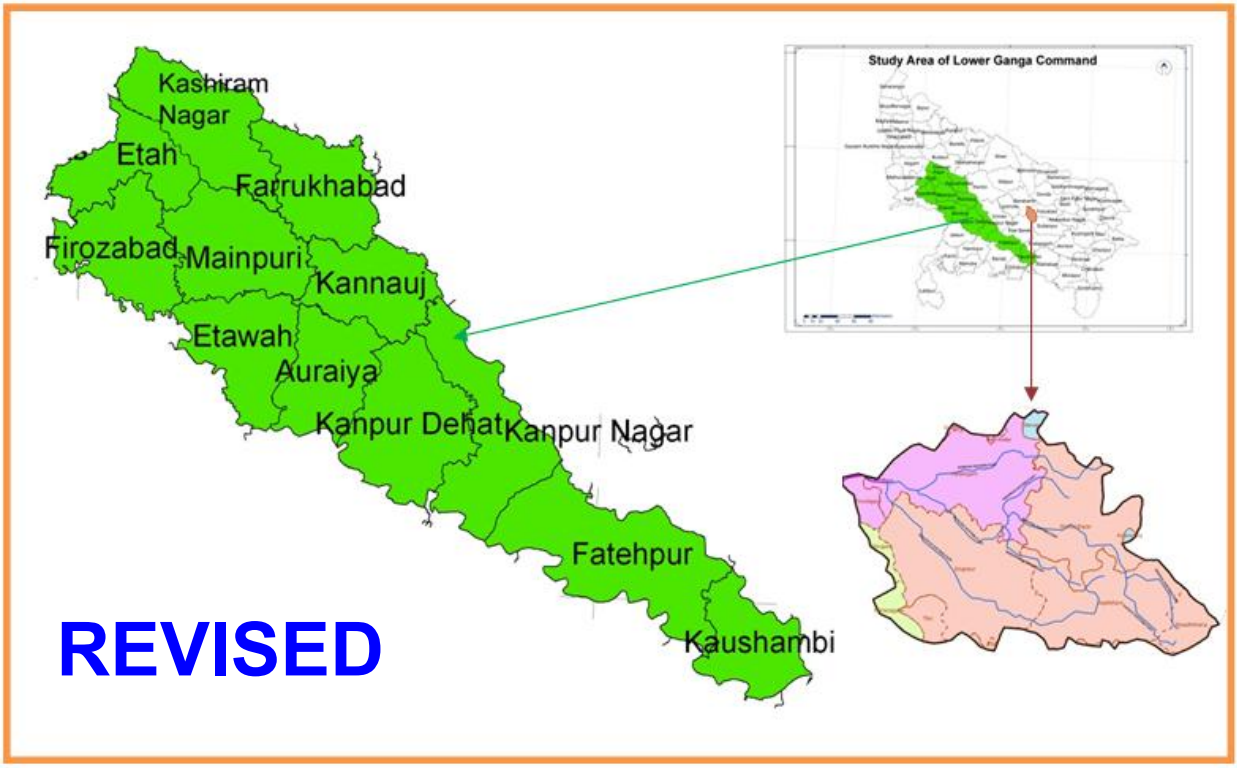
E4042 V3

Draft Final Report of Lower Ganga Canal System and Haidergarh Branch



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Executive Summary

The State of Uttar Pradesh (UP) is enriched with fertile land, abundant water resources, biodiversity, as well as human resources and historical & cultural heritage. Large networks of many perennial rivers, mostly flowing from the Himalayas, contributes to its vast water resources potential and provide drainage to the state. Major rivers include Ganga, Yamuna, Ghaghra, Gomti, Gandak, Sone and Sarda. In addition, it has a number of smaller rivers. A deep alluvial aquifer underlies the vast plains, recharged annually by almost 1000 mm monsoon rainfall.

Main streams of major rivers in the state provide water for canal irrigation. 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 system in the state includes Upper Ganga Canal, Eastern Yamuna Canal, Agra Canal, Lower Ganga Canal, Sarda Canal and Sarda Sahayak Canal System, Gandak Canal, Ken Canal and Betwa Canal systems.

Sustainability of agriculture in UP is threatened 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.

In the above context, Uttar Pradesh Water Sector Restructuring Project (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 decided in principle to include Bundelkhand region of the State to study and implement IWRM in order to reform the water and agriculture sector with emphasis to mitigate droughts and rehabilitate this region. This region has recently witnessed severest prolonged (four-year cycle) drought for the first time in the recorded history. **Considering major interventions have been planned under Bundelkhand package, the phase – II has undergone major shift in study area. Subsequently, Lower Ganga Canal System (LGC) has been included in the Phase – II, while only a selected portion of Bundelkhand & Sharda Sahayak Canal System have been included in Phase – II**.

Study area includes Lalitpur district of Bundelkhand region, three districts, Shahuji Maharaj Nagar, Barabanki & Rae Bareli district under Sharda Sahayak Command Area and twelve districts, Kashiram Nagar, Etah, Firozabad, Manipuri, Farrukhabad, Etawah, Kannauj, Auraiya, Ramabai Nagar, Kanpur Nagar, Fatehpur & Kaushambi under Lower Ganga Canal system.

Basin wise area covered in the project is given below.

Sl. No.	Basin/Project Name	GCA (Lakh ha)
1.0	***Bundelkhand Region***	
1.1	Portion of Betwa canal command consisting of Jamini Dam, Sajnam Dam and Rohini Dam	1.18
Sub Total		**1.18**
2.0	***Sharda Sahayak Command***	
2.1	Haidergarh branch of Sarda Sahayak	0.98
3.0	Lower Ganga Canal (LGC)	
3.1	LGC Canal Command Area	27
Sub Total		**27.98**

Major activities, which will be carried out under Phase II of the project area are 1 Participatory Irrigation Management Activities, 2 Rehabilitation of Canal & Drainage Systems, 3 Piloting Alternative Branch-Level Management Mechanism for Water Service Provision & Maintenance, 4 Agriculture Water Use and Productivity Efficiency Improvement Program and 5 Social Assessment/ Development.

Under Phase-I, SWaRA had developed a basin Master Plan for Ghagra–Gomti Basins (GGB), a Decision Support System (DSS) for Jaunpur Branch Canal System, and an environmental and social basin assessment (BESA) and social and environmental management plan (SEMP) for Ghagra – Gomti Sub basin. It is in this context, Project Activity Core Team (PACT) on behalf of UPWSRP, Government of Uttar Pradesh (GoUP) is carrying out a Social and Environment Assessment (SEA) of the study area in addition to updating the existing SEA and SEMP for the additional areas now being covered under Phase II project. The SEA will lead to development of social and environmental management framework (SEMF) in order to mainstream social and environmental safeguards in the overall basin development.

The SEA & SEMF is being carried out as per following objectives.

- to identify environmental, social and socio-economic issues
- 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 a Social and Environmental Management Framework (SEMF) that will guide implementers at various levels to mainstream environmental and social issues
- develop appropriate recommendations for sustainable utilization of water resources by integrating environmental and social concerns in water sector planning and management

At first, the baseline status has been assessed by collection and analysis of:

- Secondary data - published and unpublished data – e.g.: official memos / directives / documents, minutes / notes, etc., census data.
- Primary data - collected through field survey consisting of questionnaire survey, guide & focused group discussions.
- Academic and other research work published/ unpublished in the form of books, reports, and articles and,
- GIS and web based data,
- Stakeholder consultation and field observations.

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, National Environmental Engineering Research Institute, 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.

Primary data collection, KAP & PRA, focus group meetings, semi-structured interviews, workshops and scientific environmental tests have been used to collect primary data. Participatory focus group meetings have been conducted with a range of stakeholders to share their opinions and concerns regarding specific topics. A specialized, spatially organized focus group has been utilized for the focus groups proposed by IRGSSA. These focus groups provide systematic information on key project problems and targets.

The chapters given in the draft final report are Chapter 1 Introduction, Chapter 2 Social/Socio-economic & Environmental policy, legal and guidelines, Chapter 3 Social/socio-economic Baseline & Framework, Chapter 4 Environmental Baseline & Framework, Chapter 5 Social/Socio-economic & Environmental Impact Assessment and Chapter 6 Social/Socio-economic & Environmental Management Plan.

Baseline environmental conditions have been described in Chapter 4 for the LGC/SSC and Haidergarh branch command area in Chapter 4. It comprises land environment, climate & air environment, water environment and biological environment (vegetation, flora and fauna, wetlands and protected areas). Health issues related to water and vector borne diseases in the study area has also been discussed.

Summary of environmental issues in LGC command area identified during FGD's is given below

Major Environment Issues	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.	Silting of Sharda Sahayak System	Desilting is undertaken under MNREGA	Desilting & drainage restoration of canals
Decreasing Fertility of soil & increasing consumption of fertilizer	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)	Exists in command area	Occurring due to decreasing fertility level.	Project with arrest land diversification to some extent.
Extreme climatic conditions, rainfall deficiency & drought	Once in ten years	Once in ten years	Crop diversification to combat extreme conditions
Limited availability of Surface 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	69% to 70% Ground water development	Increasing use of ground water	Canal water should be made available
Surface & Ground Water Quality	Ground water quality is of concern	Fluoride and in certain blocks	Drinking water supply to be providing from Canal
Increasing dependence on ground water for irrigation in comparison to surface water.	Limited availability of canal water	Increasing dependence on ground water	Reduced dependence on ground water
Decrease in forest cover,	Land use change indicate very less forest cover	Nilgai menace has been report	None of the recommendations

Major Environment Issues	Major Findings in LGC Command Area	Major Findings in Districts from FGDs	Stakeholders Recommendations / suggestions as outcome of Proposed Project Interventions
vulnerability of Flora & Fauna			given by the stakeholders.
Water logging	Due to seepage	Exists on both sides of canal	Drainage should be improved

Summary of issues (Sharda Sahayak Command Area) is given below:

Major Environment Issues	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.	Silting of Sharda Sahayak System	Desilting is undertaken under MNREGA	Desilting & drainage restoration of canals
Decreasing Fertility of soil & increasing consumption of fertilizer	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)	Exists in command area	Occurring due to decreasing fertility level.	Project with arrest land diversification to some extent.
Extreme climatic conditions, rainfall deficiency & drought	Once in ten years	Once in ten years	Crop diversification to combat extreme conditions
Limited availability of Surface 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	69% to 70% Ground water development	Increasing use of ground water	Canal water should be made available

Major Environment Issues	Major Findings in LGC Command Area	Major Findings in Districts from FGDs	Stakeholders Recommendations / suggestions as outcome of Proposed Project Interventions
Surface & Ground Water Quality	Ground water quality is of concern	Fluoride and in certain blocks	Drinking water supply to be providing from Canal
Increasing dependence on ground water for irrigation in comparison to surface water.	Limited availability of canal water	Increasing dependence on ground water	Reduced dependence on ground water
Decrease in forest cover, vulnerability of Flora & Fauna	Land use change indicate very less forest cover	Nilgai menace has been report	None of the recommendations given by the stakeholders.
Water logging	Due to seepage	Exists on both sides of canal	Drainage should be improved

No change in forest cover has been assessed in SFR 2011 as against assessment in State of Forest Report 2009 in LGC/SSC/Haidergarh Branch Command area.

The impact identification process has been done through detailing out the project activities under each component to be implemented taken under UPWSRP Phase II, and identifying their interaction with the environmental and social media in Chapter 5. Impact Matrix of Project Interventions Vs Socio-Economic Issues and Impact Matrix of Project Intervention Vs Environmental Attributes has been provided. Further, Social Environmental Management Framework (SEMF) for Components proposed under UPWSRP Phase-II has been given. Categorization of Activities /Components has also been done. Besides, Environmental & Social Components for Screening has been given. Analysis of alternatives has been carried out in order to assess alternatives scenarios and to identify the preferred alternative an analysis of the proposed sub-project activities with regard to their environmental and social implications. The analysis was carried out for three scenarios, namely, no-project scenario, no-component scenario and with component scenario. Environmental and Social Management Framework for UPID/PACT has been developed.

As part of social & environmental management plan, IEC Strategy, Capacity Building & Training & Monitoring & Evaluation has been developed. Need for Information, Education and Communication Strategy has been identified. 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 covers

stakeholder group, communication needs, messages and preferred tools ahs been provided. 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.

Institutional Arrangement, Training and Capacity Building Plan includes mechanisms of environmental and social performance improvement of project, Skill and capacity-building requirements, capacity building and training needs of UPID, implementation mechanism, training programs for social & environmental due diligence, mechanism of implementation of training programs, training areas & faculty has been suggested. Further, convergence with overall capacity-building plan has been recommended.

Monitoring & Evaluation framework has been developed that includes social impact monitoring indicators (Level 1, Level 2 and Level 3 indicators) and environmental impacts monitoring indicators has been suggested.

Implementation Schedule & Costing has been recommended. Further, the ESMF developed for UPWSRP Phase II can be implemented effectively by integrating it with UPWSRP Project Management Systems and Procedures.

Key Environmental & Socio-economic impact on LGC area /SSC area and Haidergarh command area is described below:

Sector	Activity	Issues	Environment and Socio-Economic Impacts	Indicators	Frequency
Agriculture	Surface and Ground water consumption	Rainfall/ Depletion of Ground Water Level	Land use change	Coverage Area	Annual
			Crop Productivity	Yield	Annual
			Surface Water Quality	Irrigation and Drinking water quality	Annual
			Ground water Quality		
			Ground water Availability/ Subsurface drainage	Ground water quantity Ground water table Ground water draft	Annual

Sector	Activity		Issues	Environment and Socio-Economic Impacts	Indicators	Frequency
	Irrigation	Dam/ Hydraulic station & Canal Construction	Biodiversity	Flora & Fauna loss	No. of species (Aquatic/ Terrestrial)	Each 3Years
			Irrigation	Water Availability	Quantity	Each 5 Years
				Crop Productivity	Yield	Annual
			Migration/ Department	Livelihood	R & R and Income	Each 5 Years
		Canal Network Rehabilitation	Irrigation	Water Availability	Quantity	Twice in a Year
				Crop Productivity	Yield	Annual
				Land use change	Coverage Area	Each 5 Years
				Silt Disposal	Quantity/ Locality	Annual
		Tube Well	Irrigation	Water Availability	Quantity	Annual
				Crop Productivity	Yield	Annual
			Ground water depletion	Resource Loss	Quantity (Ground water Table)	Annual
			Conjunctive use	Land use change	Coverage Area	Annual
				Crop Productivity	Yield	Annual
Urban & Rural	Domestic water supply 1. Drinking 2. Others		Surface and Ground water Availability	Resource loss	Quantity	Each 5 Years
	Livestock Consumption		Surface and Ground water	Water pollution	Drinking and	Annual

Sector	Activity	Issues	Environment and Socio-Economic Impacts	Indicators	Frequency
		Availability		Irrigation water quality	
			Sewage	Quantity	Annual
			Disease	Occurrence	Annual
			Aquatic Biodiversity	Loss	Each 5 Years
			Crop Productivity	Yield	Annual
			Soil Fertility		Annual
			Energy	Biogas	Annual
Industries/ Mining	Mining	Surface & Ground water quality	Water pollution	Surface & Ground water Quality	Annual
			Disease	Occurrence	Annual
	Labor	Socio-Economic	Livelihood	Employment	Each 5 Years

Chapter 1: Introduction

1.0 Introduction & Background

India, which has a geographical area of about 329 million hectares (MHa), is endowed with rivers and abundant natural resources. It is crisscrossed by a large number of small and big rivers, some of them figuring amongst the mighty rivers of the world. According to 2001 census, a major part of India's population of 1.03 billion is rural where agriculture supported by river system is the major livelihood and a source of their prosperity. As per Ministry of Water Resources (MoWR), Government of India (GoI), there are twelve major river basins having a cumulative catchment area of 25,28,084 km^2 and 48 medium river basin with a cumulative catchment area of 2,48,505 km^2 in the country. As per MoWR, GoI, the average annual availability of water in these river basins is estimated at 1869.35 km^3 per year. The ground water resources of the country have been estimated based on the guidelines and recommendations of the Ground Water Estimation Committee-97 (GEC-97).The total annual replenishable ground water resources of the country have been estimated as 433 billion cubic meter (BCM). Keeping 34 BCM for natural discharge, the net annual ground water availability for the entire country is estimated to be 399 BCM. The present annual ground water draft is around 231 BCM out of which 213 BCM is for irrigation use and 18 BCM is for domestic & industrial use. The stage of ground water development in the country is around 58%. The development of large irrigation works after independence has led to food self sufficiency on one hand while creating environmental problems on the other hand. The state of Uttar Pradesh is also facing some of these problems especially in Ganga Basin. Therefore, a need for sustainable and environmentally ground water resource development and management has been felt in the basin.

1.1 Water Resource Development in Uttar Pradesh

The state of Uttar Pradesh (UP) is enriched with fertile land, abundant water resources, biodiversity, as well as human resources and historical & cultural heritage. Large networks of many perennial rivers, mostly flowing from the Himalayas, contributes to its vast water resources potential and provide drainage to the state. These rivers are shown in **Figure 1.1.** Major rivers include Ganga, Yamuna, Ghaghra, Gomti, Gandak, Sone and Sarda. In addition, it has a number of smaller rivers. A deep alluvial aquifer underlies the vast plains, recharged annually by almost 1000 mm monsoon rainfall. The average annual water balance of Uttar Pradesh as per Irrigation Department (ID), Government of Uttar Pradesh (GoUP) is shown in **Figure 1.2**. Salient features of the state are given in Box 1.

Main streams of major rivers in the state provide water for canal irrigation. Therefore, over the past century, one of the world's largest canal systems has been constructed in the state, which supports 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 system in the state includes Upper Ganga Canal, Eastern Yamuna Canal, Agra Canal, Lower Ganga Canal, Sarda Canal and Sarda

Sahayak Canal System, Gandak Canal, Ken Canal and Betwa Canal systems. In Irrigation sector, about 43.8 BCM of surface water has been utilized out of a total of about 161.70 BCM of surface water in the state. Not all the available water is utilizable due to lack of storage sites, which are located in Nepal. 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. Initially, most systems were initiated as a protective measure against droughts. However, with introduction of high-yielding varieties of crops in recent years, irrigation demand has significantly increased. So most systems have been under major rehabilitation in recent years in order to augment their discharge capacities.**

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 71 districts in the state.

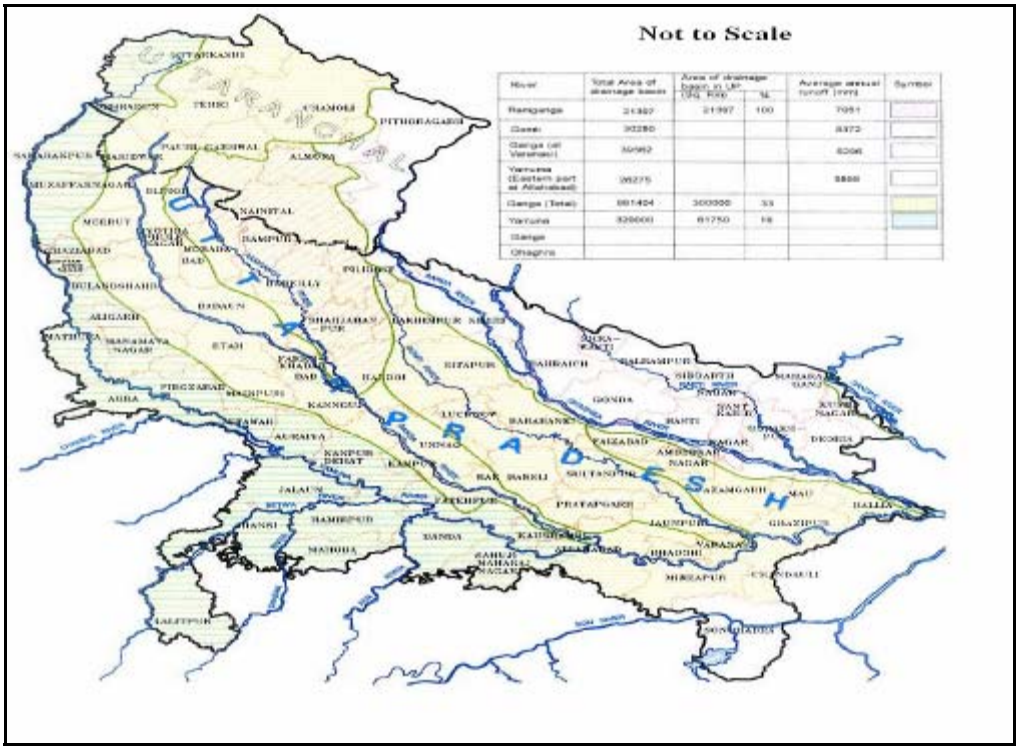
The economy of UP is predominantly dependent on agriculture, which accounts for 40% of state's GDP, and 75% of employment. The total arable land in the state is about 19.3 MHa out of which 92% is used for agriculture. Approximately 70% of total agricultural land in UP is dependent on irrigation using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

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 with an availability of 19.52 BCM per year of water for future irrigation. 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. Growing population coupled with poor human development indices started exerting pressure on the resources base and the environment in the state. Agriculture sector performance, has been declining 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 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**

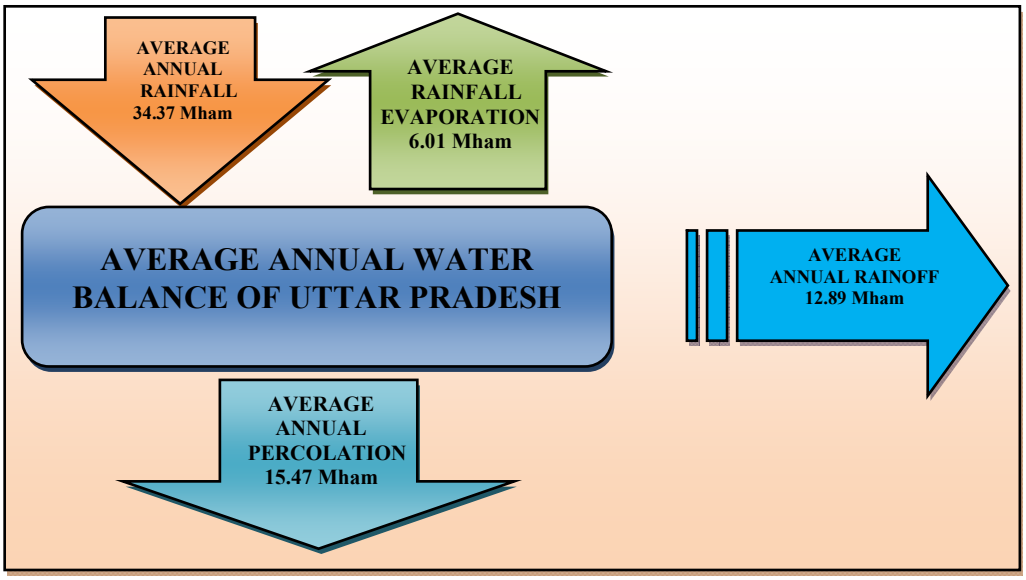
while considerable losses occur due to natural disasters like flooding. Bundelkhand region on the other hand experienced severe cyclic drought during 2004-08.

In the above context, Uttar Pradesh Water Sector Restructuring Project was initiated to address the issues related to water and related sector in the state.



Source: ID, GoUP

Figure 1.1: Major rivers & drainage basins of Uttar Pradesh



Source: ID, GoUP

Figure 1.2: Average Annual Water Balance of Uttar Pradesh

UPWSRP - Phase-I

Phase – I of the UPWSRP was initiated in 2001 with financial loan assistance of US$ 150 million from World Bank (WB) and with the developmental objectives of: (i) setting up enabling institutional and policy frame work for water sector reform in the state for integrated water resources management (IWRM); and (ii) to initiate irrigation, agriculture and drainage sub-sector reforms in the state to increase and sustain water and agricultural productivity. With the aim to adopt a river basin development and management approach to address all issues related to water in an integrated and socially and environmentally sustainable framework, and to ensure the concept of basin development and management to be deeply rooted, a 5 year long Phase-I was initiated in May 2001, which focused on Ghaghra-Gomti basin for initial implementation of both water sector and drainage sector reform programmes. Under this phase, GoUP has created the institutional set up consisting of (i) State Water Board (SWB) under the Chairmanship of Chief Secretary, GoUP and Principal secretaries of all concerned departments and finance department as members; (ii) State Water Resources Agency (SWaRA) to provide a State level capability for inter-sectoral water allocation, planning, management and optimal use of surface and ground water based on comprehensive and environmentally sustainable river basin plans. SWaRA is also working as a secretariat to the SWB. SWB and SWaRA are required to facilitate and guide the implementation of IWRM in the State; (iii) State Water Resources Data Analysis Centre (SWaRDAC) to assist SWaRA in collection, compilation, scrutiny and analysis of all water, land and other natural resource data; (iv) enacted an Act on Uttar Pradesh Water Management and Regulatory Commission Act, 2008 and established UP Water Management and Regulatory Commission (UP-WaMReC); (v) Project Activity Core Team (PACT) to implement the project, and (vi) Ghaghra-Gomti Basin Development and Management Entity (to be created).

Ghaghra Gomti Basin Social and Environmental Assessment (GG-BSEA) study comprising of 31 districts (Allahabad, Ambedkar Nagar, Azamgarh, Bahraich, Ballia, Balrampur, Barabanki, Basti, Deoria, Faizabad, Ghazipur, Gonda, Gorakhpur, Hardoi, Jaunpur, Kheri, Kushinagar, Lucknow, Maharajganj, Mau, Pilibhit, Pratapgarh, Rai Bareli, Sant Kabir Nagar, Shahjahahanpur, Shrawasti, Siddharthnagar, Sitapur, Sultanpur, Unnao and Varanasi) of Uttar Pradesh, was carried out during Phase I of the project. This study was prepared based on the basin planning, where social and environmental baseline was established both in spatial and temporal context. Further, social and environmental and institutional issues were identified and mitigation options were proposed. Training and capacity building needs assessment was carried out and type of training program / modules along with target audience were developed. A basin level social, environmental and institutional and monitoring framework was prepared for implementation during phase II. Some of the gaps which have been observed in the earlier BSEA while implementing the current environmental & social framework study are given below.

- Study area did not include Bundelkhand and Lower Ganga Canal System, which has different environmental and social features.

- Institutional structure 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.
- Environmental and social safeguard indicator / parameter monitoring framework / system which were recommended in BSEA is yet to be implemented.

The above gaps are understandable considering non transfer of irrigation infrastructure and to WUA during Phase I. However, the social and environmental knowledge base and infrastructure (GIS) developed at both PACT and SWaRA while implementing BSEA during Phase I can be utilized for implementing social & 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 decided in principle to include Bundelkhand region of the State to study and implement IWRM in order to reform the water and agriculture sector with emphasis to mitigate droughts and rehabilitate this region. This region has recently witnessed severest prolonged (four-year cycle) drought for the first time in the recorded history. **Considering major interventions have been planned under Bundelkhand package, the phase – II has undergone major shift in study area. Subsequently, Lower Ganga Canal System (LGC) has been included in the Phase – II, while only a selected portion of Bundelkhand & Sharda Sahayak Canal System have been included in Phase – II**.

1.2 Study Area & Project Activities

Study area includes Lalitpur district of Bundelkhand region, three districts, Shahuji Maharaj Nagar, Barabanki & Rae Bareli district under Sharda Sahayak Command Area and twelve districts, Kashiram Nagar, Etah, Firozabad, Manipuri, Farrukhabad, Etawah, Kannauj, Auraiya, Ramabai Nagar, Kanpur Nagar, Fatehpur & Kaushambi under Lower Ganga Canal system. Basinwise area covered in 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	***Bundelkhand Region***	
1.1	Portion of Betwa canal command consisting of Jamini Dam, Sajnam Dam and Rohini Dam	1.18
Sub Total		**1.18**
2.0	***Sharda Sahayak Command***	
2.1	Haidergarh branch of Sarda Sahayak	0.98
3.0	Lower Ganga Canal (LGC)	
3.1	LGC Canal Command Area	27
Sub Total		**27.98**
Grand Total (1.0+2.0+3.0)		**29.16**

Source: Terms of Reference pp. 22

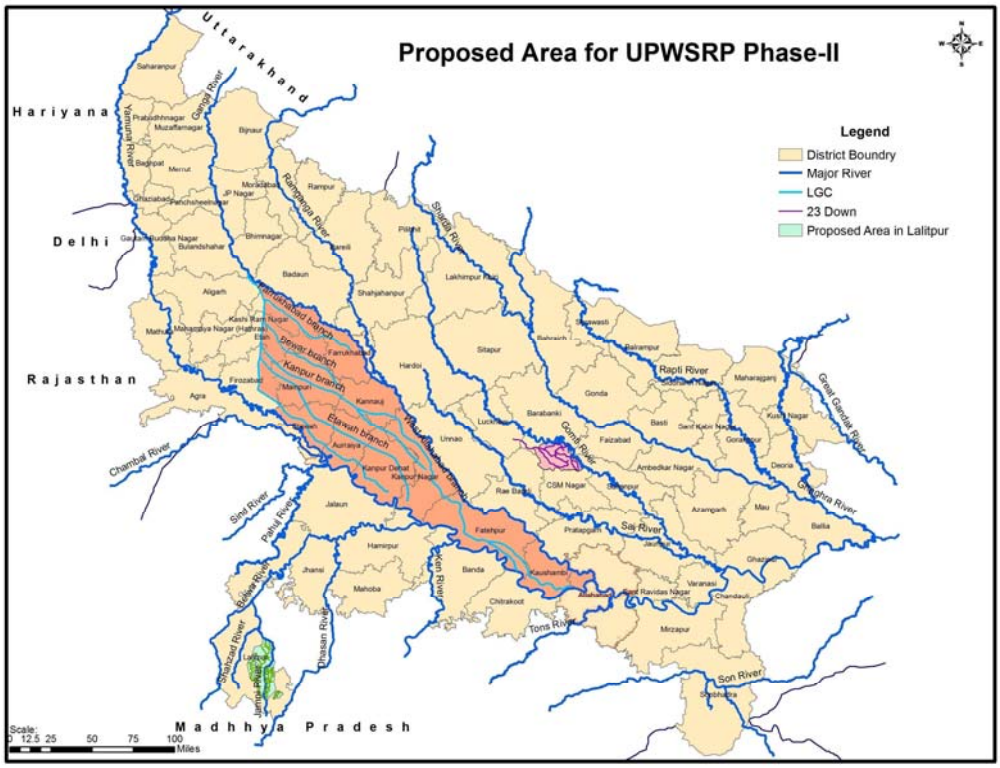


Figure 1.3: Districts in Study Area

Major activities, which will be carried out under Phase II of the project area given below.

Activity-1: Participatory Irrigation Management Activities: The participatory irrigation management (PIM) activities will be implemented in the study area. The list of PIM activities, which will be performed during the project period are: Awareness Generation; Conducting workshop with line departments; Hiring of Services of NGOs; Formation of Water User's Associations; Conduction of election training at PACT / WALMI; Capacity Building of UPID; Capacity building of WUAs (including training of NGOs personnel); Strengthening of divisional PIM Cell; Preparation of maps, forms, registers etc. for WUAs; Providing Experts in PIM Cell, PACT and PIM Cell at Regional Chief Level; Logistics for divisional PIM Cell (like computers, almirah, tables, chairs, printers and fax); Hiring of retired Revenue official per division; One time functional grant to WUAs towards their sustainability.

Activity-2: Rehabilitation of Canal & Drainage Systems: Rehabilitation and modernization of branch canal systems (sub-basins) of the Jamini, Sajnam & Rohini of Betwa Canal System; Haidergarh branch of Sarda Sahayak System & Lower Ganga Canal systems along with their head works, is proposed under phase-II. Some of the activities may include: A detailed study of the feeder head for mitigation of silt problem after due analysis and model studies; The detailed rehabilitation and modernization design/redesign plan considering the water availability in these Canal systems; Repairs of existing structures of the canal and Lining of main and branch canal. The rehabilitation

and modernization works in the Irrigation and Drainage sub-sector reforms with a view to enhance the system operational and management efficiency, are proposed in the study area.

Activity-3: Piloting Alternative Branch-Level Management Mechanism for Water Service Provision & Maintenance: It has been realized at every level that objectives of food, nutritional and environmental security cannot be achieved by the efforts of Public Sector alone. Therefore, joint efforts of Public and Private Sector in the field of irrigation are required. The major areas considered for promoting Public-Private-Partnership (PPP) in Irrigation sector include: Identification of distributary level WUA's and its adoption of interventions. These interventions may include:

- Managing water conjunctively in a participatory mode through technology support.

- Marketable horticultural produce and better live stock production through marketing support like sale of inputs, such as Seeds, Fertilizers, Pesticides, Implements, Equipments, etc. and Processing and Marketing of Farm products.

- Establishing with effective market linkages to address the agricultural input requirements as well as sale of produce through infrastructure support.

Activity-4: Agriculture Water Use and Productivity Efficiency Improvement Program: For improvement of farmers practices that are not new (water management, nutrient management etc) the phase II of the project will undertake a capacity building program though training, using tools such as participatory technology development, learning by doing and farmers forums. Introduction of new technologies, including crops, the project will use demonstrations as the primary introduction vehicle. This would have a primary focus on water efficiency (that increase productivity) technologies, such as system of rice intensification (SRI), alternative wetting and drying, conservation agriculture, direct seeding, less water using crops, etc. The project would then have a series of cross cutting interventions that link the capacity building/training and the demonstrations and these would include field days, exposure visits, workshops etc.

Preparation of outlet specific crop plans based upon availability of water shall be achieved by Farmers Field School***;*** Awareness camps***;*** Organization of need based demonstrations***;*** Promotion of green manuring; Organization of field days; Training of Farmers and facilitators; Exposure visits of farmers and facilitators and Organization of workshops.

- ***Farmers Field School:*** The Farmers Field School (FFS) shall be developed basically as training and capacity building forum for the members of the water users associations. The training will use concepts of participatory technology development and hands on learning by doing coupled with brief field level trainings. The objective of the FFS is to integrate practical lessons on water management and productivity in such a manner that it assists the members of the WUA to implement water distribution and sharing arrangements that maximize the productivity of all its members and ensures equitable resource (water)

distribution. It is anticipated that the FFS would run for a full year covering the full farming system, however the exact contents of the training 'package' would be decided through a curriculum development phase, and would use experiences from other successful interventions in UP (i.e. farmers field schools under UPDASP) and within India (i.e. farmer water schools under Andhra Pradesh Farmer Managed Groundwater Systems Project). The training is likely to include the following topics, some of which may be optional:

Crop water budgeting and warabandi	Biofertilizer applications and seed treatment
Hydrological unit (outlet/minor) concept and calculation of area	Agro-Ecosystem Analysis
Water holding capacity of soils (and impact of increased soil organic matter)	Natural and artificial recharge
Efficient irrigation techniques, e.g. SRI, ridge and furrow, sprinklers, alternate furrow and subsurface sub-line, as well as water-saving agricultural practices such as mulching	Role of institutions (WUA) in water management
Recharge, discharge, rainfall and draft concept and calculation	Role of women in water management
Water measurements in canals and borewells	
The FFS would also develop the concept of a WUA water management resources person, who would be selected with the intention that he would extend the message to other members of the WUA.	

- **Awareness Camps:** Department of Agriculture and Horticulture proposes to organize one day Awareness Camp at minor level twice a year, to create awareness among farmers about agriculture water use and productivity improvement programme and departmental ongoing scheme etc.
- **Training:** To update the skill/knowledge of farmers of the project area, training on different aspects (land, water and crop management, Bio-dynamic/organic Farming, Seed Multiplication, Post harvest management, IPM, INM on pulses, oil seed, vegetables, fruits, spices, flower medicinal & aromatic and cereal crops) will be organized in situ and at SAUs/KVKs/IIPR Kanpur and SIMA Rahman Khera, Lucknow etc.
- **Demonstrations:** Focus will be given mainly on following aspects, with priority for water efficiency related interventions –

Direct water efficiency demonstrations	Use of short duration variety, line sowing
SRI	Soil treatment with Trichoderma
Conservation agriculture	Quality seeds and Seed Replacement
Ridge and furrow systems	Integrated Nutrient Management
Timely irrigation through the conjunctive use of water	Timely Sowings

Alternative wetting and drying	Timely Transplanting
Micro irrigation	Proper Plant spacing
Zero tillage seed drills	Proper Placement of Seed & Fertilizer
Indirect (productivity related) demonstrations	Eco- Friendly Pest Management
Use of area specific varieties	Soil Testing
Use of hybrids	
Line transplanting	

- **Field Days:** To disseminate the technology adopted in demonstrations to other farmers of the village and to solve the problems of the farmers on the spot a field day will be organize during reproductive phase of the crop preferably at grain filling or fruit setting stage in Kharif, Rabi and Zaid.
- **Exposure Visits:** Best practicing farmers will be exposed to improve technical know-how through exposure visit out side the state.
- **Workshops:** To promote the cultivation of pulses & oil seed and other cereals (Rice & Wheat) it is proposed to organize Workshops every year.

Activity-5: Social Assessment/ Development: Phase II will include involvement of farmers while ensuring the social safeguards during the rehabilitation of canals and minors in order to reduce the negative social impacts through activities such as given below.

- Social Assessment and Safeguards for Rehabilitation and Development of Drains/Canals/Wetlands
- Participation of Women in PIM

1.3 Need for the Social & Environmental Framework

Under Phase-I, SWaRA had developed a basin Master Plan for Ghagra–Gomti Basins (GGB), a Decision Support System (DSS) for Jaunpur Branch Canal System, and an environmental and social basin assessment (BESA) and social and environmental management plan (SEMP) for Ghagra – Gomti Sub basin. It is in this context, Project Activity Core Team (PACT) on behalf of UPWSRP, Government of Uttar Pradesh (GoUP) is carrying out a Social and Environment Assessment (SEA) of the study area in addition to updating the existing SEA and SEMP for the additional areas now being covered under Phase II project. The SEA will lead to development of social and environmental management framework (SEMF) in order to mainstream social and environmental safeguards in the overall basin development. The SEA & SEMF is being carried out as per objectives, scope of work (SoW), approach & methodology to give the required deliverable as described below.

1.4 Objectives

- to identify environmental, social and socio-economic issues
- 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 a Social and Environmental Management Framework (SEMF) that will guide implementers at various levels to mainstream environmental and social issues
- develop appropriate recommendations for sustainable utilization of water resources by integrating environmental and social concerns in water sector planning and management

1.5 Scope of Work (SoW)

The major items of SoW as per ToR are given below.

- Identifying key environmental and social issues in the geographical areas covered by the project and assessing the potential impacts arising from proposed project investments (this will include the entire Bundelkhand area within Uttar Pradesh and new proposed areas in Phase I districts of the ongoing project).

- Undertake a detailed review of legal, policy and regulatory environment as well as the institutional framework in place for the management of water sector and irrigation service delivery with a view to recommend measures to improve management, reform institutional framework and amend legal/policy/regulatory provisions related to water and irrigation sector.

- Developing Environmental Management Plans (EMPs) for investments that are known and prepare a social and Environmental Management Framework (SEMF) 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.

1.6 Approach & Methodology

A comprehensive approach and methodology has been adopted to carry out Social and Environmental Assessment (SEA) Framework for entire Bundelkhand Area of Uttar Pradesh. A programmatic stepwise approach, which has been used to develop the SEMF is:

Step 1: Gap analysis has been carried out based on data available from earlier GGB BSEA study and requirements of the current assignment. This will also include identification of different stakeholders and their existing roles and responsibilities.

Step 2: A comprehensive regulatory review has been carried out by summarizing the applicable policies and regulations. All the ongoing plans, programs and projects have been identified and compiled in tabular formats to give an idea of the level of ongoing interventions.

Step 3: Secondary and primary data collection and analysis. All the relevent data from secondary sources is being presented using database and graphically shown using GIS technique. Identification of hotspots with different attributes have been further confirmed through ground truthing. This will lead 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 DSS carried out earlier by SWaRA.

Step 5: Based on the impact analysis, SEMF of adaptive and mitigative activities is being formulated and the level of planned investments obtained from the analysis carried out in step 2.

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. Monitoring indicators have been identified in order to monitor impacts identified in step 4 and outputs of activities identified in step 5. These indicators will serve as input to ‘performance and monitoring” software already developed earlier under GGB BSEA.

Step 7: Development of SEMF and SEMP. 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 will be assigned.

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 development of a training and capacity building plan on social and environmental issues.

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

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

At first, the baseline status has been assessed by collection and analysis of:

- Secondary data - published and unpublished data – e.g.: official memos / directives / documents, minutes / notes, etc., census (2001, 2011-if available)
- Primary data - collected through field survey consisting of questionnaire survey, guide & focused group discussions.
- Academic and other research work published/ unpublished in the form of books, reports, and articles and,
- GIS and web based data,
- Stakeholder consultation and field observations.

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, National Environmental Engineering Research Institute, 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.

Description of the Primary data collection tools being used (Stand alone/Combination)

KAP & PRA, focus group meetings, semi-structured interviews, workshops and scientific environmental tests have been used to collect primary data.

Description of KAP/ PRA/ Focus group meetings tools/ Methodologies & their Applications: For conducting KAP/PRA/ focus group meetings, the selection of sample size and target group for cultivator/householder interview component is very important. The overall sampling frame for this assessment has been used to generalize information on all villages within the project area. A statistical sample of these local communities has been used in this methodology to generalize the results back to the project as a whole. ***In this context, a primary survey was conducted in 2100 households in 21 blocks in seven districts of Bundelkhand during December 2011 and January & February 2012 based on approved questionnaire and sample size submitted with inception report.***

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 specialized, spatially organized focus group has been utilized for the

focus groups proposed by IRGSSA for this assessment. These focus groups provide systematic information on key project problems and targets.

A focus group discussion (FGD) guide was prepared and submitted to PACT in February 2012, which has been finalized and is being used for conducting FGD. A copy of this guide was submitted as Annexure 1.3 of the interim report.

Other related tools such as Trend analysis; Social mapping; Day time use analysis; 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.

1.7 Work Plan

A comprehensive work plan was submitted along with inception report. The major activities and outputs of this work plan are given below.

Activity 1: Gap analysis and regulatory review.
Output: Inception report giving the approach and methodology, modified work plan and regulatory review.

Activity 2: Secondary and primary data collection and analysis.
Output: Interim report

Activity 3: Impact analysis.
Output: Input as a chapter to draft final report

Activity 4: Identification of mitigation measures. Based on the impact analysis, frame work of adaptive and mitigative activities has been formulated.
Output: Input as a chapter to draft final report

Activity 5: Development of a monitoring and evaluation (M&E) strategy and plan. This includes identification of key environmental and social indicators for monitoring at various levels. These indicators serve as input to 'performance and monitoring" software already developed earlier under GGB BSEA.
Output: Input as a chapter to draft final report

Activity 6: Training needs assessment.
Output: Input as a chapter to draft final report

Activity 7: Consultation and communication needs assessment.
Output: Input as a chapter to draft final report

Activity 8: <u>Development of SEMF and SEMP</u>. Institutional assessment has been carried out and outputs of activities 1 to 7 are being mapped with respective institutions

so that 'roles' and "responsibilities" for implementation are being assigned. The SEMF will include:

a) Review of the project development cycle of sub-projects comprising planning, designing, implementation and operational phases and identifies opportunities for the integration of social and environmental management measures at appropriate stages of development.
b) Identifying social and environmental issues associated with each sub-projects of UPID, based on the results of the tasks carried out above.
c) Identification of potential impacts such as land acquisition, R&R, issues of vulnerable communities, gender, impact on livelihoods etc. arising out of various sub-projects.
d) Formulation Social and Environmental Management Framework comprising the following:
    - Screening and Scoping Criteria
    - Categorization of sub-projects of UPID/other sectors,
    - Outline of methodology to carry out SEA
    - Guidance on securing various clearances
    - Systems, Policies and Procedures
    - Monitoring and evaluation mechanism
    - Draft Terms of reference (TOR) for special studies (as and if required)

e) Institutional Mechanism for the implementation and monitoring of social and environmental management.
f) Training and Capacity Building requirements.

Output: Input as a chapter to draft final report

Activity 9: Draft final Report. A draft final report will be prepared consisting of outputs from activities 1 to 8.
Output: Draft final report

Activity 10: <u>Two workshops</u>. The first workshop will present outputs of draft final report and the other will present the outputs of final report.
Output: Final report

1.8 Structure of the Report

The current draft final report has been prepared and is being submitted to PACT only for Sharda Sahayak & Lower Ganga Canal area. It is organized into six chapters as described below.

Chapter 1: <u>Introduction:</u> brief description why SEA was carried out; <u>Social/Socio-economic & Environmental reports and actions</u>: Brief description of social & environmental reports and contents and actions which have been initiated; <u>Project objectives and outlines of UPWSRP:</u> Short description of the project components.

Chapter 2: Social/Socio-economic & Environmental policy, legal and guidelines: Brief review of policies and legislative acts both at the Central/State Government level and World Bank level.
Chapter 3: Social/socio-economic Baseline & Framework: Short review of baseline data & social and environmental profile of the area with detailed framework.
Chapter 4: Environmental Baseline & Framework: Short review of environmental baseline, environmental profile with detailed Framework.
Chapter 5: Social/Socio-economic & Environmental Impact Assessment: Short description social and environmental assessment and predicted impacts. Social/Socio-economic & Environmental Capabilities/Trainings: Description of the social & environmental expertise in the different departments of the UP Bundelkhand area and their required trainings.
Chapter 6: Social/Socio-economic & Environmental Management Plan: Provision of adequate safeguards in social & environmental management and measures to improve the mainstreaming of social & environmental issues in water resources management.

Limitations

While limited time availability for conducting all the stakeholder consultations and covering 2100 households in the stipulated time has been a real challenge, there have been no major limitations in conducting the work. Further change of study area post 15th March, 2012 have been a real challenge in addressing new situation issues & concerns.

The new project PIP document has not been detailed out, and therefore, the major activities are still in the final stage of development. The analysis therefore had to be undertaken keeping certain assumptions in mind.

Use of this report

The report has been prepared with the expressed understanding of 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: Regulatory Review and Gap Analysis

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 water resources, environment and natural resources, and social sector has been carried out, and findings are summarized in the following sections.

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

Both central and state government has given their attention on the degrading effects of water resources, irrigation and agricultural performance and consequential issues arising out of it. Policy and regulatory frameworks at national and state level have been formulated to ensure safeguards in the last two decades. This has been necessitated to provide appropriate technical knowhow, guidance and advice for relevant agencies to pave the way for effective water management and social and environmental safeguards. Major policy framework include sector related policies and policies related to environment and state level. Sector policies include Constitutional Provisions, National Water Policy, UP State Water Policy & UP Agriculture Policy. Environmental & Social Safeguard related policy include National Environment Policy, National Forest Policy, State's Forest Policy & National Policy on Resettlement & Rehabilitation. A gist of these policies are given in Annexure 2.1. The key features of policy and regulatory framework developed in this respect are discussed in the following sub-sections.

2.1.2 Regulatory framework to deal with water, environment and social Safeguards

The key environment and forests acts, rules and notification of Government of India are listed below:

- The Indian Forest Act (1927)
- The Indian Wildlife (Protection) Act (1973) (amended 1993)
- The Water (Prevention and Control of Pollution) Act (1974) (amended 1988)
- The Water (Prevention and Control of Pollution) Cess Act (1977) (amended 1992)
- The Forest (Conservation) Act (1980) (amended 1988)
- The Air (Prevention and Control of Pollution) Act (1981) (amended 1987)
- The Environment (Protection) Act (1986) (amended 1991)
- The Public Liability Insurance Act (1991) (amended 1992)
- The National Environment Tribunal Act (1995)

- The National Environment Appellate Authority Act (1997)
- The Wild Life (Protection) Amendment Act (2002)
- The Biological Diversity Act (2002)
- The Water (Prevention and Control of Pollution) Cess (Amendment) Act (2003)
- The Hazardous Wastes (Management, Handling & Transboundary) Rules (2008)
- The Municipal Solid Wastes (Management and Handling) Rules (2000)
- The Hazardous Wastes (Management and Handling) Amendment Rules (2000)
- The Recycled Plastics Manufacture and Usage (Amendment) Rules (2003)
- Bio-Medical Waste (Management and Handling) (Amendment) Rules (2003
- Forest (Conservation) Rules (2003)
- Draft Biological Diversity Rules (2003)
- Environmental Impact Assessment Notification (1994) (amended 2006)
- Constituting the Taj Trapezium Zone Pollution (Prevention and Control) Authority (1998)
- Fly Ash Notification (1999)

The key environment and forests acts, rules and notification of ***Government of Uttar Pradesh*** are listed below:

- Northern India Canal & Drainage Act (1873)
- UP Tendu Patta Niyamawali (1972)
- UP Wildlife (Protection) Act (1974)
- The Panchayat Forest Act (1976)
- The UP Resin and other Forest Produce (Regulation of Trade) Rules (1976)
- The UP Tree Protection Act (1976)
- Air (Pollution Prevention & Control) Rules (1983)

2.1.3 Legislative Framework to Deal with Social Safeguards

The main acts related to social safeguards are listed below:

- National Commission for Women Act (1990)
- Dowry Prohibition Act (1961) was amended in 1984
- The Medical Termination of Pregnancy Act (1971)
- Commission of Sati (Prevention) Act (1987)
- Equal Remuneration Act (1976)
- The Employees' State Insurance Act (1948)
- The National Rural Employment Guarantee Act (2005) [Act 42 of 2005]
- The Protection of Women from Domestic Violence (2005) [Act 43 of 2005]
- The Scheduled Castes and the Scheduled Tribes (Prevention of Atrocities Act (1989) [Act 33 of 1989]
- The Protection of Civil Rights Act (1955) [Act 22 of 1955]
- The Employment of Manual - Scavengers and Construction of Dry Latrines (Prohibition) Act (1933) [Act 46 of 1993]

EIA notification of 2006 forms the basis of environmental & social assessment of water resources project in U.P.

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 of the development interventions that takes 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 fall under the rehabilitation & modernization project without any change in CCA application of this notification may not be applicable.**

At state level the Department of Environment (DE) in UP have their own guidelines for carrying out environmental assessments and list the types of projects that require EIAs and provide instruction 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". They guide lines 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	Remarks
The Environmental Protection Act, 1986	Application is restricted for mainstreaming and not required for clearance from Competent Authority.
The Water (Prevention and Control of Pollution) Act, 1974	Application is restricted for mainstreaming and not required for clearance from Competent Authority.
Forest Conservation Act 1980, and 1988 amendment	Applicable only if forest land involved
Wildlife Protection Act (1972) (as amended up to 1993)	Applicable only if project site near to any wildlife/bird sanctuary. During the issues & impact assessment none of the protected area close to present activity.
The Air (Prevention and Control of Pollution) Act, 1981	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	Applicable only, if GCA is increased. In present context, it is not applicable.
The Municipal Solid Wastes (Management and Handling) Rules, 2000	It will be applicable during the construction phase e.g. from Labor Camp.
Wetland, 2010 Rules	It will be applicable and permission shall be required from the State Authority under item 2 of Rule 4.
Contract Labour (Regulation & Abolotion) Act, 1970	Shall be applicable during construction period
Child Labour (Prohibition & Regulation) Act, 1986	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	Shall be applicable during construction period
Maternity Benefit Act, 1951	Shall be applicable in case of women labour
PIM Act	Shall be applicable throughtout the project/after the project
UP WaMReC Act/Rules	Shall be applicable throughtout the project/after the project

World Bank 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 projects[1]. The applications of World Bank Safeguard Policies in project are summarized in the **Table 2.2.**

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

Table 2.2: Application of Bank Safeguard Policies

WB Safeguard Policy	Requirements	Triggered (Yes/No)	Comments
Environmental Assessment (OP 4.01, BP 4.01, OP 4.02, BP 4.02)	Environmental assessment (EA) projects proposed for Bank financing is required to help ensure that they are environmentally sound and sustainable. EA takes into account the natural environment (air, water and land); human health and safety; social aspects (involuntary resettlement, indigenous peoples, are physical cultural resources). Based on EA and degree, extent and severity8 of impacts the projects are classified as Category "A", "B" and "C".	Yes	➢ This project triggers this OP. As the physical works are of a rehabilitation nature, they are not anticipated to cause any significant adverse environmental or social impacts.
Natural habitats (OP 4.04, BP 4.04)	The Policy seeks to ensure that World Bank – Supported infrastructure and other development projects take into account the conservation of biodiversity, as well as the numerous environmental services and products which natural habitats provide to human society.	No	➢ Although there are no critical or biologically significant wetlands in this area, support for management of wetland and waterlogged areas should be enhanced in the project.
Forestry (OP 4.36, BP 4.36)	The Policy aims to reduce deforestation, enhance the environmental contribution of forested areas, promote afforestation, reduce poverty and encourage economic development.	No	➢ None of the project activities will trigger this OP as no forestry activities or activities on forest land are envisaged. Additionally, there are no forests in the irrigation areas selected for piloting reforms.
Pest Management (OP 4.09)	The procurement of any pesticide in a Bank – financed project is contingent on an assessment of the nature and degree of associated risks, taking into account the proposed use and the intended users. The need to prevent the development of resistance in pests.	Yes	➢ 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. Hence, integrated pest management activities should be enhanced.
Cultural Property (OPN 11.03)	Cultural Property – This policy aims at assisting in the preservation of cultural property, historical, religious and unique natural value-this includes remains left by previous human inhabitants and unique environment features, as well as in the protection and enhancement of cultural properties encountered in Bank-financed project.	No	➢ No archaeological or other cultural sites of significance are impacted by proposed project
Indigenous Peoples (OP 4.10, BP 4.10)	This policy contributes to the Bank's mission of poverty reduction and sustainable development by ensuring that the development process fully respects the dignity, human rights, economies, and cultures.	No	➢ No impact (adverse or positive) expected by project on tribals – a detailed spatial census analysis does not indicate any tribal concentrations in the areas selected to pilot physical interventions.
Water Resource management (OP 4.07)	Bank involvement in water resources management entails support for providing potable water, sanitation facilities, flood control , and water for productive activities in a manner that is economically viable, environmentally sustainable, and socially equitable. The Bank assists borrowers in the following priority areas:	Yes	➢ Applicable – the project intends to rehabilitate Dam and canal system

WB Safeguard Policy	Requirements	Triggered (Yes/No)	Comments
	Developing a comprehensive framework for designing water resource investments, policies, and institutions. Within this framework, when the borrower develops and allocates water resources, it considers cross-sectoral impacts in a regional setting (e.g., a river basin). Adopting pricing and incentive policies that achieve cost recovery, water conservation, and better allocation of water resources. Decentralizing water service delivery, involving users in planning and managing water projects, and encouraging stakeholders to contribute to policy formulation. Restoring and preserving aquatic ecosystems and guarding against over-exploitation of groundwater resources, giving priority to the provision of adequate water and sanitation services for the poor. Avoiding the waterlogging and salinity problems associated with irrigation investments by (i) monitoring water tables and implementing drainage networks where necessary, and (ii) adopting best management practices to control water pollution. Establishing strong legal and regulatory frameworks to ensure that social concerns are met, environmental resources are protected, and monopoly pricing is prevented.		
Involuntary Resettlement (OD 4.30)	The policy aims to avoid involuntary resettlement to the extent feasible, or to minimize and mitigate its adverse social and economic impacts.	No	➢ Although no resettlement and rehabilitation is anticipated under the project, an R&R policy for the sector has been developed and adopted by GOUP.
Safety of Dams (OP 4.37, BP 4.37)	The World Bank's safeguard policy on safety of Dams is based on the principle that, for the life of a dam, the owner (in this case of Government of India) is responsible for ensuring that appropriate measures are taken and sufficient resources are provided for the safety of the dam, irrespective of its funding sources or construction status. Because there are serious consequences if a dam does not function properly or fails. The Bank is concerned about the safety of a new dam, it finances and existing dams on which a Bank financed project is directly dependent. Upgrading and/or rehabilitation of existing dams, as proposed under this project, falls within the policy, thus OP/BP 4.37 is triggered. Under OP/BP 4.37 requires that the dam upgrading be designed and its civil works be supervised	Yes	➢ Applicable as per draft document. This component needs to be finalized.

