



Initial Environmental Examination

Project Number: 47229-001
November 2015

IND: Uttarakhand Emergency Assistance Project

Subproject : Gauchar Water Supply System

Submitted by

Project Implementation Unit, Uttarakhand Jal Santhan, Jal Bhawan, Dehradun,
Uttarakhand

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PROJECT IMPLEMENTATION UNIT (PIU)

(Urban Water Supply Sector)

Uttarakhand Emergency Assistance Project (UEAP)

Uttarakhand Jal Sansthan

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Ref: 392 /PIU-UEAP/12/2015-16

Dated: 19 August, 2015

To,

**The Country Director
India Resident Mission (ADB),
4 San Martin Marg, Chankyapuri,
New Delhi 110021, India**

Sub: Submission of revised "IEE" Reports (Uttarkashi, Srinagar, Bageshwar & Gauchar) along with the Hindi Version of 8 sub-projects for ADB approval.

Dear Sir,

This as per the discussion held with the ADB's Safeguards Mission during 28th June, 2015 to 3rd July, 2015 at PIU (UWS) that if any minor changes occurs at any stage of the project cycle, the "IEE" Reports need to be revised along with their Hindi version then approval is to be taken from ADB for their further disclosure on Websites. At this stage, the PIU (Urban Water Supply Sector) has revised the following "IEE" reports due to minor change and Statutory requirements under sub-projects.

Sl. No.	Sub-Projects	Reason for IEE Revision	Remark
1	Uttarkashi	As per the initial "IEE" Reports 'CTO' to be obtained from UEPPCB but after the meeting with HPC, EA & UEPPCB, it is not required due to already existing WTPs, only minor repair to be done under UEAP.	Both English and Hindi Version (Executive Summary & EMMP) of "IEE" Reports have been revised for ADB's approval and disclosure.
2	Srinagar		
3	Bageshwar		
4	Gauchar		

Therefore, requesting you to kindly approve the above mentioned "IEE" Reports along with the Hindi Version (Executive Summary & EMMP) of Dharchula, Kapkot, Rudraprayag & Karnaprayag sub-projects (English version have already been approved by the ADB in 2014) for disclosure on Websites.


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Enclosures:


1. Revised "IEE" Reports (English & Hindi Version) of Uttarkashi, Srinagar, Bageshwar & Gauchar Sub-projects.
2. Hindi Version (Executive Summary & EMMP) of Dharchula, Kapkot, Rudraprayag & Karnaprayag "IEE" reports (Executive Summary & EMMP).

Yours Sincerely,


(Jyoti Neera Kharwal) IAS
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UEAP-PIU-UWS

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4. Name of Sub-Project: Rehabilitation of Water Supply System of Gauchar under UEAP (ADB)

Sl. No.	Sections Reviewed on Previously Approved "IEE" Report of July, 2014	Compliances on Revised "IEE" Report of Aug., 2015
1.	Abbreviation	<ul style="list-style-type: none"> HPC added MoEFCC replaced instead of MoEF UJS repeated twice and deleted later one.
2.	Content	<ul style="list-style-type: none"> Sl. No. of Content changed after III. The following 2 Appendices added viz., Appendix IV: 'NOC' for the Construction of Clear Water Reservoir (CWR) and Appendix V: 'NOC' for the Construction of Infiltration Well ('I' Well) added in Content).
3.	I. INTRODUCTION E. IEE Content: Sl. Nos. of Chapter 7 and 8	The previous Chapter 7 divided in to two parts Chapter 7- Grievance and Redress Mechanism Chapter 8- Environment Management Plan Chapter 9- Conclusion and Recommendation
4.	III. DESCRIPTION OF THE PROJECT C. Background of the Proposed Sub-Project (Page No. 16)	After Sl. No. 15 a new Sl. No. 16 was given to – The water supply side of the road.
5.	III. DESCRIPTION OF THE PROJECT 2. Project Components (Page No. 18) To restore below (after this section 2 points added)	<ul style="list-style-type: none"> A clear water reservoir (CWR) of 100 KL capacity will be established above the gauchar airport and just below the Gauchar to Sidoli Motor Road on the land of Panai villagers. About 0.040 ha private land to be required for the construction of CWR, in this regard the consent/No-Objection Certificate has been obtained from the concerned land owner (Appendix - IV). Supply and Installation of 1 No. of I-Well (Based on RBF). The consent/No-Objection Certificate has been obtained from the Local Municipality for the construction of Infiltration Well (Appendix - V)
6.	IV. DESCRIPTION OF THE ENVIRONMENT Page No. 21 (Point No. 22) 1. Location of Intake Well WTP – 1 Samples	WTP deleted from the text and singular and plural checked for No. of Samples.
7.	IV. DESCRIPTION OF THE ENVIRONMENT After Sl. Nos. 47 & 51, Tables IV-3 & IV-6: Wildlife in Uttarakhand is repeated twice.	After Sl. No. 47 Table IV-3: Wildlife in Uttarakhand deleted. Then Sl. Nos. of all Tables revised.
8.	VIII. ENVIRONMENTAL MANAGEMENT PLAN Table VIII-2: Environmental Management & Monitoring Costs Sl. No. E: 1. Capacity Building expenses for 2 sessions (Page No. 66).	Unit Rate Rs. 15,000/ and Rs. 50,000/ were revised and a consolidated amount of Rs. 50,000/ was fixed for 2 sessions. Thus estimated cost is Rs. 1,00,000/= (2 x 50,000/=)

Initial Environmental Examination

Updated IEE

August, 2015

India: Rehabilitation of Water Supply System of Gauchar under Uttarakhand Emergency Assistance Project

Prepared by State Disaster Management Authority, Government of India, for the Asian Development Bank.

This initial environmental examination is a document of the State Disaster Management Authority, Government of Uttarakhand. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature.

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ABBREVIATIONS

ADB	Asian Development Bank
BOD	Bio Chemical Oxygen Demand
CO	Carbon Mono Oxide
CFE	Consent for Establishment
CH ₄	Methane
CFO	Consent for Operation
DO	Dissolve Oxygen
dB	Decibel
IEE	Initial Environmental Examination
EA	Executing Agency
EIA	Environmental Impact Assessment
EC	Environmental Clearance
GoI	Government of India
GoU	Government of Uttrakhand
Ha	Hectare
H ₂ S	Hydrogen sulphide
HDPE	High Density Poly Ehylene
HFL	High Flood level
HPC	High Power Committee
Km	Kilometer
Leq	Sound level
Mg	Milligram
MFF	Multitranches Financing Facility
MoEFCC	Ministry of Environment & Forests and Climate Change
MLD	Million Litter Per day
Mn	Million
M	Meter
mm	Millimeter
mg/l	Milligram per Liter
m ³	Cubic meter
NAAQM	National Ambient Air Quality Monitoring
NO _x	oxides of Nitrogen
NA	Not Applicable
OUR	oxygen uptake rate
O & M	Operation and maintenance
PMU	Project Management Unit
PVC	Poly Vinyl Chloride
PWD	Public works Division
PIU	Project Implementation Units
RCC	Reinforced Cement Concrete
RoW	Right of Way
RSPM	Respirable suspended particulate matter
RP	Rehabilitation Plan
SEIAA	State Environment Impact Assessment Authority
SPCB	State Pollution Control Board
UEPPCB	Uttaranchal Environmental Protection and Pollution Control Board
SS	Suspended Solids

SBR	Sequential Batch Reactor
SPM	Suspended Particulate Matter
SO ₂	sulphur dioxides
ST	Scheduled Tribes
SC	Scheduled Castes
SOP	Standard Operational Procedures
UDD	Urban Development Department
UPJN	Uttaranchal Peya Jal Nigam
UJS	Uttaranchal Jal Sansthan
U.P	Uttar Pradesh
UPCL	Uttaranchal Power Corporation Limited
(µg/m ³)	Micro Gram Per Cubic Meter
%	Percentage

WEIGHTS AND MEASURES

Cm	-	centimeter
Cre	-	100 lakhs = 10,000,000
Lakh	-	100 thousand = 100,000
Km	-	Kilometer
Kph	-	Kilometer per hour
Lpd	-	liters per day
M	-	Meter
mg/l	-	milligrams per liter
Mm	-	Millimeter
MSL	-	Mean sea level
μ	-	10^{-6} meter
$\mu\text{g}/\text{m}^3$	-	micrograms per cubic meter
$\mu\text{S}/\text{cm}$	-	micro Siemens per centimeter
NTU	-	Nephalo turbidity unit
Ppm	-	parts per million

NOTE{S}

In this report, "\$" refers to US dollars.
"INR" and "₹" refer to Indian rupees

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EXECUTIVE SUMMARY

1. Uttarakhand lies in the northern part of India amidst the magnificent Himalayas and dense forests. The State is bordering Himachal Pradesh in the north-west and Uttar Pradesh in the South and shares international borders with Nepal and China. The State is comprised of 13 districts divided into two regions and also called administrative divisions; the Kumaon and Garhwal.
2. Recent disaster of unprecedented floods in June, 2013 in the state of Uttarakhand, devastated many towns and villages on the banks of rivers Bhagirathi, Pindar, Mandakini, Alaknanda and Sarju. Infrastructure facilities like roads, power supply, communication, buildings, and water supply had been affected severely. Though the state government had taken up many steps to temporarily restore the facilities, it is envisaged to take up permanent measures to restore and rehabilitate the facilities.
3. The disaster impacted supply of water in terms of quantity and quality. There is a gap quantity of 1.35 MLD at delivery to the users after the disaster and it has also caused increase in turbidity. This is due to the damage of the supply infrastructure including RBF, pumps, reservoirs and distribution network.
4. To address the impact, new intake works with RBF, rehabilitation of RCC intake chamber, laying of pipeline of length 8 km has been proposed in this subproject.
5. Consistent with the Environmental Assessment and Review Framework, the proposed subproject were screened using ADB rapid environmental assessment (REA) checklist-of water supply. The environmental screening revealed that no protected or sensitive areas were traversed. All impacts are site specific; few are irreversible and can be readily mitigated supporting an environmental "Category B" classification.
6. **Air Quality.** The pristine environment and sparse population suggest that most part of the State have a very good air quality while noise level is calm except in central part of the Gauchar town. The baseline of air quality and noise level will be generated before commencement of the construction.
7. **Seismicity.** The State constitutes one of the most active domains of the Himalayan region. Several damaging earthquakes are recorded from this region. As such, the region is classified under high seismic zone V.
8. **Forest.** Uttarakhand is ranked 9th in all-India in terms of forest covered area with 24,495 km² of forestland. The district of Pauri Garhwal, Uttarkashi, Nainital, and Chamoli have the largest forest cover accounting for 50% of all the state's total. The State Govt. of Uttarakhand has declared the oak tree (*Quercus* sp.) as a *Kalpvrksha* or wish fulfilling divine tree often treated as the signature plant of the Kumaon Himalayas as numerous logos and insignias with a stylized version of the deodar inscribed on them.
9. **Sensitive Ecosystem.** The subproject location does not fall within any sensitive ecosystem. Neither the project component have direct intervention nor indirect intervention with sensitive ecosystem.

10. **Significant Environmental Impacts and Proposed Mitigation Measures.** No environmental impacts related to siting were identified in the environmental examination. All components of subproject are existing, no components of subproject is located inside or near a cultural heritage site, protected area, wetland, mangrove, estuarine, buffer zone of protected area or special area for protecting biodiversity. There are no rare, threatened, and endangered species (flora and fauna) within the subproject corridor of impact. The potential significant environmental impacts identified and assessed are related to construction time impacts.
11. **Information Disclosure, Consultation, Participation, and Grievance and Redress Mechanism.** Wide stakeholder consultation and participation was observed during the environmental examination of UEAP. Project affected communities, government institutions, and non-governmental organizations. Highlight of all consultations were documented and applicable recommended measures particularly in minimizing shifting of structures, potential conflict with migrant workers, and competing demand for local resources were incorporated in the design and the environmental management plan. This IEE report will be disclosed in the ADB website pursuant to the Bank's *Public Communication Policy* and in the SDMA website.
12. **Environmental Management Plan.** The Environmental Management and Monitoring Plan (EMMP), to form part of the bidding documents, adopted the procurement package scheme and facilitate subsequent compliance monitoring by the contractor.
13. **Conclusion.** In the present IEE certain baseline data is not available such as noise pollution and air quality. Therefore it is proposed that before the commencement of work a sampling for these parameters be conducted and IEE be revised if necessary to comply with the Environmental Assessment and Review Framework (EARF) which is in consistent with the ADB's Safeguard Policy Statement (SPS) 2009.

I. Introduction

A. Project Background/Rationale

1. Recent disaster of unprecedented floods in June, 2013 in the state of Uttarakhand, devastated many towns and villages on the banks of rivers Bhagirathi, Pindar, Mandakini, Alaknanda and Sarju. Infrastructure facilities like roads, power supply, communication, buildings, and water supply had been affected severely. Though the state government had taken up many steps to temporarily restore the facilities, it is envisaged to take up permanent measures to restore and rehabilitate the facilities.

B. THE UTTARAKHAND EMERGENCY ASSISTANCE PROJECT (UEAP)

2. Uttarakhand being a tourist and pilgrimage State, attracts a large number of tourist and pilgrims. A major disaster during 15-17 June 2013 resulted in severe damages in several parts of Uttarakhand, which has a mountainous terrain and a fragile geology. Several towns have been washed away by the unprecedented flash floods and landslides, and a large number of houses, public buildings, roads, bridges, urban, rural, and tourism infrastructure, power generation and distribution facilities have been damaged. The impact on the affected population due to the loss of connectivity has been manifold.
3. Based on the request of India, a Rapid Joint Damage and Needs Assessment (RJDNA) was undertaken by Asian Development Bank (ADB) and the World Bank. ADB agreed to assist the Government of India (GOI) with reconstruction and rehabilitation efforts for which the Uttarakhand Emergency Assistance (Sector) Project (UEASP) has been formulated as a multi-sector emergency loan in sector loan modality. The executing agency (EA) for the UEASP will be Government of Uttarakhand (GOU) and State Disaster Management Authority (SDMA). The primary implementing agencies (IA) will be Public Works Department (PWD) for roads, bridges, urban roads, and trekking routes including eco-trails Department of Tourism (DOT) for tourism infrastructure, Uttarakhand Civil Aviation Development Authority (UCADA) for helipads; and Uttarakhand Jal Sansthan (UJS) for urban water supply, or any successor hereto. Some other state agencies such as Forest Department, Kumaon Mandai Vikas Nigam Limited, and Garhwal Mandai Vikas Nigam Limited are likely to be entrusted with some works under UEAP under these primary IAs.

C. Purpose of the Environmental Assessment

4. The purpose of the study is to identify the environmental issues to be considered at project planning and design stage, assesses environmental consequences due to project intervention and suggests mitigation measures to minimise the adverse environmental impacts, if any, associated with construction and operation.
5. Initial environmental examination (IEE) has four basic objectives; (i) assess relevant potential impacts and risks associated with the proposed rehabilitation of Water Supply system, (ii) assess the compliance with ADB environmental safeguard requirements and applicable environmental laws, (iii) incorporate mitigation measures in the project design, (iv) preparation of environmental management and monitoring plan.

D. Extent of IEE

6. IEE was conducted based on preliminary Detailed Design Report (DPR). The IEE covers all activities proposed under the project. The core zone of impact is taken as direct impact of the new construction or reconstruction or rehabilitation of the project component. IEE also covers the direct impact of the sub-project component. Assessment is carried out for all components of environment covering terrestrial and aquatic ecology, soil, water, noise and socio economic aspects.

E. IEE Content

7. The IEE has been largely structured as per SPS, 2009 ADB's Environmental Assessment Guidelines (2003) and environmental safeguards- A Good Practice Source Book (December 2012). This includes following nine chapters including this introduction Chapter.

Chapter 1- Introduction

Chapter 2- Policy, Legal and Administrative Framework

Chapter 3- Description of the Project

Chapter 4- Description of the Environment

Chapter 5- Anticipated Environmental Impacts and Mitigation Measures

Chapter 6- Information Disclosure, Consultation, and Participation

Chapter 7- Grievance and Redress Mechanism

Chapter 8- Environment Management Plan

Chapter 9- Conclusion and Recommendation

F. Methodology

8. The following key steps were followed in this study: review of legal requirements, reconnaissance survey for identification of key issues data requirement and preliminary consultation, primary and secondary data collection, impact assessment, consultation with stakeholders, identification of impacts and mitigation measures, and institutional review.

G. Public Consultation

9. Extensive consultations were held with all stakeholders' that includes: local residents, gov't. departments/agencies, other water users, and NGOs with intent to collect baseline information, for better understanding of the potential impacts and appreciate the perspectives/concerns of the stakeholders. Key information gathered were integrated in project design and used in formulating mitigation measures.

