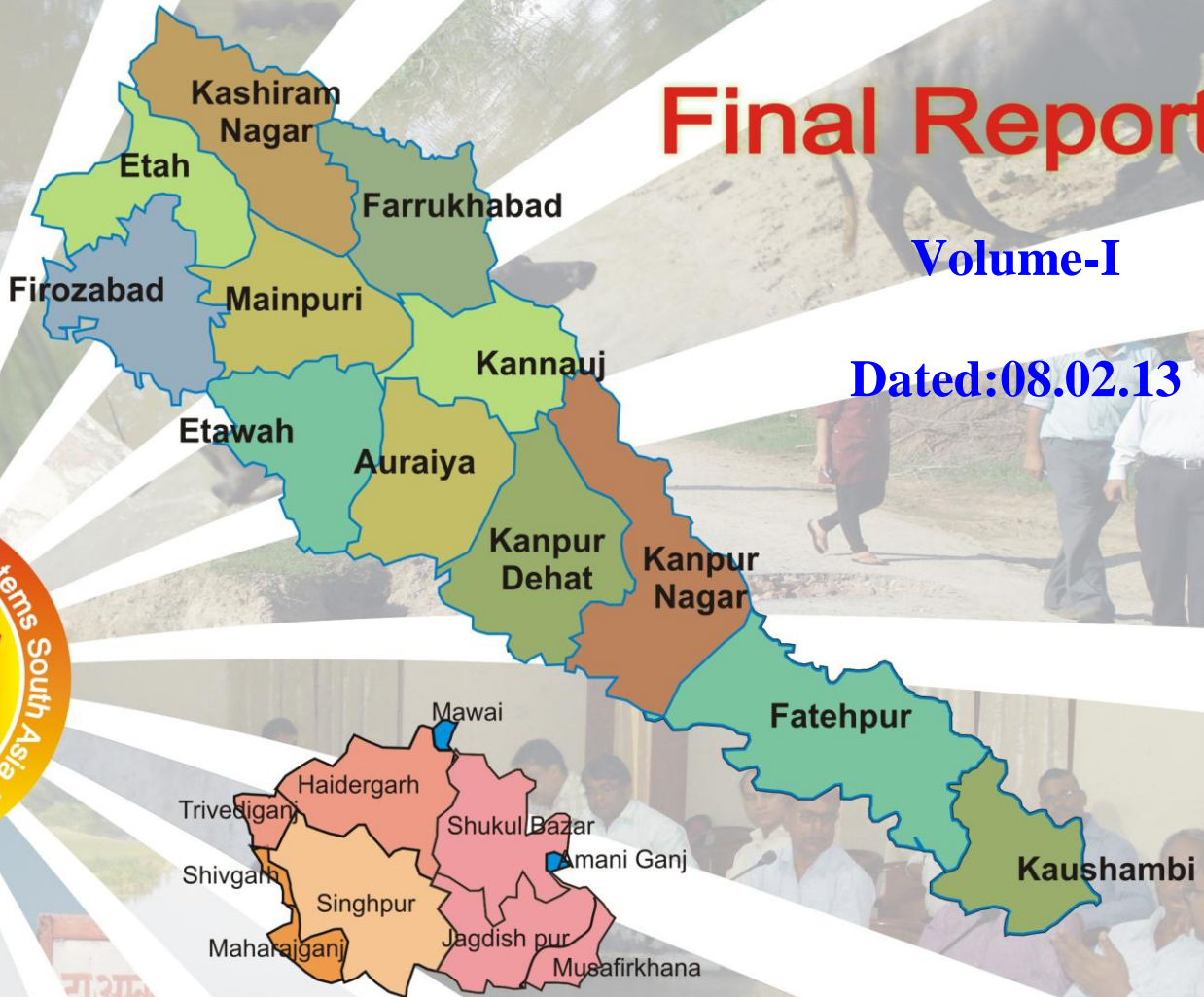


Social and Environmental Assessment Framework For Lower Ganga Canal System and Haidergarh Branch

Final Report

Volume-I

Dated:08.02.13



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Executive Summary

The Environmental and Social Management Framework (ESMF) presented in this document provides general policies, guidelines, codes of practice and procedures to be integrated into the implementation of the World Bank-supported Uttar Pradesh Water Sector Restructuring Project Phase II. The proposed project would invest in improving the irrigation service delivery in the state and the potential environmental and social impacts would largely center on these rehabilitation and modernization investments. No new irrigation systems will be built. The passage of the Participatory Irrigation Management (PIM) Act in 2009 was a major reform enacted under the previous Phase I operation and the Phase II project would further strengthen farmer participation in water management. A total of 27.98 Lakh Ha of Gross Command Area (GCA) in the Lower Ganga Canal (LGC) and Haidargarh 23 Down will be covered. Besides this, the project will also finance agriculture improvements and institutional capacity building. This project is a follow-up to the previous Uttar Pradesh Water Sector Restructuring Project (UPWSRP) Phase I operation and to be managed by the same Project Activities Coordination Team (PACT). This has reduced the overall environmental and social risk due to the familiarity of the implementers with the Bank's safeguard policies and increased the confidence for avoiding and/or mitigating any adverse impacts that may arise. *In general, the scope of the project does not indicate any major negative environmental and social impact from the project activities.*

Lower Ganga Canal and Haidargarh Branch Environmental and Social Context

Environmental profile indicates flat physiographical features a part of Indo-Gangetic alluvium plain, drained by a number of major rivers. The Project command area has thick alluvium ranging from 200 meters to 500 meters and confined ground water resources. The soils being generally fertile indicate decreasing micro and macro nutrient status. The land use indicates diversion of agriculture land for non agricultural purposes. Further, water logging, sodicity and salinity have been observed in the project areas. The region has rich biodiversity in terms of both flora and fauna.

Demographic features in the project areas indicate increasing population with adverse female to male ratio, higher literacy with reduced gap in male to female literacy. ST population is minimal though SC population is comparatively significant. The infrastructure base indicates inadequate metalled road network and erratic power supply for agriculture. Data also indicate slow growth of gross irrigated area, irrigation intensity and consumption of fertilizers though with unbalanced NPK ratio. Further, there is increasing dependence on tubewell irrigation vis a vis canal irrigation. Labor profile indicates shift in occupational pattern from agriculture to non agriculture though more pronounced in 23 Dn Haidargarh area.

Agriculture remains the main economic activity in Uttar Pradesh (UP), which is India's most populous state with over 160 million people. About 70% of agriculture in the state is dependent on irrigation. Large productivity gaps exist in the agricultural sector between achievement and potential. Agriculture sector growth has to increase to significantly alleviate poverty and raise incomes. Irrigated agriculture is expected to be the engine of this growth but is constrained by a failing public irrigation and drainage system, inadequate maintenance, and poor water management. Rehabilitated, modernized, well-functioning, and fiscally-sustainable irrigation and drainage systems integrated with appropriate agriculture inputs and practices are necessary

for agricultural growth. Farmers and water users associations involvement in managing systems at the local scale is critical for the sustainability of these systems.

Proposed Project

A long-term program covering a 15-20 year horizon with measures for improving water management and irrigation productivity was identified in the State. The Uttar Pradesh Water Sector Restructuring Project (UPWSRP) Phase I was the first step in this program and took place over 2002-2011. UPWRSP Phase II plans to scale up and improve on lessons from Phase I. It will continue to work in the Phase I areas, and will expand to cover parts of the Lower Ganga Canal (LGC) system, several dam systems in Bundelkhand and an area in the Haidargarh Branch. The Project Development Objectives are to (i) strengthen the institutional and policy framework for integrated water resources management for the entire State; and (ii) enable farmers in targeted irrigated areas to increase their agricultural productivity and water use efficiency.

The proposed UPWSRP Phase II project would include the following components:

Component A - Strengthening of State-level Water Institutions

- Operationalizing the State Water Regulatory Commission
- Strengthening the knowledge base and analytical capacity for integrated water resources management
- Strengthening the Water and Land Management Institute (WALMI) - the primary training institute for Irrigation Department engineers

Component B - Modernization and Rehabilitation of Irrigation and Drainage Systems

- Expansion of irrigation and drainage investments, with rehabilitation and modernization of irrigation and drainage infrastructure in parts of the Sardar Sahayak System (Haidargarh Branch from 23 km and down), three reservoir commands in Bundelkhand (Rohini, Jamni, Sajnam Dams), and the Lower Ganga Canal (and Parallel Lower Ganga Canal) System. A total of 27.98 Lakh Ha of Gross Command Area (GCA) in the Lower Ganga Canal (LGC) and Haidargarh 23 Down would be covered. Only existing irrigation infrastructure systems would be taken up and no new canals or drains are planned for construction under the project.
- Modernization of the regulation system in the Phase I areas (i.e. Jaunpur Branch)
- Groundwater management activities

Component C – Consolidation and Enhancement of Irrigation Institutional Reforms

- Uttar Pradesh Irrigation Department (UPID) modernization and capacity building
- Water Users Associations (WUAs) strengthening and implementing the Participatory Irrigation Management (PIM) Act

Component D – Enhancing Agriculture Productivity and On-farm Water Management

- This component focuses on Farmer Water Schools and other agriculture demonstrative investments

Component E – Feasibility Studies and Preparation Activities for the Next Phase

- This component is to prepare detailed surveys and designs for future Phase III areas

Component F – Project Coordination and Monitoring:

- Project Activities Coordination Team, with overall coordination and management of the project, including Monitoring and Evaluation
- Monitoring of crop performance using remote sensing imagery, implemented by UP State Remote Sensing Agency (RSAC)

The project (in the Lower Ganga Canal and in the Haidergarh Branch) is located in the alluvial plains that are characteristic of the Ganga river basin. The landscape is highly modified with mixed land use, dominated by agricultural farmlands. More recently, smaller towns have urbanized more vigorously due to improved road network. All canals considered under the project are gravity based and do not pass through any Protected Areas. No major and large wetlands fall on canal alignment.

Environmental and Social Analysis

Analysis involved developing an environmental and social baseline, wide stakeholder consultations including Focused Group Discussion, survey of physical and natural features, interactions with farmers and other potential beneficiaries, desk review of secondary information/data sources, primary household survey in the project areas, analysis of alternatives and identification of potential impacts of planned investments. Moreover, the socio-economic status of relevant stakeholders and a cross-sectional view of stakeholder views was undertaken to highlight key environmental and social challenges and issues.

The environmental and social analysis highlighted dissatisfaction with assured irrigation services, particularly in the tail ends of the canals. Higher dependence on groundwater is leading to over exploitation and lowering of its level. Erratic availability of electricity further compounds the problem. As a result, optimum agriculture production is not fully achieved due to loss of productivity. Poor extension services along with poor availability of quality seeds and lack of application of modern agriculture technology leads to unbalanced use of fertilizers and inhibits crop diversification. The awareness regarding safe use of pesticides is lacking in majority of farmers increasing their risk of exposure to toxics. Other social issues that emerged from stakeholder consultations include breaching of distributaries, minors and in some cases even canals at several points (at farmer's field) for irrigation. There is limited ownership of control structures amongst farmers and most such structures were observed to be broken and/or were absent. Dry canals are being used as travel conduits using tractors. Stakeholders also complained about the poor upkeep of crossover structures/narrow bridges that are dangerous to cross.

Poor operation and maintenance of canals results in problems of waterlogging and sodicity along canals. Field visits confirmed high incidences of silt deposition in almost all canals in the head, middle as well as tail ends. This is expected to an extent as Himalayan River and their tributaries carry high silt loads. Extremely low maintenance budgets allocated for upkeep of canals has not helped addressing this issue comprehensively. Further, silt removal works undertaken through the National Rural Employment Guarantee Act (NAREGA) is limited only up to the field drains. The issue of waterlogging was observed at canal head areas. Small and undescript wetlands were observed at many places along canals that are formed due to accumulation of seeping water from canal. Most of these are seasonal but support local

assemblages of birds (waders, kingfishers, bee eater etc) and amphibians. However, the field survey team did not record any endangered or threatened species in these wetlands. However, *Sarus* cranes are often seen in the paddy fields along the canals. With improved irrigation, Sarus crane stands to benefit. Canals rehabilitation, while required to ensure the objectives of irrigation service delivery, may result in localized adverse impacts on such minor wetlands and their associated biodiversity. Extensive periods of waterlogging and poor drainage could also result in creation of sodic lands in some areas. Improved canal working with reduced seepage would help address the issue of generation of sodicity.

Stakeholder Analysis

The primary project stakeholders include farmers, Water User Associations (WUAs), women SHGs, PRIs, NGOs and government line departments and agencies, besides the project implementing agencies, namely, Uttar Pradesh Irrigation Department (UPID), PACT, Departments of Groundwater and Agriculture. As part of environmental assessment, wide ranging stakeholders' consultations were undertaken in the project areas with various stakeholder groups. These consultations were held at individual, household and village/community levels in the field and also with PRIs. The EA report highlights the key feedback that emerged from these consultations. The project's coordinating agency, PACT, has the benefit of having implemented the first phase of the project in the Ghagra Gomti Basin and, therefore, has a good understanding of the Bank's safeguards policies and the importance of compliance with these. This familiarity would be useful in implementing the various mitigation measures.

Stakeholder feedback confirmed interest and support for project interventions. Many farmers suggested improvement of road (on canal bank/embankment) for better transport facility and connecting marketing centers that would result in getting a better price for farm produce. There is an overall demand for improving agricultural extension services and forward and backward linkages which help in coverage of more sown area. Better and more animal health care facilities, more cross breeding facilities, more availability of fingerings of relevant breeds of fishes and facilitate composite fish will improve their alternative livelihood. Ground water recharging facilities along primary and secondary channels of the canal network at regular interval was suggested by farmers. Further, waterlogging should be mitigated and improving rain water harvesting facilities should be introduced. Higher irrigation intensity, higher crop productivity and increased opportunity in agriculture may keep a check on migration. Finally, improved drainage will also reduce sodicity and salinity

Potential Project Impacts

In terms of observations, it should be noted that the potential environmental and social impacts would largely center on the investments in irrigation service delivery. Adverse environmental impacts may arise due to certain planned activities, like disposal of silt during rehabilitation of irrigation infrastructure, construction and installation of irrigation control structures, small bridges over canals, increased used of agro-chemicals for increasing crop productivity etc. Adverse impacts could also arise due to poor construction quality and unsafe construction practices, but these would be addressed by Quality Supervision Protocols that would be followed by the PACT, in a combination with Quality Assurance Consultants and their own engineers. Other risks would be addressed through the application of the ESMF and EMPs.

Their selective and collective use would ensure that the project would not result in any long-term and significant adverse impacts on the people and the environment. A summary of component wise planned investments, their likely impacts and proposed nature of mitigation is given below:

Component	Nature of planned investments	Potential adverse/positive impacts and intensity	Nature of mitigation
1. Strengthening of State-Level Water Institutions and Inter-Sector Coordination	Training, Exposure visit, IT Equipment, Research & Studies, HR contracting	Low & limited, health & safety Improved water resource management	Environment & Social awareness building
2. Modernization and Rehabilitation of Irrigation and Drainage Systems and Groundwater Management	Design & Survey, de-silting, canal lining, re-sectioning, control structures, bridges, weirs, sluice, measurement devices, office buildings upgrading, water storage structures (dams). Groundwater management (groundwater assessment and aquifer management plan).	Moderate to high, unsafe construction related, impacts on wetlands, local biodiversity, material handling and storage, labor camps, issues related to safety of dams etc Improved resource conservation	Negative list, screening, mitigation measures, EMP, biodiversity offsets, awareness, compensation, social best practices, labor laws, construction management, capacity building
3. Consolidation and Enhancement of Irrigation Institutional Reforms	Training & Capacity Building, equipment support (earth movers, IT etc.), awareness building, NGO contracting	Low & limited, Social cohesion, equity, transparency, participation, minor civil works Better resource ownership	Environment & Social awareness building, training, social safety nets, local governance improvement
4. Enhancing Agriculture Productivity and On-Farm Water Management	Farmer Water Schools, Training & Capacity Building, equipment purchase (laser levelers), land leveling, irrigation equipment, soil testing, IPNM, cropping etc	Moderate to high, pesticide handling & storage, agro-chemicals, health & safety related Improved food security, water resource management, reduced pollution load	Negative list, screening, mitigation measures, EMP, Pest Management Plan, IPM/INM, Environment & Social awareness building
5. Feasibility Studies and Preparation Activities for the Next Phase	Design & survey consultancy, Research & Studies	Low & limited	Environment & Social awareness building
6. Project Coordination and Monitoring	Consultancies, Remote sensing, office equipment	Low & limited	Environment & Social awareness building

The approaches to address adverse environmental and social impacts include screening, negative lists, mitigate, compensate, and offsets. Based on this exercise, and in context of project investments, the social and environmental assessment includes screening criteria that places proposed project investments into three categories based on the magnitude of potential adverse impacts. It also includes a *negative list* of activities that the project would not finance. Based on this assessment, an Environmental and Social Management Framework (ESMF) has been developed that provides for measures to avoid, minimize and mitigate adverse environmental and social impacts of planned investments, as well as include measures to enhance and replicate positive impacts. A role and responsibility matrix is included in the ESMF for ensuring timely monitoring of mitigation actions. In addition, Environmental Management Plans (EMP) are developed to ensure that investment with potentially higher

environmental risk are implemented in order to minimize potential adverse impacts. EMPs are developed for construction related and canal rehabilitation activities, including silt disposal, for handling, applying and storing pesticides (Pest Management Plan) etc. At the planning stage of each sub-activities, in case there are major environmental or social issues as described in Table 6.3, a site specific Environmental Assessment (EA) /EMP will be prepared.

With regard to information disclosure, the draft ESMF report and its subsequent revised versions were uploaded on the UPID website (<http://irrigation.up.nic.in/project.htm>) from October 2012 for inviting comments and suggestions from public and other stakeholders, as well as on the World Bank InfoShop website. Further, hard and soft copies of these reports were circulated to offices of concerned UPID Chief Engineer as well as Superintending Engineers to receive comments & suggestions from all the stakeholders. The final social and environmental assessment//EMP reports will be publicly disclosed through UPID website and World Bank InfoShop, including a translation of the executive summary in Hindi to meet World Bank's disclosure policy requirements.

Applicable World Bank Safeguard Policies

No potentially large scale, significant and/or irreversible environmental and social impacts are anticipated due to limited spatial and temporal nature of project impacts arising out of planned investments. One of the key findings of the assessment highlights that the geographical spread of adverse impacts is unlikely as the bulk of the investments are planned along linear infrastructure. In terms of social impacts, the approach to devolve management of irrigation delivery system through the PIM Act to the WUAs would be a game changer for participation and transparency at the local level of self-governance. There could be impacts (under specific project components) along the canal banks, which have been detailed in the ESMF. While the project is designed to benefit farming communities through investments on rehabilitation of irrigation systems and allied agriculture activities, the implementation of proposed components of the Project may result in adverse impacts on people and land, especially as some of the proposed canals for rehabilitation and modernization are over 100 Km long. The project is rated a Category A. It triggers **four safeguards policies, namely, Environmental Assessment (OP 4.01), Safety of Dams (OP 4.37), Involuntary Resettlement (OP 4.12), Pest Management (OP 4.09), and a legal policy, i.e. Projects on International Waterways (OP7.50).**

The system rehabilitation and modernization is unlikely to involve any need for land acquisition or resettlement and rehabilitation. In the rare event this is necessitated, the provisions of the Bank OP 4.12 on Involuntary Resettlement shall be invoked in consonance with the UP State R&R policy. The tribal populations in the project area are negligible and do not represent indigenous population; therefore they do not warrant the triggering of the OP 4.10 on Indigenous People. The project shall keep track of the tribal families that do exist in the project area and use every opportunity to support their special livelihood and allied service support requirements should any interventions be taken up in the vicinity of where these families exist. The Safety of Dams (OP 4.37) is triggered in relation to the three reservoirs in the Bundelkhand region (see environmental and social report for Bundelkhand).

Analyses of Alternatives to proposed project interventions were considered. Since this second phase is effectively an on-going modernization and rehabilitation of existing irrigation

and drainage infrastructure in the State, there is limited scope for considering alternatives to achieve intended development objectives. One alternative considered, but rejected was to create new irrigation infrastructure in the targeted areas. Instead, learning from the first phase would be applied under the project to improve irrigation water service delivery using the existing irrigation infrastructure network. A No Project scenario was also considered but rejected, as there is a dire need to improve irrigation service delivery and increase farm productivity to ensure food security, as well as reform water resources management to meet the demands of a fast growing population especially in the context of perceived increased difficulties due to projected vulnerabilities related to climate change. Another alternative considered and adopted is to also invest in groundwater management to pilot real time conjunctive use of the two irrigation approaches. Conjunctive use is a potential management option in areas where both surface water and groundwater are amply available. A dual roster for groundwater and surface irrigation water may be an effective option for improving water resource sustainability in irrigation commands. The proposed conjunctive use of irrigation sources would also result in increased environmental and resource sustainability, as well as allow for enhancing positive environmental impacts from project investments.

Environmental and Social Management Framework

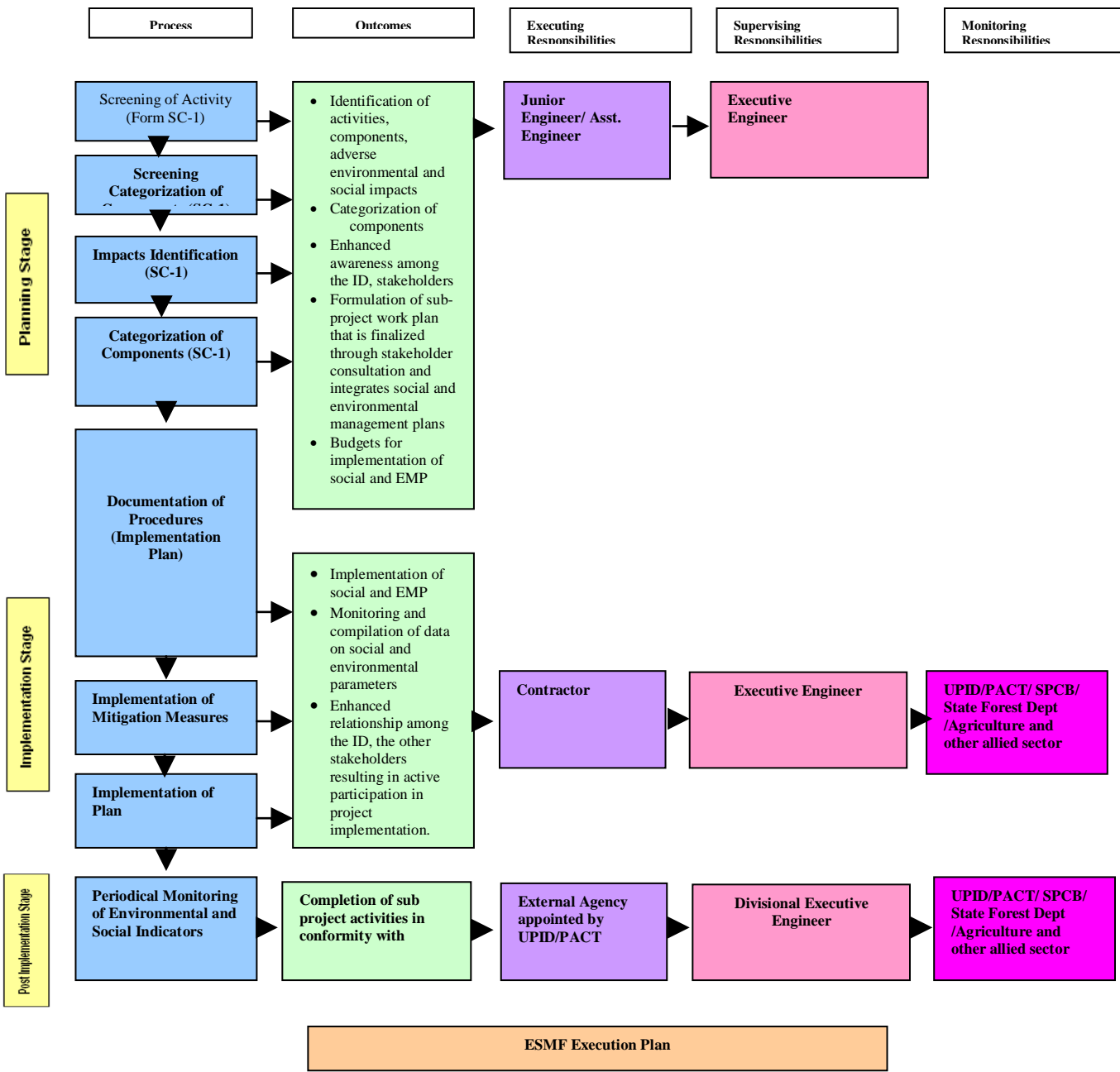
To ensure that the planned project activities do not lead to adverse environmental and social impacts, an environmental and social analysis has been undertaken in all the project areas proposed to be covered under Phase II. Moreover, since specific investments have yet to be identified, an environmental and social management framework (ESMF) has been designed to provide the project (in the LGC and Haidergarh Branch system sub-project areas) with the overall guidelines and procedures to ensure compliance with environmental and social standards during project implementation.

This **environmental and social analysis provides clear guidance on categorizing various project investments to identify and mitigate adverse impacts.** Based on potential for generating adverse environmental and/or social impacts, project activities would be placed under any of the three categories: (i) **Category A** - activity/Components which have major environmental/social impacts and require specific environment management plan (EMP) for implementation of mitigation measures. Wherever applicable, the EMP is to be incorporated in the bid document and contractor/implementing agencies has to follow this during construction as well as operation. Mitigation measures included as part of ESMF also applies; (ii) **Category B** - components which have moderate environmental and social impacts and certain precautionary measures have to be followed by the contractor and the project authorities to minimize impacts during construction as well as operation. Mitigation measures included as part of ESMF and specific management plans also applies during the project period. The final category is (iii) **Category C** - components which have negligible or nil environmental and social impacts and as such no mitigation measures have been proposed for these activities.

Environmental and social analysis will also guide project design and introduce innovative mitigation measures and strategies. One of the key observations from the analysis and stakeholder consultations feedback is the growing dependence and withdrawal of groundwater to meet irrigation needs, especially in absence of assured irrigation service delivery. In order to address the critical issue of groundwater depletion, quality and dependence, some of the environmental mitigation measures have been mainstreamed in the project design by inclusion

of a sub-component (B3) on groundwater. The project may also introduce the use of biodiversity offsets as an innovative safeguards mechanism in the state. This would ensure no net loss of biodiversity, as some spatially limited impacts could arise along canals on wetlands and associated biodiversity. The project may set aside funds as an offset to increase biodiversity in other wetlands (equivalent to the losses in biodiversity observed through project investments) so that no net loss of biodiversity is recorded due to project investments.

The proposed mitigation/enhancement measures also include specific environment management plans (EMPs) – Annex 6.1. These include plans for construction camps, waste management, construction plants and equipment management, fertilizer and pesticide handling and storage, Integrated Pest Management, public worker’s health and safety, cultural properties, tree plantation, silt disposal, biodiversity offset. Annexure 6.2 lays out the Rehabilitation and Resettlement (R&R) Policy Framework. Further, Annexure 6.3 provides the organization structure for the environmental and social cell in PACT, which will be complementing the ESMF execution mechanism shown below.



ESMF Execution Mechanism

Project implementation would require an enhanced degree of interdepartmental coordination. In terms of implementing departments, UPID will be responsible for implementing Components A, B1, B2, C, E, and F1. The Department of Agriculture is responsible for implementing Component D. To ensure close coordination between these departments (especially given the overlapping responsibilities vis-à-vis the water users association agenda), a senior (Joint Director-level) agriculture officer will be posted in the PACT. The Groundwater Department is responsible for implementing Component B3. However, implementation of identified civil works (e.g. recharge structures) will not be executed by the Groundwater Department. The Remote Sensing Applications Center will receive resources directly to carry out crop analysis and monitoring of project areas using satellite imageries. The State Institute of Rural Development will

also be contracted by the UPID to undertake the primary activities related to education campaigns and capacity building of water users associations.

Implementation of the ESMF would result in increased awareness, capacities, skills in environmental and social issues and better conflict resolution in the irrigation sector. As part of ESMF, an information education and communication strategy, capacity building and training plan, and M&E schedule have been developed. This will help to convey to stakeholders the project specific environment and social messages. Suggested strategy and framework for IEC has been defined in terms of thematic area, target audience, content and form of knowledge material has been suggested. Communication tools that cover stakeholder groups, communication needs, messages and preferred tools have been provided. The M&E framework includes social and environmental impacts monitoring indicators. Further, the ESMF developed for UPWSRP Phase II can be implemented effectively by integrating it with UPWSRP Project Management Systems and Procedures. As part of SEA, an attempt has been made for assessing the type of risks and the existing conflict resolution systems. Conflicts and existing resolution system has been described.

There is some confidence in ensuring that adverse environmental and social impacts would be addressed adequately, as the institutional and implementation arrangements of the project are more or less similar to the ones followed in Phase I, bringing in good institutional familiarity with Bank processes and procedures. The primary multi-disciplinary coordination unit managing UPWSRP Phase II is the Project Activity Core Team (PACT) that is headed by a Chairman (Senior IAS officer) and supported by various technical and administrative experts. After several years of engagement working closely with the Bank team, the PACT has built significant capacity and knowledge about World Bank procedures at the sector (institutional risk) and project (implementation risk) levels. The specific functions of the PACT would include coordination of implementation (across various departments), M&E, procurement and financial management, Environmental and Social Safeguards management and processing all the necessary sanctions from various Steering and Executive Committees and line agencies. As in the Phase I operation, the PACT will be staffed with experts covering a range of subjects including, but not limited to, PIM, procurement, financial management, monitoring and evaluation, survey and design, rehabilitation, training, management information systems (MIS), agriculture, environment, social, and groundwater. These officers will provide support to the various line departments who will be responsible for the implementation of component activities. An estimated budget of \$6.85M (over the 7 year project period inclusive of all sub-project areas) is envisioned for the implementation of the ESMF and includes costs for staff, training, and special studies (if required).

निचली गंगा नहर और हैदरगढ़ शाखा सारांश

पर्यावरण और सामाजिक प्रबंधन प्रोमोवर्क (ESMF) इस रिपोर्ट में प्रस्तुत सामान्य नीतियों एवं दिशा निर्देशों तथा अभ्यास का कोड और विल्व बैंक समर्थित उत्तर प्रदेश जल क्षेत्र पुनर्गठन परियोजना चरण-2 के कार्यान्वयन में एकीकृत प्रक्रियाओं को प्रस्तुत करता है। प्रस्तावित परियोजना राज्य में सिंचाई सेवा वितरण में सुधार लाने और संभावित पर्यावरणीय एवं सामाजिक प्रभावों, पुनर्वास और आधुनिकीकरण के निवेश पर काफी हद तक केंद्रित है। इस परियोजना में कोई नई सिंचाई प्रणाली का निर्माण नहीं किया जाएगा। सहभागितापूर्ण सिंचाई प्रबंधन (पीआईएम) अधिनियम-2009 के अन्तर्गत प्रथम चरण-1 में प्रस्तावित प्रमुख सुधार चरण-2 से परियोजनाओं तथा जल प्रबंधन में किसानों की भागीदारी मजबूत होगी। यह परियोजना निचली गंगा नहर एवं हैदरगढ़ शाखा (23 डायन के सकल कमान क्षेत्र के 27.98 लाख हेक्टेयर क्षेत्र में कियान्वित करी जाएगी। इसके अलावा इस परियोजना के अन्तर्गत वित्तीय कृषि सुधार और संस्थागत क्षमता का भी विकास किया जाएगा। यह परियोजना उत्तर प्रदेश जल क्षेत्र पुनर्गठन चरण-1 की पी (PACT) के द्वारा प्रबंधित होगा। यह (ESMF) द्वितीय चरण में प्रस्तावित परियोजना से होने वाले समग्र पर्यावरणीय और सामाजिक प्रभावों (Risk) को विश्लेषण की स्था नीतियों, राष्ट्रीय एवं राज्य की पर्यावरणीय एवं सामाजिक नीतियों के अन्तर्गत तैयार किया गया है (PACT) द्वारा चरण - 1 में इस प्रकार के कार्यान्वयन व्यवसायिक अनुभव पर आधारित होने के कारण किसी भी प्रतिकूल प्रभावों को कम करने के लिए विश्वास बढ़ाता है। सामान्यतः इस परियोजना के तायरे में किसी भी बड़े नकारात्मक गतिविधियों से पर्यावरण और सामाजिक प्रभाव का संकेत नहीं है।

निचली गंगा नहर और हैदरगढ़ शाखा के पर्यावरणीय एवं सामाजिक स्थिति के संदर्भ में:-

यह क्षेत्र पर्यावरणीय रूपरेखा के हिसाब से समतल प्राकृतिक दृश्य संबंधी Indo-Gangetic Plain का हिस्सा है और कई प्रमुख नदियों द्वारा सिंचित होता है, परियोजना कमान क्षेत्र 200 मीटर से 500 मीटर मोटी जलोढ़क में है, और सीमित मृजन संसाधनों की पुष्टि करता है। आमतौर पर उपजाऊ मिट्टी सूख्य और स्थूल पोषक तत्व स्थिति के संकेत मिलते हैं। जलनस्य, उसरता और क्षरीयता को प्रस्तावित परियोजना क्षेत्र में पाया गया है। यह क्षेत्र जैव विविधता (जीव एवं घनस्पर्ति) से समृद्ध पाया गया है।

परियोजना क्षेत्र में जनसांख्यिकीय सुविधाओं के साथ जनसंख्या पुरुष अनुपात, महिला एवं पुरुष साक्षरता में कम अंतर के साथ साक्षरता में वृद्धि का संकेत मिलता है। अनुसूचित जनजाति की जनसंख्या कम है, हालांकि अनुसूचित जाति की आबादी अपेक्षाकृत पायी गयी है। बुनियादी ढांचे के आधार पर क्षेत्र अपर्याप्त पक्की सड़के और कृषि के लिए अनियमित बिजली की आपूर्ति इंगित होते हैं। आंकड़ों से कुल सिंचित क्षेत्र, सिंचाई की तीव्रता और उर्वरकों की खपत की धीमी वृद्धि के संकेत भी मिलते हैं। इसके अलावा यहां नलकूप सिंचाई एवं नहर की सिंचाई पर बढ़ती निर्भरता को दर्शाता है। हैदरगढ़ ब्रीच में व्यवसायिक आंकड़े कृषि शक्ति परन्तु गैर कृषि व्यवसाय की ओर बदलाव दर्शाते हैं।

उत्तर प्रदेश में, जो भारत के 180 मिलियन से अधिक जनसंख्या के साथ सबसे अधिक आबादी वाला राज्य है और जहां कृषि मुख्य रूप से आर्थिक गतिविधि बनी हुई है। राज्य में कृषि 70 प्रतिशत सिंचाई पर निर्भर है। परन्तु उत्पादकता अंतराल (Productivity Gap) कृषि क्षेत्र में उपलब्धि और क्षमता के साथ मौजूद है। अतः कृषि विकास से गरीबी को कम करने के साथ ही साथ आय

में भी वृद्धि हो सकती है। सिंचित कृषि, जो आर्थिक विकास को गति प्रदान कर सकती है, परन्तु एक असफल सार्वजनिक सिंचाई और जल निकासी व्यवस्था, अपर्याप्त रखरखाव और खराब जल प्रबंधन द्वारा विपदा है। अतः पुनर्वास एवं आधुनिकीकरण अच्छी तरह से कार्य, टिकाऊ सिंचाई और जल निकासी प्रणालियों का उपयुक्त कृषि आदानों के साथ एकीकृत कृषि के विकास के लिए आवश्यक है। किसानों और जल उपयोग संघों की नागरीदारी इन प्रणालियों की स्थिरता के लिए भी महत्वपूर्ण है।

प्रस्तावित परियोजना

उपरोक्त संदर्भ के अन्तर्गत, उत्तर प्रदेश सरकार द्वारा एक लंबी अवधि के जल प्रबंधन में सुधार और सिंचाई उत्पादकता को बढ़ाने के लिए राज्य में 15-20 वर्ष के लिए उपयों के साथ, एक वित्तीय कार्यक्रम को तैयार किया गया था। उत्तर प्रदेश जल क्षेत्र पुनर्गठन (UPWSSRP)-परियोजना चरण-1 (2002-2011) इस कार्यक्रम का पहला कदम था। प्रथम चरण के अनुभव के अनुसार द्वितीय चरण में सुधार प्रस्तावित है। यह कार्य प्रथम चरण के कार्य क्षेत्र, निचली गंगा नहर (LGC), बुन्देलखण्ड में कई बांध और हैदरगढ़ शाखा में भी करने के लिए प्रस्तावित है। परियोजना विकास के उद्देश्य (i) संस्थागत और पूरे राज्य के लिए एकीकृत जल संसाधन प्रबंधन के लिए नीतिगत ढांचे का सुदृढ़ीकरण, और (ii) लक्षित सिंचित क्षेत्रों में किसानों को उनकी कृषि उत्पादकता और पानी का उपयोग क्षमता बढ़ाने के लिए प्रस्तावित है।

प्रस्तावित चरण-2 परियोजना का निम्नलिखित घटकों में कार्यान्वयन प्रस्तावित है।

घटक-ए राज्य स्तरीय जल संस्थानों का सुदृढ़ीकरण

- राज्य जल नियामक आयोग को क्रियाशील बनाना।
- ज्ञान और एकीकृत जल संसाधन प्रबंधन के लिए विद्वानतात्मक क्षमता को मजबूत बनाना।
- सिंचाई विभाग के इंजीनियरों के लिए प्राथमिक प्रशिक्षण संस्थान- जल और भूमि प्रबंधन संस्थान (WALMI) को मजबूत बनाना।

घटक बी- सिंचाई और ड्रेनेज सिस्टम के आधुनिकीकरण और पुनर्वास

सारदा सहायक के कुछ हिस्सों, (23 किमी० और नीचे से हैदरगढ़ शाखा), बुन्देलखण्ड में तीन जलाशय (रोडिणी, जामिनी, सजनम बांधों), और निचली गंगा नहर प्रणाली और (समानांतर निचली गंगा नहर) में सिंचाई और जल निकासी के बुनियादी ढांचे के विस्तार, पुनर्वास और आधुनिकीकरण का प्रस्ताव। ये पहले निचली गंगा नहर एवं हैदरगढ़ शाखा (23 डाउन) के सकल कमान क्षेत्र 27.98 लाख हेक्टर और बुन्देलखण्ड के 0.74 हेक्टर क्षेत्र में प्रस्तावित है। इस परियोजना के तहत केवल मौजूदा सिंचाई संरचना सिस्टम को ही लिया जाएगा तथा अन्य कोई नई परियोजना कार्यान्वयन प्रस्तावित नहीं है।

- चरण-1 में नियमन व्यवस्था के आधुनिकीकरण (जौनपुर शाखा)
- भूजल प्रबंधन गतिविधियां

घटक-सी एकीकरण और सिंचाई संस्थागत सुधारों में संघर्षन

- उत्तर प्रदेश सिंचाई विभाग (UPID) का आधुनिकीकरण और क्षमता का निर्माण
- जल उपयोगकर्ता संघों (WUAs) को मजबूत बनाने और सहभागितापूर्ण सिंचाई प्रबंधन (पीआईएम) अधिनियम को लागू करना।

घटक—डी कृषि उत्पादकता बढ़ाने और कृषि जल प्रबंधन

- कृषक जल स्कूलों और अन्य कृषि भावप्रदर्शक निवेश पर केन्द्रित निवेश

घटक—ई व्यवहार्यता अध्ययन और अगले चरण के लिए क्रियाएं

- भविष्य के लिए चरण—3 क्षेत्रों में विस्तृत सर्वेक्षण और रूपांकन तैयार करने के लिए है।

घटक एक – परियोजना समन्वय और निगरानी

- समय समन्वय और परियोजना के प्रबंधन, निगरानी और मूल्यांकन सहित परियोजना की गतिविधियों के साथ समन्वय टीम की क्षमता का विकास
- यूपी स्टेट रिमोट सेंसिंग एजेंसी (RSAC) द्वारा क्रियान्वित
- रिमोट सेंसिंग के द्वारा फसल उत्पादकता की निगरानी

यह परियोजना (निचली गंगा नहर में और हैदरगढ़ शाखा) गंगा नदी बेसिन में स्थिति है। भूमि उपयोग के अंकड़े, मिश्रित भूमि उपयोग और कृषि भूमि क्षेत्र को दर्शाता है। हाल ही में, बेहतर सड़क सुविधाओं की वजह से छोटे हाइड्रोग्राफिक क्षेत्र में बदल चुके हैं। सभी परियोजना किसी भी संरक्षित क्षेत्रों के अन्दर प्रस्तावित नहीं है। कोई बड़ी घेटरलैंड नहर एलाइनमेंट में नहीं आती है।

प्रारम्भिक पर्यावरणीय और सामाजिक विश्लेषण

इस परियोजना में विश्लेषण पर्यावरण और सामाजिक विकास के आधारभूत परियोजना क्षेत्र में ध्यान केंद्रित समूह चर्चा, भौतिक और प्राकृतिक सुविधाओं के सर्वेक्षण तथा किसानों और अन्य प्राथमिक चरखे सर्वेक्षण के आधार पर किया गया है। इसके अलावा, सामाजिक-आर्थिक और हितधारकों की स्थिति और उनके विचारों, तथा पर्यावरण और सामाजिक चुनौतियों और मुद्दों को उजागर करने के लिये गये हैं।

पर्यावरण और सामाजिक विश्लेषण, खराब सिंचाई व्यवस्था को दिखाता है, विशेष रूप से नहर के आखिरी छोर तथा, भूजल पर अत्यधिक निर्भरता एवं जिसके कारण अधिक भूजल दोहन और इसके कारण भू जल स्तर में निरन्तर कमी है। बिजली की कमी की भी एक समस्या पाई गयी है, नतीजतन ज्यादा कृषि उत्पादन नहीं हो पा रहा है। बीजों की अनुपलब्धता और आधुनिक कृषि प्रौद्योगिकी की कमी, असंतुलित उर्वरकों का उपयोग और खराब फसल विविधीकरण को दुर्बल करता है। किसानों में कीटनाशकों के सुरक्षित उपयोग में जागरूकता की कमी से विषाक्तता का जोखिम बढ़ाता है। अन्य सामाजिक मुद्दों भी हितधारकों से विचार-विमर्श करने से अलग हुए हैं। यह सीमित नियंत्रण और संरचनाओं की वजह से नहरों को रास्ते के रूप में प्रयोग किया जा रहा है। कृषि उत्पादकता को हितधारकों ने पुलियाओं एवं छोटे पुल के खराब रखरखाव के बारे में शिक्षागत की है।

नहरों के खराब रखरखाव की वजह से क्षेत्र में जलभराव और लवणीयता बढ़ी है। निरीक्षण से नहरों में गाद के भरने की पुष्टि हुई है। यह हिमालयी नदियों और उनकी सहायक नदियों की वजह से

हो सकता है। बजट की कमी से नहरों का रखरखाव पूर्ण रूप से नहीं हो पा रहा है। इसके अलावा, गाढ़ को नियंत्रित करने के लिए राष्ट्रीय ग्रामीण रोजगार गारंटी अधिनियम (नरेगा) का कार्य क्षेत्र केवल नालियों (ड्रेन्स) तक सीमित है। जलनराय के मुद्दे नहर के ऊपरी क्षेत्रों में पाये गये हैं। लघु और अधोचोषित झीलों (पेटलैन्ड) कई नहर के क्षेत्रों में पायी गयी है जो कि नहर से पानी के रिसाव और नराय के कारण बनी हो सकती है। इनमें से अधिकांश मौसमी है और क्षेत्रीय पत्ती, उभयचरों (एन्नीवियन्स) को जैविक सहायता करती है। हालाँकि, क्षेत्र सर्वेक्षण से कोई भी संकट ग्रस्त या लुप्त प्रजातियों को नहीं पाया गया है। सारस अक्सर नहरों और खान के छेतों में देखा गया है। नहरों के पुनर्वास, बेहतर सिंचाई व्यवस्था के लिए आवश्यक है, जो कि लघु झीलों (पेटलैन्ड) पर प्रतिकूल असर डाल सकता है। लम्बी जल नराय और खराब जल निकासी व्यवस्था भूमि को उसर बना सकती है। बेहतर नहर कार्य प्रणाली और पानी का कम रिसाव से उसर भूमि के मुद्दे से निजात पाने में मदद मिल सकती है।

हितधारक विश्लेषण (Stakeholder Analysis)

प्राथमिक परियोजना के हितधारकों में उत्तर प्रदेश सिंचाई विभाग, पैषट, नृजल विभाग और कृषि विभाग के अतिरिक्त किसानों, जल उपयोगकर्ता संघों, महिला स्वयं सहायता समूहों, पंचायती राज संस्थाओं और सरकारी संगठनों को भी शामिल किया गया था। पर्यावरणीय मूल्यांकन के भाग के रूप में व्यापक हितधारकों के साथ विचार-विमर्श किया गया, यह विचार विमर्श व्यक्तिगत, घरों / गाँवों तथा समुदाय के स्तर पर पंचायती राज संस्थाओं के साथ किये गये। यह पर्यावरणीय मूल्यांकन रिपोर्ट विभिन्न विचार विमर्श से महत्वपूर्ण रायों पर प्रकाश डालता है। परियोजना समन्वय संस्था, घाघरा-गोमती बेसिन में इस परियोजना के प्रथम चरण को लागू होने और विश्व बैंक के सुरक्षा उपायों की नीतियों और उनके अनुपालन के महत्व को प्रदर्शित करता है। यह परिचित विभिन्न महत्वपूर्ण उपायों को लागू करने में उपयोगी होगा।

हितधारकों की प्रतिक्रिया प्रोजेक्ट इन्टरवेंशन के समर्थन की पुष्टि की। कई किसानों ने बेहतर परिष्कृत सुविधा और विपणन केंद्रों से कृषि उत्पादों की विक्री एवं अच्छी कीमत प्राप्त करने के लिए बेहतर सड़क सुधार का सुझाव दिया। कृषि विस्तार संघों में सुधार और अधिक बुवाई क्षेत्र को सम्मिलित करने की समग्र माँग की। बेहतर और अधिक पशु स्वास्थ्य सुविधाओं, अधिक पजनन सुविधाओं, मछलियों की प्रासंगिक नस्लों की अधिक उपलब्धता और समग्र मछली की सुविधाओं उनके वैकल्पिक आजीविका में सुधार करने को कहा। नियमित अंतराल पर नहर डींचा के प्राथमिक और माध्यमिक श्रोतों के साथ नृजल रिचार्जिंग सुविधाओं का सुझाव दिया गया था। इसके अलावा, जलनराय में सुधार और वर्षाजल संचयन सुविधाओं पर ध्यान देने का सुझाव भी दिया। अतः बेहतर जल निकासी भूमि की क्षारकता और लवणता को कम करेगा।

परियोजना के संभावित प्रभाव

यह ध्यान दिया जाना चाहिए की संभावित पर्यावरणीय एवं सामाजिक प्रभावों को बड़े पैमाने पर सिंचाई सेवा वितरण द्वारा होने। पर्यावरण पर प्रतिकूल प्रभाव हो सकते हैं जैसे गाढ़ निपटारण, निर्माण एवं सिंचाई नियंत्रक संरचनाओं, नहरों पर छोटे पुलों की स्थापना, असंतुलित कृषि रसायन का उपयोग उत्पादकता बढ़ाने के लिए, खराब निर्माण एवं खराब गुणवत्ता और असुरक्षित निर्माण के कारण प्रतिकूल प्रभाव हो सकते हैं। लेकिन ये क्यालिडि एस्वोरेन्स सुपरविजन प्रोटोकॉलस पैषट, क्यालिडि एस्वोरेन्स कन्सल्टेन्ट और इनके इन्जीनियरों की मदद से दूर किए जायेंगे। उनकी बुनिदा

और सामूहिक उपयोग से परियोजना के लोगों और पर्यावरण पर कोई दीर्घकालीन प्रभाव नहीं होगा। उनके संभावित प्रभावों को दूर का एक सारांश नीचे दिया गया है।

घटक	योजनात्मक निवेश की प्रकृति	संभावित प्रतिकूल/सकारात्मक प्रभाव डालता है और तीव्रता	रक्षण की प्रकृति
1. राज्य स्तरीय जल संस्थानों और इंटर सेक्टर समन्वय का सुदृढीकरण	प्रशिक्षण, एकलचयन जांच, आईटी उपकरण, अनुसंधान और अध्ययन, मानव संसाधन कारा	कम सीमित स्वास्थ्य और सुरक्षा बेहतर जल संसाधन प्रबंधन	पर्यावरण एवं सामाजिक जागरूकता का निर्माण
2. सिंचाई और ड्रेनेज सिस्टम के आधुनिकीकरण और पुनर्वास	डिजाइन और सर्वेक्षण, गाढ़ विकासी नहर अन्तः, हाइड्रोलाग्य संवर्धनांग नियंत्रण संरचनाओं, मुर्दा कायमन, मोरी, नाप उपकरणों, कार्यालय भवनों का उपकरण, मृदा पुनर्नयन, जल मंडारण संरचनाओं (जोई)	उच्च, असुरक्षित संवेधित निर्माण करने के लिए उधार, बीमा, स्थानीय जैव विविधता, सामाजी ईंधन और मंडारण, आम सिंचित, जोंबी आदि की सुरक्षा से संवेधित मुर्दा पर प्रभाव	नकारात्मक सूची, स्वीकृत रक्षण उपायों, पर्यावरण प्रबंधन योजना (ईएमपी), जैव विविधता, जागरूकता, मुभावना, सामाजिक सर्वात्मन प्रभाव, आम कानूनगों, निर्माण प्रबंधन मन्ता निर्माण
3. सनेकन और सिंचाई संस्थागत सुधारों के संवेधन	प्रशिक्षण और मन्ता निर्माण, उपकरण समर्थन (अर्थ मुदस आदि सुचना प्रौद्योगिकी (आईटी), जागरूकता निर्माण, गैर सरकारी संगठन कारा	कम और सीमित, सामाजिक सामंजस्य, सचानता, नारदसिता, नागीदारी, नागुली सिंचित कारा बेहतर संसाधन स्थानिक	पर्यावरण एवं सामाजिक जागरूकता के निर्माण, प्रशिक्षण, सामाजिक सुरक्षा जांच, स्थानीय शासन सुधार
4. क्षुति उत्पादकता और क्षुति जल प्रबंधन मन्ताना	किसान पानी के स्कूलों, प्रशिक्षण और मन्ता निर्माण, उपकरणों की खरीद (जोअर), भुमि समतलीकरण, सिंचाई उपकरण, मिटटी परीक्षण, प्वाड कस्तल आदि	उच्च, कीटनासक ईंधन और मंडारण, बीडरेट क्षुति रसायन, स्वास्थ्य एवं सुरक्षा से संवेधित बेहतर खारा सुरक्षा, जल संसाधन प्रबंधन, कम तदुपण	नकारात्मक सूची, स्वीकृत रक्षण उपायों, ईएमपी, कीट प्रबंधन योजना/ आईएमएन आईएमएन, पर्यावरण एवं सामाजिक जागरूकता का निर्माण
5. अगले चरण के लिए व्यवधानता अध्ययन तैयारी कियार्	डिजाइन और सर्वेक्षण के परामर्श, अनुसंधान एवं अध्ययन	कम और सीमित	पर्यावरण एवं सामाजिक जागरूकता का निर्माण
6. परियोजना समन्वय एवं निगरानी	परामर्श, निर्माट सीमित कार्यालय उपकरण	कम और सीमित	पर्यावरण एवं सामाजिक जागरूकता का निर्माण

प्रतिकूल पर्यावरण और सामाजिक प्रभावों का पता करने के लिए दृष्टिकोण स्वीनिंग, नकारात्मक सूची को कम करने, क्षतिपूर्ति, और दूसरे प्रयास शामिल हैं. इस अभ्यास के आधार पर, और परियोजना निवेश के संदर्भ में, सामाजिक और पर्यावरणीय मूल्यांकन स्वीनिंग मानदंड है कि संभावित प्रतिकूल प्रभावों की भयावहता के आधार पर तीन श्रेणियों में प्रस्तावित परियोजना निवेश स्थानों में शामिल हैं. गतिविधियों जो कि नकारात्मक सूची में शामिल हैं. उनको किसी प्रकार का वित्त उपलब्ध नहीं कराया जायगा। पर्यावरण और सामाजिक प्रबंधन फ्रेमवर्क (ESMF) इस आधार पर विकसित किया गया है कि नियोजित निवेश का कम से कम प्रतिकूल पर्यावरण और सामाजिक प्रभावों और अविष से अविष सकारात्मक पड़े. एक भूमिका और जिम्मेदारी मेट्रिक्स शसन कार्यों के समय पर निगरानी सुनिश्चित करने के लिए ESMF में शामिल है. इसके अलावा, पर्यावरण प्रबंधन योजना (ईएमपी) संभावित उच्च पर्यावरण जोखिम के साथ कि निवेश सुनिश्चित करने के

लिए विकसित किये गये हैं। EMPs निर्माण से संबंधित हैं और नहर, गाद निपटान, सहित पुनर्वास गतिविधियों, के लिए विकसित किये गये हैं।

जानकारी प्रकटीकरण के संबंध के साथ, मसौदा ESMF रिपोर्ट और इसके बाद संशोधित संस्करण अक्टूबर 2012 से UPID (<http://irrigation.up.nic.in/project.htm>) सार्वजनिक और अन्य हितधारकों से आमंत्रित टिप्पणियाँ और सुझाव के लिए वेबसाइट पर अपलोड किए गए। इसके अतिरिक्त यह रिपोर्ट विश्व बैंक के सूचना केन्द्र की वेबसाइट पर भी उपलब्ध है। इसके अलावा, इन रिपोर्टों की हार्ड और सॉफ्ट प्रतियां संबंधित UPID चीफ कार्यालय एवं अधीक्षण अभियंता कार्यालय में भी सभी हितधारकों से टिप्पणियाँ और सुझाव प्राप्त करने के लिए सभी इंजीनियर्स के कार्यालयों में भी वितरित कराये गई हैं। अंतिम सामाजिक और पर्यावरणीय EMP // मूल्यांकन रिपोर्ट सार्वजनिक UPID वेबसाइट और विश्व बैंक के सूचना केन्द्र के माध्यम से खुलासा करी जायेगी। कार्यकारी सारांश अंग्रेजी में अनुवाद करने के लिए बैंक प्रकटीकरण नीति संबंधी आवश्यकताओं को पूरा करा जायेगा।

प्रतिकूल पर्यावरण और सामाजिक प्रभावों के लिए दृष्टिकोण

इस आकलन के आधार पर और परियोजना निवेश के संदर्भ में, पर्यावरण और सामाजिक विरलेपन स्वीनिंग मानदण्ड के संभावित प्रतिकूल प्रभावों की न्यायव्यवस्था के आधार पर प्रस्तावित परियोजना को तीन श्रेणियों में विभाजित किया गया है। इसके अलावा एक अणुात्मक सूची भी तैयार की गई है जिसके एहत कोई भी इस प्रकार का कार्यक्रम प्रतिबन्धित है। एक पर्यावरण और सामाजिक प्रबंधन प्रेमवर्क भी बनाया गया है जो प्रतिकूल प्रभावों, को कम करने में सहायक होगा और परियोजना के सकारात्मक प्रभावों के उपायों को प्रदान करता है। भूमिका और जिम्मेदारी और कार्य पर समय से निगरानी सुनिश्चित करने के लिए ई0एस0एम0एफ0 में एक मैट्रिक्स बनाया गया है। इसके अतिरिक्त, पर्यावरणीय और सामाजिक प्रभावों को रोकने के लिए पर्यावरण प्रबंधन योजना भी तैयार की गई है। निर्माण कार्य, नहर पुनर्वास, गाद निपटारीकरण, कीटनाशकों के भण्डारण (कीट प्रबंधन योजना) के लिए ई0एम0पी0 बनाये गए हैं। पर्यावरणीय एवं सामाजिक मूल्यांकन / ई0एस0एम0एफ0 / ई0एम0पी0 रिपोर्ट पर टिप्पणी के लिए हिन्दी और अंग्रेजी में सार्वजनिक किया गया है। जो कि विश्व बैंक के प्रकटीकरण नीति संबंधी आवश्यकताओं को पूरा करती है।

विश्व बैंक की लागू होने वाली रसा नीतियाँ

कोई भी बड़े पैमाने पर महत्वपूर्ण और अपरिवर्तनीय पर्यावरण और सामाजिक प्रभाव परियोजना से संभावित नहीं है। मूल्यांकन के प्रमुख बिन्दुओं से पता लगता है कि प्रतिकूल प्रभावों के नौगोलिक प्रसार की संभावना नहीं है। सामाजिक प्रभावों के संदर्भ में पिम एक्ट के माध्यम से पाटर यूजर एसोसियेशन सिंचाई वितरण प्रणाली एवं प्रबंधन में परिवर्तन होगा। नहर किनारे (विशिष्ट परियोजना घटक के तहत) प्रभाव हो सकते हैं जो कि ई0एस0एम0एफ0 में दिए गये हैं। जबकि परियोजना सिंचाई प्रणाली और कृषि गतिविधियों के पुनर्वास पर निवेश के माध्यम से खेती करने वाले समुदायों को लाभ पहुँचाने के लिए बनाया गया है। प्रस्तावित परियोजना से लोगों और भूमि पर प्रतिकूल प्रभाव हो सकते हैं। खासकर पुनर्वास और आवुनिकीकरण के लिए प्रस्तावित 100

शेनी ए में चिह्नित की गयी है। यह परियोजना विद्युत बेंक की चार नीतियों, अर्थात् पर्यावरण आकलन (ओपीओ - 4.01), बाँधों की सुरक्षा (ओपीओ - 4.37), अनैच्छिक पुनर्वास (ओपीओ - 4.12), कीट प्रबंधन (ओपीओ - 4.09) और एक कानूनी नीति, अंतरराष्ट्रीय जलमार्गों पर परियोजना (ओपीओ - 7.50) को सक्रिय करती है।

नहर और सम्बन्धित ढाँचों के पुनर्वास और आधुनिकीकरण के लिए भूमि अधिग्रहण या पुनर्वास एवं पुनर्वास के लिए किसी की जरूरत को शामिल करने की संभावना नहीं है। दुर्लभ घटना में इस नीती का सक्रिय होना जरूरी हो जाता है। इस पहलू पर ध्यान केन्द्रित करने हुए एक पुनर्वास ढाँचा भी तैयार किया गया है। इस ढाँचे के अन्तर्गत अनैच्छिक पुनर्वास पर बैंक ओपी 4.12 के प्रायधानों के अनुरूप यूपी स्टेट आर एण्ड आर नीति के साथ लागू किया जाएगा। परियोजना क्षेत्र में आदिवासी आवासीय नगण्य है और इसलिए ओपीओ 4.10 लागू नहीं होता है। इसके अतिरिक्त परियोजना क्षेत्र में कोई मौजूद, आदिवासी परिवारों का रिकार्ड रखने और उनकी हर अवसर का उपयोग करने के लिए आसपास के क्षेत्र में ले जाया जाएगा। बाँधों की सुरक्षा (ओपीओ 4.37 बुंदेलखण्ड क्षेत्र में तीन जलाशयों पर लागू होता है और इनकी अलग पर्यावरण सामाजिक रिपोर्ट बनायी गई है।

प्रस्तावित परियोजना क्रियाओं के लिए विकल्प के विरलेषण पर विचार किया गया। इस दूसरे चरण में राज्य में मौजूदा जल निकासी, सिंचाई के बुनियादी ढाँचे, आधुनिकीकरण और पुनर्वास के सिमित विकल्प हैं। नई सिंचाई बुनियादी ढाँचा एक विकल्प माना गया है, लेकिन इस परियोजना में कोई नई सिंचाई बुनियादी ढाँचा नहीं बनाया जायेगा। इसके लिए प्रथम चरण की मौजूदा सिंचाई बुनियादी ढाँचे का उपयोग और सुधार प्रस्तावित है। यहाँ एक सख्त सिंचाई सेवा प्रदान करने और कृषि उत्पादकता का बढ़ना, खास सुरक्षा, अच्छी जल संसाधन को सुनिश्चित करना और तैजी से बढ़ती हुई जनसंख्या के विरोध रूप से मीनों को पूरा करने की आवश्यकता है। दूसरा विकल्प, मृजल प्रबंधन है। संयुक्त उपयोग क्षेत्रों में जहाँ दोनों सतह के पानी का उपयोग और प्रबंधन एक संभावित विकल्प है। दोहरी पोस्टर सिंचाई जल संसाधन स्थिरता में सुधार करने के लिए एक प्रभावी विकल्प हो सकता है। सिंचाई क्षेत्रों के प्रस्तावित संयुक्त उपयोग की पर्यावरण और संसाधन स्थिरता में अच्छे परिणाम के रूप में अच्छा माना गया है। यह परियोजना में सफायात्मक विनियंत्रण की अनुमति देता है।