WB Safeguard Policy	Requirements	Triggered (Yes/No)	Comments
	by experienced and competent professionals. It also requires that implementing agency adopt and implement certain dam safety measures for the design, bid tendering, construction, operation and maintenance of the dam and associated works. The safe operation of dams has significant social, economic, and environmental relevance. World bank has concern to strengthen the institutional, legislative, and regulatory frameworks for dam safety programs.		
Projects in Disputed Areas (OP 7.60, BP 7.60, GP 7.60)	Projects is Disputed Areas	No	➢ The project is not in a disputed area and the OP is not triggered.

The EMP has 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.

2.3 Institutional Framework to deal with water, social and environmental safeguards

The legal and institutional framework to deal with water and environmental safeguard measures is described in **Table 2.3**. A number of agencies both at national and state levels are associated with water resources, environmental management and social safeguards**.** Table 2.3 also describes the key institutions at national, state, block and local levels, together with their specific roles.

Table 2.3: Agencies dealing with water, environment and social sector and their responsibility

Stakeholders	Policy	Regulatory	Data / Information	Implementation
Central				
Ministry of Water Resources	✓		✓	
Ministry of Rural Development and Poverty Alleviation	✓		✓	✓
Ministry of Environment and Forests	✓	✓	✓	
Ministry of Agriculture/ Indian Council for Agricultural Research	✓		✓	
Central Pollution Control Board	✓	✓	✓	
Ministry of Urban Development	✓	✓	✓	✓
Ministry of Power	✓	✓	✓	✓
Ministry of Industries	✓	✓	✓	✓
Ministry of Health	✓	✓	✓	✓

Stakeholders	Policy	Regulatory	Data / Information	Implementation
Ministry of Food Processing	✓	✓	✓	✓
UP State				
Minor Irrigation			✓	✓
Urban Development-UP Jal Nigam			✓	✓
Rural Development-UP Jal Nigam			✓	✓
Department of Land Development & Water Resources			✓	✓
Forest	✓	✓	✓	✓
Environment	✓	✓	✓	✓
Industries	✓	✓	✓	✓
Power	✓	✓	✓	✓
Health	✓	✓	✓	✓
Agriculture	✓	✓	✓	✓
Horticulture	✓	✓	✓	✓
Irrigation Department, UP	✓	✓	✓	✓
Department of Agriculture, UP	✓	✓	✓	✓
UP Bhumi Sudhar Nigam			✓	✓
UP Council of Agricultural Research			✓	✓
UP State Ground Water Department		✓	✓	✓
UP Jal Nigam	✓	✓	✓	✓
Directorate of Environment, UP	✓	✓	✓	
UP Remote Sensing Applications Centre			✓	
Water and Land Management Institute, Lucknow			✓	
District				
District Planning Committee	✓	✓	✓	✓
Block				
Block Development Officer			✓	✓
Local				
Gram Panchayat	✓	✓	✓	✓

2.4 Institutional Gaps

The legal and institutional framework with respect to 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*. Unlike MoEF, the DoE does not have forests under its purview, as these are handled by the state Department of Forests. 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.

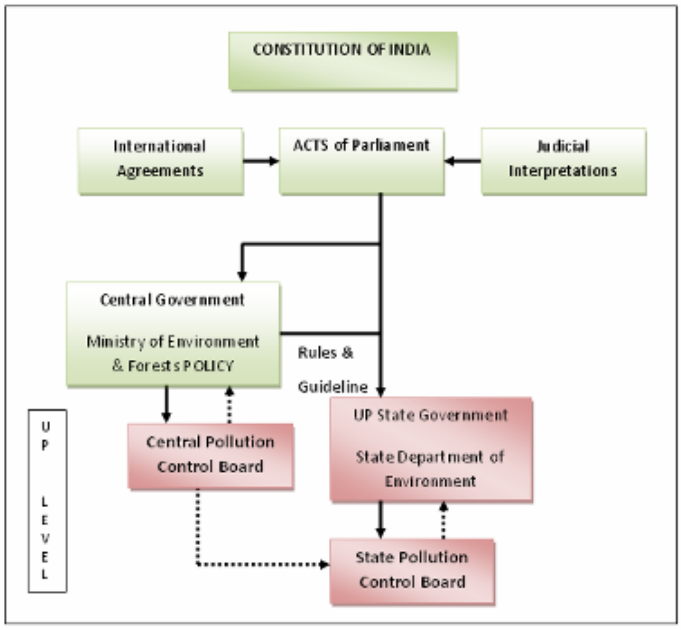


Figure 2.1: Legal and institutional framework for environmental safeguards

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 to implement them. 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. This is visible in terms of meeting individual goals by each of the agencies at the state level. For example, food sufficiency, irrigation and drinking water availability and control of pollution but lack of integrated planning in the sector over the years has manifested in terms of water logging, salinity, sodicity, siltation, reduced water delivery efficiency resulting in stagnation of agriculture production, have been achieved to some extent deterioration of soil quality, higher resource consumption and higher non point source of pollution.

Chapter 3: Socio-Economic Baseline Status

3.0 Introduction

Socio-economic status of Lower Ganga Canal System and Haidergarh Branch has been compiled based on the secondary data for the year 2000-01, 2005-06 and 2008-09. Analysis of demographic data is based on Census 1991, 2001 and provisional figures of census 2011. Similarly analysis of BPL families has also been taken from BPL Census 1998 and 2002. Livestock population is based on the year 1997 and 2003.

This chapter has been divided into six sections describing i) Socio-economic baseline status of blocks under command area of Lower Ganga Canal System based on secondary data, ii) Socio-economic baseline status of blocks under command area of Haidergarh Branch based on secondary data, iii) Socio-economic baseline status of districts under Lower Ganga Canal System based on focused group discussion, iv) Socio-economic baseline status of districts under Haidergarh Branch based on focused group discussion, v) Summary of Socio-Economic findings based on secondary data and focused Group discussion and vi) Socio-economic issues emerge from secondary data and focused group discussion. Major findings of the important parameters such as Population Density, literacy, Sex ratio, persons in labour force, families below poverty line, cropping intensity, irrigation intensity, canal irrigated area, source of drinking water, proportion of agriculture labour, etc. is given in the following section. The secondary data tables of Lower Ganga Canal districts and Haidegarh branch area are given in **Annexure 3.1 and Annexure 3.2** respectively.

3.1 Socio-Economic Baseline Status of Lower Ganga Canal Command Area Based on Secondary Data

3.1.1 Demographic Profile: 1991 and 2001

The districtwise total population in the 12 districts in 1991 and 2001 as well as of the individual Blocks of the said districts along with the sex wise and major caste-wise (SC and ST) distribution along with the statistical analyses have been given in Table 1A and 1B of Annexure 3.1. It may be noted that the total population of 1991 and 2001 of Kasganj district was calculated based on area shifted from Etah districts. The provisional figures of Census 2011 are given in table 1C of Annexure 3.1. Their analyses have been discussed hereunder.

Increase in Population during 1991-2001: The total human population of the districts increased from 1991 to 2001 by 24.2%. Among the districts increase varied from 11.4% to 35.8%. The highest percentage increase was recorded in Firozabad district and lowest in Etawah district. The provisional figure census 2011 indicates lower (16.97%) decadal growth in LGC districts as compared to state's average (20.09%). The lowest increment from 2001 to 2011 was observed in district Kanpur Nagar (9.72%) and highest in Kaushambi (23.60%) district.

Sex-wise Distribution of Population in 1991 and 2001: The proportion of Male population of the districts was about 54.5% in 1991 and the corresponding figure in 2001 was 53.9%. The proportion of male population in the Blocks covered under the command area ranged from 52.18% to 56.30% in 1991 and from 51.90% to 55.01% in 2001. As per the provisional figure of census 2011, the proportion of male population range between 52.48% and 53.99% and female between 46.01% and 47.52%. The proportion of male population in all districts was found higher (53.42%) than the state's average (52.41%). It may be seen that the proportions of male population in all districts as well as of the blocks of the said district falling under the command area were higher in both 1991 and 2001, but declined by more than 0.5% in the decade under report. This was more due to movement of male to cities in search of better employment opportunities.

Major Caste-wise (SC & ST) Distribution of Population in 1991 and 2001: The proportion of SC population in the districts as a whole ranged from 16.83% (Kanpur Nagar) to 35.10% (Kaushambi in 1991 and corresponding population proportion of SC Population in 2001 were not significantly different indicating thereby that the proportion of SC population was more or less similar in 1991 and 2001. The proportion of SC population was nearly 25% or more in Auraiya, Fatehpur and Kaushambi districts.

The proportion of SC population in the Blocks falling under the command area of the districts ranged from 14.33% in Jasrana block of Firozabad district to 41.57% in Chail Block in Kaushambi district. In fact most of the command area Blocks had very high percentage of SC Population (nearly 30% or more) in Kaushambi district while the percentage of SC population in the command area Blocks of each district was about 15% only.

Similar was the pattern of SC population in 2001 as well as own a decade there was no significant change in the proportion of SC population during the period (1991-2001)

The proportion of ST population in districts was nearly zero in all the concerned Blocks/districts.
In fact the proportion of ST population in UP was less than 1% in both 1991 and 2001 indicating thereby that there was no significant ST population in UP/selected districts/blocks of lower Ganga Command area.

3.1.2 Decadal Growth

Decadal Growth of Rural Population (1991-2001). The figures in the rural population in the decade ending 1991 and 2001 in the Blocks falling under the command area of the districts have been indicated in Table-2 of Annexure 3.1. In term of percentage of increase in decade ending 1991 it was in uncertained that the figures ranged from 13.54% (Amauli in Fatehpur district) and 14.1% in Karhal (Mainpuri districts) in lower end 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, but the spread of pattern of increase was more or less similar in the two two

decades. The decadal growth of rural population in the two decades in UP as a while was nearly same (25.49% and 25.80%) indicating thereby that the outer end movement of rural population was considerably high in command area as compared to that of the state as a whole.

3.1.3 Population Density

The total population and population per sq.km. in 12 districts of the area in 1991 and 2001 have been given in Table-3 of Annexure 3.1. Total population of the districts of the lower Ganga Command Area in 1991 ranged from 1000035 in Aurraiya to 3193113 in Kanpur Nagar districts and the per sq.km density from 457.4 in Fatehpur to 1062.5 in Kanpur Nagar, the pattern was almost same in 2001 except in Kanpur Nagar district. The total population of Aurriya in 2001 was 1179993 and of Kanpur Nagar 4167999. The density of Fatehpur was 556 and that of Kanpur Nagar 1321.1 Considering that Kanpur Nagar which is mainly, but not exclusively, comprised of Urban locality the population density were in the vicinity of 500 and 560 in 1991 and 2001 respectively. So for as the Blocks of the Command area is concerned, the population density were in the vicinity of 350 to 450 in 1991 and 425 to 525.

In 2001 except in the Blocks having substantial urban/semi urban population in which the corresponding population density were much higher. 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 which were exclusively rural in their characteristics. This may be because increased urbanization/ migration of rural population to urban/semi urban areas mainly because of increase in job opportunities in non-agricultural sectors in urban/semi urban areas. But not withstandingly more increase in density in Blocks having relatively more urban) semi-urban areas in 2001 vis-à-vis rural areas.

There were no decrease in population density in 2001 as compared to those of 1991 indicating thereby that pressure on land as a means of livelihood has actually increased in 2001 vis-à-vis in 1991. As such unless more job opportunities are created in urban/semi urban areas as also in rural areas agriculture shall remain the predominant source of livelihood in the Blocks covered under the command area.

As per the provisional figure of census 2011, density of population in all 12 districts of LGC were recorded between 634 per sq. km and 1449 per sq. km. The 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. The four districts namely Kanpur Nagar (1449 per sq. km), Firozabad (1037 per sq. km), Kaushambi (897 per sq. km) and Farrukhabad (865 per sq. km) had higher population density as compared to state's average due to better employment opportunities in the respective districts.

3.1.4 Sex Ratio: Number of Female per 1000 Male

The total districtwise and concurred Blockwise as well as the corresponding sex-ratio in UP and concurred districts a whole as well as in the concurred Blocks covered under the command area are given in Table 4 of Annexure 3.1.

As a perusal of the raw as well as the analysed data would reveal, the sex-ratio in UP a whole, which were 874 and 898 respectively in 1991 and 2001 respectively, the corresponding sex-ratio in the concerned rural Blocks were much lower in both 1991 and 2001. 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 notwithstanding the fact that usually more male population migrate to urban areas for seeking permanent / semi-permanent / temporary jobs. This should be a matter of concern.

The provisional figures of census 2011 indicate that the sex ratio in LGC districts was significantly lower (872 females per 1000 males) than the states average (908 females per 1000 males). Sex ratio was significantly lower range from 852 to 879 in all districts except Fatehpur (900) and kaushambi (905) districts.

3.1.5 Sex-wise Literacy Rates and Gender Gap in Literacy

The total number of literate population of both sexes in 1991 and 2001 in UP and the concerned districts as a whole vis-à-vis the Blocks falling under the command area along with the gender gaps are given in Table-5A (1991) and 5B (2001) of Annexure 3.1.

As perusal of raw as well as the analysed data as given in Table 5A and 5B reveals, there has been considerable increase in literacy level in both sexes in 2001 as compared to that of 1991 and corresponding decrease in gender gaps in literacy.

The literacy percentage in males in 1991 was nearly/ over 60% in the concerned districts. But they were considerably higher as compared to that of the State as a whole in both sexes. In 2001 the literacy percentage in both sexes increase by 15% to 20% vis-à-vis 1991 and the gender gap decreased by 5% to 7% percentage during the said period. The trend was similar in both urban/semi- urban and rural areas, except in Kanpur Nagar district where literacy rates were much higher in both males & females in both 1991 and 2001, but gap was more or less similar in overwhelmingly urban to semi urban and rural areas.

There were some variation in literacy percentage among the districts in respect of literacy percentage in both sexes. As expected, the literacy percentage in both sexes was considerably higher in the districts with relatively higher urban percentage, but in gender gaps were more or less similar in both 1991 and 2001. Among the districts, Kaushambi was the worst in terms of both male and female literacy, especially the latter in 1991. The situation improved considerably in the said district in 2001 but the gap remained more or less the same i.e. in the vicinity of over 30% in both 1991 and 2001.

The improvement in female literacy rate was very substantial in Kaushambi during 1991-2001. The gap in the percentage of female literacy was in the vicinity in 10% in 1991 but they increased to over 25-28% in 2001. This was become there were substantial increase in male literacy rate in Kaushambi as compared to the other districts. But the situation in absolute terms remains poor in the district, both in terms of literacy rates in both sexes as well as the gender gap.

In 2011, the percentage of male and female literates had improved as compared to census 2001. The percentage of male literates ranged between 72.91% and 87.64% while female between 50.20% and 75.89%. The total as well male and female literacy percentage was higher than the states average.
As per the provisional figure of census 2011, the gender gap in literacy in LGC districts were found lower (ranged between 8.18% and 24.59%) than the state's average (19.98%). The highest gender gap in literacy was found in district Kaushambi, Kasganj, Etah and Fatehpur.

3.1.6 Educational Institutions

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) Further there was considerable variation in continuous of increase in number of primary schools per lac of population; the increase were considerably in Ajitmal Block (Aurraiya District) (90.7 to 147.5) Erwakatra Block (Aurraiya district) (107.6 to 139.3), Mohammadabad and Kamalganj (Farrukhabad district), Devmal, Malwan, Amauli, Telyani, Bhitaura Blocks of Fatehpur district, in almost all Blocks of Etawah and Mainpuri districts.

So far as the number of primary schools per lac population is concerned, considerable increase was observed in almost all Blocks during the period (2000-01 to 2008-09) except in Madarpur Block of Firozabad district which including also recorded decrease in number of primary schools per lac population.

The increase in the number of higher secondary schools per lac population during the said period was considerably higher vis-à-vis those of primary schools and senior primary schools, in most concerned blocks of Fatehpur district.

The situation could be considerably improved if most of primary schools could be upgraded into senior primary schools which may require comparatively less investment as compared to opening of new ones. Such a move may also facilitate better administration of the schools from the point of view of improvement in the quality of education which is almost as important as increase in the number of schools.

3.1.7 Safe Source of Drinking Water

Information about Block wise source(s) of drinking water in 12 districts of the Lower Ganga Command Area have been given in Table-7 of Annexure 3.1.

Table 7 indicates that all the villages of the 12 districts were 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) getting drinking water from wells. Besides 861 villages, including some belonging to Kalyanpur (62) , Vidhunu (73) and Sarsol (80) Blocks was tetting water from general handpump. Only 9 of Sakit Block of Etah district, and a few villages of all blocks belonging to the command area. i.e. (Fatehpur district and 3 of Jasrana Block of Firozabad district and Kaushambi having tap water drinking facilities.

3.1.8 Road Density

Block wise length of mettled road in different district of the Lower ganga command area in 2000-01 and 2005-06 and 2008-09 have been given in Table 8 of Annexure 3.1.

There was appreciable increase in the length of mettled road between 2000-01 and 2008-09. In 7 Blocks of Aurriaya district road length increased ranged from 64.6% (Sahar Block) to 126.1% (Aurriya block) during the said period.

In Etah Block no figure in respect of Ganj Dundwara for 2008-09 was available. In other Blocks the metallic road increase ranged from 53.3% in Shitalpur Block to 98.9% in Aliganj Block from 2000-01 to 2008-09.

In 3 blocks of Farrukhabad district the road increase ranged from 90.7% (Nawabganj Block) to 113.6% in Shamsabad Block during the said period. In Fatehpur district the increase in metelled road from 2000-01 to 2008-09 ranged from 12.6% (Malwan Block) to 58.5% (Bhitaura Block). In Firozabad district the increase ranged from 53.9% in Eka Block to 88% in Madanpur Block. In Etawah district the increase ranged from 58.3% (Basrehar Block) to 137.4% (Saifai Block) during the said period. Apart from Kannauj and Farukhabad, the performance was the best in the district. In Kanpur Nagar district, the increase ranged from 20.8% (Sarsol Block) to 118.4% (Bhitargaon Block). No analysis was done in respect of Kashiram Nagar due to lack of data. In Kaushambi district it ranged from 11.9% (Kara Block) to 97.5% (Chail Block). In Mainpuri district the increase in metalled road from 2000-01 to 2008-09 ranged from 53% (Ghiror Block) to 117.7% (Karhal Block).

Aforesaid analyses also indicate the Kaushambi and Fatehpur were the two wrost performers in the terms of the rate of increase in the metelled road during the period.

3.1.9 Proportion of Electrified Villages

The proportion villages electrified in 12 districts all command area blocks of the command area in 2000-01, 2005-06 and 2008-09 have been given in Table-9 of Annexure 3.1.

Table 9 would reveal the Block-wise percentage of villages electrified increased substantially between 2000-01 and 2008-09. The lowest percentage of electrified village was in Aliganj Blocks (26.9%) in 2000-01 and by 2008-09 all villages were electrified. Also while the percentage of electrified villages in 2000-01 ranged from 26.9 to 100.0%, it ranged from 83.8 (Mahewa in Etawah district) to 100% by 2008-09, a very substantial increase within a short span of 8 years. In fact by 2008-09, almost 90% of villages of the command area were electrified.

3.1.10 Blockwise Number of Branches of Commercial Banks

The Blockwise numbers of branches of the Nationalised Banks, Rural Banks and other commercial banks in different Blocks of the 12 districts of the command area in 2000-01, 2005-06 and 2009-10 have been indicated the Table-10.

The actual Blockwise branches of the Nationalised Block ranged from 0 to 5 in 2000-01 and the situation only marginally improved by 2009-10 in some blocks; it actually decreased in a few blocks. But the number of branches of the rural banks and non-nationalised commercial banks increased substantial from 2000-01 to 2009-10, In fact the increase in the total number of branches of the 3 types of banks as stated above was by almost 50% in most of the Blocks between 2000-01 and 2009-10; the increase was much more in respect of the non-nationalised commercial bank as compared to the other two types of banks, indicating thereby that the non-nationalised banks were much more active in opening new branches vis-à-vis the nationalized banks during the said period. Comparatively less increase in the opening of the new branches of the nationalized banks may be because their presence was already there in 2000-01 and 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.

3.1.11 Post Offices, PCOs and Telephone Connections

The actual number of Post Offices, Telegraph offices, PCOs and Telephones in the different Blocks covered under the command area of the 12 district in 2000-01, 2005-06 and 2009-10 were as indicated in Table-11 of Annexure 3.1.

As the figures indicate the number of Post offices/ Block ranged from 10 to 26-27 in 2000-01 and their numbers increased only marginally during the 8 years under report. Telegraph office in the said period in the concerned blocks was almost non-existant and there was no change in the situation during the period. But the number of PCOs was in

almost single district in Aurriya in 2000-01, it increased by 5 to 15 times in the concern Blocks of the said district. 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.

In Etah district the number of Post offices were 21 and 27 in Aliganj and Sakit Blocks and zero in respect of Telegraph office in 2000-01 and their numbers remained static during the period the number of PCOs range from 5 and their number increased almost 2 fold and telephone numbers increased by 160% to 350%.

Similar was the pattern in the other 10 districts, except in the concerned Blocks of Mainpuri district which did not have PCOs but the increase in the number of telephones were very substantial, i.e., almost by 15 to 20 times.

Non-increase in number of PCOs but very substantial increase in the number of telephone/ mobile connections were primarily because of introduction of individually owned wireless/ mobile telephone connections during the said period.

3.1.12 Health Facilities

The various Health facilities per lac population in the 12 districts in the years 2000-01, 2005-06 and 2008-09 were as given in Table 12 of Annexure 3.1.

Table 12, indicates that the number of allopathic hospitals and primary health centres per lac population varied 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 situations were only marginally different in 2005-06 and 2008-09, the increases being not very significant.

Table 12 also shows that the number of beds /lac population available in the allopathic hospitals and primary health centres in 2000-01, 2005-06 and 2008-09 in differenct blocks also varied considerably. It was as low as 4.4 in Kannauj Block of the district Kannauj and as high as 63.2 / lac population in Haseran Block of the same district in 2000-01. But generally the figure ranged for 11/12 to 20. The situation got improved marginally by 2008-09, indicating that not much additional facilities were created during the period 2000-01 and 2008-09. In fact in some Blocks, even though the population increased, no additional facilities were created resulting into decrease in the availability of beds per lac of population.

3.1.13 Persons in Labour Force

Number of persons engaged in different economic activities in the Blocks falling under the command area consisting of 12 districts in 1991 and 2001 were as given in table 13A and 13B of Annexure 3.1. Some significant features emerging out of the analyses of data given in the said tables along with the population figures as given in Table 13 were as presented hereunder.

The 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 were little high lower; the lowest being 37.1 percent 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 in marginally in 2001 as compared to that of 1991.

The analyses also showed that, 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 of the total Command area being 73.3%. In 2001 proportion of working people engaged in agriculture and allied activities declined a little; the lowest being 42.3% in Kalyanpur of Kanpur Nagar district and highest 80.6% in Sakit (Etah district). The average of command area as a whole engaged in agriculture and allied activities was 60.7%. This showed that the proportion of people engaged in agriculture and allied activities decreased in 2001 as compared to that of 1991. This also indicates that newer working people shifted to non-agricultural activities.

3.1.14 Families Below Poverty Line

The blockwise actual number of families and actual number with proportion of families below poverty line (BPL) in 1998 and 2002 were as shown in Table 14 of Annexure 3.1.

A careful perusal of Table 14 shows that the lowest proportion of 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), Eka, Shikohabad and Madanpur Blocks (Firozabad district.) In 2002 the lowest proportion of BPL families was in Jasrana block (Firozabad district). In fact in only 2 blocks the proportion of families BPL were below 20% and both blocks belongs to Firozabad district. In Firozabad district as a whole the proportion of family BPL was below 20% in 2001.

Further, Table 14 also shows that though there were considerable variation in the proportion of families BPL in both 1998 and 2001 and in a large number of block the proportion of families BPL increased in 2001 vis-à-vis 1998, but taking the entire command area as a whole the those was only marginal decline in proportion of families BPL in 2002 as compared to the of 1998 whole in UP as a whole, both the actual number and proportion of families BPL actually increased in 2002 vis-à-vis 1998.

3.1.15 Blockwise Land Usage in the districts

The blockwise land usage in 2000-01, 2005-06 and 2008-09 were as given in Table 15A, 15B and 15C of Annexure 3.1.

A look at the 3 aforesaid tables shows that there were year to year variations in the land usage pattern in the concerned Blocks in the three years in many cases only marginally and in almost equal number considerably and no define pattern emerges from the

analyses. However, one significant finding is 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 in the 3 concerned years.

3.1.16 Cropping Intensity

The cropping intensity in the concerned Blocks in 2000-01, 2005-06 and 2008-09 were as given in Table-16 of Annexure 3.1. A careful perusal of the data given in Table 16 shows that in almost 60% of Blocks the cropping intensity increased. But the increases were only marginal over the three period. In about 40% of cases where either there was no increase or there was marginal decline in the cropping intensity. The increase were higher in Blocks belonging to Aurriya district, half of Etah, Farrukhabad and a few blocks of Mainpuri districts, to mention a few. The decline in the intensity was in Ashodhara, Hathgaon. Airaya and Dhata blocks of Fatehpur district. In Sultanpur, Bewar, Alao and Kishni Blocks of Mainpuri district, the increase in the intensity of cropping was very substantial which resulted in the increase of intensity in the Mainpuri district as a whole even though in 5 remaining Blocks there was actual decline in the intensity. In Kaushambi district, except in 2 blocks namely Sirathu and Muratganj there was increase in the cropping intensity though the increases were only marginal. As a result in the entire district as a whole, the intensity was largely static over the period. In Blocks of Kanpur Nagar district there was decrease in the intensity in most Blocks.

3.1.17 Area under Major Crops

Block wise area under major crops and a few millets in 2000-01, 2005-06 and 2008-09 were as given in Table-17 of Annexure 3.1.

Cereal: A perusal of Table 17 would show that Kharif Rice and Wheat were major cereal crops and they were 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 were grown in largely under the unirrigated conditions (about 90%). About 20-25% of Gram crop was getting a 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 incresed. This trend is likely to persist in years to come.

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 laregely in two districts, namely, Farrukhabad and Kannauj districts mostly under irrigated condition.

Commercial Crops: Sugarcane and Potato were to major commercial crops of the area and as expected they were being grown under irrigated conditions. These two crops were being grown in almost all Blocks in varying areas. The area under sugarcane was comparatively small is Mainpuri and Kannauj districts. Tabacco was being grown in Farrukhabad district only. The area under Tabacco, however increased in 2008-09 as compared to previous years.

Fodder: Fodder was being grown in Kharif, Rabi and Zaid seaons largely under irrigated conditions in Rabi and Zaid and partially under irrigated and largely as a rainfed crop Kharif. This is because animal husbandry was an important source of livelihood and this need to be encouraged. The inferences were largely similar in concern years.

Vegetables: Onion was the major vegetable crops and they were being grown in increasing area as the year went by. In 2008-09 area under onion and other vegetable crops increased as compared to 2000-01 there has been slow but steadily increase in area and they are being grown largely but not exclusively under irrigated conditions. In 2008-09 about 80-90% of area under onion and other vegetables were being grown under irrigated conditions and this situation is likely to improve as the demand of vegetables increase, which is bound to occur as economic conditions of consumers, improve in years to come. A survey of the area showed that onion and other vegetables crops were being also grown under shallow boring and tube wells/ wells in order to facilitate irrigation in right quantity and at right time, a condition essential for good yields.

3.1.18 Productivity (Qtls/ha) of Major crops

The yield of rice increased from 2000-01 to 2008-09 more consistently as compared to other crops, except in Kaushambi district where it actually decreased by 9.8%. In other district it increased by 24.2% to 87.7%. In respect of wheat too there was increase, but increase was much less as compared to rice; the increase ranged for 1% in Kannauj to 26.0% (Fatehpur). Increase trend was also recorded in respect of Barley and Jwar with the process was very low.

In Maize increase in productivity ranged for 2.0% (Aurriya) to 38% (Fatehpur), the increase being particularly high in 2008-09 as compared to previous years. The productivity of pulses and oilseeds also increased but the increases were much less. The increases were abruptly high in 2008-09 (47.5% in Farrukhabad district). In oilseeds it ranged for 0% in Kannauj to 30% in Etah and 34.3% in Mainpuri. The increases were much less in commercial crops like sugarcane and potato. In some years increase was abnormally high may be become of good weather condition or less incidence of diseases.

As compared to districts of the command area increases in yields in UP as a whole were much less, in the vicinity of about 10%.

3.1.19 Operational Landholding

Table 19 of Annexure gives blockwise distribution of landholdings among different categories of farmers. The analysis is given below.

In Erwakatra Block of Aurriya district the proportion of Marginal farmers increased from 76.1% in 1995-96 to 79.3% in 2000-01 and the actual number of Marginal farmers also increased from 18258 to 18535. The number of Small farmers was 16% (No. 3828) in 1995-96 and it decreased to 14.5% (No. 3362) but the area under operation 4242 Ha (23.2%) increased to 27.3% (4779 ha). The total number of farmers also decreased from 23989 to 23362.

In Bidhuna Block similarly the proportion of Marginal farmers 75.7% (No. 19968) increased to 78.8% (No. 20255). The total area under Marginal farmers 43% also increased to 45%. The actual number of Small farmers, 4634, decreased to 4077. The actual number of farmers in 95-96 (26372) decreased to 25694, which shows that farmers migrated to non-farming occupation.

In Achalda Block also there was migration of farmers actual number decreased between 95-96 (24929) 2000-01 (23969). In Sahar Block the number of Marginal farmers increased from 18959 (73.7%) to 19215 (77.2%) during the said period. The total number of farmers also decreased from 25723 to 24881 during the said period. In Ajitmal Block similar trend was seen. The proportion of Marginal farmers increased from 73.8% to 77.5%. The actual number of farmers which was 33145 in 1995-96 decreased to 32146. Aurriya Block also showed similar trend.

Not only actual number of farmers decreased in the said 5 year period, the total area under farming also decreased in almost all Blocks. In the district of Aurriya as a whole the actual number of farmers decreased from 195375 to 189167 and the operational area from 164814 ha. to 154561 ha.

In Etah district, however the trend was mixed. The proportion of marginal farmers increased from 68.8% (No. 134536) to 73.2% (No. 171908), the total area under their possession increased for 65131 ha to 72153 ha. Similar was the trend in respect of Small farmers (1-2 Ha). That is, actual number increased from 34976 to 43872 indicating thereby that the fragmentation and division of landholdings increased.

In Farrukhabad district also similar pattern was observed in all the 3 Blocks of the command area as also in the district as a whole. In Kayamganj the actual number & proportion of Marginal farmers increased from 20386 (72.8%) to 23964 (75.5%) in the period under review. The operating area as well as the proportion, however, decreased from 9262 ha (37.4%) to 8629 ha (35.3%) The actual no. of Small farmers however increased and so was the total area under their operation. The actual number of total

farmers (27994), however, increased (31742), but the total area under farming, 24787 ha, in 95-96decreased to 24450 ha in 2000-01), indicating diversion of land to non-farming operations. In Nawabganj and Samsabad blocks similar was the pattern. The increase in the no. of farmers was due to fragmentation and division of land. In the district as a whole the actual number of Marginal farmers increased from 134536 (68%) to 176344 (76.7%). The same was the pattern in respect of small farmers, namely 34976 in 1995-96 and 37968 in 2000-01.

In Devmai, Malwan, Telyani, Bhitaura, Haswar, Asodha, Hathgaon, Airaya, Vijaipur and Dhata Blocks these were increase in the number of Marginal farmers and area under their cultivation. This largely was also the case with Small farmers. In Devmai, Malwan, Telyani, Airaya Blocks etc. there were increase in the total number of farmers. But in Khajuha, Bhitaura Haswa, Bahnwa etc. Blocks there were decrease in the total number of farmers. The increases in the number of holdings was largely due to subdivision and fragmentation of holding, while decrease was due to migration of farmers to non-farming occupations. In most of the Blocks there was decrease in the area under farming. The decrease however was only marginal, mostly due to breakup in the joint family system which often necessiated construction of new dwellings.

In Firozabad district there is also a common pattern in different Blocks. There was decrease in the number of Marginal farmers (22031 to 20779) as well as total areas under holdings (9047 ha to 8605 ha) in Eka Block. But there was increase in the number of Small farmers as well as the total area under their holdings. There was decrease in the number of farmers in the block. Similar was the pattern in Jasrana, Shikohabad, Araon Blocks etc. In the district as a whole there was decrease in the total number of farmers from 180921 (95-96) to 176575 (2000-01) indicating that there was shifting from farming to non-farming occupations.

In Etawah (113705; 73.5%), Kannauj (179694; 81%), Kaushambi (152899; 77.6%) and Mainpuri (205004; 76.5%) too both absolute number and proportion of Marginal farmers increased from 1995-96 to 2000-01; the corresponding number and proportion being 23353 (77.8%), 203279 (84.2%), 163410 (84.4%) and 219039 (77.8%) respectively. In respect of small farmers also proportion, increased from 1995-96 to 2000-01 But total number of landholdings decreased between 1995-96 and 2000-01. 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 was the pattern of changes at the Block levels.

3.1.20 Irrigation Intensity

Irrigation Intensity data for 3 years namely 2000-01, 2005-06 and 2008-09 in the Blocks of the Lower Ganga Command Area belonging to the 12 districts were as given in Table 20 of Annexure 3.1.

The data given in Table 20 show that the average Irrigation Intensity (II) increased slowly during the said period. However, considering that the 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 in 2000-01 were lower than the State average. The corresponding number of blocks in respect of 2005-06 and 2008-09 were 38 and 36 respectively. On the other hand Irrigation Intensity in 21 out of 74 Blocks were higher than 150 in 2000-01. The corresponding figures in respect of 2005-06 and 2008-09 were 27 and 30 Blocks respectively. In fact II was above 175 in 2,2 and 10 Blocks in 2000-01, 2005-06 and 2008-09 respectively indicating thereby that there was considerable scope of further increasing II in the area.

On the other hand in 11 blocks II was less than 125 in 2000-01 and 7 each in 2005-06 and 2008-09. This indicate that there is considerable scope of increasing II.

3.1.21 Irrigation Infrastrucure

The Blockwise & districtwise available irrigation infrastructure in 2000-01, 2005-06 and 2009-10 are indicated in Table 21 of Annexure 3.1.

As a perusal of Table 21 indicates Canal, Government Tubewells, Permanent Wells, Rahat, Ground Pumpset, Boring Pumpset and Private tubewells were the sources of irrigation available in the area in the said period.

In respect of canals, except Etah, Kannauj, Kashiramnagar, Mainpuri, Kaushambi the length of canal remained stable. In 2005-06 the length of canal increased in Etah and Kashiram Nagar it decreased slightly in Kannauj and Mainpuri. In 2009-10 further decrease were noted in Etah and Kannauj and decreased in Kaushambi as compared to the previous two occasions.

In respect of Government Tubewells 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, it recorded marginal decrease in Etah, Farrukhabad Fatehpur and Firozabad districts. In respect of permanent wells, the variation was very considerable in most places a very large numbers went out of operation.

In respect of ground pumpset, Borking pumpsets, Private tubewells, etc., usually there happened to be increase in number over the decade and these increases most probably contributed to getting permanent wells out of order as the water tables decreased due to the sustained over increase in the number of private electric/diesel operated boring.

3.1.22 Source wise Irrigation

In Aurriya district as expected the area as well as proportion of total area under private tubewells increased in 5 out of 7 blocks. In only Achalda (12201: 63%) and Bhagya Nagar (7687: 43.4%) areas under canal irrigation have increased.

In Etah district, total area under canal and private tubewells increased in all except Aliganj block and under public tubewells decreased in all blocks. It has also increased under private tubwells as well as wells. This shows that privately managed irrigation system/ sources have been more efficient in term of increase in area.

In Etawah district, the area under canal irrigation as well as private tubewells in terms of absolute area as well as share has been assessed from 2000-01 to 2008-09. So has been the case with respect to the private tubewells. In respect of public tubewells, except in Basrehar and Bharthana, areas had decreased.

In Farrukhabad private tubwells have remained overwhelmingly predominant source of irrigation and areas under the same recorded increase in all the three blocks located to the command area as well as the district as a whole.

In Fatehpur district, areas under canal irrigation have decreased in almost all blocks and it share has also decreased. But coverage under private tubewells as well as its share in overall areas under irrigation had also recorded increase in the said period. In Firozabad district similar situation has been observed. The areas under public tubewells have sharply decreased. In fact 3 out of 5 blocks it has ceased to be a source of irrigation in 2008-09 while some areas were irrigated under this source of irrigation in 2000-01.

In Kannauj district areas under irrigation has decreased in all the 3 blocks. The same have sharply decreased in respect of public tubewells. The area under public tubewells in Saurikh Block decreased from 12748 Ha (2000-01) to more 67 ha in 2008-09. But area under private tubewells has increased very substantially in terms of absolute area as well as share vis-à-vis other sources.

In Command Area Blocks of Kanpur Nagar district the area under canal irrigation had sharply increased in 8 out of 9 Blocks and in except Vidhunu (10832 to 9284 Ha) and Kakwan (4283 Ha to 4025 ha), area under private tubewells had 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.

In Kashiram Nagar district area under canal irrigation has increase only in Amapur Block and decreased in 3 blocks namely Sahawar, Patiyali and Sidhpura Blocks. The area under public tubewells had decreased in all 5 Blocks of the command area. The same has been situation with respect to private tubewells. In respect of wells the situation in mixed. The area under well irrigation were 3829 Ha and 3975 ha in Patiyali and Sidhpura Blocks in

2000-01 and the areas were reduced to zero by 2008-09. The increase were found in other 3 Blocks, but it remains to be seen how sustenable is the situation.

In Kaushambi district, except in Sarsawan and Kaushambi Blocks private tubewells remained the predominant source of irrigation all through 2000-01 to 2008-09 covering from 85.7% to 99% of the area.

In Mainpuri district irrigated areas under canal have increased in 5 Blocks and decreased in 3 Blocks under private tubewells, irrigated areas have increased only in 6 out of 8 Blocks. The total area under canal irrigation in the district increased from 43256 ha to 52774 ha and that of under private tubewells from 120982 ha to 126986 ha. The total area had also increased from 174457 ha to 185894 ha.

3.1.23 Per Capita Annual Food Grains Availability

Itemwise annual per capita foodgrain availability in 2000-01, 2005-06 and 2008-09 in the concerned districts of the Command Area were as given in Table-23 of Annexure 3.1.

Table 23 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) 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 as also the state of UP as a whole the per capita availability decreased.

Decrease in per capita annual availability of Sugar was recorded in all districts of the command area as also in the State as a whole. The increased per capita availability of Potato was recorded in Aurriya (74.29 Kg to 118.25 Kg), Etah (57.96 kg to 110.74 kg), Fatehpur (43 Kg to 58.56 Kg), Firozabad (386.51Kg to 512.29 Kg), Etawah (72.26 Kg to 126.69 Kg) and Mainpuri (180.37 Kg to 201.78 Kg). It also recorded slight increase in UP as whole from 60.37 Kg to 63.99 Kg.

3.1.24 Proportion of Agricultural Labour

The Blockwise number and proportion of agricultural labour in the Command Area in 1991 and 2001 has been given in Table 24 of Annexure 3.1.

Table 24 indicates that both in terms of 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. The districtwise analysis is given hereunder.

In all 7 Blocks of Aurriya district taken together, the total number of persons engaged in agricultural activities declined for 44996-40231 from 1991 to 2001 i.e. by 10.6%.

In Etah district in 4 out of 5 Blocks, the actual number of person engaged in agricultural activities declined from 22109 to 21872 i.e. decline by 10.8%. The proportion of labour force engaged in agriculture also declined from 12.3% (1991) to 10.6% (2001) in the district.

In 7 blocks of Etawah districts the number of labour engaged in agriculture declined from 49330 (1991) to 37777 (2001) i.e. a decline by 23.4%. In terms of proportion of the total labour engaged in the said Block also declined from 18.7% to 13.8% in the said period.
But in Farrukhabad district where only 3 blocks belonged to the Command area, the total number of persons engaged in agriculture increased for 18153 to 20349, i.e. by 11.90%. But the share of agricultural labour to the total labour force declined from 14.7% to 13.6%.

In Fatehpur 12 blocks of the districts, the total of labour engaged in agricultural activities declined from 139252 (1991) to 15435 (2001) i.e. by 17.1 %. The proportion also declined.

In the command area Blocks of Firozabad district the total number of persons engaged in agricultural activities declined from 29913 to 26036 i.e. by 13% during the decade under study.

In Kannauj district, however, there was increase in the number of agri labour force from 9163 to 12147, i.e., by 32.6% during the said period. The increase in the number of persons engaged in agri activities increased in all the 3 blocks belonging to the Command Area.

In Kanpur Nagar district except in Kakwan Block, reduction in labour engaged in agricultural activities was noticed in other 8 Blocks and the total labour force engaged in agricultural activities declined from 78007 to 68660 i.e., by 11.4% in the decade under report.

In Kaushambi districts there were 7 Blocks under the Command Area and the number of persons engaged in agricultural related activities declined in all 7 blocks between 1991 and 2001. The total number being 113076 in 1991 and it declined to 83373 i.e. by 35.6%.

In Kashiram Nagar the Number of agri labour recorded increase marginally in all 5 blocks resulting into increase in the total agri labour force from 21236 in 1991 to 22268 in 2001 i.e. an increase by 4.9% in the said period.

In 6 out of the 8 Blocks, there was decrease in the number of agri labour force, only in Karhal and Kishni there were Marginal increase. But the total labour force engaged in agricultural activities in the 8 Blocks taken together declined from 35620 to 29663 during the decade i.e., by 16.7%

3.1.25 Fertilizer Consumption per hectare

Per hectare consumption of Nitrogenous (N) Phosphatic (P) and Potastic (K) fertilizers in 2001, 2005-06 and 2008-09 in different Blocks of the Command Area were as indicated in Table 25 of Annexure 3.1. In the Immediately following section the total NPK consumption of 2008-09 vis-à-vis 2001 in different Blocks of the Command Area is being compared.

In 6 out of 7 Blocks of Aurriya district total consumption of NPK has increased moderately in 2008-09 vis-à-vis 2000-01, increase ranged from 4.1% (Achalda) to 37.8% (Aurriya Block).

In all Blocks of Etah district also, the total consumption of the three fertilizers have increased very substantially ranging from 34.3% to 67.2%. The same situation has been observed with respect to the concerned Blocks of Etawah district. Consumption increase ranged from 17.2% (Bashpura Block) to 298.1% in Sainfai block, the average increase being as high as 86.7% in the said period.

In Farrukhabad the total consumption of NPK increase during 2000-01 to 2008-09 ranged from 91.4% to 128.6%, the average of the three Blocks belonging to the Command area being 112.4%.
In 12 blocks of Fatehpur district the situation, however was not as encouraging. It recorded an increase in only 3 of 12 Blocks (Bahnwa, Asodhar and Hathgaon) and in remaining nine the decline ranging from 2.6% (Telyani block) to 30.6% (Devmai block)

The total consumption of NPK increased in 4 out of 5 blocks of Firozabad district located in the command area and the increase ranged from 7.2% (Madarpur) to 64.6% (Eka), the average increase being 37.3%. The decline in consumption in Araon Block was by 2.1% only.

In all 3 blocks of Kannauj district increase ranged from 0.2% (Umarda) to 101.9% (Haseran), the average increase being 45.1% during the said period. The increase as per ha use of NPK in Kanpur Nagar district ranged from 45% (Patara) to 352.3% (Bhitargaon Block), the average increase being 169%. Except in 2 Blocks (Sarsawan and Chail), increase in the total consumption of fertilizer (NPK) was recorded in other 5 blocks of Kaushambi district; the increase ranged from 2.5% (Sarathu) to 34.8% (Kaushambi Block)

In all 5 blocks of Kashiram Nagar district for which data were available, increase in total consumption of fertilizer (NPK) ranged from 9% in Sohawar Block to 122.1% in Sorao Block in the said period.

The increase in the total consumption of 3 fertilizers was recorded in 5 out of 8 Blocks of Mainpuri district the decline was recorded in Kishni, Bewar and Karhal blocks. The increase in 5 Blocks ranged from 7.9% (Kurauli) to 25.6% (Mainpuri) in the district.

Notwithstanding the fact that the increase in total per ha fertilizer consumption was moderately to substantially high in Etah, Etawah, Farrukhabad, Firozabad, Kannauj, Kashiram Nagar, Kanpur Nagar and to some extent in Mainpuri, Kaushambi and Aurriya districts, use of NPK was highly unbalanced; the per ha uses of P and K were highly skewed the increases in use of P and K fertilizers were almost negligible in most of Blocks, except those belongings to Etawah and Farrukhabad where also use of K was much lower than the desired level. For sustainable agricultural production growth, the increase in the use of P and K should be vigorously promoted. Also there is need to promote use of organic manures.

3.1.26 Livestock Development Facilities

The Blockwise/Districtwise livestock development facilities / infrastructure in 2001-02, 2005-06 and 2008-09 have been given in Table-26 of Annexure 3.1.

Perusal of Table 26 indicates, that 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. For example, the number of Veterinary Hospital in 2001-02 in Aurriya remained same (12), the number of animal development centres decreased from 22 to 1 only but the number of artificial fertility centres/ sub centres increased from 24 (2001-02) to 30 by 2008-09. No other facility was added in the said district during the period under review.

In Etah district, there was a marginal increase in number of Veterinary Hospitals, but a sharp decrease in the Animal Development Centres (31 to 4) but very substantial increase in the number of fertility centres/ sub-centres (42 to 73).

Similarly, there was sharp decrease in the number of Animal Development Centres in Etawah districts (33 to 21) but very sharp increase in the number of Artificial Fertility Centres / Sub Centres (37 to 59). Further one breeding farm and one Pig Development Units were established in the district in 2008-09 but they were not lbelonging to the Blocks located in the command area.

In Farrukhabad district too, there was decrease in the number of Animal Development Centres (27 to 3) by 2008-09, but a substantial increase in the number of Artificial Fertility Centres/ Sub Centres (13 to 48).

Similar pattern has been observed in Fatehpur district, namely, the number of Veterinary Hospitals remained same but a sharp decrease in Animal Development Centres (from 44

to 4) but similarly some increase in the number of Fertility Centres/ Sub-Cebntres (67-79) during the period were noticed. Other facility remained same through out (2001-2009).

Similar pattern of changes has been observed in Firozabad, Kannauj, Kanpur Nagar, Kashiram nagar, Kaushambi and Mainpuri districts during the said period. The reason(s) for such sporadic changes were not clear.

3.1.27 Blockwise Livestock Population

The Blockwise livestock population in the Command Area districts in 1997 and 2003 are given in Table-27 of Annexure 3.1.

A very careful examination/analysis of data indicates that Bovine (Desi) Male population recorded decline in all, except Firozabad and 4 out of 8 Blocks of Mainpuri districts.

But, in respect of Desi Bovine (Female more than 3 years) population the picture is mixed. While population of this category of animal recorded increase in Aurriya, Etah, Farrukhabad and a few Blocks of Fatehpur (Malwan, Asodhar, Hathgaon and Dhata Blocks), Firozabad (Shikohabad and Madanpur Blocks) , Kashiram Nagar (Amapur) and Mainpuri (Mainpuri Karhal, Sultanganj, Bewer and Kishni Blocks), in rest of the districts/Blocks the population declined. The reason(s) for this need to be studied.

In respect of calf (male and female), mixed scenario has been observed. The population of this category of animals declined except in Etah, one Block of Farrukhabad (Shamsabad), a few of blocks Fatehpur (Devmai, Malwan, Khajuha, Asodha, Hathgaon, Airaya and Data), as of 5 Blocks of Firozabad district (Jasrana, Shikohabad, Araon and Madanpur), Kanpur Nagar, Kaushambi and 3 of 8 Blocks of Mainpuri district.

The population of cross breed Bovine male (more than 2.5 years) recorded increase, except in most Blocks of Fatehpur, all of Kannauj, Kaushambi, Kashiram Nagar districts during the period (1997-2003). The population of cross breed Bovine female (more than 2.5 years) recorded increase in all districts, except Kashiram Nagar 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 population of He Buffalos (more than 3 years) decreased or were at par except in Kashiram Nagar and 3 Blocks of Kaushambi district. But in respect of She Buffalo (More than 3 years), the population increased in more than 90% blocks. The picture was similar in respect of buffalo calf (Male and females), i.e, there was increase in population in more than 90% Blocks.

Tha data analysis indicates that the population of milk prodencing 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.

The population of sheep declined during 1997 to 2003 in almost all Blocks with exception of only 4 blocks, 3 of which were located in Fatehpur and one in Firozabad district.

With exception of Kanpur Nagar district, 4 blocks of Mainpuri district (Kishni, Bewar, Sultanganj and Barnahal Blocks), 2 of Kaushambi (Kara and Sirathu) and one of Kashiram Nagar (Ganj Dundwara) population of pigs declined in all Blocks belonging to the lower Ganga Command Area.

The population of goat generally increased in all except Aurriya and a few Blocks of Kashiram Nagar and Fatehpur districts. In fact rearing goat as a supplementary sooure of income with very small investment can be a good initiative considering the ever increasing demand of mutton and skin in leather industry. The population of poultry birds has decreased except in Kanpur Nagar and about half of the blocks of Kaushambi and Mainpuri district. In 3 out of 12 Blocks of Kanpur (Dhata, Vijaipur and Hathgaon) poultry population has increased.

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 vigorously.

3.1.28 Reservoir Fish Production:

The number of Government & private reservoirs with areas and production of fish, and quantities of fingerlings distributed in different Blocks of the command area in 2001-02, 2005-06 and 2009-10 is given in Table-28.

The progress as recorded during the period are being discoursed/presented hereunder. The achievements in 2009-10 vis-à-vis 2001-02 are being compared as indicators of performance/progress.

The areas under Departmental/ Government reservoirs in the different Blocks were very small and except Mainpuri, picture is dismal in terms of both area as well as production.

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, in only two blocks of Firozabad and all blocks of Kannauj, Kanpur, Kashiram Nagar and Mainpuri districts. But their productions levels were much less then what is expected from even moderately well managed private reservoirs. The canal water may be used to replenish/enhance water/end in private/public reservoirs so as to maintain one meter Water/end which would facilitate composite fish culture with local/exotic breeds of fishes.

3.2 Socio – Economic Baseline Status of Haidergarh Branch Command Area of Uttar Pradesh based on secondary data

3.2.1 Demography Profile: 1991 and 2001

Total population in the project area of 3 districts increased in census 2001 by 25.27% against census 1991. The higest increase if 47.03% was recorded in Block Jagdishpur (District Amethi) and lowest in Block Trivediganj of district Barabanki i.e. 18.7%.
In the 3 project blocks of district Amethi the population increased from 361904 in 1991 to 479815 in 2001 (increased by 32.58%). Similarly during the same period, in the 2 project blocks of Barabanki, population increased from 254591 to 294973 (increased by 15.86%) and in one project block of Raebareli district, population increased from 80492 to 98294 (increased by 22.12%).

The proportion of male population in project area of 3 districts has decreased slightly from 52.63% in 1991 to 51.56% in 2001 and a slight 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%. Thus, for female population, in Amethi district there is an increase in population from 47.77% to 48.92%, in Barabanki from 46.77 to 47.80%. A similar trend was seen in the Raebareli district where female population increased slightly from 47.42% to 48%.
In comparison to census 1991 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 which only 23 persons in 1991 which increased to 82 in 2001.

3.2.2 Decadal Growth in Population

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% (Table3).

3.2.3 Population Density

The density of population in project area of three districts had been very low as compared to the state's population density. Against 548 persons per sq km at State level in 1991 the density was 528 in the project area; 574 persons per sq km in 3 project blocks of Amethi, 525 persons per sq km in 2 project blocks of Barabanki followed by 405 persons per sq km in one project block of Raebareli district.
The number of persons per sq km increased in the project area of 3 districts in 2001 but still remained behind the State's 689 persons per sq km. In the project area of 3 districts was 682. In 3 project blocks of Amethi was significantly higher i.e. 772 persons per sq

km, in 2 project blocks of Barabanki district it was 620 persons per sq km followed by 531 persons per sq km in one project block of Raebareli district.
As per the provisional figure of census 2011, population density of the project area of three districts remained far behind the State's average of 828 persons per sq.km. (Barabanki 740 persons per sq km and Raebareli 739 persons per sq km).

3.2.4 Sex Ratio: Number of Females per 1000 Male

As compared to the sex ratio at the State level in 1991 (876) and 2001 (898), the number of females per thousand males in both census period remained considerably high in the of the three districts i.e900 in 1991 and 939 in 2001 while in project area of district Amethi it was 915, in Barabanki 878 and in Raebareli 902 in 1991 and in 2001 Amethi had sex ratio of 958, Barabanki 916 and Raebareli 923. (Table-4)
The highest improvement was seen in Shukul Bazar block (904 to 963) and lowest in Singhpur (937 to 951) in block of Amethi district from 1991 to 2001. (Table4).

3.2.5 Sex – wise Literacy Rates and Gender Gap in Literacy

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 project area of Amethi from 28.34% to 43.57%, in Barabanki from 30.69% to 46.83% and in the project area and Raebareli from 35.61% in 1991 to 53.68% in 2001. (table-5).

The Gender Gap in literacy reduced significantly in all the three districts of the area in the gap of the project area of 3 districts was 31.31 in 1991 and 28.16 in 2001; in the 3 project blocks of Amethi the gap reduced to 28.77 in 2001 from 30.15% in 1991 in 2 project blocks of Barabanki the gap reduced to 26.64 from 32.27 in 1991 and in one project block of Raebareli to 29.40 in 2001 from 32.87 in 1991. This shows that there is a significant improvement in the status of females in the area due to encouragement for literacy among females. (Table-5).

3.2.6 Educational Institutions

Table-6 shows a trend analysis of different levels of education al infrastructure in the three districts of the project area. 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, In the 3 project blocks of Amethi the number decreased from 73 in 2000-01 to 65.5 in 2008-09 while in project area in 2008-09 from the base year 2000-01 by 7.57% . District Barabanki the number increased from 79 to 86.1 and in Raebareli from 94.4 in 2000-01 to 110.9 in 2008-09.system present in the three districts of the command area.

The number of senior Primary schools per lac population also showed more or less a similar trend during the same period of 2000 – 01 to 2008 - 09. The number of schools in the project area of 3 districts was 15.5 in 2000-01 which increased to 27.4 in 2008-09, In the project area of Amethi their number increased from 14.7 in 2000-01 to 23.7 in 2008-

09, in project blocks of Barabanki from 15 to 27.5 and in the project area of district Raebareli there was an increase from 18.6 in 2000-01 to 38.7 in 2008-09.
The number of higher secondary schools per lac population increased in all the three districts from the year 2000 – 01 to 2008 – 09. It increased from 3.6 in 2000-01 to 5 in 2008-09 in the project area of the 3 districts, in Amethi from 3.8 to 4.6, in Barabanki, Raebareli their number increased from 3.7 in 2000-01 to 4.1 in 2008-09. (Table-6).

3.2.7 Safe Source of Drinking Water

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. (Table-7)

3.2.8 Road Density

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. In Amethi was 560.2 km in 2000 – 01 which steadily increased to 971 km in 2008 – 09, in Barabanki the length increased from 510.7 km in 2000-01 to 964 km. in 2008-09. During the same period, in Raebareli the road length to increased from 533.2 km in 2000-01 to 966.7 km in 2008-09. The highest increase in length of mettled road was found in Block Haidergarh (Barabankin / and the lowest was in Block Shukul Bazar (Amethi) during the same period. (Table-8).

3.2.9 Proportion of Electrified villages

The proportion of electrified villages in project area of 3 districts was 99.3% and 100.0% inAmethi project area electrified village were 98.6% in 2000-01 and 100.0% in 2008-09. In project area of district Barabanki, 59% villages were be electrified in 2000 – 01 which increased to 100% in 2008 – 09. In project area of Raebareli, 100% villages were covered. (Table-9).