II. Policy, Legal and Administrative Framework

10. The legal framework of the country consists of several acts, notifications, rules and regulations to protect environment and wildlife. In 1976, the 42nd Constitutional Amendment created Article 48A and 51A, placing an obligation on every citizen of the country to attempt to conserve the environment. Specifically for the UEAP, the following environmental laws and regulations are applicable:
11. **Table II-1: Applicable Environmental National and State Requirements for UEAP**

Sl. No.	Clearances	Acts/Rules/Notifications/Guidelines and Application to Water Supply Projects	Concerned Agency	Applicable to Contract package	Responsibility	Status of Compliance
A. Pre-construction Stage						
1	Environmental Clearance	EIA Notification, 2006 amended till date, promulgated under Environment (Protection) Act 1986 It delineates the steps required for obtaining Environmental clearance. As per the notification, a list of projects in the Schedule of the notification, requiring Environmental Clearance from regulatory agencies at the State or Central government level has been provided. It also provides for categorization of projects into category A and B, based on the threshold limits of the project as provided in the schedule of the notification.	State Environmental Impact Assessment Authority (SEIAA). If not constituted then MoEF.	No	IA / PMU	Not required
2	Forest Clearance for felling of trees and acquisition of forest land for widening.	Forest Conservation Act (1980) and Rules 2003 & 2004: This act provides guidelines for conservation of forests and diversion of forest land for non-forest use. The law also states guidelines on de-reservation of various categories of forests for diversion of forest land. This law describes the penalty for contravention of the provisions of the Act. Restriction on the dereservation of forests or use of forest land for non-forest purpose. i) If the forest land exceeds 20 hectare then prior permission of Central Government is required; ii) if the forest land is between 5 to 20 hectare, then permission from the Regional Office of Chief Conservator is required; iii) If the forest land is below or equal to 5 hectare the State Government can give permission. If the construction area is more than 40% forest, permission to undertake any work is needed from the Central Government, irrespective of the size of the area. MoEF issued soecific guidelines	District Level Committee constituted by the State Govt.	No (No <u>felling of trees or diversion of forest land required</u>)	IA / PMU	<u>Not Required</u>

		in July 2013 for state of Uttarakhand for expediting forest clearances to carry out the emergency work in forest areas (excluding works in national parks and sanctuaries) vide no 11-298/2013-FC Dated 24.07.2013				
3	Wildlife department clearances	<p>The Indian Wildlife (Protection) Act, 1972, as amended till 2006 This Act provides guidelines for protection of [Wild animals, birds and plants] and for matters connected therewith or ancillary or incidental thereto. It also states the norms for hunting of wild animals, prohibition of picking, uprooting, etc., of specified plants. The Act deals with the declaration of area as Sanctuary, National Park, and closed area and also states the restriction of entries in the sanctuary. The 2002 Amendment Act which came into force in January, 2003 have made punishment and penalty for offences under the Act more stringent.</p>	National Board for Wildlife	Not Applicable to contract package (The wildlife protection act is not applicable to the proposed subproject. All activities of project are well outside from the boundary fence of the wildlife sanctuary. The nearest wildlife sanctuary is Kedarnath Wildlife Sanctuary which is about 100 km away from the project components)	IA/PMU	Not required
4	Clearances required for using biological resources	<p>Biodiversity Act 2002 and Biodiversity Rules 2004: The Act essentially controls access to indigenous biodiversity resources. No agency/person shall, without previous approval of the National Bio-diversity Authority, obtain any biological resource occurring in India or knowledge associated thereto for research or for commercial utilization or for bio-survey and bio-utilization.</p>	Uttarakhand Biodiversity Board.	Not Applicable for the subproject	IA/PMU	Not required
5	Permission to carry out construction activities in the sites of Archaeological Importance	<p>The Ancient Monuments and Archaeological Sites and Remains Act, 1958, and the rules, 1959: The Act provides guidance for carrying out activities, including conservation, construction and</p>	State Level Committee constituted by the Central Govt.	No	IA/PMU	Not required

		reuse in and around the protected monuments Project site is not an ASI protected monument and there are no any monuments of this nature within the jurisdiction.				
B. Implementation Stage						
6	Permission for Sand Mining from river bed	Mines and Minerals (Regulation and Development) Act, 1957 as amended in 1972	River Board Authorities/ Department of Mining Govt. of Uttarakhand	No	Contractor	Contractor will obtain the consents from appropriate authority
7	Authorization for Disposal of Hazardous Waste	Hazardous Wastes (Management, Handling and Transboundary movement) Rules, 2008 and Hazardous Waste (Management, Handling and Transboundary Movement) Fourth Ammendments Rules, 2010	Uttarakhand Environmental Protection and Pollution Control Board – Dehradun	No	Contractor	
8	Consent for Disposal of Sewage from Labour camps	Water (Prevention and Control of Pollution) Act 1974	Uttarakhand Environmental Protection and Pollution Control Board - Dehradun	No	Contractor	
9	Use of Fly ash within 100 kms around Thermal Power plants	Fly Ash Notification, 1999 as amended 03.11.2009	MoEFCC	No	Contractor	
10	Pollution Under Control Certificate	Central Motor and Vehicle Act 1988 and Central Motor and Vehicle Rules,1989 amended till 2013	Department of Transport, Govt. of Uttarakhand	Yes	Contractor	
11	Installation of Generators	The Air (Prevention and Control of Pollution) Act, 1981 as Amended in 1987 and Air (Prevention and Control of Pollution) Rules, 1983	Uttarakhand Environment Protection and Pollution Control Board - Dehradun	No	Contractor	
12	Employing Labour/ workers	The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 & The Building and Other Construction Workers Related Laws (Amendment) Bill, 2013	District Labour Commissioner	Yes	Contractor	
13	Permission for extraction of boulder and sand from river beds	Mines & Minerals (Regulation and Development) Act, 1957 and its amendements in 1958, 1972, 1986, 1994,1999 & 2010	Department of Mines and Geology. Government of	Yes	Civil Work Contractors	

			Uttarakhand			
14	License for Storing Diesel and other explosives	Petroleum Rules, 2011. Hazardous Wastes (Management, Handling and Transboundary movement) Rules, 2008 and Hazardous Waste (Management, Handling and Transboundary Movement) Fourth Ammendments Rules, 2010	Commissioner of Explosives and Uttarakhand Environmental Protection and Pollution Control Board – Dehradun	No	Contractor	

III. DESCRIPTION OF THE PROJECT

A. Project Location

12. The project is located in the Gauchar which involves Installation Intake well based on RBF and laying of pipeline from airport to the market of Gaouchar.

B. Proposed Category of the Project

13. Pursuant to the requirements of the ADB Safeguard Policy Statement (2009) proposed rehabilitation of water supply system in Gauchar was screened to identify significance of potential impacts, determine the environmentally sensitive component, establish the needed level of assessment, and prescribe the information disclosure and consultations requirement to be complied by the Uttarakhand-Jal Sansthan. Consistent with the Environmental Assessment and Review Framework, the subproject was screened using the ADB rapid environmental assessment (REA) checklist - Water supply.
14. The environmental screening revealed that no protected or sensitive areas were traversed. There are no rare, threatened, and endangered species (flora and fauna) within the subproject corridor of impact. All being hill town, the most significant environmental impacts are potential increase in erosion, siltation, and landslide.
15. Existing water supply system in Gauchar is proposed to be rehabilitated post disasted and no additional infrastructure is proposed. All impacts are site specific, and all impacts can be readily mitigated supporting a Category B classification.

C. Background of the Proposed Sub-project

16. The water supply system of Gauchar is severely damaged during the floods in June, 2013 affecting the supply to the Public. The gravity sources and 2 tube wells based on river bank filtration method*¹ were completely submerged. The tube wells were completely silted and are presently inoperable. In addition, the scheme is quite old and facing production problems due to high turbidity in monsoons. As per the damage assessment report of UJS, the average per capita supply is about 13 lpcd after damages due to floods, on temporary restoration of the scheme. The current service is much lower than the desired level (135 lpcd).

Table III-1: Demand and Supply Gap Parameters

Sl. No.	Parameter	Demand	Supply Before Damage	Supply after damage	Gap/ Need for the project
1	Surface water quality after treatment	As per CPHEEO permissible limit is 10 NTU. No turbid appearance.	Satisfactory	Satisfactory.	-
2	Water production	1.7mld (year 2013)	0.23 MLD	0.15 mld (Surface water).	1.55 MLD gap is there
3	System Leakage	15 %	35-40%	35-40%	More hydraulically efficient distribution system
4	Delivery	1.5 mld (year 2013)	0.14 mld	0.09 mld	1.35 mld gap is there
5	Per Capita Demand	135 lpcd	20 lpcd	13 lpcd	New distribution system as well as source

Sl. No.	Parameter	Demand	Supply Before Damage	Supply after damage	Gap/ Need for the project
6	UFW	20%	40%	40%	More hydraulically efficient distribution system
7	Reservoir capacity	500KL	400 KL	400KL	100KL gap is there
8	Distribution lines	6.5 km	5km	3.5 km	Approx. 1.5km of distribution line
9	Supply hours	24 hours per day	4-6 hours per day	2-3 hours per day	Requirement of new system to increase supply standard
10	Coverage	100 % coverage	70%	46%	Requirement of new system to increase supply standard
11	Power availability	20 hours per day	14-15 hours per day	10-12 hours per day	Dedicated power supply required

*1: It is a system of natural filtration through the sand available on the river banks and below the river bed. The river water which infiltrates into sub surface layers of sand from the sides and bottom of the river bed is drawn through tube wells of shallow depths varying from 10m to 20m drilled into the sand on the banks. The water thus drawn is naturally filtered through fine sand media available in large depths on the banks and requires no further treatment except disinfection before distribution for human consumption.

➤ The main reasons for gaps:

Impact due to floods

- Damaged surface sources and transmission pipeline.
- Tube well based on river bank filtration technology, was damaged and need to provide infiltration wells as an alternative source for augmentation of water supply.
- The present system is restored and being managed on ad-hoc basis and may not withstand any similar flooding in future and requires immediate intervention for rehabilitation and augmentation on permanent basis.

Other Reasons

In addition to the above, the following are the other reasons, which need attention, while taking up the proposed project.

1. Deterioration of Existing facilities

- Damages and leakages in the transmission main.
- The existing distribution system is very old primarily laid during 1979 to 1990s, leading to leakages and transmission losses.

2. Inappropriate planning

- The distribution network is deficient in effective hydraulics.

3. Poor O&M

- High transmission loss
4. Funds constraint
- Low budget allocation for water supply rehabilitation and augmentation

D. Sub-project Description

1. Objective of project in Town

The main objective of the project is to provide emergency assistance to rehabilitate and augment existing infrastructure facilities and utilities pertaining to water supply scheme and restore water supply to the consumers as per the standard supply rate of 135 lpcd. The main objectives of the project are to:

- Improve water supply level to the consumers as per the standard rate of supply.
- Improve quality of water for consumer supply.
- Rehabilitate / Augment water supply components to meet the prospective demand for another 10 years.

Beneficiaries:

Total Design Population (beneficiaries) for Gauchar can be summed up as:

- 2015 – 9531+2000 (Floating) =11531
- 2025 – 11751+2000 (Floating) =13751

Improved Service Level:

- Per capita supply at consumer end – 135 lpcd;
- Quality of the potable water as per GOI standard
- Physical losses: Not more than 20 %

2. Project Components

To restore the water supply to the consumers as per standard level, the existing system needs rehabilitation and augmentation, which are outlined below:

- A clear water reservoir (CWR) of 100 KL capacity will be established above the gauchar airport and just below the Gauchar to Sidoli Motor Road on the land of Panai villagers. About 0.040 ha private land to be required for the construction of CWR, in this regard the consent/No-Objection Certificate has been obtained from the concerned land owner (**Appendix - IV**).
- Supply and Installation of 1 No. of I-Well (Based on RBF). The consent/No-Objection Certificate has been obtained from the Local Municipality for the construction of Infiltration Well (**Appendix - V**).
- Rehabilitation of RCC Intake Chambers.
- Supply, laying, Jointing, testing and Commissioning of MS ERW pipe of 200mm dia, 6mm thick for a length of 3000m from airport gate (0 chainage) to Main Bazaar (1500 chainage) on both side of main bazaar road

- Replacement/ Laying of damaged due to flood water following sizes of GI medium class pipeline at different locations as per table below:

Table III-1 : Distribution Pipeline Details

Sl. No.	Location		Diameter	Length
	From	To		
1	Airport Gate	Behind Colonel's	100 mm	1000 m
2		Lodge	80 mm	800 m
3	Colonel's Lodge	Dronagiri	50 mm	800 m
4	Colonel's Lodge	Ward No. 5	50 mm	800 m
5	Main Bazaar Area		50 mm	1200 m
6	Main Market (Pipal Tree)	GGIC	80 mm	400 m
7			65 mm	300 m
8			50 mm	200 m
9	GREF Chowk	Hospital	40 mm	550 m
10	Gravity Main	Distribution Line	80 mm	500 m
11			65 mm	500 m
12			50 mm	700 m
13			40 mm	400 m
			Total Length	8150 m

- Construction of Office building as the existing office building was partly damaged.
- Supply and Installation of Sluice Valves of 200 mm dia. 2 No.
- Supply and Installation of 2 No. Scour Valve of 200 mm dia.
- Supply and Installation of 2 No. Air Valve of 80mm dia.
- Providing, fixing of RCC valve chamber for housing sluice valves.
- Supply and Installation of BWM of 200 mm dia.
- The road restoration in the town is arising out of the works of water supply pipelines only. These restorations will be incidental to the locations some where it will require to cut black top and some places it will be side of the road.

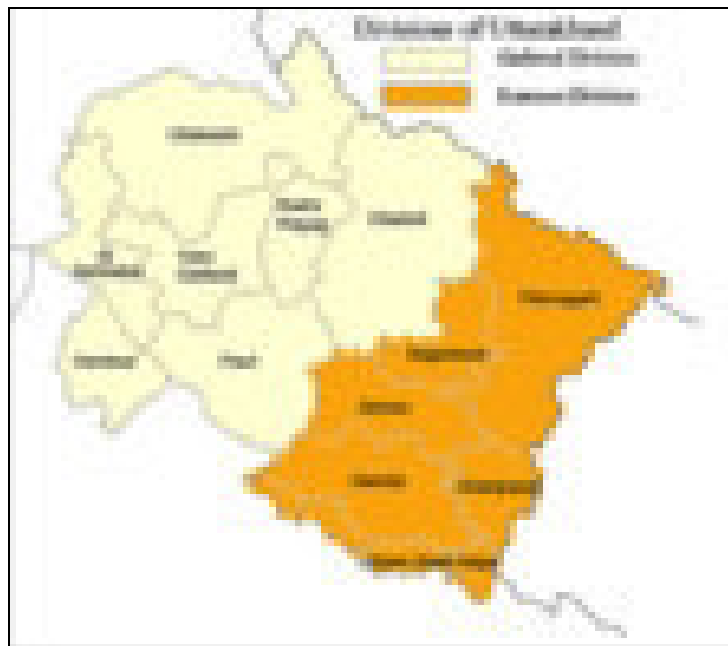
IV. DESCRIPTION OF THE ENVIRONMENT

A. Physical Environment

17. This section presents a brief description of the existing environment, including its physical, ecological resources, and socio-economic development of Sub project of Gauchar. Broad aspects on various environmental parameters such as geography, climate and meteorology, physiography, geology, seismology, ecology, socio-cultural and economic development parameters that are likely to be affected by the proposed rehabilitatio of water supply system in Gauchar are presented. Secondary information was compiled from relevant government agencies like the Forest Department, Wildlife Department, State Environment Protection, and Pollution Control Board and Metrological Department.

➤ Geography

18. Uttarakhand lies in the northern part of India amidst the magnificent Himalayas and dense forests. The State is bordering Himachal Pradesh in the north-west and Uttar Pradesh in the South and shares international borders with Nepal and China. The State is comprised of 13 districts, these are; Pithoragarh, Almora, Nainital, Bageshwar, Champawat, Uttarkashi, Udham Singh Nagar, Chamoli, Dehradun, Pauri, Tehri Garhwal, Rudraprayag, and Haridwar. Geographically, the state lies in the northern Himalayas between 28°53'24" to 31°27'50" North latitude and 77°34'27" to 81°02'22" East longitude. The State has an area of 53,484 sq. km. and a population of about 8.48 million as per census 2001.



Map – 1: Districts of Uttarakhand

19. Uttarakhand is divided into two regions and also called administrative divisions, basically following terrain: the Kumaon and Garhwal. The Kumaon division located southeast of the state and composed of Almora, Bageshwar, Champawat, Nainital, Pithoragarh, and Udham Singh Nagar. The Kumaon region is part of the vast Himalayan track and and the sub-mountains of Terai and Bhabhar. The region is drained by Gori, Dhauli, and Kali

from the Tibetan mountains, and Pindari and Kaliganga which ultimately joins Alaknanda River. The Garhwal division is composed of Chamoli, Uttarkashi, Rudraprayag, Tehri Garhwal, Pauri, Dehradun, and Haridwar districts and is entirely on rugged mountain ranges dissected by valley, and deep gorges. The Alaknanda River, the main source of the Ganges, traces its headwaters in this region.

20. The State is part of the Western Himalaya is further divided into four zones namely, the Tarai-Bhabar-Shivalik (Sub-Himalayas), Lesser-Himalayas, Greater-Himalayas, and Trans Himalaya (Tethys).

