposed of on designated sites. • Executing officer should devise Grievance Redress Mechanism (GRM) for the project to settle down the conflicts or complaints lodged by any complainant.

Impacts	Mitigation
Economic Loss	
• Execution of development projects, sometimes require land for making diversion channels, for excavation and for establishment of camp site etc. Such activities may have significant impacts and lead to economic loss to the community if not properly compensated. • Land acquisition may affect crops, structures and partial grazing lands that results economic loss to landholders. • Other sources of income (livestock, fisheries, and forest) may also become affected due to change in land use pattern. • Extended canal closure for longer duration than the schedule/ stipulated period is also cause of economic concern.	• Try to avoid land acquisition and damages to crops/ structures by adopting engineering solutions to the possible extent. • Justified/ transparent compensation for land acquisition to make diversion channels or to establish camp site/ yard should be done. • Proper compensation to mitigate the impacts due to the loss of crops/ structures, loss of productive area and loss of livelihood opportunities should be made. • The water for cultivation and other purposes should be provided to sustain livelihood during extended closure of canals. • Avoid extended canal closure. If it deems necessary, timely intimation should be conveyed to the community.

3.2 Impacts and Mitigation Measures for Physical Environment

Non-living components like air, water and land may come under threat due to development works. To carry out a project in a sustainable manner and in conformity with the environmental requirements, the perceived negative impacts need to be minimized. Impacts, on the physical components, with mitigation measures are outlined below:

Impacts	Mitigation
Climate Change Hazards	
• Disaster risks like earthquakes, landslides, floods and hurricane due to climate change may also have impact on the project.	• Effective climate resilient strategies should be adapted to minimize damage to infrastructures. • Project should be planned keeping in view the climate change hazard record of the area. • Availability of emergency response team must be ensured in the time of abrupt hazards.

Impacts	Mitigation
Deterioration of Air Quality • Dust particles, due to movement of vehicles on unpaved roads for transportation of materials in the project area, scattering of excavated material by wind erosion or movement of vehicles and smoke emitted by the machinery during construction, may deteriorate the air. • Likewise, smoke/ particulate matter in shape of carbon monoxide and oxides of sulfur and nitrogen derived from powered vehicles/ machinery and from burning domestic fuels, crop residue, and rice stubble also deteriorates the quality of air.	• Regular water sprinkling and compaction in order to settle dust particles should be done. • Excavated material should be disposed of in depressions along Right of Way. • Well-maintained equipment/ vehicle / machinery to minimize exhaust emissions should be used. • Tractor trollies should be covered with sheet while transporting construction material to avoid air pollution. • Strict compliance of the PEQS for vehicular emissions and others should be made. • The stock piles should be kept moist in dry weather. • Cutting and burning trees / shrubs for fuel should be avoided. • Burning of rice stubble, crop residue, fuel, solid waste and other hazardous material should be strictly banned and closely monitored for smog free air.
Degradation of Land/ Soil • Land contamination i.e. spillage and leakage of oils, lubricants and other chemical wastes from construction camp may cause permanent pollution of soil. • Land degradation is due to unauthorized excavation or compaction of land by movement of heavy machinery/ vehicles, dumping of excavated soil on banks, katcha roads or agricultural land. • Salinization and Waterlogging may also occur due to the project activity. • Scattering of openly dumped material by wind, erosion of loose material into water channel or obstruction in natural drainage,	• Control on spillage and leakage of oils, lubricants and chemicals from camp site and proper disposal of the used oils and lubricants should be made. • Avoid servicing and re-fuelling at site. • Avoid unnecessary movement of machinery/ vehicle on agriculture land. • No private land should be used for the excavation/ disposal of materials. • The borrow areas should be selected on Government lands (preferably on barren land). • The borrow areas should be properly filled