पर्यावरण और सामाजिक प्रबंधन छेमणक

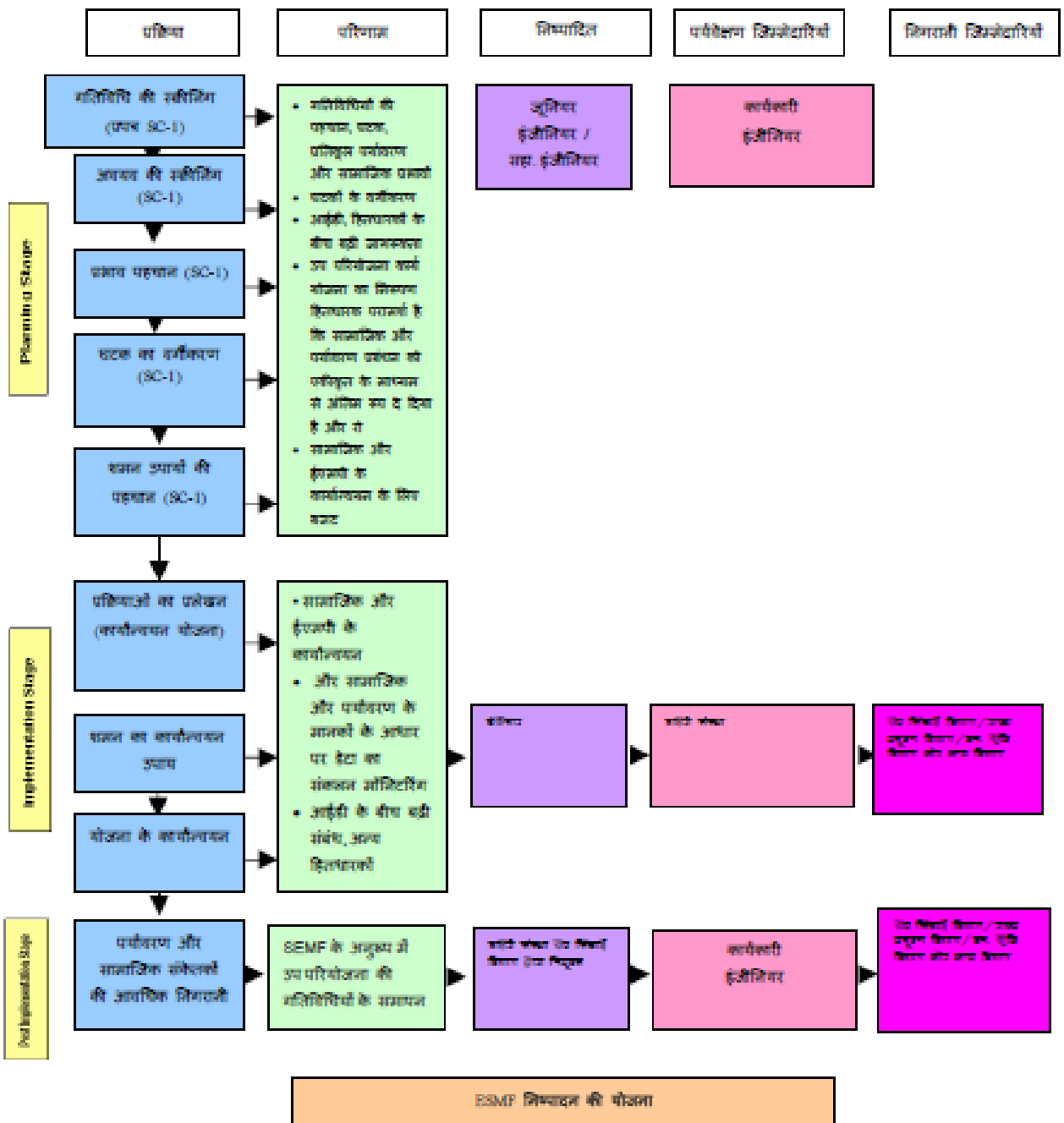
प्रस्तावित परियोजना की क्रियाओं के प्रभावों को कम करने के लिए, एक पर्यावरण और सामाजिक विरलेषण सभी परियोजना चरण-2 के क्षेत्रों में किया गया है। पर्यावरण और सामाजिक ढाँचे (ईओएसओएमओएफओ) समग्र दिशा निर्देशों और प्रक्रियाओं के साथ (निचली गंगा नहर और हैदरगढ़ शाखा) प्रदान करने के लिए बनाया गया है।

पर्यावरण और सामाजिक विरलेषण विभिन्न परियोजना नियंत्रण पर स्मार्ट मार्ग दर्शन प्रदान करने और प्रतिकूल प्रभावों को कम करने के लिए, प्रस्तावित परियोजना से होने वाले प्रतिकूल प्रभावों को तीन शेनी में रखा गया है। 1- शेनी ए: गतिविधि /अवयव जो प्रमुख पर्यावरण/सामाजिक प्रभाव डालेंगे और ईओएमओपीओ की आवश्यकता है, जहाँ भी ईओएमओपीओ लागू होता है यहाँ (Bid Document) और टेकेंडार द्वारा लागू किया जायेगा। 2- शेनी बी: इस शेनी का माध्यम पर्यावरण और सामाजिक प्रभावों को दूर करने और निर्माण के समय टेकेंडारों/संस्थाओं पर लागू होगा। ईओएसओएमओएफओ और विशिष्ट प्रबंधन के डिस्के के रूप में शामिल उपायों को भी इस परियोजना की अवधि के

दौरान लागू करने की योजना है। 3- श्रेणी सी: नगण्य या हान्य पर्यावरण और सामाजिक प्रभावों को इस श्रेणी में रखा गया है, और इन गतिविधियों के लिए कोई भी उपाय नहीं दिया गया है।

प्रारम्भिक पर्यावरण और सामाजिक विरलेपण की डिजाइन कुंजी और प्रभावों को कम करने के उपायों और रणनीतियों का परिचय, विभिन्न विचार विमर्श से ज्ञात होता है कि परियोजना क्षेत्र में सिंचाई के लिए भूजल का अधिक मात्रा में उपयोग किया जा रहा है ज्यादातर यही सुनिश्चित सिंचाई सुविधाओं की कमी है। गिरते जल स्तर, गुणवत्ता और निर्भरता के महत्वपूर्ण मुद्दों को संबोधित करने के लिए कुछ पर्यावरण उपायों का उप-घटक बी० का समावेश किया गया है। इस परियोजना से राज्य में कोई जैव विविधता का नुकसान नहीं है। कुछ महत्वपूर्ण प्रभाव नहर और झीलों में हो सकते हैं। परियोजना के रूप में अलग धनराशि निर्धारित कर सकते हैं।

प्रस्तावित परियोजना के प्रभावों को कम करने के उपायों का ई०एम०पी० बनाये गये हैं। जो कि अनुलग्नक: 6.1 में दिए गये हैं। इनमें निर्माण शिविरों के लिए योजना, ढोस प्रबंधन, निर्माण और उपकरणों का प्रबंधन, उर्वरक एवं कीटनाशक से निपटने और भंडारण, समन्वित कीट प्रबंधन, सार्वजनिक स्वास्थ्य कार्यकर्ता, सुरक्षा वृक्षारोपण, गाड़ निपटारण जैव विविधता, शामिल हैं। पुनर्तास ढाँचा का अनुलग्नक 6.2 में विवरण दिया है।



प्रस्तावित परियोजना के कार्यान्वयन के लिए अंतर्विभागीय समन्वय की आवश्यकता है। कार्यान्वयन विभागों के संदर्भ में उत्तर प्रदेश सिंचाई विभाग घटक ए, बी1, बी2, सी, ई और एफ1 को लागू करने के लिए जिम्मेदार होगा। कृषि विभाग घटक डी को लागू करने के लिए जिम्मेदार होगा। एक अच्छे भागीदारी के लिए एक वरिष्ठ (संयुक्त निदेशक स्तर) का कृषि अधिकारी को पैक्ट में नियुक्त किया जायेगा। भूजल विभाग घटक बी3 को लागू करने के लिए जिम्मेदार होगा, हालाँकि निर्माण कार्यों के लिए इसका प्रयोग नहीं किया जायेगा। रिमोट सेंसिंग केंद्र फसल और उत्पादकता विश्लेषण, सेटे लाइट ज्ञाना सित्रों की निगरानी प्रदान करेगा। राज्य ग्रामीण विकास संस्थान भी उत्तर प्रदेश सिंचाई विभाग के साथ प्राथमिक शिक्षा अभियान और पानी के उपयोग कर्ताओं संघों की क्षमता का निर्माण करेगा।

ई0एस0एम0एफ0 का कार्यान्वयन, जागरूकता में बढ़ोतारी, यातायात / सामाजिक मुद्दों और सिंचाई क्षेत्रों में समस्याओं को निपटाने का बेहतर उपाय होगा। इस ई0एस0एम0एफ0 में सूचना शिक्षा और संचार रणनीति, क्षमता निर्माण, प्रशिक्षण योजना और निगरानी एवं मूल्यांकन के लिए अनुसूची तैयार की गई है। सुझाव और सूचना शिक्षा संचार के लिए रणनीति तैयार बनाया गया है। निगरानी एवं जाँच तंत्र में पर्यावरण और सामाजिक प्रभावों को शामिल किया गया है। इसके अलावा, यू0पी0एस0आर0पी0 2 के लिए विकसित ई0एस0एम0एफ0 परियोजना प्रबंधन प्रणालियों और प्रक्रियाओं के साथ प्रभावी ढंग से लागू कर सकते हैं। पर्यावरण एवं सामाजिक मूल्यांकन ई0एस0एम0 जोखिम और मौजूदा चुनौतियों को कम करने के लिए इस परियोजना में बनाया गया है। इसमें मौजूदा प्रणाली का वर्णन किया गया है।

ई0एस0एम0एफ0 के प्रतिकूल पर्यावरण और सामाजिक प्रभावों को पर्याप्त रूप से संबोधित किया जाएगा, इसमें संस्थागत और कार्यान्वयन व्यवस्था प्रथम चरण और विश्व बैंक की प्रक्रियाओं के अनुसार होगा। प्राथमिक समन्वय बहु अनुशासनात्मक द्वितीय चरण पैक्ट के अध्यक्ष (भारतीय प्रशासनिक सेवा) के नेतृत्व में विभिन्न तकनीकी और प्रशासनिक विशेषज्ञों की निगरानी में होगा। कई सालों से विश्व बैंक की टीम के साथ, पैक्ट ने इस क्षेत्र में विश्व बैंक की प्रक्रियाओं (कार्यान्वयन जोखिम) और परियोजना स्तर पर महत्वपूर्ण क्षमता का विकास किया है। पैक्ट का कार्य परियोजना का कार्यान्वयन, वित्तीय प्रबंधन, पर्यावरण एवं सामाजिक सुरक्षा नीतियों का संचालन है। प्रथम चरण में पैक्ट में विषय विशेषज्ञों की नियुक्ति प्रस्तावित थी, लेकिन यह विम, वित्तीय प्रबंधन, निगरानी और मूल्यांकन के लिए सर्वेक्षण और डिजाइन, पुनर्वास, प्रशिक्षण, सूचना प्रबंधन प्रणाली, कृषि, पर्यावरण, सामाजिक और भूजल तक सीमित नहीं थी। ये अधिकारी विभिन्न विभागों की मदद करने के लिए भी जिम्मेदार होंगे। लगभग \$6.85 m (7 वर्षों की अवधि के लिए) बजट ई0एस0एम0एफ0 के कार्यान्वयन के लिए कल्पना की गई है, जो कि कर्मचारियों, प्रशिक्षण और विशेष अध्ययन (यदि आवश्यक हो) को भी शामिल किया गया है।

Chapter 1: Introduction

1.0 Water Resource Development in Uttar Pradesh

A large network of perennial rivers, mostly flowing from the Himalayas, contributes to Uttar Pradesh vast water resources potential and provides drainage to the state. Major rivers include Ganga, Yamuna, Ghaghra, Gomti, Gandak, Sone and Sarada, as shown in **Figure 1.1**. A deep alluvial aquifer underlies the vast plains, recharged annually by almost 1000 mm monsoon rainfall. Salient features of the State are given in Box 1.1.

The major rivers in the state provide water for canal irrigation. Over the past century, one of the world's largest canal systems has been constructed in the State, which supports a predominantly rice-wheat cropping system. The total length of the canal system in the state is about 71780 km, which consists of 4261 km of major canals and 7107 km of branch canals. The major canal systems in the state include Upper Ganga Canal, Eastern Yamuna Canal, Agra Canal, Lower Ganga Canal, Sarada Canal and Sarada Sahayak Canal System, Gandak Canal, Ken Canal and Betwa Canal systems. About 43.8 BCM of surface water is utilized for irrigation

out of a total of about 161.70 BCM of surface water in the state. As per MoWR data, the total irrigation potential created at the end of ninth plan in the state is about 29.5 MHa (31% of the total national potential), out of which 80% has been utilized. Most of irrigation headworks are run-of-river systems, supplemented by some small reservoirs at some places particularly in the Shivalik foothills of the Himalayas and in Bundelkhand region.

MoWR, GoI data indicates that the annual replenishable ground water resource in the state is about 76.35 BCM per year with net annual ground water availability of about 70.18 BCM per year, out of which 48.78 BCM per year is the total draft. The stage of ground water development in the state has been estimated to be 70%.

The recent statistics on human development shows that the socio-economic and human development in UP has fallen behind India's better performing states. Agriculture sector performance has lagged behind while the rate of poverty is increasing (with an estimated 35% living below the poverty line) every year. The existing huge gap between the present farm productivity and its potential is increasing gradually. Sustainability of agriculture is threatened

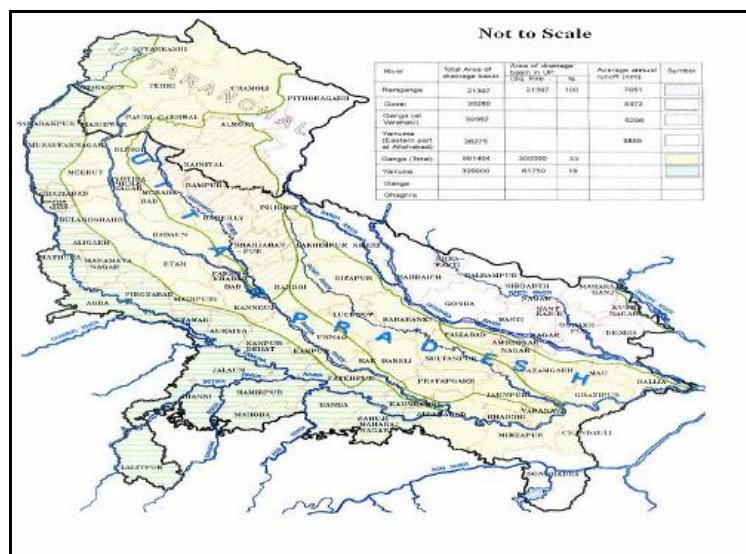
Box 1.1 Uttar Pradesh at a Glance

The state of Uttar Pradesh (UP), having a geographical area of 24 MHa and a population of 166 million inhabitants accounting for 9% of India's total land area, and 17% of its population, is endowed with rich natural resource potential, lies in the fertile Indo-Gangetic plain with high natural soil fertility, abundant rainfall, and surface and groundwater resources. Five major rivers, the Ganga, Yamuna, Ramganga, Gomti and Ghagra flow through the state. All the rivers are part of Ganga Basin and ultimately drain into the Bay of Bengal.

Physio-graphically, the state is broadly divided into two regions, the southern hills, plateau, and the vast alluvial Gangetic Plains. The state has four major regions viz. Southern UP (Bundelkhand), Western UP, Central UP, Eastern UP. Administratively there are 75 districts in the state.

The economy of UP is predominantly dependent on agriculture, which accounts for 40% of state's GDP, and 75% of employment. The total arable land in the state is about 19.3 MHa out of which 92% is used for agriculture. Approximately 70% of total agricultural land in UP is dependent on irrigation using surface water sources with an average gross cropping intensity of about 100%.

by water-logging and consequent soil salinity-sodicity in canal command areas, whereas groundwater depletion is also occurring in some other areas, resulting in reduced productivity. Further, during monsoon period, the rivers cause flooding of large areas, particularly in Eastern UP, resulting into considerable loss of crops, life and property. Overall scenario indicates that due to changes in cropping pattern, competition from increasing demands for agriculture, domestic usage, power, industrial, environmental and other uses, allocation of water to different stakeholders in appropriate quantity and quality has become increasingly difficult while considerable losses occur due to natural disasters like flooding and droughts. **In the above context, a long term program Uttar Pradesh Water Sector Restructuring Project was initiated to address the issues related to water and related sectors in the state.**



Source: ID, GoUP

Figure 1.1: Major rivers & drainage basins of Uttar Pradesh

UPWSRP – Phase I

UPWSRP Phase – 1 took place over 2002-2011 with financial loan assistance of US\$ 150 million from World Bank (WB) and with the following development objectives: (i) setting up enabling institutional and policy frame work for water sector reform in the state for integrated water resources management (IWRM); and (ii) initiating irrigation, agriculture and drainage sub-sector reforms in the state to increase and sustain water and agricultural productivity. Under the Phase I operation, key institutions for water resources management at the State level were set up. Integrated water resources management activities were carried out in the Ghaghra-Gomti basin. In particular, a basin plan was prepared for the basin and the Jaunpur Branch Sub-basin Development and Management Board was put in place. Irrigation and drainage systems covering about 300,000 ha were rehabilitated and modernized in Jaunpur Branch basin using modern surveys and designs. More than 800 WUAs (at the minor levels) were established and the Uttar Pradesh Participatory Irrigation Management Act was passed in 2009.

A Basin Social and Environmental Assessment study was carried out for Ghaghra Gomti Basin (GG-BSEA). This study was prepared based on the basin planning activities, and a social and environmental baseline was established. Social and environmental and institutional issues were then identified and mitigation options were proposed. Training and capacity building needs were

assessed and a training program was developed. A basin level social, environmental and institutional and monitoring framework was prepared for implementation during Phase II. Some of the gaps in the BSEA which have been observed while implementing the environmental and social framework study are given below.

- The study area did not include Bundelkhand and Lower Ganga Canal System, which have different environmental and social features.
- Institutional structures for mainstreaming environmental and social safeguards recommended in BSEA have not been implemented.
- Training and capacity building of UPID and other stakeholders recommended under BSEA have been partly implemented only.
- Environmental and social safeguard indicator / parameter monitoring framework / system which were recommended in BSEA is yet to be implemented.

The social and environmental knowledge base and infrastructure (GIS) developed by both PACT and SWaRA while implementing BSEA during Phase I can be utilized for implementing social and environmental interventions during Phase II.

UPWSRP - Phase II

UPWSRP was initiated with a long term perspective of 12-15 years to cover entire State and therefore, GoUP has decided to continue the efforts already initiated under Phase –I for funding from WB under Phase-II. Prior to 15th March 2012, it was planned in principle to focus on Bundelkhand region to study and implement IWRM in order to reform the water and agriculture sector with emphasis to mitigate droughts and to rehabilitate this region. A major shift in Phase II project area was then decided. Lower Ganga Canal System (LGC) has been included in the Phase II, while only a selected portion of Bundelkhand and the Sharda Sahayak Canal System (Haidergarh Branch) have been retained.

1.1 Project Area & Project Activities

The project area includes Lalitpur district of Bundelkhand region, three districts, namely Amethi, Barabanki & Rae Bareli under Sharda Sahayak Command Area, and twelve districts, namely Kasganj, Etah, Firozabad, Manipuri, Farrukhabad, Etawah, Kannauj, Auraiya, Kanpur Dehat, Kanpur Nagar, Fatehpur & Kaushambi under Lower Ganga Canal system. Basin-wise area covered under the project is given in **Table 1.1** and shown in **Figure 1.3**.

Table 1.1: Basin wise study area

Sl. No.	Basin/Project Name	GCA (Lakh ha)
1.0	<u>Bundelkhand Region</u>	
1.1	Portion of Betwa canal command consisting of Jamini Dam, Sajnam Dam and Rohini Dam	0.87
Sub Total		0.87
2.0	<u>Sharda Sahayak Command</u>	
2.1	Haidergarh branch of Sarda Sahayak	0.98
3.0	<u>Lower Ganga Canal (LGC)</u>	
3.1	LGC Canal Command Area	27

Sub Total	27.98
Grand Total (1.0+2.0+3.0)	28.85

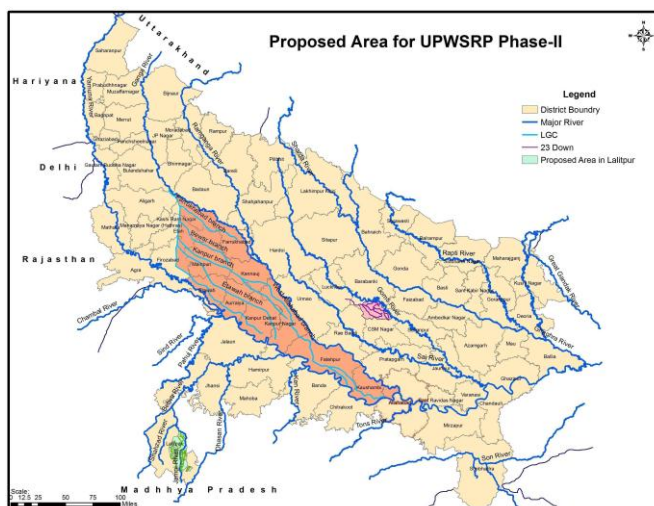


Figure 1.3: Study Area

Source: UPID, GoUP

The project has six components with a total outlay of about US\$ 515 million, including about US\$ 165 million contributed by the State as its share. These components are listed below.

- Component A: Strengthening of State-Level Water Institutions and Inter-Sector Coordination.
- Component B: Modernization and Rehabilitation of Irrigation and Drainage Systems.
- Component C: Consolidation and Enhancement of Irrigation Institutional Reforms
- Component D: Enhancing Agriculture Productivity and On-Farm Water Management.
- Component E: Feasibility Studies and Preparation Activities for the Next Phase
- Component F: Project Coordination and Monitoring.

1.2 Need for the Environmental and Social Management Framework

The implementation of UPWSRP Phase II components will have social and environmental impacts. Therefore, the Project Activity Core Team (PACT), on behalf of UPWSRP, Government of Uttar Pradesh (GoUP), is carrying out an social and environmental assessment of the study area. The social and environmental assessment will lead to the development of the Environmental and Social Management Framework (ESMF) in order to mainstream social and environmental safeguards during Phase II planning and implementation.

1.3 Objectives of the study

The objectives are:

- to identify environmental, social and socio-economic issues in the LGC and Haidergarh project areas
- to identify potential impacts (both positive and negative) of the proposed investments under Phase II

- to provide relevant mitigation measures to contain/minimize/reverse the potential negative impacts of the project investments as well as replicate/upscale/intensify the potential positive impacts
- to prepare an Environmental and Social Management Framework (ESMF) that will guide implementers at various levels to mainstream environmental and social issues
- to develop appropriate recommendations for sustainable utilization of water resources by integrating environmental and social concerns in water sector planning and management

1.4 Scope of Work

The scope of work is the following, as per the ToR for the study:

- Identifying key environmental and social issues in the geographical areas covered by the project and assessing the potential impacts arising from proposed project investments.
- Undertake a detailed review of legal, policy and regulatory environment as well as of the institutional framework in place for management of the water sector and irrigation service delivery.
- Develop Environmental Management Plans (EMPs) for investments that are known and prepare an Environmental and Social Management Framework (ESMF) for new project investments.
- Prepare a detailed social and environmental mitigation plan for the identified issues and potential adverse impacts.
- Prepare a Monitoring and Evaluation (M&E) strategy and plan including a list of key environmental and social indicators for monitoring at various levels.
- Prepare a training and capacity building plan on social and environmental issues, given the intended stakeholders and institutions.
- Develop a communications and consultation strategy to guide project investments during the implementation phase.

1.5 Approach & Methodology

A comprehensive approach and methodology, with a step-wise approach, has been adopted to develop the Environmental and Social Management Framework for LGC and Haidergarh project area.

Step 1: Gap analysis has been carried out based on data available from earlier GGB BSEA study and requirements of the current assignment.

Step 2: A comprehensive policy & regulatory review at national & state level has been carried out by summarizing the applicable policies and regulations. Applicable Safeguard policies of the World Bank have also been reviewed & summarized.

Step 3: Secondary and primary data collection and analysis. All the relevant data from secondary sources has been presented geographically & in database format. Identification of hotspots with different attributes have been further confirmed through stakeholder consultations

and selected ground truthing. This leads to identification of issues, causes and broad level impacts.

Step 4: Extent and level of impacts has been assessed by using trend analysis, outputs from the earlier studies.

Step 5: Based on the impact analysis of adaptive and mitigative activities has been formulated.

Step 6: A monitoring and evaluation (M&E) strategy and plan including a list of key environmental and social indicators for monitoring at various levels has been prepared. The objective is both to monitor impacts identified in step 4 and outputs of activities identified in step 5.

Step 7: Development of ESMF and EMP. An institutional assessment has been carried out and outputs of steps 4, 5 and 6 have been mapped with respective institutions so that 'roles' and "responsibilities" for implementation are assigned during implementation.

Step 8: Training needs assessment has been carried out by using the outputs from Steps 1 to 7 and existing training modules have been strengthened. This will lead to develop a training and capacity building plan on social and environmental issues during implementation.

Step 9: Consultation and communication needs assessment has been carried out through different stakeholders consultations identified in step 1 and assessed through step 3 and step 7. This has led to development of consultation and communication plan.

Step 10: Presentation of outputs through stakeholders' consultations by conducting two workshops, after submitting final report.

Secondary data has been collected from the various State and national level agencies such as Ministry of Environment and Forest, Central Water Commission, National River Conservation Directorate, The Energy Research Institute, Central Pollution Control Board, State Pollution Control Board, Department of Environment (GoUP), Ground Water Board (State And Central), Irrigation Department, Agriculture Department, Project Activity Core Team, State Water Resource Agency, UP Planning Commission, Department of Rural Development, Department of Health And Family Welfare, Department of Revenue And Land Record, Uttar Pradesh Diversified Agriculture Support Project, UP Bhumi Sudhar Nigam and all other relevant agencies. This data is in the form of reports, quantitative figures in excel format, table, graphs, bar charts and text. Primary data has been collected using KAP & PRA, focus group meetings / discussions, semi-structured interviews, workshops and scientific environmental tests.

Participatory Focus Group Meetings: Participatory focus group meetings provide a useful forum for a range of stakeholders to share their opinions and concerns regarding specific topics. A focus group discussion (FGD) guide was prepared and submitted to PACT in February 2012, which has been finalized and used for conducting FGD. This was modified for carrying out FGDs in the study area.

Other related tools such as Trend analysis; Social mapping; information and document review; quantitative household and community interviews; Semi-structured interviews and stakeholder

workshops had been employed as part of PRAs to capture information on specific topics of interest.

1.6 Structure of the Report

This report is being submitted in two volumes. Volume I comprises of the following:

Chapter 1 - Introduction: Brief description of the context and objectives of the ESMF

Chapter 2 - Social/Socio-economic & Environmental policy, legal and guidelines: Brief review of policies and legislative acts both at the Central/State Government and safeguard requirements of the World Bank

Chapter 3 - Project Description: Description of project components and sub components and their potential social and environmental impacts

Chapter 4 - Socio-economic and Environmental Profile: Review of baseline data & social and environmental profile of the study area.

Chapter 5 - Stakeholders Consultation

Chapter 6 - Environmental and Social Impacts and their Management & Mitigation: Provision of adequate safeguards and measures to improve the mainstreaming of social and environmental issues in water resources management

Chapter 7 - IEC strategy, Capacity-Building & Training, Monitoring & Evaluation

Annexure 6.1: EMPs

Annexure 6.2: Resettlement Policy Framework

Volume 2 consists of Annexures & data.

Annexure 2.1. – Policies and Regulatory Framework

Annexure 4.1 – Secondary Data Tables

Annexure 4.2 –Micro & Macro nutrient status Haidergarh branch

Annexure 4.3 - Details of Main canals & Ground Water in LGC

Annexure 4.4 - Year wise surface water quality status

Annexure 5.1 – Findings of FGD

Annexure 6.2 A – A summary of various Government Policies and Ordres related to land acquisition and resettlement and rehabilitation

Use of this report

The report has been prepared with the expressed understanding that the consultant will provide support and assistance to the client in meeting the disclosure requirement of the project, which, at the minimum, shall meet the World Bank policy on public disclosure and requirements under the Right to Information Act of the Government.

Chapter 2: Legislative, Regulatory and Policy Framework

2.0 Introduction

The effective mainstreaming of environmental and social concerns for sustainable water resource development means their integration within the legal, policy and institutional regimes at different levels of administration in the country and state. Therefore, a review of the existing policy, regulatory and institutional framework related to safeguards to water resources, environment and natural resources, and social sector has been carried out, and findings are summarized in the following sections. Further, the safeguard requirements of the World Bank have also been reviewed & summarized below.

2.1 Policy and regulatory framework to deal with water management, social and environmental safeguards

Policy and regulatory frameworks at national and state level have been formulated to provide for social and environmental safeguards in the last two decades. The policy framework includes in particular water sector-related policies and policies related to environmental safeguards, both at the national and state level. Sector policies include Constitutional Provisions, National Water Policy, UP State Water Policy & UP Agriculture Policy. Environmental & Social Safeguard related policies include National Environment Policy, National Forest Policy, State's Forest Policy & National Policy on Resettlement & Rehabilitation. **These policies are presented in Annexure 2.1.** The EIA notification of 2006 forms the basis of environmental & social assessment of water resources project in U.P. The key water act, rules and notification of Government of Uttar Pradesh as it relates to the project is Northern India Canal & Drainage Act (1873). Other relevant regulations which may be applicable are presented in Annexure 2.1.

2.2 Applicable Policy, Rules & Regulation to project interventions / activities

2.2.1 EIA Notification

This is the Indian Government's Guidelines for environmental impact assessment governing all development interventions that take place within the boundaries of India. EIA notification was first issued by Ministry of Environment and Forests (MoEF) in 1994 and later amended in 2002 and 2006. Under the latest EIA Notification, 14th September 2006, all projects listed in Schedule -1 of the Notification require prior environmental clearance. The objective of the notification is to formulate a transparent, decentralized and efficient regulatory mechanism to:

- Incorporate necessary environmental safeguards at planning stage
- Involve stakeholders in the public consultation process
- Identify developmental projects based on impact potential instead of the investment criteria

As per new notification, item 1(C) on river valley, projects having more than 10,000 ha of Culturable Command Area (CCA) fall in category A projects, while projects having less than 10,000 ha of CCA fall under category B projects. Category A projects require submission of EIA report as per issued ToR by national environmental appraisal committee and public consultation before getting environmental clearance from Central Government. Category B projects require clearance from State's Environmental Appraisal Committee. Since the activities currently contemplated under phase II fall under the rehabilitation & modernization project without any change in CCA, this notification appears not to be applicable. ***However, environmental and social due diligence needs to be carried out, while preparing detailed project report for rehabilitation and modernization sub components.***

2.2.2 Other national and State acts

At the state level, the Department of Environment (DE) in UP has its own guidelines for carrying out environmental assessments, including the list of types of projects that require EIAs and instructions on how they should be carried out. The guidelines include "Irrigation

Systems” in the list and provide an index of environmental considerations that should be addressed when carrying out an EIA.

No EA procedure exists in the UPID’s operating and management rules. In guidelines for “studies and reporting” produced by the previous Ministry of Irrigation (now the Ministry of Water Resources) at central level, the environment was designated as “requiring attention”. These guidelines set down a methodology for carrying out environmental studies associated with I&D works. Similar guidelines were also prepared by the Central Board of Irrigation and Power. However, UPID has initiated environmental assessment, which becomes a part of DPR for I&D works. This has been found by referring ToR for topographical and cadastral survey for the project area of Haidargarh branch canal system.

In between 1986 and 2011, a number of acts were enacted. Some of these enactments, which are applicable in the context of this project, are given in **Table 2.1**.

Table 2.1: Applicable Environmental Laws and Regulations

Rules & Regulation	Major Provisions	Remarks
The Environmental Protection Act, 1986	Chapter 1, Item 2 Chapter II, Item 3 (1), (2) Chapter III, Items 7, 8, 9, 11, 15, 17 Environment (Protection) Rules 1986, Item 3	Application is restricted for mainstreaming and not required for clearance from Competent Authority.
The Water (Prevention and Control of Pollution) Act, 1974	Chapter 1, Item 2, Chapter V, Item 24, 25, 26, 28, 31, 32, 33, Chapter VII, Item 42, 43, 44, 45, 46, 48, 49 Water (Prevention & Control of Pollution) Rules 1975, Schedule IV	Application is restricted for mainstreaming and not required for clearance from Competent Authority.
Forest Conservation Act 1980, and 1988 amendment	Item 2, 3 (A), 3(B) Forest Conservation Rules, Item 2, 6, 7, 8, 9	Applicable only if forest land involved; unlikely as only existing canals are part of project, which do not pass through any forest areas
Wildlife Protection Act (1972) (as amended up to 1993)	Item (24), (14), (15), (16), (17), (23), (24), (25), (26), (27), (28), (36), (37), Chapter 3, Chapter 4, (Part I, Part II, Part III, Schedule I, Part IV), Schedule II (Part I, Part II), Schedule III, (Part IV, Part V & Part VI)	Not Applicable; No protected area is close to present activity.
The Air (Prevention and Control of Pollution) Act, 1981	Chapter I, Item 2, Chapter IV, Item 19, 20, 21, 26, 28, 29 National Ambient Air Quality Standards Schedule VII of EPA Act	Application is restricted to mainstream and not for required clearance from competent Authority. However, it will be applicable during the construction phase e.g. operation of batching plant if required.
EIA notification dated September 14, 2006	Rule 2, Rule 3, Rule 4, Rule 5, Rule 7, Schedule 1 (c)	Applicable only, if GCA is increased.
The Municipal Solid Wastes (Management and Handling) Rules, 2000	Item 3, 5, 7, 9, Schedule 2, Schedule 3, Schedule 4	It will be applicable during the construction phase e.g. from Labor Camp.
Wetland, 2010 Rules	Chapter I, item 2 (a), 2 (b), 2 (c) Rules 2 (a), (b), (c), (e), (g). Rules 3 (i), (ii), (iii), (iv), (v), (vi), Rules 4(1): (i), (iii), (iv), (v), (vi), (vii) Rules (2): (i), (iv), (v), (vi), (vii), (viii), (x), (xi), 4 (4), Rule 6 (2), Rule 8	It will be applicable and permission shall be required from the State Authority under item 2 of Rule 4.
Contract Labour (Regulation & Abolition) Act, 1970	All Sections	Shall be applicable during construction period

Rules & Regulation	Major Provisions	Remarks
Child Labour (Prohibition & Regulation) Act, 1986	All Sections	Shall be applicable during construction period
The Building and other construction Workers (Regulation of Employment and Conditions of Services) Act, 1996 and the Cess Act of 1996	All Sections	Shall be applicable during construction period
Uttar Pradesh Maternity Benefit Act, 1951	All Sections	Shall be applicable in case of women labour
Uttar Pradesh Participatory Irrigation Management Act, 2009.	Chapter I – Item 2 (a) to (aac) Chapter II – Item 4 (v), item 5, 2 (a), (b), (c), (d) – Item 9 Chapter IV – Item 33 (1)	Shall be applicable throughout the project/after the project
Uttar Pradesh UP WaMReC Act/Rules	Chapter I, Item 1, Item 2, Chapter III, Item 12 (f), (k),(l), (m), Item 13, Item 14, Item 16, Item 20, Item 21	Shall be applicable throughout the project/after the project

2.3 World Bank safeguard requirements

The operational guidelines under which WB projects are appraised based on EAs in the “project cycle” are detailed and specific. As a consequence the WB’s EA source book, directives, policies, drafts terms of reference and technical updates have guided the preparation of this EA. All central and state EA regulations and conventions referenced have been cross checked with the WB procedures to ensure that all the points raised have been identified and satisfactorily dealt with. The WB classify Category “A” projects as those “likely to have significant environmental impacts that are diverse and unprecedented”. On the other hand Category “B” projects are those whose “potential adverse environmental impacts on human populations or environmentally important areas-including wetlands, forests, grasslands, and other natural habitats are less adverse than those of Category A projects¹. The applications of World Bank Safeguard Policies in project are summarized in the **Table 2.2**.

Table 2.2: Application of Bank Safeguard Policies

WB Safeguard Policy	Triggered (Yes/No)	Summary	Application to the Project and Compliance Mechanisms
Environmental Assessment (OP/BP 4.01)	Yes	This is an umbrella process to ensure compliance with all other Bank safeguard policies. It provides a framework for analyzing the present conditions and predicting the likely impacts of the development projects. The environmental consequences of the project are taken in to consideration during the project cycle and are taken into account in selection, siting, planning and designing of projects. It emphasizes upon the mitigative measures so as to reduce the adverse environmental consequences.	<ul style="list-style-type: none"> ➤ This project belongs to category A hence the Operational Policy (OP) is applicable to the project. ➤ The proposed investments could have adverse but geographically limited environmental impacts. Physical/civil works are of a rehabilitation nature on existing canal system and are unlikely to cause any significant adverse environmental or social impacts. Most impacts are likely to be limited to the rehabilitation phase of the infrastructure and no long-term adverse impacts are expected. ➤ The social and environmental assessment has been carried out and a range of preventive and mitigation measures are proposed as part of the Environmental and Social Management Framework (ESMF). Wherever required, Environmental Management Plans (EMP) are also prepared.
Natural	No	This policy emphasizes upon the	➤ This OP is not applicable to the project. The

1. World Bank Operational Policy, 4.01, Environmental Assessment, January 1999

WB Safeguard Policy	Triggered (Yes/No)	Summary	Application to the Project and Compliance Mechanisms
habitats (OP 4.04, BP 4.04)		conservation of the natural habitats like land, water, etc. It focuses upon the natural resource management so as to ensure environmentally sustainable development. It aims to support the protection maintenance and rehabilitation of the natural habitats and critical and semi-critical ecosystems.	project investments would not convert any critical or non-critical natural habitats. Any identified adverse impact is limited in nature and scope, both spatially and temporally. Further, any unlikely adverse impact on natural habitats would be addressed through the screening criteria included in the ESMF and an EMP has been prepared to deal with such possibilities. Finally, support for management of wetland and waterlogged areas will be enhanced in the project.
Forestry (OP 4.36, BP 4.36)	No	This policy emphasizes upon the management, conservation, and sustainable development of forest ecosystems and their associated resources.	➤ No forestry activities or activities on forest land are envisaged. Additionally, there are no forests in the irrigation areas. This OP is not applicable to the project
Pest Management (OP 4.09)	Yes	This is a policy to support biological or environmental control methods in managing pests that affect either agriculture or public health and reduce use of chemical pesticides.	➤ Although the project does not plan to finance any pesticides, there is a possibility of induced impact of greater pesticide use due to increased agricultural intensification and diversification. This OP is applicable to the project. ➤ Integrated pest management should be enhanced. A Pest Management Plan (PMP) is developed and would be applied as part of the project's EMP, in particular through Farmer Water Schools. Banned pesticides and those included in the WHO Scheduled Lists would not be financed.
Cultural Property (OP 4.11)	No	The policy aims to assist and prevention of cultural property and to avoid its elimination.	➤ No archaeological or other cultural sites of significance are impacted by the proposed project; since the project is on existing canals where no new digging (other than removal of silt on the original canal bed) is proposed, chance find procedures are not required. This OP is not applicable to the project.
Indigenous Peoples (OP 4.10, BP 4.10)	No	This policy asserts that the adverse impacts of the development projects on the indigineous people should be mitigated or avoided and the benefits of the project should be accrued to them.	➤ A detailed spatial census analysis does not indicate any tribal population in the proposed project area. therefore, no impact (adverse or positive) is expected by project on tribals This OP is not applicable to the project.
International Water ways (OP / BP 7.50)	Yes	This policy applies any river, canal, lake, or similar body of water that forms a boundary between, or any river or body of surface water that flows through, two or more states.	➤ The Ganga is an international river and water abstractions from the river for irrigation would impact flows in lean periods. This OP is applicable to the project.
Involuntary Resettlement (OD 4.12)	Yes	This policy aims at avoiding, if not minimizing adverse impacts on the local population due to project and where unavoidable it ensures that those affected improve or at least restore their livelihood.	➤ The system rehabilitation and modernization is unlikely to involve any need for land acquisition or resettlement and rehabilitation (R&R). In the rare event that this is needed, the provisions of Bank OP4.12 shall be invoked in consonance with the UP State R&R Policy. A Resettlement Policy Framework has been prepared under this project (see Annex 6.1). This OP is applicable to the project.
Safety of Dams (OP 4.37, BP 4.37)	Yes	This policy is concerned with the safety of new and existing dams on which Bank financed projects are directly dependent. The policy distinguishes between construction of new dams and existing dams / dams under construction.	➤ No significant impacts are anticipated due to inclusion of the command areas of three dams in Bundelkhand under the project. An independent safety assessment of the three dams was completed and the findings reveal that there are minimal risks in relation to dam safety. Specific recommendations were made to improve the management and operation and maintenance of the dams. These dams

WB Safeguard Policy	Triggered (Yes/No)	Summary	Application to the Project and Compliance Mechanisms
			would be supported, as required to address any safety issues under the World Bank financed Dam Rehabilitation and Improvement Project (DRIP) under implementation in parallel. The Dam Safety Cell in the State of Uttar Pradesh would be suitably strengthened under DRIP to ensure issues of dam safety are addressed. Also, an independent Dam Safety Review Panel would be set up, emergency preparedness plans, disaster management / mitigation plans would be prepared and the dams would be instrumented.
Projects in Disputed Areas (OP 7.60, BP 7.60)	No	This policy is concerned with the disputed area in project	➤ The project is not in a disputed area and the OP is not applicable to the project.

Both the ESMF and EMPs have been designed to not only ensure compliance with World Bank safeguard policies but also to adopt good practices to maximize the environmental benefits that are possible in this type of project.

2.4 Institutional Analysis

The legal and institutional framework with respect to the environment is shown in Figure 2.1. The UP Department of Environment (DoE), in Lucknow, is primarily responsible for protecting and preserving environmental quality in the state. The Uttar Pradesh State Pollution Control Board (UPSPCB) is responsible for enforcing the regulations, and has a wider role in environmental governance than any other government body in the state and reports both to the Central Pollution Control Board (CPCB) in Delhi and the DoE. In addition to monitoring and enforcing industrial environmental standards, the UPSPCB also monitors other environmental issues, such as municipal solid waste, and biomedical waste. The supervisory powers exercised by MoEF are not vested with the DoE as per the regulatory framework but instead lie with UPSPCB. DoE is dependant on the state government for resources, where as, UPSPCB raises most of its financial resources through consent fee and water cess.

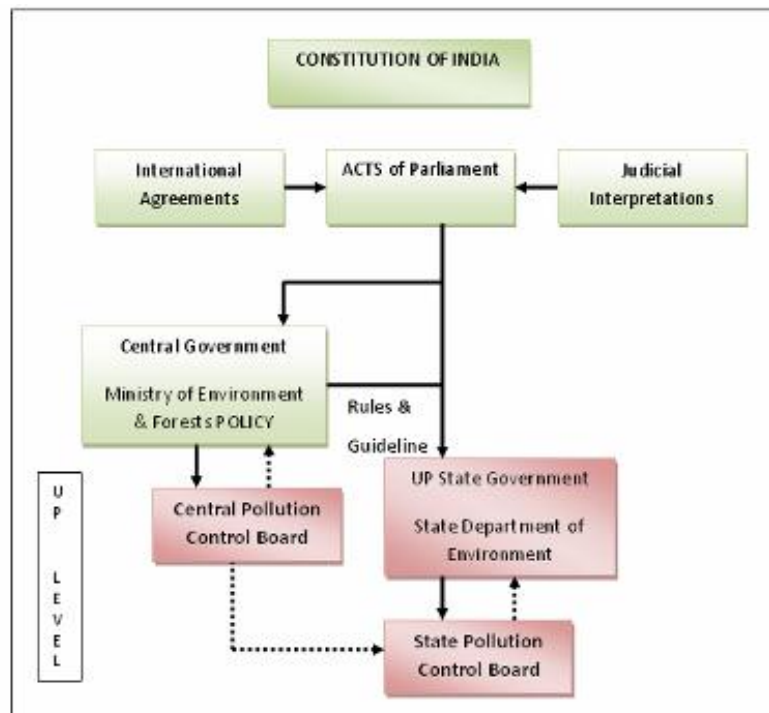


Figure 2.1: Legal and institutional framework for environmental safeguards

The analysis of the above policy, legal and regulatory framework indicates that a number of acts, regulations and agencies are involved at national, state and district level. All the agencies are functioning as per their mandate while there appears to be lack of integrating mechanism for overall development of the water sector in the state. For example, the agencies have worked on their objectives related to food sufficiency, irrigation and drinking water availability and control of pollution, but lack of integrated planning in the sector over the years has resulted in water logging, salinity, sodicity, siltation, reduced water delivery efficiency, resulting in turn in stagnation of agriculture production, deterioration of soil quality, higher resource consumption and higher non point source of pollution.

With regard to planning and implementation of UPWSRP phase II, PACT, UPID, and other line departments will be the main agencies involved. Whilst PACT appears to have sufficient capacity for implementation of the safeguard policies, UPID capacity should be strengthened and a training and capacity program has been developed in this regard (see 7.6).

2.4.1 PACT

After several years of engagement and working closely with the Bank team under Phase I project, PACT has gathered significant knowledge about World Bank procedures at the sector (institutional risk) and project (implementation risk) levels. An environmental and social cell is expected to be put in place shortly in PACT and will be responsible for screening the activities under the project, evaluating the level of environmental and social risks, ensuring overall supervision of implementation of the ESMF and conducting additional studies as needed (see Annexure 6.3 for details on the environmental and social cell). The environmental and social specialists will be further assisted in this regard by the Monitoring and Evaluation Consultant and by the Third party quality supervision Consultant.

2.4.1 Uttar Pradesh Irrigation Department

In order to streamline social and environmental issues in planning and implementation of project based on stakeholders' needs, the institutional capacity of Uttar Pradesh Irrigation Department has been assessed with the view of preparing a training and capacity building program and implementation of ESMF.

Organization Structure of UPID

Organizational Structure of UPID - Present organization structure of Uttar Pradesh Irrigation Department (UPID) is depicted in **Figure 2.2**. The organization structure of UPID broadly indicates three functional areas, which are surface water irrigation, irrigation through tube wells and planning and design. All the three functional areas are organized at three levels of hierarchy as given below.

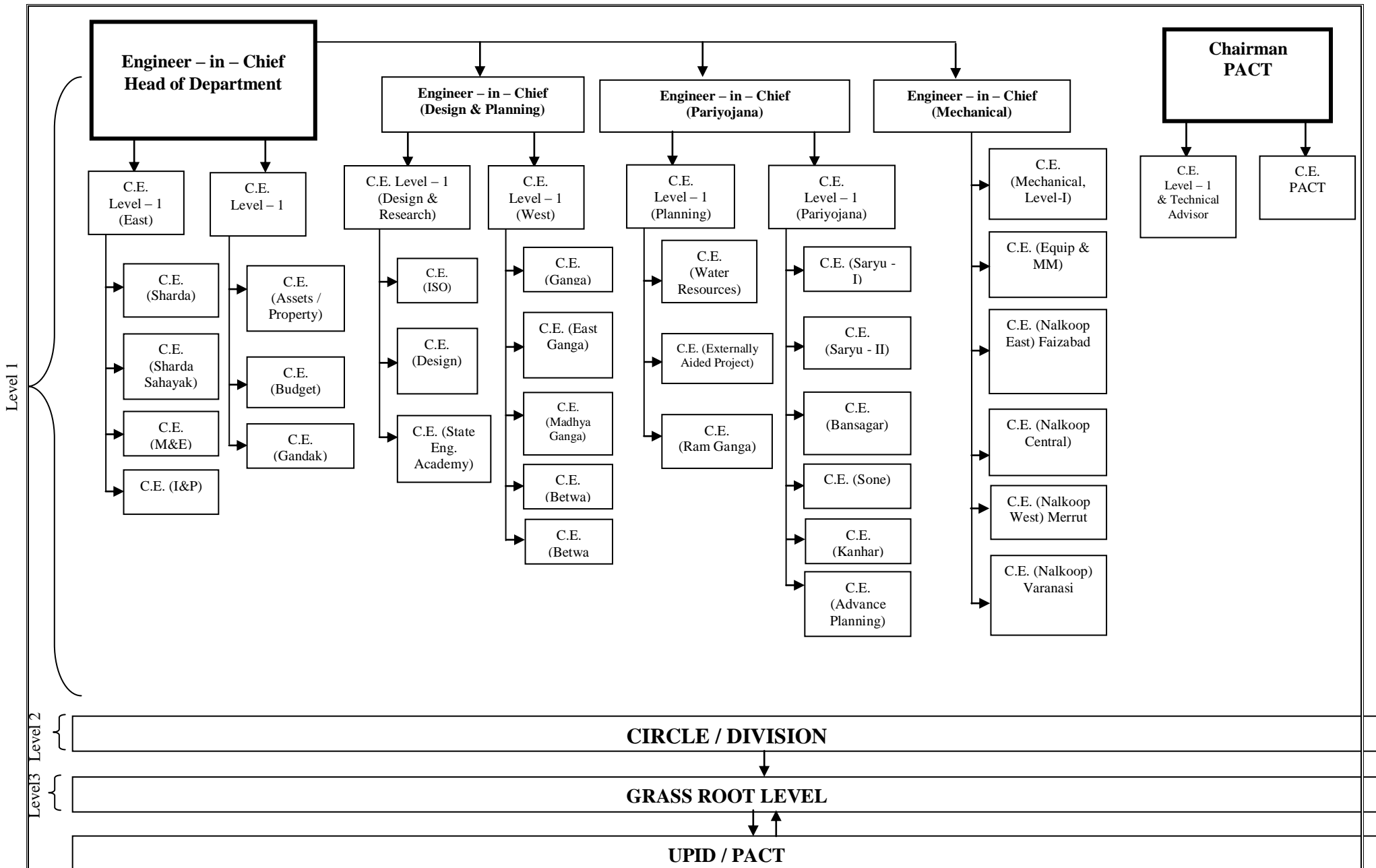
Level 1 – Top levels organized at headquarter and scheme level (En-in-Chief/Chief Engineer (Level-1) and Chief Engineer (Level-2),

Level 2 – Middle level management at Circle and Division level (Superintending Engineer, Executive Engineer and Assistant Engineer), and

Level 3 – Lower management level under each circle/ division (Junior Engineers and other field staff).

Assessment of functions of UPID

An assessment of existing functions of UPID in the context of social and environmental issues related to water resources has been carried out in terms of the knowledge base related to subject areas and the existing expertise. The different subject areas included GIS/ AutoCAD, water resources, basin planning, environment and socio–economics and agriculture. It is observed that the knowledge base exists with respect to all the subject areas in UPID except for social areas at L1 level. The expertise in respect of other areas is notable which is given in **Table 2.3**.



Source: Uttar Pradesh Irrigation Department.

Figure 2.2: Organization Structure of UPID

Table 2.3: Existing Status of Functional Knowledge

Subject	GIS/AUTOCAD			Water Resources			Basin Planning			Environment			Social			Agriculture		
	Level	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
UPID	√	Limited	Very Limited	√	√	√	√	√	Insignificant	√	Limited	Limited	Limited	Insignificant	Insignificant	√	√	Limited

Source: Compiled by IRG, BSEA, UPWSRP Phase I

In UPID outside of PACT, there is no specific staff to address environmental and social issues by implementing ESMF described in Chapter 6. A limited knowledge base exists with respect to environment and GIS/ Auto CAD at L2 level. However, it is insignificant with respect to social issues at L2 level. At L3 level in UPID, the level of knowledgebase varies from limited to insignificant with respect to all the subject areas except water resources.

There is a need for strengthening of UPID to mitigate various social and environmental issues. Different types of training programs have been designed in terms of target group, frequency of conducting training programs, duration of training programs and format of training programs. These training programs are described in **Chapter-7**.

2.4.2 Other line agencies involved

Table 2.4 shows the relevant departments and agencies and their roles and responsibilities.

Table 2.4: Line Departments and their Key Roles and Responsibilities

Department	Key Activities
Forest Department	The main function of the Forest Department is to protect, conserve and manage the forest. In the recent years, it has been noticed that the forest reserves have been decreasing. Henceforth, Joint Forest Management has been initiated so as to ensure protection of forest against encroachers, grazing and also to increase the vegetation cover. In addition to this, it has also pioneered research and development for improving the quality of seedlings. Green belt can be developed in the waste lands so as to increase vegetation cover. Further, plants which are of ecological and economic importance can be encouraged on the waste lands. Cooperation with the Forest Department should be encouraged in relation to natural habitats.
Department of Agriculture	The Department of Agriculture supplies seeds, fertilizers and other agriculture implements. It also implements policies to achieve agriculture growth through optimum utilization of resources. Under the project, the Department of Agriculture will be responsible for implementation of agricultural related activities. The main activity will be the Farmer Water Schools (FWS) program. This will be implemented with technical assistance from the FAO and through hiring of contractual staff for program supervision and of master trainers and FWS facilitators. A monitoring consultancy and an impact evaluation consultancy will also support close oversight of the program.
Fisheries Department	The main function of this department is to increase inland fish production, development of tourism thereby increasing employment. The Fisheries Department is involved in fish production in water bodies in the project area.
Social Welfare Department	The main objective of this department is to bring the target groups into the main stream of development by making them self-reliant. Various laws and policies are being implemented for the upliftment of the SCs/STs under protective discrimination basis.
Uttar Pradesh Pollution Control Board	The main function of UPPCB is to prevent, control or abate pollution. It advises the State Government on the matters concerning the prevention, control and abatement of pollution. Further, it disseminates information relating to pollution

Department	Key Activities
Water and Land Management Institute (WALMI)	The training and capacity building to the irrigation department is provided by the Water and Land Management Institute (WALMI). Under the project, WALMI capacity will be increased and staff will be hired to provide training on modern approaches to irrigation.
Groundwater Department	The Groundwater Department is responsible for management of groundwater resources in the State. Under the project, the Groundwater Department will improve groundwater assessment and will prepare a detailed aquifer management plan.

In general, there is little available expertise/ functional position in the agencies with respect to environment, social and agriculture sector to address various social and environmental issues. However, activities under the project will support greater attention to environmental and social issues. With regard to agricultural activities, technical assistance by FAO and the monitoring and evaluation consultancies shall ensure appropriate implementation of the ESMF.

Chapter 3: Project Description

3.0 Introduction

UPWSRP-Phase II project targets improvements in irrigation service delivery and efficiency and would invest in building the technical capacity in the State institutions for enhanced water resources planning and management, undertake rehabilitation and modernization of critical irrigation and drainage infrastructure in identified priority areas, and extend the agricultural intensification and on-farm water management activities in Phase I and 2 areas. Only existing irrigation infrastructure systems would be taken up and no new canals or drains are planned for construction. The project seeks to mainstream the provisions of the PIM Act in managing irrigation resources at the community level, and thus presents an opportunity to improve water use efficiency and promote practice of climate smart agriculture at the farm level. The project comprises of six components with a total outlay of about US\$ 515 million, including about US\$ 165 million contributed by the State as its share. The components are described below. Their potential social and environmental impacts are described in Chapter 6.

Component A: Strengthening of State-Level Water Institutions and Inter-Sector Coordination

This component aims to provide support to the institutions in the state responsible for overall integrated water resources management and implementation of the State Water Policy.

- (a) **Component A1: Operationalizing the State Water Regulatory Commission.** The Uttar Pradesh Water Management and Regulatory Commission (UPWAMREC) has been created under an Act (2008) passed by the legislative assembly. Functions of this ‘Regulator’ include, inter alia, approving the Integrated State Water Basin Plans, determining the allocation and distribution of entitlements for various uses of water (e.g. urban, agriculture, energy) as defined by the State Water Policy, reviewing and providing clearances to new water resources project, establishing a system of enforcement, monitoring, and measurement of entitlements, promoting better water management techniques and setting water supply standards, fixing and regulating a water tariff system, and to aid and advise the State Government on any matter referred to the Commission. This sub-component will build the capacity of the UPWAMREC to implement the power, functions, and duties of the Commission. This will include primarily training, a panel of experts, staffing, and various workshops and study tours. To the extent possible, given the political nature of this entity, specific activities will be piloted (e.g. review of new project proposals) to demonstrate the independent, impartial role that the Commission may play.
- (b) **Component A2: Strengthening the Knowledge Base and Analytical Capacity for Integrated Water Resources Management.** The State Water Resources Agency (SWARA) and the Data and Analysis Center (DAC) have been created and are functional. These two entities should eventually be merged into one body. These two agencies currently support the UPWAMREC. The function of SWARA is to develop and provide State-level inter-sectoral analysis on water allocation, planning, and management for the optimal use of surface and groundwater uses. The function of DAC is to collect, verify validate, analyze,

and store data related to water resources management for each river sub-basin in the State. This component will improve the knowledge base and analytical capacity of these two institutions. This will include, amongst other things (1) a proposal to develop an integrated water information system (IWIS) for the entire state (much like what is done under the Hydrology 2 Project), (2) the preparation of basin plans for critical basins in the State including the development of decision support systems and hydrologic modeling tools, (3) the commissioning of a study to examine inter-sector water allocation issues, (4) an assessment of the impact of climate change on the overall water resources in the state, and (5) the development of a Flood Management Information System (FMIS) for the entire State, including flood forecasting tools for identified critical basins (e.g. Rapti Basin). The flood management activities will be coordinated with various disaster risk management communities in the state to operationalize the knowledge being generated.

- (c) **Component A3: Strengthening the Water and Land Management Institute.** This sub-component aims to strengthen the existing Water and Land Management Institute such that it provides targeted, practical and effective training and capacity building services to UPID and water users. Activities envisioned to transform this training institute include: the hiring of additional long-term faculty from multiple disciplines (engineering, agriculture, social sciences, and extension services) to improve the quality and scope of training for UPID engineers and upgradation of facilities including the development of a learning laboratory (including equipment to demonstrate new irrigation techniques, modern sensors, an open channel hydraulics lab). WALMI will also be supported to provide training to engineers (and awareness building) to support the Irrigation Department’s role implementation of the Participatory Irrigation Management (PIM) Act.

Component B: Modernization and Rehabilitation of Irrigation and Drainage Systems.

The inefficient performance and poor condition of canal and drainage infrastructure in the State is a major contributor to the poor water service delivery. This component represents the major infrastructure and civil works component of the project (almost 60% of the total project costs) and will restore the system to its original design discharges.

- (a) **Component B1: Expansion of Irrigation and Drainage Investments.** This sub-component will rehabilitate and modernize irrigation and drainage infrastructure in parts of the Sarda Sahayak System (Haidergarh Branch from 23 km and down), three reservoir commands in Bundelkhand (Rohini, Jamni, Sajnam Dams), and the Lower Ganga Canal (and Parallel Lower Ganga Canal) System. For parts of the system, rehabilitation and modernization will be taken up to the outlet level. For other parts of the system, only branches will be taken up (see below).

S.N.	System	Main Canal / Branches Length	Distributaries Length	Minors Length	Total Length in Km.	CCA (in Ha)
Sarda Sahayak System						
1	Haidergarh Branch 23 dn.	8.000	271.340	406.230	685.570	73432
Total		8.000	271.340	406.230	685.570	73432
Bundelkhand Region						
2	Rohini Dam Canal System	8.640	0.000	11.450	20.090	3302

S.N.	System	Main Canal / Branches Length	Distributaries Length	Minors Length	Total Length in Km.	CCA (in Ha)
3	Jamini Dam Canal System	67.400	67.830	110.08	245.31	55114
4	Sajnam Dam Canal System	40.30	4.400	52.155	96.855	10210
Total Bundelkhand		116.34	72.23	173.685	362.255	68626
Lower Ganga Canal System						
5	Main Lower Ganga Canal	99.360			99.360	6171
6	Parallel Lower Ganga Canal	89.140			89.140	0
7	Farrukhabad Branch	98.050	Branch only		98.050	76599
8	Bewar Branch	92.613	Branch only		92.613	76068
9	Kanpur Branch	211.350	Branch only		211.350	143981
10	West Allahabad Branch	230.020	Branch only		230.020	235184
11	Fatehpur Branch + Feeder	167.800	Branch only		167.800	137454
12	Etawah Branch System	196.509	Branch only		2083.127	275029
13	Bhognipur Branch System	171.400	Branch only		1043.833	157566
Total Lower Ganga Canal System		1356.242			4115.293	1,108,052
Grand Total (Project)		1480.582	1803.051	1879.485	5163.118	1,250,110

The total cultivable command area to be attributed to the project interventions will be about 465,000 ha (assuming 45% of the CCA is attributed to the branch-only areas). The overall aim with these interventions in the 465,000 ha will be to improve the capacity and operation of the systems to ensure timely, assured, controlled, and measured water delivery and distribution. This will include updating topographic and cadastral surveys, updating hydrologic assessments, installing improved operation and discharge measurement devices (e.g. flow meters), rehabilitation of canals, drains, and pucca structures, introducing silt traps where technically advantageous, rationalization and modernization of outlets, modernization of head and cross regulators, duckbill weirs, village road bridges, vertical drainage, and canal lining in critical areas. The primary outcome of this rehabilitation and modernization work is to bring these systems back to their original design performance (i.e. enhance discharge and drainage) and improve operability of the system (i.e. meeting agreed rosters with local water users associations). This component will build upon the design features prepared in UPWSRP Phase I and build on the lessons learned during implementation.

- (b) . **Component B2: Modernization of Regulation System and Service Delivery in Phase I Areas.** This sub-component will introduce additional methods of control and operation in the UPWSRP Phase I areas where modernization was not completed. This includes the installation of controllable and measurable inlets to the minors (with close participation of WUAs), proportional, non-adjustable water dividers, modern measurement devices, and SCADA and telemetry systems (as required).
- (c) **Component B3: Groundwater Management Activities.** This sub-component aims to strengthen the groundwater assessment in the state, upgrade groundwater level monitoring network and demonstrate implementation of groundwater management interventions following preparation of aquifer management plans for an over exploited watershed/catchment in the project area. This activity, which will be implemented directly by the Groundwater and Minor Irrigation Department, will encourage greater integration between this department and the Irrigation Department (i.e. conjunctive use). The groundwater assessment will be improved through the integration of knowledge developed

by various stakeholders, use of advance hydro-geological models, remote sensing applications and up-gradation of water level monitoring systems. Initially, the development of aquifer management plans will focus on an over exploited watershed in the Phase II project areas (e.g. Araon block in Firozabad) where the majority of information will be made available through Component B1 (Irrigation Department). The development of an aquifer management plan shall be based on an understanding of the groundwater dynamics through geo-physical measurements, modeling micro-level hydro-geologic site investigations, and aquifer parameters tests.

