

Final Report

EA & EMF for RWSS sector in 28 Districts of Eastern Uttar Pradesh

April 2013
State Water and Sanitation Mission

Mott MacDonald

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Executive Summary

The Government of India (GoI) had approached World Bank (WB) for assistance on a National Project on Rural Water Supply and Sanitation for Uttar Pradesh. The project is to bring about positive health and environmental benefits through supply of 'safe' drinking water and creation of sanitary conditions in the villages of Eastern UP. The project will have programmes related to improved water quality monitoring, health and hygiene education as well as ground water recharge for water supply source protection. Environmental mitigation measures will also be included in the project design stage. Uttar Pradesh has constraints in institutional and technical capacity at state, district block and Gram Panchayat levels for implementing sustainable rural water supply schemes and sanitation facilities, as observed from the implementation of NRDWP programme in the state. Hence, Rural Water Supply and Sanitation (RWSS) is proposed to be undertaken as a separate component under NRDWP focusing on Uttar Pradesh with different funding pattern but implemented within the framework of NRDWP. With this background, the state proposed the Rural Water Supply and Sanitation Project with assistance of the World Bank.

To contribute to the environmental sustainability of the project, an 'Environmental Assessment' (EA) Study is required to be prepared as per the World Bank's safeguards policies. For this purpose State Water and Sanitation Mission has appointed Mott MacDonald Pvt Ltd for preparation of "Environmental Assessment and Environmental Management Framework Report for 28 districts of Eastern Uttar Pradesh".

The proposed Rural Water Supply and Sanitation project falls under environmental category 'B' as per World Bank's safeguard policies laid down in OP 4.01 on EA, as the potential impacts due to the rural water supply and sanitation project do not involve environmentally sensitive areas, site specific and negative impacts can be reversed with adoption of proper preventive measures like recharge of ground water with various recharge structures and afforestation measures built into the water supply scheme scope and proper disposal of wastewater from sanitation facilities. The OP 4.01 requires the borrower to screen projects upstream in the project cycle for potential impacts. Thereafter, an appropriate Environmental Assessment (EA) to assess, minimize and mitigate potentially adverse impacts is selected depending on nature and scale of project. The project interventions will be at all four levels: National, State, Districts, and Village (including blocks, as appropriate). As agreed with MoDWS, while the capacity building component will address the National and the State RWSS programs, the demonstration projects for decentralized services delivery arrangements will be implemented over a six year period. Especially designed *disbursement linked indicators* could be used to disburse against the achievement of specific implementation/ output /outcome indicators.

Major Components of the Environmental Assessment Study

The proposed water supply and sanitation project is to provide good water quality and better hygienic conditions in the rural areas of 28 districts of the eastern Uttar Pradesh. For the environmental impacts from the project, environmental monitoring and supervision will be undertaken based on the key environmental issues associated with such type of work.

The assignment will provide the client with clear understanding of the prevailing and expected environmental issues and their probable causes, which have to be considered while preparing and implementing the RWSS schemes. Environmental codes of practices will be prepared; which need to be followed during various stages such as planning, design, construction and operation and maintenance of the proposed RWSS schemes.

The Environment Management Framework will provide the client, with well-defined performance indicators for addressing the identified issues, through the various activities/task under the proposed project, and strategy for its implementation to achieve sustainable sources for water supply and sanitation benefits within the proposed project districts. The following specific components would contribute to the above stated objectives:

- Identification and assessment of the critical environmental concerns in the RWSS sector and address them as an integral part of the project design, execution and operations.
- Identification of generic environmental issues that are beyond the scope of RWSS schemes, but related to the sector and recommend remedial measures to address them as part of the project.
- Identification of household and environmental sanitation issues as well as to make an assessment of pollution level with regard to water supply and its usages and propose appropriate technology options.
- Preparation of (EA / EMF) Report including well-defined performance indicators for addressing the identified issues, through the various activities / tasks under the proposed project.

M/s. ***Mott MacDonald Pvt. Ltd.*** has been assigned the Environmental Analysis (EA) study, with a view to identify the critical environmental concerns in the RWSS sector and to put forth a mechanism to address these issues, through an Environmental Management Framework (EMF).

As per the discussion with SWSM, four representative districts were selected out of the 28 Eastern UP districts to be included in the proposed project. Three villages were selected from each of the four representative districts (Bahraich, Gorakhpur, Ballia and Sonbhadra). The field visit included analysis of the existing scenario with the water supply and sanitation schemes at the village level. Focus Group Discussions were held with villagers in order to identify the problems and needs of the people. The same has been elaborated within section 8.0 of this report.

This Draft Final Report is developed in conjunction with the Draft Environmental Assessment report describing the existing water supply and sanitation practices within the project area districts. A standard Environmental Management Framework has been included within this report with regard to the Draft Environmental Assessment Report.

In order to ensure that the environmental issues are systematically identified and addressed in the various stages of the implementation of the schemes, an Environment Management Framework (EMF) has been developed for this project. The specific objectives of the EMF are as under:

- To design a set of procedures, delineate the roles and responsibilities of various Stakeholders, and institutional structure in the implementation of sub projects along with the capacity building and staffing requirements for mainstreaming environmental management in project implementation processes
- To identify appropriate mitigation measures for addressing the identified environmental issues.

Policy, Legal and Administrative Framework

The State adopts the national policy on water and sanitation which emphasizes participation by the PRIs. It lays emphasis on integration of water supply and environmental sanitation including personal hygiene. The State Water Policy accords high priority for drinking water and underscores the need for regular programme of monitoring of fresh water bodies for protecting their water resource potential.

The proposed project will address all the issues of concern as laid down in the OD 4.01 of World Bank on EA/EMF. Though there are no specific clearances required from the Ministry of Environment, GOI, all the provisions in the various Central and State Acts listed in the chapter 2 to relevant in the context of the proposed project would be incorporated during the implementation of the project.

World Bank Safeguard Policies

The below table describes the relevant safe guard policies of the World Bank and discusses their applicability to the project.

Policy	Applicability to this project
OP/BP 4.01 Environmental Assessment	**Applicable to this project.** The EMF includes a detailed description of assessment procedures for each of the activities proposed under the project.
OP/BP 4.04 Natural Habitats	Not applicable, Since schemes to be taken up under the project would not convert or degrade natural habitats.
OP/BP 4.36 Forestry	**Applicable to the project.** Some of the schemes taken up under the Project will be located in forest areas. Assessment procedures and mitigation measures have been put into place through the EMP in accordance with the approval of the Forest Department and guidelines for compensatory afforestation.
OP 4.09 Pest Management	Not Applicable. Vector control measures, if undertaken in the project will be in accordance with the OP 4.09 avoiding use of insecticides in classes 1a, 1b and 2.
OP/BP 4.12 Involuntary Resettlement	Not Applicable The project will ensure that people are not displaced.
OP/BP 4.20 Indigenous Peoples	**Applicable to the project.** To be decided based on the Social Assessment Study.
OP/BP 4.11 Physical Cultural Resources	Not Applicable to the project. No existing cultural property will be damaged..
OP/BP 4.37 Safety of Dams	Not applicable Since the project does not involve construction of dams.
OP/BP 7.50 Projects on International Waterways	**Applicable to the project.** In accordance with OP 7.50 (International Waterways) this is seen that the proposed project falls within the exceptions to the notification requirement under para 7(a) of the Policy. OP 7.50 is applicable for the proposed project since the Ganga and its tributaries from where water resource would be used for the project is infinitesimally small fraction of overall volume of flow in these rivers and investment components involve piped water supply schemes which will ultimately improve the efficiency of water supply system, delivery of resource, decrease in wastage of resource and thus improved efficiency of WSS system and service delivery. It is envisaged that there will not be any adverse impacts on water quality and quantity due to this project and there will not be adversely affected by the water use of the other riparian countries. The project is expected to have a net positive effect on the environment.
OP/BP 7.60 Projects in Disputed Areas	Not applicable As no project components will be proposed in disputed areas.

Environmental Analysis

This will cover the overview of the physical geography of the state, with special emphasis on water resources and sanitation amenities. This environmental baseline has been developed mainly on the basis of data collected through secondary sources, and has been supplemented by village level surveys and Focus Group Discussions in villages of the 4 representative districts. The physical, land use pattern, agriculture status, water resources environment are presented in the section 3 for the study area whereas issues pertaining to the existing conditions on water supply, sanitation, health and hygiene are briefly discussed in the same chapter according to the secondary data collected and findings of the primary field visits.

Major topics covered in this study are:

- Brief Profile of State
- Physical Environment (Temperature & Precipitation, Climate change, Location)
- Drainage pattern (River system, Catchment/Watersheds Delineations)
- Geomorphology
- Hydrology (Surface water, Ground water, Wetlands)
- Disasters (Earthquake, Floods, Droughts)
- Mineral resources
- Quarrying & Mining
- Demographic data
- Land use pattern
- Forests, Agriculture & Horticulture
- Development Activities

Baseline Environmental Status

Water Supply

Surface Water

- Of the rivers and canals in the country, Uttar Pradesh occupies the first place with the total length of rivers and canals as 31.2 thousand km. that is about 17 percent of the total length of rivers and canals in the country. The state of UP falls in Ganga Basin with the sub basins of Yamuna, Ramganga, Gomati and Ghaghra Rivers. The state is estimated to have 161.70 BCM (131.0 m.a.f.) of surface water.

Groundwater

- Among the States, the highest potential of ground water is in Uttar Pradesh with about 72 BCM (58.4 m.a.f.) exploitable ground water resource. The total replenishable groundwater is 84 BCM or 68.1 m.a.f.). The Annual Ground Water Draft is 48.78 BCM and stage of ground water development is about 70%.

Identified blocks – Ground water Stressed

Problem	In UP	In Eastern UP
Over Exploited	37 Blocks	7
Critical	13 Blocks	13
Semi- critical	88 Blocks	44
Ground Water User Maps	70 districts	
Artificial Recharge to Ground Water (AR)	Area identified for AR: 45180 sq km Quantity of Surface Water Recharged: 14022 MCM Feasible AR structures: 4410 percolation tanks, 12600 cement plugs (check dams), 212700 recharge shafts, RTRWH structures (10 lakhs)	

Source: Central Ground Water Board

Surface Water Quality

The water quality in the main rivers is generally deteriorated due to discharge of industrial pollutants as well as other human excreta (especially in the river Ganga and Yamuna due to divine belief of local people), except in the upper reaches of rivers where the pollutant load is minimal.

The quality problems with respect to surface water sources are more acute in the locations and during the periods when the flow in the river is not sufficient to cause acceptable dilution of the discharged effluents.

Central Pollution Control Board (CPCB) classifies river water quality in five classes according to fitness. The standards for these classes have been specified on the basis of chemical and biological parameters, The classification with regard to quality of drinking water sources with and without conventional treatment are indicated as below.

Classification	Class	Tolerance Limit
Drinking Water Source without conventional treatment but after disinfections	A	Total Coliform Organism MPN/100 ml shall be 50 or less pH between 6.5 and 8.5 Dissolved Oxygen 6mg/l or more Biochemical oxygen demand 5 days 20o C 2mg/l or less
Drinking Water source after conventional treatment and disinfections	C	Total Coliforms Organism MPN/100 ml shall be 5000 or less pH between 6.5 and 8.5 Dissolved Oxygen 4mg/l or more Biochemical Oxygen Demand 5 days 20oC 3mg/l or less

Ground Water Quality

Major groundwater quality parameters relevant to domestic water supply need in Uttar Pradesh are Arsenic, Fluoride, Iron, and Total Dissolved Solids (TDS). The Shallow groundwater in eastern districts of the state is naturally found to be in high state of Arsenic, Fluoride, and Iron, leading to the concentrations that are often exceeding the drinking water standards. The districts where aquifers are adversely affected with Arsenic, Fluorides and other undesirable parameters problems include Ballia, Bahraich whereas certain pockets of Gorakhpur, Sonbhadra and other districts are also affected adversely by such water quality problems.

Status of Water Schemes

About 30% schemes are piped water supply schemes. The piped water supply schemes constitute a deep bore well/tube well source with a submersible pump, Over Head Tank (OHT) and a piped distribution system with public stand posts in the villages. A chlorination unit is connected to the pumping main for the disinfection of water. The water, after being chlorinated, is pumped to the overhead tank where it is stored and subsequently supplied to the users through the distribution network. The remaining 70% schemes are hand pump-based. Water treatment is provided by means of hand pump based contaminant removal units like Arsenic, Fluoride removal units..

Coverage status

As on 01.04.2012, the state of UP has a total of 260110 habitations, out of which, the population of 13838 habitations are covered by more than 75% to 99% and the population of 245390 habitations are covered by more than 100%, leaving a balance of 882 quality affected habitations, which need to be covered.

Current Water Treatment Practices

A chlorination unit is connected to the pumping main for the disinfection of water in the piped water supply scheme. After being chlorinated, it is stored and subsequently supplied to the users through the

distribution network. The quality of supplied water is periodically monitored for residual chlorine by the operator. Water quality testing is done by the UPJN at the district/block level testing laboratories.

i. Hand Pump based Treatment
ii. Piped Water Supply Schemes - Chlorination

Sanitation Status:

Health:

It is observed that due to lack of environmental sanitation in the villages, diseases such as **Japanese Encephalitis (JE)/ Acute Encephalitis Syndrome (AES), Malaria, and Gastro-enteritis** are affecting the rural population. The major source of these diseases has been identified as the puddles of stagnant water and wastewater nearby the fields/houses, which are breeding places of mosquitoes.

Uttar Pradesh has a large public sector health infrastructure comprising one ***Super Specialty Institution*** (SGPGI), 7 government ***medical colleges*** & ***hospitals***, 53 ***District Hospitals***, 13 ***Combined Hospitals***, 388 ***Community Health Centres***, 823 ***block PHCs***, 2817 additional ***PHC***s apart from 20521 ***Sub Centres***. Apart from this entire infrastructure in the state, the physical health infrastructure in the State is still much below the country average.

Sanitation Level:

There are no sanitation facilities in most of rural households in eastern Uttar Pradesh. Amongst the ones who have access to a sanitary facility, about 50% have a toilet within their house, 4% households share a toilet with other households while about <2% households use a public toilet. Most village people practice open defecation which not only results in degraded sanitation situation but also is a source of contamination of shallow groundwater. Demand and utility for sanitation facilities in eastern UP is very limited. There is need/requirement for sanitation facilities, but as the rural people in general do not have awareness on the benefits of having sanitation facilities and have traditional mind set of practising open defecation, no demand for these facilities is seen. With the intervention of the RWSS project, there could be triggering of behavioural change, which could lead to demand for household sanitary latrines and environmental sanitation facilities. The Nirmal Bharat Abhiyan program emphasises changing mindset of the people through IEC activities rather than mere creation of assets (Toilets).

Waste Management:

In the rural UP, there is no tradition of waste management and there is no proper disposal of sullage water and solid waste generated. Practice of open defecation is widely prevalent. Due to these environmentally degrading practices, rural population is prone to various water borne diseases.

Field Survey & Study

During kick-off meeting dated on 1st December 2012 with SPMU, it was suggested that three villages from each of the four representative districts has to be included for data collection and field study. It has been decided to consider at least 3 villages each from the selected 4 districts (Bahraich, Gorakhpur, Ballia and Sonbhadra) considered as the representative districts and based on the secondary data collection, proceeded for the preparation of the Environmental Assessment and Environmental Management Framework for the project area (28 districts of Eastern UP).

The village level survey and focused group discussions with villagers carried out during the field visits to the 13 villages in the selected representative districts of Bahraich, Gorakhpur, Ballia and Sonbhadra and key findings observed during these field visits conducted are summarized below indicated the following issues related to Water supply and Sanitation.

Major Findings:

Water Supply

- Awareness towards the quality of drinking water is poor among the general public.
- Bahraich and Ballia districts are majorly affected by Arsenic contamination and awareness on the use of water for drinking from the arsenic removal units (provided UPJN to supply arsenic free water) is of concern.
- Except Sonbhadra and southern parts of the project area, other parts of eastern UP have shallow hand pumps as well as deep hand pumps (installed by UPJN) and coverage in terms of quantity is not a problem. In case of quality problem habitations, the coverage of population with contaminant free drinking water could be different, as some of the plants are not working and people are not using the water from these plants.
- In Sonbhadra, because of the geophysical status, ground water table is deep and shallow hand pumps are non-existent and rural people are generally dependent on the deep Mark-II hand pumps installed by UPJN. The habitations are scattered and sparsely populated and require maintenance free robust technologies for contaminant removal. The major quality problem, in this district is fluoride and iron. In some of the habitations, Hand pump based fluoride removal plants and Iron removal plants are installed by UPJN.

Sanitation:

- Average more than 80% villagers are practicing open defecation.
- Remaining households are having sanitary latrines with soak pits.
- Majority of the latrines which have been constructed under TSC are observed to be not in use.
- Kitchen waste/ is being discharged in the open drains. These are meeting with natural water body present in village like pond resulting source of environmental pollution as well health and hygiene concern.
- In 11 villages visited, proper drains are not constructed resulting in safe disposal away from the village.
- In Gorakhpur, villages water supply pipe network is passing through/running parallel/ very close to these drains, which could be source of contamination of water pollution especially if the pipe line is having leakages.
- In Gorakhpur villages, environmental sanitation is poor (as in other districts), where the JE disease is prevalent, but the virus could be dormant in carriers such as pigs and other animals in these areas, which could break out during rainy season.

Environmental Concerns and Management Proposals:

In order to ensure that the environmental issues are systematically identified and addressed in the various stages of the implementation of the schemes, an Environment Management Framework (EMF) has been developed for this project. This section covers the brief discussion of the following sector and project related key environmental issues, and also sector related other key environmental issued and management proposals.

- Water Quantity
- Water Management
- Ground water quality
- Surface water quality
- Poor Hygiene
- Household sanitation
- Rural Environmental Sanitation
- Solid and liquid waste disposal

The study also includes:

- Management of Large Scale Degradation in Mini-Catchment Areas
- Management of Uncontrolled and Over Grazing in catchment areas
- Management of Fuel Wood Pressure

- Management of Water Quality Issues Management Measures for Source protection and its Sustainability
- Monitoring and Performance tracking of source centred catchment area conservation and Management program
- Fund flow arrangements for implementing works
- Environmental Management Measures

Stakeholders Consultation: World Bank/ GOI funded Rural Drinking Water & Sanitation program dated on 23/01/2013

A stakeholders workshop involving all the SWSM officials, district level development officers, Institutional representatives responsible for providing rural water supply and sanitation facilities (UPJN, Panchayati Raj Department), State Ground Water Department, Health Department, NGOs, PRI representatives and community leaders was conducted on 23/01/2013, to apprise them of the proposed Rural Water Supply and Sanitation Project for Eastern UP being funded by World Bank. In the workshop, the activities being taken up such as Environment Assessment and Environment Management Framework Study, Social Assessment Study, Institutional Arrangements for implementation of the project were informed and presentations were made by the study consultants to put forth the issues identified during their study and present status of their study, to solicit the suggestions and comments from workshop participants for effective identification of measures to be taken up during implementation of the project.

Key issues identified:

- Water quality monitoring should be done on regular basis, as the determination of quality problem based on one time data is not correct.
- Emphasis to be on awareness creation and triggering behavioural change for usage of individual sanitary latrines and its impact on health.
- Unsanitary conditions in the villages need attention and solid and liquid waste management has to be given due importance.
- DWSC to take lead for the implementation of all the sub-projects for the RWSS.
- Single habitation schemes/Multi village schemes and Single village multi habitations schemes to be implemented as a part of RWSS.
- DWSC shall be given full authority and assistance for choosing the support organisation (SOs).
- Water Quality problem & Water scarcity area shall be taken up on priority basis.
- The implementation and O&M responsibility to be taken up by the community.
- Bacteriological contamination and presence of anthrop virus were found to be scaling high, causing death of numerous lives. The major cause of such contamination was envisaged as the practice of open defecation, contaminating the shallow hand pumps.
- Gorakhpur/Basti/Azamgarh/Deoria, were among the worst affected districts from Japanese Encephalitis (JE), and it was envisaged that drinking water and poor sanitation condition are the primary carriers responsible for such deadly disease spreading among the community.

Institutional Arrangements

The personnel and agencies with the responsibility for environmental management will be given in table below.

Level	Institution	Function	Responsibility
State	State water Sanitation Mission (SWSM) in consultation with STA (Already in existence)	Ensure overall implementation of the EMF in the proposed RWSS project. Arrange funds required for implementing the provisions of EMF. Ensure availability of required human resources for implementation of EMF. Ensure that recommendations from supervision and monitoring are integrated into the project and the EMF is updated periodically as necessary. Integrating communication and capacity development programmes for both water supply and sanitation. Recruit external experts for conducting Environmental Audit once in a year and ensure that the relevant recommendations are integrated into the project. Conduct environmental supervision of all Water Supply and Sanitation schemes on a half yearly basis.	ED, supported by State Level Environmental Expert.
	Water and Sanitation Support Organization (WSSO) (Already in existence)	Provide support to the Department of Rural Development in preparing the EDS. Facilitating participation of the community in preparation of EDS as part of the DPR preparation and in certification process (for environmental mitigation measures) for implementation completion report. Deal with software aspect of RWSS sector and may not be involved in implementation of water supply and sanitation schemes; Liaison with forest department, UPPCB, ground water department and other related departments at scheme level for ensuring implementation of identified mitigation measures (permissions, technical support, etc.). Provide support in execution of the HRD and IEC activities on EMF. Provide support to the Department of Rural Development in the supervision, monitoring and audit activities of the EMF. Train the VWSC in conforming to EMF requirements in operation and maintenance of sanitation schemes.	Director of WSSO
District	District Water and Sanitation Mission (DWSM) (Already in existence)	Training and Capacity Building of SOs, VWSC, Block Resource Persons – Environmental Management (MRP-EM) and District Resource Person – Environmental Management (DRP-EM) on EMF. Coordination between various players and actors involved in EMF. Coordinate with other line departments on environment related issues. Formulation, management and monitoring of projects and progress on drinking water security and total sanitation in rural areas.	EE, DWSM supported by the District Level Environmental Experts

Level	Institution	Function	Responsibility
Block	Block Resources Centre	Environmental management and monitoring of RWSS sector projects at the Block level. As part of the scrutiny of the schemes submitted by the GP – will check if environmental screening and appraisal has been properly done before forwarding them to the DWSM. Coordination with NGOs for ensuring integration of EMF in all relevant project activities including capacity development, communication, project management and supervision. Sensitizing the public representatives, officials and the general public about the provisions of the EMF.	Block Resource Coordinator, supported by the DWSM resource personnel
Village	Village Water and Sanitation Committee (VWSC) with the support of Support Organization (SO)	Participation in preparation of Environmental Data Sheet (EDS) to be enclosed to Detailed Project Report (DPR). The committee shall deliberate on environmental safeguards relevant to the schemes and adopt the same during construction and implementation Certifying the implementation of environmental mitigation measures as part of the implementation completion report. Facilitate IEC activities regarding water conservation, sanitation and hygiene among the villagers. Collection of household contributions and user fees, opening and managing a bank account. Preparing annual budgets and recommendations for user fee charges. Responsible for procurement of goods and services, supervising contracts and works and making payments	President (GP), WSSO, JE/ AE (UPJN), PRI personnel

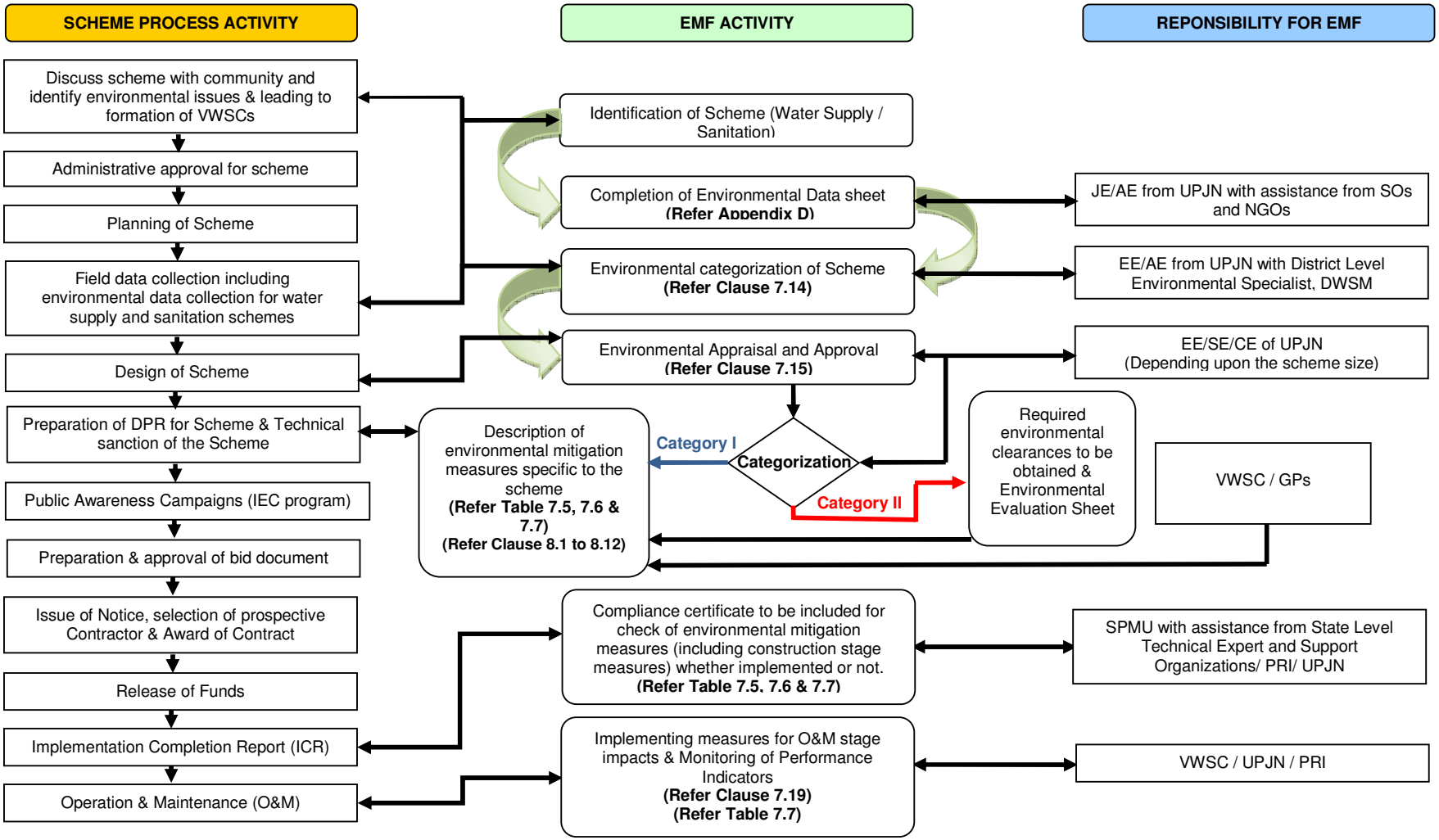
Environmental Management Framework

In order to ensure that the environmental issues are systematically identified and addressed in the various stages of the implementation of the schemes, an Environment Management Framework (EMF) has been developed for this project. EMF activities in the preplanning, planning, implementation and O&M phases of the proposed project cycle for the project sponsored schemes along with the responsibilities are indicated against the respective tasks. The key elements of EMF are as follows:

- Environmental Data Sheet
- Environmental categorization of the scheme
- Environmental appraisal and approval required
- Implementation of Environmental mitigation measures
- Environmental supervision, monitoring, and evaluation
- IEC and capacity building on hygiene and environmental issues

The following environmental frame work flow chart provides the understanding of the EMF activities to be taken up at various stages of the scheme.

EMF Implementation Process throughout a scheme cycle



Screening Guidelines for Environmental Issues

Screening Matrices has been applied to identify category of schemes regarding its environmental impacts and application/clearances of GOI/GoUP Legislative and World Bank Policies on the schemes interventions. Some significant types of schemes and environmental clearance and approval agency for such schemes are given below:-For Drinking water schemes

Activities under schemes

- Land Availability (Forest Land/Community/Private Land)
- Location and Type of source
- Sufficient water available at source (even in summer)
- Testing of water quality of the water source
- Competitive uses of the Water Source
- Preferred water source should be River or Deep Tube Wells

Category I (Low Impact)	Category II (High Impact)
a. WS involving pumping, construction of storage tanks and piped distribution networks, with source as tube well/ bore well. b. WS with source as spring where water will flow by gravity to the distribution network. c. Existing WS requiring rehabilitation. d. Roof water harvesting units, where scattered households cannot be served by piped network. e. Ground water recharge measures.	a. WS with water source requiring special treatment for removal of arsenic, iron, fluoride, and salinity, etc. b. WS with source as river where water will have to be conveyed from long distances. c. WS with source located in/very close to natural habitat/ sensitive ecosystems such as National parks, Wild life sanctuaries (requiring forest permission/clearance) d. WS with water source from highly critical aquifers / over exploited zones. e. WS with water source having significantly competing water demands over irrigation, agriculture and other domestic uses etc

Refer Appendix D: Format for Environmental Data Sheets (EDS)

D.1 EDS for Water Supply

For Toilets, Soak Pits, Compost Pits and Garbage Pits

Activities under scheme

- Location of Toilets, Soak pits/septic tanks, compost pit, & garbage pits.
- Type of soil.
- Liquid waste discharge.
- Solid waste collection and disposal

Category I (Low Impact)	Category II (High Impact)
1. Environmental Sanitation	
a. Construction of ISL, Soak Pits where subsurface strata is favourable for adopting toilets, pits and groundwater table is at depth greater than 3.0 m below ground level.	a. Community latrines, Soak pits and disposal of sewage through septic tanks / soak pits where ground water table is less than 3m below ground level. Construction of ISL/community latrines/soak pits where subsoil strata is not favourable (hard rock or low infiltration capacity) Construction of ISL/community latrines/soak pits in water logged areas.
Refer Appendix D: Format for Environmental Data Sheets (EDS) ***D.2. EDS for Sanitation Schemes*** ***D.3. EDS for Household Soak pits***	
2. Solid Waste Management	
a. Construction of Composite pits garbage pits where subsurface strata is favourable Household biogas plant Household vermin-composting plant Household aerobic composing plant	a. Community level biogas plant Processing unit for plastic waste
Refer Appendix D: Format for Environmental Data Sheets (EDS) ***D.4. EDS for Community Solid Waste Management***	

Risk & Assumptions

The major risk factors along with some proposed management measures from the environmental point of view are given in table below, which are as follows:-

S. No	Environmental Risks	Management Proposals
1	Drying-up of water sources	▪ Preventing water wastage ▪ Draw out only planned quantity ▪ Water augmentation ▪ Water harvesting ▪ Catchment area treatment ▪ Alternative sources be explored
2	Natural Calamities like Flash Floods, Droughts & Earthquakes	▪ Sub & Micro-Watershed treatment ▪ Reducing dependency on Fuel wood & Fodder extracted from forest area ▪ Installation of electrical & mechanical equipment above flood level. ▪ Cordoning off the source works with protection walls (wherever possible to do so), prone to floods ▪ Establishing diversions within the flood routes in order to protect the source at the downstream.
3	Lack of awareness in the community, especially regarding water quality and environmental sanitation	▪ Intensive awareness creation program. ▪ Incentives as visit to new/ religious places in the state, distribution of FTKs and ensuring its usages may help. ▪ Identify convenient water quality testing centres.
4	Unsuitable location and design of toilets specially twin-pit pour flush toilets	▪ Selected site should not pollute the downstream or nearby water supply source. ▪ Proper design, construction and maintenance of toilets should be ensured.
5	Absence of Proper waste management in the community	▪ Proper training regarding use of compost and garbage pits ▪ Incentives to be provided ▪ Arranging/ encouraging private garbage collectors to collect sellable/ usable waste periodically, from each village

Capacity Building and Training

The training and capacity building program has been proposed for project, the aiming of this is building environmental awareness and environmental management capacity in the project administration structure as well as in the intended target communities. The training programs for the staff in the project agencies at various levels as well as for the village communities will be detailed out in following table.

Capacity Building and Training:

S. No	Training	Purpose of the Training	Participants	Schedule	Course content
1	Introduction to Environmental Management in Proposed RWSS project including EMF	Filling of EDS, procedural & technical aspects of Environmental Assessment. To equip with knowledge and skills necessary for undertaking environmental appraisal as per the requirements of the EMF. To undertake periodic supervision of environmental performance of schemes To prepare for planning and monitoring implementation of environmental mitigation measures identified through the appraisal process. To equip with skills necessary for	Personnel from WSSO, SWSM, UPJN	Orientation Workshop - 1 day in each project district Main & Livener Training Programme – 3 days	Environment aspects pertaining to sustainability of water sources, water quality, protection of sources, Multi-GP schemes, besides sanitation facilities and Environmental appraisal. Water quality monitoring, prevention of pollution & surveillance.

S. No	Training	Purpose of the Training	Participants	Schedule	Course content
		water quality testing using the field testing kits under the Community based System for water quality Monitoring and Surveillance.			
2	Environmental Awareness and Sensitization	To build awareness on safe drinking water, water conservation, environmental sanitation and personal hygiene.	Personnel of UPJN, SOs, Members of VWSC and NGOs	One day workshop at the Block level. One day livener workshop organized annually. Total training programs will be about 224 for the project duration.	--
3	Orienting for planning, design and implementation of RWSS schemes including environmental issues/safeguard for PRIs and UPJN	To create awareness among the implementation agencies as well as the monitoring units so as to have in depth understanding of the schemes being implemented under the proposed project. The orientation shall educate the agencies with regards to the environmental issues / safeguard to be taken into consideration during the implementation of the proposed schemes.	Personnel form PRI, UPJN, Members of VWSC and NGOs.	3 day workshop – First day induction program, and next 2 days in detail training with regards to the environmental issues/safeguards.	
4	Orientation for Water Quality monitoring for PRIs	To build awareness on water quality monitoring amongst implementation agencies.	Personnel form PRI, UPJN, Members of VWSC and NGOs.	One day training at the Block level. One day livener Training organized annually. Total training programs will be about 224 for the project duration.	

Key Performance Indicators:

Following key performance indicators were identified as a result from the analysis of the secondary data collected and existing scenario of the water supply and sanitation issues. The detail is as stated in section 7.19.

1) ***Water Quantity,***
2) ***Water Quality,***
3) ***Environmental Sanitation,***
4) ***Institutional Arrangements and Capacity Building.***

Environmental Code of Practices

The details of relevant Environmental Codes of Practices (ECOPs) for following activities are described in the section 8 of this report.

- Identification of Sources of Water Supply
- Protecting Surface Water Supply Source and Ensuring Sustainability
- Protecting Ground Water Supply Sources and in Ensuring Sustainability
- Water Quality Monitoring
- Selection of Safe Sanitation Technique Options (Including Drainage) at Individual Household and Community Level
- Selection of Location for Community Toilets
- Safe Sullage Disposal and Organic Waste Management
- Safe Solid Waste Management at Individual Household and Community Level
- Management of Catchment Area
- Rehabilitation of Construction sites / Supplementary sites
- Schemes in Forest Areas
- Borrow Areas

1. Introduction

1.1 Background

The National Rural Drinking Water Programme (NRDWP) of the Government of India emphasizes the involvement of Panchayati Raj Institutions (PRIs) and communities in planning, implementing and managing drinking water supply schemes. State is incentivized to hand over management of their schemes to PRIs. Uttar Pradesh face constraints in institutional and technical capacity at state, district block and Gram Panchayat levels for implementing sustainable rural water supply scheme. Hence, Rural Water Supply and Sanitation (RWSS) being undertaken as a separate component under NRDWP focusing on Uttar Pradesh with different funding pattern but implemented within framework of NRDWP.

The Government of India (GoI) had approached World Bank (WB) for assistance on a National Project for Uttar Pradesh. The project will bring about positive health and environmental benefits through supply of 'safe' drinking water and creation of sanitary conditions in the village. The project will have programmes related to improved water quality monitoring, health and hygiene education as well as ground water recharge for water supply source protection. Environmental mitigation measures will be included in the project design stage.

Though this kind of project is not expected to cause any adverse environmental impacts, however, some key environmental concerns related to this project are:

a) Water Quality Issues
b) Availability of 'safe' drinking water, especially in the summer months
c) Management of solid and liquid waste

To contribute to the environmental sustainability of the project, an 'Environmental Assessment' (EA) Study is required to be prepared as per the World Bank's safeguards policies. For this purpose State Water and Sanitation Mission has appointed Mott MacDonald Pvt Ltd for preparation of "Environmental Assessment and Environmental Management Framework Report for 28 districts of Eastern Uttar Pradesh".

1.2 The World Bank Assisted Rural Water Supply and Sanitation Project

1.2.1 Objectives of the Assignment

The objective of the assignment is to produce an in-detail Environment Assessment and Environment Management Framework, so as to assist the Project Management unit during the implementation of the proposed RWSS schemes in the 28 districts of Eastern Uttar Pradesh.

The assignment will provide the client with clear understanding of the prevailing and expected environmental issues and their probable causes, which have to be considered while preparing and implementing the RWSS schemes. Environmental codes of practices will be prepared; which need to be followed during various stages such as planning, design, construction and operation and maintenance of the proposed RWSS schemes.

The Environment Management Framework will provide the client, with well-defined performance indicators for addressing the identified issues, through the various activities/task under the proposed project, and strategy for its implementation to achieve sustainable sources for water supply and sanitation benefits within the proposed project districts.

- This EA & EMF to provide detail guidance for providing environmentally safe and sustainable Rural Water Supply & Sanitation Scheme (RWSS) schemes, which will be taken up by the State Project Management Unit (SPMU), State Water & Sanitation Mission, Uttar Pradesh.
- An Environmental Assessment (EA) to be conducted which would provide insight into the environmental challenges being faced by the water supply and sanitation facilities including source sustainability, water quality management, drainage and disposal and household sanitation issues; consequently it would be helpful in the proposed project formulation. Accordingly, after preparation of the Preliminary EA report, Environmental Management Framework (EMF) is to be formulated.
- The EA and EMF to assist in implementation of the proposed RWSS schemes, against the possible potential environmental risks and impacts in its area of influence. The assignment will also examine project alternatives; identify ways of improving project selection, siting, planning, design and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts throughout project implementation.
- The EA & EMF to take into account the environment; human health and safety including the country's overall policy framework, national legislation, and institutional capabilities related to the environment and obligations of the state, pertaining to the project activities, under relevant national/international environmental treaties and agreements.
- Environment assessment outcomes and mitigation measures to be implemented to rural communities, especially the poor, wrt. upgraded levels of water supply and sanitation services.

1.2.2 Major Components of the assignment

The following specific components would contribute to the above stated key components:

a) Identification and assessment of the critical environmental concerns in the RWSS sector and address them as an integral part of the project design, execution and operations.
b) Identification of generic environmental issues that are beyond the scope of RWSS schemes, but related to the sector and recommend remedial measures to address them as part of the project.
c) Identification of household and environmental sanitation issues as well as to make an assessment of pollution level with regard to water supply and its usages and propose appropriate technology options.
d) Preparation of (EA/EMF) Report including well-defined performance indicators for addressing the identified issues, through the various activities / tasks under the proposed project.

1.2.3 Assessment of relevant techniques for water supply and sanitation

The experiences with different techniques to be assessed keeping in mind the background records. In-line with the recommendations in the policy we will identify sustainable and cost economic alternatives to the existing systems including source sustainability. The potential of promoting low cost household level technologies for water purification will also be assessed. Where the ground water sources are found to be quality affected, alternative sustainable surface water sources with proper treatment for a cluster of villages will be assessed.

The possible sanitation technologies to be assessed based on the experience in the sector with various designs of on-site sanitation facilities and will include solutions for household level facilities, community level facilities and institutional facilities.

1.3 Scope of the Assignment

After understanding the components; for Environmental Assessment (EA) and Environmental Management Framework (EMF) required by the World Bank the following scope have been identified:

- Analysis of the current environmental status and issues in the study area.
- Identify and Assess potential environmental impacts of the range of activities to be undertaken through the state projects, review the effectiveness of environmental management through the program systems.
- Assess the policy, codes and standards, legal and regulatory requirements relevant to WSS program and identify the provisions of the same in EMF.
- Review of existing capacity and institutional arrangements for environmental management in the program.
- Prepare the environmental impact matrix with mitigation measures and performance indicators.
- Develop an Environmental Management Framework for the project districts, based on the data collected and analysed for the selected 4 representative districts.

1.4 Need of Environmental Assessment and Environmental Management Framework

In order to improve the environmental health and hygiene in rural areas, it is a necessity to provide them with proper water supply and sanitation system. Past studies indicate that the existing water supply conditions in the rural areas of the state are not satisfactory, particularly in terms of quality. The existing sanitation system in rural areas is also very poor.

The proposed water supply and sanitation project is to provide good water quality and better hygienic conditions in the rural areas of 28 districts of the eastern Uttar Pradesh. The implementation of water supply and sanitation schemes is likely to result into varying level of environmental impacts that would also require supervision and monitoring. The environmental monitoring and supervision will be undertaken based on the key environmental issues associated with such type of work. Assessment of the existing condition of the water supply and sanitation needs to be taken up in the project area to identify:

- Current water supply scenario
- Current disposal systems of the wastewater as well as Solid Waste
- Personal health and hygiene,
- Prevailing disease due to lack of good water supply and sanitation facilities

The consultancy assignment is intended to provide assistance to the implementers in performing their duties for smooth implementation of the project. An EMF is to be prepared which will be used by the Engineers as a ready reference to screen the project interventions, impact evaluation, and adopting the mitigation measures in the design stage itself. This will help not only the GP / implementing authority but also to the engineers who are involved in the preparation of various schemes. This will help to reduce the intensity of impacts at planning stage as well as during implementation and post implementation phase.

1.5 Methodology

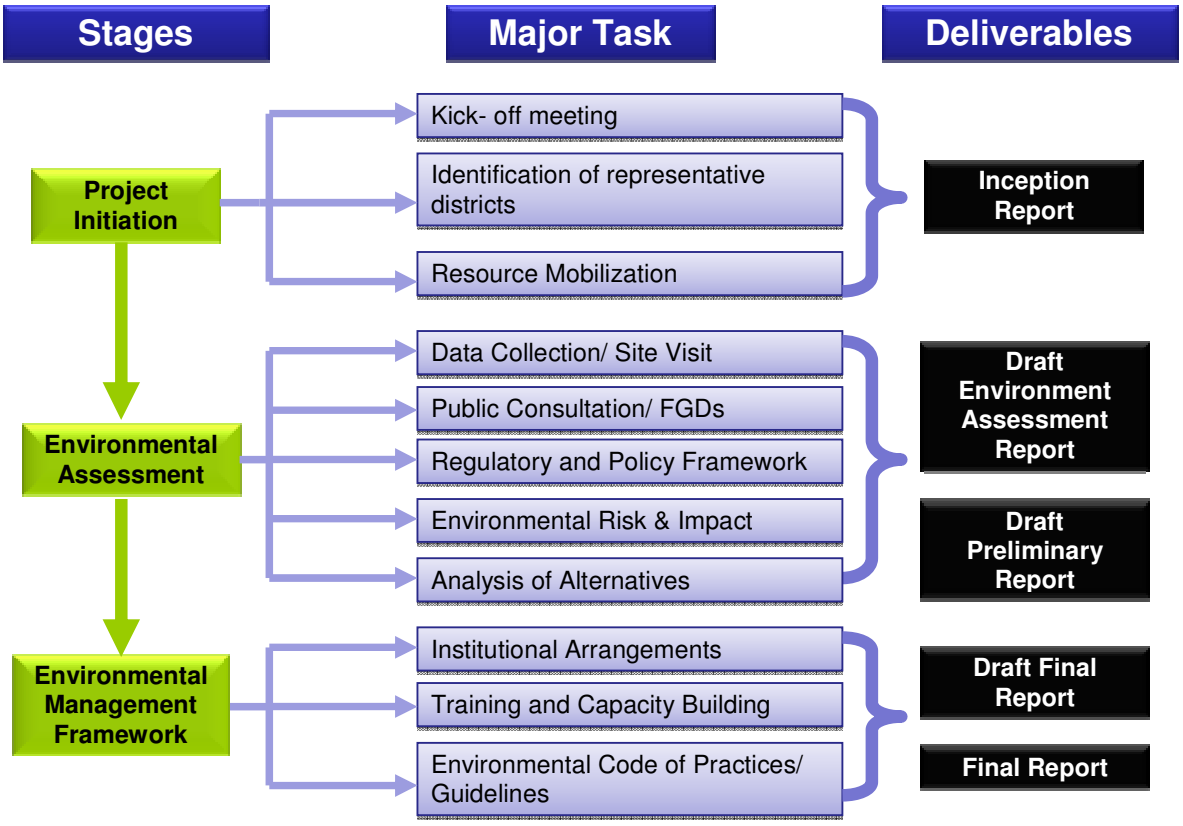
1.5.1 Data Collection and Review

The methodology basically comprised collection and collation of secondary data on water resources availability, their utilization, problems of water availability and quality as relevant in the context of the proposed RWSS project, demographic, socioeconomic and health aspects, water supply and sanitation

coverage and service levels and problems in O&M of existing water supply systems. The study also included an analysis of policy, legal and institutional framework related to water and sanitation with specific focus on 28 districts of Eastern UP. A review and analysis of this information led to the delineation of the baseline status of relevant environmental components pertaining to the state and provided the basis for assessment of the potential environmental impacts due to the proposed project and preparation of Environmental Management Framework (EMF) for mitigating negative impacts and enhancing positive impacts.

The present study has primarily relied upon the available secondary sources of data relevant to the proposed project and field visits to the villages in the project area. The major sources of data includes UP Jal Nigam, Panchayati Raj Institutions, Department of Rural Development, Central/State Ground Water Department (CGWD/SGWD), State Ground Water Department/Board, Department of Drinking Water/Rural Development, Gram Panchayats (GPs), UP Pollution Control Board (UPPCB), and Watershed Directorate, etc.

Figure 1.1: Methodology Flow Chart



1.5.2 Sample Habitations for Pilot Study

The sample villages from the 4 representative districts for water supply and sanitation schemes have been prioritized for carrying out the environmental study in consultation with the district level officers, UP Jal Nigam and Panchayati Raj Department staff of the district. Questionnaire has been developed for collection of data at village level. Sample villages in the particular district have been selected taking into account the environmental aspects so that the sample schemes may represent the entire district and subsequently the whole project area.

1.5.3 Site Visits

Site visits were taken up for field assessment using village level surveys and for conducting Focus Group Discussions (FGDs). During the field visits, local UP Jal Nigam and Panchayati Raj Department personnel were contacted regarding water and sanitation status in the sample villages and the area in general. The Gram Panchayat President and other key members of the villages (wherever available) were consulted to list the issues related water supply and sanitation and in particular related environmental issues. The site visits were conducted using participatory approaches like transact walks, field observations, FGDs, etc.

Field visit were undertaken within the suggested representative districts (Bahraich, Gorakhpur, Ballia and Sonbhadra). Three villages from each representative district were selected based on the initial discussion with district level officers, Panchayati Raj Department and UP Jal Nigam personnel of the respective districts.

Following are the sample villages selected during our field visit to the 4 districts;

1) Bahraich – Chhetara, Dhannipurwa and Shahpurjyot yusuf hathila

2) Gorakhpur – Jeetpur, Jagdishpur, Semaria Tola and Avadhpur

3) Ballia – Bajraha Khas, Ramgadh and Udvant Chhapra

4) Sonbhadra – Bahuwar, Lodhi and Pusauli

1.5.4 Focus Group Discussions (FGD)

Focus group discussions were conducted during field visits of district-wise villages. The discussions were done at different places of villages mainly with households located near hand pumps and during walk around the village in the areas which are away from hand pump.

1.6 Organisation of the Report

The Draft EA & EMF report has been outlined as per the following structure.

Chapter 1 - Introduction presents a brief description of the report discussing project background, objective of the project and its major components, scope of the project, need of Environmental Assessment and objectives of it and Methodology.

Chapter 2 – Rural Water Supply & Sanitation – Policy, Regulatory Framework, Mission and Programmes discusses State RWSS vision, RWSS coverage in the state, relevant laws/acts, WB safeguard policies, existing institutional set up.

Chapter 3 – Baseline Environmental Status gives existing environmental set-up, review and analysis of existing environmental resources, overview of existing environmental condition and issues of the eastern UP districts focusing on the villages, existing water supply status and sanitation amenities, public health and hygiene, developmental activities within project area districts, etc.

Chapter 4 – Status of Water Resources presents details about the availability of water as well as quality of water available in the project area, relevant water supply schemes and household water supply status, water quality monitoring, etc.

Chapter 5 – Rural Sanitation presents information about the existing sanitation facilities as well as health status of the people in the project area, particulars of diseases and solid and liquid waste management practices, etc.

Chapter 6 – Field Survey & Study presents information about the existing water supply and sanitation facilities observed during field visits in the sample villages of the project area and villagers' perception about these facilities and its inference, etc.

Chapter 7 – Environmental Concerns and Management Proposals describes sector and project related issues prevails in the project area and proposed measures for mitigation. Furthermore, an EMF has been prepared in light of water supply and sanitation schemes suggesting environmental data collection sheets, implementation of EMF in project cycle, responsibility matrix, environmental supervision, monitoring, evaluation plan, options for safe liquid and solid waste disposal, implementation plan including training and capacity building, training needs, budget for training is also presented in this section.

Chapter 8 – Environmental code of Practices discusses guidelines to be followed by the prospective contractors at the time of planning, designing and execution of any water supply and sanitation scheme under the proposed project.

2. Rural Drinking Water and Sanitation Policy

2.1 Introduction

The aim of the National Government is to ensure permanent drinking water security to all households in rural India, considering the guiding principles of potability, reliability, sustainability, convenience, equity and consumer's preference, while planning for community-based drinking water supply schemes. In this regard, measures to improve existing drinking water sources through conjunctive use of groundwater, surface-water and rainwater harvesting will be adopted based on the village water security plan prepared by the community.

The State adopts the national policy on water and sanitation which emphasizes participation by the PRIs. It lays emphasis on integration of water supply and environmental sanitation including personal hygiene. The State Water Policy accords high priority for drinking water and underscores the need for regular programme of monitoring of fresh water bodies for protecting their water resource potential.

The proposed project will address all the issues of concern as laid down in the OP 4.01 of World Bank on EA/EMF. Though there are no specific clearances required from the Ministry of Environment, GOI, all the provisions in the various Central and State Acts listed in this chapter and relevant in the context of the proposed project would be incorporated during the implementation of the project.

2.2 The World Bank Safeguard Policies

The below table describes the relevant safe guard policies of the World Bank and discusses their applicability to the project.

Table 2.1: The World Bank Safeguard Policies

Policy	Key Features	Applicability to this project
OP/BP 4.01 Environmental Assessment	Potential environmental consequences of projects identified early in project cycle. EA and mitigation plans required for projects with significant environmental impacts or involuntary resettlement. EA should include analysis of alternative designs and sites, or consideration of "no option" Requires public participation and information disclosure before Board approval.	Applicable to this project. The EMF includes a detailed description of assessment procedures for each of the activities proposed under the UPRWSS project. Screening and assessment tools as well as detailed guidelines have been developed for all proposed schemes.
OP/BP 4.04 Natural Habitats	Prohibits financing of projects involving "significant conversion of natural habitats unless there are no feasible alternatives". Requires environmental cost benefit analysis. Requires EA with mitigation measures.	Not applicable, Since schemes to be taken up under the project would not convert or degrade natural habitats. However, assessment procedures and mitigation measures have been put into place through the EMF so that any negative impacts on the natural environment are minimized.
OP/BP 4.36 Forestry	Prohibits financing for commercial logging operations or acquisition of equipment for use in primary moist tropical forests.	Applicable to the project. Some of the schemes taken up under the

Policy	Key Features	Applicability to this project
		Project will be located in forest areas. Mitigation measures have been appropriately included into the Environmental Management Plan (EMP) to ensure that in all schemes which have a component located on forest land, the required permission is taken through the Forest Department (for approval of the Government of India under the Forest Conservation Act, 1980)[1]. Also, any required felling of trees in forest or non forest areas is done with the permission of the Forest Department and in accordance with guidelines for compensatory afforestation. Assessment procedures and mitigation measures have been put into place through the EMP to ensure that any felling of trees is done in accordance with the approval of the Forest Department and in accordance with guidelines for compensatory afforestation.
OP 4.09 Pest Management	Supports environmentally sound pest management, including integrated pest management, but does not prohibit the use of highly hazardous pesticides. Pest management is the borrower's responsibility in the context of a project's EA.	Not Applicable. Vector control measures, if undertaken in the project will be in accordance with the OP 4.09 avoiding use of insecticides in classes 1a, 1b and 2.
OP/BP 4.12 Involuntary Resettlement	Implemented in projects which displace people. Requires public participation in resettlement planning as part of EA for project. Intended to restore or improve income earning capacity of displaced populations.	Not Applicable The project will ensure that people are not displaced. Scheme components will be sited as far as possible on Government or Panchayat lands. Resettlement Policy Framework has been prepared separately. Involuntary acquisition will be avoided.
OP/BP 4.20 Indigenous Peoples	Purpose is to ensure indigenous peoples benefit from Bank financed development and to avoid or mitigate adverse affects on indigenous peoples. Applies to projects that might adversely affect indigenous peoples or when they are targeted beneficiaries. Requires participation of indigenous peoples in creation of “indigenous people development plans”.	Applicable to the project. To be decided based on the Social Assessment Study.
OP/BP 4.11 Physical Cultural Resources	Purpose is to assist in the preservation of cultural property, such as sites having archaeological, paleontological, historical, religious and unique cultural	Not Applicable to the project. No existing cultural property will be damaged.

1 The Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 requires the Central Government to provide for diversion of forest land (of less than 1 ha, requiring felling of not more than 75 trees per hectare) for specific Government managed facilities including drinking water supply and water points, water or rainwater harvesting structures, tanks and other minor water bodies.

Policy	Key Features	Applicability to this project
	values. Generally seeks to assist in their preservation and avoid their elimination. Discourages financing of projects that will damage cultural property.	However, any cultural relics if found during any excavation during the project works will be deposited with the relevant Government authority whose recommendation regarding further excavation will also be taken.
OP/BP 4.37 Safety of Dams	Applies to large dams (15 meters or more in height). Requires review by independent experts throughout project cycle. Requires preparation of EA and detailed plans for construction and operation, and periodic inspection by the Bank.	Not applicable Since the project does not involve construction of dams.
OP/BP 7.50 Projects on International Waterways	Covers riparian waterways that form boundary between two or more states, as well as any bay, gulf, strait or channel bordered by two or more states. Applies to dams, irrigation, flood control, navigation, water, sewage and industrial projects. Requires notification, agreement between states, detailed maps, and feasibility surveys.	Applicable. In accordance with OP 7.50 (International Waterways) this is seen that the proposed project falls within the exceptions to the notification requirement under para 7(a) of the Policy. OP 7.50 is applicable for the proposed project since the **Ganga and its tributaries** from where water resource would be used for the project is infinitesimally small fraction of overall volume of flow in these rivers and investment components involve piped water supply schemes which will ultimately improve the efficiency of water supply system, delivery of resource, decrease in wastage of resource and thus improved efficiency of WSS system and service delivery. Most of the habitations are expected to be served by Single Village Schemes using local groundwater sources. However the schemes based on the surface water source shall be very minimal; mainly taken up for habitations where the local source is either not sustainable or not of acceptable quality. It is envisaged that there will not be any adverse impacts on water quality and quantity due to this project and there will not be adversely affected by the water use of the other riparian countries. In addition, the proposed project activities do not conflict with any of the agreements between the riparian countries. The project is expected to have a net positive effect on the environment.
OP/BP 7.60 Projects in Disputed Areas	Applies to projects where there are territorial disputes present. Allows Bank to proceed if governments agree to go forward without prejudice to claims. Requires early identification of territorial disputes and descriptions in all Bank documentation.	Not applicable As no project components will be proposed in disputed areas.

2.3 National Environmental Policies

Rural water supply is a state focus under the Constitution of India. However, states are guided by policies and regulations enunciated by the Government of India. These include:

1. The National Water Policy of 2002
2. The Environment (Protection) Act, No.29 of 1986
3. Water (Prevention and Control of Pollution) Act, 1974 (Central Act 6 of 1974) as amended in1988
4. Water (Prevention and Control of Pollution) Cess Act No 36 of 1977
5. Forest (Conservation) Act No. 69 of 1980 as amended in l988
6. The Wildlife (Protection) Act 1972 as Amended in 1991
7. EIA Notification of 2006

2.3.1 Environment

The Environment (Protection) Act No.29 of 1986	Under this Act, the central government is empowered to take measures necessary to protect and improve the quality of the environment by setting standards for emissions and discharges; regulating the location of industries; management of hazardous wastes, and protection of public health and welfare.
EIA Notification of MoEF 2006	All projects listed under Schedule-I of the Notification require environmental clearance from the MoEF. Water supply and sanitation projects, however, are not covered in the Schedule.
The Municipal Solid Wastes (Management and Handling) Rules, 2000.	Every municipal authority shall, within the territorial area of the municipality, be responsible for the implementation of the provisions of these rules, and for any infrastructure development for collection, storage, segregation, transportation, processing and disposal of municipal solid wastes.

2.3.2 Water

Water (Prevention and Control of Pollution) Act, 1974 (Central Act 6 of 1974) as amended in1988	This Act prohibits the discharge of pollutants into water bodies beyond a given standard and lays down penalties for non-compliance.
Water (Prevention and Control of Pollution) Cess Act No. 36 of 1977	This Act provides for a levy and collection of a cess on water consumed by industries and local authorities. It aims at augmenting the resources of the central and state boards for prevention and control of water pollution.

2.3.3 Environment Tribunal/Authority

The National Environment Appellate Authority Act, 1997	An Act to provide for the establishment of a National Environment Appellate Authority to hear appeals with respect to restriction of areas in which any industries, operations or processes or class of industries, operations or processes shall not be carried out or shall be carried out subject to certain safeguards under the Environment (Protection) Act, 1986 and for matters connected therewith or incidental thereto.

2.3.4 Forest and Wild Life

Forest (Conservation) Act No. 69 of 1980 and amended in 1988	This Act restricts the powers of the state in respect of dereservation of forests and use of forestland for non-forest purposes.
The Wildlife (Protection) Act l972, Amendment 1991	This Act provides for protection to listed species of Flora and Fauna in the declared network of ecologically important protected areas such as wild life sanctuaries and national parks.
The Indian Forest Act, 1927	The Act consolidate and reserve the areas having forest cover, or significant wildlife, to regulate movement and transit of forest produce, and duty leviable on timber and other forest produce.

2.4 State Environmental Laws / Rules

The Uttar Pradesh Jal Nigam, which was formed pursuant to the Uttar Pradesh Water Supply and Sewerage Act, 1975, is responsible for the development and regulation of water supply and sewerage services and for matters connected therewith.

Irrigation law: The State Water Policy, 1999 called for the effective and decisive involvement of WUAs in planning, design, development and management of water infrastructure/facilities, including their operation and maintenance. Accordingly, the Uttar Pradesh Participatory Irrigation Management Act, 2009 was passed.

Groundwater Bill, 2010: In order to regulate the deteriorating ground water situation in the state, the UP State govt. has drafted the UP Ground water Conservation, Protection and Development (Management, control & regulation) Bill, 2010. The same is under consideration and yet to bring in practice.

The Uttar Pradesh Water Management and Regulatory Commission Act, 2008 (UPWMRC Act): It came into force in October 2008 and the independent water regulatory authority, the Uttar Pradesh Water Management and Regulatory Commission (the 'Commission'), has been established.

The Commission has the power to determine the allocation and distribution of water entitlements to different user groups. But in view of the continuing acceptance of the link between land rights and water use, the allocation of entitlements in proportion to the land owned may reinforce the power and control of the dominant landowning group and further disempowered the marginalized sections of society. The Commission also regulates the terms, conditions, and procedure for determination of revenues and tariffs.

Water supply and sanitation in state of Uttar Pradesh is guided by the following state Acts/Laws presented in Table below.

Table 2.2: UP State Acts/Laws

S. No.	Act	Scope of Act
1	Uttar Pradesh Water Supply and Sewerage Act, 1975	Development and regulation of water supply & sewerage services in the UP State.
2	The U.P. Panchayat Raj Act, 1947	Establish and develop Local Self-Government in the rural areas of the Uttar Pradesh and to make better provision for village administration and development.
3	U. P. Kshettra Samitis and Zilla Parishads Adhiniyam, 1961 (Excerpts)	It is for Protection of sources of water supply, sanitation and prevention of diseases.
4	Uttar Pradesh Municipal Corporations Adhiniyam, 1959 (Excerpts)	Duties and Powers of the Corporation and Corporation Authorities
5	Draft Environmental Policy of the State	Discourages land use changes i.e., from green fields to brown fields. It envisages promotion of bio-agriculture; crop rotation; bio-fertilizer and bio-pesticides use, and promote integrated micro watershed management.
6	State Agricultural Policy, 1999	Encourages organic agriculture, bio pesticides & bio fertilizers; soil and water conservation programs including watershed development programs etc. Special thrust is given in the 10th Five Year Plan to promote organic food crops to meet growing domestic and international demand.

Source: International Environmental Law Research Centre, Directorate of Environment, UP

2.5 National Water and Sanitation Policy and Guidelines

2.5.1 The National Water Policy (September 1987)

Recognising that water is a prime natural resource, a basic human need and a precious national asset, the policy provides for the following guidelines in planning and operation of water resources projects as relevant in the context of the proposed project.

- "Water is a scarce and precious national resource to be planned, developed and conserved as such, and on an integrated and environmentally sound basis, keeping in view the needs of the States concerned."
- "Water should be made available to water short areas by transfer from other areas including transfers from one river basin to another, based on a national perspective, after taking into account the requirements of the areas / basins."
- "Water resource development projects should, as far as possible, be planned and developed as multipurpose projects. Provision for drinking water should be a primary consideration. The projects should provide for irrigation, flood mitigation, hydro-electric power generation, navigation, pisciculture and recreation wherever possible."
- "The study of the impact of a project, during construction and later, on human lives, settlements, occupations, economic and other aspects should be an essential component of project planning."
- "In the planning, implementation and operation of projects, the preservation of the quality of environment and the ecological balance should be a primary consideration. The adverse impact, if any, on the environment should be minimised and should be off-set by adequate compensatory measures."
- "There should be an integrated and multi-disciplinary approach to the planning, formulation, clearance and implementation of projects, including catchment treatment and management, environmental and ecological aspects, the rehabilitation of affected people and command area development."
- "Special efforts should be made to investigate and formulate projects either in or for the benefit of areas inhabited by tribal or other specially disadvantaged groups such as Scheduled Castes and Scheduled Tribes. In other areas also, project planning should pay special attention to the needs of Scheduled Castes and Scheduled Tribes and other weaker sections of society."
- "In the planning and operation of systems, water allocation priorities should be broadly as follows:
  - Drinking water
  - Irrigation
  - Hydro-power
  - Navigation
  - Industrial and other uses
- "There should be a close integration of water-use and land-use policies."

However, these priorities may be modified, if necessary, in particular regions with reference to area specific considerations.

- Water resource development projects should, as far as possible, be developed as multipurpose projects. Provision for drinking water should be a primary consideration.
- Improvements in existing strategies and the innovation of new techniques based on science and technology base will be needed to eliminate the pollution of surface and ground water resources, to improve water quality and to step up the recycling and re-use of water.
- There should be a periodical re-assessment on a scientific basis of ground water potential, taking into consideration the quality of the water available and economic viability. The exploitation of ground water resources should be so regulated as not to exceed the recharging possibilities, as also to ensure social equity, integrated and coordinated development of surface and ground water, and their conjunctive use

should be envisaged right from the project planning stage and should form an essential part of the project.

- Over-exploitation of ground water should be avoided near the coast to prevent ingress of the seawater into sweet water aquifers.
- Irrigation and multi-purpose projects should invariably include drinking water component, wherever there is no alternative source of drinking water. Providing drinking water to all human beings and animals should be the first priority.
- Both surface and ground water should be regularly monitored for quality. A phased programme should be undertaken for improving water quality.
- The efficiency of utilisation in all the diverse use of water should be improved and awareness of water as a scarce resource should be fostered. Conservation consciousness should be promoted through education, regulation, incentives and disincentives.

The guidelines issued by the Ministry of Water Resources, Government of India, stipulate that irrigation and multi-purpose projects should invariably include a minimum of 15% of water towards drinking water component and wherever there is no alternative source, drinking water needs of all human beings and animals should be the first charge on any available source of water. The requirement of drinking water should be projected at the time of designing the irrigation projects.

2.5.2 Guidelines for Implementation of Rural Water Supply Program (Aug. 2000)

The Guidelines for implementation of RWSP broadly as follows:-

1. Implementing Agencies

The implementing agencies for the programme may be decided by the State Government. The implementation may be through the Rural Development Department / Panchayati Raj Department / Board, Corporation or Authority. The implementation should be entrusted to one single department in the State and not to a number of departments, with a view to better implementation, monitoring of the progress, etc. If the programme has to be implemented in more than one department in the State due to unavoidable and certain special considerations, one of the departments should be designated as the Nodal Department for coordinating the rural water supply programmes and sending consolidated progress to the Central Government.

2. Norms for providing Potable Drinking Water

While implementing the Rural Water Supply Schemes, the following norms may be adopted for providing potable drinking water to the population: 40 litres per capita per day (lpcd) for humans to meet the following requirements.

Purpose	Quantity (LPCD)
Drinking	3
Cooking	5
Bathing	15
Washing utensils & house	7
Ablution	10

3. Criteria for identification of problem habitations

A habitation which fulfils the following criteria may be categorized as a Not Covered (NC) / No Safe Source (NSS) habitation:
The drinking water source/point does not exist within 1.6 km of the habitations in plains or 100 meter elevation in hilly areas. The
Source/point may either be public or private in nature. However, habitations drawing drinking water from a private source may be deemed as covered only when the water is safe, of adequate capacity and, is accessible to all.
Habitations which have a water source but are affected with quality problems such as excess salinity, iron, fluoride, arsenic or other toxic elements or biologically contaminated.
Habitation where the quantum of availability of safe water from any source is not enough to meet drinking and cooking needs.

Hence, in case of quality affected habitations, even if they are fully covered as per the earlier norms it would be considered as a NSS habitation if it does not provide safe water at least for the purpose of drinking and cooking.

Habitations which have a safe drinking water source/point(either private or public) within 1.6 km. in plains and 100 meter in hill areas but the capacity of the system ranges between 10 lpcd to 40 lpcd, the habitation could be categorised as “Partially Covered (PC)”. These habitations would, however, be considered as “Safe Source (SS)” habitations, subject to the water quality parameters.

All the remaining habitations may be categorised as “Fully Covered (FC)”.

4. Priority for coverage of no safe source habitations

The following priorities should be adopted:

- Coverage of No Safe Source (NSS) habitations. Among them priority may be given to the ones inhabited exclusively by SC/ST or having larger SC/ST population enumerated in the Status Report of 1994 (Survey) and resurveyed in 1996-97.
- Coverage of quality affected habitations with acute toxicity first and the others later.
- Upgradation of source level of safe source habitations which get less than 40 lpcd water to the level of 40 lpcd.
- Coverage of schools and Anganwadi where safe drinking water sources could not be provided under the outlays allocated by the Tenth Finance Commission.

5. Criteria for allocation of funds under Accelerated Rural water Supply Programme (ARWSP).

Criteria for allocation of funds to the States under the ARWSP w.e.f. 1.4.99 will be as under:

Weightage for	Percentage (%)
(a) Rural Population	40
(b) States under DDP, DPAP, HADP & special category hill States in terms of rural areas	35
(c) NC(Not Covered)/PC(partially Covered) villages (at 2:1 ratio)	10
(d) Quality affected villages	5
(e) Overall water resource availability (un-irrigated over irrigated area)	10
Total	**100**

6. ARWSP in Desert Development programme (DDP) areas

A fixed amount (of about 5%) of annual central plan allocation is earmarked for Rural Water Supply in DDP areas in Andhra Pradesh, Gujarat, Haryana, Himachal Pradesh, J&K, Karnataka and Rajasthan without the condition of the States providing matching provisions under their Minimum Needs Programme (MNP). The share of these States will be determined in proportion to the number of NSS habitations without safe source.

7. Operation & maintenance

Upto 15% of the funds released every year under the ARWSP to the States/UTs may be utilised for operation and maintenance of assets created, subject to (i) ceiling of matching grant provided by the States out of the MNP provision and (ii) the approved norms already circulated to all the States/UTs. The funds earmarked for operation and maintenance of assets is not to be permitted for creation of capital assets.

8. Earmarking of allocation for SCs/STs.

The State/UTs are required to earmark and utilize at least 25% of the ARWSP funds for drinking water supply to the SCs and another minimum 10% for the STs. Where the percentage of SC or ST population in a particular State is considerably high warranting earmarking/utilization of more than stipulated provisions, additional funds can be utilised. As a measure of flexibility, States may utilize at least 35% of the ARWSP funds for the benefit of SCs/STs, particularly in those states where SC/ST coverage is less than the coverage of the general population.
Diversion of funds earmarked for the SC/ST Sector to other sectors is not permitted. In cases where in the States have achieved substantial coverage of SC/ST habitations and, do not have sufficient SC/ST population left out so as to utilize 35% of the ARWSP and the MNP allocations, such States may be allowed by the Rajiv Gandhi National Drinking Water Mission, to incur lower level of expenditure on the coverage of SC/ST habitations, on a case to case basis, in consultation with the Ministry of Social Justice and Empowerment and the National Commission for SC/ST. In such cases, States are required to submit separate proposals giving detailed justification for availing of such relaxation.
The State Governments may list out the SC/ST habitations separately and their coverage may be monitored as a distinct component of the programme.

9. Involvement of women

Since women are the principal beneficiaries of this programme, it is of crucial importance that women are involved at all the stages of Rural Water Supply Schemes, particularly while making decisions on the location of the stand-post/spot sources in the villages/habitations. Information about sources of water should be obtained from women by the surveyors of the schemes. They should also be involved in the following manner:-
At least 30% of handpump mistries under NHRD (National Human Resources Development), TRYSEM (Training of Rural Youth for Self Employment) and other training schemes, should be women of the local areas/habitations as they can take better care of the operation and maintenance of the handpump schemes than others.
There should be women caretakers for handpumps in the habitations.
Certificate about satisfactory completion of the schemes may be obtained from women groups in the habitations.
Prominent women from the habitation should be represented on the village level water monitoring committees.

Experience has shown that where women are involved in such consultation and in the maintenance of the spot sources, the performance of the water supply systems has been effective. This aspect should be kept in view and ensured by the implementing agencies at the time of formulation, implementation and maintenance of the schemes. Each scheme/project for Rural Water Supply should mention the extent of the involvement of women.

2.5.3 Guidelines on Swajaldhara (June 2003)

Sector Reform Project (SRP) has been scaled up throughout the country in the form of centrally sponsored Swajaldhara launched on 25th December 2002. This programme has a paradigm shift from supply driven to demand driven, centralized to decentralized implementation and Government's role from service provider to facilitator. A fundamental reform principle of Swajaldhara was the empowerment of villagers to ensure their full participation in the project through a decision making role in the choice of the drinking water scheme, planning, design, implementation, control of finances, management arrangements including full ownership of drinking water assets. The community had to share partial capital cost either in cash or kind or both as well as 100% responsibility of operation and maintenance (O&M). An integrated service delivery mechanism was also promoted which includes taking up conservation measures through rainwater harvesting and ground water recharge systems for sustained drinking water supply.

Lessons learnt from “Swajaldhara” program are:

1. The empowerment of the PRIs is a viable and sustainable option for scaling up the decentralized service delivery model.
2. There is a need for consistent policy throughout the state, irrespective of the sources of financing.
3. The PRIs need to be well integrated into the institutional design of the project and organic links between user committees and GPs are essential for institutional sustainability.
4. The partial financing of capital cost by the users as well as user management and financing of O&M is a viable development concept.
5. The sustainability issue is best addressed by emphasis on beneficiary involvement and empowerment, and capacity building of state/ local governments and communities, along with promotion of cost recovery.

Box 2-1: Guidelines for environmental safety as per Swajaldhara Projects

- States would need to enact and implement law on effective ground water extraction control, regulation and recharge.
- State Government should integrate water conservation and rain water harvesting schemes with the drinking water supply schemes.
- Rural drinking water, sanitation, health, and hygiene programmes need to be integrated at the State, District, and Block and GP levels.
- DWSM and the SWSM should arrange for periodic monitoring and review of the functioning of completed water supply schemes by officers, experts, NGOs, Institutions etc. Suitable monitoring mechanism and systems may be put in place in this regard by the State Government.

2.5.4 Guidelines on National Rural Drinking Water Programme (NRDWP): 2011-2012

The Ministry of Drinking Water & Sanitation (MDWS) administers the National Rural Drinking Water programme (NRDWP), through which the Central Government provides financial and technical support to supplement the efforts of States to provide adequate potable drinking water to the rural population. Rural

drinking water supply is a State subject and has been included in the Eleventh Schedule of the Constitution among the subjects that may be entrusted to Panchayats by the States.

The NRDWP has the following objectives:

- To ensure provision of safe and adequate drinking water supply to all uncovered, partially covered and quality affected habitations in the rural areas of the country,
- To ensure that all schools and Anganwadis have access to safe drinking water,
- To enable GPs/ VWSCs to plan, manage, operate and maintain local water sources and water supply; to provide enabling support and environment for PRIs and local communities for this purpose;
- enable rural communities to monitor and keep surveillance on their drinking water sources, water supply and initiate corrective action to have contaminants free water;
- ensure equity - high priority in coverage/ investment habitations with high SCs/ STs and minority population;
- promote participatory integrated water resources management with a view to ensure drinking water security - water availability, supply and consumption to be measured;
- provide access to information through online reporting system with information in public domain to bring in transparency and informed decision making;
- Ensuring household level drinking water security through water budgeting and preparation of village water security plans.
- Consciously move away from high cost treatment technologies for tackling arsenic and fluoride contamination to development of alternative sources in respect of arsenic and alternate sources/dilution of aquifers through rainwater harvesting for tackling fluoride contamination.
- Encourage handing over of management of rural drinking water schemes (RWS) to the Panchayati Raj Institutions

The NRDWP guidelines mandate that the PRIs and the local community be involved at all stages from planning, implementation, operation and maintenance and monitoring of drinking water supply schemes. This is because drinking water security is best managed at the local level where attention is given to conservation of water, equity in distribution and usage addressed and immediate action taken for necessary repairs so that regular supply is assured.

In order to implement these processes, NRDWP proposes to establish the following structures:

i. A ***Water and Sanitation Support Organization (WSSO)*** in each state under the State Water and Sanitation Mission, to be staffed by consultants with expertise in IEC, HRD, Water Quality, Monitoring & Evaluation (M&E), Hydrogeology and Sanitation & Hygiene.
ii. The ***District Water and Sanitation Mission (DWSM)*** at district level with consultants having expertise in IEC, HRD, Monitoring and Evaluation, Hydrogeology Sanitation and Hygiene. This will strengthen the rural water supply department and also facilitate effective convergence with related departments and schemes.
iii. Establishment of ***Block Resource Centre (BRC)*** at the Block level, for community mobilization for formation/activation of Village Water and Sanitation Committees (VWSC) and enhanced IEC activities for awareness generation, technical support and capacity building for Gram Panchayats (GP)s to enable them to fulfill their role in sustainable water supply and sanitation; water quality monitoring and managerial aspects of operation and maintenance of the water supply systems. Each Block Resource Center to be staffed with one to four grass-root level workers (depending on the population in the block area).

The flexibility brought about under the NRDWP as compared to the earlier ARWSP, benefits ST concentrated habitations and IAP (Integrated Action Plan) areas. The following initiatives have been taken:

- The requirement of minimum population of 100 persons in a habitation to be considered for coverage with drinking water supply has been removed. Now habitations with less than 100 persons can and should also be covered under NRDWP. This will benefit tribal and small remote habitations in IAP districts. Collectors should cover all habitations, irrespective of the size of population, with drinking water supply schemes.
- The norm that one handpump be installed for every 250 persons at a distance of 1.6 kms has also been removed, giving flexibility to States to install hand pumps based on need and convenience.
- For better coverage of ST concentrated habitations, funds under NRDWP have been earmarked and released for Tribal Sub Plan in proportion to the ST population in each State. These are for utilization only in ST concentrated habitations. NRDWP funds have been released in 2011-12 on this basis. Collectors should obtain TSP funds under NRDWP for their districts in proportion to the population of STs in their districts.
- In the Annual Action Plan discussions 2011-12, it has been emphasized that States should give priority for coverage of ST concentrated habitations and IAP districts. The same is being ensured by the Ministry's representative in the State level Scheme Sanctioning Committee. Collectors can forward schemes benefiting IAP districts to SLSSC for approval on priority basis.
- The Integrated Action Plan for tribal and backward districts across nine states to ensure overall development of these areas- includes provision of Drinking water and Sanitation. Analysis of the data on type of works and projects taken up, in 60 districts under IAP shows that considerable funding has gone to the provision of drinking water and drainage.