➤ **Topography, Geology and Soils**

21. Topography - Gauchar is located on the hills and surrounded area is covered with forest. The project influence area is built on slope of hill.
22. The area is covered by soil/ slope wash and river borne deposit resting over Garhwal group of rocks. The river borne material consists of boulders of quartzite, gneisses, metabasics and schists mixed with silt, sand, cobbles and pebbles. The Garhwal group of rocks consists mainly of quartzite. The general trend of bend is NE-SW to E-W with moderate to steep deeps on both sides.
23. The baseline data on soil quality will be generated by collection of representative samples by the contractor before commencement of construction works.

The proposed locations are

1. Location of Intake well – 1 Sample
2. Location of construction of Reservoir – 2 Samples
3. Location of disposal of silt from the RBF construction site – 1 sample
4. Within the city limites where pipe laying will be done – 6 Samples
5. Construction Camp/ storage yard – 1 Sample
6. Location of labour camp – 1 sample

B. Climate and Meteorology

24. The State of Uttarakhand, with its highly varying topographical features, has shown an equally variegating climatic condition, ranging from hot and sub-humid tropical in the southern tract of Bhabhar to temperate, cold alpine, and glacial climates in the northern part of the high mountains.
25. Factors such as elevation, slope, proximity of glaciers, forests, mountain peaks and ridges and direction of mountain ranges together give rise to the great variations in climatic conditions, even at the micro and local levels. These attributes determine the temperature range as well as the distribution of rainfall.
26. However, the overall climatic condition in the State is governed by the southwest monsoon. It has a sub-tropical to temperate climate, with three pronounced seasons; summer, winter, and monsoon. The hilly terrain of the Himalayan region has snow cover and is severely cold during winter with snowfall normally occurring during the months of December to March. The climatic conditions of Almora, Nainital, Pithoragarh, Chamoli, Uttarkashi, Pauri and Dehradun are humid and cold.
27. The Garhwal region has a sub-temperate to temperate climate with maximum temperature recorded in the month of June is 45°C at Kotdwar while in the higher

reaches at Dudhatoli it only rises to 25°C. Temperature descends to a minimum of 1.3°C in January, and means monthly temperature for the region ranges from 25°C to 30°C.

C. Ambient Air Quality

28. The pristine environment and sparse population suggest that most part of the State have a very good air quality. Any point or non-point pollution sources of air pollution were not observed throughout the survey period. It was observed that the traffic on the roads is too low to cause unbearable air pollution due to vehicular exhaust. Finally, there are no industries recorded in or along the subproject area and hence any other source of atmospheric air pollution is not expected.
29. The air pollution level is well within the permissible limits because there are no major sources of pollution in the region. The baseline data on ambient air quality will be generated by collection of representative samples by the contractor before commencement of construction works. The selection of sampling location will be representative of residential, commercial, institutional, industrial and sensitive locations.

The proposed locations are:

1. Location of Intake well – 1 Sample
2. Location of laying of pipeline near market – 2 Samples
3. Residential Area – 1 Sample
4. Near Construction Camp – 1 Sample

D. Ambient Noise Level

30. Generally, noise pollution is not a problem in the state except in the urban areas like Dehradun.. Traffic, industrial, and festival/cultural noises, along with noise generated from construction activities, DG sets etc., are the most prominent sources of noise in the urban areas. Overall noise level in the town is calm except on the busy roads of Gauchar.
31. During the construction period, a temporary increase in the noise levels are expected as there will be movement of construction machineries and construction activities to be done in the proposed rehabilitation of water supply system. Suitable noise barriers in the form of vegetation and timely scheduling of construction activities will help minimize these effects better.
32. It was observed that ambient noise scenario in residential, commercial, and sensitive areas in the study area are quite low in general. The baseline data on ambient air quality will be generated by collection of representative samples by the contractor before commencement of construction works. The selection of sampling location will be representative of residential, commercial, institutional, industrial and sensitive locations.

The proposed locations are

1. Location of Intake well – 1 Sample
2. Location of laying of pipeline near market – 2 Samples
3. Residential Area – 1 Sample
4. Near Construction Camp – 1 Sample

E. Hydrology

33. Uttarakhand has tremendous water resources such as glaciers, lakes, rivers and other water bodies. Most of these have tourism importance like Milam, Pindari, Sunder

Dhunga and Heeramani Glaciers; Seven Lakes in Nainital; and some wetlands. However these water bodies are located far from the Project area.

34. Generally, there has been an overall decline in water resources in the State. Hydrological studies over the last decades confirm the diminishing water resources and the worsening crises (Rawat et. al) as caused by the following factors which have resulted in the decrease in underground seepages. These have directly contributed to the reduction of water availability in and reduction of discharge in nallas as well as extensive disappearance of springs—the region’s primary source of drinking water.

- There has been a diminishing regulatory effect of glaciers of the Great Himalayan zone.
- There is a long-term decreasing trend of stream discharges.
- The capacities of the lakes have dwindled.
- Surface runoff on the hillsides has shown high increase.
- There has been an increase in floodwater & decrease in base flow water in channels & rivers.
- Extensive soil erosion and landslips are recurring phenomena in the region.

35. The Sub-project is located on the Alaknada River is Gauchar (see Appendix 1. Rapid Environmental Assessment Checklist).

➤ **Water Drainage**

36. The region of Uttarakhand is well drained by numerous rivers and rivulets locally known as Gad, Gadhera and Naula. The water resources of this region are of singular importance not only for the region but also for the whole Gangetic plains of north India. There are three main river systems are: (i) the Bhagirathi – Alaknanda basin – Ganges basin, (ii) The Yamuna – Tons basin, and (iii) the Kali basin.

37. The Ganges system drains the major part of the region covering the whole of the Garhwal, except the western part of Uttarkashi district, and the western part of Garhwal Himalayas from an altitude of 7,138 m meet at Devprayag and flow as the Ganges thereafter. The Bhagirathi is the main stream while the Alaknanda, Saraswati, Dauli Ganga, Berahi Ganga, Nandakini, Mandakini, Madhu Ganga, Pindar, Atagad, Bhilangana, Jad Ganga, the Kaldi Gad and the Haipur are the main tributaries to the Alaknanda and/or Bhagirathi, ultimately contributing to the waters of Ganges. The Nayar, which drains more than a half area of the Garhwal district, is an important tributary of the Ganga. The Yamuna-Tons system is also located in the Garhwal region. The Yamuna river rises at Yamunotri and is joined by important tributaries such as the Giri and more importantly, the Tons, which is its biggest tributary with 2.7 times greater volume of water than the Yamuna. The River Yamuna flows out of the hill areas through the Doon valley and the Shivaliks, into Haridwar district, being joined in the Doon valley by several streams.

➤ **Water Quality**

38. The Gauchar town situated on the bank of Alaknanda River. The raw and treated water quality during construction will be monitored. Construction debris will be disposed away from the source and WTP premises on daily basis to avoid any contamination..

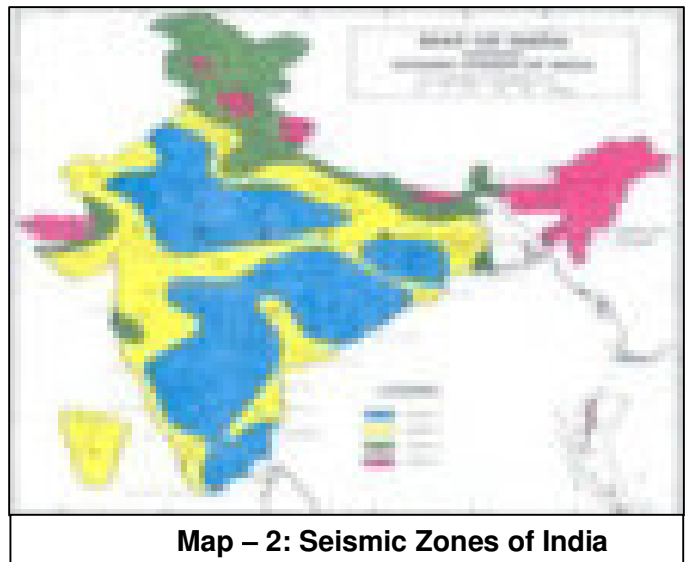
39. There is very little documentation on the pollution status of rivers except that of the holy river Ganga and some other water bodies where there were at least limited monitoring studies recently. In terms of quality, the surface water of the State is unprotected from untreated wastewater, and runoffs from chemical fertilizers and pesticides. No proper

sewage treatment facilities exist in the project area. The increasing pollution of water bodies constitutes the biggest threat to public health. At present, there is limited information available on the quality of fresh water resources in the State.

40. Based on limited records, the water quality of Uttarakhand's rivers, rivulets, and other natural water sources is generally good and no major source of water pollution was found. The hand pumps, natural water seeping out from mountains locally called as "Naula", and natural water springs locally called as "Gadhera" represent the ground water sources in the hills. There are no major sources of water pollution in terms of point or non – point sources aside from natural landslides leading to deposition of debris in streams. The baseline data on water quality will be generated by collection of representative samples by the contractor before the commencement of construction activity. The proposed location of the sample collection are
1. Up stream of Intake well and left bank of the river – 1 Sample
 2. Down Stream left bank of intake well – 1 sample
 3. Up stream of RBF and left bank of the river – 1 Sample
 4. Down Stream left bank of RBF – 1 Sample

F. Seismology

41. The main tectonic elements of the region include the (i) central thrust and (ii) boundary fault. Several NE-SW lineaments are also known from the area and these traverses across different tectonic zones.
42. Seismically, the State constitutes one of the most active domains of the Himalayan region. Several damaging earthquakes are recorded from this region. As such, the region is classified under high seismic zone V. The modified mercalli intensity broadly associated with the zone V is IX. The succeeding Figure shows the seismic zones of India.



G. Ecology

➤ Forestry

43. The Forest Survey of India in their 2009 report reported a 4.75% increase in nation's forest cover from 1987 to 1997 translating to 3.13 million hectares but puts a caveat that improvement in remote sensing, data interpretation and definition of forestland between the census dates renders the result "strictly not comparable." Uttarakhand is ranked 9th in all-India in terms of forest covered area with 24,495 km² where Madhya Pradesh, Arunachal Pradesh, and Chhatishgarh leads with 77,700; 67,353; 55,870 km², respectively.

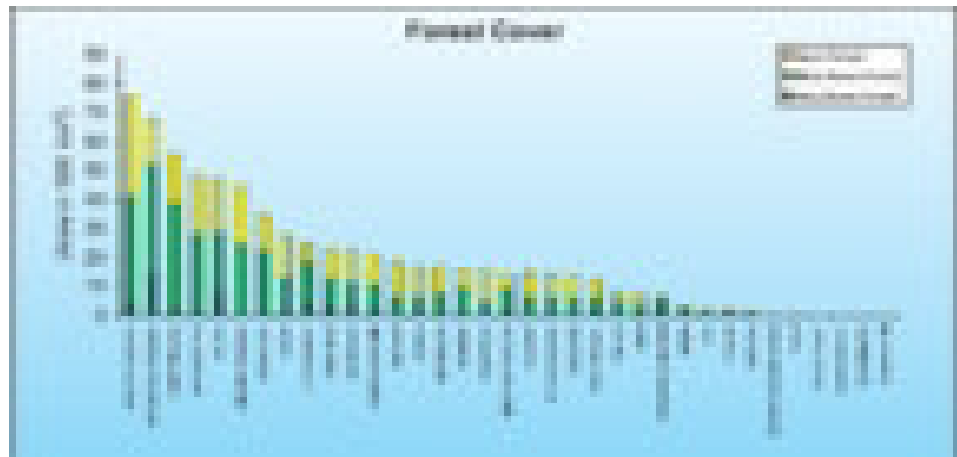
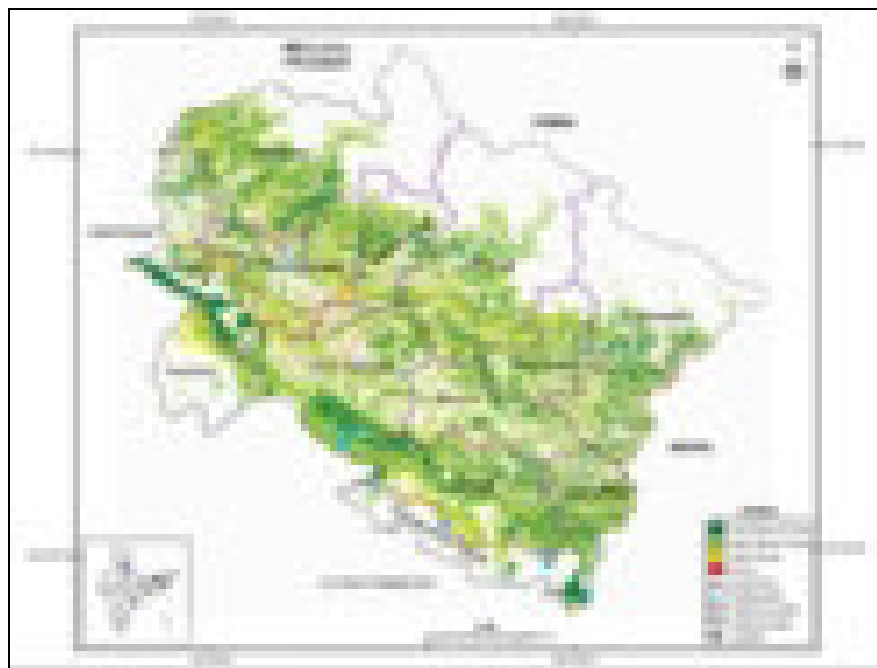


Figure – 1: Forest Cover by State, 2007 (FSI, 2009)

44. The distribution of forest cover by district is presented in the succeeding Figure and Table. The Garhwal region has more forest cover with 14,646 km compared to the Kumaon region with 9,869 km². However, they are almost equal in terms of distribution over its territory with 45% and 47% of covered with forest. The district of Pauri Garhwal, Uttarkashi, Nainital, and Chamoli have the largest forest cover accounting for 50% of all the state's total.



Map – 3: Uttarakhand's Forest Cover Map

Table IV - 1: District-wise Forest Cover, Uttarakhand

Region	District	Geographic Area	Forest Cover			Total Forest 2007	% of Total 2007
			Very Dense	Moderate Dense	Open Forest		
Garhwal	Uttarkashi	8,016	567	1959	619	3145	39.23
	Rudraprayag	1,984	246	581	298	1125	56.70

	Chamoli	8,030	427	1,586	682	2695	33.56
	Pauri Garhwal	5,329	523	2,094	672	3289	61.72
	Tehri Garhwal	3,642	298	1,232	617	2147	58.95
	Dehradun	3,088	584	695	328	1,607	52.04
	Haridwar	2,360	26	354	238	618	26.19
Sub-Total		32,449	2,671	8,501	3,454	14,626	45.07
Kumaon	Pithoragarh	7,090	567	1,115	412	2,094	29.53
	Bageshwar	2,246	194	883	304	1,381	61.49
	Almora	3,139	222	928	427	1,577	52.04
	Nainital	4,251	601	1,919	573	3,093	72.76
	Champawat	1,766	336	571	274	1,181	66.87
	U. S. Nagar	2,542	171	248	124	543	21.36
Sub-Total		21,034	2,091	5,664	2,114	9,869	46.92
Total		5,3483	4,762	14,165	5,568	24,495	42.80
Note	Very Dense Forest – All lands with tree cover of canopy density of 70% and above Moderately Dense Forest – Canopy density between 40%-70% Open Forest – Canopy density between 10%-40%						

45. In terms of type, the state forest is classified into 9 forest types based on Champion and Seth (1968) system, the largest among which are the Himalayan Moist Temperate Forests, Sub-tropical Pine Forest Tropical Moist Deciduous Forest, and Tropical Deciduous Forests accounting for 37.15%, 28.81%, 19.08%, and 6.46%, respectively.

46. A wide variety of tree species is found in the mountains of Uttarakhand and enumerated in the succeeding Table according to altitude location. Some notable tree species are Poplar (*Populus ciliata*) and Eucalyptus (*Eucalyptus citriodora*) due to their fast growing and large market demands, and Khair (*Acacia catechu*) and Seesam (*Dalbergia sissoo*) for their ecological and economic importance. Sal (*Shorea robusta*), which is highly adapted to sandy soil are being used to stabilize river banks and islands in river beds. Oak (*Quercus* sp.) is another important species considered to be amongst the best wood in the world specially for making agriculture implements due to its very heavy hard with twisted fibers. The State Govt. of Uttarakhand has declared the oak tree (*Quercus* sp.) as a *Kalpvrksha* or wish fulfilling divine tree often treated as the signature plant of the Kumaon Himalayas as numerous logos and insignias with a stylized version of the deodar inscribed on them. Deodar grows in the temperate to alpine climate that is found between 3500 and 12000 feet in this region. Finally Chir pine (*Pinus roxburghii*) a source of resin, which is used for producing resin and terpentine.