Component C: Consolidation and Enhancement of Irrigation Institutional Reforms

This component will enhance the efficiency of the Uttar Pradesh Irrigation Department (UPID) and strengthen the Participatory Irrigation Management (PIM) approach both in the department as well as in the community. Investments would provide advanced IT based tools, performance-based systems for staff evaluation, modern survey and design techniques as well the overall management of the department through administrative and managerial skills enhancements and tools (e.g. management information systems).

(a) **Component C1: UPID Modernization and Capacity Building.** This sub-component aims to provide the training and tools such that UPID may re-orient itself towards a more professional and responsive irrigation service delivery agency that is accountable to its farmer clients. As part of UPWSRP Phase I, a substantial training program was delivered involving over 4500 UPID participants covering topics ranging from the technical (e.g. AutoCAD, GIS, Canal-Mod, MASSCOT) to the managerial. Almost 2000 officers were given basic computer training as the Department was computerized and an extensive management information system (MIS) for business processing put in place. This sub-component will continue capacity building efforts including among other things intensive and extensive training on advanced surveying techniques, GIS, modern control and measurement approaches, computers and IT systems, participatory irrigation management (through primarily WALMI), project management, and financial management. The Indian Institute of Management identified the training needs of the department and the program is tailored to different functions within the UPID. The IT section of UPID, the Information System Organization (ISO), will also be further modernized including strengthening of staff, creating a centralized IT help desk, and strengthening the LAN and WAN systems across the divisional offices. A dedicated irrigation control center (connected to real-time water level sensors in the field) has also been created and will be equipped with modern facilities. Some equipment will also be provided to enhance the maintenance capacity of the Department (e.g. weed cutters, small dredgers, and customized earth moving machines). Finally, special focus and effort will be given to re-orienting field engineers towards a more performance based institution vis-à-vis “client” (i.e. water user association) satisfaction and field-level delivery metrics, in particular actual measured deliveries against the agreed roster at the beginning of the irrigation season and information provided to WUAs on changes in the roster. Special contractual relationships (between the Department and the water users association) may also be explored on a pilot basis for selected minors in the system.

(b) **Component C2: Water Users Associations (WUAs) Strengthening and Implementing Participatory Irrigation Management.** This sub-component will support the strengthening and development of water users associations and provide a framework for training and

mainstreaming PIM throughout the State. The vision of the participatory irrigation management approach to irrigation water delivery (as defined in the 2009 Act on Participatory Irrigation Management - PIM is to build the capacity of these local associations (WUAs) to monitor the current status of the irrigation system under their control, participate actively in discussions on system design and implement rehabilitation of minors with the UPID, carry out on farm development (OFD) works where required, manage themselves the local water distribution, assess water charges, manage finances, operate and maintain local infrastructure, resolve conflicts, encourage conjunctive use of surface and ground water for intensified and diversified agriculture production system and promote greater efficient water use. Equally important is enhancing the ability of the UPID Engineers to work more in partnership with farmers as clients to help them manage the system at local level and substantially improve water use efficiency and productivity. Since the 2009 Act, 8858 WUAs at the outlet levels, 805 WUAs at the minor levels, and 28 WUAs at the distributary level have been formed in the Phase I areas. The key project activities will be to scale this up in the Phase II areas and make existing and proposed WUAs functional. This will be done by focusing on three key areas (a) mobilization of communities, (b) generation of awareness amongst communities of the PIM Act, and (c) capacity building and training of WUAs. Mobilization of communities will be focused on the Phase II project areas and will be implemented by NGOs. The generation of awareness on PIM will be through the use of a variety of media (e.g. pamphlets, community radio and TV, workshops, paintings and leaflets, etc) and will be for the entire State. This awareness generation is to be implemented by the State Institute of Rural Development (SIRD). For the capacity building and training of WUAs, emphasis will be placed on governance (e.g. WUA roles and responsibilities, organizing meetings, liaison with users), technical matters (e.g. maintenance inspections, preparation of estimates, measurement of works), financial management (e.g. maintaining financial records, preparation of annual budgets) and water management (e.g. recording of irrigated area, preparation and implementation of warbandi). This will be delivered in the Phase I and 2 areas through the SIRD. WALMI Lucknow will be the key training agency to reorient UPID Engineers towards PIM (Component A3). Finally, special contractual relationships with the UPID and participation in a performance system for field engineers (as “clients”) will be used to enhance accountability and feedback for irrigation deliveries.

Component D: Enhancing Agriculture Productivity and On-Farm Water Management

This component (to be implemented directly by the Department of Agriculture) aims to improve the overall agriculture productivity and water-use efficiency at the field level. This component will focus on both Phase I and II outlet command areas where improvements in irrigation water availability and timely support to water users associations will be integrated with improved agriculture production and on-farm water management practices. The component will use a specifically developed Farmer Water School (FWS) approach (see box), targeted at the area below the outlet as a mechanism to introduce improved agronomic and water management practices, and also to develop the institutional capacity of the WUAs for water management and operation and maintenance. The FWS will be a group of 20 – 30 farmers serving about 15 – 20 ha of a single outlet. The concept of FWS will borrow heavily from the FAO Farmer Field School models implemented successfully in over 90 countries worldwide. Some of the types of activities that may be part of the FWS curriculum (to be decided and agreed upon by the participant farmers themselves) include: (i) season-long farmer field studies on a range of crop approaches e.g. ridge and furrow irrigation, border irrigation, raised and sunken beds, etc, (ii)

crop and water budgeting sessions, (iii) community interactions and consultations, (iv) field days for identified crops, and (v) soil testing for integrated plant nutrient management. A network of trainers will be developed under the project to support the FWS. FWS to FWS interactions will also be facilitated. In addition to the emphasis on FWS, this component will also support (i) a limited number of demonstrations/adaptive research trails, (ii) field level physical works related to improved water use efficiency (laser leveling, sub-plots, border check, raised beds, etc), (iii) field days (block level), (iv) exposure visits, (v) staff capacity development, and (vi) purchase of equipment (such as tensiometers and leaf color charts).

Component E: Feasibility Studies and Preparation Activities for the Next Phase

This component is to prepare detailed surveys and designs for future Phase III areas. These new areas will be identified by the Government of Uttar Pradesh and will make use of similar design principles (and the lessons learned) adopted under this Phase II operation.

Component F: Project Coordination and Monitoring

(a) **Component F1: Project Activities Coordination Team (PACT):** The existing multi-disciplinary PACT (established under Phase I) will continue to provide overall coordination and project management. This component is designed to assist the PACT with its role in facilitating and guiding the implementation and monitoring of all project activities, ensuring synergy and coordination amongst activities and Departments (Agriculture, Groundwater, Remote Sensing Agency, State Institute for Rural Development), and in preparing consolidated reports and facilitating training and study tours. Key activities include managing critical support consultancies such as the Monitoring and Evaluation consultancy and a consultancy to provide third-party construction quality support. Monitoring and evaluation will guide project implementation by conducting input and output monitoring, process monitoring, impact assessment, and by providing feedback to PACT on recommended adjustments. It will also provide feedback on client satisfaction with UPID performance. Monitoring and evaluation will make use of state-of-the-art information and communication technologies for field data collection, in particular mobile-based technologies with GPS systems. The PACT will also play a fiduciary role in the overall project, including providing support on procurement.

(b) **Component F2: Monitoring of Crop Performance using Remote Sensing Imagery.** This component will support the services of the UP Remote Sensing Applications Center (RSAC) in monitoring of the project area using satellite imageries. RSAC has independently been monitoring crop acreage and production numbers since 1988 for the major agricultural crops in UP (e.g. wheat, paddy, sugarcane, and mustard crops). Under this component, RSAC will throughout the life of the project prepare annual reports for the project areas tracking a wide range of parameters including cropping intensity, cropping calendar, acreage and productivity, irrigated areas (under the canal command and groundwater), and land use at the cadastral levels. Some ground truth data will also be collected from the field during key times during the three cropping seasons in all the study districts.

3.1 Negative list of activities

The project will not finance the following activities:

1. Any activity that convert or lead to conversion and/or degradation of significant areas of critical natural habitats (areas officially protected or proposed to be protected) and/or other natural habitats (including wetlands of significance)
2. Construction of any new irrigation reservoir dam
3. Realignment of any existing canal, branch canal and offtake
4. Realignment of any existing drain
5. Construction of new canals, branch and offtake
6. Construction of any new drain
7. Any activity that violates the provisions of applicable National and State laws
8. Any activity that is against the provisions of the PIM Act
9. Procurement of banned pesticides (Class I and Class IIA & IIB of the WHO list)

3.2 Social Perspective on Supporting Water Users Associations

Improving Irrigation service delivery and effective implementation of PIM: The focus of Components B and C of the Project is on enhancing the capacity of the UP Irrigation Department to be able to deliver irrigation services in accordance with the needs of farmers. Key areas for attention include

- The inability of the UPID to ensure irrigation service delivery as per irrigation rosters that it announces in advance.
- The tendency of head-reach farmers to over irrigate their fields and extract water from the system far in excess of their entitlements.
- The lack of awareness amongst farmers about what their water entitlement from the irrigation system is and the need therefore to undertake crop planning accordingly.
- The need for enhancing the ability of farmers at crop water budgeting and improved and efficient water management and inculcating the discipline to follow agreed norms rigorously.

The UP PIM Act and the formation of Water User Associations (WUAs) at the outlet, minor, distributary and Project levels is intended to address the need for mobilizing and organizing farmers for improved water management and operations and maintenance of the irrigation system. NGOs for assisting with community mobilization, the Department of Agriculture (DoA) supported Farmer Water Schools (FWS) as an approach to improving farmer level crop water budgeting in line with farmer water entitlements, the State Institute of Rural Development (SIRD) for creating awareness and basic capacity amongst farmers about the UP PIM Act, Participatory Irrigation Management and its key tenets, WALMI Lucknow as the agency organizing exposure visits and related capacity building and the PIM Cells at division, circle, Chief Engineer and Engineer in Chief levels as the overall coordinators of this entire effort constitute the institutional structure for the Water User Associations as depicted in the following diagram.

Effective coordination between all these entities and wholehearted involvement in coordination on the part of the UPID PIM Cells would be critical to the success of this support structure in achieving the overall objectives of Participatory Irrigation Management (PIM). UPWSRP Phase I has demonstrated how the lack of coordination amongst these entities can jeopardize the achievement of the ultimate objective of PIM.

Focus on those without land in the command area: As in Phase I of the project, there would be several households in the village who either do not own land in the command area or are even landless. It is important that the project focusses attention on involving these households in agriculture and allied service related activities such as input supply, provision of agricultural implements on hire and other related activities that while providing required support to the farmer members of WUAs also serves to address livelihood requirements of those not benefitting directly from the irrigation scheme improvements. Women would be organized into Self Help Groups (SHGs) that can similarly take on income generating activities that are catering to the agriculture and allied service support needs of WUAs and their farmer members.

The leadership and coordination role of UPID: Enhancing the ability of UPID Engineers to take leadership and at coordination and collaboration would be critical to achieve the aforesaid objectives. It is in this area that UPWSRP Phase I was unable to make adequate difference. By increasingly making UPID Engineers responsible for achieving desired outcomes and providing them the flexibility, technical, training, institutional and financial support, the UPWSRP Phase II aims to enable UPID Engineers to successfully achieve the project development outcomes.

Chapter 4: Socio-Economic and Environment Profile

4.0 Introduction

The Lower Ganga Canal Command Area lies between 27°20' 27.31"N, 25°18' 50.18"N and 80°36' 47.06"E, 83°55' 35.99" E. It comprises of 12 districts of Uttar Pradesh with a total area of 30, 619 sq.kms, about 12.7 % of the total geographical area of the State. Geographically, LGC Command Area is a part of Ganga Basin.

23 down Haidergarh Branch Command falls in Sharda Sahayak Command Area and lies between 26°41' 4.53" N, 26°23'52.44 "N and 81°18'10.74" E, 81°48'2.77" E. It comprises of 3 districts of eastern (Barabanki, Raebareli and Amethi) Uttar Pradesh. The total population of the study area is 2310074 (Source: Statistical Abstract, UP, 2010), which is 2.3% of the total population of the State. The districts/blocks considered for the study are given in Table 4.1.

Table 4.1: Districts & Block in Study Area

Sr. No.	Districts	No. of Blocks in Command Area	Name of Blocks
LGC Command Area			
1.	Auraiya	7	Erwakatra, Vidhuna, Achhalda, Aiehar, Bhagyanagar Ajeetmal ,Auraiya
2.	Etah	8	Sheetalpur, Sakeet, Marhara, Nidhauri Kala, Aliganj, Jaithara, Jalesar, Awagarh
3.	Etawah	8	Jaswantnagar, Badhpura, Basrehar, Safai Takha ,Bharthana, Mahewa ,Chakarnagar
4.	Farrukhabad	7	Badhpur, Rajepur, Kamalganj, Mohammadabad, Samshabad, Nawabganj, Kayamganj
5.	Fatehpur	13	Telyani, Bahua, Bhithaura, Haswa, Asodhar, Aieraya, Hathgaon, Vijaiapur, Dhata, Malwa, Dvmai, Amauli ,Khujuha
6.	Firozabad	9	Firozabad, Eka ,Madanpur, Jsrana, Toondla, Narkhi ,Shikohabad, Aoraon, Hathwant
7.	Kannauj	7	Kannauj, Jalalabad, Umarda, Chibramau, Talgram Saurikh, Haseran
8.	Kanpur Dehat	10	Amraudha, Jhijhink Akbarpur, Rajepur, Sandalpur, Maitha, Rasoolabad, Malasa Drapur, Sarwankhera
9.	Kanpur Nagar	10	Kalyanpur, Bidhunu, Sarsaul, Bilhaur, Chaubeypur, Shivrajpur, Kakwan, Ghatampu, Bheetergaon, Patara
10.	Kasganj	8	Kasganj, Soro, Sahawar, Amapur, Patiyali, Ganj, Dundwara, Sidhpura
11.	Kaushambi	8	Chayal, Mooratganj, Newada, Sirathu, Kadha, Manjhanpuri, Sarsawa, Kaushambi
12.	Mainpuri	9	Mainpuri, Ghiror, Kurawali, Bewar Kishni, Sultanganj, Jageer, Karhal, Barnahal
	Total	103	
Haidergarh Branch 23 down			
1.	Amethi	3	Shukul Bazar, Jagdishpur, Singhpur
2.	Barabanki	2	Trivediganj, Haidargarh
3.	Raebareli	1	Shivgarh
	Total	6	

Source: Government of Uttar Pradesh

4.1 Socio-Economic Baseline Status of Lower Ganga Canal (LGC) Command Area Based on Secondary Data

The socio-economic status of LGC command area has been compiled based on secondary data for the years 2000-01, 2005-06 and 2008-09. Analysis of demographic data is based on Census 1991, 2001 and provisional figures of census 2011. Analysis of BPL families has been taken from BPL Census 1998 and 2002. Livestock population is based on the years 1997 and 2003. The secondary data tables of Lower Ganga Canal districts are given in **Annexure 4.1**.

4.1.1 Demography

The districtwise & blockwise demographic profile are described in terms of population, sex ratio, population density, sexwise population distribution & literacy rates.

The total human population of the LGC districts increased from by 16.97% from 2001 to 2011, which is lower than state's average. With regard to historical trends, the percentage increase in decadal population ending 1991 ranged from 13.54% (Amauli in Fatehpur district) and 14.1% in Karhal (Mainpuri districts) to 45.3% in Sirathu block of Kaushambi districts and Basrehar Block (Etawah district). The decadal growth in rural population was considerably lower during the decade ending 2001. The decadal growth of rural population in the two decades in UP as a whole stayed nearly the same (25.49% and 25.80%). This indicates a significant movement of rural population from LGC command area, as compared to the state as a whole.

The 2011 Census indicates that the sex ratio in LGC districts is significantly lower (872 females per 1000 males) than the state's average (908 females per 1000 males). The analyses of data reveals, two trends, namely, increase/improvement in the Sex Ratio over the said period and relatively poor female vs male ratio in rural areas vis-à-vis the urban areas. The proportion of Male population of the districts was about 54.5% and 53.9% in 1991 and 2001 as against state's average of 52.41% in 2001. The decline in male population is supposed to have been due to movement of male to cities in search of better employment opportunities.

The proportion of (scheduled caste) SC population in the districts as a whole ranged from 16.83% (Kanpur Nagar) to 35.10% (Kaushambi) in 1991 with approximately similar proportion in 2001. There was actually a wide variation in the proportion of SC population at the block level. It ranged from 14.33% in Jasrana block of Firozabad district to 41.57% in Chail Block in Kaushambi district. In Kaushambi district most of the command area blocks had very high percentage of SC Population (nearly 30% or more) while in other command area Blocks of each district it was about 15% only. ST population in districts (about 1466 as per Census 2001) was negligible in all the concerned Blocks/districts. Scheduled tribes families do not represent indigenous people as per OP 4.10:

- They have been mainstreamed into the local culture.
- They do not differ in nature considering social, culture, economic & political institution's perspectives from the dominant community.
- They do not have attachment to geographically distinct habitats or ancestral territory in the project intervention area.
- They do not have an indigenous language.

In 2011, population density in 12 districts of LGC ranged between 634 per sq. km and 1449 per sq. km. The average density of population in all 12 districts of LGC was slightly lower (813 per sq. km) than the state's average of 828 per sq. km. Population density has increased significantly over the past two decades. In 1991, Population density ranged from 457.4 in Fatehpur to 1062.5 in Kanpur Nagar. In 2001, the increase in the density of population of districts as whole as well as in the Blocks having substantial urban/semi urban population was much higher as compared to the Blocks having rural population exclusively. This may be because increased urbanization/migration of rural population to urban/semi urban areas related to job opportunities in non-agricultural sectors in urban/semi urban areas.

In 2011, the percentage of male literates ranged between 72.91% and 87.64% while female literates ranged between 50.20% and 75.89%. These rates are higher than states average. Long-term trends show an increase in literacy rates and a decrease in the gender gap. In 2011, the gender gap in literacy in LGC districts is lower (ranged between 8.18% and 24.59%) than the state's average (19.98%). The highest gender gap in literacy was found in Kaushambi, Kasganj, Etah and Fatehpur districts.

4.1.2 Infrastructure Facilities

The districtwise and blockwise Infrastructure facilities are described in terms of Road transport, Commercial / banks, Drinking water, Health and Education.

The number of Primary Schools per lac population in all 12 districts increased between 2001 and 2008-09 except in Khajuha Block (Fatehpur district) and Madanpur Block (Firozabad district). It ranges from 11.9 (Kara Block) in Kaushambi district to 137.4 (Saifai Block) in Etawah district.

There was appreciable increase in the length of metalled roads between 2000-01 and 2008-09. Kaushambi and Fatehpur district were the two worst performers in the terms of the rate of increase in the metalled road during the period.

By 2008-09, almost 90% of villages of the command area were electrified, a very substantial increase within a short span of 8 years.

Actual blockwise branches of the nationalised banks ranged from 0 to 5 in 2000-01, which marginally improved by 2009-10 in some blocks; while it actually decreased in few blocks. However, the number of branches of the rural banks and non-nationalised commercial banks increased substantial in the same period. The increase in the total number of branches of the 3 types of banks was almost 50% in most of the Blocks between 2000-01 and 2009-10. Non-nationalised banks were more active in opening new branches. Also, there was more emphasis on opening of the new branches of the Rural Banks (Gramin Bank) which provided comparatively low cost banking facilities as compared to the other two types of commercial banks. Further the Rural Banks were actively sponsored by one of the nationalized banks.

The number of Post offices/Block ranged from 10 to 26-27 in 2000-01 and their numbers increased only marginally till 2008-09. The number of public call offices increased by 5 to 15 times. The number of telephones ranged from 54 to 371 in different Blocks except in Sahar

Block but their number increased almost 10 % over the period. Very substantial increase in the number of telephone/mobile connections have been observed, primarily because of introduction of individually owned wireless/mobile telephone connections.

All the villages of the 12 districts are getting drinking water through India Mark-2 Handpumps. Besides, 53 villages of Etawah district, including 38 of 3 blocks (Jaswantnagar, Basrehar and Bhasthara), 40 of Kanpur Nagar of 3 Blocks (Kalyanpur, Vidhunu and Sarsol Blocks) are getting drinking water from wells. Also, 861 villages, including some belonging to Kalyanpur (62), Vidhunu (73) and Sarsol (80) Blocks are getting water from general handpump. Only 9 villages of Sakit Block of Etah district, a few villages from the rest the command area, i.e. (Fatehpur district) and 3 villages of Jasrana Block of Firozabad district and Kaushambi have tap water drinking facilities.

The number of allopathic hospitals and primary health centres per lac population varies considerably from block to block. In 2000-01, it was as low as 1 in Barhpura of Farrukhabad district to 8.2 in Haseran block of Kannauj district. In most of the Blocks, however, the figures ranged for 2.5 to 3.5. The situation was only marginally different in 2005-06 and 2008-09, the increase being not very significant.

4.1.3 Agriculture & Allied Activities & Irrigation system

Agriculture & allied activities & irrigation systems are described in terms of Land Usage, Area under Major Crops, Cropping Intensity, Productivity Sourcewise Irrigation, Irrigation Intensity, Fertilizer Consumption, Livestock Development Facilities, Blockwise Livestock Population.

Blockwise land use in 2000-01, 2005-06 and 2008-09 show year to year variations in land use pattern. No clear pattern emerges from the data, except that both net and gross irrigated area increased slowly but steadily in most of the blocks belonging to the command area. Other finding indicates that the gross irrigated areas, in a large proportion of blocks, were higher by about 20% to 30% as compared to the net irrigated area.

Block wise area cropping patterns are the following, based on data from: 2000-01, 2005-06 and 2008-09

- Cereal: Kharif Rice and Wheat are major cereal crops and they are largely grown under irrigated conditions. Besides, Kharif Maize, almost half under irrigated condition was being grown in Aurriya, Etah, Farukhabad, Firozabad, Etawah, Kannauj and Mainpuri districts.
- Other Crops & Millets: Barley and Jawar and other Millets were being grown in a large number of districts, except in Fatehpur & Kaushambi districts. Almost half of area under barley was being grown under irrigated conditions. Millet was being grown mostly under unirrigated conditions.
- Pulses: Masur, Gram and Arhar are the major pulse crops grown largely under unirrigated conditions in the area. Masur and Arhar are grown largely under the unirrigated conditions (about 90%). About 20-25% of Gram crop was getting single irrigation. However, about 75% to 90% of Pea was being grown under the irrigated conditions in different districts. But as the prices/demand of arhar increased, the areas under the crop increased. This trend is likely to persist in future.

- **Oilseed:** Lahi/Sarson was the major oilseed crop (about 90%) and it was being grown in all Blocks. Besides Til was being grown in Farrukhabad, Fatehpur, Kannauj, Kaushambi districts and Groundnut sporadically in most districts except Kaushambi, Firozabad Etawah and Mainpuri districts where the area was largely negligible. Sunflower was being grown largely in two districts, namely, Farrukhabad and Kannauj districts mostly under irrigated condition.
- **Commercial Crops:** Sugarcane and Potato are two major commercial crops of the area grown under irrigated conditions in almost all Blocks in varying areas. The area under sugarcane was comparatively small in Mainpuri and Kannauj districts. Tobacco was being grown in Farrukhabad district only. The area under Tobacco, however increased in 2008-09 as compared to previous years.
- **Fodder:** Fodder was being grown in Kharif, Rabi and Zaid seasons largely under irrigated conditions in Rabi and Zaid and partially under irrigated and largely as a rainfed crop in Kharif. This is because animal husbandry was an important source of livelihood and this needs to be encouraged. The inferences were largely similar in concern years.
- **Vegetables:** Onion is the major vegetable crop and is being grown in increasing area. In 2008-09, area under onion and other vegetable crops increased as compared to 2000-01. In 2008-09, about 80-90% of area under onion and other vegetables was being grown under irrigated conditions. Increase in area cultivated is expected to continue as the demand for vegetables increase. A survey of the area showed that onion and other vegetable crops were being also grown under irrigation from shallow boring and tube wells/wells in order to facilitate irrigation in right quantity and at right time.

In almost 60% of blocks, the cropping intensity increased. But the increase was only marginal over the three periods (2001, 2005-06 & 2008-09). In about 40% of cases, either there was no increase or there was marginal decline in the cropping intensity, while average Irrigation Intensity increased slowly during the 2000-2009 period. Irrigation intensity of the State as a whole was 142.7%, 145.1% and 146% in 2000-01, 2005-06 and 2008-09 respectively. It appears that the Irrigation Intensity in 39 out of 74 Blocks of LGC in 2000-01 was lower than the State's average. Blockwise irrigation intensity is given in Annexure 4.1. Districtwise cropping and irrigation intensity are given below:-

District Name	Cropping Intensity (in Ha)			Irrigation Intensity		
	2000-2001	2005-2006	2008-2009	2000-2001	2005-2006	2008-2009
Lower Ganga Canal						
Aurriya	158.5	161.2	165.1	143.1	146.3	151.9
Etah	158.3	165.0	159.3	140.2	143.5	146.0
Farrukhabad	139.6	145.0	144.5	125.9	131.8	130.0
Fatehpur	140.3	142.5	138.7	144.3	145.6	142.7
Firozabad	158.6	158.3	161.6	119.3	123.1	123.3
Etawa	160.2	161.5	166.3	147.0	145.4	145.6
Kannauj	159.9	157.8	157.9	124.2	132.3	136.8
Kanpur Dehat	NA	NA	NA	NA	NA	NA
Kanshiram Nagar	153.7	170.7	172.4	149.9	151.0	164.6
Kaushambi	134.6	132.5	133.8	127.0	131.3	135.7

District Name	Cropping Intensity (in Ha)			Irrigation Intensity		
	2000-2001	2005-2006	2008-2009	2000-2001	2005-2006	2008-2009
Mainpuri	163.8	182.2	194.0	155.6	177.8	190.6
U.P. Total	150.4	153.0	153.8	142.7	145.1	146.0

Private tubewells was the major irrigation source in most blocks of the LGC districts followed by canal and public tubewells. Most of the blocks in LGC are showing increasing trend of irrigation by private tubewells over the the period 2001-2008-09 which reflect shortage of surface water and overexploitation of ground water. In Command Area Blocks of Kanpur Nagar district, the area under canal irrigation has sharply increased in 8 out of 9 Blocks except in Vidhunu (10832 to 9284 Ha) and Kakwan (4283 Ha to 4025 ha), area under private tubewells has also sharply increased. But total area under irrigation in the district as a whole decreased for 143209 ha to 134969 ha in the said period. Blockwise irrigated area and source of irrigation are given in Annexure 4.1.

The Blockwise & districtwise available irrigation infrastructure in 2000-01, 2005-06 and 2009-10 given in Annexure 4.1 indicates that Canal, Government Tubewells, Permanent Wells, Rahat, Ground Pumpset, Boring Pumpset and Private tubewells were the sources of irrigation available in the area. In respect of canals, except for Etah, Kannauj, Kashiramnagar, Mainpuri, and Kaushambi the length of canal remained stable. In 2005-06, the length of canal increased in Etah and Kasganj and it decreased slightly in Kannauj and Mainpuri. In 2009-10, further decrease was noted in Etah and Kannauj while decrease in Kaushambi was observed as compared to the previous two occasions. There was variation in the number of operational tubewells and permanent wells in different districts. The number of Government tubewells increased in Aurriya and Mainpuri. A marginal decrease was observed in Etah, Farrukhabad Fatehpur and Firozabad districts. With regard to permanent wells, the situation varied considerably. In most places, a very large numbers of wells went out of operation. The number of ground pumpset, boring pumpsets, private tubewells, etc., increased over the decade. It is likely that permanent wells have dried up following falling water tables levels.

An overall increase in the productivity of major crops has been observed. Rice yield increased from 2000-01 to 2008-09. The increase was quite consistent in all areas as compared to other crops, except for Kaushambi district where it actually decreased by 9.8%. In other districts, it increased by 24.2% to 87.7%. In respect of wheat, there was an increase, but it was much lower than for rice (the increase ranged for 1% in Kannauj to 26.0% (Fatehpur)).

With regard to fertilizers use, total consumption of NPK has increased moderately over the subsequent years in all districts of LGC. Notwithstanding the fact that the increase in total per ha fertilizer consumption was moderately to substantially high in Etah, Etawah, Farrukhabad, Firozabad, Kannauj, Kasganj, Kanpur Nagar and to some extent in Mainpuri, Kaushambi and Aurriya districts, use of NPK was highly unbalanced. Also there is need to promote use of organic manures.

A very weak infrastructure for livestock development existed in 2001-02. But substantial increase in the facilities were created in terms of increase in artificial fertility centres/ sub-centres by 2008-09. The number of Veterinary Hospitals did not however increase to the same extent during the said period.

Analysis of data from 1997 & 2003 indicates that Bovine (Desi) Male population recorded decline in all blocks, except Firozabad and 4 out of 8 Blocks of Mainpuri districts. But, in respect of Desi Bovine (Female more than 3 years) population the analysis indicates mixed results. The population of cross breed Bovine male (more than 2.5 years) recorded increase, except in most Blocks of Fatehpur, all of Kannauj, Kaushambi, Kasganj districts during the period (1997-2003). The population of cross breed Bovine female (more than 2.5 years) recorded increase in all districts, except Kasganj and Kaushambi districts. A mixed scenario has been observed in respect of cross-breed calf (Males & females). It increased in Etah, Etawah, Firozabad and Mainpuri districts, while the scenario was mixed in the other districts. The picture was similar in respect of buffalo calf (Male and females), i.e, there was increase in population in more than 90% Blocks. The data analysis indicates that the population of milk producing animals increased and that of male animals, it declined. The major reason is that with farm mechanization, there was much less need of male animals used for ploughing and other similar operation. Considering increasing demand of milk, meat, eggs, etc as urbanization increases, animal husbandry as an independent business and/or a supplementary and complementary source of income need to be encouraged.

The areas under Departmental/Government reservoirs in the different Blocks are very small except Mainpuri and production from these water sources is therefore very little. In respect of the distribution of fingerlings (in thousands) except Kanpur Nagar and 7 out of 8 blocks of Fatehpur (Devmai, Malwan, Bhitaura, Haswa, Asodhar, Vijaipur and Dhata), performance declined in 2009-10 vis-à-vis 2001-02. Private reservoirs were almost totally absent in 2001-02. But by 2009-10, a few private reservoirs came up in Etah (except Ganj Dundwara), Etawah, 2 in Karimganj Block of Farrukhabad, two blocks of Firozabad and all blocks of Kannauj, Kanpur, Kasganj and Mainpuri districts. But their production levels were much less than what is expected from even moderately well managed private reservoirs.

4.1.4 Landholding & Labor Profile

Landholding & Labor Profile are described in terms of Operational Land Holding, Persons in Labor Force & Proportional of Agriculture Labor. Blockwise landholding size & labor force is given in Annexure 4.1.

The proportion of Marginal and small farmers increased from 76.1% in 1995-96 to 79.3% in 2000-01 in all districts of LGC except Firozabad. The actual number of farmers decreased, which shows that farmers migrated to non-farming occupation. The total no. of landholding of Etawah, Kannauj, Kaushambi and Mainpuri were 154606, 221874, 196932 and 268124 respectively in 1995-96 and the corresponding numbers of landholdings in 2000-01 were 209583, 241548, 200709 and 281508 respectively. Also, except Etawah, the area under cultivation in aforesaid districts decreased indicating diversion of land from agricultural to non-agricultural activities as well as migration of farming population to non-farming activities. More or less similar changes in trends were observed at the Block levels.

Percentage of total working population in 1991 (taking 2/3 of total population available for employment) varied from 39.9% (Mahewa in Etawah district) to 73.8% (Sarsawan in Kaushambi district) with average for whole command area being 46.2%. In 2001, however, the percentage was little lower; the lowest being 37.1% in Sakit block of Etah district and highest in Sarsawan

of Kaushambi district with average of the total command area being 39.6%. This showed that the proportion of people gainfully employed declined marginally in 2001 as compared to that of 1991. In command area, in 1991, among the people already employed the proportion engaged in 1991 in agriculture etc. varied from 65.4% (Asodhar of Fatehpur district) to 93% (Takha of Etawah district), the average being 73.3%. In 2001, proportion of working people engaged in agriculture and allied activities declined, the lowest being 42.3% in Kalyanpur of Kanpur Nagar district and highest 80.6% in Sakit (Etah district), the average being 60.7%. This showed that the workers shifted to non-agricultural activities.

Blockwise number and proportion of agricultural labour in the Command Area in 1991 and 2001 has been given in Annexure 4.1. The data indicates that number as well as proportion of labour force engaged in agricultural activities declined very sharply in 2001 vis-à-vis those of 1991 in all blocks covered under the Command Area.

4.1.5 Poverty and Per Capita Annual Food Grains Availability

Taking the entire command area as a whole, there was only a marginal decline in proportion of families below poverty line (BPL) in 2002 as compared to that of 1998. The lowest proportion of families below poverty line was 13.58% in Eka block of Firozabad district in 1998. In a total of 4 blocks, the proportions were below 20%, namely Aliganj (Etah district), Eka, Shikohabad and Madanpur Blocks (Firozabad district.). In 2002, the lowest proportion of BPL families was in Jasrana block (Firozabad district).

Itemwise annual per capita foodgrain availability in 2000-01, 2005-06 and 2008-09 in the concerned districts of the Command Area given in Table-23 of Annexure 4.1 indicates that the per capita availability of Cereals course grains increased in only Fatehpur (289.46 Kg to 297.70 Kg), Etawah (223.94 Kg to 471.76 Kg) and Kaushambi (225.29 Kg to 240.73 Kg) while in remaining district as well as the State as a whole it decreased. In respect of pulses, the per capita availability decreased in all districts as well as the state of UP as a whole. The per capita availability of edible oils/oilseeds recorded increase only in Etah (10.87 ha to 11.20 Kg), Fatehpur (5.99 kg to 6.31 Kg), Etawah (8.46 kg to 12.82 kg), Kaushambi (1 kg to 1.72 kg) and Mainpuri (8.39 kg to 10.65 kg); In remaining districts and the state of UP as a whole, the per capita availability decreased.

4.2 Socio – Economic Baseline Status of Haidergarh Branch Command Area based on secondary data

Secondary database tables of Haidergarh Branch Command Area are available in **Annexure 4.2**.

4.2.1 Demography

Total population in the project area of 3 districts increased in census 2001 by 25.27% against census 1991. The highest increase of 47.03% was recorded in Block Jagdishpur (District Amethi) and lowest in Block Trivediganj of district Barabanki i.e. 18.7%. The proportion of male population in project area of 3 districts has decreased slightly from 52.63% in 1991 to 51.56% in 2001. There was a decrease in male population from 52.23% to 51.08% in Amethi and in Barabanki from 53.23% to 52.20% and in Raebareli from 52.58 to 52.0%. As compared to the

sex ratio at the State level in 2001 (898), the number of females per thousand males in project area of Amethi district Amethi was 958, of Barabanki district was 916, and of Raebareli district was 923.

In comparison to 1991 census, the proportion of SC population in 2001 had declined in the project area of all the three districts:

- by 1.12% and from 32.54 to 31.42% in 3 blocks of Amethi;
- by 1.23 from 28.50% to 27.26% in 1 block of Raebareli;
- by 0.01% from 36.07% to 36.06%;
- and in 2 blocks of Barabanki by 0.55% from 39.40% to 38.86%.

The ST population was very nominal in the project area of the 3 districts with only 23 persons in 1991, increasing to 82 in 2001. The decadal increase in the project area population during 1981 – 91 (20.8%) and 1991 – 2001 (26.3%) shows a significant increase. In 3 blocks of Amethi from 23.90% to 32.00%, in 2 blocks of Barabanki from 17.6% to 20.0% and in 1 block of Raebareli from 17.9% to 22.10%. The density of population in project area of three districts has been increasing but stayed lower than the state's population density. The density was 548 persons per sq km at State level in 1991 versus 528 in the project area; and 689 for the State in 2001 versus 682 for the project area.

The percentage of total as well as male and female literate population significantly improved in census 2001 against 1991. The literacy rate improved in the three project area of districts from 30.33% in 1991 to 46.34% in 2001. In Amethi, this increased from 28.34% to 43.57%, in Barabanki from 30.69% to 46.83% and in Raebareli from 35.61% in 1991 to 53.68% in 2001. The Gender Gap in literacy reduced significantly from 31.31% in 1991 to 28.16% in 2001 in all the three districts of the area in the gap of the project area of 3. This shows that there is a significant improvement in the status of females in the area due to encouragement for literacy among females.

4.2.2 Infrastructure Facilities

The number of primary schools per lac population of the project area of three districts was 78.6 in 2000-01 which increased to 79.9 in 2008-09. The number of senior primary schools in the project area of 3 districts was 15.5 in 2000-01 which increased to 27.4 in 2008-09. The number of higher secondary schools per lac population increased from 3.6 in 2000-01 to 5 in 2008-09 in the project area of the 3 districts.

The average length of metalled road per thousand sq. km. in 3 project districts was 539.2 Km which increased to 967.9 km in 2008-09. The highest increase in length of mettaled road was found in Block Haidergarh (Barabank) and the lowest was in Block Shukul Bazar (Amethi) during the same period.

The proportion of electrified villages in project area of 3 districts was 100.0%.

The number of branches of nationalized banks in the project area of the 3 districts was 15 in 2000-01 which increased to 20 in 2009-10; the number of rural banks decreased 23 to 21 during

the same period. There was only one non-commercial nationalized bank in 2000-01 which increased to 8 in 2009-10.

The project area of the 3 districts had 135 Post offices in 2009-2010, 686 PCOs and 3886 Telephone connections.

The number of Allopathic hospitals per lac population in the project area of 3 districts in 2000-01 was 4.0 which declined to 3.8 in 2008-09. The number of beds in Allopathic hospitals and primary health centres in the project area of 3 districts declined from 21.9 in 2000-01 to 21.3 in 2008-09.

The population in the project area of the 3 districts was getting drinking water either through Tap or India Mark-II handpumps since 2000-01.

4.2.3 Agriculture & Allied Activities & Irrigation System

The crop coverage area under total pulses in the project area of the 3 districts was 11379 Ha in 2000-01 which declined to 4766 Ha in 2008-09. In the project area of district Amethi, area under total pulses in 2000-01 was 7025 Ha which in 2008-09 declined to 875 Ha. In Barabanki, the area declined from 3500 Ha to 3259 Ha during same period & in Raebareli, the decline was from 854 Ha to 630 Ha.

Area under total oilseed in the project area of 3 districts in 2000-01 was 1831 ha which increased to 2102 Ha in 2008-09. Area under same crop in Amethi in 2000-01 was 552 Ha which declined to 342 ha. In Barabanki, the area increased from 936 Ha to 1481 Ha and in Raebareli, the area declined from 343 to 279 Ha in 2008-09.

The cropping intensity in the project area of 3 districts in 2000-01 was 153.5% which increased to 169.7% in 2008-09. The cropping intensity increased in the project area of the district Amethi from 143.1% to 151.3% in 2008-09, in Barabanki increase was from 170.8% in 2000-01 to 188.8% in 2008-09, and in Raebareli it increased from 151.3% to 180.9% during the same period. The irrigation intensity in the three project districts was 145.3% in 2000-01 which increased to 173.8% in 2008-09, which is shown below:

District Name	Block Name	Cropping Intensity (in Ha)			Irrigation Intensity		
		2000-2001	2005-2006	2008-2009	2000-2001	2005-2006	2008-2009
Haidergarh Branch							
Amethi	Shukul Bazar	151.7	142.9	140.9	147.7	163.4	159.2
	Jagdishpur	155.1	150.0	147.9	134.9	163.0	158.6
	Singhpur	122.4	166.8	165.2	118.2	182.8	158.8
Barabanki	Trivediganj	165.6	189.3	188.8	181.5	178.0	188.7
	Haidargarh	176.0	188.4	188.8	139.3	178.6	188.7
Raebareli	Shivgarh	151.3	181.7	180.9	150.1	176.8	175.5
Total/Avg.	Project Area	153.5	171.0	169.7	145.3	175.2	173.8

The productivity of total pulses in 2 districts in 2000-01 (excluding Amethi) was 8.2 Qtl/Ha which declined to 7.4 Qtl/Ha in 2008-09. The productivity of oilseeds also declined from 7.4 Qtl/Ha in 2000-01 to 7.0 Qtl/Ha in 2008-09. In Barabanki the productivity of total pulses in 2000-01 was 8.21 Qtl/Ha which declined to 7.81 Qtl/Ha in 2008-09 and in Raebareli district, the productivity of total pulses decreased from 8.18 Qtl/ha in 2000-01 to 6.93 Qtl./Ha in 2008-09. The productivity of total oilseeds (Qtl/Ha) declined in Barabanki district from 8.59 Qtl/Ha in 2000 – 01 to 6.44 Qtl/Ha in 2008 – 09 and in Raebareli district, the productivity had increased from 6.22 Qtl/Ha in 2000 – 01 to 7.53 Qtl/Ha in 2008 – 09.

The length of canal in project area of the 3 districts in 2000-01 was 483 Km. which increased to 837 Km in 2008-09. There were 15 public Tubewells in 2000-01 in the project area of 3 districts and 53 in 2008-09. In Amethi project area, their numbers were 12 and 49 respectively.

The proportion of Canal irrigated land has significantly declined over the years in all districts. Area irrigated through public and private tubewells/pump sets in project area of 3 districts was 8303 Ha in 2000-01 which increased to 23707 Ha in 2008-09.

In the project area of 3 district, net irrigated area declined by 5.8% in 2008-09 over the area irrigated in 2000-01. In the district Amethi, project area, the net irrigated area had declined by 1.1% in 2008-09 over the area irrigated in 2000-01 and in 2008-09 increased by 7.07% in Barabanki. The irrigated area declined by 8.5% and in Raebareli the net irrigated area declined by 11% in 2008-09 over 2000-01. The gross irrigated area in 3 project districts increased by 12.6% in 2008-09 over 2000-01. In Amethi project area, gross irrigated area increased by 21.2% in 2008-09 over 2000-01. In Barabanki, the gross irrigated area increased by 8.9% and in project area of Rae bareli district, the gross irrigated area increased by 4.1% in 2008-09 over the area in 2000-01.

The consumption of fertilizer per hectare in project area of 3 districts increased from 118.67 Kg/ha in 2000 – 01 to 180.57 Kg/Ha in 2008 –09. In the project area of 3 district population of total Bovine (Desi and Cross-breed) in animal census 1997 was 185807 which declined to 116840 in animal Census 2003. Total number of Sheep was 5219 in 1997 and 3138 in 2003; Goats were 68004 in 1997 and 65488 in 2003. the number of poultry also declined from 34181 in 1997 to 28060 in 2003.

4.2.4 Land Holding & Labor Profile

The operational landholding of project area shows decreasing trend in all districts; Amethi was 81238 in 1995-96 and in 2000-01 it was 76519 with an area of 45150 Ha and 46831 Ha respectively. In Barabanki, total landholding in 1995-96 was 57967 (Area 40792 Ha) and in 2000-01 it was 53577 (Area 35964 Ha). In Raebareli, total landholdings were 17706 in 1995-96 (area 11690 Ha) and in 2000-01 they were 15790 (area 11987 Ha).

The proportion of agricultural labour in project area of the 3 districts was 21.8% in 1991 which declined to 12.8% in 2001. This declining trend indicates that agricultural laborers are shifting towards other sectors as job availability in agriculture sector is shrinking continuously. In the 3 project districts, the number of total workers (Main and Marginal) increased by 26.9% in 2001 over 1991. Number of farmers declined by 24.5% and number of agriculture labour declined by

25.0% during the same period. The number of persons depending on agriculture, either as farmer or agriculture labour was declining may be due to poor return from their occupation.

4.2.5 Poverty

The proportion of BPL families in Amethi project area in 1998 was 79.9% which declined to 66.1% in 2001. In Barabanki, it significantly increased from 44.8% in 1998 to 67.3% in 2002 and Raebareli their proportion declined from 80.5% to 69.5% in 2002. The per capita annual availability of food grains in the district Barabanki has declined considerably from 339.45 Kg in 2000 – 01 to 326.07 Kg in 2008 – 09 (declined by 3.94%). An opposite trend was seen in the Raebareli district. It was observed that there was increase in the per capita annual availability of food grains from 282.02 Kg in 2000 – 01 to 290.98 Kg in 2008 – 09 (an increase by 3.17%).

4.3 Environmental Status of Study Area – Land environment

Land environment is described in terms of physiography, Geology & Minerals, Soil quality & fertility & land use.

Physiography

LGC: Lower Ganga Canal Command Area falls under Ganga Basin Command Area, which is a part of the Indo–Gangetic alluvium plain, drained by a number of major rivers like Ganga, Gomti, Ghaghra, Kalyani and Sai. The surface is generally flat and sloping towards South-eastwards. The salient physiographic features of Lower Ganga Canal Command area are given in **Figure 4.1**.

The general elevation of land varies from 175 to 180 meters above mean sea level in the extreme west in Aligarh district to 100 to 105 meters at Kaushambi in extreme east. Normally the area is featureless except for the presence of a number of small rivers with raised sandy banks, ravenous area along the river Yamuna, some depressions forming chains of swamp, from which a number of small rivers or drainage channels originate. These drainage channels are rather sluggish streams with low regular channel flows but high banks. Land erosion along river Yamuna is widespread and increases in intensity from north- west to southeast. In Etawah and Kanpur districts, these eroded areas have assumed formidable size, up to several kilometers wide with deep gullies. The Ganga River on the northern borders of the two divisions has shifted to north at several places leaving low lying tracts with light soil. In Etah, Farrukhabad and Kanpur districts, the change of river course is by several kilometers. However, in the old course, a chain of water pools have formed and during rains surplus water from uplands is drained in this channel, which forms a regular stream by joining all the pools. The channel is known as Burhi Ganga. Other smaller rivers draining the central alluvial tract are Kali Nadi, Sengar, Rind and Pandu. A description of physiographic features of the districts in LGC is given in **Annexure 4.1**.

Haidergarh Branch: Haidergarh Branch command area falls under Sharda Sahayak Command, which is a part of the Indo–Gangetic alluvium plain, drained by a number of northbound potential major rivers, Ganga, Gomti, Ghaghra, Kalyani and Sai. The surface is generally flat and sloping towards Southeastwards. The river Gomti flows towards Southeast direction through the districts Barabanki, Sultanpur, and Jaunpur, and joins Ganga at downstream of Varanasi. The

Gomti basin covers the southern part of the Ghagra Gomti basin between the Ganga and Ghagra rivers. The river Ghagra originates in Nepal, enters the state in Kheri district and flows South Southeastwards in Faizabad and joins Ganga near up stream of Chappra in Bihar. Sarda sub-basin, part of river Sarda (Mahakali- in Nepal), a major tributary of Ghagra River covers drainage area between Banbasa headworks upto its confluence with Ghagra. The salient physiographic features of 23 down Haidergarh Branch are given in **Figure 4.2**.



Figure 4.1: Physiographic Features of LGC & 23 Down Haidergarh

Source: Prepared by IRGSSA from UPID

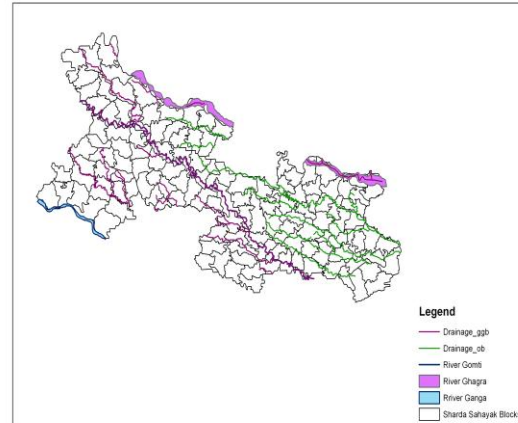


Figure 4.2: Physiographic Features of Haidergarh Branch

Source: Prepared by IRGSSA from UPID

Geology & Minerals & Hydrogeology LGC area

The project area is part of the Indo-Gangetic alluvium as is clear from the Geohydrological map of U.P. The Indo Gangetic alluvium has been classified by Wadia (1961) and Krishnan (1960) under older and newer Alluvium. The older Alluvium forming the higher lands is not generally flooded by rivers and the newer Alluvium forming the lower land gets generally flooded by river year after year. An indication regarding the depth of alluvium is given by two deep drillings done by the Central Ground Water Board at Panki near Kanpur, where the Bundelkhand granites have been encountered at a depth of about 580 meters while at Santa near Allahabad where bed rock has been encountered at a depth of about 230 meters only. The alluvium comprises of clay, kankar, silt, and sand of various grades and of different textures. The sub- surface geological information is furnished by the study of geological cross sections as well as by the study of litho logs of state and private tube wells.

Ground water in the area occurs under unconfined and semi confined conditions and is a major source of irrigation. A detailed fence diagram is given in **Annexure 4.1**, which shows the underground aquifer configuration of the command area, the detailed geological and hydrogeological conditions of the study area.

Geology & Minerals & Hydrogeology Haidergarh Branch

The entire study area is underlain by thick alluvial sediments of the Quaternary age. The alluvial sediments consist of boulders, pebbles, gravel, sand, silt, clay and kankars. The unconsolidated unit may be further subdivided into younger Alluvium and older Alluvium. The younger Alluvium occupies the present day flood plains while the older group occupies elevated doab

portions. The older Alluvium is characterized by kankar nodules. Extensive aquifers occur in the quaternary alluvium formations at various depths: phreatic, shallow, and deep aquifers. The geological formations govern the availability of water, particularly ground water as well as agricultural development in Branch Command Area. Soil characteristics in particular affect the fertility, ground water and aquifer characteristics, water quality and usage. The phreatic aquifers are unconfined in nature and represent the main source of water for drinking purposes. Geology & minerals in the study area is given in **Figure 4.3**.



Figure 4.3: Geology & Minerals in Haidergarh Command Area
Source: Geological Survey of India

Soil Quality

LGC: The soils found in Lower Ganga Canal Command area and soil pattern of LGC Command Area are shown in **Figure 4.4**. The majority of the soils found in LGC are Typic Haplustepts with Typic Ustistamments on the upper Northern and Southern periphery of the area. In the middle of top part of study area, rock outcrops with Typic Haplustalfs have been observed.

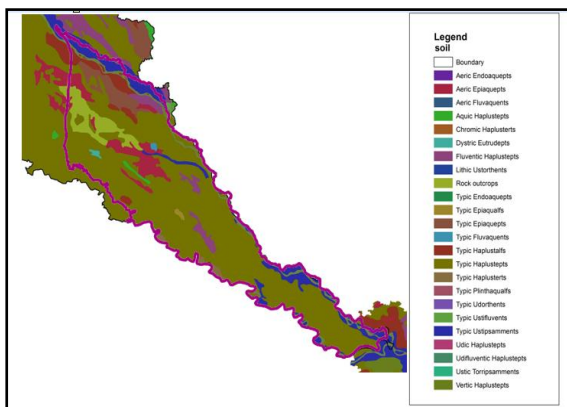


Figure 4.4: Soil Map of Lower Ganga Canal Command Area
Source: CWC's Ram Ganga Report

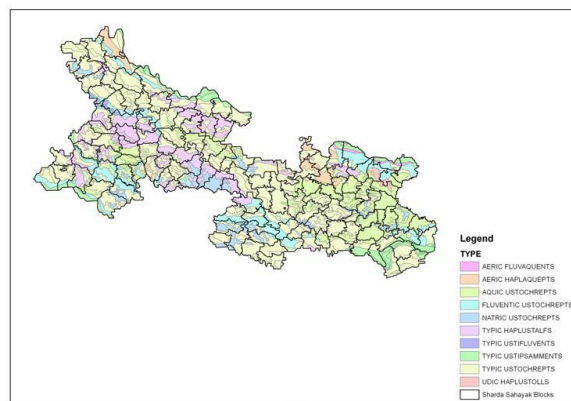


Figure 4.5: Soil Map of Haidergarh Branch
Source: Prepared by IRGSSA from UPID

Haidergarh Branch: The soils found in Haidergarh command area are the Ustochrepts subgroup, found in district of Barabanki and Raebareli. Typic Ustochrepts, moderately saline and sodic and slightly saline are also found in parts of Amethi. The soil pattern of Haidergarh

Command Area is shown in **Figure 4.5**. Based on this soil pattern, the districtwise soil pattern is described below.

Summary Soil Fertility Status

LGC: The soils of LGC in general are very fertile. The Agriculture Department data has been used to depict the soil fertility status of LGC Command Area. The block wise Macro nutrient data is given in **Annexure 4.1** and **Figure 4.6**.

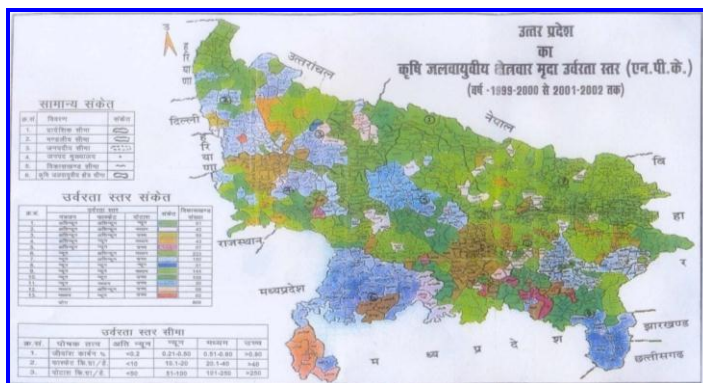


Figure 4.6: The Soil Fertility/Health Map of the Project Area
Source: Department of Agriculture, GoUP

Macro-nutrient Status: Districtwise Macro nutrient status in 2009-10 is given in **Annexure 4.2**. The summary of Macro-nutrient status is the following. The average available nitrogen status has been reported low in all districts of LGC which is similar to state average. However, in Auraiya district available nitrogen is reported very low. Low to very low phosphate status has been reported in all districts of LGC. Medium to high potassium status has been reported in all districts of LGC.

Micro-nutrients Status: Districtwise micro nutrients status in 2007-08 & 2009-10 is given in Annexure 4.2. Salient features are:

- Sulphur: The deficiencies of sulphur were reported in Mainpuri and Etah while other districts data shows medium sulphur during 2005-2008. Similarly in 2009-10 sulphur was found deficient in Mainpuri while in other districts it was medium;
- Zinc: The Zinc were reported sufficient in Firozabad district while all other districts it was found medium during 2007-08. During the year 2009-10 again, Zinc was found medium except in Kannauj where it is reported as sufficient;
- Copper: Sufficient concentration of Copper is reported in all districts of LGC except it is found medium in Etawah, Etah & Kasganj during 2005-2008. During the year 2009-10, it was found sufficient in all districts except at Mainpuri where it is reported as medium;
- Iron: Sufficient Iron is reported in all districts of LGC except in Etawah, where it is found medium Etah & Kasganj during the year 2005-08. In year 2009-10, iron contents were found to be less and usually found medium. Iron was found deficient in Mainpuri;
- Manganese: The Sufficient Manganese is reported in all districts of LGC except Etah & Kasganj where is reported as medium. In year 2009-10 iron contents have reduced.

Haidergarh Branch: The soils of project area in general are very fertile. Available nitrogen concentration in soils ranges between low to very low. The same trend has been observed for available Phosphate, where most of the soils lie between low to very low category. The available potassium is high to medium in most of the areas. According to the soil testing data on Nitrogen (N) available phosphate (P) and potassium (K) of the project area is given in **Annexure 4.2**. The macro-nutrient Status is the following:

- Nitrogen Status: The low nitrogen status has been reported in both blocks (Haidergarh & Trivediganj) of Barabanki, in Shivgarh block of Raebareli and Shukul Bazar, Jagdishpur, Singhpur of Amethi;
- Phosphate Status: Very low phosphate status has been reported in Shivgarh block of Raebareli, Haidergarh & Trivediganj blocks of Barabanki and Shukulpur and Singhpur blocks of Amethi while very low in Jagdishpur block of Amethi district;
- Potassium Status: The high potassium status has been reported in all blocks of Raebareli except Jagatpur. The medium status reported in all blocks of Barabanki, Jagdishpur block of Amethi

For micro-nutrients Status, the data of micronutrient deficiency for the districts is analyzed and has been reported in **Annexure 4.2**.

- Sulphur: The deficiency of sulphur is reported in all block of Raebareli and Jagdishpur & Suklabazar of Amethi, while other block of different district is found medium;
- Zinc: The deficiency of Zinc is reported in Trivediganj, Haidergarh blocks of Barabanki, while other blocks of different district is found medium;
- Copper: Sufficient concentration of Copper is reported in all blocks of Raebareli (except Rohniya block), while medium is reported in Barabanki and Amethi;
- Iron: The Iron deficiency is not observed in any of Blocks in the study area;
- Manganese: The Manganese deficiency is not observed in any block in the study area. Soil quality sampling was carried out in 5 Pilot Districts (Barabanki, Jaunpur, Pratapgarh, Raebareli and Sultanpur) under the Ghaghta-Gomti Basin under BSEA of phase-I of UPWSRP. The major issues and concern related to soil quality based on these reports in the three districts of the current study area indicate unbalanced use of fertilizer, declining content of organic carbon, declining microbial density and diversity in soils, declining soil fertility, dominance of water and chemical intensive cropping system and use of banned pesticide.

Land Use

LGC: The land use pattern in the command area has been studied for three periods of time (Year 2000-01, 2005-06 & 2008-09) in order to understand the changes over a period. The block wise land usage in 2000-01, 2005-06 and 2008-09 are given in Table 15A, 15B and 15C of **Annexure 4.1** and discussed earlier in section 4.1. The summary of land use pattern in 2000-01, 2005-06 & 2008-09 indicates that forest is reducing in Farrukhabad, Etawah, Kaushambi & Mainpuri. Fallow Land and Barren & uncultivated Land has increased in recent years in Aurraya. Gross irrigated area usually increased in all districts. Land put to use other than agriculture has increased in all districts except for Etah & Kaushambi.

Haidergarh Branch: The total Blockwise land area within Haidergarh 23 down Command Area is 456407 sq. km. Land use can be categorized as cultivable, and uncultivable. Uncultivable land includes forest, pasture, fallow, and barrenland. The breakup of land use pattern in 2000-01,

2005-06 & 2008-09 is given in **Annexure 4.2**. It indicates that during 2008-09, 1.2% of the total area is forest area. About 58% of the area is net sown area. 90% of the total area is gross sown area. The farmers are able to grow crops during Rabi, Kharif & Zayad seasons. About 48% of the gross sown area falls in Rabi season, 40% in Kharif & 2% in Zayad season. This indicates pressure on land, soil & water resources of the study area. About 8.96% reduction in net sown area has been reported in 2008-09 in comparison to 2000-01. However, gross sown area (GSA) has increased by 1.1%. About 3.9% GSA has increased during rabi; 6.6% GSA has decreased during Kharif and 1% has decreased during Zayad. This indicates that farmers are able to cultivate more during Rabi season in comparison to Kharif & Zayad. Therefore, more pressure on soil, water & land is expected during rabi season. About 34% of the land has been put to land use other than agriculture use. Present fallow land has increased by 110% Barren & unculturable land has decreased by 29%. This indicates major diversion of barren & unculturable land to land uses other than agriculture. However, increase in present fallow land indicates decrease in net sown area.

4.4 Climate & Air Environment

LGC: The climate of the project districts is characterized by cold weather from November to February along with hot summer from March to June and the rainy season from July to October. The average normal rainfall of the area varies between 614.5 mm and 946.1 mm. Fatehpur receives about 946.1 mm while rainfall gradually decreases to the west. There are also wide variations in rainfall in different portions of the individual district, the areas lying on the south western side receives less rainfall and the differences in annual rainfall can as large as 100mm in some of the districts. Most of the rainfall happens during the four months beginning from the last week of June to the end of the September. Heavy downpours of 10-20 cm. in one day are not uncommon while there may be long breaks with completely rainless days during this period. The rest of the year is dry except for occasional light showers during winter months. Winter season starts at the end of October and continues till the end of February when the day temperature starts rising. December and January are the coldest months which are sometimes quite severe with occasional frosts. From March onwards the hot season starts and lasts up to June. Summer months are extremely hot, the day temperature crosses 38°C and sometimes touches as high as 48°C. Strong westerly hot winds blow throughout the day with dust storms occurring quite frequently, more so in the western districts where a lot of sand is carried from across the Rajasthan border and gets deposited in areas along the western borders at places forming extensive chains of sand dunes.

As the rains stop by the end of September or early October, the main winter crops (Rabi) are generally sown up to 15th November and some late varieties up to middle of December. During the growing season of these crops soil moisture depletes rapidly and the need of supplemental irrigation is felt during December. The soil moisture stress goes on increasing till the harvesting of the crops in March and early April. During the latter parts of the sowing season of winter crops, atmospheric humidity is also lowest, the relative humidity may be as low as 40%. The crops, with no irrigation facilities suffer greatly unless there are a few winter showers. However, for optimum growth of the main crop like wheat, three to four supplemental irrigations are essential to meet the soil moisture deficit.

Haidergarh Branch: The climate of the study area is sub-tropical and may be characterized by hot dry summer and cold winter. The region shows four distinct seasons. Summer being from April to mid-June, Monsoon from mid-June to September, post-monsoonal transition between October and November while the winter months will range from December to February.

Districtwise Rainfall data from year 2000 to 2009 shown in **Figure 4.7** which indicates declining trends in all the districts of Haidergarh Branch. During 2006, the study area received lowest precipitation. During 2006, Raebareli received lowest precipitation while Amethi received the highest precipitation during the year. Barabanki received the highest rainfall in 2008. A simple root cause analysis indicates that rainfall deficiency triggers reduced water availability in canals, may further trigger decline in agriculture production and water for other user.

Decadal variation of temperature indicates that the minimum & maximum temperature in Raebareli district ranges from 2.3°C to 44.2°C; the minimum & maximum temperature in Barabanki district ranges from 3.2°C to 44.8°C and the minimum & maximum temperature in CSM district ranges from 4°C to 44°C.