2.5.5 Guidelines on Central Rural Sanitation Program (CRSP) & Total Sanitation Campaign (TSC): Jan. 2004

A direct relationship exists between water, sanitation and health. Consumption of unsafe drinking water, improper disposal of human excreta and lack of personal and food hygiene have been the major causes of many diseases in developing countries like India. High infant mortality rates are also attributable largely to poor sanitation. It was in this context the Central Rural Sanitation Programme (CRSP) was launched in 1986 with the objective of improving the quality of life of the rural people and to provide privacy and dignity to rural women. The concept of sanitation apart from disposal of human excreta includes liquid and solid waste disposal, food hygiene, and personal, domestic as well as environmental hygiene. The CRSP was restructured in 1999 to introduce the programme under the name of Total Sanitation Campaign (TSC). TSC is a comprehensive programme to ensure sanitation facilities in rural areas with a broader goal to eradicate the practice of open defecation. It follows a principle of "low to no subsidy" where a nominal subsidy in the form of incentive is given to rural poor households for construction of toilets.

TSC gives strong emphasis on Information, Education and Communication (IEC), Capacity Building and Hygiene Education for effective behavior change with involvement of PRIs, Support Organizations (SOs), and NGOs, etc. The key intervention areas are individual household latrines (IHHL), School Sanitation and Hygiene Education (SSHE), Community Sanitary Complex, Anganwadi toilets, Rural Sanitary Marts (RSMs) and Production Centres (PCs). The main goal of the GOI is to eradicate the practice of open defecation by 2010. To give fillip to this endeavour, GOI has launched Nirmal Gram Puraskar to recognize the efforts (to have 100% open defecation free status in the village) in terms of cash awards for fully covered PRIs and those individuals and institutions who have contributed significantly in ensuring full sanitation coverage in their area of operation. The project is being implemented in rural areas with district as the unit. Guidelines for environmental safety of TSC are furnished in box below:

Box 2-2: Guidelines for Environmental Safety TSC

A Sanitary latrine should not:
- Pollute or contaminate soil
- Pollute or contaminate ground water
- Pollute or contaminate surface water
- Act as medium to fly breeding or access to flies and animals
- Require handling excreta
- Produce odour and give ugly sight
- Require huge investment and high technology

2.5.6 NBA

TSC has been renamed as the "Nirmal Bharat Abhiyan' (NBA) with the objective of accelerating the sanitation coverage in rural areas so as to comprehensively cover the rural community through renewed strategies and saturation approach. Nirmal Bharat Abhiyan (NBA) envisages covering the entire community for saturated outcomes with a view to create Nirmal Gram Panchayat with the following priorities:

The main objectives of the NBA are as under:
- Bring about an improvement in the general quality of life in the rural areas.
- Accelerate sanitation coverage in rural areas to achieve the vision of Nirmal Bharat by 2022 with all gram Panchayats in the country attaining Nirmal status.
- Motivate communities and Panchayati Raj Institutions promoting sustainable sanitation facilities through awareness creation and health education.
- To cover the remaining schools not covered under Sarva Shiksha Abhiyan (SSA) and Anganwadi Centres in the rural areas with proper sanitation facilities and undertake proactive promotion of hygiene education and sanitary habits among students.
- Encourage cost effective and appropriate technologies for ecologically safe and sustainable sanitation.
- Develop community managed environmental sanitation systems focusing on solid & liquid waste management for overall cleanliness in the rural areas.

Implementation: -

Implementation of NBA is proposed with 'Gram Panchayat 'as the base unit. A project proposal that emanates from a district is scrutinized and consolidated by the State Government and transmitted to the Government of India (Ministry of Drinking Water and Sanitation) as a State Plan. NBA is to be implemented in phases with start-up activities. Funds are to be made available for preliminary IEC work. The physical implementation gets oriented towards satisfying the felt-needs, wherein individual households choose from a menu of options for their household latrines. The built-in flexibility in the menu of options gives the poor and the disadvantaged families opportunity for subsequent up gradation depending upon their requirements and financial position. In the "campaign approach", a synergistic interaction between the Government agencies and other stakeholders is essential. To bring about the desired behavioural changes for relevant sanitary practices, intensive IEC and advocacy, with participation of NGOs/Panchayati Raj Institutions/resource organizations is envisaged.

Components of NBA:-

- Start-Up Activities
- IEC Activities
- Capacity Building

- Construction of Individual Household Latrines
- Rural Sanitary Marts and Production Centres
- Provision of Revolving Fund in the District
- Community Sanitary Complex
- Institutional Toilets- School and Anganwadi toilets
- Solid and Liquid Waste Management
- Maintenance of facilities created under NBA

2.6 Some of the major externally funded projects taken by GoUP – Rural Water Supply and Sanitation

2.6.1 Dutch Assisted Sub-Project VI (II) & VIII on Rural Water Supply

Community Participation activities were taken up in water supply projects for the first time in 1986 Under Dutch assisted projects. While implementation of hardware was taken up by U. P. Jal Nigam, the community related works such as Site Selection for installation of New Hand Pumps (IM II), Review of Corrective Intervention in existing Hand Pumps, Formation & Trainings of Ward Committees and Collection of Beneficiaries Contribution towards capital cost etc. were taken care of by Project Support Unit (PSU), which was established by Dutch embassy for assisting U. P. Jal Nigam.

However, when the contract of PSU was terminated in 1997, U. P. Jal Nigam established Community Participation Unit to facilitate community participation activities in districts ***Siddharth Nagar*** under Dutch Sub Project-VI (B) and in district Aligarh, Badaun, ***Ballia***, Kanpur Dehat Moradabad and Unnao.

2.6.2 World Bank Assisted SWAJAL Project of Water Supply and Environmental Sanitation

Community Participation Unit as established by UP Jal Nigam worked as Support Organization (SO) for 26 villages in district Lalitpur. Under the Planning Phase of the project activities such as formation & Trainings of VWSC, Finalisation of Water Supply Options in consultation with the community, Collection of community contribution for water supply system, Households Sanitary Latrine, Soak pits, Compost Pit and Drainage etc have been taken up.

Preparation of Community Action Plan (CAP) and Detailed Project Report (DPR) was carried out for these villages. Under the Implementation Phase of the project activities of VWSC Training, Facilitation of VWSC for construction of various components according to DPR & CAP, and capacity building of community for operation and maintenance of W/S Sources etc were taken up.

2.6.3 UNICEF Assisted Promotion of Sanitation through Alternate Delivery System (ADS)

Mass awareness campaign on environmental sanitation was carried out in the eight blocks of District- ***Allahabad*** for motivating the rural community to construct low cost latrines for individual houses. Under the project 2068 Households had been motivated to install Low Cost Sanitary Latrines made of Ferro- Cement Squatting platforms, without any subsidy.

Four production Centres for producing Low Cost Sanitation facilities such as Ferro- Cement Squatting Platforms had been established under the project. These production centres provided Ferro-cement sanitary installations to beneficiaries on payment.

2.6.4 DFID-UNICEF assisted "Child Environment Project (CEP)"

Aim of the project was to create awareness for Safe Water, Environmental Sanitation and Personal Hygiene in the community and to build its capacity for developing and maintaining water and Sanitation facilities at village level through participatory process. Through the activities carried out under the Child's Environment Project, this cell had facilitated the community to prepare; Gram Panchayat Environment Plan (GPEP) in 150-Gram Panchayats. The GPEP contains following nine components:

- Improvement in Water Supply Systems
- Source development and Water Management
- Inter sectoral co-ordination
- Hygiene education
- Community based monitoring and evaluation
- Environment Sanitation
- Empowerment of women
- Institutional development and capacity building at grass root level
- School sanitation

2.7 State Water and Sanitation Sector Orders

2.7.1 Draft Water Policy for the State

Uttar Pradesh State Water Policy (1999)

The act deals with the planning and development of water resources of the state governed by the development perceptions of the state. Water for drinking and domestic use has the highest priority while allocating the water resource of the state. The state has to provide adequate drinking water facilities (both for people and livestock) to the entire population in both urban and rural areas by the year 2025. Sanitation facilities for entire population in urban areas and most of the rural areas should also be provided.

Having realized the need for formulation of state water policy, the state has identified the following broad objectives of the water policy for Uttar Pradesh:

a. Ensure preservation of the scarce water resources and to optimise the utilization of the available resources.
b. Bring about qualitative improvement in water resource management which should include user's participation and decentralization of authority.
c. Maintain water quality, both surface and underground, to established norms and standards.
d. Promote formulation of projects as far as and whenever possible on the concept of basin or sub-basin, treating both surface and the ground water as a unitary resource, ensuring multipurpose use of the water resource. This would inter alia consist of the following main uses:
   iv. Provide adequate water for drinking and domestic use.
   v. Providing water for irrigation.
   vi. Maximize hydro power generation with in the constraints imposed by other users.
   vii. Provide water for industries including Agro industries.
   viii. Provide water for navigation, recreation, health and for other uses.
e. Ensure ecological and environmental balance while developing water resources.
f. Promote equity and social justice among individuals and groups of users in water resource allocation and management.
g. Ensure self-sustainability in water resource development.

h. Ensure Flood Management and drainage as integral part of water resource development.
i. Provide a substantive legal framework for management.
j. Provide a Management Information System (M.I.S.) for effective monitoring of policy implementation.
k. Promote research and training facilities in the water resource sector.
l. Provide mechanism for the resolution of conflicts between various users.

2.7.2 Other Government Orders

2.7.2.1 Water Supply

- ***GO 1167/38-5-09-67 S. No. /07 TC, dated 17th July 2009.***
  Order addressed to the rural areas of the state, stating the implementation of the water supply schemes for the year 2009-10.
  The main points comprised within the Government Order were:
  - Minimum of 75 m C/C distance to be maintained between two hand pumps installed under the implementation year 2008-09. In order to enable the availability of drinking water to all class habitants within the area.
  - Priority shall be given to the un-covered habitations, for the provision of water supply and hand pumps installations. It was observed that still there are large number of un-covered habitations present within the rural areas of the state. Until the un-covered habitations are substantially covered under with water supply coverage, whole of that particular block shall not be nominated as fully covered block in terms of water supply.
  - Piped water supply schemes have to be considered and implemented for all the habitations comprising of more than 5000 population.
  - Implementation of soak pits has to be taken up for all the areas installed with Indian Mark-II hand pumps, in order to save the waste water tipping from the hand pumps. These works shall be covered under the 20% funding scheme allocation for recharging / sustainability.
  - Under water security, 20% of the funding amount shall be considered for the provision of the roof-top rain water harvesting for all the government buildings within the rural areas of the state.
  - All the parts and spare parts related with the implementation of the hand pumps shall be of ISI marks. The responsibility of assurance of the same shall be of UP Jal Nigam and UP State Agro-Industrial Co-operation Ltd.

2.7.2.2 Sanitation

Various GOs have been issued by the Panchayati Raj Department to the village levels / Gram Panchayats with regard to the funds allocation under the Nirmal Bharat Abhiyan.

2.8 Key Issues

2.8.1 Role of Forests as Water Conserver

Bifurcation of Uttaranchal State from UP in 2000 has reduced the number of ecological zones in UP to three (Terai, the Gangetic plains, Vindhyan rages) from the earlier six. There are three major forest types in UP viz. tropical moist deciduous, tropical dry deciduous and tropical thorn forests. These forests are spread over in the Northern, North-eastern and Southern parts of the state. While the Terai region has mostly moist tropical forests of Sal, Eastern UP has dry deciduous mixed forest, Eastern and Western UP generally have teak or mixed forest, and the Bundelkhand region is covered widely with thorny scrub forests.

In the forests, water seeps gently into the ground as vegetation breaks the fall. This groundwater in turn feeds wells, lakes, and rivers. Protecting forests means protecting water 'catchments'.

2.8.2 Role of Agriculture in RWSS Sector

The State is, comparatively well off in the matter of water availability though it may face water stress in future. About 72% of the cultivated area is irrigated. This is much higher than the national average of about 37%. Even so, the fact remains that more than one fourth of the cultivated area is rain fed and dependent of monsoon which many a time is erratic and untimely. Water use management needs improvement in terms of regulation of use, conservation, harvesting, distribution, pricing and user participation.

2.8.3 Integrated Sectoral Planning

Rural water supply and sanitation facilities are vital elements in the overall programme for rural development.

The inputs of professional institutions, non-government organisations (NGOs) and community-based organisations should be utilised in planning, development and management. Continuous monitoring of the sources is necessary, so that the habitations that are presently covered do not relapse into the category of uncovered. Inter-departmental coordination at the block level needs to be activated for this. Links of water supply schemes with watershed development programme should be made stronger for greater sustainability of drinking water sources.

Emphasis must be laid on the participation of stakeholders at all levels, from planning, design and location to implementation and management. Presently, water supply projects are designed and executed by the implementing departments and passed on to the end-users. Experience has shown that Gram Panchayats are unwilling to shoulder the responsibility for operating and maintaining these projects.

It is universally accepted that for drinking water projects to have any significant impact in improving public health (for example, reduction in diarrhoeal and other water-related disease), they need to be accompanied by sanitation and hygiene promotion initiatives. Although there are two separate schemes at an entry level, both programs/schemes are to be integrated and implemented at the village level.

2.8.4 Demand Driven, GP – Centric Approach

Adoption of state-of-the-art principles of decentralization and community-driven development in the program design has been proved to be beneficial for the rural water supply and sanitation schemes.

Water is perceived by the rural public as a social right, to be provided free by the Government, rather than as a scarce resource which must be managed locally as a socio-economic good in order to ensure its effective use. This perception has grown out of the fact that the present rural water supply systems are designed and executed by the Department/Boards and imposed on end-users. Demand preferences of the people are not taken into account while executing the schemes. In other words, rural water supply programme has adopted a supply driven approach. The present approach has led to the failure of a large number of water supply systems/schemes due to poor operation and maintenance.

There is a general recognition that a transformation from a target based, supply driven approach which pays little attention to the actual practices and/or preferences of the end users, to a ***demand-based approach*** where users get the service they want and are willing to pay for is urgently required.

Implementation of a participatory demand driven approach ensures that users obtain the level of service they desire and can afford to pay.

Further, full cost recovery of operations and maintenance (O&M) and replacement costs will ensure the financial viability and sustainability of the schemes. The conditions under which people would be willing to maintain and operate water supply schemes are: if they own the assets; if they have themselves installed the hand pump, or being actively; involved throughout; if they have been trained to do simple repairs; if they know the government will not maintain the asset; if they have sufficient funds for maintenance, and if they have to pay for O&M.

"Swajaldhara" programme was launched in 2002 to scale up the reforms of Water supply sector throughout the country. This programme has the key elements of ***demand–driven and community participation based approach***, wherein the Panchayats / communities would plan, implement, operate, maintain and manage all drinking water schemes. It incorporated basic reform principle:

- Community led and demand responsive schemes;
- Panchayats/communities to plan, implement, operate, maintain and manage all drinking water schemes
- Ten percent capital cost and Operations and Maintenance cost borne by users.
- Freedom to Gram Panchayat to levy tariff, and full ownership of water supply scheme assets with Gram Panchayats.

2.8.5 Water Quality

While accessing drinking water continues to be a problem, assuring that it is safe is a challenge by itself. Water quality problems are caused by pollution and over-exploitation. The rapid pace of agricultural growth combined with financial and technological constraints and non-enforcement of laws have led to generation of large quantities of waste and pollution. The problem is sometimes aggravated due to the non-uniform distribution of rainfall. Individual practises also play an important role in determining the quality of water.

Water quality is affected by both point and non-point sources of pollution include sewage discharge, run-off from agricultural fields, etc. Water quality is also affected by floods and droughts and can also arise from lack of awareness and education among users. The need for user involvement in maintaining water quality and looking at other aspects like hygiene, environment sanitation, storage and disposal are critical elements to maintain the quality of water resources. Following are the major parameters accountable for water quality problem.

- **Bacteriological Contamination**
- **Over-exploitation**
- **Other contaminants** include excess arsenic, iron, fluoride, nitrates and salinity. Increase in groundwater extraction through deep tube-wells for drinking and irrigation purposes, leading to salinity ingress. The occurrence of inland salinity is due to over-extraction of groundwater and less recharge of aquifers.

Thus, the problems that emerged from groundwater use were not limited to depleting sources, but also contaminants that did not need to be dealt with before. There are a variety of problems that relate to quality. 85% of drinking water needs are met by groundwater, which is depleting due over extraction, compounded with large scale contamination.

2.8.6 Base Maps

The Ministry started generating Hydro-Geomorphological (HGM) maps using the services of National Remote Sensing Centre, Hyderabad since 1999-2000 with the objectives of assisting State institutions (e.g. UPJN, SGWD, etc) in locating drilling sites for drinking water sources and sites for locating recharge and water conservation structures.

Preparation of HGM maps in 12 States (Andhra Pradesh (part), Assam, Karnataka, Kerala, Rajasthan, Chhattisgarh, Madhya Pradesh, Himachal Pradesh, Gujarat, Orissa, Uttarakhand and Jharkhand) have been completed and handed over to the respective States. Preparation of similar maps in 10 states (Andhra Pradesh (remaining part), Maharashtra, Punjab, Haryana, West Bengal (part), Uttar Pradesh (part), Arunachal Pradesh, Uttaranchal, Assam and Jammu & Kashmir) is in final stages of completion.

It is also proposed to complete preparation of HGM maps in all remaining States in a phased manner by 2012-13. The feedback received from States reveals that using HGM maps more than 90% success rate, on average has been achieved in drilling of bore wells and 9,057 recharge structures constructed to improve the sustainability of drinking water sources.

2.8.7 Proposals to Strengthen Water Policy

Despite of the detailed objectives been drafted for the formation of the State Water Policy, it is felt that the water policy shall include following agenda, so that it solves the existing problem with regard to the water supply and sanitation within the rural areas of the state. The policy shall also comprise of the following;

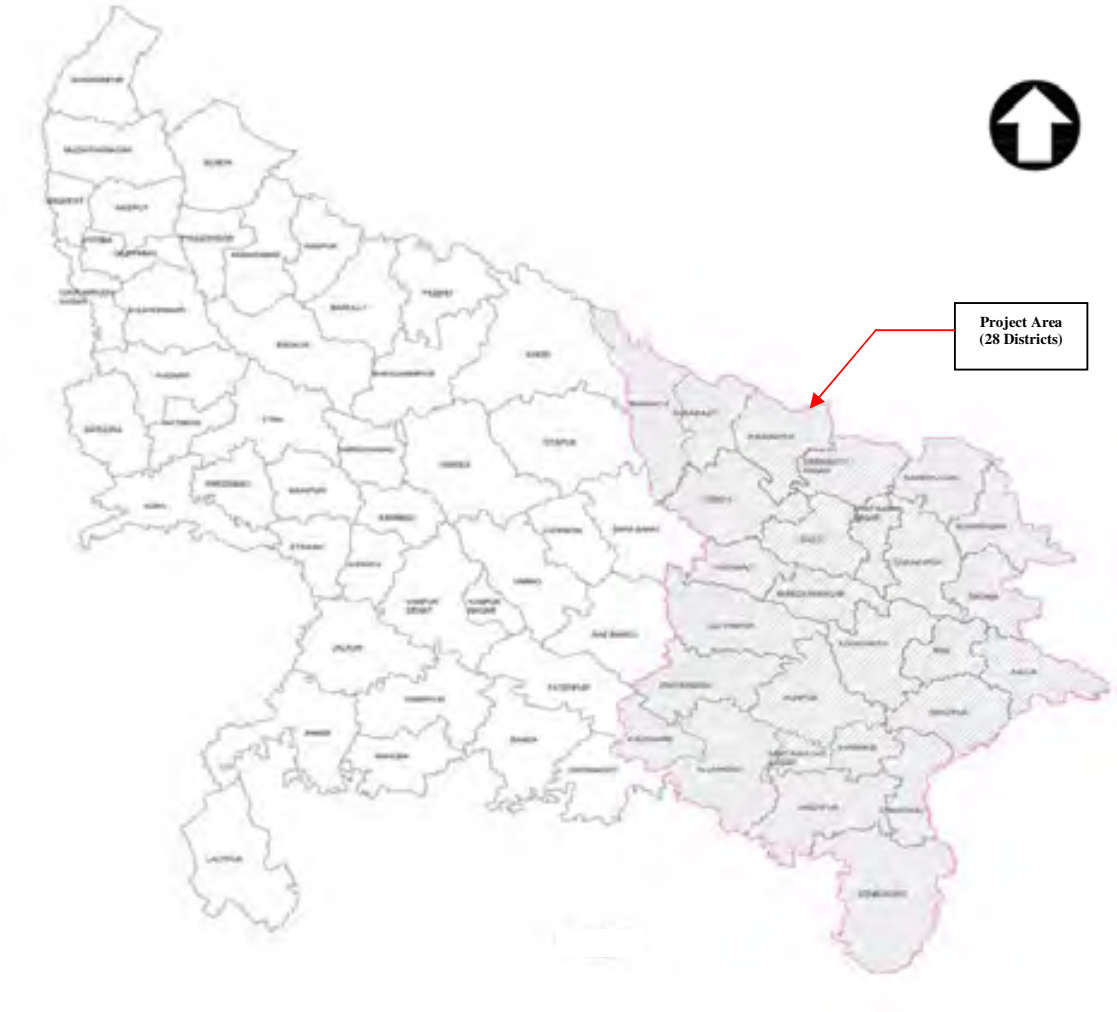
- Focus on integrated approach between the water supply and sanitation implementation process, i.e. during the implementation of the schemes particularly in rural areas, the different institutions should work in an integrated way so as to make the scheme more sustainable.
- Provide details with regard to the capacity building and institutional strengthening among the various institutions involved in the implementation of schemes.
- The water policy shall be formulated in a manner that it shall as well take care of the sanitation related issues linked with the water supply.

3. Baseline Environmental Status

This chapter provides an overview of the physical geography of the state, with special emphasis on water resources and sanitation amenities. This environmental baseline has been developed mainly on the basis of data collected through secondary sources, and has been supplemented by village level surveys and Focused Group Discussions in villages of the 4 representative districts.

In order to assess the significance of the impacts, baseline environmental conditions of the existing rural water supply and sanitation systems have been studied. The Baseline environmental conditions have been established based on the review of the secondary sources as well as the previous studies conducted by the Departments/Agencies concerned. The physical, land use pattern, agriculture status, water resources environment are presented in the following subsections for the study area. Whereas issues pertaining to the existing conditions on water supply, sanitation, health and hygiene are discussed in this section according to the secondary data collected and findings of the primary field visits.

Map 3.1: Base Map - Project Area (28 Districts)



Source: MM

3.1 Brief Profile of State

Uttar Pradesh is the most populous and fifth largest state in the Union of India. Uttar Pradesh covers a large part of the densely populated Gangetic plain. The state comprises the regions of Rohilkhand in the northwest, The Doab, or Brij (Braj) (Braj-bhoomi) in the southwest, Awadh (Oudh) (the historic country of Koshal) in the centre, the northern parts of Bagelkhand, Bundelkhand in the south, and the south-western part of the Bhojpur country, commonly called Purvanchal ("Eastern Province"), in the east. It shares an international border with Nepal and Tibet in northeast, by the Indian states of Himachal Pradesh in northwest, by Haryana, Rajasthan and Delhi in West and by the state of Madhya Pradesh in south and the state of Bihar in southeast. On virtually every index of social development, whether literacy, infant mortality or unemployment, Uttar Pradesh ranks among the lowest in India and the situation is compounded by the fact that figures for females is invariably much lower than for males on every parameter. In sheer magnitude, Uttar Pradesh is half the size of France, thrice that of Portugal and four times of Ireland.

Uttar Pradesh is the most important agricultural state of India, not only it has the highest cropped area of 25,785 thousand hectares, but it has the highest number of over 21 million farm holdings as well. In the country, Uttar Pradesh is the largest food grain producing state. It produces more than 41.1 million tonnes of food grains which is about 20% of total food grains of the country.

The other elements of the state demographic profile include its predominantly rural character, high level of poverty and low percentage of working population. About 80% of the population lives in rural areas and more than 30% of the population still lives below poverty line. The state economy is predominantly agrarian and more than 70% of the work force is engaged in agriculture and allied activities.

3.2 Physical Environment

3.2.1 Location

Garlanded by the Ganga and the Yamuna rivers; the two pious rivers of Indian mythology, Uttar Pradesh is surrounded by Bihar in the East, Madhya Pradesh in the South, Rajasthan, Delhi, Himachal Pradesh and Haryana in the west and Uttaranchal in the north and Nepal touch the northern borders of Uttar Pradesh, it assumes strategic importance for Indian defence. Its area of 2, 36,286 sq kms. Lies between latitude 24° to 31° north and longitude 77° to 84° east. Area wise it is the fifth largest State of India.

Table 3.1: Project Districts' Information

District Name	Latitude	Longitude	Population	Geographical Area (Sq. km.)
Allahabad	25.28 N	81.54 E	4936000	5482
Ambedkar Nagar	26.43 N	82.54 E	2026876	2520
Azamgarh	26.03 N	83.13 E	3939916	5740
Bahraich	27.34 N	81.38 E	2381072	4696.8
Ballia	25.44 N	84.11 E	2761620	3168
Balrampur	-	-	1682350	-
Basti	26.48 N	82.46 E	2750764	7309
Chandauli	24.82 N	82.54 E	1643251	2485
Chatrapati Shahuji Maharaj Nagar (Amethi)	A newly formed district comprising parts of Sultanpur and Rae Bareli districts.			
Deoria	26.23 N	83.42 E	2712650	2527

District Name	Latitude	Longitude	Population	Geographical Area (Sq. km.)
Faizabad	26.47 N	82.12 E	2088928	2643
Ghazipur	25.34 N	83.35 E	3037582	3377
Gonda	27.28 N	82.01 E	2765586	4448
Gorakhpur	26.46 N	83.22 E	3769456	3483.8
Jaunpur	25.46 N	82.44 E	3911679	4038
Kaushambi	-	-	1294937	1903.17
Kushinagar	26.45 N	83.24 E	3560830	2873.5
Maharajganj	25.85 N	83.70 E	2173878	2934.1
Mau	25.57 N	83.36 E	1853997	-
Mirzapur	25.10 N	82.37 E	2116042	11310
Pratapgarh	25.34 N	81.59 E	2731174	3717
Sant Kabir Nagar	-	-	1714300	1641
Sant Ravidas Nagar	25.22 N	82.27 E	1554203	1055.99
Shravasti	-	-	1114615	1948.20
Siddharth Nagar	-	-	2040085	2752
Sonbhadra	24.50 N	82.90 E	1862612	6788
Sultanpur	26.15 N	82.05 E	3790922	4436
Varanasi	25.20 N	83.00 E	3138670	1535

Source: http://upenvis.nic.in/Database/District_Information_928.aspx

3.2.2 Temperature & Precipitation

The climate in the state is both hot and cold, but variations exist because of difference in altitudes. The average temperature varies in the plains from 3 to 4℃ in January to 43 to 45℃ in May and June. The climate is cool or cold from November to early March although the days are pleasant and often warm. After the middle of March, it gets to be hot and in May, temperature could rise to 45℃ or even more. June is both hot and humid until the south-west monsoon breaks in all its fury. Thus, the temperature varies from 3℃ to 46℃. The humidity varies from 45%-50%. The wind speed varies from 3.7-9.6 km/hr.

The Himalayan region has about 1000 to 2000mm of rain fall. The rain fall in the plains is heaviest in the east and decreases towards the north-east. Floods are a recurring problem in the state, causing damage to crops, life and property. The eastern districts are the most vulnerable to floods, the western districts slightly less and the central region markedly less. The eastern districts susceptibility to floods is ascribed, among other things, to heavy rainfall, low flat country, high subsoil water level and the silting of beds which causes river levels to rise. There is water logging in the large areas. The major flood-prone rivers are the Ganges, Yamuna, Gomti, Ghaghara, Rapti, Sarda and Ramganga.

Tropical Monsoon Climate Marked By Three Distinct Seasons:

1. Summer (March–June): Hot & dry (temperatures rise to 45℃, sometimes 47-48℃); low relative humidity (20%); dust laden winds.
2. Monsoon (June–September): 85% of average annual rainfall of 990 mm. Fall in temperature 40-45℃ on rainy days.
3. Winter (October–February): Cold (temperatures drop to 3-4℃, sometimes below -1℃); clear skies; foggy conditions in some tracts.

4. Eastern part of Uttar Pradesh gets an average of ***1200-1400 mm.*** of annual rainfall around the year.

Figure 3.1: Average Annual Rainfall (in mm) - Uttar Pradesh

Source: Irrigation Department, UP

3.2.3 Climate Change

The impact of climate change and global warming is being felt in the state, as in other parts of the country. On the whole, there has been a greater frequency of droughts and floods, one of the hallmarks of climate change.

Hazard Vulnerability in UP

- Approx. 27 lakh hectares affected annually due to Floods.
- Annual estimated loss due to floods is Rs. 432 crores.
- The recurrence period of highly deficient rainfall in East U.P. has been calculated to be 6 to 8 years whereas in West U.P. it is 10 years.
- In the recent years, the year 2002, & 2004 were severe in terms of drought, with loss to crop, livestock and property assessed at Rs.7540 crores and Rs. 7292 crores respectively.

Floods are the most commonly occurring disaster in UP, affecting approximately 2.7 mha of the area and causing losses up to Rs. 432 crores per year. Out of the 240 mha of the total area of UP, approximately 7.3 mha is flood prone. As per the Irrigation Department's estimate, only 5.87 mha of this area can be

protected and the protection provided so far is merely for 1.6mha. The areas worst affected by floods are eastern UP as well as those situated in the Terai19 region bordering Nepal.

The State of U.P. has been divided into two meteorological sub-divisions, viz. U.P. East, and U.P. West. The recurrence period of highly deficient rainfall in East U.P. has been calculated to be 6 to 8 years whereas in West U.P. it is 10 years. The annual loss due to drought in the State varies depending on the severity of the drought. In the recent years, the year 2002, & 2004 were severe in terms of drought, with loss to crop, livestock and property assessed at Rs.7540 crores and Rs. 7292 crores respectively.

Crop damage is on an increasing trend. Cropping patterns are changing and pulses (once a major crop in the area and a major source of protein) are not grown due to longer periods of water logging, which disrupts the whole crop cycle and production, even in the *rabi* season, is severely affected.

There has been an increasing trend with victims of waterborne diseases like diarrhoea, cholera, dengue and Japanese encephalitis as the flood waters stagnate, the natural lines of drainage being disrupted due to embankments, roads and other encroachments. The last four to five years have seen an accentuation of adverse weather conditions with farmers being affected by prolonged drought, floods and hailstorms and decrease in annual rainfall.

The growing water scarcity poses further problems of survival to people and animals alike. In recent years, the level of the water table has gone down significantly and there are some issues been identified from the region of cattle dying due to water shortage.

3.3 Drainage Pattern

3.3.1 River Systems

Of the rivers and canals in the country, Uttar Pradesh occupies the first place with the total length of rivers and canals as 31.2 thousand km. that is about 17% of the total length of rivers and canals in the country. The state of UP falls in Ganga Basin with the sub basins of Yamuna, Ramganga, Gomati and Ghaghra Rivers. The state is estimated to have 161.70 BCM (131.0 m.a.f.) of surface water.

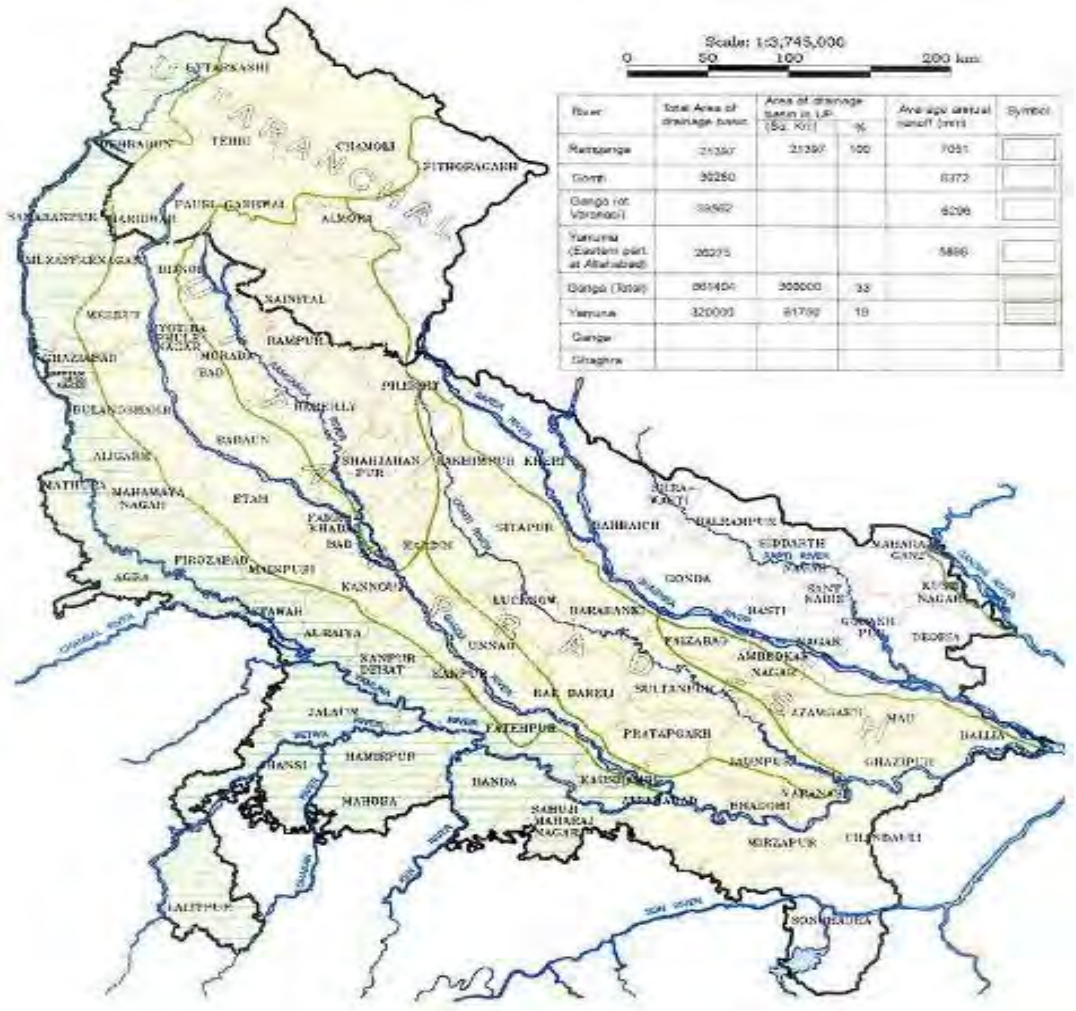
Table 3.2: Non-Irrigation Demands: Uttar Pradesh (BCM/Yr)

Use	2010	2025	2050
Domestic	7.45	11.29	21.03
Hydro and Thermal	0.47*	1.96*	4.90*
Industrial	1.75	4.82	7.80
Environmental	**Nil**	**Nil**	**Nil**
Total	9.67	18.07	33.73
Returns at 50% for domestic and industrial	4.45	8.05	14.41
Net in Consumptive Terms	5.22	10.02	19.32
Note: * Consumptive use.			

Source: Water resources Management And Developement - Planning Commission of UP

Among the States, the highest potential of ground water is in Uttar Pradesh with about 70.18 BCM exploitable ground water resources. The total replenishable groundwater is 76.35 BCM. The Annual Ground Water Draft is 48.78 BCM and stage of ground water development is about 70%.

Figure 3.2: Major Rivers of UP & Drainage Basins



River	Total Area of drainage basin	Area of drainage basin in UP (Sq. Km)	%	Average annual runoff (mm)	Symbol
Ramganga	31330	31330	100	7051	
Gomti	30250			6372	
Ganga (at Varanasi)	33932			6206	
Yamuna (Eastern part at Allahabad)	26275			5886	
Ganga (Total)	861404	300000	33		
Yamuna	320000	81792	19		
Ganga					
Ghaghra					

Source: Irrigation Department, UP

3.3.2 Catchment/Watersheds Delineations

As per demarcation of Watershed & Micro Watersheds done by the State Remote Sensing Agency, the total number of Watersheds in the State is 328 & number of Micro Watersheds are 21278 with area ranging from 1.02 ha. to 3477 ha. 4074 Micro Watersheds are overlapping in some adjoining districts.

The basins have been further divided into a number of sub basins. Sub basins consist of an independent tributary streams. Each sub basin is divided into a number of Watersheds. Watersheds are the smallest hydrological unit that can be delineated cartographically on base map. Watersheds are delineated from upstream to downstream. The entire UP state has been divided into two major basins – Upper Ganga and Lower Ganga. Upper Ganga Basin is further delineated into 7 Sub-Basins. These Sub-Basins are then further delineated into the Watersheds from upstream to downstream. Following is the map showing the

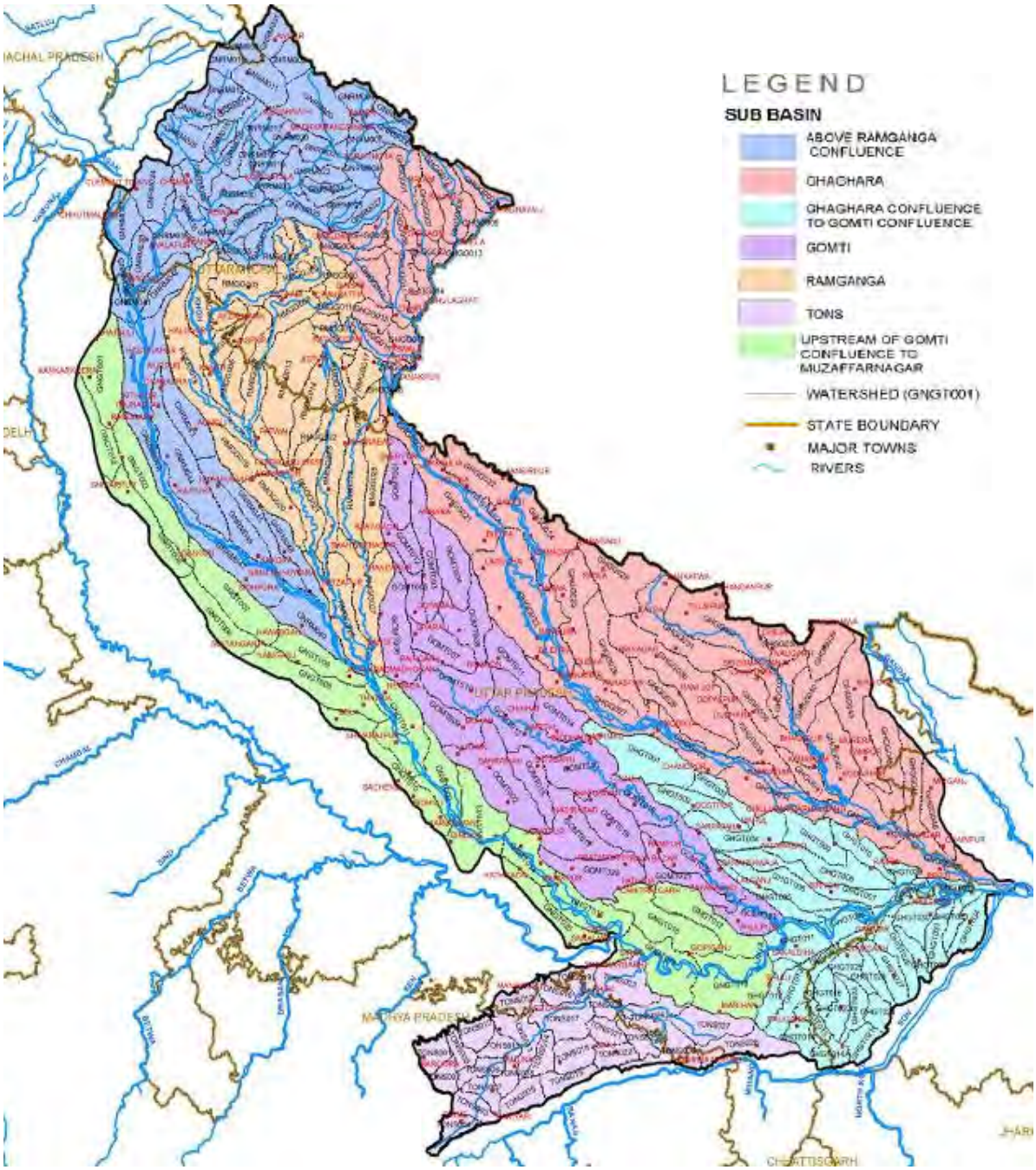
Watersheds within the ***Eastern part of UP state (covered majorly by Upper Ganga Basin and Lower Ganga Basin, covering parts of Sonbhadra district with Sone Sub-Basin)***.

Table 3.3: Nos. of Watersheds - UP State

Basins	Sub- Basin	Nos. of Watersheds (Entire Basin)	Nos. of Watersheds (UP State)
Upper Ganga	Above Ramganga Confluence	50	***10***
	Ghaghra	48	***26***
	Ghaghra Confluence to Gomti Confluence	35	***18***
	Gomti	23	***23***
	Ramganga	27	***15***
	Tons	28	***5***
	Upstream of Gomti Confluence to Muzaffarnagar	19	***19***
Lower Ganga	Sone	101	***8***

Source: Central Ground Water Authority

Map 3.2: Watersheds - Upper Ganga Basin (UP)



Source: Central Ground Water Authority, MM Analysis

3.4 Geomorphology

Uttar Pradesh can be divided into three distinct hypsographical regions:

- **The Himalayan region** in the North - Highly rugged and varied terrain; transferred to Uttrakhand. Varying topography; elevation ranges from 300 to 5000m; slope ranges from 150 to 600 m/km.
- **The Gangetic Plain** in the centre - Highly fertile alluvial soils; flat topography broken by numerous ponds, lakes and rivers; slope 2 m/km
- **The Vindhya Hills and plateau** in the south - Hard rock Strata; varied topography of hills, plains, valleys and plateau; limited water availability.

The Himalayan region comprises the districts of Uttarkashi, Chamoli, Pithorgarh, Tehri-Garhwal, Almora and Nainital tehsil of Nainital District and Chakrata and a part of Dehradun tehsil of Dehradun District. High mountains formed of sedimentary rocks broken by valleys and deep gorges, characterize the terrain. The prominent peaks in the hill region include Bandarpunch, Mount Kamet, Trishul, Dunagiri, Nanda Devi, Badrinath and Kedarnath. The hill areas are sparsely populated. There are few trees that can grow in this terrain, and soil is thus subject to heavy erosion. Irrigation facilities are deficient and only a small fraction of the total area is under artificial irrigation. The valley areas have fertile and rich soil.

The most important area for the economy of the state is the Gangetic plain which stretches across the entire length of the state from east to west. The entire alluvial plain can be divided into three sub-regions. The first in the eastern tract consisting of 14 districts which are subject to periodical floods and droughts have been classified as scarcity areas. The other two regions, the central and the western are comparatively better with a well-developed irrigation system.

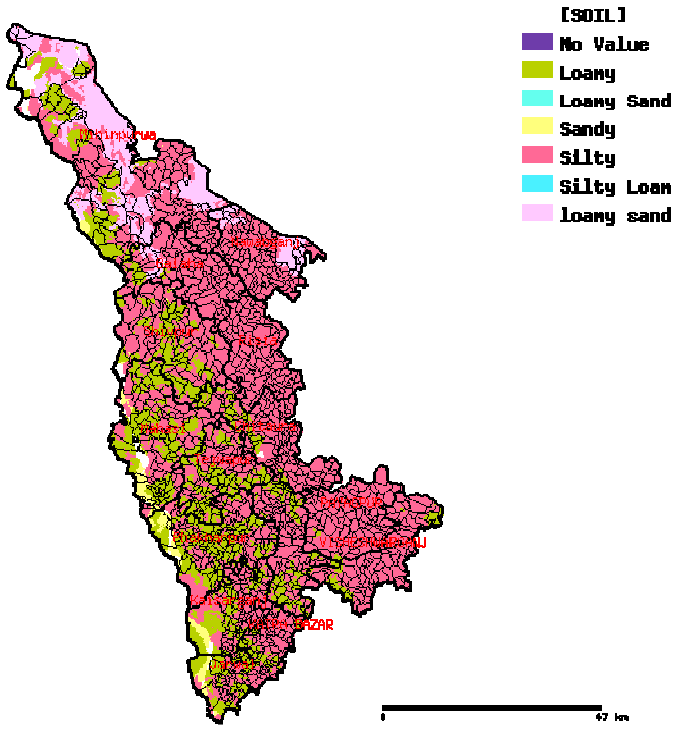
3.4.1 Types of Soils

In the eastern part of the state, the districts of Gorakhpur, Basti, Maharajganj, Siddarthnagar and Gonda contain two varieties of the soil, which are locally known as ‘Bhat’ and ‘banjar’. The alluvial soil is called ‘dhuh’. The one described as ‘mant’ is loamy sandy- calcareous, comparatively. The soil in the north western districts of the state contains less of phosphate. The district of Jaunpur, Azamgarh and Mau are found to be lacking in potash and the drier areas are known as ‘usar’ and ‘reh’. The soil of Aligarh, Mainpuri, Kanpur, Etah, Etawah, Sitapur, Unnao, Raibareilly and Lucknow is salt affected and known as ‘usar’ and ‘reh’ soils.

Mixed red and black soil is found in the districts of Mirzapur and Sonbhadra as well as the Karchhana and Meja tehsils of Allahabad besides Chakia and Varanasi district. Black soil is sticky, calcareous and fertile. It expands as it soaks moisture and contracts on drying up. In the upper plateau of these districts the soil is red and is of two kinds – ‘parwa’ and ‘rackar’ ‘parwa’ is light sandy or sandy-loam while ‘rackar’ is alkaline.

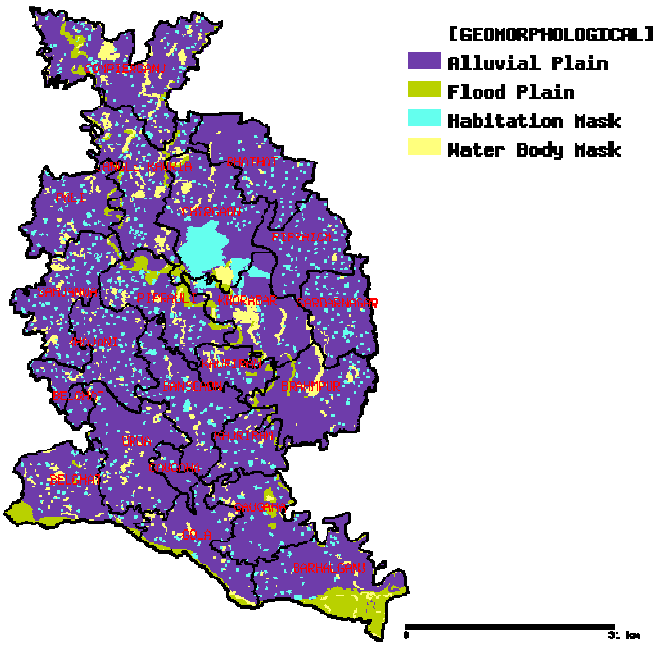
Following are the maps depicting the type of soil within the representative districts (Bahraich, Gorakhpur, Ballia and Sonbhadra)

Map 3.3: Soil Strata - Bahraich distirct



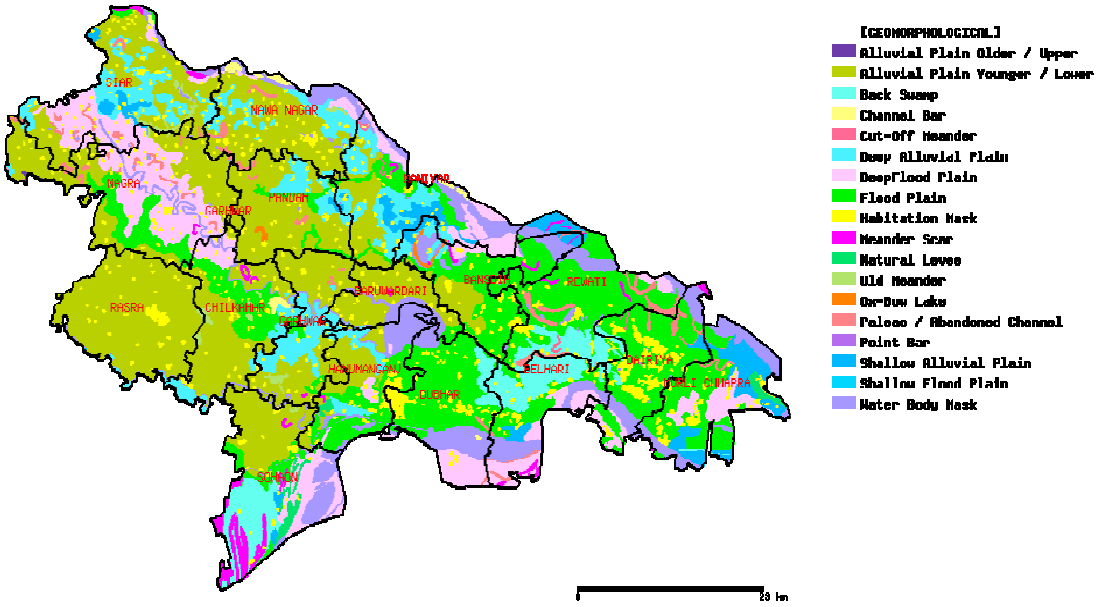
Source: http://gis.nic.in, MM Analysis

Map 3.4: Geomorphology - Gorakhpur



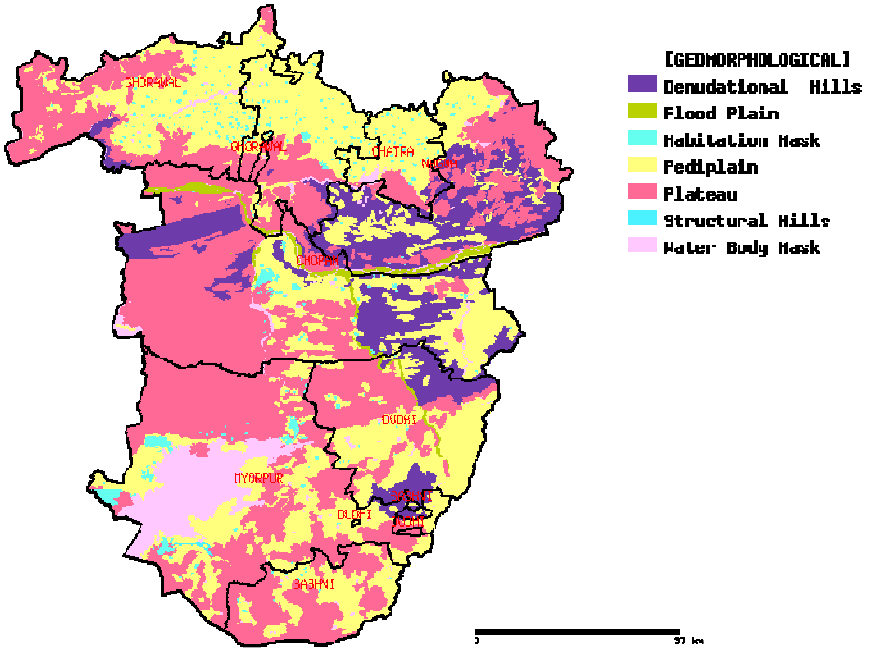
Source: http://gis.nic.in, MM Analysis

Map 3.5: Geomorphology - Ballia



Source: http://gis.nic.in, MM Analysis

Map 3.6: Geomorphology - Sonbhadra



Source: http://gis.nic.in, MM Analysis

3.5 Hydrology

3.5.1 Surface Water

Major source of Surface Water in the State are rivers flowing from southeast to southwest direction. Major rivers include Ganga, Yamuna, Ghaghra, Gomti, Gandak, Sone and Sarda. In addition it has number of smaller rivers. Upper reaches of many of these rivers have large hydro-electric dams constructed across them. Main streams in plains provide water for canal irrigation. During the monsoons, these rivers cause flooding of large areas particularly in Easter UP resulting considerable loss of crops, life and property.

3.5.2 Ground Water

Hydro geologically, the State can be divided into five units namely (1) Bhabar (2) Tarai (3) Central Ganga plains (4) Marginal alluvial plains and (5) Southern Peninsular zone. The first one is in the extreme north followed successively by the rest southwardly. The yield of tube wells tapping Bhabar and Tarai zones ranges between 100-300m^3/hr and 100-200 m^3/hr, respectively.

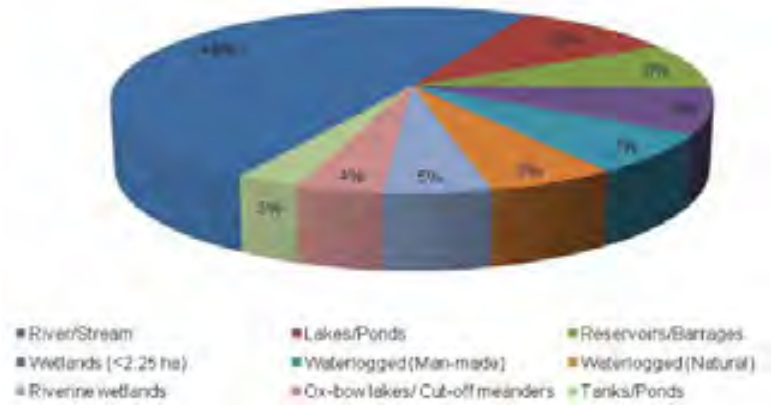
The water level is deep in Bhabar where as in Tarai auto flow conditions are noticed with piezometric head of 6-9mbgl. The Central Ganga plain is characterized by low relief and numerous alluvial features. There are four major aquifers in the depth range of 700mbgl. The yield of these tube wells ranges from 90 to 200m^3/hr. The thickness of sediments in Marginal alluvium is 50-300m and yield of tube wells is between 35 to 70m^3/hr. The yield prospects of Vindhyan & crystalline rocks in the southern peninsular region are limited.

3.5.3 Wetlands

Wetlands occupy a special place by being one of the most productive and biologically rich ecosystems and yet being one of the most endangered. The livelihood of million of people in India also depend on these ecosystems. A study done by the Wild Life Institute of India has revealed that some 70-80% of individual fresh water marshes and lakes in the Indo-Gangetic plain have been lost in the past 50 years.

The natural wetlands dominated the area with around 74% 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.

Figure 3.3: Wetlands of Uttar Pradesh



Source: Wetland Atlas of Uttar Pradesh

Table 3.4: Wetlands - Eastern UP

District	Total Reported Area (Ha)	Total nos. of Wetlands	Wetland Area Pre-Monsoon		Wetland Area Post Monsoon	
			(Ha)	*% of Total Area*	*(Ha)*	*% of Total Area*
Allahabad	727463	64	8816	1.21	9066	1.25
Azamgarh	421985	48	4234	1.00	4657	1.10
Ballia	299265	35	5608	1.87	5739	1.92
Faizabad	442694	27	2490	0.56	2490	0.56
Ghazipur	333209	26	6509	1.95	6705	2.01
Jaunpur	399713	26	2695	0.67	2695	0.67
Mau	171 776	31	3874	2.26	5463	3.18
Pratapgarh	362 423	47	8570	2.36	9073	2.50
Sultanpur	439 180	64	4994	1.14	4994	1.14
Varanasi	508 130	35	8816	1.21	9066	1.25

Source: Irrigation Department, UP

3.6 Disasters

Recurring natural disasters in the State over the years have been causing severe damage and adversely affecting human, plant and animal life, property and environment. Natural disasters that are of significance in Uttar Pradesh are Floods, Droughts, Fires and Earthquakes. Loss of life and property from these disasters, especially the former three, are in terms of hundreds of crores of rupees annually.

The project area is sensitive to all types of hazards viz: earthquakes, drought, fire and flood disaster. In the area, the drought situation has also been perceived. Flood, Drought due to dry spells and fire are the main existing disasters in the area. Erratic rainfall and lack of irrigation facilities generally creates havoc for rain dependent agriculture and small / marginal farmers are the main sufferer of the flood. But these areas have never been declared as drought prone by the government. Some blocks of Maharajganj and Gorakhpur districts were declared drought affected in year 2006.

Flood and Drought out of all disasters is prominent within the Eastern UP region Flood is counted as the major disaster in the area due to its frequency and devastative nature. The post flood effects on different sectors can be found visible for months even after the floods have gone away.

3.6.1 Earthquake

UP is broadly divided in to three Earth quake Risk Zones- High Damage Risk Zone-IV, Moderate Damage Risk Zone III and Low Damage Risk Zone II.

The following districts of Eastern UP are in the Earthquake High Damage Risk Zone-IV: Bahraich, Shravasti, Balrampur, Siddarthnagar, Maharajganj, Kushinagar, Basti, Sant Kabir Nagar, Deoria and Ballia.

The following districts of Eastern UP are in the Earthquake Moderate Damage Risk Zone III: Sonbhadra, Chandauli, Ghazipur, Varanasi, Jaunpur, Azamgarh, and Gorakhpur, Sultanpur, Faizabad and parts of Mirzapur, Pratapgarh, Bahraich, Gonda, Basti, Sant Kabir Nagar, Deoria and Ballia.

The following districts of Eastern UP are in the Earthquake Low Damage Risk Zone II: Kaushambi, Allahabad, Pratapgarh, and Mirzapur.

As per BIS 1893,-Part-I-2002, the demarcation of zones depending on the vulnerability to earthquakes, the eastern UP, the project area falls under Zone-II, III & IV. ***There are no major earthquake incidents observed within the project area districts.***

3.6.2 Floods

The State faces flood situation mostly in the northern and eastern parts in the catchments of River Ghaghra and Ganga. Around 73.06 lakh ha. is flood-prone and the districts affected are 31 with 154 blocks and 18958 villages. In certain areas every year flood situation arises whereas in some areas it is once in two to three years.

23% of the flood prone area of India is concentrated in Uttar Pradesh. Out of total losses due to flood in Uttar Pradesh, 60% concentrated in Eastern Uttar Pradesh. Due to such losses every year, the development of the eastern part is deflated.

Gorakhpur is affected by Rapti River and Kuano, Kushinagar is affected by Rapti and Ghaghra, Siddarthnagar is affected by Budhi Ganga river and Rapti river, Maharajganj and Sant Kabir Nagar are affected by Rohini and Kuano rivers that are originated from the Nepal hills. Entire region is trapped by embankments and drainage structures.

The flood situation in Eastern UP can be divided into three categories based on the intensity of flooding: the most affected areas, the medium affected areas and the least affected areas. **The most** (highly) flood-affected (about 40% of Eastern UP) districts are Bahraich, Gonda, Basti, **Siddarthnagar**, Ballia, Kushinagar and Ghazipur. These districts are closest to the Himalayas. **The medium** affected (about 33% of Eastern UP) are Varanasi, Jaunpur, Azamgarh, Deoria, **Maharajganj and Gorakhpur. The least** flood affected districts are Pratapgarh, Sultanpur, Allahabad, Mirzapur, and Sonbhadra.

Figure 3.4: Flood Affected districts in Eastern UP - 2007

Source: A report on The Natural Disasters in the Eastern UP, India - 2009

3.6.3 Drought

Drought is another major disaster affecting the State of Uttar Pradesh. The State produces about 21 percent of all food grains of the country, and hence is agriculturally an important State. The total sown area is 25.30 million ha out of which, 17.69 million ha. is irrigated area. (66% is irrigated). Of the irrigated area, canals contribute about 25%, tube wells about 67% and ponds, lakes etc. the remaining. Thus one third of the irrigated area and the entire extent of rain fed area in the State are dependent on monsoon rains. The recharge of groundwater through rains accounts about 80 % of total recharge. The monsoon rain accounts 70-80% of the total rainfall in a year.

The State of U.P. has been divided into two meteorological sub-divisions, viz. ***U.P. East***, and U.P. West. The recurrence period of ***highly deficient rainfall in East U.P. has been calculated to be 6 to 8 years*** whereas in West U.P. it is 10 years. The annual loss due to drought in the State varies depending on the severity of the drought. In the recent years, the year 2002, & 2004 were severe in terms of drought, with loss to crop, livestock and property assessed at Rs.7540 crores and Rs. 7292 crores respectively. In the year 2002, except for only 2-3 districts in Eastern U.P. and in the parts of foothill zone south of Nepal, nil or scantly rainfall was received in June and July, leading to the declaration of 15 districts as "Drought affected" by the State government in July 2002.

The Southern part of the State i.e. areas of Bundelkhand and Vindhyan region comprising of eight districts are facing drought situation almost for 3 years in a period of five years. Incidentally, these districts are

having less than fifty percent areas under irrigation. There is good potential for improving the production and productivity through watershed development activities which will improve the economic status of the people and also help in mitigating the ill effects of drought.

3.7 Mineral Resources

The State of Uttar Pradesh is characterised by rock formations ranging in age from the Archean (the Bundelkhand Graniticgneisses) to the Recent (the Ganga alluvium).

The Ganga plain which dominates the landscape and nearly covers three fourth of the geographical area of the State, lies between the rocky Himalayan belt in the north and the southern hilly tract comprised of mainly Pre-Cambrian rocks. Flexing of the Indian lithosphere in response to the compressive forces due to collision, and thrust fold loading produced the Ganga Plain foreland basin. It is filled with recent alluvial sediments which is at places more than 1,000 m. thick and an amalgam of sand, silt, and clay in varying proportions.

The southern hilly tract is roughly parallel to the Ganga-Yamuna lineament. The tract is underlain by granitic complex in Bundelkhand region and in Sonbhadra. It is overlain by rocks Mahakoshal (Bijawar) and Vindhyan Super group. The younger rock comprise of coal bearing Gondwana in south Sonbhadra and basaltic rocks in southern part of Lalitpur.

The granitic complex is considered to be potential for the search of metallic minerals like copper, lead, zinc, molybdenum, gold, nickel, Uranium and Platinum group of elements. The lower Vindhyan sediments of Sonbhadra contain deposits of cement grade limestone, flux grade dolomites, building stone and are also potential for the search of placer gold and other metals. The Upper Vindhyan sandstones are suitable for making decorative slab/tiles or ballast. Deposits of silica sands and bauxite are available in Allahabad and Chitrakoot districts while coal deposits occur in the Gondwana rocks in south-western corner of Sonbhadra.

In total of 13 districts majorly comprise the whole mineral resource of Uttar Pradesh state, namely: ***Sonbhadra, Mirzapur, Allahabad, Kaushambi***, Chitrakoot, Banda, Mahoba, Hamirpur, Jhansi, Lalitpur, Jalaun, Bijnor & Saharanpur.

Table 3.5: Mineral Resources of Uttar Pradesh

S. No.	Mineral	Locality	District	Reserves (In lakh tonnes As on mar. 31st -06)	Approx. Amount (In Crore Rupees)	Uses
1	Bauxite	Rajauan	Chitrakoot	94.22	207.04	Aluminium, Refractory Industry
2	China Clay	Naudiha, Ramgarh, Garda	**Sonbhadra**	165.0	6505.00	Ceramics, Refractory Industry
3	Coal	Kakri, Bina, Dhughichua, Kharia	**Sonbhadra**	7220.00 (source-IBM)	65702.00	Thermal Power, Cement, Ceramics Industries etc.
4	Diaspore	Garhmau, Mailar, Gaurari, Tori	Jhansi, Mahoba, Lalitpur	0.50	3.87	Refractory
5	Pyrophyllite	Garhmau, Mailar, Gaurari, Tori	Jhansi, Mahoba, Lalitpur	12.17	17.90	Refractory, Ceramics, Talc, Insecticide etc.
6	Feldspar	Khajraha-Buzurg	Jhansi	1.00	4.60	Ceramics Industry

S. No.	Mineral	Locality	District	Reserves (In lakh tonnes As on mar. 31st -06)	Approx. Amount (In Crore Rupees)	Uses
7	Silica Sand	Shankargarh, Bargarh, Lalapur	**Allahabad,** Chitrakoot	150.00	2223.00	Glass & Foundry Industry
8	Granite	Kalapahar, Khailar, Kewal, Bijoli	Jhansi, Mahoba, Lalitpur, Banda, **Sonbhadra**	484919000 M3 (source-IBM)	61852.00	Polished slab & tiles
9	Dolomite	Bari	**Sonbhadra**	200.00	340.00	Iron & Steel Industry
10	Limestone	Bhalua, Kajrahat, Billi, Ghurma	**Sonbhadra**	4000.00	6840.00	Cement & Steel Industry
11	Rock Phosphate	Pisnari & Tori	Lalitpur	60.00	369.00	Fertilizer & Elemental Phosphorus Industry
12	Sillimanite	Chhipiya	**Sonbhadra**	32.00	1659.200	Refractory Industry

Source: Directorate of Geology & Mining, UP

A New programme of environmental assessment of the mining areas is proposed by creating an environmental cell in the Mines & Geology Department. This cell will monitor the impact of mining activities on the environment at the same time it will also monitor the approval and execution of the mining plan of the mining lease areas. The expertise and facilities available in directorate for the study of environmental impact, analysis of existing mining areas, their reclamation, approval and monitoring the implementation of the comprehensive working mining plans for which related equipments will be procured.

3.8 Demographic

3.8.1 Rural Population

U.P. is the largest State in the country in terms of people living in it. As per details from Census 2011, Uttar Pradesh has population of 19.95 Crores, an increase from figure of 16.62 Crores in 2001 census. Total population of Uttar Pradesh as per 2011 census is 199,581,477 of which male and female are 104,596,415 and 94,985,062 respectively. In 2001, total population was 166,197,921 in which males were 87,565,369 while females were 78,632,552. Of the total population of Uttar Pradesh state, around 77.72% live in the villages of rural areas. In actual numbers, males and females were 81,044,655 and 74,066,367 respectively. Total population of rural areas of Uttar Pradesh state was 155,111,022.

In rural regions of Uttar Pradesh state, female sex ratio per 1000 males was 914 while same for the child (0-6 age) was 904 girls per 1000 boys. In Uttar Pradesh, 24,248,066 children (0-6) live in rural areas. Child population forms 15.63% of total rural population. In rural areas of Uttar Pradesh, literacy rate for males and female stood at 78.48% and 55.61%. Average literacy rate in Uttar Pradesh for rural areas was 67.55%. Total literates in rural areas were 88,396,557.

Table 3.6: Rural Population in 28 districts of Eastern Uttar Pradesh (Census 2011)

S. No	District	No of Households	Persons	Males	Females
1	Allahabad	555,107	3,729,320	1,962,425	1,766,895
2	Ambedkar Nagar	270,448	1,845,783	930,846	914,937
3	Azamgarh	505,688	3,642,615	1,796,544	1,846,071
4	Bahraich	351,866	2,143,074	1,149,080	993,994
5	Ballia	344,904	2,491,676	1,272,108	1,219,568

S. No	District	No of Households	Persons	Males	Females
6	Balrampur	237,271	1,546,770	816,561	730,209
7	Basti	298,289	1,968,829	1,014,325	954,504
8	Chandauli	209,875	1,469,693	763,127	706,566
9	Chatrapati Shahuji Maharaj Nagar (Amethi)	A newly formed district.			
10	Deoria	343,559	2,444,345	1,215,257	1,229,088
11	Faizabad	299,457	1,807,655	925,443	882,212
12	Ghazipur	394,496	2,804,212	1,414,994	1,389,218
13	Gonda	401,045	2,571,267	1,346,004	1,225,263
14	Gorakhpur	445,517	3,030,865	1,532,750	1,498,115
15	Jaunpur	510,266	3,622,268	1,790,619	1,831,649
16	Kaushambi	203,518	1,201,369	634,037	567,332
17	Kushinagar	409,023	2,760,673	1,403,987	1,356,686
18	Maharajganj	318,078	2,063,278	1,066,457	996,821
19	Mau	205,909	1,493,628	747,576	746,052
20	Mirzapur	264,992	1,829,536	962,560	866,976
21	Pratapgarh	417,212	2,586,619	1,287,741	1,298,878
22	Sant Kabir Nagar	195,743	1,319,675	666,747	652,928
23	Sant Ravidas Nagar	142,097	1,180,220	613,756	566,464
24	Shravasti	185,228	1,143,035	614,396	528,639
25	Siddharth Nagar	297,008	1,962,284	1,006,401	955,883
26	Sonbhadra	197,642	1,188,089	620,068	568,021
27	Sultanpur	484,155	3,062,574	1,543,351	1,519,223
28	Varanasi	256,278	1,878,100	976,055	902,045
	Total	***8,744,671***	***58,787,452***	***30,073,215***	***28,714,237***

Source: Census of India

3.8.2 Floating Population

With regards to the presence of numerous historical and religious tourist places present within the state, the floating population varies according to the district. The major contributor for the floating population within the project area districts are Allahabad, Shravasti and Varanasi. ***"Kumbh Mela" which is held at every three years at Allahabad (Prayag).*** As it is evident that there were in all about ***60-70 million*** pilgrims during the 2010 year Kumbh Mela, while it was expected that during the year 2013 which is again the ***"Maha Kumbh Mela"*** the expectancy for the floating population of the pilgrims was around ***100 million.***

3.9 Livestock

Livestock is the second major livelihood activity in rural UP and also in Northern Indian states. As part of earlier watersheds program carried out in state, a special focus is given to promote livestock activity. Land, forests and biological resources are under pressure from increasing livestock. The estimated livestock population of UP was around 65.2 million in 2001. The highest density of livestock population is in the Western region and the lowest in is Bundelkhand region. ***The Eastern region is the most pressurised region.***

Table 3.7: Livestock Population in eastern UP (as per 18th Livestock Census 2007)

S. No.	District Name	Cattle				Buffalo	Sheep	Goat	Pig	Total Other Livestock	Poultry (Without farm poultry)	Total Livestock without dog	Breedable Cattle			Total	Breedable Buffalo	Total Breedable Cattle & Buffalo
		Exotic	CB	Indigenous	Total Cattle								Exotic	Cross bred	Indigenous			
		15	7199	301874	309088	438788	114163	348905	79180	5097	120269	1295221	8	3190	94536	97734	203521	301255
		175	27055	299948	327178	360711	34314	239157	106898	4070	180761	1072328	83	11531	94883	106497	154654	261151
3	Kaushambi	15	11485	134923	146423	207336	28911	125742	38536	5298	78279	552246	11	3855	42076	45942	91193	137135
4	Allahabad	269	91793	643476	735538	569171	103215	268118	103397	3798	259245	1783237	102	35838	184487	220427	255143	475570
	Allahabad Mandal	474	137532	1380221	1518227	1576006	280603	981922	328011	18263	638554	4703032	204	54414	415982	470600	704511	1175111
5	Barabanki	25	13566	390753	404344	357065	4532	287791	39963	4110	197443	1097805	12	6207	152530	158749	153446	312195
6	Faizabad	18	15169	344026	359213	243833	15160	177953	28117	650	146433	824926	2	7361	126109	133472	101481	234953
7	Ambedkar Nagar	29	20164	169324	189517	268862	13705	138463	11712	391	148235	622650	16	8560	57845	66421	127793	194214
8	Sultanpur	46	56871	562694	619611	398359	43422	313727	47692	1829	249962	1424640	18	26012	174554	200584	180491	381075
	Faizabad Mandal	118	105770	1466797	1572685	1268119	76819	917934	127484	6980	742073	3970021	48	48140	511038	559226	563211	1122437
9	Bahraich	5	4496	497174	501675	340908	13683	560392	43661	2081	199417	1462400	4	2190	151545	153739	167344	321083
10	Shrawasti	0	2342	162695	165037	113305	4545	128735	6130	1914	74395	419666	0	690	49378	50068	53249	103317
11	Balrampur	15	1296	260908	262219	144225	5512	171049	11772	739	221603	595516	7	542	89403	89952	67413	157365
12	Gonda	67	38331	408322	446720	377580	9711	262737	8033	701	165921	1105482	34	13370	137343	150747	191695	342442
	Davipatan Mandal	87	46465	1329099	1375651	976018	33451	1122913	69596	5435	661336	3583064	45	16792	427669	444506	479701	924207
13	Siddarthnagar	10	4458	303886	308354	226233	3439	250186	12713	254	293502	801179	2	2145	105779	107926	129607	237533
14	Basti	64	32855	135896	168815	263275	5613	116213	8870	50	76395	562836	37	13807	41688	55532	145099	200631
15	Sant Kabir Nagar	59	10357	128176	138592	127951	2666	111001	2803	179	80765	383192	24	4998	44088	49110	62450	111560
	Basti Mandal	133	47670	567958	615761	617459	11718	477400	24386	483	450662	1747207	63	20950	191555	212568	337156	549724
16	Maharajganj	76	14797	146269	161142	204741	2495	278934	25990	1053	256750	674355	31	6572	50080	56683	99836	156519
17	Gorakhpur	214	99718	198508	298440	258025	15469	179466	21344	1137	280604	773881	111	40522	74191	114824	118832	233656

18	Kushinagar	237	29766	116952	146955	261083	5949	322404	12719	366	194376	749476	128	13196	36576	49900	134770	184670
19	Deoria	194	27958	138902	167054	207741	3907	254996	16102	1177	188161	650977	98	13548	42065	55711	106768	162479
Gorakhpur Mandal		721	172239	600631	773591	931590	27820	1035800	76155	3733	919891	2848689	368	73838	202912	277118	460206	737324
20	Azamgarh	340	86364	451013	537717	440261	23269	359359	32689	1716	508016	1395011	107	34000	145793	179900	205225	385125
21	Mau	223	19066	195110	214399	191475	4986	192501	23654	7500	324254	634515	80	8677	60962	69719	89280	158999
22	Ballia	220	43959	195757	239936	209859	17435	168339	19410	5453	227756	660432	126	23320	62553	85999	103837	189836
Azamgarh Mandal		783	149389	841880	992052	841595	45690	720199	75753	14669	1060026	2689958	313	65997	269308	335618	398342	733960
23	Jaunpur	441	51580	612719	664740	449957	35557	255090	30825	1076	290002	1437245	237	22112	207863	230212	211561	441773
24	Ghazipur	39	31035	340498	371572	374706	42645	278716	12043	4796	473713	1084478	26	14862	116576	131464	184577	316041
25	Chandauli	36	19443	166593	186072	189652	24368	90700	6394	1646	166061	498832	15	8404	57191	65610	92119	157729
26	Varanasi	370	44417	141953	186740	145606	11544	105517	3298	664	321408	453369	180	19911	45583	65674	69176	134850
Varanasi Mandal		886	146475	1261763	1409124	1159921	114114	730023	52560	8182	1251184	3473924	458	65289	427213	492960	557433	1050393
27	S. R. Nagar	3	19260	81061	100324	108962	28396	34072	4974	292	93819	277020	2	8491	25207	33700	51794	85494
28	Mirzapur	40	53453	421989	475482	176478	87501	145501	13951	1055	339784	899968	17	23228	152425	175670	91310	266980
29	Sonbhadra	8	4826	604632	609466	201380	47943	296930	24321	266	455174	1180306	6	2063	182992	185061	94283	279344
Mirzapur Mandal		51	77539	1107682	1185272	486820	163840	476503	43246	1613	888777	2357294	25	33782	360624	394431	237387	631818
TOTAL		***3253***	***883079***	***8556031***	***9442363***	***7857528***	***754055***	***6462694***	***797191***	***59358***	***6612503***	***25373189***	***1524***	***379202***	***2806301***	***3187027***	***3737947***	***6924974***

Source: Animal Husbandary, Government of UP - MM Analysis

3.10 Land use Status

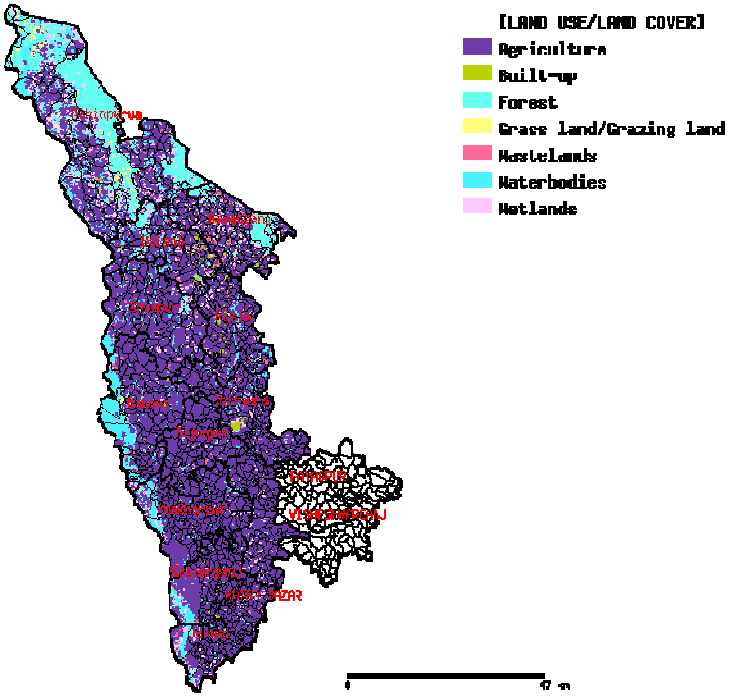
Land is a basic natural resource on which development of human with other living beings along with water and plants are going on from the beginning of the creation. Inadequate management of natural resource affects bio diversity, agriculture productivity and ecological balance.

3.10.1 Land use pattern

The state has a total reported geographical area of about 24170 thousand hectares out of which 16573 thousand hectares are under cultivation. More than half (8635 thousand hectares) of the cultivated area is sown more than once. Gross cropped area is 25414 hectares in the state. The state shares in total geographical area, net sown area and gross cropped area of the country are 7, 12 and 14 percent, respectively. Per capita land area of the state is 0.14 hectare as compared to 0.33 hectare for the country as a whole. District wise details are given in the Table 3.8.