Impacts	Mitigation
waterlogging, salinity due to rising of water table by operation of channels/ barrages etc. may degrade the soil.	and leveled. • If the agriculture land needs to be used as borrowing area with no option, then the executing officer should excavate the soil up to one-meter depth, maintain the level/ slope as far as possible by placing the top soil back and pay the compensation for any damages/ crop losses during work.
Deterioration of Water Quality • During construction phase, the surface and groundwater availability and quality is expected to be deteriorated/ reduced by polluted water. • Development projects have significant negative impacts on surface runoff and pooled water along canal banks. • The development / rehabilitation work on irrigation channels may reduce water supply for downstream/ end users and may become a threat. • Water for washing of vehicles/ machinery, spills or leaks of fuels, lubricants or chemicals from machinery and vehicles on site may also contaminate surface and groundwater. • Excessive use of water for washing, sprinkling, sanitation and concrete mixing may have negatively impact on the water resource and its sustainability.	• Wastewater from construction site/ camp office should not be discharged into canals/ drains/ rivers/ wetlands. • Sewage and other waste effluent should be handled properly and should meet the PEQS level before disposing off into the canals/ drains/ rivers/ wetlands. • Provision of septic tanks with pre-treatment facility for effluents to avoid surface and ground water contamination. • Available drinking water should be analyzed before supplying to the labor. • Overuse of water should be avoided during the construction. • Adequate water supply sources should be selected to ensure that the project will not effect on the local use of water. • To avoid contamination of surface/ground water due to spillage of oil, lubricant, fuel, chemicals and concrete or by solid waste and effluent from camp sites, Best Management Practices (BMPs) should be used.
Disturbance due to Noise and Vibration • During the construction activity, noise and vibration from the movement of construction machinery, vehicles and generators are produced which can affect the labor or nearby communities of the	• Avoid night time activities. • Compliance to PEQS should be made. • Noise controlling devices like noise barriers, silencers and insulation materials

Impacts	Mitigation
project area. • Old and poorly maintained machinery also generates high decibels of noise and cause noise pollution for workers in the close vicinity of heavy machinery. • Noise exceeding 75 dB is harmful for the receptors. • Unnecessary use of horn may also disturb the people.	etc. should be used. • Construction sites should be away from schools and residences. • New/ well-maintained vehicles/ machinery/ generators should be used. • Vehicles and equipment should be properly tuned to reduce noise. • The drivers, operators and workers working on or near the heavy machinery must be provided ear plugs. • Un-necessary use of horn should be avoided.
Soil Erosion Risk • Soil erosion occurs by wind or by water. It may cause edge scouring and damage to the crops/ lands/ canals/ bunds/ embankments. It may also become a source of air pollution and water contamination. • Excavation and cutting activities may cause adverse environmental impacts on the surrounding areas that lead to soil erosion. • Increased soil erosion and siltation may decrease holding capacity of water bodies with potential ecological problems. • Animal burrowing and rain cuts may also cause soil erosion.	• The risk may be minimized by proper soil compaction. • Excavation and cutting activities should be done carefully and should not be left un-compacted during work. • Borrow sites should be excavated and leveled as per specifications. • Proper monitoring of threatened areas should be performed to avoid potential ecological problems. • Regular inspection of infrastructures/ embankments should be made to fill or compact pits that have been damaged by animals (rodents, porcupines, reptiles etc.).

3.3 Impacts and Mitigation Measures for Biological Environment

Biological environment of an area comprises of plants, animals, birds, forests, wetlands, environmental sensitive areas and aquatic life. Biological environment of the project area is of much importance. Development projects having protected area, such as wildlife sanctuary, game reserve, or national parks, require a detailed Environmental Impact Assessment (EIA) under Punjab Environmental Protection Act, 1997 (Amended 2012).