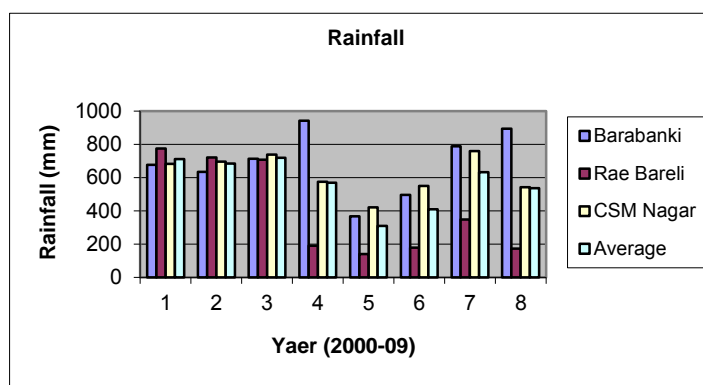


Figure 4.7: Average Rainfall in Haidergarh Branch

Source: Prepared by IRGSSA

Air Pollution

Currently no documentary or physical evidence has been found in the study area, which indicates air pollution. There is no mining or industrial activity which offers the potential of air pollution especially SPM, has been found in the project areas.

4.5 Water Environment

Water environment of the study area is described in terms of surface & ground water resource, sources of irrigation, surface & ground water quality, performance of surface & ground water resources & cost implications.

4.5.1 Surface Water Resources of LGC, Sharda Sahayak System and Haidergarh Branch Command Area

LGC: Lower Ganga Canal originates from the right bank of river Ganga at Narora Barrage. The main branch of 8500 cusecs off takes from this point. This system has been planned to provide

irrigation to 9.025 lac Ha Area (CCA) of Etah, Mainpuri, Etawah, Farrukhabad, Kanpur and Fatehpur districts. The work started in 1872 with completion in 1982 to discharge 359.63 cusec for irrigating 9.025 CCA. Details of Main Canals of Lower Ganga Canal System are given below and shown in **Annexure 4.3**, while the head discharge data from the canals is given below.

Name of Canal	Head Discharge (Cusecs)
Farrukhabad Branch	1100
Bewar Branch	900
Bewar Feeder Channel	350
Itawa Branch	3000
Bhoginipur Branch	1800
Kanpur Branch	4000
Paschimi Allahabad Branch	1785
Fatehpur Branch	925

Source: Uttar Pradesh Irrigation Department, GoUP

It is planned to augment the capacity of the system as well as rehabilitate & modernize the entire system to prevent water logging, seepage losses and facilitate water availability at the tail end. Focused Group Discussions findings confirmed water logging & seepage losses & stakeholders agree that rehabilitation & modernization is required.

Sharda Sahayak & Haidergarh Branch: Sarda Sahayak Project was proposed in 1967, commissioned in June 1974 and completed in 1985. The project consisted of construction of barrages on Ghaghra and Sharda Rivers, and linking the two rivers with a link canal with capacity of 480 cumecs. A feeder canal with capacity of 650 cumecs was built south from the Sarda Barrage to supply irrigation water to a culturable command area of 20 lakh ha (2 million ha) at a proposed annual irrigation intensity of 96%. As part of the development of the Sarda Sahayak Project, the Haidergarh Branch was disconnected from the Sarda system and connected to the Feeder Canal at km 171.6. Increased supply to Haidergarh Branch from this point allowed expansion of the CCA. Jaunpur Branch off-taking from Haidergarh at 22.8 km was part of this expansion. Jaunpur & Haidergarh branch system is shown in **Figure 4.8**.

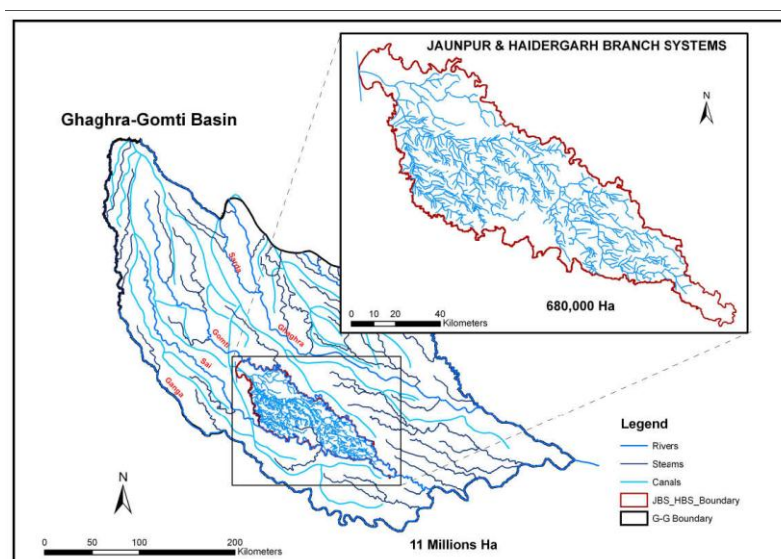


Figure 4.8: JBS-HBS Location within Ghaghra-Gomti Basin

Source: Uttar Pradesh Irrigation Department, GoUP

The Study Area covered by this report includes Haidergarh Branch Sub-basin (HBS). HBS has a gross area of approximately 24,525 ha. The CCA of HBS is 73,000 ha. Surface water is delivered to HBS through the Haidergarh Canal that offtakes from the Sarda Sahayak Feeder Canal at km 171.6. The average canal flow in the Haidergarh Branch in recent years is about 69 cumecs. The average monthly discharge varies between 28 cumecs in May to 112 cumecs in July. In a typical year (2003-04), over the 120 days Kharif season, the amount of water used and seepage loss between the HBS head and JBS bifurcation is estimated to be about 265 MCM which is about 100 cm over the gross area of HBS and 150 cm over the CCA. Over the 140 days Rabi season, the estimate is also very similar.

These values are much higher compared to that of JBS. This is justified by the water-logged area in HBS. Accordingly, two-third of JBS is permanently water-logged (0-3mbgl) and another 12% area in the range of 3-5mbgl. This is more because of seepage from unlined HBS rather than excessive use of available water. The main branches/distributaries of the Haidergarh branch canal system are given in **Table 4.2**.

Table 4.2: Main Branch/ Distributaries of Haidergarh Canal System

S. N.	Name of canal	Length in kms	Discharge in cumec
1	Haidergarh Branch Km. 22.98 to tail	8.000	33.13
2	Kakari Dy	5.200	0.74
3	Bara Dy.	16.620	2.15
4	Lahi Dy.	7.400	0.96
5	Lilhaura Dy.	7.200	0.62
6	Singhapur Dy.	19.500	9.91
7	Shivaratanganj Dy.	6.800	0.93
8	Bhawani Pur Dy.	5.400	0.96
9	Rajapur Dy.	26.000	3.40
10	Rasta Mau Dy.	11.200	1.19
11	Harimau Dy.	9.600	0.62
12	Inhauna Dy.	42.400	18.41
13	Subeha Dy.	29.200	5.61
14	Khanpur Dy.	9.520	0.91
15	Krishiya Dy.	9.600	0.65
16	Sindurawa Dy.	14.400	2.04
17	Girawan Dy.	15.200	1.05
18	Baharpur Dy.	8.600	0.74
19	Katehati Dy.	13.000	1.27
20	DeoKali Dy.	14.500	2.46
Total		279.340	

Source: Uttar Pradesh Irrigation Department, GoUP

4.5.2 Ground Water Resources Development in LGC & Haidergarh Command Area

LGC: Hydrogeological conditions in each district are described in Annexure 4.1. The net ground water availability in lower Ganga canal system was 900787 ha in 2004 which declined to 829703 ha (7.9%) in 2009. The similar trend was also observed in recharge from rainfall in non-monsoon season and recharge from other sources in both monsoon and non-monsoon season from 2004 to 2009. Recharge from rainfall in monsoon season increased from 2004 to 2009.

The highest decline (26.6%) was seen in recharge from rainfall in non monsoon season followed by recharge from other sources in both monsoon and non monsoon season during the same

period of time. The district wise ground water resource and net ground water availability in LGC is given in **Annexure 4.3**.

The stage of ground water development was 66% in districts of LGC system in 2004 which increased to 77% in 2009. The highest increase in ground water development was observed in district Kanpur Dehat followed by Kaushambi, Etawah, Aurraya and Firozabad from 2004 to 2009. The positive trend was observed in district Farukhabad and Mainpuri during the same period of time. The district wise annual Ground Water Draft and Stage of ground water development is given in **Annexure 4.3**.

In the districts of Lower Ganga Canal, 15 blocks were falling under semi-critical category which increased to 16 in 2009. A similar trend was also observed in Critical (from 2 to 8) and over exploited (from 4 to 12) category. The data indicates that the dependence on ground water had increased over the period of time. Block wise status is given in **Table 4.3**.

Table 4.3: Semi-Critical, Critical and over exploited blocks in Districts of LGC System

District	Semi-Critical		Critical		Over Exploited	
	2004	2009	2004	2009	2004	2009
Auraya	Bidhuna	-	-	-	-	-
Etah	Jalesar	Saket	-	-	Marehra	Markara
	Nidholikalan	Nidhauri Kalan	-	-	Sakeet	-
	-	Aliganj	-	-	-	-
Farrukhabad	Mohamadabad	-	Kamalganj	-	Barhpur	-
Fatehpur	Airawan	Airayan	-	Amauli	-	-
	Deomai	Bahua	-	Haswa	-	-
	-	Deomai	-	Hathgaon	-	-
	-	Khajuha	-	Malawan	-	-
	-	Teliyani	-	-	-	-
	-	Vijayeeepur	-	-	-	-
Firozabad	Madnapur	Madanapur	-	-	-	Aron
	Shikohabad	-	-	-	-	Eka
	Tundla	-	Firozabad	-	-	Firozabad
	-	-	-	-	-	Narkhi
	-	-	-	-	-	Tundla
Kannauj	Jalalabad	Kannauj	-	-	-	Jalalabad
	Kannauj	Talgram	-	-	-	-
	Talgram	-	-	-	-	-
Kanpur Nagar	-	Ghatampur	-	Bhitar Gaon	-	-
	-	Sarsaul	-	-	-	-
	Shivrajpur	Shivrajpur	-	-	-	-
Kasganj	-	-	-	Kasganj	Kasganj	
Kaushambi	Chail	Newada	-	Kara	-	Chail
	-	-	-	Manjhanpur	-	Sirathu
	-	-	-	Moorat Ganj	-	-
Mainpuri	Barnahal	-	-	-	-	Barnahal
	-	-	-	-	-	Mainpuri
Total	15	16	2	8	4	12

Source: Central Ground Water Board

Haidergarh Branch: Districtwise ground water resources in Haidergarh Branch is given in **Annexure 4.3**. Analysis of data indicates that stage of ground water development in Barabanki,

Raebareli & Amethi is 69%, 74% & 72%. Ground Water availability for future irrigation is about 56386 Ham in Barabanki, 26305 Ham in Raebareli & in Amethi 39378 Ham.

4.5.3 Sanitation Status of LGC Command Area

Sanitation status of LGC Command Area has been assessed and described below in term of, sanitation facilities, sewage generation and type of sewage disposal system. The sanitation facilities in rural area of LGC districts were found to be very poor Table 4.4. More than 80% of households except Farrukhabad district were not having toilets facilities in their houses.

Table 4.4: Sanitation facilities in LGC System

Sl. No	District Name	Total HH	House hold With Toilet	House hold Without Toilet	Sanitary Complex	School Toilets	Anganwadi Toilets	RSM	PC	SLW M	Total Sch. covered
1	Auraiya	170549	27584	142965	50	2240	817	1	1	0	1491
2	Etah	363123	56956	306167	30	5220	1796	2	0	0	5220
3	Etawah	170884	29416	141468	44	2925	1223	4	0	0	1463
4	Farrukhabad	189040	44794	144246	35	3143	1227	3	0	512	1572
5	Fatehpur	361137	55186	305951	15	3938	1548	5	0	0	2318
6	Firozabad	220610	30381	190229	10	3232	963	0	0	0	3232
7	Kannauj	181837	25668	156169	46	2373	1440	2	1	0	1286
8	Kanpur dehat	245525	40789	204736	60	3536	1149	5	5	612	1768
9	Kanpur nagar	231704	41237	190467	50	3310	1784	5	0	50	1655
10	Kasganj	NA	NA	NA	NA	2777	989	0	0	0	1389
11	Kaushambi	209361	28865	180496	24	2048	785	3	0	0	2048
12	Mainpuri	211836	31067	180769	10	3334	1309	4	0	0	1667
Total(LGC system)		2555606	411943	2143663	374	38076	15030	34	7	1174	25109

Source: Total Sanitation Mission, GoI

Sewage Generation: The highest sewage generation was observed in district Kanpur followed by Firozabad, Etawah, and Farrukhabad. Data from Table 4.5 reveals that in the majority of the district, sewage was disposed off in river / water body except Mainpuri and Auraiya.

Table 4.5: District wise Sewage Generation

Sr. No.	City/Town	Population in Year 2008	Total Water Supply (in MLD)	Per Capita sewage (LPCD)	Total Sewage (in MLD)	Treatment Capacity (in MLD)	Disposal of Sewage
1	Farrukhabad	280290	46.95	134	37.56	8.3	-
2	Kanpur	3114530	521.69	134	417.35	171.1	-
3	Etah	131730	24.34	147.8	19.47	-	Sirsa
4	Etawah	260100	48.05	147.8	38.44	10.45	Yamuna
5	Firozabad	342930	57.44	134	45.95	-	Yamuna
6	Fatehpur	186660	31.26	134	25.01	-	Yamuna
7	Kannauj	83260	9.99	96	7.99	-	-
8	Kasganj	107650	13.46	100	10.77	-	Kali
9	Mainpuri	104220	14.59	112	11.67	-	Land

Sr. No.	City/Town	Population in Year 2008	Total Water Supply (in MLD)	Per Capita sewage (LPCD)	Total Sewage (in MLD)	Treatment Capacity (in MLD)	Disposal of Sewage
10	Auraiya	75190	15.03	159.91	12.024	-	Land

Source: Central Pollution Control Board

Sewage Treatment Plants: In the LGC Command Area, 3 districts have Sewage Treatment Plant. The capacity of all sewage treatment plants was very low and treats between 22% and 41% of sewage. Table 4.15 indicates that most of the town is disposing sewage in nearby water body and on land.

The disposal of untreated sewage in the water body causes water pollution and health problem too in the project area.

4.5.4 Sources of Irrigation in LGC Command Area

LGC: Sources of Irrigation consisting of canal, public & private tubewells & wells have been detailed in section 4.2.3 of this Report.

Haidergarh Branch: District wise temporal variation (2000-01 to 2008-09) of source of irrigation indicates slight reduction of canal irrigation in Barabanki districts while in other districts the canal irrigation has increased. The decreased canal irrigation is indicative of reduced water availability or siltation in the canal system. District wise canal irrigation is given in **Table 4.6**.

Table 4.6: Districtwise canal irrigation

District	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
Barabanki	58.63	33.17	31.31	29.87	33.28	33.86	33.72	41	35.76
Raibareli	46.34	47.72	45.83	43.4	46.72	47.27	43.14	47.3	46.46
Amethi	0	27.2	27.11	30.35	27.7	25.68	26.95	28.01	26.72

Source: Directorate of Economics & Statistics, Planning Commission, GoUP

Tubewell Irrigation: District wise temporal variation (2000-01 to 2008-09) of source of irrigation indicates slight increase in tubewell irrigation in Barabanki, Raibareli and Sultanpur/Amethi districts. The increased tubewell irrigation is indicative of reduced surface water availability due to siltation or rainfall in the canal system. The decreased well irrigation is indicative of depletion of shallow ground water level in the Command area. District wise tubewell irrigation is given in Table 4.7.

Table 4.7: District wise Tubewell Irrigation

District	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
Barabanki	37.81	65.37	60.48	69.04	64.71	64.05	63.66	57.77	63.4
Raibareli	51.41	49.82	51.62	52.85	50.5	50.05	49.01	51.46	51.92
Sultanpur/ Amethi	23.56	67.59	67.98	65.43	67.91	70.28	68.95	67.92	69.32

Source: Directorate of Economics & Statistics, Planning Commission, GoUP

District wise temporal variation (eight years) of source of irrigation indicates slight reduction of canal irrigation and slight increase in ground water irrigation from 2000-01 to 2008-09 in some districts. The decreased well irrigation is indicative of depleted shallow ground water level in the

Command Area. The decreased canal irrigation is indicative of reduced water availability or siltation in the canal system during the subsequent years.

4.5.5 Water Quality

Surface Water Quality

Surface water quality has been described based on Central Pollution Control Board data (Year 2002 to 2008) of LGC Command Area. The water quality of five locations monitored in the project area is presented in **Annexure 4.4**.

Data analysis indicates that BOD complies with the standard only at Kanpur d/s, where BOD shows a marginally decreasing trend, BOD in rest of the locations shows increasing or marginally increasing trends. DO complies with the standard at all locations. However, no trend is observed at Kannauj u/s and Kanpur u/s. At Kannauj d/s, marginally decreasing and at Kanpur d/s, decreasing trends in DO are observed. DO in rest of the locations showed a marginal increasing trend. Faecal Coliform does not comply with the standard in all five locations.

Ground Water Quality: Ground water quality of LGC Command Area is monitored under National Rural Ground water Programme (Rajiv Gandhi National Ground Water Mission). Ground Water Quality status (Number of samples tested & number of samples found above permissible limits for Fluoride, Chloride, Iron, Magnesium, Calcium, Nitrate, Sulphates, Turbidity, Copper, Arsenic, Residual Chlorine & Alkalinity) of all the districts is given in **Annexure 4.4**. Analysis of the data indicates that samples were tested for deep tubewell, open well, shallow tubewell and delivery point for the year 2002 to 2012. All the parameters of tested samples were compared with the Indian Standard for Ground Water–Specification IS 10500:1991 (amendment in 2003).

A total of 57374 samples have been tested in LGC Command. Data indicates that Fluoride, Chloride, Iron, Magnesium, Calcium, Nitrate, Sulphates, Turbidity, Copper, Arsenic, Residual Chlorine & Alkalinity were found high in the area. Fluoride contamination is found high in maximum samples in Etawah; Chloride was found high in Kanpur Nagar; Iron is found high in Firozabad; Magnesium is found high in Etah; pH is found high in Etawah, Nitrate in Etawah. Other parameters in very few samples indicate high values as compared to the prescribed limits.

Likely impacts of the project on ground water are limited and will be mitigated and monitored under the project:

- Irrigation and drainage infrastructure rehabilitation and modernization are unlikely to have any direct impact on groundwater quality and quantity.
- Reduced seepage from canals and improved drainage might result in limited reduction in groundwater recharge.
- However, increased availability of surface water in command area is expected to result in reduced groundwater abstraction.
- Possible increase of pesticides from agricultural development would result in degradation of groundwater quality; in this regard, a specific EMP on pest management has been prepared (see chapter 6).

- The specific project component on groundwater aims at improving groundwater assessment and developing aquifer management plans, hence improving management of the resource.
- Finally, water quality monitoring plans are described in chapter 7.

4.5.6 Source of Irrigation

Both surface and ground water is used for irrigation in the Command Area. Surface water is supplied through canal, ponds and river. Ground water is extracted from public and private tube-wells. District wise area irrigated by different sources is given in **Annexure 4.1**. Ground water use covers 40% to 70% of the reported irrigated area in Barabanki and Amethi / Sultanpur during the year 2000-01 to 2008-09, while it varies between 40% to 50% in Raebareli during the same period. Surface water use covers 60% in 2000-01 and 30% in 2008-09 in Barabanki and Amethi/ Sultanpur. The data indicates that source of irrigation increased by more than 6% through ground water.

Haidergarh Branch: The main carrier of the entire Sarda Sahayak System i.e. the Feeder Canal presently, is not able to sustain the design head discharge resulting in inefficient services to the entire canal system. This is mainly due to ingress of large volume of silt in the channel during the monsoon season. Therefore, mitigation of silt problem in Sarda Sahayak Feeder Canal has become a real challenge. It is therefore proposed to have a detailed study of the feeder head for mitigation of silt problem after due analysis and model studies.

The canal and drainage systems selected for the irrigation and drainage sub- sector reforms through rehabilitation and modernization are old. The water availability in these Canal systems was evaluated at the time of original project design and the development was implemented. Accordingly the rehabilitation and modernization design/redesign process shall have to be considered within this limitation. The field assessment of the required works was made by the respective divisions of UPID and is being proposed in consultation with the field officers of the selected command. Apart from rehabilitation of existing canals, the field divisions have also proposed the repairs of existing structures of the canal and also new demand of VRBs, DRBs, Syphons etc. have been given as per the actual site investigation and requirement, accordingly, provision have been made in the project.

4.6 Cost Implications

Increased dependence on ground water especially on private tubewells have significant cost implications. FGD findings in district indicates that cost of surface water irrigation for Rabi season (wheat & other food grain) is about Rs 100/ha to Rs 173/ha. These costs are inclusive of 3 cycles watering through canal system. Ground water costs through private tubewells ranges from Rs 150 to Rs 200/hour. For irrigating one hectare about 10 to 12 hours of tubewells operations are required. This indicates that cost of ground water irrigation through private tubewells is about Rs 1500 to Rs 2000 per hectare. FGD findings also indicate that cost of ground water irrigation through public tubewells is about Rs 600/ha. The difference in surface & ground water irrigation rates further necessitates interventions in improving performance of canal system.

4.7 Biological Environment

The vast central portion of the Gangetic plains is the most fertile part of the State. Over 80 % of the area is devoted to agriculture. It is served by a vast network of canals. This has also been the cause of large parts of area, adjoining the canals turning saline and alkaline due to water logging caused by seepage from the canals. Climatic & soil conditions create a unique biological environment in the state.

The State of Uttar Pradesh has been broadly categorized into three major eco-zones depending upon the forest and vegetation types: (a) Terai region; (b) Gangetic plain (West and East Uttar Pradesh) and (c) Bundelkhand of Uttar Pradesh including Vindhyan ranges. LGC & Haidergarh project area falls in Gangetic plains.

4.7.1 Gangetic Plains

Most of the Gangetic Plains have been under cultivation since time immemorial. The vegetation is generally of tropical dry deciduous type with degraded to open scrub jungles. Some area in the western part falls under the Siwalik zone near Saharanpur, which represent a characteristic vegetation dominated by Sal forest in association with *Anogeissus latifolia*, *Terminalia tomentosa*, *Haldinia cordifolia*, *Mallotus philipensis*, *Litsea glutinosa*, and *Phoebe lanceolata*. The common shrubs and herbs are *Colebrookia oppositifolia*, *Murraya koenigii*, *Woodfordia fruticosa*, and *Thysanolaena maxima*. The forests and other vegetation of the Gangetic plains can be described as follows:

Sal forests: Sal is scattered throughout the western to eastern part of the State but in very low densities, the common associates are *Lagerstroemia parviflora*, *Miliusa velutina*, *Cassia fistula*, *Semecarpus anacardium*, *Buchanania latifolia*, *Kydia calycina*, *Diospyros tomentosa* and *Dillenia pentagyna* with common climbers like *Bauhinia vahlii*, *Milletia extensa*, *Acacia pennata*, *Porana paniculata*, etc. The shrubby elements are *Clerodendrum viscosum*, *Croton oblongifolium*, *Flemingia chappar*, *Murraya koenigii* and *Ardisia solanacea*. **Mixed forests:** These are characterized by number of species, which vary from place to place depending upon the local factors. They pass into drier types of forests on one hand and to Sal forest on other. Common species are *Bombax ceiba*, *Lagerstroemia parviflora*, *Emblica officinalis*, *Pterocarpus marsupium*, *Sterculia urens*, *Holarrhena antidysenterica* and *Anogeissus latifolia*. **Mixed deciduous forests:** A characteristic type of mixed forest in Gangetic Plains commonly comprises of *Terminalia tomentosa*, *Cordia myxa*, *Dalbergia latifolia*, *Acacia catechu*, *Madhuca longifolia*, *Diospyros tomentosa*, *Schrebera swietenoides*, *Albizia lebbek*, *Flacourtia indica* and *Lanea coramandelic*, *Dendrocalamus strictus* is common bamboo often occurs in patches. **Dry thorn forests:** The common species of these forests are *Ziziphus xylocarpus*, *Z. mauritiana*, *Z. mummularia*, *Butea monosperma*, *Calotropis procera*, *Prosopis spicigera*, *Capparis aphylla*, *Balanites roxburghii*, etc. **Swamp forests:** Confined in water logged swampy areas, the forest exhibits diversity in composition of the species with the degree of water logging. The characteristic species are *Syzygium cumini*, *Trewia nudiflora*, *Drypetes roxburghii*, *Bischofia javanica*, *Terminalis arjuna*, *Trema orientalis* and *Albizia procera*. Along the edges of water *Salix tetrasperma*, *Barringtonia acutangula* and shrubs like *Daedalacanthus nervosus*, *Ficus heterophylla* and *Ardisia solanacea* are frequent *Rosa involucreta* is sometimes found in open grassy swamps.

4.7.2 Forests Cover

Forest cover map of Uttar Pradesh is given in **Figure 4.9**.

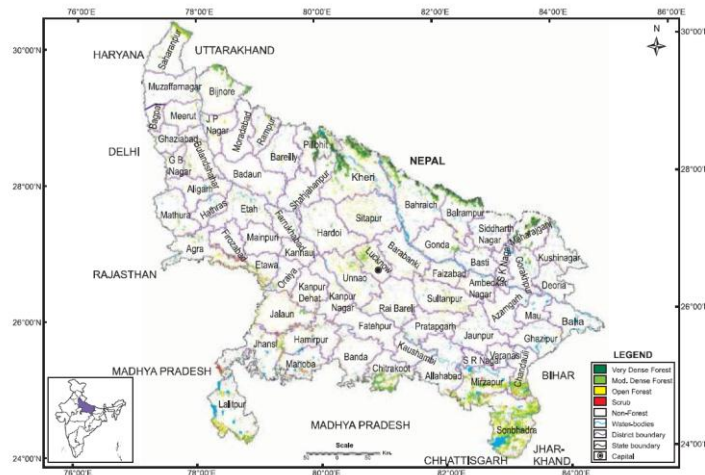


Figure 4.9: Forest cover map of Uttar Pradesh

Source: State Forest Report, Forest Survey of India, 2011

District – Forest cover in different canopy density classes and scrub found in districts falling in Lower Ganga Canal area is given in **Table 4.8**.

Table 4.8: District-wise Forest Cover in Lower Ganga Canal (Area in Km²)

District LGC/SSC	Geographical Area	2011 Assessment				Percent of GA	Change	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Etah	4,446	0	9	90	99	2.23	0	0
Etawah	2,311	0	44	142	186	8.05	0	42
Farrukhabad	2,181	0	13	33	46	2.53	0	0
Fatehpur	4,152	0	7	38	45	1.08	0	14
Firozabad	2,316	0	4	43	47	1.99	0	26
Kannauj	2,093	0	0	28	28	1.34	0	0
Kanpur Nagar & Dehat	6,176	0	12	97	109	1.76	0	37
Kaushambi	2,124	0	7	20	27	1.27	0	0
Mainpuri	2,760	0	1	13	14	0.51	0	0
Oraiya	2,015	0	8	61	69	3.42	0	11
Kasganj*	-	-	-	-	-	-	-	-

Source: State Forest Report, Forest Survey of India, 2011

*Disaggregated forest cover data (as given in State Forest Report of FSI, 2011) Kasganj is not available. No change in forest cover has been assessed in SFR 2011 as against assessment in SFR 2009 in LGC area.

District – Forest cover in different canopy density classes and scrub found in districts falling in Haidergarh branch area are given in **Table 4.9**.

Table 4.9: District-wise Forest Cover in Haidergarh Branch Area

(Area in Km²)

District LGC/SSC	Geographical Area	2011 Assessment				Percent of GA	Change	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Barabanki	4,402	0	4	79	83	1.89	0	2

District LGC/SSC	Geographical Area	2011 Assessment				Percent of GA	Change	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
Raebareli	4609	0	5	93	98	2.13	0	1
Amethi*	-	-	-	-	-	-	-	-

Source: State Forest Report, Forest Survey of India, 2011

*Disaggregated forest cover data (as given in State Forest Report of FSI, 2011) for two districts namely Amethi is not available. Amethi (Chatrapati Sahu Nagar) in SSC was carved out from Faizabad district. No change in forest cover has been assessed in SFR 2011 as against assessment in SFR 2009 in SSC area.

4.7.3 Flora and Fauna (including fisheries) reported in LGC and Haidergarh

LGC: Flora: The major trees found in the region are *Syzygium cumini* (Jamun), *Shorea robusta* (Sal, shaku), *Dalbergia sissoo* (Sheesham), *Ficus religiosa* (Peepal), *Albizia lebbeck* (Siris), etc. Fauna: faunal species includes 21 mammals, 38 bird species, 17 reptiles and 18 species of fish. Mammal: The most common mammals found in the basin are *Presbytis entellus* (Langur), *Canis aureus* (Gidar), *Boselaphus tragocamelus* (Nilgai), *Macaca mulatta* (Bandar), *Felis viverrina* (Fishing cat), etc. Avi Fauna: There are around 38 bird species in SSCA distributed in the district forest and wetland area of the basin. Some of the most common species are *Pavo cristatus* (Mor), *Columba livia* (Kabootar), *C. macrorhynchos* (Jangli kouwa), *Pycnonotus cafer* (Bulbul), *Acridotheres fuscus* (Jangli maina), *Grus antigone* (Saras), etc, found in district. Fish Fauna: Rohu, *Claxias batrachus* (Mangur), *Catla catla* (Katla), *Channa striatus* (Sor), etc. are recorded.

Haidergarh: Flora: The major trees found in the region are *Syzygium cumini* (Jamun), *Shorea robusta* (Sal, shaku), *dalbergia sissoo* (Sheesham), *Ficus religiosa* (Peepal), *Albizia lebbeck* (Siris), etc. Fauna: Inventory of faunal species includes 21 mammals, 38 bird species, 17 reptiles and 18 species of fish. Mammalian Fauna: Haidergarh Branch Command Area is home for 21 mammals. The most common mammals found in the area are *Presbytis Entellus* (Langur), *Canis aureus* (Gidar), *Boselaphus tragocamelus* (Nilgai), *Macaca mulatta* (Bandar), *Felis viverrina* (Fishing cat). Avi Fauna: There are around 38 bird species in SSCA distributed in the district forest and wetlands. Some of the most common avis are *Pavo cristatus* (Mor), *Columba livia* (Kabootar), *C. macrorhynchos* (Jangli kouwa), *Pycnonotus cafer* (Bulbul), *Acridotheres fuscus* (Jangli maina), *Grus antigone* (Saras), are recorded. Fish Fauna: A huge diversity of fish fauna is found in the SSCA. Most of them are edible. Some important species are Rohu, *Claxias batrachus* (Mangur), *Catla catla* (Katla), *Channa striatus* (Sor). Endemic plant species: *Hemarthria hamiltoniana* Steud. is reported from Upper Gangetic Plain.

4.7.4 Wetland ecosystems (Ponds and lakes)

Uttar Pradesh consists of vast extent of water resources. As such, there are 2508 wetlands in the State of which 1193 are larger than 56.25 ha. The area covered by these wetlands is 328689 ha in post monsoon and 266731.61 ha in pre-monsoon. The wetlands in U.P. occur mainly in the vast Gangetic plains. Of these, twenty-five wetlands have been identified as fragile ecosystems. Many of these are the part of Wildlife Sanctuary. The wetlands can be broadly classified into the Lentic (Stagnant) and the Lotic (Running water) categories.

The two major river systems of the State, the Ganga and the Yamuna originating from the Himalaya give rise to numerous tributaries before entering the plains of U.P. The floodwater lakes and reservoirs of the entire Terai region have been largely converted to cultivation.

Deforestation of this region has reduced the water absorption capacity of the soil. Construction of roads, railway tracks, embankments and link roads without proper drainage systems has created the problem of water logging resulting in the formation of several artificial wetlands in addition to the already existing natural wetlands. Further, the creation of irrigation canals, tanks, dams, reservoirs, etc. has also increased the number of artificial wetlands across the State. The primary purpose of these wetlands is to provide local people with water for irrigation and domestic purposes and to produce hydroelectric power. However, in course of time, they have begun to attract wildlife as well, and therefore their conservation value has increased. These wetlands, however, are now vulnerable to degradation and ecological deterioration resulting from human population pressures and related increases in the demand for natural resources.

Wetlands have been identified and on the basis of diverse criteria. Sites falling in LGC and Haidergarh are described below in Table 4.10.

(i) Sarus Crane sites: From the perspective of Sarus Crane population, the important wetland districts in Uttar Pradesh are Etawah and Etah.

(ii) Important Bird Areas Programme: Important Bird Areas (IBAs) programme lists 25 Conformed important bird. Of the Conformed IBAs, the non- PA wetlands include Kurra-Saman, Latwah (Etawah/Manipur) and amongst the additional sites the non-PAs include Narora reservoir (Bulandshahr/Budaun).

District wise wetlands falling in LGC and Haidergarh area is given in Table 4.10.

Table 4.10: District wise wetlands falling in LGCA

Sr. No.	District	Geographic Area	Wetland Area	% of total wetland area	% of district geographic area
LGC (sq. km)			(ha)		
1.	Auraiya	2015	7148	0.58	3.55
2.	Etah	2486	5204	0.42	2.09
3.	Etawah	2311	10946	0.88	4.74
4.	Farrukhabad	2181	22309	1.80	10.23
5.	Fatehpur	4152	20432	1.64	4.92
6.	Firozabad	2361	3695	0.30	1.57
7.	Kannauj	2093	8190	0.66	3.91
8.	Kanpur	3021	11603	0.93	3.84
9.	Kanpur (Nagar)	3155	14770	1.19	4.68
10.	Kasganj	1960	15237	1.23	7.77
11.	Kaushambi	2124	9485	0.76	4.47
12.	Mainpuri	2760	12887	1.04	4.67
23 Down Haidergarh Branch (sq. km)					
1.	Barabanki	4402	27290	2.20	6.20
2.	Raebareli	4609	38522	3.10	8.36
3.	Amethi*				

Source: National Wetland Atlas: Uttar Pradesh, SAC/RESA/AFEG/NWIA/ATLAS/12/2010, Space Applications Centre, ISRO, Ahmedabad, India, 372p.

In LGC, Farrukhabad district has the largest area under wetlands (22309 ha) and Firozabad has the lowest (3695 ha). Raebareli district has the largest area under wetlands (38522 ha).

Wetland statistics followed by wetland map and for each district falling in LGC and Haidergarh area are given to understand the distribution pattern and density of wetlands in the district. District-wise wetland details are given below.

Sr. No.	Wetland Category	Number of Wetlands	Total Wetland Area	% of wetland area	Open Water	
					Post-monsoon Area	Pre-monsoon Area
Inland Wetlands - Natural						
1	Lakes/Ponds	50	2246	17.43	1044	462
2	Ox-bow lakes/ Cut-off meanders	27	914	7.09	263	215
3	High altitude wetlands	-	-	-	-	-
4	Riverine wetlands	4	80	0.62	10	10
5	Waterlogged	33	558	4.33	198	91
6	River/Stream	82	1861	14.44	1852	1424
Inland Wetlands -Man-made						
7	Reservoirs/Barrages	-	-	-	-	-
8	Tanks/Ponds	52	444	3.45	219	226
9	Waterlogged	241	6190	48.03	3195	764
10	Salt pans	-	-	-	-	-
Sub-Total		490	12293	95.39	6781	3192
Wetlands (<2.25 ha), mainly Tanks		594	594	4.61	-	-
Total		1084	12887	100.00	6781	3192
Area under Aquatic Vegetation					5491	1431
Area under turbidity levels						
Low					2769	1181
Moderate					4002	1870
High					10	141

Source: Wetland Atlas Uttar Pradesh, 2011

Source: National Wetland Atlas: Uttar Pradesh, SAC/RESA/AFEG/NWIA/ATLAS/12/2010, Space Applications Centre, ISRO, Ahmedabad, India, 372p.

Project interventions in Lower Ganga Canal and Haidergarh branch have been planned in order to restore to their original design capacity. Environmental & social impacts both during construction and operation phase due to project interventions have been identified and described in Chapter 6.

Canal rehabilitation would improve irrigation service delivery and reduce seepage and water loss. This could adversely impact formation of seasonal small and nondescript wetlands that provide localized habitats for amphibians and birds (waders, kingfishers and bee eaters). A detailed Environment Management Plan, provisions for Biodiversity Offset Plans and special studies have been prepared to avoid and mitigate impacts.

Protected areas: 5 protected areas (PA) are reported to occur in LGC and Haidergarh area. A detail of PA's is given in Table 4.11 and shown in Figure 4.10.

Table 4.11: Protected Areas in Lower Ganga Canal & Haidergarh Area

Name of PA	Date of establishment	Area (Km ²)	District	Distance from Nearest Drainage System (Aerial Distance)
Wildlife sanctuaries				
1 Chambal	20-01-79	635	Etawah	Outside Project Area
1 Saman		5	Mainpuri	Inside Project Area
2 Patna	22-09-90	1.08	Etah	Outside Project Area
3 Lakh Bahoshi	21-03-88	80	Kannauj	Inside Project Area
5. Samaspur	10-08-87	8	Raebareli	Outside Project Area

Source: Protected areas in Uttar Pradesh, National Biodiversity Strategy and Action Plan, Uttar Pradesh, 2002

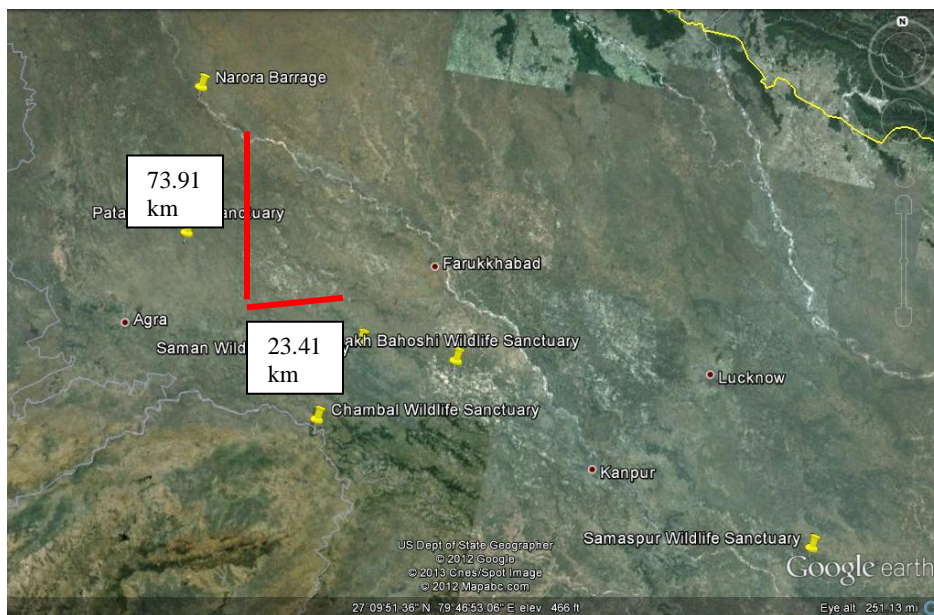


Figure 4.10: Interventions

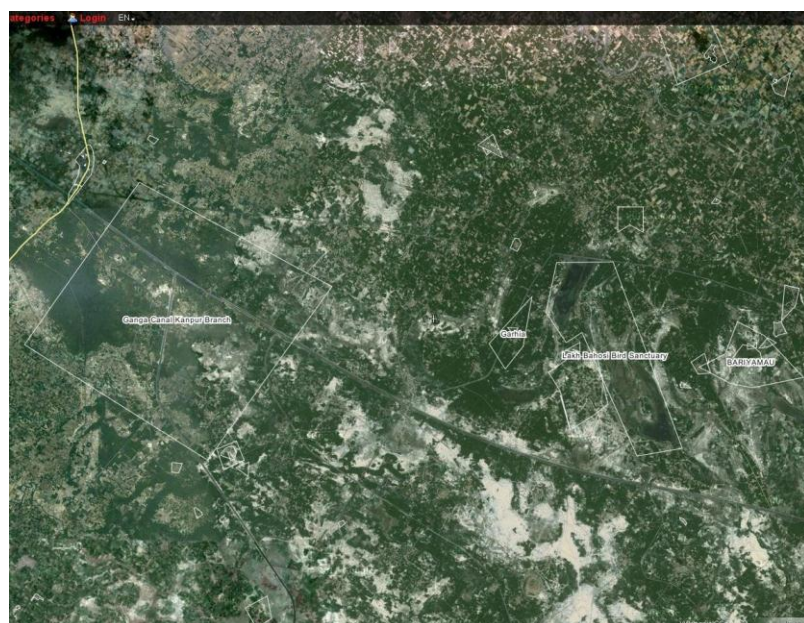


Figure 4.11: Location of Lakh Bahoshi Wildlife sanctuary

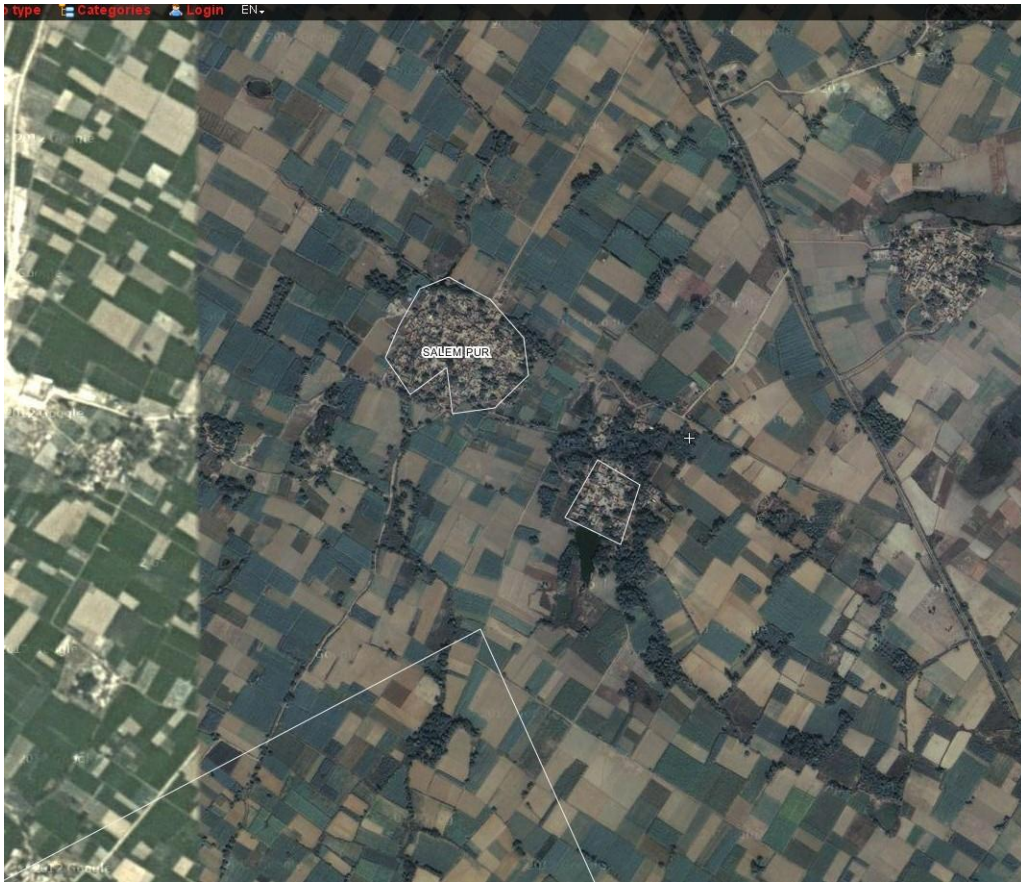


Figure 4.12: Location of Saman Wildlife sanctuary

Chambal, Patna, and Samaspur Wildlife sanctuary are located outside project area as shown in Figure 4.10. Lakh Bahoshi & Saman wildlife sanctuary are located inside LGC project boundary as shown in Figure 4.11 & Figure 4.12. Lakh Bahoshi wildlife sanctuary is located more than one km away (aerial) from project intervention area of Ganga Canal Kanpur branch. Similarly, Saman Wildlife sanctuary is located more than two km (aerial) from the project intervention area.

Chapter 5: Stakeholder Consultation & Summary of Issues

5.0 Introduction

Consultation with relevant stakeholders had been an important component of the social and environmental assessment exercise to obtain the perceptions and views of the stakeholders on social and environmental concerns pertaining to the local areas. The objective of stakeholder consultation was to identify environmental & social issues, impacts, and options to minimize potential negative impacts. The views held by the stakeholders were analyzed and are presented in this chapter.

Stakeholders were consulted through focus group discussions (FGD held) at the District level which were organized by district Chief Development Officers (CDO) and concerned Divisional Executive Engineer, Irrigation Department.

The focused group discussions were carried out between 03rd September 2012 and 13th September, 2012 in all districts of Lower Ganga Canal System and Haidergarh Branch System at district headquarter and irrigation division. All district level line department officers were invited by CDO and Executive Engineer for FGD. 15 focus group discussions were organized in all Districts and attended by 17 senior officials of different departments including Irrigation, Jal Nigam, District Development Office, PWD, Health, Forest, Minor Irrigation and Blocks. Participants to the FGD were mostly senior officials of different Departments, including Irrigation, Jal Nigam, regional office of UP Pollution Control Board district Development Office, PWD, Health, Forest, Minor Irrigation and Blocks.

Discussions with farmers groups were organized in two to three villages in each of the Districts during the same period as that of FGD (September 2012). Farmers were asked about problems with canal irrigation, agriculture, horticulture, changes in cropping pattern, and job availability locally including MNREGA. UPID revenue staff informed the farmers about the organization of these meetings.

The methodology followed in these consultation workshops is given below.

- Inviting the key stakeholders to the workshops
- Circulation of FGD Guide for these workshops among the participants prior to workshop.
- Motivating and encouraging interactions and deliberations on pertinent issues
- Eliciting feedback and responses from the participants and recording them
- Identification of ways and means to identify Environmental & Social issues, options & resolve conflicts, if any, between stakeholder groups.
- Consultations at the village level were carried out through a checklist.

The stakeholder consultations accordingly did provide an overview of the above issues and their relative importance. They have also provided insights into the complexity and diversity of interests, which were taken into account while planning for an effective ESMF. District wise details of focused group discussion are given in **Table 5.1**.

Table 5.1: District wise dates of Focused Group Discussion

Sl. No.	Date of FGD	District	Venue
LGC			
1	03.09.2012	Kasganj	Nagar Palika Bhawan, Kasganj
2	04.09.2012	Etah	Tehsil office, Etah
3	05.09.2012	Firozabad	Meeting Hall, Collectorate, Firozabad
4	07.09.2012	Fatehpur	Vikas Bhawan Meeting Hall, Fatehpur
5	08.09.2012	Kaushambi	Assistant Engineer, Irrigation Office, Kaushambi
6	10.09.2012	Kanpur Nagar	Vikas Bhawan Hall, Kanpur Nagar
7	10.09.2012	Kannauj	Vikas Bhawan, Kananuj
8	11.09.2012	Kanpur Dehat	Meeting Hall, Collectorate Kanpur Dehat
9	11.09.2012	Farrukhabad	Vikas Bhawan, Farrukhabad
10	12.09.2012	Auraiya	Meeting Hall, Collectorate, Auraiya
11	12.09.2012	Etawah	Meeting Hall, CDO office, Etawah
12	13.09.2012	Mainpuri	Vikas Bhawan, Mainpuri
23 down Haidergarh Branch Area			
1.	03.09.2012	Raebareli	Bachat Bhawan, Meeting Hall, Collectorate, Raebareli
3.	04.09.2012	Amethi	Meeting Hall, Collectorate, Raebareli
4.	05.09.2012	Barabanki	DRDA, Hall Barabanki

Significant Findings of focused group discussion related to agriculture / horticulture & irrigation system & health are given below. The description of findings in each district is given in **Annexure 5.1**.

5.1 Major findings from focus group discussions

LGC

a. Agriculture

- Main crops in Rabi were wheat and Mustard and in Kharif, Paddy, Jowar and Arhar.
- Indigenous variety seed are giving way to hybrid varieties particularly in Kannauj and Fatehpur.
- Potato, maize and groundnut are major crops in Farrukhabad and Kannauj. Due to water scarcity and inadequate marketing facilities, Sunflower, which was a major crop in these districts has been replaced by maize.
- Farmers lack knowledge about use of right kind of seed and fertilizers.
- Farmers were generally using HYV seed. Some were using hybrid seed in Fatehpur and Kannauj but procurement centres were not purchasing hybrid paddy.
- If canal water is supplied timely and adequately, there is a possibility of increase in sown area of paddy by 25000 Ha in Kaushambi and 10000 Ha in Fatehpur. Productivity of Paddy & wheat may increase by 3-4 Qtl/Ha in Fatehpur and Kaushambi). 10% sown area and 5% increase in productivity was estimated in Kanpur Nagar. Wheat area may increase by 5000 Ha, Paddy 4000 Ha and Maize 4000 Ha. Productivity Increase 3-5 Qtl/Ha in ditrict Auraiya in such situation.
- Decline in productivity due to non availability of water and fertilizer on time in district Etah was reported.

- Due to non availability of canal water, Paddy sowing has seriously declined in Kanpur Dehat and 12 Rice mills have been closed.
- Crop spoilage by wild animals was recorded in district Kasganj & Firozabad.
- Wheat area increased by 5000 Ha, Paddy 4000 Ha and Maize 4000 Ha. Productivity Increase 3-5 Qtl/Ha in ditrict Auraiya.
- Due to very high increase in price of DAP, farmers were using more urea.

b. Horticulture

- Area under horticulture is increasing – Mango, Lemon, Guvava, Amla and Banana, Ash Gourd are giving higher return.
- Banana and chillies are now popular and tissue cultured Banana are available to farmers.
- Due to poor rains and depleting ground water table many farmers engaged in horticulture were adopting drip irrigation and sprinkler system particularly in Etawah and Kaushambi.
- Due to shortage of agri labour, mostly educated farmers were shifting from traditional crops to horticulture.
- Chillies and garlic are main spices that are sown. Coriander, Turmeric are more popular in district Fatehpur.
- No problems in marketing of horticulture produce.
- Potato cultivation is high in Firozabad, Farrukhabad and Kannauj.

c. Irrigation System

- Canal cutting / blocking is common in all districts. Action is not taken in all cases due to lack of evidence about offenders and fear of reapraisal. In some case Tawan (penalty) is recovered and cases under canal Act are filed.
- Water in many tail end minors was not reaching or highly insufficient for required number of watering for crops. Thus, dependence on private tubewells or rains increase.
- In district Etah ground water was reportedly contaminated at many places.
- Desilting of canals is not uniform in all districts, in some it is done once a year and in other twice, i.e before Rabi and Kharif.
- More than one-third public tubewells in district Fatehpur were non-functional, either failed or due to depleting ground water level, which was on an average about 40 meter.
- Canal water at most of the places was not available timely, even if roster system was in operation.
- At most of the places outlets were damaged/ tampered.
- In district Kaushambi Kishanpur pump canal depend on power supply. Due to serious shortage of power water was not reaching in about one- fourth of minors and only about half of number of pumps were working.
- In Fatehpur canal, water in 19 out of 25 tail end minors was not reaching.
- WUAs in LGC area have not been formed.
- Major source of irrigation was private tubewells in all districts.
- Canal seepage was reported in district Aurraiya and Kasganj leading to sodicity and salinity.
- Poor/no drainage system in rural area due which water logging is common.
- Awareness about conjunctive use of water was lacking among farmers.

Employment and Migration

- Shortage of agricultural labour was reported particularly in district Kanpur Dehat, Fatehpur and Kannauj due to migration of labour and also availability of work under MNREGA.

- Wages for agricultural work have increased significantly in almost all districts due to non-agricultural work available under MNREGA, despite the fact that under this programme wages were not paid in time.

Health

- Common water borne disease in LGC districts include: Diarrhoea, Cholera, Dysentery, Viral fever, Gastro-entritis, Viral Hepatitis A and C, and Typhoid.
- Vector borne disease include: Filaria, Dengue, Chikangunia, Fluorosis (Fatehpur), and Malaria.
- About 8-10 cases per month of HIV positive in Kanpur Dehat were reported but AIDS cases are not identified.
- In most of the case drinking water from India Mark-II handpumps was used in villages. In some, however, water from tubwell and well was also used.

Forest and Wetland/ Ponds

- Forest cover in most of the districts was nominal.
- Almost every village has ponds but production of fish in most of the districts was limited to local consumption.
- Villagers using forest wood as a source of energy for cooking.
- Low plantation in side of canal due to excessive seepage and lack of plantation patches. The common plan species are grown in canal lining are Vilaiti babul, Sesame, jamun, Arjun, etc.
- The person belongs to marginal and landless categories were engaged in fish culture activity.
- The major varieties of fish are Rohu, Katla, Mirgul, etc.
- There is no government and private hatchery in district Farrukhabad.
- Siltation and reduction of water holding capacity in ponds was major problem. The production of fish and water holding capacity will be increased by making new ponds and desilting of existing ponds/wetlands under MNREGA schemes.

Animal Husbandry

- The quality of milch cattles in almost all districts was average graded. About half of the milk was sold in some districts to procurement centres of milk societies while in the remaining districts it was sold locally.
- There were 14 small milk chilling centres in Fatehpur and 3 in Kaushambi but the sale of milk was mostly local.
- Marketing problem of milk or milk produce is a major issue.
- Fodder availability has serious problem in district Fatehpur, Kannauj and Auraiya.
- Diseases among livestock include: Galghotu, mouth and foot disease, Wooden tong and lumpy jaw disease, worm infestation Parasite infection, Tick Born disease, Sporadic bacterial and urinary infection.

23 Down Haidergarh Branch

Rae Bareli

The discussion yielded the following information about the conditions in the district:

Agriculture: About 90% of the farmers in the district are marginal and small. Marginal farmers do not get sufficient quantum of work in off-season. The farmers also face the erratic electricity

supply. There is no roaster of electricity supply. Input cost of cultivation is increasing. The cost of seed, fertilizer, labour and implement use is increasing, making farming less remunerative. For example, the cost of DAP has tripled during the past 2 years. There is a change in cropping pattern. The area under Mentha is presently 15000 ha, which is likely to increase to 30000 Ha in 2013. Mentha is irrigated both by canal and TW. Some areas under rice – wheat cropping sequence are being replaced by rice-mustard-mentha (3 crop system). Net sown area in the district is 1.82 lac ha and Gross sown area is 3.22 lac ha. 1.51 lakh ha, in Rabi and 1.21 Lakh ha in Kharif and about 35,000 ha in Zaid. Productivity of rice is 22.5 q/ha (paddy 33.75 q/ha). Productivity of wheat is 28 q/ha. About 6% increase in sown area in Rabi is possible if canal water is supplied adequately and timely and in such condition, about 3-4% increase in yield in both Rabi and Kharif is expected. Marketing of grains is through procurement centres but all the produce is not purchased by procurement centres. Hence, farmers may have to sell their produce to local traders at cheaper rate than MSP. MSP is available only for paddy and wheat. Soil testing lab exists in the district. Rs. 7 per soil sample testing charge is for NPK and Rs. 30 for micronutrient analysis. Soil health card has been issued to farmers to help them get fertilizer. Bio fertilizers are also being used by the farmers.

Horticulture: Area under banana is 200 ha, which is being increased through government efforts in Horticulture Mission. Chillies in Sataon and Khirao block covers about 250-300 ha. Tomato covers about 200 ha. Among floriculture species, gladiolus and marigold are prominent and cover about 20 ha. Tulsi covers about 60-70 ha. Under National Horticulture Mission, citrus, mango and aonla are also being promoted. Tissue cultured banana are available to farmers. Problem of non-availability of processing facility exists in horticultural crops, especially in tomato and chillies. Marketing facility is local as well as in Kanpur for the farmers engaged in horticultural crops. There is no price regulation and the farmers have to sell their produce at a very cheap rate, eg. Chillies are purchased @ Rs. 3-4 per kg at the farmgate. Similar is the case with hybrid tomato. Processing units need to be established in the district so that the farmers can get a good price of tomato, chillies, etc. There are 14 cold storage facility in the district.

Irrigation: Canal length is 1500 km in the districts. TW Government.-273, Private (Electric)-7547, Private (Diesel) pump sets-53425, Medium TWs-2271. Problem in Dalmau Pump Canal command is that it is dependent on electricity (flow is not by gravity). Due to erratic electricity supply, areas in Lalganj, Sareni and Khirao blocks are affected due to low canal water availability. Canal cutting- approx. 100 cases per year are reported. Cases are filed under Canal Act. Total irrigated area-157,000 ha, of which 64000 ha from canal, 93000 ha from TW, and pumpsets. About 25000 ha area is rainfed. There are no ponds which are used for irrigation.

Ground water: Sareni block has been declared as critical in terms of ground water exploitation (pre-monsoon water level 74.03 m bgl, post-monsoon 79.96 m bgl). Khirao and Rahi blocks are in semi-critical category. Pre-monsoon water level 45.45 m bgl and post- 38.69m in Khirao block. In Rahi block, pre- and post- water levels are 13.52 and 23.49 m bgl. Remaining blocks are in safe category for GW.

Waterlogging: Along the main feeder, waterlogging is prevalent on both sides of the canal affecting 500 to 600 ha area.

Wetlands: There is no large wetlands in the district.

Ponds & Fisheries: There are 12,445 ponds in the district, covering 10,462 ha area. These ponds are of 0.1 to 30 ha area. About 7400 ponds are of 0.2 ha or more area. Total fish production is about 5500 t/ year. Productivity is 35 q/ha/yr. Both Indian major carps and other carps are taken. Marketing is no problem, and is done locally and to Lucknow.

Problems: Only 17% ponds are productive as the remaining ponds are left out due to non-leasing by Revenue Department Lease is given on 1250 ha area whereas 7400 ha area is economically viable. Ponds are leased to the community. Fisherman and SC/ST of the village get the lease.

Dairy: Milk production is 50,000 litres/day, both under Mother Dairy and Milk Co-operative. Processing units are available. The rate of milk in rural area is Rs. 20 /litre and is bought @ Rs. 24-28 /litre by the Co-operative sector.

Animal Husbandary: There are 30 veterinary Hospitals and 57 AI centres. Due to less number of LEOs, 45 AI centres are functional. 15 centres of BAIF support AI activities and are doing good work. Green fodder, like- Jowar and Berseem is available.

Barabanki

The discussion yielded the following information about the conditions in the District:

1. Agriculture: Net sown area in Kharif 1,96,253 Ha.
Rabi 1,99,816 Ha.
Zaid 1,23,943 Ha.
2. Productivity of Major crops:
Wheat 32.52 Qt/ Ha.
Barely 22.39 Qt/ Ha.
Gram 10.90 Qt/ Ha.
Maize 30.00 Qt/ Ha.
Rape seed/Mustard 10.41 Qt/ Ha.
Paddy 27.35 Qt/ Ha.

3. Crop Diversification: Area of the following crops increased.

Crops	Area under Crops (Ha)	Replaced Crops
1. Rapeseeds	35,100	Wheat
2. Mentha	91,820	Urad/Moong
3. Banana	500	Paddy, Wheat
4. Tulsi	400	Paddy/ Arhar

It was estimated that productivity of crops may increase by 5 to 10 percent in case Canal water reaches tail end. Soil testing is conducted by the Agriculture department seven places in the district.

Horticulture: Area under potato is 13,850 ha, which is increasing. Tomato area is 3785 ha which is also increasing. Area under green peas, brinjal and cauliflower is reducing. Among floriculture species, gladiolus and gerbera are being introduced in Ramnagar area through National Horticulture Mission. Green chillies and garlic are prominent among spices. Due to the

problem of water logging, ginger etc. are not taken. Among fruits, area under banana (609 ha) has increased. Tissue cultured banana are available to farmers, which are being supplied by Sheel Biotech, Gurgaon, M/s H. U. Gugle, Bangalore and TRRI, New Delhi and others. Mango covers 12170 ha; prominent varieties include Dusehri, Langra and Chausa. Guava orchard covers 184 ha Mentha covers a significant area (75850 ha). Problem of marketing of fruits and vegetables like banana, mango and tomato does not exist as there is a ready market at Lucknow. Subsidy on micro-irrigation facility is limited to 60% to marginal and small farmers and 50% to others, which does not seem to attract many farmers.

Irrigation: The canal length is 1100 km in the district. 75% of CCA is actually irrigated in kharif and 52 % in rabi. Due to head reach, silting in canals is more in this district. Desilting is done only once in a year, which is not sufficient.

21 out of 251 canal minors 21 are not able to supply water at the tail end. The problem is mainly in Sidhaur, Bani and Ramsanehighat blocks. Incidence of canal cutting is increasing. FIRs are registered against this.

- Canal operating efficiency was reportedly 72%.
- There is problem of seepage in Daryabad Branch canal and area affected at right bank was 11180 Ha and at left bank 8550 Ha.
- Condition of outlets was reportedly not satisfactory.
- There was no WUAs in the district.
- 100% revenue collection is done.

Minor Irrigation: The total number of shallow TWs are 103266, of which 2772 are electricity operated, 98,898 are diesel operated and 1596 are from other sources. Due to availability of ground water, shallow and medium deep private TWs are very common. Allocation of boring expenses to MI department. in the case of Shallow boring (less than 30 m bore depth) is Rs. 5000 to small farmers, Rs. 7000 to marginal farmers and Rs. 10,000 to SC/ST farmers. The additional cost, if any, has to be borne by the farmers. A subsidy on purchase of pump sets is provided @ Rs. 2800 to small, 3750 to marginal and 5650 to SC/ST farmers by the Government. For medium deep (30-60m deep) boring, farmers have to deposit Rs. 1500 as the cost of Resistivity survey. The Minor Irrigation Department bears 50% cost of boring, pump house, sump house and drain and the remaining 50% cost is to be borne by the farmer. In the year 2012-13, 6400 borings are proposed on small and marginal farmers land (General and OBC), and 2400 on SC/ ST farmers.