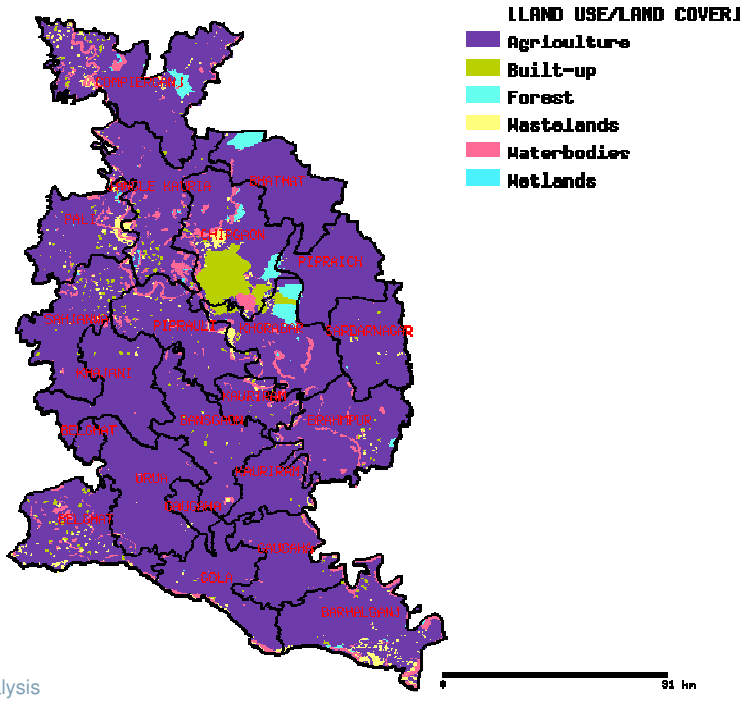
The maps depicting land-use pattern for the four representative districts as shown below;

Map 3.7: Land-Use pattern - Bahraich



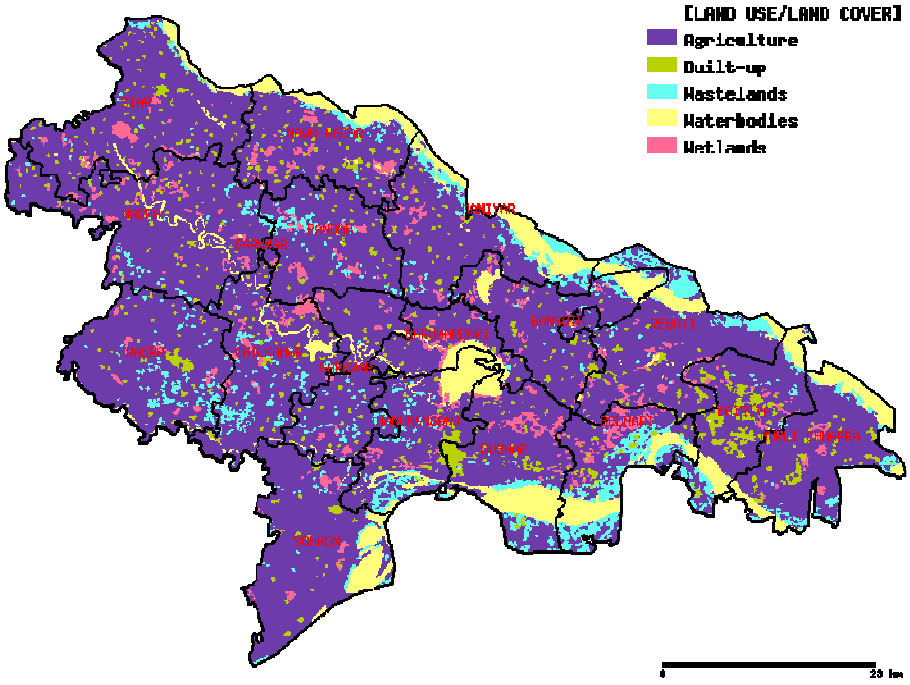
Source: http://gis.nic.in, MM Analysis

Map 3.8: Land-Use pattern - Gorakhpur



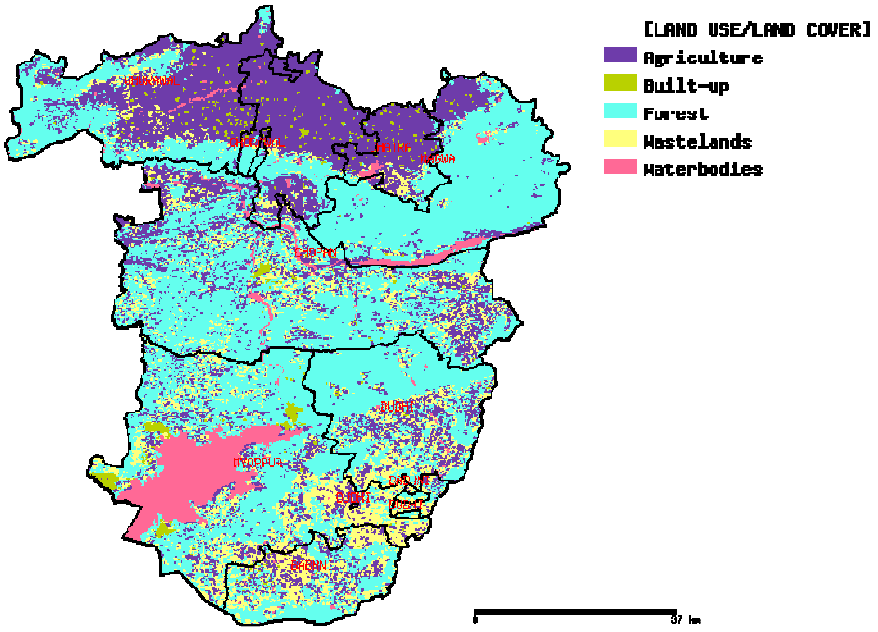
Source: http://gis.nic.in, MM Analysis

Map 3.9: Land-Use Pattern - Ballia



Source: http://gis.nic.in, MM Analysis

Map 3.10: Land-Use pattern - Sonbhadra



Source: http://gis.nic.in, MM Analysis

Table 3.8: Land-use status details for 28 districts of eastern UP (Area in Ha.)

S. No.	Districts	Reporting Area for Land Utilization (2006-07)	All type Forest Area	Land put under Non-Agri. use	Total rain fed area	Permanent pastures	Land under miscellaneous tree crops and groves	Current fallow	Other fallow	Net sown area	Net area sown more than once	Net irrigated area	Gross cropped area
1	Pratapgarh	361.577	0.569	39.750	27.170	0.654	15.691	52.499	13.411	222.361	75.767	195.191	298.128
2	Kaushambi	185.504	0.234	22.058	41.568	0.531	4.503	7.132	4.878	133.748	42.113	92.18	175.861
3	Allahabad	557.012	21.455	77.988	75.162	1.652	9.821	76.060	25.359	315.684	184.347	240.522	500.031
4	Faizabad	206.090	1.116	31.600	14.861	1.693	8.769	15.290	9.325	132.727	80.349	117.866	213.076
5	Ambedkar Nagar	236.103	0.270	38.223	9.356	0.583	4.498	10.892	5.926	167.635	114.903	158.279	282.538
6	Sultanpur	439.676	2.057	53.087	50.342	2.419	7.287	47.853	18.973	283.651	150.235	233.309	433.886
7	Bahraich	486.062	67.727	56.280	157.538	0.512	6.145	18.737	5.998	324.862	176.418	167.324	501.280
8	Shravasti	192.887	34.353	20.704	78.168	0.066	1.347	2.821	0.808	131.877	54.705	53.709	186.582
9	Balrampur	324.697	58.940	33.092	139.117	0.235	5.410	6.189	2.715	212.579	101.251	73.462	313.830
10	Gonda	401.021	12.933	51.988	30.311	1.311	8.437	14.797	6.308	293.983	147.152	263.672	441.135
11	Siddharth Nagar	297.814	3.708	35.292	47.053	0.533	3.273	11.625	2.253	235.602	158.302	188.549	393.904
12	Basti	277.039	4.093	38.311	60.689	0.504	6.648	5.493	3.808	209.73	91.153	149.041	300.883
13	Sant Kabir Nagar	174.810	4.364	27.505	21.710	0.122	5.055	8.109	3.226	121.93	86.457	100.220	208.387
14	Maharajganj	290.548	49.988	30.805	32.974	0.197	0.250	4.311	1.474	201.767	162.177	168.793	363.944
15	Gorakhpur	335.164	6.031	44.692	44.976	0.200	2.894	18.017	6.445	250.496	131.177	205.520	381.673
16	Kushi Nagar	291.466	0.817	51.049	57.696	0.329	3.789	2.795	1.177	225.228	116.994	167.532	342.222
17	Deoria	249.376	0.261	31.982	22.973	0.076	3.323	12.354	2.559	195.36	123.776	172.387	319.136
18	Azamgarh	424.058	0.110	59.344	19.265	1.395	6.759	32.368	7.902	302.916	212.289	283.651	515.205
19	Mau	171.624	0.560	22.771	9.389	0.185	3.519	13.659	2.444	124.453	83.037	115.064	207.490
20	Ballia	299.265	0.000	44.362	48.190	0.140	6.063	12.776	4.333	221.171	130.512	172.981	351.683
21	Jaunpur	399.713	0.063	45.452	35.677	1.356	4.807	33.481	20.508	279.085	175.852	243.408	454.937
22	Ghazipur	333.214	0.121	48.655	39.922	0.816	3.384	15.667	3.616	254.313	161.130	214.391	415.443
23	Chandauli	253.338	77.400	25.351	10.889	0.037	1.201	7.965	2.022	135.341	126.045	124.452	261.386

S. No.	Districts	Reporting Area for Land Utilization (2006-07)	All type Forest Area	Land put under Non-Agri. use	Total rain fed area	Permanent pastures	Land under miscellaneous tree crops and groves	Current fallow	Other fallow	Net sown area	Net area sown more than once	Net irrigated area	Gross cropped area
24	Varanasi	152.678	0.000	25.556	15.836	0.010	2.996	20.846	2.264	95.842	62.546	80.006	158.388
25	Sant Ravidas Nagar	103.045	0.056	16.614	14.002	0.289	0.676	8.186	4.274	69.986	27.659	55.984	97.645
26	Mirzapur	452.508	109.236	48.390	77.567	0.514	29.664	41.311	8.965	190.726	91.253	113.159	281.979
27	Sonbhadra	680.961	333.608	48.931	120.311	0.242	53.755	57.800	14.203	152.352	40.483	32.041	192.835
28	Chatrapati Shahu Ji Maharaj nagar (Amethi)						---						
	TOTAL	8577.25	790.07	1069.832	1302.712	16.601	209.964	559.033	185.174	5485.405	3108.082	4182.693	8593.487

Source: IWMP, Prospective & Stretegic Plan, Department of Land Development and Water Resources, UP - 2009 - MM Analysis

3.10.2 Wasteland assessment

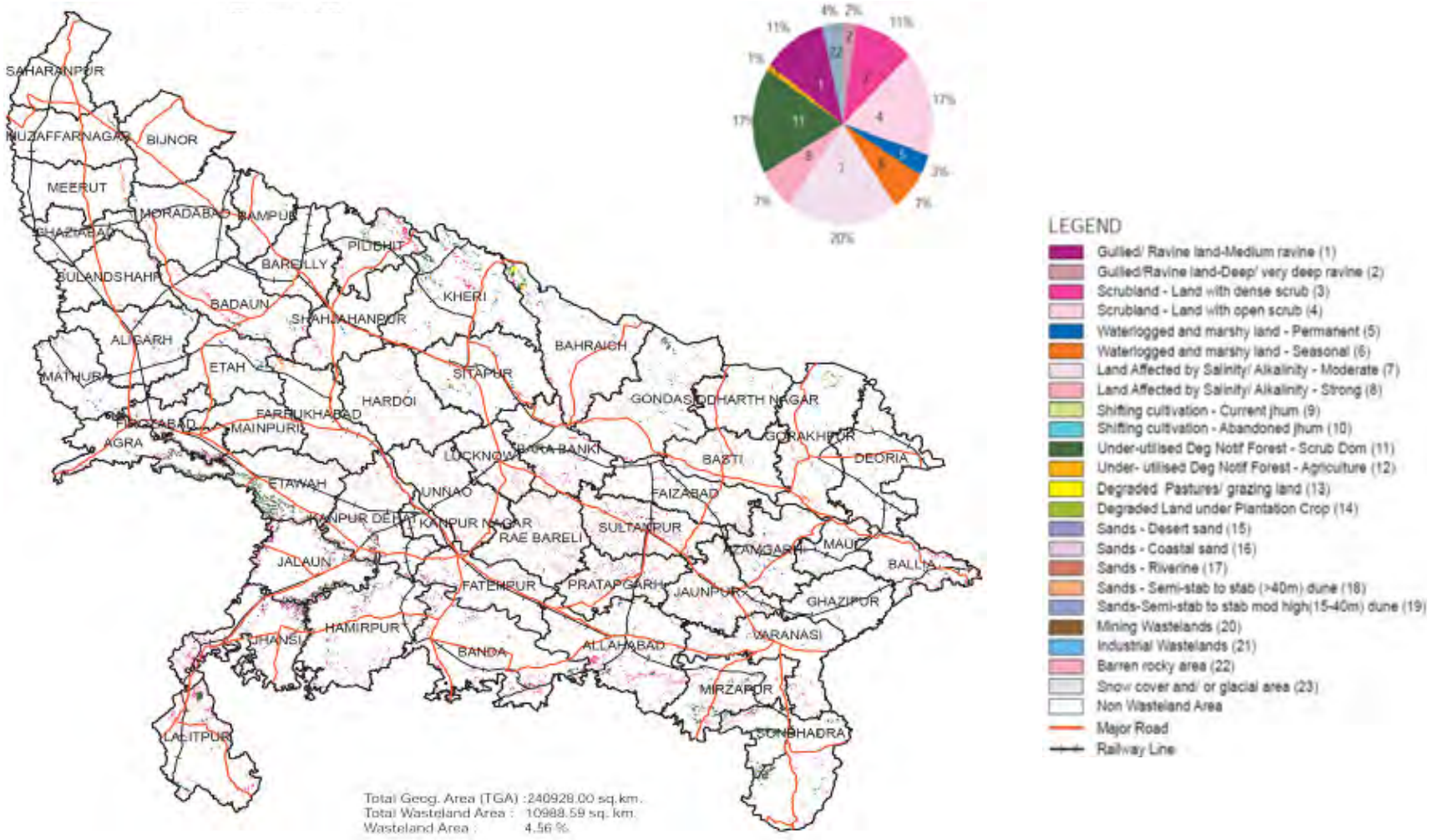
The wastelands in general may be put under two categories: cultivable wasteland and uncultivable wasteland. Table 3.9 enumerates the various causes for the degradation of utilizable land.

Table 3.9: Wastelands and Its Causing Agents

S. No	Kinds of wastelands	Causing agents			
		Water	**Wind**	**Man**	**Others**
1	Utilizable wasteland	1. Sheet Erosion	1. Sand dunes	1. Shifting cultivation	1. Shallow soil
		2. Rill erosion	2. Sand bar	2. Mine spoils	2. Land slides
		3. Gullied land		3. Industrial waste land	
		4. Ravinous land		4. Land affected by roads, kilns	
		5. Water logging		5. Strip land	
		6. Salinity			
		7. Diara land			
		8. Marshy land			
		9. Bouldery land			
2	Un-utilizable wasteland	1. Barren rocky land			
		2. Glacier land			
		3. Deserts			

Source: Wasteland Management, Booklet No. 426, Soil and water Conservation: SWCS - 3

Map 3.11: Wasteland Map of UP - 2005-06



Source: Remote Sensing Application Centre, UP - 2005-06

3.10.3 Erodability classification

Land erosion becomes the important element of environmental degradation causes a serious threat for the economic development in the state. However, deforestation, salinity, water-logging, decline of water table, improper use of fertilizer in both irrigated and non-irrigated area, are serious causes of land degradation in the state.

The proportion of wasteland to reported area, degraded forest to the reported area, annual rainfall data, percentage use of ground water and disproportionate use of fertilisers etc. are used for constructing the index for measurement of overall land degradation. Based on the method, Mirzapur in Eastern region stands the first. Some of the adverse impact reflected on agriculture production and productivity are as under:-

- Allahabad & Jhansi region are severely affected by ravine/land eroding problem.
- Sultanpur, Pratapgarh, Allahabad, Jaunpur, Azamgarh, Mau and Ballia are mostly affected by "Usar" problem. Crop productivity is very low due to alkaline problem in the land of these regions.
- Diversion of river flow of the state's main rivers like Ganga, Ghaghra, Ram Ganga and Gandak creates problem of land erosion on river bank. Flood is another major problem in these areas.
- Unplanned development & improper management of drainage system creates water logging problems.

3.10.4 Erosion under different Land uses

In Uttar Pradesh, the state planning commission estimated nearly 74.48 lakh hectares of land, which is 30.77% of the reporting areas are degraded land.

Table 3.10: Land Degradation in Uttar Pradesh (in Lakh hectares)

Degradation/Year	NRSA (2000-01)	GOUP (2002)
Soil Erosion	-------	36.82
Salt Affected area	5.81	7.63
Waterlogged Area	4.98	7.30
Marshy/Swampy Area	0	-------
Gullied /Ravines Area	2.81	9.23
Land With or Without Scrubs	5.5	------
Sandy Area	0.47	----
Riverine land	0	13.5
Barren/Stony/Sheet Rock Area	1.18	------
Shifting Cult	0	-----
Grass/Grazing Lands	0.45	------
Degraded Plantation Crops	0.05	------
Degraded Notified Forest land	3.4	-----
Salt/Pans/Snow Covered	13.17	------
Steep sloping area	0.99	------
Mining Area	0.03	---
Total Wasteland Area	38.84	74.48
Total Geographical / Reporting area	294.41	242.02
Percent of the Reporting Area	13.19	30.77

- NRSA – National Remote Sensing Agency, GoUP – Government of Uttar Pradesh

Source: NRSA, 2000-01 and Government of Uttar Pradesh, 2002-03

The problem of land degradation is more severe at the regional and district level. District such as Bahraich has 23% of the reporting area is degraded land. Similarly, nearly 10 to 20% of the reporting areas are degraded land in another seventeen districts. However, the data on waterlogging broadly represents different forms of degradation. In the state, most of the lands are affected by salinity/alkalinity due to persistence problem of waterlogging and marshy/swampy areas. Based on this estimation, Eastern region have 54.81% degraded land.

3.11 Forests

3.11.1 Forests resource and its products

Before the formation of Uttaranchal, the geographical spread of UP was 2, 94,411 square kilometres of which 33,994 square kilometres (that is 11.54%) were covered with forests. Now with an area of 23,243 square kilometres transferred to Uttaranchal, Uttar Pradesh has been left with a forest cover of only 10,751 square kilometres. Thus, the forest cover of U.P. has been reduced to a paltry 7% of its total geographical expanse. However, only 4.46% is under dense forest.

The existing plant life in Uttar Pradesh can be classified into three categories: (i) wet tropical deciduous forests (ii) dry tropical deciduous forests and (iii) tropical thorny forests.

Wet tropical forests are situated in areas which receive an annual rainfall of 100 to 150cm, a special feature of which is that deciduous trees of uneven shapes and sizes are to be found in elevated areas while the low-lying areas have a significant presence of bamboo, creepers and climbers as also cane together with green bushes. The trees that grow chiefly in these forests are: sal, plum, goolar, palash, mahua, amla, dhak, jamun etc.

Dry deciduous forests are to be generally found in the plains of almost the whole of central and western regions of the state. Bushes and grasses grow here in abundance because of sun light travelling right up to the ground level. Large tracts of land have, however, been cleared for agricultural purposes in these forests where sal, fig, palash and teak besides trees such as neem, peepal, mango, jamun, mahua and acacia grow nearby rivers or in places containing moisture.

Thorny forests abound, mostly, in the south western parts of the State where rainfall is scanty (40 to 60 cms. annually). Long stretches of land are covered with thorny bushes and stunted trees, mainly, acacia and other fruit-bearing prickly plants. The land appears to be carpeted, temporarily, by short grass during the monsoon. Altogether, this part of the state is permanent open dry woodland in which a variety of trees grow, yielding resin and gum.

Table 3.11: Forest Cover of 28 districts of Eastern Uttar Pradesh (in Sq.km.)

District	Geographic Area	Forest Cover					
		Very Dense	Moderately Dense	Open Forest	Total Forest	Percent	Change
Allahabad	5,137	-	28	69	97	1.89	-64
Ambedkar Nagar	2,337	-	2	32	34	1.45	-185
Azamgarh	4,234	`-	1	30	31	0.73	-15
Bahraich & Shravasti	6,878	210	294	347	851	12.37	-58
Balrampur	3,349	144	253	135	532	15.89	35
Ballia	2,981	-	-	23	23	0.77	13
Basti	2,688	-	6	12	18	0.67	13
Chandauli	2,549	-	190	327	519	20.36	44
Deoria	2,538	-	1	16	17	0.67	1
Faizabad	2,174	-	5	51	56	2.58	11
Ghazipur	3,377	-	4	43	47	1.39	31
Gonda	4,003	1	59	47	107	2.67	-4
Gorakhpur	3,321	-	40	25	65	1.96	27
Jaunpur	4,038	-	13	42	55	1.36	19
Kaushambi	2,124	-	9	22	31	1.46	28
Kushinagar	2,906	-	4	30	34	1.17	25
Maharajganj	2,952	202	141	118	461	15.62	17
Mau	1,713	-	1	17	18	1.05	15
Mirzapur	4,521	-	316	466	782	17.30	151
Sant Kabir Nagar	1,646	-	-	2	2	0.12	2
Sant Ravidas Nagar	1,015	-	-	1	1	0.10	1
Siddharth Nagar	2,895	-	10	29	39	1.35	-35
Sonbhadra	6,788	17	846	1,606	2,469	36.37	-28
Sultanpur	4,436	-	18	157	175	3.94	87
Varanasi	1,528	-	1	11	12	0.79	11
Total	***82,128***	***573***	***2242***	***3,658***	***6,476***	***144.03***	***142***

3.11.2 Ecologically Sensitive Areas

There are 23 wildlife sanctuaries and 1 national park in Uttar Pradesh. The Figure 3.5 below shows the map of the National Park and Sanctuaries in Uttar Pradesh.

Figure 3.5: Map of Wildlife Sanctuaries & National Parks of UP

Source: Wildlife Institute of India

Table 3.12: Wildlife Sanctuaries falling within 28 districts of Eastern UP

Sanctuary	Location	Predominant
Katarniaghat Sanctuary	Nepalese Terai, District: Bahraich	Tiger, Leopard, Swamp Deer, Chital, Nilgai, Sambhar
Chandraprabha Sanctuary	District: Chandauli	Panther, Chinkara, Sambhar, Chital, Peafowl
Kaimoor Sanctuary	District: Mirzapur and Sonbhadra	Leopard, Black buck, Chital, Ratel, Peafowl
Sohelwa Sanctuary	District: Balrampur, Gonda, Shravasti	Tiger, Cheetal, Leopard, Bear, Boar, Wild cat, Birds
Bakhira Sanctuary	District: Sant Kabir Nagar	Jackal, Mongoose, Nilgai, Local/Migratory birds
Suraha Tal Sanctuary	District: Ballia	Jackal, Mongoose, Nilgai, Monkey, Local/Migratory birds
Parvati Aranga Sanctuary	District: Gonda	Jackal, Mongoose, Hare, Nilgai, Wild cat, Local/Migratory birds
Sohagi Barwa Sanctuary	District: Maharajganj	Tiger, Leopard, Cheetal, Bear, Wild cat, Wild boar, Python
Kachhua Sanctuary	District: Varanasi	Species of Tortoise, Ganga dolphin, Water animals

Source: UP Tourism Department

3.11.3 Forest damages

Forest cover has remained stagnant in the UP sub-region because of the pressures of population and urbanization. The forest cover in Uttar Pradesh has been depleted by ten per cent in the last decade. The main reason was being attributed to indiscreet cutting of trees by wood smugglers, urbanisation, and industrialisation. One to ten per cent forest cover was lost in different cities during the last decade, the latest Indian Forest Survey says. The forest areas of Allahabad, Ambedkar nagar, Ghaziabad, Azamgarh,

Bahraich, Baghpat, Banda, Barabanki, Gautambudhnagar, Etawah, Gorakhpur and Lakhimpur Kheri have shown decline in their green cover during this period. Allahabad which had 3.13% of the forest cover in 2001 was depleted to 1.85% in 2011.The situation in Ambedkar nagar was far worse where the forest area has been reduced from 9.37% to just 1.84% in the last decade. Similarly, in Banda, the green belt has been reduced from 9.04% to 2.227%, again a steep fall in a decade.

3.11.4 Fuel wood

Fuel wood occupies a special place in rural energy systems owing to the importance of the domestic consumption for which it is mainly used and the fact that it is produced within the system itself. Wood is the fuel customarily preferred by rural people both because its decentralized method of production is suited to the scattered nature of rural habitation and usually makes it possible to obtain the fuel without added cost, and because production can be maintained on the basis of sustained yield and in combination with other goods and services.

The size of the rural populations in UP state particularly in eastern UP which are dependent on traditional fuels, and the very complementary role usually played by fuel wood, agricultural residues and animal waste, to the extent that it is difficult to dissociate them. It was estimated that, in 1979 the total energy consumption was 46% in domestic sector in India with 51% in rural sector. Human settlements have existed here for so long that the people dependent on fuel wood are often concentrated in densely-populated zones far from the forest resources. In some oases energy consumption is traditionally based on the use of agricultural and animal waste, which cannot, therefore, be considered as an indication of acute scarcity of fuel-wood.

A population density of several hundred inhabitants per km², which continues to grow, gives rise to particularly complex rural energy supply problems, difficult to resolve owing to the possible repercussions on closely intertwined systems of energy and agricultural production and on the fragile equilibrium.

3.12 Agriculture

UP produces 20.4% of the total food grains in the country. Its share is 34.8% in wheat, 13.4% in rice, 17.4% in pulses, 38.7% in sugarcane and 39.8% in potato. However, it accounts for only 4.8% of the total oilseeds production, Productivity per ha. of cultivated land is higher than the country's average in the matter of wheat, rice and potato but it does not compare well in the case of sugarcane.

Cropping intensity in UP was 151.4% in 1997-98 (higher than the country's average of 134.3%) as against 194.3% in Punjab, 168.5% in West Bengal and 169.0% in Haryana, The consumption of chemical fertilizers (kg/ha) in 1999-00 was 125.4 as against 95.3 for the country. Fertilizers' consumption levels in Punjab, West Bengal and Haryana were of course much higher.

Urea:

Urea or carbamide is an organic compound with the chemical formula CO(NH2)2. The molecule has two —NH2 groups joined by a carbonyl (C=O) functional group. It is a colourless, odourless solid, although the ammonia that it gives off in the presence of water, including water vapour in the air, has a strong odour. It is highly soluble in water and practically non-toxic. Urea is widely used in fertilizers as a convenient source of nitrogen.

DAP (Diammonium Phosphate):

DAP is used as a fertilizer. When applied as plant food, it temporarily increases the soil pH, but over a long term the treated ground becomes more acidic than before upon nitrification of the ammonium. It is incompatible with alkaline chemicals because its ammonium ion is more likely to convert to ammonia in a high-pH environment. The average pH in solution is 7.5–8.[4] The typical formulation is 18-46-0 NPK.

MOP (Muriate of Potash):

Potassium chloride (commonly referred to as Muriate of Potash or MOP) is the most common potassium source used in agriculture, accounting for about 95% of all potash fertilisers used worldwide. Its nutrient composition is approximately: Potassium: 50% & Chloride: 46%.

MOP has a high nutrient concentration and is therefore relatively price competitive with other forms of potassium. The chloride content of MOP can also be beneficial where soil chloride is low. Recent research has shown that chloride improves yield by increasing disease resistance in crops. In circumstances where soil or irrigation water chloride levels are very high, the addition of extra chloride with MOP can cause toxicity. However, this is unlikely to be a problem, except in very dry environments, since chloride is readily removed from the soil by leaching.

SSP (Single Super Phosphate):

Single super phosphate is a highly demanded fertilizer mostly used at the time of preparation of land. It comprises of 16% water soluble phosphate which is readily accepted by the crops.
Complexes:

Complex fertilisers contain varying ratios of two or three macronutrients (nitrogen, phosphorous and potassium) required by plants. Their application simplifies the task of balancing soil nutrients and boosts yields. Complex fertilisers supply crops with essential nutrients in a form favourable for plant nutrition, assuring peak efficiency in a variety of climatic conditions.

Table 3.13: Requirements of Fertilizers During 2011

State	Urea in Tonnes	Diammonium Phosphate(DAP) in Tonnes	Muriate of Potash(MOP) in Tonnes	Complexes in Tonnes	SSP in Tonnes
Uttar Pradesh	5760	1960	370	945	160

The cropping pattern as presented in the Table 3.14 reflects that food grains dominate the state agriculture.

Table 3.14: Area under Major crops

Crop	Area in lakh. ha.
Kharif crops	
Rice	55.80
Maize	8.10
Pearl millet	8.79
Sorghum	2.12
Black gram	4.38
Green gram	0.31
Sesame	1.53

Crop	Area in lakh. ha.
Ground nut	0.99
Soybean	0.05
Sugarcane	21.60
Cotton	0.04
Pigeon pea	3.80
Other	0.17
Rabi crops	
Wheat	91.60
Barley	1.55
Maize	0.04
Chickpea	7.40
Pea	3.20
Lentil	5.07
Rapeseed	7.90
Linseed	0.30
Potato	4.45
Tobacco	0.24
Onion	0.09
Zaid crops	
Green gram	0.34
Black gram	0.53
Sunflower	0.12
Onion	0.11
Tobacco	0.01

Source: IWMP, Prospective & Stretegic Plan, Department of Land Development and Water Resources, UP - 2009

Conjecture for EMF

- Agriculture, mainly utilizes ground water, which ultimately impacts on seasonal water accessibility and sustainability of ground water resources. Pesticides and fertilizers are foremost Agricultural inputs impact water quality of surface water resources as well as shallow ground water resources.
- The source selection for water supply schemes should include safeguards against use of irrigation wells & monitoring of water quality for safe drinking.

3.13 Horticulture

Horticulture crops comprises of a wide variety of crops viz. fruits, vegetables, flowers, spices, nuts, aromatics and medicinal plants, beekeeping, mushroom cultivation betel vine and other crops, which are important for food security and allied components. U.P. is blessed with diverse agro climatic conditions; those are conducive for cultivation of varied horticultural crops round the year. UP's varied agro-climate is ideal for growing large number of these crops round the year enabling their availability on a regular basis. Uttar Pradesh holds a vast potential for the development of horticulture.

There has been a substantial increase both in area and production of horticulture crops during the 10th plan. The area under fruits crops is expected to go up from 11.36 lakh hectare during 2009-10 to 12.25 lakh

hectare during 2010-11 and production is also likely to go up from 135-85 lakh MT to 149.43 Lakh MT. Similarly, the production of vegetable crops is also expected to go up from 365.20 Lakh MT to 401.72 Lakh MT during 2010-11. The increase in production of Potato has also been significant as the production during 2009-10 is likely to the tune of 120 Lakh MT which is also likely to go up to 151.75 Lakh MT during 2010-11.

The present share of Uttar Pradesh in total horticulture production of the country is approximately 26%. **U.P. ranks third in fruits, second in vegetable and first in potato production** among all states.

Table 3.15: Area and Production of Fruits, Vegetables and Potato in the state

Year	Fruits		Vegetable		Potato		Total	
	Area	Prod.	Area	Prod.	Prod.	Area	Prod.	Area Prod.
2009-10 (Target)	11.36	135.85	20.72	365.20	5.85	137.96	37.93	639.01
2010-11 (Proj. Target)	12.25	149.42	22.34	401.72	6.31	151.75	40.91	702.91
2011-12 (Proj. Target)	13.21	164.37	24.10	441.90	6.381	166.93	44.11	773.20
2012-13 (Proj. Target)	14.20	207.89	25.92	482.89	6.49	170.80	46.61	861.58

Source: Annual Action Plans of 2010-11 to 2012-13 of State Horticulture Mission, U.P.

3.14 Education

Female literacy situation in Uttar Pradesh is dismal. Only one out of four in the 7+ age group was able to read and write in 1991. In terms of more demanding criteria of educational attainment on the completion of primary or secondary education, in Uttar Pradesh, in 1992-93 only 50% of literate males and 40% of literate females could complete the cycle of eight years of schooling involved in the primary and middle stages. One other distinguishing feature of Uttar Pradesh education system is the persistence of high level of illiteracy in the younger age group. Within the younger age group, the illiteracy was endemic in rural.

The problems of education system are exacting. Due to public apathy the school are in disarray, privately run school are functional, but beyond the reach of ordinary people. The State government has taken programmes to make the population totally literate. Steps are being taken with the help of NGOs and other organizations to raise popular participation.

At the level of higher education and technical education Uttar Pradesh has 16 general universities, 3 technical universities, one Indian Institute of Technology (Kanpur), one Indian Institute of Management (Lucknow), one Indian Institute of Information Technology and large number polytechnics, engineering institutes and industrial training institutes. This provides the State with firm basis for providing opportunities for higher education to its youth.

Table 3.16: Literacy Status in Uttar pradesh

Description	2001	2011
Total Population	166,197,921	199,581,477
Male	87,565,369	104,596,415
Female	78,632,552	94,985,062

Description	2001	2011
Literates	30,027,248	88,396,557
Average Literacy	67.55 %	77.01 %
Male Literacy	78.48 %	81.75 %
Female Literacy	55.61 %	71.68 %

Source: Census of India

3.15 Economy

The economy of Uttar Pradesh and its development have a vital impact on the overall development of India. However, the economic performance of the state over the years has fallen behind the rest of the country. During the post-reform period of 1993-94 to 2000-01, the real GSDP at factor cost (1993-94 prices) in divided Uttar Pradesh (UP) had an annual average growth of 4.22% as against all-India figure of 6.3%. ***During the most recent period of 2001-02 to 2002-03 the average annual growth has been just about 2.24% as against all-India average of 4.88%.***

The state is attracting foreign direct investment which has mostly come in the software and electronics fields. Sonbhadra, a district in eastern Uttar Pradesh, has large-scale industries. Its southern region is known as the "Energy Capital of India".

3.16 Employment

Uttar Pradesh is the largest populated state of India, having 1662 lakh population as per 2001 census, against 16.2% of India's population.

From economic view point, the population is divided into main workers, marginal workers, and non-workers. People who worked for major part of the reference year are characterised as main workers and those worked for lesser duration are termed as marginal workers. Persons who did not work at all during the reference year are known as non-workers.

About 67% of the population is rural and dependent on agricultural production for their livelihood with farm income accounting for more than 20% of the income of rural households.

3.17 Industry

Uttar Pradesh has always been in the forefront in the area of industrial development. During the Vth, VIth VIIth Five Year Plan, the industrial growth rate was 9.4, 11.8 & 10.9% respectively. In the post liberalization period the industrial growth rate somewhat dropped. However, the state was able to meet the challenges. The Industrial growth rate during the Xth Five Year Plan in the State revived and has been to the tune of 6.6%.

The industrial growth rate was targeted at 10% and that of manufacturing sector at 12% for XIth Five Year Plan, in order to achieve overall 8.5% GSDP growth. This requires huge investment in the industry sector along with up-gradation of existing technology and modernization as well as creation of world class

infrastructure. The state has been able to achieve growth rate of GSDP as well as Industrial sector during first three years of XIth Five Year Plan as under:

Infrastructure Facilities

Further, in order to promote investments and to boost industrialization in the State, Uttar Pradesh has developed many SEZs, Industrial Clusters, Information technology Parks, Agro Parks; the details of them are mentioned below:

Table 3.17: Infrastructure facilities for Industrial development in Uttar Pradesh

Infrastructure Facilities	Description
Special Economic Zones	In the fast changing global economic scenario, Special Economic Zones are rightly called the engines of growth. Uttar Pradesh Government in Aug 2007 announced U.P. Special Economic Zone (Amended) Policy-2007 in order to foster the industrial and economic development and creating conducing environment for the development of SEZs in the State.
Tronica City	Integrated Industrial Township has been developed over 1600 acres land in Ghaziabad, where land is available for industrial, residential, institutional and commercial sectors
Growth Centres	Growth Centres at Shahjahanpur, Kanpur Dehat, Jhansi, and Auraiya have been completed. These Centres have industrial, residential and commercial sectors. Different sizes of plots have been developed to accommodate small/tiny, medium and large-scale industrial units at attractive rates.
Integrated Industrial Development Centres	To encourage development of small & tiny industries Integrated Industrial Development Centres have been developed at (Kosi Kotwan) Mathura, Etah, Banthar (Unnao), Baghpat, Masuri Gulawati (Ghaziabad), Kursi Road (Barabanki) and Chandauli (Varanasi) in area of 50 acres approx. each, under Central Govt. Scheme.
Cluster Development Scheme	The State Government to enhance investment, has introduced Cluster Development Scheme under which Industrial Cluster are developed by upgrading infrastructure and removal of bottleneck for Industry.
Export Promotion Industrial Park	Under the Central Govt. scheme for promotion of exports two EPIPs are developed by UPSIDC on 200 acres at Gautam Buddh Nagar and at Agra on 100 acres land, where high standard infrastructure facilities have been provided including cement concrete road, integrated security system, earth station etc.
Leather Technology Park	The state has one of the largest livestock populations in the country, which provides a strong raw material base required for the industry.
Agro Parks	Uttar Pradesh with its diverse agro climatic conditions is richly endowed in the cultivation of variety of crops.
Apparel Parks	In order to promote Apparel Industry, UPSIDC has setup Apparel Parks at Tronica City, Ghaziabad, at 12 Km. from I.S.B.T. Delhi and textile & Hosiery Park at Rooma Dist. Kanpur, at 10 Km. from Kanpur City. These Industrial Parks have industry specific infrastructure, textile training centre, fashion design centre, quality control laboratory, workshop cum tool room, common effluent treatment plant, conference hall, women hostel etc.

Source: Department of Infrastructure and Industrial Development, UP

3.18 Roads

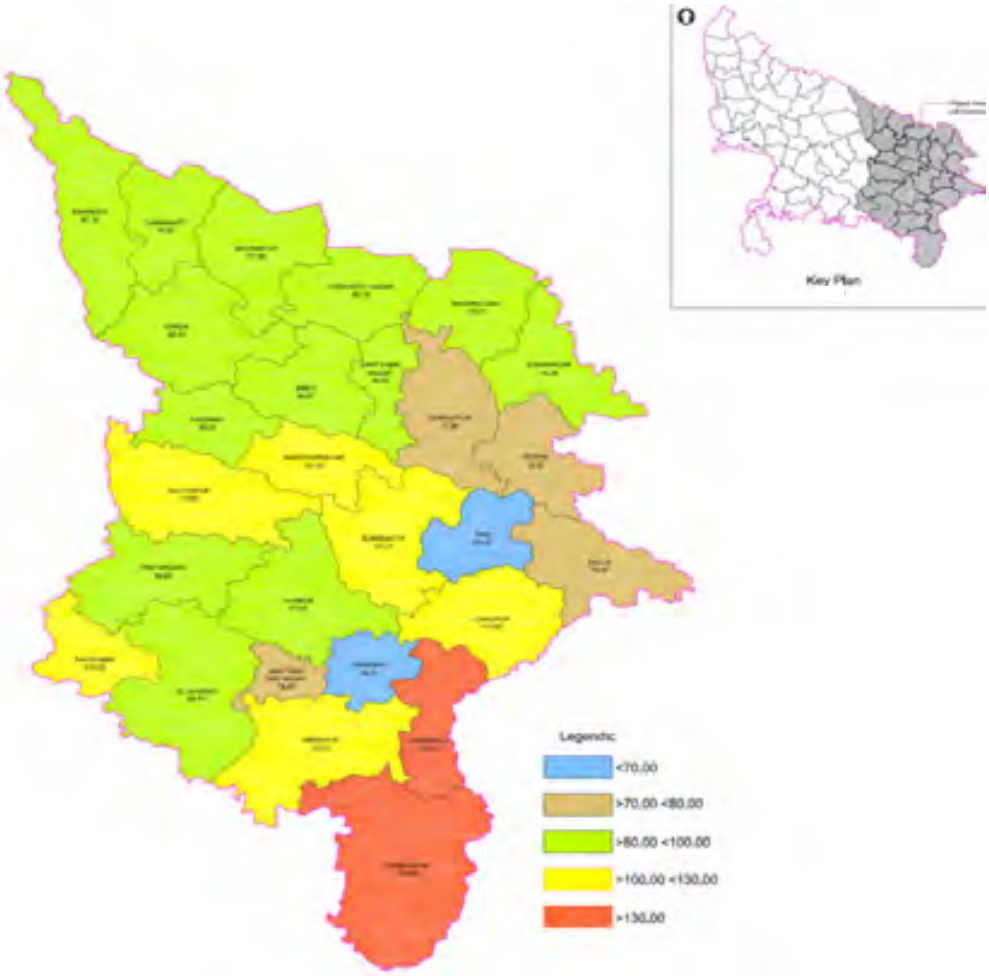
The Eastern UP region, which consists of 28 Districts of Eastern Uttar Pradesh, is densely populated. This area is flood prone and almost every year floods cause immense damage to the existing road network. Also, the road network in this area is insufficient. This vast track of fertile land has 3394.80 kms. of State Highways (SHs), 2552.90 kms. of Major District Roads (MDRs), 11993 kms. of Other District Roads

(ODRs) and 29425 kms. of Village Roads (VRs). This network suffers major damages every year due to onslaught of floods.

Eastern Districts has many Pilgrim Centres like Ayodhya, Shravasti, Gorkhnath Peeth, Kushinagar, Sarnath, Vindhyawasini, Allahabad and Varanasi. The Neighbouring States have also important Pilgrim Centres like Baijnath, Bodh Gaya, and Kapilvastu in Nepal etc. with immense tourism potential which needs to be tapped as a major source of earning. The road network needs to be upgraded immediately to certain minimum levels to take advantage of the tourism potential of the area.

In Eastern UP, State Highways need to be strengthened; Major District Roads and Other District Roads need to be upgraded to next levels. Also Major Bridges are required to be constructed at important crossings. It is proposed to strengthen 2000 kms. of State Highways, upgrade 1500 kms of Major District Roads to State Highways, upgrade 5000 kms. of Other District Roads to Major District Roads (Total 8500 kms.) and construct missing and additional bridges at important crossings on major rivers.

Map 3.12: Length of Pucca Road per Lakh of Population (Kms.)



Source: Planning Atlas - UP - 2010, MM Analysis>

3.19 Tourism

The Tourism Development Policy has been framed in Uttar Pradesh under which Tourist circuits are being developed in the following manner:-

- Buddhist Circuit
- Bundelkhand Circuit
- Braj (Agra- Mathura) Circuit
- Awadh Circuit
- Vindhya- Varanasi Circuit
- Water Cruise
- Wild Life – Eco Adventure Circuit

Uttar Pradesh is a land of unending histories and charms. This state is a land gifted with rich natural wealth. Both international and national tourists get attracted to this place as there are several aspects worth exploring.

Two most venerated rivers of India – Ganga and Yamuna – flow through Uttar Pradesh. There is a famous tourist as well as religious spot know as a "***Triveni Sangam***"; in Allahabad have two physical rivers Ganges, Yamuna, and the invisible or mythic Saraswati River. A place of religious importance and the site for historic ***Kumbh Mela*** held every 12 years, over the years.

The **most important tourist sites** of Uttar Pradesh are –

- Taj Mahal,
- Agra Fort,
- Fatehpur Sikri,
- Ghats, Sarnath (Varanasi),
- Sangam at Prayag (Allahabad),
- Forts at Allahabad,
- Jhansi,
- Bithoor,

Buddhist destinations -

- Piprahwa
- Kaushambi
- Shravasti
- Kushinagar

3.20 Energy

Electrical energy is undoubtedly a vital engine that drives economic growth. On this front UP's present scenario is dark and dismal. Power shortages are acute; per capita electricity consumption is below 200 Kwh/year. Electricity has still to reach effectively.

With the use of hydropower through water mills or irrigation systems, things began to move faster. Fuel wood and dung cakes are even today a major source of energy in rural India. **Solar energy** is used for

drying and heating. There has been an enormous increase in the demand for energy since the middle of the last century as a result of industrial development and population growth.

- In Rural areas of Eastern UP only 6.2 hrs of power has been provided in one day.
- For O&M purpose, the required voltage ranges from 320 – 420 V, while available voltage varies from 225 – 350 V; as per engineers of UPJN (informed during field visit).
- Power sector in UP has been in a state of stress for years together now. For over a decade there has been little addition to generation. Weighted average of coal consumed (kg/kwh) in thermal plants has marginally come down from 0.82kg in 1999-00 to 0.75kg in 2001-02. There has been sharper improvement in the oil consumption in thermal units from 5.89ml/kwh in 98-99 to 2.30ml/kwh in 2001-02.
- In 2001 the per capita consumption was 191 kwh in UP against all-India average of 366 kwh and 842 kwh in Punjab.
- The pooled average cost of power at consumer's end has risen from about 105 paise/unit in 1988-89 to about 357 paise/unit in 1999-2000 while, correspondingly, the per unit revenue assessed has risen from only 73 paise/unit in 90-91 to 260 paise in 2001-02. This reflects the sharply widening gap between costs incurred and revenue assessed.
- Maintenance continues to be a difficult problem that deserves to be addressed on a priority basis. Overloaded transformers and feeders. Voltage fluctuations, defective meters, tripping etc., are areas of concern. Development of new and renewable sources of energy must form a vital part of energy policy.

Table 3.18: Demand and Availability of Energy

Year	Peak Demand availability (MW)			Energy Demand availability (mkwh)		
	Peak Demand	Availability	Shortage	Demand	Availability	Shortage
1997-1998 (Actual)	6578	5395	17.98	42761	36171	15.41
1999-2000 (Actual)	6945	5967	17.97	48192	39864	17.28
2000-2001	7435	5840	21.45	48587	41988	13.58

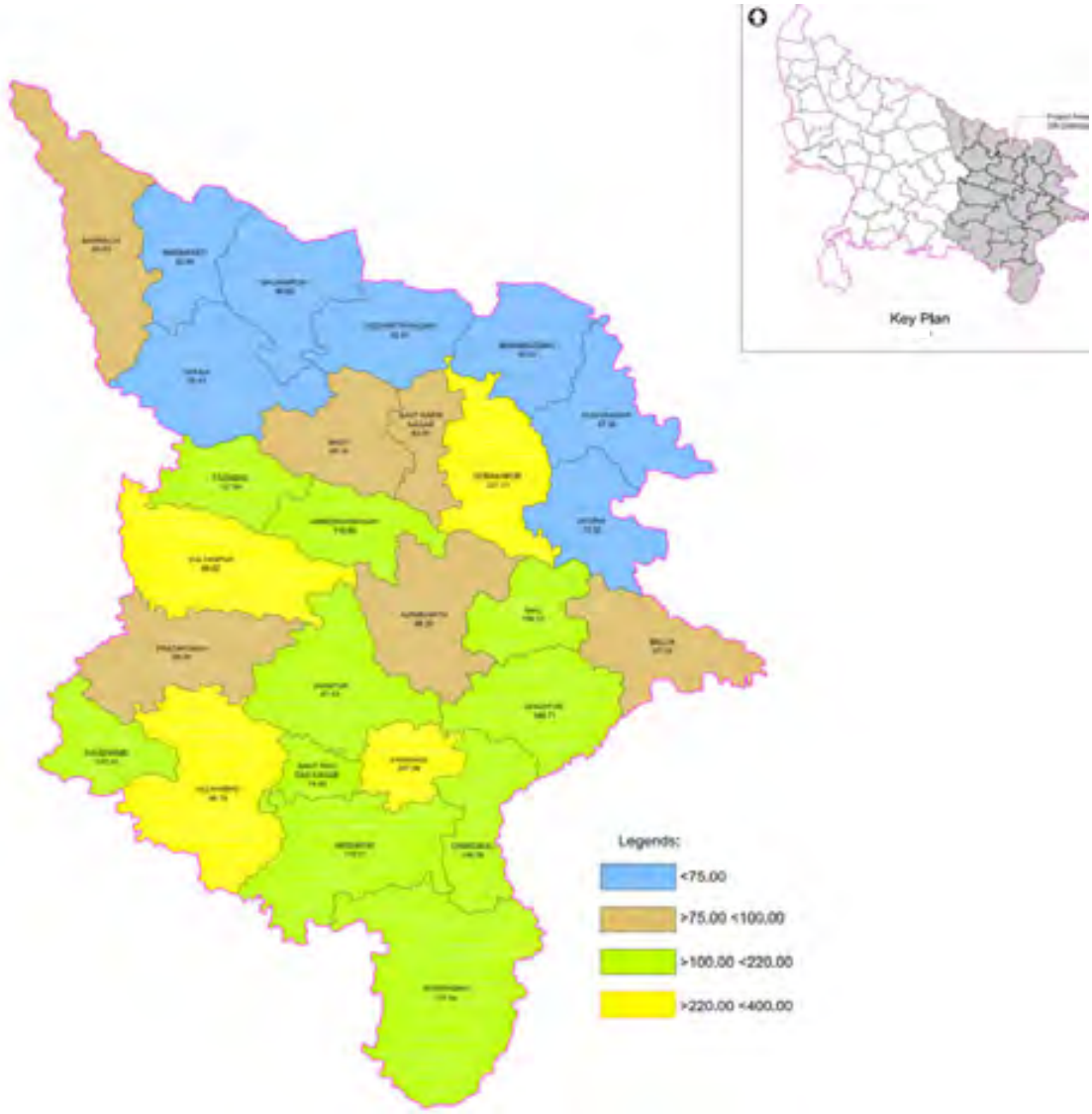
Source: Directorate of Environment, UP

Table 3.19: Type of Fuel used for Cooking - Rural areas of UP state

Fuel Type	Rural households	%	Entire state households	%
Fire Wood	13,858,123	54.4	15,707,246	47.70
Crop Residue	2,674,187	10.5	2,863,975	8.7
Cow dung cake	7,098,186	27.90	7,613,010	23.1
Coal, Lignite & Charcoal	29,830	0.10	82,508	0.30
Kerosene	57,676	0.2	238,467	0.70
LPG	1,627,095	6.4	6,226,793	18.9
Electricity	19,110	0.10	28,374	0.10
Biogas	33,956	0.10	52,033	0.20
Any other	31,035	0.10	40,493	0.10
No cooking	45,873	0.20	71,367	0.20
Total	***25,475,071***	***100.00***	***32,924,266***	***100.00***

Source: Census of India, 2011

Map 3.13: Per Capita Electricity Consumption (KwH)



Source: Planning Atlas, UP - MM Analysis

3.21 Irrigation

The total irrigated area of state is 133.13 lakh. Ha. The source wise Irrigation status of the state as indicated in the Table 3.20 shows that canal irrigation is 19.63%, State Tube well irrigation is 2.80% and Private tube wells have maximum share of irrigation that is 68.57%.

Table 3.20: Source wise irrigated area in U.P. (In lac.. ha.)

	Irrigation Source	Area	Percentage (NAS)	Percentage (Irrigated)
	Net Area Sown	165.74		
1	Canal	26.13	15.77	19.63
2	State Tube-wells	3.73	2.25	2.80
3	Private Tube-wells	91.29	55.08	68.57
4	Other Sources	11.98	7.22	9.00
	Net Irrigated Area	133.13 (80.32%)		

Source: IWMP, Prospective & Stretegic Plan, Department of Land Development and Water Resources, UP - 2009

Table 3.21: Length of canals, nos. of Tubewells & Irrigated area (Lac Hectares) in Eastern UP

Commissionery/ District	Geographical Area (1990-91)	Cultivable Land - Command Area			Total	Total Length of Canals	No. of Running Tube-wells	Irrigated Area (1996-97)			
		Maj. & Med. Canal	Tube-wells	Minor Lift Canals				Canal	Tube-wells	Lift	Total
Allahabad Commissionery											
Fatehpur	4.15	2.38	0.46	0.02	2.86	1479	538	0.87	0.14	0.02	1.03
Pratapgarh	3.72	2.05	0.16	0.04	2.25	1498	92	1.25	0.06	0.03	1.34
Allahabad	7.26	3.28	1.03	0.16	4.47	2967	1276	1.76	0.55	0.28	2.59
Total	15.13	7.71	1.65	0.22	9.58	5944	1906	3.88	0.75	0.33	4.96
Faizabad Commissionery											
Faizabad	4.51	1.35	0.85	-	2.20	1241	458	0.35	0.20	-	0.55
Gonda	7.35	0.43	0.55	0.02	1.00	353	691	0.14	0.23	0.01	0.38
Bahraich	6.88	0.32	0.50	-	0.82	474	582	0.23	0.21	-	0.44
Sultanpur	4.44	2.23	0.62	0.01	2.86	2112	765	1.12	0.23	0.01	1.36
Barabanki	4.40	2.43	0.31	0.04	2.78	2050	268	1.47	0.07	0.01	1.55
Ambedkar Nagar	-	-	-	-	-	-	400	0.20	0.16	0.00	0.36
Total	27.58	6.67	2.83	0.07	9.66	6230	3164	3.51	1.10	0.03	4.64
Gorakhpur Commissionery											
Gorakhpur	6.27	1.63	0.94	-	2.57	329	954	0.23	0.39	0.03	0.65
Deoria	5.54	2.42	0.77	-	3.19	2218	831	0.37	0.51	-	0.88
Basti	3.73	0.58	0.81	-	1.39	89	856	0.03	0.39	0.02	0.44
Azamgarh	4.23	2.14	0.69	-	2.83	1797	406	0.80	0.16	0.01	0.42
Siddharth nagar	3.49	-	-	-	-	1767	406	0.80	0.16	0.01	0.97
Mau	1.71	-	-	-	-	357	275	0.25	0.16	0.00	0.42
Maharajganj	NA	-	-	-	-	994	254	0.89	0.07	-	0.96
Padrauna	NA	-	-	-	-	-	139	1.09	0.05	-	1.14
Total	24.88	6.77	3.21	-	9.98	6429	4.12	3.86	1.85	0.07	5.78
Varanasi Commissionery											

Varanasi	5.09	1.50	1.75	0.29	3.54	1926	974	1.61	0.46	0.18	2.25
Mirzapur	4.52	2.32	0.28	0.15	2.75	1335	364	1.32	0.19	0.11	1.63
Jaunpur	4.04	1.48	0.46	0.06	2.00	1580	410	0.94	0.25	0.05	1.24
Ghazipur	3.38	0.92	0.68	0.12	1.72	1344	753	0.91	0.39	0.12	1.42
Ballia	2.98	0.70	0.76	0.06	1.52	683	706	0.53	0.25	0.02	0.80
Sonbhadra	6.79	-	-	-	-	576	-	0.55	-	0.02	0.57
Bhadohi	-	-	-	-	-	179	580	0.21	0.27	0.00	0.48
Total	26.8	6.92	3.93	0.68	11.53	7623	3787	6.07	1.81	0.50	8.38
Total Uttar Pradesh	***188.87***	***56.23***	***23.24***	***1.94***	***81.5***	***53574***	***21839.12***	***35.24***	***11.06***	***1.86***	***47.63***

Source: Irrigation Department, Uttar Pradesh - MM Analysis

4. Status of Water Resources (Availability and Quality)

4.1 Water Availability

4.1.1 Ground water

Hydrogeologically, the State can be divided into five units namely (1) Bhabar (2) Tarai (3) Central Ganga plains (4) Marginal alluvial plains and (5) Southern Peninsular zone. The first one is in the extreme north followed successively by the rest southwardly. The yield of tube wells tapping Bhabar and Tarai zones ranges between 100-300 m^3/hr and 100-200 m^3/hr, respectively.

The water levels in Uttar Pradesh show a wide variation from less than 2 mbgl to more than 30mbgl. In Bhabhar area, the depth to water level varies from 8 to 35mbgl, while in Tarai, it ranges from less than 2 to 10 mbgl. The central and eastern parts of the state show a wider range of water levels varying from less than 2 mbgl to more than 20mbgl. The water levels in southern parts (Plateau Region) vary from 2 to 30 mbgl. The deepest water levels are encountered in the ravenous tracts along the Yamuna and Betwa rivers in Hamirpur, Jalaun, Banda, **Allahabad** and Jhansi districts.

The water level is deep in Bhabar where as in Tarai auto flow conditions are noticed with piezometric head of 6-9mbgl. The Central Ganga plain is characterized by low relief and numerous alluvial features. There are four major aquifers in the depth range of 700mbgl. The yield of these tube wells ranges from 90 to 200m^3/hr. The thickness of sediments in Marginal alluvium is 50-300m and yield of tube wells is between 35 to 70m^3/hr. The yield prospects of Vindhyan & crystalline rocks in the southern peninsular region are limited.

Table 4.1: Ground Water Availability in Uttar Pradesh

Dynamic Ground Water Resources	
Annual Replenishable Ground water Resource	76.35 BCM
Net Annual Ground Water Availability	70.18 BCM
Annual Ground Water Draft	48.78 BCM
Stage of Ground Water Development	70 %

Source: Central Ground Water Board

Table 4.2: Ground Water Potential in 28 districts of Eastern UP region (As on 01-04-2004)

S. NO.	NAME OF THE DISTRICT	NET G.W. AVAILABILITY	ANNUAL DRAFT FOR ALL USES	NET G.W.AVAILABILITY FOR FUTURE USE	STAGE OF DEVELOPMENT
		(ham.)	(ham.)	(ham.)	(%)
1	Allahabad	109503.20	75688.38	33814.82	69.12
2	Ambedkar Nagar	95333.66	65470.29	29863.37	68.67
3	Azamgarh	150748.80	108995.21	41753.59	72.30
4	Bahraich	127529.17	81874.95	45654.22	64.20
5	Ballia	96182.75	67620.50	28562.25	70.30
6	Balrampur	94736.71	53599.99	41136.72	56.58
7	Basti	87547.16	69970.28	17576.88	79.92
8	Chandauli	69895.76	29194.16	40701.60	41.77
9	Chatrapati Shahuji Maharaj Nagar (Amethi)	A newly formed district comprising parts of Sultanpur and Rae Bareli districts.			

S. NO.	NAME OF THE DISTRICT	NET G.W. AVAILABILITY	ANNUAL DRAFT FOR ALL USES	NET G.W.AVAILABILITY FOR FUTURE USE	STAGE OF DEVELOPMENT
10	Deoria	86355.59	71422.96	14932.63	82.71
11	Faizabad	110071.99	73301.55	36770.44	66.59
12	Ghazipur	121595.61	79450.60	42145.01	65.34
13	Gonda	142127.02	112710.86	29416.16	79.30
14	Gorakhpur	132411.28	92093.76	40317.52	69.55
15	Jaunpur	143726.17	111188.68	32537.49	77.36
16	Kaushambi	41844.91	25100.20	16744.71	59.98
17	Kushi Nagar	124367.88	55298.55	69069.33	44.46
18	Maharajganj	114607.26	52565.96	62041.30	45.87
19	Mau	49757.10	40060.30	9696.80	80.51
20	Mirzapur	49532.33	24132.18	25400.15	48.72
21	Pratapgarh	119713.82	72494.31	47219.51	60.56
22	Sant Kabir Nagar	53888.70	38349.28	15539.42	71.16
23	Sant Ravidas Nagar	35053.17	26579.88	8473.29	75.83
24	Shravasti	42536.49	29136.47	13400.02	68.50
25	Siddharth Nagar	104492.45	58137.09	46355.36	55.64
26	Sonbhadra	27885.89	11957.31	15928.58	42.88
27	Sultanpur	157948.53	114934.09	43014.44	72.77
28	Varanasi	51637.67	37786.49	13851.18	73.18
	Total	***2541031.07***	***1679114.28***	***861916.79***	***66.08***

Source: State Ground Water Department, UP

Table 4.3: Groundwater availability status - Blocks of Concern in Eastern Uttar Pradesh

District	Over-exploited	Critical	Semi-critical
Allahabad (Total Blocks – 20)	-	Karchhana	Bahadurpur
	-	-	Dhanupur
	-	-	Kaurihar
	-	-	Pratappur
	-	-	Saidabad
	-	-	Urwa
Sub-Total		***1***	***6***
Ambedkar Nagar (Total Blocks – 09)	-	-	Bhiti
Sub-Total		***-***	***1***
Faizabad (Total Blocks – 11)	-	-	Bikapur
	-	-	Tarun
Sub-Total		***-***	***2***
Ghazipur (Total Blocks – 16)	-	-	Ghazipur
	-	-	Jakhaniya
	-	-	Karanda
	-	-	Saidpur
Sub-Total		***-***	***4***
Jaunpur (Total Blocks – 21)	Buxa	Badlapur	Barsathi
	Karanja Kalan	Dharmapur	Dobhi

District	Over-exploited	Critical	Semi-critical
	Kerakat	Maharajganj	Khutahan
	Sirkoni	-	Muftiganj
	-	-	Sikrara
	-	-	Sujanganj
Sub-Total	***4***	***3***	***6***
Kaushambi (Total Blocks – 08)	Chail	Kara	Newada
	Sirathu	Manjhanpur	-
	-	Mooratganj	-
Sub-Total	***2***	***3***	***1***
Mirzapur (Total Blocks – 12)	-	Majhawan	Chanbey
	-	Sikhar	City
	-	-	Kon
Sub-Total	-	***2***	***3***
Pratapgarh (Total Blocks – 16)	Pratapgarh Sadar	Sandwa-Chandrika	Baba Bakhernath
	-	Shivgarh	Patti
Sub-Total	-	***2***	***2***
St. Ravidas Nagar (Total Blocks – 05)	-	-	Abholi
	-	-	Gyanpur
	-	-	Suriyawan
Sub-Total	-	***-***	***3***
Sonbhadra (Total Blocks – 08)	-	-	Ghorwal
Sub-Total	-	***-***	***1***
Sultanpur (Total Blocks – 13)	-	-	Akhand Nagar
	-	-	Bhadaiya
	-	-	Bhadar
	-	-	Dubeypur
	-	-	Jagdishpur
	-	-	Jaisinghpur
	-	-	P.P. Kannaicha
	-	-	Sangrampur
	-	-	Shahgarh
	-	-	Shukul Bazar
Sub-Total	-	***-***	***10***
Varanasi (Total Blocks – 08)	-	Arajiline	Baragaon
	-	Harhuwa	Chiraj gaon
	-	-	Cholapur
	-	-	Kashi Vidyapeeth
	-	-	Pindra
Sub-Total	***-***	***2***	***5***
Total in Eastern UP	***7***	***13***	***44***

Source: UP Jal Nigam, MM Analysis

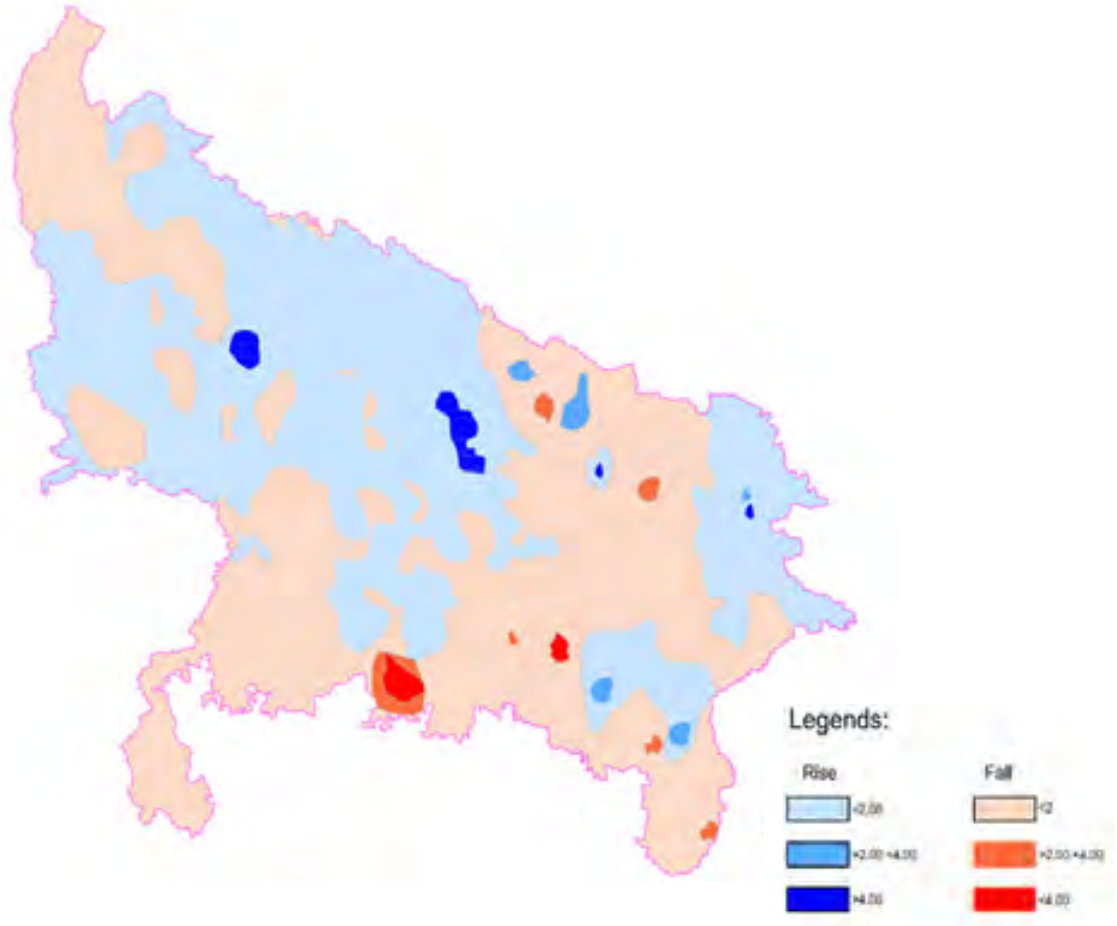
Map showing Categorization of blocks as per ground water availability within project area is attached as <u>Appendix E.</u>

Table 4.4: Ground water recharge schemes in UP

Ground Water Development & Management	
Over Exploited	37 Blocks
Critical	13 Blocks
Semi- critical	88 Blocks
Artificial Recharge to Ground Water (AR)	Area identified for AR: 45180 sq km Quantity of Surface Water Recharged: 14022 MCM Feasible AR structures: 4410 percolation tanks, 12600 cement plugs (check dams), 212700 recharge shafts, RTRWH structures (10 lakhs)

Source: Central Ground Water Board

Figure 4.1: Ground Water Level fluctuation from January 2010 to January 2011 in Uttar Pradesh (in meter)



Source: Central Ground Water Department

Conjecture for EMF

- Source identification criteria should be considered as specified in Chapter 8
- Ground water recharge measures shall be undertaken in critical and over exploited zones as part of the proposed schemes.

4.1.2 Surface Water

Of the rivers and canals in the country, Uttar Pradesh occupies the first place with the total length of rivers and canals as 31.2 thousand km. that is about 17% of the total length of rivers and canals in the country. The state of UP falls in Ganga Basin with the major sub basins of Yamuna, Ramganga, Gomti and Ghaghra Rivers. The state is estimated to have 161.70 BCM (131.0 m.a.f.(million acre feet)) of surface water.

Table 4.5: Average Discharge from the Rivers

River	Average Discharge
Ganga	12,500 m^3/s (441,433 cu ft/s)
Ghaghara	2,990 m^3/s (105,591 cu ft/s)

Source: Wikipedia, MM Analysis

The Uttar Pradesh Perspective Plan mentions that the observed dependable flow of these rivers was 178.4 BCM. If one corrects these for upstream uses, as also from dependable to average, the natural flow at the five sites, (which will already include the groundwater base flow component) would be about 250BCM. In the absence of an accepted and enforceable law on water, the water rights of nations/states sharing an international basin are often nebulous unless these have been mutually agreed upon through treaties, agreements, accepted arbitration awards or adjudications.

a. International Matters

i. The Ganga water treaty dated 12-12-1996 between India and Bangladesh for sharing Ganga waters at Farakka Barrage; Article VIII regarding cooperation in finding solutions to the long term problem of augmenting the flow of Ganga and clause (ii) of Article II regarding efforts being made by the upper riparians to protect the flows at Farakka are of comparative importance.
ii. The Mahakali treaty dated the 12-02-1996 between HMG of Nepal and India about the integrated development of Mahakali river.

Interstate Matters

There are a number of existing interstate agreements on the Ganga. Summarising, the UP water development would have to take into consideration:

iii. Upstream Uses
- Upstream uses, as flowing out of Yamuna, Sone, Rajghat and other agreement, and Indo-Nepal agreements.
- Upstream established uses in rivers.
- Likely future upstream uses, which can take place in the absence of any agreement.

iv. Downstream Obligations

- Rights of Bihar in regard to use of Gandak water, which is a boundary river.
- The need to not cause appreciable or significant harm to Bihar, West Bengal or also to Bangladesh, in regard to the Ganga. Mostly maintaining the low flows from January to May would be the main concern.

– In regard to the southern tributaries of Ganga, UP is the upper or middle riparian and Bihar is the lower riparian. The obligation would be in allowing the agreed share to Bihar on Sone or its tributaries (and not low flow alone since, for Sone sub-basin, there is a considerable possibility of storage development).

4.2 Water Quality

4.2.1 Water quality norms and Samplings

The Bureau of Indian Standards specification IS: 10500-1991 governs the quality of drinking water supplies in India by public agencies. The standards based on International standards for drinking water quality issued by the WHO and the BIS standards of quality for drinking water supplies are represented in ***Appendix H.***

Table 4.6: Laboratory Testing in 28 districts of Eastern UP

S. No.	District	Total Sources Tested	Total Samples Tested
1	Allahabad	0	0
2	Ambedkar nagar	871	884
3	Azamgarh	278	280
4	Bahraich	287	294
5	Ballia	298	302
6	Balrampur	119	119
7	Basti	149	149
8	Chandauli	195	195
9	Chatrapati Shahu ji nagar	578	602
10	Deoria	0	0
11	Faizabad	32	32
12	Ghazipur	167	167
13	Gonda	15	15
14	Gorakhpur	499	500
15	Jaunpur	0	0
16	Kaushambi	0	0
17	Kushi nagar	63	63
18	Maharajganj	301	301
19	Mau	347	347
20	Mirzapur	253	254
21	Pratapgarh	1036	1052
22	Sant Kabir nagar	1	1
23	Sant Ravidas nagar	24	24
24	Shravasti	0	0
25	Siddharth nagar	0	0
26	Sonbhadra	359	364
27	Sultanpur	5	5
28	Varanasi	0	0
	Total	***5877***	***5950***

Source: Ministry of Drinking Water & Sanitation

4.2.2 Water Quality – Ground water

Major groundwater quality parameters relevant to domestic water supply need in Uttar Pradesh are Arsenic, Fluoride, Iron, Nitrate and Total Dissolved Solids (TDS). The Shallow groundwater in eastern districts of the state is naturally found to be in high state of Arsenic, Fluoride, and Iron, leading to the concentrations that are often exceeding the drinking water standards. The districts where aquifers are adversely affected with Arsenic, Fluoride and other undesirable parameters problems include Ballia, Bahraich whereas certain pockets of Gorakhpur, Sonbhadra and other districts are also affected adversely by such water quality problems.

Table 4.7: Ground Water Quality Problems

Contaminants	Districts affected (in part)
Fluoride (>1.5 mg/l)	Jaunpur, Mau, Sonbhadra, Gorakhpur
Iron (>1.0 mg/l)	Azamgarh, Ballia, Balrampur, Ghazipur, Gonda, Mau, Siddharth Nagar
Nitrate (>45 mg/l)	Allahabad, Ambedkar Nagar, Balrampur, Basti, Ghazipur, Jaunpur, Sant Ravidas Nagar, Sonbhadra, Sultanpur
Arsenic (>0.05 mg/l)	Bahraich, Ballia, Balrampur, Gonda, Gorakhpur

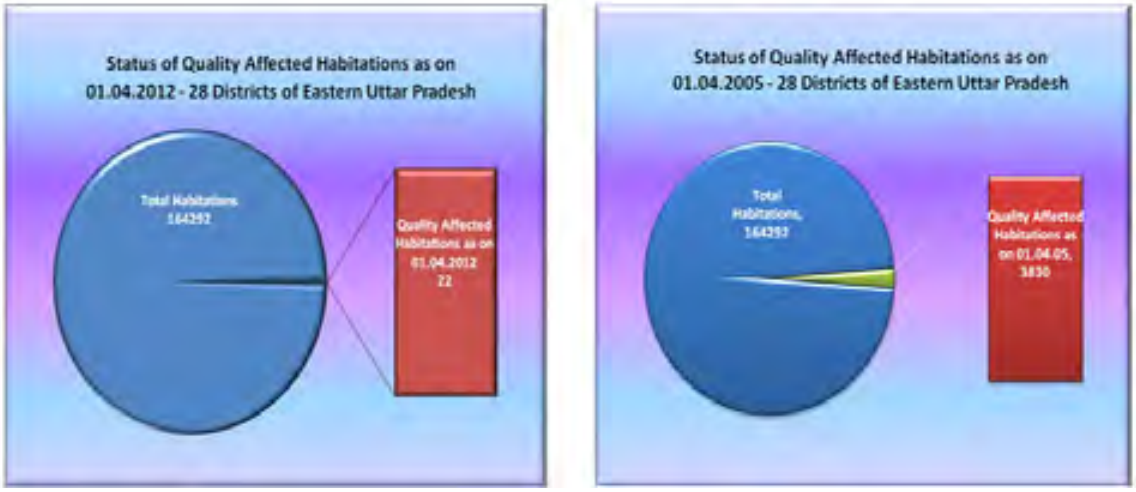
Source: Central Ground Water Board

Maps showing Water Quality affected blocks (Arsenic, Iron, Fluoride, Nitrate and Salinity) within project area are attached as Appendix F.

Figure 4.2: Quality Affected Habitation Status - Uttar Pradesh State

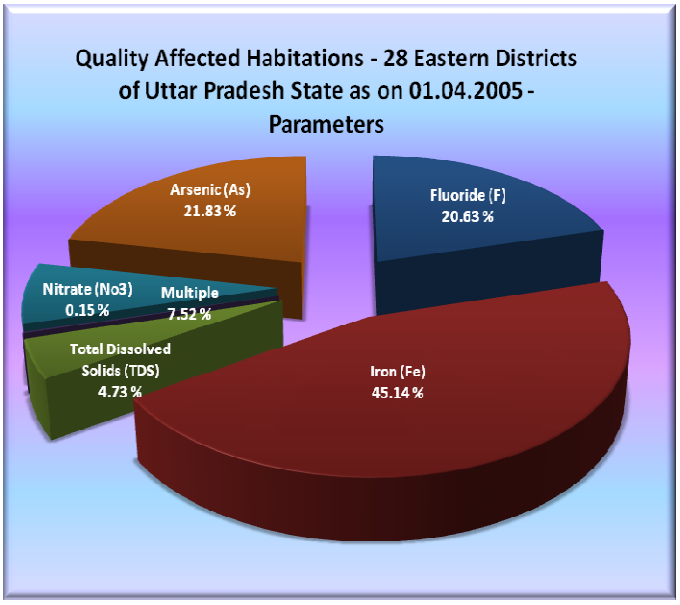
Source: UP Jal Nigam, MM Analysis

Figure 4.3: Quality affeted habitations in 28 districts of eastern UP



Source: UP Jal Nigam, MM Analysis

Figure 4.4: Parameters - Quality affeted habitations in 28 districts of Eastern UP



Source: UP Jal Nigam, MM Analysis

4.2.3 Water Quality – Surface water

The water quality in the main rivers is generally deteriorated due to discharge of industrial pollutants as well as other human excreta (especially in the river Ganga and Yamuna due to divine belief of local people), except in the upper reaches of rivers where the pollutant load is minimal.

The quality problems with respect to surface water sources are more acute in the locations and during the periods when the flow in the river is not sufficient to cause acceptable dilution of the discharged effluents.

Central Pollution Control Board (CPCB) classifies river water quality in five classes according to fitness, as following. The standards for these classes have been specified on the basis of chemical and biological parameters.