Table IV-2: Predominant Top-Canopy (Tree) Species According to Altitude

Sl. No.	Common Name	English Name	Botanical Name	Altitude (m.)
1.	Kachnar	Orchid tree	<i>Bauhinia variegata</i>	600-900
2.	Cheed	Chir Pine	<i>Pinus roxburghii</i>	600-900
3.	Shal tree	Shal tree	<i>Shorea robusta</i>	600-750
4.	Banj	Oak tree	<i>Quercus incana</i>	1700-2000
5.	Kail	Blue pine	<i>Pinus wallichiana</i>	1800-2400
6.	Buransh	Rose tree	<i>Rhododendron arboretum</i>	200-2100
7.	Deodar	Cedar tree	<i>Cedrus deodara</i>	1800-2400
8.	Raga	Himalayan fir-low level	<i>Abies pindrow</i>	2100-2900
10.	Raga	Himalayan fir-high level	<i>Abies spectabilis</i>	2900-3600
11.	Spruce	Spruce	<i>Picea smithiana</i>	2400-2900

Sl. No.	Common Name	English Name	Botanical Name	Altitude (m.)
12.	Thuner	Himalayan Yew	<i>Texus baccata</i>	2400-2700
13.	Surai	Cypress	<i>Cupressus torulosa</i>	2300-2400
14.	Pangar	House Chestnut	<i>Aesculus indica</i>	1800-2100
15.	-	Strawberry tree	<i>Cornus capitata</i>	2000-2300
16.	Bhojpatra	Betula	<i>Betula utilis</i>	3000-3500
17.	Buransh	Rose Wood	<i>Rhododendron arboreum</i>	1700-2000
18.	Simaru	Rose Wood	<i>R. campanulatum</i>	2200-3000
19.	Moru	Oak tree	<i>Quercus dilatata</i>	2000-2500
20.	Kharsu/Khoru	Oak tree	<i>Quercus semicarpifolia</i>	2200-2400

47. The proposed subproject is not expected to have any adverse impact on the Forests and does not involve any tree cutting.

➤ **Biodiversity**

48. The State of Uttarakhand is endowed with rich bio-diversity as manifested by its approximately 64 percent forest cover. The State has established six national parks and six wildlife sanctuaries for the conservation of flora and fauna. Such areas include the Nanda Devi National Park, Valley of Flowers, Gangotri National Park, Govind Pashu Vihar National Park, Rajaji National Park, Jim Corbett National Park, Kedarnath Wildlife Sanctuary, Askot Musk Deer Sanctuary, Mussoorie Sanctuary, Binsar Wildlife Sanctuary, Sanadi Sanctuary, and Govind Wildlife Sanctuary—all of which are being looked after by the Uttarakhand government. A positive remark on the State is that it maintains rich wildlife outside their protected areas.

Table IV-3: Wildlife in Uttarakhand

S. N.	Protected Areas	Year	Unit	Statistics
1.	National Parks			
	(i) Number	2009	No.	3
	(ii) Area	2009	Sq. Km.	4083
2.	Wildlife Sanctuaries			
	(i) Number	2009	No.	5
	(ii) Area	2009	Sq. Km.	2396
3.	Important Wild Animals			
	(i) Musk Deer	2001	No.	160
	(ii) Cheetal	2001	No.	35000
	(iii) Himalayan Black Bear	2001	No.	375
	(iv) Elephant	2002	No.	1582
	(v) Tiger	2003	No.	245
	(vi) Leopard	2003	No.	2090

49. The Himalayas represent one of the most fascinating biota (fauna and flora) all over the world, both in terms of quality and quantity. This is evident from the fact that more than 50 percent of all biota can be found only in the Himalayan region. Such fact is brought about by the region's uniqueness in terms of favorable climatic conditions, natural habitats, and soil types.

50. The State of Uttarakhand is represented by Biogeographic Zones 2B Western Himalaya and 7B Siwaliks ¹ in this region. About 18.7 % of the total area under the Forest

¹ Negi, A.S., Status, Distribution and Management of Mountain Ungulates in Uttaranchal, Envis Bulletin, 2002

Department has been clearly earmarked for biodiversity conservation by the creation and management of 12 Protected Areas (PA) and a biosphere reserve in the State.

Table IV-4: National Parks in Uttarakhand

Sl. No.	National Park	Year of Establishment	Area (Km ²)	District
1.	Corbett NP	1936	521	Garhwal
2.	Nanda Devi NP	1982	630	Chamoli
3.	Valley of Flower NP	1982	87	Chamoli
4.	Rajaji NP	1983	820	Dehradun & Haridwar
5.	Gangotri NP	1989	2390	Uttarkashi
6.	Govind NP	1990	472	Uttarkashi

Source: Wildlife and Protected Areas, ENVIS, 2002

Table IV-5: Wildlife Sanctuaries in Uttarakhand

Sl.No.	Sanctuary	Year of Establishment	Area (sq.km.)	District
1.	Govind WLS	1955	521	Uttarkashi
2.	Kedarnath WLS	1972	957	Chamoli
3.	Askot WLS	1986	600	Pithoragarh
4.	Sonanadi WLS	1987	301	Garhwal
5.	Binsar WLS	1988	46	Almora
6.	Musoorie WLS	1993	11	Dehradun

Source: Wildlife and Protected Areas, ENVIS, 2002

51. Variations in the topography of high mountain ranges and deep valleys and altitudes from sea-level portions give the project districts different habitats for a variety of fauna and in turn resulted in the enriched biodiversity in the region. The common wildlife reported from the forests includes Tigers, Panthers, Civet Cats, Leopard Cats, Jungle Cats, Himalayan Silver Fox, and the Jackal. Various species of deer including the Musk Deer and the Barking Deer also roam in the districts. Sambhar and Gural as well as the Bear and the Porcupine are also found in the project area. The flying mammal Bat is also common in the area. Other animals in the region include the Chipmunk, the Rhesus Monkey and the Flying Squirrel. Discussion with local people during the survey process generated reports on the presence of Leopards, Deers, Foxes, and Wild Pigs. Some important information about wildlife of Uttarakhand is given in the Table below.
52. Proposed subproject is not expected to have any adverse impact on the biodiversity.

Table IV-6: Wildlife in Uttarakhand

Sl. No.	Protected Areas	Year	Unit	Statistics
1.	National Parks			
	(i) Number	2009	No.	3
	(ii) Area	2009	Sq. Km.	4083
2.	Wildlife Sanctuaries			
	(i) Number	2009	No.	5
	(ii) Area	2009	Sq. Km.	2396
3.	Important Wild Animals			
	(i) Musk Dear	2001	No.	160
	(ii) Chital	2001	No.	35000
	(iii) Himalayan Black Bear	2001	No.	375
	(iv) Elephant	2002	No.	1582
	(v) Tiger	2003	No.	245
	(vi) Leopard	2003	No.	2090

Table IV-7: List of Major Flora

Sl. No.	Local Name	Scientific Name
Trees (Top-canopy Layer Species)		
1.	Buransh	<i>Rhododendron arboretum</i>
2.	Deodar	<i>Cedrus polycarpus</i>
3.	Chir	<i>Pinus roxburghii</i>
4.	Surai	<i>Cupressus tourulose</i>
5.	Padam	<i>Prunus cornuta</i>
6.	Mehal	<i>Pyrus pashia</i>
7.	Otis	<i>Alnus nepalensis</i>
8.	Ayar	<i>Lyonia ovalifolia</i>
9.	Kafal	<i>Myrica sapida</i>
10.	Akhrot	<i>Juglana regia</i>
11.	Bhimal	<i>Grewia optiva</i>
12.	Ritha	<i>Sapindus mukorossi</i>
13.	Tun	<i>Toona ciliate</i>
14.	Nimla	<i>Ficus auriculata</i>
15.	Timur	<i>Zanthoxylum tamala</i>
16.	Kharik	<i>Celtis eriocarpa</i>
17.	Chamkhirik	<i>Carpinus viminea</i>
18.	Katmon	<i>Betula alnoides</i>
19.	Kajal	<i>Acer acuminatum</i>
20.	Katoj	<i>Castanopsis tribuloides</i>
21.	Kirmola	<i>Acer oblongum</i>
22.	Kandru	<i>Ilex dipyrene</i>
23.	Banj	<i>Quercus semicarpifolia</i>
Shrubs (Sub-canopy Layer Species)		
1.	Kala Hisalu	<i>Rubus lasiocarpus</i>
2.	Karoz	<i>Carissa spinarium</i>
3.	Kobra Plant	<i>Arisama helleborifolium</i>
4.	Kandali	<i>Urtica parviflora</i>
5.	Satavar	<i>Asparagus racemosus</i>
6.	Dudhi	<i>Hollerrhena antidysentric</i>
7.	Bajradanti	<i>Potentilla fulgens</i>
8.	Banfasa	<i>Viola surpans</i>
9.	Bach	<i>Acorus calamus</i>
10.	Nakol	<i>Urticor dioica</i>
11.	Patyura	<i>Pteraacanthus angustifrons</i>
12.	Dudhia	<i>Taraxacum officinale</i>
13.	Vatula	<i>Flemingia fruticulose</i>
14.	Belmur	<i>Flacourtia indica</i>
15.	Nirghesi	<i>Delphinium denudatum</i>
16.	Silfoda	<i>Bergenia gossypina</i>
17.	Jula	<i>Gerbera grassypina</i>
18.	Jatamasi	<i>Nardostachys grandiflora</i>
Grasses (Understorey Layer vegetation)		
1.	Dub	<i>Cynodon dactylon</i>
2.	Kush	<i>Sucharum spontanour</i>
3.	Gol ringal	<i>Chimonobambusa falcate</i>
4.	Tachita	<i>Apluda muticr</i>
5.	Dev ringal	<i>Thamnocalamus facloueri</i>
6.	Jhugra ringal	<i>Arundinaria jaunsarensis</i>
7.	Thamgil	<i>Thamnocalamus spathiflorus</i>

Table IV-8: List of Major Fauna

Sl. No.	Wild Animals	
	Local Name	Scientific Name
Mammalian Species		
1	Guldar	<i>Panthera Pardus</i>
2	Kala Bhalu	<i>Selenarctos thibetanus</i>
3	Ghural	<i>Memorhaedus goral</i>
4	Kakar	<i>Muntiacus muntjak</i>
5	Khirao	<i>Capricornis sumatraensis</i>
6	Jangli Suar	<i>Sus-scrofa cristatus</i>
7	Chitrola	<i>Martes flavigula</i>
8	Langoor	<i>Presbyits entellus</i>
9	Khargosh	<i>Lepus nigricollis</i>
10	Sehi	<i>Hystrix indica</i>
11	Gidar	<i>Canis aureus indicus</i>
12	Jangli Billi	<i>Felis chaus</i>
13	Gilehri	<i>Eurambulus pennanti</i>
14	Bandar	<i>Macaques mulatta</i>
Birds Species		
1	Chir Fijent	<i>Catreus wallichii</i>
2	Kalij Fijent	<i>Lophura Leucomelana</i>
3	Koklaj Fijent	<i>Pucrassia macrolophus</i>
4	Kala Irgal	<i>Letinaetus makavensis</i>
5	Karorla	<i>Urocissa erythrorhyncha</i>
6	Ullu	<i>Strix aluco nivicola</i>
7	Baaj	<i>Flaco severaus</i>
8	Kala Titar	<i>Francolinus francolinus</i>
9	Papiha	<i>Cuculus varius</i>
10	Tota	<i>Psittacula humalayana</i>
11	Chakor	<i>Alectoris graeca chuker</i>
12	Hariyal	<i>Treron spenura</i>
13	Pashchimi Tregopan	<i>Tragopan meloccephalus</i>
14	Bulbul	<i>Pyconotus cafer</i>
15	Maina	<i>Aeriotheres tristis</i>
16	Fakhta	<i>Streptobelia orientalis meena</i>
17	Gidh	<i>Gyps himalayensis</i>
18	Kauwa	<i>Carvus macromynchos</i>
19	Saat Bahen	<i>Teyrdoides striatus</i>
20	Neelkanth	<i>Garrulus Lanaclatus</i>

➤ **Biosphere Reserves**

53. The Biosphere Reserve is the top category after Wildlife Sanctuary and National Park in the Country. Out of the 14 Biosphere Reserves situated in India, the Nanda Devi Biosphere Reserve (NDBR)—established second among the 14—is situated in the State of Uttarakhand. It extends in the three districts of Chamoli (Garhwal), Pithoragarh, and Bageshwar (Kumaon). The Nanda Devi National Park (NDNP) and the Valley of Flowers are UNESCO World Heritage Site declared in 1988. The NDNP is located in the transition range between the Zanskar range and Himalayan foothills with 97 species of plants including many rare and almost extinct plants like *Saussurea sudhanshui*, *Nardostachys grandiflora*, *Picrorhiza kurroa*, *Cypripedium elegans*, *C. himalaicum*, *Dioscorea deltoidea* and *Allium stracheyi*. There are also 83 animal species including the Bharal (*Pseudois nayaur*), Himalayan Musk Deer (*Moschus chrysogaster*), Mainland Serow (*Capricornis sumatraensis*), Himalayan Tahr (*Hemitragus jemlahicus*), Goral

(*Nemorhaedus goral*), Snow Leopard (*Panthera uncia*), Common Leopard (*Panthera pardus*), Himalayan Black Bear (*Selenarctos thibetanus*), Common Langur (*Presbytis entellus*), and Rhesus Macaque (*Macaca mullata*). Also, there are about 114 avian species and 27 species of butterflies in the NDNP

54. The Rajaji National Park was established in 1983 protecting sections of the tropical deciduous forest area of the Shivalik Hill range on the Himalayan foothills. The Park covers 820.42 square kms, along the Haridwar, Dehradun and Pauri Garhwal. The park has a vast Sal forest, and mixed forest mostly covered with *Acacia catechu* and *Vetiveria zizanioides*. It is refuge to approximately 49 species of mammals, 315 species of birds, 49 species of reptiles, 10 species of amphibians and 49 of Piscean species. This park has the largest population of elephants in Uttarakhand and a large population of tigers and leopards. Notable animals seen in the park are the Wild Cat, Goral, Rhesus Macaque, Himalayan Yellow Throated Marten, Monitor, Lizard, Indian Hare, Sloth, Himalayan Black Bear, King Cobra, Jackal, Barking Deer, Sambar, Wild boar, Indian Langur, Indian Porcupine and Pythons. The population of birds consists of the Great Pied Hornbill, Himalayan Pied Kingfisher, Sparrows, Fire Tailed Sunbird and the Peacock (Indian National Bird).
55. The Jim Corbett National Park covers 520 sq kms of Savannah-type grasslands and Sal forests. Declared as a Tiger Reserve in 1973, the Park has a rich diversity including the White Tiger, Throated Martem, Himalayan Palm Civet, Indian Grey Mongoose, Para, Kakka, Ghoral, Bar-headed Goose, Duck, Grepe, Snipe, Turtles, Python, Common Otter, Porcupine, Clack-taped Hare, Chital, Spotted Deer, Viper, Cobra, Krait, King Cobra, Tortoise, Graylag, Sandpiper, Gull, Cormorants and Egrets. There are 488 species of flora found protected in the Park including Sal, Savannah Grass, Anogeissus-*Acacia catechu* forests, *Mallotus philippensis*, Jamun and *Diospyros tomentosa*.
56. The Govind National Park covers an area of 957 sq. kms in Uttarakashi and a sanctuary for the endangered Snow Leopard and some other 15 species of mammals and 150 species of birds that includes the Himalayan Black bear, Brown bear, Musk deer, Bharal, Himalayan Tahr, Serow and Common leopard. The endangered birds found in this region are Monal Pheasant, Koklas Pheasant, Bearded Vulture Himalayan Snow Cock, Golden Eagle, Western Tragopan, Steppe Eagle and Black Eagle. Other varieties of birds include Owls, Pigeons, Minivets, Thrush, Warblers, Bulbul, Cuckoo and Finches.
57. The Valley of Flowers is a World Heritage Site located in Chamoli. There are hundreds of species mostly being Orchids, Poppies, Primula, Calendulas, Iris, Lily, Roses, Violets, Rhododendron, Angelica, Himalayan Fritillary, Daisies and Anemones and also supports a variety of mammals like the Himalayan Tahr, Snow Leopard, Musk Deer, Red Fox, Common Langur (a type of monkey), Bharal, Serow, Himalayan Black Bear, Himalayan Brown Bear, Pica (Mouse hare). A huge variety of butterflies and birds are also found in the valley including Himalayan Golden Eagle, Griffon Vulture, Snow Partridge, Himalayan Snow Cock, Himalayan Monal, Snow Pigeon, and Sparrow Hawk.

H. Socio-Economic

➤ Social and Cultural Development

58. The State of Uttarakhand occupies a total land area of 53,483 sq. km. which is 1.73 percent of India's total land area. Demographically, the State has a population of 10,086,292 as per the 2011 census consisting of 51 percent males and 49 percent females. Out of these, 7,036,954 people live in rural areas spreading over 16,623

revenue villages settled in 39,967 habitations. The habitation's population is scattered between small streams and rivers and is spread over 20 to 70 degree slopes of the Himalayan and the Lesser Himalayan regions.

59. The State is divided into Garhwal and Kumaon divisions. Administratively, the State is divided into 13 districts, 49 tehsils and 95 blocks. Garhwal division has seven hill districts with one located in the foothills (Haridwar). Kumaon division, on the other hand, has six districts—one in the foothills (Udham Singh Nagar). There are 16,177 villages in the State and 7,227 gram panchayats. Of the total number of villages, 5,868 are not connected to all weather roads.