Ponds & Fisheries: There are 8961 ponds in the district, covering 6220 ha area. These ponds are mainly community - owned, 22 ponds are under private ownership, covering 14 ha area. In addition, there are 49 jhils, covering 415 ha area. Only 3 jhils are with Fisheries Department and are used for seed stock and production; remaining are under private ownership. Productivity of fish is 29.5 q /ha/yr. Both Indian major carps (Rohu, Katla and Mrigal) and other carps (silver, grass and common) are taken. Marketing is no problem, and is done locally and to Lucknow.

Problems: Use of TW water for fish ponds proves costly. Irrigation Department may provide canal water to fish ponds which will work out to be cheaper.

Dairy: Milk production is low. The average milk production as per survey by A.H. Department in 2008-09 for milch cow was 1.62 litres/day, and 2.55 litres /day for buffalo. Processing units

are available. One unit of PCDF and one private dairy (Devasheesh) is available, apart from one collecting and chilling centre.

Animal Husbandry: There are 36 veterinary Hospitals and one Mobile unit. There are 102 A.I. centres. There is a scarcity of green fodder due to increase in Mentha, Banana and Tomato area. Berseem is grown but the supply is not sufficient. Harvesting of rice and wheat by combines has also affected the availability of dry fodder. Common cattle health problem includes worm infestation and seasonal illness. Vaccination is done by the Department Trace element / micronutrient deficiency, and sterility are the problems.

Amethi

The discussion yielded the following information about the conditions in the district:

Agriculture: Net Sown Area in Kharif	: 1.52 Lakh Ha
Net Sown Area in Rabi	: 1.36 Lakh Ha
Net Sown Area in Zaid	: 0.12 Lakh Ha
Productivity of Wheat	: 24.0 Qtl./Ha
Rice	: 22.7 Qtl./Ha
Arhar	: 10.2 Qtl./Ha

No new crops are sown. In case Canal water is supplied adequately and timely increase in sown area may be marginal. Crop production may increase significantly i.e. upto about 10% if canal water is supplied adequately and timely. There is problem of salinity in Amethi Tenshil and about 5000 Ha area is affected. Procurement centres do not purchase entire produce of farmers. They purchase upto their target only and the remaining produce is sold in local market at comparatively lower rates.

Irrigation: Canal Length	: 1900 Km.
Govt. Tubewells	: 410
Private including Pumpsets	: 80500

About 70% of the net sown area was irrigated. Canal water was available timely and adequately. There was no problem of tail and uses of the canal remaining unserved. Incidences of canal cutting and blocking of water by upstream users were few. Desilting of canal was done once a year. The efficiency of canal operation is about 70%. The outlets are maintained in good condition. There is no seepage problem in canals. Roaster system for canal water was operational. WUAs have been formed. No specific role of women users has been envisaged. There is no willingness of the farmers to manage water sharing and maintain canal through WUAs. Only about 10-20% of WUAs were willing to manage and collect dues from farmers. There is no problem in collection of water charges, which were collected through Tahsils. Animal Husbandry: There were 33 Veterinary hospitals, and 44 AI Centres out of which only 10 were functioning. There were about 10-15% cross breed milch cattles. The production of Milk was about 80000 Litre per day, most of which is transported outside to mother dairy and PCDF. A proposal for 9 large dairies in the district has been processed and sent to Lead bank Development Manager (NABARD). There was no milk processing units in the district. Fodder is not a problem for animals. Common diseases related to livestock include: Worm infestation, particularly in low lying and water logged areas, pneumonia in cold weather and Trypanosomes in which case animal become blind, starts circling, suffer with high fever and uneasiness. If not treated timely, dies. Major Industrial units in the district include: Indo-gulf Fertilizers Co. Ltd., Bharat Heavy Electricals Ltd., SAIL Jagdishpur Unit and Quality Packagings.

5.3 Summary of Socio-Economic and Environmental Issues in project areas

Socio-economic and environmental issues have been analyzed on the basis of secondary data and focused group discussion. The major social & environmental findings / issues identified are given in Table 5.2, Table 5.3, Table 5.4 & Table 5.5.

The project design addresses well stakeholders recommendations. Modernization and rehabilitation of irrigation and drainage systems and other project activities will result in:

- Desilting, drainage and restoration of canals.
- Lining of main channels/ canals.
- Increased water availability for command area.
- Higher irrigation intensity.
- Reduced dependence on groundwater.
- Increased opportunity in agriculture and additional income due to project.
- Increased food grain availability.
- Improving agricultural extension services
- Crop diversification to combat extreme climatic conditions.
- Improvement in drainage.
- Reduced salinity/ sodicity.
- Promote increased use of Farm Yard Manure.

The project interventions might result in increased use of fertilizer and pesticides in the command area. The project however also provides the scope for awareness building and pilot demonstration on appropriate fertilization and pest management practices. In this regard, a pest management plan has been prepared for sustainable use of pesticide (see chapter 6 and Annexure 6.1). This management plan will be implemented mostly through the Farmer Water Schools. A negative list of WHO category 1a, 1b or 11 pesticides including pesticides banned in India has been prepared and is included in Annexure 6.1 as 6.1.4.

A few of the stakeholders recommendations are outside of the project scope; these could be addressed by the national and State level programs and schemes on these topics:

- Improving forward and backward agricultural linkages
- Groundwater recharging facilities along primary and secondary channels (although groundwater management will be improved under the project).
- Additional opportunities in other sources of livelihoods.
- Improvement of road infrastructure.
- Increased water availability could improve fish production & provide additional source of livelihood.
- Drinking water supply to be provided from canal

Table 5.2: Major Social Issues / Findings Based on Secondary Data Related to Proposed Project in LGC Area

Major Social Issues	Findings in LGC System Area	Cause	Stakeholder Recommendations/ Suggestions as outcome of proposed Intervention
Low cropping intensity	All districts of the command area	Non-availability of modern agri-technology, Poor extension network; Poor availability of quality seed and Inadequate supply of canal water.	Improving agricultural extension services and forward & backward linkages which help in coverage of more sown area.
Crop Diversification	All districts of the command area	Non-availability of modern agri-technology, Poor extension network; Poor availability of quality seed.	Improving agricultural extension services and forward & backward linkages.
Imbalanced use of NPK fertilizers	All districts of the command area	Poor extension education services	Improving agricultural extension services and forward & backward linkages.
Lowering of Ground Water Level	All districts	Over exploitation of ground water; low ground water recharging facilities; Poor rain water harvesting facilities	Ground water recharging facilities along primary and secondary channels of the canal network at regular interval. Improving rain water harvesting facilities
Preventing/ reducing loss of canal water	All main channels	Loss of canal water	Lining of main channels/canals

Table 5.3: Major Social Issues/Findings based on Secondary Data Related to Proposed Project in 23 Down Haidergarh Branch

Major Social Issues	Cause	Major findings in Amethi, Barabanki and Raebareli district	Major findings in Project area	Stakeholder's Recommendations/Suggestions as outcome of Proposed Project Intervention
Agriculture & Livelihood	Good Rainfall, Sufficient availability of water, Trend of getting more crops from farm field.	An increasing trend has been observed.	An increasing trend has been observed.	Increased water availability for command area
Irrigation, infrastructure, agriculture & livelihood	Good Rainfall, major focused on this area in UPWSRP-I Phase and dense canal network, Sufficient availability of surface and ground water, Trend of getting more crops from farm field.	Increased irrigation intensity	Increased irrigation intensity	Higher water availability, therefore, higher irrigation intensity
Shift in occupational pattern & livelihood	Lower wages of agriculture labour than non-agriculture labour, Majority of farmers not getting benefits of minimum support price of agriculture produce. Fragmentation of families and buy agriculture land by marginal farmers/ landless from small and large farmers.	Changes in occupational patterns to areas other than agriculture allied activities	Increase in number of main and marginal workers	Increased opportunity in agriculture
Awareness & capacity building	Financial support by government through various schemes and programmes for education,	Increased literacy rate in the 3 districts	Increased literacy rate	Additional opportunity in agriculture and other sectors

Major Social Issues	Cause	Major findings in Amethi, Barabanki and Raebareli district	Major findings in Project area	Stakeholder's Recommendations/Suggestions as outcome of Proposed Project Intervention
	Increased awareness regarding education,			due to rising literacy
Shift in occupational pattern, livelihood & migration	Limited opportunity in agriculture, Lower wages of agriculture labour than non-agriculture labour, farmers not getting benefits of minimum support price of agriculture produce.	Decline in the number of farmers in Amethi and Barabanki but an increase Raebareli. Decrease in agricultural laborers.	Decline in the number of farmers in Amethi and Barabanki but an increase Raebareli. Decrease in agricultural laborers.	Additional opportunities in other sources of livelihood
Shift in occupational pattern, livelihood & migration	Migration for livelihood opportunities in other areas.	Decreasing SC population in Amethi and Raebareli but stagnant population in Barabanki due to migration. ST population is very nominal	Decreasing SC population due to migration ST population is very nominal	Additional opportunities in other sources of livelihood
Livelihood	Limited employment opportunities and increased population.	BPL families have increased in Barabanki and decreased in Amethi and Raebareli	BPL families are increasing as well as decreasing in the area	Additional opportunity and income due to project may keep a check on this trend
Livelihood and Food Security	Increased population and Shift in occupational patterns in district Barabanki. Increased production of agriculture produce in Raebareli district.	Trends in food availability has decreased in Barabanki district and increased in Raebareli	Increase/Decrease in per capita food grain availability	Increased agriculture productivity will ensure increased food grain availability
Connectivity to Agri market infrastructure	Government initiatives to provide better connectivity.	Increased road density	Increased road density	Road infrastructure should be improved
Livelihood	Sufficient water availability and easy access of HYV seedling and improved awareness.	Increasing reservoir fish production	Increasing reservoir fish production	Increasing water availability will improve fish production and additional source of livelihood
Water & soil contamination	Farmers tried to get more production from farm field, Easy process of procurement and application of chemical fertilizers.	Increase in consumption of fertilizers	Increase in consumption of fertilizers	Possible increased usage of fertilizers in the project

Table 5.4: Summary of Environmental Issues LGC Command Area

Major Environment Issues	Cause	Major Findings in LGC Command Area	Major Findings in Districts from FGDs	Stakeholders Recommendations / suggestions as outcome of Proposed Project Interventions
Soil Erosion in the Catchment area, which leads to silt deposition water in bodies.	Illegal cutting of forest for firewood and other uses, incidence of flood during rainy season, Lack of Warwandi and usarwandi in the system, undulating farm fields, movement of cattle's in canals, slippage of banks, erosion of bed.	Silting of LGC System	Desilting is undertaken under MNREGA, but only restricted to field drains	Desilting, drainage and restoration of canals
Decreasing Fertility of soil & increasing consumption of fertilizer	Imbalance and higher use of chemical fertilizers, At the head end of canal command area reported, reduction in Soil fertility due to sodicity/ water logging. Very low practices of soil testing.	Increasing consumption of chemical fertilizers	Increasing use of Farm Yard Manure	Promote Increased use of Farm Yard Manure
Changes in land use particularly in catchment area e.g. decreasing forest cover & diversion of land for other uses (non agriculture)	Forest cover is going to reduce due to illegal cutting of forest for firewood and other uses in some district.	Exists in command area	Occuring due to decreasing fertility level.	Project would arrest land diversification to some extent.
Extreme climatic conditions, rainfall deficiency	National phenomena due to climate change	Once in ten years	Once in ten years	Crop diversification to combat extreme conditions
Limited availability of Surface Water	Lower forest cover, insufficient natural surface water resources, topography of the local area, lack of knowledge regarding water conservation and selection of crops. Insufficient of funds for care & maintenance of surface water resources, insufficient manpower for water management and collection of water charges, Insufficient and untimely supply of canal water, Due to higher use at head & middle end and illegal cutting water does not reach tail end, lack of knowledge regarding water conservation and conjunctive use of water.	Water does not reach tail end due to seepage.	6% increase in productivity with timely availability.	Canal water should be made available
Limited availability of Ground Water	Overuse of ground water for irrigation, deficiency in rainfall, lower recharge due to topography and geological conditions of the region.	69% to 70% Ground water development.	Increasing use of ground water	Canal water should be made available
Surface & Ground Water Quality	Surface water quality was good due to higher dilution capacity of river/canals and lower presence of water polluting industries. Drinking water quality was observed above permissible limit in some part of LGC due to lower strata and geological conditions of the region. It may also be due to unscientific practices such as improper management of sewage and solid waste.	Ground water quality is of concern.	Fluoride and in certain blocks	Drinking water supply to be provided from Canal

Major Environment Issues	Cause	Major Findings in LGC Command Area	Major Findings in Districts from FGDs	Stakeholders Recommendations / suggestions as outcome of Proposed Project Interventions
Increasing dependence on ground water for irrigation in comparison to surface water.	Untimely and insufficient availability of canal water, Water not reach at tail end, Lack of awareness regarding conjunctive use of water, water conservation & integrated water resource management.	Limited availability of canal water.	Increasing dependence on ground water	Reduced dependence on ground water
Sodicity / Salinity	High ground water level at the head of canal	Land use indicates barren unculturable land.	Exists in Mainpuri & other districts at the head	Reduced salinity / sodicity
Water logging	Due to seepage, illegal cutting or damage of minor/canal	Major water logging problem was observed at the head end of canal command area.	Exists in Mainpuri & other districts at the head	Drainage should be improved

Table 5.5: Summary of Environmental Issues (Haidergarh Branch Area)

Major Environment Issues	Cause	Major Findings in 23 down Haidergarh Command Area	Major Findings in 3 Disticts	Stakeholders Recommendations / suggestions as outcome of Proposed Project Interventions
Soil Erosion in the Catchment area, which leads to silt deposition in water bodies.	Illegal cutting of forest for firewood and other uses, incidence of flood during rainy season, Lack of Warwandi and usarwandi in the system, undulating farm fields, movement of cattle's in canals, slippage of banks, erosion of bed.	Silting of Haidergarh System	Desilting is undertaken under MNREGA, but only restricted to field drains.	Desilting & drainage restoration of canals
Decreasing Fertility of soil & increasing consumption of fertilizer (Refer table 4.4 & 4.5).	Imbalance and higher use of chemical fertilizers, At the head end of canal command area reported reduction in Soil fertility due to sodicity/ water logging. Very low practices of soil testing.	Increasing consumption of chemical fertilizers	Increasing use of Farm Yard Manure	Increased use of Farm Yard Manure
Changes in land use particularly in catchment area e.g. decreasing forest cover & diversion of land for other uses (non agriculture)	Forest cover is going to reduce due to illegal cutting of forest for firewood and other uses.	Exists in command area	Occuring due to decreasing fertility level.	Project will arrest land diversification to some extent.
Extreme climatic conditions, rainfall deficiency & drought	Natural phenomena due to climae change.	Once in ten years	Once in ten years	Crop diversification to combat extreme conditions
Limited availability of Surface Water	Lower forest cover, insufficient natural surface water resources, topography of the local area, lack of knowledge regarding water conservation and selection of crops. Insufficient of funds for care & maintenance of surface water resources, insufficient manpower for water management and collection of water charges, Insufficient and untimely supply of canal water, Due to higher use at head & middle end and illegal cutting water	Water does not reach tail end due to seepage.	6% increase in productivity with timely availability.	Canal water should be made available

Major Environment Issues	Cause	Major Findings in 23 down Haidergarh Command Area	Major Findings in 3 Disticts	Stakeholders Recommendations / suggestions as outcome of Proposed Project Interventions
	does not reach tail end, lack of knowledge regarding water conservation and conjunctive use of water.			
Limited availability of Ground Water	Overuse of ground water for irrigation, deficiency in rainfall, lower recharge due to topography and geological conditions of the region.	69% to 70% Ground water development	Increasing use of ground water	Canal water should be made available
Surface & Ground Water Quality	Surface water quality was good due to higher dilution capacity of river/canals and lower presence of water polluting industries. Drinking water quality was observed above permissible limit in some part of Haidergarh due to lower strata and geological conditions of the region. It may also be due to unscientific practices such as improper management of sewage and solid waste.	Ground water quality is of concern.	Fluoride and in certain blocks	Drinking water supply to be provided from Canal
Increasing dependence on ground water for irrigation in comparison to surface water.	Untimely and insufficient availability of canal water, Water not reach at tail end, Lack of awareness regarding conjunctive use of water, water conservation & integrated water resource management.	Limited availability of canal water.	Increasing dependence on ground water	Reduced dependence on ground water
Sodicity / Salinity	High Ground water level at the head of canal.	Land use indicates barren unculturable land.	Exists in Dona Minor, Raebareli & other districts at the head	Reduced salinity / sodicity
Water logging	Due to seepage, illegal cutting or damage of minor/canal	Water losses from canals indicate water logging.	Exists in all districts at the head of canal	Improved drainage

Chapter 6: Environmental and Social Impacts and their Management and Mitigation

6.0 Introduction

A social and environmental assessment (SEA) has been carried out based on impact evaluation criteria. This assessment has informed the design of the Environmental & Social Management Framework (ESMF), which is to be implemented as part of the UPWSRP Phase II. The ESMF presented here meets the requirements of the World Bank’s OP 1.01 on Project’s Environmental Management Plan and comprises of the following elements:

- Potential Environmental and Social Impacts
- Screening
- Categorization of activities
- Environmental and Social Management Framework.

6.1 Potential Environmental and Social Impacts

The potential environmental and social impacts would largely center on the investments in irrigation service delivery. Adverse environmental impacts may arise due to certain planned activities, like disposal of silt during rehabilitation of irrigation infrastructure, construction and installation of irrigation control structures, small bridges over canals, potential increased used of agro-chemicals for increasing crop productivity etc. Adverse impacts could also arise due to poor construction quality and unsafe construction practices. A summary of component wise planned investments, their likely impacts and proposed nature of mitigation is given in Table 6.1.

Table 6.1: Identified Impacts

Component	Nature of planned investments	Potential adverse/positive impacts and intensity	Nature of mitigation
1. Strengthening of State-Level Water Institutions and Inter-Sector Coordination	Training, Exposure visit, IT Equipment, Research & Studies, HR contracting	Low & limited, health & safety Improved water resource management	Environment & Social awareness building
2. Modernization and Rehabilitation of Irrigation and Drainage Systems and Groundwater Management	Design & Survey, de-silting, canal lining, re-sectioning, control structures, bridges, weirs, sluice, measurement devices, office buildings upgrading, water storage structures (dams). Groundwater management (groundwater assessment and aquifer management plan).	Moderate to high, unsafe construction related, impacts on wetlands, local biodiversity, material handling and storage, labor camps, issues related to safety of dams etc Improved resource conservation	Negative list, screening, mitigation measures, EMP, biodiversity offsets, awareness, compensation, social best practices, labor laws, construction management, capacity building
3. Consolidation and Enhancement of Irrigation Institutional Reforms	Training & Capacity Building, equipment support (earth movers, IT etc.), awareness building, NGO contracting	Low & limited, Social cohesion, equity, transparency, participation, minor civil	Environment & Social awareness building, training, social safety nets, local governance improvement

Component	Nature of planned investments	Potential adverse/positive impacts and intensity	Nature of mitigation
		works Better resource ownership	
4. Enhancing Agriculture Productivity and On-Farm Water Management	Farmer Water Schools, Training & Capacity Building, equipment purchase (laser levelers), land leveling, irrigation equipment, soil testing, IPNM, cropping etc	Moderate to high, pesticide handling & storage, agro-chemicals, health & safety related Improved food security, water resource management, reduced pollution load	Negative list, screening, mitigation measures, EMP, Pest Management Plan, IPM/INM, Environment & Social awareness building
5. Feasibility Studies and Preparation Activities for the Next Phase	Design & survey consultancy, Research & Studies	Low & limited	Environment & Social awareness building
6. Project Coordination and Monitoring	Consultancies, Remote sensing, office equipment	Low & limited	Environment & Social awareness building

6.2 Screening

A screening exercise was carried out to delineate the potential environmental and social impacts due to the components identified in the planning stage. The screening has been carried out based on following three major parameters and eight sub parameters.

1. Adverse impact on:
 - Land Environment
 - Air Environment
 - Water Environment
 - Biological Environment
2. Nature of Impact:
 - Reversible
 - Irreversible
3. Duration
 - Temporary
 - Permanent

A negative score of more than 4 on the above mentioned eight parameters identifies the impact as significant requiring mitigation measures. A negative score of 1 to 4 identifies the impact of medium significance requiring precautionary approach. A score of 0 to 1 identifies the impact as insignificant.

6.3 Categorization of Activities /Components

Categorization of activities/components envisaged in the project has been done and shown in **Table 6.2** based on their extent of adverse environmental and social impacts. Based on Potential

environmental and social impacts associated with each activity/component, these components have been classified under three categories.

Category A: Activity/Components which have major environmental/social impacts and require specific environment management plan (EMP) for implementation of mitigation measures. This EMP is to be incorporated in the bid document and contractor/implementing agencies has to follow this during construction as well as operation.

Category B: Components which have moderate environmental and social impacts and certain precautionary measures have to be followed by the contractor and the project authorities to minimize impacts during construction as well as operation.

Category C: Components which have negligible or nil environmental and social impacts and as such no mitigation measures have been proposed for these activities.

Table 6.2: Categorization of Project Intervention

Socio - Economic Components / Activities	Category A	Category B	Category C
Component A: Strengthening of State-Level Water Institutions and Inter-Sector Coordination			
➤ Component A1: Operationalizing the State Water Regulatory Commission.			√
➤ Component A2: Strengthening the Knowledge Base and Analytical Capacity for Integrated Water Resources Management.			√
➤ Component A3: Strengthening the Water and Land Management Institute.			√
Component B: Modernization and Rehabilitation of Irrigation and Drainage Systems.			
➤ Component B1: Expansion of Irrigation and Drainage Investments.	√		
➤ Component B2: Modernization of Regulation System and Service Delivery in Phase I Areas.			
○ Rehabilitation and Modernization Canal System	√		
○ Drainage Rehabilitation	√		
○ Lining of Canal	√		
○ Rehabilitation of existing important Building e.g. Inspection houses, offices, colonies, video conferencing centre etc.	√		
➤ Component B3: Groundwater Management Activities.			√
Component C: Consolidation and Enhancement of Irrigation Institutional Reforms			
➤ Component C1: UPID Modernization and Capacity Building.			√
➤ Component C2: Water Users Associations (WUAs) Strengthening and Implementing Participatory Irrigation Management.			√
○ Hiring of services for formation of WUAs			√
○ Awareness and village motivation campaign on PIM			√
○ Preparation of landholders list and voter list for selected area			√
○ Election of water users' associations for selected area			√
○ Registration and handing over of management of irrigation system to the WUAs			√
○ Capacity building of UPID and WUAs; Training of PIM cell at division and circle			√

Socio - Economic Components / Activities	Category A	Category B	Category C
○ Construction of office for WUAs	√		
Component D: Enhancing Agriculture Productivity and On-Farm Water Management			
➤ Construction of field channels and other identified on-farm works.		√	
➤ Concurrent Training and Awareness Campaigns for the farmers, water user association, various departmental functionaries and other stakeholders.			√
➤ Agriculture development and allied activities through training & capacity building & demonstration projects. (Refer to World Bank Project Appraisal Document)		√	
Component E: Next Phase			
➤ Feasibility Studies and Preparation Activities for the Next Phase			√
Component F: Project Coordination and Monitoring			
➤ Component F1: Project Activities Coordination Team (PACT)			√
➤ Component F2: Monitoring of Crop Performance using Remote Sensing Imagery.			√

6.4 Environmental and Social Management Framework

The Environmental and Social Management Plan (ESMP) is described in table 6.3. It details out impacts due to project activities during construction and operation of the project. The ESMP also details the mitigation/ enhancement measures which will be required over and above the project design. Implementation schedule for each of the suggested measures along with the primary responsibility for implementation is also incorporated in the ESMP and an annual environmental and social audit should be carried out to evaluate the performance and effectiveness of ESMF implementation.

6.4.1 Negative list of activities

The project will not finance the following activities:

- Any activity that convert or lead to conversion and/or degradation of significant areas of critical natural habitats (areas officially protected or proposed to be protected) and/or other natural habitats (including wetlands of significance)
- Construction of any new irrigation reservoir dam
- Realignment of any existing canal, branch canal and offtake
- Realignment of any existing drain
- Construction of new canals, branch and offtake
- Construction of any new drain
- Any activity that violates the provisions of applicable National and State laws
- Any activity that is against the provisions of the PIM Act
- Procurement of banned pesticides (Class I and Class IIA & IIB of the WHO list)

6.4.2 Environmental and Social Management Plan

Table 6.3: Environmental and Social Management Plan (ESMP) for Components proposed under UPWSRP Phase II

Sr. No.	Anticipated Project Impacts during Construction/Operation Phase	Impact Category	Mitigation Measures	Site Responsibility	Supervision Responsibility	Quality Responsibility	Stage (8)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
1.	<p>Component B: Rehabilitation and Modernization of Lower Ganga Canal System: (types of activities may include regulators, weirs, canal lining, re-sectioning, de-silting, dam improvements and up gradation)</p> <ul style="list-style-type: none"> • Lead to greater surface water availability at tail end thereby reducing dependence on ground water resources in tail end • Lead to preparation & implementation of Crop Plan, which will lead to agriculture intensification & diversification • Lead to greater water availability resulting is increase in net sown area and bringing additional land into agriculture & allied activities • Lead to increased opportunities for sustainable livelihood through agriculture & allied activities thereby arresting changes in occupational pattern; reduction in indebtedness & reduction in risk & vulnerability. <p>Implementation Period: Year 1-3</p>							
2.	Dredging / Desiltation or Excavation	Air / Noise Pollution	A	<ul style="list-style-type: none"> ➤ Air pollution control measure like water sprinkling ➤ Limit hours of operation in populated areas ➤ Use of barriers to reduce exposure ➤ Plants, machinery and equipment may be handled so as to minimize generation of dust. ➤ All crusher used in construction should Conform to relative dust emission devices ➤ Low emission construction equipment generator sets and pollution free certified vehicles may be used ➤ Air quality monitoring may be conducted at construction sites. 	Contractor	Executive Engineer	Third Party / PACT	C
3.		Water Pollution (Surface Water)	A	<ul style="list-style-type: none"> ➤ Dump solid waste in specified place to minimize contamination of water ➤ Discharge wastewater at authorized locations and after treatment 	Contractor	Executive Engineer	Third Party/PACT	C
4.		Seasonal water bodies created on the sides of canals due to seepage will get either reduced due to better drainage.	A	<ul style="list-style-type: none"> ➤ This may be offset by interventions for strengthening existing notified wetlands in the project area. 	Contractor	Executive Engineer	Third Party/PACT	C
5.		Soil Pollution	A	<ul style="list-style-type: none"> ➤ Collection and recycling of lubricants ➤ Measures to prevent accidental spills 	Contractor	Executive Engineer	Third Party/PACT	C
6.		Trucks Traffic will lead to Air Pollution	A	<ul style="list-style-type: none"> ➤ Pollution Free certified vehicles to be allowed ➤ Avoid traffic in populated areas as much as possible ➤ Install speed breaker and signages near settlements ➤ Roadside plantation 	Contractor	Executive Engineer	Third Party/PACT	C
7.		Worker/Local people exposure	A	<ul style="list-style-type: none"> ➤ Provide safety measures (mask, gloves, hat etc) to minimize exposure ➤ Provide sirens in vehicles to avoid any collision with human/animals ➤ Organise awareness programs on environmental resource management ➤ Organise Health camps ➤ Child labour must be strictly prohibited ➤ Provide signages near work sites ➤ Locate handling sites away from populated areas ➤ Follow proper operation and handling measures to minimize exposure 	Contractor	Executive Engineer	Third Party/PACT	C
8.		Disposal of Excavated Material (Soil/Silt/vegetation) will	A	<ul style="list-style-type: none"> ➤ A silt disposal plan with quantum (generated/ utilized/ disposed off) shall be part of contract agreement ➤ Disposal Area shall be pre-identified with due consent of local community prior to initiate work 	Contractor	Executive Engineer	Third Party/PACT	C

Sr. No.	Anticipated Project Impacts during Construction/Operation Phase		Impact Category	Mitigation Measures	Site Responsibility	Supervision Responsibility	Quality Responsibility	Stage (8)
(1)	(2)		(3)	(4)	(5)	(6)	(7)	
		lead to Air, Water, Soil Pollution		<ul style="list-style-type: none"> ➤ Quality of silt shall be assessed before disposal ➤ Remove extra silt and vegetation material as soon as possible from site ➤ Dumping of silt/vegetation only in designated place by the engineers to minimize impact on environment ➤ Major Drains (if any) contract agreement shall also have silt disposal plan ➤ Slope of drains/canals shall not be more than 1 m height and 2 m in width ➤ Technical specifications shall be part of contract agreement 				
9.		Water Delivery Reduction Interruption	A	➤ Prior water use plan shall be prepared and arrange alternate source of water to fulfil more basic needs	Contractor	Executive Engineer	Third Party/PACT	C
10.	Heavy Machinery Handling and Haulage of Machinery	Air / Noise Pollution	A	(Refer Row 2, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
11.		Soil Pollution	A	(Refer Row5, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
12.		Worker/Local people exposure	A	(Refer Row 7, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
13.	Material Handling And Storage	Air / Noise Pollution	A	(Refer Row 2, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
14.		Soil Pollution	A	(Refer row 5, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
15.		Worker/Local people exposure	A	(Refer 7, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
16.	Debris Disposal	Air / Noise Pollution	A	(Refer Row 2, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
17.		Water Pollution (Surface Water)	A	(Refer Row 3, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
18.		Soil Pollution	A	(Refer Row 5, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
19.		Trucks Traffic will lead to Air Pollution	A	(Refer Row 6, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
20.		Landscape Degradation	A	<ul style="list-style-type: none"> ➤ Carry plantation work on open sites ➤ Do not dump waste along settlement or access route ➤ Frame waste disposal program ➤ Frame quarry & borrow area rehabilitation program ➤ Develop green belts along approach road ➤ On completion of the works all the temporary structures may be cleared away, all rubbish disposed, excreta and disposal pits or trenches filled in and effectively sealed off and the whole site 	Contractor	Executive Engineer	Third Party/PACT	C
21.	Transport of Materials	Air / Noise Pollution	A	(Refer Row 2, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
22.		Soil Pollution	A	(Refer Row 5, Column 4)	Contractor	Executive	Third	C

Sr. No.	Anticipated Project Impacts during Construction/Operation Phase		Impact Category	Mitigation Measures	Site Responsibility	Supervision Responsibility	Quality Responsibility	Stage (8)
(1)	(2)		(3)	(4)	(5)	(6)	(7)	
						Engineer	Party/PACT	
23.		Trucks Traffic will lead to Air Pollution	A	(Refer Row 6, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
24.	Small Tools and Pumps	Air / Noise Pollution	A	(Refer Row 2, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
25.	Borrow Materials/ Area	Air / Noise Pollution	A	(Refer Row 2, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
26.		Soil Pollution	A	(Refer Row 5, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
27.		Trucks Traffic will lead to Air Pollution	A	(Refer Row 6, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
28.		Soil Erosion	A	<ul style="list-style-type: none"> ➤ Limitation of earth moving to dry periods ➤ Protection of vulnerable areas with mulch ➤ Protection of drainage channels with beams, straw or fabric barriers Installation of sedimentation basins ➤ Seeding or planting of erodible surfaces as soon as possible 	Contractor	Executive Engineer	Third Party/PACT	C
29.		Worker/Local people Exposure	A	(Refer Row 7, column 4)	Contractor	Executive Engineer	Third Party/PACT	C
30.		Generation of Excavated Material	A	(Refer Row 8, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
31.		Landscape Degradation	A	Refer Row 20, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
32.	Quary Materials/ Area	Air / Noise Pollution	A	(Refer Row 2, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
33.		Soil Pollution	A	(Refer Row 5, column 4)	Contractor	Executive Engineer	Third Party/PACT	C
34.		Trucks Traffic will lead to Air Pollution	A	(Refer Row 6, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
35.		Worker/Local people Exposure	A	(Refer Row 7, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
36.		Generation of Excavated Material	A	(Refer Row 8, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
37.		Landscape Degradation	A	(Refer Row 20, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
38.	Resettlement & Rehabilitation	Land Acquisition	A	<ul style="list-style-type: none"> ➤ Follow applicable guidelines and policies, in particular World Bank OP 4.12, National R&R Policy 2007, Uttar Pradesh Water Sector R&R Policy 2001, and Uttar Pradesh Land Acquisition Policy 2011. ➤ See Rehabilitation and Resettlement Policy Framework (Annexure 6.2). ➤ Involuntary resettlement and land acquisition will be avoided wherever feasible, or minimized, by exploring all viable alternatives. ➤ Where involuntary resettlement and land acquisition is unavoidable, resettlement and compensation activities will be implemented. Affected Persons will be meaningfully consulted and will have opportunities to participate in planning and implementing the R&R programme. 	Contractor	Executive Engineer	Third Party/PACT	C

Sr. No.	Anticipated Project Impacts during Construction/Operation Phase		Impact Category	Mitigation Measures	Site Responsibility	Supervision Responsibility	Quality Responsibility	Stage (8)
(1)	(2)		(3)	(4)	(5)	(6)	(7)	
				<ul style="list-style-type: none"> ➤ Affected Persons will be assisted in improving their livelihood and standards of living at least to restore them prior to the beginning of the project. ➤ The transition period will be minimized in the resettlement process. ➤ Completion shall be paid and efforts will be made to complete the R&R before taking possession of land/ properties. 				
39.		Impact on local/ tribal communities	A	<ul style="list-style-type: none"> ➤ States policy for tribal community has to be followed if livelihood is going to be affected. ➤ Tribal Development Plan shall be prepared, laying down the detailed procedure for settling land rights The Plan shall contain a programme for development of alternate fuel, fodder and nontimber forest produce (NTFP) resources on non-forest lands ➤ In cases of involuntary displacement of two hundred or more Scheduled Tribes families from the Scheduled Areas, the concerned Tribes Advisory Councils (TACs) may be consulted. ➤ Each affected family that is displaced and has cattle, shall get financial assistance for construction of cattle shed. ➤ Each affected family that is displaced must be provided with a one-time financial assistance of such amount as the appropriate but not less than ten thousand rupees, for shifting of the family, building materials, belongings and cattle. ➤ Each affected person who is a rural artisan, small trader or self-employed person and who has been displaced shall be provided a one-time financial assistance. ➤ Preference to the affected families ➤ at least one person per nuclear family - in providing employment in the project ➤ The affected persons shall be offered the necessary training facilities for development of entrepreneurship, technical and professional skills for self employment. ➤ Offer scholarships and other skill development opportunities to the eligible persons from the affected families 	Contractor	Executive Engineer	Third Party/PACT	O
40.	Labour Camps	Worker/Local people Exposure	A	(Refer Row 7, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
41.		Impact on Human health, especially workers working at construction sites (Labour Camps)	A	<ul style="list-style-type: none"> ➤ Routine medical check up of Field staff and labours ➤ Provision of potable drinking water at site ➤ Provision of proper sewage and waste disposal system. Sanitation facilities have to be provided at the camp sites. ➤ Awareness program on HIV Aids and other communicable disease may be provided to the work force. ➤ First aid facilities to be provided at the construction camps. Any case of disease outbreak may be immediately subjected to medical treatment. Mosquito repellent to be provided to the labors such as odomas, coil and sprays. The camps may maintain cleanliness and hygienic condition. ➤ Proper ventilation may be provided in labour camps 	Contractor	Executive Engineer	Third Party/PACT	C

Sr. No.	Anticipated Project Impacts during Construction/Operation Phase		Impact Category	Mitigation Measures	Site Responsibility	Supervision Responsibility	Quality Responsibility	Stage (8)
(1)	(2)		(3)	(4)	(5)	(6)	(7)	
				<ul style="list-style-type: none"> ➤ Sufficient fuel may be provided to the work force at campsite. Alternate arrangement for fuel such as provision of LPG, Kerosene etc. to be provided to the camp ➤ Head phones, ear plugs to be provided to the workers at construction site. ➤ All workers employed on mixing of asphaltic material, cement, lime mortars, concrete etc. may be provided with protective footwear and protective goggles. Workers involved in welding work may be provided with welder's protective eye shields ➤ Adequate precaution must be taken to prevent danger from electrical equipments 				
42.	Hot Mix Plant	Air / Noise Pollution	A	(Refer Row 2, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
43.		Soil Pollution	A	(Refer Row 5, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
44.		Worker/Local people Exposure	A	(Refer Row 7, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
45.	Concrete Mixture and Heavy Pumps	Air / Noise Pollution	A	(Refer Row 2, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
46.		Soil Pollution	A	(Refer Row 5, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
47.		Worker/Local people Exposure	A	(Refer Row 12, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
48.	Temporary Land Acquisition	Air / Noise Pollution	A	(Refer Row 2, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
49.		Soil Pollution	A	(Refer Row 5, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
50.		Worker/Local people exposure	A	(Refer Row 7, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
51.	Tree Felling, Vegetation Clearance	Landscape Degradation	A	(Refer Row 20, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
52.		Impact on Flora	A	<ul style="list-style-type: none"> ➤ Frame compensatory afforestation plan ➤ If any rare and endangered species present in the area frame conservation plan for the species ➤ Encourage farming of medicinal plants found in the area Distribute fruit plants grown in the region ➤ Plantation with native species along dam periphery, approach road and colony area ➤ Protection/fencing of planted area, provision of guard for three year ➤ Location of camp away from forest area. 	Contractor	Executive Engineer	Third Party/PACT	O
53.		Soil Erosion	A	(Refer Row 28, Column 4)	Contractor	Executive Engineer	Third Party/PACT	O
54.	Sheds to keep Machines and Tools	Air / Noise Pollution	A	(Refer Row 2, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
55.		Soil Pollution	A	(Refer Row 5, Column 4)	Contractor	Executive	Third	C

Sr. No.	Anticipated Project Impacts during Construction/Operation Phase	Impact Category	Mitigation Measures	Site Responsibility	Supervision Responsibility	Quality Responsibility	Stage (8)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)		
					Engineer	Party/PACT		
56.	Worker/Local people exposure	A	(Refer Row 7, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C	
57.	Landscape Degradation	A	(Refer Row 20, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C	
58.	Generation of Debris /waste material	A	<ul style="list-style-type: none"> ➤ Identification of debris disposal site to minimize the impact on environment and local people. ➤ Debris disposal site should be located at least 500m away from any human settlement and prior NoC has to be obtained from the State Pollution Control Board before dumping debris on the identified site. ➤ Debris can be used as filling material or river embankment protection material. 	Contractor	Executive Engineer	Third Party/PACT	C	
59.	Rehabilitation of existing important Building e.g. Inspection houses, offices, colonies, video conferencing centre etc.							
60.	May require land						C	
61.	Labor Camps	<ul style="list-style-type: none"> ➤ Worker local People Exposure ➤ Impact on human health (Labor Camps) 	A	(Refer Row 7, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
62.	Heavy machinery	<ul style="list-style-type: none"> ➤ Air / Noise Pollution ➤ Soil Pollution ➤ Worker local People Exposure 	A	(Refer Row 7, Column 4) (Refer Row 5, Column 4) (Refer Row 2, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
63.	Hot mix plant	<ul style="list-style-type: none"> ➤ Air / Noise Pollution ➤ Soil Pollution ➤ Worker local People Exposure 	A	(Refer Row 2, Column 4) (Refer Row 5, Column 4) (Refer Row 7, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
64.	Concrete mixture and heavy Pumps	<ul style="list-style-type: none"> ➤ Air / Noise Pollution ➤ Soil Pollution ➤ Worker local People Exposure 	A	(Refer Row 2, Column 4) (Refer Row 5, Column 4) (Refer Row 7, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
65.	Material handling and storage	<ul style="list-style-type: none"> ➤ Soil Pollution ➤ Worker local People Exposure ➤ Air / Noise Pollution 	A	(Refer Row 2, Column 4) (Refer Row 5, Column 4) (Refer Row 7, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
66.	Debris Disposal	<ul style="list-style-type: none"> ➤ Air / Noise Pollution ➤ Water Pollution (Surface) ➤ Soil Pollution ➤ Trucks Traffic increase ➤ Landscape Degradation 	A	(Refer Row 2, Column 4) (Refer Row 3, Column 4) (Refer Row 5, Column 4) (Refer Row 6, Column 4) (Refer Row 20, Column 4)	Contractor	Executive Engineer	Third Party/PACT	C
67.	Transport of	<ul style="list-style-type: none"> ➤ Air / Noise Pollution 	A	(Refer Row 2, Column 4)	Contractor	Executive	Third	C

Sr. No.	Anticipated Project Impacts during Construction/Operation Phase		Impact Category	Mitigation Measures	Site Responsibility	Supervision Responsibility	Quality Responsibility	Stage (8)
(1)	(2)		(3)	(4)	(5)	(6)	(7)	
	materials	<ul style="list-style-type: none"> ➤ Soil Pollution ➤ Trucks Traffic will lead to Air Pollution 		(Refer Row 5, Column 4)		Engineer	Party/PACT	
68.	Component C: Consolidation and Enhancement of Irrigation Institutional Reforms							
69.	Construction of office for WUAs in project areas area (if applicable)		A					C
70.	May require land						C	
71.	Labor Camps	<ul style="list-style-type: none"> ➤ Worker local People Exposure ➤ Impact on human health (Labor Camps) 	A	(Refer Row 7, Column 4) (Refer Row 41, Column 4)	Contractor	Executive Engineer	C	C
72.	Heavy machinery	<ul style="list-style-type: none"> ➤ Air / Noise Pollution ➤ Soil Pollution ➤ Worker local People Exposure 	A	(Refer Row 2, Column 4) (Refer Row 5, Column 4) (Refer Row 7, Column 4)	Contractor	Executive Engineer	C	C
73.	Hot mix plant	<ul style="list-style-type: none"> ➤ Air / Noise Pollution ➤ Soil Pollution ➤ Worker local People Exposure 	A	(Refer Row 2, Column 4) (Refer Row 5, Column 4) (Refer Row 7, Column 4)	Contractor	Executive Engineer	C	C
74.	Concrete mixture and heavy Pumps	<ul style="list-style-type: none"> ➤ Air / Noise Pollution ➤ Soil Pollution ➤ Worker local People Exposure 	A	(Refer Row 2, Column 4) (Refer Row 5, Column 4) (Refer Row 7, Column 4)	Contractor	Executive Engineer	C	C
75.	Material handling and storage	<ul style="list-style-type: none"> ➤ Soil Pollution ➤ Worker local People Exposure ➤ Air / Noise Pollution 	A	(Refer Row 2, Column 4) (Refer Row 5, Column 4) (Refer Row 7, Column 4)	Contractor	Executive Engineer	C	C
76.	Debris Disposal	<ul style="list-style-type: none"> ➤ Air / Noise Pollution ➤ Water Pollution (Surface) ➤ Soil Pollution ➤ Trucks Traffic increase ➤ Landscape Degradation 	A	(Refer Row 2, Column 4) (Refer Row 3, Column 4) (Refer Row 5, Column 4) (Refer Row 6, Column 4) (Refer Row 20, Column 4)	Contractor	Executive Engineer	C	C
77.	Transport of materials	<ul style="list-style-type: none"> ➤ Air / Noise Pollution ➤ Soil Pollution ➤ Trucks Traffic will lead to Air Pollution 	A	(Refer Row 2, Column 4) (Refer Row 5, Column 4) (Refer Row 6, Column 4)	Contractor	Executive Engineer	C	C
78.	Component D: Agriculture Water Use and Productivity Efficiency Improvement Program & On Farm Management.							
79.	Construction of small scale on-	Air / Noise Pollution	B	(Refer Row 2, Column 4)	Contractor	WUA	EE / PACT	C

Sr. No.	Anticipated Project Impacts during Construction/Operation Phase		Impact Category	Mitigation Measures	Site Responsibility	Supervision Responsibility	Quality Responsibility	Stage (8)
(1)	(2)		(3)	(4)	(5)	(6)	(7)	
	farm development works (e.g. field channels, subplots)							
80.		Water Pollution	B	(Refer Row 3, Column 4)	Contractor	WUA	EE / PACT	C
81.		Soil Pollution	B	(Refer Row 5, Column 4)	Contractor	WUA	EE / PACT	C
82.		Trucks Traffic will lead to Air Pollution	B	(Refer Row 6, Column 4)	Contractor	WUA	EE / PACT	C
83.		Worker/Local people exposure	B	(Refer Row 7, Column 4)	Contractor	WUA	EE / PACT	C
84.		Disposal of Excavated Material (Silt/vegetation)	B	(Refer Row 8, Column 4)	Contractor	WUA	EE / PACT	C
85.		Water Delivery Reduction Interruption	B	Prior water use plan shall be prepared and arrange alternate source of water to fulfil more basic needs	Contractor	WUA	EE / PACT	C
86.	Material Handling And Storage	Air / Noise Pollution	B	(Refer Row 2, Column 4)	Contractor	WUA	EE / PACT	C
87.		Landscape Degradation	B	(Refer Row 20, Column 4)	Contractor	WUA	EE / PACT	C
88.	Transport of Materials	Air / Noise Pollution	B	(Refer Row 2, Column 4)	Contractor	WUA	EE / PACT	C
89.		Soil Pollution	B	(Refer Row 5, Column 4)	Contractor	WUA	EE / PACT	C
90.		Trucks Traffic will lead to Air Pollution	B	(Refer Row 6, Column 4)	Contractor	WUA	EE / PACT	C
91.	Small Tools and Pumps	Air / Noise Pollution	B	(Refer Row 2, Column 4)	Contractor	WUA	EE / PACT	C
92.	Resettlement & Rehabilitation	Land Acquisition	B	(Refer Row 38, Column 4)	Contractor	WUA	EE / PACT	C
93.		Impact on local/ tribal communities	B	(Refer Row 39, Column 4)	Contractor	WUA	EE / PACT	O
94.	Temporary Land Acquisition	Air / Noise Pollution	B	(Refer Row 2, Column 4)	Contractor	WUA	EE / PACT	C
95.		Soil Pollution	B	(Refer Row 5, Column 4)	Contractor	WUA	EE / PACT	C
96.		Worker/Local people exposure	B	(Refer Row 7, Column 4)	Contractor	WUA	EE / PACT	C
97.	Tree Felling, Vegetation Clearance	Landscape Degradation	B	(Refer Row 20, Column 4)	Contractor	WUA	EE / PACT	C
98.		Impact on Flora	B	<ul style="list-style-type: none"> ➤ Frame compensatory afforestation plan ➤ If any rare and endangered species present in the area frame conservation plan for the species ➤ Encourage farming of medicinal plants found in the area Distribute fruit plants grown in the region ➤ Plantation with native species along dam periphery, approach road and colony area ➤ Protection/fencing of planted area, provision of guard for three year 	Contractor	WUA	EE / PACT	O

Sr. No.	Anticipated Project Impacts during Construction/Operation Phase		Impact Category	Mitigation Measures	Site Responsibility	Supervision Responsibility	Quality Responsibility	Stage (8)
(1)	(2)		(3)	(4)	(5)	(6)	(7)	
				➤ Location of camp away from forest area.				
99.		Soil Erosion	B	(Refer Row 28, Column 4)	Contractor	WUA	EE / PACT	O
100.	Sheds to keep Machines and Tools	Air / Noise Pollution	B	(Refer Row 2, Column 4)	Contractor	WUA	EE / PACT	O
101.	Agriculture Development on farm demonstrations	Water losses through seepage	B	➤ Field Bunding, Alternate cropping pattern and usage of water conservation technologies	WUA	Executive Engineer	PACT	O
102.		Water Pollution	B	➤ Usage of IPN / IPNM Reduction in use of chemical fertilize & pesticides	WUA	Executive Engineer	PACT	C
103.		Soil Pollution	B	➤ Usage of farm yard manure / biofertilizers. Usage of IPN & IPNM Reduce consumption of chemical fertilizer & pesticides.	WUA	Executive Engineer	PACT	C

Note: Column 8 indicates Stage C- Construction, Stage O- Operation

6.4.3 Environmental Management Plans

The mitigation / enhancement measures include specific environment management plans (EMPs) (given in annexure 6.1) which need to be implemented.

The following EMPs are included:-

1. **Construction Camps Plan (Annexure 6.1.1)**: During implementation phase, a large labor population is likely to influx in the project area. An Environmental Management Plan for construction camp has been formulated to control degradation of the surrounding landscape due to the location of the proposed construction camp. The Contractor must provide, erect and maintain necessary living condition and ancillary facilities at the camp and all this must be included in contract document provided to the Contractor.
2. **Waste Management Plan (Annexure 6.1.2)**: Waste generated from construction activities comprise of wood, reinforcement steel left over, pipes, bolt, nails, concrete bricks, electrical cutting, equipment parts etc. Domestic waste includes food containers such as beverage cans, coffee /tea cups wrapping papers, plastic, leftover food, glass etc. An Environmental Management Plan has been prepared and the Contractor must provide all facilities at the construction site.
3. **Construction plants & equipment management Plan (Annexure 6.1.3)**: During execution of the project, construction equipments, machinery and plants always have impact on the environment. The impact can be due to the emissions, dust, noise and oil spills that concern the safety and health of the workers, surrounding settlements and environment as a whole. An Environmental Management Plan has been prepared and the Contractor must provide all facilities at the construction site.
4. **Fertilizer & Pesticide Handling & Storage Plan (Annexure 6.1.4)**: A fertilizer & pesticide handling & storage environmental management plan has been prepared. This plan addresses issues arising from the improper handling and storage of these chemicals.
5. **Pest Management Plan (Annexure 6.1.5)**:- The project interventions might results in increased use of fertilizer and pesticides in the command area. A pest management plan, incorporating stakeholders recommendations, has been prepared for sustainable use of pesticide.
6. **Nutrient Management Plan (Annexure 6.1.6)**: The most appropriate strategy for increasing fertilizer use efficiency is to practice NMP. The basic principle of NMP is the maintenance of soil fertility, sustaining agricultural productivity and improving farmers' profitability through the judicious and efficient use of mineral fertilizers, organic manures and bio-fertilizers. The INMP package has area-specific implications depending upon the availability and performance of the various components. A management plan has been prepared for sustainable use of pesticide.
7. **Health & Safety Management Plan (6.1.7)**: The safety and health concerns of the workers and the general public can be impacted due to the hazards created by construction activities. An Environment Management Plan for Public and Worker's Health and Safety has been prepared to describe the hazards and necessary mitigation measures.

8. **Cultural Properties Plan (Annexure 6.1.8)**: Cultural properties can be located close to the service road might be impacted by construction activities. Most of the properties are avoided in general during interventions. A detailed Environment Management Plan has been prepared to avoid any impact.
9. **Tree Plantation Plan (Annexure 6.1.9)**: The system rehabilitation and modernization is unlikely to involve any need for vegetation cleaning or trees felling. This EMP provides for a specific plan for tree plantation.
10. **Silt Disposal Plan (Annexure 6.1.10)**: This plan procedure is required for handling, reuse and disposal of silt during construction.
11. **Biodiversity Offset Plan (Annexure 6.1.11)**: Canal rehabilitation would improve irrigation service delivery and reduce seepage and water loss. This could adversely impact formation of seasonal small and nondescript wetlands that provide localized habitats for amphibians and birds (waders, kingfishers and bee eaters). A detailed Environment Management Plan has been prepared to avoid and mitigate impacts.
12. **Canal Rehabilitation Plan (Annexure 6.1.12)**: A detailed Environment Management Plan has been prepared to avoid impact of canal rehabilitation.
13. **Resettlement Policy Framework and Action Plan (Annexure 6.2)**: The system rehabilitation and modernization is unlikely to involve any need for land acquisition or resettlement and rehabilitation (R&R). However, in the rare event that this is required, the provisions of the Bank OP 4.12 with the UP State R&R Policy will be applied.

6.5 Analysis of Alternatives

Since the second phase is effectively an on-going modernization and rehabilitation of existing irrigation and drainage infrastructure in the State, there is a limited scope for considering alternatives to achieve intended development objectives. One alternative considered, but rejected was to create new irrigation infrastructure in the targeted areas. This would lead to major social and environmental impacts considering the baseline situation in the project areas. Instead, interventions focused on rehabilitation and modernization of existing irrigation infrastructure would have limited impacts only. Besides, learnings from the first phase are applied under Phase II to improve the interventions. A No Project scenario was also considered but rejected, as there is a dire need to improve irrigation service delivery and increase farm productivity to ensure food security, as well as reform the water resources management to meet the demands of a fast growing population. Another alternative considered and adopted is to invest in groundwater management to pilot real time conjunctive use of the two irrigation approaches. Conjunctive use is a potential management option in areas where both surface water and groundwater are amply available. A dual roster for groundwater and surface irrigation water may be an effective option for improving water resource sustainability in irrigation commands. This has been incorporated as its own project sub-component.

Analysis of the no project versus with project scenario is presented in **Table 6.4**.

Table 6.4: Analysis of No Project versus With Project Scenario

No Project Scenario	With Project Scenario
<ul style="list-style-type: none"> - Existing inefficient system will continue with environmental & social problems. - Lower agriculture productivity - Poor Participatory Irrigation Management - No new technologies use - Inefficient & unsustainable Water Resource Management - Unsafe irrigation structures - Limited knowledgebase - Poor Pest Management - Poor Nutrient Management Plan - Poor Soil Quality - Poor Water Quality - Unbalance Fertilizer use 	<ul style="list-style-type: none"> - Improved, sustainable & efficient water delivery system - Participatory Irrigation Management - Improved agriculture productivity - Improved drainage system - Improved knowledgebase for implementing efficient water resource management system - Possible increase in fertilizers and pesticides use, but mitigated through Farmer Water Schools approach - Short term environmental impact during construction may take place but risk factor will reduce and better water management system will emerge - Safer dam operation and irrigation operation can be achieved. -

6.6 Implementation of the Environmental and Social Management Framework

The ESMF will be used by the project authorities for incorporation of environmental and social safeguards in the planning, execution and operation stages of each sub-project activity. A step-by-step methodology is provided along with engineering and institutional interventions required for the project activities.

6.6.1 Implementation mechanism

A schematic diagram for implementation of the ESMF is provided in figure 6.1 and the procedure to follow is described below. An environmental and social cell headed by an environmental expert equivalent to the rank of executive engineer is proposed to be established in PACT supported by a social expert. The cell will assist in implementation of ESMF at each stage described below. Proposed organization structure & the roles & responsibility of the staff is described in Annexure 6.3.

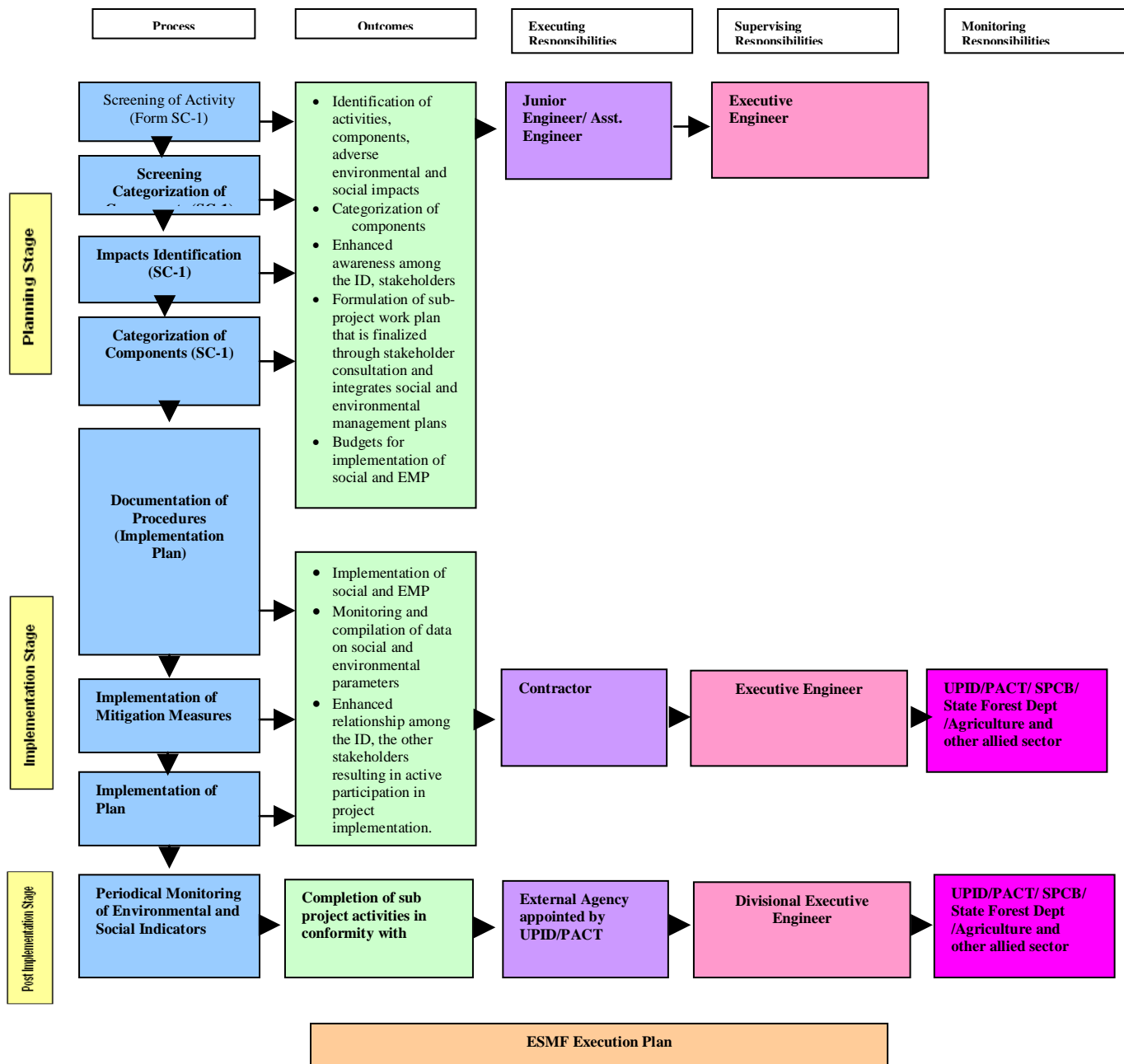


Figure 6.1: ESMF Execution Mechanism

Planning Stage

For each activity, the concerned State/Circle level PMUs will use a template (Form SC-1) during the investigation and preliminary design stage to provide detailed information on technical, environmental, social, and all implementation-related aspects of the activity. The State/Circle level PMU will incorporate in this template the essential elements from the environmental and social screening templates prepared. Based on the review of the templates, a final categorization of each of the sub-project activity will be made. The activities that have no major environmental or social issues can have the designs finalized and be tendered. For the activities where there may be major

environmental or social issues, a site specific EA/EMP will be prepared. In this rare case of application of EIA notification 2006, the EA/EMP proposed will require public hearing and disclosure as per this EA/EMP's notification. A copy of this notification is given in Annexure 2.1. These will be integrated in the bidding documents of contractors.

The social and environmental specialists, PACT, will review the Form SC-1.

The checklist below shows the steps to be undertaken and responsibilities in the planning stage.

Checklist for Screening and Mitigation

Sr. No.	ESMP activities	Who will be Involved	Coordinator	Review
1	Screening of sub-project Activities through Screening Format (Form SC-1)	Irrigation Department (ID) and Other Line Department	Executive Engineer	Social and environmental specialists, PACT
2	Screening of components associated with each activity through Table 6.5			
3	Identification of adverse environmental impacts associated with execution of each component (Table 6.5)			
4	Categorization of components through table 6.5			
5	Identification of suitable mitigation measures for each adverse impact on natural and social environment caused by each component with the help of Table 6.5			
6	Integration of Form SC-1 and relevant EMPs in the bidding documents.			

The outcome of the planning stage is the following:

- Identification of activities
- Identification of components
- Identification adverse environmental and social impacts
- Identification and categorization of components to be undertaken in each sub-project
- Enhanced awareness among the ID, stakeholders resulting in active participation
- Formulation of sub-project work plan that is finalized through stakeholder consultation and integration social and environmental management plans
- Budgets for implementation of social and environmental management plans
- Integration of Form SC-1 and EMPs in the bidding documents

Implementation Stage

The primary tasks in this stage are implementation of proposed social and environmental management plans for sub-project following the checklist shown in **Table 6.5**.

Table 6.5: Checklist for ESMP Activities – Implementation

Activities	Who will be Involved	Co-ordinator	Overall monitoring
Procurement of documents, procedures followed and contracts awarded & equipment procured	Contractor, Implementation agency	Engineers from Irrigation Department/ other Implementing agencies	Social and environmental specialists, PACT, assisted by Third Party Quality Supervision Consultant and Monitoring and Evaluation Consultant
Implementation of the social and environmental management plans as Proposed in the Mitigation measures and EMP.	Contractor, Implementation agency, Authorized consultants	Engineers from Irrigation Department/ other implementing agencies	
Monitoring and evaluation of social and environmental parameters as identified in the Mitigation measures and EMP. Special attention will be paid to ensure that no child labor (as per the GoI) is involved in the construction activities The dam site officials may monitor contract works or authorize the consultants to monitor processes and impacts at sub project level. However the consolidated monitoring and learning (M & L) report will be furnished by EE, In charge of Project to designated project authority i.e. CE, In-charge, and finally to Division	Contractor, Implementation agency, Authorized Consultants	Engineers from Irrigation Department/ other implementing agencies	

Outcomes of Implementation Stage:

- Implementation of social and environmental management plans
- Monitoring and compilation of data on social and environmental parameters
- Enhanced relationship among the ID, the other stakeholders resulting in active participation in project implementation.

Post-Implementation Stage

The primary tasks in this stage are to monitor and assess the long-term impacts of the project (through Impact Indicators) and draw lessons from the success and failures, for improvement of subsequent sub-project interventions. Compliance of ESMP provisions has to be ensured through third party monitoring for verification of the sub-project completion report. The Formats for monitoring the above parameters would be developed by PACT. Validation should be carried out before finalizing.

Outcome of Post Implementation Stage:

- Verification of completion of sub project activities in conformity with ESMP.

It should be noted that the ESMP is a live document which has been developed considering all common major activities associated with sample sub-projects. It can be improved,

upgraded or modified at sub-project level as per the site specific requirement and their mitigation measures.

6.6.2 Template for screening activities at the planning stage

Form SC-1 helps identify the specific activities concerned for development of the ESMP and screen out the other activities. The Form lists the potential impacts from the activity, identifies mitigation measures, and entities responsible for execution, supervision and monitoring of the mitigation measures.