3.2.10 Number of Commercial Banks

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, 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. In the project area of district Amethi the number of branches of nationalized banks increased from 13 in 2000-01 to 16 in 2009-10, in Barabanki project area their number increased from one to three and in the project area of Raebareli only one Branch continued to function.

The number of Rural banks were 11 in 2000-01 in the project area of Amethi which declined to 10 in 2009-10, in Barabanki project area their number declined from 9-8 during the same period while in the project area of Raebareli 3 Rural Banks continued fro 2000-01 to 2009-10.

There was no nationalized non-commercial Bank in project area of Amethi and Raebareli in 2000-01. In 2009-10 their number was 6 and one respectively 2009-10. In project area of Barabanki one branch continues to function from 2000-01 to 2009-10. (Table-10).

3.2.11 Post offices, P.C.O. and Telephone Connections

The project area of the 3 districts had in 2000-01 135 Post offices, 3 Telegraph offices, 338 PCOs and 2023 Telephone connection.s in 2009-10 the number of PCOs increased to 686 and Telephone connections increased to 3886 while number of Post offices remained same and Telegraph offices were closed in 2009-10. In the 3 blocks of Amethi project area the post offices 67 to 68, PCOs from 245 to 522 and Telephone connections from 1668 to 2666. In Project area of Barabanki district the number of post offices declined from 48 in 2000-01 to 47 in 2009-10. PCOs increased from 58 to 150 and Telephone connections from 195 to 1000, in the project area of Raebareli number of Post offices remained 20, PCOs declined from 35 to 14 and Telephone connections increased from 160 in 2000-01 to 220 in 2009-10.

3.2.12 Health Facilities

Indicators for health facilities in districts include:

- Number of Allopathic Hospitals and Primary Health Centres per lac population
- Number of beds available in Allopathic hospitals and PHCs per lac population

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.

In the project area of Amethi the number of Allopathic hospitals and PHCs per lac population was 4.1 in 2000-01 which declined to 3.8 in 2008-09. In Barabanki was 3.5 in 2000-01 which declined to 3.1 in 2008-09 and In Raebareli district number of hospitals and PHCs per lac population increased from 5 in 2000-01 to 5.1 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.

In project area of Amethi the number of beds per lac population was 21.3 in 2000-01 which seriously declined to 15.6 in 2008-09, in Barabanki their number was 22.5 in 2000-01 which declined to 21.1 in 2008-09 and in district Rae bareli the number of beds in hospitals per lac population significantly increased from 22.4 in 2000-01 to 38.7 in 2008-09. (Table-12).

3.2.13 Workers in Different Activities

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 project area of Amethi total workers increased by 30.3% in 2001 over 1991, in Barabanki the workforce increased by 26.30% and in project area of Raebareli the increase was by 29.6% in 2001 and 1991.

The number of farmers in the project area of Amethi decline by 28.02% in 2001 over 1991, in Barabanki declined by 27.2% and in Raebareli the increase was Marginal, i.e. by 0.04% in 2001 over 1991.

A similar trend was observed in all the 3 districts of the area in terms of agricultural laborers. In Amethi project area agricultural labour decreased by 28.9%, in Barabanki by 25.9% and their number increased in Raebareli by 0.14%.

The number of persons depending on agriculture, either as farmer or agriculture labour was decling may be due to poor return from their occupation. (Table-13).

3.2.14 Families Below Poverty Line

The proportion of BPL families in Amethi project area in 1998 was 79.9% which declined to 66.1% in 2001, in Barabanki 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. (Table-14).

3.2.15 Land Usage

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 districts Amethi project area the net irrigated area had declined by 1.1% in 2008-09 over the area irrigated in 2000-01, 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 increase by 8.9% and project area of Rae bareli district the gross irrigated area increased by 4.1% in 2008-09 over the area in 2000-01. (Table-15)

3.2.16 Cropping Intensity

The cropping intensity in the project area of 3 district area of 3 districts in 2000-01 was 153.5 which 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. (Table-16).

3.2.17 Crop Coverage Area under Pulses and Oilseeds

The crop coverage area under total pulses in the project area of 3 districts was 11379 Ha in 2000-01 which seriously 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 (Table-17).

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, In Raebareli the area declined from 343 to 279 Ha in 2008-09. Table-17.

3.2.18 Productivity of Pulses and Oilseeds

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 (Table-18).

3.1.19 Operational Landholdings

The operational landholding in 3 project districts in 1995-96 were 156911 with an area of 97632 Ha which declined to 145886 holdings with an area of 94782 Ha in 2000-01. The number of holdings of less then 0.50 Ha were in 1995-96 were 94046 with an area of 23049 Ha and 2000-01 there number was 89364 and area of 27126 Ha.

The operational landholding of project area of Amethi was 81238 in 1995-96 and in 2000-01 76519 with their area of 45150 Ha and 46831 respectively. In Barabanki total landholding in 1995-96 were 57967 (Area 40792 Ha) and in 2000-01 were 53577 (Area 35964 Ha) and in Raebareli total landholdings were 17706 in 1995-96 (area 11690 Ha) and in 2000-01 were 15790 (area 11987 Ha). (Table-19).

3.2.20 Irrigation Intensity

Table 20 shows the irrigation intensity in the three project districts was 145.3 in 2000-01 which increased to 173.8 in 2008-09. The irrigation intensity in project area of Amethi has increased from 133.6% in 2000 – 01 to 158.9 % in 2008 – 09, in Barabanki from to 160.4 % in 2000 – 01 to 188.7 % in 2008 – 09 and in project area of district Raebareli, the irrigation intensity was 150.1% in 2000 – 01 and increased to 175.5 Ha in 2008 – 09. (Table-20)

3.2.21 Irrigation Potential

The length of canal in project area of 3 districts in 2000-01 was 483 Km. which increased to 837 Km in 2008-09.

The length of Canal in project area of districts Amethi was 197 Km. in 2000-01 which increased to 375 Km. in 2008-09, in Barabanki in 2000-01 was 145 Km. and in 2008-09 321 Km. and in Raebareli the length of Canal remained constant i.e. 141 Km.

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 number was 12 and 49 respectively, in Barabanki there was no public tubewell in 2000-01 and in 2008-09 were only two, in Raebareli their number declined from 3 in 2000-01 to 2 in 2008-09.

Private Tubewells / pumpsets in the 3 districts in 2000-01 were 12692 and in 2008-09 were 29240.

In project area of district Amethi their number increased from 5113 to 14842, in Barabanki their number of 4963 increased to 10278 and in Raebareli in 2000-01 were 2616 which increased to 4120 in 2008-09. (Table021)

3.2.22 Source wise Irrigation

In the project area of 3 districts in 2000-01 was 49590 Ha declined to 44934 Ha in 2008-09.

The proportion of Canal irrigated land has significantly declined over the years. The total irrigated land through canal in project area of district Amethi was 11,417 Ha (which was only in Singhpur block) in 2000 – 01 which increased to 16574 Ha in 2008 – 09. In district Barabanki Canal irrigated area was 29711 Ha in 2000-01 which declined to 18970 Ha and in Raebareli area increased from 8462 Ha in 2000-01 to 9390 Ha in 2008-*09.

Area irrigated through public and private tubewells/ pumpsets in project area of 3 districts was 8303 Ha in 2000-01 which increased to 23707 Ha in 2008-09.

The area irrigated through this source in Amethi in 2000-01 was 3982 Ha which increased to 13242 Ha in 2008-09, in Barabanki it increased from 1467 Ha to 9742 Ha

and Raebareli the area irrigated through this source declined from 2854 Ha in 2000-01 to 723 Ha in 2008-09. (Table-22).

3.2.23 Per Capita Annual Food Grain Availability

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%). (Table-23).

3.2.24 Proportion of Agricultural Laborer

The proportion of agricultural labour in project area of 3 districts was 21.8% in 1991 which declined to 12.8% in 2001.

The proportion of agricultural laborer among total workers in 1991 was 24.2% in Amethi project area which declined to 13.1% in 2001, in Barabanki it declined from 20% in 1991 to 12.3% in 2001 and in Raebareli district, a similar declining trend was observed from 16% in 1991 to 12.1% in 2001.
This declining trend indicates that agricultural laborers are shifting towards other sectors as job availability in agriculture sector is shrinking continuously.(Table-24)

3.2.25 Consumption of fertilizer

The consumption of fertilizer per hectare in project area of 3 districts had increased from 118.67 Kg/ha in 2000 – 01 to 180.57 Kg/Ha in 2008 –09.
In project area of Amethi district, the consumption of fertilizers was 98.17 Kg per Hectare in 2000 – 01 which increased to 154.54 Kg per hectare in 2008 – 09, in Barabanki the consumption of fertilizers increased from 165.92 Kg/Ha 206.52 Kg per hectare in 2008–09. Similarly in Raebareli district, the consumption of fertilizers increased from 85.69 Kg per hectare in 2000–01 to 206.75 Kg per hectare in 2008–09. (Table-25)

3.2.26 Facilities for Livestock

For the treatment of diseases of livestock a number of veterinary hospitals and animal development centres existed in the project districts, which included 15 Veternary hospitals, 39 Animal development Centres, 42 AI Centres/ subcentres in 2000-01. In 2008-09 number of Veternary hospitals declined to 14, number of Animal development reduced to only one and number of AI centres / Sub Centres increased to 76 in 2008-09. In project area of Amethi there were 7 Veternary hospitals, 13 Animal development Centres and 17 AI Centres/Sub-Centres, in 2000-01. Their number in 2008-09 was 7, nil and 20 in respectively. In barabanki there were 7 Veterniary hospitals, 22 Animal development Centres and 21 AI Centres and in 2000-01 and in 2008-09 their number was 6, nil and 51 respectively. In Raebareli project area were 1 Veterinary hospital, 4 Animal

Development Centres and 4 AI Centres in 2000-01 and in 2008-09 the number of Veterinary hospital remained 1, Animal Development Centres 1 and 5 AI Centres/Sub-centres.

A tremendous decline was seen in the Animal Development Centre in all the three districts. The numbers reduced to null in Amethi and Barabanki districts and in Raebareli it came down to one centre in the year 2008 – 09. (Table-26).

3.2.27 Livestock Population

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 all these animals declined the number of pultry also declined from 34181 in 1997 to 28060 in 2003. (Table-27).

3.2.28 Reservoir Fish Production

There was no departmental reservoir in the project area of 3 districts in 2001-02 and 2009-10. There were 92 private reservoir in 2009-10 with an area of 43 Ha and production of 534 Qtl.

There were 5 departmental reservoirs in Raebareli district with an area of 53.25 ha in 2001 – 02 which increased to 27 in 2009 – 10 with an area of 63.95 ha. Also, 3 departmental reservoirs were observed in Amethi and Barabanki district in the year 2009 – 10 producing 39 Qtl fish.
As far as private reservoirs are concerned, there were no private reservoirs in the year 2001 – 02 but in 2009 – 10 there were 16 private reservoirs (10 ha) observed in Amethi and Barabanki producing 335 Qtl fish and 378 private reservoirs (281 ha) in Raebareli district producing 6176 Qtl fish.
In project area of Amethi there were 81 private reservoirs with an area of 37 ha producing 357 Qtl fish in 2009-10. 4 private reservoirs were reported in 2009-10 with an area of 2 Ha producing 85 Qtl fish. and in project area of Raebareli, there were but 7 private reservoirs with an area of 4 Ha producing 92 Qtl fish in the 2008-09.(Table-28).

3.3 Socio-Economic Status of Lower Ganga Canal Command Area Based on Focused Group Discussion

Focused group discussions with different stakeholders was carried out between 03rd September 2012 and 13th September, 2012 in all districts of Lower Ganga Canal System. District wise details of focused group discussion are given in **Table 3.1.** Significant Findings of focused group discussion are given below.

Table 3.1: District wise dates of Focused Group Discussion

Sl. No.	Date of FGD	District	Venue
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

3.3.1 Findings of Focussed Group Discussion in District Kasganj

Irrigation: The present canal system dates back to 1885. The discharge in the canal system is higher than the designed capacity and hence requires remodelling. Increased discharge and lack of wings in the canal has caused seepage, soil erosion and breaching of the canals. Gates in minor canals are lacking.

There is an urgent need for lining of minors, desilting of drains and installation of silt traps. Drainage system need to be improved and developed. Maintenance requires budgetary support which is not adequate and regular at this moment.

The issue of cutting of canals is very rampant in the district and any initiatives by the Irrigation Department to regulate it turns out to be futile. '*Seejpaals'* who are the field level personnel of the department are often manhandled/threatened by the farmers in case they try to object canal cutting or report the matter for disciplinary action. There are reported instances of pilferage of transformers and oil as well.

Paddy is the predominant crop. Crops require 5-6 waterings these days and hence the demand has increased as compared to the available infrastructure. Only two times watering is possible in tail end farms. Tube wells have been installed by the farmers to supplement irrigation needs, especially where canal network is absent or where canal is not able to provide enough water for irrigation (tail end farms).

The de-silting works in the mains and distributaries are carried out by the department whereas those in the minor and feeder channels are done under MGNREGA.

Barren land has decreased owing to development of irrigation facilities in the command area. However, area adjacent to Ganga are inaccessible and needs treatment like clearing of shrubs and electrification and restricts public movement.

Paddy and wheat are the major crops grown in the district requiring high consumption of water. However due to canal cutting and diversion of water at different points along the canal, the amount of water available for irrigation at the tail end of the canal is very little and only two watering are possible. Installation of tube wells have resulted in dropping of ground water table.

Health: Water and vector borne diseases in areas prone to water logging have been reported. Sanitation related works are handled by the Gram Sabhas in the villages. The health related problems have been incorporated in NRHM. Increased availability of water and water logging may increase threat of water and vector borne diseases. However, application of larvicidal for elimination of mosquito breeding would alleviate the threat. Access to health services is poor in villages across Ganga River.

Agriculture: Crops are grown in Kharif, Rabi and Zaid season. Rabi and Zaid season needs more watering.

Timely availability of water is essential which is not happening currently thus affecting productivity and overall income for farmers. Drainage system is improper. The worst affected are small and marginal farmers. Rabi crops can be sown in time but Kharif crops are affected. Padiyali, Kadarganj and Soron blocks of the district are affected with sodicity (*usar*). The Diversified Agriculture Support Project (DASP) is under last phase of implementation. Therefore, there is a need for supply of gypsum for reclamation of barren land. Pulse crops can increase productivity in Kharif and Zaid season.

Horticulture: Mango, Guava, Citrus fruits and spices are grown primarily in the district. Big farmers do not venture into vegetable farming and it's only done by small and marginal farmers without the provision of adequate water for irrigation. This calls for installation of sprinkler or drip irrigation systems for effective use of water.

The old variety of sugarcane grown locally is rejected by sugarcane mills. New varieties of sugarcane needs promotion in the district. Further, the need for a Research Centre on Sugarcane for improving the quality of sugarcane was also highlighted.

The head (reach) of the canal has reportedly high ground water level and hence tube wells could be introduced for promoting conjunctive use of ground and surface water. This conjunctive use of surface and ground water could reduce demand of water for irrigation in the head reach leading to increased availability of canal water in tail reach where the demand for canal water is higher (due to lower water levels) but the flow is reduced. The Minor Irrigation Department can consider this proposal which will enable access to water to tail end farms. However, higher cost of pumping water from tube well makes it an unfavorable proposition with farmers in Head Reach who prefer canal for irrigation.

Forests and Wildlife: '*Nilgai*' and wild pigs cause extensive damage to standing crops thus resulting in losses and hence farm lands need fencing, etc. to protect their crops. Peas in particular are destroyed by wild pigs. There is a scope for afforestation along the canal.

Co-operatives: It was informed that both KRIBHCO and IFFCO have been successfully functioning in the district. However, it was suggested that the Vaidyanathan Committee recommendations of providing financial support to *'samitis'* (farmer's co-operatives) should be followed.

Suggestions: Training should be provided to farmers at the Nyaya Panchayat level for effective use of irrigation water and sensitization towards equal rights to natural resources. Training to address current method of flood irrigation by introducing improved water use efficiency technologies and farming practices is required.

- Will involve women in mobilizing the community against acts like canal cutting etc.
- The Agriculture department will consider involving the Irrigation department in its training so that a comprehensive orientation can be done for the farmers on crop and water management.
- Installation of private tube wells at the head of the canal can prevent canal cutting to a great extent and ensure adequate availability of water at the tail end.
- Water User's Associations to be formed by November and women's participation will be ensured as per the PIM, 2009 Act.

Education: No participation of officials from the department. Overall improvement in education has been attributed to schemes in education of State Government and SSA.

Overall women's co-operation is good in agriculture at the village level. They do follow mixed cropping which has been ensured by training of women involved in agriculture. A case in point is introduction of mustard with wheat solely by women. Women participate in all aspects of farming activities except for irrigation.

Drinking water supply: Kasganj lies in dark zone with respect to ground water zonation based on the ground water table. Drinking water supply is based on hand pumps and tube wells. In urban areas piped water supply is used to provide drinking water whereas in rural areas there are 26 piped water supply schemes and hand pumps (IM II) covering the entire district. This is to prevent water borne diseases. However, some habitations are not covered with water supply schemes and some hand pumps become dysfunctional every year. This indicates lack of services in potable water supply. Treated water is supplied through overhead tanks.

Revenue department: Patwari and Gram Panchayat Secretary should be a part of the training programmes conducted by Irrigation and Agriculture departments for farmers and villagers in general.

Observations: There has been no engagement with PRIs so far in the implementation of irrigation schemes despite a few orientation camps to mobilize villagers stakeholders suggested more camps and joint training sessions should be organized at the Panchayat level.

The agriculture and irrigation department officials have been of the common view that the sprinkler system is ideal to tackle the irrigation problem which will also result in effective use of water.

Interaction with community members in Nadrai village including Administrative and Revenue officials:

- There is no immediate benefit of the Lower Ganga Canal (LGC) or Parallel Lower Ganga Canal (PLGC) to the community living next to it. PLGC, a feeder canal system was constructed in 1975 to cater to irrigation needs of Kharif cropping season and is active in this season only.
- The Nadrai aqueduct (also called as *Hazara Nahar*) built on LGC over Kali river was constructed in the year 1889 and requires maintenance (proposed as an activity in UPWSRP - Phase II) and may be declared as a heritage structure.
- The natural drainage has been choked/altered. Roads have been constructed on drains under MGNREGS. Further, under Chakbandi System, earlier drains in farmlands were left as it is. However, under MGNREGS, the drains have been reclaimed by covering with earthen materials. It was opined that if 5% land can be spared, the issue of alteration in drainage system could be addressed.
- Desilting works in Distributaries and minors could be taken up under MGNREGS.

3.3.2 Findings of Focussed Group Discussion in District Etah

A presentation was made in Tehsil office on a pre-scheduled *Janpad Diwas* where District administration and line department officials were also present. During the FGD, following issues emerged:

- No sewerage facility in Etah.
- Groundwater is contaminated in many places in the district.
- Canal cutting is a grave issue affecting irrigation efficiency.
- There has been no training of farmers, villagers and PRIs members so far by the Irrigation Department on issues like water use efficiency and management of conflicts relating to water use for irrigation.

Community meeting in Kartala Gram Panchayat:

- The reason behind cutting of canals is the reduced width of the distributaries and minor canal. Growth of vegetation and deposition of earthen materials along the banks of the distributaries, minors and field channels (*gools)* lead to reduced width, thus resulting in reduced water availability. This prompts farmers to tamper with kulaba system by cutting the minor and increasing the width of gools to get water to

the farms. Because of this, tail end farmer get reduced flow of water or no water at all.

- The cleaning and desilting of the distributaries, field channels or gool does not take place regularly – only once a year because of which, the water flow reduces. Because of poor drainage and maintenance of gool, water from farm lands can't be drained properly. Maintenance of Gool does not come under in the jurisdiction of Irrigation Department.
- The discharge in canal network is higher than the original design and capacity of the canal. Nevertheless, the water demand and increased area under agriculture and cropping intensity, make the current canal network not being able to meet the demands.
- Funds available under MGNREGS should and can be used to clean and desilt the distributaries and field channels. The panchayat may take this responsibility after seeking permission from the Irrigation Department.
- Training and sensitization of especially big farmers is important to motivate them for effective water use and desist from actions like canal cutting to ensure equitable distribution of water to all.
- Overall productivity has decreased since the last 10 years. This is mainly due to the fact that water and fertilisers (Urea/DAP) are not available on time. Farmers use Urea/DAP based on their availability and not on the basis of requirement of soil. Vermi compost has been attempted but there is further need for trainings to ensure replication. The low farm income has affected children in pursuing their higher education as it requires money. School education is however taken off through schemes like Sarva Shiksha Abhiyan (SSA)and other programmes.
- Farmers especially the small and marginal ones have used organic fertilizers like compost which have had a good impact on the productivity. However this has not helped in spreading across to other farmers in a big way.
- The state of health services in the SHC is poor especially that of immunization. Patients are often referred to other health centres even in the case of immunization of children where vaccines are available at the SHC.
- There has been an increase in migration due to fall in agricultural productivity and low soil output. People migrate to nearby towns and also to Delhi in search of employment.
- Kartala village has *usar* land.
- Certain agro-industries could be promoted for value addition of agri products like packaging of spices, preparation and packaging of potato chips, etc.
- Peanut and Shivala has been introduced in the cropping pattern since 2009 by farmers based on their own initiative.

Community members mentioned of use of bricks in gool repair and maintenance. Suggestion was also made to lay PVC pipes to strengthen gool system of irrigation.

3.3.3 Findings of Focussed Group Discussion in District Firozabad

Agriculture: The production has been stagnant during the last five years due to weather related issues. Now it has started showing upward trend in recent times.

Only 5% of the total sown area is irrigated and the rest are catered to by private tubewells. This has resulted in extensive use of ground water and as such 5 blocks are in the dark zone.

There has been very little instance of water logging in the canal irrigated area and paddy is the main crop grown in and around the waterlogged areas and the canal. The waterlogging is seasonal in nature (5-6 months in a year) as long as the canal carries water to its full capacity.

There have been on farm demonstration of bio-fertilizers and SRI for paddy under the UPDASP programme which has resulted in many farmers adopting the techniques and benefitting in terms of higher yield. The farmers are now self motivated to use such innovative techniques for increasing productivity. Use of High Yielding Varieties have also resulted in increasing production. There are seed distribution centres at every Nyaya Panchayat level.

The quality of soil can be termed as ok if not good and farmers have become aware of the deteriorating soil condition in the district and have taken pro-active measures before the situation goes out of control. There are two soil testing laboratories in the district. The levels of nitrogen and potassium in the soil are as desired but the amount of phosphate is lesser than required.

The department has undertaken numerous outreach programmes in the form of *melas*, *goshtis* (open discussion involving scientists and farmers), meetings etc. at the panchayat and block level to spread awareness on agriculture related issues. All this along with supply of good quality inputs have resulted in higher productivity which has translated into higher economic and social status of the farmers. The department ensures at least 30% participation of women in all workshops and discussions as they play a vital role in agriculture. However this is not possible everytime. There has been use of modern technologies like sms and helplines for dissemination of information but *goshtis* have been the most successful medium of reaching out, informing and mobilizing the farming community.

The *Goshtis* are conducted in consultation with the Gram Panchayat. The department works closely with the Panchayat in a couple of areas. For e.g.: selection of beneficiaries.

The district is the second highest in the state in terms of potato cultivation as many farmers are increasingly adopting cultivation of potato. There is however no sugarcane farming in the district. The district also holds the 2nd highest record in the state in terms of Bajra production.

In the case of farm mechanization, the district has shown good results as farmers have been provided subsidies to purchase various agricultural implements including tractors. This has been particularly seen in the case of small and marginal farmers the majority of which grows potato.

Although modernization of the canal system and improvement in its infrastructure along with setting up of WUAs will contribute to better use of water, the risk of overuse or exploitation still persists and hence subsidies should be provided for the purchase of sprinkler and drip irrigation sets along with on-farm demonstration and trouble shooting support for popularizing the same amongst the cultivators.

Horticulture: The National Horticulture Mission is currently not being implemented in the district but is expected to begin in the next 1-2 years. The department has been successful in growing potato, garlic, chilly, citrus fruits etc. through the farmers. There has been large scale conversion of net sown area under agriculture to horticulture because of potato.

There are only two Government owned cold storages for seeds in the entire state. There are a couple of private cold storages but are not reliable and the department does not considers the seed storing process authentic in these cold storages. As regards the agricultural produce there are farmer managed cold storages mainly used for potato which are then sent all over the country.

'Nilgai' affects standing crops in a big way. Many a times they attack in large numbers which makes it difficult for the farmers to handle them and end up losing the crops.

Forest Department: The reason for 'Nilgai' attacking the agricultural fields has been on account of their increasing numbers and corresponding decrease of pasture land.

There is around 1600 ha of wasteland as per Forest department record and no wetlands in the district. This has also affected in the spotting of Siberian cranes as they no longer visit the district.

The Irrigation, Forest and Soil and Water Conservation departments can work together in tackling the problem of waterlogging.

Energy requirement is met by the villagers from the forests in the form of firewood. The most common species grown catering to firewood availability is *Prosopis juliflora*.They are grown as energy plantation. There are around 25 active Joint Forest Management Committees in the district.

Around 3% area of total agricultural land is in the form of bunds which can be utilized through agro-forestry.

Forestry results in recycling of nutrients, recharging of ground water whereas agriculture does just the opposite.

Fisheries: Pisciculture in the district is mostly rain fed. Fish production has been hit in the last 6-7 years due to erratic and insufficient average rainfall. However the condition of pisciculture can improve with the co-operation of the Irrigation department. The major varieties of fish reared are Rohu, Katla and Mrigul.

Mostly landless farmers takes up pisciculture which has helped them to improve their socio-economic status. Further the department provides them training, subsidies etc. which helps them to improve their income.

There is a new proposal by the irrigation department for the next financial year wherein all ponds are to be connected for boosting fish production.

Many a times deepening of pond or desilting results in percolation of water through the pond or more sand siltation thus affecting fish production adversely. Hence this activity needs to be done in scientific manner.

The water in the waterlogged areas is rich in nutrients and highly suitable for pisciculture. However there have not been any attempt under any programme to channelize that water to a nearby pond which would have solved the waterlogging and connected issues and also would have enabled efficient use of water. This can be taken up under MGNREGS.

The banks do not provide adequate loans for pisciculture as the applicants are mostly landless or small farmers who do not have much assets.

Drinking water: Piped water supply system covers most parts of the district. Excess fluoride in groundwater have been found in some blocks closer to Etah district.

Health: Vector borne mostly water borne diseases are prevalent in the rural areas. There is no centralized plant for water treatment in the district. A new sewage treatment plant has been commissioned under UDISSMT and is likely to be ready in the next 1-2 years. This plant will cover almost 80% of the population.

Irrigation dept: The Gram Panchayats can use MGNREGS funds to clean *gules (a local term for conduits connecting the distributaries to the field)* and minors.

Animal Husbandry and Veterinary Dept: The most prevalent breeds of buffalo is 'murrah' and that of cow is 'jersey'. The Artificial Insemination (AI) programme has been helpful in improving the breed.

The milk production has increased almost 10% - 15% in the last 5 yrs. Landless and marginal farmers depend on cattle for their survival. There is enough availability of fodder in the district.
Despite high production of milk in the district, its marketing has been an issue. The Paras Co-operative Dairy Federation (PCDF) has been closed which has adversely affected milk marketing.

There has been lack of Veterinary. Personnel in some parts of the district due to connectivity issue.

A helpline service at the state level in the name *Jan Suchna Kendra* has been set up. The complaints lodged by villagers are sent via SMS to the veterinary Services at the district level and subsequent actions are taken by informing the personnel at the field level.
There is plenty of water and fodder availability in the district because of the canal system.

Other observations:

- Connecting fisheries with irrigation department is of paramount importance.
- Intensification and diversification – both are the focus of all concerned line departments especially agriculture and allied.
- Over exploitation of water and excessive use of chemical fertilizer, are the major issues in the district.
- Massive plantations along canal bunds should be carried out..

3.3.4 Findings of Focussed Group Discussion in District Fatehpur

The meeting held on 07.09.2012 was attended by 19 senior officials of deferent departments including C.D.O., Irrigation, Drainage, Veterinary, Labour, Horticulture, Ground Water, Forest, Fisheries, Agriculture and JaL Nigam. The discussion yielded the following information about the conditions in the District:

Agriculture:

Net sown area	2.30 Lakh hectare
Area sown in Kharif	1.37 Lakh hectare.
Area sown in Rabi	2.30 Lakh hectare.
Area sown in Zaid	0.15 Lakh hectare.

- Main crops in Rabi are Wheat, Gram and Mustard and the Kharif paddy, Jwar and Arhar.
- Productivity of wheat was 33 Qtl./Ha.and that of Rice 24 Qtl./ Ha.(Paddy 36 Qtl./ Ha.)
- Crop Diversification: Banana and chillies are now popular and tissue cultured Banana are available to farmers. There was a demand for establishing Tissue culture Lab in the district.
- In case canal water is supplied adequately and timely there was possibility to increase sown area of paddy by about 10,000 Ha.
- In case of timely availability of canal water, productivity of wheat and paddy may increase by 3 to 4 Qtl./Ha.
- HYV seeds were available to farmers and about 25% of seeds used were hybrid. The procurement centres does not purchase hybrid paddy.
- Horticulture: Area under fruit trees including Mango, Lemon, Guvava and Aonla is 9837 Ha. Area under them is increasing by 40-50 Ha. per year while under Banana is about 50 Ha.
- Area under spices such as Chillies, Coriander and Turmeric is 1550 ha.
- Horticultural produce is normally purchased by middleman and sold by them in mandi where they earn huge margin of profit.

- National horticulture mission is not working in the district.
- Irrigation: Canal length is 1409.19 Km.
- 417 Government Tubewell are in working condition against 667. Thus 250 Tubewell were non functional, either failed or due to depleting water level giving sand or became defunct. Average ground water table is about 40 Mtr. Though in some areas it is between 22 and 27 meters.

  Net irrigated to net sown area 65%

  Through Private Tubewells 72%

  Through canal 22%

  Through Govt. Tubewells 03%

- About one- third of the sown area is rainfed.
- Canal work on roster basis but timely water is sometime not available to farmers.
- Canal water does not reach Tail end in Block Khaga.
- Desilting of canal is done once a year.
- Cases of canal cutting and Blocking are large, particularly during Kharif, but have not been reported.
- Canal operating efficiency in Rabi was reportedly 35% and in Kharif 30%.
- Outlet were mostly tampered.
- WUAs were not formed in the district.
- About 70% of water charges were collected.
- Availability of Agricultural labour: Agricultural labour is available but their wages have increased significantly due to their employment under MNREGA.
- Health: Common water borne diseases in the district were: Diarrhoea, cholera, Viral fever, gastro- enteritis. While vector borne disease include Filarial, Fluorosis (in Bhitora Block).
- Source of drinking water is India Mark-II handpumps and tubewells.
- There is no drainage system and water logging is common problem.
- There were: 6 CHC, 11 PHC, 2 Hospital, 72 sub-centres and 42 dispensaries in the district. All sub centres work as family welfare centres. This facility is also available at CHCs and PHCs.
- Animal husbandry: the district has 35 Veterinary Hospitals and 52 AI centres.
- Average daily production of milk in the district is 57.36 Qtl. and there are 14 small milk chilling centres but the sale of milk is mostly local and cheap.
- Only about 20% of the required green fodder is available.
- As per BPL survey 2002, 38.21% of rural families were living below poverty line.

3.3.5 Findings of Focussed Group Discussions in District Kaushambi

The meeting held on 08-09-2012 was attended by seven senior officials of different departments including Animal husbandary, Horticulture, Irrigation, Ground Water, Health, Forest and Agriculture. The discussion yielded the following information about the conditions in the district:

- **Agriculture:** Net sown Area : 1.34 Lakh ha
  Area sown in Kharif : 0.91 Lakh ha
  Area sown in Rabi : 1.34 Lakh ha

- Main crops in Rabi are wheat, gram and in Kharif Paddy, Jwar and Arhar.
- Productivity of wheat was 28 Qtl/Ha, Gram 15 Qtl/Ha and that of Rice 22 Qtl/Ha.
- Area under wheat was about 91000 Ha, under Paddy about 57000 Ha and under Gram about 13000 Ha.
- If canal water is supplied timely and adequately there is a possibility of an increase in sown area of Paddy by about 25000 Ha.
- The productivity of wheat and Paddy may increase by about 3 to 4 Qtl/Ha if canal water is available timely.

- Horticulture: Area under Banana : 1922 Ha
  Area under Guvava : 800 Ha

  Area under Lemon : 200 Ha

  Area under Spices : 17470 Ha

  (mainly chillies and garlic particularly in Block Newada and Kaushambi)

- Due to poor rains and depleting ground water table (going down by 20 to 25 centimetres per year) many tubewells become ineffective. Many farmers engaged in horticulture are adopting drip irrigation and Sprinkler system for which marginal farmers are getting 60% while others were getting 50% subsidy from the government.
- Under Drip irrigation and Sprinkler system it was claimed that water is saved by about 50%, growth of plants is better and produce of fruits is also better.
- Mostly educated farmers were ignoring traditional crops and shifting to orchards/ horticulture as they require less labour (due to MNREGA farmers were not getting labour during crop season.)
- The horticultural crops are more profitable. The production of Banana is approximately 60,000 Kg per Ha and they get price between Rs. 7/- and Rs. 15/- per kg (Average Rs. 10/- per kg) while the production of Guvava is about 12000 kg per ha for which they receive an average price @ Rs. 8/- per kg.

- Irrigation: Canal Length *(Kishanpur Pump Canal)* : 264.88 Km
  Government Tubewell : 268

  Private Tubewells *(including Pumpsets)* : 18126

- Net irrigated to net sown area : 70%
- Area irrigated through:
  Canal : 20.1%

Public Tubewells	:	3.7 %
Private Tubewells	:	76.2%

- Since Kishanpur is a pump canal timely and adequate supply of water depend on power supply.
- Out of 35 Tail minors, water in 9 minors was not reaching.
- Shortage of power is a serious problem due to which out of 420 cusec only about 200 cusec water is generally available in canal. Out of 7 pumps only 3 to 5 pumps work for about 8 hours per day.
- Fatehpur canal which also serve some part of the district has 25 minors and in 19 of them water was not reaching at tail end.
- Desilting of canal is done before Rabi and Kharif (November and June)
- Cases of canal cutting/Blocking are common. Tawan (Fine) was charged from two groups of farmers and 6 cases under canal Act were filed for Blocking in the last one year.
- Canal operating efficiency was approximately 50%.
- There was no problem of seepage in canal.
- Condition of outlets was reported as satisfactory.
- Roaster system was in practice
- WUAs have not been formed
- Irrigation department is able to collect 100% charges.
- There is no problem of water logging and floods in the district.
- Health: Diarrhoea, Viral fever and gastro-entritis are common water borne diseases and Filaria and Malaria are vector borne diseases in the district.
- For drinking water local as well as India mark-II handpumps, Tubewells and wells are used..
- No proper drainage system exist in rural areas.
- Forest cover was nominal in the district i.e. about 700 Ha.
- Animal Husbandry: There were 15 veterinary hospitals and 24 Artificial Inseminates (AI Centers (Only 6 working while remaining without staff)
- About 1.10 lakh Milch Cattle in the district produce an average of about 4 liter per day/ cattle.
- Out of an average production of 4.40 lakh litre milk per day, procurement by milk plants was about 2.56 lakh and the rest was sold locally.
- Only about 10% of cattle are of cross breed thus more quality breed is required to improve milk production.
- There are 3 chilling plants in the district.
- Fodder seed distribution program has been taken up by Government
- Galghotu, mouth and foot disease, wooden tong and lumpy jaw diseases are commonly found among livestock.
- Awareness about conjunctive use of water among farmers is lacking.
- Only Block Sarsawa and Kara have relatively shallow water table (being canal command area) rest of the areas have deep water table, going down by 20 to 25 centimeters per year.

3.3.6 Findings of Focussed Group discussion in district-Kanpur Nagar

The meeting held on 10-09-2012 was attended by 9 Senior officials of different departments including Agriculture, Irrigation, Forest, Fishereis, Jal Nigam, Tubewell, Horticulture and Ground water. The discussion yielded the following information about condition in the district:

- Agriculture: Net Sown Area : 1.99 Lakh Ha
  Net Sown Area in Kharif : 1.70 Lakh Ha
  Net Sown Area in Rabi : 1.76 Lakh Ha
  Net Sown Area in Zaid : 0.30 Lakh Ha
- Productivity of Wheat : 34.80 Qtl./Ha
  Rice : 27.08 Qtl./Ha

- No significant diversification of crops is reported.
- In case canal water is supplied adequately and timely, there is a a possibility of an increase of 10% in sown area and 5% in productivity of crops.
- Horticulture: Area under fruit trees such as Mango and Guvava is about 800 Ha.
- Guvava saplings for 20 Ha area have been distributed by the department last year.
- Area under spices including chillies and garlic is about 160 Ha.
- There is no problem in marketing of the horticulture produce.
- There is one Fruit processing unit in the district which process the produce and also impart training in processing.
- Irrigation: Canal Length : 1000.19 Km.
  CCA Kharif : 143498 Ha
  CCA Rabi : 143498 Ha
  PPA Kharif : 59552 Ha(41.5%)
  PPA Rabi : 51660 Ha (36.0%)
  Govt. Tubewells : 334 (50 Acre Command Area per TW)
  Private Tubewells : 44470
  (including Pumpsets)

- Canal water available as per roaster.
- Incidence of Canal cutting/blocking were reportedly 50 in a year. For which Tawan (penalty) is recovered in some cases while in other, cases are filed through Deputy Revenue Officer.
- Desilting of Canal is done once in a year, before Rabi.
- About 50% of outlets were reportedly damaged.
- Canal irrigation charges were Rs. 287/- per Ha. In Rabi and Kharif both.

- WUAs have not been formed in the district, list of farmers was being prepared for voters list.
- 100% irrigation charges are collected through Tehsil Staff.
- Health: Source of drinking water in rural areas is mostly India Mark-II handpumps and in towns and city is piped water.
- Sanitary conditions in villages are not satisfactory as people generally throw garbage in pits near their home and drains are either damaged or remain unclean and choked.
- Testing of drinking water quality is done at the time of boring for handpumps.
- Average ground water level in the district is about 20 mtr. Tehsil Bilhaur has 9 mtr while Tehsil Kanpur has 25 mtr deep water table.
- Forest: The district has a total of 5378.255 Ha forest area i.e. about 1.5% of total area of the district. It include 300 Ha reserved forest and 3000 Ha along Ganges in Bilhaur Tahsil.
- There were 941 ponds covering 633 Ha area.
- The production of fish was about 7651 Qtl/year and average productivity was 35 Qtl/Ha.
- About half of the rural household in the district (49.08%) were living below poverty line, as per BPL Census 2002.

3.3.7 Findings of Focussed Group discussion in Kannauj district

Agriculture: The southern part of the district is well catered by the irrigation system whereas there is no such system in the northern part. This results in the major part of the district using tube wells / bore wells for irrigation.

There used to be a substantial cultivation of sunflower in the district which got ultimately erased due to lack of irrigation and marketing facilities. It was replaced by maize which is equally water demanding and requires 8-9 waterings. However, with improved irrigation and power supply, farmers in certain parts of the district have started growing sunflower. However, the marketing infrastructure still need to be improved.

There is considerably poor awareness amongst farmers regarding the varying quantity of irrigation for varying crops. The agriculture department has conducted a lot of *goshtis* at the Panchayat level to educate farmers on crop specific watering and management of water and there has been some amount of awareness although a lot more need to happen.

The soil quality has deteriorated and there is no nitrogen fixation. Excessive use of chemical fertilizers and poor subsidy for organic manure has only helped in the rampant use of the former for increasing production thus leading to poor soil quality. However, off late some farmers have started using nitrogen fixing crops as part of crop rotation and is carrying on with the practice out of their own interest.

The agriculture extension work mostly involves demonstration of improved varieties at the farmer's level.

There is almost no use of indigenous varieties of crops and farmers big and small have taken extensively to growing hybrid varieties.

Jal Nigam (water supply): The groundwater table in the canal fed areas are quite satisfactory whereas in the remaining parts of the district, its quite at an alarming level due to excessive overdrawing for irrigation. The Kannauj and Jalalabad blocks are in the dark zone where the water table is alarmingly low.

There is a water quality testing lab in the district operational since 2003-04. However Gram Panchayats have also been provided with water testing kits and have been trained to use them to test the quality of water from time to time. Till date no GPs have reported a single sample of water to the department.

There are around 13392 sources of India Mark II hand pumps and tubewells across the district. Most parts of the district are catered to by the piped water supply scheme through deep tubewells.

The department had implemented a few water conservations schemes like construction of soak pits etc. but was not able to continue the same due to paucity of funds. Also the terrain across the district is plain which does not provide much scope of water harvesting / water conservation works like stop dams etc. except farm ponds, irrigation channels etc.

Convergence with MGNREGA is not possible for undertaking water conservation works as under the scheme the material labour ratio is 60:40 whereas the norms of the department is 80:20.

Irrigation: Uncontrolled distribution of water is the major problem in the district despite of its enough availability at present. Issues like rampant breach of canal by farmers, installing illegal conduits etc. results in the water not reaching the tail end. Even if the water reaches, it starts flowing in the reverse direction. Increasing tail end as suggested by farmers is not possible.
Almost 80% of irrigation across the district is through tubewells / bore wells. There is a lot of wastage of water.
Reclamation of land has resulted in increase of net sown area which implies more demand for irrigation against the existing infrastructure. Every year there is an increase of 10% of reclaimed land and such land cannot be left idle which means irrigation has to be ensured round the year. Also an average of 3-4 crops a year is taken across the district which leads to more demand. All this implies expansion of the existing infrastructure / new systems to cater to the increasing demand.

The Irrigation division in the district has been formed only 11 months back and the officials are in the process of organizing the system. There have been orientation about the existing condition and the department is also not adequately staffed.

There is hardly instances of water logging along the canal side as is the case in other districts.

Fisheries: Tank irrigation is possible in some areas wherein the irrigation channel can help fill farm ponds to promote fisheries. Common problems affecting pisciculture are – siltation and reduction of water holding area.

The department caters to the poor by arranging land for them on lease, facilitating bank loans etc. However, poor response of banks towards providing loans and water availability for just 5-6 months has affected pisciculture across the district. Immediate attention is required not only by the fisheries department but by other departments as well to promote fisheries as a viable occupation for the landless and the poor and hence guarantee a source of livelihood.

Horticulture: Drip irrigation can be very useful for potato cultivation keeping in mind the substantial production in the district. The system can save water up to 80%. Sprinkler sets have been distributed and there have been success. However the ample water available for irrigation through tubewells / bore wells and canals do not allow farmers to consider alternative water saving and energy efficient systems of irrigation. Further there has not been enough subsidies for drip and sprinkler irrigation systems which is another reason why farmers do not get inclined towards using it.

Animal Husbandry: Cattle rearing has been in good shape and the supporting factor has been marketing of milk through co-operatives – Govt. as well as private in the district. However there is no milk processing unit in the district and setting up of one would help in increasing the income of the cattle rearing family. Milk production has not increased substantially due to lack of adequate fodder. The district has to import fodder from other districts. Subsidies for fodder seeds to families having cattle should be provided. A total of 2000 ha of land is under fodder and grassland in the district. Trainings have been organized by the Department for the families rearing cattle on various ways of protection and prevention from diseases. Poor recovery of loans discourages banks from providing further loans to poor families for purchasing hybrid varieties.

Common observations: Overall productivity is constant but production has increased.

As an effect of MGNREGS, agricultural labour has drifted from agricultural work to non-agricultural work which has also affected agricultural production. To counter this extensive mechanization of agriculture has happened.

The canal is run as per roster. Hence if water is provided for 15days to the farmers and then the remaining 15days for filling up of the ponds then water use efficiency and a proper management regime can be followed. However this does not happen as farmers stake their claim over the water which is meant to fill up the pond and hence adequate water supply to irrigate the ponds cannot take place.

There is a need to regulate number of ponds which can be catered to by the irrigation canals. In the case of excessive number of ponds, justice cannot be done to all of them especially in peak irrigation demand season.

The damage to standing crops by *Nilgai* is very common in the district. They causes heavy damage to the crops. Since they are regarded as a cow by the local population therefore they cannot be killed or culled and hence the menace caused by them becomes uncontrollable.

In UP land registration never used to be in the name of woman although they use to do the maximum work on the field. The situation has changed and registration in the name of woman has become concessional. In all programmes, at least 30% participation of women is ensured.

All departments like agriculture, horticulture etc. coordinate and collaborate with the Panchayat level officials and office bearers in implementing its programme.

There have however been no exclusive training for the *krishi* (agriculture) *samiti* (committee) of the Gram Panchayat on issues relate to agriculture ana irrigation so far. They are involved / invited in training programmes / workshops / discussions organize by the departments for the farmers.

Twice a year *Goshtis* are organized at the Nyaya Panchayat level wherein all line departments participate and popularize / disseminate information about various issues related to agriculture, horticulture, animal husbandry, fisheries etc.

Agriculture and allied departments do not have adequate personnel to regularly implement and monitor their programmes at the ground level – block and GP level. Adding to this, too many schemes and programmes of the Central and State Government causes confusion and additional pressure at the implementation level thus affecting quality.

3.3.8 Findings of Focussed Group discussion in district Kanpur Dehat

The meeting held on 11-09-2012 was attended by 14 Senior officials of different departments including Agriculture, DRDA, PWD, Horticulture, Panchayat, Zila Parishad, Irrigation, Animal Husbandry, Health and Rural Development and the Chief Development Officer. The discussion yielded the following information about condition in the district:

- Agriculture: Net Sown Area : 2.91 Lakh Ha
  Net Sown Area in Rabi : 1.83 Lakh Ha
  Net Sown Area in Kharif : 1.06 Lakh Ha
  Net Sown Area in Zaid : 0.03 Lakh Ha
- Productivity of Wheat : 34.59 Qtl./Ha
  Rice : 23.21 Qtl./Ha

- Due to very high increase in price of DAP farmers were now using more urea.
- Earlier, Paddy was main crop in the district but due to non availability of canal water in Tail minors, it has become insignificant.
- Due to serious decline in paddy crop, 12 rice mills in Pukhraiyan and Rasoolabad have closed.
- Rasoolabad Tehsil has large part of usar land.
- Serious Power crisis result in Tubewells not working to their capacity.
- In case canal water is supplied adequately and timely, it is expected that sown area productivity for wheat & rice may increase by about 15% and 10%.
- Due to shortage of canal water many farmers were shifting to pulses- Arhar, Moong and urd.
- Many farmers were also shifting to Ash Gourd (Petha) as it gives high return.
- Horticulture: Area under fruit (Guvava) trees was about 300 Ha and under spices such as chillies and Corriander about 50 Ha . There is no marketing problem for the produce.
- Irrigation Canal Length CCA PCA Kharif PCA Rabi

ID Nabipur	336 Km.	53571 Ha	36%	41.5%
ID Dibyapur	122 Km.	20000 Ha	36%	41.5%
LGC	74.50 Km.			
Bhognipur Div	35.66 Km.			

- Public tubewells 255
  Private Tubewells *(Including Pumpsets)* 45941

- Blocks with Deep Ground Water Level (60-95 ft) are Amordha, Malasa, Rajpur, Derapur and Sandalpur.
- Blocks with Medium Strata (20-60 ft) are Akbarpur, Jhinjhak, Rasulabad, Maitha and Sarban Khera.
- Canal Water supply was neither adequate nor timely.
- In at least 10% of tail end minors water was not reaching.
- Desilting of canal was done every year during November-December.
- Large Number of incidences of Canal cutting/ Blocking are reported. Last year 30 cases were filed and in 8 cases FIR were lodged with the police in Nabipur Khand. Tawan (penalty) amounting to Rs. 275000/- was recovered in 32 cases.
- Condition of outlets was reportedly poor/damaged.
- Roaster system exist but actually supply depend on availability of water in canal.
- WUAs does not exist, voters list under preparation.
- 100% water charges are collected through Tehsil.
- In 2011 Kisan Credit Cards to 31000 farmers were distributed.
- Employment & Migration: Farmers were facing problem in getting labour for agriculture work, wages for agricultural labour have increase due to migration of workers to Gujrat and Delhi and employment under MNREGA.

- Works undertaken under MNREGA include: laying Kharanja, forestation, Canal maintenance, Link roads, land development and farm land levelling etc.
- Payment under MNREGA is done through Gram Sabha and there is generally delay in payment to labour.
- Health: Source of drinking water is generally local and India Mark-II handpumps. Handpumps of 30-40 feet deep boring have generally polluted water.
- Drainage and sanitary conditions in villages are generally poor.
- The district has 12 CHCs, 31 PHCs and the district hospital. Maternal and Child Welfare Centres also exist at these places.
- Significant disease among people include: Floursis (particularly in Block Rajpur and Amraudha) Iodine deficiency, Anaemia and Worm related. About 8-10 cases per month are found HIV positive.
- There is no TB Clinic but 19 TB centres and 4 TB units were working.
- All public schools have India Mark-II handpumps and toilets.
- Health Check-up of students is conducted annually in all public schools and Iron and de-worming tablets are distributed.
- Forest and Wetlands/Ponds: There is no reserved forest. Plantation at Roadside and Gram Sabha land under social forestry has been done.
- The district has about 1800 ponds but fish production was insignificant.
- Animal Husbandry: There were 24 Veternary Hospitals and 70 AI Centres.
- Quality of Milch Cattle is average graded.
- There is no shortage of fodder for animals.
- Common disease in livestock is Worm infestation.
- The number of educational institutions for girls at different level were few as against for boys, e.g. Out 127 High Schools only 6 are for girls; Out of 126 Intermediate colleges 13 are for girls and Out of 52 Degree colleges only 2 for girls.
- As per BPL Census 2002, about 63% of Rural household were living below poverty line.
- There were no WUAs in the district.

3.3.9 Focussed Group discussion in district Farrukhabad

Irrigation: The canal network is around 140 km which is highly insufficient compared to the demand. Canal and *Kulaba* breaching is also a phenomenon in places where water is available. The water hardly reaches the tail end and hence there is every need to increase the amount of water supply for irrigation along with improving the infrastructure.

Since there is very little water, there is hardly any instance of water logging in the district. Most of the irrigation needs are catered to by the private tubewells / bore wells.

The excess of paddy cultivation in the district is also a reason for higher demand of irrigation water which is resulting in overdrawing of groundwater in the absence of an elaborate canal system. Construction of cattle ghats to prevent damages, lining of canals and remodeling are of utmost importance in the district.

The incidence of flood is only when water from upstream is released from dams and barrages. It is not due to rains as is the common perception as the amount of rainfall has decreased in the district. The flood water can be diverted through canals which is not currently happening and hence the drainage system needs to be rejuvenated.

There have been no measures taken by the district to check siltation. Neither have there been any structures installed in this regard.

The irrigation department has been involved in orienting / educating farmers 1-2 times on irrigation systems, water use and management using CDs and DVDs. However there have been no such efforts off late by the department.

'Sinchai Mitra' – Friends of Irrigation is an initiative by the district administration wherein monthly meetings are held with the irrigation, agriculture and other allied departments and is chaired by the Chairman of the Zila Panchayat. Such meetings which used to yield good results and most importantly ensure inter-departmental coordination are no longer a feature since quite some time.

The *Jiledars* of the Irrigation department holds monthly meetings with farmers on the 25th of every month to sort out irrigation related issues.

There is hardly any information / knowledge about the canal roster system amongst villagers. They are not aware as to when does the canal run and the right time to irrigate their fields. Hence the increased dependence on tubewells. The department should broadcast the roster schedule regularly through local television and newspaper so as to inform the farmers about the availability of water. Average power availability is around 8 hrs in rural areas.

Jal Nigam: The department is currently setting up a system of water supply in the district following which sewage treatment will be taken up. The amount of water required for sewage is 135 LPCD. The average water table in the district is at 8 – 10 metres except in two blocks which are in the grey zone and the water table has fallen to 30 metres.

There are a total of 26 piped water supply systems across the district which is majorly catering to the rural areas. Rest of the areas not covered under piped water supply is catered by tubewells.

As regards water quality, only one block has excess of iron content. Water quality testing facility is available in the district.

Agriculture: Potato, maize and groundnut are major crops grown in the district. Sunflower used to be a major crop but is no longer grown due to water scarcity and lack of marketing facilities.
Sprinkler systems were distributed to the farmers but they remove the sprinkler and use the pipes to flood the fields.

There is a district level helpline that operates and provides farmers with the required assistance / information. However it is seldom used as there is not much awareness about the same amongst farmers.

There is no knowledge amongst the dealers of seeds, fertilizers and pesticides on the right kind of seeds and fertilizer use. This results in farmers getting misdirected and compelled to use whatever is being sold by the dealers. Proper education of dealers is a must along with those of the farmers so that the right kind of inputs can be used.

Women are sent for training conducted by KVKs and the agriculture department on certain issues but there are hardly any programme / scheme to promote women's role in agriculture.

Since potato is grown in large numbers their storage in cold chains becomes an issue due to limited capacity and hence farmers do not get proper price for their produce despite of ending up paying high rents for using the cold storage. This calls for semi-processing and processing units for potato and proper marketing facilities which will fetch them better incomes for e.g.: chips manufacturing unit in the district.

Cash crops like sugarcane can be grown where the canal system is catering but there is dependence on tubewells for growing vegetables.

An NGO a few years back initiated *Aloe vera* cultivation amongst the farmers and provided them inputs. However they failed to guarantee buy back and hence the venture flopped.

Forest: There is only 1000 ha of forest land in the district. Canal side plantation has not been initiated in a big way due to lack of plantation patches. Sesame has been grown at some places and was successful but is now fast dying owing to fungus infection. There are only temporary wetlands in the district.

Health: No such incidence of water borne diseases in the district except sporadic ones which are controlled through timely interventions. Vector borne diseases which are currently low can increase owing to expansion in irrigation if problems like water logging are not handled simultaneously.

Institutional delivery is low in the district despite of schemes and efforts due to low levels of literacy and traditional beliefs.

Animal Husbandry: An extensive canal system would have led to more fodder availability thus leading to better livestock rearing and improved livelihoods. However, the current situation is not very encouraging although people do maintain cattle other than agriculture.

The milk production in the district is satisfactory but marketing facilities need to be improved.

The department does conduct camps and contact programmes with the villagers educating them on proper upkeep / maintenance of the cattle but very infrequently due to lack of staff and logistics with the department. Activities like immunization etc. cannot be carried out at regular intervals due to the bottlenecks.

Para-vets are not very active in carrying out their responsibilities as they consider themselves to be veterinary doctors after getting trained. There is no mechanism to force them to do their duties.

Fisheries: There are no Private or Government hatcheries in the district. The situation currently is dull but there is a lot of scope for improvement in the district provided line departments co-operate, financial institutions extend their support and marketing facilities are created.

MGNREGS can be used for the construction of ponds and also support to plantation and bore well thus improving pisciculture. Small rivers / rivulets can be tamed for pisciculture. There is no deficiency of fodder for the cattle in the district due to year round availability of maize, sugarcane etc.

Common observations: The Net Sown Area has increased considerably which implies that the fields are covered with one or the other crop in most parts of the year. This has also necessitated more water for irrigation.

There is a need in developing and promoting IEC activities under agriculture and irrigation activities especially at the Nyaya and Block Panchayat level. The Village Water and Sanitation committees of the Gram Panchayat can be used to disseminate information regarding water use and efficiency, cropping patterns, irrigation systems etc.

Adequate and frequent hand holding of irrigation and agriculture department staff and personnel is of utmost importance for them to be abreast of developments in agriculture and allied issues across the district.

NGOs are required at the block level which would engage with the farming community on a regular basis and would orient them on issues related to cropping pattern, water use efficiency, conflict resolution, higher productivity with minimum inputs, preserving soils nutrients, developing other allied activities like horticulture, fisheries, animal husbandry etc.