60. The schedule caste and schedule tribe population in the State is significant, averaging 17.9 percent and three percent respectively. The population density is 159 persons/Km²—considerably lower than the national average of 324 persons per sq.km. Rural population constitutes about 74% while urban population composes the remaining 26% of State's total populations. About 70% of the State population lives below the poverty line which is way above the national average of 46%. Literacy rate in the State is 71.6%.
61. The State recorded 19.2% decadal growth during the 1991-2001 census period which is close to the national growth rate of 21.3 %. The district of Nainital registered the highest decadal growth rate with 32%, followed by Udham Singh Nagar with 27.8%.

➤ **Land Use and Land Use Pattern**

62. The land use pattern of Uttarakhand is strongly governed by the following: elevation, climate, mountainous terrain, lithological type, topography, surface hydrology, sunlight in the fields of forestry and agriculture, alpine meadows, sparse vegetation (scrub), grazing land, barren land, and human settlement. The human settlements are mainly located in the shallow water zones or around the localities nearer to springs.

63. Forest is the main land use in the State and nearly 64 % of the geographical area is under the varying forest densities (cover). Tree line is clearly demarcated above 2900 m elevation. Agriculture is confined to areas of low reliefs which are underlined by weak rock formation (i.e. schists, phyllites, weathered gneisses, and crushed quartzite). The cultivated land, approximately 11.5 % of the total geographical area, is either terraced/semi-terraced or plain. Other land use categories such as meadows, grazing lands, and scrubs do not exhibit definite relationship with lithology. It is also observed that the south-facing hill slopes are covered by lush green forests.

Table IV-9: Land Utilisation in Uttarakhand

Sl. No.	Land-use	Period / Year	Unit	Statistics
1.	Total Reported Area	2006-07	Hectare	5,666,878
2.	Forest Area	2006-07	Hectare	3,465,057
3.	Culturable Waste Land	2006-07	Hectare	366,713
4.	Fallow Land	2006-07	Hectare	108,132
	(i) Current Fallow	2006-07	Hectare	44,064
	(ii) Fallow Land other than Current Fallow	2006-07	Hectare	64,068
5.	Barren & Unculturable Land	2006-07	Hectare	311,849
6.	Land under Non-agricultural Uses	2006-07	Hectare	160,649
7.	Permanent Pasture & Other Grazing Land	2006-07	Hectare	220,286
8.	Land under Misc., Tree Crops and Groves not included in Net Area Sown	2006-07	Hectare	269,042
9.	Net Area Sown	2006-07	Hectare	765,150

Source: Uttarakhand at a Glance 2009-10, Govt. of Directorate of Economics and Statistics

I. Health

64. The Total Fertility Rate of the State is at 3.6 while the Maternal Mortality Ratio is at 517 (SRS 2001-03). Both of which are higher than the national average. The sex ratio in the State is 962 slightly higher than the 933 All-India. Comparative figures of major health and demographic indicators are mentioned below.

Table IV-10: Health Indicators of Uttarakhand

Sl. No.	Item	Uttarakhand	India
1	Total population (Census 2001) (in millions)	8.5	1,028.61
2	Decadal Growth (Census 2001) (%)	20.41	21.54
3	Crude Birth Rate (SRS 2007)	21.0	23.5
4	Crude Death Rate (SRS 2007)	6.7	7.5
5	Total Fertility Rate (SRS 2006)	3.6	2.9
6	Infant Mortality Rate (SRS 2007)	43	57
7	Maternal Mortality Ratio (SRS 2001 - 2003)	517	301
8	Sex Ratio (Census 2001)	962	933

Source: RHS Bulletin, March 2007, M/O Health & F.W., GOI

65. The health infrastructure of the State is described in succeeding Table. There are only 34 Obstetricians / Gynecologists and 18 Pediatricians in the State. Such numbers are way below the estimated State requirement of 49 each. Some of the essential requirements of the new State include basic primary health care, pre and post-natal

care, and nutritional status and preventive care. Accessibility to health services with the aid of improved road conditions is essential to put progress in the health indicators of the State. Post disaster 2013 water supply facility provided to population in and around the sub-project area has been adversely affected. With better water supply system and delivery of appropriate quantity and quality of water, health scenario will also improve.

Table IV-11: Health Infrastructure of Uttarakhand

Particulars	Required	In position
Sub-centre	1,294	1,765
Primary Health Centre	214	232
Community Health Centre	53	49
Multipurpose worker (Female)/ANM at Sub Centres & PHCs	1,997	1,785
Health Worker (Male) MPW(M) at Sub Centres	1,765	656
Health Assistant (Female)/LHV at PHCs	232	159
Health Assistant (Male) at PHCs	232	147
Doctor at PHCs	232	182

Source: RHS Bulletin, March 2007, M/O Health & F.W., GOI

J. Literacy

66. In terms of the population's literacy, Uttarakhand recorded an overall literacy rate of 71.6% in 2001, marking a significant improvement from 57.7% in 1991. Meanwhile, the overall literacy rate in rural areas is 68.1%. The succeeding Table shows the literacy of Uttarakhand. The male literacy rate is 83.30% and female literacy rate is 59.60% which is comparatively high from the national average. It indicates that the rural population needs more education facilities to bridge the gap with that of the urban areas.

Table IV-12: Literacy Rate in Uttarakhand

Literacy Rate 2001	% of Total Population
Total	71.60
Males	83.30
Females	59.60
Scheduled Caste	
Total	63.40
Males	77.30
Females	48.70
Scheduled Tribes	
Total	63.20
Males	76.40
Females	49.40
School education	
Percentage of Pre- Primary/Primary schools to total institutions	69.76
Percentage of Middle schools to total institutions	19.75
Percentage of High schools/Higher Secondary to total institutions	10.48

Source: Uttarakhand at a glance 2006-07

67. The general enrollment and access to primary schools has seen a tremendous boost in the last decade. Such improvements are brought by the increased availability of functional primary schools and the initiation of the Education Guarantee Scheme in the State. Cultural and Archaeological Resources
68. The State of Uttarakhand has a great range of cultural practices. Festivals and cultural activities are being celebrated throughout the year in the State. The major fairs and festivals of the Garhwal region include the Hatkalika Fair, Tapkeshwar Fair, Surkhanda Devi Mela, Kunjapuri Fair, Lakhawar Village Fair, and Mata Murti Ka Mela. On the other hand, major fairs and festivals in the Kumaon region consist of Uttarayani Mela, Shraavan Mela (Jageshwar), Kartik Poornima at Dwarahat, Kasar Devi fair, and Nanda Devi melas.
69. There are no heritage sites listed by Archaeological Survey of India (ASI) within the study area hence, the proposed project activities do not have any adverse impact on these sites. There are few small temples/ shrines located along the project corridors, but none of them will be affected by the subproject and the construction activity is restricted to the available land. . In terms of the area's common property resources (CPR) such as public wells, water tanks, play grounds, common grassing grounds or pastures, market areas and community buildings, none will be affected by sub-project.
70. Economic Development
 - **Transportation and Communication**
71. Transportation system is a key factor in the socio-economic development of any State. Roads are logically the critical inputs to the growth of all the sectors. Aside from road systems, the State of Uttarakhand is connected to other states via rail and air transportation systems. Dehradun, Haridwar and Kathgodam are the major railway stations connected to various parts of the country. Jolly Grant near Dehradun is the lone airport present in the State. As per statistical data from 2006-07, Uttarakhand has a total road network of 23,274 km of which 2,228.90 km comprises the National Highway (1,328.30 km with State PWD and 900.60 km with BRTF); 1,553.00 km comprises the State Highway; 579.85 km covers the MDR; 7,154.88 km comprises the ODR (6723.90 km with State PWD and 430.98 km with BRTF), and 7,250.53 km to the Village Road. Light vehicle roads constitute of about 2,633 km.
72. Density of road length per 100 sq. Km. is 45 km which is very low compared to the national average of 97 km. Only about seven percent of the roads in the State are built in two-lane standards while 50 percent are paved. About a third of the higher class paved roads are in poor condition and over 70 percent of the light-vehicle roads need to be repaired or rehabilitated. Due to the lack of road connectivity, vast areas of the State are inaccessible. Such problem influences the population to 'chunk' in far flung areas of the State remaining to be under-developed and devoid of educational and health facilities and employment opportunities.
73. The road density per 100 sq. km. of the total area in Garhwal region is 30 km whereas road density in Kumaon region is 37 km. In terms of population, Garhwal region has 234 km of roads per lakh and the corresponding figure in Kumaon is 266 km. Motor vehicles has increased with the annual growth rate of 11 percent accounting to 44,7000 vehicles

in 2003. PWD is the principal agency responsible for the management of roads in the State.

➤ **Industrial Development**

74. The State has very few industrial units mainly because of lack resources. In the hilly terrains, industries promoted include food processing, fruit processing, medicinal/herbal plants, and horticultural/floriculture-based industries. In the plain districts of Haridwar, Udham Singh Nagar, and other places, capital intensive and high-value addition industries are being encouraged by the government. In 2003-04, there were 178 large and medium-scale industries with total investment of Rs. 500,700 lacs providing employment to about 44,000 employees. Small scale industries, on the other hand, employ about 129,782 of the population.
75. In recent years, Uttarakhand has emerged as one of the attractive industrial destinations in India. In this regard, the government is encouraging private participation in all industrial activities in the State. The New Industrial Policy announced in 2003 by the State government puts in place the regulatory framework for Uttarakhand's industrialisation. The New Industrial Policy indicates that private resources may be tapped while promoting integrated Industrial States in Uttarakhand. The State government provides assistance in establishing small and medium sized agro parks, food parks, and the likes which in turn are expected to provide common infrastructure facilities for storage, processing, grading, and marketing.

K. Energy and Electric Power Potential

76. Uttarakhand has an estimated hydro power potential of approximately 20,200 MW. However, only 1,130 MW has been tapped at present. Meanwhile, 4,170 MW projects are under implementation and 3,800 MW projects are allotted to Central, State and private sectors. Thirty-nine projects with a potential of 6,374 MW have been identified for PFR under PMs Hydro Initiatives.

Although Uttarakhand is a power surplus State, a lot needs to be done to harness the untapped potential and sale the surplus power to make this a GDP driver sector for the State.

L. Aesthetic and Tourism

77. Tourism is one of the strong pillars of the State economy. The State has high growth potential for tourism, be in nature, wildlife, adventure or pilgrimage tourism. The State received 10.5 million domestic tourists in the year 2000-01, 11.6 million in the year 2001-02, and 12.9 in the year 2002-03, registering an average growth of 10.7 percent. Expenditure on schemes for tourism development and promotion in the State has progressively increased over the years. In the current five year plan, about Rs. 860 million have been spent, which is about 10 times the amount spent during 1980-85. Some of the major destinations with tourism potential include Haridwar (called 'The Gateway of God'), Rishikesh (the birth place of Yoga), Dehradun, Mussoorie, Almora, Kedarnath, Badrinath, Yamunotri, Gangotri, Jim Corbett National Park, Nainital, Ranikhet, and Pithoragarh.

M. Project Implementation Schedule

Project Activity	Start	Completion	Total duration of the project activity
Sub-Project Appraisal Report	September 2013	December 2013	4 Months
Detailed Project Report and Bidding Document	March 2014	May 2014	3 Months
Bid invitation, evaluation and award	June 2014	August 2014	3 Months
Clearances and handover of site to contractor	August 2014	September 2014	1 Month
Construction	September,2014	February, 2016	18 months

V. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

78. Water supply infrastructure was screened using the ADB's rapid environmental assessment (REA) checklist for Water Supply.
- The individual environmental screening checklist is provided in **Appendix - I** of this report.
 - No environmental impacts related to siting.** Project area section is not located inside or near a cultural heritage site, protected area, wetland, and mangrove, estuarine, buffer zone of protected area or special area for protecting biodiversity. There are no rare, threatened, and endangered species (flora and fauna) within the subproject corridor of impact.
 - Potential significant environmental impacts..** The potential significant environmental impacts are related to the excavation and disposal of earth during construction and inconvenience to local commuter during laying of pipes on the roads.
79. The beneficial impacts still outweighs the potential environmental impacts. The beneficial impact includes better water quality and reliability of supply.

A. Screening of Environmental Impacts

Sl. No.	Environmental Attributes	Stages under Project		
		Pre-Construction	Construction	Operational
1.	Physical Environment	No Impact	No Impact	No Impact
	Geography	No Impact	No Impact	No Impact
	Topography, Geology & Soils	No Impact	No Impact	No Impact
2.	Climate and Meteorology	No Impact	No Impact	No Impact
3.	Ambient Air Quality	No Impact	Reversible & Insignificant during Construction	No Impact
4.	Ambient Noise Level	No Impact	Reversible and Insignificant during Construction Stage	No Impact
5.	Hydrology	No Impact	No Impact	No Impact
	Water Drainage	No Impact	Reversible and Insignificant during Construction Stage	No Impact

	Water Quality	No Impact	No Impact	No Impact
6.	Seismology	No Impact	No Impact	No Impact
7.	Ecology	No Impact	No Impact	No Impact
	Forestry	No Impact	No Impact	No Impact
	Biodiversity	No Impact	No Impact	No Impact
	Biosphere Reserves	No Impact	No Impact	No Impact
8.	Socio-Economic	No Impact	No Impact	No Impact
	Social & Cultural Development	No Impact	No Impact	No Impact
	Land Use & Land Use Pattern	No Impact	No Impact	No Impact
	Health	No Impact	No Impact	No Impact
	Literacy	No Impact	No Impact	No Impact
	Transportation & communication	No Impact	No Impact	No Impact
	Industrial Development	No Impact	No Impact	No Impact
9.	Cultural and Archaeological Resources	No Impact	No Impact	No Impact
10.	Aesthetic & Tourism	No Impact	No Impact	No Impact

B. Impact and mitigation measure during planning and design phase

80. There are no significant adverse environmental impacts on topography, soil and geographic significance during the planning and design phase based on the environmental screening of the sub-project in Gauchar.
81. Impacts on Climate, Ambient Air Quality, Noise Level, Seismic, Economic, Cultural and Aesthetics are insignificant in the planning and design stage.

Environmental Attributes & Project Activity and its Impacts	Mitigation
Project Establishment and pre-construction activity and its social Impacts	Open liaison channels shall be established between the Site owner, operator, the contractors and interested and affected parties such that any queries, complaints or suggestions pertaining to environmental management aspects can be dealt with quickly and by the appropriate person(s).
	A communications strategy is of vital importance in terms of accommodating traffic during laying of pipes on road. In case of road closure together with the proposed detour needs to be communicated via advertising, pamphlets, radio broadcasts, road signage, etc
	Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.
	Storage facilities, elevated tanks and other temporary structures on site shall be located such that they have as little visual impact on local residents as possible.
	In areas where the visual environment is particularly important (e.g. along commercial/ tourism routes) or privacy concerns for surrounding buildings exist, the site may require screening. This could be in the form of shade cloth, temporary walls, or other suitable materials prior to the beginning of construction.
	Special attention shall be given to the screening of highly

Environmental Attributes & Project Activity and its Impacts	Mitigation
	reflective materials on site.
Lack of sufficient planning to assure long term sustainability of the improvements and ensure protection of the assets created and the architectural/archaeological character of the surroundings	Design will include provisions for ensuring effective maintenance and protection of the assets created so as to ensure the long term sustainability.
Layout of components and its location to avoid impacts on the aesthetics, sensitive environmental areas / attributes of the site	The project components siting will avoid impacts on the aesthetics of the site, ensure minimal impacts and in compliance with statutory and regulatory requirements. The contractor, FPIU/ IA and DSC will identify any direct or indirect intervention of primary or secondary activity before establishment of any project components on the ground.
Selection of materials and construction technologies, if not carefully chosen, will adversely impact the aesthetic appeal of the destinations	<p>Selection of materials will be according to specification and from approved sources</p> <p>Material selection would be done keeping in view that no asbestos (except as allowed), and CFC is used.</p> <p>Contractors shall prepare a source statement indicating the sources of all materials (including topsoil, sands, natural gravels, crushed stone, asphalt, clay liners etc), and submit these to the Engineer for approval prior to commencement of any work</p> <p>Where materials are borrowed (mined), proof must be provided of authorization to utilize these materials from the landowner/material rights owner and the Department of Geology and Mining</p> <p>Procurement of all material according to the material specification of the contract document and sourced from licensed and approved sources.</p> <p>A signed document from the supplier of natural materials shall be obtained confirming that they have been obtained in a sustainable manner and in compliance with relevant legislation</p>
Socio cultural resources- Ground disturbance can uncover and damage archaeological and historical remains	<p>There is not such location is anticipated on the project site. In case of chance of finding such location, Consult Archaeological Survey of India (ASI) and/or concerned dept. of Uttarakhand Govt. as applicable to obtain an expert assessment of the archaeological potential of the site;</p> <p>Consider alternatives if the site is found to be of medium or high risk;</p> <p>Develop a protocol for use by the construction contractors in conducting any excavation work, to ensure that any chance finds are recognised and measures are taken to ensure they are protected and conserved.</p>
Integration of energy efficiency and energy conservation programs in design of sub-project components	The detailed designs for the sub-project components shall ensure that environmental sustainability principles, including energy efficiency, resource recycling, waste minimization, rainwater harvesting etc.
Site clearance activities, including delineation of construction areas	<p>Any removal of vegetation or tree felling shall be done after taking statutory permissions if required. All works shall be carried out such that the damage or disruption of flora other than those identified for cutting is minimum.</p> <p>Only ground cover/shrubs that impinge directly on the permanent works or necessary temporary works shall be</p>

Environmental Attributes & Project Activity and its Impacts	Mitigation
	removed with prior approval from the Environmental Expert of DSC All areas used for temporary construction operations will be subject to complete restoration to their former condition with appropriate rehabilitation procedures.as per the rehabilitation plan prepared by the contractor and approved by the EE of DSC.
Blockage of access in residential area, commercial area and sensitive location like school, college, hospitals and court	Contractor will identify such location in the preconstruction stage and prepare plan approved by DSC to minimize inconvenience to the people.
Slop protection near reservoir and intake well	Retaining wall will constructed near reservoir and intake well

C. Impacts and Mitigation Measures during Construction Phase

82. Majority of the impacts will occur during the construction phase. These impacts, to be described in the succeeding sections are classified according to major components of the environment – physical, biological, air, water, and socio-economic. These impacts were mainly drawn from screening of impacts described in the introduction of this Chapter.