Rehabilitation, remodeling and maintenance works may have negative impacts as per project actions/ activities that need to be minimized through proper and strict

implementation of mitigation measures. Impacts on the biological environment of the area with mitigation measures are outlined below:

Impacts	Mitigation
Damage to Flora (Plants, Vegetation, Trees) • During rehabilitation, remodeling and maintenance works on canals/ drains/ flood infrastructures, existing flora is disturbed in the process of land clearance, leveling and excavation. • Use of wood from nearby forests by labor at the camp site to meet their fuel requirements may increase. • Un- necessary cutting of trees/ removal of vegetation/ damage to plants or bushes for site clearance along the banks of infrastructure may cause negative impact. • There may be shortage of water to the forests/ trees/ floral cover due to project execution. • Polluted and contaminated water supply may damage to natural vegetation of the project area.	• Unnecessary uprooting or cutting of plants and removal of vegetation cover for establishment of camp sites and equipment yards should be avoided at all cost. • While planning the project, executing officer should select the route with less vegetation loss and no tree cutting so that damage to the natural topography and landscape is kept minimum as possible. • No unauthorized tree or bush cutting should be allowed. It should be ensured that unauthorized felled trees are not being used as fuel wood. • Adequate water supply to floral habitats should be maintained during construction phase of the project. • After completion of project, the vegetation of the area should be restored. • One percent (1%) of total cost of project should be used for tree plantation with indigenous species. • Awareness of the worker/ labor should be enhanced regarding the flora/ fauna through environmental trainings.
Damage to Fauna (Animals, Birds) • The envisaged risks to the fauna of the area during construction phase include; damage to the habitat and nesting places, disturbance of migratory birds or wild animals, undue interference into the habitat/ environmental hotspot area, polluted/ contaminated water supply and hunting/ poaching of wild fauna etc. • These impacts may become more severe during breeding seasons.	• Warning signs should be erected at or near the hotspot/ protected areas. • Safe driving should be observed to avoid accidental killing of reptiles or small animals crossing the road. • Staff should be strictly prohibited from poaching, capturing, hunting, trapping, harassing or buying wildlife. • There should be no activity during night

Impacts	Mitigation
• The movement of mammals and reptiles may be impeded and their habitats may be disturbed.	time. • Unnecessary interference with animals or their habitats should be avoided during the project activity.
Damage to Wetlands/ Aquatic Life • During rehabilitation / remodeling of canals, drains, Headworks and flood protection infrastructures, wetlands in that area will be affected due to change in water supply, dumping of waste materials, un-necessary interference of labor, contamination from oil spill / waste water, soil erosion by wind / water and illegal fishing. • Diverting water from river system especially during seasonal low flows can cause downstream change in riverine ecology, fisheries, and other aquatic life. • The contamination of the water due to usage of lubricants/ oil and mixing of material during transportation may potentially damage the aquatic life.	• Adequate and continuous water supply should be ensured to the wetlands or water bodies for its sustainability. • Prohibition on illegal fishing, use of chemicals, over-harvesting of wetlands vegetation, over-grazing and illegal hunting of birds/ mammals/ reptiles should be strictly monitored. • Executing officer must consider project design to protect wetland before start of work. • Water quality should be protected to conserve wetlands biodiversity and associated significant habitat. • Inventory of wetland with the cooperation of Wildlife department should be maintained. • There should be restriction on discharging untreated contaminants into the river or other water bodies. • Executing officer may convince Fisheries and wildlife department for fish aquaculture setup and favorable waterfowl habitat etc. (for both local /migratory species) in the pooled water.

4 IMPLEMENTATION AND MONITORING MECHANISM

The key purpose of these guidelines is to assist and guide the executing officers in identifying the social and environmental issues and conforming the proposed mitigation measures during project execution. These guidelines may also support the Department in making the development project environment friendly and socially acceptable. Executing officers and contractors are liable to implement and monitor the environmental compliances. The cost of the implementation and monitoring parameters should also be estimated and included in the overall project budget to settle these impacts.