There is a need for convergence amongst the forest and animal husbandry departments on castrating the male Nilgai to stop further reproduction. Fast multiplication of Nilgai and reduced grasslands causes damages to standing crops. Funds need to be provided by the Forest department to the Animal Husbandry department to carry out the operation.

Waste water need to be treated and used for irrigation instead of letting it out to the rivers or other water bodies. This will help avert health related problems as well as solve the issue of inadequate water availability for irrigation at least in certain regions.

3.3.10 Findings of Focussed Group discussion in district Auraiya

The meeting held on 12-09-2012 chaired by Mr. Lalmani, officiating District Magistrate was attended by 24 Senior Officials of different departments including Agriculture, Irrigation, Rural Engineering, Health, Jal Nigam, Social Welfare, Forest, Tubewell, DRDA, CDO and Rural Development. The discussion yielded the following information about the conditions in the district:

- Some Serious problems:
  i) Serious problem of drainage, water logging and seepage in Block Achhalda and Bidhuna.
  ii) Seepage in Etawah Branch canal leading to Sodicity, Salinity and sandy soil.
  iii) Sodicity has affected the entire district.
  iv) Rugged land in Block Auraiya and Ajitmal.
  v) Wild animals damaging crops seriously in block Ajitmal.
- Agriculture:

	Net Sown Area in Rabi -Wheat	:	100625 Ha
	Net Sown Area in Kharif-Paddy	:	50179 Ha
	Net Sown Area in Zaid-Moong	:	5000 Ha
Productivity of	Wheat	:	37.51 Qtl./Ha
	Paddy	:	26.24 Qtl./Ha
	Moong	:	4.90 Qtl/Ha

- Crop Diversification: Crop area under Maiz increased from 9075 Ha 5 years back to 16154 Ha at present.
- HYV seeds are used in all Kharif, Rabi and Zaid crops due to which income improved particularly in Paddy and Maiz.
- Possibility of increase in sown area if canal water is supplied timely and adequately: Wheat by 5000 Ha, Paddy 4000 Ha, Maiz 4000 Ha, Moong 3000 Ha and Sugarcane by 5000 Ha.
- Increase in productivity is possible if adequate and timely canal water is supplied: Wheat by 4 Qtl/Ha, Paddy 3 Qtl/Ha, Maiz 5 Qtl/Ha and Sugarcane by 5.5 Qtl/Ha.
- Horticulture: Area under fruit trees 9870 Ha (Mango, Guvava) under spices 885 Ha (Garlic and Chillies).
- Market price of Garlic is between Rs. 800/- and Rs. 1200/- per quintal which is very low and, therefore need minimum support price.
- Irrigation:

	Canal Length	:	818.798 Km
	Public Tubewells	:	308
	Private Tubewells (Including Pumpsets)	:	30000

- Net irrigated to net sown area - 92%

- Source wise irrigation
  - Canal : 37.15%
  - Public Tubewells : 8.7%
  - Private Tubewells : 53.03%
- Canal water in 4 Tail end minors with command area of about 400 Ha is not reaching.
- Problems preventing canal water from reaching tail end include: indisciplined farmers, illegal outlets and absence of Osrabandi.
- Desilting of Canal is done twice a year, during April-June and October-November.
- About 60 cases per year of canal cutting / blocking were recorded.
- For canal cutting/ Blocking Tawan (penalty) of Rs. 3.5 Lakh was collected last year and 6 cases were filed under canal Act.
- Canal seepage has affected about 1490 Ha area.
- Condition of outlets not satisfactory as most of them are damaged.
- Roaster system for canal water was in operation.
- WUAs does not exist.
- Water charges are collected through Tehsil. Though collections were 100% but mostly delayed.
- Marketing of Produce: Farmers face problems as there is only one mandi in Auraiya proper which is incapable to meet demand of farmers. Thus, most of the produce is sold locally or through middlemen.
- Out of the proposed 38886 only 11771 Kisan Credit Cards were issued this year.
- Employment and Migration: There is no shortage of agriculture labour as there is no problem of migration. Labour is also available for MNREGA works.
- Health: Common water borne diseases include: acute diarrhoeal disease, Bacillary dysentery, Viral hepatitis A and C and Typhoid. Vector borne diseases include: Malaria, Dengae, Chikanguniya and Filaria. High incidence of both type of diseases in Block Achhalda and Sahar.
- Sources of drinking water were local handpumps, well and India Mark-II handpumps.
- The district has 5 CHC, 26 PHC, 157 sub-Centre, 22 Ayurvedic and Unani hospitals and 7 Homeopathic hospitals.
- Animal Husbandry: There were 14 Veternary hospitals, 25 AI Centres under Animal husbandry department and 16 under BAIF.
- The quality of milch cattle is medium graded.
- Average production of milk the district is 250000 litres/day which is sold locally. There is no milk processing industry.
- Only about 20% of the required fodder was available.
- Common diseases related to livestocks were Parasite infection, Tick Born disease, Sporadic Bocterial and urinary infection.
- Forest and Wetlands: Area under forest in the district was 100.1 Km (10000 Ha).
- Area under wetlands is 1200 Ha. Its area is reducing due to encroachment by people.
- Self Help Groups: A total of 5208 SHGs were formed till August 2012. Out of them 250 were inactive. The number of women SHGs was 1533. A total of 2014 SHGs including 42 women SHGs were engaged in income generating activities.

- Block Ajitmal and Auraiya have deep ground water strata of over 50 feet where more public Tubewells were needed.
- About 45% of rural families were living below poverty line as per BPL census 2002.

3.3.11 Findings of Focussed Group discussion in district Etawah

Irrigation: Adequate availability of water for irrigation in canals can be of benefit to activities of other departments like drinking water and sanitation etc. Canal water is available at very cheaper rates as against water from tubewells / bore wells.
However in reality canal water has reduced and there is no provisions for distribute water equitably. Further there is lot of wastage especially in Kharif crops. If the water is conserved and wastage can be controlled, more area can be brought under irrigation.

The department has not conducted any training or orientation for farmers on effective water use as per crops. There is a need for construction of minors and '*gules*' to convey the water to the fields which is not happening today.

The reason behind breaching of canals are man-made, animal and nature created. Most of the time it is man-made. The irrigation structures have become very old and calls for maintenance and modernization with new equipments. Participatory irrigation will be best understood with the formation of WUAs as per the PIM Act will be constituted soon.

The restructuring project will be sustainable only when modernization / automation will happen in the case of construction of new canal systems, maintenance and rehabilitation and in arresting breaches of the canal structure.

The *Sinchai Bandhu* initiative is running well in the district.

Minor irrigation: Nearly 56% of irrigation in the district is with the help of groundwater.
Shallow, medium and deep tubewells have been installed for the purpose. However shallow tubewells have failed and farmers prefer medium and deep tube well.

Aquifer mapping should be done to determine the depth of boring and inform villagers on the exact state of groundwater in the region so as to help them in deciding the use.

Agriculture: Training/workshops/ *goshtis* at block and Nyaya Panchayat level are conducted. The Krishi Vigyan Kendra (KVKs) disseminate information on better and improved varieties and also on crop specific water requirement.

Sprinkler sets and pipes have been distributed around 5-7 years back. However farmers in canal served areas hardly use sprinkler sets for irrigation. There have been three times more productivity due to the use of sprinkler sets and even more productivity because of drip irrigation sets. However the successful use of the sprinkler and drip sets have been possible only in two blocks.

Excessive water logging has given rise to wastelands and ravines. Salt tolerant species need to be introduced in the wastelands.

Audio-visual means like documentary films have worked well in disseminating information to the farmers on agriculture and allied areas. There have been exposure visits for farmers to expose them to good practices in agriculture and pisciculture. Disseminating information with the help of sms has also been very popular off late because of the availability of mobile with most farmers.

Fisheries: Farm ponds are filled by canals in the month of May and June. However water availability should be increased to make pisciculture more viable in the district.

There was an effort by the department to distribute the land leases to women but none of them had land registered in their name.

Marketing facilities should be created to boost production and contribute towards sustainability of the venture. There are no hatcheries in the district except a fish farm for seed production.

As of now only 100-150 families in the district are engaged in pisciculture. Huge lack of staff is affecting the performance of the department.

Horticulture: Potato and garlic are grown as major crops. Very few horticultural crops can be grown along the canal side due to water-logging.

Some programmes/schemes for training women in fruit preservation can be started as a skill and value addition initiative in the district.

Forests: Excessive seepage from canals is hindering the process of plantation. The sides of canals should be clearly demarcated on both sides so that the land is not encroached by farmers and plantation can be taken up on a large scale.

There are over 17000 ha of forests in the district out of which around 420 ha is along the canal system. 13000 ha of land is ravenous in the district.

Soil and Water Conservation: Drainage development has helped in reclamation of land wherein the fallow cover has reduced from 25000 ha to 20000 ha.

Jal Nigam: The source of drinking water across the district is mainly ground water. However, surface source development will reduce cost and will check indiscriminate use of ground water. Hand pumps are not a permanent source of water supply. However, the current situation indicates that not only human but even cattle has to depend on hand pump for its drinking water requirement.

Maintenance of hand pumps have been entrusted to the Gram Sabhas. 90% - 95% diseases are related to bad water supply. In the urban area, there is no such activity

related to drainage. Hand pumps have been installed in around 620 schools across the district.

Health: During the water logging season incidence of malaria increases whereas there are more cases of diarrhea at the time when the water recedes.

Common observations: Water logging is not due to seepage but because of poor drainage systems which does not allow the rain water to flow.

Very little participation of women in agricultural activities in the district has been observed due to social restrictions. Even in MRNREGS, there is only 7% participation of women in the workforce.

Cattle is another source of damage to the canal banks as they break the sidewalls during their movement to and fro from canal. Despite construction of cattle ghats, Inter-departmental coordination is a common phenomenon in the district.

3.3.12 Findings of Focussed Group discussion in district Mainpuri

Irrigation: The entire irrigation infrastructure in the district is around 125 years old and have crossed their life span. There have been no restructuring or remodeling of the existing structures. Farmers do not allow the passage of water through their fields to other fields. All this results in huge wastages.

All blocks in the district are covered under canal irrigation. Canal breaching is a serious issue like in other districts. The irrigation department has not conducted any trainings or orientation for the farming community on efficient water use.

Despite of a good canal system, use of bore wells still remains rampant across the district. There are two blocks out of nine which falls in the dark zone indicating overexploitation of groundwater. There is ample of waterlogged sites in the district which calls for a comprehensive drainage system.

There is acute shortage of staff in the department – almost 50% positions are vacant. The department officials especially those at the field level need to be trained on how to deal with erring farmers and how to cope with issues like political patronage thus making disciplinary action almost impossible.

Horticulture: There is heavy soil erosion by the canal side which further reduces the canal life. Plantation of fruit bearing trees will lead to checking soil erosion and increased revenue.

Farmers were distributed pipes for flood irrigation on their fields. The canal tube well ratio in the district is approx. 75:25. The major fruits grown are guava, bell, atonal etc.

Agriculture: Poor drainage causing excessive water logging has resulted in wasteland formation and hence reclamation has not worked due to successive water logging every year. This calls for an elaborate drainage system only after which the wasteland can be reclaimed. The ATMA scheme for agriculture extension has been implemented in the district as per guidelines.

Convincing farmers and marketing have been very difficult which is why innovative agriculture is not possible many a times.

Availability of bio-inputs are not always certified following which it cannot be trusted by farmers. Similarly, convincing farmers to use organic manure for agriculture has also not worked well despite demonstration as they all want faster returns.

Ground Water and Hydrology: Farmers opt for boring despite ban by the Government on Private and Government bore wells.

Fisheries: Farm ponds should be promoted by the Government keeping in view the low level of pisciculture in the district. The department is very poorly staffed with just one official at the district level and having no facilities to reach out to the community.

Most of waterlogged areas are on private land and hence the Gram Sabah cannot decide the channeling of the water into ponds. The department extends the benefits of the scheme to families living under BPL, small and marginal farmers, landless etc.

Animal Husbandry: Fodder is imported in summer. The major issues affecting cattle rearing are parasitic infections in waterlogged areas and lack of clean drinking water.

Forest: There is around 1400 ha of reserved forest land in the district. Farmers encroach upon the land immediate to the canal sides thus making it difficult for plantations. Fencing of plantations are a must in order to ensure its life and protect it from animals. At least 10 – 30 metres of the bank on either side should be developed to enable plantation by the department.

Vilaiti Babool is grown in places on places with pH more than 9. Other plants that are grown along with canal banks as of now is – sesame, *jamun, arjun* etc.

Pollution Control Board: monitors the quality of river water both at the upstream and downstream. There is only one water polluting industry in the district. Any renovation of canal works should avoid polluting industries. Construction of ponds will definitely help in raising the water table.

Common observations: It was suggested that the irrigation department should extend its full support to Fisheries for its promotion in the district. Fisheries department should immediately prepare IEC materials detailing the schemes of the department and should be widely circulated at the district, block and gram panchayat level.

Also care needs to be taken to avoid disturbing the migratory bird (mostly *saras*) nesting areas which are usually around the wetlands.

Community interaction with farmers at Village Koson

Irrigation and Agriculture: Excess of water is a disadvantage as it does not get drained and some areas do not have gool for directing water to the fields. On the other hand there are places which do not get water. 30% of the total land area remains inundated for a major part of the year thus rendering it useless for agriculture.

It is not possible to grow crops in the entire field area as conveyance of water is a big issue. Minors should be connected which will enable a large area to be irrigated.

Agriculture and cattle rearing are interconnected. While women do not work in the open fields they take care of the fodder and other necessities of the cattle. Without the cattle being properly fed and taken care of, it is not possible for them to be used for agriculture. Hence both men and women contribute in agriculture in their own ways.

Villagers are not very confident of the WUA model and that it will resolve all issues related to irrigation. The major reasons being illiteracy and caste and class based division.

Maintenance of irrigation structures cannot be taken up under MGNREGS as there is lack of labour due to lesser wages (120 as compared to 150 for on farm rates) and also irregularity in payment. Also there is a restriction on using of machines which further prevents work. Improvement in infrastructure will lead to better use.

Traditional agricultural practices has not led to increase in production. Whatever has increased is due to the use of modern inputs and machinery. However with increase in production cost of inputs have also increased many folds which is why the profit margin or net income of farmers have gone down substantially. This has resulted in farming being considered as an unproductive occupation and something to be pursued for a living in the absence of other options. Paddy is grown in the region since the last 30 years.

Land reclamation has also increased pressure on the existing irrigation structures which has increased the use of tubewells. This has resulted in the groundwater table going down to 30ft.

Fisheries and sugarcane cultivation have a lot of potential but is not pursued because of lack of marketing facilities. Another reason for pisciculture not being popular is that the majority of the population is vegetarian. Hence the bulk of the produce will have to be sold which calls for storage and marketing facilities.

Education: Around 70% - 75% children in and around the village go to Government schools for primary and secondary education. Quality of higher education is not good in the near vicinity which is why either children continue with agriculture as their profession or migrate to nearby cities.

The landless or small and marginal farmers do not just depend on agriculture for their income. Children from their families move to cities for employment and thus contributes to the family income. This is not so much in the case of big farmers. Around 20% of girls goes for higher education from the village.

Health: There is no health centre in the village and the nearest is around 7-8 kms from the village. A building has been constructed in the name of a sub-health centre but there has been no efforts to make it operational since the last 2-3 years. The villagers are not aware about any ANM or MPW who visits the village.

Around 90% of the village population is affected by malaria due to water logging. It was informed that there has hardly been any steps taken by the health or any department to control the menace. People do not remember when was the last disinfection / spraying done in the village.

Functioning of the Panchayat: There is no mechanism at the Panchayat level to check the status of education, health or nutrition as there are no Gram Sabha meetings or even monthly meetings of the Gram Panchayat with the line department officials. There is no sharing of information by the Gram Panchayat and the Pradhan is a women from the SC community. It was informed that the participation and support from the majority affluent 'thakur' class is almost negligible. This makes it more difficult for the Panchayat to function and hence this is taken as an excuse for non-performance. People are just aware about the standing committees on paper but do not remember who all are members as the committees never met since their formation.

Impact on local flora and fauna: There are not many cases of snake bites despite the area being waterlogged as the snake population has reduced drastically owing to high pesticide use in the fields.

3.4 Socio-Economic Status of Haidergarh Branch Area Based on Focused Group Discussion

The focused group discussion was carried out between 03rd September 2012 and 05th September, 2012 in all districts of Haidergarh Branch Area. District wise details of focused group discussion are given in **Table 3.2.** Significant Findings of focused group discussion are given below.

Table 3.2: District wise dates of Focused Group Discussion in LGC districts

Sl. No.	Date of FGD	District	Venue
1	03.09.2012	Raebareli	Bachat Bhawan, Meeting Hall, Collectorate, Raebareli
2	04.09.2012	Amethi	Meeting Hall, Collectorate, Raebareli
3	05.09.2012	Barabanki	DRDA, Hall Barabanki

3.4.1 Findings of Focussed Group discussion in district Rae Bareli

The meeting held on 03.09.2012 was attended by 20 senior officials of different departments including agriculture, Irrigation, Veterinary, Fisheries, Forest, Horticulture, Minor irrigation, Health, Pollution Control Board, Jal Nigam, Tubewell, C.D.O. and DRDA. The discussion yielded the following information about the conditions in the district:

1. 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 roster of electricity supply.

2. 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.

3. 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 area under rice –wheat cropping sequence are being replaced by rice-mustard-mentha (3 crop system).

4. Net sown area in the district is 1.82 lac ha and Gross sown area is 3.22 lac ha. 1.51Llakh ha. In Rabi, 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 in possible of canal water in supplied adequately and timely and in such condition, about 3-4% increase in yield in both Rabi and Kharif in 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 tradersar cheaper rate than MSP. MSP is available only for paddy and wheat.

5. 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.

6. Horticulture: Area under banana is 200 ha, which is being increased through govt. efforts in Horticulture Mission. Chillies in Sataon and Khiro 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.

7. Irrigation: Canal length is 1500 km. in the districts.TW Govt.-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 Khiro 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 is rainfed. There are no ponds which are used for irrigation.
8. 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). Khiro and Rahi blocks are in semi-critical category. Pre-monsoon water level 45.45 m bgl and post- 38.69m in Khiro 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.

9. Loans: crop loans are available through Co-operatives to 100,000 members. About 120,000 farmers have KCC from commercial banks. (total no. of farmers-293,000). Moneylenders charge exorbitantly, @ 5% per month interest.

10. Labour rates: Urban area min.rate Rs. 200 / day, in rural area more thanRs. 125/ day (MNREGA rate is 125/ day). MNREGA has reduced labour migration to some extent.
11. MNREGA: Deepening of ponds, land reclamation works like- levelling, bunding, construction of check dams and bundhis, fisheries activity, etc., are taken up under this programme.

Problems: Timely payment to labourers is not done. EFMS (Electronic Fund Mgt. System) may improve this, if adopted. Labourer does not know his right to demand work, and he is not sure whether he will get work if he so demands.All those who desire to work, get work.

12. Health: There is a problem of Fluoride toxicity in the ground water used for drinking in the district. The district has been taken up under Floured control programme.Lalganj and Sareni blocks are affected more due to Fluoride problem. In the recently dug borewell in the proposed Railway Coach Factory premises, 2.5 ppm F was found. Under the UPWSRP, steps may be taken to provide drinking water supply from surface water (canal) in the Fluoride affected blocks.

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

14. Wetlands: There is no large wetlands in the district.

15. 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 Dept. 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.

16. 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.

17. Animal Husbandary : There are 30 veterinary Hospitals and 57 AI centres. Due to less no. 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.

18. Natural Disaster: Floods and Drought are not a problem in the district.

19. Tribes: No tribal population in the district.

20. BPL families: As per 2002 census, 213,108 BPL families in the district ie. About 50% total rural families.

21. Social problems: Illiteracy, inequality and practice of purdah are the problems. Among women, literacy is less than 50%.

22. Industry: No cottage industry. Thermal power plant, Paper Mill, Cement factory and Telephone unit is the major industrial units. Recently, a Rail Coach Factory is being established.

23. SHG: out of 12197 SHGs 11453 SHGs are active in the district, of which 2821 are Women SHGs. Activities include micro-credit through revolving fund for mini dairy,piggery, poultry, cycle repair, tailoring, etc. 15 NGOs are involved in SHG activities. Rajiv Gandhi Women Empowerment Scheme is also working for women development.

24. Waste disposal: Traditional pits in the villages are used.

3.4.2 Findings of Focussed Group discussion in district Barabanki

The meeting held on 05.09.2012 was attended by 14 senior officials of deferent departments including Animal Husbandry, Fisheries, Health, Irrigation, DRDA, Education, Minor Irrigation, JaL Nigam, Forest and Agriculture. 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 Qtl/ Ha.
Barely	22.39 Qtl/ Ha.
Gram	10.90 Qtl/ Ha.
Maize	30.00 Qtl/ Ha.
Rape seed/Mustard	10.41 Qtl/ Ha.
Paddy	27.35 Qtl/ 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

4. It was estimated that productivity of crops may increase by 5 to 10 percent in case Canal water reacheds tail end.

5. Soil testing is conducted by the Agriculture department seven places in the district.

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

among spices. Due to the problem of waterlogging , ginger etc. are not taken. Among fruits,area under banana is 609 ha, and increasing. 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 to60% to marginal and small farmers and 50% to others, which does not seem to attract many farmers.

7. 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.

8. Minor Irrigation: The total no. 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 dept. in the case of Shallow boring (less than 30 m bore depth) isRs. 5000 to small farmers, 7000 to marginal farmers and 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 Govt. For medium deep (30-60m deep) boring, farmers have to deposit Rs. 1500 as the cost of Resistivity survey. The Minor Irrig. Dept. 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.

9. **Ground water**: There is no problem of declining ground water in the district.

10. **Drinking water**: Jal Nigam had taken up during 2006-07, 2007-08 and 2008-09, seven schemes for quality problem. There are 43,600 India Mark II HPs in the district. Almost all habitations are covered under drinking water supply. The remaining are being taken up now. Both GOI and State schemes are operational for drinking water supply. There is no requirement of drinking water supply from the canal in the district due to adequate GW available.

11. **Labour rates**: Urban area min.rate Rs. 200 / day, in rural area more thanRs. 125/ day (MNREGA rate is 125/ day). MNREGA has reduced labour migration to some extent.

12. **MNREGA**: Labour rate is Rs. 125 per day.There is no problem of labour availability. Women participation till last year was almost nil, now being increased upto 11 %. Deepening of ponds, land reclamation works like- levelling, bunding, construction of check dams and bundhis, flood control works, drain restoration, plantation of saplings desilting of canals, fisheries activity, etc., are taken up under this programme.

Problems: Timely payment to labourers is not done. E-muster roll has been started from this year. EFMS (Electronic Fund Mgt. System) may improve the timely payment, which is planned to be initiated from Oct. 2012. Labourer does not know his right to demand work, and he is not sure whether he will get work if he so demands.All those who desire to work, may get work.

9. Health: Among vector-borne diseases, Filarial is reported in the district. 752 cases were reported last year There is a problem of iron toxicity in the ground water used for drinking in Trivediganj ,Haidergarh, Ramsanehighat and Ramnagar blocks. Last year, six schemes have been taken up to tackle the problem in the district.

10. Waterlogging : Along the main feeder , waterlogging is prevalent on both sides of the canal affecting about 2000 Ha. area.

11. Forest and Wetlands: Area under forest is 5565 ha.These are riverine forests, in patches along Ghaghra and Gomti rivers banks. Canal and roadside plantations exists and new plantations are also being taken up under social forestry scheme. Due to the security problem, no plantation are being done now along rail way line. Commercial species are mainly Shisham and Khair. Among special trees, 'Parijat ' in Ramnagar tehsil may be mentioned (there are only six Parijat trees in U.P.). Among large water bodies, Bhagaharjhil under gram samaj is now proposed to be developed by Forest department under MNREGA.

12. Ponds & Fisheries: There are 8961 ponds in the district, covering 6220 ha area. These ponds aremainly 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 Dept. 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 Dept. may provide canal water to fish ponds which will work out to be cheaper.

13. Dairy: Milk production is low. The average milk production as per survey by A.H. Dept 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.

14. 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 Dept. Trace element / micronutrient deficiency, and sterility are the problems.

15. Natural Disaster: Floods are a problem , occurring almost every year. A 54 km stretch along Ghaghra on the left bank and 24 km on the right bank are affected by floods. After the 2009 high floods, embankment on the entire 54 km length have been approved. SirouliGauspur ,Ramnagar, and part of RamsanehiGhattahsils are affected by floods.

16. Tribes: No tribal population in the district.

17. BPL families: as per 2002 survey is rural area were 3,14,363 i.e. 47%.

18. Social problems: Illiteracy, inequality and purdah are the problems. Among women, literacy is low.

19. Industry: No cottage industry. Reliance Fibre, Govind Farm Equipments, Biscuit factory at Safedabad, IPL Somaiyya Group at Dewa and sugar mill at Haidergarhare the major industrial units.

20. SHG: 10,185 SHGs exist in the district, out of which 1,008 are defunct. 1744 are Women SHGs. Activities include micro-credit through revolving fund for mini dairy, poultry, cycle, diesel engine and pump set repair, tailoring, fisheries, handlooms, vermi-compost, floriculture, tent house, mini rice mill, goatery, beauty parlour, chiken and zardosi work etc. Dairy is the largest among SHG activities. The average no. of members

in the group is 12-15, while the guideline is 10-20 members. It is estimated that every member is able to earn an average of Rs. 500/= to Rs. 600/= per month.

3.4.3 Focussed Groupn discussion in district-Amethi; Venue: Collectorate, Amethi

The meeting held on 04-09-2012 was attended by the CDO and senior officials of Agriculture, Irrigation and Animal Husbandry departments. Other Line departments officials could not attend as they were engaged in Tehsil Diwas. The discussion yielded the following information about the conditions in the district:

1. 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
2. Productivity of Wheat : 24.0 Qtl./Ha
   Rice : 22.7 Qtl./Ha
   Arhar : 10.2 Qtl./Ha
3. No new crops are sown.
4. In case Canal water is supplied adequately and timely increase in sown area may be marginal.
5. Crop production may increase significantly i.e. upto about 10% if canal water is supplied adequately and timely.
6. There is problem of salinity in Amethi Tenshil and about 5000 Ha area is affected.
7. 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.
8. Irrigation: Canal Length : 1900 Km.
   Govt. Tubewells : 410
   Private including Pumpsets : 80500
9. About 70% of the net sown area was irrigated.
10. Canal water was available timely and adequately.

11. There was no problem of tail and uses of the canal remaining unserved.
12. Incidences of canal cutting and blocking of water by upstream users were few.
13. Desilting of canal was done once a year.
14. The efficiency of canal operation is about 70%.
15. The outlets are maintained in good condition.
16. There is no seepage problem in canals.
17. Roaster system for canal water was operational.
18. WUAs have been formed. No specific role of women users has been envisaged.
19. There is no willingness of the farmers to manage water sharing and maintain canal through WUAs.
20. Only about 10-20% of WUAs were willing to manage and collect dues from farmers.
21. There is no problem in collection of water charges, which were collected through Tahsils.
22. Animal Husbandry: There were 33 Veternary hospitals, and 44 AI Centres out of which only 10 were functioning.
23. There were about 10-15% cross breed milch cattles.
24. The production of Milk was about 80000 Litre per day, most of which is transported outside to mother dairy and PCDF.
25. A proposal for 9 large dairies in the district has been processed and sent to Lead bank Development Manager (NABARD).
26. There was no milk processing units in the district.
27. Fodder is not a problem for animals.
28. Common diseases related to livestock include: Worm infestation, particularly is 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.
29. Major Industrial units in the district include: Indo-gulf Fertilizers Co. Ltd., Bharat Heavy Electricals Ltd., SAIL Jagdishpur Unit and Quality Packagings.

3.5 Summary of major findings

3.5.1 Findings based on secondary data

- Population in the decade ending 2001 increased by 24.9%. The population increase was highest in Firozabad district i.e. by 35.6%.
- The proportion of male population in the Command area districts was 54.5% in 1991 which declined very marginally to 53.9% in 2001.
- The proportion of SC Population ranged from 16.83% (Kanpur Nagar district) to 35.10% (Kaushambi) in 1991 and the situation was not different in 2001. The proportion of ST population was very insignificant, less than 1%.
- The population density in Command Area districts except in Kanpur Nagar district, was in between 350-450/Sq.Km in 1991 and 425-525 in 2001.
- The literacy rate was nearly 60% in the concerned blocks in 1991, but it increased by 15 to 20% in 2001. Among the districts, Kaushambi was the worst in both 1991 and 2001 and best in Kanpur Nagar district.
- The number of primary schools per lac population increased considerably between 2001-2008-09, except in Khajuha Block (Fatehpur district) and Madanpur Block (Firozabad district).
- People were getting drinking water mainly through India Mark-2 Handpump and at few places from wells.
- There was considerable increase in road density (50-100%) in 2008-09 vis-à-vis 2000-01 in different districts, the situation was worst in Kaushambi and Fatehpur district and while in Kanpur Nagar district, it increased significantly.
- By 2008-09, almost 90% of villages of the command area were electrified.
- By 2009-10 all blocks were having Banking facilities. The telephone connections increased very substantially with the introduction of mobile telephone services. With coming of mobile, the number of PCOs either remained stagnant or declined.
- The availability of primary health centres/ allopathic hospitals/ beds there in /lac population varied considerably from Block to Block. The worst was Barhpura (Farrukhabad) and best Haseran Block (Kannauj), among rural Blocks.
- The percentage of working population in 1991 ranged from 39.9 (Mahewa of Etawah district) to 73.8% (Sarsawan of Kaushambi district). The proportion of working population declined marginally in 2001, vis-à-vis 1991. Among the people employed 65.4% (Ashodhar of Fatehpur) to 93% (Takha of Etawah) were engaged in agriculture related activities. The proportions of people engaged in agriculture in 2001 were lower as compared to 1991.
- About 20% of rural families belonged under BPL mark in 1998. The proportion declined only marginally in 2002 but the actual number increased during the said period.
- Both net and gross area under irrigation increased slowly between 2000-01 and 2008-09, increase being mainly on account of increase in the number of private tubewells. The total irrigated area under canal/public tubewells/ permanent wells declined due to increase in private tubewell which also resulted in depleting of ground water label due to which permanent wells were defunct.

- Kharif rice and wheat were predominant cereal crops and they were being grown mostly under irrigated conditions. Millets, oilseeds, pulses (except Peas) were being grown under unirrigated conditions. Fodder was also being grown in dense area largely under irrigated conditions (except in Kharif). Onion and Potatos were important vegetables/ spices.
- Increase in productivity of rice from 2000-01 to 2008-09 reported in all districts as compared to other crops, except in Kaushambi where it actually declined by over 9%, it increased by 24.2% to 87.7% in other districts. In wheat too the productivity increase was low; the increase ranged from 1% in Kannauj to 26.0% in Fatehpur. In major productivity increase ranged from 2% (Aurriya) to 38% (Fatehpur). The productivity increase was much less in pulses and oilseeds.
- Generally actual number and proportion of Marginal farmers as well as proportion of total area operated by them increased from 1995-96 to 2000-01. The number of small farmers decreased but the total area cultivated by them increased. Also, except Etawah district, the total area under agriculture declined marginally due to diversion to non-farming area of land.
- The irrigation intensity increased slowly from 2000-01, 2005-06 and 2008-09. The irrigation intensity of 39 out of 74 Blocks were lower than the UP State average in 2000-01. The corresponding figures in 2005-06 and 2008-09 were 38 and 36 Blocks respectively. There was considerable scope of increasing irrigation intensity in the area.
- Canals, Government Tubewells, Permanent Wells, Rahat, Ground Pumpsets, Private Tubwells were sources of irrigation. But the total area under canal, Government tubewells, permanent wells etc either remained stagnant or decreased. Permanent wells almost ceased to be a source of irrigation most probably because of lowering of water tables.
- The per capita availability of cereals increased only in Fatehpur, Etawah and Kaushambi, it decreased in remaining districts. The per capita availability of pulses & sugar decreased in all districts and of oilseeds in 7 districts.
- The proportion of labour engaged in agriculture declined very sharply in 2001 vis-à-vis 1991 in all districts.
- Per ha consumption of NPK increased in all districts the increase being very steep in respect of N and very little in other two.
- There was some, though only sporadic, increase in animal development facilities (but not health care facilities) during 2001-2009. Much more need to be done considering immense scope and need for increasing milk, meat and fish production. As expected, the population of male animals (both desi and cross breed) decreased, the population of milk producing age desi and cross breed animals increased. But poultry industry did not record much growth. Goat rearing and fisheries also did not record growth as expected.

3.5.2 Findings based on focused group discussion

a. Agriculture

- Main crops in Rabi were wheat and Mustard and in Kharif, Paddy, Jwar and Arhar.

- Indigenous variety seed are giving way to hybrid varieties particularly in Kannauj and Fatehpur.
- Potato, maiz 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 Maiz 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 Maiz 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, Aonla 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:

- 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 repraisal. 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 roaster 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 Kansganj 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 labout 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.

3.6 Socio-Economic Issues in Lower Ganga Canal System and Haidergarh Branch

Analysis of socio economic status has been carried out in all districts of Lower Ganga Canal System and Haidergarh Branch specially focused on project area of the concerned districts based on secondary data and focused group discussion. The major finding/issues of this analysis are given in **Table 3.2** and **Table 3.3**.

Table 3.2: Major Social Issues / Findings Based on Secondary Data Versus Proposed Project

Sr. No.	Major Social Issues	Findings in LGC System Area	Cause	Stakeholder Recommendations/ Suggestions as outcome of proposed Intervention
1.	Number of Schools	All districts with emphasis on Firozabad district.	Lack of adequate number of schools to meet requirement of the Rights of Education Act.	i) Increase in the number of senior primary schools by 50%. ii) Upgrading primary schools into Senior primary schools by providing (a) additional 2-3 class rooms (b) additional teachers as per norms iii) Involving local Panchayats to ensure better supervision of school teaching.
2.	Female Education	All districts of the command area	15-20% lower literacy levels among female vis-à-vis male.	Special programme to increase Adult & child female literacy.
3.	Road Density	All districts with emphasis on Kaushambi and Fatehpur districts.	Inadequate/loss length of metelled road	Improving the length of metalled road for better transport facility connecting marketing centers resulted better price for farm produce.
4.	Village electrification	i) About 90% of villages electrified ii) No figure regarding %age of rural household electrified. iii)Highly inadequate power supply	i) Low power generation in the state. ii) Inadequate maintenance of system.	i) Increase household electrification which reduces dependence on firewood/cow dung and kerosene. ii) Solar power harvesting for rural street electrification. iii) Minimum assured power supply especially during agriculture season may increase productivity.
5.	Telephone Connectivity	Low increase in telephone and PCO connections in all Village	i) Low relay tower density ii) Poor Service iii) Cumbersome procedure in getting connection iv) Popularity of mobile	i) Increase in relay tower density ii) Simple procedure in getting connection iii) Improve service
6.	Lack of / inadequate land record.	All village	Fragmentation of holdings & non-repetition of land surveys.	Fresh round of land survey/ consolidation measures.
7.	Low cropping	All districts of the	Non-availability of modern agri-	Improving agricultural extension services and

Sr. No.	Major Social Issues	Findings in LGC System Area	Cause	Stakeholder Recommendations/ Suggestions as outcome of proposed Intervention
	intensity	command area	technology, Poor extension network; Poor availability of quality seed and Inadequate supply of canal water.	forward & backward linkages which help in coverage of more sown area.
8.	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.
9.	Imbalanced use of NPK fertilizers	All districts of the command area	Poor extension education services	Improving agricultural extension services and forward & backward linkages.
10.	Livestock Developments	All districts	Very low animal health care facilities; low availability of cross-breeding facilities for improving milk yield. Poor milk & meat processing & packaging facilities.	Better and more animal health care facilities, more cross breeding facilities, more availability of fingerings of relevant breeds of fishes & facilitate composite fish culture Better facilities for introduction of Black Bengal Breeds of goats; Introduction of cooperative milk production facilities on the pattern of Anand District Milk Union. Milk Processing and mandatory facilities.
11.	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
12.	Preventing/ reducing loss of canal water	All main channels	Loss of canal water	Lining of main channels/canals

Table 3.3: Major Social Issues/Findings based on Secondary Data
Major Social Issues / Findings based on Secondary Data versus Proposed Project versus Proposed Project

Major Social Issues	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	An increasing trend has been observed.	An increasing trend has been observed.	Increased water availability for command area
Irrigation, infrastructure, agriculture & livelihood	Increased irrigation intensity	Increased irrigation intensity	Higher water availability, therefore, higher irrigation intensity
Shift in occupational pattern & livelihood	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	Increased literacy rate in the 3 districts	Increased literacy rate	Additional opportunity in agriculture and other sectors due to rising literacy
Awareness & capacity building	Decreased gap in gender literacy	Decreased gap in gender literacy	Additional opportunity in agriculture and other sectors due to rising literacy
Shift in occupational pattern, livelihood & migration	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	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	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	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
Health	Major source of drinking water is India Mark II	Major source of drinking water is India Mark II	Rain water harvesting can reduce the dependence on India Mark II for drinking water
Health	Increasing trend in number of beds in PHCs and hospitals in Amethi and Raebareli and declined in Barabanki Decreasing number of PHC's and hospitals in Amethi and Barabanki and increasing numbers in Raebareli.	Decreasing number of PHC's and hospitals but increasing number of beds per lac population.	Project will not have any implication on health infrastructure

Major Social Issues	Major findings in Amethi, Barabanki and Raebareli district	Major findings in Project area	Stakeholder's Recommendations/Suggestions as outcome of Proposed Project Intervention
Dependence on electricity	100% villages are electrified.	100% villages are electrified.	Reduced load on electricity due to reduced load on tube wells for irrigation
Connectivity to Agri market infrastructure	Increased road density	Increased road density	Road infrastructure will be improved
Livelihood	Increasing reservoir fish production	Increasing reservoir fish production	Increasing water availability in reservoirs will improve fish production and additional source of livelihood
Water & soil contamination	Increase in consumption of fertilizers	Increase in consumption of fertilizers	Increased usage of fertilizers in the project

Chapter 4: Lower Ganga Canal Command Area and Haidergarh Branch Environmental Setting & Environmental Baseline

4.0 Background

Lower Ganga Canals System irrigates major parts of Uttar Pradesh one of the most fertile tracts of the country. Environmental status of the Lower Ganga Canal Command Area and Haidergarh Branch has been assessed based on, Land use, Soil environment, Water environment, Forest and biodiversity. The baseline indicators have been developed considering 2000-01 as benchmark year. At first, an attempt has been made to fix the baseline by using secondary data of previous/ subsequent years particularly of the benchmark year followed by Field Group Discussions to identify issues and problematic areas. Broad parameters for the environment study to understand the pre & post environmental impact due to the proposed project are-

- Natural resources features like Physiography & Drainage, Geology & Mining, Climate conditions
- Land environment
- Water Environment including drinking water supplies, health status, health services, occurrence of diseases,
- Air Environment
- Biological Environment comprising of flora, fauna, aquatic life, endangered species, migratory birds etc
- Canal System Performance including drainage including waterlogged and saline areas.
- Archeological monuments

Environmental status of the Phase – II area under Lower Ganga Canal & 23 down Haidegarh Branch has been assessed based on natural resources features like Physiography & Drainage, Geology & Mining, Climate conditions, Land use, Soil environment, Water environment, Forest and biodiversity. The baseline indicators have been developed considering 2000-01 as benchmark year. Each of these items are described in following sections.

4.1 Environmental Status of Lower Ganga Canal (LGC) Command Area

Lower Ganga Canal Command Area lies between 27º20' 27.31"N, 25º18' 50.18"N and 80º36' 47.06"E, 83º55' 35.99" E. It comprises of 12 districts of Uttar Pradesh with a total area of 30, 619 sq.kms. which is 12.7 % of the total geographical area of the State (2,40,928 sq.kms). Geographically, LGC Command Area is a part of Ganga Basin with a number of major rivers Ganga, Gomti, Ghaghra, Kalyani and Sai. The districts/blocks considered for the study are given below:

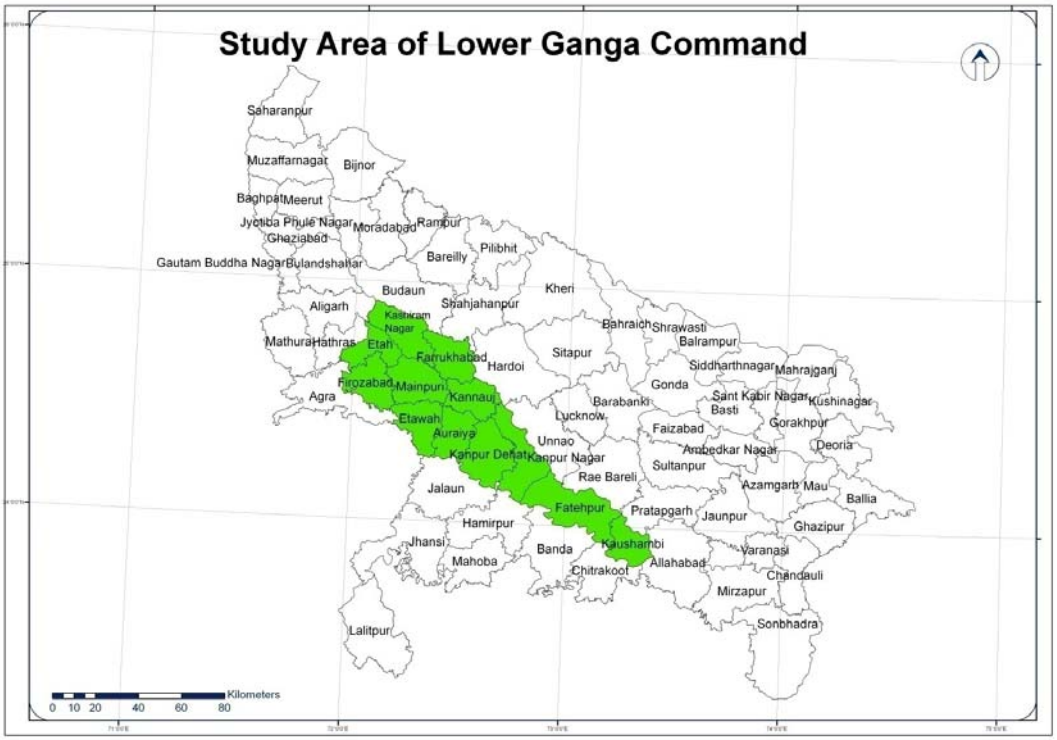


Figure 4.1: Study area of LGC

Sr. No.	Districts in LGC Command	No. of Blocks in LGC Command	Name of Blocks
1.	**Aurraiya**	7	Erwakatra, Vidhuna, Achhalda, Aiehar, Bhagyanagar Ajeetmal ,Auraiya
2.	**Etah**	8	Sheetalpur, Sakeet, Marhara, Nidhauli 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, Vijaipur, Dhata, Malwa, Dvmai, Amauli ,Khujuha
6.	**Firozabad**	9	Firozabad, Eka ,Madanpur, Jasrana, Toondla, Narkhi ,Shikohabad, Aoraon, Hathwant
7.	**Kannauj**	7	Kannauj, Jalalabad, Umarda, Chibramau, Talgram Saurikh, Haseran
8.	**Kanpur Dhat**	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.	**Kashiram Nagar**	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**	

4.2.1 Environmental status of Phase-II area Under 23 down Haidergarh Branch Command

The proposed study area falls in Sharda Sahayak Command Area and lies between 26º41` 4.53``N, 26º23`52.44 ”N and 81º18`10.74`` E, 81º48`2.77``” E. It comprises of 3 districts of eastern (Barabanki, Raebareli and CSM Nagar) Uttar Pradesh. Geographically, Sharda Sahayak Command Area is a part of northern India with a number of northbound potential major rivers Ganga, Gomti, Ghaghra, Kalyani and Sai. 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.

4.2.2 Land Environment

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

4.2.3 Physiography

LGC

Lower Ganga Canal Command Area is under Ganga Basin Command which is a part of the Indo–Gangetic alluvium plains, which is drained by a number of major rivers 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 4.2**.

Figure 4.2: Physiographic Features of Lower Ganga Canal Command Area

The tract from Aligarh to Kaushmbi lying between the two great rivers is a wide expense of level alluvial plains with gentle slope in south east direction. 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 wide spread and increases in intensity from north- west to southeast.

In Etawah and Kanpur districts, these eroded areas have assumed formidable size, may be several kilometers wide with deep gullies. The tract on the western side of river Yamuna in Mathura and Agra districts presents a different appearance. In the western most parts of Agra and Mathura districts are found a chain of low rocky hillocks generally as isolated outcrops but at places as continuous formation. These ranges from part of Aravalli system but now here assume any considerable size.

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. From the old high banks to the course of the main stream, the whole area is partially or at places completely affected by the fluvial action of the river making the whole tract precarious in nature. These areas are locally known as Diara and are met with along almost all the rivers draining this tract but the magnitude is not as extensive as along with the Ganga River. Other smaller rivers draining the central alluvial tract are Kali Nadi, Sengar, Rind and Pandu.

Aurraiya:

Auraiya lies entirely in the Gangetic plain, but its physical features vary considerably and are determined by the rivers which cross it. The area of Etawah and Auraiya districts is divisible into four portions of distinct natural characteristics. The first of these consists of area lying north-east of the Senger river, which runs across it from west to east almost parallel to the Yamuna; it includes the northern portions of tahsils Etawah and Bharthana. The second tract lies south of the Senger and extends as far as the high lands immediately overlooking the Yamuna. It comprises a slightly undulating terrain covering portions of Etawah and Bharthana and the bulk of a Auraiya Tehsil of Auraiya District. The tract includes the parts of some tehsils that adjoins the river Yamuna. Beyond the Yamuna, stretching from the borders of tahsil Bah in Agra to the confluence of the Sindh, Kuwari, Chambal and Yamuna rivers, lies the high and broken area formerly known as Janibrast. These tracts differ from each other in a very marked degree though each presents general conformity within its own limits.

Soil: In the Pachar and Ghar tracts the soils are broadly distinguishable into dumat or loam, matiyar or clay and bhur or sand. Besides these are found everywhere low-lying beds of clay in which water collects during the rains and rice alone can be grown; these clay beds are known as Jhabar. In the Kurka and trans-Yamuna tract, several other classes of soil are metwith. In the ravines of the river and the land immediately adjacent to them are found fields full of kankar and gravel, the soil of which is called Pakar; this is in fact a sandy soil mixed with gravel. Below the ravines and in the wider valleys between them, the soil that is flooded by the Yamuna is called kachhar; and along the edges of the streams there is a rich strip of alluvial deposit which is known as Tir. Both kachhar and tir vary greatly in quality: some patches of these soils consist of a rich reddish clay; other portions are composed of a dark colored loam; and others again are white and sandy in appearance and less fertile.

Etawah: Etawah lies in the southwestern portion of **Uttar Pradesh** 26° 47" north latitude and 72° 20" east longitude and forms a part of the **Kanpur** Division. In shape it is a parallelogram with a length from north to south 70 kms. and East to west 66 kms. on one side and 24 kms. on the other side. It is bounded on the north by the districts of **Farrukhabad** and **Mainpuri**, while the small extent of western border adjoins tahsil Bah of the Agra district. The eastern frontier marches with the district of

Auraiya, and along the south lie Jalaun and the district of **Gwalior**, the division line being, except for a short distance, the **Chambal** and **Yamuna** rivers. The total area in 1999 is calculated to be 2434 Km. Etawah lies entirely in the **Gangetic** plain, but its physical features vary considerably and are determined by the rivers which cross it. It is divisible into four portions of district natural characteristics. The first of these consists of the area lying north-east of the **Senger** river, which runs across it from west to east almost parallel to the Yamuna; it includes the northern portions of tahsils Etawah and Bharthana. The second tract lies south of the Senger and extends as far as the high lands immediately overlooking the **Yamuna**. It comprises a slightly undulating area covering portions of Etawah and Bharthana and the bulk of a Auraiya Tahsil (now in Auraiya District). The tract includes the parts of some tahsils that adjoins the river Yamuna. The northern portion of the district, which is separated from the rest by the **Sengar** is known as **Pachar**. It presents a level expanse of upland, of which the surface is only broken by occasional sandy ridges or by one or two inconsiderable streams such as the **Pandu** and **Arind** or **Rind**, and the latter's tributaries, the **Ahneya** and **Puraha**. The soil is for the most part a rich loam of great fertility, interspersed with large tracts of *usar* and frequently varied by beds of clay, the centers of which form marshes or *jhils* out of which rise some small streams. The second tract between the **Sengar** and the **Yamuna** locally known as the **Ghar**. Its characteristic soil is a red a light but fertile sandy loam. The surface, which is not quite level, lies lowest nearly midway between the two rivers and one like the pachar, the Ghar is a plain of culturable soil unbroken by *usar*, while in the depressions the clay is found in much smaller beds. Here and there the ground rises into hillocks of sand and *bhur*, but these are for the most part confined to the **Bharthana** tehsil. In the **Pachar** and **Ghar** tracts the soils are broadly distinguishable into *dumat* or loam, *matiyar* or clay, and *bhur* or sand. Besides, these are found everywhere low-lying beds of clay in which water collects during the rains and rice alone can be grown; these clay beds are known as *Jhabar*. In the **Kurka** and trans-Yamuna tract several other classes of soil are metwith. In the ravines of the river and the land immediately adjacent to them are found fields full of *kankar* and gravel, the soil of which is called **Pakar**; this is in fact a sandy soil mixed with gravel. Below the ravines and in the wider valleys between them the soil that is flooded by the **Yamuna** is called *kachhar*; and along the edges of the streams there is a rich strip of alluvial deposit which is known as *Tir*. Both *kachhar* and *tir* vary greatly in quality.

Farrukhabad: Farrukhabad is situated between Lat. 26° 46' N & 27° 43' N and Long. 79° 7' E & 80° 2' E. It forms a part of Kanpur division. It is bounded by Badaun & Shahjahanpur on the north, Hardoi on the east, Kannauj on the south and Etah & Mainpuri on the west. The district is a level plain varied only by a few gentle undulations and slopes, sometimes abrupt, which lead down to the river valleys. The highest recorded elevation is 167m. above sea level at Mohammadabad and the lowest 145.69 m. at Mau Rasulpur in the Trans Ganga flats of Tehsil Farrukhabad. The only marked variation of level is between the two divisions, the upland or bangar, which is a continuation of the doab and the low lands or Tarais, cut away from the upland by the erosive action of the rivers. The climate of the district is characterised by a hot dry summer and a pleasant cold season

Fatehpur: District Fatehpur was setup on 1826 A.D. as a separate district, taking fertile land lying in between river Ganga & river Yamuna. River system comprises of Ganga, Pandu Nadi, Bari Nadi, Yamuna, Nun, Rind, Chhoti Nadi, Sasur Khaderi. Geologically the district is formed by Sub-Recent to Recent rocks composed of the ordinary Gangetic alluvium. The alluvium probably rest on the north-eastward sloping basement consisting of gneisses, granites, and patches of Vindhyan rocks. The district is not rich in economic mineral deposits. However, there are appreciable ground-water potentialities besides building materials like sand from the bank of the Ganga, gravel (moram) from the Yamuna and clays, silty clays in the alluvium suitable for brick manufacture. The climate of the district is characterized by a hot summer and a pleasant winter. The cold season from about middle of November

to February is followed by hot season from March to middle of June. The period from mid-June to the end of September is south-west Monsoon season. Records of rainfall in the district are available for three stations namely Fatehpur, Khajwa and Khaga. The average annual rainfall in the district is 906.2 mm(35.68"). The rainfall varies from 870.3 mm(34.26") at Fatehpur to 926.8 mm (36.49") at Khaga. The highest rainfall 168% of the normal occurred in 1915 and lowest rainfall 60% of the normal occurred in 1918. Max. Temp is 45-48 Deg. C. During May & June and Min Temp is 3.0-8.6 Deg. C. during December & January.

Firozabad: Firozabad is located in western Uttar Pradesh about 40 kms. away from Agra and around 240 kms. away from Delhi, at the northern edge of the Deccan Plateau, at 27°09′N 78°24′E / 27.15°N 78.4°E / 27.15; 78.4. The height above sea level is 164 meters (540 ft). The boundaries of Firozabad district touch Etah district in north and Mainpuri and Etawah districts in the east. The Yamuna river makes its southern boundary. The area of the district is about 0.8% of total area of Uttar Pradesh, and the population is 1.1% of the state's total population. Approximately 73.6% of the population lives in rural area. More than half of the workforce is engaged in manufacturing activities. The city is also an important market center. It has severe winter and summer seasons. The district is mostly flat and its slope is from northwest to south.

Kannauj: Kannauj district lies between 27 degree 13 min 30 sec North latitude and from 79 deg 19 min to 80 degree 1 min east longitudes. The district was carved out of the erstwhile Farrukhabad district on September 18, 1997. The district is situated in Kanpur Division. Its North border touches Farrukhabad District, at it's east Hardoi District is situated, Kanpur dehat is at its south east border while western and southern borders touches District Mainpuri and Etawah respectively. The district is divided into three tehsils and eight development blocks. It is almost rectangular shaped district. Ganga is the main river of the district at the North East border of the district, Kali and Ishan rivers are in other parts of the District. Kali river is at the northern border of the district while Ishan flows in between the District. Average rain fall of the District is approximately 80 cms. The climate of the district is characterized by a hot dry summer and a pleasant cold season.

Kanpur Dehat is surrounded by districts Kanpur Nagar, Hamirpur, Jalaun, Etawah and Kannauj. River Yamuna divides Kanpur Dehat and Jalaun. The district name has been changed to Kanpur Dehat on 30/07/2012. Earlier Kanpur Dehat district was renamed as Ramabai Nagar on 1-7-2010. Initially this ditrict was with Kanpur and then divided and got the name as Kanpur Dehat in year 1977.

Kanpur Nagar: Kanpur is the biggest city of the State and is main centre of commercial and industrial activities. It is also called the commercial capital of the State.

Kashiram Nagar: Kanshiram Nagar District, popularly known as Kasganj was created on April 17, 2008 by dividing Etah district. Kanshiram Nagar the newly created district is among the four districts of Aligarh Division. Kanshiram Nagar includes three Tehsils kasganj, Patiali and Sahavar. Area of Kanshiram Nagar District is 1993.08 sq kms. Kanshiram Nagar district is surrounded by Farrukhabad in east, Aligarh in west, Etah district in north and south is surrounded by Badaun. The town has got a prominent geographical feature in the shape of Kali river. The river originates in Doon Valley and merges with Hindon river in Ghaziabad which subsequently merges with river Yamuna. The Kali river has also got two canals which pass over the river through the two aqucducts specially made for this purpose. This system of river and canals bridges also served as a flood control mechanism where in case of floods, the excess water could be drawn from the river with the pump set and drained through in the canals. The town is situated on a plain flatland with rich alluvium soil and not so deep water table. This makes the land fertile for agriculture

Kaushambi: Kaushambi district was carved out of Allahabad district on 4th April 1997. The District Headquarter, Manjhanpur is situated in the south-west of the Allahabad on the north bank of the Yamuna river,about 55 kms away from Allahabad. District Kaushambi is situated in the west of Allahabad district. In the North of the district Pratapgarh, in the south Chitrakoot, In the east Allahabad, in the west Fatehpur districts are located. The total geographical area of the district is 2012.8 sq. kms. The district is divided into three tehsils named as Manjhanpur, Sirathu & Chayal. Tehsils are divided into Development Blocks. Sarsawa, Manjhanpur & Kaushambi are the development blocks in the Manjhanpur tehsil, Kada & Sirathu are the development blocks in the Sirathu Tehsil, Chayal, Mooratganj, Newada are the development blocks in the Chayal tehsil. The Ganga & The Yamuna are the main rivers of the district. The plain area of the district is situated in between Ganga & Yamuna so these rivers play a very pivotal role in the agriculture of the district. In the summer season the weather is too hot and in the winter the weather is very cold. But in the rainy season the weather is good and pleasant. The District Kaushambi is mainly agricultural district in which the main crops are wheat and rice. Some area is cultivated under pulses like Arhar, Urad and Chana. The famous Allahabad variety of Guava is actually the speciality of Kaushambi. The principal sources of irrigation are canals and tubewells.