➤ **Impact on Physical Environment, Geography, Topography, Geology and Soil**

83. The constructions of all components of the sub-project are at the existing location and not requiring additional land. So the impact on location related impact is insignificant.

➤ **Impact on Climate and Meteorology**

84. The project components do not have impact on the climate and meteorology of Gauchar.

➤ **Ambient Air Quality**

85. The handling of material, excavation of earth for laying pipes, emission of air pollutants from operation construction vehicles causes air pollution. Since the scale of construction activity is not significant, so the impact is also not very significant. Periodic air quality monitoring to ensure emissions comply with standards will be conducted as per the agreed environmental monitoring plan

➤ **Ambient Noise Level**

86. The operation of construction vehicles and equipments will generate noise. Since this operation will be located and limited to the construction site. The beating of carriage way of road also generated noise. This activity will be limited to day time. So, the impact due to noise is insignificant and limited to the construction period only. Monitoring of noise levels in potential problem areas as per the monitoring plan will be carried out.

➤ **Water Drainage**

87. The disposal of soil and excavation of road sides may impact the drainage. This impact will be insignificant since the exaction of road sides will be covered in the same day and

disposal of excavated earth will be on the low laying area so that impact on drainage is minimum. Monitoring of water quality as per the monitoring plan will be carried out.

88. The mitigation measures of each project components are provided below.

Environmental Attributes and Project Activity and its Impacts	Mitigation
Impacts due to operation of construction Camps and its Location, Selection, Design and Layout	<p>Siting of the construction camps, labour camp and stockpiles shall be as per the guidelines of UEPPCB, ULB, village panchayat and any other applicable guideline to the local site. The contractor will assess the impact of the construction camp and should be acceptable to the FPIU/ IA/PMU..</p> <p>Construction camps shall not be proposed within 500m from the sensitive receptors, nearest settlements to avoid conflicts and stress over the infrastructure facilities with the local community.</p> <p>Location for stockyards for construction materials shall be identified at least 300m away from watercourses.</p> <p>Construction camps will be located away from settlements and drainage from and through the camps will not endanger any domestic or public water supply. Construction camps including sanitation facilities must be adequately drained.</p> <p>Sewage management through septic tanks and solid waste management through local ULB system or other alternate measures.</p>
Impacts due to poor supply of poor drinking water to the workers involved in construction.	<p>Sufficient supply of potable water to be provided and maintained as per the standards, requirements, test methods and sampling procedure according to IS:10500. If the drinking water is obtained from an intermittent public water supply then storage tanks will be provided. The cleanliness of the storage tanks will be ensured and all measures to be taken to avoid any water contamination.</p>
Impacts on waste disposal from the construction site and construction camp.	<p>Pre-identified disposal location (identified by Contractor in compliance to relevant regulation and approved by EE-DSC) shall be part of Comprehensive Waste Disposal Plan Solid Waste Management Plan to be prepared by the Contractor in consultation and with approval of Environmental Specialist of DSC.</p> <p>Contractor shall ensure that waste shall not be disposed off near the water course or agricultural land, Orchards and Natural Habitats like Grasslands.</p>
Impacts on local environment due to loss of natural resource of earth due to poor storage.	<p>Stockpiling of construction materials and excavated earth or silt in case of construction of river bed filtration does not impact obstruct the drainage and Stockpiles will be covered to protect from dust and erosion.</p>
Impacts due to construction traffic on access to Site	<p>Contractors shall ensure that all side and mitre drains and scour check valves on access and haul roads are functioning properly and are well maintained.</p> <p>Contractors shall ensure that access roads are maintained in good condition by attending to potholes, corrugations and storm water damage as soon as these develop.</p> <p>If necessary, staff must be employed to clean surfaced roads adjacent to construction sites where materials have been spilt.</p> <p>Unnecessary compaction of soils by heavy vehicles must</p>

Environmental Attributes and Project Activity and its Impacts	Mitigation
	<p>be avoided; construction vehicles must be restricted to demarcated access, haulage routes and turning areas. Cognizance of vehicle weight / dimensions must be taken when using access constructed out of certain materials. e.g. paved surfaces / cobbled</p>
<p>Impacts on increased load on water supply source due to construction work.</p>	<p>The contractor shall use ground/surface water as a source of water for the construction with the written consent from the concerned Department.</p> <p>To avoid disruption/ disturbance to other water users, the Contractor shall extract water from fixed locations and consult DSC & line agencies before finalizing the locations.</p> <p>The Contractor shall provide a list of locations and type of sources from where water for construction shall be extracted.</p> <p>The Contractor shall need to comply with the requirements of the State Ground Water Department for the extraction and seek their approval for doing so and submit copies of the permission to DSC.</p>
<p>Impacts due to Soil/land Erosion</p>	<p>Slope protection measures will be undertaken as per design to control soil erosion.</p> <p>The Contractor shall not in any way modify nor damage the banks or bed of streams, rivers, other open water bodies and drainage lines adjacent to or within the designated area</p> <p>Earth, stone and rubble is to be properly disposed of so as not to obstruct natural water pathways over the site. i.e.: these materials must not be placed in storm water channels, drainage lines or rivers.</p> <p>There shall be a periodic checking of the site's drainage system by DSC, FPIU/IA and PMU to ensure that the water flow is unobstructed.</p>
<p>Water Pollution from Construction Wastes</p>	<p>The Contractor shall take all precautionary measures to prevent entering of wastewater into streams, water bodies or the irrigation system during construction. Contractor shall not wash his vehicles in river/stream water and shall not enter riverbed nearby the water resource area for that purpose.</p> <p>Mixing / decanting of all chemicals and hazardous substances must take place either on a tray or on an impermeable surface. Waste from these shall then be disposed of to a suitable waste site in accordance with Hazardous Wastes (Management, Handling and Transboundary movement) Rules, 2008 and amendments till date and applicable norms</p> <p>Site staff shall not be permitted to use any stream, river, other open water body or natural water source adjacent to or within the designated site for the purposes of bathing, washing of clothing or for any construction or related activities. Municipal water (or another source approved by the Engineer) shall instead be used for all activities such as washing of equipment or disposal of any type of waste, dust suppression, concrete mixing, compacting etc.</p>
<p>Water Pollution from Fuel and</p>	<p>The Contractor shall ensure that all construction vehicle</p>

Environmental Attributes and Project Activity and its Impacts	Mitigation
Lubricants	<p>parking locations, fuel/ lubricants storage sites, vehicle, machinery and equipment maintenance and refueling sites shall be located at least 300 m away from rivers/streams and irrigation canal/ponds if any</p> <p>Contractor shall ensure that all vehicle/machinery and equipment operation, maintenance and refueling shall be carried out in such a manner that spillage of fuels and lubricants does not contaminate the ground.</p> <p>Wastewater from vehicle parking, fuel storage areas, workshops, wash down and refueling areas shall be collected and separated through an oil interceptor before discharging it on land or into other treatment system as per specified standards and UEPPCB and ULB norms if any.</p>
Soil Pollution due to fuel and lubricants, construction waste	<p>The fuel storage and vehicle cleaning area will be stationed such that spillage of fuels and lubricants does not contaminate the ground. All pollution parameters will be monitored as per monitoring plan.</p> <p>Wastewater from vehicle parking, fuel storage areas, workshops, wash down and refueling areas shall be collected and separated through an oil interceptor before discharging it on land or into other treatment system</p>
Generation of dust	<p>The contractor will take every precaution to reduce the levels of dust at construction site.</p> <p>Regular sprinkling of water and Stockpiles of soil will be kept covered in such a manner to minimize dust generation</p>
Emission from Construction Vehicles, Equipment and Machinery	<p>All vehicles, equipment and machinery used for construction shall conform to the relevant Bureau of India Standard (BIS) norms. The discharge standards promulgated under the Environment Protection Act, 1986 shall be strictly adhered to.</p> <p>The use of silent/quiet equipment compliant with India ambient noise standards and standards specified for manufacturers shall be encouraged in the sub Project.</p> <p>The Contractor shall maintain a record of PUC for all vehicles and machinery used during the contract period which shall be produced for verification whenever required.</p>
Noise Pollution	<p>The Contractor shall confirm that all Construction equipment used in construction shall strictly conform to the MoEF/CPCB noise standards and all Vehicles and equipment used in construction shall be fitted with exhaust silencers.</p> <p>At the construction sites noisy construction work such as crushing, operation of DG sets, use of high noise generation equipment shall be stopped during the night time between 10.00 pm to 6.00 am.</p> <p>Noise limits for construction equipment used in this project will be in conformity to the BIS/SPCB/CPCB standards</p> <p>Regular monitoring of ambient noise levels to ensure compliance to Uttarakhand Environment Protection & Pollution Control Board standards.</p>
Material Handling at Site	Workers Employed on mixing cement, lime mortars,

Environmental Attributes and Project Activity and its Impacts	Mitigation
	<p>concrete etc., will be provided with protective footwear and protective masks and goggles.</p> <p>Workers, who are engaged in welding works, will be provided with welder's protective eye-shields.</p> <p>Workers engaged in stone breaking activities will be provided with protective goggles, masks, and clothing.</p> <p>Stockpiles shall not be situated such that they obstruct natural water pathways.</p> <p>Stockpiles shall not exceed 2m in height unless otherwise permitted by the Engineer.</p> <p>If stockpiles are exposed to windy conditions or heavy rain, they shall be covered either by vegetation or cloth, depending on the duration of the project. Stockpiles may further be protected by the construction of berms or low brick walls around their bases.</p> <p>All concrete mixing must take place on a designated, impermeable surface</p> <p>The use of any toxic chemical will be strictly in accordance with the manufacturer's instructions and applicable regulations.</p> <p>The Engineer will be given at least 6 working days notice of the proposed use of any chemical. A register of all toxic chemicals delivered to the site will be kept and maintained up to date by the contractor.</p>
Damage, and disturbance to other infrastructure in the construction site	<p>Confirm location of infrastructure. Finalize alignment in coordination with agencies like Uttarakhand Power Corporation Limited, Bharat Sanchar Nigam Limited, etc.</p> <p>Ensure prior permission of respective agency</p> <p>Realign pipelines, if required and subsequently revise IEE</p> <p>Provide public information in case of service disruptions</p>
Disposal of Construction Waste / Debris / Cut Material	<p>The Contractor shall confirm that Safe disposal of the construction waste will be ensured in the pre-identified disposal locations. In no case, any construction waste will be disposed around the project site indiscriminately.</p>
Disruption / cessation of existing water supply systems due to construction activity..	<p>Care be taken during improvement of existing water supply systems, so that disruption in existing water supply would not occur.</p> <p>Tentative schedule of closure should be known to affected people prior to cessation of water supply.</p> <p>In case disruption of water supply exceeds the intimated schedule, arrangement for supply of potable water should be made.</p>
Safety Measures During Construction	<p>Personal Protective Equipment for workers on the project and adequate safety measures for workers during handling of materials at site will be taken up. The contractor has to comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches and safe means of entry and egress.</p> <p>The contractor has to comply with all regulations for the safety of workers. Precaution will be taken to prevent danger of the workers from fire, etc. First aid treatment will be made available for all injuries likely to be sustained during the course of work. Contractor shall also organize periodic visits by a qualified registered medical</p>

Environmental Attributes and Project Activity and its Impacts	Mitigation
	<p>practitioner to the site and workers camp. Contact information of Doctor, availability & location of first aid box shall be displayed in appropriate language both at work site and workers camp.</p> <p>The Contractor will conform to all anti-malaria instructions given to him by the Engineer.</p> <p>The Contractor will also ensure that the interests of the community are preferably not disturbed, and if unavoidable then disturbed to the minimum. Provide traffic management personnel, barricade, appropriate signage and safety information in and around the construction site and prevent local people entering into the construction site.</p>
Clearing of Construction of Camps and Restoration	<p>Contractor to prepare site restoration plans for approval by the Engineer. The plan is to be implemented by the contractor prior to demobilization.</p> <p>On completion of the works, all temporary structures will be cleared away, all rubbish burnt, excreta or other disposal pits or trenches filled in and effectively sealed off and the site left clean and tidy, at the Contractor's expense, to the entire satisfaction of the Engineer and facility owner.</p>
Risk of archaeological chance finds	<p>Strictly follow the protocol for chance finds in any excavation work;</p> <p>Request FPIU/DSC or any authorized person with archaeological field training to observe excavation;</p> <p>Stop work immediately to allow further investigation if any finds are suspected; and</p> <p>Inform FPIU/DSC, and take any action they require ensuring its removal or protection in situ.</p>
Conflict with locals	<p>Contractor shall ensure that mostly the local labourers are employed and migratory laborer shall be employed only in case of unavoidable circumstances.</p>

D. Impacts during Operation Phase

Environmental Attributes and Project Activity and its Impacts	Mitigation
Impact on Environmental Conditions due to operation of water supply system	<p>The periodic monitoring of the ambient air quality, noise level, water (both ground, surface water) quality and soil, in the subproject area as suggested in pollution monitoring plan through an approved monitoring agency.</p>
Increased Pollution due to the better water supply.	<p>The subproject involves renovation and rehabilitation of existing system, augmentation of water supply is envisaged for 10 years project population and to fulfill the deficit of water supply to user as per 135 lpcd. Subproject does not envisage improvement in distribution system to end users as such very little increase in pollution load is anticipated. Sewage generated will be handled by the prevalent existing sewage management system of the town.</p>
Risk of contamination in water.	<p>Chlorine should be added in sufficient quantity so that residual chlorine within permissible limit is available in pipeline.</p>

Unhygienic condition due to poor maintenance of sanitation facilities and irregular solid waste collection	Jal Sansthan will carry out maintenance of the existing toilets, and carry out the regular collection and disposal of wastes as per norms. New facilities proposed to be created under UEAP will cater to additional load.
Management of Chlorine stock	Chlorine stock shall be maintained in cool, dark and locked rooms, near the reservoir site and be handled with proper care and under safety measure.

E. Economic Development

89. After the disaster, there is significant economic loss mainly due to loss of life and livelihood and tourism activity. This rehabilitation of water supply scheme will bring positive impact interms of health and economic activity. The restoration of water supply will bring the supply level of pre-disaster stage and give support to the local economy.

VI. INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION

A. Public participation during the preparation of the IEE

90. The public participation process included identifying interested and affected parties (stakeholders); informing and providing the stakeholders with sufficient background and technical information regarding the proposed development; creating opportunities and mechanisms whereby they can participate and raise their viewpoints (issues, comments and concerns) with regard to the proposed development; giving the stakeholders feedback on process findings and recommendations; and ensuring compliance to process requirements with regards to the environmental and related legislation.
91. Stakeholder consultation and participation with various stakeholders is an integral part of the environmental and social impact assessment and also part of regulatory requirement of EIA Notification, 2006 and ADB requirements. The stake holders of the project include project affected communities (directly or indirectly affected) and institutional stake holders such as PCB, local bodies, Water Resource Department, Environmental Department, Mines and Geology Department, Forest Department, etc. Consultations at micro- and macro-level (e.g. District/State level institutional consultations) helped planners to integrate the short term and long terms requirements of the local, regional, state and national goals in to the planning process. The regional, state and national goals are generally set by the legislations and policies by controlling or limiting the activities in order to reduce and nullify the adverse impact generated by infrastructure projects.
92. The following methodologies were adopted for carrying out public consultation
- [i] Local communities, Individuals affected, traders and local shopkeepers who are directly affected were given priority while conducting public consultation.
 - [ii] Walk-through informal group consultations along the proposed subprojects area
 - [iii] One to one meetings were generally held with a few members of local communities. These consultations sometimes focused on one or more specific issues in a given section (link) of the project corridor. Focus group consultations were conducted with a sample section of the community with a good representation from the affected communities. Such meetings usually provide substantial information about the community concerns.