Form SC 1: Screening of Environmental and Social Impacts & Mitigation Measures

Component Activity	Please Tick Yes (Y) or No (N) / Insignificant		If yes, please refer column 2 of table 6.5 & write Impacts	If Yes please refer column 4 of table 6.5 & write mitigation measures	Execution, Supervision, Monitoring responsibility (Refer Table 6.5, columns 5, 6, 7 and write name of Agency)
	(1)	(2)				(3)	(4)	(5)
	Y	N			
Category A					
➤ Rehabilitation and Modernization of Canal System.			Row 1 to 58	Row 1 to 58	Row 1 to 58
➤ Dainage Rehabilitation			Row 1 to 58	Row 1 to 58	Row 1 to 58
➤ Lining of Canal			Row 1 to 58	Row 1 to 58	Row 1 to 58
➤ Rehabilitation of existing important Building e.g. Inspection houses, offices, colonies, video conferencing centre etc.			Row 59 to 67	Row 59 to 67	Row 59 to 67
➤ Construction of office for WUAs in phase I area (If envisaged in Project)			Row 68 to 77	Row 68 to 77	Row 68 to 77
➤ Construction of office for WUAs in Phase II area (If envisaged in Project)			Row 68 to 77	Row 68 to 77	Row 68 to 77
Category B					
➤ Construction of field channel.			Row 79 to 100	Row 79 to 100	Row 79 to 100
➤ Rehabilitation of surface drainage system, including field drainage.			Row 79 to 100	Row 79 to 100	Row 79 to 100
➤ Agriculture development and allied activities through training & capacity building & demonstration projects. (Refer to World Bank Project Appraisal Document for specific activities)..			Row 101 to 103	Row 101 to 103	Row 101 to 103

Submitted

Signature.....

Name.....

Designation.....

Contractor

Checked

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Assistant Engineer

Reviewed

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Social and environmental
Specialists, PACT

Approved

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Executive Engineer

Chapter 7: IEC Strategy, Capacity Building & Training & Monitoring & Evaluation

7.0 Introduction

As part of social & environmental management plan, information, education & communication strategies (IEC), training & capacity building and monitoring & evaluation plans have been prepared. Each of these items is described in following sections.

7.1 Need for Information, Education and Communication Strategy

In order to ensure effective participation of various stakeholders and for achieving the desired project objectives, there is a need to ensure effective two way knowledge – between the project and project communities. Sharing of information is required at various levels and on different aspects of the project. As part of SEMF, an attempt was made to assess the existing communication among stakeholders and the type of information shared based on which Information, Education and Communication (IEC) strategy has been prepared with clear timelines and roles and responsibilities of concerned stakeholders. Broad objectives of IEC include: awareness generation and motivation, technology dissemination, developing the information system, improving access to project information, and educating the stakeholders. The task of educating and communicating the target people, especially beneficiary farmers, is quite challenging due to their literacy/educational level and access to and use of modern communication sources. There is lack of reasonable ability to read and understand printed material with narration among the farmers and other people of rural areas even though mobile phone penetration is increasing exponentially. Moreover, people's access to electronic media is also limited in the rural areas. Thus, there is a need for the project to evolve suitable IEC strategy and make available required information, in the form and time, which could help project stakeholders. The IEC strategy discussed here intends to cover mainly environmental and social aspects of the project implementation.

7.2 Generation of information and knowledge base

In addition to the information that is required to be made available to seeking it under National Right to Information Act, the foremost task in the IEC is to generate an information and knowledge base on the basis of which environmental & social education and communication could be undertaken. In this regard, the suggested strategy is presented in **Table 7.1**.

Table 7.1: Suggested strategy and framework for IEC

Thematic area	Target audience	Contents	Form of knowledge material
Information on social aspects	(i) Vulnerable groups (VG) (ii) Members of PRIs, WUA, SHGs, NGOs and other groups. (to also focus on religious leaders, person of eminence and respect in the community).	- Extent of loss arising out of the proposed intervention. - Project benefits particularly for the VG (for eg: landless, small and marginal farmers, BPL etc.) - Project information.	- Printed documents along with pictographs. - Pamphlets and booklets. - CDs, DVDs etc. - Public display of affected families and their entitlements.
Social conflict resolution mechanisms	(i) Headquarter level officers of UPID/PACT and line departments. (ii) Division /District level officers of the project and line departments including the police. (iii) Field staff of the project and line departments. (iv) Functionaries & representatives of PRIs, NGO and others. (to also focus on religious leaders, person of eminence and respect in the community). (v) Members of WUA, SHG and marketing groups. (vi) Judges, Lawyers and other members of the legal fraternity.	- Description of social conflicts arising in rural areas including economic, institutional and legal. - Description of existing resolution system in different socio-economic settings (for eg: any mechanism developed by the Dept. of Social Welfare, other concerned departments, NGOs, individuals etc.) - Applicability of such resolution system in other socio-economic settings. - Information on project implementation – activities and beneficiaries. - Analysis of legal vis-à-vis traditional resolution systems for better understanding.	- Printed documents along with pictographs. - Pamphlets and booklets. - Sharing of information in the meetings of various institutions. - Print media especially local newspaper, electronic media like local TV channels, mobile applications like sms, 24 hour helplines etc. - Availability if wage employment announced in village meetings and in groups. - Organizing ‘goshtis’, workshops, melas etc. for information dissemination and awareness on a mass scale.
Social risks	(i) Headquarter level officers of UPID/PACT and line departments. (ii) Divisional/District level officers of the project and line departments including the police. (iii) Field staff of the project and line departments. (iv) Village institutions – PRIs, WUA and other groups. (v) Project beneficiaries. (vi) Judges, Lawyers and other members of the legal fraternity.	- Description of various social risks to implementation of the project activities. - Ways and means to reduce/mitigate such risks (especially if any of them have been tried and tested previously by any Govt. dept. or NGOs, individuals etc.) - Suggested precautions - Description of social risks that are likely to happen post project implementation. - Possible ways and means to resolve such crises. - Dates (and standard agenda if possible) of the meetings of various institutions. - List of beneficiaries and the type of benefits.	- Printed document. - Pamphlets and booklets. - List of beneficiaries and their benefits are publicly displayed in villages. - Making available information in various meetings. - Print and electronic media such as local newspaper, short documentary films etc.

Thematic area	Target audience	Contents	Form of knowledge material
Participatory decision making	<p>(i) Headquarter level officers of UPID/PACT and line departments.</p> <p>(ii) Divisional /District level officers of the project and line departments including the police.</p> <p>(iii) Field staff of the project and line departments.</p> <p>(iv) Functionaries/ representatives of Gram Panchayat, NGO and others (to also focus on religious leaders, person of eminence and respect in the community).</p> <p>(v) General villagers especially women, the landless, small and marginal farmers, SCs, OBCs, the farming community.</p>	<ul style="list-style-type: none"> - Preparation of work breakdown structure for the project components along with delineation of roles and responsibilities of each level of project management. - Delineation of primary and secondary implementing responsibilities along with schedule and quality standards. - Clarification in case work breakdown structure under the project are in conflict or in duplication with the conventional administrative structure. - Delineation of activities with clear cut mention of the roles of beneficiaries, WUAs, Gram Sabha etc. seeking there proactive involvement in planning, implementation and monitoring and evaluation. - Description of participation process for the concerned activities with focus on the integrated village planning process to avoid duplication of planning exercises. 	<ul style="list-style-type: none"> - Descriptive documents along with matrix of roles and responsibilities. - Schematic exhibition of participatory process and participatory structure especially for the illiterate. - Pamphlets, booklets and handouts in the local dialects. - Extensive use of print and electronic media such as local newspaper, cable TV channels etc. - Organizing ‘goshtis’, workshops, melas etc. for information dissemination and awareness on a mass scale. - Wall paintings.
Environmental awareness	<p>(i) Headquarter level officers of UPID/PACT and line departments.</p> <p>(ii) Divisional/District level officers of the project and line departments.</p> <p>(iii) Field staff of the project and line departments.</p> <p>(iv) Functionaries/ representatives of Gram Panchayat, NGO and others.</p> <p>(v) General villagers with focus on religious leaders, person of eminence and respect in the community, women, landless, small and marginal farmers, SCs, OBCs and the farming community.</p> <p>(vi) Judges, Lawyers and other members of the legal fraternity.</p>	<ul style="list-style-type: none"> - Interaction between project activities and the environment including air, water and soil. - An account of previous / past positive and negative impacts of similar interventions. - Probable positive and negative impacts of the project activities on the environment - Proposed measures for enhancing the positive impacts and reducing the negative affects along with primary, supervisory and policy-making responsibilities for these measures. - Proposed mechanism for monitoring and evaluation of various impacts and measures at various levels of policy making and implementation. - Expectations from / responsibilities of each and every stakeholder. 	<ul style="list-style-type: none"> - Printed material in descriptive form. - Project activity wise positive and negative impacts along with proposed measures, implementation responsibility and expectations from stakeholders in form of matrix for easy understanding of the information. - Expectations from farmers and general villagers should be straight forward in language and form. - Use of electronic and print media, mobile applications etc. - Organizing ‘goshtis’, workshops, melas etc. for information dissemination and awareness on a mass scale. - Wall paintings.
Monitoring and	(i) Headquarters level officers of UPID/PACT	- Documentation of project activities, targets,	- Printed material in matrix form.

Thematic area	Target audience	Contents	Form of knowledge material
Evaluation	and line departments. (ii) Divisional/District level officers of the project and line departments. (iii) Field staff of the project and line departments. (iv) Functionaries/ representatives of Gram Panchayat, NGO, WUA and others. (v) General villagers and farming community including women	timelines, primary and secondary responsibilities for implementation of various measures to improve environmental and social performance of the project and expected output, outcome and impacts. - Timelines for monitoring and evaluation Compliance review mechanism	- Clear pictorization / elaboration in local dialect about the outcomes of the project and community monitoring tools like social audit. - Display of such information on the Gram Panchayat building and other prominent places like community centres, choupals etc.
Inter-departmental coordination / convergence	(i) Headquarters level officers of UPID/PACT and line departments. (ii) Divisional/District level officers of the project and line departments. (iii) Field staff of the project and line departments. (iv) Functionaries/representatives of Gram Panchayat, NGO, WUA and others. (v) General villagers and farming community including women		

Entire information base suggested above should be preferably generated in a single document so that officers and functionaries of UPID, PACT and line departments could access it easily. This should also be made available in the website of UPID/project. However, a separate document in form of booklet should be designed and developed for the rural farming community especially keeping in mind the illiterate and semi-literate population. While the knowledge material for officers and functionaries could be in English and Hindi, the material for farmers must be in Hindi language preferably in the local dialect.

Since the project envisages inter-departmental coordination and convergence between various schemes, funds could be easily leveraged for village information centres either at each Gram Panchayat level or at a cluster of Gram Panchayats depending on accessibility, population etc. Such an information centre can also be an extension of the Gram Panchayat building which can also house events such as WUA meetings, stakeholder consultations etc. The Backward Regions Grant Fund can be used utilized for construction of Block Resource Centres / Panchayat Resource Centres / Rajiv Gandhi Sewa Kendras which can be the store house of all IEC materials and other relevant information. The Bharat Nirmaan Volunteers (BNV) – a scheme promoted by the Ministry of Rural Development can be used for activities like awareness generation, people’s participation, social audit, grievance redressal, vigilance and monitoring etc. Similarly, provisions under other flagship programmes should be explored and where possible should be brought on board under this project to avoid duplication of resources and effective utilization of the existing resources.

7.3 Strategic Communication

The policymakers and government officials would be a primary audience for the purpose of building support for the project, especially in terms of continued financing after implementation is complete. To fulfill above objectives, the strategy would include regular briefing and updating them through meetings, a newsletter, Brochures, Fact Files and communication materials which they can distribute to the visitors at their respective offices. Beyond policy makers, scientist, technocrats, NGOs and opinion leaders will also be informed, educated and communicated through various tools. Some important modes and tools are as follows:

- *Face to Face meetings.* State level expert meetings will be periodically organized to maintain ties with policymakers to build a positive sense of ownership. In addition, regular meetings of Circle Officers, Divisional Officers, and line department officials will also be held for strategic communication and effective implementation and review of the project.
- *Brochures.* Concise, understandable and attractive brochures will be prepared to provide an overview of the project, summarize project progress, tell the success stories and also not so successful instances of the project, beneficiaries and explain various issues relevant to water sector.
- *Fact File.* A glossy fact file containing data of water projects will be prepared and circulated to politicians, policymakers and visitors to the project area.
- *Newspaper Articles and Editorials.* A wide spread newspaper coverage of project can raise public awareness of water sector issue and plight of poor farmers. Editorials,

explaining to the urban population the plight of those who grow food for them, will also be published.

- *Case Studies.* The case study based on MIS data will be an effective way to communicate non-specialist audience.
- *Technical manuals.* All technical guidelines and procedures will be prepared for LGC / PLGC areas in form of technical manuals for the benefits of NGOs, universities scholars, developmental staff etc.
- *District Level multi-stakeholder workshops* – These could be formal workshops where state level policy makers interact directly with field level implementation staff and select community members. There can also be public hearings at suitable locations wherein policy makers get a first hand experience of the situation and are able to take corrective actions or explore participatory ways of conflict resolution. These workshops can be on a quarterly / half yearly basis depending upon the pace of implementation of the project.

Some specific suggestions for improving communication on environmental and social aspects are given below:

- Each communication material (mainly printed) should have a separate section on environmental and social aspects.
- Field staff, PRI members, WUA's and NGO workers should be particularly oriented on environmental and social issues. They should be provided adequate literature for further distribution among the general farmers and beneficiaries as well as display them at prominent locations for the information of all.
- As the experience of Water conservation campaign (Amrit Jaldhara) in Aurangabad district of Maharashtra under the National Agriculture Technology Project shows wall paintings can prove quite effective in sensitizing farmers on environmental aspects.
- Capacity building of Gram Panchayat especially the standing committees (through trainings, providing untied funds and personnel) and their subsequent involvement in creating awareness on environmental and social issues will be very effective as they will be able to reach out to the entire population.
- Subsequent capacity building and orientation of the Zilla Panchayat and Block Panchayat representatives on social and environmental issues can help strengthen such initiatives.
- The current system of *Sinchai Bandu* at the district wherein the ZP President presides over a monthly meeting of line department officials of irrigation, agriculture and allied departments should be regularized across all the districts and participation of GP, WUA representatives and beneficiaries should be ensured.
- Project should also promote Kisan Mitra and Mahila Kisan Mitra as environmental and social messengers. They should be adequately trained and sensitized on these issues so that could further communicate with other farmers.
- Special-purpose cultural troupe should be mobilized to organize cultural programs on environmental and social aspects. This media is likely to be more effective in sensitizing people.
- Krishi Vigyan Kendras to be supported with innovative means of communication and updated with information from irrigation, agriculture and allied departments so that they are able to communicate the same to the beneficiaries and extension workers.

- The communication system for the project including environmental and social aspects should be dynamic in nature. It should be continuously improved and updated with additional knowledge resources and tools and techniques on the basis of implementation experience and feedback from implementation partners.
- The communication strategy itself should be reviewed periodically – atleast once in 6 months to ascertain its efficacy and suggestions from all stakeholders like line departments, media groups, NGOs, PRIs, Community members should be elicited to improve the same.

A summary of communication tools which can be used is presented below in **Table 7.2**.

Table 7.2: Summary of communication tools

Stakeholder Group	Primary Communication Need	Primary Messages	Preferred Tools
Beneficiaries	Operational	<ul style="list-style-type: none"> • Project rules, roles, responsibilities. • Benefits of participation. • Clarity of roles of PRI, WUAs and other CBOs. • Guide to conflict resolution. • Right to information • Technical knowledge on land management (agriculture) • Opportunities for income generation (livelihoods) • Other programs that can meet their needs (dovetailing) 	<ul style="list-style-type: none"> • Traditional theater • Posters • Village meetings • Newspaper • Radio ads/shows • TV ads • SMS technology (for extension messages) • Wall paintings • Citizen's charter in the Gram Panchayat Bhavan.
Policymakers	Strategic	<ul style="list-style-type: none"> • Project progress • To maintain Tie and build ownership • To show project impacts • To flag deviations, risks and concerns for timely action. • Oppurtunities of convergence between departments / schemes / programmes for maximum results. 	<ul style="list-style-type: none"> • Meetings • Brochures • Fact File • Documentaries • TV/radio • Case studies – highlighting good practices and failures. • Technical manuals.
Opinion Leaders, Academia	Strategic	<ul style="list-style-type: none"> • Project progress • To maintain Tie and build opinion • To show project impacts • Influencing policy 	<ul style="list-style-type: none"> • Meetings • Brochures • Fact File • Documentaries • TV/radio • Case studies
Government officials (practitioners)	Operational	<ul style="list-style-type: none"> • Project rules, roles, responsibilities • Benefits of participation • Right to information • Technical knowledge on land management related issues • To flag deviations, risks and concerns for timely action. • Oppurtunities of convergence between departments / schemes / programmes for maximum results. 	<ul style="list-style-type: none"> • Meetings • Circulars • Brochures • Community interactions like <i>Goshtis</i>, public hearings etc. • Print and Electronic media •

Stakeholder Group	Primary Communication Need	Primary Messages	Preferred Tools
NGOs	Operational	<ul style="list-style-type: none"> • Project rules, roles, responsibilities • Benefits of participation • Right to information • Technical knowledge on land management related issues • Awareness' campaign • Legal issues 	<ul style="list-style-type: none"> • Meeting • Extension Literature • Audio/Video • Wall paintings • Social audit and public hearings • Policy and legal documents
Legal fraternity	Operational	<ul style="list-style-type: none"> • Project rules, roles and responsibilities. • Legal framework. • Stakeholders. • Right to Information. • Technical knowledge on land and water management. • Rights issues. • Legal interventions in other states. 	<ul style="list-style-type: none"> • Workshops and seminars • Project related literature • Print and electronic media (for suo- moto cognizance) • Meeting circulars, brochures etc.

7.4 Conflict Resolutions

As part of the SEA, an attempt was made on assessing the type of conflicts in the area and existing conflict resolution systems. The major findings are presented below in **Table 7.3**. Some of the conflicts mentioned by the stakeholders are not relevant to the project activities (such as access to community grazing land/ pasture, community toilets, community handpumps, etc).

Table 7.3: Conflicts and existing resolution system

S. No.	Conflict areas/risks	Existing resolution system
1.	In absence of irrigation channel network attached to private boring, sometimes farmers whose field is located away from boring face problem in irrigating their crop because other farmers do not allow conveyance of boring water through fields. Such objections are attributed to personal reasons or anticipated loss of crop or indifferent attitude of concerned farmer. The social status in terms of caste/class issues also play an important role in such cases.	<ul style="list-style-type: none"> ▪ Conflict/objection due to personal reasons (between two farmers) is sorted out through mutual discussion or through intervention from influential people of the village or through peer pressure. Sometimes, it is never resolved. ▪ Conflict/objection due to anticipated loss of crop is addressed through synchronization of sowing and irrigation schedule by the concerned farmers. ▪ Conflict/objection due to indifferent attitude is resolved through peer/social pressure.
2.	Pond water is better accessible to those farmers whose field is located adjacent/closer to the pond. Such farmers develop a sense of first right to use pond water. When owner of distantly-located plot uses pond water, conflict arises. Many a time, this leads to intense conflicts.	<ul style="list-style-type: none"> ▪ Final resolution of conflict depends on relative socio-economic power of the concerned parties. Sometime, decision is taken in favor of stronger party. ▪ In majority cases, adjacent farmer is convinced about equal rights of all farmers of the village to use pond water. ▪ Members of Gram Panchayat, not the Gram Panchayat as an institution, play crucial role in resolution of such conflicts.
3.	Conflict arises also in use of canal water for crop irrigation. When quantum of water in	<ul style="list-style-type: none"> ▪ Such conflicts are resolved generally through mutual negotiation. In many cases, the problem is referred to the Irrigation Department

S. No.	Conflict areas/risks	Existing resolution system
	canal is low and some intermittent farmer puts on bunds in order to ensure higher quantity of water for his field tail users have smaller quantity of water, conflict among farmers arises.	<p>which intervenes to resolve the issue.</p> <ul style="list-style-type: none"> ▪ Sometimes FIRs are lodged against the erring farmers but no action is taken against them because of political patronage.
4.	Community grazing land/pasture should be theoretically accessible to all farmers of the village. However, influential people have better access to such lands/pastures. Many a time, animals belonging to powerful people get privilege. Thus, poor and weaker farmers have lower access.	<ul style="list-style-type: none"> ▪ Such conflicts, when arise, are never resolved. Poor farmers adjust their timing.
5.	Absence of proper field/link drain network connecting agricultural fields also leads to conflict among farmers, especially during heavy rains.	<ul style="list-style-type: none"> ▪ Generally, such conflicts are not resolved. ▪ However, sometimes, farmers will arrive at mutual consensus to drain out the entire area.
6.	Sowing and harvesting time is generally the same for all farmers. Hence, their labor requirement is also simultaneous. In majority of cases, a group of labor engaged by a farmer is hired by another farmer through allurements of little higher wages or other mechanisms. Thus, conflict of interest arises between the two parties.	<ul style="list-style-type: none"> ▪ Such conflicts are resolved through mutual discussions. ▪ When conflict becomes intense other people and even members of Gram Panchayat intervene.
7.	Some general conflict of interest arises in the villages. These conflicts may relate to property, division of assets between brothers, etc.	<ul style="list-style-type: none"> ▪ These conflicts are generally resolved through informal Panchayat under which elderly and influential people are invited to decide the case. Such elderly people provide an opportunity of hearing to both the parties and take decision on the basis of merit. If the parties are not satisfied with the decision, they approach the court for legal remedy.
8.	Community hand pumps have been installed under different government schemes (National Drinking Water Mission). These hand pumps are supposed to be located at easily accessible location to all users. However, such hand pumps are located at private places/premises of individuals who tend to prohibit others from these hand pumps. Such situation leads to quarrel between two parties.	<ul style="list-style-type: none"> ▪ In majority cases, Gram Panchayat intervenes and resolves the conflict.
9.	Community toilets under Total Sanitation Campaign have also been constructed in many villages which are meant for the use of all those who wish to use it. But neighboring families have better physical access to such toilets. When distantly-located families use these toilets, conflict arises because neighboring families raise objections.	<ul style="list-style-type: none"> ▪ In such cases, Gram Panchayat intervenes and resolves the conflict.
10.	Field bunds are prepared by two adjacent farmers. Both of them are required to contribute equal area towards field bund. If an individual farmer tends to reduce the area bund area from his side, conflict arises.	<ul style="list-style-type: none"> ▪ Such types of conflicts are resolved through social pressure or mutual understanding.
11.	Absence of common drain outlets in	<ul style="list-style-type: none"> ▪ Community pressure resolves the issue.

S. No.	Conflict areas/risks	Existing resolution system
	residential area also leads to conflicts among people, especially during rains. Downstream households object to flow of water from up-land through their premises.	<ul style="list-style-type: none"> ▪ Sometimes, Gram Panchayat also intervenes to resolve the issue.

As shown above, the majority of the conflicts are resolved through mutual discussions/negotiations, community pressure, intervention of Gram Panchayat or other influential people of the village. In a few cases, the affected parties also resort to legal remedies. The major reasons for such conflicts as have been expressed by the communities are illiteracy and ego related problems coupled with caste and class based politics. Given such conditions, any conflict resolution mechanism (internally or externally) is not likely to be full proof. Also, the importance of Gram Panchayats has been greatly undermined owing to issues like caste based reservations, poor capacity building and insufficient support for the Panchayats to be effective institutions of governance, poor occurrence of Gram Sabha and standing committee meetings etc.

7.5 Conflict resolution systems for new assets and opportunities to be created under the project.

According to the community, it is anticipated that the existing conflict resolution systems will prove equally effective for the assets and opportunities to be created under the project.

The other major conflict resolution mechanisms under the project will be:

- Through WUAs. The intent is, through WUAs establishment and capacity-building, to build mechanisms for farmers to handle water related conflicts in a more organized and transparent manner.
- Through UPID complaint and grievance redressal system, which is already functional.
- Moreover, the overall governance system within UPID will be enhanced by making more transparent the performance of the system. This includes greater introduction of monitoring and dissemination of this information through public websites. The strengthening of the existing management information system (MIS) will also contribute to overall greater transparency in the UPID.

Conflicts and their resolution will be monitored through the overall Monitoring and Evaluation of the project by PACT assisted by the external M&E agency.

Some of the specific provisions for conflict resolution under the **PIM Act** are given below.

Settlement of Disputes: The dispute or difference relating to constitution, management, powers and functions of a WUA shall be resolved as follows:

1. Any dispute or difference arising between its members shall be resolved by the managing committee of the water users' association.
2. Any dispute or difference arising between a member of water users' association and a members of its managing committee shall be resolved by the immediate upper level water users' association or the competent canal officer, as the case may be.

3. Any dispute or difference arising between users' associations shall be resolved by the immediate upper level water users' association or the competent canal officer, as the case may be;
4. Every dispute or difference shall be disposed of within thirty days from the date of reference of the dispute in such manner as may be prescribed.

Appeals: Relevant provisions are given below.

Any party aggrieved by the decision made or orders passed by a water users' association may prefer an appeal to the immediate upper level water users' association or the corresponding competent canal officer, if such upper level water users' association does not exist.

Appeal under shall be made within thirty days from the date of the decision or the orders and shall be disposed of within thirty days from the date of filing thereof.

Any party aggrieved by the decision or order of the competent canal officer may appeal to appellate officer within 30 days from the date of such decision or order. The decision taken by the appellate authority shall be final and binding. The organization structure for complaint redressal is given below in table 7.4.

Table 7.4: Organization Structure for Complaint Redressal under PIM Act

Sr. No.	Committee	Canal Officer	Registrar	Appellate Officer
1.	Kulaba Committee	Junior Engineer	Executive Engineer	Executive Engineer
2.	Alpika Committee	Assistant Engineer	Executive Engineer	Executive Engineer
3.	Rajbaha Committee	Executive Engineer	Superintending Engineer	Superintending Engineer
4.	Branch Committee	Superintending Engineer / Chief Engineer level - 2	Chief Engineer level - 2	Chief Engineer level - 1
5.	Project Committee	Chief Engineer level - 2	Chief Engineer level - 1	Chief Engineer Design

Source: Training Manual WUA, PACT / UPID

The implementation of the PIM Act includes mechanism for lodging complaint at every level. At the base level, the following provisions will be implemented.

1. A complaint register will be maintained by every Alpika/ Rajbaha Committee of WUA.
2. Any member/ farmer of WUA can lodge a complaint in this complaint book.
3. Management committee of the WUA will resolve the complaint within fifteen days.

In case of non resolution, conflict resolution mechanism will exist through PIM cell to be established at division, circle and zonal level, where monthly meetings provide opportunities for such conflict resolution.

7.6 Institutional Arrangement, Training and Capacity Building Plan

The project is anticipated to have various environmental and social impacts which may be positive or negative. There will be a need for combination of strategies to address such impacts. While one of the strategies should aim at maximization of minimum possible positive outcomes from each activity, the other strategy should target to minimize the maximum probable undesirable outcomes. Willingness and capacity of different stakeholders will be the most important determinant of the success. Thus, capacity-building of farmers and functionaries of UPID and line departments will be necessary to improve environmental and social performance of the project. The following section describes each of these items.

7.6.1 Mechanisms of environmental and social performance improvement of project

Environmental and social performance of the project will depend, on clarity of objectives and goals, meticulous planning, implementation, and rigorous monitoring and evaluation along with compliance review and action mechanism. The aim is to reduce adverse environmental and social impacts and to enhance the positive outcomes. Chapter 5 and Chapter 6 have described the impacts and Environmental and Social Management Framework, respectively. Environmental issues are mainly technical in nature and need to be handled technically. However, adequate sensitization of various stakeholders, especially implementation partners such as UPID (the agency mainly responsible for implementation of the ESMF), and Agriculture Department (responsible for organization of FWS, crop demonstrations, etc). Though these departments are aware of both positive and negative impacts of their activities they need additional sensitization so that all possible precautions are taken to avoid negative outcomes and enhance the positive outcomes. Farmers need to be sensitized and cautioned against negative environmental impacts and the steps which they could adopt for the same.

Social issues such as probable conflicts, caste and other socio-economic dynamics should be kept in mind while planning and implementing the project activities. Project functionaries including the line department staff should be apprised of these inherent conflicts and socio-economic dynamics which exist in the rural areas so that they take preemptive measures against these negative forces.

7.6.2 Skill and capacity-building requirements

Summary of skill & capacity building requirements at various stakeholder levels is given in **Table 7.5**.

Table 7.5: Summary of capacity-building requirements at various stakeholder levels

Stakeholder level	Skill and capacity-building requirement
Individual	<ul style="list-style-type: none">▪ Individual level measures to avoid adverse environmental impacts▪ Sensitization to covariate factors affecting the environment▪ Trade-off between short term and long term gains from various activities▪ Socio-economic heterogeneity existing the villages and measures to overcome for common cause
Farm/household	<ul style="list-style-type: none">▪ Individual level measures to avoid adverse environmental impacts

Stakeholder level	Skill and capacity-building requirement
	<ul style="list-style-type: none"> ▪ Sensitization to covariate factors affecting the environment ▪ Trade-off between short term and long term gains from various activities ▪ Socio-economic heterogeneity existing the villages and measures to overcome for common cause ▪ Orientation and sensitization of women and if possible children about all the above issues
Water Users Associations	<ul style="list-style-type: none"> ▪ Necessity of group approach in planning and execution of irrigation system development including irrigation channel network, field drain network, construction and maintenance of link drains through watershed approach ▪ Water sharing among group members ▪ Preparation of water roster on consensus basis to enhance transparency and to avoid disputes and conflicts in water sharing ▪ Planning of crop rotation and crop mix ▪ Collective management of agricultural inputs ▪ Ways to overcome socio-economic heterogeneity for the common cause
Community	<ul style="list-style-type: none"> ▪ Mass awareness in order to develop a community for environmental and social aspects ▪ Sensitization of community towards environmental and social issues so that individual efforts of farmers get support from the community ▪ Developing community ownership of various concerns affecting the entire community
Institutional	<ul style="list-style-type: none"> ▪ UPID/PACT and other line departments need to prepare separate action plan to address environmental and social issues concerned with their respective activities ▪ Awareness among all the functionaries of implementing agencies ▪ Officers and functionaries of UPID/PACT and line departments are technically sound. However, they are generally driven by targets set by the project or higher authorities. As a result, they neglect environmental and social aspects of their activities. They need to be alerted against negative outcomes of their activities and probable measures to reduce the same.
Division/District	<ul style="list-style-type: none"> ▪ Since Division/district level officers and functionaries of the project and line departments will be entrusted with the direct responsibility of implementation, they need adequate orientation to environmental and social issues. ▪ They need to be trained on environmental and social settings in which they will function for which location-specific knowledge base should be created and communicated to these officers and functionaries.
State	<ul style="list-style-type: none"> ▪ State level officers should be oriented about the environmental and social settings of all the project districts and the state as a whole. ▪ Sense of ownership needs to be developed at the top management level

UP irrigation department will be a major stakeholder in both planning & implementation of UPWSRP phase II. Therefore, an effort has been made to identify, develop & implement training & capacity building plan as described below.

7.6.3 Capacity Building and Training Needs of UPID on Environmental and Social Issues

In order to streamline social and environmental issues in planning and implementation of project based on stakeholders' needs, the institutional capacity of Uttar Pradesh Irrigation Department has been assessed and described in chapter 2. Training needs assessment, design of training programs and implementation mechanism is described below based on this assessment.

Training Needs Assessment

In the absence of a well designed training program covering environmental and social issues at the grass root level, an effort was made to assess the efficacy of existing training programs being imparted to NGOs, WUAs and UPID in order to identify the gaps. This gap analysis has been carried out by comparing the contents and duration of the existing training program being imparted to NGOs, WUAs and UPID at the grass root level and the response elicited from the target groups as described below.

Contents of training at L3 level

NGOs, UPID officials and WUAs should be trained by WALMI, PACT and NGOs. Subjects covered by *NGOs*- NGO's can play a important role in training programme for grass root level (Farmers) workers with the help of WALMI, PACT and other institutions. The subjects should be covered in the training programs:

- i. Maintenance of Minor,
- ii. Water management
- iii. Maintenance of records.
- iv. Participatory Irrigation Management,
- v. Evaluation of work of WUAs.
- vi. Budgeting,
- vii. Bio-fertilizer and
- viii. Horticulture.

UPID officials- Objective of training programs should to provide an understanding about the role of officials in strengthening the concept of PIM and the activities of WUAs. These should be included:

- i. Generate awareness among farmers about the importance of PIM and WUAs;
- ii. Provide help to WUAs in cleaning of Minors;
- iii. Timely and equal distribution of Water through Warabandi and Osrabandi;
- iv. Provide knowledge to farmers about new crops and use of fertilizers; and
- v. Effective water management/ prevent wastage of water.

Executive Engineers and Assistant Engineers (AEs) should also imparted training with respect to ways for strengthening of WUAs. The Seenchpals should also train in the maintenance of irrigation record and their responsibilities towards WUA's.

WUA- Training should be imparted through NGOs and WALMI and the duration of their training ranged between 1 and 5 days. The contents of the training program at WALMI included:

Maintenance of minor including de-silting:

- i. Benefits of PIM and the role and responsibilities of WUAs;

- ii. Need of communication among all stakeholders;
- iii. Use of high yielding variety (HYV) and new seeds;
- iv. Maintenance of records;
- v. Proper use of water and equity in its distribution through Warabandi/Osrabandi;
- vi. Prevention of water wastage and
- vii. Maintenance of drainage system.

Design of Training Program

Design of training program should be carried out based on major training needs as summarized below.

- i. Water resources sector needs both augmentation of knowledgebase as well as organizational strengthening with respect to mainstreaming of environmental and social issues.
- ii. At L1 level, there is a need for transforming environmental and social issues related policies both at national and state level into intervention planning, implementation and monitoring for effective mainstreaming from time to time.
- iii. L2 and L3 levels need training covering all aspects of social and environmental issues identification, intervention planning, implementation and monitoring. The existing formats of training program at L3/WUA/ NGO level needs to be strengthened in the light of identified gaps.

The above inferences define type of training programs required to be implemented at different levels. These training programs are summarized below in **Table 7.6**.

Table 7.6: Target Groups and Type of Training Programs

Type of Training Program	Target Group				
	L1	L2	L3	NGOs	WUAs
Environmental & Social Awareness	√	√	√	√	√
Design of Social & Environmental Interventions	√	√			
Implementation of Social & Environmental Interventions	√	√	√	√	√
Monitoring & Evaluation	√	√	√	√	√

Source: Compiled by IRG, BSEA Phase I

These training programs have been designed in terms of target group, frequency of conducting training programs, duration of training programs and format of training programs. The source for developing training material has been identified and is part of social and environmental assessment study outputs, which will be institutionalized in a time bound manner. Each of these training programs can be implemented in terms of seven sub training modules. These modules have been described in **Table 7.7** and **Table 7.8**. These sub training modules can be implemented either independently or in combination with others.

7.6.4 Implementation Mechanism

It is proposed to institutionalize the environmental and social capacity building and training activity at UPID/PACT. The rationale for institutionalizing it at UPID/PACT is given below.

- i. Repository of social and environmental knowledgebase
- ii. Existence of environmental and social expertise
- iii. Existence of infrastructure/ facilities in terms of operating hardware and software e.g. modeling/ DSS/ GIS/ Auto CAD etc.

It is proposed to develop the capacity of UPID/PACT in carrying out environmental and social due diligence so that they can act as trainers to other stakeholders. Further, PACT can act as independent / autonomous agency for monitoring the capacity building effort. The entire implementation mechanism is shown in **Figure 2.2**. The proposed training areas and faculty for these modules are described in **Table 7.9**. It is proposed to augment the capacity of faculty at UPID/PACT by conducting training programs under the social and environmental assessment.

Table 7.7: Training Programs for Awareness Raising

Target Group									
Awareness	L1	L2	L3	NGO	WUA	Frequency	Duration	Content/ Format	Source
Module 1: Policy & Regulations	√	√				Twice Every Year	One Day	Policy (Social/water resources/ Environment)	SEA-Environmental & Social Regulatory Framework / UPWSRP Phase II ESMF Report
					Regulations related to water resources.				
					Regulations related to environment assessment.				
								Regulations related to social assessment.	
Module 2: Baseline Environment & social Status	√	√				Twice Every Year	One Day	Environmental & Social regulatory framework.	Baseline Environmental Social database compendium / GIS database / UPWSRP Phase II ESMF Report
					Status based on baseline Environmental Indicators.				
					Status base on Baseline Social Assessment Indicators.				
								Description of hotspots.	
Module 3: Area specific baseline Environment & Social Status		√	√	√	√	Twice Every Year	One Day	Area specific environmental issues	Baseline environmental & Social database comparative / maps / UPWSRP Phase II ESMF Report
								Area specific social issues.	
								- Description of hotspots.	

Source: Compiled by IRG, BSEA, Phase I

Table 7.8: Training Programs for Social & Environmental Due Diligence

Target Groups									
Design / Implementation and monitoring of Social & Environmental Intervention	L1	L2	L3	NGO	WUA	Frequency	Duration	Content/ Format	Source
Module 4: Preplanning Stage (E.A./SA scoping)	√	√					Half day	1- Environmental & Social Screening.	1- Guidelines for usage of environmental knowledgebase at district & block level (BSEA, UPWSRP Phase I).
								2- Identification of hotspots.	
Module 5: Planning Stage (EIA/SA Study)	√	√				Twice Every Year	One day	3-Evaluation of engineering interventions.	2- SEA- environmental & Social regulatory framework. (BSEA, UPWSRP Phase I) 3. ESMF UPWSRP Phase II
								4-Regulatory Framework.	
Module 6: Implementation Stage (Implementation of SEMF)	√	√	√	√	√		Half day	1- Baseline assessment using primary & secondary data.	1- Guidelines for prioritizing the environmental uses (BSEA, UPWSRP Phase I).
								2- Impact identification & quantification and formulation of mitigation measures.	
								3- Preparation of BOQ.	2- Guidelines for impact identification & prioritizing (BSEA, UPWSRP Phase I).
									3- Guidelines for recommendation of mitigation measures (BSEA, UPWSRP Phase I).
									4- Guidelines for investment scenarios & alternatives (BSEA, UPWSRP Phase I).
									5. ESMF UPWSRP Phase II
								1- Monitoring & Management Plan.	1. Guidelines for monitoring & evaluation (BSEA, UPWSRP Phase I). 2. ESMF UPWSRP Phase II
								2- Implementation of mitigation measures.	
								3- Overall evaluation of environment & social safeguard	

Target Groups									
Design / Implementation and monitoring of Social & Environmental Intervention	L1	L2	L3	NGO	WUA	Frequency	Duration	Content/ Format	Source
Module 7: Post Implementation Stage (Monitoring & Evaluation)	√	√	√	√	√	Twice Every Year	Half day	framework. 4- Institutional Framework roles & responsibility.	

Source: Compiled by IRG

Table 7.9: Training Areas & Faculty

Awareness	Areas	Roles/Responsibility / Faculty
Policy & Regulatory	EIA/ SA scoping : Regulatory review using existing regulatory guide to identify applicable regulations	Environmental / Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT / M&E consultant / Forest Department / UPPCB
Baseline Environment & Social Status	EIA/ SA scoping : Environmental and social screening of sub project using GIS database/ Environmental and Social knowledgebase (developed under SEA) available at UPID/PACT using the screening formats in attached guidelines	Environmental / Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT / M&E Consultant / Department of Agriculture / UPPCB / Ground Water Department / Forest Department / UPRSAC
Area and Specific Social Status	EIA/ SA scoping: Identification of hotspots using GIS database/ Environmental and Social knowledgebase (developed under SEA) available at UPID/PACT.	Environmental / Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT / M&E Consultant / Department of Agriculture / UPPCB / Ground Water Department / Forest Department / UPRSAC
Pre Planning Stage	EIA/ SA scoping : Environmental and social screening of sub project using GIS database/ Environmental and Social knowledgebase (developed under SEA) available at UPID/PACT using the screening formats in attached guidelines	Environmental / Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT / M&E Consultant / Department of Agriculture / UPPCB / Ground Water Department / Forest Department / UPRSAC
	EIA/ SA scoping: Identification of hotspots using GIS database/ Environmental and Social knowledgebase (developed under SEA) available at UPID/PACT.	Environmental/ Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT / M&E Consultant / Department of Agriculture / UPPCB / Ground Water Department / Forest Department / UPRSAC
	EIA/ SA scoping: Evaluation of proposed engineering intervention and their alternatives followed by public consultation.	Environmental / Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT / M&E Consultant / Department of Agriculture / UPPCB / Ground Water Department / Forest Department / UPRSAC
	EIA/ SA scoping: Regulatory review using existing regulatory guide to identify applicable regulations	Environmental / Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT / M&E Consultant / Department of Agriculture / UPPCB / Ground Water Department / Forest Department / UPRSAC
Planning and Design Stage	EIA/ SA study: Baseline assessment using secondary data e.g. GIS database/ Environmental and Social knowledgebase (developed under SEA) available at UPID/PACT using the formats in attached guidelines	Environmental / R&R/ Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT / M&E Consultant / Department of Agriculture / UPPCB / Ground Water Department / Forest Department

Awareness	Areas	Roles/Responsibility / Faculty
		/ UPRSAC
	EIA/ SA study: Baseline assessment using primary data by referring to guidelines as per the procedures and formats/ questionnaires in attached guidelines.	Environmental / Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT / M&E Consultant / Department of Agriculture / UPPCB / Ground Water Department / Forest Department / UPRSAC
	EIA/ SA study: Impact identification based on project interventions both during construction and operation by referring to guidelines as per the procedures and formats/ questionnaires in attached guidelines.	Environmental / Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT / M&E Consultant / Department of Agriculture / UPPCB / Ground Water Department / Forest Department / UPRSAC
	EIA/ SA study: Formulation of impact mitigation measures both during construction and operation by referring to soil management framework, water conservation plan, water pollution control plan/ resource use efficiency plan/ green cover improvement plan/ silt disposal plan/ pesticide management plan/ waste management plan/ disaster management plan/ R&R plan and guidelines and as per the procedures and formats in attached guidelines.	Environmental / Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT / M&E Consultant / Department of Agriculture / UPPCB / Ground Water Department / Forest Department / UPRSAC
	EIA/ SA study: Preparation of bills of quantities (BOQ) and EIA and SA management plan considering mitigation measures both during construction and operation by referring to guidelines and as per the procedures and formats in attached guidelines.	Environmental / Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT
	EIA/ SA study: Identification of environmental and social parameters to be monitored and time bound monitoring plan both during project implementation and post implementation by referring to guidelines and as per the procedures and formats in attached guidelines.	Environmental / Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT / M&E Consultant / Department of Agriculture / UPPCB / Ground Water Department / Forest Department / UPRSAC
Implementation stage	Implementation of EIA/ SA mitigation measures by the contractor/ implementing agency.	Environmental / Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT / M&E Consultant / Department of Agriculture / UPPCB / Ground Water Department / Forest Department / UPRSAC
	Third party evaluation of the project implementation & safeguard measures undertaken during construction	Environmental / Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT / M&E Consultant / Department of Agriculture / UPPCB / Ground Water Department / Forest Department / UPRSAC
	Third party evaluation of the success of project implementation & safeguard measures undertaken during construction.	Environmental / Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT / M&E Consultant / Department

Awareness	Areas	Roles/Responsibility / Faculty
		of Agriculture / UPPCB / Ground Water Department / Forest Department / UPRSAC
Post Implementation stage	Third party evaluation of the post project monitoring parameters/ indicators	Environmental / Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT / M&E Consultant / Department of Agriculture / UPPCB / Ground Water Department / Forest Department / UPRSAC
	Third party evaluation of the post project success & safeguard measures undertaken and follow up activities based on lessons learnt.	Environmental / Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT / M&E Consultant / Department of Agriculture / UPPCB / Ground Water Department / Forest Department / UPRSAC

Source: Compiled by IRG, BSEA, UPWSRP Phase I

7.6.5 Convergence with overall capacity-building plan

UPID has already prepared a Project Implementation plan for project functionaries and farmers. Environmental and social aspects could be built into this plan in order to ensure efficiency and effectiveness of these programmes. Various training material planned to be developed for overall training and awareness generation should include a separate section on environmental and social aspects. New sets of pamphlets, flip charts, booklets should be designed, printed and distributed to the concerned stakeholders. At farmers' field school, some specific-purpose Master Trainers should be identified and trained. These master trainers would impart training to farmers on environmental and social issues. Similarly, environmental and social issues should be included in the training programmes for officers and functionaries of UPID and line departments as described above.

Institutional arrangement

There should/will be a separate Training Cell at UPID headquarters which will plan, coordinate and implement the training and capacity building activities. The Training Cell at UPID headquarters will coordinate with the identified institutes/agencies for sending batches of trainees there. The Cell will function in close coordination with the Environment Cell and Participatory Management Cell at PACT so that environmental and social issues are adequately addressed in training programmes. At the division/district level, a dedicated staff should/would be posted who will coordinate all training activities in the division/district. At sub-district level, field staff including NGO workers will/should be entrusted the responsibility of coordinating the training and capacity building activities. Farmers' Field School can play an important role in capacity building on environmental and social aspects of the project intervention. These schools should be adequately strengthened through literature, infrastructure and financial support to organize training programmes at the local level. This arrangement will also improve attendance in training sessions.

Timeline

Schedule of capacity building should be drawn in such a manner that it caters to both orientation and refresher requirement of a given audience. Thus, training programmes should be organized for different project functionaries immediately after their induction and at regular intervals for reminder/refresher purposes. The suggested timelines of the capacity building of project officers/functionaries and farmers are described below in **Table 7.10**.

Table 7.10: Timeline of capacity-building initiatives for functionaries and farmers

Target group	Year-1	Year-2	Year-3	Year-4	Year-5
Individual					
Farm/household					
WUG					
Community					
Institutional					
Division/District					
State					

Notes:

	Continuous		Orientation		Refresher
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7.7 Monitoring & Evaluation

Monitoring of social and environmental issues forms a key element of ESMF. Actions need to be planned by the project to integrate the monitoring within the project monitoring and evaluation system. The monitoring will involve not only the progress on activities and inputs but generating learning on results and outcomes of project interventions on social and environmental issues. The project will have both internal and external monitoring along with participatory monitoring by beneficiaries.

Internal monitoring

This is done at three levels. At the WUA level, as a part of participatory monitoring, the Representative of MIC, WUAs, NGO and representatives local communities would be monitoring the progress of the implementation and report to MIC and PMU. At the division level, UPID-Division Project Unit (UPIDDPU) will monitor the implementation of social management plans. The UPIDDPU will submit quarterly progress reports to PMU. At the state level, the PMU will monitor implementation of the project and ESMF activities. Both at DPU

and PMU levels the respective Social Environmental Units will be overall responsible for monitoring of implementing of the ESMF.

External Monitoring

The monitoring of ESMP should be made an integral part of the overall M&E system. The external M&E agency will be responsible for monitoring compliance with safeguard policies, on the basis of the Environmental and Social Management Framework and dam safety measures. Annual audits should be conducted by the M&E agency in this regard. The third party quality supervision consultant will also conduct social and environmental checks of construction works.

Monitoring and evaluation is primarily required to ensure proper and timely implementation of environmental and social mitigation measures identified in the planning stage, based on the ESMP. Monitoring at regular intervals during implementation and for a specified period in the post implementation stages is necessary to identify and implement any change / improvement needed in the execution of the activity or in the mitigation measures. Monitoring of the ESMF implementation is needed to verify impacts, ensure adherence to approved plans, environmental standards and general compliance.

Impact Evaluation

Proposed environmental & social impacts monitoring indicators have been identified based on: (i) expected activities in the Project Area, (ii) identified environmental issues and (iii) expected environmental and socio-economic impacts. It is anticipated that future activities in the area will lead to emergence of environmental issues on account of both short and long term environmental impacts. The indicators to monitor these impacts and their frequency of measurement are summarized in Table 7.11. The frequency of measurement has been fixed for annual and five year monitoring period. These have been fixed considering short and long term implementation perspective. The ESMP developed for UPWSRP Phase II can be implemented effectively by integrating it with UPWSRP Project Management Systems and Procedures (to be procured and managed by PACT).

Table 7.11: Indicators for Monitoring

Parameter	Indicator	Frequency	Agency
Environmental parameters			
Soil	Fertility through soil testing Extent of waste land through survey	Annual	UPIDDPU, WUA –after training, Agriculture Department Impact evaluation by M&E agency
Water and Quality	Surface and sub surface Water quality through testing for Standard parameters Pesticide residues (both in water and sediment)	Pre monsoon Post Monsoon	UPIDDPU, WUA –after training, Jal Nigam Impact evaluation by M&E agency
Agri chemicals	Consumption of Fertilizers, pesticides through Survey	Crop-season	UPIDDPU, WUA –after training, Agriculture Department Impact evaluation by M&E agency
Biodiversity	Changes in diversity and	Pre monsoon	UPIDDPU, WUA –after

Parameter	Indicator	Frequency	Agency
	density of avians, natural predators, weeds in water bodies, fields Fish growth	Post Monsoon	training, Forest Department Impact evaluation by M&E agency
Social parameters			
Resettlement	<ul style="list-style-type: none"> - No. of RAP with concerned population - Extent of land acquired/appropriated - No. of affected families eligible for and receiving R&R entitlements 	Before initiating sub-project implementation plan	UPIDDPU, M& E agency
Access to Project benefits	<ul style="list-style-type: none"> - % of beneficiaries from vulnerable groups - No. of days of employment generated and availed by vulnerable groups - % of vulnerable groups accessing agriculture support 	Annually	UPIDDPU, WUA –after training, DoA, M& E agency
Participation	<ul style="list-style-type: none"> - No. of WUAs formed - % of WUA membership from vulnerable sections - Participation of vulnerable groups in WUA and UPID meetings 	Annually	UPIDDPU, WUA –after training, M& E agency
Conflicts	<ul style="list-style-type: none"> - No. and nature of conflicts reported - No. of conflicts resolved 	Annually	UPIDDPU, WUA –after training, M& E agency

7.8 Implementation Schedule & Costing

The implementation schedule has been detailed in environmental and social impact mitigation / enhancement matrix. Budget for implementation for each of the proposed component of ESMF which includes training and capacity building, special studies Biodiversity offset & Monitoring & Evaluation and any investment for mitigation measures (to be included in project bid documents) is recommended to be prepared and included in the project cost once all the activities are finalized. At EIA level, the detailed scheduling and cost estimates for implementing E&S mitigation measures, training and capacity building and other aspects will be prepared and presented as part of the sub-project proposal document to PACT. An estimated budget (inclusive of Bundelkhand, LGC, and Haidergarh Branch sub-project areas) to implement the ESMF is provided in Table 7.12 and expenditures will be monitored under the project M&E system:

Table 7.12: Estimated Budget for ESMF Implementation

Item	Costs (7 years)	Comments
Staff costs	\$1.5 M	(Inclusive of travel budget and other peripherals) Environment Specialist & Support staff
Training Program	\$0.5M	Some of this would be supported under the envisioned Project training program for UPID e.g. training on IPM & IPNM, GIS etc.
Special Studies on environment and social (if required)	\$0.25M	This would be to support special investigations as required by PACT (e.g. wetlands)
Biodiversity offset	\$4.0M	These funds have been allocated for implementation of offset measures along canals.
M&E	\$ 100,000	Some of this would be supported under M&E component
Total	\$6.85M	

7.9 Information Disclosure

Preparation of the Social and Environmental Assessment was widely advertised through district administration during stakeholders consultations carried out in 2012 (see Chapter 5). Draft Final reports for ESMF Bundelkhand, LGC & Haidergarh Branch and their subsequent revised versions were uploaded on the UPID website (<http://irrigation.up.nic.in/project.htm>) on 03.10.2012 for inviting comments and suggestions from public and other stakeholders and were also uploaded on the World Bank InfoShop website. Further, hard and soft copies of these reports were circulated to offices of concerned UPID Chief Engineers (Betwa, Sharda Sahayak and Kanpur) as well as Superintending Engineers (Lalitpur, Aligarh, Kanpur, Etawah, Lucknow) to receive comments & suggestions from all the stakeholders.

Once finalized, the report will be made available to the stakeholders through UPID website and through the World Bank InfoShop. The executive summary has been translated in Hindi and will be made available to the communities in the project areas.

At the planning stage of each project sub-activities, in case there are major environmental or social issues as described in Table 6.3, a site specific EA/EMP will be prepared. In this rare case of application of EIA notification 2006 in any of the sub-activity, the EA/EMP of this activity will require public hearing and disclosure as per this notification. A copy of this notification is given in Volume II for reference.

6.1.1 Construction Camps Plan

The terms and conditions of this EMP pertain to the siting, development, management and restoration of construction camps to avoid or mitigate impacts on the environment. The area requirement for the construction camp shall depend upon the size of contract, number of labourers employed and the extent of machinery deployed. The role and responsibility has been defined for different activities (Pre, construction and post construction phase) as shown below:

Sr. No.	Activity	Site Responsibility	Monitoring Responsibility
Pre-Construction Stage			
1	Identify the site for construction camp in consultation with the individual owners in case of private lands and the Gram Panchayat in case of government lands (Use Format-1).	Contractor	The suitable sites shall be selected and finalized in consultation with the EE or his appointed representative not below the rank of AE
2	Work out arrangements for setting up his facilities during the duration of construction with the land owner/Gram Panchayat.	Contractor	Arrangements will be verified by the EE or his appointed representative not below the rank of AE / Gram Panchayat (GP) to enable redressal of grievances at a later stage of the project.
3	The arrangements will include the restoration of the site after the completion of construction	Contractor	
4	Submit a detailed layout plan for development of the construction camp, indicating the various structures to be constructed including the temporary structures to be put up, site roads, drainage, lighting and other facilities	Contractor	The plan shall be finalized or approved by the EE or his appointed representative not below the rank of AE
5	The plan will include the redevelopment of sites to pre-construction stage. The campsite should cover an area of about 3000 sq. m for 60 Nos. of workers.	Contractor	
6	Submit following documents for arrangement with landowners:- – Written No-objection certificate of the owner/cultivator – Extent of land required and duration of the agreement – Photograph of the site in original condition – Details of site redevelopment after completion	Contractor	The documents shall be checked or approved by the EE or his appointed representative not below the rank of AE
7	Provide, free of cost in the camp site, temporary living accommodation to all the workers employed by contractor for such a period as the construction maintenance work is in progress	Contractor	Monitoring by the EE or his appointed representative not below the rank of AE
8	Provide for a sufficient supply of potable water in the construction camps, in earthen pots	Contractor	
9	Identify suitable community water sources as hand pumps and ponds for procuring drinking water, in consultation with the Gram Panchayat.	Contractor	
10	Event of non-availability of other sources of potable water, the Contractor shall obtain water from an unprotected source, after the testing for its potability	Contractor	
11	– Every water supply or storage shall be at a distance of not less than 15m from any wastewater / sewage drain or other source of pollution. – Water sources within 15m proximity of toilet, drain or any source of pollution will not be used as a source of drinking water in the project		
12	Every site adequate and suitable facilities for washing clothes and utensils shall be provided	Contractor	Monitoring by the EE or his appointed representative not below the rank of AE
13	Separate and adequate bathing facilities shall be provided for the use of male and female workers. Such facilities shall be conveniently accessible and shall be kept in clean and hygienic conditions.	Contractor	
14	Sanitary arrangements, latrines and urinals shall be provided in every work place on the following scale:	Contractor	Monitoring by the EE or his appointed representative not below the rank of

	<ul style="list-style-type: none"> Where female workers are employed, there shall be at least one latrine for every 25 females or part thereof. Where males are employed, there shall be at least one latrine for every 25 males or part thereof. Every latrine shall be under cover and so partitioned off as to secure privacy, and shall have a proper door and fastenings. Where workers of both sexes are employed, there shall be displayed outside each block of latrine and urinal, a notice in the language understood by the majority of the workers "For Men Only" or "For Women Only" as the case may be. The latrines and urinals shall be adequately lighted and shall be maintained in a clean sanitary condition at all times and Water shall be provided in or near the latrines and urinals by storage in drums. 		AE
1 5	Arrangements for Waste Disposal <ul style="list-style-type: none"> Disposal of sanitary wastes and excreta shall be into septic tanks. Kitchen wastes shall be disposed into soak pits. Wastewater from campsites will be discharged and disposed in a kitchen sump located at least 15 meters from any body of water. Sump capacity should be at least 1.3 times the maximum volume of wastewater discharged per day. The bottom of the pit should be filled with coarse gravel and the sides shored up with board, etc. to prevent erosion and collapse of the pit. Solid wastes generated in the construction site shall be reused if recyclable or disposed off in land fill sites 	Contractor	Monitoring by the EE or his appointed representative not below the rank of AE
1 6	First Aid Facilities <ul style="list-style-type: none"> First Aid Box will be provided at every construction campsite and under the charge of a responsible person who shall always be readily available during working hours of the work place. It will be adequately trained in administering first aid-treatment. Formal arrangement shall be prescribed to make motor transport available to carry injured person or person suddenly taken ill to the nearest hospital. 	Contractor	Monitoring by the EE or his appointed representative not below the rank of AE
1 7	Storage Site <ul style="list-style-type: none"> Storage of Petrol/Oil/Lubricants: Brick on edge flooring or sand flooring will be provided at the storage places of Petrol/Oil/Lubricants to avoid soil and water contamination due to spillage. Storage of cement: Damp-proof flooring, as per IS codes Storage of blasting materials: Shall be as per the specific provisions of law. 	Contractor	Monitoring by the EE or his appointed representative not below the rank of AE
1 8	Fire fighting arrangements <ul style="list-style-type: none"> As per HMSP plan (6.1.7) 	Contractor	Monitoring by the EE or his appointed representative not below the rank of AE
1 9	Interactions with host communities <ul style="list-style-type: none"> Issue identity cards to labourers and residents of construction camps. 	Contractor	Monitoring by the EE or his appointed representative not below the rank of AE
Construction Phase			
1	<ul style="list-style-type: none"> Construction camps shall be maintained free from litter and in hygienic condition. It should be kept free from spillage of oil, grease or bitumen. Any spillage should be cleaned immediately to avoid pollution of soil, water stored or adjacent water bodies <p>Following precautions need to be taken in construction camps.</p>	Contractor	EE or his appointed representative not below the rank of AE will monitor the cleanliness of construction campsites and ensure that the sites are properly maintained throughout the period of the contract.

	<ul style="list-style-type: none"> - Measures to ensure that no teaching of oil and grease into water bodies or underground water takes place - Wastewater should not be disposed into water bodies - Regular collection of solid wastes should be undertaken and should be disposed off safely - All consumables as the first aid equipment, cleaning equipment for maintaining hygiene and sanitation should be recouped immediately 		
Post Construction Phase			
1	<ul style="list-style-type: none"> - At the completion of construction, all construction camp facilities shall be dismantled and removed from the site - The site shall be restored to a condition in no way inferior to the condition prior to commencement of the works (Use Format 2) <p>Various activities to be carried out for site restoration are:</p> <ul style="list-style-type: none"> - Oil and fuel contaminated soil shall be removed and transported and buried in waste disposal areas. - Construction campsite shall be grassed and trees cut replaced with saplings of similar tree species. - Saplings planted shall be handed over to the community or the land owner for further maintenance and watering - Soak pits and septic tanks shall be covered and effectively sealed off. 	Contractor	The restored site shall be inspected by the EE and will issue "Restoration Certificate". The same shall be submitted to EE before final payment is claimed.

Selection or construction camp/site locations

Avoid the following	Prefer the following
<ul style="list-style-type: none"> • Lands within 500m of habitations • Irrigated agricultural lands • Lands belonging to small farmers • Lands under village forests • Lands within 100 m of community water bodies and water sources as rivers • Lands within 100 m of watercourses • Low lying lands, marshy areas and bheels • Lands supporting dense vegetation • Grazing lands and lands with tenure rights • Lands where there is no willingness of the landowner to permit its use 	<ul style="list-style-type: none"> • Waste lands • Lands belonging to owners who look upon the temporary use as a source of income • Community lands or government land not used for beneficial purposes • Private non-irrigated lands where the owner is willing and • Lands with an existing access road

Include in the bid document, as a special condition clause stating that all provisions of guideline shall be applicable to the locations of construction camps.

Format 1: Setting-up Construction Camp and Storage Area (To be filled by Contractor)

1. Name of Canal.....
2. Name of Nearest Human Settlement.....
3. Location of Camp.....

Sr. No.	Item	Unit	Detail	Remarks by UPID (If any)
1.	Detail of Construction Camp			
a.	Area of Camp			
b.	Distance from Nearest Habitation			
c.	Distance from nearest water source			
d.	Details of storage area			
e.	Availability of separate waste disposal from storage area			
2.	Details of Workforce			
a.	Total No. of Workers			
b.	Total No. of Male workers			
c.	Total No. of Female workers			
d.	No. of Children			
3.	Details of dwellings units			
a.	No. of dwellings units			
b.	Source of Drinking Water			
c.	Total No. of bathrooms			
3.	Details of Facilities			
a.	Details of First Aid facility			
b.	Availability of Dustbins			

Remarks:.....

.....

Submitted

Checked

Approved

Signature.....

.....

.....

Name.....

.....

.....

Designation.....

.....

.....

Contractor

Assistant Engineer

Executive Engineer,

UPID

UPID

Format 2: Restoration of Construction Site

(To be filled by the Contractor)

1. Name of Canal.....
2. Name of Nearest Human Settlement.....
3. Date of Submission.....

S. No.	Contract Package	Labor Camp		Construction Camp		Plant Site		Borrow Areas		Disposal Location		Top Soil	
		O	R	O	R	O	R	O	R	O	R	Preserved	Restored

Remarks:.....