Mainpuri: Mainpuri is a District of Agra Division, Uttar Pradesh, India, is bounded on the North by Etah District, on the East by District Farukkhabad and Kannauj, on the South by District Etawah and on West by the District Firozabad and Etah. It lies between North Latitude 26^0 53' to 27^0 31' and East Logitude 78^0 27' to 79^0 26'. The area of the district is 2745 sq. k.m. and population is 13,11,492 in 1991. Topography of the district generally presents the appearance of an extensive level plain broken only by the sand ridges on the western border, the rolling sand hills and undulations of the Kali and Isan rivers, and the ravines along the Yamuna to the south-west. The Kali Nadi forms the boundary of this plain on the north and north-east and the Yamuna encloses it on the south-west. Both these rivers flow towards the south-east, and between them, in almost parallel courses, run the four smaller streams, the Isan, the Arind, the Sengar, and the Sirsa, following the general slope of the country from north-west to south-east. Taking the district from north to south, the average fall of the rivers, excluding the Yamuna, in 1.5 feet per mile, and the average slope of the surface of the country is 1.2 feet per mile. A line of levels taken across the district from the Yamuna to Kali shows that the watershed of the streams running through it at the point of intersection are almost exactly the same height above the level of the sea. The highest point in the district is only 139 feet above the lowest. Generally soils of the district are typical of those found elsewhere in the **Indo-Gangetic** plain, and are classified on two principles according as the distinctions recognised are natural or artificial. Of the natural divisions, **Bhur** is the name of the soil containing a large proportion of sand, while M**atyar** is the name of that containing a large proportion of clay, and between these two extremes is a loamy soil called **Domat** having clay and sand more evenly divided as its name implies. A lighter soil than Domat is known as **Pilia**, coming between Domal and Bhur. The distribution of these soil appears to be connected with the rapidity of the drainage of surface water from almost flat alluvial plain, for sand is found wherever there is a river with a comparatively deep bed within a few miles, and clay is common east near swamps and other ill-defined drainage lines, and it is manifested that the finer particles of clay having a low inertia are washed out of the higher tracts into the depressions and deposited under favourable circumstances, but where the drainage is too fast to permit of their being deposited they are carried down. The barren soil known as ***Usar*** found at the heads and partly down the courses of the smaller rivers such as **Ahnaiya** and **Puraha,** the **Sengar** and **Arind** and the numerous minor streams, and appears to be a clayey deposit too compact to permit cultivation in places too impregnated with Reh and other deleterious minerals substances to permit growth of even grass.

Haidergarh Branch

Haidergarh Branch command Area is under Sharda Sahayak Command, which is a part of the Indo–Gangetic alluvium plains, which is 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, Jaunpur and Joins Ganga at downstream of Varanasi. 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 4.3**.

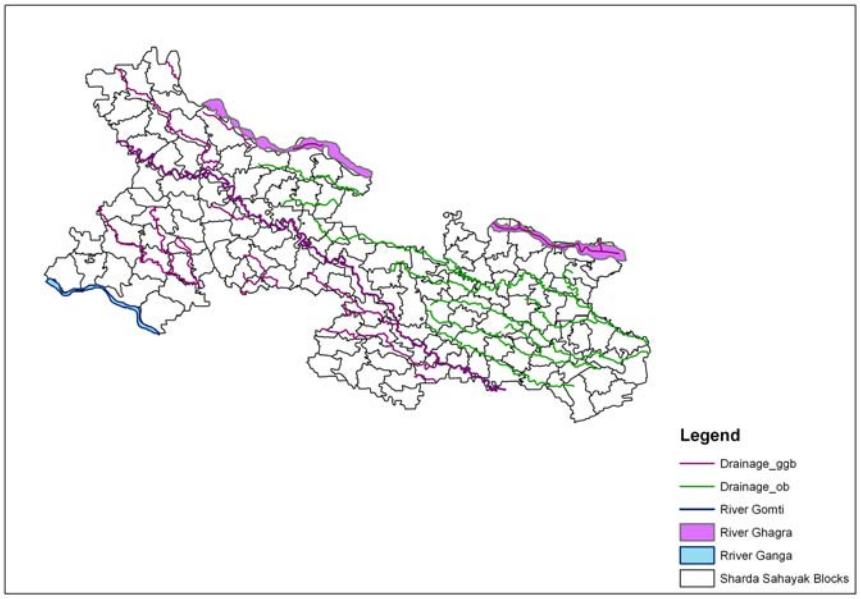


Figure 4.3: Physiographic Features of Haidergarh Branch

The salient features of the districts falling in 23 down Haidergarh Branch Command Area are described below.

CSM Nagar: Chatrapati Shahuji Maharaj Nagar District has been created in year 2010, which comprises of Shukul Bazar & Jagdishpur blocks of Sultanpur Districts and Singhpur Block of Raebareli District within the Haidergah Command area.

Barabanki: District Barabanki lies between Latitudes 26° 30' N and 27° 19' N and Longitudes 80° 58' E and 81° 55' E. The area of the district is 4402 sq. kms.with total population of 2424836. The district can be topographically divided into three main regions. First is TARAI region, the area in the North East towards river Ghaghra; Second is GOMTI PAR region, the wide area from South West to South East of the district and the third is called the normal region, which is situated at some height to the Gomti Par region. The whole tract is gently undulating land with gentle slope from the North West to South East. The district is well fed by rivers Ghaghra, Gomti and Kalyani with their tributaries for major part of the year, although some of them dry out during summers and create havoc during rainy season by flooding. The climate of the district is sub-humid.

Raebareli: The district is irregular in shape but fairly compact. It forms a part of the Lucknow Division and lies between Latitude 25° 49' N and 26° 36' N and Longitude 100°41' E and 81°34' E. The district,as a whole, is fairly compact tract of gently undulating land. The elevation varies from about 120.4 amsl above sea level in the north west to 86.9 amsl above sea level in the extereme South East, on the banks of the Ganga. The highest points are the crowns of the watersheds of the different drainage channel which serve to divide the district into five main physical units. The Ganga Khadar, the Ganga upland, the southern clay tract, the central tract or the Sai upland and the Northern clay tract. The district is drained by the Ganga, the Sai and their tributaries although some of them join the main stream after passing through the district. This district lies in the vast Gangetic plains of North India at an elevation of 100 to 120 metres amsl, sloping gently to South East. Relief from the summer heat arrives with the mansoon in second half of June, through the weather may often remain sultry. The winter sets in November and last upto February.

4.2.4 Geology & Minerals

The area is part of the Indo-Gangetic alluvium as is clear from the Geohydrological map of U.P 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 Sainta near Allahabad 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 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.

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. A detailed fence diagram given in **Annexure 4.1.** The underground aquifer configuration of the command area. However the detailed geological conditions in some of the districts are described in the following paragraphs.

Etah: There are two more or less continuous sand layers of fine to medium sand occur at a shallow depth. The second aquifer layer of medium to coarse sand occurs below 30 meters (100ft.). These two layers of sand are the main source of supply to the private irrigation works. The ground water in the first aquifer occurs under unconfined conditions while in second aquifer ground water occurs under semi–confined condition. At places, lenses of sand layers have also been encountered in the tube wells which form local aquifers with limited areal extent.

Mainpuri: The sediments that underlie this area up to depth of 150 meters principally comprise clay, sand of various grades and clay mixed with kankar. The subsurface distribution of the alluvial deposits in the area indicates that present day alluvial deposits in the area indicates that the present day rivers Yamuna, Kali, Sengar, Sirsa, Arind and Isan have been the chief agents of deposition during the development of the sedimentary sequence.

The first aquifer zone has generally been tapped for the construction of masonry dug wells and private cavity type tube wells at some places. Texturally this horizon varies from fine sand to medium grained sand. Ground water in this horizon is unconfined. The next aquifer consists of a 15.5 m thick strip of medium to fine grained sand and is underlain by thick layer of clay with kankar which causes vertical leakage of water from top aquifer to lower aquifer. Ground water in this second aquifer occurs under semi– confined conditions. Beside these two prominent aquifer zones, there are some lenticular sand

beds of small extent in Mainpuri, Ghiror Blocks. The lenses up to 45 m depths are of medium grained sand as pierced by S.T.W number.15 of Mainpuri group. The tube well pierces several thin lenses of sand having thickness of a couple of meters to 16 m. On the whole the top aquifer varying in thickness from 15 to 45 m can be very well utilized for the construction of masonry wells and shallow tube well which can yield sufficient water for minor irrigation.

Etawah: To study the sub surface geology of the district, the litho logs of some deep wells as well as some private shallow tube wells studied. The geological cross section depicts the sub surface geological conditions and aquifer position in the area. On the perusal of fence diagram, it is concluded that the top clay layer is thick towards Yamuna River. The first sand layer is encountered below 23 m which is more than 30 m thick. The sand is medium to coarse granite moram, which has been derived on disintegration of Bundelkhand Granite along Yamuna River. Aquifer at shallow depth occurs in from of lenses of fine sand below 45 m to 60 m depth a continuous sand layer of medium to coarse texture is encountered. Ground water in the area occurs under unconfined to semi – confined conditions.

Kanpur: The sub surface geological information of the litho logs of state and private tube wells of the area indicates the aquifer disposition in the Kanpur districts. On the perusal of these sections, it is concluded that the top clay layer is thicker towards Yamuna River. The same layer is encountered generally below 15 m to 21 m in northern parts of the districts but along Yamuna River this depth is considerably greater. The maximum thickness of the aquifer is about 90 m as encountered in state tube wells. The aquifer material is mostly medium to coarse grained moram which has been derived on disintegration of Bundelkhand Granite along Yamuna River. Along Ganga River the aquifer material is composed of fine to medium grained sand. This aquifer is continuous throughout the district area. However, along Ganga River, this aquifer is divided into two or three horizontal layers by clay with kankar. Ground water in this aquifer occurs under unconfined to semi confined conditions.

Kaushambi: The sub surface geological information furnished by the study of tube wells reveals that the private tube wells tap the aquifer below 30 m to 60 m. This aquifer is mostly composed of fine sand with some patches of course to medium sand. At some places kankar is also present. The aquifer is reliable and can supply sufficient water to private tube wells.

Aligarh: Top layer in the area consists of clay varying in thickness up to 20 m. Thereafter deposit of fine sand is encountered which is the main aquifer. This aquifer extends generally up to the depth of 45 m. below this there is again a clay layer followed by a fine sand aquifer. At some places inter lenses of clay layer exist in the sand aquifer. Thickness of the aforesaid aquifers varies widely from place to place.

Farrukhabad: The district is a part of indo gangetic alluvium comprises of clay, kankar, silt and sand of various grades and of different textures. This indo-gangetic alluvium has been classified by Wadia (1961) and Krishnan (1960) under older and newer alluvium. The older alluvium forming the higher land, is not generally flooded by rivers year after year. In brief geology of the area can be written as consists of unconsolidated formation of quarternary arid having clay silts of various grades with Kankar.

The sub surface geological information is furnished by the study of geological cross section as well as by the study of litho logs of state and private tube wells. The geological cross sections reveal that up to depth of about 150 meters, the formation consists of alternate layers of sand and clay. The sand formations act as potential aquifers. The top aquifers behave as unconfined ones, while the deeper ones

act as confined with leakage from top; the development of ground water is both by shallow and deep tube wells.

Fatehpur: At the top of there is a 5 to 7 meters thick surface clay layer followed by a 25–30 meters thick clay band after which sand formation occurs. These sand horizons act as top unconfined water table aquifer and sustain the shallow private tube wells.

Agra: Two distinct types of geological units are found in Agra district. South western part of the district is composed of red colored sand stone of Vindhyan age and rest of the area is covered by Indo-gangetic alluvium. A brief geological description of both the units is given below.

South Western Area near Fatehpur Sikri: This area is covered by the sand stone belonging to Vindhyan system. The rocks near the hillocks are covered by the thin layers of alluvium. The bedding is generally obscure. The colour of the sand stone in this area is red because of oxidation phenomenon in presence of iron (Fe) contents. The alluvium cover overlying these rocks comprises *in situ* or transported pieces of hard rocks. The sediments deposited in this area are not fully mature. The grade of sediments ranges from fine to very coarse and their admixture. After the study of their texture it has been concluded that they are *in situ*, their shape, size and roundness range from poor to good as one move towards the river Chambal. In this area ground water occurs in the fractures joints and fissures. In hard rock area where the bedding is perfectly marked ground water occurs along bedding planes.

Area towards River Yamuna: This area is covered by the great Indo Gangetic alluvium of the quaternary age. The gangetic planes are built up of various grades of sand, clay, kankar and their mixture. These layers have been deposited by the flowing rivers during Pleistocene to recent period. These layers form the main water yielding horizons for private and state tube wells.

4.2.5 Geology & Minerals 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. These are classified as

i) Phreatic aquifers up to depth of 50 m below ground level;
ii) Shallow aquifers between 50 m to 150 m below ground level,
iii) Medium deep aquifers between 150 m to 300 m below ground level and
iv) Deep aquifers between 300 to 500 m below ground level.

These 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 main source of water for drinking purposes. Geology minerals in the study area is given in **Figure 4.4**.

Figure 4.4 :Geology & Minerals in Haidergarh Command Area

4.2.6 Soils Quality

LGC

The soils found in Lower Ganga Canal Command area and soil pattern of LGC Command Area is shown in **Figure 4.5**. Majority of the soils found in LGC are Typic Haplustepts with Typic Ustistamments on the upper Northern and Soutern periphery of the area. In the middle of top part of study area Rock Outcrops with Typic Haplustalfs have been observed.

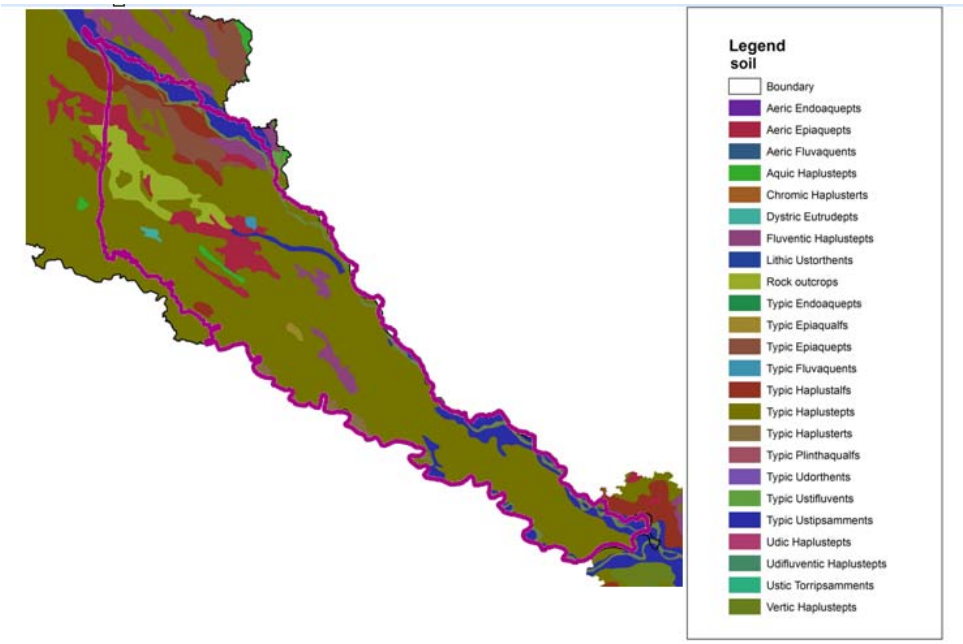


Figure 4.5: Soil Map of Lower Ganga Canal Command Area

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 CSM Nagar. The soil pattern of Haidergarh Command Area is shown in **Figure 4.6**. Based on this soil pattern, the districtwise soil pattern is described below.

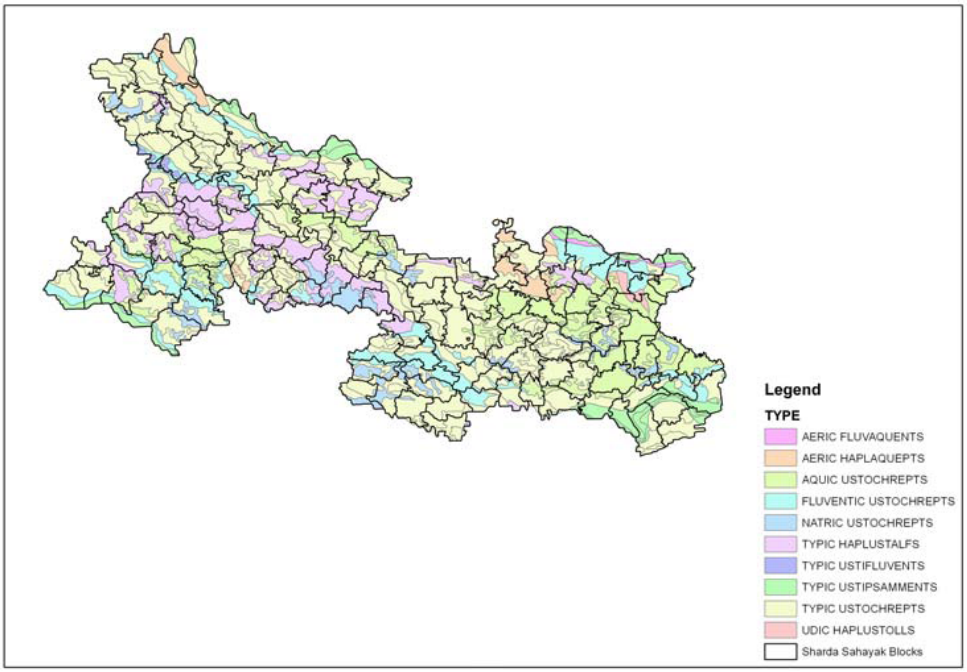


Figure 4.6: Soil Map of Haidergarh Branch

District CSM Nagar: The district falls in Ustochrepts subgroup. The soil group under this classification indicates deep, moderately well drained, fine, mont-morillonitic soil on very gentle slopes with lomy surface and slight erosion.

District Barabanki: The district falls in Typic Ustipsamments having excessive drainage on very gentle sloping landscape. The active flood plain is noticeable in parts of Pure Dalai, Ramnagar, Suralganj and Fatehpur blocks and has moderate flood hazards. In general, most old alluvial plain have normal soils with argillic B horizon qualifying for Aquic Haplustalfs having deep, well drained fine loamy soils in parts of Haidergarh, Dalai blocks. Another subgroup has fine silty textural family with imperfect drainage. Another subgroup of Typic Ustochrepts with cambic B-horizon is extensive fine loamy soils on nearly level landscape in parts of Dewa, Nindaura and Banki. The fine loamy soils on very gentle slope with slight erosional problems are found in part of Banki and Harakh blocks.

District Raebareli: The major soil scapes found in the district are:

i) Active flood plain,
ii) Recent alluvial plain,
iii) Old alluvial plain and
iv) Old alluvial plain with abundant channels, Ox-box and Bars.

A linear stretch along the southern border area has active flood plain covering parts of Saronni, Lalganj, Dalmau, Jagatpur and Uchahar blocks. They are deep, sandy, excessively drained soils belonging to Typic Ustipsamments with moderate flood hazards.

4.2.7 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 4.7**.

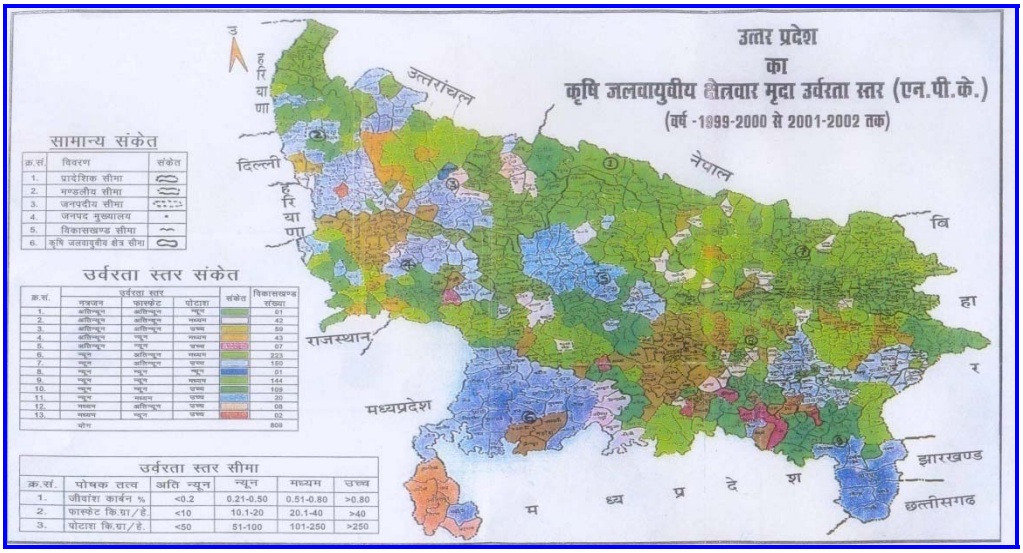


Figure 4.7: The Soil Fertility\Health Map of the Project Area

4.2.8 Macro-nutrient Status

Districtwise Macro nutrient status in 2009-10 is given in Table 4.1
Nitrogen Status: The average available nitrogen status has been reported low in all districts of LGC which is similar with state average. However, in Aurraiya district available nitrogen is reported very low.

Phosphate Status: The low to very low phosphate status has been reported in all districts of LGC,

Potassium Status: The medium to high potassium status has been reported in all districts of LGC.

Table 4.1: District wise Soil Fertility Status (2009-10)

District	No. of Samples	Element Index			Fertility Level		
		N	P	K	N	P	K
Kaushambi	18878	1.80	1.79	3.31	L	L	H
Fatehpur	14007	1.82	1.76	3.31	L	L	H
Kanpur Nagar	25648	1.83	1.85	3.17	L	L	M
Kanpur Dehat	25810	1.84	1.84	3.03	L	L	M
Farrukhabad	19286	1.86	1.97	3.05	L	L	M
Kannauj	17570	1.78	1.73	3.00	L	VL	M
Etawah	25224	2.07	1.94	3.39	L	L	H
Aurraiya	18256	1.75	1.75	3.05	VL	VL	M
Firozabad	19427	1.77	1.82	3.61	L	L	H
Mainpuri	21872	1.98	1.29	3.53	L	VL	H
Etah	19102	1.85	1.06	3.59	L	VL	H
Kashiram Nagar	12180	1.88	1.05	3.60	L	VL	H
UP Total	1767171	1.88	1.69	3.09	L	VL	M
H-High, L-Low, VL-Very low & M-Medium							

Micro-nutrients Status

Districtwise micro nutrients status in 2007-08 & 2009-10 is given in Table 4.2 & Table 4.3.

Sulphur: The deficiencies of sulphur were reported in Mainpuri and Etah while other districts data sshows 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: The Sufficient Copper is reported in all districts of LGC except it is found medium in Etawah, Etah & Kashiram Nagar 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: The Sufficient Iron is reported in all districts of LGC except it is found medium in Etawah, Etah & Kashiram Nagar during the year 2005-08. In year 2009-10 iron contents were reduced and usually found medium. Iron was found deficient in Mainpuri.

Manganese: The Sufficient Manganese is reported in all districts of LGC except Etah & Kashiram Nagar where is reported as medium. In year 2009-10 iron contents have reduced

Table 4.2: Micro-nutrients and precision element index, 2005-06 to 2007-08

Sl. No.	District	No. of Samples	Sulphur		No. of Samples	Element Index				Level			
			Element Index	Level		Zn	Cu	Fe	Mn	Zn	Cu	Fe	Mn
1	**Kaushambi**	85	2.43	M	703	2.09	2.894	2.60	2.88	M	S	S	S
2	**Fatehpur**	364	2.35	M	1142	2.03	2.934	2.522	2.76	M	S	S	S
3	**Kanpur Nagar**	290	1.90	M	290	2.09	2.52	2.69	2.82	M	S	S	S
4	**Kanpur Dehat**	374	2.16	M	359	2.32	2.614	2.714	2.99	M	S	S	S
5	**Farrukhabad**	241	2.22	M	1837	2.40	2.687	2.851	2.93	M	S	S	S
6	**Kannauj**	720	2.11	M	1050	2.46	2.687	2.806	3.03	M	S	S	S
7	**Etawah**	1227	2.70	S	1723	2.21	2.776	2.276	2.94	M	S	M	S
8	**Aurraiya**	1466	2.36	M	1446	2.26	2.774	2.531	2.95	M	S	S	S
9	**Firozabad**	0	0	0	199	2.77	2.981	2.706	2.92	S	S	S	S
10	**Mainpuri**	64	1.41	D	277	2.46	2.94	2.99	2.57	M	S	S	S
11	**Etah**	460	1.62	D	1700	2.14	2.313	1.838	2.29	M	M	M	M
12	**Kashiram Nagar**	0	0	0	446	2.14	1.92	1.757	2.22	M	M	M	M
	UP Total	134424	1.84	M	145511	1.77	2.71	2.31	2.57	M	S	M	S

D-Deficient, M-Marginal, S-Sufficient (Source: Department of Agriculture)

Table 4.3: Micro-nutrients and precision element index, 2009-10

Sl. No.	District	No. of Samples	Sulphur		No. of Samples	Element Index				Level			
			Element Index	Level		Zn	Cu	Fe	Mn	Zn	Cu	Fe	Mn
1	**Kaushambi**	209	2.19	M	209	1.72	2.80	2.17	2.62	M	S	M	S
2	**Fatehpur**	0	0	0	0	0	0	0	0	0	0	0	0
3	**Kanpur Nagar**	561	1.84	M	561	2.06	2.59	2.54	2.88	M	S	S	S
4	**Kanpur Dehat**	21	2.40	M	21	2.32	2.59	2.51	3.08	M	S	M	S
5	**Farrukhabad**	653	2.03	M	1476.9	2.33	2.70	2.75	3.08	M	S	S	S
6	**Kannauj**	706	1.90	M	536	3.04	2.77	3.03	3.12	S	S	S	S
7	**Etawah**	310	2.43	M	843	1.91	2.59	2.30	3.00	M	S	M	S
8	**Aurraiya**	395	2.35	M	385	2.27	2.72	2.52	3.00	M	S	S	S
9	**Firozabad**	0	0	0	1567	2.48	2.925	2.28	1.94	M	S	M	M
10	**Mainpuri**	155	1.35	D	155	2.38	1.75	1.43	1.83	M	M	D	M
11	**Etah**	0	0	0	0	0	0	0	0	0	0	0	0
12	**Kashiram Nagar**	0	0	0	0	0	0	0	0	0	0	0	0
	UP Total	82417	1.65	D	89412	1.65	2.53	2.03	2.41	D	S	M	M

D-Deficient, M-Marginal, S-Sufficient (Source: Department of Agriculture)

Haidergarh Branch

The soils of project area in general are very fertile. Available nitrogen concentration in soils in general ranges between low to very low. 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 **Table 4.4**.

Table 4.4: Block wise Soil Fertility Status (2009-10)

S. No.	District Name	Block Name	Number of Samples	Element Index			Fertility Level		
				N	P	K	N	P	K
1.	**CSM Nagar**	**Shukul Bazar**	1314	2.16	1.85	2.86	L	L	M
		Jagdishpur	1444	1.81	1.52	3.65	L	VL	H
		Singhpur	268	1.35	1.33	3.75	VL	VL	H
2.	**Barabanki**	**Trivediganj**	1228	1.97	1.60	2.84	L	VL	M
		Haidergarh	1200	1.97	1.66	2.93	L	VL	M
3.	**Raebareli**	**Shivgarh**	327	1.47	1.38	3.82	VL	VL	H

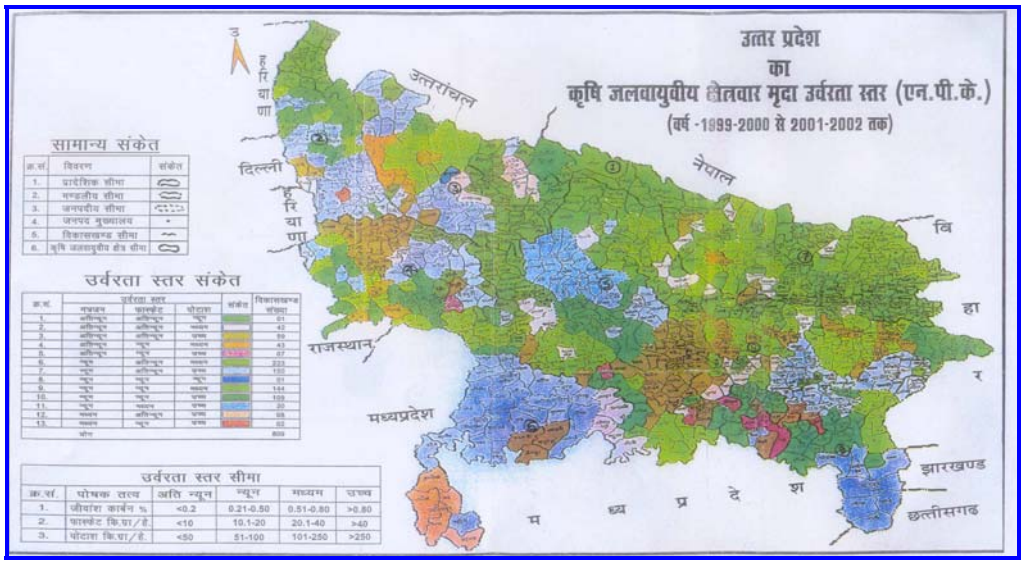


Figure 4.8: The Soil Fertility\Health Map of the Project Area

Macro-nutrient Status

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 CSM Nagar district.

Phosphate Status: The very low phosphate status has been reported in Shivgarh block of Raebareli, Haidergarh & Trivediganj blocks of Barabanki and Shukulpur and Singhpur blocks of CSM Nagar district while very low in Jagdishpur block of CSM Nagar 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 CSM Nagar

Micro-nutrients Status

The data of micronutrient deficiency for the districts is analyzed and has been reported in **Table 4.5.**

Table 4.5:Block wise Micro-nutrients and precision element index, 2009-10

S. No.	District Name	Block Name	Sulphur		Element Index				Level			
			Element Index	Level	Zn	Cu	Fe	Mn	Zn	Cu	Fe	Mn
1.	CSM Nagar	Shukul Bazar	2.00	M	1.91	2.43	1.98	2.85	M	M	M	S
		Jagdishpur	1.84	M	1.90	2.12	2.02	2.73	M	M	M	S
		Singhpur	1.22	D	2.10	2.60	2.70	3.00	M	S	S	S
2.	Barabanki	Trivediganj	1.71	M	1.66	2.13	2.27	2.30	D	M	M	M
		Haidergarh	1.84	M	1.60	2.39	2.23	2.41	D	M	M	M
3.	Raebareli	Shivgarh	1.49	D	2.10	2.60	2.40	2.80	M	S	M	S

Sulphur: The deficiency of sulphur is reported in all block of Raebareli and Jagdishpur & Suklabazar of CSM Nagar, 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: The Sufficient Copper is reported in all blocks of Raebareli (except Rohniya block), while medium is reported in Barabanki and CSM Nagar.

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.

Soil Fertility Status

- The surface soils in the study area are predominantly silty loam with moderately slow permeability and have ideal bulk densities; however, in few cases denser bulk densities are noticed. In few cases, silty clay loam soil type is also met with.
- Soil reaction ranges from neutral to moderately alkaline.
- A correlation of present NPK status with block NPK status shows overall improvement in organic matter N and available P; however, available K status shows depletion in CSM Nagar Sultanpur and Rae Bareli.

High Use of Fertilizer

- Barabanki show very slight depletion of available Potassium (K) and Phosphorus (P).
- Higher NPK are required for high yielding Paddy and Wheat varieties to increase crop productivity. Both Paddy and Wheat are dominant crops in the district; so, that farmers are using unbalanced fertilizer at the rate of 160-170 kg/ha to increase crop productivity.
- There is no pesticides build up, as such, the present usage in much below the harmful limits.

Sodic Land: major findings and conclusions drawn are given below.

- PH>9 can be considered as major indicator of sodic lands.
- Rae Bareli soils are slightly saline;
- Soil pattern suggest that soil support agriculture in all districts. Flood is major concern in some blocks of Barabanki, and Raebareli.
- The soils of project area in general are very fertile. Available nitrogen concentration in soils in general ranges between low to very low. 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.
- The deficiency of sulphur in soil was reported in Raebareli.
- The deficiency of Zinc in soil was reported in both the blocks of Barabanki district..
- The Iron deficiency in soil was observed in Tarun block of Faizabad, Puredalai & Banikodar block of Barabanki, Dostpur block of Sultanpur, Dharampur block of Jaunpur, Sadat block of Ghazipur, Mohammadpur block of Mau and Muhammadpur, Mirzapur, Jahanganj, Martinganj, Palhana & Maharajganj blocks of Azamgarh district

4.3 Land Use

LGC

The land use pattern in the command area is 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 as given in Table 15A, 15B and 15C of Annexure 3.1 and dicussed in Chapter 3. The summary of land use pattern in 2000-01, 2005-06 & 2008-09 is given in **Table 4.6**.

Land use data indicates that forest is reducing usually. Fallow Land and Barren & uncult. Land has been increased in recent years in Aurraiya. Gross irrigated area usually increased in all districts.

Table 4.6: Land use Pattern of LGC Command Area
(Year 2000-01, 2005-06 & 2008-09) in Hectare

District Name	Total Area	Forest	Barren Cult. Waste	Present fallow land	fallow barren & uncult.	to other than	Pastures non-	to	bush,	Net area sown	Area sown more than once	Gross area sown	Net irrigated area	Gross irrigated area
Aurraiya														
2000-01	200268	2725	7573	12938	5637	5885	17193	1390	5609	141318	82723	224041	120215	172005
2005-06	206126	10283	5223	11794	5716	7246	19857	1292	697	144018	88068	232086	121719	178085
2008-09	206126	4321	6942	11119	7351	8590	20173	1292	1680	144658	94178	238836	123961	188331
Etah														
2000-01	445892	3075	32214	16593	21718	6384	40720	834	1850	322504	187875	510379	284037	398105
2005-06	439635	3058	23095	15589	18159	5843	43430	597	1168	328696	213715	542411	316027	453553
2008-09	241121	144	12048	9272	9389	2319	20719	328	602	186300	110441	296741	182842	266932
Farrukhabad														
2000-01	219539	1021	4911	5053	7141	8985	23748	675	2953	165052	65380	230432	129315	162839
2005-06	219911	518	4663	24778	5199	6848	25340	609	4111	147845	66554	214399	126782	167160
2008-09	219911	518	4002	22994	4722	6229	28099	609	4027	148711	66182	214893	137427	178681
Fatehpur														
2000-01	421642	6096	11149	29846	15876	11236	46217	2196	5708	293318	118062	411380	185100	267154
2005-06	421475	5208	10477	30663	15419	10764	47735	2387	5900	292922	124566	417488	187631	273203
2008-09	422126	7615	10278	33682	14318	10449	48726	2676	5821	288561	111568	400129	197251	281436
Firozabad														
2000-01	235733	8611	3999	8130	8885	7990	20039	667	1434	175978	103076	279054	166221	198264
2005-06	241180	8611	3303	7751	7828	6759	23217	629	1497	181585	105835	287420	171752	211444
2008-09	241180	8611	3166	7563	7256	6552	24821	624	1095	181492	111801	293293	175569	216401
Etawah														
2000-01	246152	36103	6742	14307	6617	12314	20302	618	2026	147123	88567	235690	115390	169639
2005-06	240265	30140	7535	14266	4801	10918	23151	635	715	148104	91061	239165	123220	179153
2008-09	240265	36102	6036	18192	4616	7869	24029	531	758	142132	94222	236354	128343	186836
Kannauj														
2000-01	208974	4789	7764	8478	7490	11757	17216	2124	4144	145212	86917	232129	134976	167625
2005-06	208973	13414	4755	11127	6437	5693	17737	2054	3001	144755	83599	228354	131672	174137
2008-09	208973	13332	3879	14171	5727	5172	19082	2098	2124	143388	83063	226451	129030	176576
Kanpur Nagar														
2000-01	299435	1573	11481	19624	10938	22397	31159	3598	5596	193069	103601	296670	143209	183183
2005-06	299435	5656	9508	30747	7353	17524	36267	3688	3025	185667	82605	268272	130333	178674
2008-09	301326	5656	8775	30632	6145	15669	40996	3659	3106	186688	75556	262244	134969	177632
Kanpur Dehat	314984	5796	4248	164443	1007	17475	28044	376	223681	92253	315934	163140	210779	314984
Kaushambi														
2000-01	191230	960	5229	16107	7269	9177	23131	527	3999	124831	43251	168082	72184	91650
2005-06	185504	234	3992	7643	5201	8494	21924	531	4629	132856	43151	176007	90848	119310
2008-09	185504	702	3821	6439	4857	8132	22528	517	4075	134433	45400	179833	94104	127718
Kashi Ram Nagar														
2000-01	205999	1629	13818	6722	8458	2231	22812	330	1238	148761	79925	228686	117474	176067
2005-06	198090	2914	11233	6873	4951	3692	24490	258	778	142901	101019	243920	133921	202187

2008-09	198515	2914	10565	6938	7363	3545	24375	240	592	141983	102807	244790	126881	208895
Mainpuri														
2000-01	273060	2154	9254	15411	19836	18287	18689	1415	2127	185887	118650	304537	174457	271417
2005-06	272448	1774	7467	24028	16507	16378	19188	1353	1615	184138	151440	335578	182965	325254
2008-09	272723	1775	7383	20682	16160	16302	19680	1367	1612	187762	176439	364201	185894	354349
UP														
2000-01	24801278	1688729	NA	1047577	641395	617254	NA	70025	340065	16825236	8478911	25304147	12400507	17689948
2005-06	24201290	1654102		1270262	549691	515116	NA	64562	375552	16633142	8674205	25307347	13074753	18970032
2008-09	24170156	1662092	NA	1262505	539017	498626	NA	64884	364558	16562171	8908596	25470767	13435129	19611685

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 **Table 4.6**. **Table 4.6** 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 follow 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.

Table 4.7: Block wise Land use Pattern of Haidergarh Command Area (Year 2000-01, 2005-06 & 2008-09) in Hectare

District Name	Bock Name	Total Area	Forest	Barren Cult. Waste	Present fallow land	Other fallow land	Barren & uncult. Land	Land put to use other than agriculture	Pastures to non-agri. Use	Area under bush, forest & garden	Net area sown	Area sown more than once	Gross area sown				Land prepared for sugarcane	Net irrigated area	Gross irrigated area
													Total	Rabi	Kharif	Jayad			
Blockwise 2000-01																			
CSM Nagar	Shukul Bazar	19357	893	805	1280	1020	611	1558	171	526	12493	6456	18949	8501	8337	1699	0	7712	11391
	Jagdishpur	21569	63	700	2598	357	635	2376	251	823	13766	7581	21347	8479	9914	2443	0	7040	9498
	Singhpur	24105	300	1327	73	1110	579	2433	300	1034	16949	3798	20747	11167	9093	487	0	15419	18229
Barabanki	Trivediganj	22889	339	661	1358	1453	352	2295	159	820	15452	10130	25582	11754	11368	2460	0	14312	25979
	Haidargarh	25831	965	462	1783	1696	746	2850	357	503	16469	12514	28983	11311	15497	2175	0	17063	23767
	Total District	**385999**	**6298**	**7062**	**29368**	**20599**	**10007**	**47564**	**2323**	**9813**	**252965**	**187894**	**440859**	**192416**	**201960**	**46450**	**33**	**212415**	**354812**
Raebareli	Shivgarh	19527	98	783	265	2281	1124	2275	232	628	11841	6073	17914	7955	9184	775	0	11365	17059
	Total District	**456695**	**4918**	**19467**	**18638**	**27197**	**20936**	**47274**	**3945**	**22679**	**291641**	**126136**	**417777**	**211554**	**197163**	**9060**	**0**	**244702**	**347062**
Blockwise 2005-06																			
CSM Nagar	Shukul Bazar	19148	853	660	1424	1013	577	1727	94	486	12314	5278	17592	8630	7375	1586	1	8279	13527
	Jagdishpur	21542	60	572	2848	370	600	2632	136	740	13584	6795	20379	8608	9469	2301	1	7553	12308
	Singhpur	21399	349	496	1592	1151	489	3125	219	1045	12933	8645	21578	10545	10419	614	0	11113	20312
Barabanki	Trivediganj	23506	339	275	1954	1008	403	2570	118	747	16092	14374	30466	13042	14568	2856	0	14423	25676
	Haidargarh	25626	965	570	2659	1099	284	3189	266	485	16109	14248	30357	11721	16098	2537	1	14324	25584
	Total District	**442763**	**6298**	**9221**	**43768**	**14115**	**4738**	**60852**	**1892**	**9809**	**292070**	**247151**	**539221**	**228973**	**240555**	**69682**	**11**	**248901**	**454445**
Raebareli	Shivgarh	19258	114	1372	583	2198	1111	3097	232	640	9911	8097	18008	7801	9590	617	0	9788	17308
	Total District	**456338**	**5717**	**15823**	**41893**	**25495**	**14912**	**60803**	**3966**	**22957**	**264772**	**153708**	**418480**	**220184**	**190965**	**7314**	**17**	**227593**	**355685**
Blockwise 2008-09																			
CSM Nagar	Shukul Bazar	19237	885	602	1221	1016	588	1775	94	488	12568	5137	17705	7765	8384	1566	0	8730	13898
	Jagdishpur	21465	62	521	2464	374	612	2696	137	742	13857	6635	20492	9858	8362	2274	0	7984	12659
	Singhpur	24154	350	532	3724	1499	489	3237	217	1338	12768	8319	21087	10470	9945	672	0	13119	20835
Barabanki	Trivediganj	23608	383	316	1734	1194	293	2630	123	721	16214	14393	30607	13523	14310	2774	0	14348	27070
	Haidargarh	25845	1090	655	2353	1301	206	3263	275	468	16234	14409	30643	12152	15979	2511	1	14366	27102
	Total District	**388587**	**5565**	**8690**	**34621**	**14857**	**3139**	**54473**	**1601**	**8625**	**257016**	**228198**	**485214**	**212573**	**207622**	**65012**	**7**	**227434**	**429139**
Raebareli	Shivgarh	19490	114	1451	1504	2120	1092	3209	222	366	9412	7613	17025	7688	8647	690	0	10119	17754
	Total District	**456407**	**5746**	**16850**	**39312**	**24592**	**14816**	**63346**	**3895**	**22354**	**265496**	**147462**	**412958**	**219871**	**184099**	**8981**	**7**	**239402**	**364847**

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 and 946.1 mm. Fatehpur receives about 946.1 mm while it goes gradually decreasing regularly as one goes west. There are also wide variations in rainfall in different portions of the individual district, the areas lying on the south western side receiving less rainfall and the differences in annual rainfall may be as wide as 100mm in some of the districts. Most of the rain precipitates during the four months beginning from the last week of June to the end of the September. Heavy down pours 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 month are extremely hot, the day temperature crosses 38ºC and sometimes touches as high as 48ºC. 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 percent 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.

4.4.1 Rainfall

Rainfall is one of the most significant parameter for classifying biomes, geographic area and climate. The temporal variation as well as the spatial variation plays a significant role in the water resources planning of system. District wise rainfall pattern is given in **Table 4.8**. Rainfall data from year 2000 to 2009 shown in **Figure 4.9** indicates declining trends in all the districts of Sharda Sahayak Command Area (SSCA).

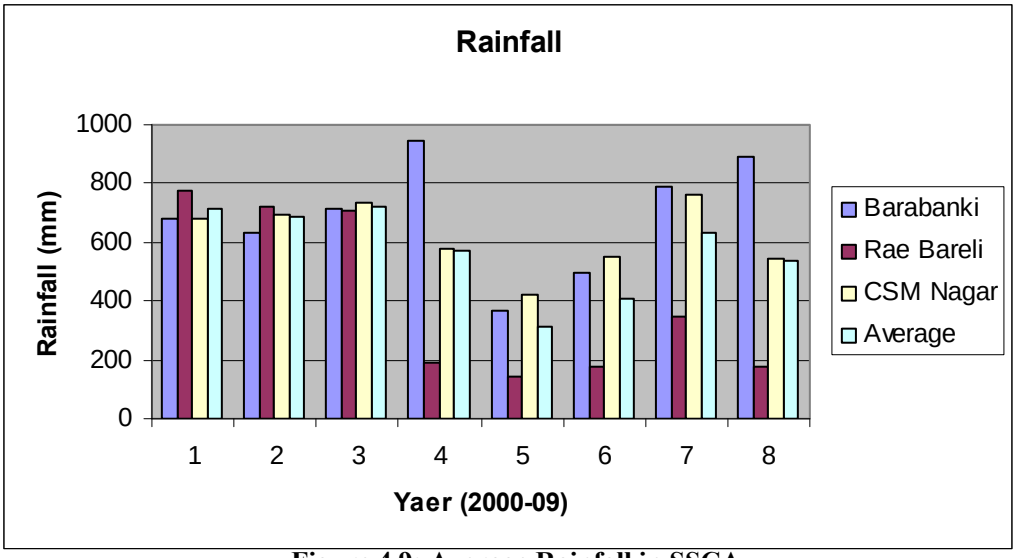


Figure 4.9: Average Rainfall in SSCA

Table 4.8: Rainfall Pattern of Command Area

Districts	2000	2001	2002	2005	2006	2007	2008	2009
Barabanki	677	634	713	943	368	497	789	894
Rae Bareli	776	721	708	191	140	180	349	174
CSM Nagar	683	697	738	576	421	551	760	542
Average	**712**	**684**	**720**	**570**	**310**	**409**	**633**	**537**

Source: Statistical Abstract, 2010 and Met Data

- Barabanki received the highest rainfall in 2008
- During the 2006, the study area received lowest precipitation. During 2006, Raebareli received lowest precipitation while CSM Nagar received the r. ceived the highest precipitation during the year.

- 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.

4.4.2 Temperature

Decadal variation of temperature indicates:

- The minimum & maximum temperature in Raebareli district ranges from 2.3ºC to 44.2ºC.
- The minimum & maximum temperature in Barabanki district ranges from 3.2ºC to 44.8C.
- The minimum & maximum temperature in CSM district ranges from 4ºC to 44ºC.

4.4.3 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 in the project area which offers the potential of air pollution especially SPM.

4.5 Water Environment

Water environment of the study area has been 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, Etawa, Farrukhabad, Kanpur and Fatehpur districts. Its work started in 1872 with completion in 1982 to discharge 359.63 cusec in order to irrigate 9.025 CCA.

Details of Main Canals of Lower Ganga Canal System are given below shown in **Annexure 4.3.**

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

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. Focussed Group discussions findings also confirm 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 given

in **Figure 4.10.**

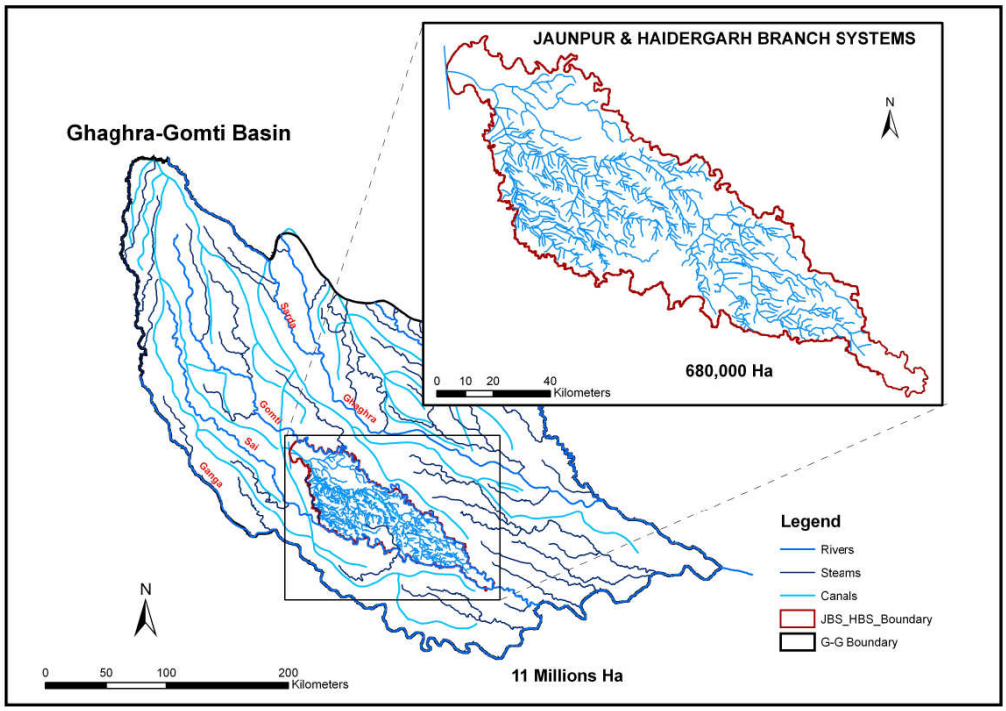


Figure 4.10: JBS-HBS Location within Ghaghra-Gomti Basin

The cropping system in the area is dominated by paddy (rice) in the Kharif season (June to October) and wheat in the Rabi season (November to March). Other crops grown include maize, pulses, oil seeds, sugarcane and vegetables. Small areas of crops are grown in Jayaad season (April to June). The Study Area covered by this report includes Haidergarh Branch Sub-basin (HBS). HBS has a gross area of approximately 24,525 ha. The Culturable Command Area (CCA) of JBS is given as 2,75,000 ha. The CCA of HBS is 15,900 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 in 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 another12% area in the range of 3-5mbgl. This is more because of seepage from unlined HBS rather than excessive use of available. The main branches/distributaries of the Haidergarh branch canal system are given in **Table 4.9**.

Table 4.9: 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**	

4.5.2 Ground Water Resources Development in LGC & Haidergarh Command Area

LGC

The net ground water availability in lower Ganga canal system was 900787 in 2004 which declined to 829703 (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 was 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 ware resource and net ground water availability in LGC is given in Table 4.10.

Table 4.10: Ground Water Availability in Lower Ganga Canal System

SI. No.	District	Annual Replenishable Groundwater Resource					Natural Discharge during non-monsoon Season	Net Annual Ground water Availability
		Monsoon Season		Non-monsoon Season		Total		
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources			
Year 2004								
1	Auraiya	30736	18806	2440	27453	79435	6396	73039
2	Etah	63774	14639	11101	35911	125424	12542	112881
3	Etawah	30473	17072	2517	27186	77248	6413	70835
4	Farrukhabad	35019	11389	3249	18509	68166	3835	64331
5	Fatehpur	69339	20555	6142	42878	138914	9538	129376
6	Firozabad	34663	10397	6519	26131	77709	7173	70537
7	Kannauj	35074	10387	3346	29425	78232	7171	71061
8	Kanpur Dehat	51749	13725	4026	26667	96167	7059	89108
9	Kanpur Nagar	48148	17906	3454	31221	100728	8067	92662
10	Kasganj	NA	NA	NA	NA	NA	NA	NA
11	Kaushambi	28808	7696	1295	7358	45158	3313	41845
12	Mainpuri	39343	15596	7361	30377	92678	7566	85112
	LGC Total	**467126**	**158168**	**51450**	**303116**	**979859**	**79073**	**900787**
	State Total (ham)	**3862644**	**1195084**	**563646**	**2013843**	**7635216**	**616926**	**7018290**
	State Total (bcm)	**38.63**	**11.95**	**5.64**	**20.14**	**76.35**	**6.17**	**70.18**
Year 2009								
1	Auraiya	27575	11995	0	24839	64410	6441	57969
2	Etah	37178	14598	6614	21841	80231	8023	72208
3	Etawah	34523	13700	2387	26199	76809	7053	69756
4	Farrukhabad	41796	5229	4466	9879	61370	5172	56198
5	Fatehpur	61720	18877	0	26891	107488	6584	100904
6	Firozabad	32499	13226	6215	23870	75810	6152	69658
7	Kannauj	33862	10075	4123	21509	69569	5444	64125
8	Kanpur Dehat	54613	11689	0	22759	89060	8108	80952
9	Kanpur Nagar	46816	12432	0	24024	83272	7591	75681
10	Kasganj	30156	10702	5027	16261	62147	6215	55932
11	Kaushambhi	31076	6101	1295	6411	44883	3950	40933
12	Mainpuri	39291	14615	7655	31395	92956	7569	85387
	LGC Total	**471105**	**143239**	**37782**	**255878**	**908005**	**78302**	**829703**
	State Total (ham)	**4077837**	**1136994**	**541075**	**1769552**	**7525458**	**668004**	**6857454**
	State Total (bcm)	**40.78**	**11.37**	**5.41**	**17.7**	**75.25**	**6.68**	**68.57**

Source: Central Ground Water Board

Ground Water Resources Development under LGC Command Area

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, Aurraiya 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 Table 4.11.

Table 4.11: Annual Ground Water Draft and Stage of ground water development

Sl. No.	District	Annual Ground Water Draft			Projected demand for Domestic and Industrial uses upto 2025	Net Ground Water Availability for Future Irrigation use	Stage of Ground Water Development (Y.)
		Irrigation	Domestic& Industrial Water Supply	Total			
Year 2004							
1	Auraiya	39645	2311	41955	3026	30368	57
2	Etah	81879	6550	88430	9826	21177	78
3	Etawah	27382	2307	29689	2965	40489	42
4	Faizabad	68602	4699	73302	7795	33675	67
5	Farrukhabad	45661	2299	47961	3104	15565	75
6	Fatehpur	86372	4869	91241	6778	36226	71
7	Firozabad	52724	4049	56773	6073	11739	80
8	Kanpur Dehat	40663	3340	44003	4141	44305	49
9	Kanpur Nagar	58727	3666	62393	5306	28629	67
10	Kasganj	NA	NA	NA	NA	NA	NA
11	Kaushambi	22502	2598	25100	4256	15087	60
12	Mainpuri	64689	4953	69643	7430	12993	82
	LGC Total	**588846**	**41641**	**630490**	**60700**	**290253**	**66**
	State Total (ham)	**4536196**	**342241**	**4878436**	**530337**	**1951757**	**70**
	State Total (bcm)	**45.36**	**3.42**	**48.78**	**5.30**	**19.52**	**70**
Year 2009							
1	Auraiya	40712	2605	43317	3312	13945	75
2	Etah	57117	3413	60530	4620	10471	84
3	Etawah	36713	2440	39153	2900	30143	56
4	Farrukhabad	36398	3104	39502	4225	15574	70
5	Fatehpur	79378	5274	84652	12061	9465	84
6	Firozabad	66297	3791	70088	5142	-1781	101
7	Kannauj	41160	2767	43927	3429	19537	69
8	Kanpur Dehat	51721	3554	55275	4632	24598	68
9	Kanpur Nagar	57709	3331	61040	4259	13713	81
10	Kasganj	40497	2363	42860	2890	12545	77
11	Kaushambhi	29477	3136	32613	5753	5703	80
12	Mainpuri	65549	3942	69491	5784	14054	81
	LGC Total	**602728**	**39720**	**642448**	**59007**	**167967**	**77**
	State Total (ham)	**4599580**	**348728**	**4948308**	**536083**	**1721792**	**72**
	State Total (bcm)	**46**	**3.49**	**49.48**	**5.36**	**17.22**	**72**

Source: Central Ground Water Board

In the districts of lower Ganga canal, 15 blocks were falling under semi-critical category which increased to 16 in 2009. The 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 4.12**.