93. During consultation the following general opinions/suggestions were noted: i) Most of the people were not happy with the existing water infrastructure post June 2013 disaster and they need improvement of the water supply scheme, ii) wanted early restoration of facility iii) minimum disturbance to the local people due to construction activity in the town, iv) minimum loss to the trees v) minimum disturbance to traffic

B. Future consultation and Disclosure

94. The public consultation and disclosure program will remain a continuous process throughout the subproject implementation and shall include the following

C. Consultation during Detailed Design

95. Focus-group discussions with affected persons and other stakeholders to hear their views and concerns, so that these can be addressed in subproject design wherever necessary. Regular updates on the environmental component of the subproject will be kept available at the PIU/PMU of UEAP.
96. FPIU/PMU will conduct information dissemination sessions at major habitations and solicit the help of the local community leaders/prominent citizens to encourage the participation of the people to discuss various environmental issues.
97. The FPIU/PMU, with assistance of DSC will conduct information dissemination sessions in the subproject area. During EMP implementation FPIU, DSC, and PMU shall organize public meetings and will apprise the communities about the progress on the implementation of EMP in the subproject works

D. Consultation during Construction

98. Public meetings with affected communities (if any) to discuss and plan work programs and allow issues to be raised and addressed once construction has started.
99. Smaller-scale meetings to discuss and plan construction work with local communities to reduce disturbance and other impacts, and provide a mechanism through which stakeholders can participate in subproject monitoring and evaluation.

E. Project Disclosure

100. A communications strategy is of vital importance in terms of accommodating traffic during laying of pipes. Local communities will be continuously consulted regarding location of construction camps, access and hauling routes and other likely disturbances during construction. In case of road closure together with the proposed detours will be communicated via advertising, announcements, road signage, etc.
101. For the benefit of the community the IEE will be disclosed to the affected people and other stakeholders in a form and language(s) understandable to them at an accessible place in a timely manner and made available at: (i) PIU/PMU office; (ii) District Magistrate Office; and, (iii) DSC office. It will be ensured that the hard copies of IEE are kept at such places which are conveniently accessible to citizens as a means to disclose the document and at the same time creating wider public awareness. Electronic version of the IEE will be placed in the official website of the SDMA UEAP and the official website of ADB after approval of the IEE by ADB. The PIU will issue Notification on the locality-wise start date of implementation of the subproject. Copies of the IEE will

be kept in the PMU/PIU office and will be distributed to any person willing to consult the IEE.

102. The IEE report will be disclosed in the English language at PMU, Jal Sansthan division office and will also be available in the website of ADB. The full reports will also be available to interested parties upon request from PMU.

VII. GRIEVANCE AND REDRESS MECHANISM

103. A joint social and environmental redress mechanism will be implemented under the project. Grievances and suggestions from local and affected people may come up related to inappropriate implementation of the project and components of EMP. The expected range of grievances to be handled through this mechanism will encompass but not limited to the following: i) nuisance from noise, dust, and temporary blocking of access; ii) contamination of receiving water from runoff; iii) emissions from increase vehicular traffic and stationary sources like construction machineries; iv) conflict between local residents and migrant workers; v) ownership of vegetation for clearing; and vi) damage compensation. These issues will be addressed through acknowledgement, evaluation and corrective action and response approach. Grievances from public or stakeholders concerning the project and EMP implementation will be received by the concerned Executive Engineer of UEAP division. The Executive Engineer shall refer the application to Construction Supervision Consultants (DSC) who then assess the grievances/suggestions and if they are found to be genuine and acceptable, will be resolved at division level itself within 15 to 30 days from the date of receipt. In case, the issue is unable to be resolved, the matter will be forwarded to the Social and Environmental cell, UEAP (Head quarter). This mechanism is non-judicial in nature and does not preclude the affected people coursing their grievances to the courts. The corrective action will be started as per the action plan indicated to the stakeholder. The action taken and the outcome shall form a part of quarterly report to ADB.

VIII. ENVIRONMENTAL MANAGEMENT PLAN

A. ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN (EMMP)

104. The Environmental Management and Monitoring Plan (EMMP) designed will guide the environmentally-sound construction of the subproject and ensure efficient lines of communication between the Design & Supervision Consultants (DSC) – also an Engineer for the project, Contractors, Field Project Implementation Unit (FPIU), and Project Management Unit (PMU). Uttarakhand Jal Sansthan is implementing agency (IA) and will implement the Project through its field PIU's. The EMMP identifies the three phases of development as: (i) Pre Construction (ii) Construction Phase; and (iii) Post Construction/Operational Phase.

105. The purpose of the EMMP is to ensure that the activities are undertaken in a responsible non-detrimental manner with the objectives of: (i) providing a pro-active, feasible and practical working tool to enable the measurement and monitoring of environmental performance on site; (ii) guide and control the implementation of findings and recommendations of the environmental assessment conducted for the subproject; (iii) detail specific actions deemed necessary to assist in mitigating the environmental impact of the subproject; and (iv) ensure that safety recommendations are complied with.

106. A copy of the EMMP must be kept on site during the construction period at all times. The EMMP will be made binding on all contractors operating on the site and will be included

within the Contractual Clauses. Non-compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance. It shall be noted that the Supreme Court of India * mandates those responsible for environmental damage must pay the repair costs both to the environment and human health and the preventive measures to reduce or prevent further pollution and/or environmental damage. (The polluter pays principle).²

107. The Contractor is deemed not to have complied with the EMMP if:

- (i) Within the boundaries of the site, and site extensions, there is evidence of contravention of clauses;
- (ii) If environmental damage ensues due to negligence;
- (iii) The contractor fails to comply with corrective or other instructions issued by the Engineer/PMU/FPIU within a specified time; and
- (iv) The Contractor fails to respond adequately to complaints from the public.

➤ **Institutional Arrangements**

108. The institutional arrangements specify the arrangements for the implementation of environmental provisions of the proposed subproject. The Executing Agency (EA), State Disaster Management Authority (SDMA) will work closely with the Implementing Agency (IA) Uttarakhand Jal Sansthan for effective implementation of environmental safeguards related requirements of the sub projects. The institutional arrangements and responsibilities are detailed below.

109. The subproject will be implemented and monitored by Uttarakhand Jal Sansthan as Implementing agency and implemented through its Field PIU's supported by DSC (also working as Engineer) and overall management support shall be provided by PMU, UEAP.

110. The Safeguard Staff of UEAP SDMA (EA) in PMU & IA will monitor the implementation of environmental covenants with assistance of Engineer (DSC).

111. UEAP SDMA (EA) shall be responsible for ensuring compliance to environmental requirements of the ADB as well as central/state governments and reporting the same to ADB. A relevant portion of EMMP will be a part of contract with the civil works contractors engaged for execution of the works. The primary responsibility of implementation of EMMP is of the IA during pre-construction and operation and maintenance phases; and of the civil works contractor during the construction phase as defined in the EMMP. The responsibility of supervision of EMMP implementation is of the DSC; and it would guide the IA and the civil works contractors in this regard. , DSC with IA and EA, UEAP will act as monitoring agency as delegated in EMMP. All applicable statutory environmental clearances, consents, and/or permits (at national, state and local levels) as required for the implementation of the subproject would be obtained by the IA or by the civil works contractor in line with India's national/state/local laws and regulations, and in accordance with ADB's SPS 2009 requirements . Redressal of grievances shall be the responsibility of UEAP SDMA (EA). Apart from the mechanism for the grievances receiving and redressal at the level of EA, the provision shall be kept

² Writ petition no 657 of 1995. The Supreme Court, in its order dated Feb.4, 2005 that "The Polluter Pays Principle means that absolute liability of harm to the environment extends not only to compensate the victims of pollution, but also to the cost of restoring environmental degradation. Remediation of damaged environment is part of the process of sustainable development."

in the EMP of the subprojects wherein the contractor will depute one Environmental Safeguard Officer who shall be responsible for implementation of EMP, reporting and grievance redressal on day-to-day basis. The grievances/complaints received at the level of contractor shall be recorded on the Complaints Register and the same shall be forwarded to the DSC (Engineer of the Contract) within 48 hours along with the details of action taken to redress the grievance. The Team Leader of DSC shall immediately try to resolve the issues and forward the details to the FPIU / IA. If the action taken by Contractor and DSC is found to be inadequate, then necessary instructions shall be issued by the FPIU. IA for implementation of rectification measures.

➤ **UEAP, SDMA (PMU)**

- Complies with all applicable legislation and is conversant with the requirements of the EMMP;
- Assesses all activities requiring special attention as specified and/or requested by the Engineer (DSC) and/or Safeguards Staff of UEAP SDMA for the duration of the Contract;
- May, on the recommendation of the EE DSC and/or Safeguards Staff of UEAP SDMA, through the DSC order the Contractor to suspend any or all works on site if the Contractor or his subcontractors/ suppliers fail to comply with the said contractual stipulations with respect to environment and EMMP.
- Act as overall monitoring agency.
- Addressing complaints and redressal of grievances.

➤ **UEAP, IA / FPIU**

- Ensures along with Engineer (DSC) that EMMP and all necessary environmental stipulations are included in bidding documents and Contract documents with Contractor.
- Complies with all applicable legislations and is conversant with the requirements of the EMMP;
- Assesses all activities requiring special attention as specified and/or requested by the Engineer (DSC) and/or Safeguards Staff of UEAP PMU as Implementing agency for the duration of the Contract;
- Ensures that the Contractor conducts all activities in a manner that minimizes disturbance to directly affected residents and the public in general, as advised by the Engineer and/or Safeguards Staff of UEAP PMU & IA.
- May, on the recommendation of the EE DSC and/or Safeguards Staff of UEAP PMU & IA, through the DSC order the Contractor to suspend any or all works on site if the Contractor or his subcontractors/ suppliers fail to comply with the said contractual stipulations with respect to environment and EMMP.
- Act as supervising & monitoring agency as delegated in EMMP.
- Carries out public consultations, addresses complaints and responsible for redressal of grievances.

➤ **The Engineer (DSC)**

- Guides EA, IA, FPIU and Contractors with respect to environmental regulations and associated requirements, and facilitates ensuring compliance with those;
- Arranges information meetings for and consults with interested and affected parties about the impending construction activities;
- Maintains a register of complaints and queries by members of the public at the site office. This register is forwarded to the Project Manager of FPIU on weekly basis

- Enforces and monitors compliance the requirements of the EMMP on site;
- Assesses the Contractor's environmental performance in consultation with Environmental Expert
- Documents in conjunction with the Contractor, the state of the site prior to commencing construction activities.
- Documents state of implementation of EMMP and clearly delineate if any item of EMMP is pending partially or fully before issue of completion certificate of the work.

➤ **Environmental Expert of Engineer (DSC)**

- Briefs the Contractor about the requirements of the Environmental Specification and/ or EMMP, as applicable;
- Facilitates statutory compliance related activities for the IA and Contractors;
- Advises the Engineer about the interpretation, implementation and enforcement of the Environmental Specification and other related environmental matters;
- Monitors and report on the performance of the contractor/project in terms of environmental compliance with the EMMP to the Engineer and UEAP, SDMA-PMU;
- Provides technical advice relating to environmental issues to the Engineer.
- Organise and ensure public consultation and information disclosure are done as per the EMMP and ADB requirements. Monitor complaints and grievances are handled as per the Grievance Redressal Mechanism and report the same as per the environmental reporting.
- Receives complaints/grievances from public, discuss Team Leader (TL) DSC, FPIU & IA and take steps for implementation of remedial measures in consultation with the TL (DSC), and reports to the Engineer (DSC) on the status in its each monthly progress report till satisfactory resolution.

➤ **The Contractor**

- Appoints one full time suitably qualified and experienced Environmental Safeguard Officer for implementation of EMMP including Environment Health & Safety (EHS) measures, community liaisoning, reporting and grievance redressal on day to day basis.
- Complies with all applicable legislations, is conversant with the requirements of the EMMP, and briefs staff about the requirements of same;
- Ensures any sub-contractors/ suppliers who are utilized within the context of the contract comply with the environmental requirements of the EMMP. The Contractor will be held responsible for non-compliance on their behalf;
- Supplies method statements for all activities requiring special attention as specified and/or requested by the Engineer or Environmental Expert (of Engineer) during the duration of the Contract;
- Provides environmental awareness training to staff;
- Bears the costs of any damages/ compensation resulting from non-adherence to the EMMP or written site instructions;
- Conducts all activities in a manner that minimizes disturbance to directly affected residents and the public in general, and foreseeable impacts on the environment.
- Ensures that the Engineer is timely informed of any foreseeable activities that will require input from the Environmental Expert (of Engineer)
- Receives complaints/grievances from public, discuss with DSC, FPIU & IA and take steps for implementation of remedial measures in consultation with the Engineer (DSC), and reports to the Engineer (DSC) on the status in its each monthly report till satisfactory resolution.

112. The proposed sub-project will be implemented by the IA & FPIU, Uttarakhand Jal Sansthan. The FPIU will be responsible for supervision and monitoring of day-to-day implementation of subprojects including EMMP.

113. For monitoring of environmental parameters as outlined in the EMMP, appropriate monitoring agencies would be engaged by the contractor (cost has been included in each contract based on subproject specific monitoring plans) or by the IAs for the monitoring works not included in the civil works contracts (cost included in the budget given in table VIII-2).

➤ **Environment Management**

114. All works undertaken towards protection of environmental resources as part of the EMMP and as part of good engineering practices while adhering to relevant specifications will be deemed to be incidental to works being carried out and no separate payment will be made unless otherwise specified explicitly. The costs towards environmental management as per EMMP unless otherwise provided as a separate head, will be deemed to be part of the bill of quantities (BOQ) of the project. The scope of works of the contractor towards the implementation of the environmental provisions shall be as follows:

- Abide by all existing Environmental regulations and requirements of the Government of Uttarakhand and Government of India, local level ULBs and Gram Sabha etc. during implementation
- Compliance with all mitigation measures and monitoring requirements set out in the EMMP.
- Submission of a method statement detailing how the subproject EMMP will be complied with. This shall include methods and schedules of monitoring.
- Monitoring of project environmental performance including performance indicators defined therein, and periodic submission of monitoring reports.
- Compliance with all measures required for construction activities in sensitive areas, in line with the regulatory requirements of these protected areas, and the guidelines set forth in the management plans for these areas.
- Compliance with all regulatory requirements associated with proximity of the sub-project to the International Borders based on assessment of Contractor in consultation with the Engineer DSC.
- Compliance of all safety rules and regulations applicable at work, and provision of adequate health and safety measures such as water, food, sanitation, personal protective equipment, workers insurance, and medical facilities besides all social and community related requirements as stipulated in EMMP.

115. The detailed provisions for specific environmental issues shall be as outlined in the EMMP table on impacts and mitigation measures. Key clauses are outlined in the following sections.

➤ **Quarrying**

116. The contractor will identify and seek prior approval of the engineer for quarrying operations. Quarrying will be carried only from locations approved by the Department of Geology & Mining and State Pollution Control Board and no new quarries will be opened for the purposes of the project. Any deviation from the provisions will be immediately notified and approval of the engineer is to be sought.

117. The Contractor shall maintain all stockpiles, and spoil disposal areas so as to assure the stability and safety of the works and that any adjacent feature like houses and community assets especially along hill slopes are not endangered, and to assure free and efficient natural and artificial drainage, and to prevent erosion. Stockpiling of materials (, fill material, gravel, aggregates, and other construction materials) shall not be allowed during rainy season unless covered by a suitable material. Storage on private property will be allowed if written permission is obtained from the owner or authorized lessee.

118. Quarries shall be sited, worked, and restored in accordance with the specifications and as per the closure plan (approved by Engineer). Spoils shall be disposed of at approved disposal sites prepared, filled, and restored in accordance with the related specification requirements.

➤ **Debris Disposal**

119. Dismantling of existing structures: Debris Disposal shall be maximum utilized and disposed as per norms after consultation with DSC/FPIU/PMU Safeguard Specialist. Due care shall be taken that any material falling under hazardous waste category is disposed in accordance with Hazardous Wastes (Management, Handling and Transboundary movement) Rules, 2008 and amendments till date & applicable norms.

➤ **Precautions for protection of Environmental Measures**

120. The Contractor shall ensure that construction activities do not result in any contamination of land, air or water by polluting substances or cause noise generated by the activities. For cleaning activities and operation of equipment, the Contractor will utilize such practical methods and devices as are reasonably available to control, prevent and otherwise minimize air/noise pollution.

121. Unless otherwise provided in the specifications, the Contractor shall ensure that no trees or shrubs or other vegetation are felled or harmed except those required to be cleared for execution of the works for which all statutory permissions have been obtained. The Contractor shall protect trees and vegetation from damage to the satisfaction of the Engineer.

➤ **Air, Water, Noise Pollution and Soil Contamination**

122. All works will be carried out without unreasonable noise and air, water and soil pollution. Subject and without prejudice to any other provision of the Contract and the law of the land and its obligation as applicable, the Contractor will take all precautions outlined in the EMMP to avoid the air, water, soil and noise pollution.