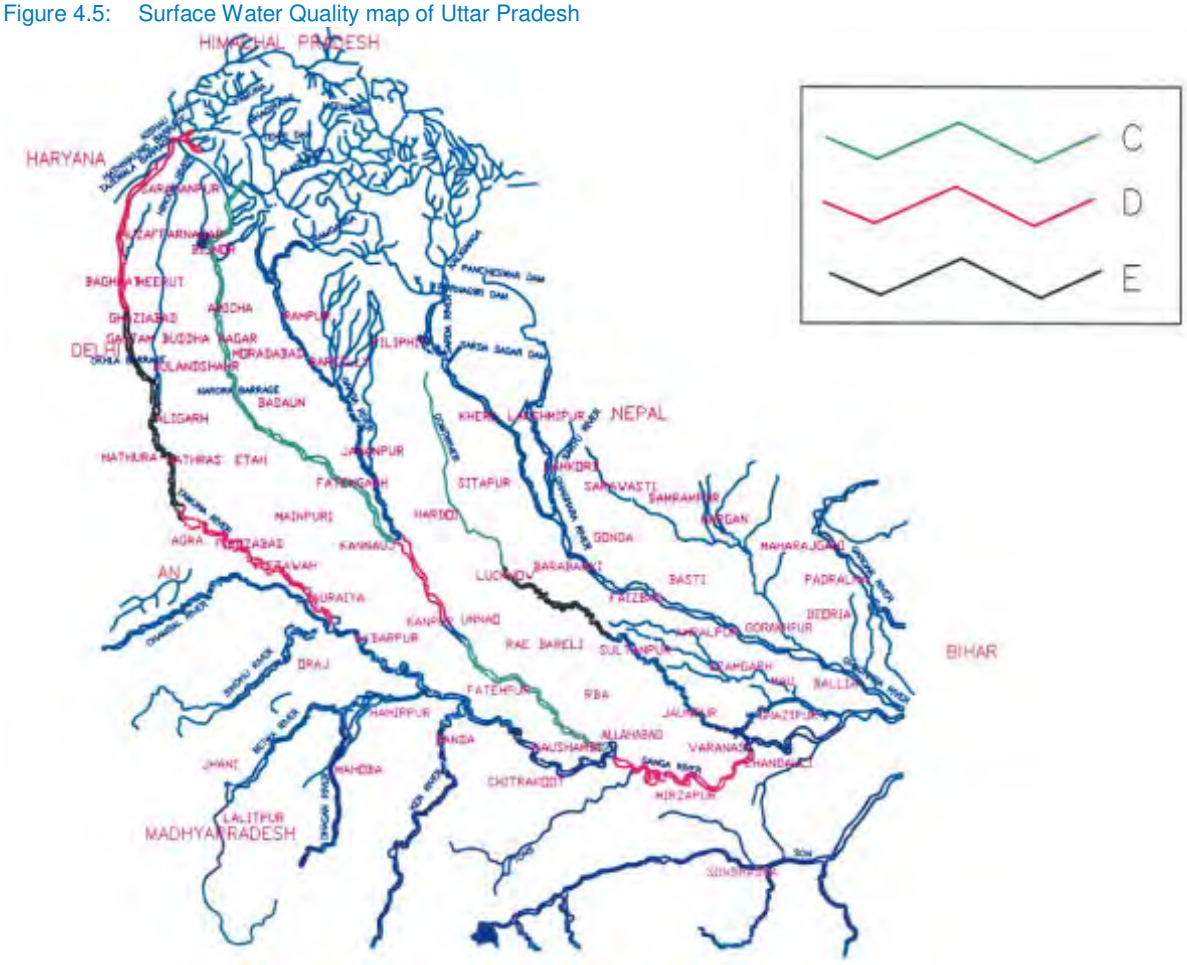
Table 4.8: Primary Water Quality Criteria for Designated best use - Classes

Classification	Class	Tolerance Limit
Drinking Water Source without conventional treatment but after disinfections	A	Total Coliform Organism MPN/100 ml shall be 50 or less pH between 6.5 and 8.5 Dissolved Oxygen 6mg/l or more Biochemical oxygen demand 5 days 20o C 2mg/l or less
Outdoor Bathing (Organized)	B	Total Coliforms Organism MPN/100 ml shall be 500 or less pH between 6.5 and 8.5 Dissolved Oxygen 5mg/l or more Biochemical Oxygen Demand 5 days 20℃ 3mg/l or less
Drinking Water source after conventional treatment and disinfections	C	Total Coliforms Organism MPN/100 ml shall be 5000 or less pH between 6.5 and 8.5

Classification	Class	Tolerance Limit
		Dissolved Oxygen 4mg/l or more Biochemical Oxygen Demand 5 days 20oC 3mg/l or less
Propagation of Wild Life and Fisheries	D	pH between 6.5 and 8.5 Dissolved Oxygen 4mg/l or more Free Ammonia (as N)1.2 mg/l or less
Irrigation Industrial Cooling, Controlled waste disposal	E	pH between 6.0 and 8.5 Electrical Conductivity at 25℃ micro mhos/cm Max. 2250 Sodium absorption ratio Max. 26 Boron Max. 2 mg/l

Source: UP Pollution Control Board

Figure 4.5: Surface Water Quality map of Uttar Pradesh



Source: UP DevelopWater resources: Management & Developement - Planning Commission, UP

Conjecture for EMF

- Water quality of the rivers should be tested out periodically (once in 4 months).
- Safe sanitation techniques to be implemented to prevent the bacteriological contamination of rivers.

Table 4.9: River Water Quality in Eastern Uttar Pradesh (Year 2010-2011)

S. No.	Regional Office	District	River/ Lake	Sampling Point	Parameters		
					D.O. (mg/L)	B.O.D (mg/L)	Total Coliform (mg/L)
1.	Allahabad	Kaushambi	Ganga	Kada Ghat	7.6	3.63	4167
2.	Allahabad	Allahabad	Ganga	Upstream - Allahabad	7.23	4.21	7750
3.	Allahabad	Allahabad	Ganga	Downstream - Allahabad	7.15	3.95	8583
4.	Allahabad	Mirzapur	Ganga	Upstream – Vindhyachal, Mirzapur	8.54	2.98	1995
5.	Allahabad	Mirzapur	Ganga	Downstream - Mirzapur	7.57	3.52	4433
6.	Varanasi	Varanasi	Ganga	Upstream - Varanasi	7.78	3.67	18530
7.	Varanasi	Varanasi	Ganga	Downstream - Varanasi	7.17	6.22	48000
8.	Ghazipur	Ghazipur	Ganga	Downstream – Tari Ghat	7.38	4.15	18000
9.	Varanasi	Varanasi	Varuna	Rameshwer – Varanasi	7.45	3.90	13070
10.	Varanasi	Varanasi	Varuna	Downstream - Varuna	5.6	19.6	111300
11.	Varanasi	Jaunpur	Sae	Jalalpur, Jaunpur	7.50	3.90	14300
12.	Jaunpur	Jaunpur	Gomti	Downstream - Jaunpur	7.44	4.05	18600
13.	Varanasi	Varanasi	Gomti	Downstream – Gomti, Rajwari, Varanasi	7.54	3.77	15100
14.	Faizabad	Faizabad	Saryu	Saryu - Faizabad	9.11	2.61	6558
15.	Allahabad	Allahabad	Yamuna	Yamuna – Allahabad	6.90	2.09	2833
16.	Allahabad	Sonbhadra	Rihand Dam	Upstream – Renukut	7.58	1.39	1800
17.	Allahabad	Sonbhadra	Rihand Dam	Downstream - Renukut	7.72	1.65	2142
18.	Gorakhpur	Gorakhpur	Ghaghra	Badhalganj, Upstream - Gorakhpur	7.64	2.96	238
19.	Gorakhpur	Deoria	Ghaghra	Downstream - Deoria	7.67	2.76	295
20.	Gorakhpur	Gorakhpur	Rapti	Downstream – Gorakhpur	7.69	2.76	198
21.	Gorakhpur	Gorakhpur	Rapti	Rajghat, Downstream - Gorakhpur	7.51	3.23	363
22.	Gorakhpur	Gorakhpur	Ramghad Lake	Ramghad Lake - Gorakhpur	8.64	5.16	492

Source: UP Pollution Control Board

4.2.4 Water Quality Monitoring

Table below represents the existing status of Water Quality Monitoring within 28 districts of eastern UP. As seen from the table there are no block level laboratories available and thus testing or monitoring is conducted at the district level laboratories.

Table 4.10: Water Quality Monitoring

Level	Roles and Responsibilities	Infrastructure Available	Institution Responsible	Frequency of testing/water analysis	Issue/Gaps
Gram Panchayat	PRI functionaries - 1. To test the samples at field level to verify the quality of water being supplied. 2. To test basic parameters of quality and bacteriological contamination using H2S vials.	FTKs and H2S vials supplied to GPs	GP	Pre and post monsoon and whenever problem or doubt of contamination arises.	FTKs and H2S vials are observed to be not in use.
Block	Block level functionaries – 1. Collection of water samples, monitoring Frequency of testing and ensuring testing-	-	Panchayati Raj Dept., UPJN-	Pre and post monsoon and whenever problem or doubt of contamination arises.	No block level laboratories available
District	UPJN - 1. To test samples for all chemical parameters and bacteriological testing for presence of E-coli with MPN number.	Laboratory available with UPJN	UPJN Division at District	Pre and post monsoon testing of all sources and regular monitoring of quality of drinking water. On an average UPJN district lab., tests 80 to 90 water samples per month	Ensuring all sources to be tested during pre and post monsoon periods is an issue.
State	UPJN - 1. To test samples for all chemical and bacteriological parameters.	Laboratory available with UPJN	UPJN		Non-monitoring of functioning of labs, and obtaining water analysis data for updation at state level.

Source: MM Analysis & Secondary Data Collected

Field Test Kits (FTKs)

- Under GoI programme, Field Test Kits (FTKs) were given to Gram Panchayats for testing few important parameters like Fluoride, Arsenic and for bacteriological testing H_2S vials were given on regular basis.
- During the field visits, it is observed that the villagers are not aware of these FTKs and H_2S vials being used for testing.

The details regarding the tested sources in 28 districts of eastern UP is given in Table 4.11.

Table 4.11: Gram Panchayat-wise Tested Sources in 28 districts of eastern UP (as on 31.01.2013)

S. No.	District	Schemes/ Delivery points and Other Sources	No. Of Sources Tested	No. of Sources with Contaminants Above Permissible Limit	
				Chemical	Bacteriological
1	Allahabad	66170	41424	78	8
2	Ambedkar nagar	18824	2337	27	1
3	Azamgarh	25911	15034	13	3
4	Bahraich	39149	10790	19	0
5	Ballia	40352	9817	300	0
6	Balrampur	22224	2493	25	3
7	Basti	33754	31541	3372	11
8	Chandauli	23645	1216	59	0
9	Chatrapati Shahu ji nagar	34359	1582	55	0
10	Deoria	37479	1110	12	0
11	Faizabad	28808	780	19	0
12	Ghazipur	26571	2350	61	0
13	Gonda	26317	19000	5273	4752
14	Gorakhpur	43991	6196	192	3
15	Jaunpur	56699	726	0	0
16	Kaushambi	18598	16397	43	5
17	Kushi nagar	44655	925	3	0
18	Maharajganj	29573	1268	23	0
19	Mau	21645	1292	21	0
20	Mirzapur	31533	12246	10	0
21	Pratapgarh	29288	16614	827	22
22	Sant Kabir nagar	13906	1048	33	2
23	Sant Ravidas nagar	22559	436	6	0
24	Shravasti	13002	429	2	0
25	Siddharth nagar	29156	6443	26	1
26	Sonbhadra	30792	4458	763	2
27	Sultanpur	37925	340	5	0
28	Varanasi	14792	822	17	0
	Total	***861677***	***209114***	***11284***	***4813***

Source: Ministry of Drinking Water & Sanitation

4.2.5 Water Treatment

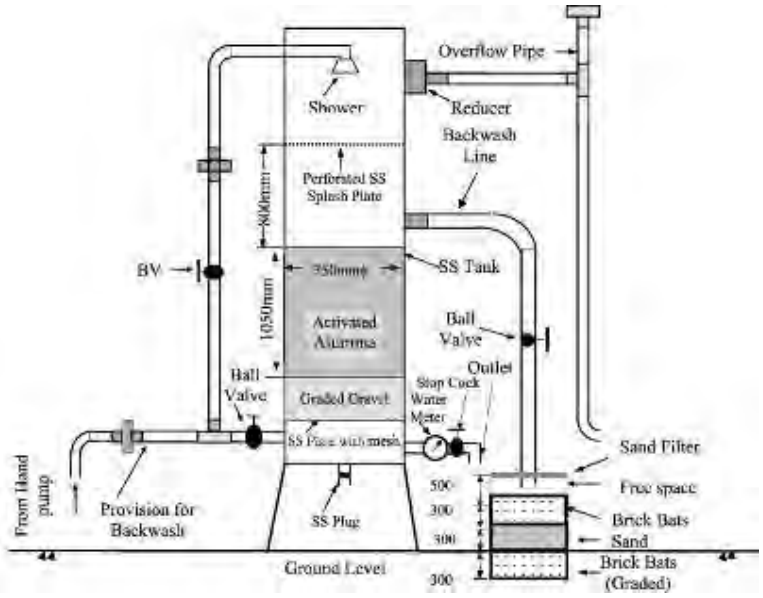
For hand pumps, generally disinfection is not required. But for hand pumps which yield quality problem water, contaminant removal plants are installed and people use contaminant free water from these plants. In case of piped water supply scheme, chlorination unit is connected to the pumping main for the disinfection of water in the piped water supply scheme. After being chlorinated, it is stored and

subsequently supplied to the users through the distribution network. The quality of supplied water is periodically monitored for residual chlorine by the operator. Water quality testing is done by the UPJN at the district level testing laboratories.

4.2.5.1 Hand Pump based Treatment

Villages, which have water sources affected by quality problem such as iron, fluoride, arsenic or other toxic elements, Uttar Pradesh Government has been adopting a number of techniques/ equipments for water treatment. Small scale hand pump based water treatment plants (i.e. Arsenic removal units based on activated alumina process, Fluoride removal units; iron removal units) are installed in places like Bahraich, Ballia, Gorakhpur, Sonbhadra, etc. in the Eastern UP. These units are under use on mass scale and as per data available, all the Arsenic and Fluoride affected habitations are covered by these plants in the Eastern UP except 22 habitations. UPJN has installed more of such plants in eastern parts of UP where water-quality is a serious issue. As these plants are hand pump based and the supplier has to install and maintain the plants for 5 years, most of the plants are functioning and in use.

Figure 4.6: Typical Arrangement of Handpump operated Arsenic Removal Unit (ARU)



Source: Resources, Conservation and Recycling by Elsevier B.V

4.2.5.2 Piped Water Supply Schemes - Disinfection

In case of piped water supply schemes, the source is mostly ground water and treatment is limited to disinfection with chlorination with minimum concentration of 0.2mg/l. UPJN has constructed such systems in quality affected districts of eastern UP and at present these schemes are being maintained by UPJN.

4.3 Status of Water Schemes

The UP State Government Constituted a Corporation by the name of Uttar Pradesh Jal Nigam in the year 1975 which came into existence with effect from 18th June 1975. The basic objective of creating this corporation is development and regulation of water supply & sewerage services and for matters connected therewith.

Many areas of Uttar Pradesh suffer from poor quality drinking water. The rural water supply system includes traditional open wells, hand pumps; piped water supply schemes with disinfection treatment having supply through public stand posts and connections. The process of decentralisation of rural water supply systems has been confined to handing over of hand pumps to Gram Panchayats, which are responsible for maintenance.

Though the piped water supply schemes after completion need to be handed over to the Gram Panchayats concerned, the Gram Panchayats are not coming forward to take over the operation and maintenance of the schemes due to lack of technical staff and availability of funds for O&M. Due to this fact, many of the completed piped water supply schemes are being operated and maintained by UP Jal Nigam itself, which is the executing agency of water supply schemes. It is understood that Jal Nigam also does not have funds earmarked for O&M of the schemes and Jal Nigam being Corporation, charges the amount required for investigations and construction supervision to the estimate cost of the schemes.

To tackle low yield from the deep hand pumps, UPJN have introduced the technology of using hydro fracturing units, through which high pressure water is pumped into the bore hole to the aquifer, which forces the closed fractures in the strata to open up and channelise water to the bore from the aquifer. Through this method some of the dry and low yield bore wells could yield at least to the extent of drinking water requirement at 12litres per minute. But still during the summer season, the ground water table within such deep bores diminishes and creates water shortage problems.

Water Supply in Integrated Action Plan (IAP) Districts

IAP districts are characterised by small remote habitations with large tribal populations and with no power supply or irregular supply. The average cost per Solar Powered Dual pump based piped water supply schemes is about Rs 5 lakh; through National Rural Drinking Water Programme (Sustainability) funds that are provided on a 100% central share basis and with subsidy from Ministry of New and Renewable Energy. The other costs on bore well, piping, tanks etc, may be met from NRDWP (Coverage) fund on 50:50 share basis. The Figure 4.7 shows the working of a water supply system based on solar power pumps. The pump can be operated manually when the solar pump is not working.

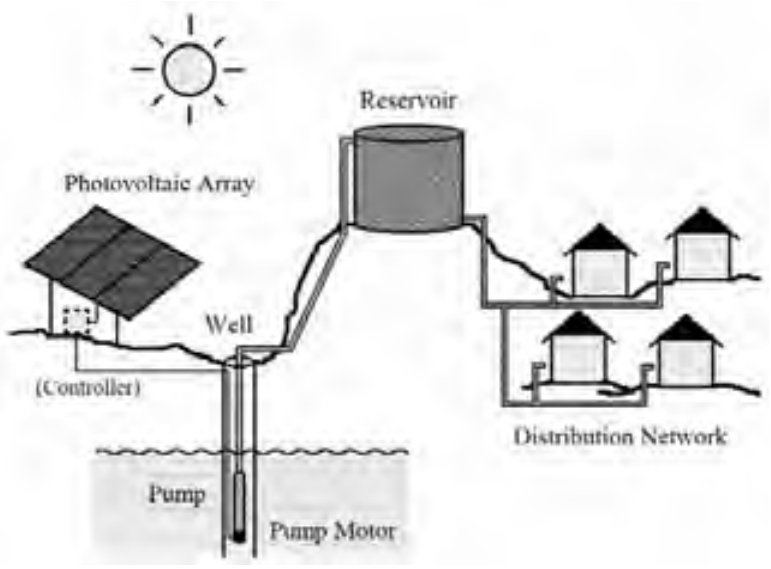
Out of 28 Eastern districts of UP, total three districts are selected for the scheme – Chandauli, Mirzapur and Sonbhadra. Out of the selected 82 IAP districts from entire UP state, total habitations to be targeted within particular districts (within our project area) are as given below;

Table 4.12: Total Nos. of habitations to be benefited - 28 districts of eastern UP

District	Total Habitations in District	Total Nos. of Habitations to be targeted in the district
Chandauli	323	44
Mirzapur	677	92
Sonbhadra	309	37
Total	1308	173

Source: Ministry of Drinking Water and Sanitation, MM Analysis

Figure 4.7: Typical arrangement - Solar Powered Dual pump based piped water supply scheme

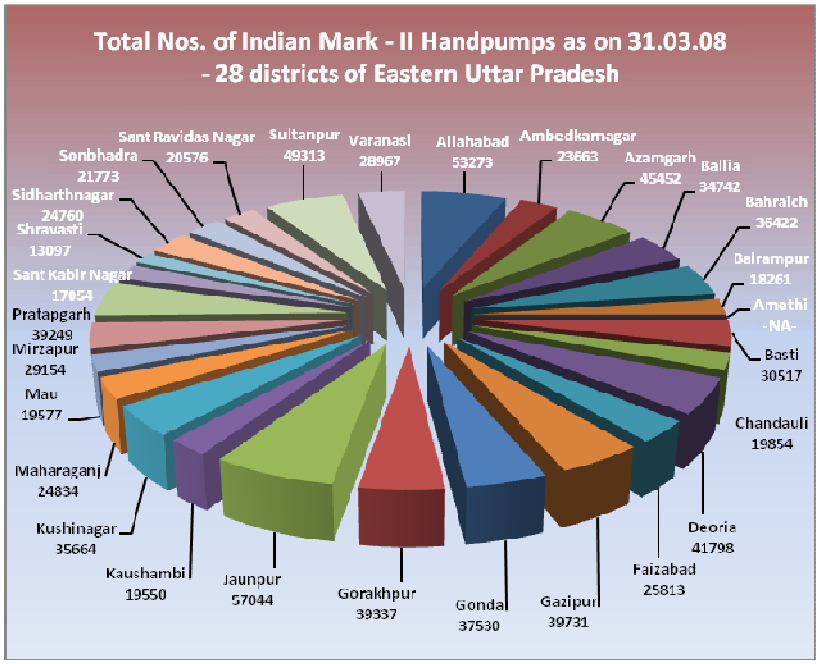


4.3.1 Existing drinking water schemes

The existing rural water supply schemes essentially have two modes of supply with ground water as source - Piped water supply schemes (Single & Multi Village) and hand pumps.

The piped water supply schemes constitute a deep bore well/tube well source with a submersible pump, Over Head Tank (OHT) and a piped distribution system with public stand posts in the villages. A chlorination unit is connected to the pumping main for the disinfection of water. The water, after being chlorinated, is pumped to the overhead tank where it is stored and subsequently supplied to the users through the distribution network.

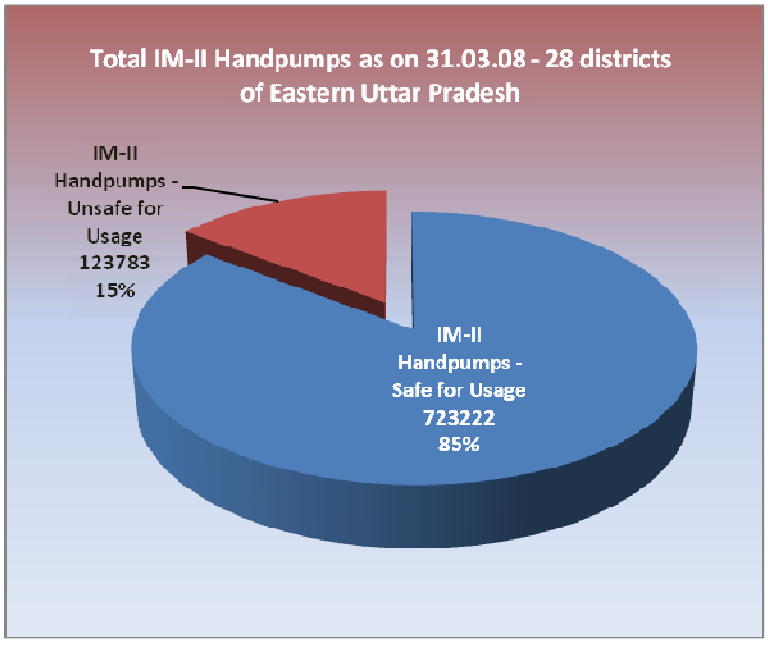
Figure 4.8: Total nos. of handpumps installed in 28 districts of eastern Uttar Pradesh



Total Nos. of IM-II handpumps – 847,005

Source: UP Jal Nigam, MM Analysis

Figure 4.9: Status of IM-II Handpumps - 28 districts of Eastern UP



Source: UP Jal Nigam, MM Analysis

Table 4.13: Existing Drinking Waster Schemes - 28 Districts of Eastern UP

District	Total Habitations	Habitations covered by Piped Water Schemes	Type of Drinking Water supply source						
			Habitations covered by			Habitations covered by			
			Handpump / Tubewells	Open Well	Infiltration Gallery / Well	Pond/River/Stream	Spring	Treated Surface Water	Rivulet / Nallah / Gadhera
Allahabad	9954	89	4903	106	5	0	0	0	0
Ambedkar nagar	5598	50	3227	15	1	0	0	1	0
Azamgarh	11360	10	6567	41	27	0	0	0	0
Bahraich	8743	116	6461	202	4	0	0	0	0
Ballia	5132	202	3350	77	0	0	0	0	0
Balrampur	4102	39	3041	24	1	1	0	0	0
Basti	5342	61	4321	31	0	0	0	2	0
Chandauli	2533	20	2372	22	1	0	0	0	0
Chatrapati Shahu ji nagar	6434	120	4595	15	3	0	0	0	0
Deoria	4113	29	2686	83	6	0	0	2	0
Faizabad	6213	1	4364	27	1	0	0	0	0
Ghazipur	7988	165	4356	34	10	0	0	13	0
Gonda	12252	153	8321	96	120	0	0	0	0
Gorakhpur	6568	86	5399	5	10	0	0	0	0
Jaunpur	13516	51	9622	70	4	0	0	0	0
Kaushambi	1877	38	1466	24	1	0	0	0	0
Kushi nagar	6010	73	5142	317	20	1	0	0	0
Maharajganj	4105	68	3441	20	2	0	0	0	0
Mau	4511	25	3621	15	0	0	0	0	0
Mirzapur	4206	48	2600	69	11	2	1	0	2

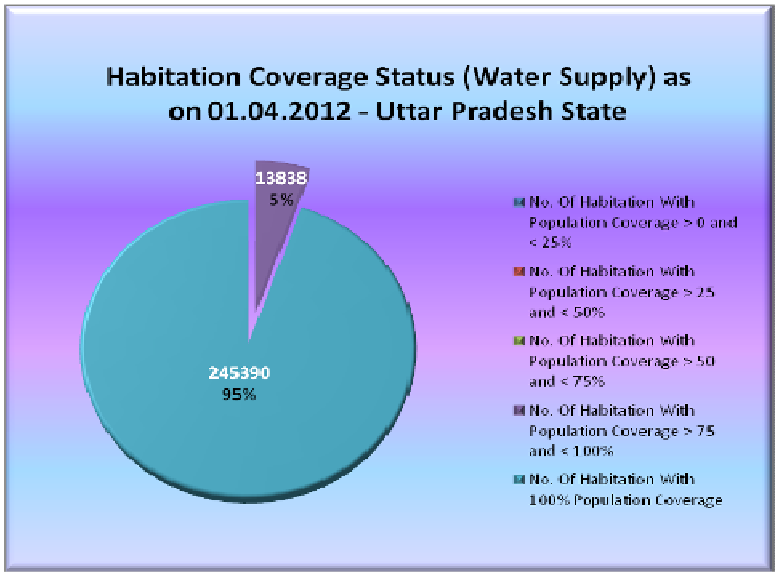
Pratapgarh	8614	398	3588	27	1	0	0	0	0
Sant Kabir nagar	2429	31	1824	0	6	0	0	0	0
Sant Ravidas nagar	3526	0	2427	47	2	0	0	0	0
Shravasti	2587	13	1997	5	2	0	0	0	0
Siddharth nagar	4005	86	2699	27	0	0	0	0	0
Sonbhadra	2319	559	2161	244	27	0	0	0	0
Sultanpur	5592	81	3499	13	0	0	0	0	0
Varanasi	4663	43	2522	0	22	0	0	1	0
TOTAL	***164292***	***2655***	***110572***	***1656***	***287***	***4***	***1***	***19***	***2***

Source: UP Jal Nigam, MM Analysis

Coverage status

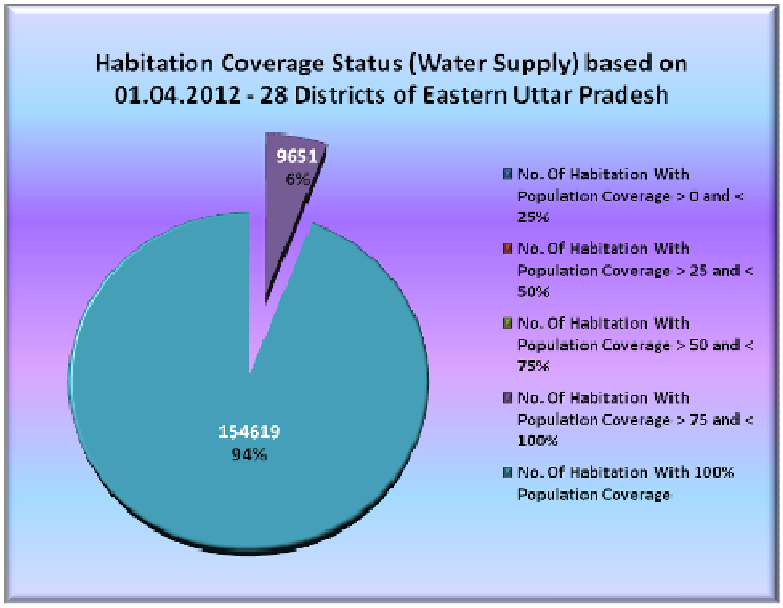
As on 01.04.2012, the state of UP has a total of 260110 habitations, out of which, the population of 13838 habitations are covered by more than 75% to 99% and the population of 245390 habitations are covered by more than 100%, leaving a balance of 882 quality affected habitations, which need to be covered. The coverage status of the State and of proposed project area, i.e., Eastern UP is depicted below.

Figure 4.10: Habitation Coverage for UP State for Water Supply



Source: UP Jal Nigam, MM Analysis

Figure 4.11: Habitation Coverage for 28 districts of Eastern UP for Water Supply



Source: UP Jal Nigam, MM Analysis

4.3.2 Household water supply

Water supply for rural households is facing increasing antagonism. Approximately 85% of eastern UP's rural population rely on shallow or deep groundwater aquifers for drinking water. Domestic use accounts for only 20-30% of total groundwater abstraction, whereas irrigation accounts for almost 60-65% and industry for the remainder.

The recent expansion and development of the agricultural sector have swelled the demand for groundwater-based irrigation which is around 54 BCM/Yr (as per Uttar Pradesh Development Report – Vol. 2). Groundwater currently provides half of the water used for irrigation and is abstracted from Tube wells/Bore wells.

4.3.3 Requirements for animals

Water use by animals is water associated with livestock watering, feedlots, dairy operations, and other on-farm needs. Livestock includes dairy cows and heifers, beef cattle and calves, sheep and lambs, goats, hogs and pigs, horses, and poultry. Other livestock water uses include cooling of facilities for the animals and animal products such as milk, dairy sanitation and wash down of facilities, animal waste-disposal systems, and incidental water losses.

As per the existing practice within the project are, it is observed that majority of the water requirement for the livestock is fulfilled from the hand pumps itself, and thus there is no such separate quantum of water requirement has been computed. Though in some of the villages, it was observed that, livestock were fed from the available individual private shallow hand pumps; while the dwellers were using the IM-II deep bore hand pumps installed by UPJN for their daily water requirements.

There shall be a need in prospective project for water supply schemes for considering the water requirement for livestock, during designing phase of the piped water supply schemes, especially for the hilly terrains (e.g. Sonbhadra district), where there is scarcity of ground water availability.

Considering the population of livestock in rural areas as per ***18th Livestock census 2007 (25,373,189)*** with an average requirement of 10 Litres per animal per day works out to around **250MLD.**

5. Rural Sanitation

5.1 Health

Health care in U.P. can be summarized as a composite challenge of access, quality and demand. The large public sector does not have adequate access besides being found wanting in the quality of care at the cutting edge line (PHCs and Sub-centres).

Uttar Pradesh has a large public sector health infrastructure comprising one ***Super Specialty Institution*** (SGPGI), 7 government ***medical colleges*** & ***hospitals***, 53 ***District Hospitals***, 13 ***Combined Hospitals***, 388 ***Community Health Centres***, 823 ***block PHCs***, 2817 additional ***PHC***s apart from 20521 ***Sub Centres***. Apart from this entire infrastructure in the state, the physical health infrastructure in the State is still much below the country average.

5.1.1 Status of existing facilities

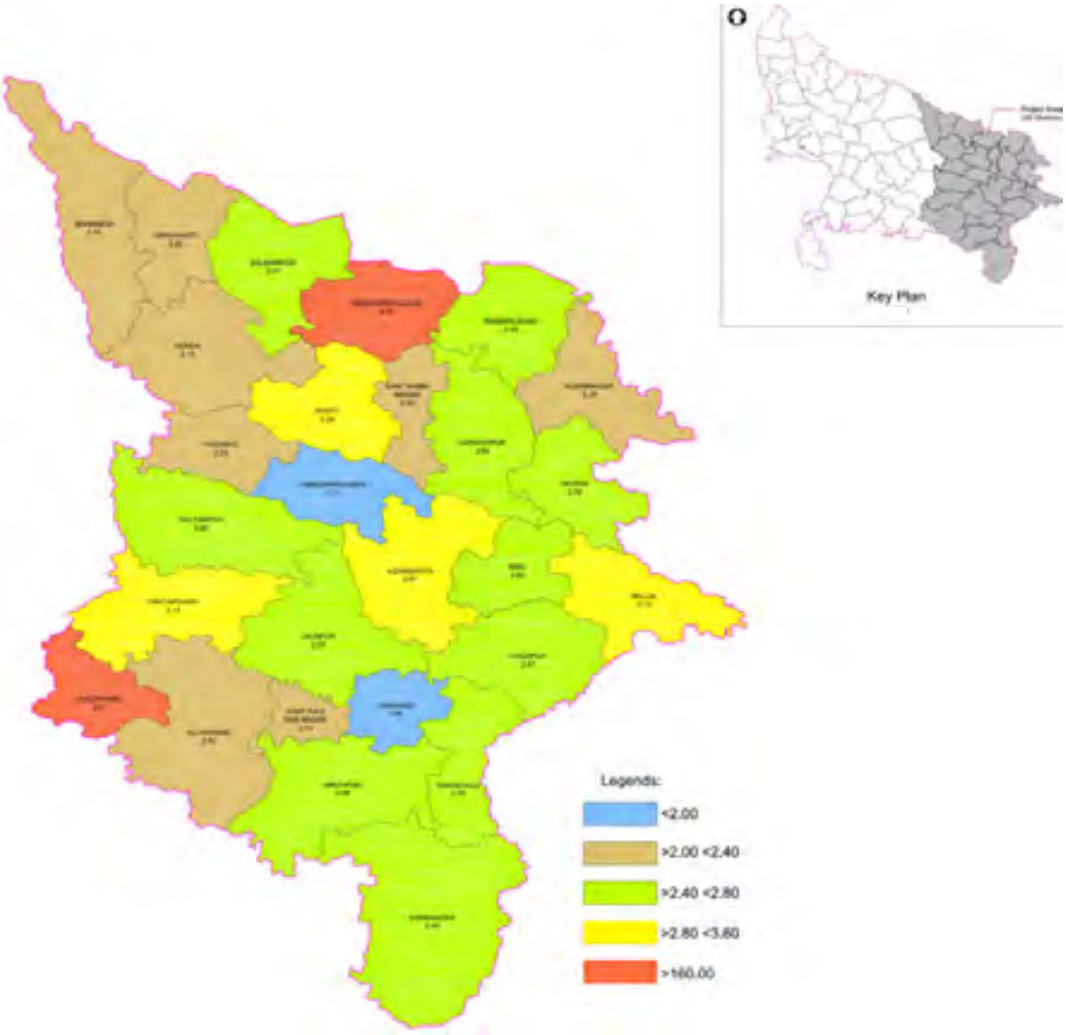
In rural UP, 27% of the people seek inpatient care from public sector against a national average of 42% and others go to private practitioners, quacks and traditional healers.

Table 5.1: Health Infrastructure in UP - Rural Area

Type of Facility	Number
Community Health Centres (CHCs)	388
Block Public Health Centres (BPHCs)	823
Additional Public Health Centres (PHCs)+BPHCs	3640
Rural PHCs (Primary Health Centres)/?	147
Sub Centres	20521

Source: Human Development Report, UP - MM Analysis

Map 5.1: Allopathic Hospitals/ Dispensaries per lakh of Population (Nos.)



Source: Planning Atlas, UP - MM Analysis

5.1.2 Health status

The overwhelming cause of premature death and disability apart from the illness within the state, are the communicable diseases, malnutrition, and prenatal conditions, a disease pattern common among very poor population. Other notable diseases which affect quality of life and human development in UP are reproductive morbidity (including RTI) and diseases like malaria, tuberculosis, leprosy, AIDS, blindness, diarrhoea and measles, etc. Healthy life conditions are also threatened by diabetes, blood pressure and coronary diseases. Invariably, children constitute a large proportion of these victims.

A large number of people are losing their lives from non-fatal diseases is a matter of grave concern. Death from malnutrition raises a whole range of issues relating to child and maternal care, micronutrients and poverty. Another large chunk of these valuable lives are being lost due to lifestyle diseases.

The major illnesses observed within the state are briefly discussed below. It is observed that due to lack of environmental sanitation in the villages, diseases such as Japanese Encephalitis (JE)/ Acute Encephalitis Syndrome (AES), Malaria, and Gastro-enteritis are affecting the rural population. The major source of these diseases has been identified as the puddles of stagnant water and wastewater nearby the fields/houses, which are breeding places of mosquitoes.

- ***Leprosy***

Leprosy is one of the major health problems in Uttar Pradesh, which falls in the range of high endemic states. In 1983 over 1, 87,000 cases of leprosy were on record. Around the turn of the century, 50,000-60,000 new cases were being detected in Uttar Pradesh every year. However, by 2005 this number had come down to 27,582.

- ***Malaria***

Malaria is a high incidence morbidity condition in Uttar Pradesh. The evidence suggests that over the years malaria cases do not seem to show any discernible decline, however, there has been a significant decline in death due to malaria. Maximum incidence is observed in the *tarai* belt of the state.

- ***AIDS***

12 districts in the UP state are regarded as high prevalence districts of HIV. In October 2005 Uttar Pradesh had 2,248 AIDS cases, of which 1,873 were men and 375 females. Efforts have been made by the state to meet the looming threat of HIV / AIDS by conducting awareness campaigns with the involvement of NGOs.

- ***Japanese Encephalitis***

Japanese Encephalitis (JE) is a much bigger and unique challenge in Uttar Pradesh. It is found that 60% of total JE cases in the country are accounted for, by Uttar Pradesh state followed by the states like Assam, Karnataka and Bihar.

Japanese encephalitis is endemic in several parts of the state. The disease has emerged as a major killer particularly in the eastern region of the state. Around 32 districts emerge as worst affected by the disease. As per the ministry of state for health and family welfare, in year 2011 a total of 501 deaths due to AES (brain fever) have been reported from all the districts of Uttar Pradesh. During year 2011, in Gorakhpur district there were a maximum of 143 deaths, which was followed by Kushinagar district with 123 deaths and Deoria district with 95 deaths in Uttar Pradesh.

The Table below shows the nos. of blocks and Gram Panchayat affected with JE / AES disease, widely observed at Gorakhpur and Deoria district. The disease had an effect which caused deaths in certain cases due to lack of treatment at right time, or inaccessible medical facilities due to remote places, unavailability of anti-biotic, etc.

Table 5.2: List of Japanese Encephalitis (JE)/Acute Encephalitis Syndrome (AES) Affected GPs in eastern UP

S. No.	District Name	No of JE/AES affected Blocks	No of JE/AES affected GPs
1	Azamgarh	2	3
2	Bahraich	0	0
3	Ballia	5	6
4	Balrampur	9	62

5	Basti	2	13
6	Deoria	16	325
7	Gonda	2	3
8	Gorakhpur	18	200
9	Kushinagar	4	25
1	Maharajganj	0	0
10	Mau	7	11
11	Sant Kabir Nagar	9	181
12	Shravasti	0	0
13	Siddharth Nagar	14	112
	Total	***88***	***941***

Source: Ministry of Drinking Water and Sanitation, MM Analysis

Map 5.2: JE/AES affected districts (Nos.)

Source: Ministry of Drinking Water & Sanitation, MM Analysis

5.2 Sanitation

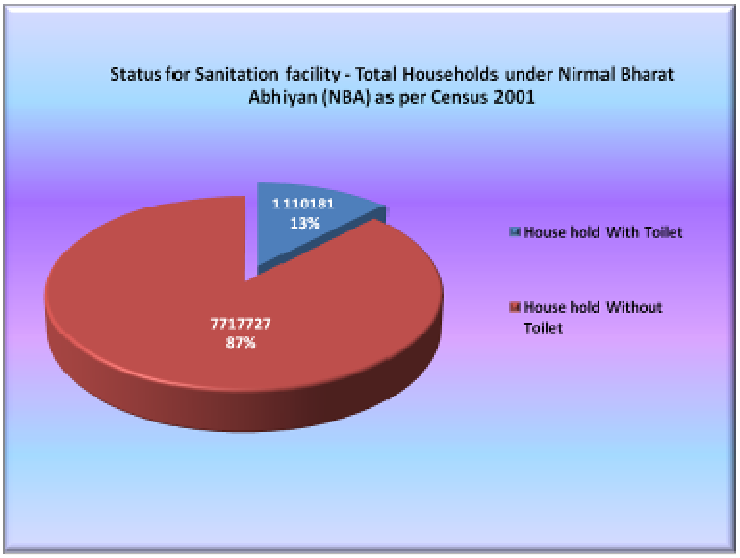
There are no sanitation facilities in most of rural households in eastern Uttar Pradesh. Among the total of 8,827,908 households who have access to a sanitary facility, about 50% have a toilet within their house, 4% households share a toilet with other households while about <2% households use a public toilet. More than **80%** of village population practice open defecation which not only results in degraded sanitation situation but also is a source of contamination of shallow groundwater.

5.2.1 Sanitation status

Habitually sanitation in rural India relied heavily on high levels of subsidies for latrine construction. Focus on 'Triggering' behaviour change for the community as well as individual is necessary. Increasing trend has been observed with the achievement of the sanitation facility for the households with the intervention of Central Government with Total Sanitation Campaign programme (now named as Nirmal Bharat Abhiyan), as described in Figure 5.2 below, with almost 80% increase since 2001-2002 year. Details of households with/without toilets are as furnished in the Figure 5.1 below. The baseline data for the toilets constructed is as given in Table 5.3 below. From the baseline data it is observed that majority of the schools, Anganwadi and sanitary complexes are without toilets.

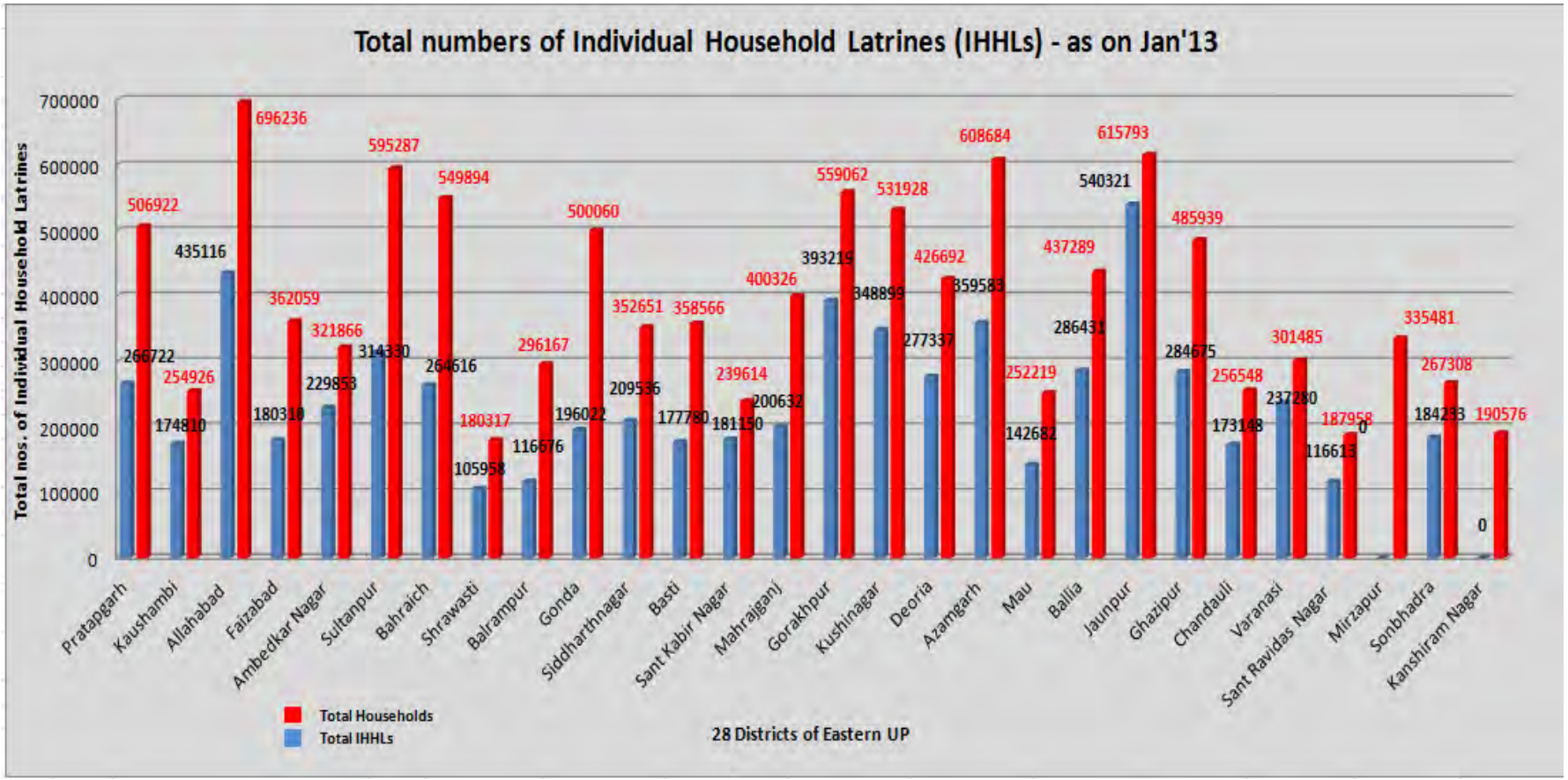
Mere construction of toilets will not result in its usage, unless there is behavioural change in the people. This change can be triggered only with sustained awareness campaigns and IEC activities at village level. The programme now named as Nirmal Bharat Abhiyan rightly puts emphasis on IEC activities but not just on numbers.

Figure 5.1: Status of Households Sanitation



Source: Ministry of Drinking Water and Sanitation, MM Analysis

Figure 5.2: Total nos. of IHHL's as compared to Toal Households



Source: Ministry of Drinking Water and Sanitation - MM Analysis

Table 5.3: District-wise Toilet Construction Status in 28 districts of eastern Uttar Pradesh (as on 30.12.2012)

S. No.	District Name	District wise Base Line Data											
		Total Household as per Baseline Survey	BPL Family		APL Family		BPL+APL Family		School Toilet		Anganwadi Toilet		Sanitary Complex	
			with Tlt.	Without Tlt.	With Tlt.	Without Tlt.	With Tlt.	Without Tlt.	With Tlt.	Without Tlt.	With Tlt.	Without Tlt.	With Tlt.	Without Tlt.
1	Allahabad	657927	28897	181311	7159	440560	36056	621871	82	2644	99	2219	3	20
2	Ambedkar Nagar	278288	9434	132725	9092	127037	18526	259762	121	1334	23	1350	2	18
3	Azamgarh	560095	34898	178967	35634	310596	70532	489563	923	2443	18	2296	3	86
4	Bahraich	432146	48332	187920	27021	168873	75353	356793	1011	1451	2	1802	0	0
5	Ballia	321828	86065	91038	42130	102595	128195	193633	149	3443	98	1085	9	107
6	Balrampur	227461	17529	65161	8400	136371	25929	201532	553	1245	13	1191	1	18
7	Basti	335317	25133	160471	29309	120404	54442	280875	22	1643	24	1807	5	21
8	Chandauli	227181	12276	91959	15340	107606	27616	199565	29	1310	4	1101	1	22
9	Chatrapati Shahu ji Maharaj Nagar (Amethi)	A newly formed district comprising parts of Sultanpur and Rae Bareli districts.												
10	Deoria	360473	69203	95410	40401	155459	109604	250869	243	1914	57	1025	16	17
11	Faizabad	232942	23405	96565	7033	105939	30438	202504	563	608	10	1083	1	0
12	Ghazipur	473686	37769	124542	35189	276233	72958	400775	21	1754	4	1458	56	14
13	Gonda	350153	14105	136500	11783	187765	25888	324265	26	1864	4	1483	0	16
14	Gorakhpur	524606	85081	149342	85019	205164	170100	354506	54	1246	32	1199	20	85
15	Jaunpur	600402	54361	172782	72513	300746	126874	473528	3	2622	1	3400	0	125
16	Kaushambi	271743	27861	111870	14310	117702	42171	229572	36	729	12	263	0	22
17	Kushinagar	478938	88685	221543	61895	106815	150580	328358	119	1987	85	2130	3	25
18	Maharajganj	299071	27271	142669	18515	110616	45786	253285	5	1426	3	1402	0	53
19	Mau	242055	40476	112003	21109	68467	61585	180470	96	887	286	804	0	13
20	Mirzapur	322511	10023	165200	9078	138210	19101	303410	32	1614	4	1199	33	109
21	Pratapgarh	459422	84931	104163	13834	256494	98765	360657	36	2381	88	1955	72	50
22	Sant Kabir Nagar	251528	15275	120090	7704	108459	22979	228549	571	1182	2	988	0	0
23	Sant Ravidas Nagar	173935	6486	67485	9812	90152	16298	157637	1	810	0	902	2	27
24	Shravasti	166343	5453	104820	2465	53605	7918	158425	0	908	0	647	2	3
25	Siddharth Nagar	330895	28623	128038	41365	132869	69988	260907	60	1376	14	1250	0	49
26	Sonbhadra	264203	13252	138160	10323	102468	23575	240628	3	1178	0	575	2	7
27	Sultanpur	422859	6747	162406	10296	243410	17043	405816	238	3557	8	1962	4	40
28	Varanasi	301496	26358	85530	36728	152880	63086	238410	346	551	267	430	1	1
	Total	***9567504***	***927929***	***3528670***	***683457***	***4427495***	***1611386***	***7956165***	***5343***	***44107***	***1158***	***37006***	***236***	***948***

* Data shown above is changing frequently because of ongoing online data entry of GP-wise baseline data.
** Sanitary Complex is an infrastructure for the use of the community and/or floating population. Depending on the nature of users, a sanitary complex may be categorized as either a community toilet or public toilet. The design aspect remains the same in both cases. The type of toilet in both cases depends upon the expected profile of users.

Source: Ministry of Drinking Water & Sanitation, MM Analysis

5.2.2 Sanitation level

From sanitation perspective Eastern Uttar Pradesh is in a transition phase. Risks associated with bacteriological contamination due to traditional sanitation practices, though decreasing, are still relatively high. In addition, new risks are emerging from the rise in wastewater production (and its inappropriate or inadequate disposal) that accompanies the increased coverage and service levels.

Environmental sanitation is essential for minimizing the vector-borne diseases that thrive in stagnant waters. User satisfaction with sanitation facilities or displeasure at the lack of facilities, are typically correlated with demand for household latrines. The latter depends on population density, access to open space, and cultural and social factors. Access to sanitation is accompanied by intensive information and health education campaigns.

5.3 Waste Management

5.3.1 Solid and Liquid Waste Management

Effective solid and liquid waste management is the key to achieve this and create a clean environment. Effective management of SLWM includes management of biodegradable and non biodegradable waste, management of all grey water generated in the village and general cleanliness of the village.

Table 5.4: Sanitation Status - 28 district of eastern UP

Districts	IHHLs	No. of Solid Liquid Waste Management Programs
Allahabad	36056	0
Ambedkar nagar	18526	0
Azamgarh	70532	2
Ballia	128195	20
Bahraich	75353	0
Balrampur	25929	0
Basti	54442	0
Chatrapati Shahuji Maharaj nagar	--	--
Chandauli	27616	76
Deoria	109604	0
Faizabad	30438	249
Ghazipur	72958	7
Gonda	25888	1
Gorakhpur	170100	1233
Jaunpur	126874	0
Kaushambi	42171	0
Kushinagar	150580	0
Maharajganj	45786	112
Mau	61585	11
Mirzapur	19101	0
Pratapgarh	98765	62
Sant Kabir nagar	22979	38

Districts	IHHLs	No. of Solid Liquid Waste Management Programs
Sant Ravidas Nagar	16298	0
Shravasti	7918	0
Siddarthnagar	69988	56
Sonbhadra	23575	73
Sultanpur	17043	53
Varanasi	63086	34

Source: Ministry of Drinking Water & Sanitation, MM Analysis

6. Field Survey & Study

6.1 Sample selection

Based on the discussions with the Client, four districts, i.e., Bahraich, Ballia, Gorakhpur and Sonbhadra, which fairly represent the eastern UP, were selected and it was suggested to take up field study in three villages from each of the four representative districts.

6.1.1 Selection of 13 villages

As per the discussion with client, it has been decided to consider at least 3 villages each from the selected 4 districts (Bahraich, Gorakhpur, Ballia and Sonbhadra) considered as the representative districts and based on the secondary data collection, proceeded for the preparation of the Environmental Assessment and Environmental Management Framework for the project area (28 districts of Eastern UP).

6.1.2 Sample details

The sample villages from the 4 representative districts selected for the studies are as follows:

S. No.	District	Block	Village
1.	Bahraich	Tejwapur	Chhetara
		Tejwapur	Dhanipurwa
		Chitaura	Shahpur Jyotyusuf Hathila
2.	Gorakhpur	Piprauli	Jeetpur
		Pipraich	Jagdishpur Khas
		Pipraich	Semaria tola
		Sardarnagar	Avadhpur
3.	Ballia	Belhari	Bajraha
		Belhari	Ramghad
		Belhari	Udvant Chhapra
4.	Sonbhadra	Robertsganj	Bahuwar
		Robertsganj	Lodhi
		Robertsganj	Pusauli

6.1.3 Methodology of field study

The consultant has to collect the existing information about Environmental issues of RWSS sector, from the sector institutions and other sources like report of the surveys conducted in the past, the report of the relevant studies done earlier, official records of various concerned departments/organizations etc.

As per our scope of work for the assignment, detailed field study was conducted within the four sample districts of Eastern UP. These sample districts were selected in consultation with SWSM with regards to the various prevailing issues within these districts. Bahraich, Ballia, Gorakhpur and Sonbhadra districts were selected as the sample districts for field study.

6.2 Analysis of Peoples' perception and present status

6.2.1 General

District	Village Name	Block	Population	No. of HH	Remarks
Bahraich	Chhetara	Tejwapur	800	160	No Historical Important, structures were found
	Dhanipurwa	Tejwapur	396	82	
	Shahpur Jyotyusuf Hathila	Chitaura	-	450	Historical important - Mosque of Hathila >200 yrs old
Gorakhpur	Jeetpur	Piprauli		-	No Historical Important, structures were found
	Jagdishpur Khas	Pipraich	4628	-	
	Semaria tola	Pipraich	2347	-	
	Avadhpur	Sardarnagar	-	35	
Ballia	Bajraha	Belhari	3723	200	No Historical Important, structures were found
	Ramghad	Belhari	7678	1500	
	Udvant Chhapra	Belhari	10971 (Covering 8 habitations)	2000	
Sonbhadra	Bahuwar	Robertsganj	5000	700	
	Lodhi	Robertsganj	5100	-	No Historical Important, structures were found
	Pusauli	Robertsganj	3000	500	

* Historical Importance represents the importance of the village as Archeologically, Religiously, etc.

6.2.2 Baseline Environment

District	Village Name	Block	Field Observations
Bahraich	Chhetara	Tejwapur	▪ Plain Topography ▪ No water logging problems within the area ▪ No water bodies found. ▪ Unpaved roads ▪ Average width of road is <2.0 m. ▪ No solid waste disposal system was found. ▪ Local Crops: sugarcane, wheat pepper mint, & paddy.
	Dhanipurwa	Tejwapur	▪ Plain Topography ▪ Shallow Water table ▪ Deep aquifer for UPJN handpumps ▪ No water bodies found. ▪ No water logging problems within the area ▪ Unpaved roads ▪ Average width of road is <3.0 m. ▪ Solid waste disposal system: Street collection ▪ Local Crops: wheat, vegetables
	Shahpur Jyotyusuf Hathila	Chitaura	▪ Plain Topography ▪ Shallow Water table ▪ Deep aquifer for UPJN handpumps ▪ Lake is used for discharging of village liquid waste. ▪ No water logging problems within the area ▪ Paved roads ▪ Average width of road is <2.0 m. ▪ Solid waste disposal system: Partly in drains and partly open dumping. ▪ Local Crops: Tomato, wheat, Mutter, Guava
Gorakhpur	Jeetpur	Piprauli	▪ Plain Topography ▪ Silty clay soil ▪ Rainfall: 1195mm, Moderate ▪ River as a water body was found. ▪ Very deep water table. ▪ No water logging problems within the area

District	Village Name	Block	Field Observations
			▪ Unpaved roads ▪ Average width of road is <2.0 m. ▪ No Solid waste Collection system. ▪ Local Crops: Tomato, wheat, Paddy, peas.
	Jagdishpur Khas	Pipraich	▪ Plain Topography ▪ Silty Clay Soil ▪ Average 1195mm rainfall ▪ Shallow Water table ▪ Deep aquifer for UPJN handpumps ▪ No water logging problems within the area. ▪ Lake as a water body found. ▪ Lake is used for discharging of village liquid waste. ▪ Unpaved roads ▪ Average width of road is <3.0 m. ▪ No Solid waste disposal system. ▪ Local Crops: wheat, Paddy.
	Semaria tola	Pipraich	▪ Plain Topography ▪ Silty Clay/ Black cotton Soil at 4m depth. ▪ Shallow Water table ▪ Deep aquifer for UPJN handpumps ▪ Average 1195mm rainfall- Moderate ▪ No water logging problems within the area ▪ Unpaved roads ▪ Average width of road is <2.0 m. ▪ No Solid waste disposal system. ▪ Local Crops: wheat, Paddy, Seasam
	Avadhpur	Sardarnagar	▪ Plain Topography ▪ Silty Clay soil ▪ Average 1195 mm rainfall- Moderate ▪ Shallow Water table ▪ Deep aquifer for UPJN handpumps ▪ No water logging problems within the area

District	Village Name	Block	Field Observations
			▪ Partially paved roads ▪ Average width of road is <2.0 m. ▪ No Solid waste disposal system. ▪ Local Crops: wheat, Paddy, Sugarcane, Vegetables
Ballia	Bajraha	Belhari	▪ Plain Topography ▪ Sand mined soil ▪ Shallow Water table ▪ Deep aquifer for UPJN handpumps ▪ No existing water body. ▪ No water logging problems within the area. ▪ Paved roads ▪ Average width of road is <2.0 m. ▪ No Solid waste disposal system. ▪ Local Crops: wheat, channa, Vegetables
	Ramghad	Belhari	▪ Plain Topography ▪ Sand mined soil ▪ Moderate rainfall ▪ Shallow Water table ▪ Deep aquifer for UPJN handpumps ▪ No existing water body. ▪ No water logging problems within the area. ▪ Paved roads ▪ Average width of road is <2.0 m. ▪ No Solid waste disposal system. ▪ Local Crops: wheat, channa, Vegetables, Paddy
	Udvant Chhapra	Belhari	▪ Plain Topography ▪ Sand mined soil (Silty sandy) ▪ Moderate rainfall ▪ Deep water table ▪ water body: Lake ▪ No water logging problems within the area. ▪ Liquid waste discharges direct to streets, contaminate drinking water body.

District	Village Name	Block	Field Observations
			▪ Paved roads ▪ Average width of road is <3.0 m. ▪ No Solid waste disposal system. ▪ Local Crops: wheat, Vegetables
Sonbhadra	Bahuwar	Robertsganj	▪ Plain Topography ▪ Silty clay - Soil ▪ Moderate rainfall ▪ Very deep water table ▪ Lake – water body ▪ No water logging problems within the area. ▪ Paved roads ▪ Average width of road is <2.0 m. ▪ No Solid waste disposal system. ▪ Local Crops: wheat, paddy, Tomato, Mustered, Channa, Arhar, Vegetables
	Lodhi	Robertsganj	▪ Plain Topography ▪ Silty clay - Soil ▪ Moderate rainfall ▪ Very deep water table ▪ Paved roads - Average width of road is <2.0 m. ▪ No water logging problems within the area. ▪ No Solid waste disposal system. ▪ Local Crops: wheat, paddy, Tomato, Channa, Seasam, Vegetables
	Pusauli (Patel Basti)	Robertsganj	▪ Plain Topography ▪ Silty clay - Soil ▪ Moderate rainfall ▪ Very deep water table ▪ No water logging problems within the area. ▪ Paved roads - Average width of road is <2.5 m. ▪ No Solid waste disposal system. ▪ Local Crops: wheat, Mustered, Vegetables

6.2.3 Public Health Issues

District	Village Name	Block	Remarks
Bahraich	Chhetara	Tejwapur	▪ No incidence of waterborne diseases in the past. ▪ No vector borne diseases
	Dhanipurwa	Tejwapur	
	Shahpur Jyotyusuf Hathila	Chitaura	
Gorakhpur	Jeetpur	Piprauli	▪ No incidence of waterborne diseases in the past. ▪ No vector borne diseases
	Jagdishpur Khas	Pipraich	
	Semaria tola	Pipraich	▪ No incidence of waterborne diseases in the past **vector borne disease of Japanese Encephalitis (JE)**
	Avadhpur	Sardarnagar	▪ No incidence of waterborne diseases in the past. ▪ No vector borne diseases
Ballia	Bajraha	Belhari	▪ No incidence of waterborne diseases in the past No vector borne diseases
	Ramghad	Belhari	
	Udvant Chhapra	Belhari	
Sonbhadra	Bahuwar	Robertsganj	▪ No incident of waterborne dieses in the past. ▪ No vector borne diseases
	Lodhi	Robertsganj	
	Pusauli	Robertsganj	

6.2.4 Existing Water Supply Scheme

District	Village Name	Block	Field Observations	Pictures
Bahraich	Chhetara	Tejwapur	▪ Water supply : Hand pump with Arsenic Removal Unit ▪ Deep Hand pump: 10 (by Jal Nigam) ▪ Shallow Hand Pump: 40 – 50. ▪ No single/multi village WS scheme ▪ G.P is responsible for Hand Pump O&M. ▪ Irrigation by tube well. ▪ Ground Water contamination due to Arsenic and human waste discharge and solid waste dumping.	
	Dhanipurwa	Tejwapur	▪ Water supply : Hand pumps with 4 ARU + 2GSF ▪ Deep Hand pump: 7 (by Jal Nigam) ▪ Shallow hand Pumps: 60. ▪ No single/multi village WS scheme ▪ G.P is responsible for Hand Pump O&M. ▪ Irrigation by tube well. ▪ 82 Households using HPs & open wells. ▪ Ground water contamination due to human waste discharge and solid waste dumping. ▪ Under Bahraich Arsenic Mitigation Program, Water quality analysis being done quarterly. ▪ Water quality problem - Iron & Arsenic.	 
	Shahpur Jyotyusuf Hathila	Chitaura	▪ Water supply : Hand pumps ▪ Deep Hand pumps: 21 (by Jal Nigam) ▪ Shallow hand Pump: 350. ▪ No single/multi village WS scheme ▪ U.P. Jal Nigam is responsible for Water Supply Schemes' O&M and Hand Pumps' O&M by GP. ▪ Irrigation by tube well. ▪ 450 HH is using HPs. ▪ Ground water contamination due to human waste discharge and solid waste dumping.	

District	Village Name	Block	Field Observations	Pictures
			▪ Water quality problem - Iron.	
Gorakhpur	Jeetpur	Piprauli	▪ Water supply : Hand pump with ARU ▪ Deep Hand pumps: 21 (by UP Jal Nigam) ▪ MVS scheme: 1 under construction at Baghagara. ▪ U.P. Jal Nigam is responsible for WS Scheme ▪ (piped) O&M and GP for Hand Pump O&M. ▪ Irrigation by tube well. ▪ 21 HH is using HPs. ▪ Ground water contamination due to human waste discharge and solid waste dumping. ▪ Water quality problem - Arsenic.	
	Jagdishpur Khas	Pipraich	▪ MVS scheme: 1 under construction ▪ U.P. Jal Nigam is responsible for Piped WS O&M and GP for HP O&M. ▪ Irrigation by tube well. ▪ 29 public stand posts. ▪ Ground water contamination due to human waste discharge and solid waste dumping. ▪ Disinfection with chlorination. ▪ Water quality problem - Arsenic	
	Semaria tola	Pipraich	▪ Water supply : Hand pump ▪ Deep Hand pumps: 4 (by UP Jal Nigam) ▪ U.P. Jal Nigam is responsible for Piped WS O&M and GP for HP O&M. ▪ Irrigation by tube well. ▪ Ground water contamination due to human waste discharge and solid waste dumping.	
	Avadhpur	Sardarnagar	▪ Water supply : Hand pump ▪ Deep Hand pumps: 5 (by UPJN) , ▪ Shallow HP : 35 ▪ U.P. Jal Nigam is responsible for Piped WS O&M. ▪ Irrigation by tube well.	

District	Village Name	Block	Field Observations	Pictures
			▪ Ground water contamination due to human waste discharge and solid waste dumping. ▪ Water quality problem - Iron.	
Ballia	Bajraha	Belhari	▪ Water supply : Hand pump with 2 ARU ▪ Deep Hand pumps: 70 (by Jal Nigam) , ▪ Shallow HP: 100 ▪ MVS scheme: 1 ▪ U.P. Jal Nigam is responsible for Piped WS O&M. ▪ Irrigation by tube well. ▪ 29 public stand posts ▪ Ground water contamination due to human waste discharge and solid waste dumping. ▪ Water quality problem - Arsenic. ▪ Disinfection with chlorine.	 
	Ramghad	Belhari	▪ Water supply : Hand pump with ARU ▪ Deep Hand pumps: 70 (by UP Jal Nigam) ▪ MVS scheme: 1 ▪ UP Jal Nigam is responsible for Piped WS O&M. ▪ Irrigation by tube well. ▪ 20 public stand posts ▪ Ground water contamination due to human waste discharge and solid waste dumping. ▪ Water quality problem - Arsenic.	
	Udvant Chhapra	Belhari	▪ Water supply scheme: 1 no. of MVS scheme ▪ U.P. Jal Nigam is responsible for Piped WS O & M. ▪ Irrigation by tube well. ▪ Ground water contamination due to human waste discharge and solid waste dumping. ▪ Water quality problem - Arsenic.	

District	Village Name	Block	Field Observations	Pictures
Sonbhadra	Bahuwar	Robertsganj	▪ Water supply : Hand pump with ARU ▪ 500HH through HPs ▪ Deep Hand pumps: 60 (by UP Jal Nigam) ▪ UP Jal Nigam is responsible for Piped WS O&M. ▪ Irrigation by tube well. ▪ Ground water contamination due to human waste discharge and solid waste dumping. ▪ Water quality problem - Iron.	 
	Lodhi	Robertsganj	▪ Water supply : Hand pump ▪ Hand pumps: 70 (by jal Nigam) ▪ 500HH through HPs & 10 Open wells ▪ UP Jal Nigam is responsible for WS O&M. ▪ Irrigation by tube well. ▪ Ground water contamination due to human waste discharge and solid waste dumping. ▪ Water quality problem - Iron.	
	Pusauli (Patel Basti)	Robertsganj	▪ Water supply : Hand pump ▪ Deep Hand pump: 2 (by UP Jal Nigam), 1 open well. ▪ UP Jal Nigam is responsible for Piped WS O&M. ▪ Irrigation by tube well. ▪ Ground water contamination due to human waste discharge and solid waste dumping. ▪ Water quality problem - Iron.	

6.2.5 Existing Sanitation Facilities

District	Village Name	Block	Field Observations	Pictures
Bahraich	Chhetara	Tejwapur	▪ Sanitation practice: Open Defecation ▪ 5 HH – with ISL ▪ Solid waste disposal: Open dumping on streets, ▪ Liquid waste disposal on streets. ▪ Lack of public hygiene awareness.	
	Dhanipurwa	Tejwapur	▪ Sanitation practice: Open Defecation ▪ 15 HH – with ISL ▪ Solid waste disposal: Open dumping on streets, ▪ Liquid waste disposal on streets. ▪ Lack of public hygiene awareness.	
	Shahpur Jyotyusuf Hathila	Chitaura	▪ Sanitation practice: Latrine with soak pits ▪ 350 HH – with ISL ▪ Solid waste disposal: Open dumping on streets, ▪ Liquid waste disposal on pond. ▪ Lack of public hygiene awareness.	
Gorakhpur	Jeetpur	Piprauli	▪ Sanitation practice: Open Defecation ▪ Solid waste disposal: Open dumping on streets, ▪ Liquid waste disposal on streets. ▪ Lack of public hygiene awareness.	
	Jagdishpur Khas	Pipraich		
	Semaria tola	Pipraich		
	Avadhpur	Sardarnagar	▪ Sanitation practice: Open Defecation ▪ Solid waste disposal: Open dumping on streets, ▪ Liquid waste disposal on streets. ▪ Moderate level of public hygiene awareness.	

District	Village Name	Block	Field Observations	Pictures
Ballia	Bajraha	Belhari	▪ Sanitation practice: Latrine with soak pits ▪ 35 HH – with ISL ▪ SWM: Dumping into near by pits, ▪ Liquid waste: Dumping into near by pits. ▪ Lack of public hygiene awareness.	
	Ramghad	Belhari	▪ Sanitation practice: Open defecation ▪ Solid waste disposal: Open dumping on streets, ▪ Liquid waste: Dumping into near by pits. ▪ Lack of public hygiene awareness.	
	Udvant Chhapra	Belhari		
Sonbhadra	Bahuwar	Robertsganj	▪ Sanitation practice: Open defecation ▪ Solid waste disposal: Open dumping on streets, ▪ Liquid waste: Dumping into near by pits. ▪ Lack of public hygiene awareness.	

6.3 Inferences

The village level survey and focused group discussions with villagers carried out during the field visits to the 13 villages in the selected representative districts of Bahraich, Gorakhpur, Ballia and Sonbhadra and key findings observed during these field visits conducted are summarized below indicated the following issues related to Water supply and Sanitation.

The field survey formats used during field visits are given in ***Appendix C***.

Water Supply – Key Issues:

1. Awareness towards the quality of drinking water being consumed is poor among the general public.

2. Bahraich and Ballia districts are affected by Arsenic contamination. Awareness on the use of handpumps for drinking water with Contaminant removal units installed is of concern.

3. In Sonbhadra, because of the geophysical status, ground water table is deep and shallow hand pumps are non-existent and rural people are generally dependent on the deep Mark-II hand pumps installed by UPJN. The habitations are scattered and sparsely populated and require maintenance free robust technologies for contaminant removal. The major quality problem, in this district is fluoride and iron. In some of the habitations, Hand pump based fluoride removal plants and Iron removal plants are installed by UPJN.

Conjecture for EMF
- Before selecting the source for water supply scheme the quality of water should be tested to ensure the water is safe for drinking.
- Coverage of quality problem habitations with contaminant removal plants like ARU/FRU could be affected, once the 5 year responsibility of O&M of these removal plants by the Contractor ends.

4. Except Sonbhadra and southern parts of the project area, other parts of eastern UP have shallow hand pumps as well as deep hand pumps (installed by UPJN) and coverage in terms of quantity is not a problem. In case of quality problem habitations, the coverage of population with contaminant free drinking water could be different, as some of the plants are not working and people are not using the water from these plants.

Conjecture for EMF
- In these quality affected habitations, piped water supply schemes with safe and sustainable source for a group of habitations can be a better option in the habitations where people come forward to bear the costs of O&M of the scheme.
- The EMF integrates measures to monitor adequate continuous disinfection of water supply to prevent the disease prevalence, (for example, monitoring of residual chlorine).

Sanitation - Key Issues:

1. More than 80% villagers are practicing open defecation.

2. Only about a few households are having sanitary latrines with soak pits, except the village Shahpurjyot Jyotyusuf Hathila in Bahraich, which is having 90% of the households with toilets.

3. Majority of the latrines which have been constructed under TSC are observed to be not in use.

4. Kitchen waste/ is being discharged in the open drains. These are meeting with natural water body present in village like pond resulting source of environmental pollution as well health and hygiene concern.

5. In most of the villages visited, proper drains are not constructed resulting in safe disposal away from the village.

6. In some of the villages' water supply pipe network is passing through/running parallel/ very close to these drains, which could be source of contamination of water pollution especially if the pipe line is having leakages.

7. In Gorakhpur villages, environmental sanitation is poor (as in other districts), where the JE disease is prevalent, but the virus could be dormant in carriers such as pigs and other animals in these areas, which could break out during rainy season.

8. Total there are 2027 nos. of Solid Liquid Waste Management programmes has been implemented within 28 districts of Eastern UP. Detailed assessment on its effectiveness could not be made due to lack of in-depth data availability from the concerned department. The works undertaken under these programs are mainly drains and soak pits for sullage disposal and collection of solid waste in dustbins. But, as observed, the waste management programs were small in number and the interventions did not yield much benefit due to ineffective O & M and lack of community ownership at the village level. Slopes for drains and proper network for disposal was not done resulting in stagnation of water in drains leading to aggravated insanitary conditions.

Conjecture for EMF

- Solid wastes should be segregated at the source and organic portion of the waste should be processed into compost and used in the agricultural field.
- Appropriate trainings for awareness creation and fund allocation should be provided for management of SLWM programmes.

7. Environmental Concerns and Management Proposals

7.1 Sector & Project related key environmental issues and management proposals

7.1.1 Water Quantity

Groundwater has been the major source of water for drinking, irrigation and industrial uses in 28 districts of eastern Uttar Pradesh. Though at present stage of ground water development is at 70% in the state, owing to large-scale extraction of groundwater for irrigation, combined with increasing demands in other sectors due to population and industrial growth, the aquifers are prone to be under stress. Some of the sources have become either unsustainable or contaminated in the southern region of the project area. For a large number of rural households which are dependent on hand pumps or tube wells, the declining and fluctuating groundwater levels could affect the water supply.

About 90% of RWSS schemes in Uttar Pradesh are based on groundwater source. The remaining 10% of the water supply schemes are based on other surface /sub-surface water sources. The RWSS project in 28 districts of eastern UP will involve implementation of Single Village Schemes (SVS) and Multi Village Schemes (MVS) to tackle problem habitations with safe and sustainable sources. The total rural population of 28 districts is around 59 million and the population to be benefited will depend on the proposed schemes to be taken up under the RWSS project. Approximately around 4130 MLD water requirement is estimated considering 70 lpcd drinking water requirement against total rural population of around 59 million for 28 districts of Eastern UP.

Environmental Issues

- Inadequate and/or disrupted water supply affects human health and environmental sanitation.
- In upland hard rock areas further tapping of overexploited areas may cause quality deterioration with increased concentration of harmful substances like fluoride.
- Over extraction of groundwater for irrigation may lead to drying up of drinking water wells/sources.

Management Measures to Augment Water Supplies

Augmentation of existing water supplies could be achieved through one or more of the following options.

- Augmentation through rehabilitation/ upgrading of existing water supply schemes should be a priority wherever feasible.
- The existing resources should be conserved and the availability augmented by maximizing retention, eliminating pollution and minimizing losses. For this, measures like rehabilitation of existing tanks for storing rainwater and augmenting groundwater recharge. Water supply from river based schemes if reliable should be designed either with enhanced storage commensurate with the non-flow periods, or with other sources which may be more distant but more consistent.
- Distant surface sources could be tapped to augment water supply with simple treatment (Slow Sand Filters or conventional Rapid Sand Filters), chlorination or appropriate amalgamation of ground water and treated surface water to obtain a drinking water of desired quality standards.
- In cases where the drinking water supply source involves extraction from a critical or overexploited aquifer the emphasis must be on water conversation (including ground water recharge and rainwater harvesting).
- Regulation of extractions from the groundwater aquifers to be ensured by having relevant legislation and its efficient implementation.
- Efficiency of use of water should be promoted through education, regulation, incentives and disincentives.

7.1.2 Water Management

Environmental Issues

- Consumption of poor quality/contaminated water affects human health and livelihood.
- Community involvement on decline in planning, design and implementation.
- Resources not managed in integrated way.
- Pollution/Contamination of ground water in some of the area.
- Financial limitations on the part of GPs and UPJN with regard to O&M leading ineffective O&M resulting in irregular and poor quality of supply.
- Environmental degradation due to unsanitary conditions and Pollution.
- No integrated approach for water supply and sanitation.

Mitigation Measures

- Community involvement should be at every stage of project including: siting, planning, design, and operation of the schemes.
- An assimilated approach in selection of source for the water supply should be made.
- Regulation of extractions from the groundwater aquifers to be ensured by having relevant legislation and its efficient implementation.
- Effective regulations as well as preventive and corrective measures for controlling sources of pollution should be ensured.
- Efficiency of use of water should be promoted through education, regulation, incentives and disincentives.
- Institutional and financial arrangements should be put in place for preparedness in calamity management.

7.1.3 Water Quality

7.1.3.1 Surface Water Quality

The water quality in the main rivers is generally deteriorated due to discharge of industrial pollutants as well as other human excreta (especially in the river Ganga and Yamuna due to divine belief of local people), except in the upper reaches of rivers where the pollutant load is minimal.

The quality problems with respect to surface water sources are more acute in the locations and during the periods when the flow in the river is not sufficient to cause acceptable dilution of the discharged effluents

Environmental Issues

- Non point sources of pollution in the catchment areas due to the widely prevalent practice of open defecation, and agricultural runoff containing fertilizers and pesticides, washing, bathing and other human activities in rivers considered as water supply sources.
- Discharge of inadequately treated municipal and industrial wastes in receiving water bodies or on land.
- Inefficient and irregular disinfection of drinking water supplies.
- Breakage/ leakage in rising main, distribution lines and valve chambers.
- Improper collection, storage and handling of water at the individual household level.

7.1.3.2 Ground Water Quality

The groundwater quality in eastern Uttar Pradesh is poor owing to natural presence of arsenic/iron and groundwater quality in uplands with fluoride at concentrations exceeding the permissible levels for drinking

water use. In addition, the quality of groundwater may also indicate bacteriological or chemical contamination due to inadequate treatment and disposal of sullage, effluent from municipal/industrial discharges.

From field visits and analysis of the secondary data collected it was observed that the state is not suffering with regards to quantity of ground water availability, except in some of hilly terrains (such as Sonbhadra district). But the major problem is with the quality of groundwater they are receiving. Most of the sources of the groundwater are contaminated with Arsenic/Iron/Fluoride/Manganese/Nitrates/TDS, especially in the Gangetic plains.