Submitted
 Signature.....
 Name.....
 Designation.....
 Contractor

Checked

 Assistant Engineer
 UPID

Approved

 Executive Engineer,
 UPID

6.1.2 Waste Management Plan

The procedures for this EMP are for handling, reuse and disposal of waste materials during construction. The waste materials generated can be classified into (i) Construction Waste and (iii) Domestic waste. The role and responsibility has been defined for different activities (Pre, construction and post construction phase) as shown below:

Sr. No.	Activity	Site Responsibility	Monitoring Responsibility
Project Planning and Design Stage			
1	Carry out the following activities as part of DPR : <ul style="list-style-type: none"> Finalize design to minimize waste generation through balancing of cut and fill operations and minimizing excess cuts requiring disposal. Identify the type of wastes as well as sources of waste during construction and suggest options for possible reuse Provide guidelines to the contractor for locating waste disposal sites for non-toxic wastes Identify existing landfill sites if available for disposal of toxic materials. In case no existing landfill sites are available, identification of landfill site as well as decommissioning of these site should be undertaken. Towards this, identify the clearance requirements. Include in the bid document a special condition clause stating that all provisions shall be applicable to the locations of disposal of wastes 	UPID-Division	EE or his appointed representative not below the rank of AE <ul style="list-style-type: none">
Pre Construction Stage			
1	Identify the activities during construction, that have the potential to generate waste and work out measures for the same in the construction schedule to be submitted to the EE or his appointed representative not below the rank of AE.	Contractor	Arrangements will be verified by the EE or his appointed representative not below the rank of AE / Gram Panchayat (GP) to enable redressal of grievances at a later stage of the project.
2	For the disposal of excess cut and unsuitable (non-toxic) materials, the contractor shall identify the location for disposal in consultation with the community / Gram Sabha (Use Format-3)	Contractor	
3	Any toxic materials shall be disposed in existing landfill sites that comply with legislative requirements	Contractor	The documents shall be checked or approved by the EE or his appointed representative not below the rank of AE
4	Prior to disposal of wastes onto private/community land, it shall be the responsibility of the Contractor to obtain a No-objection Certificate (NOC) from the land owner/community.	Contractor	
6	Educate his workforce on issues related to disposal of waste, the location of disposal site as well as the specific requirement for the management of these sites.	Contractor	Monitoring by the EE or his appointed representative not below the rank of AE
Construction & Post Construction Phase			
1	– Either reuse or dispose the waste generated during construction depending upon the nature of waste, as specified in Table 1 . – The reuse of waste shall be carried out by the contractor only after carrying out the specific tests and ascertaining the quality of the waste materials used, and getting the same approved by the EE. The contractor shall adopt the following precautions while reusing wastes for construction: <ul style="list-style-type: none"> In case of bituminous wastes, dumping will be carried out over a 60 mm thick layer of rammed clay so as to eliminate any chances of leaching. In case of filling of low-lying areas with wastes, it needs to be ensured that the level matches with the surrounding areas. In this case care should be taken 	Contractor	The waste management practices adopted by the Contractor, including the management of wastes at construction camps, etc. The work shall be reviewed by the EE on random sampling basis during the progress of construction.

	that these low lying areas are not used for rainwater storage <ul style="list-style-type: none"> • In case oil and grease are trapped for reuse in a lined pit, care shall be taken to ensure that the pit should be located at the lowest end of the site. 		
Post Construction Phase			
1	<ul style="list-style-type: none"> - Hand over the site after clearing the site of all debris/wastes to the EE or his appointed representative not below the rank of AE - In case of disposal of wastes on private land, certificate of Completion of Reclamation is to be obtained by the Contractor from the landowner that "the land is restored to his satisfaction" (Use Format 2). 	Contractor	<ul style="list-style-type: none"> - Inspected by the EE or his appointed representative not below the rank of AE. - The same is to be submitted to the EE before final payment is claimed.

Table 1: Type of wastes and scope for reuse

S. No	Activity	Type of waste	Scope for possible reuse	Disposal of waste
I CONSTRUCTION WASTES				
	Site Clearance	Vegetative cover and top soil	Vegetating embankment slopes	
		Unsuitable material in embankment foundation	Embankment Fill	Low lying areas Land till sites
2	Earthworks			
	Overburden of borrow areas	Vegetative cover and soil	Vegetating embankment slopes	
	Overburden of quarries	Vegetative cover and soil	Vegetating embankment slopes	
		Granular material	Embankment Fill, Pitching	
	Accidental spillages during handling	Dust		
	Embankment construction	Soil and Granular Material	Embankment Fill	
	Construction of earthen drains	Soil	Embankment Fill	
3	Concrete structures			
	Storage of materials	Dust, Cement, Sand,	Constructing temporary structure, embankment till	
		Metal Scrap		Scrap Yard
	Handling of materials	Dust		
	Residual wastes	Organic matter	Manure, Revegetation	
		Cement, sand	Constructing temporary structure, embankment fill	
		Metal scrap	Diversion sign, Guard Rail	
4	Reconstruction works			
	Dismantling of existing pavement	Bitumen Mix, granular material	Sub-base	
		Concrete	Road sub-base, reuse in concrete, fill material and as rip rap on roads	
		Guard rail sign post, guard stone	Reuse for same	
	Dismantling of cross drainage structures	Granular material & bricks	Constructing temporary structure, embankment till	
		Metal scrap	Diversion sign, Guard Rail	
		Pipes	Culvert	
	Decommissioning of sites			
	Dismantling of temporary structures	Granular material and bricks	Constructing temporary structure, embankment till	

II	OIL AND FLUIDS			
	Construction machinery maintenance and refueling	Oil and Grease	Incineration, Cooking, Illumination	
2	Bituminous works			
	Storage	Bitumen	Low Grade Bitumen Mix	
	Mixing and handling	Bitumen	Low Grade Bitumen Mix	
		Bitumen Mix	Sub-base, Paving access & cross roads	
	Rejected bituminous mix	Bitumen Mix	Sub-base, Paving access & cross roads	
III	DOMESTIC WASTES			
	Construction camps	Organic waste,	Manure	
		Plastic and metal scrap		Scrap Yard
		Domestic effluent	Irrigation	

Practices to avoid - waste disposal

Tipping of waste into stream channels, water
 location of disposal site as well as the bodies, forests and vegetated slopes
 Non-cleaning of wastes after day's work
 Leaching of wastes
 Littering in construction camps / sites
 Storing wastes on private land

Format 3: Identification of Waste Disposal Site (To be filled by Contractor)

1. Name of Canal.....
2. Name of Nearest Human Settlement.....

Sr. No.	Criteria on which information for each site is to be collected	Site 1	Site 2	Site 3	Site 4
1.	Existing Land use				
2.	Area				
3.	Total material than can be dumped within the site (m ³)				
4.	Distance from Nearest Watercourse				
5.	Nearest Settlement (m)				
6.	Whether the community is agreeable to siting of dumping site (Y/N)				

Remarks:.....

Submitted

Checked

Approved

Signature.....

.....

.....

Name.....

.....

.....

Designation.....

.....

.....

Contractor

**Environmental Engineer
Supervision Party**

**Executive Engineer,
UPID**

6.1.3 Construction Plants & Equipment Management Plan

During execution of the project, construction equipments, machinery and plants always have impact on the environment. The impact can be due to the emissions, dust, noise and oil spills that concern the safety and health of the workers, surrounding settlements and environment as a whole. The EMP describes the activities during the project stages where pollution control measures are required. The role and responsibility has been defined for different activities (Pre, construction and post construction phase) as shown below:-

Sr. No.	Activity	Site Responsibility	Monitoring Responsibility
Project Planning and Design Stage			
1	Selection criteria for setting up a plant area and parking lot for equipments and vehicles shall be done as per siting criteria for construction camp.	Contractor	Arrangements will be verified by the EE or his appointed representative not below the rank of AE to enable redressal of grievances at a later stage of the project.
Pre Construction Stage			
1	<ul style="list-style-type: none"> The Contractor must educate the workers to undertake safety precaution while working at the plant / site as well as around heavy equipments (Use Format 6 & 7). The Contractor shall ensure all vehicles must possess Pollution Under Control (PUC) Certificate, which and shall be renewed regularly. The Contractor must ensure that all machinery, equipments, and vehicles shall comply with the existing Central Pollution Control Board (CPCB) noise and emission norms (Use Format 8). The Contractor shall design the service road with protection measures as black topping at vulnerable points as in low lying areas. 	Contractor	<ul style="list-style-type: none"> The EE or his appointed representative not below the rank of AE must ensure that the Contractor shall submit a copy of the NOC and PUC Certificates before the start of work. Monitoring of all activities by the EE or his appointed representative not below the rank of AE (Format 9).
Construction Phase			
1	<ul style="list-style-type: none"> The Contractor shall undertake measures as per Table 1 to minimize -the dust generation, emissions, noise, oil spills, residual waste and accidents at the plant site as well as during transportation of material to construction site. A detailed of Machinery Operation should be provided (Use Format 4). During site clearance, all cut and grubbed materials shall be kept at a secured location so that it does not raise any safety concerns. During <i>excavation</i>, <i>water</i> sprinkling shall be done to <i>minimize</i> dust generation Frequent water sprinkling shall be done on the haul roads to minimize dust generation. Incase of loose soils, compaction shall be done prior to water sprinkling. Cautionary and informatory sign shall be provided at all locations specifying the type of operation in progress. The construction waste generated shall be disposed as per guidelines for “Waste Management Plan”. The equipments, which are required to move forward and backward, shall be equipped with alarm for backward movement. It shall be ensure that the workers shall remain away from the working areas at such times. Safety measures during bitumen construction work... <p>- Ensure that bitumen storing, handling as well as</p>	Contractor	The EE or <i>his</i> appointed representative not below the rank of AE shall carry out periodic inspections to ensure that all the pollution control systems are appropriately installed and comply with existing emission and noise norms.

	mixing shall be done at hot-mix plant or designated areas to prevent contamination of soil and ground water (Use Format 5). - Skilled labour shall be used while hand placing the pre-mixed bitumen material. - The hand placing of pre-mixed bituminous material shall be done only in following circumstances: <ul style="list-style-type: none"> • For laying profile corrective courses of irregular shape and varying thickness • In confined spaces where it is impracticable for a paver to operate and • For filling potholes - Provide safety equipments i.e. gumboots and gloves to the workers while handling bitumen - While applying Tack Coat, spraying of bitumen shall be done in the wind direction. The labour shall wear jacket while spraying the bitumen - All the bituminous work shall be done as per IRC's Manual for Construction and Supervision of Bituminous Works.		
Post Construction Phase			
1	- Ensure that all the haul roads are restored to their original state. - In case any inner village road is damaged while transporting the procured material; the contractor shall restore the road to its original condition - ensure that the decommissioning of plant shall be done in environmentally sound fashion and the area brought to its original state.	Contractor	- Inspected by the EE or his appointed representative not below the rank of AE. - The same is to be submitted to the EE before final payment is claimed.

Table 1: Measures at Plant Site

Concern	Causes	Measures
Dust Generation	Vehicle Movement	<ul style="list-style-type: none"> • Water sprinkling • Fine Materials shall be Transported in Bags or Covered by Tarpaulin during Transportation • Tail board shall be properly closed and sealed
	Crushers	<ul style="list-style-type: none"> • Water Sprinkling
	Concrete-Mix Plant	<ul style="list-style-type: none"> • Educate the workers for following good practices while material handling
Emissions	Hot-Mix Plant	<ul style="list-style-type: none"> • Site Selection as per IRC's Manual for Construction & Supervision of Bitumen Work • Regular maintenance of Dust Collector as per manufacture's recommendations
	Vehicles	<ul style="list-style-type: none"> • Regular maintenance as per manufacture's recommendation
	Generators	<ul style="list-style-type: none"> • Exhaust vent of long length
	Heavy Load Vehicles	<ul style="list-style-type: none"> • Exhaust silencer, Regular maintenance as per manufacture schedule
	Crushers	<ul style="list-style-type: none"> • Siting
	Generators	Shall be kept in closed room and regular maintenance as per Good practice
Oil Spills	Storage and Handling	<ul style="list-style-type: none"> • manufacture's recommendation
Residual waste	Dust Collector and	<ul style="list-style-type: none"> • Guidelines for Waste Management
Concrete waste	Concrete-Mix plant	<ul style="list-style-type: none"> • Guidelines for Waste Management
Bitumen and bitumen mix		<ul style="list-style-type: none"> • Guidelines for Waste Management
Stone chips	Crushers	<ul style="list-style-type: none"> • Guidelines for Waste Management
	Trajectory of	<ul style="list-style-type: none"> • No worker shall be present in the vicinity of the equipments
	Movable Parts of	<ul style="list-style-type: none"> • Caution Sign, awareness among workers
	Plant Area / Site	<ul style="list-style-type: none"> • Caution Sign, Safety Equipments
	Accidents / Health	<ul style="list-style-type: none"> • First Aid Box, Periodic Medical Check up
	Break down of	<ul style="list-style-type: none"> • Arrangement for towing and bringing it to the workshop

Format 4: Details of Machinery Operation (To be filled by the Contractor)

1. Name of Canal.....
2. Name of Nearest Human Settlement.....
3. Monthly Report for Each Borrow Area under use.....
4. Date of Submission.....

1. Details of Machinery Operation

1.1	Total machinery in operation (Nos.)	
1.2	Number of pavers	
1.3	Number of rollers	
1.4	Number of excavators	
1.5	Number of dumpers	
1.6	Number of vehicles in repair at each location	
1.7	Details of waste disposal. (Whether Sold/ Disposed)	

Remarks:.....
.....

Submitted	Checked	Approved
Signature.....	.....	.....
Name.....	.....	.....
Designation.....	.....	.....
Contractor	Environmental Engineer Supervision Party	Executive Engineer, UPID

Format 5: Details of Hot Mix Plant (HMP) (To be filled by the Contractor)

1. Name of
Canal.....
2. Name of Nearest Human Settlement.....
3. Monthly Report for Each Borrow Area under use.....
4. Date of Submission.....

1. Environment Features of the surrounding area

1.1	Name and location of Hot Mix Plant	
1.2	Wind Direction	
1.3	Name (s), distance population and type of settlements in a 1.5 km radius of site.	

2. Details of HMP and Mitigation Measures taken

2.1	Installed Capacity	
2.2	Average Utilization	
2.3	Model	
2.4	Last Serviced	

3. Explain Air Pollution Control Measures taken at the HMP site

4. Explain Noise Pollution Control Measures taken at the HMP site

Remarks:.....
.....

Submitted	Checked	Approved
Signature.....	.....	.....
Name.....	.....	.....
Designation.....	.....	.....
Contractor	Environmental Engineer Supervision Party	Executive Engineer, UPID

Format 6: Safety Check list (To be filled by the Contractor)

1. Name of Canal.....
2. Name of Nearest Human Settlement.....
3. Name of Contractor.....
4. Name of Safety Officer (if any)
5. Date of Submission.....

1. Location 1, 2 ,3

- Adequate at time of Inspection (Y/N) - Needs Improvement - Needs Immediate Attention	Location 1			Location 2			Remarks
General	A	B	C	A	B	C	
Stacking of Material							
Lighting							
Fire Prevention							
Fire Fighting Appliance							
Dust Control							
Noise Control							
First Aid Equipment							
Washing Facility							
Latrine							
Safety Shoes							
Others							

Remarks:.....

.....

Submitted

Signature.....

Name.....

Designation.....

Contractor

Checked

.....

.....

.....

**Environmental Engineer
Supervision Party**

Approved

.....

.....

.....

**Executive Engineer,
UPID**

Format 7: Accident Report (To be filled by the Contractor)

1. Name of Canal.....
2. Name of Nearest Human Settlement.....
3. Date of Submission.....

1. Type of Accident

1.1	Struck by moving objects	
1.2	Handling without machinery	
1.3	Crushing / burying	
1.4	Fire	
1.5	Contact with poisonous gas or toxic substances	
1.6	Vehicle / Mobile plant accident	
1.7	Machinery operation accident	
1.8	Any Other	

2. Agent Involved in Accident

2.1	Machinery	
2.2	Vehicle or associated equipment Machinery	
2.3	Material being handled, used or stored	
2.4	Gas, vapour, dust, fume or oxygen	
2.5	Hand tools	
2.6	Excavation / underground working	
2.7	Construction formwork, shuttering and falsework	
2.8	Any Other	

Part-II - To be completed Upon Finalization of Employee's Compensation Claim

- No permanent incapacity (Yes/No)
- Less than 5% incapacity
- More than 5% incapacity
- Fatal

Remarks:.....

Submitted	Checked	Approved
Signature.....	.....	.....
Name.....	.....	.....
Designation.....	.....	.....
Contractor	Environment Health Officer Supervision Party	Executive Engineer, UPID

Format 8: Pollution Monitoring

1. Name of Canal.....
2. Name of Nearest Human Settlement.....
3. Monitoring measures suggested in last report compiled or not (if nor give reason).....

Sr. No	Changing (km)	Detail of Location	Duration of Monitoring	Instruments used	Completion	Results	Reason for exceeding results	Mitigation measures	Type of Area (Residential/ Commercial/Industrial)	Remarks
1.	Air Quality Monitoring									
						PM ₁₀ PM _{2.5} Sox NOx Others				
2.	Water Quality Monitoring									
						pH, TSS, TDS, Turbidity, Hardness, BOD, Iron, Fluoride, Nitrate,				
3.	Soil Quality Monitoring									
						pH, Organic Carbon, Alkanity, P ₂ O ₅ ,				

								Conductivity, Iron, Pesticide, Nitrate				
4.	Noise Monitoring											
								L-day equivalent, L-night equivalent				

Submitted

Checked

Approved

Signature.....

.....

.....

Name.....

.....

.....

Designation.....

.....

.....

Contractor

**Environmental Engineer
Supervision Party**

**Executive Engineer,
UPID**

Format 9: Checklist for Environment Inspection (Points / Issues to be covered)

1. Name of Canal.....
2. Name of Nearest Human Settlement.....
3. Date of Submission.....

Sr. No.	ESMP Measures
1.	Provision of a personnel accountable for implementation of ESMP / Safety Measures with Contractor
2	Consent of UP PCB to Establish HMP (If applicable)
3	Consent of UP PCB to operate HMP (If applicable)
4	Compliance of PCB Conditions for HMP installation and operation
5	Whether compliance reported through monthly Progress report to Divisional Office of Executive Engineer
6	Precautions to prevent contamination of soil by emulsion, Bitumen, oil and lubricant taken while storing
7.	Providing cover to fine construction material & bituminous mix during transportation
8	Spoil and debris disposal
9	Safety equipment i.e helmet. gloves, gumboot, mask, earplugs etc. provided to workers
10	Provision of labour camp with sanitation & potable water
11	Fire precautions at Hot Mix Plant and site Office
12	Air and noise monitoring done in camp site
13	Status of drainage provision in camp area
14	Others

Remarks:.....

Submitted
Signature.....
Name.....
Designation.....
Contractor

Checked

Environmental Engineer
Supervision Party

Approved

Executive Engineer,
UPID

6.1.4 Fertilizer & Pesticide – Handling & Storage Plan

This EMP addresses issues arising from the improper handling and storage of fertilizers and pesticides. These precautionary measures shall be applicable to handling and storage by (i) the traders dealing in fertilizers and pesticides, (ii) individual beneficiaries of the project, and (iii) Department of Agriculture. In addition to these precautionary measures, DoA capacity to procure, distribute, and manage anticipated types of pesticides will be increased.

Building a storage facility

The trader shall store fertilizers in a dry and secure location, so that impact on groundwater does not result. The fertilizers shall be stored away from activities that might rip open a bag or allow rain to enter the container. An impermeable (waterproof) floor, such as properly treated concrete shall prevent fertilizer from seeping into the ground and leaching to groundwater. This Secondary containment provides impermeable floor and walls around a fertilizer or chemical storage area that minimize the amount of fertilizer or chemical seeping into the ground from a spill or leak.

When building and maintaining a fertilizer-storage facility, the following precautionary measures shall be considered:

- The size of the storage facility should be adequate for holding the peak fertilizer requirement.
- Locate the dry-storage building or liquid secondary containment down slope and at least 15m away from the water body.
- The building foundation and secondary-containment floor shall be constructed from impermeable material & well drained and above the water table.
- Rainwater shall be diverted away from the fertilizer storage area.
- Fertilizer storage warehouses should be constructed of materials that protect the fertilizer from the natural elements.
- Fertilizer shall be stored in a manner to prevent contamination with other products. (i.e. seed, pesticides, grain, etc.) Store all dry fertilizer products under roof.
- The fertilizer bags shall not be stored on bare ground and shall be stored in dry place
- Display appropriate warning and hazard signs on storage facilities.

In addition, the siting of the storage facility, layout and construction of buildings shall be in conformance with building activities.

Modifying an existing storage facility

The following precautionary principles shall be followed during the modification /expansion of an existing storage facility:

- The building foundation and secondary-containment, floor shall be constructed of impermeable material & well drained and above the water table. Drainage should be provided around the building.
- Fertilizer shall be stored in a manner to prevent contamination with other products. (i.e. seed, pesticides, grain, etc.).
- If the storage facility is within 15m of a water body, the same shall be relocated.

Recommendation for Safe Loading & Unloading

Loading and unloading facilities shall be designed to (i) reduce the risk of dry fertilizer escaping to the environment, and (ii) permit easy cleanup of any spilled fertilizer. The following measures for safe loading and unloading shall be adopted:

- Surface of the loading and unloading areas shall be constructed of an impervious material (i.e. concrete or asphalt).
- The area shall be larger than the vehicles being loaded and/or unloaded. The perimeter area shall be sloped away from the loading or unloading area to permit rainwater to drain away (to prevent puddles). Spilled fertilizer shall be swept up and re-blended in a dry useable form.
- Loading and unloading techniques shall prevent unnecessary spillage of the fertilizer.
- Bagged fertilizer must be handled in a manner to prevent fertilizer from escaping to the environment. Torn bags should be re-packaged immediately.
- Spills should be cleaned up immediately or at the end of the day to avoid the potential for soil and groundwater contamination.
- All dry fertilizer should be reused and wet fertilizer should be properly reused and recycled

Handling and Storage of Pesticides

The following measures shall be complied with:

- Always Read the Label: Follow all safety precautions on the label. Wear protective clothing and use protective equipment according to instructions on the pesticide label.
- Be careful when handling pesticide spray materials to avoid spilling on skin or clothing. Should such an accident occur, wash immediately with soap and water.
- Avoid drift to non-target areas, which may endanger other plants or animals. Cover feed pans, troughs, and watering tanks in livestock areas.
- When selecting pesticides, keep in mind that the type of formulation and application equipment affects the potential for drift.
- Bathe or shower in hot, soapy water after applying pesticides.
- After applying pesticides, wash clothing, separate from other laundry, in hot, soapy water. Contaminated clothing must be handled with the same precautions as the pesticide itself.
- The washing of the containers of pesticides should not be disposed off into any flowing water body or a water body used for drinking purpose.

Safety Measures for Personnel Handling Fertilizers and Pesticides

Towards ensuring adequate safety, personnel handling fertilizers / pesticides should use personal protective equipment, e.g. face shields or goggles, rubber aprons, long-sleeved shirts, rubber gloves and boots. In addition, the trader shall

- Adequately train all employees in the use of appropriate protective gear and equipment for handling products.
- Proper use of safety equipment and protective clothing for workers involved in handling and storage of fertilizers
- Use closed mixing/transfer systems for pesticide handling safety.
- Do not mix pesticide-contaminated clothing with family clothing.
- Hang clothing outside in direct sunlight and wind to dry when possible.
- Use strong detergents and hot water for washing. Run empty washer with detergent and hot water cycle to clean after washing contaminated clothing.
- Provide and use appropriate personal protection device when loading and mixing pesticides.
- Provide office or non-storage areas with separate exit doors from pesticide storage rooms.
- Properly ventilate and lighted storage areas.
- Provide Information of first aid and antidote to personnel handling fertilizer or pesticides.

Measures for users of small quantities of pesticides and for Department of Agriculture

Avoiding pesticide dependence: Efforts shall be made by the Agriculture Department to reduce the dependence of farmers on chemical pesticides through training & demonstration programmes of IPM. Programmes that raise awareness of the hazards of pesticides encourage users to treat pesticides with care, minimize their use, and manage them and their waste products cautiously.

Buying pesticides: Through training and awareness programmes, the agriculture department shall ensure that only the appropriate pesticide is purchased to prevent accumulation of unwanted stocks. The farmers shall seek advice from agricultural extension officers, Agriculture Service Centres. The product selected should not only be effective against the pest but should also be of a formulation that is appropriate to the type of application equipment used by the buyer. Products should be bought only when they are in their original, sealed containers and not in repacked containers and complete product label attached. The label should be in a local language and be clearly legible. Buyers should resist pressure from pesticide vendors to buy larger quantities than are needed, even if cost reductions are offered. Pesticides intended for use in major crops should not be used on other crops such as vegetables, or for the control of domestic pests.

Storing pesticides: Owners and end users of pesticides have a responsibility to store them safely so that they do not cause harm. Badly stored pesticides are likely to deteriorate and become unusable or obsolete. The following conditions should be adhered to when pesticides are stored in homes or on farms:

- Pesticides should be kept in a secure place to which children, animals or unauthorized people do not have access.
- They should not be stored in living or sleeping quarters
- They should be kept separately from all food, including animal feed, and away from water and water supplies
- They should be kept dry and out of direct sunlight
- They should be kept away from naked flames, e.g. fires or lamps.
- Storage places should be well ventilated.
- Pesticides should never be transferred into containers other than those in which they were supplied.
- Older products held in store should always be used before newly purchased products. Use-by dates on products should be strictly observed

Empty containers: The containers should be cleaned out as completely as possible. For liquid (e.g. emulsifiable concentrate) or solid (e.g. wettable powder) formulations that are diluted before application, containers should be triple-rinsed and the washings used as part of the product dilutant. Containers for dry application products should be emptied as completely as possible. Empty containers should not be used for any purpose other than storage of the pesticides that they originally contained. To prevent such misuses, schemes to collect empty containers by the traders to be insisted by the Agriculture department. Containers should be punctured to prevent reuse. Empty containers should not be burned or buried.

Unwanted pesticides: Unidentified or unusable pesticides should not be kept or used for any purpose. Neither should pesticides that are out of date or stored in damaged containers. Advice should be sought from pesticide suppliers/distributors. The department shall encourage pesticide suppliers/distributors to establish schemes for disposal. A list of banned pesticides is given below:-

List of pesticides banned by Government of India

S. No.	Name of Pesticides
1.	Aluminium Phosphide
2.	DDT
3.	Lindane
4.	Methyl Bromide
5.	Methyl Parathion
6.	Sodium Cyanide
7.	Methoxy Ethyl Mercuric Chloride (MEMC)
8.	Monocrotophos
9.	Endosulfan
10.	Fenitrothion
11.	Diazinon
12.	Fenthion
13.	Dazomet

List of pesticides not permissible (WHO classes Ia, Ib and II)

1. Extremely hazardous (Class Ia):

Common name	
Aldicarb	Ethoprophos
Brodifacoum	Flocoumafen
Bromadiolone	Hexachlorobenzene
Bromethalin	Mercuric chloride
Calcium cyanide	Mevinphos
Captafol	Parathion
Chlorethoxyfos	Parathion-methyl
Chlormephos	Phenylmercury acetate
Chlorophacinone	Phorate
Difenacoum	Phosphamidon
Difethialone	Sodium fluoroacetate
Diphacinone	Sulfotep
Disulfoton	Tebupirimfos
EPN	Terbufos

2. Highly hazardous (Class Ib):

Common name	
Acrolein	Oxydemeton-methyl
Allyl alcohol	Paris green
Azinphos-ethyl	Pentachlorophenol
Azinphos-methyl	Propetamphos
Blasticidin-S	Sodium arsenite
Butocarboxim	Sodium cyanide
Butoxycarboxim	Strychnine
Cadusafos	Tefluthrin
Calcium arsenate	Thallium sulfate
Carbofuran	Thiofanox
Chlorfenvinphos	Thiometon
3-Chloro-1,2-propanediol	Triazophos
Coumaphos	Vamidothion
Coumatetralyl	Warfarin
Zeta-cypermethrin	Zinc phosphide
Demeton-S-methyl	Famphur
Dichlorvos	Fenamiphos
Dicrotophos	Flucythrinate
Dinoterb	Fluoroacetamide

DNOC	Formetanate
Edifenphos	Furathiocarb
Ethiofencarb	Heptenophos
Isoxathion	Methiocarb
Lead arsenate	Methomyl
Mecarbam	Monocrotophos
Mercuric oxide	Nicotine
Methamidophos	Omethoate
Methidathion	Oxamyl

3. Moderately hazardous (Class II):

Common name	
Alanycarb	Endosulfan
Anilofos	Endothal-sodium
Azaconazole	EPTC
Azocyclotin	Esfenvalerate
Bendiocarb	Ethion
Benfuracarb	Fenazaquin
Bensulide	Fenitrothion
Bifenthrin	Fenobucarb
Bilanafos	Fenpropidin
Bioallethrin	Fenpropathrin
Bromoxynil	Fenthion
Bromuconazole	Fentin acetate
Bronopol	Fentin hydroxide
Butamifos	Fenvalerate
Butylamine	Fipronil
Carbaryl	Fluxofenim
Carbosulfan	Fuberidazole
Cartap	Gamma-HCH , Lindane
Chloralose	Guazatine
Chlorfenapyr	Haloxypop
Chlordane	HCH
Chlorphonium chloride	Imazalil
Chlorpyrifos	Imidacloprid
Clomazone	Iminoctadine
Copper sulfate	Ioxynil

Cuprous oxide	Ioxynil octanoate
Cyanazine	Isoprocarb
Cyanophos	Lambda-cyhalothrin
Cyfluthrin	Mercurous chloride
Beta-cyfluthrin	Metaldehyde
Cyhalothrin	Metam-sodium
Cypermethrin	Methacrifos
Alpha-cypermethrin	Methasulfocarb
Cyphenothrin [(1R)-isomers]	Methyl isothiocyanate
2,4-D	Metolcarb
DDT	Metribuzin
Deltamethrin	Molinate
Diazinon	Nabam
Difenzoquat	Naled
Dimethoate	Paraquat
Dinobuton	Pebulate
Diquat	Permethrin
Phenthoate	Quizalofop-p-tefuryl
Phosalone	Rotenone
Phosmet	Spiroxamine
Phoxim	TCA [ISO] (acid)
Piperophos	Terbumeton
Pirimicarb	Tetraconazole
Prallethrin	Thiacloprid
Profenofos	Thiobencarb
Propiconazole	Thiocyclam
Propoxur	Thiodicarb
Prosulfocarb	Tralomethrin
Prothiofos	Triazamate
Pyraclofos	Trichlorfon
Pyrazophos	Tricyclazole
Pyrethrins	Tridemorph
Pyroquilon	Xylylcarb
Quinalphos	

6.1.5 Pest Management Plan

Objectives of Pest Management Plan (PMP)

The purpose of this document is to describe a Plan by which the project can promote and support safe, effective, and environmentally sound pest management in agricultural interventions undertaken under UPWSRP. The plan further presents components to strengthen such capacity. The Plan promotes the use of biological and environmental control methods and the reduction in reliance on synthetic chemical pesticides. Integrated Pest Management, including biological, botanical, chemical, and other approaches will be the preferred approach for the PMP.

Integrated Pest Management

Integrated Pest Management is the approach now being adopted worldwide to address the issue of excessive use of chemical pesticides in agriculture. The World Bank's Operational Policy 4.09 defines integrated pest management as a mix of farmer-driven, ecologically based pest control practices that seeks to reduce reliance on synthetic chemical pesticides. It involves

- a) managing pests (keeping them below economically damaging levels) rather than seeking to eradicate them;
- b) relying, to the extent possible, on non-chemical measures to keep pest populations low; and
- c) selecting and applying pesticides, when they have to be used, in a way that minimizes adverse effects on beneficial organisms, humans, and the environment.

Tools of IPM

The main tools of IPM are:

Monitoring: Crop monitoring, that keeps track of the pests and their potential damage, is the foundation of IPM. This provides knowledge about the current pests and crop situation and is helpful in selecting the best possible combinations of the pest management methods. Pheromone traps have an advantage over other monitoring tools such as light and sticky traps. Being selective to specific pests, they have proven their usefulness in large scale IPM validations in cotton, basmati rice, chickpea and pigeon pea.

Pest resistant varieties: Breeding for pest resistance is a continuous process. At the same time the pests also, particularly the plant pathogens, co-evolve with their hosts. Thus, gene transfer technology is useful in developing cultivars resistant to insects, plant pathogens and herbicides. An example of this is the incorporation of genetic material from *Bacillus thuringiensis* (Bt), a naturally occurring bacterium, in cotton, corn, and potatoes, which makes the plant tissues toxic to the insect pests. Scientific community is impressed by its huge potential in managing the pests, but is also concerned about the possibility of increased selection pressure for resistance against it and its effects on non-target natural fauna. However, due to ethical, scientific and social considerations, this potential technology has been surrounded by controversies.

Key Components of IPM

Given here below is an outline of a typical IPM plan:

- Identification of major pests & diseases for the crop in the area
- Identification of the minor pests & diseases for the crop in the area
- Assessment of ETL for major pests /diseases
- Pest monitoring based on Agro Ecosystem Analysis (AESA) and conjunctive use of pheromone traps, sticky traps, etc.
- IPM in action
 - Identification of pest & disease tolerant /resistant varieties
 - Cultural methods
 - Physical / mechanical methods
 - Biological methods
 - Bio-pesticides
 - Chemical methods (preferably use chemicals that are less toxic and have a shorter life after application)

Cultural pest control: It includes crop production practices that make crop environment less susceptible to pests. Crop rotation, fallowing, manipulation of planting and harvesting dates, manipulation of plant and row spacing, and destruction of old crop debris are a few examples of cultural methods that are used to manage the pests. Planting of cover crops, nectar-producing plants and inter-planting of different crops to provide habitat diversity to beneficial insects are important management techniques. Cover crops, often legume or grass species, prevent soil erosion and suppress weeds. A cover crop can also be used as a green manure, which is incorporated in the soil to provide nitrogen and organic matter to the subsequent crop. When incorporated in the soil, some cover crops of the *Brassica* family have the ability to suppress nematode pests and wilt diseases. Left in the field as residues, rye and wheat provide more than 90 percent weed suppression. Cultural controls are selected based on knowledge of pest biology and development.

Physical or mechanical controls: These are based on the knowledge of pest behaviour. Placing plastic-lined trenches in potato fields to trap migrating Colorado potato beetles is one example of the physical control. Shaking of the pigeon pea plant to remove *Helicoverpa* larvae is a common practice in pigeon pea growing areas. Hand picking of insect pests is perhaps the simplest pest control method. Installation of dead as well as live bird perches in cotton and chickpea fields has proved effective in checking the bollworm infestation. Using mulches to smother weeds and providing row covers to protect plants from insects are other examples.

Biological controls: These include augmentation and conservation of natural enemies of pests such as insect predators, parasitoids, parasitic nematodes, fungi and bacteria. In IPM programmes, native natural enemy populations are conserved, and non-native agents may be released with utmost caution. *Trichogramma* spp. is the most popular parasitoids being

applied on a number of host crops. A number of microorganisms such as *Trichoderma* spp., *Verticillium* spp., *Aspergillus* spp., *Bacillus* spp. and *Pseudomonas* spp. that attack and suppress the plant pathogens have been exploited as biological control agents.

Chemical controls: Pesticides are used to keep the pest populations below economically damaging levels when the pests cannot be controlled by other means. Pesticides include both the synthetic pesticides and plant-derived pesticides. Synthetic pesticides include a wide range of man-made chemicals. These are easy to use, fast-acting and relatively inexpensive. Ideally, pesticides should be used as a last resort in IPM programmes because of their potential negative effect on the environment. Pesticides with the least negative impacts on non-target organisms and the environment are most useful. Fortunately, new generation pesticides with novel modes of action and low environmental effects are being developed and registered for use. Pesticides that are short-lived or act on one or a few specific organisms fall in this class.

Assessment of Economic Threshold Level: This is based on the concept that most plants can tolerate at least some pest damage. In an IPM programme where the economic threshold is known, chemical controls are applied only when the pest's damaging capacity is approaching the threshold, despite application of other alternative management practices.

Use of Botanical Pesticides: These can be prepared in various ways. They can be as simple as raw crushed plant leaves, extracts of plant parts or as complex as chemicals purified from the plants. Pyrethrum, neem, tobacco, garlic, and pongamia formulations are some examples of botanicals. Some botanicals are broad- spectrum pesticides. Botanicals are generally less harmful to the environment, because of their quick degrading property. They are less hazardous to transport. The major advantage is that these can be formulated on-farm by the farmers themselves.

Implementing PMP

The main crops grown in the targeted clusters could be maize, chickpea, green gram (moong), green pea, groundnut, moth bean, cluster bean, soybean, cumin, coriander, and fruits and vegetables like, pomegranate, guava and tomato, brinjal, cauliflower, cabbage etc. Example of biocontrol measures for some of the pests and diseases are given below:

- Use of Trichogramma cards @ 8 cards per ha at 15 days interval four times for management of stem rot in maize;
- seed treatment with Trichoderma @ 6 gm per kg seed for seed rot and fungal diseases in field in soybean; IPM package including proper spacing of 30 cm, seed rate of 80 kg/ha, use of sex pheromones @ 5 traps/ha for *Spodoptera litura*, and application of need based safer bio-pesticides for disease and pests in soybean are recommended.
- For girdle beetle, trap crop of dhaincha around field and at 20-20 meter distance in field, and for control of vector for tobacco mosaic virus, pheromone traps (5 per ha) and light trap (one in 5 ha) are recommended.
- For disease and insect pest management in groundnut, the IPM strategy includes soil and seed treatment followed by spray on the crop. Soil amendment with neem cake @ 250 kg/ha preferably 15 days before sowing, and soil application of Trichoderma

harzianum @ 4.00 kg/ha incubated in 50 kg FYM for 15 days and applied before sowing; seed treatment with imidacloprid @ 2 ml/kg seed and T. harzianum @ 10 gm/kg seed; followed by foliar spray of mancozeb @ 2 gm/l at the time of 1st appearance of leaf spot disease are recommended.

- For management of fruit borer in tomato and brinjal, use of 2.5 Trichogramma cards per ha at 45 days crop stage, 5-6 times at 7 days interval has shown good management. Also, in tomato, trap crop of marigold after every eight rows of tomato is beneficial.
- The PMP package for cauliflower and cabbage includes soil application of T. harzianum through FYM (250 kg/ha), neem cake @ 50 g/m² in nursery, soil solarization, seed treatment with T. harzianum @ 4g/kg seed, sowing on raised beds, seedling dip in T. harzianum @ 4g/lt., monitoring population of S. litura and Plutella xylostella through pheromone traps, hand picking of larvae and egg masses of S. litura, application of biopesticides such as NPV and NSKE and need based application of low risk insecticides like novaluron, cartap hydrochloride, spinosad, emamectin benzoate and mancozeb/ridomil.

UPWSRP (with support from various SAU's and ICAR research centres) has the capability in terms of sourcing inputs and knowledge to implement IPM in the project. Under UPWSRP, the following steps are being proposed.

Awareness creation: A multimedia approach that includes Kiosks, Print and e-media, Manuals, pamphlets, brochure, SMS over Mobile phones and Farmers fairs/group discussions would be used to create awareness about PMP in study area in UPWSRP.

Input management: Inputs for IPM start with selection of the right varieties and seeds. In addition, PMP is more effective when coupled with NMP and appropriate irrigation management. Therefore, UPWSRP would provide support through the Farmer Water Schools to source required inputs such as seeds of pest resistant varieties, biofertilizers, biocontrol agents, biopesticides, etc.

Capacity building: In order to train a large no. of farmers, a Farmer Water Schools program will be implemented, based on the Farmer Field School approach. Master Trainers would be trained at the District Level. They in turn would train FWS facilitators, who would support establishment of FWS in the minors. The FWS is specifically designed to target the area below the outlet as a mechanism to introduce improved agronomic and water management practices, and also to develop the institutional capacity of those farmers for water management and operation and maintenance of their own systems. The FWS will run for the entirety of a cropping cycle (i.e. kharif, rabi and zaid) to give farmers a better understanding of crop and water management in the different seasons (under varying water availability conditions) and the impact of good management on one season to the next. The FWS will consist of a group of 20 – 30 farmers serving about 15 – 20 ha of a single outlet. The FWS is made up of core activities, including integrated pest management. The farmers will have a degree of autonomy over decisions such as the specific crop technology they would like to test, the fixing of training sessions, etc.

In addition to the emphasis on FWS, the agricultural component under the project will also support (i) a limited number of demonstrations/adaptive research trails, (ii) field level physical works related to improved water use efficiency, (iii) field days (block level), (iv)

exposure visits, (v) staff capacity development, and (vi) purchase of equipment (such as tensiometers and leaf color charts).

Mainstreaming PMP in UPWSRP

Training, demonstrations, FWS, input incentives, etc., for implementing IPM in UPWSRP has been provided in the mainstream budget since the activity has been adopted as a mainstream activity. In addition, PMP should be included as a specific Toolkit and use the following monitoring indicators to be assessed periodically as part of internal monitoring, external audit as well supervision missions from the World Bank:

- % of farmers who have adopted all components of PMP
- % reduction in use of chemical pesticides over baseline in l/Ha.
- % increase in friendly pest population over baseline situation

As can be noted, the monitoring indicators cover both adoption as well as knowledge of IPM among UPWSRP farmers.

6.1.6 Nutrient Management Plan

Nutrient Management Plan (NMP)

The most appropriate strategy for increasing fertilizer use efficiency is to practice NMP. The basic principle of NMP is the maintenance of soil fertility, sustaining agricultural productivity and improving farmers' profitability through the judicious and efficient use of mineral fertilizers, organic manures and bio-fertilizers. The NMP package has area-specific implications depending upon the availability and performance of the various components.

BOX 1: Benefits of Plant Nutrient Management

- Helps achieve highest production per unit of investment by way of reducing unavoidable losses due to leaching and volatilization.
- Helps reduce toxicity, which happens due to excessive use of single nutrients.
- Helps in quality production besides enhancement of Benefit Cost (B/C) ratio.
- Provides natural safeguard against biotic and abiotic stresses.
- Soils using only chemical fertilizer exhibit declining productivity per unit of plant nutrient used.
 - Using only major nutrients (NPK) results in deficiencies of micro and secondary nutrients.
 - Helps maintain soil health through organic matter and results in better fertilizer use efficiency.
 - Organic manures and plant residues are available locally and thus if managed properly are cost effective.

The interventions underlying NMP shall include:

- Adoption of soil-test based optimum nutrient use levels, ensuring adequacy of P level to meet the competitive demands of crops and P-fixation capacity of soils
- Working model for integration of organic manures and NPK fertilizers for sustainable high yields/farmers' resource - based target yields.
- Inoculation of soybean and other legume seeds.
- Inclusion of legumes in rotation.
- Adoption of improved (modern) crop management practices to ensure cultivation of HYV, timely sowing and adequate crop stand establishment, timely weed control and plant protection, and proper water management.
- Technical training courses at village level for improving farmers knowledge base. The training shall focus on concept and contents of NMP, integration of organic and inorganic resources in consideration of farmers' resource base for mobilizing various nutrient sources, improvement of quality and quantity of FYM, making use of NADEP compost system, including vermiculture and use of bio-fertilizers. (Extension agencies and NGOs shall be involved in organizing training courses).
- Working in close collaboration with NGOs, on orienting farmers to organic and biodynamic farming approach involving the use of FYM, green manures, crop residues, vermin-compost, bio-fertilizers and bio-pesticides while understanding their resources and targeted yields.

- Facilitating certification and marketing of certified organic produces with appropriate price premiums through Department of Agriculture.
- Facilitating the adoption of NMP in general and organic farming in particular, and for monitoring of practices adopted in producing organic products, keeping full track of production processes and products from field to sale point as well as for arranging organic certification and marketing.

Procedures for Preparation of NMP

The proposed activities related to NM are to be taken up by an external agency including monitoring and evaluation (facilitated by the ID/ PACT and Agriculture Specialist). This team would evaluate the NMP component for effectiveness and scaling-up implications. Procedures for Preparation of NMP are presented below:-

Procedures & Indicators for NMP

Sub-Projects Stages	Procedures	Agency	Process, Outcomes & Impact Indicators (Monitoring Agency)
Pre-Planning Stage	Preparation of Thematic Maps on Agriculture, Soil, Geology, Water Resources, Fertilizer use, Pesticide use, etc. of sub-projects areas	Department of Agriculture helped by UPID/PACT & Agriculture Expert	List of agriculture related features (Agricultural Expert)
	Sensitization through joint walk through and consultations to identify cropping patterns, survey, types of fertilizer, pesticide use etc.	Department of Agriculture helped by UPID/PACT & Agriculture Expert	List of all sensitive issues and banned agrochemicals (Environmental & Agricultural Experts)
	Identification of environmental and social impacts inclusion of the concerns into ESMP	Department of Agriculture helped by UPID/PACT & Agriculture Expert	List of all likely impacts of agricultural practices related to agriculture & requirements of IPM plan (Environmental, Social & Agricultural Experts)
Planning and design stage	Joint walk through, consultations and PRA techniques to disclose concerns related to existing agricultural practices	Department of Agriculture helped by UPID/PACT & Agriculture Expert	List of Spatial and Non spatial issues (Agriculture expert)
	Training on IPM along with projects benefits to the farming community & alleviate apprehension related to productivity due to change in water regime in the catchment and command area	Department of Agriculture helped by UPID/PACT & Agriculture Expert	List of safe guard measures (Agriculture expert)
Implementation and post-implementation stage	Setting up information Kiosks, Organic Certification of Agricultural products,	Department of Agriculture helped by UPID/PACT &	Number of Kiosks, Certified Products, Demonstration Projects, Levels and types of pesticide in soil & water

Sub-Projects Stages	Procedures	Agency	Process, Outcomes & Impact Indicators (Monitoring Agency)
	Demonstration	Agriculture Expert	(Environmental & Agriculture Expert)
	Projects with approved agro-chemicals only, Training material restricted to mention of approved agro-chemicals only, pesticide etc.	Department of Agriculture helped by UPID/PACT & Agriculture Expert	

The following components can be considered as parts of the NMP, and can be adopted as per need, resource and local conditions:

- Nitrogen Fixing Plants
- Bio-fertilizers
- Organic Manure
- Vermiculture

It is recommended that FAO/ UN Sponsored concept of Farmer Field School (FFS) approach should be followed to promote a comprehensive programme towards the use of farm waste and low chemical input for soil fertilization, as well as NMP as means to promote sustainable agriculture with low cost of production and high profitability. State Agriculture Universities, Krishi Kendra (KK), NGOs and other support agencies could be tapped for technical support.

Conclusion

The issues, challenges and the proposed plan for sustainable agriculture development in the irrigated areas under UPWSRP-2 have been elaborated in the proceeding sections. A summary of these is presented below:-

Issues, Suggested Reforms and Responsible Agencies for Sustainable Agriculture in Project Area

Issues	Suggested Reforms	Agency Responsible
Intensity of land use as reflected by the cropping intensity is low in general and even lower in irrigated areas	Identification and introduction of short duration, low water duty crops for different project areas for second season	Agriculture Department, PACT, NGOs.
Large gap in gross culturable area and actual irrigated area in the state and in different project areas	Introduction of crops planning and water budgeting for farmers failing under the project area	Agriculture Department, PACT
There is environmental degradation of cultivable lands in the project area which is adversely affecting sustainability of crop production	Effective steps of soil conservation and soil reclamation need to be taken up	Soil Conservation Division of the Agriculture Department, PACT
Imbalance use of fertilizers, Higher application in certain crops like sugarcane and much below optimal application in others like coarse cereals, oil	Integrate INM with balance use of inorganic and organic manure	Agriculture Department, PACT

seeds, pulses. This has resulted in inefficient use of chemical fertilizers resulting in lower crop productivity		
Major crops in irrigated area are paddy, wheat, bajra, gram, sugarcane and fruits and vegetables which account major percent of the irrigated area.	Diverse cropping system should be made available to the farmers to irrigate different crops	Agriculture Department, PACT
Guidance for use of modern techniques for agriculture production is missing	Need to provide extension services for transfer of technology along with the efficient use of water by the ID	Agriculture Department, PACT
Lack of crop planning among the farmers since the availability of the irrigation water is not certain	Proper development of the information system and maintenance of the roster schedule	Agriculture Department, PACT

6.1.7 Health and Safety Management Plan (HSMP)

The safety and health concerns of the workers and the general public are impacted due to the hazards created during the construction of road. The detailed HSMP describes the hazards and measures that need to be taken to mitigate the impacts and is shown below.

Sr. No.	Activity	Site Responsibility	Monitoring Responsibility
Project Planning and Design Stage			
1	To address health and safety concerns, the DPR shall contain selection criteria for setting up: <ul style="list-style-type: none"> - Construction - Borrow Areas 	Contractor	Executive Engineer
2	To address the safety concerns to road user during operational phase, the DPR shall contain the following: <ul style="list-style-type: none"> - Selection and location of regulatory as well as informatory signs as per IRC: 67-2001, depending upon the geometry of the road. - Provision of passing places and parapet wall shall be included in road design 		Monitoring of all activities by the EE or his appointed representative not below the rank of AE.
Pre Construction Stage			
1	In order to incorporate public health and safety concerns, Contractor shall disseminate the following information to the community: <ul style="list-style-type: none"> • Location of construction camps, borrow areas and new quarry areas. • Extent of work • Time of construction • Diversions, if any • Precaution measures in sensitive areas • Involvement of local labours in the road construction • Health issues — water stagnation, exposure to dust, communicable disease • Mechanism for grievances 	Contractor	Monitoring of all activities by the EE or his appointed representative not below the rank of AE.
2	The Contractor must educate the workers to undertake the health and safety precautions. The contractor shall educate the workers regarding: <ul style="list-style-type: none"> - Personal safety measures and location of safety devices. - Interaction with the host community - Protection of environment with respect to: <ol style="list-style-type: none"> 1. Trampling of vegetation and cutting of trees for cooking 2. Restriction of activities in forest areas and also on hunting 3. Water bodies protection 4. Storage and handling of materials 5. Disposal of construction waste 	Contractor	Monitoring of all activities by the EE or his appointed representative not below the rank of AE.
Construction Phase			
1	During the progress of work, following are the safety requirements that need to be undertaken by the contractor at the construction site: <ul style="list-style-type: none"> - Personal safety equipments (such as footwear and gloves) for the workers - All measures as per bidding document shall be strictly followed - Additional provisions need to be undertaken for safety at site: <ul style="list-style-type: none"> o Adequate lighting arrangement o Adequate drainage system to avoid any stagnation of water o Lined surface with slope 1:40 (V:H) and provision of lined pit at the bottom, at the storage and 	Contractor	The EE or <i>his</i> appointed representative not below the rank of AE shall carry out periodic inspections to ensure that all the pollution control systems are appropriately installed and comply with existing emission and noise norms.

Sr. No.	Activity	Site Responsibility	Monitoring Responsibility
	handling area of bitumen and oil, as well as at the location of generator (grease trap). <ul style="list-style-type: none"> ○ Facilities for administering first aid 		
2	The following measures need to be adopted by the contractor to address public safety concerns: <ul style="list-style-type: none"> – The Contractor shall schedule the construction activities taking into consideration factors such as: <ol style="list-style-type: none"> 1. Sowing of crops 2. Harvesting 3. Local hindrances such as festivals etc 4. Availability of labour during particular periods – All the cautionary signs as per IRC: 67-2001 and traffic control devices (such as barricades, etc) shall be placed as soon as construction activity get started and shall remain in place till the activities get completed. – Following case specific measures need to be followed during the progress of the activity: <ol style="list-style-type: none"> 1. In case of blasting, the Contractor must follow The Explosives Rules, 1983. 	Contractor	
Post Construction Phase			
1	During this stage a major concern is on road user <i>safety</i> . Following are the measures that need to be undertaken by the EE or his appointed representative not below the rank of AE to ensure safer roads: <ul style="list-style-type: none"> – Inspection and maintenance of installed regulatory and informatory signs – Ensure that the location of signage does not obstruct the visibility – In case of hill roads, maintenance of parapet wall as well as of overtaking zone 	UPID	The EE or his appointed representative not below the rank of AE must ensure that during the maintenance operation of road, road materials are stored at a location such that they shall not create any risk to road users. The construction site shall be cleaned of all debris, scrap materials and machinery on completion of construction for the safety of public and road users.

Environmental Health and Safety Management Plan

S. No.	Activity	Impacts	Mitigation Measures	Site Responsibility	Supervision Responsibility	Quality Responsibility	
1.	Occupational Health and Safety (OHS)	<ul style="list-style-type: none"> - Fire Fighting - Adequate Water Supply - Medical Facility - Road Access 	<ul style="list-style-type: none"> - Fire Hazards - Health Problems - Stress on workers - Accident/Casualty 	<ul style="list-style-type: none"> - Fire suppression and control includes all automatic and manual such as Automatic sprinkler systems and Manual portable extinguishers - Alarm system should be installed - Provision of Potable Water Supply at site - Provision of Clean Eating Area - Provision of Lighting - Provision of Safe Access - Provision of First Aid Box 	Contractor/EHS officer	Executive Engineer	Third Party / PACT
		<ul style="list-style-type: none"> - Communication & Training 		<ul style="list-style-type: none"> - Provisions should be made to provide OHS orientation training to all new employees to ensure they are apprised of the basic site rules of work at / on the site and of personal protection and preventing injury to fellow employees. - Training should consist of basic hazard awareness, site specific hazards, safe work practices, and emergency procedures for fire, evacuation and natural disaster - Any site-specific hazard or color coding in use should be thoroughly reviewed as part of orientation training 	Contractor/EHS officer	Executive Engineer	Third Party / PACT
		<ul style="list-style-type: none"> - Rotating & Moving Equipment - Heavy Machinery Handling and Haulage of Machinery - Material Handling & Storage - Transport of Materials - Debris Disposal 	<ul style="list-style-type: none"> - Vibration - Air/Noise Pollution - Water Pollution - Soil Pollution - Workers and local people exposure - Impact on Human health - Water Delivery Reduction Interruption 	<ul style="list-style-type: none"> - Designing machines to eliminate trap hazards and ensuring that extremities are kept out of harm's way under normal operating conditions - Turning off, disconnecting, isolating, and de-energizing machinery - Provide safety measures (mask, gloves, hat etc) - Organize health camps - Follow proper operation and handling measures to minimize exposure - Head phones, ear plugs to be provided to the workers at construction site. 	Contractor/EHS officer	Executive Engineer	Third Party / PACT
		<ul style="list-style-type: none"> - Labor Camp 	<ul style="list-style-type: none"> - Workers and local people exposure - Impact on Human health 	<ul style="list-style-type: none"> - Provide safety measures (mask, gloves, hat etc) to minimize exposure - Provide sirens in vehicles to avoid any collision with human/animals - Organise awareness programs on environmental resource management - Organise Health camps 	Contractor/EHS officer	Executive Engineer	Third Party / PACT

S. No.	Activity	Impacts	Mitigation Measures	Site Responsibility	Supervision Responsibility	Quality Responsibility	
			<ul style="list-style-type: none"> - Child labour must be strictly prohibited - Provide signages near work sites - Locate handling sites away from populated areas - Follow proper operation and handling measures to minimize exposure - Routine medical check up of Field staff and labours - Provision of potable drinking water at site - Provision of proper sewage and waste disposal system. Sanitation facilities have to be provided at the camp sites.. - First aid facilities to be provided at the construction camps. Any case of disease outbreak may be immediately subjected to medical treatment. Mosquito repellent to be provided to the labors such as odomas, coil and sprays. The camps may maintain cleanliness and hygienic condition. - Head phones, ear plugs to be provided to the workers at construction site. - All workers employed on mixing of asphaltic material, cement, lime mortars, concrete etc. may be provided with protective footwear and protective goggles. Workers involved in welding work may be provided with welder's protective eye shields - Adequate precaution must be taken to prevent danger from electrical equipments 				
2.	Community Health and Safety	- Water Quality & Availability	<ul style="list-style-type: none"> - Health Problem - Stress on workers - 	<ul style="list-style-type: none"> - Drinking water sources should be protected from air emissions, wastewater effluents, oil and hazardous materials, and wastes. - Drinking water sources, whether public or private, should provide (135 liters per person per day) at all times through Tankers - Drinking water quality provided should meet National Drinking Water Standards (IS:10500) 	Contractor/EHS officer	Executive Engineer	Third Party / PACT
		- Waste water & Sanitation	<ul style="list-style-type: none"> - Unhygienic Condition - Health Problems - Air Pollution - Water Pollution - Soil Pollution 	<ul style="list-style-type: none"> - Provide mobile toilet at site - Consider provision of systematic, regular collection of fecal sludge - Use appropriate collection vehicles - Wastewater and fecal sludge should not be disposed off in or near any water bodies - 	Contractor/EHS officer	Executive Engineer	Third Party / PACT
		- Solid Waste/Hazardous	<ul style="list-style-type: none"> - Health Problems - Air Pollution 	<ul style="list-style-type: none"> - Dump solid waste in specified place to minimize contamination of water 	Contractor/EHS officer	Executive Engineer	Third Party / PACT

Environment Management Plan

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S. No.	Activity	Impacts	Mitigation Measures	Site Responsibility	Supervision Responsibility	Quality Responsibility
	waste	<ul style="list-style-type: none"> - Water Pollution - Soil Pollution 	<ul style="list-style-type: none"> - Discharge wastewater at authorized locations and after treatment - Proper labeling of containers, including the identify and quantity of the contents, hazards, and shipper contact information - Implement a training program for workers - Continuously monitor air quality in work areas for hazardous conditions - Hazardous/solid waste should be managed as per MSW Rule-2000, and Hazardous waste - Providing the necessary means for emergency response on call 24 hours/day 			
	- Diseases Prevention	<ul style="list-style-type: none"> - Communicable Diseases - Vector-Borne Diseases 	<ul style="list-style-type: none"> - Providing surveillance and active screening and treatment of workers - Preventing illness among workers in local communities by: <ol style="list-style-type: none"> 1. Undertaking health awareness and education initiatives 2. Training health workers in disease treatment 3. Conducting immunization programs for workers in local communities to improve health and guard against infection - Elimination of unusable impounded water - Increase in water velocity in natural and artificial channels - Promoting use of repellents, clothing, netting, and other barriers to prevent insect bites - Monitoring communities during high-risk seasons to detect and treat cases 	Contractor/EHS officer	Executive Engineer	Third Party / PACT/PHC
	- Structural safety of project infrastructure	<ul style="list-style-type: none"> - Physical trauma associated with failure of building structures - Burns and smoke inhalation from fires - Injuries suffered as a consequence of falls or contact with heavy equipment - Respiratory 	<ul style="list-style-type: none"> - The following issues should be considered and incorporated as appropriate into the planning, siting, and design phases of the project: - Inclusion of buffer strips or other methods of physical separation around project sites - Incorporation of siting and safety engineering criteria to prevent failures due to natural risks posed by earthquakes, wind, flooding, landslides and fire - Application of locally regulated or internationally recognized building codes - Engineers and architects responsible for designing and constructing facilities, building, plants and other structures should certify the applicability and appropriateness of the 	Contractor/EHS officer	Executive Engineer	Third Party / PACT

Environment Management Plan

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S. No.	Activity	Impacts	Mitigation Measures	Site Responsibility	Supervision Responsibility	Quality Responsibility	
			<ul style="list-style-type: none"> distress from dust, fumes, or noxious odors – Exposure to hazardous materials 	structural criteria employed			
	<ul style="list-style-type: none"> – Life and fire safety for new buildings or rehabilitated buildings accessible to the public 	<ul style="list-style-type: none"> – Injuries 	<ul style="list-style-type: none"> – Project sponsors' architects and professional consulting engineers should demonstrate that affected buildings meet the life and fire safety objectives – Life and fire safety systems and equipment should be designed and installed using appropriate prescriptive standards and/or performance based design, and sound engineering practices – Life and fire safety design criteria for all buildings should incorporate all local building codes and fire department regulations 	Contractor/EHS officer	Executive Engineer	Third Party / PACT	
3.	Traffic Management	<ul style="list-style-type: none"> – Vehicle Movement 	<ul style="list-style-type: none"> – Health Problems – Injuries – Air Pollution – Water Pollution – Soil Pollution 	<ul style="list-style-type: none"> – Emphasizing safety aspects among drivers – Improving driving skills and requiring licensing of drivers – Adopting limits for trip duration and arranging driver rosters to avoid overtiredness – Avoiding dangerous routes and times of day to reduce the risk of accidents – Providing the necessary means for emergency response on call 24 hours/day – Regular maintenance of vehicles and use of manufacturer approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure – Where the project may contribute to a significant increase in traffic along existing roads: collaboration with local communities to improve signage, visibility and overall safety of roads, employing safe traffic control measures such as road signs and flag persons 	Contractor	Executive Engineer	Third Party / PACT

Format 10: Safety Check list
(To be filled by the Contractor)

- 6. Name of Canal.....
- 7. Name of Nearest Human Settlement.....
- 8. Name of Contractor.....
- 9. Name of Safety Officer (if any)
- 10. Date of Submission.....

1. Location 1, 2,3

- Adequate at time of Inspection (Y/N) - Needs Improvement - Needs Immediate Attention	Location 1			Location 2			Remarks
General	A	B	C	A	B	C	
Stacking of Material							
Lighting							
Fire Prevention							
Fire Fighting Appliance							
Dust Control							
Noise Control							
First Aid Equipment							
Washing Facility							
Latrine							
Safety Shoes							
others							

Remarks:.....
.....