Table 4.12: Semi-Critical, Critical and over exploited blocks in Districts of LGC System

District	Semi-Critical		Critical		Over Exploited	
	2004	2009	2004	2009	2004	2009
Auraiya	Bidhuna	-	-	-	-	-
Etah	Jalesar	Saket	-	-	Marehra	Markara
	Nidholikalan	Nidhauli Kalan	-	-	Sakeet	-
	-	Aliganj	-	-	-	-
Farrukhabad	Mohamadabad	-	Kamalganj	-	Barhpur	-
Fatehpur	Airawan	Airayan	-	Amauli	-	-
	Deomai	Bahua	-	Haswa	-	-
	-	Deomai	-	Hathgaon	-	-
	-	Khajuha	-	Malawan	-	-
	-	Teliyani	-	-	-	-
	-	Vijayeepur	-	-	-	-
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

District	Semi-Critical		Critical		Over Exploited	
	2004	2009	2004	2009	2004	2009
Total	**15**	**16**	**2**	**8**	**4**	**12**

Source: Central Ground Water Board

Haidergarh Branch:

Districtwise ground water resources in Haidergarh Branch is given in Table 4.13

Table 4.13: District wise Ground Water Resources Available, Utilization and Stage of Development in Sarda Sahayak Command Area-2009

District	Annual Replenishable Ground Water Resources					Natural Discharge during non-monsoon seasn	Net Annual G/w Availability
	Monsoon Season		Non-Monsoon Season		Total		
	Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources			
Barabanki	86140	38678	18101	70064	212983	21298	191685
Raebareli	56314	22463	10683	34227	123686	10890	112796
Sultanpur/ CSM Nagar	81834	44297	0	50523	176654	15586	161068
Average							

Source: Central Ground Water Board

District	Annual G/W Draft			Projected Demand for Domestic and Industrial uses upto 2025	G/W Availability for future irrigation	Stage of G/W development (%)
	Irrigation	Domistic & Industrial uses	Total			
Barabanki	125096	6891	131987	10203	56386	69
Raebareli	76773	6777	83551	9718	26305	74
Sultanpur/ CSM Nagar	108346	8113	116459	13344	39378	72
Average						71.12

Source: Central Ground Water Board

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 lower Ganga canal districts were found very poor (Table 4.14). More than 80% of households except Farrukhabad district were not having toilets facilities in their houses.

Table 4.14: 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	SLWM	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**

Sewage Generation: The highest sewage generation was observed in district Kanpur followed by Firozabad, Etawah, and Farrukhabad. Data from Table **4.15** reveled that the majority of the district were disposed off their sewage in river except Mainpuri and Aurraiya.

Table 4.15: 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
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.

Sources of Irrigation in LGC Command Area

LGC
Source of Irrigation has been given in section 3.1 and 3.2 in Chapter 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 **Figure 4.11**. The decreased canal irrigation is indicative of reduced water availability or siltation in the canal system. District wise canal irrigation is given in **Table 4.16**.

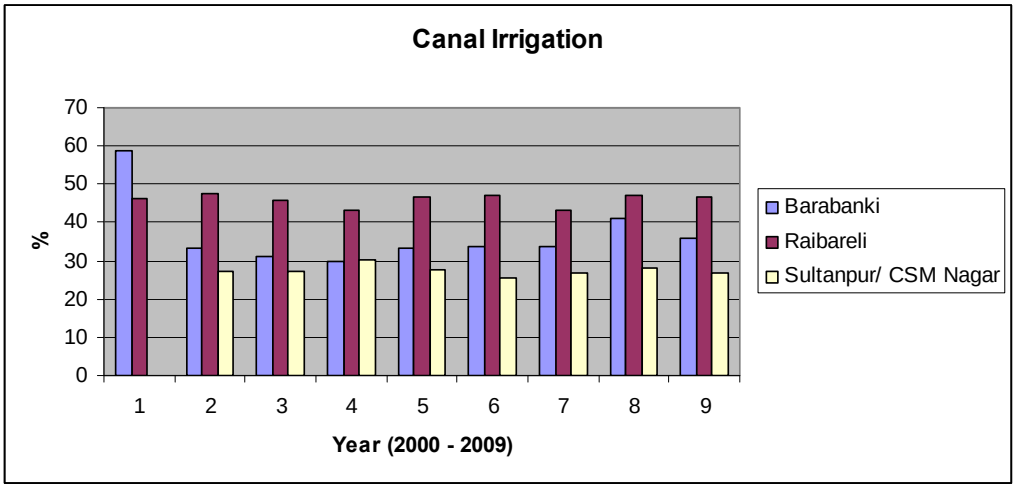


Figure 4.11: Canal Irrigation

Table 4.16: 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
Sultanpur/ CSM Nagar	0	27.2	27.11	30.35	27.7	25.68	26.95	28.01	26.72

4.5.3 Tubewell Irrgation

District wise temporal variation (2000-01 to 2008-09) of source of irrigation indicates slight increase in tubewell irrigation in Barabanki, Raibareli and Sultanpur/ CSM Nagar districts **Figure 4.12**. 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 deplition of shallow ground water level in the Command Area. District wise tubewell irrigation is given in Table 4.17.**

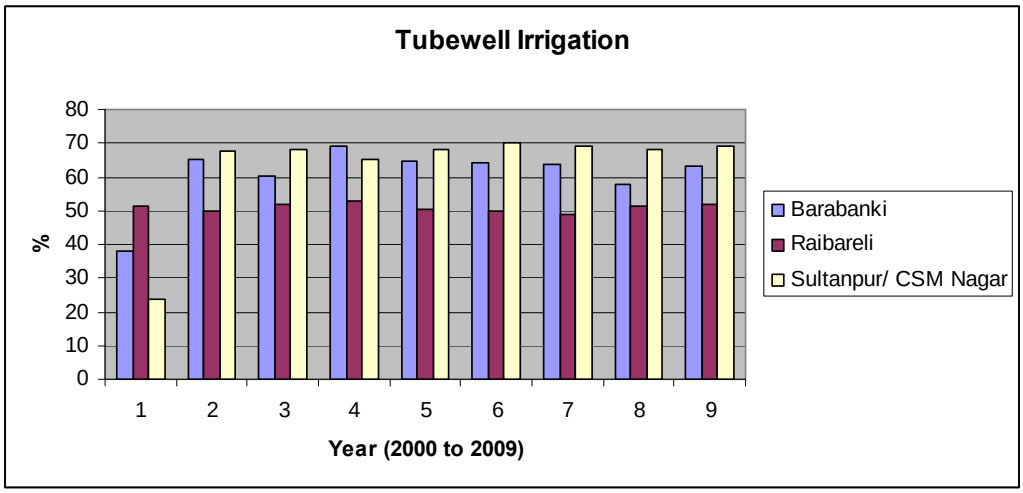


Figure 4.12: Tube well Irrigation

Table 4.17: 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/ CSM Nagar	23.56	67.59	67.98	65.43	67.91	70.28	68.95	67.92	69.32

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.

Surface Water Quality

Surface water quality has been described based on Central Pollution Control Board data in Year 2002 to 2008) of LGC Command Area. The water quality of five locations monitored in the project Area is presented in **Table 4.18**.

Table 4.18 indicate 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 not complied with the standard in all five locations.

Table 4.18: Surface Water Quality Lower Ganga Canal Districts

Year	Kannauj U/S (Rajghat)	Kannauj D/S	Bithoor (Kanpur)	Kanpur U/S (Ranighat)	Kanpur D/S (Jajmau Pumping Station)
Fecal Coliform (MPN/100ml)					
2003	919	1478	1022	1089	4911
2004	994	1101	950	939	3484
2005	4300	5471	3611	2813	26167
2006	6243	7314	4000	3543	22857
2007	2033	3389	2151	2633	32889
2008	3567	3080	3125	3190	16818
Biological Oxygen Demand (mg/l)					
2002	2.0	3.0	2.0	2.0	5.0
2003	2.3	3.3	2.6	2.7	5.0
2004	2.7	3.4	2.4	2.3	6.9
2005	2.8	3.0	2.3	1.8	5.2
2006	3.6	3.5	3.3	3.0	6.3
2007	3.4	3.9	2.7	2.9	6.1
2008	3.6	4.1	3.5	3.4	8.3
Dissolve Oxygen (mg/l)					
2002	7.5	7.5	7.6	7.7	6.4
2003	6.4	6.4	6.7	6.9	5.8
2004	6.8	6.8	6.7	6.9	4.6
2005	7.3	6.8	7.3	7	5.8
2006	7.3	7.9	7.6	6.7	3.9
2007	7.8	7.7	7.5	7.7	5.5
2008	7.4	7.1	7.4	7.6	5.6

Source: Central Pollution Control Board

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 are given in Annexure **4.4**.

Analysis of the data indicate 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 indicate that Fluoride, Chloride, Iron, Magnesium, Calcium, Nitrate, Sulphates, Turbidity, Copper, Arsenic, Residual Chlorine & Alkalinity were found high in the area. Fluoride contamination in maximum

samples were found high in Etawah, Chloride was in Kanpur Nagar, Iron In Firozabad, Magnesium in Etah, pH in Etawah, Nitrate in Etawah. Other parameters in very few samples indicate high values as compared to the prescribed limits.

Some of the issues identified in FGDs are given below;

S. No.	District	Water Related Issues
1.	**Auraiya**	➢ Sources of drinking water were local handpumps, well and India Mark-II handpumps.
2.	**Etah:**	➢ Groundwater is contaminated in many places in the district.
3.	**Etawah**	➢ The source of drinking water across the district is chiefly ground water. However, surface source development will reduce cost, improve the cost and will check indiscriminate use of ground water. ➢ Hand pumps are not a permanent source of water supply. However the situation as of now is that not only human but even cattle has to depend on hand pump for its drinking water requirement. ➢ Maintenance of hand pumps have been entrusted to the Gram Sabhas. 90% - 95% diseases are related to bad water supply. In the urban area, there is no such activity related to drainage. Hand pumps have been installed in around 620 schools across the district.
4.	**Farrukhabad**	➢ The department is currently setting up a system of water supply in the district following which sewage treatment will be taken up. The amount of water required for sewage is 135 LPCD. The average water table in the district is at 8 – 10 metres except in two blocks which are in the grey zone and the water table has fallen to 30 metres. ➢ There are a total of 26 piped water supply systems across the district which is majorly catering to the rural areas. Rest of the areas not covered under piped water supply is catered by tubewells. ➢ As regards water quality, only one block has excess of iron content. Water quality testing facility is available in the district. ➢ The Village Water and Sanitation committees of the Gram Panchayat can be used to disseminate information regarding water use and efficiency, cropping patterns, irrigation systems etc.
5.	**Fatehpur**	➢ Source of drinking water is India Mark-II handpumps and tubewells.
6.	**Firozabad**	➢ Piped water supply system covering most parts of the district. Excess fluoride in groundwater have been found in some blocks closer to Etah district. ➢ Over exploitation of water and excessive use of chemical fertilizer, are the major issues in the district.
7.	**Kannauj district**	➢ The groundwater table in the canal fed areas are quite satisfactory whereas in the remaining parts of the district, its quite at an alarming level due to excessive overdrawing for irrigation. The Kannauj and Jalalabad blocks are in the dark zone where the water table is alarmingly low. ➢ There is a water quality testing lab in the district operational since 2003-04. However Gram Panchayats have also been provided with water testing kits and have been trained to use them to test the quality of water from time to time. Till date no GPs have reported a single sample of water to the department. ➢ There are around 13392 sources of India Mark II hand pumps and tubewells across the district. Most parts of the district are catered to by the piped water supply scheme through deep tubewells.

S. No.	District	Water Related Issues
		➢ The department had implemented a few water conservations schemes like construction of soak pits etc. but was not able to continue the same due to paucity of funds. Also the terrain across the district is plain which does not provide much scope of water harvesting / water conservation works like stop dams etc. except farm ponds, irrigation channels etc. ➢ Convergence with MGNREGA is not possible for undertaking water conservation works as under the scheme the material labour ratio is 60:40 whereas the norms of the department is 80:20.
8.	**Kaushambi**	➢ For drinking water local as well as India mark-II handpumps, Tubewells and wells are used.
9.	**Kanpur Dehat**	➢ Source of drinking water is generally local and India Mark-II handpumps. Handpumps of 30-40 feet deep boring have generally polluted water. ➢ All public schools have India Mark-II handpumps and toilets.
10.	**Kanpur Nagar**	➢ Source of drinking water is rural areas is mostly India Mark-II handpumps and in towns and city is piped water. ➢ Testing of drinking water quality is done at the time of boring for handpumps. ➢ Average ground water level in the district is about 20 Mtr. Tehsil Bilhaur has 9 Mtr while Tehsil Kanpur has 25 Mtr deep water table.
11.	**Kasganj:**	➢ Kasganj lies in dark zone with respect to ground water zonation based on the ground water table. Drinking water supply is based on hand pumps and tube wells. In urban areas piped water supply is used to provide drinking water whereas in rural areas there are 26 piped water supply schemes and hand pumps (IM II) covering the entire district. This is to prevent water borne diseases. However, some habitations are not covered with water supply schemes and some hand pumps become dysfunctional every year. This indicates lack of services in potable water supply. Treated water is supplied through overhead tanks.
12.	**Mainpuri**	➢ Farmers opt for boring despite of a ban by the Govt. on Private and Government bore wells. ➢ **Pollution Control Board:** monitors the quality of river water both at the upstream and downstream. There is only one water polluting industry in the district. Any renovation of canal works should avoid polluting industries. Construction of ponds will definitely help in raising the water table.

4.5.4 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 **Table 4.19**.Ground water use covers 40% to 70% of the reported irrigated area in Barabanki and CSM Nagar/ 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 CSM Nagar/ Sultanpur. The data indicates that source of irrigation increased by more than 6% through ground water.

Table 4.19: District wise Different Source of Irrigation in Command Area (%)

District	Year	Canals	Tubewell		Wells	Ponds	Others
			Public	Private			
Barabanki	2000-01	58.63	1.8	37.81	1.29	0.17	0.29
	2001-02	33.17	0.8	65.37	0.57	0.09	0.03
	2002-03	31.31	7.6	60.48	0.38	0.09	0.12
	2003-04	29.87	0.9	69.04	0.09	0.10	0.01
	2004-05	33.28	1.7	64.71	0.22	0.04	0.01
	2005-06	33.86	1.6	64.05	0.48	0.01	0.01
	2006-07	33.72	1.2	63.66	1.36	0.00	0.01
	2007-08	41.00	0.6	57.77	0.60	0.01	0.00
	2008-09	35.76	0.8	63.40	0.00	0.01	0.00
Raebareli	2000-01	46.34	2.1	51.41	0.09	0.09	0.00
	2001-02	47.72	2.3	49.82	0.00	0.13	0.00
	2002-03	45.83	2.5	51.62	0.00	0.05	0.00
	2003-04	43.40	3.7	52.85	0.01	0.02	0.01
	2004-05	46.72	2.7	50.50	0.00	0.04	0.00
	2005-06	47.27	2.6	50.05	0.03	0.04	0.01
	2006-07	43.14	3.6	49.01	0.00	4.27	0.00
	2007-08	47.30	1.1	51.46	0.10	0.00	0.01
	2008-09	46.46	1.6	51.92	0.00	0.03	0.01
Sultanpur/ CSM Nagar	2000-01	0.00	40.8	23.56	31.94	0.00	3.66
	2001-02	27.20	5.2	67.59	0.03	0.02	0.00
	2002-03	27.11	4.7	67.98	0.09	0.04	0.05
	2003-04	30.35	4.1	65.43	0.06	0.06	0.02
	2004-05	27.70	4.3	67.91	0.03	0.05	0.00
	2005-06	25.68	4.0	70.28	0.04	0.04	0.00
	2006-07	26.95	4.0	68.95	0.02	0.03	0.00
	2007-08	28.01	4.0	67.92	0.06	0.00	0.00
	2008-09	26.72	3.9	69.32	0.04	0.02	0.00

4.5.5 Performance of Surface Water Schemes

LGC

Some of the Issues which emerged during FGDs are as below;

S.No.	District	Canal System Related Issues
1.	**Auraiya**	➢ Serious problem of drainage, water logging and seepage in Block Achhalda and Bidhuna. ➢ Seepage in Etawah Branch canal leading to Sodicity, Salinity and sandy soil. ➢ Canal water in 4 Tail end minors with command area of about 400 Ha is not reaching. ➢ Problems preventing canal water from reaching tail end include: indisciplined farmers, illegal outlets and absence of Osrabandi.

S.No.	District	Canal System Related Issues
		➢ Desilting of Canal is done twice a year, during April-June and October-November. ➢ About 60 cases per year of canal cutting / blocking were recorded. ➢ For canal cutting/ Blocking Tawan (penalty) of Rs. 3.5 Lakh was collected last year and 6 cases were filed under canal Act. ➢ Canal seepage has affected about 1490 Ha area. ➢ Condition of outlets not satisfactory as most of them are damaged. ➢ Roaster system for canal water was in operation. ➢ WUAs does not exist. ➢ Water charges are collected through Tehsil. Though collections were 100% but mostly delayed.
2.	**Etah:**	➢ Canal cutting is a grave issue affecting irrigation efficiency. ➢ The reason behind cutting of canals is the reduced width of the distributaries and minor canal. Growth of vegetation and deposition of earthen materials along the banks of the distributaries, minors and field channels (*gools)* lead to reduced width, thus resulting in reduced water availability. This prompts farmers to tamper with kulaba system by cutting the minor and increasing the width of gools to get water to the farms. Because of this, tail end farmer get reduced flow of water or no water at all. ➢ The cleaning and desilting of the distributaries, field channels or gool does not take place regularly – only once a year which is why the water flow reduces. Because of poor drainage and maintenance of gool, water from farm lands can't drained properly. Maintenance of Gool is not in the jurisdiction of Irrigation Department. ➢ The discharge in canal network is higher than the original design and capacity of the canal. Nevertheless, the water demand and increased area under agriculture and cropping intensity, make the current canal network not being able to meet the demands. ➢ Funds available under MGNREGS should and can be used to clean and desilt the distributaries and field channels. The panchayat may take this responsibility after seeking permission from the Irrigation Department.
3.	**Etawah**	➢ Adequate availability of water for irrigation in canals can be of benefit to activities of other departments like drinking water and sanitation etc. Canal water is available at very cheaper rates as against water from tubewells / bore wells. ➢ However in reality canal water has reduced and there is no provisions for distribute water equitably. Further there is lot of wastage especially in Kharif crops. If the water is conserved and wastage can be controlled, more area can be brought under irrigation. ➢ The department has not conducted any training or orientation for farmers on effective water use as per crops. There is a need for construction of minors and '*gules*' to convey the water to the fields which is not happening today. ➢ The reason behind breaching of canals are man-made, animal and nature created. Most of the time it is man-made. ➢ The irrigation structures have become very old and calls for maintenance and modernization with new equipments. ➢ Participatory irrigation will be best understood with the formation of WUAs as per the PIM Act and will be constituted soon. ➢ The restructuring project will be sustainable only when modernization / automation will happen in the case of construction of new canal systems,

S.No.	District	Canal System Related Issues
		maintenance and rehabilitation and in arresting breaches of the canal structure. ➢ The *Sinchai Bandhu* initiative is running well in the district.
4.	**Farrukhabad**	➢ The canal network is around 140 km which is highly insufficient compared to the demand. Canal and *Kulaba* breaching is also a phenomenon in places where water is available. The water hardly reaches the tail end and hence there is every need to increase the amount of water supply for irrigation along with improving the infrastructure. ➢ Since there is very little water, there is hardly any instance of water logging in the district. Most of the irrigation needs are catered to by the private tubewells / bore wells. ➢ The excess of paddy cultivation in the district is also a reason for higher demand of irrigation water which is resulting in overdrawing of groundwater in the absence of an elaborate canal system. ➢ Construction of cattle ghats to prevent damages, lining of canals and remodeling are of utmost importance in the district. ➢ The incidence of flood is only when water from upstream is released from dams and barrages. It is not due to rains as is the common perception as the amount of rainfall has decreased in the district. The flood water can be diverted through canals which is not currently happening and hence the drainage system to be rejuvenated. ➢ Certain regulations are a must and should be enforced like only when full water is available at the tail end should those near the head be entitled to use it. ➢ There have been no measures taken by the district to check siltation. Neither have there been any structures installed in this regard. ➢ The irrigation department has been involved in orienting / educating farmers 1-2 times on irrigation systems, water use and management using CDs and DVDs. However there have been no such efforts off late by the department. ➢ *'Sinchai Mitra'* – Friends of Irrigation is an initiative by the district administration wherein monthly meetings are held with the irrigation, agriculture and other allied departments and is chaired by the Chairman of the Zila Panchayat. Such meetings which used to yield good results and most importantly ensure inter-departmental coordination are no longer a feature since quite some time. ➢ The *Jiledars* of the Irrigation dept. holds monthly meetings with farmers on the 25th of every month to sort out irrigation related issues. ➢ There is hardly any information / knowledge about the canal roster system amongst villagers. They are not aware as to when does the canal run and the right time to irrigate their fields. Hence the increased dependence on tubewells. The department should broadcast the roster schedule regularly through local television and newspaper so as to inform the farmers about the availability of water. Average power availability is around 8 hrs in rural areas.
5.	**Fatehpur**	➢ Canal work on roster basis but timely water is sometime not available to farmers. ➢ Canal water not reaching Tail end in Block Khaga. ➢ Desilting of canal is done once a year. ➢ Cases of canal cutting and Blocking are large, particularly during Kharif, but not reported. ➢ Canal operating efficiency in Rabi was reportedly 35% and in Kharif 30%. ➢ Outlets were mostly tampered.

S.No.	District	Canal System Related Issues
6.	**Firozabad**	➢ The Gram Panchayats can use MGNREGS funds to clean *gules (a local term for conduits connecting the distributaries to the field)* and minors.
7.	**Kannauj district**	➢ Uncontrolled distribution of water is the major problem in the district despite of enough availability at present. Issues like rampant breach of canal by farmers, installing illegal conduits etc. results in the water not reaching the tail end. Even if the water reaches, it starts flowing in the reverse direction. Increasing tail end as suggested by farmers is not possible. ➢ Almost 80% of irrigation across the district is through tubewells / bore wells. There is a lot of wastage of water. ➢ Reclamation of land has resulted in increase of net sown area which implies more demand for irrigation against the existing infrastructure. Every year there is an increase of 10% of reclaimed land and such land cannot be left idle which means irrigation has to be ensured round the year. Also an average of 3-4 crops a year is taken across the district which leads to more demand. All this implies expansion of the existing infrastructure / new systems to cater to the increasing demand. ➢ Uncontrolled distribution of water is the major problem in the district despite of enough availability at present. Issues like rampant breach of canal by farmers, installing illegal conduits etc. results in the water not reaching the tail end. Even if the water reaches, it starts flowing in the reverse direction. Increasing tail end as suggested by farmers is not possible. ➢ Almost 80% of irrigation across the district is through tubewells / bore wells. There is a lot of wastage of water. ➢ Reclamation of land has resulted in increase of net sown area which implies more demand for irrigation against the existing infrastructure. Every year there is an increase of 10% of reclaimed land and such land cannot be left idle which means irrigation has to be ensured round the year. Also an average of 3-4 crops a year is taken across the district which leads to more demand. All this implies expansion of the existing infrastructure / new systems to cater to the increasing demand.
8.	**Kaushambi**	➢ Fatehpur canal which also serve some part of the district has 25 minors and in 19 of them water was not reaching at tail end. ➢ Desilting of canal is done before Rabi and Kharif (November and June) ➢ Cases of canal cutting/Blocking are common. Tawan (Fine) was charged from two groups of farmers and 6 cases under canal Act were filed for Blocking in the last one year. ➢ Canal operating efficiency was approximately 50%. ➢ There was no problem of seepage in canal. ➢ Condition of outlets was reported as satisfactory. ➢ Roaster system was in practice
9.	**Kanpur Dehat**	➢ Due to shortage of canal water many farmers were shifting to pulses- Arhar, Moong and urd. ➢ Canal Water supply was neither adequate nor timely. ➢ In at least 10% of tail end minors water was not reaching. ➢ Desilting of canal was done every year during November-December. ➢ Large Number of incidences of Canal cutting/ Blocking are reported. Last year 30 cases were filed and in 8 cases FIR were lodged with the police in Nabipur Khand. Tawan (penalty) amounting to Rs. 275000/- was recovered in 32 cases. ➢ Condition of outlets was reportedly poor/damaged. ➢ Roaster system exist but actually supply depend on availability of water in

S.No.	District	Canal System Related Issues
		canal. ➢ WUAs does not exist, voters list under preparation. ➢ 100% water charges are collected through Tehsil.
10.	**Kanpur Nagar**	➢ Canal water available as per roaster. ➢ Incidences of Canal cutting/blocking were reportedly 50 in a year. For which Tawan (penalty) is recovered in some cases while in other, cases are filed through Deputy Revenue Officer. ➢ Desilting of Canal is done once in a year, before Rabi. ➢ About 50% of outlets were reportedly damaged. ➢ Canal irrigation charges were Rs. 287/- per Ha. In Rabi and Kharif both. ➢ WUAs have not been formed in the district, list of farmers was being prepared for voters list. ➢ 100% irrigation charges are collected through Tehsil Staff.
11.	**Kasganj:**	➢ The discharge in the canal system is higher than the designed capacity and hence calls for remodelling. ➢ Increased discharge and lack of wings in the canal has caused seepage, soil erosion and breaching of the canals. Gates in minor canals are lacking. ➢ There is an urgent need for lining of minors, desilting of drains and installation of silt traps. ➢ Drainage system needs to be improved and developed. Maintenance requires budgetary support which is not adequate and regular at this moment. ➢ The issue of cutting of canals is very rampant in the district and any initiatives by the Irrigation Department to regulate it turn out to be futile. '*Seejpaals'* who are the field level personnel of the department are often manhandled/threatened by the farmers in case they try to object canal cutting or reports the matter for disciplinary action. Many a times, FIRs are also lodged against the offenders but very little happens as punitive measures. This has created a sense of disillusion and discontent among workers. There are reported instances of pilferage of transformers and oil as well.
12.	**Mainpuri**	➢ The entire irrigation infrastructure in the district is around 125 years old and have crossed their life span. There have been no restructuring or remodeling of the existing structures. Farmers keep on circulating hot and cold water to and from the field. They also do not allow the passage of water through their fields to other fields. All this results in huge wastages. ➢ All blocks in the district are covered under canal irrigation. Canal breaching is a serious issue like in other districts. The irrigation department has not conducted any trainings or orientation for the farming community on efficient water use. ➢ Despite of a good canal system, use of bore wells still remains rampant across the district. There are two blocks out of nine which falls in the dark zone indicating overexploitation of groundwater. There is ample of waterlogged sites in the district which calls for a comprehensive drainage system. ➢ There is acute shortage of staff in the department – almost 50% positions are vacant. The department officials especially those at the field level need to be trained on how to deal with erring farmers and how to cope with issues like political patronage thus making disciplinary action almost impossible. ➢ Excess of water is a disadvantage as it does not get drained and some areas do not have gool for directing water to the fields. On the other hand there are places which do not get water. 30% of the total land area remains inundated for a major part of the year thus rendering it useless for agriculture.

S.No.	District	Canal System Related Issues
		➢ It is not possible to grow crops in the entire field area as conveyance of water is a big issue. Minors should be connected which will enable a large area to be irrigated.

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 and existing systems. 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. Heavy to medium Usar conditions affects a very sizeable proportion of land. The total usar area is estimated at over 11 lakh ha, both in the eastern and western parts. The temperature varies from a minimum of 5-80 C in winter to a maximum of 400 C in summer. Frosts are rare but the winter is harsh because of cold winds. There are

pronounced hot wind in the summer. The western part of the zone has lower rainfall as compared to the eastern part. The rainfall varies from a 600 mm to about 1,200 mm. Some lands along the Ganga in Meerut and other adjoining districts are subject to periodic flooding and are known as Khadar and Kholas. Efforts are being made by the Government to afforest these areas by various species including poplars. There are also areas, which are abandoned along the course of the Ganga. They are comparatively recent, very sandy, subject to severe wind erosion, and not very fertile. Such areas are good for large-scale tree plantations. Particularly in areas close to the watercourse several species such as shisham, poplars and khair are expected to give successful plantation results.

4.7.1 Vegetation types

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)
(c) Bundelkhand of Uttar Pradesh including Vindhyan ranges

4.7.2 Gangetic Plains

Most of the Gangetic Plains are 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 phillipeniss, 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 Bauhina vahlii, Milletia extensa, Acacia pennata, Porana paniculata, etc. The shrubby elements are Clerodendurm 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 antidysentrica 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 swietenioides, albizia lebbeck, Flacourtia indica and Lannea coramandelica, 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 involucrata is sometimes found in open grassy swamps.

4.7.3 Forests Cover

Recorded Forest Area: The recorded forest area of the Uttar Pradesh is 16,583 km2 which is 6.88% of its geographical area. Reserved Forests constitute 70.31%, Protected Forests 8.56% Unclassed Forests 21.12%. Forest cover map of Uttar Pradesh is given in **Figure 4.13**.

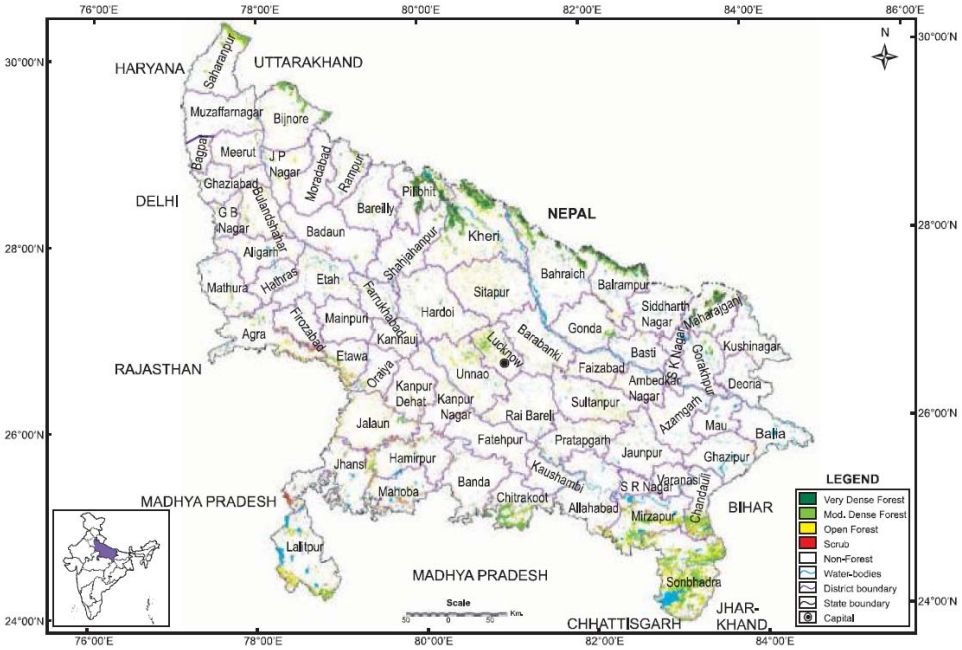


Figure 4.13: Forest cover map of Uttar Pradesh

District – Forest cover in different canopy density classes and scrub found in districts falling in Lower Ganga Canal area is given in **Table 4.20**.

Table 4.20: 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

District LGC/SSC	Geographical Area	2011 Assessment				Percent of GA	Change	Scrub
		Very Dense Forest	Mod. Dense Forest	Open Forest	Total			
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*	-	-	-	-	-	-	-	-

*Disaggregated forest cover data (as given in State Forest Report of FSI, 2011) Kasnagar is not available. Kasnagar (Kanshi Ram Nagar), was carved out from Etah district in 2008.
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 Sharda Sahayak Command area are given in **Table 4.21**.

Table 4.21: District-wise Forest Cover in Sharda Sahayak Command area (SSC) 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
Raebareli	4609	0	5	93	98	2.13	0	1
Amethi*	-	-	-	-	-	-	-	-

*Disaggregated forest cover data (as given in State Forest Report of FSI, 2011) for two districts namely Amethi is not available. Amethi (Chattrapati 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.

Flora and Fauna (including fisheries) reported in LGCA, SSCA and Haidergarh

LGCA

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, Claxrias batrachus (Mangur), Catla catla (Katla), Channa striatus (Sor), etc. are recorded.

SSCA

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, Claxrias 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 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 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), etc 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, Claxrias batrachus (Mangur), Catla catla (Katla), Channa striatus (Sor), etc.

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 328689.1 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.

Status and distribution of Wetlands: Total 23890 wetlands have been mapped at 1:50,000 scale in the State. In addition, 97352 smaller wetlands (smaller than 2.25 ha) are also identified. Total wetland area estimated is 1242530 ha; this is around 5.16 percent of the geographic area (Table-4). Graphical distribution of wetland type is shown in Figure-10. The natural wetlands dominated the area with around 74 percent share. The major natural wetland types observed in the state are: rivers/streams, lakes, ox-bow lakes, riverine wetlands and waterlogged areas. The rivers and streams which are perennial, contribute around 49 percent of wetland area of the state. Reservoirs/barrages and waterlogged areas dominated the man made wetlands.

Wetlands have been identified and on the basis of diverse criteria. Sites falling in LGCA/ SSCA/Haidergarh are described below:

(i) Sarus Crane sites

Uttar Pradesh supports the largest population of Sarus Cranes in India. A total of 1019 Sarus Cranes were counted from 46 sites in 20 districts in 1999 accounting for 50% of the India's total. Most of the other population, however, is found outside the PA network with protected areas currently, not contributing significantly to the protection of the species as a whole. From the perspective of Sarus Crane population, the important wetland district in Uttar Pradesh is Etawah and Etah.

(ii) Important Bird Areas Programme

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

Aquatic vegetation is more during post-monsoon season with 219289 ha during post- monsoon and 129228 ha during pre-monsoon season. The open water area of the wetlands decreased by around 28.0 per cent in pre-monsoon compared to post-monsoon season. This is mainly due to change in water spread observed in two major types: rivers/streams (6.0%) and Reservoirs/barrages (37.0%). The turbidity of open water is in general moderate and low in both the seasons. District wise wetlands falling in LGC/SSC/Haidergarh area is given in **Table 4.22** and **Table 4.23**.

Table 4.22: District wise wetlands falling in LGCA

Sr. No.	District	Geographic Area	Wetland Area	% of total wetland area	% of district geographic area
	(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) Kanshiram Nagar	1960	15237	1.23	7.77
11.	Kaushambi	2124	9485	0.76	4.47
12.	Mainpuri	2760	12887	1.04	4.67

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

Table 4.23: District wise wetlands falling in SSCA/Haidergarh area

Sr. No.	District	Geographic Area	Wetland Area	% of total wetland area	% of district geographic area
(sq. km)			(ha)		
1	Barabanki	4402	27290	2.20	6.20
2	Raebareli	4609	38522	3.10	8.36
3	Amethi*				

*Disaggregated data for Amethi district is not available.
In SSC area, Raebareli district has the largest area under wetlands (38522 ha).

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

Area in ha

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

Protected areas: 5 Protected areas (PA)are reported to occur in LGCA, SSCA/Haidergarh area. Details of PAs is given in **Table 4.24** and **Table 4.25**.

Table 4.24: PAs in Lower Ganga Canal area

Name of PA	Date of establishment	Area (Km^2)	District
Wildlife sanctuaries			
1 Chambal	20-01-79	635	Etawah/Agra
Bird Sanctuaries			
1 Saman		5	Mainpuri
2 Patana	22-09-90	1	Etah
3 Lakh Bahoshi	21-03-88	80	Farrukhabad/Kannauj

No PA located in LGC area will be impacted by the proposed activities.

1 PA is reported to occur in SSCA/Haidergarh area. Detail of PA is given in **Table 4.25**.

Table 4.25: PA in Sharda Sahayak Command area/Haidergarh area

Name of PA	Date of establishment	Area (Km2)	District
1 Samaspur	10-08-87	8	Raibareilly

PA (Samaspur) located in SSA area will not be impacted by the proposed activities.

4.8 Health Issues

Water Borne Disease: Water borne diseases are infectious diseases spread primarily through contaminated water. Though these diseases are spread either directly or through flies or filth, water is the medium for spread of these diseases and hence they are termed as water-borne diseases. These diseases are more prevalent in areas with poor sanitary conditions. The pathogens travel to water sources through various routes and infect susceptible persons directly through consumption of food and water. Since these diseases are highly infectious, extreme care and hygiene should be maintained by people looking after an infected patient. Hepatitis, cholera, dysentery, and typhoid are the common water-borne diseases that affect considerable populations.

Vector Borne Disease: A vector-borne disease is one in which the pathogenic microorganism is transmitted from an infected individual to another individual by an arthropod or other agent, sometimes with other animals serving as intermediary hosts. The transmission depends upon the attributes and requirements of at least three different living organisms: the pathologic agent, either a virus, protozoa, bacteria, or helminth (worm); the vector, which are commonly arthropods such as ticks or mosquitoes; and the human host. In addition, intermediary hosts such as domesticated and/or wild animals often serve as a reservoir for the pathogen until susceptible human populations are exposed.

Summary of Issues LGC Command Area

Major Environment Issues	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.	Silting of Sharda Sahayak System	Desilting is undertaken under MNREGA	Desilting & drainage restoration of canals
Decreasing Fertility of soil & increasing consumption of fertilizer	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)	Exists in command area	Occuring due to decreasing fertility level.	Project with arrest land diversification to some extent.
Extreme climatic conditions, rainfall deficiency & drought	Once in ten years	Once in ten years	Crop diversification to combat extreme conditions
Limited availability of Surface 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	69% to 70% Ground water development	Increasing use of ground water	Canal water should be made available
Surface & Ground Water Quality	Ground water quality is of concern	Fluoride and in certain blocks	Drinking water supply to be providing from Canal
Increasing dependence on ground water for irrigation in comparison to surface water.	Limited availability of canal water	Increasing dependence on ground water	Reduced dependence on ground water
Decrease in forest cover, vulnerability of Flora & Fauna	Land use change indicate very less forest cover	Nilgai menace has been report	None of the recommendations given by the stakeholders.
Water logging	Due to seepage	Exists on both sides of canal	Drainage should be improved

Summary of Issues (Haidergarh Branch Area)

Major Environment Issues	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.	Silting of Sharda Sahayak System	Desilting is undertaken under MNREGA	Desilting & drainage restoration of canals
Decreasing Fertility of soil & increasing consumption of fertilizer	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)	Exists in command area	Occuring due to decreasing fertility level.	Project with arrest land diversification to some extent.
Extreme climatic conditions, rainfall deficiency & drought	Once in ten years	Once in ten years	Crop diversification to combat extreme conditions
Air quality deterioration	Major urban centres experience deteriorating air quality	Health impacts due to air pollution	None of the recommendations given be the stakeholders.
Limited availability of Surface 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	69% to 70% Ground water development	Increasing use of ground water	Canal water should be made available
Surface & Ground Water Quality	Ground water quality is of concern	Fluoride and in certain blocks	Drinking water supply to be providing from Canal
Increasing dependence on ground water for irrigation in comparison to surface water.	Limited availability of canal water	Increasing dependence on ground water	Reduced dependence on ground water
Decrease in forest cover, vulnerability of Flora & Fauna	Land use data indicate very less forest cover is very less	Shrinking habitat leading to Nilgai menace	Canal side plantation should be implemented.
Sodicity / Salinity	Land use indicates barren unculturable land	Exists in Manpuri & other districts at the head	Reduced salinity / sodicity
Water logging	Water losses from canals indicate water logging	Exists in Manpuri & other districts at the head	Improved drainage

Chapter 5: Impact Assessment and Environmental and Social Management Framework

5.0 Introduction

Social & Environmental Impact Assessment has been carried out based on Impact evaluation criteria. Based on the outcome of Social & Environmental Impact Assessment for project related activities, an appropriate Environmental & Social Management Framework (ESMF) has been formulated which needs to be implemented as part of UPWSRP Phase II. The ESMF formulated and presented here meets the requirements of the World Bank's OP 1.01 on Project's Environmental Management Plan and comprises of following elements:

- Screening & scoping of impact
- Assessment of environmental and social impacts;
- Environmental and Social Management Framework outlining mitigation measures, implementation schedule and primary responsibility for implementation.

Each of the above mentioned items are described below.

5.1 Categorization of Activities /Components

Categorization of activities/components envisaged in the project has been done and shown in **Table 5.1** 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 5.1: Categorization of Project Intervention

Socio - Economic Components / Activities	Category A	Category B	Category C
C1: 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			√
➢ Election of kulaba and alpika samiti for selected area			√
➢ Registration and handling over of management of irrigation system to the WUAs			√
➢ Capacity building of UPID and WUAs; Training of PIM cell at division and circle			√
➢ Exposure trips to successful experiments			√
➢ Construction of office for WUAs in phase I area	√		√
➢ Construction of office for WUAs in phase 2 area	√		√
➢ Impact Assessment studies; Strengthening of PIM Cell PACT (Human Resource)			√
C2: Rehabilitation of Canal & Drainage Systems			
➢Rehabilitation and Modernization Canal System.	√		
➢ Dainage Rehabilitation	√		
➢Lining of Canal	√		

Socio - Economic Components / Activities	Category A	Category B	Category C
➢ Rehabilitation of existing important Building e.g. Inspection houses, offices, colonies, video conferencing centre etc.	√		
C 3: Piloting Alternative Branch – Level Management Mechanism for Water Service Provision & Maintenance as part of promoting Public-Private-Partnership in Irrigation Sector.			
➢ Implementation in a participatory mode through active engagement of all the stakeholders at various levels e.g. Ascertain equitable distribution of canal water.			√
➢ Optimally utilizing available water for intensive and diversified agriculture to promote for productivity gains in the crops along with promoting higher sown area in the Kharif season e.g. Promotion and extension of improved management mechanism for water service provision & maintenance; Increase production of cereals, pulses and oil seeds through improved practices for productivity enhancement in a sustainable manner; Restoring soil fertility and productivity; Enhancing farm level economy diversifying through vegetable and fruit cultivation.		√	
➢ Animal husbandry and dairy activities will be expanded as an ancillary activity to enhance farmer's incomes as well as to cope with the drought conditions e.g. improving livestock and poultry productivity through breeding, feeding and management.		√	
➢ Irrigated agriculture technology with conjunctive use of water e.g. Improved irrigation water application systems like drip/sprinkler systems in conjunction with canal water.		√	
➢ Marketing infrastructure and agricultural risk management will be important areas of focus.			√
➢ Capacity Building of the farmers, facilitating personnel's and other stakeholders.			√
C 4: Agriculture Water Use and Productivity Efficiency Improvement Program			
➢ Construction of field channel.		√	
➢ Rehabilitation of surface drainage system, including field drainage.		√	

Socio - Economic Components / Activities	Category A	Category B	Category C
➢ Boring of new tube wells, after evaluating the need.		√	
➢ Concurrent Training and Awareness Campaigns for the farmers, water user association, various departmental functionaries and other stakeholders to get them oriented for maximum land and water resource utilization with utmost efficiency.			√
➢ Agriculture development and allied activities through training & capacity building & demonstration projects. Direct water efficiency demonstrations will include: e.g. SRI; Conservation agriculture; Ridge and furrow systems; Timely irrigation through the conjunctive use of water; Alternative wetting and drying; Micro irrigation & Zero tillage seed drills. Indirect (productivity related) demonstrations e.g. Use of area specific varieties; Use of hybrids; Line transplanting; Use of short duration variety, line sowing; Soil treatment with Trichoderma; Quality seeds and Seed Replacement; Integrated Nutrient Management; Timely Sowings; Timely Transplanting; Proper Plant spacing; Proper Placement of Seed & Fertilizer; Eco- Friendly Pest Management & Soil Testing.		√	
➢ Horticulture Development through training & capacity building & demonstration projects e.g. Area expansion of horticultural crops i.e. fruits, vegetables, flowers, spices & medicinal & aromatic plants through demonstration on farmer's fields; Arrange demonstration and training to the farmers in new techniques of horticultural practices and post harvest technology; Strengthening of District Horticulture office of districts & project implementation unit of horticulture at head office & Study of impact by evaluation of ongoing practices. Horticulture demonstration will include: Quality seeds and Seed Replacement, Quality Planting Material, Balance fertilizer, Timely Showing / Transplanting, Proper Plant spacing, Introduction of new technology, Proper Placement of Seed & Fertilizer, Timely Irrigation through Conjunctive use of water and Eco-Friendly Pest Management.		√	
C 5:- Social Assessment / Development			

Socio - Economic Components / Activities	Category A	Category B	Category C
➢ Formation of Women Self Help Groups in Project area.			√
➢ Awareness Creation.			√
➢ Organization of Workshops for development of groups.			√
➢ Organizing Group Management Training for better group functioning.			√
➢ Promotion of saving and credit activity in groups.			√
➢ Grading of WSHGs.			√
➢ To promote economic activity in the group providing revolving fund in the groups and establish their CCL with Banks.			√
➢ The Groups after establishing their CCL from Banks will be handed over to the concerned departments (Animal Husbandry, Fisheries, Horticulture etc.) for economic activity as per the proposal of the group.			√
➢ The willing groups of BPL categories will also be linked with SGSY scheme of the department as per guidelines.			√
➢ Marketing assistance to groups' produce through organizing exhibitions and melas.			√
➢ Exposure Trips to various successful experiences of other states.			√
➢ Participation in national/ international exhibitions and events.			√
➢ '**Impact Assessment of WSHGs Formation and its functioning on the socio-economic betterment of their families'**.			√

5.2 Environmental and Social Management Framework

Impact identification based on above criteria has been carried out in **Table 5.2** in this sub-section. At first the impacts have been classified under components which are likely to trigger the impacts. This has been done as some of the impacts are likely to get triggered owing to activities proposed under more than one sub component. The environmental and social impacts are jointly clubbed under the components to establish clarity based on the components under which they fall. The SEMF also does the impact categorization on the basis of the impact assessment discussed in section 5.1. Further, SEMF details out the mitigation/ enhancement 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 SEMF.

Chapter 5: Impact Assessment and Environmental and Social Management Framework

5.0 Introduction

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Socio - Economic Components / Activities	Category A	Category B	Category C
C1: Participatory Irrigation Management			
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➢ 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			√
➢ Election of kulaba and alpika samiti for selected area			√
➢ Registration and handling over of management of irrigation system to the WUAs			√
➢ Capacity building of UPID and WUAs; Training of PIM cell at division and circle			√
➢ Exposure trips to successful experiments			√
➢ Construction of office for WUAs in phase I area	√		√
➢ Construction of office for WUAs in phase 2 area	√		√
➢ Impact Assessment studies; Strengthening of PIM Cell PACT (Human Resource)			√
C2: Rehabilitation of Canal & Drainage Systems			
➢Rehabilitation and Modernization Canal System.	√		
➢ Dainage Rehabilitation	√		
➢Lining of Canal	√		

Socio - Economic Components / Activities	Category A	Category B	Category C
➢ Rehabilitation of existing important Building e.g. Inspection houses, offices, colonies, video conferencing centre etc.	√		
C 3: Piloting Alternative Branch – Level Management Mechanism for Water Service Provision & Maintenance as part of promoting Public-Private-Partnership in Irrigation Sector.			
➢ Implementation in a participatory mode through active engagement of all the stakeholders at various levels e.g. Ascertain equitable distribution of canal water.			√
➢ Optimally utilizing available water for intensive and diversified agriculture to promote for productivity gains in the crops along with promoting higher sown area in the Kharif season e.g. Promotion and extension of improved management mechanism for water service provision & maintenance; Increase production of cereals, pulses and oil seeds through improved practices for productivity enhancement in a sustainable manner; Restoring soil fertility and productivity; Enhancing farm level economy diversifying through vegetable and fruit cultivation.		√	
➢ Animal husbandry and dairy activities will be expanded as an ancillary activity to enhance farmer's incomes as well as to cope with the drought conditions e.g. improving livestock and poultry productivity through breeding, feeding and management.		√	
➢ Irrigated agriculture technology with conjunctive use of water e.g. Improved irrigation water application systems like drip/sprinkler systems in conjunction with canal water.			√
➢ Marketing infrastructure and agricultural risk management will be important areas of focus.			√
➢ Capacity Building of the farmers, facilitating personnel's and other stakeholders.			√
C 4: Agriculture Water Use and Productivity Efficiency Improvement Program			
➢ Construction of field channel.		√	
➢ Rehabilitation of surface drainage system, including field drainage.		√	

Socio - Economic Components / Activities	Category A	Category B	Category C
➢ Boring of new tube wells, after evaluating the need.		√	
➢ Concurrent Training and Awareness Campaigns for the farmers, water user association, various departmental functionaries and other stakeholders to get them oriented for maximum land and water resource utilization with utmost efficiency.			√
➢ Agriculture development and allied activities through training & capacity building & demonstration projects. Direct water efficiency demonstrations will include: e.g. SRI; Conservation agriculture; Ridge and furrow systems; Timely irrigation through the conjunctive use of water; Alternative wetting and drying; Micro irrigation & Zero tillage seed drills. Indirect (productivity related) demonstrations e.g. Use of area specific varieties; Use of hybrids; Line transplanting; Use of short duration variety, line sowing; Soil treatment with Trichoderma; Quality seeds and Seed Replacement; Integrated Nutrient Management; Timely Sowings; Timely Transplanting; Proper Plant spacing; Proper Placement of Seed & Fertilizer; Eco- Friendly Pest Management & Soil Testing.		√	
➢ Horticulture Development through training & capacity building & demonstration projects e.g. Area expansion of horticultural crops i.e. fruits, vegetables, flowers, spices & medicinal & aromatic plants through demonstration on farmer's fields; Arrange demonstration and training to the farmers in new techniques of horticultural practices and post harvest technology; Strengthening of District Horticulture office of districts & project implementation unit of horticulture at head office & Study of impact by evaluation of ongoing practices. Horticulture demonstration will include: Quality seeds and Seed Replacement, Quality Planting Material, Balance fertilizer, Timely Showing / Transplanting, Proper Plant spacing, Introduction of new technology, Proper Placement of Seed & Fertilizer, Timely Irrigation through Conjunctive use of water and Eco-Friendly Pest Management.		√	
C 5:- Social Assessment / Development			

Socio - Economic Components / Activities	Category A	Category B	Category C
➢ Formation of Women Self Help Groups in Project area.			√
➢ Awareness Creation.			√
➢ Organization of Workshops for development of groups.			√
➢ Organizing Group Management Training for better group functioning.			√
➢ Promotion of saving and credit activity in groups.			√
➢ Grading of WSHGs.			√
➢ To promote economic activity in the group providing revolving fund in the groups and establish their CCL with Banks.			√
➢ The Groups after establishing their CCL from Banks will be handed over to the concerned departments (Animal Husbandry, Fisheries, Horticulture etc.) for economic activity as per the proposal of the group.			√
➢ The willing groups of BPL categories will also be linked with SGSY scheme of the department as per guidelines.			√
➢ Marketing assistance to groups' produce through organizing exhibitions and melas.			√
➢ Exposure Trips to various successful experiences of other states.			√
➢ Participation in national/ international exhibitions and events.			√
➢ 'Impact Assessment of WSHGs Formation and its functioning on the socio-economic betterment of their families'.			√

5.2 Environmental and Social Management Framework

Impact identification based on above criteria has been carried out in **Table 5.2** in this sub-section. At first the impacts have been classified under components which are likely to trigger the impacts. This has been done as some of the impacts are likely to get triggered owing to activities proposed under more than one sub component. The environmental and social impacts are jointly clubbed under the components to establish clarity based on the components under which they fall. The SEMF also does the impact categorization on the basis of the impact assessment discussed in section 5.1. Further, SEMF details out the mitigation/ enhancement 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 SEMF.

Table 5.2: Social Environmental Management Framework (SEMF) for Components proposed under UPWSRP Phase-II.