4.1 Role of Executing Officer

Executing officers are the primary target groups. They are good trainers and implementers. They can disseminate the "Guidelines for Social and Environmental Assessment of Irrigation Sector Projects" to their concerned field formations. They have the responsibility to implement these guidelines by putting into practices in the on-going project. They are also responsible for the monitoring of project keeping in view the identified social and environmental issues with mitigation measures. Dissemination and training of the field officers will be helpful in identification of social and environmental issues and in selection of mitigation measures. It may also help them in filling up social and environmental checklist that is mandatory to be attached in all the PC-1s of development projects.

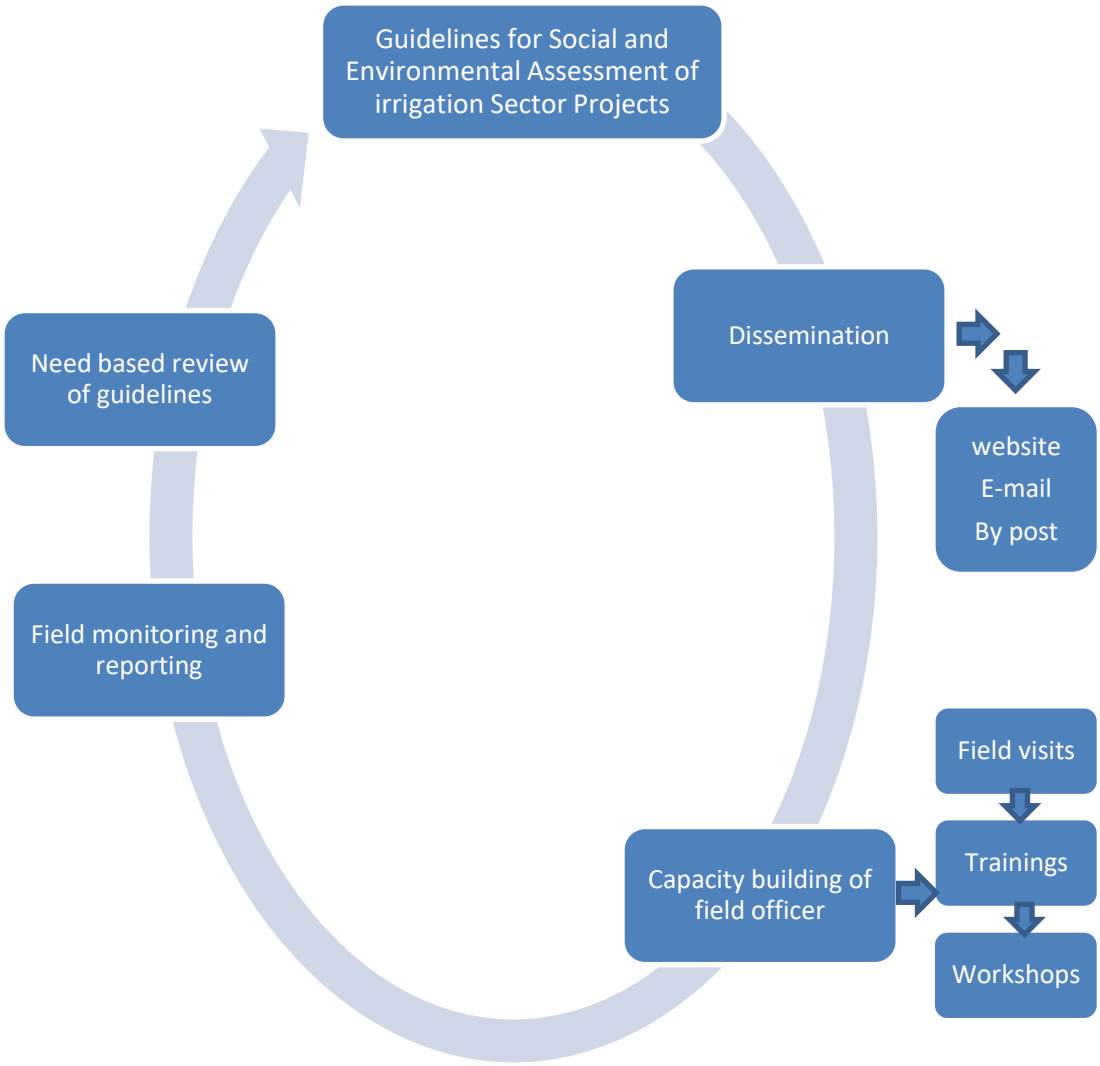
4.2 Role of Contractor

The contractor is responsible for on-field implementation of the environmental compliance keeping in view the contract agreement and cost that is allocated for mitigation measures. The contractor is liable to train his staff in social and environmental aspects. The contractor may also get benefit from the best practice guidelines. SPRU has also developed social and environmental guidelines for contractors that need to be made a part of contractor agreement.

4.3 Role of Strategic Planning & Reform Unit (SPRU)

Strategic Planning & Reform Unit (SPRU) is responsible for dissemination of "Guidelines for Social and Environmental Assessment of Irrigation Sector Projects". SPRU is also responsible for building the capacity of Irrigation officers/ staff by arranging focused training programs. The purpose of capacity building is to provide basic knowledge and information to the field officers on the assessment and management of environmental and social issues related to the projects activities.

The following diagram shows the schematic view of guidelines dissemination and implementation.



Schematic diagram showing implementation strategy

4.4 Monitoring Mechanism