Environmental Issues

- Presence of arsenic and fluoride at concentrations exceeding the permissible levels for drinking water use;
- Bacteriological or chemical contamination due to inadequate treatment and disposal of sullage, usage of fertilisers and pesticides.
- Operational problems including inefficient and irregular disinfection.

Mitigation Measures

The siting, planning, design, and operation of the schemes should ensure that source selection is conducted with due regard to water quality of the source, and that water quality at household delivery level meets the drinking water norms. More specifically:

- The selection of source for the water supply should be after thorough investigation of both surface and groundwater sources. The water quality testing should be done prior to source selection of water supply schemes.
- For Fluoride/Iron/Arseinc affected villages the strategy should be distant safe groundwater or distant surface water.
- In case quality of available ground water is very poor, a distant safe and sustainable surface water source for a cluster of quality affected habitations can be opted.
- Effective and regular disinfection, as well as preventive and corrective maintenance of water distribution systems should be ensured.
- Institutional arrangements should be put in place for preventive and corrective maintenance of water distribution system (leak detection, repair and control) and for preparedness in crisis management during major breakdowns.
- A set of rules for regular water quality testing and control measures should be developed implemented through the operations phase of the water supply schemes. Water quality testing for industrial and agricultural chemical contaminants shall be conducted, in a phased manner based on an initial sampling of groundwater and river waters in all districts of the state before taking up subprojects in that area. This cost shall be included in the project preparation cost.

7.1.4 Rural Environmental Sanitation

The present level of latrine coverage in the rural areas of the state is only 17%. Only about half of the rural households with latrines are using them regularly. This implies that still nearly 80% of rural population resorts to open field defecation with its associated risk to water supply sources and public health. Open defecation constitutes a major non-point source of pollution of surface and ground waters.

The project intends to take up the following activities under waste management in the villages.

1. Solid waste management.
2. Liquid waste management.

In rural areas the amount of waste generated is about 200- 300 gms/day/person, wherein 25% is of this is non- biodegradable and 75% is biodegradable in nature. Out of the non-biodegradable waste about 75% is recyclable and the remaining 25% is non-recyclable. For an average village of about 1000 population, the total solid waste generated is about 250 kg per day; out of which 187.5 kg is bio-degradable waste and 62.5 kg is non-biodegradable waste. Out of this 62.5 kg of non-biodegradable waste, 47kg is the recyclable and 15.5 kg is the non-recyclable. This non-recyclable waste is mostly inert material. These are very small amounts of solid waste (as the project is to be implemented in rural areas) and require decentralized solutions and more of local action.

Hence segregation of solid waste at household level will be introduced through IEC campaigns and house-to-house awareness creation activities.

For managing bio-degradable waste, composting or vermi-composting at household level or community level, as required is proposed.

All the recyclable waste will be segregated at household level itself and reused. The remaining non-recyclable waste will be disposed at commonly identified places by the community, as this quantity is too small.

For liquid waste, drains will be provided in the village and village households are encouraged to build soak pits. Where required liquid waste will be collected and disposed into waste stabilisation ponds for stabilisation.

The issue for final disposal of solid and liquid waste has been addressed in the reports through Environmental Codes of Practice on Safe Disposal of Sullage & Organic Waste Management and Safe Solid and Liquid Waste Management at Individual, Household and Community level. All these rural villages are located among agricultural fields, where the fields will readily absorb the liquid waste generated.

This is Rural Water Supply and Sanitation Project and addresses waste management at rural household level and cannot be taken up under integrated waste management plan. Hence this cannot be considered as category A project.

Environmental Issues

- Practice of open field defecation due to households without latrines, low usage of latrines and low levels of awareness.
- Without adequate arrangements for treatment and disposal, the wastewater often seeps into hand pumps, open dug wells and pipelines, and the village ponds leading to contamination of aquifers and loss of productive uses.
- The presence of stagnant water in the surface drains combined with poor personal hygiene leads to the incidence of malaria and other vector borne diseases, diahorreal diseases, etc.
- Solid wastes of decomposable and non-decomposable class are collected together and disposed by mere dumping along streets and depressed lands in the village leading to stinking and vector breeding.

Mitigation Measures

- Construction of latrines and awareness creation for increased usage at personal, household and community level.
- Efficient design of surface sullage drains and adoption of good construction practices, along with a system of regular maintenance can ensure that stagnant pools of sullage are eliminated.

- Installation of small bore sewer systems for conveyance of sewage can eliminate environmental and public health hazards associated with open drain system. Suitable consultants shall be commissioned to do the required studies, preparation of detailed project reports and for construction supervision for these schemes. Costs of these consultancies will be borne under the project preparation and management costs.
  Adopting the recommended practice of laying water and sullage lines on different sides of the road reduces the risk of cross contamination.
- Adequate treatment and gainful utilization of the treated effluent/ sullage is possible in agriculture, aquaculture and agro forestry. The treatment system could be any of the following: Stabilization ponds, Constructed wetlands, etc. Suitable consultants shall be commissioned to do the required studies, preparation of detailed project reports and for construction supervision for these schemes. Costs of these consultancies shall be borne under the project preparation and management costs.
- Vector control measures should be provided to the ponds and drains carrying sullage by way of avoiding stagnation and spraying with non-hazardous insecticides in accordance with OP 4.09.
- The project will need to ensure that the benefits of improved water supply are not compromised by poor personal hygiene standards, by supporting sustained sanitation campaign to create and enhance awareness on hygiene aspects pertaining to hand washing, safe water collection, storage and handling practices.
- Solid waste management including segregation of wastes at source, collection at door step, recycling of non-degradable wastes, composting of biodegradable wastes, safe disposal of hazardous wastes, demarcated land fill sites, etc.

7.1.5 Poor Rural Hygiene

According to Sanitation level status of GoUP, against total households within the project are 9,567,504, there are only 236 of solid and liquid waste management programs been implemented. Considering that majority of the project areas fall into downstream of the Upper Ganga Basin, run off of frequent flash floods and storm water may carry residues posing environmental risks for water storage of the piped water supply schemes. The project is to made provision for garbage pits, soak pits, compost pits and for improved drainage system with prioritisation of sub-project areas.

For non-biodegradable waste the project need to adopt extensive community mobilization strategy to segregate these wastes at primary level (glass, metal, plastic, paper etc.). The project's community mobilization strategy will promote basic primary segregation at the village/household level; of waste having economic value, waste having hazardous implications and waste that can be disposed at the village level with collective input from the community itself. The waste having economic value will be collected at one place near village and it will be disposed with the help of a professional garbage collector. The biodegradable waste will be collected in garbage pits and subsequently used as compost. Care should be taken to select site from which there is no leaching to any drinking water source. The project will also encourage for soak pits at the household and community level for improved environmental sanitation practices through advocacy and campaign.

7.1.6 Identified Hotspots within the project area

A district is considered as an environmental hotspot, if any three of the seven environmental problems viz. Surface water pollution, groundwater pollution, hazardous waste, municipal solid waste and land degradation cross the following broad criteria: ***(as per Environment Directorate – Uttar Pradesh)***

- BOD load on surface water bodies is over 500 kg/day
- Levels of fluoride, nitrate or iron groundwater are beyond the WHO prescribed drinking water standard.

- Groundwater exploitation is more than 70 percent of annual recharge.
- Ambient air emissions are over 100 tons per year
- Hazardous waste generation is over 500 tons per year
- Degraded land area is over 9 percent

As per the analysis, 22 of the 70 district in UP emerged as environmental hotspots. Ambient air pollution and Hazardous waste (19 districts each), MSW (18 districts), surface and groundwater pollution (14 districts each) are the main environmental concerns that make these districts environmental hotspots.

As per the analysis of the Environment Directorate, Sonbhadra is the one of the critical districts where 5 environmental issues crossed the criteria levels outlined above.

Thus working on the same lines, with regards to the proposed project, several hotspots have been identified within the project area – Basti, Gorakhpur, Ghazipur, Jaunpur, Pratapgarh and Varanasi districts, with regards to the following criteria:

- Quality affected districts (Arsenic, Fluoride, Iron, Nitrate and Salinity)
- Groundwater exploitation (Over exploited, Critical & Semi critical)
- JE affected gram panchayats (due to poor sanitation practice)

Map showing identified Hotspots within project area is attached as Appendix G.

7.2 Sector Related Other Key Environmental Issues and Management Proposals

7.2.1 Watershed Management

Watersheds are complex systems where water, soil, geology, flora, fauna, and human land use practices interact. Hence, watershed degradation has environmental and socioeconomic effects far beyond the more obvious onsite and downstream impacts. For the same reasons, watershed management interventions may bring local, regional, and global environmental benefits.

Upper watersheds are linked, through water flows, to downstream land far from the steep terrains where water flows are generated.

Most of the Uttar Pradesh state falls within the Upper Ganga Basin, having very high intensity of flooding incidents. These floods from the Upstream have major effect on the downstream side of the Basin (Eastern part of the state).

The effect of flash flood can be minimised with provision of suitable watershed management structures. The runoff generating from the flood can be captured and contained within these structures, fulfilling the below mentioned objectives. The water thus contained, can be then utilised for various water requirement purposes;

The objectives of Watershed management:

The hydrological objectives of watershed management projects should be clearly set at the design stage. Different objectives—more water overall, reduction in peak flows and localized flash flooding, improved dry-season or low flows, reduced sedimentation, and improved water quality—may need different kinds of interventions upstream. Even when the intervention involves a small area or a minor water course and local interactions are the main focus, the bigger picture needs to be borne in mind.

Hydrological monitoring may in most cases be required, and the M&E (Monitoring and Evaluation) system needs to be capable of picking up negative impacts promptly.

- Control damaging runoff and degradation and thereby conservation of soil and water.
- Manage and utilize the runoff water for useful purpose.
- Protect, conserve and improve the land of watershed for more efficient and sustained water management.
- Protect and enhance the water resource originating in the watershed.
- To check soil erosion and to reduce the effect of sediment yield on the watershed.
- To rehabilitate the deteriorating land.
- To moderate flood peaks at downstream areas.
- Mitigating the adverse effects of extreme climatic conditions such as drought and desertification on crops, human and livestock population for their overall improvement.
- Increase infiltration of rainwater.
- Improve and increase the production of timbers, fodder and wild life resource.
- Restoring ecological balance by harnessing, conserving and developing natural resources i.e. land, water, vegetative cover.
- Enhance the ground water recharge.

Control measures:

Watershed management can help improve water quality by reducing sedimentation and pollution. For example, tree planting programs can protect water supplies by removing fertilizers and pesticides from field runoff.

Watershed Development Plan to be prepared in concurrence with the Integrated Watershed Management Program (IWMP) by GoI. The Development plan to include various control measures for the watershed management;

- Land Development including in-situ soil and moisture conservation measures like contour and graded bunds fortified by plantation, bench terracing in hilly terrain, nursery raising for fodder, timber, fuel wood, horticulture & Non Timber Forest Product Species.
- Afforestation including block plantations, agro-forestry and horticultural development. Shelterbelt plantations, sand dune stabilization, etc.
- Drainage line treatment with a combination of vegetative and engineering structures.
- Development of small water harvesting structures such as rain water harvesting structures, low-cost farm ponds, nallah bunds, check-dams and percolation tanks & ground water recharge measures.
- Renovation and augmentation of water resources, desiltation of tanks for drinking water/irrigation.
- Pasture development either by itself or in conjunction with plantations.
- Repair, restoration and up-gradation of existing common properly assets and structures in the watershed to obtain optimum & sustained benefits from previous public investments.
- Crop demonstrations for popularizing new crops/varieties or innovative management practices
- Promotion and propagation of non-conventional energy saving devices and energy conservation measures.

7.2.2 Water Augmentation and Water Harvesting

Rainwater harvesting also has great potential as a solution to mitigate wide spread arsenic poisoning. In Uttar Pradesh state the alluvial Ganges aquifers are used for public water supply, are polluted with

naturally occurring (geogenic) arsenic, which adversely affects the health of millions of people by causing Arsenicosis and increasing the risk of cancer.

Arsenic mobilization is associated with the advent of massive irrigation pumping that draws relatively young water directly into the aquifer. Deep wells are being advocated as a remedy, that may provide a source of clean water; but the solution is only a provisional one. It is observed from the sample field visit of the project area that, many villages within the Arsenic affected region, the hand pumps are provided with Arsenic Filtration Units installed by UP Jal Nigam in order to mitigate the effect of Arsenic contaminated ground water.

As it is evident that the ground water is contaminated with the geogenic arsenic presence, in which case using of alternate source of water supply is only the sustainable solution. Though at some villages the water supply need is been fulfilled with the single village/multi village piped water supply system through deep bore wells and further disinfection facilities, but the system also faces severe interruptions due to in-sufficient power supply. Rainwater harvesting is a better option to provide arsenic-free, safe water in a cost-effective and accessible manner, particularly for drinking and food preparation.

Artificial recharging of the aquifers is to be aimed for augmentation of the natural movement of surface water into ground water reservoir through suitable civil construction techniques. Such techniques interrelate and integrate the source water to ground water reservoir and are dependent on the hydro geological situation of the area concerned.

Artificial recharge techniques aim at extending the recharge period in the post-monsoon season for about three or more months, resulting in enhanced sustainability of ground water sources during the lean season.

- Rainwater harvesting can be promoted as a core adaptation strategy for achieving the global security and sustainability of water resources in an era of anthropogenic climate change.
- Water harvesting has to be done on watershed basis, as watersheds are natural hydrologic units. Integrated watershed management programs often envisage a holistic approach on development of water resources.
- Development of watershed programs within the regions can subsequently result into water augmentation.
- Qualitative and quantitative information on the rise of water table consequent upon a successful implementation of watershed management program is a key for impact assessment.
- Rain water harvesting structures are low energy requiring and sustainable systems that can provide a long term supply of high-quality water without the need for modern technology.

Following are the prior need for planning of any type of water harvesting units; so as to have sustainable and efficient water harvesting systems;

- Climatic records- rainfall, humidity, evaporation rates;
- Topographical maps including drainage networks and ephemeral streams;
- Data on soil thickness (types and distribution);
- Distribution of rock types, especially surface features;
- Definition of pore networks;
- Recognition of recharge, discharge areas and the flow direction of the groundwater.

7.2.3 Excessive extraction of Bio-mass & Fuel wood from Forest areas

Uttar Pradesh has a geographical area of 238,286 sq. kms. with a total population of 166.05 million. Spread across 72 districts, the state has 13,746 km2 of forest cover, which is 5.7% of its geographical area.

As it is observed that majority of the rural population are dependent on the bio-mass and fuel wood, which in turn creates pressure, as an increase in demand. The demand shall lead to deforestation of the nearby forest cover. The act of deforestation for fulfilling the requirement of the bio mass and fuel wood attracts many environmental concerns.

In Eastern UP, except southern parts, ground water potential is very good and most of the schemes could be based on ground water sources only, wherein the degradation of forest areas for construction of schemes is not foreseen. However, where surface water sources are tapped involving forest areas, necessary preventive and mitigation measures are detailed in ECoPs to avoid forest degradation. However, past experience of rural water supply projects and as other projects implemented by other sector institutions indicate that a majority of schemes may not require more than 0.5Ha (single village schemes) and 1-2 Ha (multi-village schemes). This means, most approvals will be sought within the state, even if the schemes are in forest areas requiring clearances.

Control measures:
- Practicing afforestation within the areas identified with excessive extraction of fuel wood and bio mass, leading to deforestation.
- Usage of alternative fuel – such as cow dung cakes, remnants of the plants (from farming activity), etc.

7.2.4 Soil Erosion

Eastern Uttar Pradesh states, majorly consists of water logged soils. Karail soils occurring in the lower basins of the Ganga below the point of confluence of the Yamuna with the Ganga in the districts of Allahabad, Mirzapur, Varanasi, Ghazipur and Ballia represent the typical hydromorphic soils of the state. The high water table and very slow surface drainage pose a serious problem of water logging in major parts of eastern Uttar Pradesh.

The main cause for soil erosion within the project area is due to the excessive runoff resulting from the heavy floods from the upstream (Upper Ganga Basin).

Controlling of soil erosion shall help;
- sustain or improve crop yields,
- retain nutrients and chemicals where applied,
- reduce hazards when working on eroding soil, and
- Help improve water quality.

Control measures:
- Retain vegetation cover. Vegetation cover is important because roots of plants hold soil particles together. Plants intercept rainfall and protect soil from direct impact of raindrops.
- Cattle grazing should be controlled.
- Crop rotation and keeping the land fallow (not planting anything in the soil for sometime) should be adopted.
- Vegetation and soil management should be improved in order to increase soil organic matter.

Various other preventive measures can be adopted in order to minimise the effect of soil erosion:

1) Crop and Residue Cover:

The benefits of growing the appropriate crops on specific soils are important. Crops help reduce the erosive forces of water and wind by means of their canopy intercepting rain, and acting as a windbreak. Root systems stabilize the soil and reduce losses. Crop residues perform similar functions and, in addition, form small dams that help retain runoff water, thereby reducing erosion.

2) Tillages

Proper tillage practices employed separately or in combination with crop rotations can be very effective in reducing soil erosion losses. Compared to conventional fall ploughing, a mulch tiller used in the fall can reduce soil loss by up to 40%. The tillage practice shall leave the soil surface in a rough condition, and, where practical, shall be protected with crop residues. These conditions facilitate easier infiltration of water by slowing surface water runoff, and minimize soil erosion.

7.3 Critical Environmental Factors

7.3.1 Sub-optimum Agriculture

UP produces 20.4% of the total food grains in the country. Its share is 34.8% in wheat, 13.4% in rice, 17.4% in pulses, 38.7% in sugarcane and 39.8% in potato. However, it accounts for only 4.8% of the total oilseeds production, Productivity per ha. of cultivated land is higher than the country's average in the matter of wheat, rice and potato.

As it is evident that majority of the irrigation activities are through the tube wells, using major chunk of ground water resource. The spontaneous unplanned drilling of water wells by farmers in and around major irrigation-canal commands on alluvial aquifer systems has occurred very widely as a coping strategy in the face of inadequate irrigation-water service levels.

Various water efficient agriculture techniques shall be implemented in order to improvise the water resources available for the purpose; as the major consumption of ground water is due to the use in irrigation purpose.

The agricultural development plan to be developed based on the seasonal and non-seasonal cropping pattern, as per the dependency on the water requirement for cultivation. This in turn can be superimposed on the basic farmland facilities. Consequently, agricultural development in the project area is to aim at high productivity, ***optimised water usage*** and higher profitability. To achieve such targets, optimization of cropping intensity and yield/ha of each crop are indispensable. The promotion of a compound farming system second crop cultivation is a very recommendable alternative for the project area.

Various measures can be adopted in order to promote sub-optimised agriculture within the project area:

- To introduce various techniques of farming, this shall promote the water containing capacity within the field, especially within the plain terrain of the project area.
- Farmers to practice mid-summer drainage, for increasing the yield and optimised water availability to the cultivated area.
- Introduction of secondary crops to reduce Inundation/water-logging and to control groundwater table from autumn to winter, as a part of effective land use.

In order to implement the above stated measures for the sub-optimised agriculture it is necessary to first analyse and demarcate the land usage as per the land capability analysis. As the soil is an essential element in determining land capability as most forms of land utilization depend on soil as the medium for plant growth as well as shall have major impact on the water resource requirement. Thus land capability analysis has to be made in order to optimise the agriculture practice within the project area.

The land capability analysis shall include parameters such as soil susceptibility to erosion, steepness of slope within the farming land, liability to wetness or drought, depth of soil, type of soil, soil characteristics, presence of any contamination within the farming land, and salinity.

7.3.2 Water management

As per the issues related with water management, identified and discussed in section 7.1.2 of this report; it is required to have proper water management techniques in order to achieve the sustainable water supply status within the project area.

Main activities with Water management other than that of issues identified within the previous section of this report shall include:

1. In detail analysis of the existing scenario of water supply in the project area.
2. Computation of the water supply demand with regards to the requirements (such as public, institutions (if any), livestock etc).
3. Identification of water supply sources (ground water, surface water or an integrated water source)
4. Development of wastelands
5. All the other sub-projects in relation to the water supply shall be planned and implemented with an integrated approach with watershed management.
6. Water quality monitoring and surveillance
7. Management of Data generated from the Gram Panchayat level or laboratories to be reported through MIS (Management Information System) developed by the NIC-MDWS or through MIS developed by the States. Only the chemical parameters will be reflected at the National level MIS and whereas the physical and bacteriological contamination to be reported and tackled at the GP/District/State level.

The unit of management of water supply system should be a ***hydrological basin*** rather than fragmented for individual communities within basin, as this will provide realistic basin data on flow pattern, spell of dry season, maximum flood flow, average flow on a long term basis, as well as the extent of urbanisation, industrialisation and number of housing units planned for the region. This will also help in integration of available manpower and better distribution of water between upstream and downstream users, particularly helpful for planning of water supply schemes through such sources.

The most commonly practiced technique for water management in the rural areas is rain water harvesting, wherein the rain water can be collected and stored for future usage, this technique can be implemented at the community level. This technique can be of importance or success in case of the with the availability of plain terrain, while for the hilly regions it is envisaged that for the seasonal water (rainfall) may be channelized from the slopes, with the help of ***mini check dams in lined ponds or closed tanks***. Thin walled tanks consuming substantially less cement can be constructed locally by laying iron wire mesh within the building material using special moulds and techniques. It is recommendable to build the storage facility for individual household or small communities residing in far off places in desert affected areas or scattered populated areas.

The activities identified above, shall be taken into consideration in order to achieve the sustainable approach for water supply schemes. The management of such data shall benefit with intensified designing of the water supply schemes at village levels.

7.3.3 Water Conservation Techniques

To increase the amount of water stored in the soil profile by trapping or holding rain where it falls, or where there is some small movement as surface run-off.

The run-off resulting from the severe floods within the upper Ganga Basin, Runoff conservation techniques can be developed in the downstream of the basin so as to conserve the run-off water. These are normally multi-purpose measures, mutually complementary and conducive to soil and water conservation, afforestation and increased agricultural productivity. They are suitable in areas receiving low to moderate rainfall mostly during a single monsoon season and having little or no scope for transfer of water from other areas. Different measures applicable to runoff zone, recharge zone and discharge zone are available. The structures commonly used are bench terracing, contour bunds, gully plugs, nallah bunds, check dams and percolation ponds.

Various techniques which can be implemented within the project area;

1) Bench Terracing

Bench terracing involves levelling of sloping lands with surface gradients up to 8 percent and having adequate soil cover for bringing them under irrigation. It helps in soil conservation and holding runoff water on the terraced area for longer durations, leading to increased infiltration and ground water recharge. This technique can be adopted with the southern regions of project area.

2) Contour Trenches

Contour trenches are rainwater harvesting structures, which can be constructed on hill slopes as well as on degraded and barren waste lands in both high- and low- rainfall areas. The trenches break the slope at intervals and reduce the velocity of surface runoff. The water retained in the trench will help in conserving the soil moisture and ground water recharge.

3) Percolation Tanks

Percolation tanks are among the most common runoff harvesting structures in India. A percolation tank is an artificially created surface water body submerging a highly permeable land area so that the surface runoff is made to percolate and recharge the ground water storage. More than one percolation tank in a catchment can be developed, for mitigating surplus runoff in accordance with the available site characteristics favour artificial recharge through such structures.

The purpose of construction of percolation tanks is to ensure recharge of maximum possible surface water runoff to the aquifer in as short a period as possible without much evaporation losses. The percolation tank should be located downstream of runoff zone. The development of the percolation tanks requires substantial amount of engineering aspects as well as various other studies and analysis.

Apart from such artificial ground water recharging techniques, there is the most common technique which are widely used for the water conservation are the ***rain water harvesting*** structures, open wells, detention ponds, etc.

Detention ponds to be developed within the heavy run-off areas of the region wherein this runoff can be captured and retained within these artificial ponds. The development of the detention ponds shall promote the water augmentation as well as prevent soil erosion. Such structures to be developed as an integrated watershed management programme, in order to enhance the identified watersheds within the project area.

7.4 Management of Large Scale Degradation in Mini-Catchment Areas

The entire state area is the catchment of one or the other river. Majorly the project area is falling within the single basin – Upper Ganga Basin, with parts of Sonbhadra district within the Lower Ganga Basin. Nearly 30.74% of the area, which is classified as forest area, is degraded and devoid of tree cover. The moisture retention capacity of these degraded areas, directly influence the recharging capacity of the local aquifers. Most of the drinking water supply sources are situated in these areas.

The silt loads on rivers and run-off water along the catchments has significant effect on water supply sources, majorly the ground water source – the degradation in such mini-catchments areas shall make the available water supply unstable and unsustainable for usage.

Catchment treatment has primarily been the responsibility of Forest, Agriculture and Watershed Management Departments. Clearly, the interventions from these line departments have not been adequate. In light of this, the state government has recently made perspective planning of Integrated Watershed Management Programme, to revive the mini-catchments through an integrated approach.

7.5 Management of Uncontrolled and Over Grazing in catchment areas

Another perceived environmental risk for source protection includes the grazing and fuel wood extraction pressure on the source catchment. Considering that the livestock has been an integral part of the existing livelihood system, the sub-project will encourage stall-feeding practices and reduce grazing pressure on the catchment areas through various community mobilization interventions.

Over grazing can be controlled by encouraging people to keep few high-yielding varieties of cattle. Proper grazing management activities would be encouraged in line of close and open rangeland management practices. Besides this, the carrying capacity of grazing land can also be improved by promoting plantation of good quality of grasses, legumes of higher fodder value and making staggered contour trenches to improve the moisture regime. This would also include encouraging people to use crop residue as fodder through a collective effort at the village level. The project plans to have extensive community mobilization action by using support agencies for creating such awareness activities.

7.6 Management of Fuel Wood Pressure

The villagers are heavily dependent on catchment for fuel wood supply. According to the environmental preliminary assessment suggests that fuel wood is primarily collected from the catchments that are having rich biomass base and are also having the sources for water supply schemes. In light of this, the project has to made provision for creating awareness for alternative energy campaign (promoting LPG) for cooking and stall-feeding for livestock. Possible control measures for reducing fuel wood pressure include the following steps.

- Promotional camps for LPG in coordination with private companies would be undertaken in each sub-project areas.
- Encouraging/promoting biogas plants in sub-project areas.
- As it was evident from the sample village field visits, many of the villages are using dried cow-dung cakes as fuel for cooking; this process can be promoted, in other villages so as to reduce the load on excessive need of fuel wood.
- The remainder dried cropping plants – especially that of castor seeds, as eastern part of Uttar Pradesh has majority of plantation with castor seeds, the plant after harvesting the seeds has proven very good alternative for fuel in some of the villages.
- The project shall promote alternate source of energy (solar) in collaboration with other line departments.

7.7 Management of Water Quality Issues

As it is evident from the baseline issues within the project area, the majority of the rural population are dependent on the ground water as the primary source for all the day to day water needs. The contamination within source, have adverse effect on the habitation. Out of total 164292 habitations in eastern UP, there are many numbers of habitations not having access to the safe and potable water due to quality affected ground water sources.

Modern methods of water quality monitoring and surveillance should be provided in all districts level laboratories and adopted for all drinking water sources and systems (water safety to prevent contamination with verification by water quality testing) along with standard operation and maintenance procedures. VWSCs will be trained in preparation and implementation of water safety plans, and protocols introduced for water quality testing based on Field Test Kits and Bacteriological kits. For detailed analysis of source contamination on regular basis testing must be ensured at UPJN District level water quality testing laboratories.

- The VWSC and DWSM must ensure that regular sampling and analysis takes place using field test kits and district and sub-district testing laboratories. The national protocols/norms for water quality testing should be followed.
- The grass roots level workers trained for testing water quality through the use of field test kits should act as ambassadors for achieving household level drinking water security. They may be paid suitable charges for the number of samples collected and sent for lab testing and disseminating test results to the VWSC and the community.
- The VWSC's responsibilities, with support from the DWSM, shall include maintenance of the field test kits (replacement of used materials) and meeting the sampling expenses.
- The VWSC should liaise with PHCs to monitor incidence of diseases relating to water quality and the results must be shared with the community (Gram Panchayat).
- All districts should have well equipped labs with qualified technicians. Sub-district Labs may be set up in close co-ordination with district level committee or outsourced to NGOs, educational institutions, etc.
- The district and sub-district water testing laboratories should have facilities to test all the notified quality parameters.
- All water quality testing labs at District level, should obtain accreditation from the National Accreditation Board for Laboratories.

7.7.1 Water Quality Testing Process

Table 7.1 below gives the type of tests, facilities available, frequency of tests, and organizations responsible for execution and monitoring of the water quality-testing program.

Table 7.1: Recommended Water Quality Testing Process

Types of Test	Laboratory Facilities/Means of surveillance	Responsibilities at the Village level	Frequency of Testing	Cross-verification	Overall Responsibility/Monitoring
1. Chemical Analysis					
▪ Turbidity, ▪ Colour, ▪ Taste, ▪ Odour, ▪ pH, ▪ TDS, ▪ Hardness	Field testing Kit and District level laboratories	SO will help VWSC collecting water sample and get it analyzed in coordination with ES of DPMU. Regular sample collection procedures will be mainstreamed by the SPMU.	Quarterly	State Pollution Control Board regularly undertakes random sample analysis. SPMU will coordinate with SPCB ensuring samples are analyzed. Only 2% of the sample will be cross-checked.	▪ SPMU will coordinate with line departments (SPCB, UP Jal Nigam, Panchayati Raj Institutions) ▪ SPMU in coordination with DPMUs will organize training for all SOs and select VWSC members. ▪ The training will include sample collection procedure and safety measure that needs to be adopted.
▪ Nitrate, ▪ Chloride, ▪ Sulphate, ▪ Fluoride, ▪ Iron	District level laboratories.	SO	Once a year	2% of the sample needs to be cross-checked by DPMU with help SPCB.	▪ ES of DPMU. ▪ GP/SO will help ES in compiling and creating a database.
▪ Heavy metal residues	District level laboratories. Only 10% of the random sample should be sent for testing.	SPMU will make special arrangements with SPCB (without any additional burden on SPCB) for sample collection analysis.	Once in year	NA	▪ SPMU with the help of SPCB will be responsible for this task
2. Bacteriological Analysis					
▪ Bacteriological, ▪ MPN (Coliform bacteria per 100ml & E-coli per 100ml)	By using H_2S strips	SO and VWSC	Twice a year Pre and Post-monsoon	By DPMU taking few random samples with the help of SPCB.	▪ SPMU will ensure that trainers are regularly sent to train SOs and VWSC during first two years of the project. ▪ SPMU will ensure that H_2S strips are procured and provided to all VWSC and SO.

The project will adhere to the permissible limit/standard prescribed by the Indian National Standard. Institutional arrangement has been made by SPMU for testing of water samples in district laboratories, which can be conveniently accessed from different sub-project areas. Since testing of Coliform should be done within a short period, H_2S strip will also be encouraged by the project. Accordingly, VWSC will be trained for regular testing by using H_2S with the help of the support organization. The key management measures required as part of the water quality surveillance include the following:

1. Undertaking chemical and bacteriological water testing of the source, prior to any execution work of the water supply scheme.
2. Undertaking regular bacteriological test during the implementation phase for assessing bacteriological contamination due to Coliform presence. This would be done by the VWSC/GP/SO, using H_2S strips, preferably during pre-post-monsoon times.
3. The training of VWSC along with SOs on the use of H_2S for bacteriological testing of water samples at village level. Each VWSC will be provided with H_2S strips by the DPMU. The SO will provide all catalytic support for undertaking quarterly water quality surveillance and mitigation measures in consultation with GP. The SPMU in coordination with DPMU will make regular training arrangements for the VWSC, SOs and selected GP members on how to undertake bacteriological testing by using H_2S.
4. In case of any Coliform presence, the DPMU will coordinate with the health department and supply chlorine tablets for disinfecting the storage tanks. Besides this, regular checking of chlorine residues in the storage tanks would also be an integral part of the project.
5. Project would establish a mechanism in coordination with the State Pollution Control Board to allow user VWSC/GP, to use its laboratories for water sample testing on demand basis.
6. The State does not have any water testing laboratory facilities at the block level. The project must ensure that the concerned line departments (Health, Pollution Control Board and UP Jal Nigam) develop decentralized water testing facilities so that the VWSC can access such facilities at the district level. At present, the state has district level laboratories.
7. While the project anticipates industrial effluent discharge that can pose any concern for the chemical and heavy metal contamination in downstream areas, it has taken adequate precaution for any such possible contamination. Considering the increasing trend of using pesticides and fertilizers, the project has made provision of regular tube well/bore well water testing for chemical as well as bacteriological contamination.

7.8 Management Measures for Source protection and its Sustainability

Source protection and its sustainability have been identified as a priority area of intervention under the environment component of the proposed project. Various interventions have already been demonstrated in Swajaldhara project's micro-catchment treatment options for source protection and recharge of the local aquifer. The SWSM intends to upscale similar type of interventions under the proposed project. The sources include majorly uncontaminated shallow and deep aquifers and surface water bodies that can be tapped for single/ multi village based piped water supply schemes.

According to the environmental analysis study, every village in Eastern Uttar Pradesh has substantially high ground water availability and some distant surface water sources. Therefore, most sub-projects are likely to tap only ground water as the key water supply source for the single/ multi village schemes. Given the fact that 85% of rural population in the eastern UP depends on ground water sources for day-to-day water requirements, the project needs to develop systematic/controlled ground/surface water management norms within the community – so that the very purpose of this source protection is not defeated. However,

the following steps are some of the key steps required for planning and execution for source protection and its sustainability:-

Step-1: The source centred Catchment Area Plan is to be implemented in phases involving identification and assessment of source catchment, creating a baseline database for the source catchment, delineation of zones for treatment within the source catchment and prioritization of issues and interventions. The planning and execution will involve three stages of interventions; 1) technical intervention plan, 2) cost estimation plan, 3) and a monitoring plan. While the SO, GP and other resource agency will provide technical support for developing and finalizing these plans, the management and implementation remains the responsibility of the UP Jal Nigam.

Step-2: A Planning phase agreement will be signed between Support Organization/GP, DWSM and UPJN. The agreement will clearly define the description of activities to be performed during the planning phase. The agreement will have provisions for source catchment assessment, problem identification, catchment area identification and zonation. The provision for the manpower and cost required for the various activities to be performed will also be part of the planning phase agreement.

Step-3: The Environmental Specialist (ES) of the DWSM will ensure that the UPJN and SOs selected for implementing the sub-project activities follow the guidelines developed under the environmental mitigation plan. It will also ensure that the source protection work start before the onset of monsoon. As part of the implementation process, the UPJN in coordination with the local SO will need to submit a technical and a financial report (stating key activities expected to be undertaken by UPJN for source catchment treatment). The technical report should include all environmental concerns: availability of water sources, measures for source protection, support required from GP and DWSM, type of support required from the line departments during the construction and operation of the catchment treatment plan for source protection, water quality monitoring strategy and emergency (contingency) plan for any environmental crisis during the operation. This activity can also be clubbed with water supply scheme plan.

Step-4: Based on the technical report, the ES from DWSM will undertake a quick appraisal of the proposed environmental management plan (EMP) validating the technical report. Based on ES report, the DWSM will directly release the budget to the UPJN for implementing the EMP. The Detailed Project Report (DPR) will be implemented through provisions of the Implementation Phase Agreement (IPA), signed between the DWSM, SO and the UPJN. The DPR will be the integral part of the IPA. The outcome of the IPA will be the successful implementation of the DPR.

Step-5: An external independent service agency will be placed to supervise the progress of the implementation. The Agency will be required to monitor the monthly progress and provide technical support and guidance to the GP/UPJN. The agency will be also responsible for the quality of the work under implementation.

7.8.1 Management Plan for Source centred catchment area and management program

In view of the large-scale degradation of the catchment, the project has made a conscious attempt to ensure that each sub-project is adequately supported by a small micro-mini-catchment treatment plan. This includes contour/terrace-bunding, creation of percolation tanks, plantation/grass land development on village forest and reserve forestland including percolation/recharge pits and drainage treatments. While the catchment area for recharging any spring/stream sources would require a larger intervention in a micro-catchment, the project intervention would focus on a limited scale (focus on micro-mini-catchment) and the

remaining watershed interventions would be dovetailed with other line department activities. Catchment treatment to be carried out at the sub project level shall include treatment around the source, at forest/private land/community level as part of the source protection measures.

However, for long-term sustainability of the schemes located in critical watershed areas, the SWSM shall coordinate with the Forest Department & Watershed Management Department of GoUP to implement larger interventions in these areas. Key management steps required to treat a mini-catchment of the source, include the following, for which ECOPs for Identification of Sources of Water Supply; Protecting Surface Water Supply Source and Ensuring Sustainability; and Protecting Ground Water Supply Sources and in Ensuring Sustainability may be referred.

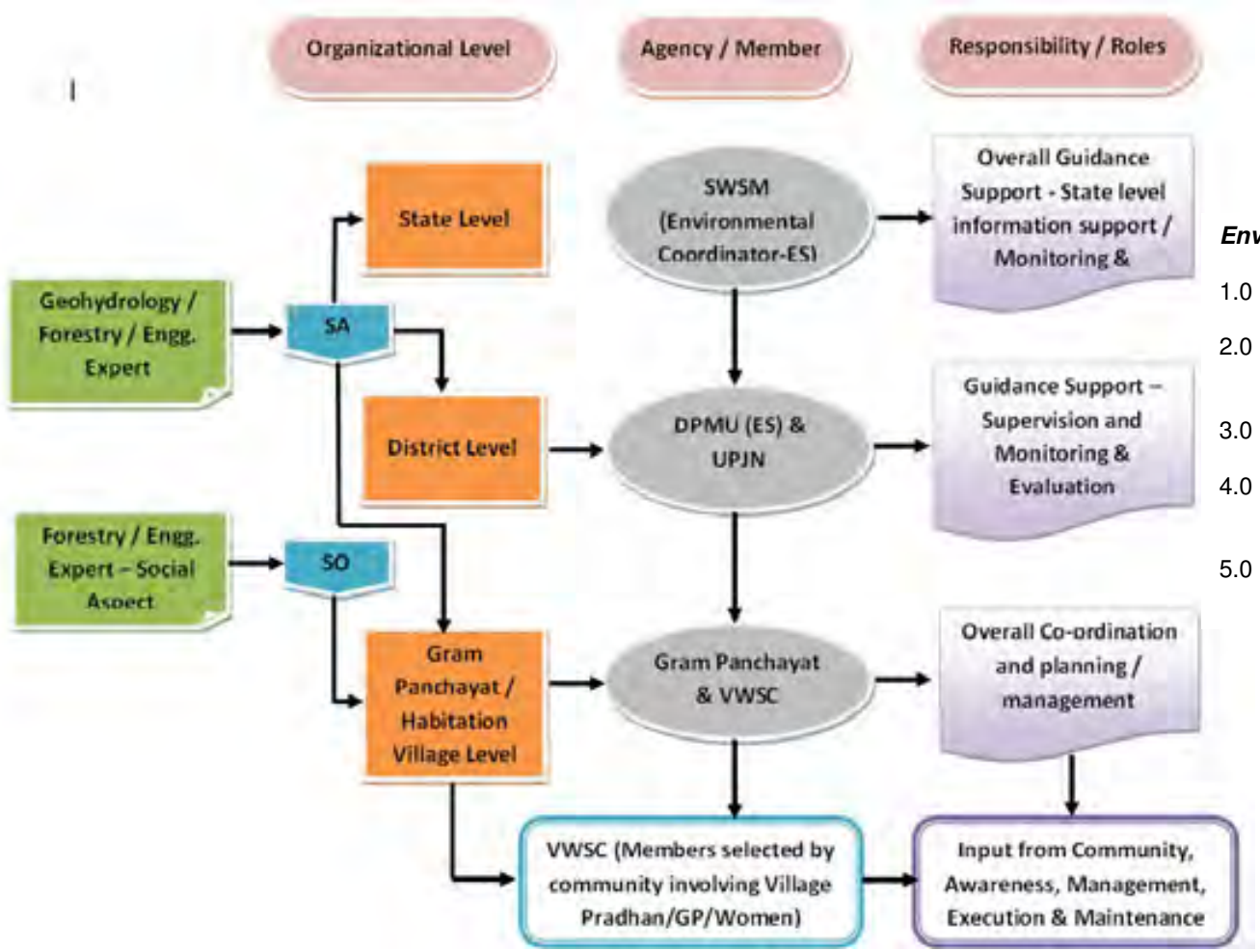
- Protecting the catchment area from grazing animals.
- Rotational Grass cutting (for fodder) may be permitted in line of rangeland management as appropriate in the catchments.
- Check-dam and gully plugging would be done in gully formations of micro-mini-catchments.
- Staggered contour trenches with grasses would be made around source for its protection.
- Locally suitable plants and useful brushwood would be planted in each trench.
- Plantation of multipurpose trees (1000 trees/ ha.) will be encouraged.

7.8.2 Monitoring and Performance tracking of source centred catchment area conservation and Management program

In order to evaluate the efficiency of mitigation measures the monitoring will focus on the two types of observations in the sub-project areas; 1) visual observation of overall environmental conditions and, 2) monitoring specific environmental quantitative/qualitative parameters. Project design is purposefully flexible to encourage a variety of approaches. It was agreed that the project design will need to allow for rapid learning and replication. At the same time, it is important to learn as systematically as possible from these interventions. The M&E component would be designed accordingly. The M&E system will permit to learn from the variety of approaches adopted during proposed project so that the lessons learned can subsequently be fed back into the project.

The objective of the monitoring programme is to assess the efficiency of mitigation and enhancement measures suggested in the EMF and adoption of additional mitigation measures if necessary, for improving the environmental conditions in the project area, particularly, for improving source sustainability. Source centred catchment area conservation and management plan requires a balanced approach with integration of various biological, engineering and social components in the three tiers Panchayati Raj system. The catchment area also involves active participation of different stakeholders in planning, execution, supervision and monitoring. The proposed monitoring flow chart **(below with indicators**) is developed with the objective of effective monitoring and evaluation at different stages of program by involving the state level, district level and GP level organizations, which will be supported by service agencies and SOs. The monitoring plan will facilitate phase wise monitoring of activities by different agencies involved in plan execution.

Figure 7.1: Monitoring Plan



Environmental Monitoring Indicators:

1.0 Source Discharge (lpm)

2.0 Natural Re-generation in the area (No./ha)

3.0 Plant survival rate/regeneration in %

4.0 Household adopting stall feeding practices

5.0 No. of households using LPG/other sources for cooking.

Source: MM Analysis

7.9 Environmental Management Measures

The management measures for the various environmental issues discussed in above sections fall into two distinct categories – the ones that require larger policy and program interventions as their scope is much wider compared to the proposed program, and the ones that can be reasonably addressed through this program. This section attempts to describe the management measures for the latter category, though relevant reference has been made to the larger interventions that are required for the sector-wide approach. The following Table 7.2 gives the brief of the Environmental issues, related opportunities, concerns, and management/ mitigation measures.

Table 7.2: Environmental issues, related opportunities, concerns, management/ mitigation measures

Environmental Issue	Opportunities	Potential Concerns	Management/Mitigation Measures
Water Supply			
Water Quantity & Quality Excess use of water Source in over-exploited zone	Water tapped	Depletion in ground/surface water level	Augment supply though rehabilitation/ upgrading of existing system wherever feasible
	Easy access to water	Risk of hydraulic interference in aquifers, increase in mineral concentration	Identify new sources (local/distant) of good quality and yield (Arsenic/ Fluoride / Iron free)
	Free running water	may be eroding areas and creating water logging and becoming breeding ground of vectors	
Dual supply	Availability of increased/ demanded level of safe drinking water on a sustainable basis	Local hydrology disturbed	Augment water availability by Rainwater harvesting
Availability of good quality of Water of adequate Quantity	Labour, time and cost saving in fetching water	Increased ground/ surface water abstraction	Dual water supply
	Improvement in quality of ground water through dilution due to recharge	Disturb the stream ecology, its flora & fauna	Integrated use of available sources
Non point sources of pollution in the catchment areas due to the widely prevalent practice of open defecation, and agricultural runoff containing fertilizers and pesticides, washing, bathing and other human activities in rivers considered as water supply sources	Animals may also get easy access to water for drinking	Traditional practices may be changed	Catchment treatment
	Improvement in water quantity and quality	Downstream cropping pattern may have to be changed	Source catchment protection
	Reduction in water related diseases, improved personal/ family health and hygiene leading to improved quality of life of the people	More polluted water for downstream villages	Integrated approach to water supply & sanitation
	Women labour saved from the water fetching work	Water stagnation at spill over areas	Use of time saved for other beneficial activities.
	Increase in value of property	Increased generation of sullage	Proper drainage facility to be provided
Source quality affected due to poor sanitation facilities		Possibility Malaria/ Filaria etc. diseases if water stagnates	Proper designing of water use/ drawl system/ drainage system will help Provision of proper bund within the periphery of stand-posts or hand-pumps
Consumption of poor quality/contaminated water affects human health and livelihood	Quality monitored water is healthier water	Diseases/ infection spread may increase if water quality is not of proper level	Regular monitoring

Environmental Issue	Opportunities	Potential Concerns	Management/Mitigation Measures
	Choice of right source can be made	Concentrated source can infect larger population	Identify alternate/ distant sources
Bacteriological or chemical contamination due to inadequate treatment and disposal of sullage, usage of fertilisers and pesticides	Timely remedial measures can be taken		Continuous chlorination of water supply to ensure a minimum residual chlorine of 0.2 mg/litre at tap point
	Lesser diseases and sickness		Preventive and corrective maintenance of water distribution system
	Healthier people		Constant training and maintenance backup
Increased use of ground water for Irrigation	Higher food grain production	Drying up of drinking water bore wells	Regulation of extractions, efficient use with proper crop management, community involvement in distribution of available water resources for competing demands
Environmental Sanitation			
Construction of household/ group/ community/ institutional latrines	Hygiene	Risk of ground water contamination if not designed and constructed properly	Sustained training programmes with focus on women to generate demand for household/group/ community latrines
	Convenient- women need not go far	Lack of space for household latrine	Install 'safe' sanitation systems to suit local soil type.
	Reduction in soil and surface water contamination	Keeping clean can be problem	Proper placing of toilets be done
	Reduction in water and sanitation related diseases, improved personal/ family health and hygiene	Can breed disease if not well-kept	Construct sullage drains and provide low cost treatment/ disposal/ re-use system for sullage
	Improved Social status	Risk of ground water contamination from sanitation systems where the ground water table is high or due to rocky bottom (Shallow soil depth)	Safe disposal of waste grey and black water
	Safety and convenience of household	Concentration of sewage disposal	
	Desirable healthy practices amongst children who can serve as catalyst to promote household hygiene	More water will be required specially for wet toilets	
	Improvement in general health status of people	Safe disposal of water can be problem if whole village has not got proper drains	
	Enhanced environmental sanitation and hygiene status and general aesthetics of village		
Sanitary disposal of sullage	Improved aesthetics and reduction in breeding places for mosquitoes		
	Increase in property value		

Environmental Issue	Opportunities	Potential Concerns	Management/Mitigation Measures
Paving of internal paths in villages	Walking, specially at night for women and children be safe	On steep slopes, paths may become slippery, especially for animals – at higher risk of bone injury.	Wide steps on steep portions
	Hygienic and clean environment		Paving of internal paths with appropriate locally available material/ water bound macadam/brick to ensure proper drainage.
Garbage management	Cleaner environment	Pits require efforts & land & will cost more	Collect garbage and send it for recycling
Biodegradable waste (Make compost pits)	Good quality manure and Healthier surrounding		
Non-biodegradable Restrict/ Ban polythene/ plastics		Collection, dumping and processing at a place outside village will require extra work	
Provision of individual/ community compost pits/ garbage pits	Aesthetically better	May pollute water	Incinerate it in small lots away from habitation
			Sustained training campaigns to persuade cattle owners to shift the cattle outside the living area
			Provide individual/ community compost pits for sanitary disposal of biodegradable wastes
		Unhygienic environmental sanitation conditions due to large number of manure pits	Promote bio-gas plants
		Costly	Non-biodegradable waste may be sold out
		Needs maintenance	
		Creation of breeding places of disease vectors	

7.10 Summary of Stakeholders' Consultation

A stakeholders workshop involving all the SWSM officials, district level development officers, Institutional representatives responsible for providing rural water supply and sanitation facilities (UPJN, Panchayati Raj Department), State Ground Water Department, Health Department, NGOs, PRI representatives and community leaders was conducted on 23/01/2013, to apprise them of the proposed Rural Water Supply and Sanitation Project for Eastern UP being funded by World Bank. In the workshop, the activities being taken up such as Environment Assessment and Environment Management Framework Study, Social Assessment Study, Institutional Arrangements for implementation of the project were informed and presentations were made by the study consultants to put forth the issues identified during their study and present status of their study, to solicit the suggestions and comments from workshop participants for effective identification of measures to be taken up during implementation of the project.

The following are the stakeholders opinions/views expressed during the discussions.

- Wherever quality problem is there, it is considered to have distant sustainable ground water source or surface water based source with piped water supply system.
- Water quality monitoring should be done on regular basis, as the determination of quality problem based on one time data is not correct.
- Emphasis to be on awareness creation and triggering behavioural change for usage of individual sanitary latrines and its impact on health.
- Unsanitary conditions in the villages need attention and solid and liquid waste management has to be given due importance.
- DWSC to take lead for the implementation of all the sub-projects for the RWSS.
- Single habitation schemes/Multi village schemes and Single village multi habitations schemes to be implemented as a part of RWSS.
- DWSC shall be given full authority and assistance for choosing the support organisation (SOs).
- Water Quality problem & Water scarcity area shall be taken up on priority basis.
- It is proposed to have 100% piped water supply
- The implementation and O&M responsibility to be taken up by the community.
- There is felt a need for having an intensive data with respect to the hydro geological data, as the areas covered within the project areas are having very dynamic data for the hand pumps.
- Bacteriological contamination and presence of anthrop virus were found to be scaling high, causing death of numerous lives. The major cause of such contamination was envisaged as the practice of open defecation, contaminating the shallow hand pumps.
- Gorakhpur/Basti/Azamgarh/Deoria, were among the worst affected districts from Japanese Encephalitis (JE), and it was envisaged that drinking water and poor sanitation condition are the primary carriers responsible for such deadly disease spreading among the community.
- In order to increase the awareness for the better sanitation practices within the village level, Panchayati Raj department, have initiated the practice of posters printing and distribution on the basis of the specific need of the districts.
- It was brought to knowledge from the World Bank Mission; that the proposed project shall be of 6 years.
- It is envisaged to divide the project for 28 districts of eastern UP, into three phases so as to implement the sub-project into an integrated manner with regards to the water supply and sanitation schemes.

The issues as brought out during the field study and as per the data analysis were detailed in section 6.3 and key issues with regard to water supply and sanitation are as stated below.

- Water Quality problem

- Abstraction of ground water for Irrigation.
- Depletion of ground water levels
- No ground water recharge activities
- Unsanitary conditions at Source
- Availability of power, in case of piped water supply schemes
- Disinfection of piped water supply
- Location of hand pumps based on convenience not on scientific basis
- Pollution due to fertilisers and pesticides.
- Awareness on the ill effects of usage of quality affected water
- Repairs done but no Preventive or Regular Maintenance of assets
- Lack of technical skills at GP level
- Insufficient funds with GP resulting in non-takeover of piped schemes from UPJN
- No community ownership
- Resources not managed in integrated way
- Financial limitations on the part of GPs and UPJN with regard to O&M
- Environmental degradation due to unsanitary conditions and Pollution
- No integrated approach for water supply and sanitation
- People's preference for Open defecation.
- Water requirement for flushing.
- Lack of awareness on unhygienic practices and their impact on health
- Lack of Funds for environmental sanitation, like road side drains, solid and liquid waste management and disposal, street cleaning, etc
- Lack of awareness in maintaining household hygiene.

Based on the discussions and views expressed by various participants, the mitigation measures for the environmental issues were drawn and discussed in detail in the respective sections.

7.11 Institutional Arrangements

The personnel and agencies with the responsibility for environmental management will be located as follows in the project institutional structure:

7.11.1 Village Level VWSC

VWSC is a standing committee of the Gram Panchayat which is expected to shoulder full responsibilities for all activities including planning, implementation, operation, maintenance and management related to RWSS at the village level. The main functions of VWSC are:

- Providing facts and figures to the Gram Panchayat for reviewing water and sanitation issues.
- Ensuring community participation and decision making in all phases of scheme activities;
- Commissioning and takeover of completed water supply and sanitation works through a joint inspection with Line Department Staff;
- Collecting household contributions and user fees Opening and managing a bank account.
- Preparing annual budgets and recommendations for user fee charges.
- Organizing people to be vigilant about not wasting water and keeping water clean.
- Ensuring professional support for hand pump caretakers and piped water supply operators.
- Ensuring access to spare parts for hand pumps and trained mechanics for regular preventive maintenance.

- Ensuring the operators handling piped water supply systems are provided with adequate training to gain the technical and financial skills needed to do the job.
- The VWSC is also responsible for procurement of goods and services, supervising contracts and works and making payments.

The JE/ AE of UPJN, Department of Rural Development and Support Organisation created at district level with multi-disciplinary functionaries under SWSM will support the VWSC in the execution of these functions. The project will develop capacities of VWSC through training and other information sharing measures to execute these functions effectively.

7.11.2 Support Organizations

Support Organizations (SOs) selected for a cluster of villages within a particular geographical boundary will support VWSCs. SOs will primarily be responsible for providing community development, technical expertise/contract management (in case of small village or habitation based schemes) and external liaison support to the VWSCs on a day to day basis. One SO is expected to service 10-20 GPs.

The TOR for the SO would include specific responsibilities pertaining to the EMF including
- Facilitation of the VWSCs participation in filling up the EDS,
- Deal with software aspect of RWS sector ;
- Take up HRD and IEC activities
- Certifying the implementation of the environmental mitigation measures,
- Identifying and meeting capacity building needs, etc.

7.11.3 Block Level

At the Block level, Block Resource Centre (BRC) will facilitate IEC and capacity building activities to the GPs and VWSCs. The BRC helps communities prepare and implement plans by providing motivation and training and organizing technical support from the DWSM, and by providing information on water quality and public health. The GP/VWSC should contact the BRC for advice on any issue where they need help. The functions of BRC will be as follows:

- Scrutinizing of the schemes, including EDS, submitted by the GP and then forwards them to DWSM.
- Cooperate with the SOs for social mobilization, capacity development, communication, project management and supervision.
- Also sensitize public representatives, officials and general public about the project principles.
- Provide guidance and support to institutions for imparting training for capacity development of all stakeholders, and undertaking communication campaign.

Block Resource Centre (BRC) will be headed by a Block Resource Coordinator who will be responsible for ensuring the EMF implementation at Block level. One of the resource persons, appointed by the DWSM, would be trained in Environmental management and would assist the BRC in discharging the mandated duties and functions relevant to the EMF at Block level.

7.11.4 District Level

A District Water and Sanitation Mission (DWSM) shall be constituted at the district level and should function under the supervision, control and guidance of Zilla Parishad. Similar arrangements are envisaged in DWSMs to ensure all RWSS plans follow and are in conformity with the EMF, and to ensure proper

planning and monitoring of EMF activities at the district level, and coordination between the District and SWSM.

The functions of DWSM will be as follows:

- Formulation, management and monitoring of projects and progress on drinking water security and total sanitation in rural areas;
- Scrutiny and approval of the schemes submitted by the Block Panchayat/ Gram Panchayat and forwarding them to SLSSC if required, where necessary;
- Selection of agencies and/ NGOs and enter into agreements for social mobilisation, capacity development, communication, project management and supervision,
- Sensitising the public representatives, officials and the general public;
- Engaging Institutions for imparting training for capacity development of all stakeholders, and undertaking communication campaign;
- Coordination of matters relating to water and sanitation between district representatives of Health, Education, Forests, Agriculture, Rural Development, etc as well as National programmes such as SSA, NRHM, ICDS, etc; and
- Interaction with SWSM, State Government and the Government of India.

The EE, UPJN, who is member of DWSM, will be responsible for ensuring EMF implementation within the district. He will also select the external experts for appraisal of Category II schemes, if required.

7.11.5 State Level

At the State level the SWSM prepares the environment policy and sets the guidelines for the EMF implementation, monitoring and evaluation. This SWSM also liaises with other departments with regard to environmental issues.

The Executive Director, SPMU, SWSM will be responsible for ensuring the implementation of the EMF across the state. One State Level Environmental Expert in the SPMU, SWSM will ensure that environmental management activities are in conformity with the EMF and that necessary guidance and budget is provided to implement these plans.

SWSM in consultation with the UPJN will identify reputed Technical Institutions, designated as State Technical Agencies (STA), which will give technical support to SPMU, UPJN and PRI; the executing agencies for commissioning rural water supply and sanitation schemes at the state level. The STA will be used to fill up gaps in the technical needs, as and when required, without resorting to creation of posts and recruitment. The broad function of STA is given below:
To assist the State Department to plan and design scientifically sound and cost effective rural water supply schemes with special emphasis on sustainability of the source and system.

- To assist in preparation of action plan for both software activities and hardware activities.
- To evaluate and scrutinize major/ complex water supply and sanitation schemes as assigned by the SLSSC for consideration.
- To provide feedback to the SWSM/SLSSC on various aspects of the programme and problems encountered in planning and implementation at the field level for possible changes/solution at the State level.
- To engage technical experts on specific assignments.

The following Table 7.3 depicts the role and responsibilities of the major players in implementing the EMF.

Table 7.3: Institutional Arrangement for Implementation of the EMF

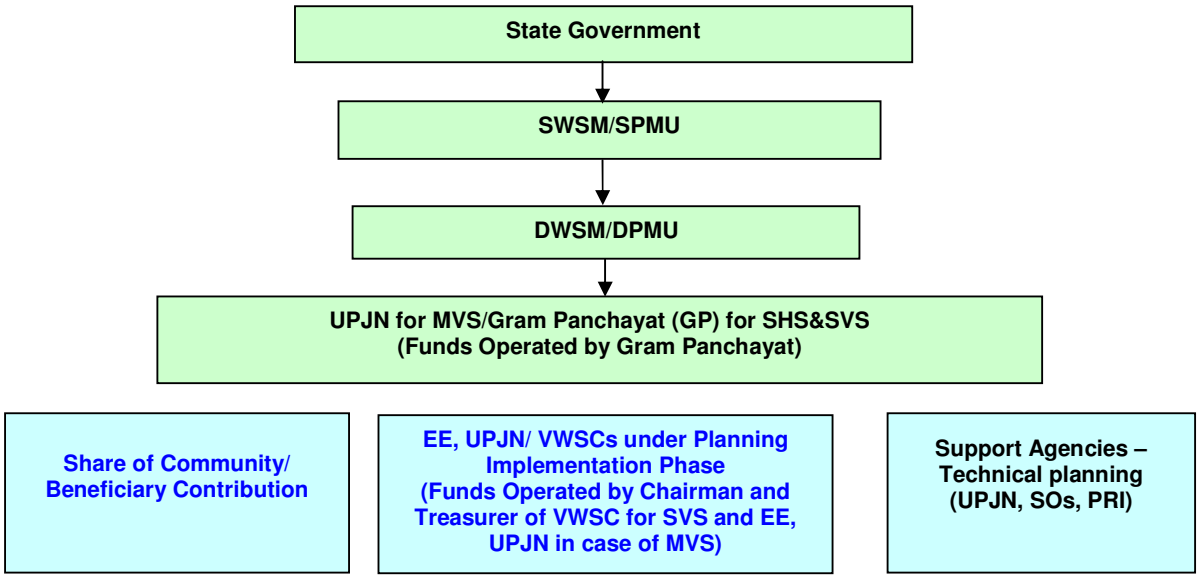
Level	Institution	Function	Responsibility
State	State water Sanitation Mission (SWSM) in consultation with STA (Already in existence)	▪ Ensure overall implementation of the EMF in the proposed RWSS project. ▪ Arrange funds required for implementing the provisions of EMF. ▪ Ensure availability of required human resources for implementation of EMF. ▪ Ensure that recommendations from supervision and monitoring are integrated into the project and the EMF is updated periodically as necessary. ▪ Integrating communication and capacity development programmes for both water supply and sanitation. ▪ Recruit external experts for conducting Environmental Audit once in a year and ensure that the relevant recommendations are integrated into the project. ▪ Conduct environmental supervision of all Water Supply and Sanitation schemes on a half yearly basis.	ED, supported by State Level Environmental Expert.
	Water and Sanitation Support Organization (WSSO) (Already in existence)	▪ Provide support to the Department of Rural Development in preparing the EDS. ▪ Facilitating participation of the community in preparation of EDS as part of the DPR preparation and in certification process (for environmental mitigation measures) for implementation completion report. ▪ Deal with software aspect of RWSS sector and may not be involved in implementation of water supply and sanitation schemes; ▪ Liaison with forest department, UPPCB, ground water department and other related departments at scheme level for ensuring implementation of identified mitigation measures (permissions, technical support, etc.). ▪ Provide support in execution of the HRD and IEC activities on EMF. ▪ Provide support to the Department of Rural Development in the supervision, monitoring and audit activities of the EMF. ▪ Train the VWSC in conforming to EMF requirements in operation and maintenance of sanitation schemes.	Director of WSSO
District	District Water and Sanitation Mission (DWSM) (Already in existence)	▪ Training and Capacity Building of SOs, VWSC, Block Resource Persons – Environmental Management (MRP-EM) and District Resource Person – Environmental Management (DRP-EM) on EMF. ▪ Coordination between various players and actors involved in EMF. ▪ Coordinate with other line departments on environment related issues. ▪ Formulation, management and monitoring of projects and progress on drinking water security and total sanitation in rural areas.	EE, DWSM supported by the District Level Environmental Experts
Block	Block Resources Centre	▪ Environmental management and monitoring of RWSS sector projects at the Block level. ▪ As part of the scrutiny of the schemes submitted by the GP – will	Block Resource Coordinator, supported by the DWSM resource

Level	Institution	Function	Responsibility
		check if environmental screening and appraisal has been properly done before forwarding them to the DWSM. ▪ Coordination with NGOs for ensuring integration of EMF in all relevant project activities including capacity development, communication, project management and supervision. ▪ Sensitizing the public representatives, officials and the general public about the provisions of the EMF.	personnel
Village	Village Water and Sanitation Committee (VWSC) with the support of Support Organization (SO)	▪ Participation in preparation of Environmental Data Sheet (EDS) to be enclosed to Detailed Project Report (DPR). ▪ The committee shall deliberate on environmental safeguards relevant to the schemes and adopt the same during construction and implementation ▪ Certifying the implementation of environmental mitigation measures as part of the implementation completion report. ▪ Facilitate IEC activities regarding water conservation, sanitation and hygiene among the villagers. ▪ Collection of household contributions and user fees, opening and managing a bank account. ▪ Preparing annual budgets and recommendations for user fee charges. ▪ Responsible for procurement of goods and services, supervising contracts and works and making payments	President (GP), WSSO, JE/ AE (UPJN), PRI personnel

7.12 Fund flow arrangements for implementing works

The funds from the State Water and Sanitation Mission (SWSM) would be transferred to the DPMU. The DPMU after the approval of the district level committee (known as District Water and Sanitation Mission) would transfer the funds to the account of the Gram Panchayat in case of piped single habitation schemes/Single village schemes and to UPJN in case of multi-village piped water supply schemes. The Gram Panchayat shall open a separate account for the water supply and sanitation works. The Project shall provide an Assistant Accountant to the Gram Panchayats for assisting them in account maintenance. The Gram Pradhan shall operate the accounts. The Gram Panchayat will in turn transfer the funds within 15 days to the account of VWSC. The Gram Pradhan shall be the de-facto chairman of the VWSC. The Gram Panchayat shall maintain separate ledger for separate VWSC. The VWSC shall maintain two separate accounts – first for capital cost of the scheme and second for the O&M cost. These accounts shall be operated by the VWSC Chairman and Treasurer (elected from the VWSC). The Assistant Accountant provided by the project shall also assist these VWSCs in maintenance and audit of their accounts. The VWSC shall plan, operate and maintain source protection measures and allow Gram Panchayat to review it in Panchayat meetings.

Figure 7.2: Funds Flow Mechanism



7.13 Environmental Management Framework

An Environmental Management Framework is an integral part of the project. It establishes the outline for how the mitigation measures should be implemented during different stages of project namely, preplanning stage, planning, and implementation and post implementation phase. A benchmark environmental management framework for both water supply and sanitation scheme is developed as good environmental practices for its enhancement at scheme level under this project. The provision of these measures shall be selected and finalized based on the discussion with the villagers during planning stage and be implemented during implementation and post implementation phase. The environmental enhancement measures shall be executed by the prospective contractor under the direct supervision of VWSC, DWSM and SWSM. The present section describes common framework likely to be adopted at scheme level.

An analysis of the baseline environmental situation, observations during site visits, discussions with State, district and GP level functionaries as well as the focus group discussions and consultations during stakeholders meeting have identified the key environmental issues. These issues mainly relate to,

- Inadequate or disrupted water supply
- Chemical and Bacteriological contamination of water.
- Presence of Arsenic, Iron and Fluoride concentrations exceeding the permissible levels in drinking water.
- Lack of sanitation facilities.
- Inadequate Solid Waste Management

In order to mainstream environmental management and to ensure that EMF is systematically implemented for all the project sponsored schemes, EMF needs to be integrated in the project cycle. The Table 7.4 below provides an overview of various EMF activities in the preplanning, planning, implementation and

O&M phases of the proposed project cycle for the project sponsored schemes. The responsibilities are indicated against the respective tasks.

7.13.1 Objectives of EMF

The proposed Project will finance investments in rural water supply and sanitation improvement schemes to serve the rural population in 28 districts of Eastern UP. The project interventions are, therefore, expected to result in public health benefits in the rural communities through improved quality and delivery levels of RWSS services. Some of the main environmental health benefits expected under the project include: increased and better quality water supply – especially for drinking purpose; improvements in personal hygiene and village sanitation levels; and reduced faecal oral contamination of drinking water resulting in lower occurrence of diseases. In order to ensure that the environmental issues are systematically identified and addressed in the various stages of the implementation of schemes, an EMF has been developed with the following objectives:

- To design a set of procedure, delineate the roles and responsibilities of various stakeholders and institutional structure in the implementation of schemes along with the capacity building and staffing requirements for mainstreaming environmental management in project implementation processes.
- To provide a systematic approach for identifying the various possible environmental impacts at the different stages of the scheme cycle.
- To identify appropriate mitigation measures for addressing the identified environmental issues.

7.13.2 Key Elements of EMF

The key elements of the EMF as applied to the proposed sponsored scheme are discussed below;

7.13.2.1 Collection of Basic Environmental Data:

The EMF requires that basic environmental data pertaining to the proposed schemes be compiled at the field data collection stage. For this purpose, a simple Environmental Data Sheet (EDS) has been formulated on water supply, sanitation, solid and liquid waste management. The formats for the EDSs for different types of schemes are furnished in Appendix D. The JE/AE of the UPJN/Engineers of DPMU of SWSM, fills up the EDS with the facilitation support of the NGO / SO.

7.13.2.2 Environmental Categorization of Schemes:

At the Detailed Project Report (DPR) preparation stage, the available environmental information in the EDS will be evaluated and based on the level of expected environmental and health impacts, the proposed schemes would be classified as either Category I (Low Impact) or Category II (High Impact – Detailed Environmental Appraisal required). The EDS formats are given in Appendix D. The screening tool for the categorization of schemes is furnished section 7.14 of this report. The environmental categorization of schemes by using the screening tool shall be done by the AE of UPJN/Engineers of DPMU of SWSM.

7.13.2.3 Environmental Appraisal and Approval:

Based on the Environmental Categorization of the schemes for the proposed project, appraisals and approvals have to be obtained as mentioned in the subsequent section of Environmental Management Framework.

7.13.2.4 Environmental Compliance Monitoring during Implementation and O&M phases:

The EMF shall ensure that:

- The prescribed environmental mitigation measures (including construction stage measures) as identified through the environmental appraisal process are adequately implemented. The Implementation Completion Report of each scheme shall be furnished with an Environmental Completion Certificate given by the VWSC/GPs for SVS and UPJN/VWSC for MVS indicating that the mitigation measures identified in the appraisal have been implemented.
- Periodic supervision and monitoring including an independent external audit is conducted as a part of the overall project monitoring program.
- Capacity building and IEC activities are undertaken to enable effective implementation of the EMF including procedures, supervision, monitoring, etc as well as for community awareness and sensitization on personal hygiene, environmental sanitation, water conservation, etc.

7.13.3 Application of EMF to proposed project

In order to mainstream environmental management and to ensure that the EMF is systematically implemented for all the project schemes, the EMF needs to be integrated in the scheme cycle. The responsibilities are indicated in the Table 7.4 below, against the respective tasks.

Table 7.4: Environmental Management Framework

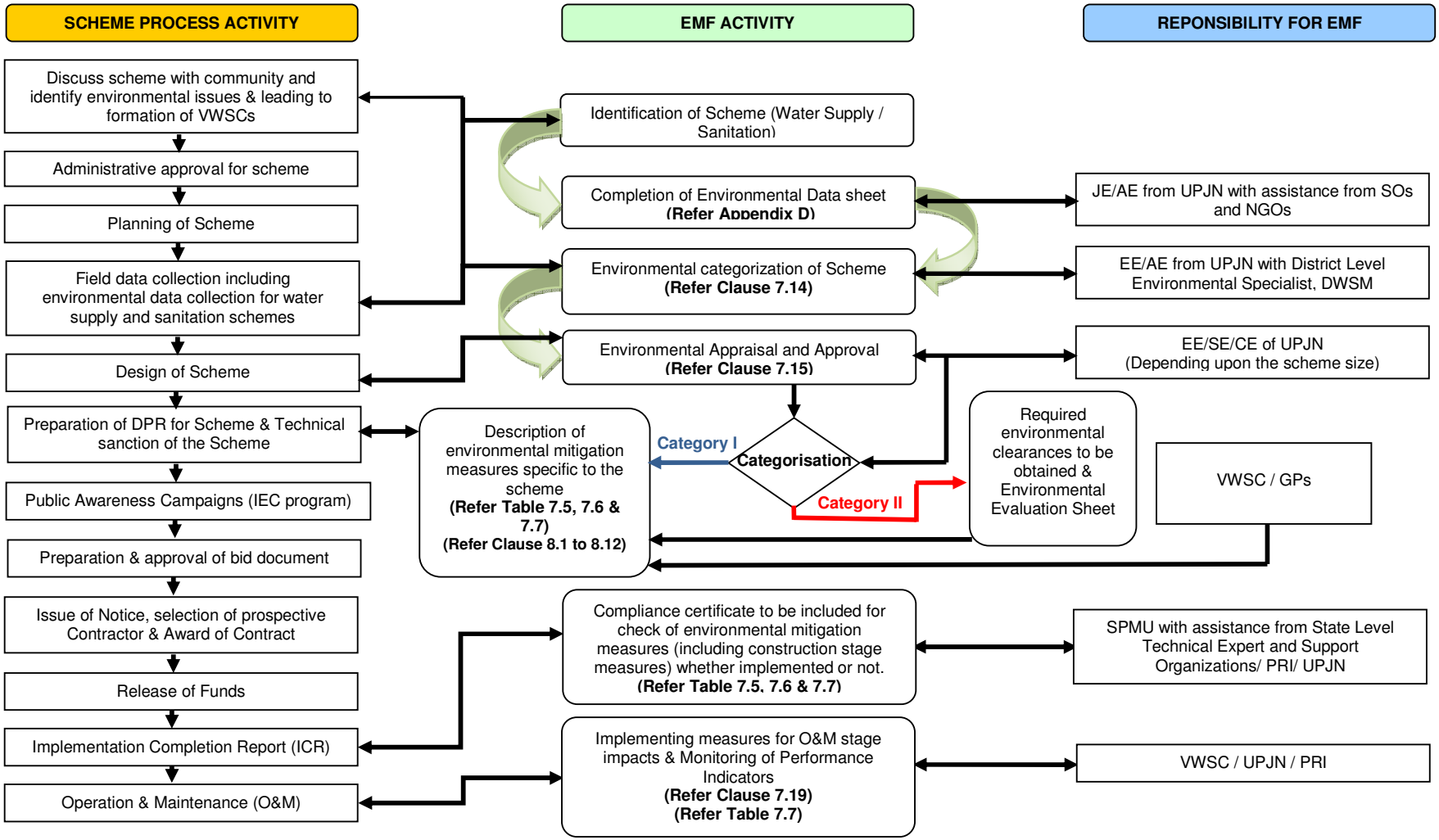
Phase	EMF Activity	Objectives	Process	Responsibility	Result
Preplanning/ Planning	Environmental Data Sheet	To collect basic information on environmental aspect of the proposed scheme.	Discuss scheme with community and identify environmental issues of concern.	NGOs/SOs, with assistance of JE/AE from UPJN.	EDS prepared and attached to DPR.
			Complete EDS with supplementary notes if required.	JE/AE from UPJN with assistance from SOs and NGOs[2].	
	Environmental categorization of the scheme	To ensure that schemes with potentially significant environmental or public health issues are identified at an early stage for detailed environmental appraisal.	Evaluate all the available information on environmental aspects as provided in the Environmental Data Sheet, and based on the level of expected environmental and public health impacts, assess whether the proposed scheme is Category I (low impact),or Category II (high impact).	EE/AE of UPJN with District Level Environmental Specialist, DWSM.	Scheme classified as Category I or category II using the screening tools.
	Environmental appraisal and approval required	To ensure that relevant environmental issues have been identified and appropriate mitigation measures have been designed to address them.	For category I schemes, there shall be no separate environmental appraisal but environmental aspects shall be included in the normal appraisal and evaluation process for the proposed scheme, based on the EDS included in the DPR.	District level Environmental Specialist, DWSM.	Environmental appraisal of the scheme is made of Category II Schemes and approval of proposed scheme, with decision to (i) accept scheme as submitted, or (ii) accept scheme with modification suggested in the environmental appraisal.
			For category II schemes, a limited (depending upon the impacts of proposed project) a detailed environmental appraisal including evaluation of environmental and public health impacts, risk assessment, and design of mitigation measures, shall be undertaken through an environmental consultant.		
		To ensure that mitigation measures and their cost are	Technical Sanction for the scheme will not be accorded without	EE of UPJN for Category I schemes. EE of UPJN for Category II schemes	Technical Sanction for scheme with environmental mitigation

[2] If Technical Support is out sourced, then they should be part of EDS filling, classification and appraisal.

		integrated in scheme design and implementation plans.	Environmental Clearance.	(up to 10 lakhs) SE of UPJN for Category II schemes (10 lakhs to 50 lakhs) CE of UPJN for Category II schemes (above 50 lakhs)	measures and accordingly its costs are integrated in scheme design and implementation plans.
Implementation	Implementation of Environmental mitigation measures.	To ensure that the prescribed environmental mitigation measures (including construction stage) are implemented.	Implementation Completion Report (ICR) for scheme will need to include compliance certificate that all prescribed environmental mitigation measures (including construction stage) have been implemented.	VWSC/ GPs for SVSs and MVSs.	ICR with environmental compliance information.
O&M	Environmental supervision, monitoring, and evaluation IEC and capacity building on hygiene and environmental issues.	To ensure that environmental aspects are integrated in the O&M phase.	Environmental Audit for water availability and water quality through external agency will be conducted once in a year by selecting 10% of schemes completed. Water quality monitoring will be done by UPJN thrice a year.	District Level Environmental Specialist supported by State Level Environmental Specialist State Project Management Unit (SPMU) with assistance from State Level Technical Expert and Support Organizations.	Water quality monitoring reports. Periodic environmental supervision, monitoring and audit reports. Training and IEC activity reports.

A flowchart showing EMF activities to be implemented in a project cycle for water supply and sanitation (Sewerage and Solid Waste) along with responsibility is shown in Figure 7.3 below.

Figure 7.3: EMF Implementation Process through out a scheme cycle



7.14 Screening Guidelines for Environmental Issues and Safe Guard Measures

The following Screening Matrices to be applied to identify category of schemes regarding its environmental impacts and application/clearances of GOI/GoUP Legislative and World Bank Policies on the schemes interventions. Some significant types of schemes and environmental clearance and approval agency for such schemes are given below:-

7.14.1 For Drinking water schemes

Activities under schemes

- Land Availability (Forest Land/Community/Private Land)
- Location and Type of source
- Sufficient water available at source (even in summer)
- Testing of water quality of the water source
- Competitive uses of the Water Source
- Preferred water source should be River or Deep Tube Wells

Category I (Low Impact)	Category II (High Impact)
a. WS involving pumping, construction of storage tanks and piped distribution networks, with source as tube well/ bore well. b. WS with source as spring where water will flow by gravity to the distribution network. c. Existing WS requiring rehabilitation. d. Roof water harvesting units, where scattered households cannot be served by piped network. e. Ground water recharge measures.	f. WS with water source requiring special treatment for removal of arsenic, iron, fluoride, and salinity, etc. g. WS with source as river where water will have to be conveyed from long distances. h. WS with source located in/very close to natural habitat/ sensitive ecosystems such as National parks, Wild life sanctuaries (requiring forest permission/clearance) i. WS with water source from highly critical aquifers / over exploited zones. j. WS with water source having significantly competing water demands over irrigation, agriculture and other domestic uses etc

Refer Appendix D: Format for Environmental Data Sheets (EDS)
D.1 EDS for Water Supply

7.14.2 For Toilets, Soak Pits, Compost Pits and Garbage Pits

Activities under scheme

- Location of Toilets, Soak pits/septic tanks, compost pit, & garbage pits.
- Type of soil.
- Liquid waste discharge.
- Solid waste collection and disposal

Category I (Low Impact)	Category II (High Impact)
1. Environmental Sanitation	
a. Construction of ISL, Soak Pits where subsurface strata is favourable for adopting toilets, pits and groundwater table is at depth greater than 3.0 m below ground level.	a. Community latrines, Soak pits and disposal of sewage through septic tanks / soak pits where ground water table is less than 3m below ground level. Construction of ISL/community latrines/soak pits where subsoil strata is not favourable (hard rock or low infiltration capacity) Construction of ISL/community latrines/soak pits in water logged areas.
Refer Appendix D: Format for Environmental Data Sheets (EDS) ***D.2. EDS for Sanitation Schemes*** ***D.3. EDS for Household Soak pits***	
2. Solid Waste Management	
a. Construction of Composite pits garbage pits where subsurface strata is favourable Household biogas plant Household vermin-composting plant Household aerobic composing plant	a. Community level biogas plant Processing unit for plastic waste
Refer Appendix D: Format for Environmental Data Sheets (EDS) ***D.4. EDS for Community Solid Waste Management***	

7.15 Environmental Appraisal and Approval

Based on the category under which a given scheme is classified, suitable and commensurate environmental assessment and mitigation planning procedures should be applied. The procedures could vary for different categories.