Sr. No.	Anticipated Project Impacts	Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1.	Hiring of services for WUA formations will lead to employment generation.			Year 1 to Year 3	NGOs	Executive Engineer	PACT
1.	**Awareness campaign on PIM will lead to increased awareness which will:**			Year 1 to Year 2			
1.1	➢ Lead to greater awareness about community inclusion, ownership, participation & empowerment including female & SC/ST in water resource management e.g. Pani Panchayat at village level.	C			NGOs	Executive Engineer	PACT
1.2	➢ Lead to greater awareness about the need for surface water availability at tail end thereby reducing dependence on ground water resources in tail end area of command.	C			NGOs	Executive Engineer	PACT
1.3	➢ Lead to greater awareness about the need to prepare & implement Crop Plan, which will lead to agriculture intensification & diversification.	C			NGOs	Executive Engineer	PACT
1.4	➢ Lead to greater awareness about land use change, due to increase in net sown area due to bringing of additional land into agriculture & allied activities.	C			NGOs	Executive Engineer	PACT
1.5	➢ Lead to greater awareness about the need to arrest land diversion for uses other than agriculture.	C			NGOs	Executive Engineer	PACT
1.6	➢ Lead to greater awareness about increased opportunities for sustainable livelihood through agriculture & allied activities triggering arrest of changes in occupational pattern; reduction in indebtedness & finally reduction in financial risk & vulnerability.	C			NGOs	Executive Engineer	PACT

Sr. No.	Anticipated Project Impacts	Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1.7	➢ Lead to greater awareness about soil fertility, soil erosion and waste dumping / utilization of waste for useful purposes.	C			NGOs	Executive Engineer	PACT
1.8	➢ Lead to greater awareness and knowledge base about air pollution, GHG emissions and extreme climate events.	C			NGOs	Executive Engineer	PACT
1.9	➢ Lead to increased awareness about water pollution, causes of pollution, surface and ground water quality as well as the sources of pollution e.g. nutrient transport from agriculture field into water body may cause eutrophication of water bodies.	C			NGOs	Executive Engineer	PACT
1.10	➢ Lead to increased awareness about the need to conserve fodder & develop pasture land/ Sodic land.	C			NGOs	Executive Engineer	PACT
1.11	➢ Lead to increased awareness about the need to protect Flora, Fauna, Protected Areas, Cultural Heritage & Wetlands.	C			NGOs	Executive Engineer	PACT
1.12	➢ Lead to increased awareness about the need to protect and conserve drinking water sources for arresting water & vector borne diseases, improve sanitation practices and address public health.	C			NGOs	Executive Engineer	PACT
2.	**Election of candidates / farmers / SC/ST in water user's association at all levels (field / Kolaba / alpika / others) will not only lead to** empowerment of females, vulnerable groups about also ensure their ownership and partnership in decision making.	C		Zero Year to Year 4	NGOs	Executive Engineer	PACT
3.	**Registration & handing over of management of irrigation system to**	C		Year 1	NGOs	Executive Engineer	PACT

Sr. No.	Anticipated Project Impacts	Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	WUAs will:						
3.1	➢ Lead to competing uses community inclusion, ownership, participation & empowerment including female & SC/ST in water resource management at village level.	C			NGOs	Executive Engineer	PACT
3.2	➢ Lead to surface water availability at tail end thereby reducing dependence on ground water resources in tail end.	C			NGOs	Executive Engineer	PACT
3.3	➢ Lead to preparation & implementation Crop Plan, which will lead to agriculture intensification & diversification.	C			NGOs	Executive Engineer	PACT
3.4	➢ Lead to increase in net sown area and bring additional land into agriculture & allied activities.	C			NGOs	Executive Engineer	PACT
3.5	➢ Lead to arrest of land diversion for uses other than agriculture.	C			NGOs	Executive Engineer	PACT
3.6	➢ Lead to increased opportunities for sustainable livelihood through agriculture & allied activities thereby arresting changes in occupational pattern; reduction in indebtedness & reduction in risk & vulnerability.	C			NGOs	Executive Engineer	PACT
3.7	➢ Lead to planning & implementation of measures for soil fertility, soil erosion and waste dumping / utilization of waste for useful purposes.	C			NGOs	Executive Engineer	PACT
3.8	➢ Lead to planning & implementation of measures for air pollution and GHG emissions as well as extreme climate events.	C			NGOs	Executive Engineer	PACT
3.9	➢ Lead to increased planning & implementation of measures for addressing water pollution, causes of pollution and surface and	C			NGOs	Executive Engineer	PACT

Sr. No.	Anticipated Project Impacts	Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ground water quality, as well as the sources of pollution.						
3.10	➢ Lead to planning & implementation of measures to conserve fodder & develop pasture land/Sodic land.	C			NGOs	Executive Engineer	PACT
3.11	➢ Lead to planning & implementation of measures to protect Flora, Fauna, Protected Areas, Cultural Heritage & Wetlands.	C			NGOs	Executive Engineer	PACT
3.12	➢ Lead to planning & implementation of measures to protect & conserve drinking water sources for arresting water & vector borne diseases improve sanitation practices and address public health issue.	C			NGOs	Executive Engineer	PACT
4.	**Training & Capacity Building of UPID & WUA's will lead to planning & implementation of:**	C		Year 1 to Year 5			
4.1	➢ Community inclusion, ownership, participation & empowerment including female & SC/ST in water resource management.	C					
4.2	➢ Surface water availability at tail end thereby reducing dependence on ground water resources in tail end.	B	Prevention of seepage losses and water logging monitoring water availability at the tail end.				
4.3	➢ Preparation & implementation of Crop Plan, which will lead to agriculture intensification & diversification.	B	Soil Quality Monitoring, Water Quality Monitoring.				
4.4	➢ Bring additional land into agriculture & allied activities.	B	Monitoring of landuse change.				
4.5	➢ Arresting of land diversion for use other than agriculture.	B	Monitoring of landuse change.				
4.6	➢ Developing increased opportunities for sustainable livelihood through agriculture &	B	Monitoring of indebtedness				

Sr. No.	Anticipated Project Impacts	Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	allied activities thereby arresting changes in occupational pattern reduction in indebtedness & reduction in risk & vulnerability.						
4.7	➢ Measures for soil fertility, soil erosion and waste dumping / utilization of waste for useful purposes.	B	Top soil restoration using farm yard manure. Prevention of soil loss through bunding waste dumping at designated sites waste utilization for biocomposting.				
4.8	➢ Measures for addressing air pollution and GHG emissions as well as extreme climate events.	B	Reduction of GHG emissions through alternate cropping.				
4.9	➢ Measures for addressing water pollution, causes of pollution, surface and ground water quality as well as the sources of pollution.	B	Monitoring of water quality measurement and reduction in pesticide consumption Assessment of chemical fertilizer consumption.				
4.10	➢ Measures for conserving fodder & developing pasture land/sodic land.	B	Conjunctive use of water top soil restoration Green Plantation.				
4.11	➢ Measures for protecting Flora, Fauna, Protected Areas, Cultural Heritage & Wetlands.	B	Prevention of encroachment into wetlands, Cultural Heritage Protected areas.				
4.12	➢ Measures for protecting & conserving drinking water sources for arresting water & vector borne diseases, improving sanitation practices and addressing public health issue.	B	Prevention of water logging waste dumping at designated place.				
5.	**Exposure trips to sites of successful experiments will:**	C		Year 4 to Year 5	NGOs	Executive Engineer	PACT
5.1	➢ Lead to learinng about community inclusion, ownership, participation & empowerment including female & SC/ST in water resource management.	C			NGOs	Executive Engineer	PACT
5.2	➢ Lead to learning about surface water availability at tail end thereby reducing dependence on	C			NGOs	Executive Engineer	PACT

Sr. No.	Anticipated Project Impacts	Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ground water resources in tail end.						
5.3	➢ Lead to learning about the need to prepare & implement Crop Plan, which will lead to agriculture intensification & diversification.	C			NGOs	Executive Engineer	PACT
5.4	➢ Lead to learning about increase in net sown area and bringing additional land into agriculture & allied activities.	C			NGOs	Executive Engineer	PACT
5.5	➢ Lead to learning about arrest of land diversion for user other than agriculture.	C			NGOs	Executive Engineer	PACT
5.6	➢ Lead to learning about increased opportunities for sustainable livelihood through agriculture & allied activities thereby arresting changes in occupational pattern; reduction in indebtedness & reduction in financial risk & vulnerability.	C			NGOs	Executive Engineer	PACT
5.7	➢ Lead to learning about soil fertility, soil erosion and dumping / utilization of waste for useful purposes.	C			NGOs	Executive Engineer	PACT
5.8	➢ Lead to learning about water pollution, causes of pollution, surface and ground water quality as well as the sources of pollution e.g. eutrophication of water bodies & its causes.	C			NGOs	Executive Engineer	PACT
5.9	➢ Lead to learning about the need to conserve fodder & develop pasture land/sodic land.	C			NGOs	Executive Engineer	PACT
5.10	➢ Lead to learning about the need to protect Flora, Fauna, Protected Areas, Cultural Heritage & Wetlands.	C			NGOs	Executive Engineer	PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
5.11	➢ Lead to learning about the need to protect conserve drinking water sources for arresting water & vector borne diseases improve sanitation practices and address public health issue.		C			NGOs	Executive Engineer	PACT
6.	**Construction of office for WUAs in phase 1 & Phase II may require additional land for construction and also for creation of infrastructure for providing services.**		A		Year 2 to Year 3	Contractor	Executive Engineer	Third Party / PACT
6.1	Construction of WUAs office building			➢				
6.2	Labor Camps	➢ Worker local People Exposure ➢ Impact on human health (Labor Camps)		➢ 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 repellant to be provided to the labors such as odomas, coil and sprays. The camps may maintain cleanliness and hygienic condition. ➢ Proper ventilation may be		Contractor	Executive Engineer	Third Party / PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				provided in labour camps ➢ 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				
6.3	Heavy machinery	➢ Air / Noise Pollution Soil Pollution ➢ Worker local People Exposure		➢ Limit hours of operation in populated areas ➢ Use of barriers to reduce exposure ➢ All crusher used in construction should confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Collection and recycling of lubricants ➢ Measures to prevent accidental Spills		Contractor	Executive Engineer	Third Party / PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals ➢ 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 construction sites and approach roads				
6.4	Hot mix plant	➢ Air / Noise Pollution ➢ Soil Pollution ➢ Worker local People Exposure		➢ 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 confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at		Contractor	Executive Engineer	Third Party / PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				construction sites. ➢ Collection and recycling of lubricants ➢ Measures to prevent accidental Spills ➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals for blasting ➢ 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 construction sites and approach roads				
6.5	Concrete mixture and heavy Pumps	➢ Air / Noise Pollution ➢ Soil Pollution ➢ Worker local People Exposure		➢ 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 confirm to relative dust emission devises ➢ Low emission		Contractor	Executive Engineer	Third Party / PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may beconducted at construction sites. ➢ Collection and recycling of lubricants ➢ Measures to prevent accidental Spills ➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals for blasting ➢ Provide sirens in vehicles to avoid any collision with human/animals ➢ Organise awareness programs on environmental resource management ➢ Organise Health camp ➢ Child labour must be strictly prohibited ➢ Provide signages near construction sites and approach roads				
6.6	Material handling and storage	➢ Soil Pollution ➢ Worker local People Exposure ➢ Air / Noise Pollution		➢ 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.		Contractor	Executive Engineer	Third Party / PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				➢ All crusher used in construction should confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at construction sites. ➢ Collection and recycling of lubricants ➢ Measures to prevent accidental spills ➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals for blasting ➢ 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 construction sites and approach roads				
6.7	Debris Disposal	➢ Air / Noise Pollution ➢ Water Pollution (Surface) ➢ Soil		➢ Air pollution control measure like water sprinkling ➢ Limit hours of operation in populated areas ➢ Use of barriers to reduce exposure		Contractor	Executive Engineer	Third Party / PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
		Pollution ➢ Trucks Traffic increase ➢ Landscape Degradation		➢ Plants, machinery and equipment may be handled so as to minimize generation of dust. ➢ All crusher used in construction should confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at construction sites. ➢ Dump solid waste in specified place to minimize contamination of water ➢ Dump wastewater in authorized locations and after treatment ➢ Collection and recycling of lubricants ➢ Measures to prevent accidental spills ➢ Avoid traffic in populated areas as much as possible ➢ Install speed breaker and signages near settlements ➢ Roadside plantation ➢ It is a direct, short term impact; Irreversible in nature; Severity is low; Insignificant Impact on Livelihood ➢ Carry plantation work on open sites ➢ Do not dump waste along settlement or access route ➢ Frame Muck disposal program				

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				➢ 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				
6.8	Transport of materials	➢ Air / Noise Pollution ➢ Soil Pollution ➢ Trucks Traffic increase		➢ 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 confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at construction sites. ➢ Collection and recycling of lubricants ➢ Measures to prevent accidental Spills ➢ Spillage proof vehicles shall be allowed ➢ Avoid traffic in populated		Contractor	Executive Engineer	Third Party / PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				areas as much as possible ➢ Install speed breaker and signages near settlements ➢ Roadside plantation				
7.	**Rehabilitation and Modernization of Haidergarh / LGC Branch Canal System and drainage system will:**				Year 1 to Year 3			
7.1	➢ Lead to greater surface water availability at tail end thereby reducing dependence on ground water resources in tail end.		C			Contractor	Executive Engineer	Third Party / PACT
7.2	➢ Lead to preparation & implementation of Crop Plan, which will lead to agriculture intensification & diversification.		C			Contractor	Executive Engineer	Third Party / PACT
7.3	➢ Lead to greater water availability resulting is increase in net sown area and bringing additional land into agriculture & allied activities.		C			Contractor	Executive Engineer	Third Party / PACT
7.4	➢ Lead to arrest of land diversion for uses other than agriculture.		C			Contractor	Executive Engineer	Third Party / PACT
7.5	➢ Lead to increased opportunities for sustainable livelihood through agriculture & allied activities thereby arresting changes in occupational pattern; reduction in indebtedness & reduction in risk & vulnerability.		C			Contractor	Executive Engineer	Third Party / PACT
7.6	Dredging / Desiltation or Excavation	Air / Noise Pollution	A	➢ 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		Contractor	Executive Engineer	Third Party / PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				of dust. ➢ All crusher used in construction should confirm to relative dust emission devises ➢ Low emission construction equipment generator sets and pollution free certified vehicles may be used ➢ Air quality monitoring may be conducted at construction sites.				
7.7		Water Pollution Surface Water	A	➢ Dump solid waste in specified place to minimize contamination of water ➢ Dump wastewater in authorized locations and after treatment		Contractor	Executive Engineer	Third Party/PACT
7.8		Soil Pollution	A	➢ Collection and recycling of lubricants ➢ Measures to prevent accidental spills		Contractor	Executive Engineer	Third Party/PACT
7.9		Trucks Traffic increase	A	➢ 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
7.10		Worker/Local people exposure	A	➢ 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	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				➢ Child labour must be strictly prohibited ➢ Provide signages near work sites				
7.11		Disposal of Excavated Material (Silt/vegetation)	A	➢ 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 ➢ 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		Contractor	Executive Engineer	Third Party/PACT
7.12		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
7.13	Heavy Machinery Handling and Haulage of Machinery	Air / Noise Pollution	A	➢ Limit hours of operation in populated areas ➢ Use of barriers to reduce exposure ➢ All crusher used in		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				construction should confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used				
7.14		Soil Pollution	A	➢ Collection and recycling of lubricants ➢ Measures to prevent accidental Spills		Contractor	Executive Engineer	Third Party/PACT
7.15		Worker/Local people exposure	A	➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals ➢ 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 construction sites and approach roads		Contractor	Executive Engineer	Third Party/PACT
7.16	Material Handling And Storage	Air / Noise Pollution	A	➢ 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		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				generation of dust. ➢ All crusher used in construction should confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at construction sites.				
7.17		Soil Pollution	A	➢ Collection and recycling of lubricants ➢ Measures to prevent accidental spills		Contractor	Executive Engineer	Third Party/PACT
7.18		Worker/Local people exposure	A	➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals for blasting ➢ 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 construction sites and approach roads		Contractor	Executive Engineer	Third Party/PACT
7.19	Debris Disposal	Air / Noise Pollution	A	➢ Air pollution control measure like water sprinkling ➢ Limit hours of operation in populated areas ➢ Use of barriers to reduce		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				exposure ➢ Plants, machinery and equipment may be handled so as to minimize generation of dust. ➢ All crusher used in construction should confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at construction sites.				
7.20		Water Pollution (Surface Water)	A	➢ Dump solid waste in specified place to minimize contamination of water ➢ Dump wastewater in authorized locations and after treatment		Contractor	Executive Engineer	Third Party/PACT
7.21		Soil Pollution	A	➢ Collection and recycling of lubricants ➢ Measures to prevent accidental spills		Contractor	Executive Engineer	Third Party/PACT
7.22		Trucks Traffic increase	A	➢ Avoid traffic in populated areas as much as possible ➢ Install speed breaker and signages near settlements ➢ Roadside plantation		Contractor	Executive Engineer	Third Party/PACT
7.23		Landscape Degradation	A	➢ It is a direct, short term impact; Irreversible in nature; Severity is low; Insignificant Impact on Livelihood ➢ Carry plantation work on open sites ➢ Do not dump waste along settlement or access route ➢ Frame Muck disposal		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				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				
7.24	Transport of Materials	Air / Noise Pollution	A	➢ 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 confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at construction sites.		Contractor	Executive Engineer	Third Party/PACT
7.25		Soil Pollution	A	➢ Collection and recycling of lubricants ➢ Measures to prevent accidental Spills		Contractor	Executive Engineer	Third Party/PACT
7.26		Trucks Traffic	A	➢ Spillage proof vehicles shall be allowed		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
		increase		➢ Avoid traffic in populated areas as much as possible ➢ Install speed breaker and signages near settlements ➢ Roadside plantation				
7.27	Small Tools and Pumps	Air / Noise Pollution	A	➢ Low emission construction equipment, vehicles and generator sets may be used		Contractor	Executive Engineer	Third Party/PACT
7.28	Borrow Materials/ Area	Air / Noise Pollution	A	➢ 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 confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at construction sites.		Contractor	Executive Engineer	Third Party/PACT
7.29		Soil Pollution	A	➢ Collection and recycling of lubricants ➢ Measures to prevent accidental Spills		Contractor	Executive Engineer	Third Party/PACT
7.30		Trucks Traffic increase	A	➢ Avoid traffic in populated areas as much as possible ➢ Install speed breaker and signages near settlements ➢ Roadside plantation		Contractor	Executive Engineer	Third Party/PACT
7.31		Soil Erosion	A	➢ Limitation of earth moving to dry periods ➢ Protection of vulnerable		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				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				
7.32		Worker/Local people Exposure	A	➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals for blasting ➢ 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 construction sites and approach roads		Contractor	Executive Engineer	Third Party/PACT
7.33		Generation of Excavated Material	A	➢ Remove dredged material as soon as possible from river side ➢ Dumping of dredging material only in designated place by the engineers to minimize impact on environment		Contractor	Executive Engineer	Third Party/PACT
7.34		Landscape Degradation	A	➢ It is a direct, short term impact; Irreversible in nature; Severity is low; Insignificant Impact on		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				Livelihood ➢ Carry plantation work on open sites ➢ Do not dump waste along settlement or access route ➢ Frame Muck 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				
7.35	Quary Materials/ Area	Air / Noise Pollution	A	➢ 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 confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at construction sites.		Contractor	Executive Engineer	Third Party/PACT
7.36		Soil Pollution	A	➢ Collection and recycling		Contractor	Executive	Third

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				of lubricants ➢ Measures to prevent accidental Spills			Engineer	Party/PACT
7.37		Trucks Traffic Increase	A	➢ Avoid traffic in populated areas as much as possible ➢ Install speed breaker and signages near settlements ➢ Roadside plantation		Contractor	Executive Engineer	Third Party/PACT
7.38		Worker/Local people Exposure	A	➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals for blasting ➢ 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 construction sites and approach roads		Contractor	Executive Engineer	Third Party/PACT
7.39		Generation of Excavated Material	A	➢ Remove dredged material as soon as possible from river side ➢ Dumping of dredging material only in designated place by the engineers to minimize impact on environment		Contractor	Executive Engineer	Third Party/PACT
7.40		Landscape Degradation	A	➢ It is a direct, short term impact; Irreversible in nature; Severity is low; Insignificant Impact on Livelihood		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				➢ Carry plantation work on open sites ➢ Do not dump waste along settlement or access route ➢ Frame Muck 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				
7.41	Resettlement & Rehabilitation	Land Acquisition	A	➢ Follow National R&R Policy 2007. ➢ The compensation award shall be declared before displacement of the affected families. Full payment of compensation as well as adequate progress in resettlement shall be ensured. ➢ The compensation award shall take into account the market value of the property being acquired, including the location wise minimum price per unit area fixed (or to be fixed) by the respective State Government. ➢ Conversion to the intended category of use of the land being acquired (for example, from agricultural		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				to non-agricultural) shall be taken into account in advance of the acquisition, and the compensation award shall be determined as per the intended land use category. ➢ The rehabilitation and resettlement benefits shall be extended to all the affected families. ➢ Any affected family owning house and whose house has been acquired or lost, may be allotted free of cost house site ➢ The land or house allotted to the affected families may be in the joint names of wife and husband of the affected family. ➢ Each affected below poverty line family which is without homestead land and has been residing in the affected area and which has been involuntarily displaced from such area, shall be entitled to a house. ➢ In case of involuntary displacement infrastructural facilities and amenities shall be provided in the resettlement area ➢ Facilities and amenities shall, inter alia, include roads, public transport, drainage, sanitation, safe drinking water, drinking				

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				water for cattle, community, ponds, grazing land, land for fodder, plantation (social forestry or agroforestry), Fair Price shops, panchayatghars, Cooperative Societies, Post Offices, seedcum-fertilizer storage, irrigation, electricity, health centres, child" and mother supplemental nutritional services, children's playground, community centres, schools, institutional arrangements for training, places of worship, land for traditional tribal institutions, burial/cremation grounds, and security arrangements.				
7.42		Impact on local/ tribal communities	A	➢ 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		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				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				

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				other skill development opportunities to the eligible persons from the affected families				
7.43	Labour Camps	Worker/Local people Exposure	A	➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals for blasting ➢ 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 construction sites and approach roads		Contractor	Executive Engineer	Third Party/PACT
7.44		Impact on Human health, especially workers working at construction sites (Labour Camps)	A	➢ 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		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				case of disease outbreak may be immediately subjected to medical treatment. Mosquito repellant 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 ➢ 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				
7.45	Hot Mix Plant	Air / Noise Pollution	A	➢ Air pollution control measure like water sprinkling ➢ Limit hours of operation in populated areas ➢ Use of barriers to reduce		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				exposure ➢ Plants, machinery and equipment may be handled so as to minimize generation of dust. ➢ All crusher used in construction should confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at construction sites.				
7.46		Soil Pollution	A	➢ Collection and recycling of lubricants ➢ Measures to prevent accidental Spills		Contractor	Executive Engineer	Third Party/PACT
7.47		Worker/Local people Exposure	A	➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals for blasting ➢ 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 construction sites and approach roads		Contractor	Executive Engineer	Third Party/PACT
7.48	Concrete	Air / Noise	A	➢ Air pollution control		Contractor	Executive	Third

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
	Mixture and Heavy Pumps	Pollution		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 confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may beconducted at construction sites.			Engineer	Party/PACT
7.49		Soil Pollution	A	➢ Collection and recycling of lubricants ➢ Measures to prevent accidental Spills		Contractor	Executive Engineer	Third Party/PACT
7.50		Worker/Local people Exposure	A	➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals for blasting ➢ Provide sirens in vehicles to avoid any collision with human/animals ➢ Organise awareness programs on environmental resource management ➢ Organise Health camp ➢ Child labour must be		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				strictly prohibited ➢ Provide signages near construction sites and approach roads				
7.51	Temporary Land Acquisition	Air / Noise Pollution	A	➢ 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 confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at construction sites.		Contractor	Executive Engineer	Third Party/PACT
7.52		Soil Pollution	A	➢ Collection and recycling of lubricants ➢ Measures to prevent accidental Spills		Contractor	Executive Engineer	Third Party/PACT
7.53		Worker/Local people exposure	A	➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals for blasting ➢ Provide sirens in vehicles to avoid any collision with human/animals ➢ Organise awareness programs on		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				environmental resource management ➢ Organise Health camps ➢ Child labour must be strictly prohibited ➢ Provide signages near construction sites and approach Roads				
7.54	Tree Felling, Vegetation Clearance	Landscape Degradation	A	➢ It is a direct, short term impact; Irreversible in nature; Severity is low; Insignificant Impact on Livelihood ➢ Carry plantation work on open sites ➢ Do not dump waste along settlement or access route ➢ Frame Muck 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
7.55		Impact on Flora	A	➢ 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		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				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.				
7.56		Soil Erosion	A	➢ 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
7.57	Sheds to keep Machines and Tools	Air / Noise Pollution	A	➢ 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 confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				➢ Air quality monitoring may be conducted at construction sites.				
7.58	Blasting	Air / Noise Pollution	A	➢ 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 confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at construction sites.		Contractor	Executive Engineer	Third Party/PACT
7.59		Soil Pollution	A	➢ Collection and recycling of lubricants ➢ Measures to prevent accidental spills		Contractor	Executive Engineer	Third Party/PACT
7.60		Worker/Local people exposure	A	➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals for blasting ➢ Provide sirens in vehicles to avoid any collision with human/animals ➢ Organise awareness programs on environmental resource		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				management ➢ Organise Health camps ➢ Child labour must be strictly prohibited ➢ Provide signages near construction sites and approach roads				
7.61		Landscape Degradation	A	➢ It is a direct, short term impact; Irreversible in nature; Severity is low; Insignificant Impact on Livelihood ➢ Carry plantation work on open sites ➢ Do not dump waste along settlement or access route ➢ Frame Muck 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
7.62		Generation of Debris /waste material	A	➢ 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 duping		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				debris on the identified site. ➢ Debris can be used as filling material or river embankment protection material.				
	Post Implementation Phase			➢		Contractor	Executive Engineer	Third Party/PACT
7.63	Increased Traffic/ Operation of Heavy Machinery For Regular Maintenance etc.	Air / Noise Pollution	A	➢ Specific air and noise pollution control measure to minimize impact on environment. ➢ Periodic air quality monitoring		Contractor	Executive Engineer	Third Party/PACT
7.64		Water Pollution (Surface Water)	A	➢ Control oil spillage ➢ Setup a covered place for operation and handling of oil to stop contamination ➢ Periodic water quality monitoring		Contractor	Executive Engineer	Third Party/PACT
7.65		Soil Pollution	A	➢ Control oil spillage ➢ Setup a covered place for operation and handling of oil to stop contamination ➢ Soil quality testing at least once a year		Contractor	Executive Engineer	Third Party/PACT
7.66		Worker/Local population Exposure	A	➢ Arrange mask for generator operator ➢ Use modern device to reduce smoke generation		Contractor	Executive Engineer	Third Party/PACT
7.67		Disturbance to Fauna	A	➢ Fencing is required on the both side of the road to avoid accident in forest area ➢ Use of sign boards on the road side to avoid accident		Contractor	Executive Engineer	Third Party/PACT
7.68		Increased Traffic	A	➢ Avoid traffic in populated areas as much as possible		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				➢ Follow precautionary measures to avoid accident ➢ Install speed breakers and signages near settlement				
7.69	Repair of Existing structures of the canal and also new demand of VRBs, DRB, Siphons etc.	Dredging/De-siltation	A	➢		Contractor	Executive Engineer	Third Party/PACT
7.70	Labor Camps	➢ Worker local People Exposure ➢ Impact on human health (Labor Camps)	A	➢ 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 repellant 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 ➢ Sufficient fuel may be		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				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				
7.71	Heavy machinery	➢ Air / Noise Pollution ➢ Soil Pollution ➢ Worker local People Exposure	A	➢ Limit hours of operation in populated areas ➢ Use of barriers to reduce exposure ➢ All crusher used in construction should confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Collection and recycling of lubricants ➢ Measures to prevent accidental Spills ➢ Locate handling sites away from populated areas		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals ➢ 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 construction sites and approach roads				
7.72	Hot mix plant	➢ Air / Noise Pollution ➢ Soil Pollution ➢ Worker local People Exposure	A	➢ 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 confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at construction sites. ➢ Collection and recycling		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				of lubricants ➢ Measures to prevent accidental Spills ➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals for blasting ➢ 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 construction sites and approach roads				
7.73	Concrete mixture and heavy Pumps	➢ Air / Noise Pollution ➢ Soil Pollution ➢ Worker local People Exposure	A	➢ 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 confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				may be used ➢ Air quality monitoring may beconducted at construction sites. ➢ Collection and recycling of lubricants ➢ Measures to prevent accidental Spills ➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals for blasting ➢ Provide sirens in vehicles to avoid any collision with human/animals ➢ Organise awareness programs on environmental resource management ➢ Organise Health camp ➢ Child labour must be strictly prohibited ➢ Provide signages near construction sites and approach roads				
7.74	Material handling and storage	➢ Soil Pollution ➢ Worker local People Exposure ➢ Air / Noise Pollution	A	➢ 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		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at construction sites. ➢ Collection and recycling of lubricants ➢ Measures to prevent accidental spills ➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals for blasting ➢ 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 construction sites and approach roads				
7.75	Debris Disposal	➢ Air / Noise Pollution ➢ Water Pollution (Surface) ➢ Soil Pollution ➢ Trucks Traffic increase ➢ Landscape	A	➢ 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		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
		Degradation		so as to minimize generation of dust. ➢ All crusher used in construction should confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at construction sites. ➢ Dump solid waste in specified place to minimize contamination of water ➢ Dump wastewater in authorized locations and after treatment ➢ Collection and recycling of lubricants ➢ Measures to prevent accidental spills ➢ Avoid traffic in populated areas as much as possible ➢ Install speed breaker and signages near settlements ➢ Roadside plantation ➢ It is a direct, short term impact; Irreversible in nature; Severity is low; Insignificant Impact on Livelihood ➢ Carry plantation work on open sites ➢ Do not dump waste along settlement or access route ➢ Frame Muck disposal program ➢ Frame quarry & borrow area rehabilitation program				

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				➢ 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				
7.76	Transport of materials	➢ Air / Noise Pollution ➢ Soil Pollution ➢ Trucks Traffic increase	A	➢ 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 confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at construction sites. ➢ Collection and recycling of lubricants ➢ Measures to prevent accidental Spills ➢ Spillage proof vehicles shall be allowed ➢ Avoid traffic in populated areas as much as possible ➢ Install speed breaker and		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				signages near settlements ➢ Roadside plantation				
7.77	Repair and Clearing of irrigation outlets	Dredging/De-siltation				Contractor	Executive Engineer	Third Party/PACT
7.78	Labor Camps	o Worker local People Exposure o Impact on human health (Labor Camps)	A	➢ 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 repellant 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 ➢ 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		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				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				
7.79	Heavy machinery	➢ Air / Noise Pollution ➢ Soil Pollution ➢ Worker local People Exposure	A	➢ Limit hours of operation in populated areas ➢ Use of barriers to reduce exposure ➢ All crusher used in construction should confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Collection and recycling of lubricants ➢ Measures to prevent accidental Spills ➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals ➢ Provide sirens in vehicles to avoid any collision with		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				human/animals ➢ Organise awareness programs on environmental resource management ➢ Organise Health camps ➢ Child labour must be strictly prohibited ➢ Provide signages near construction sites and approach roads				
7.80	Hot mix plant	➢ Air / Noise Pollution ➢ Soil Pollution ➢ Worker local People Exposure	A	➢ 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 confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at construction sites. ➢ Collection and recycling of lubricants ➢ Measures to prevent accidental Spills ➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				minimize exposure ➢ Provide prior warning /signals for blasting ➢ 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 construction sites and approach roads				
7.81	Concrete mixture and heavy Pumps	➢ Air / Noise Pollution ➢ Soil Pollution ➢ Worker local People Exposure	A	➢ 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 confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may beconducted at construction sites. ➢ Collection and recycling of lubricants ➢ Measures to prevent		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				accidental Spills ➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals for blasting ➢ Provide sirens in vehicles to avoid any collision with human/animals ➢ Organise awareness programs on environmental resource management ➢ Organise Health camp ➢ Child labour must be strictly prohibited ➢ Provide signages near construction sites and approach roads				
7.82	Material handling and storage	➢ Soil Pollution ➢ Worker local People Exposure ➢ Air / Noise Pollution	A	➢ 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 confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				construction sites. ➢ Collection and recycling of lubricants ➢ Measures to prevent accidental spills ➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals for blasting ➢ 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 construction sites and approach roads				
7.83	Debris Disposal	➢ Air / Noise Pollution ➢ Water Pollution (Surface) ➢ Soil Pollution ➢ Trucks Traffic increase ➢ Landscape Degradation	A	➢ 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 confirm to relative dust emission devises ➢ Low emission construction		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at construction sites. ➢ Dump solid waste in specified place to minimize contamination of water ➢ Dump wastewater in authorized locations and after treatment ➢ Collection and recycling of lubricants ➢ Measures to prevent accidental spills ➢ Avoid traffic in populated areas as much as possible ➢ Install speed breaker and signages near settlements ➢ Roadside plantation ➢ It is a direct, short term impact; Irreversible in nature; Severity is low; Insignificant Impact on Livelihood ➢ Carry plantation work on open sites ➢ Do not dump waste along settlement or access route ➢ Frame Muck 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				

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				trenches filled in and effectively sealed off and the whole site				
7.84	Transport of materials	➢ Air / Noise Pollution ➢ Soil Pollution ➢ Worker local People Exposure	A	➢ 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 confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at construction sites. ➢ Collection and recycling of lubricants ➢ Measures to prevent accidental Spills ➢ Spillage proof vehicles shall 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
8.	**Lining of Canals**				Year 1 to Year 3	Contractor	Executive Engineer	Third Party/PACT
8.1	➢ Lead to surface water availability at tail end thereby reducing dependence on ground water		C			Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
	resources in tail end.							
8.2	➢ Lead to preparation & implementation Crop Plan, which will lead to agriculture intensification & diversification.		C			Contractor	Executive Engineer	Third Party/PACT
8.3	➢ Lead to increase in net sown area and bring additional land into agriculture & allied activities.		C			Contractor	Executive Engineer	Third Party/PACT
8.4	➢ Lead to reduce recharge of Ground Water.					Contractor	Executive Engineer	Third Party/PACT
8.5	Lining of Main and branch canal	➢ Air / Noise Pollution ➢ Water Pollution (Surface) ➢ Soil Pollution ➢ Trucks Traffic increase ➢ Worker local People Exposure ➢ Generation Excavated Material ➢ Water Delivery reduction, interruption	A			Contractor	Executive Engineer	Third Party/PACT
8.6	Labor Camps	➢ Worker local People Exposure ➢ Impact on human health (Labor Camps)	A	➢ 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		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				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 repellant 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 ➢ 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				
8.7	Heavy	➢ Air / Noise	A	➢ Limit hours of operation in		Contractor	Executive	Third

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
	machinery	Pollution ➢ Soil Pollution ➢ Worker local People Exposure		populated areas ➢ Use of barriers to reduce exposure ➢ All crusher used in construction should confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Collection and recycling of lubricants ➢ Measures to prevent accidental Spills ➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals ➢ 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 construction sites and approach roads			Engineer	Party/PACT
8.8	Hot mix plant	➢ Air / Noise Pollution ➢ Soil Pollution ➢ Worker local People	A	➢ Air pollution control measure like water sprinkling ➢ Limit hours of operation in populated areas ➢ Use of barriers to reduce		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
		Exposure		exposure ➢ Plants, machinery and equipment may be handled so as to minimize generation of dust. ➢ All crusher used in construction should confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at construction sites. ➢ Collection and recycling of lubricants ➢ Measures to prevent accidental Spills ➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals for blasting ➢ 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 construction sites and approach roads				
8.9	Concrete mixture	➢ Air / Noise	A	➢ Air pollution control		Contractor	Executive	Third

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
	and heavy Pumps	Pollution ➢ Soil Pollution ➢ Worker local People Exposure		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 confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may beconducted at construction sites. ➢ Collection and recycling of lubricants ➢ Measures to prevent accidental Spills ➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals for blasting ➢ Provide sirens in vehicles to avoid any collision with human/animals ➢ Organise awareness programs on environmental resource management ➢ Organise Health camp ➢ Child labour must be			Engineer	Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				strictly prohibited ➢ Provide signages near construction sites and approach roads				
8.10	Material handling and storage	➢ Soil Pollution ➢ Worker local People Exposure ➢ Air / Noise Pollution	A	➢ 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 confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at construction sites. ➢ Collection and recycling of lubricants ➢ Measures to prevent accidental spills ➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals for blasting ➢ Provide sirens in vehicles to avoid any collision with human/animals ➢ Organise awareness programs on		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				environmental resource management ➢ Organise Health camps ➢ Child labour must be strictly prohibited ➢ Provide signages near construction sites and approach roads				
8.11	Debris Disposal	➢ Air / Noise Pollution ➢ Water Pollution (Surface) ➢ Soil Pollution ➢ Trucks Traffic increase ➢ Landscape Degradation	A	➢ 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 confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at construction sites. ➢ Dump solid waste in specified place to minimize contamination of water ➢ Dump wastewater in authorized locations and after treatment ➢ Collection and recycling of lubricants ➢ Measures to prevent accidental spills ➢ Avoid traffic in populated		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				areas as much as possible ➢ Install speed breaker and signages near settlements ➢ Roadside plantation ➢ It is a direct, short term impact; Irreversible in nature; Severity is low; Insignificant Impact on Livelihood ➢ Carry plantation work on open sites ➢ Do not dump waste along settlement or access route ➢ Frame Muck 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				
8.12	Transport of materials	➢ Air / Noise Pollution ➢ Soil Pollution ➢ Trucks Traffic increase	A	➢ 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 confirm to relative dust		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at construction sites. ➢ Collection and recycling of lubricants ➢ Measures to prevent accidental Spills ➢ Spillage proof vehicles shall be allowed ➢ Avoid traffic in populated areas as much as possible ➢ Install speed breaker and signages near settlements ➢ Roadside plantation				
8.13	Dredging / De-siltation					Contractor	Executive Engineer	Third Party/PACT
8.14	Labor Camps	➢ Worker local People Exposure ➢ Impact on human health (Labor Camps)	A	➢ 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		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				subjected to medical treatment. Mosquito repellant 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 ➢ 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				
8.15	Heavy machinery	➢ Air / Noise Pollution ➢ Soil Pollution ➢ Worker local People Exposure	A	➢ Limit hours of operation in populated areas ➢ Use of barriers to reduce exposure ➢ All crusher used in construction should confirm to relative dust emission devises		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Collection and recycling of lubricants ➢ Measures to prevent accidental Spills ➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals ➢ 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 construction sites and approach roads				
8.16	Hot mix plant	➢ Air / Noise Pollution ➢ Soil Pollution ➢ Worker local People Exposure	A	➢ 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		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at construction sites. ➢ Collection and recycling of lubricants ➢ Measures to prevent accidental Spills ➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals for blasting ➢ 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 construction sites and approach roads				
8.17	Concrete mixture and heavy Pumps	➢ Air / Noise Pollution ➢ Soil Pollution ➢ Worker local People Exposure	A	➢ Air pollution control measure like water sprinkling ➢ Limit hours of operation in populated areas ➢ Use of barriers to reduce Exposure Plants, machinery and equipment		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				may be handled so as to minimize generation of dust. ➢ All crusher used in construction should confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may beconducted at construction sites. ➢ Collection and recycling of lubricants ➢ Measures to prevent accidental Spills ➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals for blasting ➢ Provide sirens in vehicles to avoid any collision with human/animals ➢ Organise awareness programs on environmental resource management ➢ Organise Health camp ➢ Child labour must be strictly prohibited ➢ Provide signages near construction sites and approach roads				
8.18	Material handling and storage	➢ Soil Pollution ➢ Worker local	A	➢ Air pollution control measure like water sprinkling		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
		People Exposure ➢ Air / Noise Pollution		➢ 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 confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at construction sites. ➢ Collection and recycling of lubricants ➢ Measures to prevent accidental spills ➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals for blasting ➢ 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 construction sites and				

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				approach roads				
8.19	Debris Disposal	➢ Air / Noise Pollution ➢ Water Pollution (Surface) ➢ Soil Pollution ➢ Trucks Traffic increase ➢ Landscape Degradation	A	➢ 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 confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at construction sites. ➢ Dump solid waste in specified place to minimize contamination of water ➢ Dump wastewater in authorized locations and after treatment ➢ Collection and recycling of lubricants ➢ Measures to prevent accidental spills ➢ Avoid traffic in populated areas as much as possible ➢ Install speed breaker and signages near settlements ➢ Roadside plantation ➢ It is a direct, short term impact; Irreversible in nature; Severity is low;		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				Insignificant Impact on Livelihood ➢ Carry plantation work on open sites ➢ Do not dump waste along settlement or access route ➢ Frame Muck 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				
8.20	Transport of materials	➢ Air / Noise Pollution ➢ Soil Pollution ➢ Trucks Traffic increase	A	➢ 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 confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				construction sites. ➢ Collection and recycling of lubricants ➢ Measures to prevent accidental Spills ➢ Spillage proof vehicles shall be allowed ➢ Avoid traffic in populated areas as much as possible ➢ Install speed breaker and signages near settlements ➢ Roadside plantation				
9.	**Rehabilitation of existing important Building e.g. Inspection houses, offices, colonies, video conferencing centre etc.**				Year 1 to Year 2		Contractor	Executive Engineer
9.1	Will require land						Contractor	Executive Engineer
9.2	Labor Camps	➢ Worker local People Exposure ➢ Impact on human health (Labor Camps)	A	➢ 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 repellant to be provided to the labors such as odomas,		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				coil and sprays. The camps may maintain cleanliness and hygienic condition. ➢ Proper ventilation may be provided in labour camps ➢ 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				
9.3	Heavy machinery	➢ Air / Noise Pollution ➢ Soil Pollution ➢ Worker local People Exposure	A	➢ Limit hours of operation in populated areas ➢ Use of barriers to reduce exposure ➢ All crusher used in construction should confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				➢ Collection and recycling of lubricants ➢ Measures to prevent accidental Spills ➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals ➢ 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 construction sites and approach roads				
9.4	Hot mix plant	➢ Air / Noise Pollution ➢ Soil Pollution ➢ Worker local People Exposure	A	➢ 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 confirm to relative dust emission devises ➢ Low emission construction equipment,		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at construction sites. ➢ Collection and recycling of lubricants ➢ Measures to prevent accidental Spills ➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals for blasting ➢ 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 construction sites and approach roads				
9.5	Concrete mixture and heavy Pumps	➢ Air / Noise Pollution ➢ Soil Pollution ➢ Worker local People Exposure	A	➢ 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		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				construction should confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may beconducted at construction sites. ➢ Collection and recycling of lubricants ➢ Measures to prevent accidental Spills ➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals for blasting ➢ Provide sirens in vehicles to avoid any collision with human/animals ➢ Organise awareness programs on environmental resource management ➢ Organise Health camp ➢ Child labour must be strictly prohibited ➢ Provide signages near construction sites and approach roads				
9.6	Material handling and storage	➢ Soil Pollution ➢ Worker local People Exposure ➢ Air / Noise Pollution	A	➢ Air pollution control measure like water sprinkling ➢ Limit hours of operation in populated areas ➢ Use of barriers to reduce exposure		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				➢ Plants, machinery and equipment may be handled so as to minimize generation of dust. ➢ All crusher used in construction should confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at construction sites. ➢ Collection and recycling of lubricants ➢ Measures to prevent accidental spills ➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals for blasting ➢ 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 construction sites and approach roads				
9.7	Debris Disposal	➢ Air / Noise Pollution	A	➢ Air pollution control measure like water sprinkling		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
		➢ Water Pollution (Surface) ➢ Soil Pollution ➢ Trucks Traffic increase ➢ Landscape Degradation		➢ 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 confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at construction sites. ➢ Dump solid waste in specified place to minimize contamination of water ➢ Dump wastewater in authorized locations and after treatment ➢ Collection and recycling of lubricants ➢ Measures to prevent accidental spills ➢ Avoid traffic in populated areas as much as possible ➢ Install speed breaker and signages near settlements ➢ Roadside plantation ➢ It is a direct, short term impact; Irreversible in nature; Severity is low; Insignificant Impact on Livelihood ➢ Carry plantation work on open sites				

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				➢ Do not dump waste along settlement or access route ➢ Frame Muck 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				
9.8	Transport of materials	➢ Air / Noise Pollution ➢ Soil Pollution ➢ Trucks Traffic increase	A	➢ 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 confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at construction sites. ➢ Collection and recycling of lubricants ➢ Measures to prevent		Contractor	Executive Engineer	Third Party/PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				accidental Spills ➢ Spillage proof vehicles shall be allowed ➢ Avoid traffic in populated areas as much as possible ➢ Install speed breaker and signages near settlements ➢ Roadside plantation				
10.	**Piloting Alternative Branch – Level Management Mechanism for Water Service Provision & Maintenance as part of promoting Public-Private-Partnership in Irrigation Sector.**			➢				
10.1	Promotion & extension of improved management mechanism for water services provision & maintenance e.g. on farm demonstration activities in agriculture & horticulture.	Water losses through seepage	B	➢ Field Bunding, Alternate cropping pattern and Usage of water conservation technologies.				
10.2		Water Pollution	B	➢ Usage of IPN / IPNM Reduction in use of chemical fertilize & pesticides.		WUA	Executive Engineer	PACT
10.3		Soil Pollution	B	➢ Usage of farm yard manure / biofertilizers. Usage of IPN & IPNM Reduce consumption of chemical fertilizer & pesticides.		WUA	Executive Engineer	PACT
10.4	Animal Husbandry & dairy activities	Solid Waste	B	➢ Disposal of solid waste excreta to a designated place.		WUA	Executive Engineer	PACT
10.5		Water Pollution	B	➢ Prevent effluent from				

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				animal husbandary & dairy activities to enter into source of drinking water, pond and other sources of water.				
10.6			B	➢ Prevent stagnation of effluent from animal husbandary & dairy activity at one place.		WUA	Executive Engineer	PACT
11.	**Agriculture Water Use and Productivity Efficiency Improvement Program.**				Year 1 to 5			
11.1	Construction of field channels & rehabilitation of surfact drainage system.	Air / Noise Pollution	B	➢ 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 devises. ➢ Low emission construction equipment and pollution free certified vehicles may be used. ➢ Air quality monitoring may be conducted at construction sites.		Contractor	WUA	Executive Engineer / PACT
11.2		Water Pollution Surface Water	B	➢ Dump solid waste in specified place to minimize contamination of water.		Contractor	WUA	Executive Engineer / PACT
11.3		Soil Pollution	B	➢ Collection and recycling of lubricants		Contractor	WUA	Executive Engineer / PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
11.4		Trucks Traffic increase	B	➢ Pollution Free certified vehicles to be allowed ➢ Avoid traffic in populated areas as much as possible		Contractor	WUA	Executive Engineer / PACT
11.5		Worker/Local people exposure	B	➢ 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		Contractor	WUA	Executive Engineer / PACT
11.6		Disposal of Excavated Material (Silt/vegetation)	B	➢ 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 ➢ 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 to minimize impact on environment ➢ Major Drains (if any) contract agreement shall also have silt disposal plan ➢ Slope of drains/canals		Contractor	WUA	Executive Engineer / PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				shall not be more than 1 m height and 2 m in width ➢ Technical specifications shall be part of contract agreement				
11.7		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	Executive Engineer / PACT
11.8	Material Handling And Storage	Air / Noise Pollution	B	➢ 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 confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at construction sites.		Contractor	WUA	Executive Engineer / PACT
11.9		Landscape Degradation	B	➢ It is a direct, short term impact; Irreversible in nature; Severity is low; Insignificant Impact on Livelihood ➢ Carry plantation work on open sites ➢ Do not dump waste along settlement or access route ➢ Frame Muck disposal program		Contractor	WUA	Executive Engineer / PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				➢ 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				
11.10	Transport of Materials	Air / Noise Pollution	B	➢ 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 confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at construction sites.		Contractor	WUA	Executive Engineer / PACT
11.11		Soil Pollution	B	➢ Collection and recycling of lubricants ➢ Measures to prevent accidental Spills		Contractor	WUA	Executive Engineer / PACT
11.12		Trucks Traffic increase	B	➢ Spillage proof vehicles shall be allowed ➢ Avoid traffic in populated		Contractor	WUA	Executive Engineer / PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				areas as much as possible ➢ Install speed breaker and signages near settlements ➢ Roadside plantation				
11.13	Small Tools and Pumps	Air / Noise Pollution	B	➢ Low emission construction equipment, vehicles and generator sets may be used		Contractor	WUA	Executive Engineer / PACT
11.14	Resettlement & Rehabilitation	Land Acquisition	B	➢ Follow National R&R Policy 2007. ➢ The compensation award shall be declared before displacement of the affected families. Full payment of compensation as well as adequate progress in resettlement shall be ensured. ➢ The compensation award shall take into account the market value of the property being acquired, including the location wise minimum price per unit area fixed (or to be fixed) by the respective State Government. ➢ Conversion to the intended category of use of the land being acquired (for example, from agricultural to non-agricultural) shall be taken into account in advance of the acquisition, and the compensation award shall be determined as per the intended land use category. ➢ The rehabilitation and resettlement benefits shall be extended to all the affected families.		Contractor	WUA	Executive Engineer / PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				➢ Any affected family owning house and whose house has been acquired or lost, may be allotted free of cost house site ➢ The land or house allotted to the affected families may be in the joint names of wife and husband of the affected family. ➢ Each affected below poverty line family which is without homestead land and has been residing in the affected area and which has been involuntarily displaced from such area, shall be entitled to a house. ➢ In case of involuntary displacement infrastructural facilities and amenities shall be provided in the resettlement area ➢ Facilities and amenities shall, inter alia, include roads, public transport, drainage, sanitation, safe drinking water, drinking water for cattle, community, ponds, grazing land, land for fodder, plantation (social forestry or agroforestry), Fair Price shops, panchayatghars, Cooperative Societies, Post Offices, seedcum-fertilizer storage, irrigation, electricity,				

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				health centres, child" and mother supplemental nutritional services, children's playground, community centres, schools, institutional arrangements for training, places of worship, land for traditional tribal institutions, burial/cremation grounds, and security arrangements.				
11.15		Impact on local/ tribal communities	B	➢ 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		Contractor	WUA	Executive Engineer / PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				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				
11.16	Labour Camps	Worker/Local people Exposure	B	➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals for blasting		Contractor	WUA	Executive Engineer / PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				➢ 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 construction sites and approach roads				
11.17		Impact on Human health, especially workers working at construction sites (Labour Camps)	B	➢ 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 repellant 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	WUA	Executive Engineer / PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				➢ 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				
11.18	Concrete Mixture and Heavy Pumps	Air / Noise Pollution	B	➢ 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 confirm to relative dust emission devises ➢ Low emission construction equipment,		Contractor	WUA	Executive Engineer / PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				vehicles and generator sets may be used ➢ Air quality monitoring may beconducted at construction sites.				
11.19		Soil Pollution	B	➢ Collection and recycling of lubricants ➢ Measures to prevent accidental Spills		Contractor	WUA	Executive Engineer / PACT
11.20		Worker/Local people Exposure	B	➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals for blasting ➢ Provide sirens in vehicles to avoid any collision with human/animals ➢ Organise awareness programs on environmental resource management ➢ Organise Health camp ➢ Child labour must be strictly prohibited ➢ Provide signages near construction sites and approach roads		Contractor	WUA	Executive Engineer / PACT
11.21	Temporary Land Acquisition	Air / Noise Pollution	B	➢ 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		Contractor	WUA	Executive Engineer / PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				construction should confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at construction sites.				
11.22		Soil Pollution	B	➢ Collection and recycling of lubricants ➢ Measures to prevent accidental Spills		Contractor	WUA	Executive Engineer / PACT
11.23		Worker/Local people exposure	B	➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals for blasting ➢ 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 construction sites and approach Roads		Contractor	WUA	Executive Engineer / PACT
11.24	Tree Felling, Vegetation Clearance	Landscape Degradation	B	➢ It is a direct, short term impact; Irreversible in nature; Severity is low; Insignificant Impact on Livelihood ➢ Carry plantation work on open sites ➢ Do not dump waste along		Contractor	WUA	Executive Engineer / PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				settlement or access route ➢ Frame Muck 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				
11.25		Impact on Flora	B	➢ 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	WUA	Executive Engineer / PACT
11.26		Soil Erosion	B	➢ Limitation of earth moving to dry periods ➢ Protection of vulnerable areas with mulch ➢ Protection of drainage channels with beams,		Contractor	WUA	Executive Engineer / PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				straw or fabric barriers ➢ Installation of sedimentation basins ➢ Seeding or planting of erodible surfaces as soon as possible				
11.27	Sheds to keep Machines and Tools	Air / Noise Pollution	B	➢ 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 confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at construction sites.		Contractor	WUA	Executive Engineer / PACT
11.28	Blasting	Air / Noise Pollution	B	➢ 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		Contractor	WUA	Executive Engineer / PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				confirm to relative dust emission devises ➢ Low emission construction equipment, vehicles and generator sets may be used ➢ Air quality monitoring may be conducted at construction sites.				
11.29		Soil Pollution	B	➢ Collection and recycling of lubricants ➢ Measures to prevent accidental spills		Contractor	WUA	Executive Engineer / PACT
11.30		Worker/Local people exposure	B	➢ Locate handling sites away from populated areas ➢ Follow proper operation and handling measures to minimize exposure ➢ Provide prior warning /signals for blasting ➢ 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 construction sites and approach roads		Contractor	WUA	Executive Engineer / PACT
11.31		Landscape Degradation	B	➢ It is a direct, short term impact; Irreversible in nature; Severity is low; Insignificant Impact on Livelihood ➢ Carry plantation work on open sites ➢ Do not dump waste along settlement or access route		Contractor	WUA	Executive Engineer / PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				➢ Frame Muck 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				
11.32		Generation of Debris /waste material	B	➢ 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 duping debris on the identified site. ➢ Debris can be used as filling material or river embankment protection material.		Contractor	WUA	Executive Engineer / PACT
11.33	Boring of tubewell	Air / Noise Pollution	B	➢ 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		WUA	Executive Engineer	PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
				generation dust emission devises. ➢ Low emission construction equipment and pollution free certified vehicles may be used.				
11.34		Water Pollution	B	➢ Dump solid waste in specified place to minimize contamination of water.		WUA	Executive Engineer	PACT
11.35		Soil Pollution	B	➢ Prevent accidental spill of oil.		WUA	Executive Engineer	PACT
11.36		Worker / local people Exposure	B	➢ Provide safety measures (mask, gloves, hat etc.) to minimize exposure.		WUA	Executive Engineer	PACT
11.37		Disposal of excavated material	B	➢ Disposal Area shall be pre-identified with due consent of local community prior to initiate work. ➢ Dumping of silt / vegetation only in designated place to minimize impact on environment.		WUA	Executive Engineer	PACT
11.38	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
11.39		Water Pollution	B	➢ Usage of IPN / IPNM Reduction in use of chemical fertilize & pesticides		WUA	Executive Engineer	PACT
11.40		Soil Pollution	B	➢ Usage of farm yard manure / biofertilizers. Usage of IPN & IPNM Reduce consumption of chemical fertilizer & pesticides.		WUA	Executive Engineer	PACT
11.41	Horticulture Development on	Water losses through seepage	B	➢ Field Bunding, Alternate cropping pattern and usage		WUA	Executive Engineer	PACT

Sr. No.	Anticipated Project Impacts		Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)
	farm demonstration			of water conservation technologies				
11.42		Water Pollution	B	➢ Usage of IPN / IPNM Reduction in use of chemical fertilize & pesticides		WUA	Executive Engineer	PACT
11.43		Soil Pollution	B	➢ Usage of farm yard manure / biofertilizers. Usage of IPN & IPNM Reduce consumption of chemical fertilizers & pesticides.		WUA	Executive Engineer	PACT
12.	**Social Assessment / Development.**			➢				
12.1	Formation of Women Self Help Group will result in improved livelihood & employment, including gender empowerment & participation including SC & ST.		C	➢		WUA	Executive Engineer	PACT
12.2	Awareness creation will lead to conjunctive use of water, greater surface 7 ground water availability, agriculture intensification diversification, improved livelihoods, reduced indebtedness & risks & vulnerability, inclusion, improved community health, greater participation.			➢		WUA	Executive Engineer	PACT
12.3	Organization of workshops, training & capacity building will result in greater empowerment, inclusion, transparency & employment.			➢		WUA	Executive Engineer	PACT
12.4	Promotion of saving & credit activity, will lead to improved livelihood, reduced indebtedness & vulnerability of economically weaker section (SC & ST) participation.			➢		WUA	Executive Engineer	PACT
12.5	Grading of SHG will result in greater empowerment, participation & transparency.			➢		WUA	Executive Engineer	PACT
12.6	Monitoring & evaluation will result in			➢		WUA	Executive	PACT

Sr. No.	Anticipated Project Impacts	Impact Categorization	Mitigation Measures	Implementation Schedule	Site Responsibility	Supervision Responsibility	Quality Responsibility
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	greater transparency & participation.					Engineer	

5.3 Screening

Analysis of **Table 5.2** indicates that construction activity lead to negative impacts, which may be of short term & long term durations.

Construction phase interventions, such as improvement of access roads, labor camps, silt disposal, and other ancillary temporary infrastructure may produce impacts on the communities in proximity. The SEMF does provide for addressing construction phase interventions, including how to deal with labor camps. The template discussed below will describe any major issues related to construction phase interventions that are identified at the investigation and pre-design phase. For example, in the instance there will be reservoir de-silting, the design will have to determine the amount of silt and will have to prepare a specific plan where the silt will be deposited. The SEMF suffices to identify this as an environmental issue to be addressed during design and construction.

There are readily available, well-developed environmental specifications and it will be ensured that such specifications will indeed be included in the technical specifications of each tender document. The contractor will have to factor costs related to the implementation of environmental mitigation aspects in his bid. Site engineers will be instructed to supervise the compliance with the technical specifications, including the environmental clauses. As part of the third-party construction supervision and quality control, the Consultant will ensure compliance as well.

In order to assess alternatives scenarios and to identify the preferred alternative an analysis of the proposed sub-project activities was carried out with regard to their environmental and social implications. The analysis was carried out for three scenarios, namely, no-project scenario, no-component scenario and with component scenario. The findings of the analysis are given in the following **Table 5.3.**

Table 5.3: Analysis of Alternatives

S. No.	Sub-Project Activities	No-Project Scenario	No-Component Scenario	With Component Scenario
1.	De-silting of canal/drains	Existing Degaraded system will be as such with social problems. No Basin approach No PIM No new technologies use	Local, short term environmental problems like air and noise pollution will reduce but dam safety aspects will suffer.	Better water delivery system Air, water and noise pollution due to Silt disposal cutting of canal bank, dredging etc. have negligible imact by following mitigation measures.
2.	Rehabilitation and modernization		Though local, short term environmental	Water delivery System will

S. No.	Sub-Project Activities	No-Project Scenario	No-Component Scenario	With Component Scenario
	design/redesign process	No Water Management No Safty aspects No knowledgebase No sustainable resource management	problem will be avoided;	improve. No Land acquisition. Public consent in work with more transparency. Mitigation and enhancement measures will reduce / avoid adverse impacts.
3.	Lining of main and branch canal		Local, short term environmental problems like air, water and noise pollution will reduce but environmental and social risks envisaged if not implemented.	Short term impacts during construction which could be minimize with suitable mitigation measures
4.	Repairs of existing structures of the canal and also new demand of VRBs, DRBs, Syphons etc		Local, short term water pollution will occur. Smooth operation of canal system may get affected. Dam safety may suffer	Surface water pollution during cleaning activity. Reduction of risk factor Better Canal (Branch) operation
5.	Construction of WUA office building		Local, short term environmental problems like air, water and noise pollution will reduce but environmental and social risks envisaged if not implemented.	Air, water and noise pollution due to construction of office building.
6.	Improving Drainage		Local, short term environmental problems like air, water and noise pollution will reduce but environmental and social risks	Air, water and noise pollution due to construction and repairing canal system. Water quality may deteriorate during

S. No.	Sub-Project Activities	No-Project Scenario	No-Component Scenario	With Component Scenario
			envisaged if not implemented.	construction period. Reduction in environmental and social risk factors. Better sustainability of the Drainage System.
7.	Piloting Alternative Branch-Level Management Mechanism for Water Service Provision & Maintenance		No Environmental Damage will occur.	Reduction of risk factor Better irrigation operation
8.	Promotion of green manuring		No Environmental Damage will occur.	Reduce soil chemical fertilizer contamination and increase crop production
9.	Capacity building of UPID/WUA's		Smooth operation of Canal may get affected if not implemented	Reduction of risk factor. Better irrigation /canal operation.
10.	Social Assessment and Safeguards for Rehabilitation and Development of Drains/Canals/Wetlands		No Environmental Damage will occur. Dam safety and Social life may be at stake.	Minor Short term environmental impact may take place but risk factor will reduce and better water management system will be the outcome.
11.	Improving communications – real-time as much as possible –between officers/farmers		No Environmental Damage will occur. Canal management and Social life may be at stake.	No Environmental Damage will occur but reduce risk factor and better water/canal management system will be the outcome.
12.	Farmers Field School		No Environmental Damage will occur. Canal water	Insignificant/Nil impact on environment. Safer

S. No.	Sub-Project Activities	No-Project Scenario	No-Component Scenario	With Component Scenario
			management and Social life may be at stake.	dam operation can be achieved; better water management practices, awareness and crop production will be the outcome.
13.	Agriculture Water Use and Productivity Efficiency Improvement Program		No Environmental Damage will occur. Canal water management and Social life may be at stake.	Insignificant/Nil impact on environment. Safer irrigation operation can be achieved; better water management practices, awareness and crop production will be the outcome
14.	Outreach and participation of WSHGs in rehabilitation and water management activities		No Environmental Damage will occur. Canal water management and Social life may be at stake.	Insignificant/Nil impact on environment. Safer irrigation operation can be achieved; better water management practices, awareness and crop production will be the outcome
15.	Promotion of Women SHGs for raising the income of family		No Environmental Damage will occur. Canal water management and Social life may be at stake.	Insignificant/Nil impact on environment. Safer dam operation can be achieved; better water management practices, awareness, crop production and strengthened farmers income will be the outcome
16.	Strengthening of PIM cells		No Environmental Damage will occur. Canal water management system will be the outcome	Insignificant/Nil impact on environment. Safer dam/canal operation can be achieved; better water

S. No.	Sub-Project Activities	No-Project Scenario	No-Component Scenario	With Component Scenario
				management practices, awareness, crop production and strengthened farmers income will be the outcome

Based on the analysis, with-component scenario is suggested as the preferred alternative.