Environmental monitoring is carried out to ensure that construction activities comply and adhere to environment requirements. The executing officer is responsible for implementation of the environmental compliance and for the monitoring of identified social and environmental issues and their mitigation during the construction and operational phase.

The executing officer, being responsible for monitoring of the project activities, will ensure that:

i. The checklist has been filled and all the identified social and environmental issues with proposed mitigation measures have been documented.
ii. The budget allocation for the mitigation of different social and environmental impacts including one percent (1%) of total cost of project for tree plantation has been made in the PC-1s.

iii. The “social and environmental guidelines for contractors” have been shared with the contractor at the time of contract award.
iv. Proposed mitigation measures have been implemented to eliminate the social and environmental impacts in development schemes.

The executing officer should keep record of complaints/ grievances if received from community and labor during implementation and monitoring of project and efforts should be made to address these issues/ complaints right at site. A complaint register must be maintained at site with the Contractor as well as in the office of the executing officer. Community should be informed about the process and procedure of Grievance Redress Mechanism (GRM). The executing officer will be the first level to register and resolve the complaint if it is not addressed by the contractor. Chief Engineer and Superintending Engineer of the concerned executing officer are the administrative in-charges to review and decide on complaint. During execution of the project, if status of environmental non-compliance from contractor is observed, executing officer may take all steps as he deems necessary.

The office of Chief, Strategic Planning and Reform Unit can be contacted for assistance on social and environmental issues.