Submitted	Checked	Approved
Signature.....	.....	.....
Name.....	.....	.....
Designation.....	.....	.....
Contractor	Environmental Engineer Supervision Party	Executive Engineer, UPID

6.1.8 Cultural Properties Plan

Cultural properties can be located close to the service road and might be impacted by construction activities. Most of the properties are avoided in general during implementation of interventions. The role and responsibility has been defined for different activities (Pre, construction and post construction phase) which are given below:-

Sr. No.	Activity	Site Responsibility	Monitoring Responsibility
Project Planning and Design Stage			
1	Measures for mitigation of impacts on cultural properties during project preparation shall be as per the following steps: <ul style="list-style-type: none"> - Identification of locally significant cultural properties should be done - Assessment of likely impacts on each cultural property due to project implementation - The extent of impact on the identified culture property should be assessed and possible measures for avoidance should be devised based on the site investigation 	Contractor	Monitoring of all activities by the EE or his appointed representative not below the rank of AE.
2	<ul style="list-style-type: none"> - In case impact is not avoidable, identification of alternative routes or possibility of relocation of the culture property shall be assessed in consultation with the local public, based on the economic feasibility - In case of relocation, relocated site should be suggested by the local people and the size of relocated structure should at least be equal to the original structure. - A detailed design of the relocated structure and its site plan along with the necessary BOQ are to be presented in DPR. The relocation and other avoidance measures should be carried out before the start of the road work.			- Monitoring of all activities by the EE or his appointed representative not below the rank of AE. - It must be ensured by the EE or his appointed representative not below the rank of AE that the BOQ and rates are incorporated into the contract document.
Construction Phase			
1	Following are precautionary measures that need to be undertaken by the contractor while working near these structures: <ul style="list-style-type: none"> - Provision of temporary barricades to isolate the precincts of the cultural property from the construction site shall be devised by the Engineer to avoid impacts. - Restrict movement of heavy machinery near the structure - Avoid disposal or tipping of earth near the structure - Access to these properties shall be kept clear from dirt and grit 	Contractor	The EE or <i>his</i> appointed representative not below the rank of AE shall carry out periodic inspections to ensure that all the pollution control systems are appropriately installed and comply with existing emission and noise norms.
2	Information to be collected:- <ul style="list-style-type: none"> - Location - Direction (North/South/East/West) With Respect to Road - Distance of the structure from existing centerline of the road - Type of Property eg: temple/mosque/shrine/dargah etc - Plan of the structure - Importance of the structure historical/social/archeological - Ownership of the property - Probable loss to the property - Specific periods/durations in which large congregations as festivals/mela take place causing hindrance to vehicular movement - Choice of community, issue of relocation 	Contractor	
2	<ul style="list-style-type: none"> - During earth excavation, if any property is unearthed and seems to be culturally significant 	Contractor	

	or likely to have archeological significance, the same shall be intimated to the Engineer (Use Format 10) <ul style="list-style-type: none"> - The State Archeological Department shall be intimated of the chance find and the Engineer shall carry out a joint inspection with the department. Actions as appropriate shall be intimated to the Contractor along with the probable date for resuming the work 		
Post Construction Phase			
1	<ul style="list-style-type: none"> - Immediately after completion of construction, the Contractor will affect clearance of the precincts of cultural properties. - Incase access to any of the cultural properties is severed during construction; it needs to be restored at the Contractor's cost. 	UPID	The EE or his appointed representative not below the rank of AE shall certify restoration of all road links as well as relocated properties before final payment is made

Format 11: Details of Earthwork
(To be filled by the Contractor)

1. **Name of Canal**.....
2. **Name of Nearest Human Settlement**.....
3. **Monthly Report for Each Borrow Area under use**.....
4. **Date of Submission**.....

	Name of Village	Drainage (km)	Haul road length (m)
I			
II			

Details of Borrow Areas

1	Capacity of the Borrow Area	
2	Total quality of the Earth Excavated (in cum)	
3	Quantity of Top Soil removed from the Borrow Areas	
4	Location of Top Soil stored removed	
5	Quantity of Top Soil utilized at the end of the month	
6	Total quantity of earthwork reused in cum. (5%)	
7	Location disposal (if other than sites) (Specify clearly on a location plan)	
8	Outline a rehabilitation plan for each of the exhausted borrow areas with special reference to Erosion Protection Measures. Also, submit at separate detailed rehabilitation plan for exhausted borrow areas for approval supported adequately with layouts, plans and drawings.	

Remarks:.....
.....

Submitted	Checked	Approved
Signature.....	.....	.....
Name.....	.....	.....
Designation.....	.....	.....
Contractor	Assistant Engineer	Executive Engineer,
	UPID	UPID

6.1.9 Tree Plantation Plan

This EMP elaborates on the approach towards planting trees on service roads. Emphasis is laid on a greater involvement of communities and Gram Panchayats in planting and maintenance of roadside trees. Planting of fruit bearing and other suitable trees along the roads improve aesthetics and ecology of the area besides, the trees provide fuel wood, act as noise barriers, provide visual screen for sensitive areas and also generate revenue by sale of its produce.

However, certain precautions must be taken in design of avenue or cluster plantation so that the trees do not have an adverse impact on road maintenance and/or on safety of the road users at Project Planning and Design Stage.

Due consideration shall be given to minimise the loss of existing tree cover, encroachment of forest areas / protected areas etc, "Project Preparation". Tree felling, if unavoidable, shall be done only after requisite permission have been obtained. Tree plantation shall be carried out by the Volunteers identified by EE of the district or his appointed representative not below the rank of AE under the supervision of Nodal NGO.

Plant trees along roads here there is...
- Availability of land for planting
- Availability of water
- Willingness of PRI to nurture the saplings

A roadside landscape plan shall be prepared by the JE as part of the DPR, and shall be finalised by EE or his appointed representative not below the rank of AE in consultation with the State Forest Department and PRI. The plantations shall be in accordance with the IRC:SP:21-1979 Manual on Landscaping and IRC :66-1976. The plan may be in the form of avenue trees or cluster plantation.

The species shall be identified in consultation with officials of forest department, giving due importance to local flora, It is recommended to plant mixed species in case of both avenue or cluster plantation.

Consultations for the identification of volunteers for tree plantation and maintenance shall be conducted with the PRI. The identified volunteers will be entitled of any revenue generated out of these planted trees. It shall be the responsibility of the EE or his appointed representative not below the rank AE to work out institutional mechanisms for disbursing the cost, managing the plantation and upkeep of trees.

Do not plant trees...
- Within the line of sight around junctions
- On the inside of curves
- Within 5 m of the proposed centre line

The plantation strategy shall suggest the planting of fruit bearing trees and other suitable trees. Development of cluster plantations will be encouraged in the Gram Sabha lands, at locations desired by the community. The choice of species will be based on the preference of the community.

Fruit bearing indigenous species requiring less maintenance shall be chosen to ensure a higher survival rate. Necessary budgetary provisions shall be made in the cost estimates prepared the roads to include tree plantation and their maintenance.

Post-construction stage

Planting of saplings from the nurseries as per the landscape plan and the subsequent maintenance of the trees planted shall be carried out by the identified volunteers. Planting shall be undertaken immediately after rainy season or initial weeks of spring.

Watering of trees during the initial period of two to three years shall be the responsibility of the identified volunteers. For the protection of planted trees against the animals, Bamboo tree guard shall be provided. The payment to volunteers shall be made based on the number of survival trees after evaluation by EE and the Nodal NGO.

The activities to be taken up as part of maintenance shall include: (i) cutting/lopping branches up to a height of 2.5m above ground level to ensure visibility (ii) Removal of dead wood from the roadway and storing away from roads, and (iii) Weed cutting from shoulders and keeping the shoulders free from any growth of vegetation. In addition, the volunteers are to ensure a healthy survival rate by planting replacement saplings in cases where the survival rate is less than 80%.

It shall be the responsibility of the Nodal NGO to make community aware for fruit and timber harvesting rights and responsibilities of the planted trees in conformance with Forest Management Rule.

The Executive Engineer or his appointed representative not below the rank of AE shall ensure that the shoulders of the road shall be kept clear of weeds or any undesirable undergrowth, which may hinder free flow of traffic. It also be ensured that the branches of the trees do not obstruct clear view of the informatory and caution signs. Deciduous trees shed leaves every season. It is necessary to keep the roadway clear of such debris. Some gaps should be Left in avenue plantation to ensure that the carriageway dries up early after an occasional shower.

6.1.10 Silt Disposal Plan

This plan is required for handling, reuse and disposal of silt during construction. The role and responsibility has been defined for different activities (Pre, construction and post construction phase) as shown below:-

Sr. No.	Activity	Site Responsibility	Monitoring Responsibility
Project Planning and Design Stage			
1	Carry out the following measures for DPR: <ul style="list-style-type: none"> - Finalize design to minimize silt generation through balancing of cut and fill operations and minimizing excess cuts requiring disposal. - Identify the type of silt suggest options for possible reuse - Provide instructions to the contractor for locating silt disposal sites including landfill site. - Include in the bid document, as a special condition clause stating that all provisions of guideline shall be applicable to the locations of disposal of silt. 	UPID	- Executive Engineer (EE) or his appointed representative not below the rank of AE
Pre Construction Phase			
1	<ul style="list-style-type: none"> - Identify the activities during construction, that have the potential to generate silt and work out measures for the same in the construction schedule to be submitted to the EE or his appointed representative not below the rank of Assistant Engineer - For the disposal of excess cut and unsuitable, the contractor shall identify the location for disposal in consultation with the community / Gram Sabha. Prior to disposal of silt onto private/community land, it shall be the responsibility of the Contractor to obtain a No-objection Certificate (NOC) from the land owner/community. 	Contractor	The EE or <i>his</i> appointed representative not below the rank of AE shall carry out periodic inspections to ensure that all the pollution control systems are appropriately installed and comply with existing emission and noise norms.
Construction Phase			
1	<ul style="list-style-type: none"> - Either reuse or dispose the silt generated during construction depending upon the nature of silt - These could be embankment fill or usage as soil conditions if its characteristics support soil rejuvenation. The reuse of silt shall be carried out by the contractor only after carrying out the specific tests and ascertaining the quality of the silt materials, and getting the same approved by the EE. - In case of filling of low-lying areas with silt, it needs to be ensured that the level matches with the surrounding areas. In this case care should be taken that these low lying areas are not used for rainwater storage 	Contractor	The EE or <i>his</i> appointed representative not below the rank of AE shall carry out periodic inspections to ensure that all the pollution control systems are appropriately installed and comply with existing emission and noise norms.
Post Construction Phase			
1	<ul style="list-style-type: none"> - After decommissioning of construction sites, the Contractor shall hand over the site after clearing the site of all silt to the EE or his appointed representative not below the rank of AE (Use Format 3) - In case of disposal of silt on private land, certificate of Completion of Reclamation is to be obtained by the Contractor from the landowner that "the land is restored to his satisfaction". The same is to be submitted to the EE before final payment is claimed (Use Format 2). 	Contractor	The EE or his appointed representative not below the rank of AE shall certify restoration of all road links as well as relocated properties before final payment is made

Practices to avoid - silt disposal

- Tipping of silt into stream channels, water location of disposal site as well as the bodies, forests and vegetated slopes
- Non-cleaning of silt after day's work
- Littering in construction camps / sites
- Storing silt on private land

Format 12: Identification of Disposal Site Locations (To be filled by Contractor)

3. Name of Canal.....
4. Name of Nearest Human Settlement.....

Sr. No.	Criteria on which information for each site is to be collected	Site 1	Site 2	Site 3	Site 4
1.	Existing Land use				
2.	Area				
3.	Total material than can be dumped within the site (m ³)				
4.	Distance from Nearest Watercourse				
5.	Nearest Settlement (m)				
6.	Whether the community is agreeable to siting of dumping site (Y/N)				

Remarks:.....

.....

.....

.....

.....

Submitted

Checked

Approved

Signature.....

.....

.....

Name.....

.....

.....

Designation.....

.....

.....

Contractor

**Environmental Engineer
Supervision Party**

**Executive Engineer,
UPID**

6.1.11 Biodiversity Offsets Plan

Identified Impact: Canal rehabilitation would improve irrigation service delivery and reduce seepage and water loss. This could adversely impact formation of seasonal small and nondescript wetlands that provide localized habitats for amphibians and birds (waders, kingfishers and bee eaters).

Suggested Mitigation: The project would set aside US\$ 4 million for improving the management of wetlands of significance that are present in some of the project districts to offset any loss of biodiversity due to project investments at least to the level that biodiversity is likely to be lost so that no net loss of biodiversity happens.

S. No.	Process Step	Specific Action	Responsible Agency
1.	Sets aside US\$ 4 million as Biodiversity Offset	Create a separate line item in cost table under Environment and Social Safeguards	PACT
2.	Undertake extensive mapping of canal bank wetlands to identify impacts on specific species (measuring anticipated loss)	Contract a reputed experienced agency that has scientific and policy experience in wetlands management and research	PACT
3.	Preparation of wetlands management plans (including updating of any existing plans) for wetlands if significance	Contract a reputed experienced agency that has scientific and policy experience in wetlands management and research	PACT in consultation with State Biodiversity Board and State Forest Department
4.	Provide financial support from the Biodiversity Offset fund to implement the wetlands management plans	<p>Option 1: Contract a reputed experienced agency that has scientific and policy experience in wetlands management and research to help provide technical support in implementation of the wetlands management plans</p> <p>Option 2: Transfer funds directly to the State Forest Department for implementing the wetlands management plan</p> <p>Option 3: Transfer funds to the State Biodiversity Board for providing technical support for implementing the wetlands</p>	PACT in consultation with State Biodiversity Board and State Forest Department

S. No.	Process Step	Specific Action	Responsible Agency
		management plan <i>Note: In exercising any of the options 1,2 or 3, PACT would be responsible for monitoring the implementation of the wetlands management plan milestones, outputs and outcomes. This will be part of overall project reporting arrangements to the World Bank.</i>	
5.	Monitor, document, record and publish the implementation of the wetlands management plan	Prepare annual reports and disclose publically	Any of the agency as per Option 1, 2 or 3 under b/4 above

The Biodiversity Offset fund would also be used for any other loss of biodiversity observed/identified during implementation of the project.

6.1.12 Canal Rehabilitation Plan

Component B of the project will rehabilitate and modernize irrigation and drainage infrastructure in parts of the Sarda Sahayak System (Haidergarh Branch from 23 km and down), three reservoir commands in Bundelkhand (Rohini, Jamni, Sajnam Dams), and the Lower Ganga Canal (and Parallel Lower Ganga Canal) System. For parts of the system, rehabilitation and modernization will be taken up to the outlet level. For other parts of the system, only branches will be taken up.

To mitigate potential environmental and social impacts on account of canal rehabilitation, the following EMPs should be implemented:

Sr. No. of EMP	Name of EMP
6.1.1	Construction Labor Camp
6.1.3	Construction Plants & Equipment Management Plan
6.1.10	Silt Disposal Plan
6.1.7	Environmental Health and Safety Plan
6.1.2	Waste Management Plan
6.2	Rehabilitation and Resettlement Policy Framework

Format-13
Monitoring of culvert opening and longitudinal drains
(To be filled by the Contractor)

1. Name of Canal.....
2. Name of Nearest Human Settlement.....
3. Date of Submission.....

Sr. No.	Structural No.	Pre monsoon	Date	Post monsoon	Date
Name of the Canal System					
1.					
2					
3					
4					
5					
6					
7.					
8					
9					
10					
11					
12					
13					

Remarks:.....

Submitted
 Signature.....
 Name.....
 Designation.....
Contractor

Checked

Environmental Engineer
Supervision Party

Approved

Executive Engineer,
UPID

Format-14
Enhancement Measures
(To be filled by the Contractor)

1. Name of Canal.....
2. Name of Nearest Human Settlement.....
3. Date of Submission.....

Sr. No.	Drainage System Name	Name of the Site	Canal	Consent Taken (Y/N)	Total Budget		Date start of work	Remarks
					Total	Utilized		

Remarks:.....

Submitted
 Signature.....
 Name.....
 Designation.....
 Contractor

Checked

Environmental Engineer
Supervision Party

Approved

Executive Engineer,
UPID

A **Resettlement Policy Framework (RPF)** is required when the extent of resettlement cannot be known at appraisal stage. This framework provides for any situation that may arise where need for temporary or permanent land acquisition or resettlement and rehabilitation is inevitable. Resettlement and compensation activities should be conceived and executed in a sustainable manner. The RPF is intended for use as a practical tool, to guide the preparation of the Resettlement Action Plan (RAP) or the Abbreviated Resettlement Plan (ARP), depending upon the scale and severity of impacts.

The objective of the RPF is to ensure that the Project Affected Persons (PAPs) get compensation for their loss, are offered resettlement measures, and are supported in improving or at least restoring their levels of living and income after the project impact to pre-project levels. The RPF is intended to safeguard the interests of the population impacted by the project, especially the poor and vulnerable. The RPF is based on applicable Policies.

1. Potential Impact of Project Activities

UPWSRP Phase II component having potential land impact is the rehabilitation and modernization of irrigation and drainage systems. The activities under this component are unlikely to involve any need for land acquisition or resettlement and rehabilitation, as the infrastructure already exists. In the rare event that this would be the case, the RPF will be applied and implemented.

Possible impacts can be categorized in three broad groups:

- Loss of immovable assets i.e. agricultural land, homestead, cattle sheds, wells, ponds, trees, commercial establishments, community infrastructure etc.;
- Loss of livelihood or income opportunity on account of loss of agricultural land.
- Impact on the community in terms of loss of common property resources such as grazing land, other common land, village commons or forests or access to it.

The impacts can be either temporary (for the duration of construction activities) or permanent.

2. Legal Framework

The RPF is prepared in accordance with:

- Land Acquisition Act, 1894.
- World Bank guidelines as set out in the Operational Policy OP 4.12 on Involuntary Resettlement.
- Land Acquisition (Determination of Compensation and Declaration of Award by Agreement) Rules, 1997
- National Rehabilitation and Resettlement Policy, 2007
- Uttar Pradesh Water Sector Resettlement and Rehabilitation Policy, 2001.
- Government Order No. 1252/1-13-10-20 (29)/ 2004, 17 August 2010 laying out Uttar Pradesh Rehabilitation and Resettlement Policy

- Government Order No. 1307/1-13-10- (29)/ 2004, 03 September 2010 regarding Uttar Pradesh Rehabilitation and Resettlement of families affected in Land Acquisition Matters
- Government Order No. 1666/1-13-2010-18-1(95)/10, 01 December, 2010 regarding quick procedure for land acquisition and Government Order No. 71-1/13-11-7-3(1)/90-59T.C.-1, 04 February, 2011
- Government Order No. 632/1-13-11-20(29)2004, 2 June, 2011 laying out Uttar Pradesh Land Acquisition Policy
- Government Order No. 2386/12-27 –I-3-28L/12, 08 October, 2012 regarding land to be taken for various irrigation projects by mutual agreement and compensation determination

These Government Policies and Orders are presented in Volume II – Annexure 6.2 A.

2.1 World Bank guidelines

World Bank guidelines seek to ensure that, throughout its life, the project fully complies with the principle that any involuntary loss of assets or relocation of economic activities or residence, are minimized and fully compensated, and that adequate procedures exist for prior consultation of all affected persons, assessment of losses and entitlements, handling complaints and disputes, and monitoring the outcomes. In particular it provides that the outcomes conform to the principles of full and prior compensation for any lost assets and full restoration of standards of living of those that are directly and adversely affected. The guidelines also applies to those who lack legal or formal ownership of affected assets and they are entitled to fair compensation and all other forms of assistance (housing, social services etc.).

2.2 National Rehabilitation and Resettlement Policy, 2007

Key features of the National Rehabilitation and Resettlement Policy, 2007, are the following:

- Policy covers all cases of involuntary displacement;
- Social Impact Assessment (SIA) introduced for displacement of 400/200 or more families in plain/tribal, hilly, Scheduled Areas, etc;
- Tribal Development Plan in case of displacement of 200+ ST families;
- Consultations with Gram Sabha or public hearings made compulsory;
- Principle of rehabilitation before displacement;
- If possible, land for land as compensation;
- Skill development support and preference in project jobs (one person per nuclear family);
- Rehabilitation Grant in lieu of land/job;
- Option for shares in companies implementing projects to affected families;
- Housing benefits to all affected families including the landless;
- Monthly pension to the vulnerable, such as disabled, destitute, orphans, widows, unmarried girls, etc;

- Monetary benefits linked to the Consumer Price Index; also to be revised suitably at periodic intervals;
- Necessary infrastructural facilities and amenities at resettlement areas;
- Periphery development by project authorities;
- R&R Committee for each Project, to be headed by Administrator for R&R;
- Ombudsman for grievance redressal; and
- A National Rehabilitation Commission.

2.3 Government Order No. 1252/1-13-10-20 (29)/ 2004, 17 August 2010

The major features of 2010 Uttar Pradesh Rehabilitation and Resettlement Policy relevant to the project are given below:

- Each of the project affected family whose entire land has been acquired for the project is entitled for one time compensation equivalent to five years of minimum agriculture wages for loss of livelihood.
- Each of the project affected family whose land has been acquired partially and who has become marginal farmers due to acquisition of land in the project area are entitled for one time compensation equivalent to 500 days of minimum agriculture wages for loss of livelihood.
- Each of the project affected family whose land has been acquired partially and who has become small farmers due to acquisition of land in the project area are entitled for one time compensation equivalent to 375 days of minimum agriculture wages for loss of livelihood.
- Agriculture and non agriculture farmers whose land has been acquired partially due to acquisition of land in the project area are entitled for one time compensation equivalent to 625 days of minimum agriculture wages for loss of livelihood.
- In addition to the above compensation, each of the project affected family which has been displaced will be given one time compensation equivalent to 250 days of minimum agriculture wages for loss of livelihood.
- Each of the project affected family will be given housing facility in case of emergency acquisition of land under section 17 of Land Acquisition Act, 1894 till such time that the RAP is prepared & implemented.
- PAF will provide adequate facilities for capacity building & skill development for self employment under to start for self employment.
- The policy further prescribes the organizational structure for land acquisition, and related conflict resolution and its implementation.

2.4 Government Order No. 632/1-13-11-20(29)2004, 2 June, 2011

The Government Order lays out Uttar Pradesh Land Acquisition Policy. The general policy for taking land for all purpose will be that the land be purchased directly from the land owners on the basis of mutual understanding/agreement arrived at between the land owners & the acquisition bodies by following the relevant rules/orders relating to the purchase of land. For implementation of infrastructure projects in public sector, the process of land acquisition would be initiated by following the Rules & Regulations as provided in the Land Acquisition Act 1894, but the compensation of land would be fixed by mutual consent as per the provisions of The Uttar Pradesh Land Acquisition (Determination of Compensation and Declaration of Award by Agreement) Rules, 1997 and the land owners would be given all the benefits of the Rehabilitation & Resettlement Policy 2010.

In addition to these benefits, the following benefits shall also be available to land owners:

- **Annuity**
 - (a) Every land owner, whose land has been acquired shall be given annuity @ Rs. 23000/= per acre per year in addition to compensation amount.
 - (b) The amount of annuity of Rs. 23000/= shall be increased by Rs. 800/= per acre every year in the month of July.
 - (c) The land owner, who does not want to take annuity, shall be given Rs. 2,76,000/= per acre in lump sum as rehabilitation subsidy.
- A Kisan Bhawan (Farmer Resource Centre) would be constructed by the developer agency of the project at its own cost in every village affected by land acquisition so that the land owners can have a building for their community requirements.
- A scheme of at least one model school (up to class 8) with play ground would be started in the project area & the building for it would be constructed by the developer of the project at its cost for providing education below poverty line, who are affected by the land acquisition.
- The developed land given to the land owners as compensation shall be exempted from stamp duty and registration fee payable on registration.
- If the affected land owners purchase any agricultural land in the State within a period of one year from the date of receiving the compensation, then in that case, they shall be exempted from paying the stamp duty and registration fee on its registration up to the value of compensation received.

2.5 Government Order No. 71-1/13-11-7-3(1)/90-59T.C.-1, 04 February, 2011 and Government Order No. 1666/1-13-2010-18-1(95)/10, 01 December, 2010

These Government Orders apply to the quick procedure for land acquisition. Government Order of 01 December, 2010, states that the basis for invoking this quick procedure should be supported by appropriate data and permissions. Government Order of 04 February, 2011, states that the quick procedure should be evoked under extreme emergency conditions only.

GO No. 2386/12-27-Ir-3-38 L/12 Land acquisition for Irrigation Projects based on Mutual Agreement and Compensation Fixation, 8th October 2012

Irrigation department will follow land acquisition policy described in GO No. 632/1-13-11-20(29)2004 dated 2nd June 2011.

Land acquisition for irrigation projects will be based on mutual agreement and cooperation with land owners. This will be followed as a general policy as per guidance given in GO No. 632/1-13-11-20(29)2004 dated 2nd June 2011.

Rates for land acquisition based on mutual agreement with land owners will be decided by the committee headed by District Magistrate and coordinated by Executive Engineer of the respective division.

The recommendations of the above mentioned committee will be given to the concerned Chief Engineer along with separate written consent from the farmers. This document will be made public for four months and the procedure for land acquisition will be invoked after its expiry.

In case of failure of land acquisition procedure by mutual agreement then other provisions for land acquisition as mentioned in clause 1 of land acquisition policy given in GO No. 632/1-13-11-20(29)2004 dated 2nd June 2011 will be invoked.

2.6 Uttar Pradesh Water Sector Resettlement and Rehabilitation Policy, 2001

The Policy is based on the following principles:

- Avoid or minimize acquisition of land and other assets and reduce negative social and environmental impacts. In an effort to minimize the losses, where ever possible explore all viable alternative project design. Efforts should be made towards the enhancement of the positive impact of the projects, especially for the PAPs;
- Wherever negative impacts are unavoidable, efforts should be made either to improve the standard of living of the affected persons or at least assist them in restoring their previous standard of living at no cost to them;

- Lack of ownership or title to the acquired project does not deprive the affected persons to get support in their resettlement and rehabilitation;
- People's participation in planning their own resettlement and rehabilitation enabling them opportunities to share development benefits is central to resettlement and rehabilitation. The affected population should be involved throughout the process of planning and implementation of resettlement programs;
- Integration of the resettling population with the host community should be ensured, enabling them to share the development benefits and also blend within the planning framework, the requirement of necessary infrastructure on account of the added population pressure and the possible future population growth;
- In planning for the resettlement and rehabilitation, care should be taken to preserve the interest of women, youth and other interest groups and particularly the traditional land rights and customs. In case of tribals, specific Indigenous People's Development Plans need to be prepared to address their issues;
- Support will be extended under the policy to meet the replacement cost of the assets;
- If after acquisition, the remaining asset becomes operationally non-viable the remaining portion will be acquired and compensated at replacement cost;
- No construction activities will be initiated unless the land and properties are compensated and support extended for R & R;
- While planning for developing resettlement sites for displaced community from the project it should be ensured that there are no adverse social, economic and environmental effects of displacement on the host communities through consultation during the process planning and implementation. Wherever required specific measures will be taken to meet the additional demand for resources.

The Policy describes the procedures to follow, the process for land acquisition and payment of compensation, assistance provided, and guidelines for planning and implementing Rehabilitation and Resettlement, as well as the organizational structure and monitoring and post-project evaluation.

2.7 Summary table

A summary of the various Government Policies and Orders is given below:-

Act/Policy/Guidelines	Summary	National/ State
Land Acquisition Act, 1894	<p>It is applicable whenever it appears to the [appropriate Government] the land in any locality [is needed or] is likely to be needed for any public purpose [or for a company].</p> <p><u>Taking Possession</u> <u>Power to take possession.</u> - When the Collector has made an award under section 11, he may take possession of the land, which shall thereupon [vest absolutely in the [Government], free from all encumbrances.</p> <p><u>Special powers in case of urgency.</u> – (1) In cases of urgency whenever the [appropriate Government], so directs, the Collector, though no such award has been made, may, on the expiration of fifteen days from the publication of the notice mentioned in section 9, sub-section 1). [take</p>	National

possession of any land needed for a public purpose]. Such land shall thereupon [vest absolutely in the [Government]], free from all encumbrances.

(2) Whenever, owing to any sudden change in the channel of any navigable river or other unforeseen emergency, it becomes necessary for any Railway Administration to acquire the immediate possession of any land for the maintenance of their traffic or for the purpose of making thereon a river-side or ghat station, or of providing convenient connection with or accesses to any such station, [or the appropriate Government considers it necessary to acquire the immediate possession of any land for the purpose of maintaining any structure or system pertaining to irrigation, water supply, drainage, road communication or electricity,] the Collector may immediately after the publication of the notice mentioned in sub-section (1) and with the previous sanction of the [appropriate Government], enter upon and take possession of such land, which shall thereupon [vest absolutely in the [Government]] free from all encumbrances.

(3) In every case under either of the preceding sub-sections the Collector shall at that time of taking possession offer to the persons interested compensation for the standing crops and trees (if any) on such land and from any other damage sustained by them caused by such sudden dispossession and not excepted in section 24; and, in case such offer is not accepted, the value of such crops and trees and the amount of such other damage shall be allowed for in awarding compensation for the land under the provisions herein contained.

Temporary Occupation of Land

Temporary occupation of waste or arable land. Procedure when difference as to compensation exists. - (1) Subject to the provisions of Part VII of this Act, whenever it appears to the [appropriate Government] that the temporary occupation and use of any waste or arable land are needed for any public purpose, or for a Company, the [appropriate Government] may direct the Collector to procure the occupation and use of the same for such term as it shall think fit, not exceeding three years from the commencement of such occupation.

(2) The Collector shall thereupon give notice in writing to the person interested in such land of the purpose for which the same is needed, and shall, for the occupation and use thereof for such term as aforesaid, and for the materials (if any) to be taken there from, pay to them such compensation, either in a gross sum of money, or by monthly or other periodical payments, as shall be agreed upon in writing between him and such persons respectively.

(3) In case the Collector and the persons interested differ as to the sufficiency of the compensation or apportionment thereof, the Collector shall refer such difference to the decision of the Court.

Power to enter and take possession and compensation on restoration. -

(1) On payment of such compensation, or on executing such agreement, or on making a reference under section 35, the collector may enter upon and take possession of the land, and use or permit the use thereof in accordance with the terms of the said notice.

(2) On the expiration of the term, the Collector shall make or tender to the persons interested compensation for the damage (if any) done to the land and not provided for by the agreement, and shall restore the land to the persons interested therein:

Provided that, if the land has become permanently unfit to be used for the purpose for which it was used immediately before the commencement of such term, and if the persons interested shall so require, the [appropriate

	Government] shall proceed under this Act to acquire the land as if it was needed permanently for a public purpose or for a Company. <u>A copy of this Act is attached in Annexure 6.2A.</u>	
World Bank OP 4.12	The system rehabilitation and modernization is unlikely to involve any need for land acquisition or resettlement and rehabilitation (R&R). In the rare event that this is needed, the provisions of Bank OP4.12 shall be invoked in consonance with the UP State R&R Policy. A Resettlement Policy Framework has been prepared under this project. This OP is applicable to the project. <u>A copy of this policy is attached in Annexure 6.2A.</u>	World Bank
Land Acquisition (Determination of Compensation and Declaration of Award by Agreement) Rules, 1997	The body or Department for which the land if being acquired may, at any stage of the proceedings settle down the terms and conditions and rates of the land under acquisition, with the land owners and appear before the Collectors and make an application indicating the terms and conditions so settled down and its readiness and willingness for determination of compensation and declaration of award in accordance with agreement. The Collector shall, if satisfied, issue notice to the persons interested in the land under acquisition to express their readiness and willingness to execute the agreement in writing, on the matters to be included in the award. <u>A copy of this rule is attached in Annexure 6.2A.</u>	State
National Rehabilitation and Resettlement Policy, 2007	The system rehabilitation and modernization is unlikely to involve any need for land acquisition or resettlement and rehabilitation (R&R). In the rare event that this is needed, the provisions of UP State R& R Policy shall be invoked. A Resettlement Policy Framework has been prepared under this project. This National Policy is not applicable to the project. <u>A copy of this policy is attached in Annexure 6.2A.</u>	National
Uttar Pradesh Water Sector Resettlement and Rehabilitation Policy, 2001	The Policy describes the procedures to follow, the process for land acquisition and payment of compensation, assistance provided, and guidelines for planning and implementing Rehabilitation and Resettlement, as well as the organizational structure and monitoring and post-project evaluation. <u>A copy of this policy is attached in Annexure 6.2A.</u>	
Government Order No. 1252/1-13-10-20 (29)/2004, 17 August 2010 laying out Uttar Pradesh Rehabilitation and Resettlement Policy	The major features of 2010 Uttar Pradesh Rehabilitation and Resettlement Policy relevant to the project are <ul style="list-style-type: none"> • Each of the project affected family whose entire land has been acquired for the project is entitled for one time compensation equivalent to five years of minimum agriculture wages for loss of livelihood. • Each of the project affected family whose land has been acquired partially and who has become marginal farmers due to acquisition of land in the project area are entitled for one time compensation equivalent to 500 days of minimum agriculture wages for loss of livelihood. • Each of the project affected family whose land has been acquired partially and who has become small farmers due to acquisition of land in the project area are entitled for one time compensation equivalent to 375 days of minimum agriculture wages for loss of livelihood. • Agriculture and non agriculture farmers whose land has been acquired partially due to acquisition of land in the project area are entitled for one time compensation equivalent to 625 days of minimum agriculture wages for loss of livelihood. • In addition to the above compensation, each of the project affected family which has been displaced will be given one time compensation equivalent to 250 days of minimum agriculture wages for loss of livelihood. • Each of the project affected family will be given housing facility in case of emergency acquisition of land under section 17 of Land Acquisition Act, 1894 till such time that the RAP is prepared & implemented. • PAF will provide adequate facilities for capacity building & skill development for self employment under to start for self employment. 	State

	<ul style="list-style-type: none"> The policy further prescribes the organizational structure for land acquisition, and related conflict resolution and its implementation. <p><u>A copy of this policy is attached in Annexure 6.2A.</u></p>	
Government Order No. 71-1/13-11-7-3(1)/90-59T.C.-1, 04 February, 2011 and Government Order No. 1666/1-13-10-18-1(95)/10, 01 December, 2010	These Government Orders apply to the quick procedure for land acquisition. Government Order of 01 December, 2010, states that the basis for invoking this quick procedure should be supported by appropriate data and permissions. Government Order of 04 February, 2011, states that the quick procedure should be evoked under extreme emergency conditions only. <u>A copy of this policy is attached in Annexure 6.2A.</u>	State
Government Order No. 1307/1-13-10- (29)/ 2004, 03 September 2010	The Government Orders apply to Uttar Pradesh Rehabilitation and Resettlement of families affected in Land Acquisition Matters. <u>A copy of this policy is attached in Annexure 6.2A.</u>	State
Government Order No. 632/1-13-11-20(29)2004, 2 June, 2011 laying out Uttar Pradesh Land Acquisition Policy	The Government Order lays out Uttar Pradesh Land Acquisition Policy. The general policy for taking land for all purpose will be that the land be purchased directly from the land owners on the basis of mutual understanding/agreement arrived at between the land owners & the acquisition bodies by following the relevant rules/orders relating to the purchase of land. For implementation of infrastructure projects in public sector, the process of land acquisition would be initiated by following the Rules & Regulations as provided in the Land Acquisition Act 1894, but the compensation of land would be fixed by mutual consent as per the provisions of The Uttar Pradesh Land Acquisition (Determination of Compensation and Declaration of Award by Agreement) Rules, 1997 and the land owners would be given all the benefits of the Rehabilitation & Resettlement Policy 2010. <u>A copy of this policy is attached in Annexure 6.2A.</u>	State
Government Order No. 2386/12-27 –I-3-28L/12, 08 October, 2012	The Government Orders apply to land taken for various irrigation projects by mutual agreement and determine compensation. <u>A copy of this policy is attached in Annexure 6.2A.</u>	State

3. Definitions

As per Uttar Pradesh Water Sector Resettlement and Rehabilitation Policy, 2001:
Project-Affected Person (PAP): a person who is affected on account of the land acquisition or appropriation of land home stead land and structures thereon and loss of trade and occupation and livelihood due to construction of the project.

Project Displaced Persons: the persons who have lost total livelihood derived from the assets affected by the project and/or have become homeless.

Project Affected Family:

- Affected person and his/her spouse and minor children;
- Every son irrespective of his marital status above the age of 18 years;
- Every unmarried daughter above the age of 18 years;
- Divorced, widowed, abandoned, separated or single unwed mother living separately;
- Disabled and orphans.

Encroacher: a person who has trespassed Government/ private/ community land to which he/ she is not entitled to.

Squatter: a person who has unauthorisedly settled on the land or building for shelter or livelihood.

Land less/ agriculture labor: a person who does not hold any agricultural land and has been deriving his main income by working on the land of others on wage labor.

Vulnerable Persons include the following:

- The people living Below Poverty Line (BPL) as defined by the Government of India;
- Members of the Schedule Caste/ a Tribe community/ Other Backward Caste;
- Women headed households;
- Orphans and destitute;
- Disabled and aged;
- Landless persons.

Cut-Off Date:

- The date of issuing notice under section 4(1) of the Land Acquisition Act of 1984 and its amendments for titleholders.
- For the non-title holders the cut- off date is the date of Census Survey which should be completed 2 years prior to the section 4(1) notice under the L.A. Act.

4. Principles and objectives of RPF

The RPF is based on the following principles and objectives:

- Involuntary resettlement and land acquisition will be avoided where feasible, or minimized, by exploring all viable alternatives.
- Where involuntary resettlement and land acquisition is unavoidable, resettlement and compensation activities will be implemented. Project Affected Persons will be meaningfully consulted and will have opportunities to participate in planning and implementing resettlement and compensation programs.
- Project Affected Persons will be assisted to improve their livelihood and standards of living or at least to restore them prior to the beginning of the project.
- The transition period will be minimized in the resettlement process.
- Compensation shall be paid and efforts will be made to complete the R&R of PAPs/PDPs before taking possession of the land/properties.

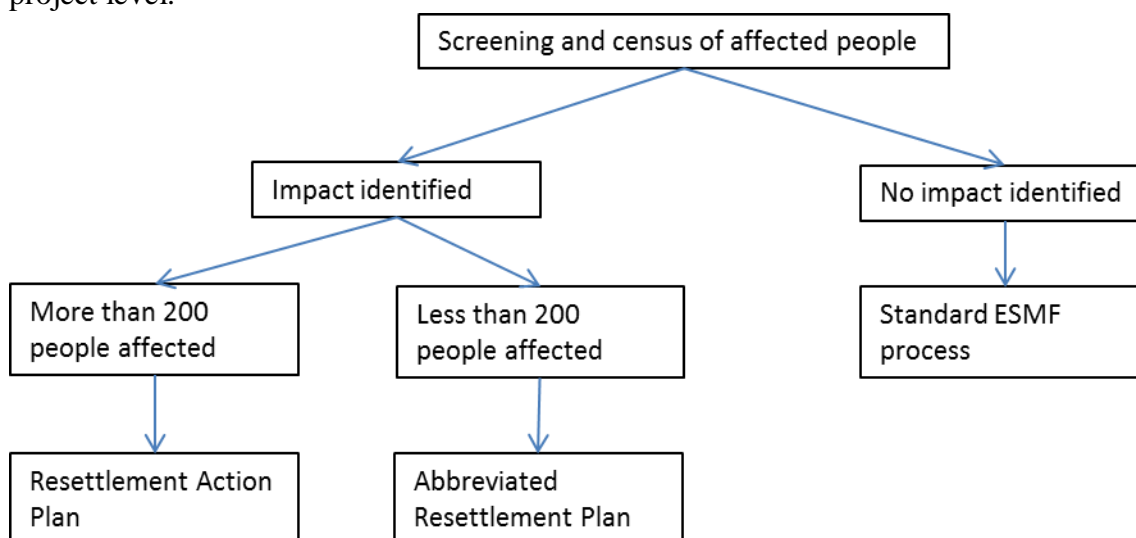
The RPF describes the details of entitlements and type of assistance to be extended to the affected persons, which will become the basis for preparing the Resettlement Action Plan

(RAP) or Abbreviated Resettlement Plan (ARP) depending on number of displaced persons as per OP 4.12.

5. Overview of the RPF process

5.1 Application of RPF

The following figure presents an overview of the identification/review process under this RPF to address specifically land impacts and displacement/resettlement needs at sub-project level.



5.2 Screening of sub-projects and census of affected assets and households

During the project preparation, alternative designs will be examined to minimize acquisition of land and other assets and to reduce negative socioeconomic impacts. All sub projects shall be screened for their likely adverse impacts in the Planning Stage. A sample screening format is given in Form – 1. Where land acquisition must take place, and whatever the extent of the land acquisition, a census will be carried out to inventory affected assets and affected households.

If the issues related to resettlement are triggered, the RAP/ ARP will have to be prepared for the concerned sub project. Such a plan shall be prepared at the Planning and Design Stage of the project preparation. The RAP and ARP contain the implementation details on how to ensure that principles and provisions of this policy can be implemented. The plan is based on up-to-date and reliable information about (a) the proposed resettlement and its impacts on the displaced persons or adversely affected groups, and (b) the legal issues involved in resettlement.

5.3 Resettlement Action Plan (RAP)

The Resettlement Action Plan will be used where more than 200 individuals are displaced. All RAPs need World Bank approval prior to commencing resettlement activities. The outline of RAP as per Uttar Pradesh Water Sector Rehabilitation and Resettlement Policy is given below.

A socio-economic base line survey should be conducted within two years of the publication of the section 4(I) notification of Land Acquisition Act and should include:

- Identification of the affected area through maps and consultations with the local communities. This will form the basis for issuing of identity cards to the eligible families.
- Baseline survey - census verification of 100% of the affected population and the loss of properties.
- A detailed sample socio-economic survey including consultation, focus group discussions, etc.
- A survey among the host community to identify issues relating to the relocation of displaced population.
- Identification and analysis of social structures, norms, customs, cultural centers, traditional rights including those related to common properties and practices, leadership pattern, social networking.

The entire plan for resettlement should be prepared by the project authorities in consultation with all stakeholders including local representatives, NGOs/CBOs and PAPs. The RAP will include:

- Description of the sub-project and its potential land impacts
- Main objectives of the resettlement program
- Legal and institutional framework
- Baseline census of affected people and their losses, including:
 - Results of the census survey covering current occupants of the affected area to establish a basis for the design of the resettlement program and to exclude subsequent inflows of people from eligibility for compensation and resettlement assistance;
 - Standard characteristics of displaced households, including a description of production systems, labor, and household organization; and baseline information on livelihoods (including, as relevant, production levels and income derived from both formal and informal economic activities) and standards of living (including health status) of the displaced population;
 - Magnitude of the expected loss-total or partial-of assets, and the extent of displacement, physical or economic;
 - Information on vulnerable groups or persons, for whom special provisions may have to be made; and
 - Provisions to update information on the displaced people's livelihoods and standards of living at regular intervals so that the latest information is available at the time of their displacement

- A description of land tenure and transfer systems, common property resources
- Patterns of social interaction in the affected communities
- Public infrastructure and social services that will be affected
- Social and cultural characteristics of displaced communities
- Eligibility. Based on this RPF, definition of displaced persons and criteria for determining their eligibility for compensation and other resettlement assistance, including relevant cut-off dates.
- Valuation of and compensation for losses, including the methodology to be used in valuing losses to determine their replacement cost as per applicable Policies; and a description of the proposed types and levels of compensation and such supplementary measures as are necessary to achieve replacement cost for lost assets.
- Resettlement measures and assistance, alternatives for economic rehabilitation
- Planning for relocation: identification of New Resettlement sites in consultation with the displaced and host population, identification of the necessary infrastructure and common properties to be developed at the new sites, arrangements during shifting and transition period, specific issues related to women, tribals and other vulnerable groups
- Planning for economic rehabilitation: identification of livelihood alternative feasible in the area in consultation with the affected community with emphasis on the needs of the vulnerable groups particularly women, tribal and others; the focus should be on land based activities and where such possibilities are not feasible, identification of alternate opportunities and provision of both backward and forward linkages for the success of restoration of livelihood.
- Participatory framework
- Mechanism for implementation, monitoring and grievance redress
- Implementation schedule
- Budget

The executive summary of RAP should be translated in the local language and widely communicated.

A sample Terms of Reference (ToR) for carrying out social assessment & preparing RAP as part of DPR is given in Form – 2.

5.4 Abbreviated Resettlement Plan (ARP)

The Abbreviated Resettlement Plan will be used where less than 200 individuals are displaced. The outline of an ARP is given below. The project must keep documentation and provide reports that detail what actions were taken in these areas. All ARPs need World Bank approval prior to commencing resettlement activities.

The abbreviated resettlement plans should briefly present:

- The project activity necessitating acquisition of land or any other assets, and the nature and extent of that acquisition, with justification and minimization, including sketch maps
- Census Survey of Affected Persons and Valuation of Assets:
 - o Methodology
 - o Affected Persons and Assets
 - o Socio-Economic Features and Affected People's Livelihoods
- Description of compensation, entitlements, and other resettlement assistance according to the different categories of impacts and a corresponding table of compensation entitlements with the nature and bases of compensation rates as per applicable Policies
- Consultation with affected persons about acceptable choices and alternatives
- Mechanism for implementation, monitoring and grievance redress
- Implementation schedule
- Budget

The abbreviated plan (except for the amounts of monetary awards) shall be made publicly available in local language, and other media as appropriate, and in locations accessible to the affected people.

6. Affected assets, affected people, entitlements, and compensations

Together with land, other assets which could potentially be impacted by construction of a subproject include the following:

- Immovable assets: buildings, other structures (wells, channels, etc...), crops (perennial and annuals), trees.
- Right of way.
- Livelihoods.

Entitlements and compensations will be as per applicable Policies presented in section 2.

The compensation for the land and properties to be acquired shall be paid according to the provisions of the Land Acquisition Act, 1894 amended and Government Order No. 632/1-13-11-20(29)2004, 2 June, 2011.

All affected assets and related affected people located within the footprint of a subproject shall be inventoried. The R&R assistance will be extended to only those PAPs who are identified on or prior to the cut-off date. Only affected assets identified during the census will be eligible for compensation. All PAPs will be entitled to R&R assistance over and above the compensation received under the Land Acquisition Act. The non-titleholder PAPs are not entitled for compensation (encroachers and Squatters) but will get Rehabilitation and Resettlement (R&R) assistance.

Other key entitlements and compensations as per Uttar Pradesh Water Sector Resettlement and Rehabilitation Policy, 2001 are the following:

- Wherever possible, land for land for agriculture purposes will be provided. The size of the alternate agricultural land provided will not be less than the average landholding in the district.
- In case of shops and houses, the size of the alternate plots will be:
 - (a) 100 sq. mt. for plots greater than 100 sq. mt.
 - (b) 50 sq. mt. for plots below 100 sq. mt.
 - (c) 25 sq. mt. for shops.
 - (d) these alternate plots will be free of cost for the vulnerable.
- Alternate agricultural lands/ houses/ shops will be in the joint name of husbands and wives. Cost of registration of the sale deed to that effect would be borne by the project authority
- If the residual land is less than the average land holding in the district (as determined by the Revenue department, GOUP), the owner of the land shall have the right to seek acquisition of his entire contiguous holding. Similarly if the residual part of the structure becomes unlivable/ unusable, the owner shall have the right to seek acquisition of the left over part.
- The Policy lays out provisions for the calculation of replacement costs.
- Compensation of trees will be based on their market value in case of timber bearing trees and in case of fruit bearing trees, as per the rates decided by the competent authority in consultation with the Department of Agriculture, Forest, Horticulture, Sericulture etc. as the case may be.
- The value of houses, buildings and other immovable properties of the Project Displaced Persons (PDPs) and Project Affected Persons (PAPs) shall be determined for the purpose of payment of compensation, without deducting the depreciation value.
- The PDPs and PAPs shall hand over the land and properties acquired to the Government free from all encumbrances such as mortgage, debt, etc., pertaining to the lands and properties acquired. However, in case of any loans on such acquired lands and properties given to the PAP by any Govt. agency remains unadjusted as per the information furnished by the PAPs or by the loaner agency, then such amounts shall be deducted out of total compensation.
- If compensation for structures is less than the cost of Weaker Section Housing scheme of the Government of India, then the difference will be paid as *ex-gratia*.
 - Fixing up the market value of homestead land will be as per the replacement cost considered for agricultural land.
 - The houseless displaced families will be assisted to get shelter under Weaker Section Housing Scheme of the Government of India free of cost
- Additional economic rehabilitation grant calculated for one-year income level as determined by the Planning Commission, Government of India, for the below poverty-line (BPL) level will be provided for the affected vulnerable families.
- Allowances shall be provided for Project Displaced Persons; these allowances are listed in the Policy.

- The R&R activity in respect of the tribal people should be adapted to their needs and environment. Customary rights and land tenure system of the tribal PDPs and PAPs should be protected.
- If the project impact leads to people being unable to continue, with the previous occupation, the project will provide support and assist through alternative employment strategies that are acceptable to the Project Displaced Persons. Long-Term earning opportunities will be provided through strategies such as vocational training, employment counseling, inclusion in income generating schemes, and access to credit, etc.
- Training for skill upgradation or those related to income generation will be provided as a part of rehabilitation assistance. Training for up-gradation of skills to enable the PDPs and PAPs to begin new livelihood, through income generation programs with the help of NGOs.
- Compensation for the properties belonging to the community or for common places of worship, which are acquired for the project shall be provided to enable construction of the same at the new place through the local self-governing bodies. The replacement will be in kind through community participation.
- New settlement sites with necessary infrastructure for relocating displaced families and will be close to the original place of habitation.
 - The resettlement site should be selected with the majority of the displaced persons agreeing for the site, with no secondary displacement involved.
 - Every effort will be made to ensure that the land is developed for the new housing site, the plots are drawn and allocated to the individual displaced families, as per their entitlements.
 - Wherever the PDPs do not opt for such site, and prefer cash, then assistance in lieu of the house site/shop will be given to them.
 - At the new resettlement centers, basic civic amenities as listed by the Government of India, viz drinking water, internal and link roads, medical facilities, schools, electricity etc. will be provided along with any other amenities which the PDPs enjoyed at their abandoned place.
 - Special attention will be given to ensure that alternative arrangements will be made for those people whose livelihoods were dependent on public lands.

UP Policy, 2001, also provides for other assistance:

- The affected population will be assisted in getting their names included in the voter's lists of the area of their resettlement.
- For the purpose of treating the divorces and widows having no source of livelihood as separate family, benefits like old age pension etc, availed off by them should not be taken into account.
- The project will ensure that PAPs get preference in job with the contractors during the construction phase.

7. Implementation Arrangements

For each sub-project, the Executive Engineer in charge, UPID, will be responsible for implementation of the RPF. He will be assisted as required by PACT and will coordinate with the revenue department for all Land Acquisition issues. The RAP and ARP will be approved by PACT.

Efforts will be made to ensure consultation, involving the people, Non-Government Organizations (NGOs) and stakeholders in planning, implementing and monitoring of the project. Separate consultations should be held with vulnerable people including tribals. All these consultations should lead to minimize risks involved and develop appropriate mitigation measures.

The transition period will be minimized in the resettlement process. Personal and individual attention will be paid towards assisting affected families during their resettlement.

Compensation shall be paid and efforts will be made to complete the R&R of PAPs/PDPs before taking possession of the land properties. Also, sufficient time will be provided to harvest the standing crops.

Payment of compensation and other R&R monetary assistance through cheques should be carried out in a totally transparent manner, in village meetings in presence of Gram Pradhan (Village headman) and other villagers.

Funding for RPF Activities

All the cost of resettlement activities will be met from the sub-project cost. Detailed R&R cost estimates will be developed based on the proposed mitigation measures proposed and will be included in the project cost at the sub-project level.

Grievance Redress Mechanisms

Grievance Redress Mechanisms will be as per applicable Policies.

In particular, the National Resettlement Policy, 2007, states that in each concerned district, the State Government shall constitute a standing Rehabilitation and Resettlement Committee under the chairpersonship of the District Collector or, as the case may be Deputy Commissioner of the district, to monitor and review the progress of rehabilitation and resettlement of the affected families in the district.

In accordance with UP Water Sector Rehabilitation and Resettlement Policy, 2001, the Committee shall include representation from the affected community.

The National Policy also states that an Ombudsman shall be appointed by the appropriate Government, in the manner as may be prescribed, for time-bound disposal of the grievances arising out of the matters covered by this policy. Any affected person, if aggrieved, for not being offered the admissible rehabilitation and resettlement benefits as

provided under this policy, may move an appropriate petition for redressal of his or her grievances to the Ombudsman concerned.

The grievance redress mechanism should be in place at the time of initiating the implementation of RAP and civil construction activities in the area

8. Monitoring and Evaluation

Uttar Pradesh Water Sector Resettlement Policy, 2001, requires that, during and on completion of the R&R work, project authorities will monitor the progress of the resettlement and rehabilitation activities and its impact on the PAPs and the host population. The socio-economic survey undertaken during the project preparation will provide benchmarks for comparison on the socioeconomic status of the PAPs in the post-project period. Regular monitoring of physical and financial aspects of the project will be conducted by the project by UPID. Baseline, mid-term, and final impact evaluation of resettlement and rehabilitation implementation process will be carried out by the external M&E agency with the participation of the representative; of the PAPs/ PDPs themselves. Suggestions made in the evaluations report will be incorporated in the RAP/ revised RAP to make the R&R programs more effective.

Involuntary Resettlement Screening Form - 1

Screening Questions for Resettlement Categorization

Project Title:.....

Probable Involuntary Resettlement Effects*	Yes	No	Not Known	Possible	Remarks
Will the project include any physical construction work?					
Does the project include upgrading or rehabilitation of existing physical facilities?					
Are any project effects likely lead to loss of housing, other assets, resource use or incomes/livelihoods?					
Is land acquisition likely to be necessary?					
Is the site for land acquisition known?					
Is the ownership status and current usage of the land known?					
Will easements be utilized within an existing Right of Way?					
Are there any non-titled people who live or earn their livelihood at the site or within the Right of Way?					
Will there be loss of housing?					
Will there be loss of agricultural plots?					
Will there be losses of crops, trees, and fixed assets?					
Will there be loss of businesses or enterprises?					
Will there be loss of incomes and livelihoods?					
Will people lose access to facilities, services, or natural resources?					
Will any social or economic activities be affected by land use-related changes?					
If involuntary resettlement impacts are expected:					
1. Are local laws and regulations compatible with World Bank's Involuntary Resettlement policy?					
2. Will coordination between government agencies be required to deal with land acquisition?					
3. Are there sufficient skilled staff in the Executing Agency for resettlement planning and implementation?					
4. Are training and capacity-building interventions required prior to resettlement planning and implementation?					

*Whenever possible, consider also any future subprojects or investments.

Information on Affected Persons:

Any estimate of the likely number of households that will be affected by the Project?

No Yes If yes, approximately how many?

Are any of them poor, female-heads of households, or vulnerable to poverty risks?

No Yes If yes, please briefly describe their situation:

Are any Affected Persons from indigenous or ethnic minority groups? If yes, please explain:

Submitted

Checked

Approved

Signature.....

.....

.....

Name.....

.....

.....

Designation.....

.....

.....

Contractor Survey & Design

Assistant Engineer

Executive Engineer

Or Assistant Engineer UPID

UPID

UPID

Form – 2: Indicative Outline Terms of Reference for Social Assessment

This template provides the outline of terms of reference for conducting the socio-economic base line survey for rehabilitation and resettlement under a sub-project activity and preparing the required Resettlement Action Plan (RAP).

In case only an Abbreviated Resettlement Plan (ARP) is needed, the scope of work and description of tasks to be carried out should be adapted.

Background information

Include a brief presentation of the sub-projects considered, their intended objectives, a description of major activities, implementing agency(ies), current status and timetable, and describe any associated existing programs or schemes.

Describe the likely extent of rehabilitation and resettlement under the sub-project (estimate the number of people concerned and the corresponding land area).

Objectives

The objective of the consultancy is to conduct the social assessment for rehabilitation and resettlement under the sub-project considered, to carry out the required socio-economic baseline survey and to prepare the required RAP/ ARP.

Some of the key principles for the Consultancy are the following:

- The Consultancy will be guided by the Resettlement Policy Framework attached to this TOR.
- The consultant will assess the likely positive and negative social impacts, particularly on vulnerable groups, of the reconstruction activities planned and assess the level of awareness, concerns and attitudes of people towards these planned activities.
- The Consultant shall strive to ensure transparency, accountability, and stakeholders participation in the process.
- The feasibility and acceptability of the new relocation sites, the efficiency and equity of implementation mechanism, maintaining good relation with host population at new relocation sites and special needs of the vulnerable groups (women, widows, children, lower castes, physically challenged people, etc.) are some the important issues that will be examined during the social assessment process.

Scope of work

Summarize the scope of the social assessment and discuss its timing in relation to the sub-project preparation, design and implementation.

Tasks to be carried out

Describe in the final ToR the specific tasks expected from the agency conducting the assessment, for example:

- Task 1: Description of the methodological framework and work-plan
- Task 2: Description of the proposed sub-projects and their intended social outcomes
- Task 3: Brief description of the socio-cultural, institutional, historical and political context; assess legislative and regulatory considerations and role of local government
- Task 4: Data collection and analysis – quantitative surveys, focus group discussions, key informant interviews and triangulation of data, use of statistical techniques, use of consultative and participatory approaches
- Task 5: Analysis of key social issues –for example, diversity and gender issues, institutional arrangements, information flows and rules for effective decision- making, participation of Stakeholders and potential social risks including, but not limited to, the feasibility and acceptability of the sub-project outcomes, efficiency and equity of implementation arrangements, relations between beneficiaries and non-beneficiaries, efficacy of site selection, conflict management or grievance-redress processes, and the maintenance of public assets created.
- Task 6: Assess land tenure issues such as loss of ownership documents, physical boundaries of properties affected during Project and related issues with a view to propose suitable measures to restore the property documents and update the land records.
- Task 7: Recommended strategy and prepare RAP/ARP (see section 5 of the Resettlement Policy Framework) to achieve social development outcomes
- Task 8: Analysis of alternatives, management and implementation arrangements
- Task 9: Developing a plan and indicators for monitoring and evaluation of rehabilitation and resettlement, including participatory monitoring approaches

Expected outputs, schedule and reporting relationships

Within (*2 weeks*) the consultant will prepare an inception report including work plan and methodology with a detailed schedule of the tasks to be completed, as described in the terms of reference.

Within (*2 months*) the Consultant will provide a draft social assessment report which will identify stakeholders and their expectations, interests or concerns, assess the social risks of the sub-projects (both the risk of the sub- project’s impacts on the vulnerable, as well as other social risks to the sub-project’s feasibility or success), and recommend design changes or mitigation measures or action most suited to manage those risks during implementation.

The final report will be completed by (*month 4*) and will include:

- Socio economic baseline data, including relevant charts and graphs, statistical and qualitative analysis and, where relevant, raw data obtained during the social assessment.
- RAP (or ARP)
- Note on the social assessment process itself, stating any difficulties likely to be faced by the team in conducting the social assessment, and the most appropriate dissemination strategy for its findings.

(dates are indicative and depend on the scope of rehabilitation and resettlement under the project)

The report and accompanying materials will be provided in English and Hindi and posted in District Administration offices.

1.0 Organization Structure

It is proposed to institutionalize the ESMF execution mechanism at PACT based on its current organizational structure given in Chapter 2. The proposed organizational structure at PACT is given below in Figure 1.

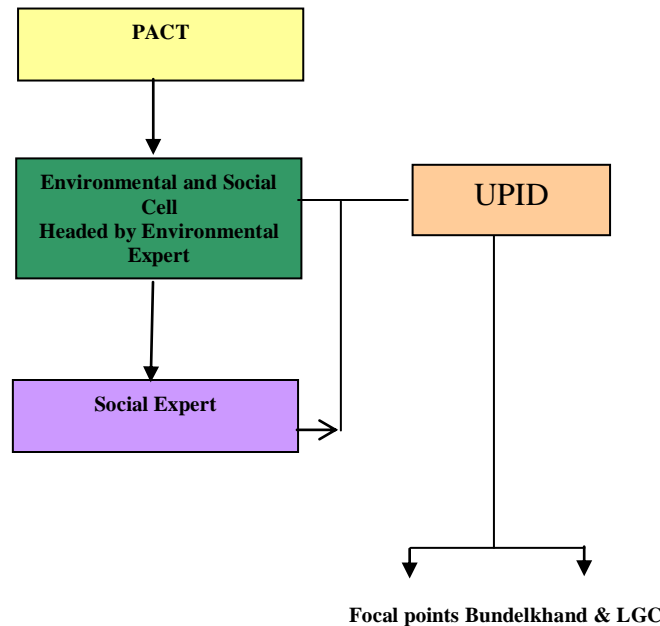


Figure 1: Environmental and Social Organizational Structure

2.0 Environmental and Social Cell

The Environmental and Social cell can be integrated under the existing organizational structure of PACT and can serve for mainstreaming social and environmental safeguards in UPWSRP Phase II. The proposed cell will be headed by Environmental expert similar in rank to Executive Engineer, UPID. He/she will be assisted by social expert. Both the staff will assist UPID focal points in Bundelkhand & LGC for planning, implementation & monitoring of ESMF.

Duties and Functions

Key duties and function of the proposed cell would be:

ESMF planning, implementation and monitoring - Provide technical assistance in ESMF planning implementation & monitoring for each sub project activity.

Information/ Data Base Management - Manage comprehensive environmental & social information management system/data bases and documentation.

Training and Capacity building - Periodic workshops/ Meetings seminars on Social & Environment aspects; develop tailor made courses; organize basic /orientation training programs; organize documentation of staff experience on Social & Environmental issues/

solutions / lessons learned program ; develop environmental ‘tool kits’ for staff – CDs/ slides organize inter and intra states field visits; experience sharing program; organize study tours to provide exposure to the similar experience /best practices of the overseas etc. Enhancement of the staff capacity and their commitment are key pre-requisite for the effective implementation of UPWSRP-II.

Awareness/ Sensitization - Develop/ Implement social & environmental awareness/ sensitization programs.

Inter-sectoral linkages and inter-agency coordination - Facilitate effective inter-sectoral linkages and inter-agency coordination among and between agencies and other key stakeholders involved in water sector management in relation to socio- environmental issues.

Grievance Redressal – Provide technical assistance to UPID related to grievance redressal mechanism to attend to any social and environmental grievances made by any person, community group or agency under UPWSRP Phase II.

Provide assistance for UPWSRP Phase III - Provide essential guidance and inputs related to Environmental & Social aspects for UPWSRP Phase III.