- For low impact category (***Category I***), a set of very simple mitigation steps have to be incorporated in the project plan based on the environmental codes of practice and technical guidelines; possibly a limited environmental appraisal can be undertaken either through SPMU or an environmental consultant. This may pertain to collection of information on source, sanitation, quality of water etc, and its analysis for environmental implication. The scheme specific environmental mitigation measures shall be completed as part of the preparation of detailed project report and shall become a binding provision in the contract documents for civil works construction, where applicable.
- For all Category I schemes, there shall be no separate environment appraisal other than filling up of EDS
- The Detailed Project Report (DPR) for Category I schemes shall be accompanied by the Environmental Data Sheets (EDS). The EE/SE/CE of the SWSM shall ensure this.
- For high impact category (***Category II***), a full-fledged environmental appraisal to be conducted through an environmental consultant. In this case, the EMF would recommend obtaining necessary clearances as required for the implementation of schemes. The same shall be completed as part of the scheme-

specific engineering designs and will become a binding provision in the contract documents for civil works construction, where applicable.

- For Category II schemes, a detailed Environmental Appraisal of the proposed scheme is required. This shall be done by the districts level environmental expert attached to SWSM. In extreme cases, where the district level resources are not sufficient for conducting the environmental appraisal and designing the appropriate mitigation measures, support from the environmental experts of the state level (SPMU) may be requested.
- The Detailed Project Report (DPR) for Category II schemes shall be accompanied by the Environmental Data Sheet (EDS) as well as Environmental Appraisal Sheet. The AE/EE/SE of the UPJN / Engineers of DPMU of SWSM shall ensure the same.

The bid documents of the contractor shall include ECOPs for environmental management during construction stages. The Technical Expert of SPMU shall ensure this. The Figure 7.3 shows the EMF Implementation Process throughout a scheme cycle pertaining to Low and High Impact Category Projects respectively.

7.16 Risk & Assumptions

In managing the water supply sub-projects, the major risk factors along with some proposed management measures from the environmental point of view are given in table below, which are as follows:-

S. No	Risks	Management Proposals
1	Drying-up of water sources	▪ Preventing water wastage ▪ Draw out only planned quantity ▪ Water augmentation ▪ Water harvesting ▪ Catchment area treatment ▪ Alternative sources be explored
2	Natural Calamities like Flash Floods, Droughts & Earthquakes	▪ Sub & Micro-Watershed treatment ▪ Reducing dependency on Fuel wood & Fodder extracted from forest area ▪ Minimum disturbing the topography of the area and immediately rehabilitating it through biological and mechanical measures when constructing Roads ▪ Cordoning off the source works with protection walls (wherever possible to do so), prone to floods ▪ Establishing diversions within the flood routes in order to protect the source at the downstream.
3	Lack of awareness in the community, especially regarding water quality and environmental sanitation	▪ Intensive awareness creation program. ▪ Incentives as visit to new/ religious places in the state, distribution of FTKs and ensuring its usages may help. ▪ Identify convenient water quality testing centres.
4	Unsuitable location and design of toilets specially twin-pit pour flush toilets	▪ Selected site should not pollute the downstream or nearby water supply source. ▪ Proper design, construction and maintenance of toilets should be ensured.
5	Absence of Proper waste management in the community	▪ Proper training regarding use of compost and garbage pits ▪ Incentives to be provided ▪ Arranging/ encouraging private garbage collectors to collect sellable/ usable waste periodically, from each village

Drying–up of the source: The drying up of the sources can be the biggest risk. For it the short-term solutions are to prevent water wastage and to draw out or take only planned quantity for each household to meet the basic essential needs of all. The quantity to be drawn will depend on the quantity of immediately available water. The long-term solutions will be water augmentation, water harvesting, catchment area treatment and exploration of new alternative sources. On the other hand care should be taken that easy availability of water may not encourage people to waste water. The extra water can be stored in well-made cemented tanks for animals' use. Even if, there is more water, then it can be connected to local irrigation system or should be drained out safely to natural streams.

Water Quality & Hygiene: Another fear is that the people may not appreciate or understand the importance of maintaining the water quality and rural hygiene. Intensive training and awareness creation is the only way to let them understand it. Proper training including raising the awareness levels of the GPs is a must. Lack of proper capabilities of the GPs to undertake total work planning, execution, maintenance, monitoring and evaluation may present the biggest risk to the project. Thus, proper training may be termed as a pre-requisite for the success of the project. Hand holding of the GPs may have to be done for a long period, according to the local absorption capacity to work under changed circumstances.

Some incentives may be given to the people to encourage them to adopt the suggestions. The incentives can be: taking them to see success stories of neighbouring districts or visit to some neighbouring religious or tourist places. The people who accept the program may be given higher priority while distributing items of some other program in the village. Regarding water quality, help in identification of convenient, easily accessible testing laboratories would be an incentive to get it done regularly.

Location & Design of Toilets: Toilets especially with soak pits can concentrate contaminants in a small area. Therefore proper designing, construction and the follow-up maintenance is very important.

Solid Waste Disposal: In most of the villages there is no tradition of proper waste management. Therefore people will have to be trained and convinced to use compost and garbage pits. The sellable, non-biodegradable waste would be sorted out separately and sold out to professional garbage collectors periodically. The villagers could be encouraged to collect all sellable waste at one place for removal. Professional garbage collectors would be encouraged to contract large areas (a block or a district or all the villages on a major road etc.) so that it may become remunerative for them. People accepting the proper waste management and sanitation may be provided with some incentives either from RWSS sector or from other village programs.

7.17 Impact Identification and Analysis

7.17.1 EMP for Planning and Design Stage Impacts of RWSS Project

The SWSM together with the community, with assistance from the project executing agency/s and WSSO, shall set up an Environmental Management Plan based on issues identified during the planning stage of the proposed project and necessary preventive and mitigation measures should be considered in the design and be provided in the scheme costing. The contractor shall provide an undertaking for execution of the activities identified in the Environmental Management Plan.

There are no direct impacts expected to occur during the planning and design phase of the proposed project. However, prior to construction, a number of preparations should be made to ensure minimal impacts to the environment. Table 7.5 describes the Environmental Management Plan for planning and design phase and mitigation measures to be considered by the prospective contractor to mitigate the

environmental impacts of the project. The EMP shall be initiated at the planning & design stage of project and the process shall involve addressing relevant environmental issues ranging from household to village level with appropriate detail.

7.17.2 EMP for Construction Stage Impacts of RWSS Project

The SWSM together with the community, with assistance from the project executing agency/s and WSSO, shall set up an Environmental Management Plan based on issues identified during the construction phase of the proposed project. The EMP will be initiated at the community mobilisation stage of project cycle and the process shall involve addressing relevant environmental issues ranging from household to village level with appropriate detail.

The EMP shall give particular attention to project sustainability issues such as protection of intake points, catchment areas, prevention of pollution of water ways, water quality monitoring, user conflicts, selection of proper latrine design and siting. In addition, the EMP shall also address proper drainage facilities around the households and water points, and any construction related impacts. The supervising consultants of the SWSM and the project staff shall take a lead in assisting the contractor in implementing the EMP. The EMP shall be finalized prior to commencement of construction activities and it shall be monitored at defined intervals by VWSC/GP.

Table 7.6 below provides an environmental management plan with suggested mitigation measures for construction stage environmental impacts for proposed RWSS project in 28 districts of eastern UP. The appropriate mitigation measures shall be implemented by the prospective contractor as identified according to the project context and major anticipated impacts during the execution.

7.17.3 EMP for O&M Stage Impacts of RWSS Project

Table 7.7 provides an environmental management plan with suggested mitigation measures for operation and maintenance stage environmental impacts for proposed RWSS project in 28 districts of eastern UP. The appropriate mitigation measures shall be implemented by the prospective contractor as identified according to the project context and major anticipated impacts during the O & M.

Table 7.5: Environmental Management Plan for Planning and Design stage impacts

S. No.	Potential Environmental Impacts	Mitigation Measures	Implementing Agency	Monitoring Institution
1.	Site Access	All work areas (including sensitive areas) or areas that have been identified in the Basic Assessment Report as No-Go areas must be marked off and clearly identified.	DPMU / SPMU/UPJN	VWSC/GP
2.	Training Plan	A detailed training plan shall be prepared to develop and strengthen environmental capacities of the client and other associated agencies/departments. The strategy should include a mix of hands-on training for key staff involved in project preparation, and whenever required, full-fledged academic programs on environmental management at well-recognized institutions.	DPMU / SPMU/UPJN	VWSC/GP
3.	Source of water for construction purpose	A source of water for construction purposes, particularly for the mixing of concrete and the compaction of materials for the construction, needs to be determined. The financial implications of transporting water to site from an alternative location should also be identified and established before construction.	DPMU / SPMU/UPJN	VWSC/GP/UPJN
4.	Site Layout and Management	The construction site must have clearly demarcated areas for the storage and management of construction materials (stockpiling areas), tools, vehicles and heavy machinery, offices and ablution facilities in areas where environmental impacts are minimised. The construction sites shall not be established on steep slopes or within a recommended 30m of wetland, riparian or heritage areas.	DPMU / SPMU/UPJN	VWSC/GP/UPJN
5.	Public Awareness	The planning & design stage opportunities and constraints considered shall be conveyed to the preferred project site locality and site layout plan on which this EMP is based.	DPMU / SPMU/UPJN	VWSC/GP/UPJN
6.	Mechanisms for improved co-ordination	Develop mechanisms that can be effective in co-ordination, reducing delays in ancillary activities such as, but not limited to, shifting of utilities and obtaining required regulatory permissions	DPMU / SPMU/UPJN	VWSC/GP/UPJN

Table 7.6: Environmental Management Plan for Construction stage impacts

S. No.	Potential Environmental Impacts	Mitigation Measures	Implementing Agency	Monitoring Frequency	Monitoring Institution
1.	Site Clearance	No illegal tree chopping shall be allowed. Vegetation clearance activity shall be closely monitored especially within forest areas.	Prospective Contractor	Once in a week	VWSC/GP
2.	Excavation, laying and jointing of Pipes	Loose soil shall be compacted properly after finishing the work. Damage to the roots shall be prevented during trenching, placing, backfill, driving or parking heavy equipment, dumping of trash, oil, paint, and other materials detrimental to plant health.	Prospective Contractor	Daily	VWSC/GP
3.	Public Safety	Excavated areas shall be clearly demarcated. Proper barricading shall be placed along the excavated trenches. Warning sign boards shall be provided along the construction sites in Hindi as well as in local languages. Tress passing of the construction sites shall not be allowed.	Prospective Contractor	Twice in a month	VWSC/GP/UPJN
4.	Access Management	Proper access to the residents shall be provided near the residential areas, schools, hospitals, and religious structures such as mosque or temples etc.	Prospective Contractor	Twice in a month	VWSC/GP/UPJN
5.	Storage of Construction Materials	All construction materials shall be stored in secured places. Contractor shall not be allowed to store the material at construction sites for more than 1 week. No hazardous material, if any, shall be allowed to store near the construction sites.	Prospective Contractor	Once in a week	VWSC/GP/UPJN
6.	Construction sites	It shall be kept free of water logging. Protective guards shall be provided across the areas where workers may fall or could face an impalement hazard. Store tools and materials neatly and out of the way in storage bins or lockers and keep flammable or hazardous wastes, if any, in covered, segregated waste containers. Keep form and scrap lumber with protruding nails cleared away from work areas, passageways. No loose material shall be allowed to leave unattended and sites shall be properly finished after completing the work. Good housekeeping shall be maintained at construction sites.	Prospective Contractor	Twice in a month	VWSC/GP/UPJN
7.	Noise Pollution	Machineries as well as equipments shall be maintained properly. No high noise generating equipment which is not meeting UPPCB	Prospective Contractor	Twice in a month	VWSC/GP/UPJN

S. No.	Potential Environmental Impacts	Mitigation Measures	Implementing Agency	Monitoring Frequency	Monitoring Institution
		requirement shall be allowed at construction sites. Generator etc. shall be properly enclosed, and proper padding shall be placed below such machinery to reduce vibration. Special care must be taken near religious structures, schools, hospitals etc. Machineries/equipments/vehicles shall meet the noise emission requirement of the State Pollution Control Board, UP.			
8.	Air Pollution	Properly maintained vehicles and equipments shall be used. In dusty areas, sprinkling of water shall be done and especial care must be given during summer season. Construction debris shall not be allowed to remain unattended at construction sites for longer time. Workers working in dusty areas such as concrete mixing equipment shall use stringently nose masks. Machineries/equipments/vehicles shall meet the emission requirement of the State Pollution Control Board, UP.	Prospective Contractor	Once in a week	VWSC/GP/UPJN
9.	Water Pollution	No washing of vehicles or equipment shall be permitted near the water source. Construction debris shall not be disposed to the water bodies. Contractor shall arrange its own water for carrying out Construction activities.	Prospective Contractor	Daily	VWSC/GP
10.	Soil Quality	Excavated areas shall be properly compacted. Loose earth shall not be left unattended near the construction sites.	Prospective Contractor	Daily	VWSC/GP
11.	Construction Camps	Proper cooking fuel shall be provided to the labour residing in the camps. In any case, woods shall not be used for cooking. Proper sanitation facilities shall be provided in the construction camps. Potable drinking water shall be provided to the workers. Water logging conditions shall not be allowed inside the camp. For establishing construction camps, contractor shall obtain NOC from the State Pollution Control Board, UP.	Prospective Contractor	Once in a week	VWSC/GP/UPJN
12.	Occupational health and Safety	Safe access to the Job sites shall be provided to all workers Passage ways, walkways, and stairways shall be kept free of materials, scraps or obstructions.	Prospective Contractor	Daily	VWSC/GP

S. No.	Potential Environmental Impacts	Mitigation Measures	Implementing Agency	Monitoring Frequency	Monitoring Institution
		First Aid box shall be readily available at construction sites Contact with nearest nursing homes/clinics/primary health centre shall be maintained by the contractor to deal with any emergency at site. A vehicle shall be readily available at construction site to meet emergency situation. The contractor shall comply with all the precautions as required for the safety of the workmen as per the International Labour Organization (ILO) Convention No. 62 as far as those are applicable to this contract. The contractor shall strictly follow the statuary child labour act. Good housekeeping shall be maintained at sites. Personal Protection Equipments such as helmets, hand gloves, safety shoes, nose masks, safety goggles shall be provided to the workers.			

Table 7.7: Environmental Management Plan for Operation & Maintenance stage impacts

S. No.	Potential Environmental Impacts	Mitigation Measures	Implementing Agency	Monitoring Frequency	Monitoring Institution
Water Supply Scheme					
1.	Hand Pumps	▪ Routine inspections of hand pumps ▪ Source protection + treatment for Arsenic / Iron / Fluoride, etc., ▪ Regular cleaning and back washing of treatment units/filters in-lined with hand pumps (removal of wreckage, etc.) shall be ensured. ▪ Enforce Ground Water Act + monitor regularly ground water level	Prospective Contractor / UPJN / VWSC	Monthly	VWSC/GP/UPJN
2.	Piped Water Supply Schemes	▪ Chlorination level of water supply to ensure minimum residual chlorine of 0.5mg /litre and regular water quality testing + control.	Prospective Contractor / UPJN / VWSC	Daily	VWSC/GP/UPJN
		▪ Preventive and corrective maintenance of water distribution system including checking of leakages.		Quarterly	VWSC/GP/UPJN
Sanitation Scheme					
1.	Drain/Sewer Condition Assessment	▪ Routine inspections of drains and sewers. ▪ Regular cleaning of interception chambers/drains (removal of blockages, debris, etc.) shall be ensured.	Prospective Contractor / UPJN / PRI	Quarterly	VWSC/GP/PRI
		▪ Leakage in sewers		Yearly	VWSC/GP/PRI
2.	Sewage Treatment Plant	▪ Routine maintenance of plants shall be organized.	Prospective Contractor / UPJN / PRI	Twice in a month	VWSC/GP/PRI
		▪ In case of ponds, – Its characteristic changes in colour and odour shall be observed. – The ponds shall be cleared of floating mats of algae at the corners and sides. – All marginal growth of weeds and vegetation shall be removed. It also helps prevent mosquito breeding. – The overgrown and dead grass shall be removed.		Every Six months	VWSC/GP/PRI

7.17.4 Monitoring and Evaluation

Monitoring and evaluation is primarily required to ensure proper and timely implementation of mitigation measures identified in the planning stage, based on the EMF. 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.

A monitoring and evaluation cell to be created at State level under the supervision of an official familiar with environmental issues of the proposed scheme. In specific situations, one may consider appointing external agencies to carry out the monitoring and evaluation activities and report to the supervising official (EE/AE of UPJN/Engineers of DPMU of SWSM). The indicators to be monitored can be framed from the EMF taking into consideration the activities involved.

The feedback received from monitoring and evaluation cell will be discussed with the implementing officials and the contractor and corrective actions will be taken, where necessary. The EMF requires detailed supervision, monitoring and evaluation of the impact of the project on the environment. This shall include:

Environmental Supervision: A sample of 10% of the completed schemes shall be visited at six monthly intervals by a team from NRDWP from Central Govt.,and World Bank and a sample of 10% of the completed schemes shall be visited at quarterly intervals by a team from SWSM (including District Resource Persons) to check if all safeguard requirements are met and to identify any issues that need to be addressed. The selected samples shall have representation of both Category I & II schemes in water supply, sanitation and solid & liquid waste management. The internal environmental monitoring shall be done as part of the regular monitoring by the UPJN. The DPMU shall visit all the completed schemes in the district on monthly basis to check the implementation of environmental safeguards.

Monitoring of relevant external environmental parameters: Once every year, the SWSM shall prepare a report of the environmental situation in the project area districts including data and analysis of relevant parameters such as rainfall, depth to water levels, status of groundwater basins, incidence of water borne diseases, etc, as well as a listing of relevant legislations and regulations that have a bearing on the environmental performance of the project. The EMF shall be suitably revised annually on the basis of this document by the SWSM.

Environmental Audit: Once every year, the SWSM shall appoint an external agency to undertake an independent audit of the environmental performance of the project. 5% of the completed schemes shall be covered in the audit having representation of both Category I and II schemes in water supply, sanitation and solid & liquid waste management. Section 7.19 gives a list of key performance indicators to be used in these audits.

Third Party Environmental Review: SWSM shall appoint an external agency to undertake an independent mid-term and end term reviews of the environmental performance of the RWSS project in the project implementation period of 6 years.

7.18 Capacity Building and Training

The State currently has limited capacity for environmental management. The training and capacity building program developed for the project aims at building environmental awareness and environmental management capacity in the project administration structure as well as in the intended target communities.

The training programs for the staff in the project agencies at various levels as well as for the village communities will be organized.

Both SOs and VWSC to work in the project with GPs, SPMU will require capacity building for survey, design, preparation of designs, drawings and cost estimates for the water supply and sanitation schemes by using computer-oriented tools.

7.18.1 Objectives

The capacity building for environment management shall be integrated with overall capacity building component of the project with the following objectives:

- To build and strengthen the capability of rural water and sanitation agency/institutions (UPJN and PRI) and other partners (NGOs, Contractors and Supporting Organisations) to integrate sound environmental management in water and sanitation services.
- To orient the service delivery of staff and GP representatives to the requirements of the projects' Environmental Management Framework.
- Systematic capacity building initiatives shall be introduced only after the completion of training needs assessment.
- The training shall be of plummet mode. All the trained staff and other shall in turn conduct further trainings at State, District and Gram Panchayat levels for improved service delivery.

7.18.2 Training Approach

A specific training program for the key officials of the project, focused on the procedural and technical aspects of environmental assessment and management shall be developed. This training would be mandatory for the SO personnel and GP personnel. The project shall fulfil (a) short-term training on EMF application in planning and implementing of schemes under the proposed project to all stakeholders concerned including the potential beneficiary communities (b) water quality monitoring and watershed conservation training to Department of Rural Development and regulating authorities. The training shall involve initial orientation, main training program and livener training programs. The main and livener training programs shall be for duration of 2-3 days each, where as the initial orientation workshop shall be of duration of one day.

7.18.3 Training Resources

Some specialized institutions identified for training are:

- UPJN: Uttar Pradesh Jal Nigam
- CWRDM: Centre for Water Resources Development and Management
- National Institute for Rural Development (NIRD)
- CGWB: Central Ground Water Board
- UPPCB: Uttar Pradesh Pollution Control Board
- WSSO: Water and Sanitation Support Organization

7.18.4 Training Programmes

The various training programmes along with the details are presented in the Table 7.8 below.

Table 7.8: Training Programmes

S. No	Training	Purpose of the Training	Participants	Schedule	Course content
1	Introduction to Environmental Management in Proposed RWSS project including EMF	Filling of EDS, procedural & technical aspects of Environmental Assessment. To equip with knowledge and skills necessary for undertaking environmental appraisal as per the requirements of the EMF. To undertake periodic supervision of environmental performance of schemes To prepare for planning and monitoring implementation of environmental mitigation measures identified through the appraisal process. To equip with skills necessary for water quality testing using the field testing kits under the Community based System for water quality Monitoring and Surveillance.	Personnel from WSSO, SWSM, UPJN	Orientation Workshop - 1 day Main & Livener Training Programme – 3 days	Environment aspects pertaining to sustainability of water sources, water quality, protection of sources, Multi-GP schemes, besides sanitation facilities and Environmental appraisal. Water quality monitoring, prevention of pollution & surveillance.
2	Environmental Awareness and Sensitization	To build awareness on safe drinking water, water conservation, environmental sanitation and personal hygiene.	Personnel of UPJN, SOs, Members of VWSC and NGOs	One day workshop at the Block level. One day livener workshop organized annually. Total training programs will be about 224 for the project duration.	--
3	Orienting for planning, design and implementation of RWSS schemes including environmental issues/safeguard for PRIs and UPJN	To create awareness among the implementation agencies as well as the monitoring units so as to have in depth understanding of the schemes being implemented under the proposed project. The orientation shall educate the agencies with regards to the environmental issues / safeguard to be taken into consideration during the implementation of the proposed schemes.	Personnel from PRI, UPJN, SWSM, Members of VWSC and NGOs.	3 day workshop – First day induction program, and next 2 days in detail training with regards to the environmental issues/safeguards.	-
4	Orientation for Water Quality monitoring for PRIs	To build awareness on water quality monitoring amongst implementation agencies.		One day training at the Block level. One day livener training organized annually. Total training programs will be about 224 for the project duration.	

7.18.5 Budget

The estimated cost of training on environmental management for members of VWSCs, NGOs/ SOs, Engineers of SWSM, under the proposed RWSS project is presented in the table below. It is proposed to have 1 no. of training programme on "Introduction to Environmental Management for Proposed RWSS project including EMF" and on "Orientation for Planning, Design and Implementation of RWSS schemes including environmental issues/safeguards for PRIs and UPJN" in each of the project districts (28 districts) in the first year on the launch of the project in the district two times. While 8 nos. of training programme on "Environmental Awareness and Sensitization" and on "Orientation for water quality monitoring for PRIs" in each of the project districts (28 districts) over the project period of 6 years depending on the phasing of the project.

Table 7.9: Estimated Cost of Training

S. No.	Training	No. of Programs	Estimated Unit Cost in Rs.	Total Cost in Rs.
1	Introduction to Environmental Management for Proposed RWSS project including EMF	56	200,000	11,200,000
2	Environmental Awareness and Sensitization	224	80,000	17,920,000
3	Orientation for Planning, Design and Implementation of RWSS schemes including environmental issues/safeguards for PRIs and UPJN	56	200,000	11,200,000
4	Orientation for water quality monitoring for PRIs	224	80,000	17,920,000
	Total			***58,240,000***

The total estimated cost for monitoring implementation of environmental management including training for members of VWSCs, NGOs/ SOs, Engineers of SWSM, under the proposed RWSS project is presented in the table below.

Table 7.10 Estimated Cost on Environmental Management

S. No.	Training	No.	Estimated Unit Cost in Rs.	Total Cost In Rs.
1	Trainings	4		58,240,000
2	Internal supervision visits by NRDWP from Central Govt.,/ World Bank Mission during the project period (Half-yearly)	12	200,000	2,400,000
3	Internal supervision visits by SPMU/Consultants during the project period (once in a quarter)	24	100,000	2,400,000
4	Internal supervision visits by DPMU/Consultants during the project period (monthly once)	72	50,000	3,600,000
5	Environmental Audit by External Agency once in a year for 6 years	6	1,000,000	6,000,000
6	Preparation of specific IEC material related to Environment			5,000,000
7	Environmental assessment for Category-II schemes	10	500,000	5,000,000

S. No.	Training	No.	Estimated Unit Cost in Rs.	Total Cost In Rs.
8	Monitoring external environmental parameters once in a year	6	1,000,000	6,000,000
9	Third Party Reviews during mid-term and end term	2	3,000,000	6,000,000
	Total			***94,640,000***

7.19 Performance Indicators

1. Water Quantity:

- No. of habitations with availability of at least 70lpcd of drinking water during the year as a percentage of total project habitations completed.
- No. of habitations which have now been provided an alternative sustainable source as a percentage of total project habitations previously depending on critical and overexploited basins.
- No. of wells providing sustainable yield (throughout the year) as a percentage of total wells constructed in the project.

2. Water Quality:

- No. of habitations with Arsenic removal unit as percentage of total habitations affected by Arsenic.
- No. of habitations with Fluoride removal unit as percentage of total habitations affected by Fluoride.
- No. of habitations with Iron removal unit as percentage of total habitations affected by Iron.
- No. of habitations with bacterial/chemical contamination in drinking water supplies as a percentage of total habitations.
- No. of habitations with no residual chlorine levels at the public taps as percentage of project habitations with piped water supply schemes.
- No. of project habitations with disinfection facility as percentage of total project habitations.
- Reduction in water quality related diseases.

3. Environmental Sanitation:

- Number (and %) of households and institutions with access to safe sanitation facilities.
- Number (and %) of households and institutions with regular use of latrines/sanitation facilities.
- Number of habitations with solid waste management including composting as percentage of all project habitations.
- Number of habitations with liquid waste management including drainage and safe disposal of sullage as percentage of all project habitations.
- Reduction in open defecation.
- Reduction in No. of cases of water borne diseases.

4. Institutional Arrangements and Capacity Building:

- No. of districts with capacity to anchor responsibility of EMF implementation as percentage of all project districts.
- No. of project staff at state, district and Block levels trained in EMF as a percentage of all project staff at each level.
- No. of community institutions (VWSCs, etc.) that participated in IEC programmes conducted on EMF as a percentage of all community institutions involved in the project.
- Number of external audits conducted as against the target number of audits for the project duration.

8. Environmental Code of Practices

8.1 ECOPs for identifications of Sources of Water Supply

The identification and selection of source determines the adequacy, reliability and quality of the water supply. The raw water quality dictates the treatment requirements. For example, most ground waters that are free from objectionable mineralisation are both safe and potable and may be used without treatment, provided the wells or springs are properly located and protected. Surface waters, on the other hand, are exposed to direct pollution and treatment is usually a prerequisite for their development as a drinking water supply. The location of the source also defines the energy requirements for raw water pumping, which can directly affect recurrent operational costs.

Whenever possible, the raw water source of highest quality economically available should be selected, provided that its capacity is adequate to furnish the water supply needs of the community.

With a new supply, an assessment should be made in conjunction with the collection of engineering data covering the development of a given source and its capacity to meet existing and future needs. The assessment should include the detection of all health hazards and their present and future importance. Persons trained and competent in public health engineering and the epidemiology of waterborne diseases should conduct the assessment. In the case of an existing supply, the assessment should be made at a frequency compatible with the control of the health hazards and the maintenance of a good sanitary quality.

The information furnished by the assessment is essential to complete interpretation of bacteriological and frequently the chemical data. This information should always accompany the laboratory findings. The following outline covers the essential factors which should be investigated or considered in the assessment. Not all of the items are pertinent to any one supply and in some cases; items not in the list would be important additions to the survey list.

8.1.1 Ground Water Supplies

- Local geology; slope of ground surface.
- Nature of soil and underlying porous strata; whether clay, sand, gravel, rock (especially porous limestone); coarseness of sand or gravel; thickness of water-bearing stratum, depth to water table; location, log and construction details of local wells in use and abandoned.
- Slope of water table, preferably as determined from observational wells or as indicated, presumptively but not certainly, by slope of ground surface.
- Extent of drainage area likely to contribute water to the supply.
- Nature, distance and direction of local sources of pollution.
- Possibility of surface-drainage water entering the supply and of wells becoming flooded; methods of protection.
- Methods used for protecting the supply against pollution by means of sewage treatment, waste disposal, and the like.
- Well construction - Total depth of well
- Casing: diameter, wall thickness, material and length from surface.
- Screen or perforations: diameter, material, construction, locations and lengths.
- Formation seal: Material (cement, sand, bentonite, etc.), depth intervals, annular thickness and method of placement.
- Protection of well at top: presence of sanitary well seal, casing height above ground, floor, or flood level, protection of well vent, protection of well from erosion and animals.

- Availability of an unsafe supply, usable in place of normal supply, hence involving danger to the public health.
- Disinfection: equipment, supervision, test kits, or other types of laboratory control.

8.1.2 Surface-Water Supplies

- Nature of surface geology: character of soils and rocks.
- Character of vegetation, forests, cultivated and irrigated land, including salinity, effect on irrigation water, etc.
- Population per sq Km of catchment area.
- Methods of sewage disposal, whether by diversion from watershed or by treatment.
- Character and efficiency of sewage-treatment works on watershed.
- Proximity of sources of faecal pollution to intake of water supply.
- Proximity, sources and character of industrial wastes, mine waters, etc.
- Adequacy of supply as to quantity.
- For lake or reservoir supplies: wind direction and velocity data, drift of pollution, sunshine data (algae).
- Character and quality of raw water: Coliform organisms (MPN), algae, turbidity, colour, objectionable mineral constituents.
- Nominal period of detention in reservoir or storage basin.
- Probable minimum time required for water to flow from sources of pollution to reservoir and through reservoir intake.
- Shape of reservoir, with reference to possible currents of water, induced by wind or reservoir discharge from inlet to water-supply intake.
- Protective measures in connection with the use of watershed to control fishing, boating, swimming, wading, permitting animals on marginal shore areas and in or upon the water etc.
- Efficiency and constancy of policing.
- Treatment of water: kind and adequacy of equipment; duplication of parts; effectiveness of treatment; adequacy of supervision and testing; contact period after disinfection; free chlorine residuals carried.

8.1.3 Distances to sources of contamination

All ground water sources should be located at a safe distance from sources of contamination. In cases where sources are severely limited, however, a ground water aquifer that might become contaminated may be considered for a water supply if treatment is provided. After a decision has been made to locate a water source in an area, it is necessary to determine the distance the source should be placed from the origin of contamination and the direction of water movement.

Because many factors affect the determination of "safe" distances between ground water supplies and sources of pollution, it is impractical to set fixed distances. Where insufficient information is available to determine the 'safe' distance, the distance should be the maximum that economics, land ownership, geology and topography will permit. It should be noted that the direction of ground water flow does not always follow the slope of the land surface. Each installation should be inspected by a person with sufficient training and experience to evaluate all of the factors involved.

Since safety of a ground water source depends primarily on considerations of good well construction and geology, these factors should be the guides in determining safe distances for different situations. The following criteria apply only to properly constructed wells. There is no safe distance for a poorly constructed well.

When a properly constructed well penetrates an unconsolidated formation with good filtering properties and when the aquifer itself is separated from sources of contamination by similar materials, research and experience have demonstrated that 50 feet is an adequate distance separating the two. Lesser distances should be accepted only after a comprehensive sanitary survey, conducted by qualified state or local health agency officials, has satisfied the officials that such lesser distances are both necessary and safe.

If it is proposed to install a properly constructed well in formations of unknown character, the state or Geological Survey and the state or local health agency should be consulted.

When wells must be constructed in consolidated formations, extra care should always be taken in the location of the well and in setting "safe" distances, since pollutants have been known to travel great distances in such formations.

The following table is offered as a guide in determining distances:

Formation	Minimum acceptable distance from Pollution source
Favourable (unconsolidated)	50 feet. Lesser distances only on health department approval following comprehensive assessment of proposed site and immediate surroundings
Unknown	50 feet only after comprehensive geological survey of the site and its surroundings has established, to the satisfaction of the health agency that favourable formations do exist.
Poor (consolidated)	Safe distances can be established only following both the comprehensive geological and comprehensive assessment. This assessment also permits determining the direction in which a well may be located with respect to sources of contamination. In no case should the acceptable distance be less than 50 feet.

8.2 ECOPs for Protection of Surface water supply source and Ensuring sustainability

The contamination, pollution and any degradation of the quality of water supply sources have damaging effects on health, well-being and economy, as well as on the general environment. The careful selection of the surface water supply source and its protection, are most important measures for preventing the spread of water borne enteric diseases.

- Water, being an essential of life, is one of the most valuable resources of man. Therefore, everyone has a natural right to safe, acceptable quality water for drinking, culinary and other domestic uses.
- The water supplier, an individual, a utility or the municipality, has a natural right to good quality raw water.
- The responsibility for preventing and abating pollution and contamination of raw water sources rests with those who discharge, directly or indirectly, waste products into the water sources or the land, as well as with those who cause unacceptable land use conditions within the watershed.
- All water and land users are responsible for taking effective action to identify and reduce to the lowest practical level pollution of surface water sources.
- All levels of government and regional planning and water resources agencies must coordinate their efforts in managing, regulating and monitoring surface water resources.
- Land, water and air are interrelated resources, and planning for their protection, management and use must consider their mutual impacts and influences in an integrated manner.
- Where reasonable access to other water bodies is available, public water supply source must not be used for recreational purposes.
- Primary body contact such as swimming and wading must not be allowed in water supply sources.
- Distribution or equalizing reservoirs from which water is supplied directly to the public requires the strict controls and must under no circumstances be used for any type of recreation.
- Control of the quality of surface water supply sources (including catchments basins, impoundments and distribution reservoirs) is imperative to facilitate the effective and economical production of safe, adequate and aesthetically acceptable water for domestic uses, and to enhance the economic value of the water for municipal and industrial purposes.

8.2.1 Surface Water Supply Source Monitoring and Inspection Considerations

8.2.1.1 Watershed Inspection

- Physical Conditions within the watershed, near reservoirs, in relation to
- Erosion, sedimentation, silt movement
- Floating solids, debris, oil, grease, algal mats
- Excessive vegetative growth, unusually enriched growth of green grass (indicative of sewage contamination, e.g., by failure of septic tanks)
- Changes to water course path or conditions
- Slumping, terrain heaving, drift wood etc

8.2.1.2 Waste Disposal

- Solid wastes dumping
- Oil drums, large chemical containers, other unwarranted
- Industrial and household materials, equipment, appliances, and goods
- Liquid waste discharges including septic tank effluents (pumpouts)

8.2.1.3 Land Use

- Changes in site use (number of people, additions to buildings, repairs or additions to septic systems).
- Activities in watershed-recreation, waste disposal on land and injection wells, construction, forestry operations etc.
- Industrial storage facilities for fuels or chemicals.
- Aerial spraying of pesticides or weed control agents within or surrounding the watershed.
- Condition of any road crossing, causeways, beaches, slopes, etc.
- Grazing of domesticated animals (cattle, sheep, horses) and condition of the yards.
- Utilization of transportation corridors for the movement of materials which may result in contamination should an accident occur.

8.3 ECOPs on Protecting Ground water supply sources and ensuring Sustainability

Same as surface water sources, the contamination, pollution and any degradation of the quality of ground water supply sources have also damaging effects on health, well-being and economy. The careful selection of the ground water supply source and its protection, are most important measures for preventing the spread of water borne enteric diseases.

Groundwater Recharge Methods

Existing Practices in Ground Water Recharge in Uttar Pradesh

The State Ground Water Department, Government of Uttar Pradesh has implemented schemes involving several different types of water harvesting structures (depending on the local site conditions). These include:

- Check Dams
- Percolation Tanks
- Rooftop Rain Water Harvesting Structures
- Recharge Pits
- Injection Wells/Recharge Wells

Guidelines for Ground Water Recharge

The guidelines presented are based on the guidelines provided in the publication "*Water Harvesting and Artificial Recharge"* published by the Rajiv Gandhi National Drinking Water Mission, Department of Drinking Water Supply, Ministry of Rural Development, Government of India (2004). The Recommended Water Harvesting Measures for Eastern Uttar Pradesh are presented in the following table:

Recommended water harvesting measures for Eastern Uttar Pradesh[3]

Agro-climatic zone	Region in eastern Uttar Pradesh	Recommended water harvesting structures
Eastern Region	Entire project area	Roof-top harvesting Percolation tanks Check dams Ponds/tanks Injection Wells/Recharge Wells

3 Department of Drinking Water Supply, Ministry of Rural Development, Government of India, 2004

Roof Top Harvesting Systems

Roof top water harvesting systems can provide good quality potable water with the design features outlined below are taken into account:

- The substances that go into the making the roof should be non-toxic in nature.
- Roof surfaces should be smooth, hard and dense since they are easier to clean and are less likely to the damage and release material / fibre into the water.
- Roof painting is not advisable since most paints contain toxic substances and may peel off.
- No overhanging tree should be left near the roof.
- The nesting of birds on the roof should be prevented.
- All gutter ends should be fitted with a wire mesh screen to keep out leaves etc.
- A first-flush rainfall capacity, such as detachable down pipe section, should be installed.
- A hygienic soak away channel should be built at water outlet and a screened overflow pipe should be provided.
- The storage tank should have a tight fitting roof that excludes light a manhole cover and a flushing pipe at the base of the tank (for standing tanks).
- There should be a reliable sanitary extraction device such as a gravity tap or a hand pump to avoid contamination of the water in the tank.
- There should be no possibility of contaminated wastewater flowing into the tank (especially for tanks installed at ground level).
- Water from other sources, unless it is reliable source, should not be emptied into the tank through pipe connections or the manhole cover.
- During the rainy season, the whole system (roof catchment, gutters, pipes, screens, first-flush and overflow) should be checked before and after each rain and preferably cleaned after every dry period exceeding a month.
- At the end of the dry season and just before the first shower of rain is anticipated, the storage tank should be scrubbed and flushed of all sediment and debris (the tank should be re-filled afterwards with a few centimetres of clean water to prevent cracking). Ensure timely service (before the first rains are due) of all tanks features, including replacement of all worm screened and servicing of the outlet tap or handpump.

Percolation Tanks

- Percolation tanks should normally be constructed in a terrain with highly fractured and weathered rock for speedy recharges; in case of alluvium the boundary formations are ideal. However, the permeability shouldn't be too high that may result in the percolated water escaping the downstream.
- Submergence area should be uncultivated as far as possible.
- Rainfall pattern based on long-term evaluation is to be studied so that the percolation tanks get filled up fully during monsoon (preferably more than once).
- Soil in the catchment area should preferably be of light sandy type to avoid silting upon the tank bed.
- The location of the tank should preferably be downstream of runoff zone or in the upper part of the transition zone, with a land slope gradient of 3 to 5%.
- While designing, due care should be taken to keep the height of the ponded water column about 3 to 4.5m above the bed level.
- Construction–wise there is not much difference between a percolation tank and a minor irrigation tank, except for providing outlets for surface irrigation and the depth of the cut-off trench. The cut-off trench is to be provided below the earthen bund with depth limited to one fourth of the height between bed level and full storage level.

Check Dams

Check Dams are constructed in the drainage course of narrow streams in low rainfall area to impound run-off rainwater. The following are some guidelines for construction of check dams.

- The total catchment of the nallah should normally be between 40 to 100 hectares though the local situations can be guiding factor in this
- The rainfall in the catchment should be less than 1000mm/ annum
- The Nallah bunds should be preferable located in area where contour or graded bunding of lands have been carried out
- The rock strata exposed in the ponded area should be adequately permeable to cause ground water recharge through ponded water
- Nallah bund is generally a small earthen dam with cut-off core wall of bricks work, though masonry and concrete bunds/plugs are now prevalent
- Dams should be built at sites that can produce relatively high depth to surface area so as to minimize evaporation loses.
- Rocky surface should not be fractured or cracked, which may cause the water to leak away to deeper zones or beneath the dam.
- Dam foundation must of solid impermeable rock with no soil pockets or fracture line
- No soil erosion in the catchment area
- Dams should be sited along the edges of depressions or directly across the lower ends of deep gullies into rock.

Ponds/ Tanks

A good pond should possess the following traits:

- The site should be narrow gorge with a fan shaped valley above: so that amount of earthwork gives a large capacity. Junctions of two tributaries, depressions and other sites of easily available fill material and favourable geology should be preferred
- The capacity catchment ratio should be such that the pond can be fill up to about 2-3 months of rainfall. The capacity should not be too small to be choked up with sediments very soon
- The pond should be located where it could serve a major purpose e.g. if irrigation it should be above irrigated field
- The site should not have excessive seepage losses
- The catchment areas should be put under conservative practices

Rainwater Harvesting Structures

Guidelines for Implementation of Rainwater Harvesting Structures for Sustainability of Drinking water supply sources:

- The rainwater harvesting (RWH) structures should be site specific closer to the source but 15m away from the bore well to prevent direct contamination; the location should be certified by the hydro geologist of the state ground water department/UPJN.
- The local geological and hydro geological conditions have to be studied in conjunction with the location of the groundwater source to facilitate maximum recharge from the structure.
- No RWH structure should be installed in the supply/feeder channel of tanks.
- RWH structure should be simple and suitable to the location and economically viable to the community.
- All the works of RWH structure should be implemented before the onset of the monsoon.

- Pre and post water level and water quality monitoring should be carried out in the well for water supply source to evaluate the benefit accrued of the RWH structures.

Erosion control in catchment

There is no unique solution for erosion control. The following are some of the erosion control measures used in many parts of the country.

Conservation cover: Establish and maintain perennial vegetative cover to protect soil and water resources.

Contour bunding/trenching: Forming contour bunding or trenching along the contour in steep sloped areas may be taken up for reducing runoff and erosion. Terraces are constructed with earthen embankments that retard runoff and reduce erosion by breaking the slope into numerous flat surfaces separated by slopes that are protected with permanent vegetation.
Critical area planting: Planting vegetation such as trees, shrubs, grasses or legumes on highly erodable or eroding areas. While undertaking any plantation programme care must be taken to plant only indigenous species with involving and close coordination with local people.

8.4 ECOPs on Water Quality Monitoring

Water Quality Standards

The Bureau of Indian Standards specification IS: 10500-1991 governs the quality of drinking water supplies in India by public agencies. These are based on International standards for drinking water quality issued by the WHO and the manual of standards of quality for drinking water supplies, ICMR, 1971.

Physical and chemical Parameters

S. No.	Characteristics	Acceptable limits	Maximum Limits
1.	Turbidity (NTU)	1.0	10
2.	Colour (unit on Pt. Cobalt scale)	5.0	25.0
3.	pH	7.0 to 8.5	<6.5 or >9.2
4.	TDS (mg/L)	500	2000
5.	Total hardness (mg/L)	200	600
6.	Calcium (mg/L)	75	200
7.	Magnesium (mg/L)	<30	150
8.	Chlorides (mg/L)	200	1000
9.	Sulphates (mg/L)	200	400
10.	Fluorides (mg/L)	1.0	1.5
11.	Nitrates (mg/L)	45.0	45.0
12.	Iron (mg/L)	0.1	1.0

Bacteriological Parameters: In 100 ml sample, the count of Coliform organism and E-coli should be zero.

Guidelines for WQM&S

The guidelines given are in line with the guidelines of the Community-based Water Quality Monitoring and Surveillance system documented in the *Implementation Manual on National Rural Water Quality Monitoring and Surveillance Programme* published in 2004 by the Rajiv Gandhi National Drinking Water Mission,

Department of Drinking Water Supply, Ministry of Rural Development, Government of India. These guidelines will be applied in the proposed RWSS project.

Plan for WQM&S

Community-based systems for Water Quality Monitoring and Surveillance:

The actions planned for integrating a Community-based system for Water Quality Monitoring and Surveillance programme as part of the RWSS are:

- Identifying suitable user-friendly field testing kits for Water Quality Testing.
- Initiating an action research (pilot) on Community-based systems for Water Quality Monitoring and Surveillance in few villages.
- Using the piloting experience to develop a scaling-up strategy for all the project villages.
- Implementing the Community-based systems for Water Quality Monitoring and Surveillance programme in all the project villages through the use of user-friendly Water Quality Testing Kits and by involving the VWSCs, GPs, local educational institutions, etc.

Water Quality Monitoring and Surveillance through Laboratory Infrastructure:

The water to be supplied is tested at two stages.

- Firstly, at the time of development of source to ascertain if the source would yield water within safe chemical-content limits.
- Secondly, after commissioning of the water supply schemes, to monitor any change in quality of the water supply source over the years.
- Water samples, apart from the source, are also taken from different points in the distribution system including the consumer end and tested in the laboratories.

Testing personnel	Frequency	Responsibility
Pump operator of water distribution	Once in a day	Checking and ensuring the safety of water Maintaining a record of residual chlorine
Junior Engineer	Once in a week	Checking turbidity of treated water from filters in case of surface water sources Testing residual chlorine Checking the water quality record maintained by operator Maintaining the record of treated water quality
Assistant Engineer/ Executive Engineer	Once in a month	Testing residual chlorine in the water sample Checking the record of tests conducted by the pump operator and JE and will record his comments over the results.
	Once in quarter	Collecting and sending samples for bacteriological analysis; Maintaining the records of bacteriological water quality
	Twice in a year Pre and post monsoon	Collecting and sending samples to district laboratories for Chemical analysis; Maintaining the records of chemical water quality

Objective of the water quality monitoring:

- To ascertain the quality of water in various rural water supply schemes (ground water or surface water) as well as in the distribution network.
- To examine physico-chemical and bacteriological quality to establish whether the drinking water is fit for human consumption and meets the drinking water standards as laid down in IS - 10500: 1991.

Sampling:

Selection of location for sampling should indicate true representative samples.

- Public stand posts
- Selected consumer locations at random
- In addition to above, raw water source and treated water should also be analyzed in case of surface water based water supply schemes.

Recommended Frequency:

Source	Minimum frequency of sampling and analysis		Remarks
	Bacteriological	Physical/Chemical	
Ground Water			
Shallow tube wells with hand pump	Shallow tube wells with hand pump	Shallow tube wells with hand pump	Shallow tube wells with hand pump Deep tube wells with hand pump Wells and piped supplies
Deep tube wells with hand pump	Deep tube wells with hand pump	Deep tube wells with hand pump	
Wells and piped supplies	Wells and piped supplies	Wells and piped supplies	
Surface Water			
Filtered and/or chlorinated and piped supplies	Filtered and/or chlorinated and piped supplies	Filtered and/or chlorinated and piped supplies	Filtered and/or chlorinated and piped supplies

Water Quality Record:

The water quality test results should be entered in a logbook as per the prescribed format (as shown below) and should be submitted to the DWSM once every 3 months.

S. No.	Point of Sampling	Turbidity (NTU)	Residual Chlorine	Faecal Coliform MPN/ 100mL	Quantity of bleaching powder/ sodium hypochlorite being added/day	Initials of pump operator carrying test	Initials of Engineer carrying test	Remarks
1.								
2.								
3.								
4.								

8.5 ECOPs on safe sanitation techniques (including Drainage) at individual household and community level

Selection and installation of safe sanitation technologies to suit the local soil characteristics and hydrogeology is necessary so as to minimise ground water contamination. For selecting the most appropriate system for any location the following factors are to be considered:

- Number of people to be served
- Low cost sanitation systems like pour flush single/two pit latrines, conventional septic tanks could be installed.
- Revamping the existing deep pit latrines (>3m) to prevent direct contact of human excreta with the ground water. Depending upon site specific conditions, such latrines could be a source of potential risk to public health.
- Per capita water supply rate and the water availability for ablution and flushing.
- Extent of space available within the plot/street for sanitation facility.
- Hydro geologic characteristics of the subsoil,
- Depth to groundwater table from the ground surface (summer and rainy season),
- Quality of groundwater in the vicinity and their present uses,
- Locations of the existing water supply wells sources.

Further the selection of the types of toilets shall mainly depend on the type of sub-soil within the location; thus appropriate type of toilet has to be selected as per the local soil characteristics and ground water table depth**.** Other factors to be considered:

- Hard to dig
- Clay soil
- Coarse sand
- Water rises higher than one meter from bottom of the latrine pit, but never completely floods the latrine pits
- Distance from latrines pit to drinking water sources.

Table 8.1: Different Types of Sanitation Techniques

Latrine Type	Suitable for high Ground Water table	Suitable for areas prone to floods or flushes	Suitable for loose soils	Suitable for soils of low permeability	Water requirement	Ease of construction	Ease of maintenance	Remarks
Direct Single Pit Latrine Without Pour flush	Yes, if raised	Yes, if raised	Yes, if Fully clay soils lined	Not for clay soils	No	Easy	Easy	Sludge unsafe
Direct Twin Pit Latrine Without Pour flush	Yes, if raised	Yes, if raised	Yes, for fully lined	Not for clay soils	No	Easy	Easy	Safe sludge
Offset Single Pit Latrine with Pour-flush	Yes, if raised and with soak away	Yes, if raised	Yes, for fully lined	Yes, with soak away	Yes	Easy	Easy	Sludge unsafe
Offset Twin Flush Pit Latrine raised and with Pour flush	Yes, if raised and with soak away	Yes, if raised	Yes, for fully lined	Yes, with soak away	Yes	Fairly Easy	Fairly Easy	Safe sludge easy
Solar heated single-vault eco-sanitary latrine with urine separation	Yes	Yes	Yes	Yes	No	Fairly Easy	Difficult	Safe dehydrated material
Single-vault eco-sanitary latrines with urine separation	Yes	Yes	Yes	Yes	No	Easy	Difficult	Safe dehydrated material
Urinal	Yes	Yes	Yes	Yes	Very Less	Easy	Easy	-

8.6 ECOPs on selection on location for community toilets

Environmental Considerations in Location of Community Toilets

The soil and water table conditions should be carefully investigated prior to selecting the site for the Toilet/Latrine:

Specific topic on which information/ data is needed	Considerations
Type of soil –stability	
Loose, sides of wall collapse	Line the pits. In very sandy soils, sink cement rings that are perforated or set on top of each other without cement.
Hard to dig	Use the pits. In very sandy soils, sink cement rings that are perforated or set on top of each other without cement.
permeability (how water is absorbed by soil)	
Clay soil	Test by pouring water into a hole and measuring how long it takes to be absorbed. Pits in dense clay may need back filling about 1.2 meters with more sandy soil.
Coarse sand	Back fill around the rings with denser soil and /or locate the latrine pipes far (for example, 40 meters or more) from a well used for drinking.
Hard Latrine	If there might be cracks in the latrine, the latrine pits can pollute nearby drinking water sources. Place the latrine far from these sources.
Ground water level in wet season (deepest level)	
Water rises higher than one meter from bottom of the latrine pit, but never completely floods the latrine pits	Locate the latrine pit far from any well used for drinking purpose and should be away for example, 40 meters or more
Water rises to or above the ground level and sludge comes out the latrines	Raise the latrines above the ground level so that the top third of the pit is always above the water level. Place latrines far from drinking water sources.
Distance to Water sources	
Distance from latrines pit to drinking water sources	At least 15 meters
Children or teachers may be spent extra time, for example, more than 15 minutes going one-way to collect water.	VIP latrine is preferred as it uses less water.

Closeness to users: A latrine should be sited within or close to the compound to allow easy access to the users day and night. Community latrines should therefore be located centrally.

Proximity to water supply services: The latrine should not be sited within a distance of 15m from water sources such as springs, streams and wells, and should always be down-gradient (at a lower level than the source).

Accessibility: The site should be selected to allow easy removal of materials excavated from the pit. These materials should be stacked sufficiently far to prevent it from falling back into the pit, especially if construction is done during the rainy season.

8.7 ECOPs on safe sullage disposal and Organic waste management

1. Introduction

The RWSS project will undertake the following sullage disposal activities during the project period:

- Drains and liquid waste disposal in villages
- Soak pits at household level in villages

2. Technical options for household level management

The village level water management system should be as simple as possible for a village level person to understand and implement and it should be decentralized. The technological options should be based on domestic (Household) level management and/ or community level management.

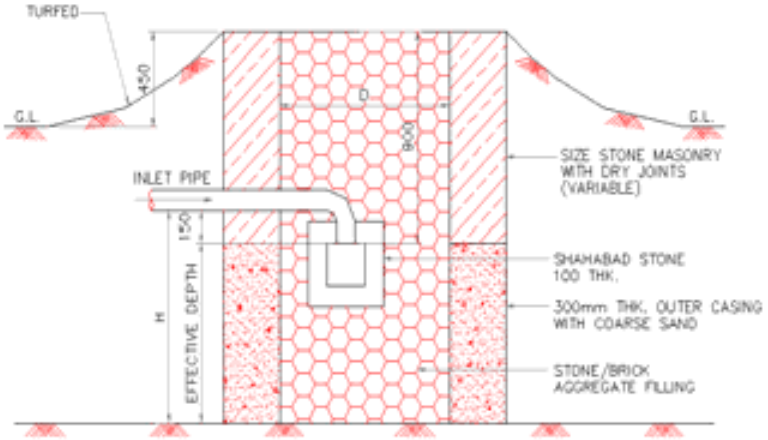
It will always be better to manage and treat domestic grey water generated in the house in the area/courtyard/land surrounding the house. The following technological options appear suitable for this purpose:

- Leach pit
- Soakage pit.

3. Soak Pit

Soak pit is a dug out pit filled with stones or preferably over burnt bricks. The large numbers of stones or bricks increase the surface area over which biological and chemical action takes place. The water seeps into the ground and reduces danger of polluting the ground water sources.

Figure 8.1: Typical Details of Soak Pit without lining



Source: MM

Advantages

- This is the cheapest technology for management of water at household level
- Prevents grey water stagnation
- Prevents vector breeding.

Operation and maintenance (O&M)

- Filter to be cleaned every fortnight or month, depending on accumulation of dirt
- Make a hook of thick wire and pierce it in the filter and take filter media out and clean/wash it and dry and replace it in the earthen pot
- Soak pit looses its capacity within a period of 7 to 8 years of work. At that time take out the boulders from the pit, scrap the walls of the pit in order to remove the oily layer; let the pit dry for a period of 2 to 3 days and clean and dry the boulders and replace into the pit.

Limitations

- Soakage pit is not suitable for rocky terrain and areas having impermeable soil strata.
- It will overflow if wastewater flow in the pit exceeds the design flow
- If suspended solids get into the pit, the choking of the pit will take place earlier.

4. Off Site Community Level Management:

For the community grey water of this type, the first step would be to establish a system for collecting and transporting this grey water for the treatment on a suitable location. It will be necessary to establish a suitable drainage system for this purpose. This drainage system could be of two types:

- Open drain with technically sound design, involving semicircular base and trapezoidal cross section so as to maximize self cleansing velocity for carrying away silt in grey water
- Closed drain-small bore grey water draining system with intercepting tanks at suitable points.

Open or Surface Grey water Drainage System

For collection and transportation of grey water flowing out from the houses, surface drain has been the simplest system, whereby, the community grey water is carried away from the village for treatment. This system can be established easily with available local mason at minimum cost.

Operation and maintenance (O&M)

- Gram Panchayat will have to establish a system for periodical cleaning and silt removal from the drain.
- Community will have to be educated to keep the drain free from garbage, so as to avoid blockages in drain.
- Care needs to be taken to avoid overflow water from flowing to the open drain. This effluent should be led to leach pit/soak pit covered at the top.

Closed Drainage

Small bore grey water drainage system

In rural areas, closed drain system analogous to conventional sewerage systems will not be feasible because of the excessive capital & operation maintenance expenditure and the sophisticated maintenance requirements.

The small bore grey water drainage system which is laid close to the soil surface is suitable and appropriate as it is low cost and requires minimum maintenance which is easy.

Advantages:

- As the system is closed, materials like garbage, road side solid wastes, plastics, building materials etc. will not find access to the system.
- Operation and maintenance becomes easily manageable by Gram Panchayat.
- Construction cost is comparable to the cost for surface drain. It may be only marginally varying.
- Road space is fully utilized.

5. Treatment of Community Grey water

Once the community grey water is collected at one or multiple points outside the village, treatment is required to convert it into harmless and reusable water. The treatment technologies need to suit the following requirements.

- As low cost as possible
- O&M should be easy and low cost for Gram Panchayat
- Some cost recovery may be possible by the farmers
- Selling the treated water. Treated water could be used for public gardens or horticulture. The produce may be sold portably.
- Vector breeding is avoided
- Pollution of water from nallah or river is prevented.
- Some appropriate technologies easily manageable by Gram Panchayat/villagers could be as follows:
  - Sullage stabilization and reuse
  - Systems like Decentralized Wastewater Treatment Systems (DEWATS).

Sullage Stabilization Ponds

The grey water collected via drainage system is passed to such ponds excavated at suitable land site and placed serially as a stabilization system in which grey water is stabilized, its pathogenicity is reduced and the stabilized water becomes useable.

Anaerobic ponds

The grey water reaching the pond via drain usually has high solid content. In the anaerobic pond, these solids settle at the bottom, where these are digested anaerobically. Thus, the partially clarified liquid is discharged onwards into a facultative pond for further treatment.

Facultative ponds

The partially clarified water is led to facultative pond. In this pond oxidation of grey water takes place. It is called ‘facultative’ because in this pond in the upper layer aerobic conditions are maintained while in the lower layer, anaerobic conditions exist.

Maturation pond

The stabilized water from facultative pond is led to a maturation pond. The main function of the maturation period is the destruction of pathogens. This pond is wholly aerobic.

Operation and maintenance

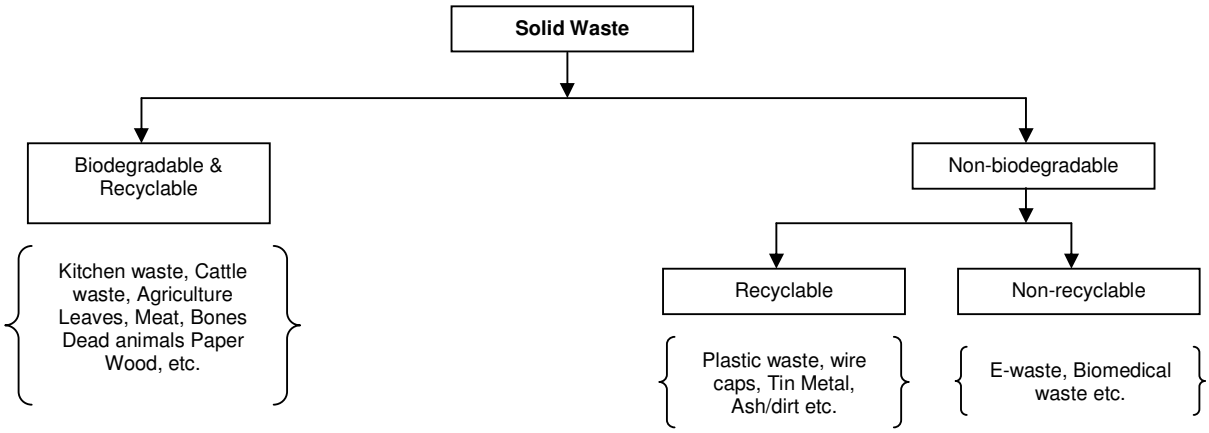
- It will be the responsibility of GP.
- Maintenance requirements are minimal. Regular cutting of grass on embankments and removal of any floating scum from pond surface are the only requirements
- Occasional anti mosquito spraying treatment may be necessary.

Reuse of Stabilized Water

Grey water stabilized and cleaned by the use of any of the above mentioned systems can be reused in many ways such as irrigation for agricultural use and irrigation for horticulture.

8.8 ECOPs on safe solid waste management at individual household and community level

The guidelines in this annexure on solid waste disposal at household and community levels are based on the guidelines in the publication - '*Solid and Liquid Waste Management in Rural Areas - A Technical Note*' (TSC, UNIECF). These guidelines will apply to the solid disposal activities undertaken in the UPRWSS.



Approaches for Solid Waste Management

For effective management of solid waste in rural areas, focus should be on management at household level. That which cannot be managed at household level should be managed at the community level. In general, the following approach should be followed:

- Segregation of solid waste at the household level (Biodegradable and non biodegradable).
- Reuse of non biodegradable waste at the household level to the extent possible.
- Household level treatment of bio degradable waste.
- Collection and transportation of segregated waste at the household level to a place identified at the community level (in cases where household level treatment is not possible).
- Community level treatment or recycling/reuse of waste
  - All the biodegradable waste should be composted at the community level
  - Non biodegradable waste may be further segregated and sold or recycled
  - Waste which cannot be composted, reused or recycled may be disposed at the commonly agreed places following appropriate procedure, (such waste may usually be construction waste, debris etc).

Community level composting

Community level composting may be coursed to when management of solid waste at household level is not possible. For community level composting, Panchayat should select a suitable site as Compost Yard for the village. Site should be selected taking into consideration wind flow direction, so that the inhabited areas don't get any foul odour. The site should be easily accessible for transportation of waste and manure. It should not be a low lying area to avoid water logging.

a. Underground manure pit or garbage pit:

This is applicable for rural areas with low rainfall and villages where there is lack of space at household level for composting. This is not suitable for heavy rainfall areas and rocky terrain.

Use and maintenance of the pits

- Go on adding collected garbage in the pits (only biodegradable type)
- Wherever possible, it is advisable to add cattle dung slurry to the garbage to enhance the composting process
- Spread a very thin layer of soil over it (once a week) to avoid odour & fly nuisance
- Continue to add garbage everyday
- Follow the above procedure & repeat the layers till the pit is full. It is recommended to fill the pit up to about 300mm above ground level
- After 3-4 days the garbage above ground settles down
- Plaster it with soil.
- Leave the pit as it is for 3-6 months for maturation and start other pits sequentially
- After 3-6 months take out the compost & use it in the fields.

Underground brick lined manure pit or garbage pit:

This is applicable for rural areas with low rainfall and villages where there is lack of space at household level for composting. This is not suitable for heavy rainfall areas and rocky terrain and is a capital intensive option.

Use and maintenance of the pit

- Go on adding collected garbage from the houses in the pits (only biodegradable type).
- Wherever possible, it is advisable to add cow dung slurry to the garbage to enhance the composting process.
- Spread a very thin layer of soil over it (once a week) to avoid odour & fly nuisance.
- Continue to add garbage every day.
- Follow the above procedure & repeat the layers till the pit is full. It is recommended to fill the pit up to about 300mm above ground level.
- After 3-4 days the garbage above ground settles down.
- Plaster it with soil.
- Leave the pit as it is for 3-6 months for maturation and start other pits sequentially.
- After 3-6 months take out the compost & use it in the fields.

Over ground brick lined compost tank:

This is applicable for rural areas with high rainfall and rocky terrain and for villages where there is lack of space at household level for composting.

Use and maintenance of the tank

- Go on adding collected garbage from the houses in the tank (only biodegradable type)
- Wherever possible, it is advisable to add cow dung slurry to the garbage to enhance the composting process
- Spread a very thin (1-2 inch) layer of soil over it (once a week) to avoid odour & .y nuisance
- Continue to add garbage everyday
- Follow the above procedure & repeat the layers till the heap attains the height of 1m
- After 3-4 days the garbage above ground settles down
- Plaster it with soil
- Leave the heap as it is for 3-6 months for maturation
- After 3-6 months take out the compost & use it in the fields
- Till the manure in the tank matures, make another tank of the same dimensions at a minimum distance of 1m from the first tank.

Vermi-composting at Community Level

The following steps need to be followed for vermi-composting at community level:

- Appropriate site selection: the site should be protected from direct sunlight and should not be in low lying areas
- Vermiculture site preparation; Proper ramming of soil or preparation of platform is required before preparation of vermi-compost beds
- Construction of appropriate shed: thatched roof/tin sheds on bamboo/metal poles with proper slope to drain rain water, and proper ventilation
- The biodegradable waste should be pre-digested in a separate bed before transferring to the treatment beds.

Precautions to be taken

- Proper covering of feed bed (local available materials may be used for covering of the vermi-compost pit)
- Avoid excess water (only sprinkling)
- Protect the shed area and the beds from red ants, cockroaches etc.
- Keep the feed beds away from birds/chicken/ducks/rodents from eating the worms.

Recycling

In all types of solid waste in rural areas, plastics have become a major cause of concern due to Non-biodegradability, nuisance value in waste stream and blockage of drainage channels, pollution of surface water and random burning here and there causing air pollution problem. There is no proper collection or disposal system of plastic waste.

Disposal on commonly agreed place

In spite of composting, re-use and recycling, some waste remains untreated/unmanaged which requires final disposal. Incineration is a technology where waste is burnt in a specially engineered machine called Incinerator. Incineration is not simply burning, but complete combustion. Incinerators are considered to be causes of air pollution. This is not a viable option for waste management in rural areas. A disposal site is a properly designated and commonly agreed place and used for the disposal of non-biodegradable and non-recyclable inorganic solid waste. It is considered to be a viable option. This land takes care of the problem of disposal of non recyclable solid waste.

- Selection of disposal site: Gram Panchayat in consultation with Zilla Parishad should select the site which should be:
  - Located at the outskirts of the village
  - Accessible
  - On vacant/uncultivated land
  - Located in the natural depressions with slight slopes.
  - Before establishing any disposal site, baseline data of ground water quality in the area shall be collected and kept as a record for future reference.

Operation and maintenance

- Gram Panchayat/Community should prevent entry of stray animals and persons through protective measures.
- Avoid entry of cattle and grazing on the site.

8.9 ECOPs on Management of Catchment Area

A. Establish an enabling environment

To ensure an institutionally supportive environment that will facilitate the implementation of the project process with particular emphasis on devolution of responsibilities to grass-roots levels and, in particular, user implementation, a demand-oriented approach, and sustainability and management of the catchment area.

- **Public Awareness.** Implement a widespread public awareness campaign to promote water as an economic good and the need to charge cost-reflective prices and implement conservation activities.

- **Give Priority to Drinking Water in Water Resource Use.** Strengthen and implement national and state policies giving priority to drinking water, and prepare state specific legislation to protect groundwater resources.

- **Redefine and Reduce Government Role.** Develop and implement national and state policies defining the role of public sector in the RWSS sector, and guidelines for sector operations regarding financial and institutional aspects.

- **Full Cost Recovery and Capital Cost Sharing.** Develop and implement national and state RWSS cost recovery and cost-sharing policy that defines situations in which the community will be eligible for matching government financing for new schemes and rehabilitation or replacement of existing schemes.

- **Decentralize Responsibilities.** Devolve management autonomy to local level administrations.

- **Institutional Strengthening.** Strengthen institutional capabilities, including development of MIS, financial systems, monitoring and evaluation systems, and training at all administrative levels to facilitate the devolution process.

B. Ensure Institutional sustainability

Objective: Decentralize and strengthen RWSS agencies, defining clear mandates at each administrative level, devolving functions to the lowest appropriate level, and encouraging participation of NGOs & the private sector.

- Enable Panchayat institutions and user community groups to assume the lead in decision making for RWSS.
- Enable, promote and facilitate participation of NGOs and the private sector; define appropriate roles of these non-government as well as external agencies.
- Strengthen institutional capabilities to undertake consumer orientation, policy development, planning, implementation, O&M, monitoring and evaluation, and promotion of health and sanitation.
- Reform public sector institutions.
- Strengthen operational guidelines and procedures for RWSS agencies.

C. Protection of Water Sources

- Characterize appropriate remedial measures to address water quality problems.
- Create a strategy for developing water supply schemes in areas with water quality problems that meet safe drinking water requirements and acceptability (preference) of users.
- Develop technology and other innovative options for solving water quality problems (fluoride, iron and arsenic) both at village and household level as well as for larger piped schemes.
- Develop groundwater legislation and regulations, and develop regulators' capabilities to manage and protect groundwater resources.
- Develop institutional capabilities for multi-sectoral water allocation, planning and management, including water pricing mechanisms, and features to prioritize allocation for drinking water and protection/mitigation against pollution.

8.10 ECOPs on Rehabilitation of Construction / Supplementary Sites

In order to mitigate and reduce environmental hazards of the sites used for the construction activities during the project implementation should be rehabilitated in the environmentally sound and controlled manner. The proposed RWSS project of Uttar Pradesh envisages construction and laying of pipelines for water supply, sanitation facilities like toilets, drains, etc. It will be endeavoured to use excavated materials in compact fills as far as possible only remaining is to be disposed off in identified/approved dumping areas or to fill in the construction sites used during the project implementation phase. The proposed guidelines give the details of methods of rehabilitation of construction sites.

The construction activities involved in the proposed project are likely to generate an amount of construction trash. The excavation and dumping may lead to the various environmental hazards and adverse impacts on the water & land environment, if it is not treated with controlled manner. It increases the concentration of suspended particulate matter in the air and suspended solids in the water bodies resulting in the health problem of people and damage of terrestrial and aquatic life.

The guidelines are formulated for rehabilitation of the construction/excavated sites through integrated approach and are to be followed by the prospective contractor are as following:

- The Contractor shall ensure that all temporary structures, equipment, materials, waste and facilities used for construction activities are removed upon completion of the project. The Contractor shall clear and clean the construction site upon completion of the project.
- The methodology for rehabilitation of construction sites shall have minimal environmental damage.
- To minimize the environmental damage, construction material like stones, gravels, earth, sand, etc. required for the construction shall be obtained mostly from the excavated material.
- After completion of construction activities, the subsoil must be replaced first and then compacted so as to match the original condition as closely as possible at the construction sites. The topsoil must then be put in place and must be similarly compacted.
- If possible, formulation of appropriate blends of organic waste and soil to enhance the nutrient status to support vegetation have to be made.
- Re-vegetation with native species may involve direct seeding, natural regeneration or any combination of these.
- Control measures should be implemented to prevent and minimize construction impacts in riparian zones and to ensure that appropriate remedy is undertaken.

8.11 ECOPs on Schemes in Forest areas

Considering the planned activities by the project and the scale of these activities, it is expected that there will be minimal disturbance to forest lands. Also, the Forest Department has clearly identified procedures to minimize and mitigate impacts on forestland. It also identifies procedures and approvals required under the Forest (Conservation) Rules, 2003 for any forest land diversion. However guidelines are given below in case the project is in/near a forest area.

1. Avoid forest areas and identify alternate route for laying pipeline or other infrastructure.
2. Where there are no alternate options and there is a need to lay pipelines through a forest consider possibility of laying pipelines along the road and within the right of way of the road or right of way alternate infrastructure, if possible.
3. Prior to finalizing the detailed design for work in the forest, discuss with Forest Department requirement and undertake a joint survey with them on proposed siting of infrastructure.
4. Based upon discussions with the Forest Department, identify compensation and clearances for the project and submit the required documents as identified by the forest act and rules.
5. After laying the underground pipelines in the forest, the soil should be compacted with adequate plantations.
6. The project will also ensure that small cross-bunds (stone pitching) are made on excavated/compacted areas to prevent water runoff over it and any further soil degradation.
7. Both during project design and construction minimize tree cutting.
8. No construction activity should be undertaken at night time or during any high wildlife activity
9. After construction is completed the area must be brought back as close to original as is possible
10. Ensure that there are no construction camps near or in the forest areas and ensure that there is no firewood procured from the forest area.
11. Ensure that machinery used during construction creates minimum disturbance to the area.
12. Compensatory plantation at the ratio of 1: 3 should be undertaken, where for every tree cut, 3 trees should be planted at appropriate area identified for the activity should be 3 trees of indigenous and local species. The compensatory plantation plan should include a minimum of 3 years of management plan to ensure survival of trees.

8.12 ECOPs for Borrow Areas

Embankment fill material is to be procured from borrow areas designated for the purpose. Scope of this ECOP extends to measures that need to be incorporated during borrow area location, material extraction and rehabilitation.

Design measures for reduction in quantity of earth work need to be undertaken to reduce the quantity of material extracted and consequently decrease the borrow area requirement.

The DPR shall contain (i) Guidelines for locating site of borrow areas (ii) The arrangements to be worked out with the land owner/community for the site and (iii) Sample designs for redevelopment of borrow areas.

Pre-construction stage

- The contractor needs to identify the borrow area locations in consultation with the individual owners in case of private lands and the Gram Panchayat, in case of Gram Sabha lands. This is to be done after assessing the suitability of the material.
- The suitable sites will be selected and finalised in consultation with UPJN/DPMU.

Areas to avoid borrow pits

- At least 15m from toe line of river and water bodies
- Irrigated agriculture areas
- Grazing lands
- Lands within 0.8 kms of a settlement
- Natural habitats and ecologically sensitive areas
- Any area where the borrow pit may result in environmental degradation, landslides etc.

- The Contractor needs to work out arrangements for borrowing with the land owner/Gram Panchayat, as is appropriate.
- The arrangements will be verified by the UPJN/GP/DPMU to ensure that all issues are addressed at the start, in case of a dispute or grievance.
- The UPJN/DPMU engineer will approve the borrow area after inspection of the site to verify the reclamation plan and its suitability with the contractor and landowner. The contractor shall commence borrowing soil only after the approval.
- Based upon the arrangement a contract with the land owner/panchayat will be made. This contract will include the redevelopment after completion of borrowing. The contract between the borrower and contractor leasing the site needs to include,
  - A written no objection certificate from the borrower/leaser of land
  - Extent of land required and duration of time leased out
  - Photographs of site in original condition
  - Details of compensation
  - Details of site redevelopment, including a redevelopment plan
  - Dispute resolution procedure, in case of a dispute.
- The redevelopment will include,
  - Land use objectives and agreed post borrowing activities
  - Physical aspects of the site in present form and planned development changes. These will include landform stability, erosion concerns, drainage and drainage needs, soil type, existing slope.
  - Biological aspect of the site in present form and planned changes from development. These will include existing fauna and flora cover and usage, habitats
  - Water quality
  - Public safety issues
- For access to the borrow site and vehicle loading sites required permissions and redevelopment would also need to be considered. This will be discussed with the UPJN/DPMU and as required agreements similar to those made for borrow pits should be considered.

Construction stage

- No borrow area will be operated without permission of the UPJN/DPMU engineer.
- The procurement of borrow material should be in conformity to the guidelines laid down in IRC: 10-1961. In addition, the contractor should adopt the following precautionary measures to minimise any adverse impacts on the environment:
  - The unpaved surfaces used for haulage of borrow materials will be maintained dust free by the contractor by sprinkling water as required.
  - To avoid any embankment slippage, the borrow areas will not be dug continuously, and the size and shape of borrow pits needs to be decided along with the DPMU/UPJN if not already designed in the DPR.
  - In case it is not possible to avoid a borrow site at distances greater than 0.8 km from a settlement, the pit should not be deeper than 30 cm after removing 15cm of the topsoil.
  - The contractor shall maintain erosion and drainage control in the vicinity of all borrow pits and make sure that surface drains do not affect the adjacent land or future reclamation.
  - In case the borrow pit is on agricultural land, the depth of borrow pits should not exceed 45 cm. The pit depth should not be more than 30 cm after stripping the 15 cm top soil aside. Top soil from any digging or other activities may also be kept aside and used for filling the borrow pits.
  - A buffer zone between the borrow site and adjoining sites must be created to ensure that there is minimal disturbance to the surroundings. Buffer zone shall be 3 m wide or equal to the depth of excavation whichever is greater.
  - In case of riverside, borrow pit should be located not less than 15m from the toe of the bank, distance depending on the magnitude and duration of flood to be withstood.
  - In no case the borrow pit should be within 1.5m from the toe line of the proposed embankment.

Post Construction Stage

- All reclamation shall begin within one month of abandonment of borrow area, in accordance with the redevelopment plan. The site shall be inspected after implementation of the reclamation plan.
- Certificate of Completion of Reclamation is to be obtained by the Contractor from the landowner/s for borrow sites and any other sites which may have been used to access the land or park vehicles stating that the land is restored to his/her satisfaction. An inspection checklist is given alongside.
- The certificate is to be submitted to the UPJN prior to the release of the final payment.
- Depending on the choice of the individual land owner/community, the contractor shall prepare redevelopment plans for the borrow areas.