ANNEXURE- A

SCHEDULE I
List of projects requiring an IEE

A.		**Agriculture, Livestock and Fisheries etc.**
	1.	Poultry, livestock, stud and fish farms with total cost of more than ten million rupees
	2.	Projects involving repacking, formulation or warehousing of agricultural products
B.		**Energy**
	1.	Hydroelectric power generation less than 50 MW
	2.	Thermal power generation less than 200 MW
	3.	Transmission lines less than 11 KV and large distribution projects
	4.	For oil and gas transmission systems, Oil and gas extraction projects including exploration, production, gathering systems, separation and storage
	5.	Waste-to-energy generation projects
C.		**Manufacturing and processing**
	1.	Ceramics and glass units with total cost more than fifty million rupees
	2.	Food processing industries including sugar mills, beverages, milk and dairy products, with total cost less than one hundred million rupees
	3.	Man- made fibers and resin projects with total cost of less than 100 million rupees
	4.	Manufacturing of apparel, including dyeing and printing, with total cost more than twenty five million rupees
	5.	Wood products with total cost of more than twenty five million rupees
D.		**Mining and mineral processing**
	1.	Commercial extraction of sand, gravel, limestone, clay, sulpher and other minerals not included in Schedule II with total cost of less than one hundred million rupees
	2.	Crushing, grinding and separation processes
	3.	Smelting plants with total cost less than Rs. 50 million
E.		**Transport**
	1.	Federal or Provincial highways (except maintenance, re-building or reconstruction of existing metaled roads) with total cost of less than fifty million rupees
	2.	Ports and harbor development for ships less than five hundred gross tons
F.		**Water management, dams, irrigation and flood protection**
	1.	Dams and reservoirs with storage volume less than fifty million cubic meters of surface area less than eight square kilometers
	2.	Irrigation and drainage projects serving less than fifteen thousand hectares
	3.	Small-scale irrigation systems with total cost less than fifty million rupees
G.		**Water supply and treatment**
	1.	Water supply schemes and treatment plants with total cost less than 25 million rupees
H.		**Waste disposal**
	1.	Waste disposal facility for domestic or industrial wastes, with annual capacity less than 10,000 cubic meters
I.		**Urban development and tourism**
	1.	Housing schemes
	2.	Public facilities with significant off-site impacts (e.g. Hospital wastes)
	3.	Urban development projects
J.		**Other projects**
	1.	Any other project for which filing of an IEE is required by the Federal Agency under sub-regulation (2) of Regulation 5

SCHEDULE II

List of projects requiring an EIA

A.		**Energy**
	1.	Hydroelectric power generation over 50 MW
	2.	Thermal power generation over 200 MW
	3.	Transmission lines 11 KV and above, and grid stations
	4.	Nuclear power plants
	5.	Petroleum refineries
B.		**Manufacturing and processing**
	1.	Cement plants
	2.	Chemical projects
	3.	Fertilizer plants
	4.	Food processing industries including sugar mills, beverages, milk and dairy products with total cost of Rs. 100 million and above
	5.	Industrial estates including export processing zone
	6.	Man-made fibers and resin projects with total cost of Rs. 100 million and above
	7.	Pesticides (manufacture or formulation)
	8.	Petrochemicals complex
	9.	Synthetic resins, plastics and man-made fibers, paper and paper board, paper pulping, plastic products, textiles (except apparel), printing and publishing, paints and dyes, oil, fat and vegetable ghee projects with total cost more than Rs.10 million
	10.	Tanning and leather finishing projects
C.		**Mining and mineral processing**
	1.	Mining and processing of coal, gold, copper, sulpher and precious stones
	2.	Mining and processing of major non-ferrous metals, iron and steel rolling
	3.	Smelting plants with total cost of Rs.50 million and above
D.		**Transport**
	1.	Airports
	2.	Federal/ Provincial highways/major roads (except maintenance, re-building or reconstruction of existing metaled roads) with total cost of Rs. 50 million & above
	3.	Ports and harbor development for ships of 500 gross tons and above
	4.	Railway works
E.		**Water management, dams, irrigation and flood protection**
	1.	Dams and reservoirs with storage volume of fifty million cubic meters and above or surface area of eight square kilometers and above
	2.	Irrigation and drainage projects serving 15,000 hectares and above
F.		**Water supply and treatment**
	1.	Water supply schemes and treatment plants with total cost of Rs.25million rupees and above
G.		**Waste disposal**
	1.	Waste disposal and/or storage of hazardous or toxic wastes (including landfill sites, incineration of hospital toxic waste)
	2.	Waste disposal facilities for domestic or industrial wastes, with annual capacity more than 10,000 cubic meters
H.		**Urban development and tourism**
	1.	Land use studies and urban plans (large cities)
	2.	Large-scale tourism development projects with total cost more than Rs.50 million
I.		**Environmentally Sensitive Areas**
	1.	All projects situated in environmentally sensitive areas
J.		**Other projects**
	1.	Any other project for which filing of an EIA is required by the Federal Agency under sub-regulation (2) of Regulation 5
	2.	Any other project likely to cause an adverse environmental effect