Application of Environmental and Social Management Framework

The SEMF can 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 has been provided that can be followed along with engineering and institutional interventions required for the project activities.

A template will be used that will require the concerned State/Circle level PMUs during the investigation and preliminary design stage to provide detailed information on technical, environmental, social, and all implementation-related aspects of each activity. Details about the data to be collected and the specific forms to be prepared are given in the next sections. The State/Circle level PMU will for each sub-project incorporate in the template the essential elements from the environmental and social screening templates prepared as part of the SEMF. Based on the review of the templates, a final categorization of each of the sub-project activity will be made. Those that have no major environmental or social issues can have the designs finalized and be tendered. Only the few where there may be major environmental or social issues will require the preparation of a site specific EA/EMP. This template will allow an early identification of those activities where major issues can be expected.

It may be mentioned here that though the sub-project activities for the development of this SEMF have been identified based on the analysis of such activities proposed to be taken up under the SEA, this is a live document which can be improved upon at the sub-project level by the concerned authorities, as and when the need arises.

There are 21 sub-project level activities which have been identified for the development of the SEMF. These have been given in **Form SC-1** for the purpose of identifying components the activities relevant to a specific sub-project and screening out the other activities. The responsible entity at the diversion level will carry out this task.

For the development of the SEMF, it is necessary to identify the potential environmental / social impacts of an activity. In order to do so, the tasks and facilities required to be performed and provided to implement the activity are needed to be identified, as these will help assess the potential impacts due to the activity. A list of all possible impactss have been prepared, which include requirements of labor, machinery, materials, space, etc. For each activity, the components involved can be identified by diversion level officials. The list of these impacts for

screening purpose is given in (Column 2 & column 3) **Form SC-1.** Based on potential environmental and social impacts associated with each component, these have been categorized as A, B and C.

Form SC-1 has been further developed to identify mitigation measures for each type of potential environmental and social impacts. For ease of understanding and use, the activities identified are given in the first column and corresponding mitigation measures are provided in the second column. The fifth column indicate the entities responsible for execution, supervision and monitoring of the mitigation measures, respectively. Schematic diagram for execution of SEMF is given below in figure 5.1.

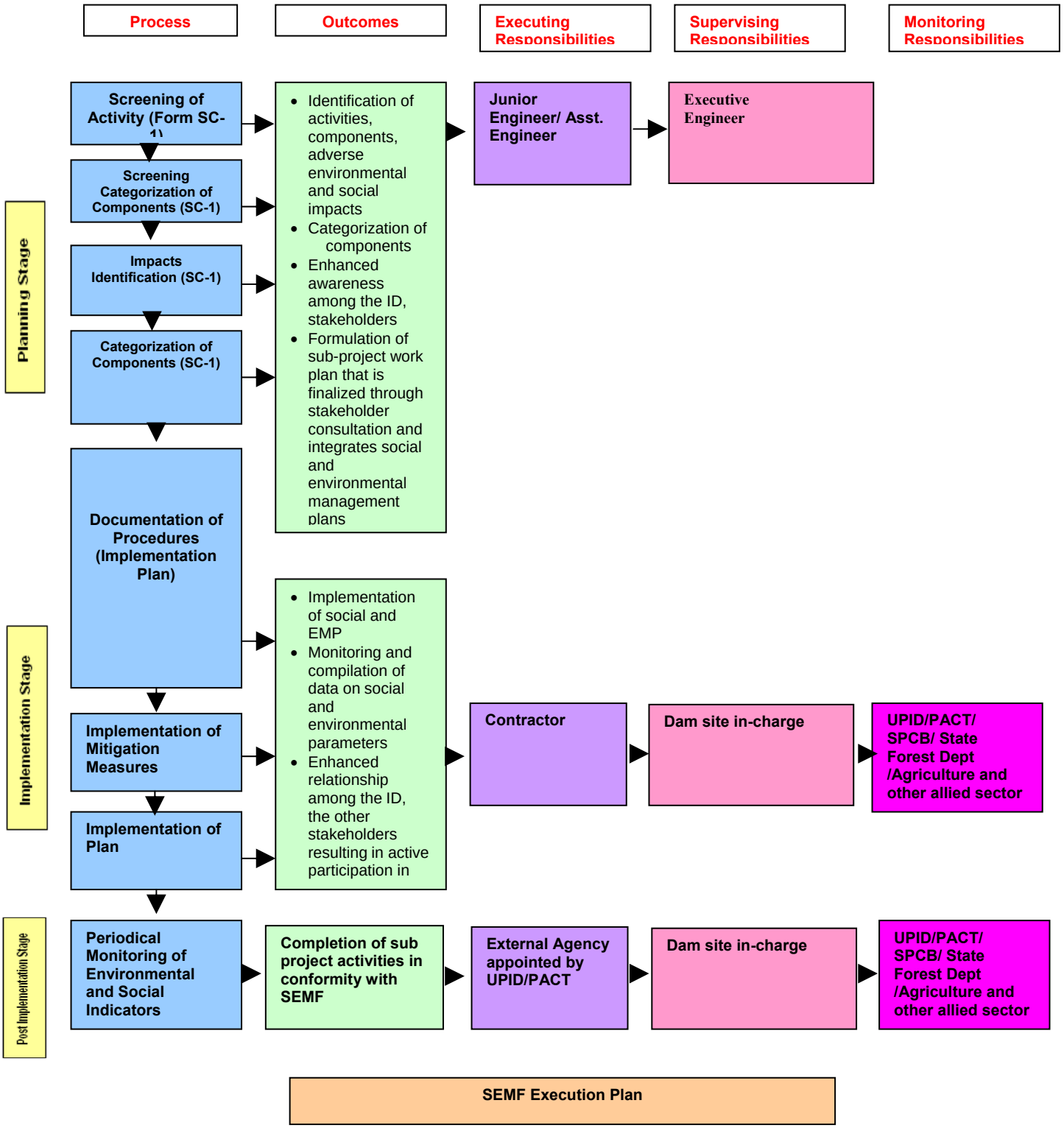


Figure 5.1: SEMF Execution Mechanism

The procedure for execution of SEMF to be followed is described below:

Planning Stage

In the planning stage, following actions are to be taken:

- Screening of components activities by using Form SC-1
- Identification of adverse impacts associated with each component using Form SC-3
- Identification of mitigation measures for the adverse impacts caused by each component, including identification of entities responsible for execution, supervision and monitoring with the help of Form SC-5

Outcomes of Planning Stage

The Outcomes of this stage are:

- 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 integrates social and environmental management plans
- Budgets for implementation of social and environmental management plans

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 5.4.**

Table 5.4: Checklist for SEMF Activities – Implementation

SEMF activities	Who will be involved	Co-ordinator
Procurement of documents, procedures followed and contracts awarded & equipment procured	Contractor, Implementation agency	Engineers from Irrigation Department
Implementation of the social and environmental management plans as Proposed in the Mitigation measures and EMP.	Contractor, Implementation agency, Consultants authorized by UPID	Engineers from Irrigation Department
Monitoring and evaluation of social and environmental parameters as identified in the Mitigation measures and EMP.	Contractor, Implementation agency, Consultants	Engineers from Irrigation Department

SEMF activities	Who will be involved	Co-ordinator
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	authorized by UPID	

Outcomes of Implementation Stage

The outcomes of this stage are:

- 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 SEMF 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

Completion of sub project activities in conformity with SEMF.

The SEMF 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.

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 5.2 & write Impacts	If Yes please refer column 4 of table 5.2 & write mitigation measures	Monitoring Agency (Refer Table 5.2, columns 6, 7, 8 and write name of Agency)
(1)	(2)		(3)	(4)	(5)
	Y	N			
Category A					
➢ Construction of office for WUAs in phase I area			Row: 6.1 to 6.8 Column: 2	Row: 6.1 to 6.8 Column: 4	Row: 6.1 to 6.8 Column: 6, 7, 8
➢ Construction of office for WUAs in phase 2 area			Row: 6.1 to 6.8 Column: 2	Row: 6.1 to 6.8 Column: 4	Row: 6.1 to 6.8 Column: 6, 7, 8
➢ Rehabilitation and Modernization of Canal System.			Row: 7.1 to 7.8 3 Column: 2	Row: 7.1 to 7.83 Column: 4	Row: 7.1 to 7.83 Column: 6, 7, 8
➢ Dainage Rehabilitation			Row: 7.1 to 7.83 Column: 2	Row: 7.1 to 7.83 Column: 4	Row: 7.1 to 7.83 Column: 6, 7, 8
➢ Lining of Canal			Row: 8.1 to 8.20 Column: 1, 2	Row: 8.1 to 8.20 Column: 4	Row: 8.1 to 8.20 Column: 6, 7, 8
➢ Rehabilitation of existing important Building e.g. Inspection houses, offices, colonies, video conferencing centre etc.			Row: 9.1 to 9.8 Column: 2	Row: 9.1 to 9.8 Column: 4	Row: 9.1 to 9.8 Column: 6, 7, 8

Component Activity	Please Tick Yes (Y) or No (N) / Insignificant		If yes, please refer column 2 of table 5.2 & write Impacts	If Yes please refer column 4 of table 5.2 & write mitigation measures	Monitoring Agency (Refer Table 5.2, columns 6, 7, 8 and write name of Agency)
(1)	(2)		(3)	(4)	(5)
	Y	N			
Category B					
➢ Optimally utilizing available water for intensive and diversified agriculture to promote for productivity gains in the crops along with promoting higher sown area in the Kharif season e.g. Promotion and extension of improved management mechanism for water service provision & maintenance; Increase production of cereals, pulses and oil seeds through improved practices for productivity enhancement in a sustainable manner; Restoring soil fertility and productivity; Enhancing farm level economy diversifying through vegetable and fruit cultivation.			Row: 10.1 to 10.3 Column: 2	Row: 10.1 to 10.3 Column: 4	Row: 10.1 to 10.3 Column: 6, 7, 8
➢ Animal husbandry and dairy activities will be expanded as an ancillary activity to enhance farmer's incomes as well as to cope with the drought conditions e.g. improving livestock and poultry productivity through breeding, feeding and management.			Row: 10.4 to 10.6 Column: 2	Row: 10.4 to 10.6 Column: 4	Row: 10.4 to 10.6 Column: 6, 7, 8
➢ Construction of field channel.			Row: 11.1 to	Row: 11.1 to	Row: 11.1 to 11.32

Component Activity	Please Tick Yes (Y) or No (N) / Insignificant		If yes, please refer column 2 of table 5.2 & write Impacts	If Yes please refer column 4 of table 5.2 & write mitigation measures	Monitoring Agency (Refer Table 5.2, columns 6, 7, 8 and write name of Agency)
(1)	(2)		(3)	(4)	(5)
	Y	N			
Category B					
			11.32 Column: 2	11.32 Column: 4	Column: 6, 7, 8
➢ Rehabilitation of surface drainage system, including field drainage.			Row: 11.1 to 11.32 Column: 2	Row: 11.1 to 11.32 Column: 4	Row: 11.1 to 11.32 Column: 6, 7, 8
➢ Boring of new tube wells, after evaluating the need.			Row: 11.33 to 11.36 Column: 2	Row: 11.33 to 11.36 Column: 4	Row: 11.33 to 11.36 Column: 6, 7, 8
➢ Agriculture development and allied activities through training & capacity building & demonstration projects. Direct water efficiency demonstrations will include: e.g. SRI; Conservation agriculture; Ridge and furrow systems; Timely irrigation through the conjunctive use of water; Alternative wetting and drying; Micro irrigation & Zero tillage seed drills. Indirect (productivity related) demonstrations e.g. Use of area specific varieties; Use of hybrids; Line transplanting; Use of short duration variety, line sowing; Soil treatment with Trichoderma; Quality seeds and Seed Replacement; Integrated Nutrient Management; Timely Sowings; Timely Transplanting; Proper Plant spacing; Proper Placement of Seed & Fertilizer; Eco- Friendly			Row: 11.38 to 11.40 Column: 2	Row: 11.38 to 11.40 Column: 4	Row: 11.38 to 11.40 Column: 6, 7, 8

Component Activity	Please Tick Yes (Y) or No (N) / Insignificant		If yes, please refer column 2 of table 5.2 & write Impacts	If Yes please refer column 4 of table 5.2 & write mitigation measures	Monitoring Agency (Refer Table 5.2, columns 6, 7, 8 and write name of Agency)
(1)	(2)		(3)	(4)	(5)
	Y	N			
Category B					
Pest Management & Soil Testing.					
➢ Horticulture Development through training & capacity building & demonstration projects e.g. Area expansion of horticultural crops i.e. fruits, vegetables, flowers, spices & medicinal & aromatic plants through demonstration on farmer's fields; Arrange demonstration and training to the farmers in new techniques of horticultural practices and post harvest technology; Strengthening of District Horticulture office of districts & project implementation unit of horticulture at head office & Study of impact by evaluation of ongoing practices. Horticulture demonstration will include: Quality seeds and Seed Replacement, Quality Planting Material, Balance fertilizer, Timely Showing / Transplanting, Proper Plant spacing, Introduction of new technology, Proper Placement of Seed & Fertilizer, Timely Irrigation through Conjunctive use of water and			Row: 11.41 to 11.43 Column: 2	Row: 11.41 to 11.43 Column: 4	Row: 11.41 to 11.43 Column: 4

Component Activity	Please Tick Yes (Y) or No (N) / Insignificant		If yes, please refer column 2 of table 5.2 & write Impacts	If Yes please refer column 4 of table 5.2 & write mitigation measures	Monitoring Agency (Refer Table 5.2, columns 6, 7, 8 and write name of Agency)
(1)	(2)		(3)	(4)	(5)
	Y	N			
Category B					
Eco-Friendly Pest Management.					

Component Activity	Please Tick Yes (Y) or No (N) / Insignificant		If yes, please refer column 2 of table 5.2 & write Impacts	If Yes please refer column 4 of table 5.2 & write mitigation measures	Monitoring Agency (Refer Table 5.2, columns 6, 7, 8 and write name of Agency)
(1)	(2)		(3)	(4)	(5)
	Y	N			
Category C					
➢ 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		√			
➢ Election of kulaba and alpika samiti for selected area		√			
➢ Registration and handling over of management of irrigation system to the WUAs		√			
➢ Capacity building of UPID and WUAs; Training of PIM cell at division and circle		√			
➢ Exposure trips to successful experiments		√			
➢ Construction of office for WUAs in phase I area		√			
➢ Construction of office for WUAs in phase 2 area		√			
➢ Impact Assessment studies; Strengthening of PIM Cell PACT (Human Resource)		√			
➢ Implementation in a participatory mode through		√			

Component Activity	Please Tick Yes (Y) or No (N) / Insignificant		If yes, please refer column 2 of table 5.2 & write Impacts	If Yes please refer column 4 of table 5.2 & write mitigation measures	Monitoring Agency (Refer Table 5.2, columns 6, 7, 8 and write name of Agency)
(1)	(2)		(3)	(4)	(5)
	Y	N			
Category C					
active engagement of all the stakeholders at various levels e.g. Ascertain equitable distribution of canal water.					
➢ Irrigated agriculture technology with conjunctive use of water e.g. Improved irrigation water application systems like drip/sprinkler systems in conjunction with canal water.		√			
➢ Marketing infrastructure and agricultural risk management will be important areas of focus.		√			
➢ Capacity Building of the farmers, facilitating personnel's and other stakeholders.		√			
➢ Concurrent Training and Awareness Campaigns for the farmers, water user association, various departmental functionaries and other stakeholders to get them oriented for maximum land and water resource utilization with utmost efficiency.		√			
➢ Formation of Women Self Help Groups in Project area.		√			
➢ Awareness Creation.		√			
➢ Organization of Workshops for development of groups.		√			

Component Activity	Please Tick Yes (Y) or No (N) / Insignificant		If yes, please refer column 2 of table 5.2 & write Impacts	If Yes please refer column 4 of table 5.2 & write mitigation measures	Monitoring Agency (Refer Table 5.2, columns 6, 7, 8 and write name of Agency)
(1)	(2)		(3)	(4)	(5)
	Y	N			
Category C					
➢ Organizing Group Management Training for better group functioning.		√			
➢ Promotion of saving and credit activity in groups.		√			
➢ Grading of WSHGs.		√			
➢ To promote economic activity in the group providing revolving fund in the groups and establish their CCL with Banks.		√			
➢ The Groups after establishing their CCL from Banks will be handed over to the concerned departments (Animal Husbandry, Fisheries, Horticulture etc.) for economic activity as per the proposal of the group.		√			
➢ The willing groups of BPL categories will also be linked with SGSY scheme of the department as per guidelines.		√			
➢ Marketing assistance to groups' produce through organizing exhibitions and melas.		√			
➢ Exposure Trips to various successful experiences of other states.		√			
➢ Participation in national/ international		√			

Component Activity	Please Tick Yes (Y) or No (N) / Insignificant		If yes, please refer column 2 of table 5.2 & write Impacts	If Yes please refer column 4 of table 5.2 & write mitigation measures	Monitoring Agency (Refer Table 5.2, columns 6, 7, 8 and write name of Agency)
(1)	(2)		(3)	(4)	(5)
	Y	N			
Category C					
exhibitions and events.					
➢ 'Impact Assessment of WSHGs Formation and its functioning on the socio-economic betterment of their families'		√			

Chapter 6: IEC Strategy, Capacity Building & Training & Monitoring & Evaluation

6.0 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 are described in following sections.

6.1 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.

6.2 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 6.1.**

Table 6.1: 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**	- Extent of loss **arising out of the proposed intervention.** - Project benefits particularly for the VG (for eg: **landless, small and marginal farmers,**	- Printed documents along with pictographs. - Pamphlets and booklets.

Thematic area	Target audience	Contents	Form of knowledge material
	on religious leaders, person of eminence and respect in the community).	**BPL etc.** - Project information.	**- 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.	- 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	- Printed document. - Pamphlets and booklets. - List of beneficiaries and their benefits are publicly displayed in villages. - Making available information in various meetings. - **Print and**

Thematic area	Target audience	Contents	Form of knowledge material
	(iv) Village institutions – PRIs, WUA and other groups. (v) Project beneficiaries. **(vi) Judges, Lawyers and other members of the legal fraternity.**	**- 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.	**electronic media such as local newspaper, short documentary films etc.**
Participatory decision making	(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) Functionaries/ representatives of Gram Panchayat, NGO and others (**to also focus on religious leaders, person of eminence and respect in the community)**. (v) General villagers especially **women, the landless, small and marginal farmers, SCs, OBCs,** the farming community.	- 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.**	- 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	(i) Headquarter level officers of UPID/PACT and line departments.	- Interaction between project activities and the environment including air, water and soil.	- Printed material in descriptive form. - Project activity wise

Thematic area	Target audience	Contents	Form of knowledge material
	(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 and others. (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. **(vi) Judges, Lawyers and other members of the legal fraternity.**	- **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.	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 Evaluation	(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	- Documentation of project activities, targets, 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	- Printed material in matrix form. - **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.**

Thematic area	Target audience	Contents	Form of knowledge material
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** (farm**ing** 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.

6.3 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 al 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 6.2**.

Table 6.2: Summary of communication tools

Stakeholder Group	Primary Communication Need	Primary Messages	Preferred Tools
Beneficiaries	Operational	• Project rules, roles, responsibilities. • Benefits of participation. • **Clarity of roles of PRI, WUAs and other CBOs.** • **Guide to conflict resolution.**	• Traditional theater • Posters • Village meetings • **Newspaper** • Radio ads/shows • TV ads

Stakeholder Group	Primary Communication Need	Primary Messages	Preferred Tools
		• Right to information • Technical knowledge on land management (agriculture) • Opportunities for income generation (livelihoods) • Other programs that can meet their needs (dovetailing)	• SMS technology (for extension messages) • **Wall paintings** • **Citizen's charter in the Gram Panchayat Bhavan.**
Policymakers	Strategic	• 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.**	• Meetings • Brochures • Fact File • Documentaries • TV/radio • Case studies – **highlighting good practices and failures.** • Technical manuals.
Opinion Leaders, Academia	Strategic	• Project progress • To maintain Tie and build opinion • To show project impacts • **Influencing policy**	• Meetings • Brochures • Fact File • Documentaries • TV/radio • Case studies
Government officials (practitioners)	Operational	• 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.**	• Meetings • Circulars • Brochures • **Community interactions like *Goshtis,* public hearings etc.** • **Print and Electronic media** •
NGOs	Operational	• Project rules, roles, responsibilities • Benefits of participation • Right to information • Technical knowledge on land management related issues • Awareness' campaign	• Meeting • Extension Literature • Audio/Video • Wall paintings • **Social audit and public hearings**

Stakeholder Group	Primary Communication Need	Primary Messages	Preferred Tools
		• Legal issues	• **Policy and legal documents**
Legal fraternity	**Operational**	• **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.**	• **Workshops and seminars** • **Project related literature** • **Print and electronic media (for suo- moto cognizance)** • **Meeting circulars, brochures etc.**

6.4 Conflict Resolutions

As part of SEA, an attempt was made on assessing the type of risks and the existing conflict resolution systems. The major findings are presented below in **Table 6.3**.

Table 6.3: 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.**	▪ 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.	▪ 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 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.	▪ Such conflicts are resolved generally through mutual negotiation. In many cases, the problem is referred to the Irrigation Department which intervenes to resolve the issue. ▪ **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	▪ Such conflicts, when arise, are never resolved. Poor farmers adjust their timing.

S. No.	Conflict areas/risks	Existing resolution system
	lower access.	
5.	Absence of proper **field/link drain** network connecting agricultural fields also leads to conflict among farmers, especially during heavy rains.	▪ 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 allurement of little higher wages or other mechanisms. Thus, conflict of interest arises between the two parties.	▪ 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.	▪ 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.	▪ 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.	▪ 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.	▪ Such types of conflicts are resolved through social pressure or mutual understanding.
11.	Absence of common **drain outlets** in residential area also leads to conflicts among people, especially during rains. Downstream households object to flow of water from up-land through their premises.	▪ Community pressure resolves the issue. ▪ Sometimes, Gram Panchayat also intervenes to resolve the issue.

6.5 Effectiveness of existing resolution system for new assets and opportunities to be created under the project.

It can be inferred that 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. It is needed to examine the effectiveness of these existing resolution systems for the assets and opportunities to be created by the project. **One of the major reasons for such conflicts as has been expressed by the communities has been 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 by the community in the state owing to issues like caste based reservations, poor capacity building and support for the Panchayats to be effective institutions of governance, poor occurrence of Gram Sabha and standing committee meetings etc. Now with the WUAs proposed to be constituted as per the PIM Act 2009, the importance of Gram Panchayats is further likely to be eroded as there is hardly any role envisaged for it. To counter all this a sustained literacy, behavior change and sensitization programme need to be initiated by converging with adult literacy programmes, behavioural change communication initiatives etc. NGOs and media need to be brought on board to sensitize the local population and the district administration.

Similarly, the PRI members need to be trained and oriented alongwith providing all other support so that they become effective bodies for conflict resolution and are able to support the WUAs in carrying out their duties.

According to the community, it is anticipated that the existing resolution system will prove equally effective for the assets and opportunities to be created under the project. However, it is necessary to explore additional resolution mechanisms in order to manage the probable conflicts and/or risks. The project is likely to create/rehabilitate various assets during its course of implementation. Such assets include **main canal, minors, distributaries, drains, field conduits** etc. assets of SHG federation, asset for Cluster Organization including capital assets/goods for value addition and/or agribusiness activities. These findings are discussed in **Table 6.4.**

Table 6.4: Findings of conflicts and their resolution for various assets

S. No.	Asset/ opportunity	Probable conflict/risk	Proposed resolution system
1.	Field drain	▪ The concerned farmers may not be ready to spare land for field drain, hence field drain between two adjacent plots cannot be dug. ▪ Even after digging of field drain, an individual farmer may dismantle its portion and join the area with his field. In such case, field drain will cease to exist.	▪ Since field drain will be dug on private lands, farmers' willingness to retain it will be the key factor in its sustainability. ▪ Farmers should be adequately sensitized about essentiality of field drain not only for draining out leached water from their fields but also for draining out of excess rainwater in long run. Once, they realize this fact they are likely to retain field drain as it will not acquire much area.
2.	Link drain	▪ If link drain is dug on private lands, the same problem, as in case of field drain, may arise. ▪ Link drain may not be maintained periodically	▪ Ideally, link drain should be dug on community land. ▪ If it is dug on private land, area under link drain can be declared as the property of Gram Sabha. ▪ Gram Panchayat/WUA should be involved since very beginning so that it takes the responsibility of maintenance of link drain after project withdrawal. ▪ Farmers should be sensitized and motivated to make monetary and/or labor contribution for maintenance of link drain.
3.	Main drain	▪ Post-rehabilitation maintenance of main drains may not be taken up by the Irrigation Department. It	▪ Irrigation Department should formally agree to provide adequate fund and undertake periodical maintenance of main drains.

S. No.	Asset/ opportunity	Probable conflict/risk	Proposed resolution system
		may result into deterioration in the quality of main drains rehabilitated during the project.	
4.	Productive assets for SHG	▪ Though productive assets will be provided to the group, some members are deprived from the benefits	▪ Provision of productive asset should be decided on the basis of consensus. ▪ Moreover, the group should formally agree to share the use of such assets among all its members.
5.	Assets (Storage, collection center, etc) to Community Organization (CO)	▪ Some members of the Community Organization (CO) may be neglected by the influential members and may not derive the benefits from these assets.	▪ CO should be established as a registered entity and appropriate institutional provisions should be made for hearing of voice of all. ▪ The executive body of the CO should be formed through democratic process so that each and every member has a say.

6.6 Institutional Arrangement, Training and Capacity Building Plan

The project is anticipated to leave 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 strategy 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 describe each of these items.

6.6.1 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 has 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 SEMF), Agriculture Department (responsible for organization of demonstrations, crop cutting experiments and seed certification) and Animal Husbandry department (responsible for livestock development through breed improvement, animal health care, 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.

6.6.2 Skill and capacity-building requirements

Summary of skill & capacity building requirements at various stakeholder levels is given in **Table 6.5**.

Table 6.5: Summary of capacity-building requirements at various stakeholder levels

Stakeholder level	Skill and capacity-building requirement
Individual	▪ 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	▪ 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 ▪ Orientation and sensitization of women and if possible children about all the above issues
Water Users Groups	▪ 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	▪ 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 het support from the community ▪ Developing community ownership of various concerns affecting the entire community
Institutional	▪ UPID/PACT and other line departments need to prepare separate action plan to address

Stakeholder level	Skill and capacity-building requirement
	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	▪ 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	▪ 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.

6.6.3 Capacity Building and Training Needs of UPID

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 in the context of designing and draft training programs. Firstly, stakeholders' demand assessment is carried out to identify their needs. Thereafter, the findings of this demand assessment are used to develop relevant training programs for implementation. The five step approach is used to develop these programs. Theses are: (i) present organizational structure of UPID (ii) assessment of functions of UPID in the context of social and environment assessment, (iii) training needs assessment and (iv) design of training programs and (v) implementation mechanism. These steps have been carried out by studying the existing organization structure and by having one to one interaction with officials of UPID various levels. The results of primary survey at grass root level have been extensively used to identify training needs, which have been used to develop the training modules and programs at each level. The following sections describe each of these steps.

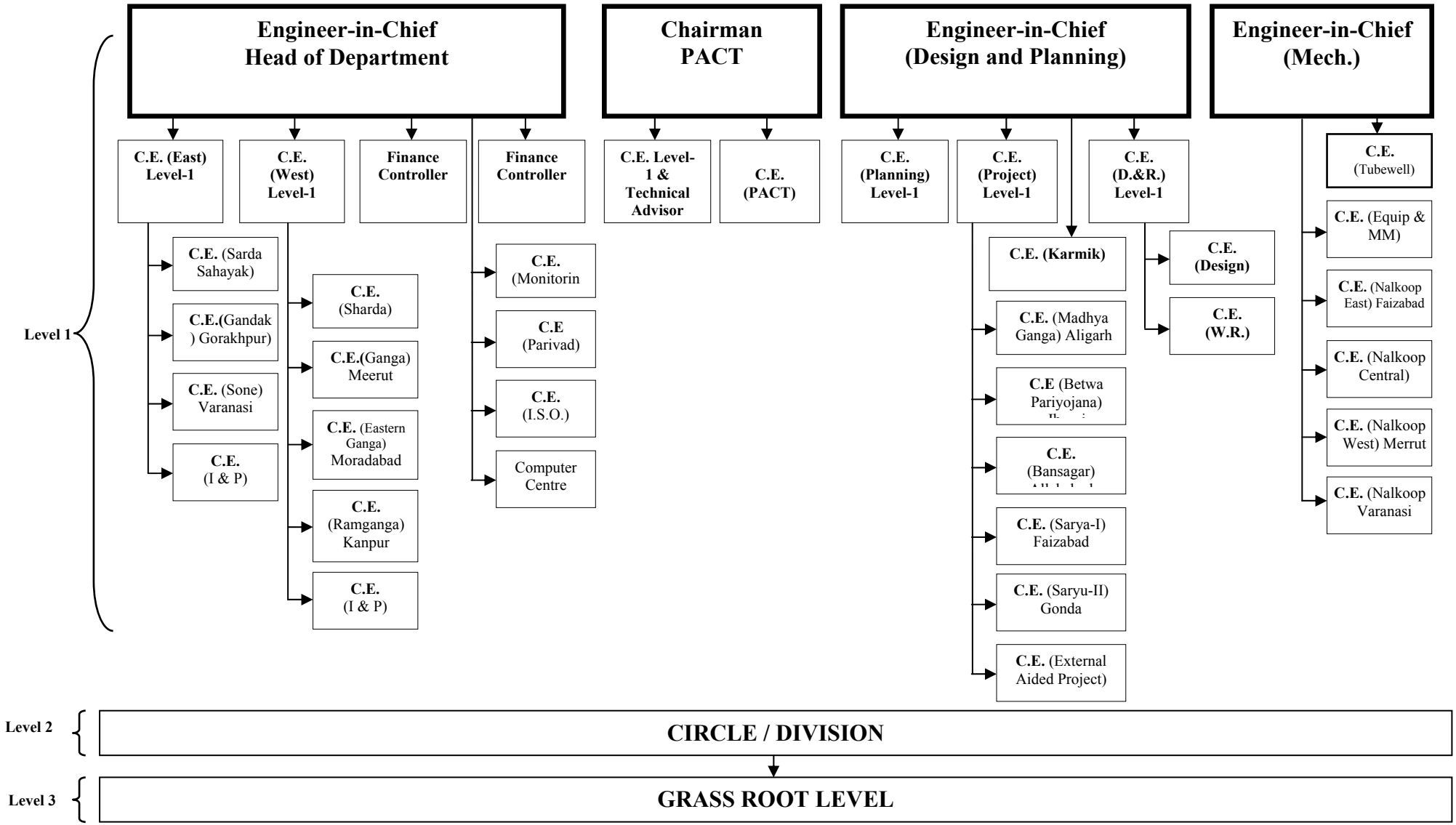
Organization Structure of UPID

Organizational Structure of UPID - Present organization structure of Uttar Pradesh Irrigation Department (UPID) is depicted in **Figure 6.1**. 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 knowledgebase 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 knowledgebase 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 6.6**.



Source: Uttar Pradesh Irrigation Department.

Figure 6.1: Organization Structure of UPID

Table 6.6: 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 1

In UPID, 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.

The findings of **Table 6.6** and organizational structure of UPID in **Figure 6.1** do not indicate available expertise/ functional position with respect to environment, social and agriculture sector.

Training Needs Assessment

In the absence of a well designed training program covering environment 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 these agencies during these training programs are summarized below.

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 carried be 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 environment 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 6.7**.

Table 6.7: 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 1

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 SEA 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 6.8** and **Table 6.9**. These sub training modules can be implemented either independently or in combination with others.

6.6.4 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 6.2**. The proposed training areas and faculty for these modules are described in **Table 6.10.** It is proposed to augment the capacity of faculty at UPID/PACT by conducting training programs under SEA.

Table 6.8: Training Programs for Awareness Raising

Target Group									
Awareness	**L1**	**L2**	**L3**	**NGO**	**WUA**	**Frequency**	**Duration**	**Content/ Format**	**Source**
Module 1: Policy & Regulations	√	√				Once in three years	One Day	Policy (Social/water resources/ Environment) Regulations related to water resources. Regulations related to environment assessment. Regulations related to	SEA-Environmental & Social Regulatory Framework

Target Group									
Awareness	**L1**	**L2**	**L3**	**NGO**	**WUA**	**Frequency**	**Duration**	**Content/ Format**	**Source**
								social assessment.	
Module 2: Baseline Environment & social Status	√	√				Once in three years	One Day	Environmental & Social regulatory framework. Status based on baseline Environmental Indicators. Status base on Baseline Social Assessment Indicators. Description of hotspots.	Baseline Environmental Social database compendium / GIS database
Module 3: Area specific baseline Environment & Social Status		√	√	√	√	Once in three years	One Day	Area specific environmental issues Area specific social issues. - Description of hotspots.	Baseline environmental & Social database comparative / maps

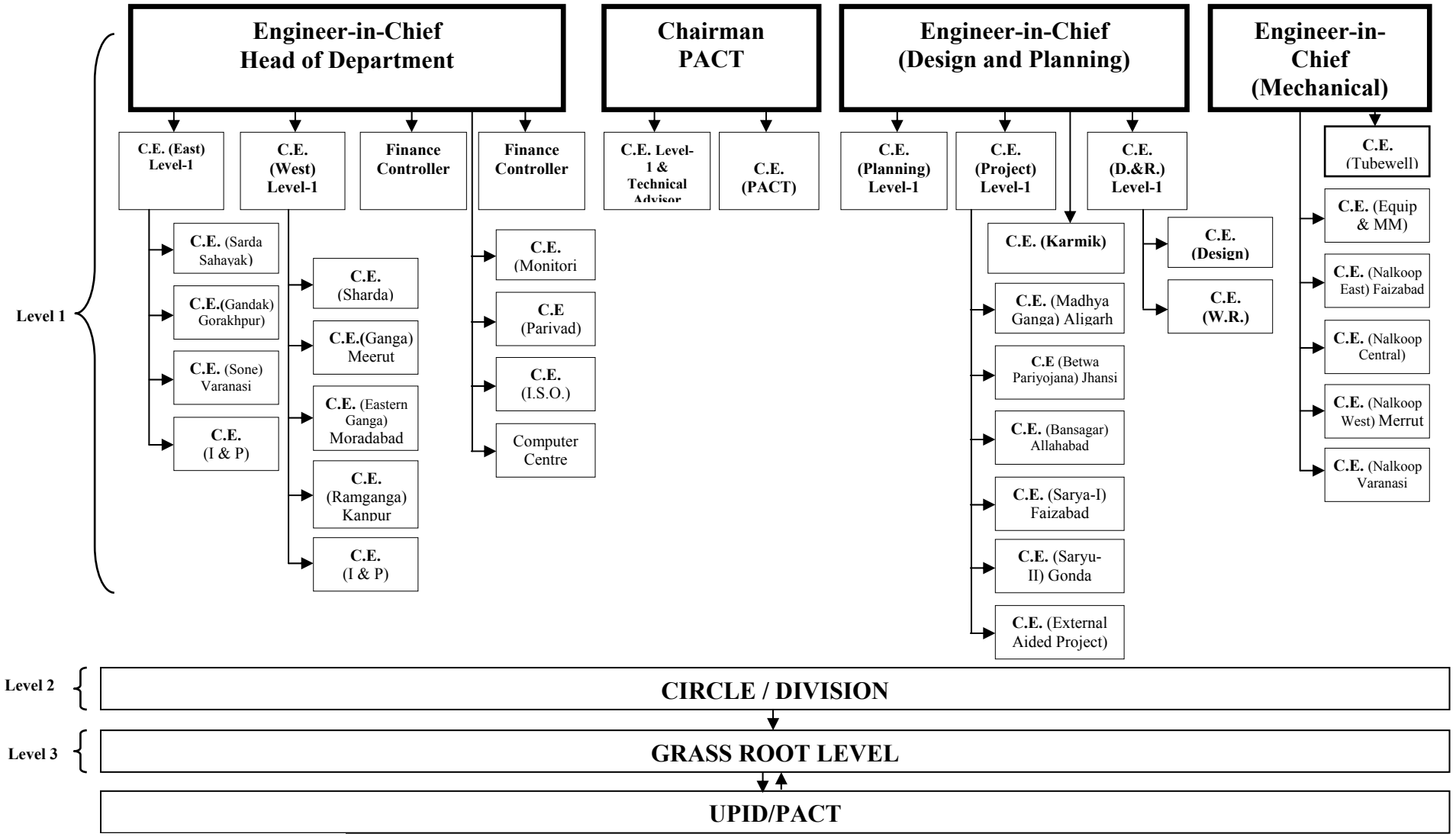
Source: Compiled by IRG, BSEA, Phase 1

Table 6.9: 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)	√	√				Once in three years	Half day	1- Environmental & Social Screening.	1- Guidelines for usage of environmental knowledgebase at district & block level (BSEA, UPWSRP Phase 1).
								2- Identification of hotspots.	
								3-Evaluation of engineering interventions.	
								4-Regulatory Framework.	2- SEA- environmental & Social regulatory framework. (BSEA, UPWSRP Phase 1)
Module 5: Planning Stage (EIA/SA Study)	√	√					Half day	1- Baseline assessment using primary & secondary data.	1- Guidelines for prioritizing the environmental uses (BSEA, UPWSRP Phase 1).
								2- Impact identification & quantification and formulation of mitigation measures.	2- Guidelines for impact identification & prioritizing (BSEA, UPWSRP Phase 1).
								3- Preparation of BOQ.	3- Guidelines for recommendation of mitigation measures (BSEA, UPWSRP Phase 1).
									4- Guidelines for

									investment scenarios & alternatives (BSEA, UPWSRP Phase 1).
Module 6: Implementation Stage (Implementation of SEMF)	√	√	√	√	√		Half day	1- Monitoring & Management Plan. 2- Implementation of mitigation measures. 3- Overall evaluation of environment & social safeguard framework. 4- Institutional Framework roles & responsibility.	1. Guidelines for monitoring & evaluation (BSEA, UPWSRP Phase 1).
Module 7: Post Implementation Stage (Monitoring & Evaluation)	√	√	√	√	√	Once in three years	Half day		

Source: Compiled by IRG



Source: Compiled by IRG

Figure 6.2: Mechanism of Implementation of Training Programs

Table 6.10: Training Areas & Faculty

Awareness	Areas	Roles/Responsibility / Faculty
Policy & Regulatories	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
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
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
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
	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
	EIA/ SA scoping : Evaluation of proposed engineering intervention and their alternatives followed by initial public consultation.	Environmental / Social Expert/ functional expert (agriculture/water resources/ soil/ economist) team in PACT
	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
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
	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
	EIA/ SA study: Impact identification based on project interventions both during	Environmental / Social Expert/ functional expert

Awareness	Areas	Roles/Responsibility / Faculty
	construction and operation by referring to guidelines as per the procedures and formats/ questionnaires in attached guidelines.	(agriculture/water resources/ soil/ economist) team in PACT
	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
	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
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
	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
	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
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

Awareness	Areas	Roles/Responsibility / Faculty
	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

Source: Compiled by IRG, BSEA, UPWSRP Phase 1

6.6.5 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 6.11**.

Table 6.11: 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

6.7 Monitoring & Evaluation

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 SEMF. 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 SEMF implementation is needed to verify impacts, ensure adherence to approved plans, environmental standards and general compliance.
Monitoring of the SEMF would need to cover the entire project. The objective of SEMF monitoring would be:-

- Provide timely information about success or otherwise of the Environmental Management process outline in the SEMF in such a manner that changes can be made as required to ensure continuous improvement to the process; and
- To evaluate the performance of the SEMF by determining whether the mitigation measures designed into proposed activities have been successful.

6.7.1 Social Impact Monitoring Indicators

Social assessment indicators have been developed at three levels. At first / base level, indicators will facilitate primary socio-economic assessment of the study area, which may be applicable to any geographic unit (village/block/district). At second level, indicators will facilitate assessment of stakeholders starting from grass root level to policy level. The outcome of level 1 and level 2 indicators will facilitate development of social change impact indicators at the third level. The

entire monitoring mechanism is shown in **Figure 6.3**. At each level, the type of instrument to be used for measurement and frequency of measurement has been described below.

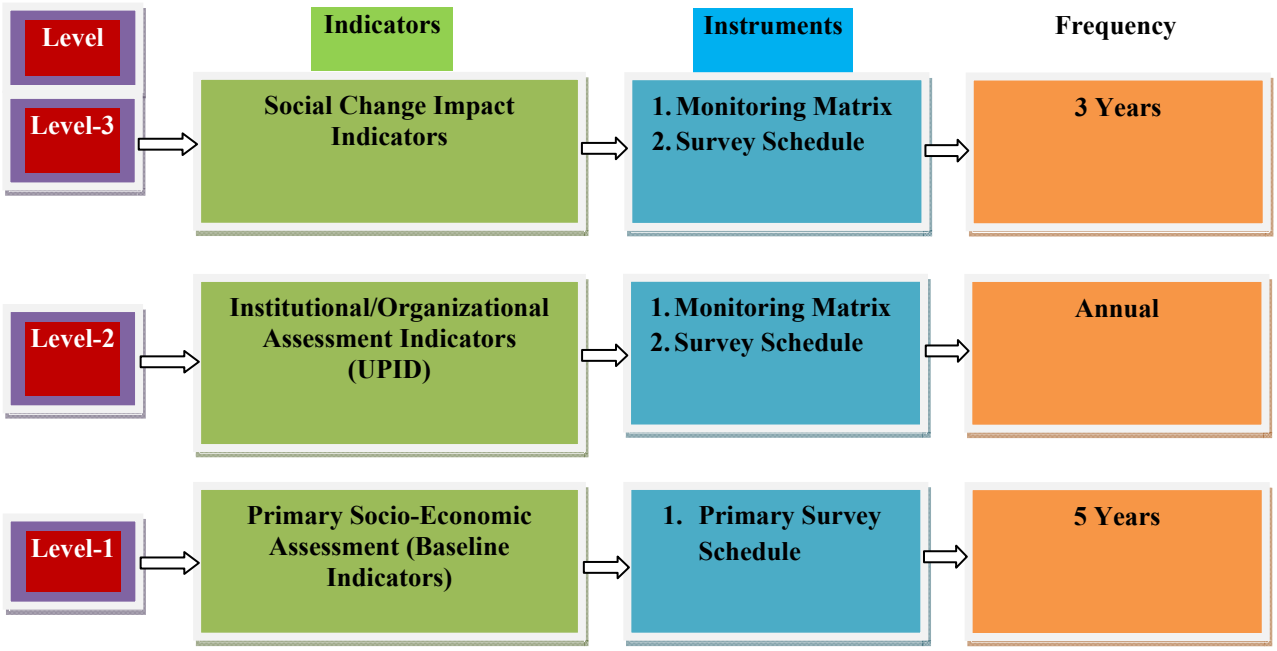


Figure 6.3: Social Monitoring Indicator Mechanisms

6.7.2 Level-1 Indicators

The level-1 include following monitoring indicators:

i. *Demographic indicators* such as population, gender ratio, literacy, occupation, and annual income
ii. *Indicators related to living conditions* such as type of house; fuel for cooking; electricity; water supply and sanitation.
iii. *Indicators related to economic conditions* such as land holding size, source of income, expenditure, resource consumption, agriculture expenditure, indebtedness and migration
iv. *Irrigation and agriculture related indicators* such as shift in cropping pattern, source of irrigation, condition of canal irrigation, productivity, problems in agriculture and irrigation, UPID government schemes, marketing, markets for agriculture produce, quantities sold, pesticide use, fertilizer consumption.
v. *Gender Issues* such as literacy, expenses on female education, health condition, mortality rate, Immunization, women participation in agriculture, households expenses, decision making and social conditions.

6.7.3 Level-2 and Level-3 Indicators

Level-2 and level-3 indicators have been developed by adopting following three steps.

Step 1- Establishment of criteria

The criteria used to identify these indicators are given in **Table 6.12**. This criterion includes adequate representation of socio-economic conditions, ease of measurement and linkage to any geographical unit.

Table 6.12: Criteria for identifying indicators

Sl. No.	Criteria	Social Change Impact Indicators	Establishing Social/ organizational / Institutional Assessment Indicators	Establishing Government Institutional Assessment Indicators
1	Adequate representation of socio-economic conditions	√	√	
2	Ease of measurement and monitoring	√	√	√
3	Application to any geographical planning unit e.g. Division level/ district level, block level	√	√	√

Source: Compiled by IRG, BSEA, UPWSRP Phase 1

Step 2 - Identification of elements to design indicators

The three basic elements, which have been identified to develop social change indicators, are: (i) economic condition, (ii) infrastructure, (iii) attitude of farmers.

The two basic elements identified to develop institutional indicators, are (i) knowledge base and (ii) Implementation. The development of knowledge base is dependent on the sub-elements of awareness and capacity building, while their effective implementation is dependent on sub-elements of coordination and operation at planning and grass-root level.

The basic elements identified to develop social/organizational/institutional indicators, are (i) knowledgebase, (ii) socio-economic condition, (iii) infrastructure and (iv) attitude of farmers.

Knowledgebase provides firm footing for socio-economic change and overcomes infrastructure constraints. The combination of three elements brings about attitudinal change, which leads to implementation and results in outcome. The summary of major elements, which are used to determine these indicators are given in **Table 6.13**.

Table 6.13: Elements to develop indicators

Sl. No.	Elements	Social Change Impact Indicators	Establishing Social/ organizational / Institutional Assessment Indicators	Establishing Government Institutional Assessment Indicators
1	Knowledgebase		√	√
2	Economic Condition	√	√	

Sl. No.	Elements	Social Change Impact Indicators	Establishing Social/ organizational / Institutional Assessment Indicators	Establishing Government Institutional Assessment Indicators
3	Infrastructure	√	√	
4	Attitude of farmer	√	√	
5	Implementation mechanism		√	√

Source: Compiled by IRG

Step 3 - Identification of indicators and sub indicators

Level-2 and level-3 indicators have been established for the assessment of social change impact, social/organizational/institutions and government institutions involved to bring about social change in the water sector. These indicators have been summarized in matrix format given in **Table 6.14**. This matrix describes indicators, sub-indicators, and measurable attributes, units of measurement and frequency of measurement. The government institutional assessment indicators have been developed based on issues arise from primary survey (Household survey), consultation with UPID officials and other sectoral stakeholders through Focus Group Discussion.

6.7.4 Environmental Impacts Monitoring Indicators

Environmental 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 Bundelkhand 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 6.15**. The frequency of measurement has been fixed for annual and five year monitoring period. These have been fixed considering short and long term basin planning and implementation perspective.

Table 6.14: Level-2 and Level-3 Indicators

Indicator	Sub indicator	Attribute	Unit	Frequency of Measurement	Source of data
Establishing Government Institutional Assessment Indicator					
Awareness & Sensitization of UPID	Awareness about objectives of PIM	Participation of farmers in PIM	Opinion expressed (number)	Annual	Primary
		Optimum/ Conjunctive use of water			
		Prevention of wastage of water			
		Drainage of surplus water to the nearest drain			
	Impact of PIM	Crop wise water management (water usage) e.g. wheat and rice	Opinion expressed (number)	Annual	Primary
		Productivity in terms of crop production			
		Adoption of new technology			
		Crop Diversification/ Adoption of new crops	Area (Ha)		
Capacity Building	Training of trainers (UPID)	Training received on PIM	Yes/ No (number)	Annual	Primary
		Training provided			
		Areas of training	Number		
		Duration of training	Days		
		Extent of benefit	Opinion expressed (number)		
	Training by trained trainers	Training provided	Yes/ No (number)	Annual	Primary
		Attendance of UPID Officials meetings	Number		
		Major issues of concern in irrigation	Opinion expressed (number)		
		Inspection of irrigation work			
		Women participation in meeting (general body/ executive committee)	%		
		Women participation in irrigation activities			
Coordination	Coordination with line Line Departments	Updation and validation of secondary data	Yearly (time)	Annual	Primary
		Meetings convened	Periodicity(year	Semiannual	

Indicator	Sub indicator	Attribute	Unit	Frequency of Measurement	Source of data
			ly/ semiannually)		
		Implementation of recommendation	Outcome	Annual	
	Coordination with social groups	Meetings convened	Periodicity(yearly/ semiannually)	Semiannual	Primary
		Points of concern in assessment meetings	Number	Annual	
Establishing Social/ organizational / Institutional Assessment Indicators					
Demographic Characteristic (block wise)	Total Population	Rural/ Urban/ Total/ Male/ Female	Numbers	Annual	Secondary
	SC Population	Rural/ Urban/ Total/ Male/ Female	%		
	ST Population	Rural/ Urban/ Total/ Male/ Female			
	Population Density	Rural/ Urban/ Total/ Male/ Female			
	Sex Ratio	Rural/ Urban/ Total/ Male/ Female	Number/ %		
Literacy (/ block wise)	Literacy Rate	Rural/ Urban/ Total/ Male/ Female	%	Annual	Secondary
Institutions (block wise)	Junior Basic Schools	Rural/ Urban	Number	Annual	Secondary
	Allopathic Hospitals & Dispensaries	Rural/ Urban	Number per lakh of population		
	Scheduled/ Cooperative Banks/ Credit Societies	Rural/ Urban			
Economic Conditions (block wise)	Landholdings	Average size	Ha		
	Agriculture land use	Cropping Intensity	%		
	Crop wise Productivity (wheat/rice)	Average Yield	Quintals/ hectare		
	Canal Irrigation	Net irrigated area by canal	Ha and %		
	Tube wells/ Pump set irrigation	Net irrigated area by tubewell/ punpsets	Ha and %		

Indicator	Sub indicator	Attribute	Unit	Frequency of Measurement	Source of data
	BPL Population	BPL Families	%		
		BPL SC/ST families			
		Small farmers			
		Marginal farmers	%		
		Rural Artisans			
		Agriculture Labourers			
Social Change Impact Indicators					
Change in economic conditions	Cropping Pattern	Total coverage area	Ha	Annual	Secondary
	Wheat	Cropwise Coverage Area	Ha		
	Rice	Cropwise Coverage Area			
	Barley	Cropwise Coverage Area			
	Maize	Cropwise Coverage Area			
	Bajra	Cropwise Coverage Area			
	Jawar	Cropwise Coverage Area			
	Pulses	Cropwise Coverage Area			
	Gram	Cropwise Coverage Area			
	Oilseeds	Cropwise Coverage Area			
	Cropping Intensity	Net Cropping Area	Ha		
		Gross Cropping Area			
		Intensity	%		
	Irrigation Intensity	Net Irrigated Area	Ha	Annual	Secondary
		Gross Irrigated Area			
		Intensity	%		
	Crop Production (Major Crops)	Productivity	quintal/ Ha	Annual	Secondary
	Poverty Level	BPL Population	%	Annual	Secondary
		BPL Households			
		Landless			

Indicator	Sub indicator	Attribute	Unit	Frequency of Measurement	Source of data
Infrastructure Constraints	Canal Water Availability	Canal Cutting	Event Occurrence (Nos.)	Annual	Secondary / Primary
		Water Blockage			
		Tail Feeding			
Attitudinal Change	Farmer's Awareness	Lack of cooperation among farmers on water sharing (Perception/ Opinion)	Number	Annual	Primary

Table 6.15: Key Environmental & Socio-economic impact of SEA-Bundelkhand

Sector	Activity		Issues	Environment and Socio-Economic Impacts	Indicators	Frequency
Agriculture	Surface and Ground water consumption		Rainfall/ Depletion of Ground Water Level	Land use change	Coverage Area	Annual
				Crop Productivity	Yield	Annual
				Surface Water Quality	Irrigation and Drinking water quality	Annual
				Ground water Quality		
				Ground water Availability/ Subsurface drainage	Ground water quantity Ground water table Ground water draft	Annual
	Irrigation	Dam/ Hydraulic station & Canal Construction	Biodiversity	Flora & Fauna loss	No. of species (Aquatic/ Terrestrial)	Each 3Years
			Irrigation	Water Availability	Quantity	Each 5 Years
				Crop Productivity	Yield	Annual
			Migration/ Department	Livelihood	R & R and Income	Each 5 Years
		Canal Network Rehabilitation	Irrigation	Water Availability	Quantity	Twice in a Year
				Crop Productivity	Yield	Annual

Sector	Activity	Issues	Environment and Socio-Economic Impacts	Indicators	Frequency
			Land use change	Coverage Area	Each 5 Years
			Silt Disposal	Quantity/ Locality	Annual
	Tube Well	Irrigation	Water Availability	Quantity	Annual
			Crop Productivity	Yield	Annual
		Ground water depletion	Resource Loss	Quantity (Ground water Table)	Annual
		Conjunctive use	Land use change	Coverage Area	Annual
			Crop Productivity	Yield	Annual
Urban & Rural	Domestic water supply 3. Drinking 4. Others	Surface and Ground water Availability	Resource loss	Quantity	Each 5 Years
	Livestock Consumption	Surface and Ground water Availability	Water pollution	Drinking and Irrigation water quality	Annual
			Sewage	Quantity	Annual
			Disease	Occurrence	Annual
			Aquatic Biodiversity	Loss	Each 5 Years
			Crop Productivity	Yield	Annual
			Soil Fertility		Annual
			Energy	Biogas	Annual
Industries /Mining	Mining	Surface & Ground water quality	Water pollution	Surface & Ground water Quality	Annual
			Disease	Occurrence	Annual
	Labor	Socio-Economic	Livelihood	Employment	Each 5 Years

6.8 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, pilot demonstration, studies and any investment for mitigation measures 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.

6.9 Integration with the Project

The ESMF developed for UPWSRP Phase II can be implemented effectively by integrating it with UPWSRP Project Management Systems and Procedures.