Compliance Checklist for DPMU/UPJN inspection

- Compliance to post borrowing activities and land use with the reclamation plan
- Vegetation density targeted, density achieved in case of re-vegetation and species planted
- Drainage measures taken from inflow and outflow in case borrow pit is developed as a detention pond
- Decrease of risk to public due to reclamation
- Condition of reclamation site in comparison to original

Appendices

Appendix A. Terms of References for Environmental Analysis

A.1. Background

The main objective of the assignment is to carry out Environmental Assessment and produce Environment Management Framework (EMF) which will be implemented while offering rural communities, especially poor, various choices of up gradable levels of water supply and sanitation services. This EA & EMF will provide detail guidance for providing environmentally safe and sustainable Rural Water Supply and Sanitation Scheme (RWSS), which will be taken up by the State Water and Sanitation Mission (SWSM), Uttar Pradesh. The proposed assignment will be taken up as per the World Bank's "Safeguard Policies".

The EA and EMF will assist in implementation of the proposed RWSS schemes, against the possible potential environmental risks and impacts in its area of influence. The assignment will also examine project alternatives; identify ways of improving project selection, siting, planning, design and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts throughout project implementation. The EA & EMF will take into account the environment; human health and safety including the country's overall policy framework, national legislation, and institutional capabilities related to the environment and obligations of the state, pertaining to the project activities, under relevant national/international environmental treaties and agreements.

A.2. Objective of the Study

The key objective of the study is to conduct Environmental Analysis (EA) and preparation of Environment Management Framework (EMF) with a view to identify the critical environmental concerns in the RWSS sector and address them as an integral part of project design.

The specific objectives include:

- To assess the existing status of environment in the state and to identify threats and issues which have effect on RWSS sector.
- To identify the environmental issues associated with implementation of RWSS schemes in the 28 districts of Eastern Uttar Pradesh and develop environmental codes of practices that need to be followed during various stages such as planning, construction and operation and maintenance.
- To identify generic environmental issues that are beyond the scope of individual RWSS schemes, but related to the sector and recommend remedial measures to address them as part of the project.
- To identify household and environmental sanitation issues as well as to make an assessment of pollution level with regard to water supply and its usages & propose appropriate sanitation technology options.
- The Environmental Management Framework will provide client, with well-defined performance indicators for addressing the identified issues, through the various activities / task under the proposed project, and strategy for its implementation to achieve sustainable sources for water supply and sanitation benefits within the proposed project districts.

A.3. Scope of Work

Approach to services shall be based upon the key objectives of the assignment including the major activities such as;

- Analysis of the current environmental status and issues in the study area;
- Identify and Assessment of potential environmental impacts of the range of activities to be undertaken through the state projects, review the effectiveness of environmental management through the program systems and developing draft environmental assessment report stating the current scenario of water supply and sanitation practices within the study area (28 districts of Eastern UP);
- Assess the policy, codes and standards, legal and regulatory requirements relevant to RWSS program and identify the provisions of the same in EMF;
- Review of existing capacity and institutional arrangements for environmental management in the program;
- Prepare the environmental impact matrix with mitigative measures and performance indicators;
- Develop an Environmental Management Framework for the state.

Environmental Code of Practices (ECOPs) shall be prepared as a part of Environmental Management Framework (EMF) for various activities such as;

  - Guidelines/ECOPs for identification of sources of water supply
  - Guidelines/ECOPs on protecting surface water supply sources and ensuring sustainability
  - Guidelines/ECOPs on protecting ground water supply sources and ensuring sustainability
  - Guidelines/ECOPs on Water Quality Management.
  - Guidelines/ECOPs on selection of Safe Sanitation Technology Options (including drainage) at individual household and community level.
  - Guidelines/ECOPs on selection of location for community toilets
  - Guidelines/ECOPs on Safe Sullage Disposal and Organic waste management.
  - Guidelines on Safe Solid Waste Management at individual household and community level

- The environmental issues to be presented in detail, using Charts, Tables and Maps for clarity. Use of pie charts will be especially useful for analyzing the hotspots. The EMP and performance indicators to be presented in a matrix format. The consultants will provide all relevant data / information in this regard.

A.4. Suggested methodology for the study

The consultant will collect the existing information about Environmental issues of RWSS sector, from the sector institutions and other sources like report of the surveys conducted in the past, the report of the relevant studies done earlier, official records of various concerned departments/organizations etc.

As per the scope of work, the study shall be approached in five main stages;

A.2.1. Stage – I Inception Report

This stage included the following activities;

- Kick-Off Meeting
- Resource Mobilisation / Project Set-Up
- Data Requirement and Mode of Collection
- Identification of Districts / Blocks for field study
- Fine tuning of Study Methodology
- Preparation and Submission of Inception Report

A.2.1. Stage –II Draft Environmental Assessment Report

This stage included the following activities;

- Data Collection
- Field Study
- Stakeholder Consultation
- Preliminary Environmental Analysis and Assessment
- Review of Legal, Regulatory and Policy Framework
- Review of Institutional Arrangements and Capacities
- Preparation and Submission of Draft Environmental Assessment Report

A.2.1. Stage-III Preliminary Environmental Assessment Report

This stage included the following activities;

- Discussions / Meetings

A.2.1. Stage-IV Draft Final Report

This stage included the following activities;

- Detailed Environmental Analysis
- Preparation of Environmental Management Plan
- Preparation of Environmental Management Framework
- Preparation and Submission of Draft Final Report

A.2.1. Stage-V Final Report

This stage included the following activities;

- Consultation Workshop
- Preparation and Submission of Final Report

A.5. Assignment Deliverables

S. No.	Reporting Outputs	Submission Date	December – 2012					January – 2013				February - 2013			
			3	10	17	24	31	7	14	21	28	4	11	18	25
1.	**Inception Report**	**10/12/2012**		■											
2.	**Draft Environmental Assessment report**	**31/12/2012**					■								
3.	**Preliminary Draft report**	**14/01/2013**							■						
4.	**Draft Final Report**	**01/02/2013**									■				
5.	**Final Report**	**15/02/2013**												■	
■	**Submission Milestone**														

A.6. Payment Terms

The payment terms for the assignment is as mentioned below;

Payment Percentage of Total Amount	Remarks
10%	Upon receipt of a confirmed copy of the letter and submission of Inception Report
30%	Upon Submission and Acceptance of Draft Environmental Assessment Report
20%	Upon Submission and Acceptance of Preliminary Draft Report
20%	Upon Receipt and Acceptance of Draft Final Report
20%	Upon Submission and Acceptance of Final Report

A.7. Assignment Team

The day-to-day management of the project will be done by the Team Leader who will be responsible for coordination of the input of the various specialists in close coordination with the team. The team-leader will be responsible for the reporting to the client and for quality control of outputs. He will also provide inputs in the development of the EA followed by an EMF.

The Team of Professionals will work in close consultation with sector stakeholders. The team will be interacting with the Stakeholders and the personnel concerned in particular if needed; of the water supply & sanitation sector in the development of the benchmark EMF. Following is the list of the key personnel for the assignment.

Name of key person	Firm	Position assigned	Task assigned
Key Professional staff			
Sreekant Bathuku	Mott MacDonald Pvt. Ltd.	Team Leader	▪ Overall responsibility of the study deliverables ▪ Co-ordination with client and stakeholder's consultation ▪ Guidance in data collection, data analysis and field surveys ▪ Review of EA and technical inputs in preparation of EMF
Ramesh Kumar	Mott MacDonald Pvt. Ltd.	Environmental Specialist	▪ Identification of data requirements and assessment of data ▪ Preparation of questionnaires for stakeholder's consultations; ▪ Identifying environmental issues and preparation of performance indicator matrix ▪ Assistance in preparation of reports
Nishad Kansara	Mott MacDonald Pvt. Ltd.	Research Co-ordinator	▪ Filed surveys and data collection ▪ Analysis of data ▪ Assistance in preparation of performance indicator matrix ▪ Assistance in preparation of various guidelines and reports
Additional Professional staff			
Hardik Trivedi	Mott MacDonald Pvt. Ltd.	Environmental Engineer	▪ Data collection ▪ Assistance in data analysis and preparation of various maps, charts, etc. ▪ Assistance in preparation of reports
CAD Technicians			
Bhavnika Vania	Mott MacDonald Pvt. Ltd.	CAD Technician	▪ Preparation of study district maps on GIS/AutoCAD ▪ Assistance in compilation of reports

Appendix B. Sample Habitations Selected for Field Study

Date	Places visited		Activities carried out
	Village	Block	
District: - Bahraich			
16.12.2012	Chhetara	Tejwapur	Meeting with CDO and departure to Tejwapur. Visit to village. Focused group discussion with villagers and inspection of hand pumps and overall sanitation conditions in the village.
17.12.2012	Dhanipurwa	Tejwapur	Meeting and discussions with CDO, DPRO and UP Jal Nigam official, NGO and departure to Tejwapur and Chitaura. Visit to village. Focused group discussion with communities, GP and inspection of community toilets and overall sanitation conditions prevailing in the village.
17.12.2012	Shahpur Jyotyusuf Hathila	Chitaura	Visit to village. Focused group discussion with villagers, GP and inspection of hand pumps, and overall water supply and sanitation conditions prevailing in the village
District: - Gorakhpur			
18.12.2012	Jeetpur	Piprauli	Meeting with DDO and UP Jal Nigam Officials. Visit to village. Focused group discussion with GP Pradhan, villagers, inspection of hand pumps and water treatment facility in the village, inspection of toilets and other sanitation facilities.
19.12.2012	Jagdishpur Khas	Pipraich	Meeting with EE and JE. Visit to village. Inspections of existing water supply and sanitation facilities of the village. Focused group discussion with villagers about water and sanitation facilities in the village.
19.12.2012	Semaria tola	Pipraich	Visit to village. Inspections of existing water supply and water treatment facilities and sanitation facilities of the village. Focused group discussion with villagers about water and sanitation facilities in the village.
19.12.2012	Avadhpur	Sardarnagar	Visit to village. Inspections of existing water supply and sanitation facilities of the village. Focused group discussion with villagers about water and sanitation facilities in the village.
District: - Ballia			
20.12.2012	Bajraha	Belhari	Meeting and discussions with DDO, DPRO and UP Jal Nigam official. Visit to village. Focused group discussion with villagers and inspection of overall sanitation conditions prevailing in the village.
20.12.2012	Ramghad	Belhari	Visit to village. Focused group discussion with villagers, pradhan. Inspection of overall hand pumps and water treatment facilities and sanitation conditions in the village.
20.12.2012	Udvant Chhapra	Belhari	Visit to village. Focused group discussion with villagers. Inspection of hand pumps and water treatment facilities and overall sanitation conditions in the village.
District: - Sonbhadra			
22.12.2012	Bahuwar	Robertsganj	Meeting and discussions with DDO, DPRO and UP Jal Nigam official (on date 21-12-2012). Meeting with EE of UP Jal Nigam. Visit to village. Focused group discussion with villagers and inspection of overall water supply and sanitation conditions prevailing in the village.
22.12.2012	Lodhi	Robertsganj	Visit to village. Focused group discussion with the villagers and school teachers. Inspection of toilets and school sanitation. Inspection of overall water supply and sanitation conditions in village.
22.12.2012	Pusauli	Robertsganj	Visit to village. Focused group discussion with the villagers. Inspection of overall water supply and sanitation conditions in village.

Appendix C. Checklist/Questionnaire for Field Data Collection

VISITED: 16/12/2012

Environmental Data Collection sheet for Water Supply and Sanitation			
1. GENERAL			
Name of Village/Town	CHETARA		
Gram Panchayat	CHENPUR / SARPUNCH - SMT. GONTI DEVI		
Block	TEJWAPUR		
District	BAHRAICH		
Zone (East/West/North/South)			
Population (2011 Census)/Revenue records	800 approx.		
Number of households	160 approx.		
Historical Importance	☐ Yes	☑ No	
Presence of historical structure/any sensitive area	NOT OBSERVED ANY.		
2. BASELINE ENVIRONMENT			
Topography	☑ Plain	☐ Hilly	☐ Rolling
Soil type			
Rainfall intensity	☐ Low	☐ Moderate	☐ High
Temperature			
Water Table (Depth below Ground)	☐ Shallow (0-5m)	☐ Moderate (5-10m)	
	☐ Deep aquifer (10-20m)	☐ Very deep (>20m)	
Existing water body within area	☐ River	☐ Canal	☐ Lake/Pond
	☐ Other	NO WATER BODIES	
If pond, current use of it.	☐ Drinking	☐ Cattle washing	☐ Irrigation
	☐ Other	NO PRESENCE OF ANY POND	
Water logging problem within area	☐ Yes	☑ No	
If yes,			
Name of area			
Period of water logging			
Population affected by water logging			
Contamination to drinking water sources			
Existing roads	☐ Paved	☑ Un-paved	
	☐ Other		

Avg. Width of Roads (m)/ROW	~~[illegible]~~ < 2.0M
Current solid waste collection/disposal system	☐ Combined dust bin ☐ Door to door collection ☐ Drains ☐ Streets ☐ Other NO SUCH SYSTEM EXISTS.
Local ~~Vegetation~~ crops (species)	SUGARCANE, WHEAT & PEPPERMINT, paddy
3. PUBLIC HEALTH ISSUES	
Incident of Waterborne epidemic/disease in the recent past	☐ Yes ☑ No
If yes, name of disease	☐ Diarrhoea ☐ Gastro entities ☐ Typhoid ☐ Other — —
Any vector borne disease	☐ Yes ☐ No
If yes, name of disease	☐ Malaria ☐ Dengue ☐ Filaria ☐ Other
4. EXISTING WATER SUPPLY SCHEME	
Type of scheme	☐ Single Village ☐ Multi village ☑ Hand Pump
No. of Hand pumps	10 NOS. DEEP BY JAL NIGAM & 40-50 nos. SHALLOW HOUSHOLD
No. of Single Village Scheme	NONE
Institution responsible for providing water supply ~~&sanitation~~	U.P. JAL NIGAM
Details of Institutional set up	
Role of GP in planning the scheme	—
Current drinking water situation	SATISFIED THROUGH HAND PUMPS. TOTAL 3 ARSENIC TREATMENT PLANTS ARE THERE, 2 IN WORKING (JAL NIGAM) - 1 NOT WORKING (JICA)
Source of drinking water supply	☐ River ☐ Lake/Pond ☐ Canal ☑ Ground water ☐ Other
Water being supplied in LPCD	—
No. of Households with water connection	NONE

No. of Households using Public stand posts/hand pumps/ open wells	TOTAL POP. OF VILLAGE - USING HANDPUMPS.
Depletion in ground water table in summer	NO DEPLETION
Is Irrigation by tube well, if yes, any legislation on drilling of private bore wells	YES, THERE IS NO SUCH LEGISLATION IN EXISTENCE YET.
Water testing labs	
Frequency of Water quality analysis for bore well sources/other sources (yearly twice - pre and post monsoon)	
Water quality in summer	NO CHANGE
Water quality test report available	☐ Yes ☐ No
Major water quality problem	☐ Fluoride ☐ Iron ☐ Heavy Metals ☐ Bacteriological ☐ TDS ☐ Pesticide ☐ Nitrate ☑ Arsenic ☐ Other
Treatment, if any for ground water	2 NOS. ARSENIC FILTRATION INSTALLED BY JAL NIGAM AND WORKING. 1 NO. OF ARSENIC FILTER TANK INSTALED BY JICA - NOT WORKING
Is disinfection being practiced?	—
Is there potential risk of contamination of source due to industrial contaminants, human waste discharge, solid waste dumping, use of agro chemicals (Fertilizers, Pesticides etc?)	☑ Yes ☐ No
If yes, source details	HUMAN WASTE DISCHARGE / SOLID WASTE DUMPING.
Any alternative safe & sustainable source available	— get info. from Jal Nigam
Presence of WTP's	☐ Yes ☑ No
Type of treatment	—
If Ground water, indicate the Treatment Technology	☐ R.O. ☐ De-fluoridation plant ☐ Iron removal plant ☑ Other ARSENIC REMOVAL PLANT.
Who is responsible of O&M of schemes?	HPS O&M by GPS. ARUs being maintained by contractor (5 yrs. O&M)
Current O&M practice	
Any water charges being levied	NO

5. EXISTING SANITATION FACILITIES			
Current Sanitation Practices	☐ Septic Tank	☐ Latrine with Soak pit	
	☑ Open defecation	☐ Bore /soak pit type	
	☐ Other		
No. of households with individual sanitary latrines	5 NOS. (2 not in use)		
No. of households with septic tank	—		
No. of community latrines	NONE		
Level of awareness on impact of sanitation on health	POOR		
Current Drainage Pattern	☐ Open Drains	☐ partially covered open drains	☑ No drainage system
Residents feedback about current sanitation practices	☐ Satisfactory	☑ Non-satisfactory	
Wastewater quantity in MLD	—		
Current solid waste disposal method	OPEN DUMPING ON STREETS		
Current liquid waste/ sullage water disposal method	DISPOSED TO STREETS		
Presence of STP's	☐ Yes	☑ No	
STP distance from nearest settlement	☐ <200m	☐ 200-500m	☐ >500m
STP distance from the nearest school/primary health centre/religious structure	☐ <200m	☐ 200-500m	☐ >500m
Existing Ponds used for disposal of effluent	☐ Yes	☑ No	
Land availability for new STP	☐ Yes	☐ No	
If yes, current land use	☐ Agriculture	☐ Barren land	
Plantation around STP site	☐ Yes	☐ No	
Any Potential risk of contamination of water source	OPEN DEFECATION, NO DRAINAGE SYSTEM, SOLID WASTE DUMPING.		
Repair and Cleaning of Drains	☐ Yes	☑ No	
Solid waste removal of streets	☐ Yes	☑ NO	
Need of Public awareness on hygiene	☑ Yes	☐ No	

- VISITED: 17/12/2012

Environmental Data Collection sheet for Water Supply and Sanitation			
1. GENERAL			
Name of Village/Town	DHANI PURWA		
Gram Panchayat	NEWADA		
Block	TEJWAPUR		
District	BAHRAICH		
Zone (East/West/North/South)			
Population (2011 Census)/Revenue records	396		
Number of households	82		
Historical Importance	☐ Yes	☑ No	
Presence of historical structure/any sensitive area	—		
2. BASELINE ENVIRONMENT			
Topography	☑ Plain	☐ Hilly	☐ Rolling
Soil type			
Rainfall intensity	☐ Low	☐ Moderate	☐ High
Temperature			
Water Table (Depth below Ground)	☐ Shallow (0-5m)	☐ Moderate (5-10m)	
	☑ Deep aquifer (10-20m)	☐ Very deep (>20m)	
Existing water body within area	☐ River	☐ Canal	☐ Lake/Pond
	☐ Other	NONE	
If pond, current use of it.	☐ Drinking	☐ Cattle washing	☐ Irrigation
	☐ Other		
	—		
Water logging problem within area	☐ Yes	☑ No	
If yes	—		
Name of area	—		
Period of water logging	—		
Population affected by water logging	—		
Contamination to drinking water sources	—		
Existing roads	☐ Paved	☑ Un-paved	
	☐ Other		

Avg. Width of Roads (m)/ROW	< 3·0m		
Current solid waste collection/disposal system	☐ Combined dust bin	☐ Door to door collection	
	☐ Drains	☑ Streets	
	☐ Other		
Local ~~Vegetation~~ Crops (species)	Wheat, Vegetables.		
3. PUBLIC HEALTH ISSUES			
Incident of Waterborne epidemic/disease in the recent past	☐ Yes	☑ No	
If yes, name of disease	☐ Diarrhoea	☐ Gastro entities	☐ Typhoid
	☐ Other		
	—		
Any vector borne disease	☐ Yes	☑ No	
If yes, name of disease	☐ Malaria	☐ Dengue	☐ Filaria
	☐ Other	—	
	—		
4. EXISTING WATER SUPPLY SCHEME			
Type of scheme	☐ Single Village	☐ Multi village	☑ Hand Pump
No. of Hand pumps	60 SHALLOW + 7 DEEP (TOTAL - 67)		
No. of Single Village Scheme	—		
Institution responsible for providing water supply ~~& sanitation~~	UP JAL NIGAM		
Details of Institutional set up	UP JAL NIGAM (MAJOR) GRAM PANCHAYAT (MINOR)		
Role of GP in planning the scheme	NONE		
Current drinking water situation	FAIRLY SATISFACTORY,		
Source of drinking water supply	☐ River	☐ Lake/Pond	
	☐ Canal	☑ Ground water	
	☐ Other		
Water being supplied in LPCD	—		
No. of Households with water connection	NONE		

No. of Households using Public stand posts/hand pumps/ open wells	82 - HAND PUMPS & OPEN WELLS
Depletion in ground water table in summer	—
Is Irrigation by tube well, if yes, any legislation on drilling of private bore wells	YES, NO LEGISLATION IN PLACE YET.
Water testing labs	NONE
Frequency of Water quality analysis for bore well sources/other sources (yearly twice - pre and post monsoon)	QUATERLY BY BAMP.
Water quality in summer	NO CHANGE
Water quality test report available	☐ Yes ☐ No
Major water quality problem	☐ Fluoride ☑ Iron ☐ Heavy Metals ☐ Bacteriological ☐ TDS ☐ Pesticide ☐ Nitrate ☑ Arsenic ☐ Other
Treatment, if any for ground water	PROVISION OF 2 NOS. GSF & 4 NOS. WITH ACTIVATED ALUMINIUM TREATMENT PLANTS.
Is disinfection being practiced?	
Is there potential risk of contamination of source due to industrial contaminants, human waste discharge, solid waste dumping, use of agro chemicals (Fertilizers, Pesticides etc?)	☑ Yes ☐ No
If yes, source details	OPEN DEFECATION, SOLID WASTE DUMPING.
Any alternative safe & sustainable source available	
Presence of WTP's	☐ Yes ☑ No
Type of treatment	—
If Ground water, indicate the Treatment Technology	☐ R.O. ☐ De-fluoridation plant ☐ Iron removal plant ☑ Other ARSENIC REMOVAL PLANT 2 NOS · GRAVEL SAND FILTERS. 4 NOS · ACTIVATED ALUMINIUM FILTER.
Who is responsible of O&M of schemes?	UP · JAL NIGAM
Current O&M practice	MAINTAINED BY WATER LIFE (CONTRACTERS RESPONSIBLE)
Any water charges being levied	NO

5. EXISTING SANITATION FACILITIES			
Current Sanitation Practices	☐ Septic Tank	☐ Latrine with Soak pit	
	☑ Open defecation	☐ Bore /soak pit type	
	☐ Other		
No. of households with individual sanitary latrines	NIL		
No. of households with septic tank	— NONE		
No. of community latrines	— NONE		
Level of awareness on impact of sanitation on health	POOR		
Current Drainage Pattern	☐ Open Drains	☐ partially covered open drains	☑ No drainage system
Residents feedback about current sanitation practices	☐ Satisfactory	☑ Non-satisfactory	
Wastewater quantity in MLD	—		
Current solid waste disposal method	OPEN DUMPING		
Current liquid waste/ sullage water disposal method	ON STREETS		
Presence of STP's	☐ Yes	☑ No	
STP distance from nearest settlement	☐ <200m	☐ 200-500m	☐ >500m
STP distance from the nearest school/primary health centre/religious structure	☐ <200m	☐ 200-500m	☐ >500m
Existing Ponds used for disposal of effluent	☐ Yes	☑ No	
Land availability for new STP	☐ Yes	☐ No	
If yes, current land use	☐ Agriculture	☐ Barren land	
Plantation around STP site	☐ Yes	☐ No	
Any Potential risk of contamination of water source	OPEN DUMPING / OPEN DEFECATION		
Repair and Cleaning of Drains	☐ Yes	☑ No	
Solid waste removal of streets	☐ Yes	☑ NO	
Need of Public awareness on hygiene	☑ Yes	☐ No	

VISITED: 17/12/2012

Environmental Data Collection sheet for Water Supply and Sanitation			
1. GENERAL			
Name of Village/Town	SHAPURJYOT YUSUF HATILA		
Gram Panchayat	SHAPURJYOT YUSUF HATILA		
Block	CHITAURA		
District	BAHRAICH		
Zone (East/West/North/South)			
Population (2011 Census)/Revenue records			
Number of households	~~300~~ 450		
Historical Importance	☑ Yes	☐ No	
Presence of historical structure/any sensitive area	HATILA DARGAH - >200 YRS OLD		
2. BASELINE ENVIRONMENT			
Topography	☑ Plain	☐ Hilly	☐ Rolling
Soil type			
Rainfall intensity	☐ Low	☐ Moderate	☐ High
Temperature			
Water Table (Depth below Ground)	☐ Shallow (0-5m)	☐ Moderate (5-10m)	
	☑ Deep aquifer (10-20m)	☐ Very deep (>20m)	
Existing water body within area	☐ River	☐ Canal	☑ Lake/Pond
	☐ Other		
If pond, current use of it.	☐ Drinking	☐ Cattle washing	☐ Irrigation
	☑ Other		
	DISCHARGING VILLAGE LIQUID WASTE.		
Water logging problem within area	☐ Yes	☑ No	
If yes,			
Name of area			
Period of water logging			
Population affected by water logging			
Contamination to drinking water sources			
Existing roads	☑ Paved	☐ Un-paved	
	☐ Other		

Avg. Width of Roads (m)/ROW	< 2.0M	
Current solid waste collection/disposal system	☐ Combined dust bin	☐ Door to door collection
	☐ Drains	☐ Streets
	☑ Other	
	PARTLY IN DRAINS AND PARTLY OPEN DUMPING.	
Local ~~Vegetation~~ crops (species)	TOMATO, WHEAT, PEAS/MUTTER, GUAVA.	
3. PUBLIC HEALTH ISSUES		
Incident of Waterborne epidemic/disease in the recent past	☐ Yes	☑ No
If yes, name of disease	☐ Diarrhoea	☐ Gastro entities ☐ Typhoid
	☐ Other	
Any vector borne disease	☐ Yes	☑ No
If yes, name of disease	☐ Malaria	☐ Dengue ☐ Filaria
	☐ Other	
4. EXISTING WATER SUPPLY SCHEME		
Type of scheme	☐ Single Village	☐ Multi village ☑ Hand Pump
No. of Hand pumps	21 (UPJALNIGAM) + 350 (SHALLOW)	
No. of Single Village Scheme	—	
Institution responsible for providing water supply ~~& sanitation~~	U.P. JAL NIGAM	
Details of Institutional set up	MAJOR O&M BY UPJAL NIGAM. MINOR O&M BY GRAM PANCHAYAT.	
Role of GP in planning the scheme	NONE	
Current drinking water situation	FAIRLY GOOD	
Source of drinking water supply	☐ River	☐ Lake/Pond
	☐ Canal	☑ Ground water
	☐ Other	
Water being supplied in LPCD	—	
No. of Households with water connection	NONE	

No. of Households using Public stand posts/hand pumps/ open wells	450
Depletion in ground water table in summer	ABOUT 5 FEET
Is irrigation by tube well, if yes, any legislation on drilling of private bore wells	YES. NO LEGISLATION IS YET IN PLACE. (250-300 NOS. OF TUBEWELLS)
Water testing labs	NONE
Frequency of Water quality analysis for bore well sources/other sources (yearly twice - pre and post monsoon)	—
Water quality in summer	NO CHANGE
Water quality test report available	☐ Yes ☐ No
Major water quality problem	☐ Fluoride ☑ Iron ☐ Heavy Metals ☐ Bacteriological ☐ TDS ☐ Pesticide ☐ Nitrate ☐ Arsenic ☐ Other
Treatment, if any for ground water	NONE
Is disinfection being practiced?	NO
Is there potential risk of contamination of source due to industrial contaminants, human waste discharge, solid waste dumping, use of agro chemicals (Fertilizers, Pesticides etc?)	☑ Yes ☐ No
If yes, source details	SOLID WASTE DUMPING AND LIQUID WASTE DISCHARGE TO EXISTING POND.
Any alternative safe & sustainable source available	CHITAURA LAKE AVAILABLE 5KMS AWAY FROM THIS VILLAGE.
Presence of WTP's	☐ Yes ☑ No
Type of treatment	—
If Ground water, indicate the Treatment Technology	☐ R.O. ☐ De-fluoridation plant ☐ Iron removal plant ☐ Other NONE
Who is responsible of O&M of schemes?	U.P. JAL NIGAM
Current O&M practice	NONE
Any water charges being levied	NO

5. EXISTING SANITATION FACILITIES			
Current Sanitation Practices	☐ Septic Tank	☑ Latrine with Soak pit	
	☐ Open defecation	☐ Bore /soak pit type	
	☐ Other		
No. of households with individual sanitary latrines	350 APPROX.		
No. of households with septic tank	—		
No. of community latrines	—		
Level of awareness on impact of sanitation on health	FAIRLY AWARED.		
Current Drainage Pattern	☐ Open Drains	☑ partially covered open drains	☐ No drainage system
Residents feedback about current sanitation practices	☐ Satisfactory	☑ Non-satisfactory	
Wastewater quantity in MLD	—		
Current solid waste disposal method	OPEN DUMPING		
Current liquid waste/ sullage water disposal method	INTO EXISTING POND.		
Presence of STP's	☐ Yes	☑ No	
STP distance from nearest settlement	☐ <200m	☐ 200-500m	☐ >500m
STP distance from the nearest school/primary health centre/religious structure	☐ <200m	☐ 200-500m	☐ >500m
Existing Ponds used for disposal of effluent	☐ Yes	☐ No	
Land availability for new STP	☐ Yes	☐ No	
If yes, current land use	☐ Agriculture	☐ Barren land	
Plantation around STP site	☐ Yes	☐ No	
Any Potential risk of contamination of water source	SOLID WASTE DUMPING, LIQUID WASTE DISPOSAL TO EXISTING POND.		
Repair and Cleaning of Drains	☐ Yes	☑ No	
Solid waste removal of streets	☐ Yes	☑ NO	
Need of Public awareness on hygiene	☑ Yes	☐ No	

18/12/2012

Environmental Data Collection sheet for Water Supply and Sanitation			
1. GENERAL			
Name of Village/Town	Jeetpur		
Gram Panchayat			
Block	Pipraulí		
District	Gorakhpur		
Zone (East/West/North/South)	-		
Population (2011 Census)/Revenue records			
Number of households			
Historical Importance	☐ Yes	☑ No	
Presence of historical structure/any sensitive area	NONE		
2. BASELINE ENVIRONMENT			
Topography	☑ Plain	☐ Hilly	☐ Rolling
Soil type	SILTY CLAY		
Rainfall intensity (1195mm)	☐ Low	☑ Moderate	☐ High
Temperature			
Water Table (Depth below Ground)	☐ Shallow (0-5m)	☐ Moderate (5-10m)	
	☐ Deep aquifer (10-20m)	☑ Very deep (>20m)	
Existing water body within area	☑ River	☐ Canal	☐ Lake/Pond
	☐ Other		
If pond, current use of it	☐ Drinking	☐ Cattle washing	☐ Irrigation
	☐ Other		
Water logging problem within area	☐ Yes	☑ No	
If yes,			
Name of area			
Period of water logging			
Population affected by water logging			
Contamination to drinking water sources			
Existing roads	☐ Paved	☑ Un-paved	
	☐ Other		

Avg. Width of Roads (m)/ROW	< 2.0m	
Current solid waste collection/disposal system	☐ Combined dust bin	☐ Door to door collection
	☐ Drains	☐ Streets
	☐ Other	
	NONE	
Local Crops (species)	Wheat, Paddy, Tomatoes, Peas.	
3. PUBLIC HEALTH ISSUES		
Incident of Waterborne epidemic/disease in the recent past	☐ Yes	☑ No
If yes, name of disease	☐ Diarrhoea	☐ Gastro entities ☐ Typhoid
	☐ Other	
Any vector borne disease	☐ Yes	☑ No
If yes, name of disease	☐ Malaria	☐ Dengue ☐ Filaria
	☐ Other	
4. EXISTING WATER SUPPLY SCHEME		
Type of scheme	☐ Single Village	☐ Multi village ☑ Hand Pump
No. of Hand pumps	21	
No. of Single Village Scheme	None. (One Multivillage scheme @ Baghaggag is under construction)	
Institution responsible for providing water supply & sanitation	U.P. JAL NIGAM	
Details of Institutional set up	O&M BY JAL NIGAM, Hand pumps maintained by Gram Panchayats.	
Role of GP in planning the scheme	NONE.	
Current drinking water situation	Satisfactory.	
Source of drinking water supply	☐ River	☐ Lake/Pond
	☐ Canal	☑ Ground water
	☐ Other	
Water being supplied in LPCD	-	
No. of Households with water connection	None	

No. of Households using Public stand posts/hand pumps/ open wells	21 (Handpumps).
Depletion in ground water table in summer	NO depletion
Is Irrigation by tube well, if yes, any legislation on drilling of private bore wells	Irrigation - Tubewell. NO legislation is in place at present.
Water testing labs	Lab available at distt level.
Frequency of Water quality analysis for bore well sources/other sources (yearly twice - pre and post monsoon)	—
Water quality in summer	NO change.
Water quality test report available	☐ Yes ☑ No
Major water quality problem	☐ Fluoride ☐ Iron ☐ Heavy Metals ☐ Bacteriological ☐ TDS ☐ Pesticide ☐ Nitrate ☑ Arsenic ☐ Other
Treatment, if any for ground water	One no. Arsenic Removal Unit has been installed
Is disinfection being practiced?	NO
Is there potential risk of contamination of source due to industrial contaminants, human waste discharge, solid waste dumping, use of agro chemicals (Fertilizers, Pesticides etc?)	☑ Yes ☐ No
If yes, source details	Open defecation, discharge of liquid waste on streets & fields.
Any alternative safe & sustainable source available	*
Presence of WTP's	☐ Yes ☑ No
Type of treatment	—
If Ground water, indicate the Treatment Technology	☐ R.O. ☐ De-fluoridation plant ☐ Iron removal plant ☑ Other Arsenic Removal Unit: Using Aluminium filter plate.
Who is responsible of O&M of schemes?	JAL Nigam
Current O&M practice	Maintained by JAL Nigam.
Any water charges being levied	Currently none.

* Proposed WSS scheme @ Bagragara can act as an sustainable source of water supply. Tubewell as a source to provide piped WSS by providing public standpost. To be completed in March 2013.

5. EXISTING SANITATION FACILITIES			
Current Sanitation Practices	☐ Septic Tank	☐ Latrine with Soak pit	
	☑ Open defecation	☐ Bore /soak pit type	
	☐ Other		
No of households with individual sanitary latrines	None.		
No. of households with septic tank	None.		
No. of community latrines	None.		
Level of awareness on impact of sanitation on health	Poor.		
Current Drainage Pattern	☐ Open Drains	☐ partially covered open drains	☑ No drainage system
Residents feedback about current sanitation practices	☐ Satisfactory	☑ Non-satisfactory	
Wastewater quantity in MLD	—		
Current solid waste disposal method	Open dumping, liquid waste discharged into nearby depressed land/streets.		
Current liquid waste/ sullage water disposal method			
Presence of STP's	☐ Yes	☑ No	
STP distance from nearest settlement	☐ <200m	☐ 200-500m	☐ >500m
STP distance from the nearest school/primary health centre/religious structure	☐ <200m	☐ 200-500m	☐ >500m
Existing Ponds used for disposal of effluent	☐ Yes	☐ No	
Land availability for new STP	☐ Yes	☐ No	
If yes, current land use	☐ Agriculture	☐ Barren land	
Plantation around STP site	☐ Yes	☐ No	
Any Potential risk of contamination of water source	Open defecation, liquid waste disposal on streets / fields.		
Repair and Cleaning of Drains	☐ Yes	☑ No	
Solid waste removal of streets	☐ Yes	☑ NO	
Need of Public awareness on hygiene	☑ Yes	☐ No	

19/12/2012

Environmental Data Collection sheet for Water Supply and Sanitation			
1. GENERAL Scheme Jagdishpur			
Name of Village/Town	Jagdishpur (Matiabujurg and other tola)		
Gram Panchayat	Jagdishpur & Matiabujurg		
Block	Pipraich		
District	Gorakhpur		
Zone (East/West/North/South)			
Population (2011 Census)/Revenue records	4625		
Number of households			
Historical Importance	☐ Yes	☑ No	
Presence of historical structure/any sensitive area	—		
2. BASELINE ENVIRONMENT			
Topography	☑ Plain	☐ Hilly	☐ Rolling
Soil type	Silty clay		
Rainfall intensity (average) 1195 mm	☐ Low	☐ Moderate	☐ High
Temperature			
Water Table (Depth below Ground)	☐ Shallow (0-5m)	☐ Moderate (5-10m)	
	☐ Deep aquifer (10-20m)	☐ Very deep (>20m)	
Existing water body within area	☐ River	☐ Canal	☑ Lake/Pond
	☐ Other		
If pond, current use of it.	☐ Drinking	☐ Cattle washing	☐ Irrigation
	☑ Other	discharging of waste water from village Jagdishpur	
Water logging problem within area	☐ Yes	☑ No	
If yes,			
Name of area			
Period of water logging			
Population affected by water logging			
Contamination to drinking water sources			
Existing roads	☐ Paved	☑ Un-paved	
	☐ Other		

Avg. Width of Roads (m)/ROW	< 3.0m	
Current solid waste collection/disposal system	☐ Combined dust bin	☐ Door to door collection
	☐ Drains	☐ Streets
	☐ Other	
	None.	
Local ~~Vegetation~~ Crops (species)	Jowar, Wheat, Paddy.	
3. PUBLIC HEALTH ISSUES		
Incident of Waterborne epidemic/disease in the recent past	☐ Yes	☑ No
If yes, name of disease	☐ Diarrhoea	☐ Gastro entities ☐ Typhoid
	☐ Other	
Any vector borne disease	☐ Yes	☑ No
If yes, name of disease	☐ Malaria	☐ Dengue ☐ Filaria
	☐ Other	
4. EXISTING WATER SUPPLY SCHEME		
Type of scheme	☐ Single Village	☑ Multi village ☐ Hand Pump
No. of Hand pumps	—	
No. of Single Village Scheme	None.	
Institution responsible for providing water supply & sanitation	UP JAL Nigam.	
Details of Institutional set up	O&M by JAL Nigam.	
Role of GP in planning the scheme	None.	
Current drinking water situation	Moderate	
Source of drinking water supply	☐ River	☐ Lake/Pond
	☐ Canal	☑ Ground water (Tubewell) 100-120m deep.
	☐ Other	
Water being supplied in LPCD	40 lpcd.	
No. of Households with water connection	None.	

No. of Households using Public stand posts/hand pumps/ open wells	Stand posts - 29 nos.
Depletion in ground water table in summer	Not observed
Is Irrigation by tube well, if yes, any legislation on drilling of private bore wells	Yes, NO legislation is in place as such.
Water testing labs	Labs available at district only.
Frequency of Water quality analysis for bore well sources/other sources (yearly twice - pre and post monsoon)	—
Water quality in summer	No change.
Water quality test report available	☐ Yes ☑ No
Major water quality problem	☐ Fluoride ☑ Iron ☐ Heavy Metals ☐ Bacteriological ☐ TDS ☐ Pesticide ☐ Nitrate ☐ Arsenic ☐ Other
Treatment, if any for ground water	None.
Is disinfection being practiced?	Chlorination is done.
Is there potential risk of contamination of source due to industrial contaminants, human waste discharge, solid waste dumping, use of agro chemicals (Fertilizers, Pesticides etc?)	☑ Yes ☐ No
If yes, source details	Open defecation, liquid waste disposal into nearby pond (existing).
Any alternative safe & sustainable source available	The current W/S scheme is through tubewell only.
Presence of WTP's	☐ Yes ☑ No
Type of treatment	—
If Ground water, indicate the Treatment Technology	☐ R.O ☐ De-fluoridation plant ☐ Iron removal plant ☐ Other None.
Who is responsible of O&M of schemes?	UP JAL Nigam.
Current O&M practice	Maintained regularly by JAL Nigam.
Any water charges being levied	NO.

5. EXISTING SANITATION FACILITIES			
Current Sanitation Practices	☐ Septic Tank	☐ Latrine with Soak pit	
	☑ Open defecation	☐ Bore /soak pit type	
	☐ Other		
No. of households with individual sanitary latrines	NO.		
No. of households with septic tank	—		
No. of community latrines	—		
Level of awareness on impact of sanitation on health	Poor		
Current Drainage Pattern	☐ Open Drains	☐ partially covered open drains	☑ No drainage system
Residents feedback about current sanitation practices	☐ Satisfactory	☑ Non-satisfactory	
Wastewater quantity in MLD	—		
Current solid waste disposal method	Open dumping, dumping on streets & existing pond.		
Current liquid waste/ sullage water disposal method	Discharged into existing pond.		
Presence of STP's	☐ Yes	☑ No	
STP distance from nearest settlement	☐ <200m	☐ 200-500m	☐ >500m
STP distance from the nearest school/primary health centre/religious structure	☐ <200m	☐ 200-500m	☐ >500m
Existing Ponds used for disposal of effluent	☐ Yes	☐ No	
Land availability for new STP	☐ Yes	☐ No	
If yes, current land use	☐ Agriculture	☐ Barren land	
Plantation around STP site	☐ Yes	☐ No	
Any Potential risk of contamination of water source	Open defecation, liquid waste disposal to existing pond.		
Repair and Cleaning of Drains	☐ Yes	☑ No	
Solid waste removal of streets	☐ Yes	☑ NO	
Need of Public awareness on hygiene	☑ Yes	☐ No	

19/12/2012

Environmental Data Collection sheet for Water Supply and Sanitation			
1. GENERAL			
Name of Village/Town	Semarbitola		
Gram Panchayat	Kushmi Kothi		
Block	Pipraich		
District	Gorakhpur		
Zone (East/West/North/South)			
Population (2011 Census)/Revenue records	2347		
Number of households			
Historical Importance	☐ Yes	☑ No	
Presence of historical structure/any sensitive area	None.		
2. BASELINE ENVIRONMENT			
Topography	☑ Plain	☐ Hilly	☐ Rolling
Soil type	Silty Clay / Black Cotton Soil (at 4m depth)		
Rainfall intensity (1195MM)	☐ Low	☑ Moderate	☐ High
Temperature			
Water Table (Depth below Ground)	☐ Shallow (0-5m)	☐ Moderate (5-10m)	
	☐ Deep aquifer (10-20m)	☑ Very deep (>20m)	
Existing water body within area	☐ River	☐ Canal	☐ Lake/Pond
	☐ Other	None.	
If pond, current use of it	☐ Drinking	☐ Cattle washing	☐ Irrigation
	☐ Other		
	—		
Water logging problem within area	☐ Yes	☑ No	
If yes,			
Name of area			
Period of water logging			
Population affected by water logging			
Contamination to drinking water sources	Open defecation, liquid waste disposal to streets.		
Existing roads	☐ Paved	☑ Un-paved	
	☐ Other		

Avg. Width of Roads (m)/ROW	< 2.0m	
Current solid waste collection/disposal system	☐ Combined dust bin	☐ Door to door collection
	☐ Drains	☐ Streets
	☐ Other	
	None.	
Local ~~vegetation~~ (crops) (species)	Paddy, Wheat, Sesbau.	
3. PUBLIC HEALTH ISSUES		
Incident of Waterborne epidemic/disease in the recent past	☐ Yes	☑ No
If yes, name of disease	☐ Diarrhoea	☐ Gastro entities ☐ Typhoid
	☐ Other	
Any vector borne disease	☑ Yes	☒ No
If yes, name of disease	☐ Malaria	☐ Dengue ☐ Filaria
	☑ Other	
	Japanese Encephalitis (JE).	
4. EXISTING WATER SUPPLY SCHEME		
Type of scheme	☐ Single Village	☐ Multi village ☑ Hand Pump
No. of Hand pumps	4 nos. + 3nos. (To be Installed)	
No. of Single Village Scheme	—	
Institution responsible for providing water supply ~~& operation~~	Jal Nigam.	
Details of Institutional set up	O&M by Jal Nigam.	
Role of GP in planning the scheme	None.	
Current drinking water situation	Moderate to Poor.	
Source of drinking water supply	☐ River	☐ Lake/Pond
	☐ Canal	☑ Ground water
	☐ Other	
Water being supplied in LPCD	—	
No. of Households with water connection	None.	

No. of Households using Public stand posts/hand pumps/ open wells	—
Depletion in ground water table in summer	No change.
Is Irrigation by tube well, if yes, any legislation on drilling of private bore wells	Yes, No such legislation is yet in place.
Water testing labs	Labs available only at district level.
Frequency of Water quality analysis for bore well sources/other sources (yearly twice - pre and post monsoon)	—
Water quality in summer	No change.
Water quality test report available	☐ Yes ☑ No
Major water quality problem	☐ Fluoride ☐ Iron ☐ Heavy Metals ☐ Bacteriological ☐ TDS ☐ Pesticide ☐ Nitrate ☐ Arsenic ☐ Other None.
Treatment, if any for ground water	None.
Is disinfection being practiced?	No.
Is there potential risk of contamination of source due to industrial contaminants, human waste discharge, solid waste dumping, use of agro chemicals (Fertilizers, Pesticides etc?)	☑ Yes ☐ No
If yes, source details	Open defecation and liquid waste disposal to streets.
Any alternative safe & sustainable source available	None within the vicinity.
Presence of WTP's	☐ Yes ☑ No
Type of treatment	—
If Ground water, indicate the Treatment Technology	☐ R.O ☐ De-fluoridation plant ☐ Iron removal plant ☐ Other None. —
Who is responsible of O&M of schemes?	UP Jal Nigam.
Current O&M practice	O&M to be done by Jal Nigam.
Any water charges being levied	No.

5. EXISTING SANITATION FACILITIES			
Current Sanitation Practices	☐ Septic Tank	☐ Latrine with Soak pit	
	☑ Open defecation	☐ Bore /soak pit type	
	☐ Other		
No. of households with individual sanitary latrines	None.		
No. of households with septic tank	None		
No. of community latrines	None.		
Level of awareness on impact of sanitation on health	Poor to Moderate - the people are aware with some level of sanitation practice		
Current Drainage Pattern	☐ Open Drains	☐ partially covered open drains	☑ No drainage system
	–		
Residents feedback about current sanitation practices	☐ Satisfactory	☑ Non-satisfactory	
Wastewater quantity in MLD	–		
Current solid waste disposal method	On Streets.		
Current liquid waste/ sullage water disposal method	disposed to nearby depressed land.		
Presence of STP's	☐ Yes	☑ No	
STP distance from nearest settlement	☐ <200m	☐ 200-500m	☐ >500m
STP distance from the nearest school/primary health centre/religious structure	☐ <200m	☐ 200-500m	☐ >500m
Existing Ponds used for disposal of effluent	☐ Yes	☐ No	
Land availability for new STP	☐ Yes	☐ No	
If yes, current land use	☐ Agriculture	☐ Barren land	
Plantation around STP site	☐ Yes	☐ No	
Any Potential risk of contamination of water source	Open defecation, liquid waste disposal to streets / fields.		
Repair and Cleaning of Drains	☐ Yes	☑ No	
Solid waste removal of streets	☐ Yes	☑ NO	
Need of Public awareness on hygiene	☑ Yes	☐ No	

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Environmental Data Collection sheet for Water Supply and Sanitation			
1. GENERAL			
Name of Village/Town	Avadhpur (visited Station Kota area)		
Gram Panchayat	Avadhpur		
Block	Sardar nagar		
District	Gorakhpur		
Zone (East/West/North/South)			
Population (2011 Census)/Revenue records			
Number of households	35		
Historical Importance	☐ Yes	☑ No	
Presence of historical structure/any sensitive area	-NO-		
2. BASELINE ENVIRONMENT			
Topography	☑ Plain	☐ Hilly	☐ Rolling
Soil type	Silty clay		
Rainfall intensity average in District 1195mm	☐ Low	☑ Moderate	☐ High
Temperature			
Water Table (Depth below Ground)	☐ Shallow (0-5m)	☐ Moderate (5-10m)	
	☐ Deep aquifer (10-20m)	☑ Very deep (>20m)	
Existing water body within area	☐ River	☐ Canal	☐ Lake/Pond
	☐ Other		
If pond, current use of it.	☐ Drinking	☐ Cattle washing	☐ Irrigation
	☐ Other		
Water logging problem within area	☐ Yes	☑ No	
If yes,			
Name of area			
Period of water logging			
Population affected by water logging			
Contamination to drinking water sources			
Existing roads	☐ Paved	☐ Un-paved	
	☑ Other	Partially paved	

Avg. Width of Roads (m)/ROW	< 2 m		
Current solid waste collection/disposal system	☐ Combined dust bin	☐ Door to door collection	
	☐ Drains	☐ Streets	
	☐ Other		
	NO solid waste collection and disposal.		
Local ~~Vegetation~~ Crops (species)	wheat, paddy, sugarcane, vegetables.		
3. PUBLIC HEALTH ISSUES			
Incident of Waterborne epidemic/disease in the recent past	☐ Yes	☑ No	
If yes, name of disease	☐ Diarrhoea	☐ Gastro entities	☐ Typhoid
	☐ Other		
Any vector borne disease	☐ Yes	☑ No	
If yes, name of disease	☐ Malaria	☐ Dengue	☐ Filaria
	☐ Other		
4. EXISTING WATER SUPPLY SCHEME			
Type of scheme	☐ Single Village	☐ Multi village	☑ Hand Pump
No. of Hand pumps	5 (out of 5, 3 are iron affected) about 35 shallow Hand pumps in houses.		
No. of Single Village Scheme	—		
Institution responsible for providing water supply ~~& sanitation~~	UPJN		
Details of Institutional set up	At district level - EE, UPJN } for common. At ~~block~~ Nehari level - AE, UPJN } & schemes & HPs. At block level - JE, UPJN } O&M of HPs done by GPs. O&M of Schemes by UPJN		
Role of GP in planning the scheme	—		
Current drinking water situation	Not satisfactory, due to quality problem of iron and pollution of gw by distillery.		
Source of drinking water supply	☐ River	☐ Lake/Pond	
	☐ Canal	☑ Ground water	
	☐ Other		
Water being supplied in LPCD	—		
No. of Households with water connection	None		

No. of Households using Public stand posts/hand pumps/ open wells	Hand pumps being used by about 35 households in this area.
Depletion in ground water table in summer	- marginal -
Is Irrigation by tube well, if yes, any legislation on drilling of private bore wells	yes, but no legislation on drilling of bores by private persons.
Water testing labs	At district level
Frequency of Water quality analysis for bore well sources/other sources (yearly twice - pre and post monsoon)	At time of installation of HPS and subsequently whenever any change is observed in quality.
Water quality in summer	- no change -
Water quality test report available	☐ Yes ☐ No
Major water quality problem	☐ Fluoride ☑ Iron ☐ Heavy Metals ☐ Bacteriological ☐ TDS ☐ Pesticide ☐ Nitrate ☐ Arsenic ☐ Other pollution due to effluent discharge of industry (Distillery) untreated into the drain
Treatment, if any for ground water	—
Is disinfection being practiced?	—
Is there potential risk of contamination of source due to industrial contaminants, human waste discharge, solid waste dumping, use of agro chemicals (Fertilizers, Pesticides etc?)	☑ Yes ☐ No
If yes, source details	Sarayu Distilleries, Avadhpur (near railway line)
Any alternative safe & sustainable source available	Ground water can be tapped from pollution free and safe zone & in Daipur and can be supplied through piped water supply scheme
Presence of WTP's	☐ Yes ☑ No
Type of treatment	—
If Ground water, indicate the Treatment Technology	☐ R.O ☐ De-fluoridation plant ☐ Iron removal plant ☐ Other no treatment at present.
Who is responsible of O&M of schemes?	HPS and schemes are to be maintained by PHED, Schemes are not being maintained by GP.
Current O&M practice	and so UPJN is maintaining by GP.
Any water charges being levied	— No —

5. EXISTING SANITATION FACILITIES			
Current Sanitation Practices	☐ Septic Tank	☐ Latrine with Soak pit	
	☑ Open defecation	☐ Bore /soak pit type	
	☐ Other		
No. of households with individual sanitary latrines	—		
No. of households with septic tank	—		
No. of community latrines	—		
Level of awareness on impact of sanitation on health	poor		
Current Drainage Pattern	☐ Open Drains	☐ partially covered open drains	☑ No drainage system
Residents feedback about current sanitation practices	☑ Satisfactory	☐ Non-satisfactory	
Wastewater quantity in MLD	people are practicing open defecation and find no problem with that, as they are not aware of its impact on health & well-being of the environment		
Current solid waste disposal method	dumping on streets		
Current liquid waste/ sullage water disposal method	discharging on to streets		
Presence of STP's	☐ Yes	☑ No	
STP distance from nearest settlement	☐ <200m	☐ 200-500m	☐ >500m
STP distance from the nearest school/primary health centre/religious structure	☐ <200m	☐ 200-500m	☐ >500m
Existing Ponds used for disposal of effluent	☐ Yes	☑ No	
Land availability for new STP	☐ Yes	☐ No	
If yes, current land use	☐ Agriculture	☐ Barren land	
Plantation around STP site	☐ Yes	☐ No	
Any Potential risk of contamination of water source	yes. Due to lack of sanitation practice and dumping of waste/wastewater without proper disposal.		
Repair and Cleaning of Drains	☐ Yes	☑ No	
Solid waste removal of streets	☐ Yes	☑ NO	
Need of Public awareness on hygiene	☑ Yes	☐ No	

20/12/2012

Environmental Data Collection sheet for Water Supply and Sanitation			
1. GENERAL			
Name of Village/Town	Bajhsaha Khas		
Gram Panchayat			
Block	Bethari		
District	Ballia		
Zone (East/West/North/South)			
Population (~~2011~~ 2001 Census)/Revenue records (Total)	3723		
Number of households	200		
Historical Importance	☐ Yes	☑ No	
Presence of historical structure/any sensitive area	None.		
2. BASELINE ENVIRONMENT			
Topography	☑ Plain	☐ Hilly	☐ Rolling
Soil type	Sand mixed soil.		
Rainfall intensity	☐ Low	☐ Moderate	☐ High
Temperature			
Water Table (Depth below Ground)	☐ Shallow (0-5m)	☐ Moderate (5-10m)	
	☑ Deep aquifer (10-20m)	☐ Very deep (>20m)	
Existing water body within area	☐ River	☐ Canal	☐ Lake/Pond
	☐ Other	None	
If pond, current use of it	☐ Drinking	☐ Cattle washing	☐ Irrigation
	☐ Other		
	—		
Water logging problem within area	☐ Yes	☑ No	
If yes,			
Name of area			
Period of water logging			
Population affected by water logging			
Contamination to drinking water sources			
Existing roads	☑ Paved	☐ Un-paved	
	☐ Other		

Avg. Width of Roads (m)/ROW	< 2.0m	
Current solid waste collection/disposal system	☐ Combined dust bin	☐ Door to door collection
	☐ Drains	☐ Streets
	☐ Other	
	None.	
Local ~~Vegetation~~ Crops (species)	Wheat, Vegetables, Channa;	
3. PUBLIC HEALTH ISSUES		
Incident of Waterborne epidemic/disease in the recent past	☐ Yes	☑ No
If yes, name of disease	☐ Diarrhoea	☐ Gastro entities ☐ Typhoid
	☐ Other	
Any vector borne disease	☐ Yes	☑ No
If yes, name of disease	☐ Malaria	☐ Dengue ☐ Filaria
	☐ Other	
4. EXISTING WATER SUPPLY SCHEME		
Type of scheme	☐ Single Village	☑ Multi village ☐ Hand Pump
No. of Hand pumps	UP JAL NIGAM - 70 / Shallow handpumps 100	
No. of Single Village Scheme	—	
Institution responsible for providing water supply ~~& sanitation~~	UP Jal Nigam	
Details of Institutional set up	O&M By Jal Nigam	
Role of GP in planning the scheme	None.	
Current drinking water situation	Satisfactory (80% of people drinking through pipe water scheme)	
Source of drinking water supply	☐ River	☐ Lake/Pond
	☐ Canal	☑ Ground water
	☐ Other	
Water being supplied in LPCD	40 lpcd.	
No. of Households with water connection	None.	

No. of Households using Public stand posts/hand pumps/ open wells	35 nos. of standposts.
Depletion in ground water table in summer	Moderate amount of depletion is observed.
Is Irrigation by tube well, if yes, any legislation on drilling of private bore wells	Yes, NO legislation is in place as such.
Water testing labs	District level lab is present.
Frequency of Water quality analysis for bore well sources/other sources (yearly twice - pre and post monsoon)	—
Water quality in summer	NO change.
Water quality test report available	☐ Yes ☑ No
Major water quality problem	☐ Fluoride ☐ Iron ☐ Heavy Metals ☐ Bacteriological ☑ TDS ☐ Pesticide ☐ Nitrate ☑ Arsenic ☐ Other
Treatment, if any for ground water	2 nos. of Arsenic Removal Units.
Is disinfection being practiced?	✓ Bleaching powder.
Is there potential risk of contamination of source due to industrial contaminants, human waste discharge, solid waste dumping, use of agro chemicals (Fertilizers, Pesticides etc?)	✓ Yes ☐ No
If yes, source details	Open defecation, liquid waste disposal on streets.
Any alternative safe & sustainable source available	
Presence of WTP's	☐ Yes ☑ No
Type of treatment	—
If Ground water, indicate the Treatment Technology	☐ R.O ☐ De-fluoridation plant ☐ Iron removal plant ✓ Other Arsenic Removal Units & Piped Water Supply with disinfection.
Who is responsible of O&M of schemes?	UP JAL Nigam
Current O&M practice	Moderate.
Any water charges being levied	None.

5. EXISTING SANITATION FACILITIES			
Current Sanitation Practices	☐ Septic Tank	☑ Latrine with Soak pit	
	☑ Open defecation	☐ Bore /soak pit type	
	☐ Other		
	35 nos. latrines with soakpit		
No. of households with individual sanitary latrines	35		
No. of households with septic tank	None.		
No. of community latrines	None.		
Level of awareness on impact of sanitation on health	Poor.		
Current Drainage Pattern	☐ Open Drains	☐ partially covered open drains	☐ No drainage system
	Open drains discharging to nearby pits		
Residents feedback about current sanitation practices	☐ Satisfactory	☑ Non-satisfactory	
Wastewater quantity in MLD	—		
Current solid waste disposal method	Into nearby pits.		
Current liquid waste/ sullage water disposal method	Discharged into nearby pits.		
Presence of STP's	☐ Yes	☑ No	
STP distance from nearest settlement	☐ <200m	☐ 200-500m	☐ >500m
STP distance from the nearest school/primary health centre/religious structure	☐ <200m	☐ 200-500m	☐ >500m
Existing Ponds used for disposal of effluent	☐ Yes	☐ No	
Land availability for new STP	☐ Yes	☐ No	
If yes, current land use	☐ Agriculture	☐ Barren land	
Plantation around STP site	☐ Yes	☐ No	
Any Potential risk of contamination of water source	Open defecation, liquid waste disposal to nearby pits.		
Repair and Cleaning of Drains	☐ Yes	☑ No	
Solid waste removal of streets	☐ Yes	☑ NO	
Need of Public awareness on hygiene	☑ Yes	☐ No	

20/12/2012

Environmental Data Collection sheet for Water Supply and Sanitation			
1. GENERAL			
Name of Village/Town	Gangapur & Ramghad Gangapur		
Gram Panchayat			
Block	Ballia		
District			
Zone (East/West/North/South)			
Population (~~2011~~ 2001 Census)/Revenue records (Total)	7678		
Number of households	1500		
Historical Importance	☐ Yes	☑ No	
Presence of historical structure/any sensitive area	None.		
2. BASELINE ENVIRONMENT			
Topography	☑ Plain	☐ Hilly	☐ Rolling
Soil type	Sandy mixed soil.		
Rainfall intensity	☐ Low	☑ Moderate	☐ High
Temperature	—		
Water Table (Depth below Ground)	☐ Shallow (0-5m)	☐ Moderate (5-10m)	
	☑ Deep aquifer (10-20m)	☐ Very deep (>20m)	
Existing water body within area	☐ River	☐ Canal	☐ Lake/Pond
	☐ Other	None.	
If pond, current use of it	☐ Drinking	☐ Cattle washing	☐ Irrigation
	☐ Other		
	—		
Water logging problem within area	☐ Yes	☑ No	
If yes,			
Name of area			
Period of water logging			
Population affected by water logging			
Contamination to drinking water sources			
Existing roads	☑ Paved	☐ Un-paved	
	☐ Other		

Avg. Width of Roads (m)/ROW	12.0 m		
Current solid waste collection/disposal system	☐ Combined dust bin	☐ Door to door collection	
	☐ Drains	☐ Streets	
	☐ Other	None.	
Local ~~Vegetation~~ Crop (species)	Wheat, Vegetables, Paddy, Channa.		
3. PUBLIC HEALTH ISSUES			
Incident of Waterborne epidemic/disease in the recent past	☐ Yes	☑ No	
If yes, name of disease	☐ Diarrhoea	☐ Gastro entities	☐ Typhoid
	☐ Other		
Any vector borne disease	☐ Yes	☑ No	
If yes, name of disease	☐ Malaria	☐ Dengue	☐ Filaria
	☐ Other		
4. EXISTING WATER SUPPLY SCHEME			
Type of scheme	☐ Single Village	☑ Multi village	☐ Hand Pump
No. of Hand pumps	70		
No. of Single Village Scheme	—		
Institution responsible for providing water supply ~~& sanitation~~	UP Jal Nigam		
Details of Institutional set up	O&M By UP Jal Nigam.		
Role of GP in planning the scheme	None.		
Current drinking water situation	Moderate		
Source of drinking water supply	☐ River	☐ Lake/Pond	
	☐ Canal	☑ Ground water	
	☐ Other		
Water being supplied in LPCD	40 lpcd.		
No. of Households with water connection	None		

No. of Households using Public stand posts/hand pumps/ open wells	Public stand posts - 20 nos.
Depletion in ground water table in summer	Moderate amount of depletion of GW.T (5-10 ft)
Is Irrigation by tube well, if yes, any legislation on drilling of private bore wells	Yes, NO legislation is in place yet.
Water testing labs	District level labs are present.
Frequency of Water quality analysis for bore well sources/other sources (yearly twice - pre and post monsoon)	—
Water quality in summer	No change.
Water quality test report available	☐ Yes ☑ No
Major water quality problem	☐ Fluoride ☐ Iron ☐ Heavy Metals ☐ Bacteriological ☐ TDS ☐ Pesticide ☐ Nitrate ☑ Arsenic ☐ Other
Treatment, if any for ground water	Arsenic Removal Units installed
Is disinfection being practiced?	Yes.
Is there potential risk of contamination of source due to industrial contaminants, human waste discharge, solid waste dumping, use of agro chemicals (Fertilizers, Pesticides etc?)	☑ Yes ☐ No
If yes, source details	Open defecation, liquid waste disposal to streets.
Any alternative safe & sustainable source available	Piped water supply scheme constructed & completed in March 2009.
Presence of WTP's	☐ Yes ☑ No
Type of treatment	—
If Ground water, indicate the Treatment Technology	☐ R.O ☐ De-fluoridation plant ☐ Iron removal plant ☑ Other Yes Arsenic Removal Units.
Who is responsible of O&M of schemes?	UP JAL NIGAM.
Current O&M practice	Moderate
Any water charges being levied	NO.

5. EXISTING SANITATION FACILITIES			
Current Sanitation Practices	☐ Septic Tank	☐ Latrine with Soak pit	
	☑ Open defecation	☐ Bore /soak pit type	
	☐ Other		
No. of households with individual sanitary latrines	— None.		
No. of households with septic tank	— None.		
No. of community latrines	None.		
Level of awareness on impact of sanitation on health	Poor.		
Current Drainage Pattern	☐ Open Drains	☐ partially covered open drains	☑ No drainage system
Residents feedback about current sanitation practices	☐ Satisfactory	☑ Non-satisfactory	
Wastewater quantity in MLD	—		
Current solid waste disposal method	Open dumping.		
Current liquid waste/ sullage water disposal method	Discharge to streets & nearby pits.		
Presence of STP's	☐ Yes	☑ No	
STP distance from nearest settlement	☐ <200m	☐ 200-500m	☐ >500m
STP distance from the nearest school/primary health centre/religious structure	☐ <200m	☐ 200-500m	☐ >500m
Existing Ponds used for disposal of effluent	☐ Yes	☐ No	
Land availability for new STP	☐ Yes	☐ No	
If yes, current land use	☐ Agriculture	☐ Barren land	
Plantation around STP site	☐ Yes	☐ No	
Any Potential risk of contamination of water source	Open defecation, liquid waste disposal to nearby pits.		
Repair and Cleaning of Drains	☐ Yes	☑ No	
Solid waste removal of streets	☐ Yes	☑ NO	
Need of Public awareness on hygiene	☑ Yes	☐ No	

20/12/2012

Environmental Data Collection sheet for Water Supply and Sanitation			
1. GENERAL			
Name of Village/Town	Uduant Chapparg.		
Gram Panchayat	Haldi.		
Block	Balhaa.		
District	Ballia.		
Zone (East/West/North/South)			
Population (~~2011~~ 2001 Census)/Revenue records (Total)	10971 (excesing & habitations)		
Number of households	Appron. 2000.		
Historical Importance	☐ Yes	☑ No	
Presence of historical structure/any sensitive area	None.		
2. BASELINE ENVIRONMENT			
Topography	☑ Plain	☐ Hilly	☐ Rolling
Soil type	Sand mixed soil (silty sandy)		
Rainfall intensity	☐ Low	☑ Moderate	☐ High
Temperature	—		
Water Table (Depth below Ground)	☐ Shallow (0-5m)	☐ Moderate (5-10m)	
	☐ Deep aquifer (10-20m)	☑ Very deep (>20m)	
Existing water body within area	☐ River	☐ Canal	☑ Lake/Pond
	☐ Other		
If pond, current use of it	☐ Drinking	☐ Cattle washing	☐ Irrigation
	☑ Other		
Water logging problem within area	☐ Yes	☑ No	
If yes,			
Name of area			
Period of water logging			
Population affected by water logging			
Contamination to drinking water sources	Open defecation, liquid waste disposal to street.		
Existing roads	☑ Paved	☐ Un-paved	
	☐ Other		

Avg. Width of Roads (m)/ROW	<30m		
Current solid waste collection/disposal system	☐ Combined dust bin	☐ Door to door collection	
	☐ Drains	☐ Streets	
	☐ Other		
	None		
Local ~~Vegetation~~ Crops (species)	Wheat, vegetables,		
3. PUBLIC HEALTH ISSUES			
Incident of Waterborne epidemic/disease in the recent past	☐ Yes	☑ No	
If yes, name of disease	☐ Diarrhoea	☐ Gastro entities	☐ Typhoid
	☐ Other		
Any vector borne disease	☐ Yes	☑ No	
If yes, name of disease	☐ Malaria	☐ Dengue	☐ Filaria
	☐ Other		
4. EXISTING WATER SUPPLY SCHEME			
Type of scheme	☐ Single Village	☑ Multi village	☐ Hand Pump
No. of Hand pumps	—		
No. of Single Village Scheme	—		
Institution responsible for providing water supply & sanitation	UP Jal Nigam.		
Details of Institutional set up	O & M By UP Jal Nigam.		
Role of GP in planning the scheme	None.		
Current drinking water situation	Moderate.		
Source of drinking water supply	☐ River	☐ Lake/Pond	
	☐ Canal	☑ Ground water	
	☐ Other		
Water being supplied in LPCD	40 lpcd		
No. of Households with water connection	None.		

No. of Households using Public stand posts/hand pumps/ open wells	—
Depletion in ground water table in summer	Moderate depletion is observed.
Is Irrigation by tube well, if yes, any legislation on drilling of private bore wells	Yes, NO legislation is in place as yet.
Water testing labs	District level labs are available.
Frequency of Water quality analysis for bore well sources/other sources (yearly twice - pre and post monsoon)	None.
Water quality in summer	NO change.
Water quality test report available	☐ Yes ☑ No
Major water quality problem	☐ Fluoride ☐ Iron ☐ Heavy Metals ☐ Bacteriological ☐ TDS ☐ Pesticide ☐ Nitrate ☑ Arsenic ☐ Other
Treatment, if any for ground water	None.
Is disinfection being practiced?	Yes.
Is there potential risk of contamination of source due to industrial contaminants, human waste discharge, solid waste dumping, use of agro chemicals (Fertilizers, Pesticides etc?)	☑ Yes ☐ No
If yes, source details	Open defecation, liquid waste disposal to nearby pits / streets.
Any alternative safe & sustainable source available	Piped water supply.
Presence of WTP's	☐ Yes ☑ No
Type of treatment	—
If Ground water, indicate the Treatment Technology	☐ R.O. ☐ De-fluoridation plant ☐ Iron removal plant ☐ Other ~~Piped water Supply~~ —
Who is responsible of O&M of schemes?	UP Jal Nigam
Current O&M practice	Moderate.
Any water charges being levied	NO.

5. EXISTING SANITATION FACILITIES			
Current Sanitation Practices	☐ Septic Tank	☐ Latrine with Soak pit	
	☑ Open defecation	☐ Bore /soak pit type	
	☐ Other		
No. of households with individual sanitary latrines	None.		
No. of households with septic tank	None.		
No. of community latrines	None.		
Level of awareness on impact of sanitation on health	Poor.		
Current Drainage Pattern	☐ Open Drains	☐ partially covered open drains	☑ No drainage system
Residents feedback about current sanitation practices	☐ Satisfactory	☑ Non-satisfactory	
Wastewater quantity in MLD	—		
Current solid waste disposal method	Open dumping.		
Current liquid waste/ sullage water disposal method	On streets / Discharge into nearby pits.		
Presence of STP's	☐ Yes	☑ No	
STP distance from nearest settlement	☐ <200m	☐ 200-500m	☐ >500m
STP distance from the nearest school/primary health centre/religious structure	☐ <200m	☐ 200-500m	☐ >500m
Existing Ponds used for disposal of effluent	☐ Yes	☐ No	
Land availability for new STP	☐ Yes	☐ No	
If yes, current land use	☐ Agriculture	☐ Barren land	
Plantation around STP site	☐ Yes	☐ No	
Any Potential risk of contamination of water source	Open defecation, liquid waste disposal.		
Repair and Cleaning of Drains	☐ Yes	☑ No	
Solid waste removal of streets	☐ Yes	☑ NO	
Need of Public awareness on hygiene	☑ Yes	☐ No	

22/12/2012

Environmental Data Collection sheet for Water Supply and Sanitation			
1. GENERAL			
Name of Village/Town	Bahuwar		
Gram Panchayat	Bahuwar		
Block	Robertsganj		
District	Soubhadra		
Zone (East/West/North/South)			
Population (2011 Census)/Revenue records	5000 (approx.)		
Number of households (about)	700		
Historical Importance	☐ Yes	☑ No	
Presence of historical structure/any sensitive area	- Nil -		
2. BASELINE ENVIRONMENT			
Topography	☑ Plain	☐ Hilly	☐ Rolling
Soil type	Silty Clay		
Rainfall intensity	☐ Low	☑ Moderate	☐ High
Temperature	—		
Water Table (Depth below Ground)	☐ Shallow (0-5m)	☐ Moderate (5-10m)	
	☐ Deep aquifer (10-20m)	☑ Very deep (>20m)	
Existing water body within area	☐ River	☐ Canal	☐ Lake/Pond
	☐ Other	—	
If pond, current use of it.	☐ Drinking	☐ Cattle washing	☐ Irrigation
	☐ Other		
	—		
Water logging problem within area	☐ Yes	☑ No	
If yes,			
Name of area			
Period of water logging			
Population affected by water logging			
Contamination to drinking water sources			
Existing roads	☑ Paved	☐ Un-paved	
	☐ Other		

Avg. Width of Roads (m)/ROW	< 2.0m	
Current solid waste collection/disposal system	☐ Combined dust bin	☐ Door to door collection
	☐ Drains	☐ Streets
	☐ Other	
	None.	
Local Vegetation (species)	Crops Wheat, Paddy, Tomatoes, Mustard, Channa, Ashar.	
3. PUBLIC HEALTH ISSUES		
Incident of Waterborne epidemic/disease in the recent past	☐ Yes	☑ No
If yes, name of disease	☐ Diarrhoea	☐ Gastro entities ☐ Typhoid
	☐ Other	
Any vector borne disease	☐ Yes	☑ No
If yes, name of disease	☐ Malaria	☐ Dengue ☐ Filaria
	☐ Other	
4. EXISTING WATER SUPPLY SCHEME		
Type of scheme	☐ Single Village	☐ Multi village ☑ Hand Pump
No. of Hand pumps	60 (Deep bore) – No shallow handpumps.	
No. of Single Village Scheme	—	
Institution responsible for providing water supply & sanitation	Jal Nigam	
Details of Institutional set up	O&M By Jal Nigam	
Role of GP in planning the scheme	None.	
Current drinking water situation	Moderate	
Source of drinking water supply	☐ River	☐ Lake/Pond
	☐ Canal	☑ Ground water
	☐ Other	
Water being supplied in LPCD	—	
No. of Households with water connection	None	

No. of Households using Public stand posts/hand pumps/ open wells	Approx. 500 - through tubel pumps.
Depletion in ground water table in summer	Yes.
Is Irrigation by tube well, if yes, any legislation on drilling of private bore wells	Yes, No legislation is in place.
Water testing labs	District level.
Frequency of Water quality analysis for bore well sources/other sources (yearly twice - pre and post monsoon)	—
Water quality in summer	No change
Water quality test report available	☐ Yes ☑ No
Major water quality problem	☐ Fluoride ☑ Iron ☐ Heavy Metals ☐ Bacteriological ☐ TDS ☐ Pesticide ☐ Nitrate ☐ Arsenic ☐ Other
Treatment, if any for ground water	None
Is disinfection being practiced?	☑ None
Is there potential risk of contamination of source due to industrial contaminants, human waste discharge, solid waste dumping, use of agro chemicals (Fertilizers, Pesticides etc?)	☑ Yes ☐ No
If yes, source details	Open defecation, liquid waste disposal to nearby pits/streets.
Any alternative safe & sustainable source available	No.
Presence of WTP's	☐ Yes ☑ No
Type of treatment	—
If Ground water, indicate the Treatment Technology	☐ R.O. ☐ De-fluoridation plant ☐ Iron removal plant ☐ Other None.
Who is responsible of O&M of schemes?	UP Jal Nigam.
Current O&M practice	Moderate.
Any water charges being levied	No.

5. EXISTING SANITATION FACILITIES			
Current Sanitation Practices	☐ Septic Tank	☐ Latrine with Soak pit	
	☑ Open defecation	☐ Bore /soak pit type	
	☐ Other		
No. of households with individual sanitary latrines			
No. of households with septic tank	—		
No. of community latrines	—		
Level of awareness on impact of sanitation on health	Poor.		
Current Drainage Pattern	☐ Open Drains	☑ partially covered open drains	☐ No drainage system
Residents feedback about current sanitation practices	☐ Satisfactory	☑ Non-satisfactory	
Wastewater quantity in MLD	—		
Current solid waste disposal method	Open dumping.		
Current liquid waste/ sullage water disposal method	Discharge to nearby pits/fields.		
Presence of STP's	☐ Yes	☑ No	
STP distance from nearest settlement	☐ <200m	☐ 200-500m	☐ >500m
STP distance from the nearest school/primary health centre/religious structure	☐ <200m	☐ 200-500m	☐ >500m
Existing Ponds used for disposal of effluent	☐ Yes	☐ No	
Land availability for new STP	☐ Yes	☐ No	
If yes, current land use	☐ Agriculture	☐ Barren land	
Plantation around STP site	☐ Yes	☐ No	
Any Potential risk of contamination of water source	Open defecation, liquid waste disposal to pits/fields.		
Repair and Cleaning of Drains	☐ Yes	☑ No	
Solid waste removal of streets	☑ Yes	☑ NO	
Need of Public awareness on hygiene	☑ Yes	☐ No	

22/12/2012

Environmental Data Collection sheet for Water Supply and Sanitation			
1. GENERAL			
Name of Village/Town	Lodhi		
Gram Panchayat	Lodhi		
Block	Robertsganj		
District	Sonbhadra		
Zone (East/West/North/South)			
Population (2011 Census)/Revenue records	approx. 5,100		
Number of households			
Historical Importance	☐ Yes	☑ No	
Presence of historical structure/any sensitive area	- NO -		
2. BASELINE ENVIRONMENT			
Topography	☑ Plain	☐ Hilly	☐ Rolling
Soil type	Silty clay		
Rainfall intensity	☐ Low	☑ Moderate	☐ High
Temperature	—		
Water Table (Depth below Ground)	☐ Shallow (0-5m)	☐ Moderate (5-10m)	
	☐ Deep aquifer (10-20m)	☑ Very deep (>20m)	
Existing water body within area	☐ River	☐ Canal	☐ Lake/Pond
	☐ Other	—	
If pond, current use of it	☐ Drinking	☐ Cattle washing	☐ Irrigation
	☐ Other	—	
	—		
Water logging problem within area	☐ Yes	☑ No	
If yes,			
Name of area			
Period of water logging			
Population affected by water logging			
Contamination to drinking water sources			
Existing roads	☐ Paved	☐ Un-paved	
	☐ Other		

Avg. Width of Roads (m)/ROW	< 2.0m	
Current solid waste collection/disposal system	☐ Combined dust bin	☐ Door to door collection
	☐ Drains	☐ Streets
	☐ Other	
	None.	
Local Vegetation (species)	Crops wheat, Sarsaw, Paddy, Channa, Arhar.	
3. PUBLIC HEALTH ISSUES		
Incident of Waterborne epidemic/disease in the recent past	☐ Yes	☑ No
If yes, name of disease	☐ Diarrhoea	☐ Gastro entities ☐ Typhoid
	☐ Other	
Any vector borne disease	☐ Yes	☑ No
If yes, name of disease	☐ Malaria	☐ Dengue ☐ Filaria
	☐ Other	
4. EXISTING WATER SUPPLY SCHEME		
Type of scheme	☐ Single Village	☐ Multi village ☑ Hand Pump
No. of Hand pumps	50	
No. of Single Village Scheme	—	
Institution responsible for providing water supply & sanitation	UP Jal Nigam	
Details of Institutional set up	O & M By Jal Nigam	
Role of GP in planning the scheme	None.	
Current drinking water situation	Moderate	
Source of drinking water supply	☐ River	☐ Lake/Pond
	☐ Canal	☑ Ground water
	☐ Other	
Water being supplied in LPCD	—	
No. of Households with water connection	None	

No. of Households using Public stand posts/hand pumps/ open wells	• Hand pumps & 10 Open wells. (9-personal & 1-Govt.)
Depletion in ground water table in summer	Moderate level of depletion is observed.
Is Irrigation by tube well, if yes, any legislation on drilling of private bore wells	Yes, No legislation is yet in place.
Water testing labs	District level.
Frequency of Water quality analysis for bore well sources/other sources (yearly twice - pre and post monsoon)	—
Water quality in summer	No change
Water quality test report available	☐ Yes ☑ No
Major water quality problem	☐ Fluoride ☑ Iron ☐ Heavy Metals ☐ Bacteriological ☐ TDS ☐ Pesticide ☐ Nitrate ☐ Arsenic ☐ Other —
Treatment, if any for ground water	None.
Is disinfection being practiced?	No.
Is there potential risk of contamination of source due to industrial contaminants, human waste discharge, solid waste dumping, use of agro chemicals (Fertilizers, Pesticides etc?)	☑ Yes ☐ No
If yes, source details	Open defecation, liquid waste disposed to streets / fields.
Any alternative safe & sustainable source available	None.
Presence of WTP's	☐ Yes ☑ No
Type of treatment	—
If Ground water, indicate the Treatment Technology	☐ R.O. ☐ De-fluoridation plant ☐ Iron removal plant ☐ Other None
Who is responsible of O&M of schemes?	Jal Nigam
Current O&M practice	Moderate
Any water charges being levied	No-

5. EXISTING SANITATION FACILITIES			
Current Sanitation Practices	☐ Septic Tank	☐ Latrine with Soak pit	
	☑ Open defecation	☐ Bore /soak pit type	
	☐ Other	Though there was the presence of organised toilets.	
No. of households with individual sanitary latrines	—		
No. of households with septic tank	—		
No. of community latrines	—		
Level of awareness on impact of sanitation on health	Poor.		
Current Drainage Pattern	☑ Open Drains	☐ partially covered open drains	☐ No drainage system
Residents feedback about current sanitation practices	☐ Satisfactory	☑ Non-satisfactory	
Wastewater quantity in MLD	—		
Current solid waste disposal method	Open dumping.		
Current liquid waste/ sullage water disposal method	Discharge of liquid waste onto roads / streets / fields.		
Presence of STP's	☐ Yes	☑ No	
STP distance from nearest settlement	☐ <200m	☐ 200-500m	☐ >500m
STP distance from the nearest school/primary health centre/religious structure	☐ <200m	☐ 200-500m	☐ >500m
Existing Ponds used for disposal of effluent	☐ Yes	☐ No	
Land availability for new STP	☐ Yes	☐ No	
If yes, current land use	☐ Agriculture	☐ Barren land	
Plantation around STP site	☐ Yes	☐ No	
Any Potential risk of contamination of water source	Open defecation, liquid waste disposal.		
Repair and Cleaning of Drains	☐ Yes	☑ No	
Solid waste removal of streets	☐ Yes	☑ NO	
Need of Public awareness on hygiene	☑ Yes	☐ No	

22/12/2012

Environmental Data Collection sheet for Water Supply and Sanitation			
1. GENERAL			
Name of Village/Town	Pusauli (visited patel Basti)		
Gram Panchayat	Pusauli		
Block	Robertsganj		
District	Sonbhadra		
Zone (East/West/North/South)			
Population (2011 Census)/Revenue records (Total)	about 3,000		
Number of households	about 500 (total) - 30 (Patel Basti)		
Historical importance	☐ Yes	☑ No	
Presence of historical structure/any sensitive area	- do -		
2. BASELINE ENVIRONMENT			
Topography	☑ Plain	☐ Hilly	☐ Rolling
Soil type	silty clay		
Rainfall intensity	☐ Low	☑ Moderate	☐ High
Temperature			
Water Table (Depth below Ground)	☐ Shallow (0-5m)	☐ Moderate (5-10m)	
	☐ Deep aquifer (10-20m)	☑ Very deep (>20m)	
Existing water body within area	☐ River	☐ Canal	☐ Lake/Pond
	☐ Other		
If pond, current use of it.	☐ Drinking	☐ Cattle washing	☐ Irrigation
	☐ Other		
Water logging problem within area	☐ Yes	☑ No	
If yes,			
Name of area			
Period of water logging			
Population affected by water logging			
Contamination to drinking water sources			
Existing roads	☑ Paved	☐ Un-paved	
	☐ Other		

Avg. Width of Roads (m)/ROW	< 2.5m	
Current solid waste collection/disposal system	☐ Combined dust bin	☐ Door to door collection
	☐ Drains	☐ Streets
	☐ Other	
Local Vegetation (species)	Rabi Season – wheat, vegetables Kharif " – wheat, mustard	
3. PUBLIC HEALTH ISSUES		
Incident of Waterborne epidemic/disease in the recent past	☐ Yes	☑ No
If yes, name of disease	☐ Diarrhoea	☐ Gastro entities ☐ Typhoid
	☐ Other	
Any vector borne disease	☐ Yes	☑ No
If yes, name of disease	☐ Malaria	☐ Dengue ☐ Filaria
	☐ Other	
4. EXISTING WATER SUPPLY SCHEME		
Type of scheme	☐ Single Village	☐ Multi village ☑ Hand Pump
No. of Hand pumps	In this basti, 2 HPs	
No. of Single Village Scheme	—	
Institution responsible for providing water supply & sanitation	UPJN	
Details of Institutional set up	UPJN	
Role of GP in planning the scheme	–	
Current drinking water situation	In Summer, one HP gets dried up & yields less	
Source of drinking water supply	☐ River	☐ Lake/Pond
	☐ Canal	☑ Ground water
	☐ Other	
Water being supplied in LPCD	—	
No. of Households with water connection	More.	

No. of Households using Public stand posts/hand pumps/ open wells	2-Handpumps, 1 open well. & Shallow handpumps.
Depletion in ground water table in summer	Yes.
Is Irrigation by tube well, if yes, any legislation on drilling of private bore wells	Yes, No such legislation in place as yet. District level
Water testing labs	
Frequency of Water quality analysis for bore well sources/other sources (yearly twice - pre and post monsoon)	—
Water quality in summer	No change.
Water quality test report available	☐ Yes ☐ No
Major water quality problem	☐ Fluoride ☑ Iron ☐ Heavy Metals ☐ Bacteriological ☐ TDS ☐ Pesticide ☐ Nitrate ☐ Arsenic ☐ Other
Treatment, if any for ground water	None
Is disinfection being practiced?	None.
Is there potential risk of contamination of source due to industrial contaminants, human waste discharge, solid waste dumping, use of agro chemicals (Fertilizers, Pesticides etc?)	☑ Yes ☐ No
If yes, source details	Open defecation, liquid waste disposal to streets / fields.
Any alternative safe & sustainable source available	None.
Presence of WTP's	☐ Yes ☑ No
Type of treatment	—
If Ground water, indicate the Treatment Technology	☐ R.O ☐ De-fluoridation plant ☐ Iron removal plant ☐ Other None.
Who is responsible of O&M of schemes?	UP Jal Nigam
Current O&M practice	Moderate.
Any water charges being levied	No.

5. EXISTING SANITATION FACILITIES			
Current Sanitation Practices	☐ Septic Tank	☑ Latrine with Soak pit	
	☑ Open defecation	☐ Bore /soak pit type	
	☐ Other		
No. of households with individual sanitary latrines	3 (Personal)		
No. of households with septic tank	—		
No. of community latrines	—		
Level of awareness on impact of sanitation on health	Poor.		
Current Drainage Pattern	☑ Open Drains	☐ partially covered open drains	☐ No drainage system
Residents feedback about current sanitation practices	☐ Satisfactory	☑ Non-satisfactory	
Wastewater quantity in MLD	—		
Current solid waste disposal method	Open dumping.		
Current liquid waste/ sullage water disposal method	Discharged into fields & streets.		
Presence of STP's	☐ Yes	☑ No	
STP distance from nearest settlement	☐ <200m	☐ 200-500m	☐ >500m
STP distance from the nearest school/primary health centre/religious structure	☐ <200m	☐ 200-500m	☐ >500m
Existing Ponds used for disposal of effluent	☐ Yes	☐ No	
Land availability for new STP	☐ Yes	☐ No	
If yes, current land use	☐ Agriculture	☐ Barren land	
Plantation around STP site	☐ Yes	☐ No	
Any Potential risk of contamination of water source	Open defecation, liquid waste disposal, Un-lined open wells.		
Repair and Cleaning of Drains	☐ Yes	☑ No	
Solid waste removal of streets	☐ Yes	☑ NO	
Need of Public awareness on hygiene	☑ Yes	☐ No	

Appendix D. Format for Environmental Data Sheets (EDS) & Evaluation Sheet

D.1. EDS for Water Supply

D.2. EDS for Sanitation Schemes

D.3. EDS for Household Soak pits

D.4. EDS for Community Solid Waste Management

D.5. Environmental Evaluation Sheet for Category II (High Risk) Schemes

D.1 EDS for Water Supply

S. No.	Description	Particulars		Remarks
GENERAL				
1.	Name of Habitation			
2.	Name of Gram Panchayat			
3.	Name of Block			
4.	Name of District			
5.	Population (present)			
6.	Total water demand (Litres per day)			
7.	Present water supply (Litres per day)			
8.	Present classification of habitation			
9.	Problem with present water supply			
10.	Net demand of water from the proposed source (Litres/day)			
11.	Type of source	Groundwater source	Surface water	
12.	Type of scheme	Single Village Scheme (SVS)	Multi Village Scheme (MVS)	
13.	Is Treatment planned?	Yes	No	
LOCATION				**Refer Clause 8.1 (ECOP)**
14.	Where is the source located?			
15.	Has a sanitary survey of the source location been done? (Enclose the report of the sanitary survey)			
16.	Is any component of the scheme located in a forest area?	Yes	No	If yes, obtain permission in writing from the Forest Department. **Refer Clause 8.11 (ECOPs)**
17.	Is the source is near (within 5km) any ecologically sensitive area (National Parks, Wildlife Sanctuaries)?	Yes	No	Avoid the sensitive areas. If not possible, obtain permission in writing from the Forest Department and follow mitigation measures as suggested by the Forest Department. **Refer Clause 8.11 (ECOPs)**
18.	Are any trees likely to be cut at the location for construction of the scheme? If yes, mention the number of trees.			If yes, obtain permission in writing from the Forest Department. **Refer Clause 8.11 (ECOPs)**
IN CASE OF GROUNDWATER SOURCE				
AQUIFER STATUS AND SUSTAINABILITY				**Refer Clause 8.1 & Clause 8.3 (ECOPs)**
19.	What is the type of aquifer?	Shallow aquifer	Deep aquifer	
20.	Total depth of well (meters)			
21.	Depth to groundwater table below GL (m)			
22.	Summer			
23.	Winter			
24.	Is the groundwater tapping in safe zone (classified based on exploitation)?	Yes	No	
25.	What are the measures proposed for source sustainability?	Groundwater recharging structure	Limiting the draft to safe yield	
LOCATION OF THE WELL				**Refer Clause 8.1 & Clause 8.4 (ECOP)**

26.	What is the distance of this source from the nearest leach pit of any existing sanitation facility? (It should be more than 15 meters)			
27.	What is the distance of this source from the nearest rain water harvesting pit? (It should be more than 15 meters)			
28.	What is the distance of the source from the nearest existing well? (It should be more than 300 meters)			
29.	STRUCTURE OF THE WELL			
30.	Will the well be provided with sanitary plug till the pump is installed?	Yes	No	
31.	Is a concrete mat (of at least 75 cm radius) planned around the bore well?	Yes	No	
32.	Is grouting of the space outside the well casing planned?	Yes	No	
WATER QUALITY				**Refer Clause 8.4 (ECOP)**
33.	Is the quality of water acceptable? (enclose the water quality test report)	Yes	No	
34.	If not acceptable, mention the type of water quality problem			
35.	What is the alternative proposed?			
36.	If the water is to be treated, mention the treatment process			
37.	What is the frequency planned for testing water for bacteriological contamination? (should be 1 initially and later as required)			
38.	What is the frequency planned for testing water for physical and chemical contamination? (should be 4 times/year)			
39.	What is the frequency planned for testing residual chlorine? (should be at least once a week)			
40.	What is the frequency planned for sanitary inspection by VWSC/GP? (should be 4 times/year)			
41.	What is the frequency planned for sanitary inspection by AE/JE? (should be once/year)			
IN CASE OF SURFACE WATER SOURCE				**Refer Clause 8.1 & Clause 8.2 (ECOP)**
LOCATION				
42.	Will there be any significant land disturbance resulting in erosion, subsidence and instability?	Yes	No	
43.	Will the scheme involve alteration of natural drainage? If yes, indicate the measures for the drainage.	Yes	No	
SUSTAINABILITY				
44.	Is the expected safe yield from the source greater than water demand?	Yes	No	
WATER QUALITY				**Refer Clause 8.4 (ECOP) & Appendix H**
45.	What is the Turbidity of raw water (NTU)?			Enclose water quality test report
46.	Is this source within 100 m from the nearest sewage/industrial effluent disposal point (disposal into the surface water source)?	Yes	No	
47.	Is there any chemical impurity present? If yes, furnish the details.	Yes	No	

48.	What is the frequency planned for testing water for bacteriological contamination? (should be 1 every month)			
49.	What is the frequency planned for testing water for physical and chemical contamination? (should be 4 times/year)			
50.	What is the frequency planned for testing residual chlorine? (should be once every day)			
51.	What is the frequency planned for sanitary inspection by VWSC/GP? (should be 12 times/year)			
52.	What is the frequency planned for sanitary inspection by AE? (should be 2 times /year if population serviced is less than 5000; should be 24-48 times /year if population serviced is between 5000-20000)			
WATER TREATMENT				
53.	What is the method of water treatment proposed?			
54.	How will the sludge and other residue from the water treatment plant be disposed?			

D.2 EDS for Sanitation Schemes

S. No.	Description	Particulars		Remarks
GENERAL				
1.	Name of Habitation			
2.	Name of Gram Panchayat			
3.	Name of Block			
4.	Name of District			
5.	Population (present)			
6.	No. of ISL proposed			
LOCATION				**Refer Clause 8.5 & 8.6 (ECOP)**
7.	Are any trees likely to be cut at the location for construction of the scheme? If yes, mention the number of trees.			If yes, obtain permission in writing from the Forest Department **Refer Clause 8.11 (ECOP)**
8.	Type of substrata	Pervious	Impervious	
9.	Depth to groundwater table, in meters			
10.	*winter			
11.	*summer			
12.	Is a shallow aquifer used as source for drinking water supply in the habitation?			
13.	Is a minimum distance of 15 meters maintained between the pits and the nearest drinking water sources? (for all the ISLs proposed)	Yes	No	
14.	In case of high ground water table and in case of highly permeable soils, is a minimum distance of 40 meters maintained between the pits and the nearest drinking water sources? (for all the ISLs proposed)	Yes	No	
STRUCTURE				**Refer Clause 8.5 (ECOP)**
15.	What is the type of toilet proposed?			
16.	For ISL			
17.	What are the precautions taken to prevent groundwater contamination?			
18.	In case of high ground water table, is raising of platform, bottom sealing of pit and earth filling outside along sides of pit planned?	Yes	No	
19.	In case of flood prone area, is raising of platform and earth filling outside along sides of pit planned?	Yes	No	
20.	In case of loose soils, is lining of pits with perforated cement rings planned?	Yes	No	
21.	In case of soils with low permeability, is back filling of part of pit with more sandy soil planned?	Yes	No	
22.	In case of soils with high permeability, is earth filling around rings with denser soil planned?	Yes	No	
MAINTENANCE				
23.	Is an awareness programme for prospective users on proper use and maintenance of the IHLs being planned?			
24.	Is adequate water available for use?			
25.	What is the expected cleaning interval of pits? (a pit should not be emptied before 1 ½ years after its being in use)			
26.	What is the method of disposal of materials removed from pits?			

D.3 EDS for Household Soak pits

S. No.	Description	Particulars		Remarks
GENERAL				
1.	Name Habitation			
2.	Name of Village Panchayat			
3.	Name of Block			
4.	Name of District			
5.	Population (present)			
LOCATION				**Refer Clause 8.7 (ECOP)**
6.	Is the soak pit located in rocky terrain? (Not suitable for rocky terrain)	Yes	No	
STRUCTURE				**Refer Clause 8.7 (ECOP)**
7.	Will the wastewater flow exceed the design flow of the soak pit? (calculate design flow as per requirement for bathing 20-30 l/p/d, kitchen 5-10 l/p/d, washing clothes 15-20 l/p/d, and other uses)	Yes	No	
8.	Is filling material of appropriate size available? (Should be pebbles of sizes 125 – 150 mm, 100 -125 mm and 50 – 75 mm)	Yes	No	
9.	Is the pit to be filled loosely? (Filling material must not be tightly packed)	Yes	No	
10.	Is the pit to be filled with murram, brickbats or sand? (These materials must not be used)	Yes	No	
MAINTENANCE				**Refer Clause 8.7 (ECOP)**
11.	What is the frequency planned for cleaning the filter of the soak pit? (Must be cleaned every fortnight or month)			
12.	What is the frequency planned for cleaning the pit and replacing the filling material? (Must be once in 7-8 years)			

D.4 EDS for Community Solid Waste Management

S. No.	Description	Particulars		Legal requirements
GENERAL				
1.	Name of Habitation			
2.	Name of Gram Panchayat			
3.	Name of Block			
4.	Name of District			
5.	Population (present)			
LOCATION				
6.	Type of substrata	Pervious	Impervious	
7.	Depth to groundwater table in meters			
8.	*winter			
9.	*summer			
WASTE GENERATION				
10.	What is the expected quantity of solid waste generation per day? (tons)			
11.	What is the expected quantity of biodegradable waste (waste that can be composted) per day? (tons)			
12.	What is the expected quantity of non-biodegradable waste (waste that can be composted) per day? (tons)			
WASTE MANAGEMENT				**Refer Clause 8.8 (ECOP)**
WASTE SEGREGATION AND COLLECTION				
13.	Are awareness programmes on household waste segregation planned to be organized?	Yes	No	
14.	Is segregation of wastes at household level (into biodegradable and non-biodegradable wastes) being planned?	Yes	No	
15.	How will the household waste be collected?	Community waste bins	Door-to-door collection	
16.	Are the community waste bins planned to be located at least 15 m away from any water sources?			
17.	What is the planned frequency of collecting waste (from community bins or from individual households)?			
COMPOSTING OF BIODEGRADABLE WASTE				
18.	What is the type of composting planned? Underground (lined or unlined) pits – suitable for low rainfall areas Over ground heap or tank – suitable for high rainfall areas and rocky terrain Vermi-compost units			
FOR COMPOSTING UNITS				
19.	Will the wind flow direction at the composting yard cause foul odour in the habitation?			
20.	Is the compost yard in a low lying area (likely to get water logged)?			
21.	Will weekly covering of the compost pit/heap with thin soil layer planned to avoid odour and fly nuisance?			
FOR VERMI-COMPOSTING UNITS				
22.	What is the variety of earthworms planned? (local or exotic) (local variety – *Lampito mauritii* is preferred to exotic varieties – *Eisenia foetida* and *Eudrilus*			

	euginiae)			
23.	Is the vermi-composting unit located in an area that is not low-lying and has adequate slope (to prevent water-logging)?			
24.	What pest control (control of red ants, cockroaches, etc.) methods are planned at the vermi-composting unit? (Only non-chemical methods such as application of turmeric and flour around perimeter of the tank must be practiced)			
MANAGEMENT OF NON-BIODEGRADABLE WASTE				
25.	What part of the non-biodegradable waste will be sent to the land fill?			
26.	Is the site identified for the land fill located in a forest area?	Yes	No	Avoid the forest area
27.	Is the site located for the land fill near (within 5 km) any ecologically sensitive area (National Parks, Wildlife Sanctuaries)?	Yes	No	Avoid having the land fill site near the sensitive area (Seek Forest Department permissions) **Refer Clause 8.11 (ECOP)**
28.	What is the extent of land available for the solid waste disposal fill site?			Obtain clearance from UPPCB
29.	What is the ownership of the land identified for the disposal site?	Government / Panchayat land	Private land	
30.	What is the distance of the land fill site from nearest water supply source/catchment boundary/water body (less than 100 m?)			
31.	What are the precautions taken/planned to prevent surface and groundwater contamination?			
32.	Is periodic covering of waste with minimum 10 cm of soil/debris planned?			
33.	Is covering of waste with 40-65 cm thick soil cover planned before every monsoon (to prevent infiltration)?			
34.	Is an appropriate drainage system planned at the land fill site to divert run off water?			
35.	Will the land fill site have fencing and a gate to prevent entry of stray animals and unauthorized persons?			
36.	Has baseline data on groundwater quality in the area been collected (for future reference)? Enclose report water quality test.			

D.5 Environmental Evaluation Sheet for Category II (Medium Risk) Schemes

A) General

S. No.	Description	Particulars
1	Name of District	
2	Name of Block	
3	Name of Gram Panchayat	
4	Name of Habitation	
5	Population coverage	
7	Name of the Scheme	

8 Duration of Scheme

B) Scheme Details

1	**Scheme Objectives:**
2	**Scheme Components:**
3	**Resource Requirement:**
4	**Use of Technology:**
5	**Environmental Issues specific to the Scheme:**
6	**Mitigation Measures:**

C) Environmental Impacts

Expected Impacts	**Mitigation Measures**
Land Environment	
Change in land use/ land cover/ topography	
Clearance of existing land	
Demolition works	
Facilities for storage of goods	
Stream/ nallah crossing	
Loss of Top soil due to construction	
Alteration of Natural Drainage system	
Modification of wetlands / low lying areas	

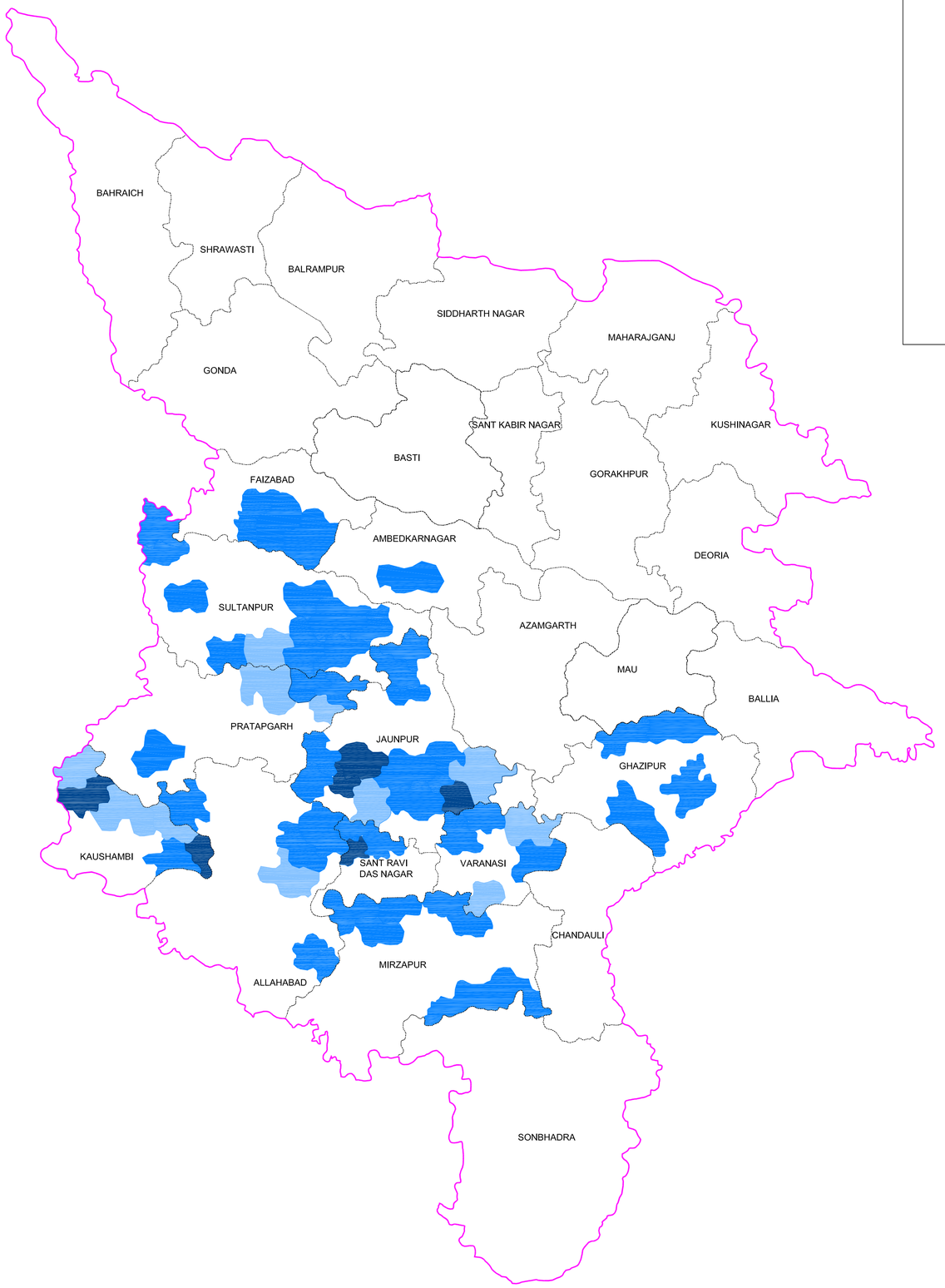
Waste generation	
Air Environment	
Generation of dust, smoke, fumes or Hazardous gases from project activities	
Increase in traffic noise due to project activities	
Vehicular dust	
Any other (specify)	
Water Environment	
Run off from construction activities leading to contamination of aquifers/ nearby water bodies	
Flooding of site due to rain	
Groundwater depletion	
Discharge of wastes	
Reduced availability of water	
Reduction in ground water recharge	
Any other (specify)	
Bio- Diversity	
Clearing or modification of vegetation	
Threat to endangered species (flora & fauna)	

Obstruction to migratory path of birds
Obstruction to natural breeding site of wild animals
Invasion of alien species
Any other
Health and Safety
Domestic waste accumulation
Accidents & Hazards
Vector borne diseases
Communicable diseases
Inadequate sanitation
Any other

D) Analysis of Alternatives

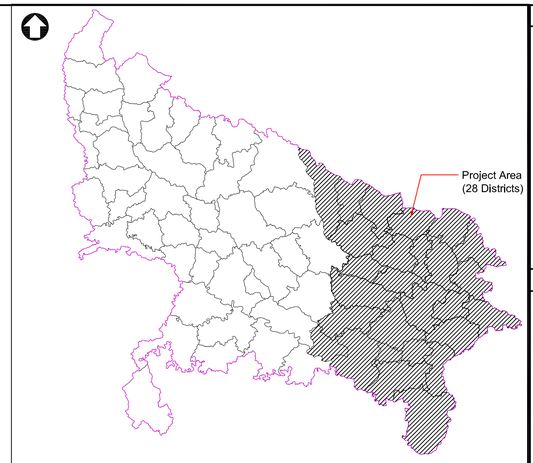
Alternatives – if any (only if significant)	***Environmental Implications***	***Mitigation Measures required***
1		
Overall recommended mitigation plan:		
Cost involved in implementing mitigation measures:		

Appendix E. Ground water availability – Categorization of blocks



Categorization of Blocks

1:1000



Key Plan

1:5000

Notes

1. Map Prepared as per secondary data availability and field visit observations.
2. Do not Scale from this Drawing.
3. State and District Boundary shown are indicative only, and should not be used for any Administrative Purpose.

Key to symbols

Legends:

- Over Exploited
- Critical
- Semi Critical

Reference drawings

1:5000 0 250m 500m

1:1000 0 50m 100m

Rev	Date	Description	Drawn	Ch'k'd	App'd
R0	28/01/2013	FOR APPROVAL	SP	NK	SB

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State Water and Sanitation Mission UP
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Title

EA & EMF for RWSS Sector in 28 Districts of Eastern Uttar Pradesh
G.W Avaibility - Categorization of Block in Eastern UP

Designed	N Shukla		Eng check	N Kansara	
Drawn	S Panchal		Coordination	H Trivedi	
Dwg check	N Patel		Approved	S Bathuku	

Scale at A1	Status	Rev
AS Shown	PRE	R0

Drawing Number

MMD-317719-Z-DR-00-XX-0001

Appendix F. Water Quality affected districts

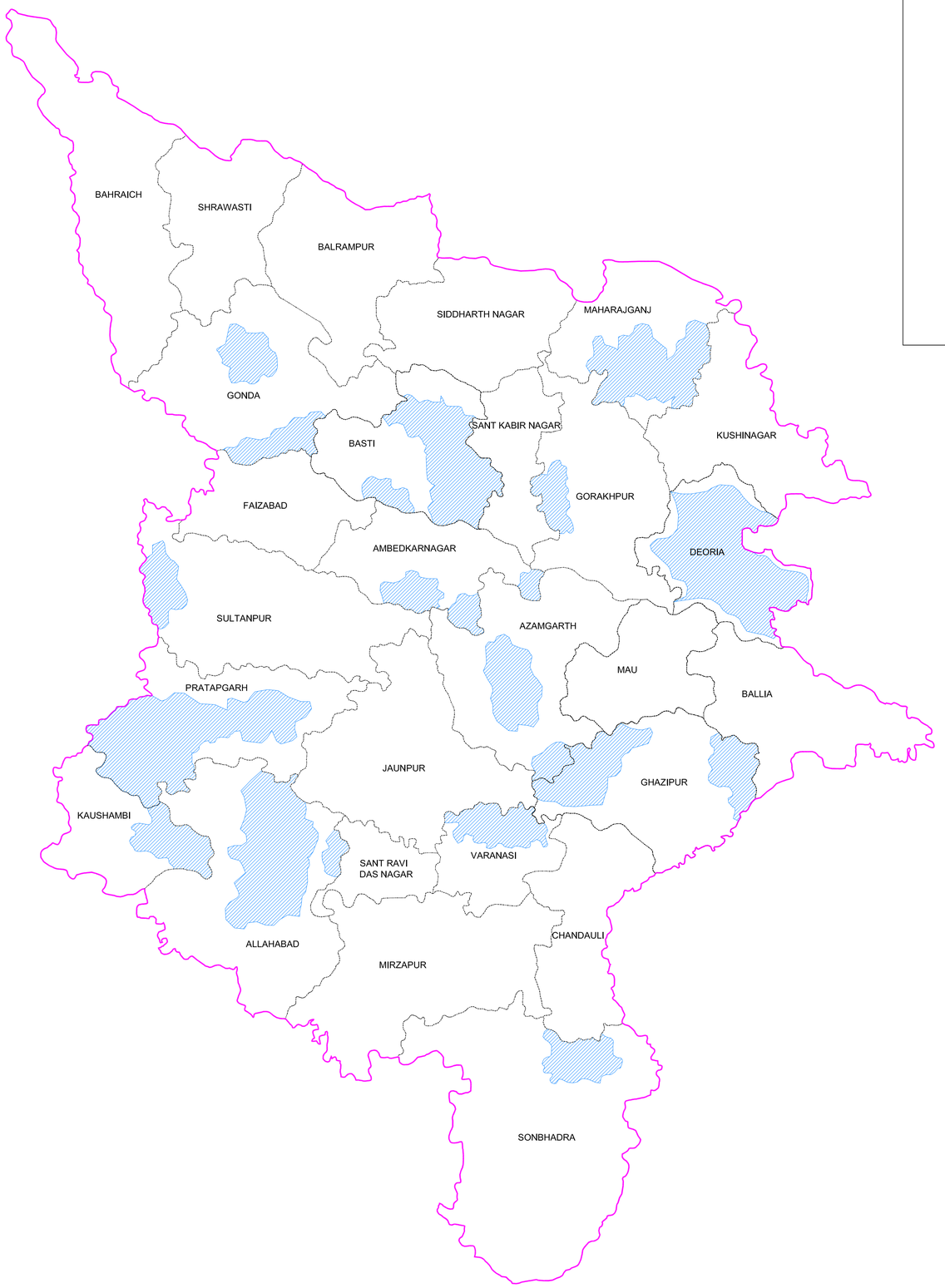
F.1. Fluoride affected districts

F.2. Iron affected districts

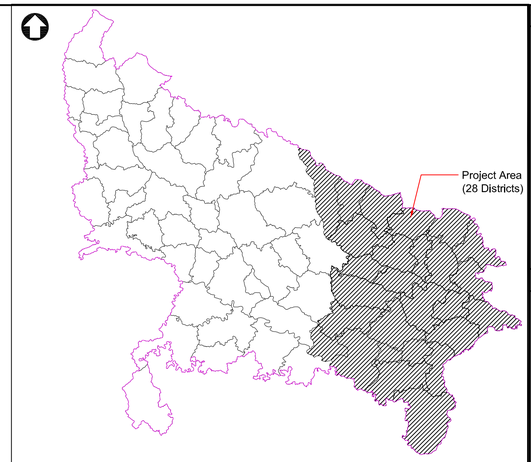
F.3. Arsenic affected districts

F.4. Salinity affected districts

F.5. Nitrate affected districts



Fluoride Affected Areas
1:1000



Key Plan
1:5000

Notes

1. Map Prepared as per secondary data availability and field visit observations.
2. Limits as per ISO:10500:1981 Drinking water.
3. Do not Scale from this Drawing.
4. State and District Boundary shown are indicative only, and should not be used for any Administrative Purpose.

Key to symbols

Legends:

- Fluoride Affected Area (F >1.5 mg/l)
- District Boundary
- State Boundary

1:5000 0 250m 500m

1:1000 0 50m 100m

Rev	Date	Description	Drawn	Ch'k'd	App'd
R0	28/01/2013	FOR APPROVAL	SP	NK	SB

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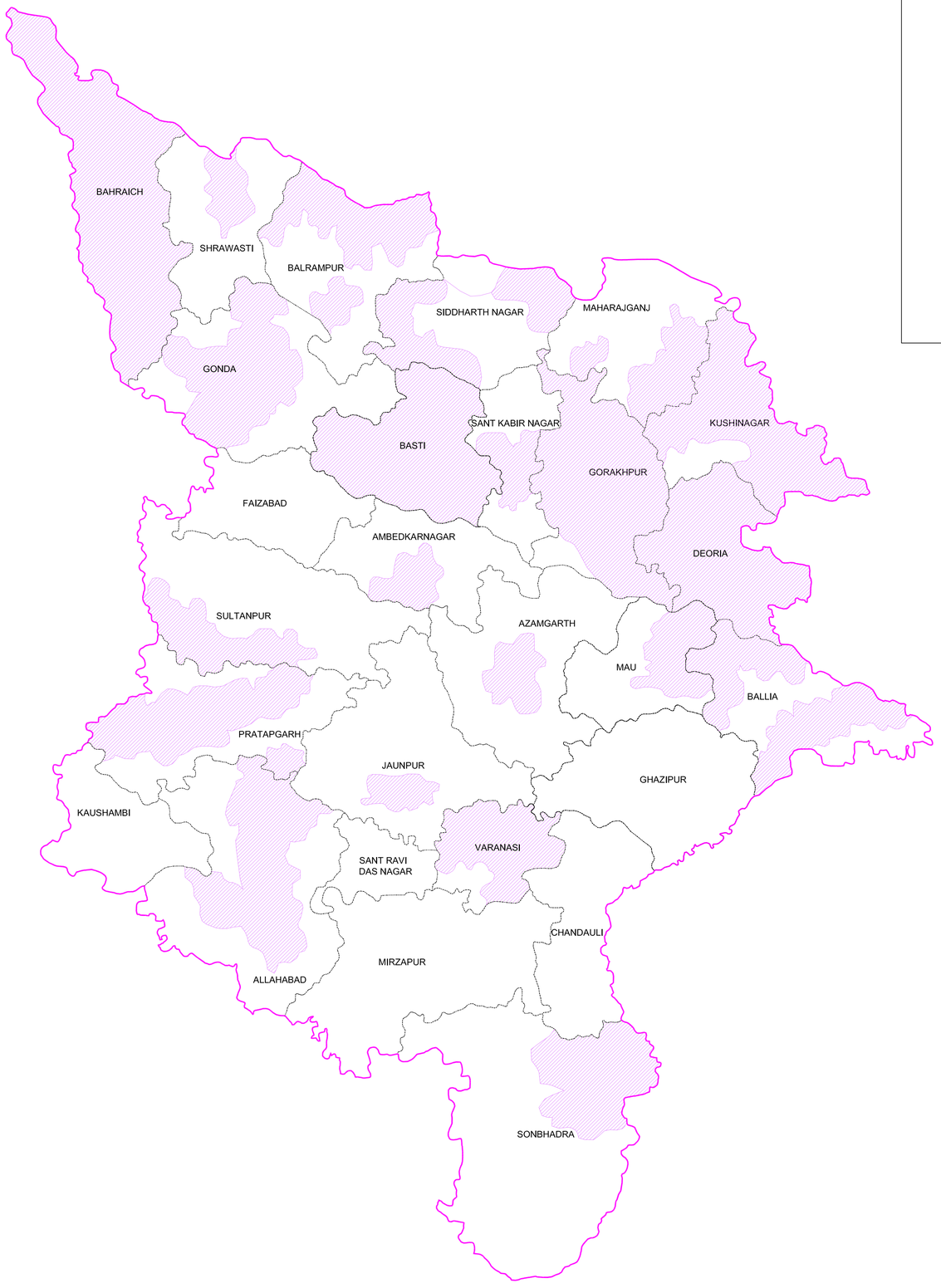
EA & EMF for RWSS Sector in 28 Districts of Eastern Uttar Pradesh
Fluoride Affected Districts

Designed	N Shukla		Eng check	N Kansara	
Drawn	S Panchal		Coordination	H Trivedi	
Dwg check	N Patel		Approved	S Bathuku	

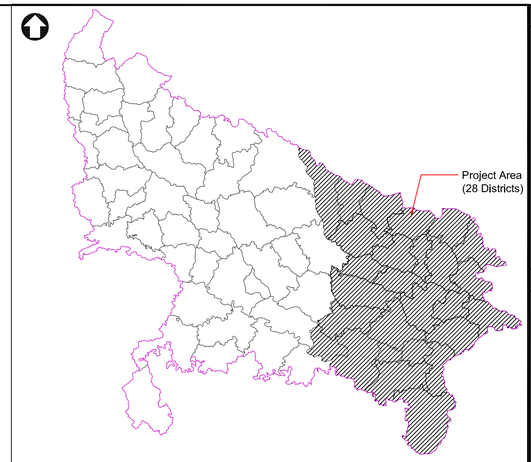
Scale at A1: AS Shown
Status: PRE
Rev: R0

Drawing Number
MMD-317719-Z-DR-00-XX-0002



Iron Affected Areas

1:1000



Key Plan

1:5000

Notes

1. Map Prepared as per secondary data availability and field visit observations.
2. Limits as per ISO:10500:1981 Drinking water.
3. Do not Scale from this Drawing.
4. State and District Boundary shown are indicative only, and should not be used for any Administrative Purpose.

Key to symbols

Legends:

- Iron Affected Area (Fe >1.0mg/l)
- District Boundary
- State Boundary

Reference drawings

1:5000 0 250m 500m

1:1000 0 50m 100m

Rev	Date	Description	Drawn	Ch'k'd	App'd
R0	28/01/2013	FOR APPROVAL	SP	NK	SB

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Title

EA & EMF for RWSS Sector in 28 Districts of Eastern Uttar Pradesh
Iron Affected Districts

Designed	N Shukla		Eng check	N Kansara	
Drawn	S Panchal		Coordination	H Trivedi	
Dwg check	N Patel		Approved	S Bathuku	

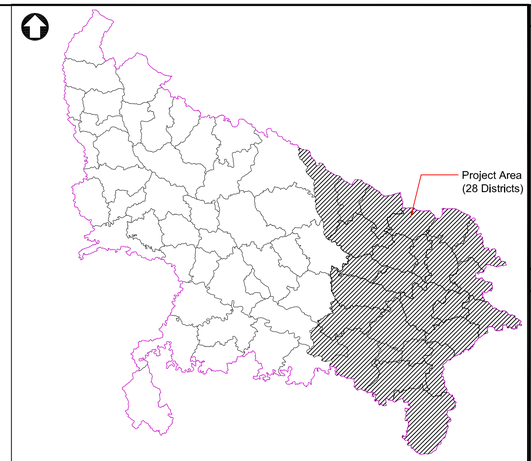
Scale at A1	Status	Rev
AS Shown	PRE	R0

Drawing Number

MMD-317719-Z-DR-00-XX-0003

Arsenic Affected Areas

1:1000



Key Plan

1:5000

Notes

1. Map Prepared as per secondary data availability and field visit observations.
2. Limits as per ISO:10500:1981 Drinking water.
3. Do not Scale from this Drawing.
4. State and District Boundary shown are indicative only, and should not be used for any Administrative Purpose.

Key to symbols

Legends:

- Arsenic Affected Area (Ar >0.05mg/l)
- District Boundary
- State Boundary

1:5000 0 250m 500m

1:1000 0 50m 100m

Rev	Date	Description	Drawn	Ch'k'd	App'd
R0	28/01/2013	FOR APPROVAL	SP	NK	SB

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Client

State Project Management Unit
State Water and Sanitation Mission UP
6 Sarojini Naidu Marg,
Lucknow - 226001

Title

EA & EMF for RWSS Sector in 28 Districts of Eastern Uttar Pradesh
Arsenic Affected Districts

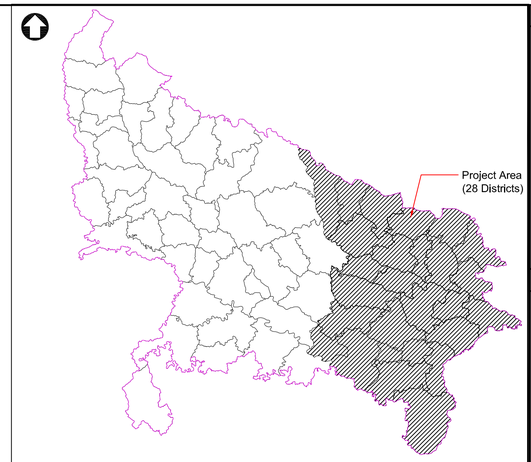
Designed	N Shukla		Eng check	N Kansara	
Drawn	S Panchal		Coordination	H Trivedi	
Dwg check	N Patel		Approved	S Bathuku	

Scale at A1	Status	Rev
AS Shown	PRE	R0

Drawing Number

MMD-317719-Z-DR-00-XX-0004

Salinity Affected Areas
1:1000



Key Plan
1:5000

Notes

1. Map Prepared as per secondary data availability and field visit observations.
2. Limits as per ISO:10500:1981 Drinking water.
3. Do not Scale from this Drawing.
4. State and District Boundary shown are indicative only, and should not be used for any Administrative Purpose.

Key to symbols

Legends:

- Salinity Affected Area (TDS >2000mg/l)
- District Boundary
- State Boundary

Reference drawings

1:5000 0 250m 500m

1:1000 0 50m 100m

Rev	Date	Description	Drawn	Ch'k'd	App'd
R0	28/01/2013	FOR APPROVAL	SP	NK	SB

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State Water and Sanitation Mission UP
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Lucknow - 226001

Title

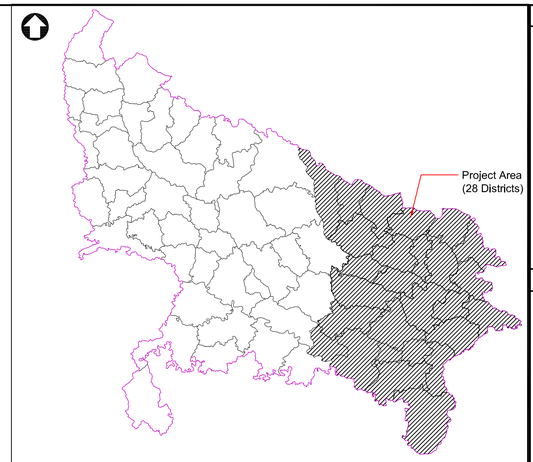
EA & EMF for RWSS Sector in 28 Districts of Eastern Uttar Pradesh
Salinity Affected Districts

Designed	N Shukla		Eng check	N Kansara	
Drawn	S Panchal		Coordination	H Trivedi	
Dwg check	N Patel		Approved	S Bathuku	

Scale at A1	Status	Rev
AS Shown	PRE	R0

Drawing Number
MMD-317719-Z-DR-00-XX-0005

Nitrate Affected Areas
1:1000



Key Plan
1:5000

Notes

1. Map Prepared as per secondary data availability and field visit observations.
2. Limits as per ISO:10500:1981 Drinking water.
3. Do not Scale from this Drawing.
4. State and District Boundary shown are indicative only, and should not be used for any Administrative Purpose.

Key to symbols

Legends:

- Nitrate Affected Area (NO_3>100mg/l)
- District Boundary
- State Boundary

Reference drawings

1:5000 0 250m 500m

1:1000 0 50m 100m

Rev	Date	Description	Drawn	Ch'k'd	App'd
R0	28/01/2013	FOR APPROVAL	SP	NK	SB

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Title

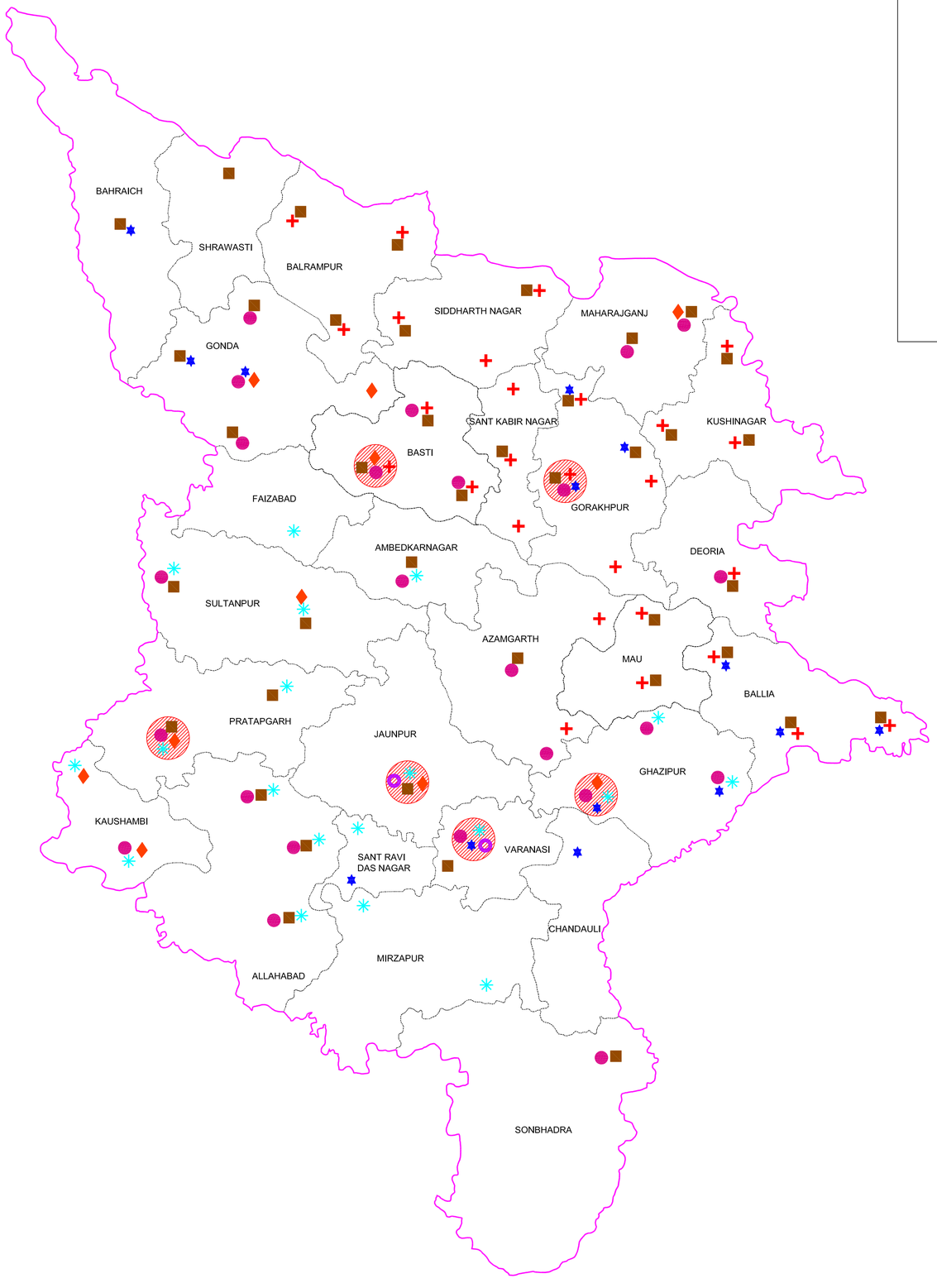
EA & EMF for RWSS Sector in 28 Districts of Eastern Uttar Pradesh
Nitrate Affected Districts

Designed	N Shukla		Eng check	N Kansara	
Drawn	S Panchal		Coordination	H Trivedi	
Dwg check	N Patel		Approved	S Bathuku	

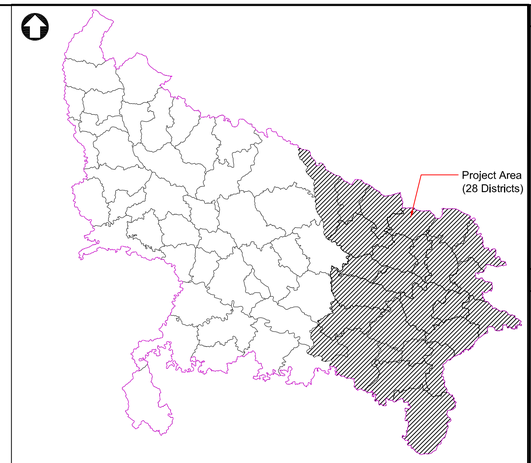
Scale at A1	Status	Rev
AS Shown	PRE	R0

Drawing Number
MMD-317719-Z-DR-00-XX-0006

Appendix G. Identified Hotspots – 28 districts of Eastern UP



Hotspots
1:1000



Key Plan
1:5000

Notes

1. Map Prepared as per secondary data availability and field visit observations.
2. Do not Scale from this Drawing.
3. State and District Boundary shown are indicative only, and should not be used for any Administrative Purpose.

Key to symbols

Legends:

- Fluoride
- Arsenic
- Iron
- Salinity
- Nitrate
- JE/AES
- G.W. Categorization
- Intense Hotspot

Reference drawings

1:5000 0 250m 500m

1:1000 0 50m 100m

Rev	Date	Description	Drawn	Ch'k'd	App'd
R0	31/01/2013	FOR APPROVAL	SP	NK	SB

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Client

State Project Management Unit
State Water and Sanitation Mission UP
6 Sarojini Naidu Marg,
Lucknow - 226001

Title

EA & EMF for RWSS Sector in 28 Districts of Eastern Uttar Pradesh
Hotspots

Designed	N Shukla		Eng check	N Kansara	
Drawn	S Panchal		Coordination	H Trivedi	
Dwg check	N Patel		Approved	S Bathuku	

Scale at A1: AS Shown
Status: PRE
Rev: R0

Drawing Number
MMD-317719-Z-DR-00-XX-0008

Appendix H. Drinking Water Standards

S. No	Substance or characteristics/Parameter	BIS, Indian Standards(IS 10500:1991)		World Health Organization(WHO Guidelines)
		Desirable Limit	Permissible Limit in the absence of Alternate Source	Maximum allowable concentration
Essential Characteristics				
1	Colour Hazen Units, Max	5	25	15 True colour units
2	Odour	Unobjectionable	---	--
3	Taste	Agreeable	---	--
4	Turbidity, NTU, Max	5	10	5.0 NTU
5	pH value	6.5 to 8.5	No relaxations	6.5 to 8.5
6	Total hardness (as CaCO2) mg/L, Max	300	600	500 mg/L
7	Iron (as Fe) mg/L, Max	0.3	1.0	0.3 mg/L
8	Chlorides (as Cl) mg/L , Max	250	1000	250 mg/L
9	Residual, free chlorine (when protection against viral infection is required it should be Min 0.5 mg/L), mg/L, Min	0.2	---	--
Desirable characteristics				
10	Dissolved solids mg/L, Max	500	2000	1000 mg/L
11	Calcium (as Ca) mg/L, Max	75	200	--
12	Copper (as Cu) mg/L, Max	0.05	1.5	1.0 mg/L
13	Magnesium(as Mg),mg/L, Max	30	100	--
14	Manganese (as Me) mg/L, Max	0.1	0.3	0.1 mg/L
15	Sulphate (as SO4) mg/L, Max	200	400	400 mg/L
16	Nitrate (as NO3) mg/L, Max	45	No relaxation	10 mg/L
17	Fluoride (as F) mg/L, Max	1.0	1.5	1.5 mg/L
18	Phenolic compounds (asC6H5OH) mg/L, Max	0.001	0.002	--
19	Mercury (as Hg) mg/L, Max	0.001	No relaxation	0.001 mg/L
20	Cadmium (as Cd), mg/L, Max	0.01	No relaxation	0.005 mg/L
21	Selenium (as Se), mg/L, Max	0.01	No relaxation	0.01 mg/L
22	Arsenic (as As) mg/L, Max	0.05	No relaxation	0.05 mg/L
23	Cyanide (as CN), mg/L, Max	0.01	No relaxation	0.1 mg/L
24	Lead (as Pb), mg/L, Max	0.05	No relaxation	0.05 mg/L
25	Zinc (as Zn), mg/L, Max	5	15	5.0 mg/L
26	Ammonic detergents (as MBAS) mg/L, Max	0.2	10	--
27	Chromium (as Cr6+) mg/L, Max	0.05	No relaxation	0.05 mg/L
28	Polynuclear aromatic hydrocarbons (as PAH) g/L, Max	---	---	

S. No	Substance or characteristics/Parameter	BIS, Indian Standards(IS 10500:1991)		World Health Organization(WHO Guidelines)
		Desirable Limit	Permissible Limit in the absence of Alternate Source	Maximum allowable concentration
29	Mineral oil mg/L, Max	0.01	0.03	--
30	Pesticides mg/L, Max	Absent	0.001	--
31	Radioactive Materials: a) Alpha emitters Bq/L, Max b) Beta emitters pci/L, Max	--- ---	0.1 1	--
32	Alkalinity mg/L, Max	200	600	--
33	Aluminium (as Al), mg/L, Max	0.03	0.2	0.2 mg/L
34	Boron, mg/L, Max	1	5	--
35	Sodium	-	-	200 mg/L
36	Aldrin & dieldrin	-	-	0.03 µg/L
37	DDT	-	-	1.0 µg/L
38	Lindane	-	-	3.0 µg/L
39	Methoxychlor	-	-	30.0 µg/L
40	Benzene	-	-	10.0 µg/L
41	Hexachlorobenzene	-	-	0.01 µg/L
42	Pentachlorophenol	-	-	10.0 µg/L

Appendix I. Internal Supervision of Completed Schemes

Objectives:

Objectives of internal supervision are to verify/check the following:

- To check the adequacy/correctness of EDS, screening and environmental assessment of the Category II schemes;
- To check in the field the quality of implementation and effectiveness of the environmental mitigation measures with reference to the performance indicators.

Scope:

Internal supervision will be carried twice a year for about 11% of schemes (as given in table below) completed in each districts. The supervision will be done by a team of officials formed from DWSCs of other districts by the SPMU. Internal supervision shall be done prior to taking up of the external audit.

Sampling of Schemes for Internal supervision:

Purposive sampling of schemes for Internal Supervision will be done considering the significance of the scheme-type to the environment. The following table indicates the number of samples of each type of scheme that will be included in the supervision:

Sampling of schemes for internal supervision

Components	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	Total	Remarks
SVS								
Supervision Sample – SVS								
MVS								
Supervision Sample – MVS								
Rain water harvesting								
Supervision Sample – RWH								
Improvements								
Augmentation of SVS (distribution system)								
Supervision Sample - Augmentation of SVS (distribution system)								
Augmentation of MVS (distribution system)								
Supervision Sample - Augmentation of MVS (distribution system)								
Improving ground water sources								
Supervision Sample - Improving ground water sources								
Catchment area protection for surface sources								
Supervision Sample - Catchment area protection for surface sources								
Environmental sanitation								
IHHLs								

Components	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	Total	Remarks
Supervision Sample – IHHLs								
Pavements, drains and SLWM in major GPs								
Supervision Sample - Pavements, drains and SLWM in major GPs								
Soak pits in GPs								
Supervision Sample – Soak pits in GPs								
UGD and SLWM in Block head quarters								
Supervision Sample – UGD and SLWM in Block head quarters								
Total Projects each year								
Total Sample each year								
Percentage of sample								

Guidelines for Internal supervision:

A) Documents to be referred to prior to and during the Supervision visit:

- Filled in EDS of the scheme type
- Filled in Checklist for Environmental Assessment of the Category II Schemes (if applicable)
- Scheme specific supervision checklist given in Annexure
- Format of report of field visits undertaken during supervision given in Appendix L.

B) Process of supervision:

The supervision visit must include the following methodology:

- Interaction with JE/AE
- Interaction with SO
- Interaction with VWSC
- Field inspection of all components of the scheme under supervision
- Interaction with beneficiaries
- Photo documentation (highlighting any significant issues)

C) Report of Supervision: For each scheme visited in the supervision, a separate report should be prepared as per the format given in Appendix L. The report must be submitted to the DWSC for action. A copy must be sent by the DWSC to the SWSM for reference.

Appendix J. External Audit of the Completed Schemes

Objectives:

Objectives of external audit are to verify/check the following:

- To check the adequacy/correctness of EDS, screening and environmental evaluation of the Category II schemes;
- To check in the field the quality of implementation and effectiveness of the environmental mitigation measures with reference to the performance indicators.
- To assess the effectiveness of supervision and capacity building initiatives undertaken as part of the EMF

Scope:

External audit will be carried once in a year. The audit will also conduct a desk review to verify whether the environmental assessments procedures are followed correctly. The external audit will be done by an external agency appointed by the SWSP.

Sampling of Schemes for External Audit:

Purposive sampling of schemes for External Audit will be done considering the significance of the scheme-type to the environment. The following table indicates the number of samples of each type of scheme that will be included in the supervision:

Sampling of schemes for external audit

Components	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	Total	Remarks
SVS							-	
Audit Sample – SVS								
MVS								
Audit Sample – MVS								
Rain water harvesting								
Audit Sample – RWH								
Improvements								
Augmentation of SVS (distribution system)								
Audit Sample – Augmentation of SVS (distribution system)								
Augmentation of MVS (distribution system)								
Audit Sample – Augmentation of MVS (distribution system)								
Improving ground water sources								
Audit Sample - Improving ground water sources								
Catchment area protection for surface sources								
Audit Sample - Catchment area protection for surface sources								
Environmental sanitation								
IHHLs								
Audit Sample – IHHLs								

Components	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	Total	Remarks
Pavements, drains and SLWM in major GPs								
Audit Sample - Pavements, drains and SLWM in major GPs								
Soak pits in GPs								
Audit Sample – Soak pits in GPs								
UGD and SLWM in Block head quarters								
Audit Sample – UGD and SLWM in Block head quarters								
Total Projects each year								
Total Sample each year								
Percentage of sample								

50% of the schemes taken up for external audit will be selected on the above basis from the schemes already supervised internally to assess the effectiveness of internal supervision.

A) Documents to be referred to prior to and during the External Audit:

- EA/EMF of the UPRWSS
- Reports of all supervision reports
- List of performance indicators
- Reports of previous External Audits (if applicable)
- Reports of all capacity building programs related to the EMF
- Latest MIS of the UPRWSS showing district-wise, scheme-type wise list of schemes
- For the specific schemes selected for field visits:
  - Filled in EDS of the scheme-type
  - Filled in Checklist for Environmental Assessment of the Category II Schemes (if applicable)
  - Report of any previous internal supervision visit undertaken to the scheme (if applicable)
  - Scheme-specific audit checklist given in Annexure.
  - Format of report of field visits undertaken during audit given in Appendix L

B) Process of External Audit:

The audit includes the following methodology:

- Interaction with the SWSM and at least 30% of the DWSCs
- Desk review of all relevant EMF documents (mentioned in A)
- For the specific schemes selected for field visits:
  - Interaction with JE/AE
  - Interaction with SO
  - Interaction with VWSC
  - Field inspection of all components of the scheme under supervision
  - Interaction with beneficiaries
  - Photo documentation (highlighting any significant issues)

- Report of Audit: A detailed report of the external audit as per the format given in Annexure K must be submitted to the SWSC for action. The report must include the following:
- Description of methodology including details of sampling
- Review of the following (implementation and issues):

- Effectiveness of the environmental assessment system in identifying issues and implementing appropriate mitigation measures
- Institutional arrangements for implementation of the EMF
- Capacity building on the EMF
- Responsiveness of EMF to emerging environmental concerns
- Overall environmental performance of the UPRWSS with respect to the performance indicators
- Recommendations for strengthening the EMF
- Individual reports of the field visits undertaken as per the Appendix K (Sample Report of Field Visits Undertaken during Internal Supervision / External Audit).

A copy of the report of the Audit must be sent to all the DWSCs by the SWSM for reference.

Appendix K. Checklist for Environmental Supervision/ Audit

K.1 Checklist for Supervision/Audit of Water Supply Schemes

Groundwater sources

Construction:

- Well construction:
- Total depth of well.
- Type of casing: diameter, material and length from surface.
- Screen or perforations: diameter, material, locations and lengths.
- Formation seal: Material (cement, sand, bentonite, etc.), depth intervals, annular thickness and method of placement.

Protection:

- Protection of well at top: presence of sanitary well seal, casing height above ground or flood level, protection of well from erosion and animals.
- Is there any source of contamination within 15 m radius from the well?
- Is direct runoff of rain water into bore well sources prevented?
- Is a concrete mat of sufficient thickness for 75 cm radius around the bore well provided to seal the outer periphery of the bore well with the casing pipe raised 60 cm above ground level?
- Is rainwater harvesting and recharge structure located within 15 m of the bore well subject to direct contamination of the source?
- Is there any soak pit for the disposal of effluent from septic tank or other sanitation facility is within 15 m radius from the bore well of water supply source subject to direct contamination?
- Is there any sand mining in the river bed within a radius of 500 m from the wells?

Water Quality:

- Is there any unsafe supply available, usable in place of normal supply, hence involving danger to the public health?
- What is the type of disinfection arrangement provided? Is the test kit provided for testing residual chlorine?
- What is the monthly consumption of bleaching powder?

Surface water sources

- Protective measures in connection with the use of watershed to control fishing, boating, swimming, wading, permitting animals on marginal shore areas and in or upon the water etc.
- Treatment of water: kind and adequacy of equipment; duplication of parts; effectiveness of treatment; adequacy of supervision and testing; contact period after disinfection; free chlorine residuals carried.
- Pumping facilities: pump house, pump capacity and standby units, storage facilities.

Rainwater Harvesting Structures

- Are the rainwater harvesting (RWH) structures site specific closer to the source but 15 m away from the bore well?
- Whether the location of the RWH structures was certified by the hydrogeologist of the APRWSS department?
- Whether the RWH structure was implemented before the onset of the monsoon?

Water Quantity

- Any register maintained to record daily water supply to the habitation?
- What are the average, maximum and minimum daily water supplies to the community for each month?
- What is average per capita water supply for each month?
- What is the duration of supply?

Water Quality

- Are water quality monitoring is being done as per protocol?
- Are records of water quality tests are maintained in a register?
- What are the parameters tested and the frequency of testing?
- Is the residual chlorine test carried out daily?
- What is the number of days in a month that the residual chlorine is absent?
- Analyze the results and report what percentage of the results is complying with the drinking water standards.

K.2 Checklist for Supervision/Audit of Sanitation Schemes

Sanitation Coverage

Details of existing toilets in the habitation with types and categories

Category	Open pit	VIP Toilet	Twin-pit PFT	Water closet connected to Septic tank	Total
Existing prior to projects					
IHHL					X1
GOL					X2
School toilets					
Anganwadi toilets					
Total					
Constructed under the Project					
IHHL					Y1
GOL					Y2
School toilets					
Anganwadi toilets					
Total					
Grand total					

Percentage population having access to toilets = $\frac{\{(X1 + X2) + (Y1 + Y2)\}}{\text{Population of the habitation}} * 100$

Structure

- Is the junction chamber of the toilet constructed with proper slope and Y pipe?
- Are the leach pits properly connected and covered with pre-cast slab?
- Is the facility for cleaning linked to soak pit?

Selection

- Whether the selection of the toilet is appropriate to the substrata and groundwater table?

Operation and Maintenance

- What is the condition of the toilet (including pan and fixtures such as doors)?
- Has the pan been cleaned after fixing and is free of cement droppings?
- Is the toilet and its surrounding area clean?
- Are the toilets being used?
- Is water supply available for the toilet?
- Are the people adopting the hygienic practices (such as cleaning hands after using toilets)?
- What is the volume of the pit filled?

Sullage/ Drainage Coverage

Details of existing sullage/ drainage in the habitation with types and categories

Category	Open	Covered	Total
Existing prior to projects			X
Constructed under the Project			XX
Total			

Percentage population have access to sullage/ drainage = (X+XX) / (Population of the habitation * 100)

Structure

- Is the drain designed for the project population?
- Is the drain having proper slope and shape to maintain free flow without silting?
- Are there silt traps at the household connection and at the junctions?
- Is this drainage linked treatment facility?

Selection

- Whether the selection of the pipe material appropriate to village population and soil conditions?

Operation and Maintenance

- What is the condition of the drain (including manholes and treatment facility)?
- Is silt being removed from the drains and manhole chambers? Is the removed silt taken away to diposal sites?
- Is there is any pooling water in the open drains?
- Is there any mosquito breeding in the manholes and open drains?
- Does the Gram Panchayat have equipment for cleaning the drains?

Soak Pits Coverage

Details of existing soak pits in the habitation

Category	Total
Existing prior to projects	X
Constructed under the Project	XX
Total	

Percentage population having soak pits = (X+XX) / (Population of the habitation * 100)

Structure

- Is the soak pit filled with ballast/ boulders or brick bats?
- Is the soak pit filled with filter sand on top?
- Is there a pot with a holes attached to out let pipe to collect grit and debris?

- Is the soil permeable?

Selection

- Whether the selection of the soak pit as choice made based on the local soil conditions?

Operation and Maintenance

- Is the soak pit cleaned every fortnight/ month?
- Is the filter media being cleaned on a regular basis?
- Is there dirty water around the soak pit? Is the soak pit overflowing?
- Is there any mosquito breeding around the soak pit?

Sanitation Coverage

Details of existing Solid Waste Management systems in the habitation with types and categories

Category	Vermicomposting	Land Fill	Total
Existing prior to projects			X
Constructed under the Project			XX
Grand total			

Percentage population have access to SWM = (X+XX) / (Population of the habitation * 100)

Structure

- Are the walls of the Vermicompost pit sufficiently high to keep away predators?
- Is the land fill site outside the village in a vacant area?
- Is the land fill site fenced and locked?
- Is there a plantation around the land fill site?

Selection

- Whether the selection of the land fill site made based on the substrata and groundwater table?

Operation and Maintenance

- What is the temperature in the vermicompost pit (range 20 to 30℃)?
- Is there too much of water in the vermicompost plant?
- Is the compost being turned?
- Are there any solid inorganic objects or metals in the compost?
- Are there any ants, cockroaches, etc. around the plant?
- Are there any stray animals in the land fill site?
- Is there any foul smell at the land fill site?
- Is the ground water quality being monitoring regularly near the land fill?

Appendix L. Sample Field Visit Report for Internal Supervision/ External Audit

Name and designation of team members:

Date of the visit:

- Name of district:
- Name of Block:
- Name of Gram Panchayat:
- Name of habitation:
- Type and category of scheme:
- Brief description of the scheme components:
- Has the EDS been filled in and attached to the DPR?
- Has the screening been done correctly?
- Has the Checklist for Environmental Assessment of Category II Schemes been filled in properly (if applicable)?
- What are the mitigation measures prescribed in the EDS and/or specified in the Environmental Management Plan?
- What is the implementation status of these mitigation measures?
- Mitigation measure implemented:
- Mitigation measures not implemented:
- What environmental concerns were noted during the field visit:
- Recommendations for managing the environmental concerns noted:
- Did the beneficiaries of the scheme receive any relevant IEC? Give details of participation in any training or awareness programme, any communication material received, etc.
- Any other findings:

Signature of VWSC Member	Signature of JE/AE	Signature of the Leader of Supervision/Audit Team

Appendix M. Format for Declaration by Contractor / Consultant

Contract Package:

Contract No.:

I/We hereby declare that we have read and understood the Environmental Management Framework for the Uttar Pradesh Rural Water Supply and Sanitation Project. We will implement all the necessary mitigation measures, procure required goods and equipment, provide the required services, build/ construct necessary works, etc. in order to comply with the EMF. The following clauses of the EMF as well as ECOPs stated within the EA & EMF report are applicable for our package.

Clauses:

Clause 7.15.1: EMP for Planning & Design stage impacts for RWSS project

Clause 7.15.1: EMP for Construction stage impacts for RWSS project

Clause 7.15.2: EMP for Operation & Maintenance for RWSS project

ECOPs (Environmental Code of Practices):

ECOP 8.1: Identification of sources of water supply

ECOP 8.2: Protection of Surface water supply source and ensuring sustainability

ECOP 8.3: Protecting Ground water supply source and ensuring sustainability

ECOP 8.4: Water Quality Monitoring

ECOP 8.5: Safe Sanitation Technique at Individual Households and Community level

ECOP 8.6: Selection on location for Community Toilets

ECOP 8.7: Safe Sullage Disposal and Organic Waste Management

ECOP 8.8: Safe Solid Waste Management at Individual Household and Community level

ECOP 8.9: Management of Catchment Area

ECOP 8.10: Rehabilitation of Construction / Supplementary Sites

ECOP 8.11: Schemes in Forest areas

ECOP 8.12: Borrow Area

Signature of Authorized Representative of Contractor/ Consultant

Name in Full:

Designation:

Company Seal

Place:

Date:

Appendix N. Terms of Reference / Scope of Work for Environmental Specialist

Objective:

The objective of hiring of Environment Specialist is to ensure adequate management of environmental safeguards aspects of the project, as detailed in the EA-EMF and the same is implemented. In order to ensure effective implementation of the EMF and provide guidance on environmental issues of the project, the SWSM intends to deploy a full time Environment Specialist

(a) Scope of work

The scope of work for the Environment Specialist to be positioned in the SPMU will comprise the following tasks:

- Work closely with the project implementing agencies (Contractors and Consultants) and provide advice on the environmental aspects to be considered during design and implementation of sub- projects.
- Review the EDS format and Environmental Assessments (EA) and other related documents with regard to their compliance with the EMF and approve the same.
- Identify environmental issues related to sub-projects, asses the adequacy of management measures and provide necessary guidance to the consultants and contractors in improving the environment management quality.
- Co-ordinate with and provide necessary support in securing regulatory clearances such as Environment and Forest Clearances or consents from the PCB and other agencies.
- Carry out periodic visits to sub-project implementation sites to monitor as well as to provide onsite guidance to the contractors on the implementation of respective sub-project Environmental Management Plans (EMPs), if any, and other aspects of the EMF.
- Participate in the progress review meetings of the SPMU and provide advice on environmental aspects of the respective sub-projects during implementation.
- Prepare quarterly progress reports on environment management and forward the same to The World Bank for necessary approval / clearance.
- Co-ordinate with the Consultants, Environmental Auditors and other consultants / agencies of the project (employed by the SPMU) and ensure that the environmental aspects related to the task of respective agencies are performed as per the EMF ;
- Maintain a data base in a standard form, on the status of various environmental activities of (EDS reports, clearances, compliances, EA reports, progress reports, Monitoring data, etc.) and update the same on regular basis.
- Prepare and submit periodic progress reports to the SWSM/ SPMU and the quarterly progress reports the World Bank, on all the aspects related to environmental management in RWSS-LIS;
- Function as a single-point contact at the SPMU and for other external agencies, including The World Bank, and provide all support on environmental matters of RWSSP-LIS;
- Follow up with the other agencies in addressing various environmental safeguard actions agreed during the World Bank Missions from time to time, and provide timely update to the SPMU and the Bank.

(b) Qualification and Experience

The Consultant shall be an environment professional with post graduation in Environmental Engineering/ Planning /Science and 10 years of experience in environmental management. At least 5 years of the above experience shall include carrying out Environmental Assessment (EA/EIA), preparation of Environmental Management Plans (EMPs) and management of environmental issues in rural water and sanitation projects.

(c) Reporting and Deliverables

The Consultant shall report to the Executive Director, SPMU, RWSSP-LIS and shall provide outputs by way of monthly reports, technical supervision reports, reviews on various documents and other environmental matters related to the project.

Glossary

AE	Assistant Engineer
AES	Acute Encephalitis Syndrome
ARU	Arsenic Removal Unit
ARWSP	Accelerated Rural Water Supply Programme
ASHA	Accredited Social Health Associate
BAMP	Bahraich Arsenic Mitigation Project
BCM	Billion Cubic Meter
BIS	Bureau of Indian Standard
BRC	Block resource Centre
CAP	Community Action Plan
CCDU	Communication and Capacity Development Unit
CDO	Chief Development Officer
CEP	Child Environment Project
CGWB	Central Ground Water Board
CPCB	Central Pollution Control Board
CRSP	Central Rural Sanitation Programme
DDO	District Development Officer
DDP	Desert Development Programme
DEWATS	Decentralized Wastewater Treatment System
DPMU	District Project Management Unit
DPR	Detailed Project Report
DPRO	District Panchayati Raj Officer
DWSC	District Water & Sanitation Committee
DWSM	District Water & Sanitation Mission
EA	Environmental Assessment
ECOPs	Environmental Code of Practices
ED	Executive Director
EDS	Environmental Data Sheet
EE	Executive Engineer
EIA	Environment Impact Assessment
EMF	Environmental Management Framework
EMP	Environmental Management Plan
ES	Environmental Specialist
FGD	Focused Group Discussion
FRU	Fluoride Removal Unit
FTK	Field Testing Kit
GIS	Geographic Information System
GoI	Government of India
GoUP	Government of Uttar Pradesh
GP	Gram Panchayat
GPEP	Gram Panchayat Environment Plan
HRD	Human Resource Development
HGM	Hydro-Geomorphological Map
IAP	Integrated Action Plan
IEC	Information, Education and Communication
IHHL	Individual Household Latrines
IPA	Implementation Phase Agreement
ISL	Individual Sanitary Latrine

IWMP	Integrated Watershed Management Programme
JE	Japanese Encephalitis
LPCD	Litre Per Capita Day
MAF	Million Acre Feet
MDWS	Ministry of Drinking Water & Sanitation
MLD	Million Litres per Day
MoEF	Ministry of Environment and Forest
MVS	Multi Village Scheme
NBA	Nirmal Bharat Abhiyan
NGO	Non Government Organization
NRDWP	National Rural Drinking Water Programme
NRSA	National Remote Sensing Agency
NSS	No Safe Source
NTU	Nephelo Turbidity Unit
OHT	Overhead Tank
O & M	Operation & Maintenance
PHC	Public Health Centre
PRIs	Panchayati Raj Institutions
RWH	Rain Water Harvesting
RWSS	Rural Water Supply and Sanitation
SC	Scheduled Cast
SEZ	Special Economic Zone
SLSSC	State Level Scheme Sanction Committee
SO	Supporting Organization
SSHE	School Sanitation and Hygiene Education
SLSSC	State Level Scheme Sanctioning Committee
SLWM	Solid Liquid Waste Management
SPMU	State Project Management Unit
ST	Scheduled Tribe
STA	State Technical Agency
SVS	Single Village Scheme
SWSM	State Water & Sanitation Mission
TSC	Total Sanitation Campaign
TDS	Total Dissolved Solids
UP	Uttar Pradesh
UPJN	Uttar Pradesh Jal Nigam
UPPCB	Uttar Pradesh Pollution Control Board
VWSC	Village Water and Sanitation Committee
WHO	World Health Organization
WS	Water Supply
WSSO	Water and Sanitation Support Organization