123. The Contractor shall monitor the environmental parameters periodically as specified in the monitoring plan and report to the Engineer.
124. The Contractor shall reduce the dust emission due to construction activities by regular water sprinkling in the affected areas.
125. All the construction equipment and vehicles shall have Pollution under Control (PUC) Certificate to ensure that no air pollution is caused due to operation of their equipment and vehicles.
126. All the construction equipment and vehicles should remain all time in good conditions up to satisfaction of site engineers.
127. The Contractor shall indemnify and keep indemnified the Employer from and against any liability for damages on account of noise or other disturbance created while carrying out the work, and from and against all claims, demands, proceedings, damages, costs, charges, and expenses, whatsoever, in regard or in relation to such liability.

➤ **Occupational & Community Health and Safety During Construction**

128. The Contractor shall, in accordance with the safety and health provisions specified in the EMMP, provide workers with a safe and healthy working environment, in the work areas, through application of preventive and protective measures consistent with international good practices, as reflected in internationally recognized standards. The contractors, engineer, IAs and the EA will take steps to prevent accidents, injury, and disease arising from, associated with, or occurring during the course of work by-
 - Providing preventive and protective measures, including modification, substitution, or elimination of hazardous conditions or substances;
 - Providing appropriate equipment to minimize risks and requiring and enforcing its use;
 - Training workers and other staff; and providing them with appropriate incentives to use and comply with health and safety procedures and protective equipment;
 - Documenting and reporting occupational accidents, diseases, and incidents;
 - Having emergency prevention, preparedness, and response arrangements in place.
 - Provide first aid facilities in all the work sites and workers camp and having qualified first aider to give first aid at the time of any accident. Contractor shall also organize periodic visits by a qualified registered medical practitioner to the site and workers camp. Contact information of Doctor, availability & location of first aid box shall be displayed in appropriate language both at work site and workers camp.
 - Contractor should provide safe drinking water, clean eating and resting areas, separate toilets for male and female work force and sufficient amenities at work site and workers camps as per prevalent Labor law and EMMP. Contractor will ensure proper sanitation and would provide soak pits and septic tanks for disposal of waste water and sewage.
 - Contractor should have prepared emergency response plan (to be approved by Engineer) with full details and methods of emergency response during any accident and shall have and display the emergency contact numbers at site.

- Contractor should follow all the applicable rules and regulations for workers health and safety.

129. The Contractor will also ensure that the interests of the community are disturbed to the minimum as envisaged in the EMMP. Provide barricade, signage and safety information in and around the construction site and also to prevent local people entering into the construction site.

➤ **Post Construction Clearance**

130. On completion of work, wherever applicable, the Contractor shall clear away and remove from the sites all constructional plant, surplus materials, rubbish, scaffoldings, and temporary works of every kind and leave the whole of the sites and works in a clean condition as per agreed redevelopment plan to the satisfaction of the Engineer.

131. Construction camp sites and any other sites temporarily occupied during construction shall be cleared as specified in the contract and handed over to the Owner. It will be ensured by the contractor that the site handed over is in line with the conditions of temporary acquisition signed by both parties. Contractor would obtain and furnish (to FPIU) a certificate to this effect from the owner.

B. Environmental Monitoring Plan

132. To ensure the effective implementation of mitigation measures and Environmental Management Plan during construction and operation phase of the sub-project, it is essential that an effective Environmental Monitoring Plan be followed as given in Table below.

133. Monitoring is an essential component for sustainability of any developmental project. It is an integral part of any environmental assessment process. The monitoring program consists of performance indicators, reporting formats and necessary budgetary provision. The contractors monitoring methods and parameters should be in accordance with the norms prescribed by the Uttarakhand Environment Protection and Pollution Control Board (UEPPCB) & CPCB which ever has stringent standards for air, water, soil and noise. Indicators and Targets for Environmental Performance are provided in the table VIII-4 in Section E of this EMMP. The frequency of sampling and selection of sampling sites are sub-project specific.

134. The monitoring will be carried out by the contractor through approved agency accredited by National Accreditation Board for Testing and Calibration Laboratories and will be supervised by the Environmental Expert of the Design & Supervision Consultant. The monitoring plan is outlined in **Table VIII-1** below.

Table VIII-1: Monitoring Plan

Indicators	Parameters to be Monitored	Frequency	Responsibility
Pre- Construction Stage			
Legislation, permits and Agreements	Permissions,/NoCs/Consents other statutory requirement	Once in Pre-Construction Stage	Contractor, DSC, IA & EA.
Environmental Baseline Data Generation	Ambient Air Quality, Noise level, Water Quality & Soil characteristics as per parameters outlined in EMMP.	Once in Pre-Construction Stage	Contractor
Debris disposal	Safe disposal of construction	Random checks	Contractor

Indicators	Parameters to be Monitored	Frequency	Responsibility
	wastes including bituminous wastes		
Construction Stage			
Legislation, permits and Agreements	Permissions,/ NoCs/Consents other statutory requirement	Continuous	Contractor, DSC, IA & EA.
Dust suppression	No. of tankers for water sprinkling, Timing of sprinkling, Location of sprinkling (log books to be maintained)	Random checks	Contractor
Ambient air quality	RPM, SPM, SO ₂ , NO _x , CO	Once in a Quarter where work is in progress and near sensitive receptors; and at the construction camp sites (except monsoon) for the entire construction period	Contractor, to be monitored through approved Monitoring Agency
Ambient noise	Equivalent Day & Night Time Noise Levels	Once in a quarter where work is in progress and near sensitive receptors during construction stage	Contractor, to be monitored through approved Monitoring Agency
Water Quality	TDS, TSS, pH, Hardness, BOD, Faecal Coli form	Once in a quarter where work is in progress and near sensitive receptors during construction stage	Contractor, to be monitored through approved Monitoring Agency
Soil	Available Nitrogen, Phosphorus, Carbon, heavy metals (including Lead) and Pesticides	Once in a quarter where work is in progress and near sensitive receptors during construction stage	Contractor, to be monitored through approved Monitoring Agency
Heritage Protection, if needed	Visual Inspection of works, compliance with ASI regulations and norms	Continuous	DSC/ASI/FPIU
Occupation Health and Safety	Usage of PPE on site, adequacy of equipment. Testing of drinking water for compliance to standards specified in IS:10500.	Continuous and quarterly for drinking water	Contractor
Establishing Medical facilities	Access to health facilities for the construction workers	Continuous	Contractor
Accident record	No. of fatal accidents at work site, No. of injuries, No. of disabilities	Continuous	Contractor
Post construction	Physical field verification and	Post construction	Contractor

Indicators	Parameters to be Monitored	Frequency	Responsibility
clearance of site	Satisfaction certificate from owner: Whether temporary locations for workers camp, site office, batching plant and other construction locations are restored to pre-project conditions as per approved closure plan		
Operation & Maintenance Stage			
Water quality	All parameters as per UEPPCB & CPCB standards	Once in year during operation stage	PMU, SDMA
Disposal of Solid Waste	Proper disposal of Solid Waste (domestic) generated shall be ensured in accordance with the prevalent norms		

Budget covered in subsequent cost Table, however, would be finalized based on subproject specific requirements at IEE stage. Contractor will obtain a copy of approved IEE and keep available at construction site and site office(s) for proper implementation of IEE & EMMP.

C. Environmental Budget

135. As part of good engineering practices in the project, there have been several measures as erosion prevention, rehabilitation of borrow areas, safety, signage, provision of temporary drains, etc., the costs for which will be included in the design costs (site development cost) of specific subprojects. Therefore, these items of costs have not been included in the IEE budget. Only those items not covered under budgets for construction are included in the IEE budget.
136. The Contractor's cost for site establishment, preliminary, construction, and defect liability activities will be incorporated into the contract agreements, which will be binding on him for implementation and Uttarakhand Jal Sansthan as Implementing Agency and DSC to ensure the compliance. The air, soil, water quality, and noise level monitoring during construction and defect liability phases will be conducted by the contractor for which provision has been kept in Environmental budget of EMMP.
137. These are small construction projects, therefore, it is not expected to cause much significant air, water, soil and noise pollution. The main EMMP cost will arise from monitoring of environmental parameters (air, soil, water and noise).
138. The costs of water sprinkling for dust suppression and providing personal protective equipment to construction workers shall be borne by contractor as part of conditions of contract. In addition the sources of funds for Mitigation measures during construction stage including monitoring during construction stage are also to be borne by the contractor. These are deemed to be included as part of the contract price amount quoted by the contractor for the works. The costs for generation of baseline data and monitoring shall be borne by the contractor. The locations for baseline data generation & monitoring shall be identified during IEE preparation. The baseline data will be generated prior to commencing with civil works. The costs of components for monitoring during operation and maintenance stage and the capacity building costs are to be funded by the PMU. The EMMP cost is given in the Table VIII-2 below.
139. Most of the mitigation measures require the contractors to adopt good site practice, which should be part of their normal procedures already, so there are unlikely to be

major costs associated with this compliance. Only those items not covered under budget for construction are included in the IEE budget. The IEE costs include mitigation, monitoring and capacity building costs. The summary budget for the environmental management costs for the subproject based on construction period stipulated in the bidding document is presented in Table below:

Table VIII-2: Environmental Management & Monitoring Costs

Sl. No.	Particulars	Stages	Unit	Total No.	Rate (INR)	Cost (INR) *	Source of fund
A.	Legislation, permits and Agreements	Consent to Establish and Consent to Operate for plants and machinery of the contractor		The cost for clearances, permits and consents required by IA & Contractors shall be borne by them respectively.			
B.	Public consultations and information disclosure	Pre-Construction phase Construction phases		Lump sum	5,00,000	5,00,000	
C. Environmental Baseline Data Generation							
1.	Ambient Air Quality monitoring	Pre-Construction	Per Sample	5	15000	75000	Contractors cost
2.	Noise Quality monitoring			5	5,000	25000	
3.	Water Quality monitoring			4	9,200	36800	
4.	Soil			12	8000	96000	
D. Environmental Monitoring							
1	Air quality	Construction	Per sample	(5 No of Location X 3 seasons in year X 1 sample per location)	15,000	337500	
2	Water quality		Per sample	(4 No of Location X 3 seasons in year 1 sample per location)	9200	165600	
3	Noise Levels		Per location	(5 No of Location X 3 seasons in year X 1 sample per location)	5000	180000	
4	Soil		(12 No of Location X 3 seasons in year X 1 sample per location)	8000	432000		

Sl. No.	Particulars	Stages	Unit	Total No.	Rate (INR)	Cost (INR) *	Source of fund
5.	Dust Suppression at subproject sites	construction and defect liability phases	lump sum		lump sum	500000	
6	Ambient Air Quality	Operation/ Defect Liability Period	Per Sample	(5 No of Location X 3 seasons in year X 3 sample per location)	15000	675000	Implementing Agencies cost/ Contractors cost
7	Water quality		Per year	(4 No of Location X 3 seasons in year 1 sample per location)	9200	110400	
8	Ambient Noise Quality		Per Sample	(5 No of Location X 3 seasons in year X 3 sample per location)	5000	225000	
E. Capacity Building (Includes cost estimates for entire sub project area not included in the package costs)							
1	Capacity Building expenses 2 sessions	EMP Training at Site Implementation of EMMP for field PIUs and Engineer		2	50,000	1,00,000	PMU/DSC
Total INR						34,58,300	

D. Environmental Monitoring and Reporting

140. The PMU will monitor and measure the progress of EMMP implementation. Safeguards Staffs of IA / FPIU will undertake site inspections and document review to verify compliance with the EMMP and progress toward the final outcome. Environment and Safety Officer of the Contractor will submit the monitoring of EMMP to the DSC/Engineer on day to day basis. DSC / Engineer will submit monthly EMMP monitoring and implementation reports to FPIU, who will take follow-up actions, if necessary. FPIU/IA will submit quarterly monitoring and implementation reports to PMU. The PMU will submit semi-annual monitoring reports to ADB based on reporting of FPIU/ IA and its safeguards staff assessment of the implementation performance and its verification by the PMU safeguards specialist. PMU will also take corrective actions as required.

141. Monitoring reports will be posted in a location accessible to the public.

142. ADB will review project performance against the EA's commitments as agreed in the legal documents. The extent of ADB's monitoring and supervision activities will be commensurate with the Project's risks and impacts. Implementation of social and

environmental safeguards related requirements will be integrated into the project performance management system. ADB will monitor projects on an ongoing basis until a project completion report is issued.

Table VIII-3: Standardized EMMP to guide the contractor in mitigating environmental impacts

Sl. No.	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
1.	Site Establishment and Preliminary Activities Impacts				
1.1	Legislation, Permits and Agreements	In all instances, EA, IA contractors and consultants must remain in compliance with relevant environmental legislation of India at the national, state and local levels.	1. Permissions,/ NoCs/Consent requirement– IA/PMU 2. Permissions / NoCs/Consents requirement for equipment/machinery and material sourced from licensed/ approved quarries etc – Contractor	PMU	IA, Contractor
		Proof of compliance to statutory requirements must be forwarded by the facility owner and/or contractor to PMU/FPIU in relation to hot mixing, stone crushers, diesel generators etc	ESO-Contractor, Engineer, & Environmental Expert of DSC (EE)	PMU	
		A copy of the EMP must be kept on site during the construction period	ESO-Contractor, Engineer & EE	FPIU, IA & PMU	
1.2	Education of site staff on general and Environmental Conduct ³	Ensure that all site personnel have a basic level of environmental awareness training	ESO-Contractor and EE EE to deliver	IA & PMU	Contractor, IA,
		Staff operating equipment (such as excavators, loaders, etc.) shall be adequately trained and sensitized to any potential hazards associated with their task	Safety and environment officer of Contractor and EE	FPIU, IA & PMU	
		No operator shall be permitted to operate critical items of mechanical equipment without having been trained by the Contractor	Contractor and EE	FPIU, IA & PMU	
		All employees must undergo safety training and wear the necessary protective clothing /equipment.	Contractor and EE	IA & PMU	
		A general regard for the social and ecological well-being of the site and adjacent areas is expected of the site staff. Workers need to be made aware of the following general rules: <ul style="list-style-type: none"> • No alcohol / drugs to be present on site; • Measures for abatement of noise due to construction related activities and conduct of work 	Contractor and EE	IA & PMU	

³ These points need to be made clear to all staff on site before the work commences.

Sl. No.	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
		<p>force.</p> <ul style="list-style-type: none"> Construction staff are to make use of the facilities provided for them, as opposed to ad-hoc alternatives (e.g. use of firewood for cooking, the use of surroundings as a toilet facility are forbidden) Trespassing on private / commercial properties adjoining the site is forbidden Other than pre approved security staff, no workers shall be permitted to live on the construction site. No worker may be forced to do work that is potentially dangerous or for what he / she is not trained to do. 			
1.3	Social Impacts ⁴	<p>Open liaison channels shall be established between the Site owner, operator, the contractors and interested and affected parties such that any queries, complaints or suggestions pertaining to environmental management aspects can be dealt with quickly and by the appropriate person(s).</p> <p>A communications strategy is of vital importance in terms of accommodating traffic during laying of pipes. The road closure together with the proposed detour needs to be communicated via advertising, pamphlets, radio broadcasts, road signage, etc</p> <p>Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.</p> <p>Storage facilities, elevated tanks and other temporary structures on site shall be located such that they have as little visual impact on local residents as possible.</p> <p>In areas where the visual environment is particularly important (e.g. along commercial/ tourism routes) or privacy concerns for surrounding buildings exist, the site may require screening. This could be the form of shade cloth ,</p>	<p>Environment and Safety officer of Contractor with the Engineer, EE & FPIU</p> <p>Contractor with the Engineer, EE & FPIU</p> <p>Contractor with the Engineer, EE & FPIU</p> <p>Engineer and EE</p> <p>Engineer and EE</p>	<p>IA & PMU</p> <p>IA & PMU</p> <p>IA & PMU</p> <p>IA & PMU</p> <p>IA & PMU</p>	<p>Contractor</p>

⁴ It is important to take notice of the needs and wishes of those living or working adjacent to the site. Failure to do so can cause disruption to work.

Sl. No.	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
		temporary walls, or other suitable materials prior to the beginning of construction.			
		Special attention shall be given to the screening of highly reflective materials on site.	EE	IA & PMU	
1.4	Lack of sufficient planning to assure long term sustainability of the improvements and ensure protection of the assets created and the architectural/archaeological character of the surroundings	Design will include provisions for ensuring effective maintenance and protection of the assets created so as to ensure the long term sustainability.	Contractor, Engineer, EE and FPIU	IA/ PMU	
2.	Design Impacts and Pre-construction Impacts				
2.1	Layout of components and its location to avoid impacts on the aesthetics, sensitive environmental areas / attributes of the site	The project components siting will avoid impacts on the aesthetics of the site, ensure minimal impacts and in compliance with statutory and regulatory requirements. The contractor, FPIU/ IA and DSC will identify any direct or indirect intervention of primary or secondary activity before establishment of any project components on the ground.	Engineer, EE and FPIU	IA & PMU	
2.2	Selection of materials and construction technologies, if not carefully chosen, will adversely impact the aesthetic appeal of the destinations	Selection of materials will be according to specification and from approved sources Material selection would be done keeping in view that no asbestos (except as allowed), and CFC is used. Contractors shall prepare a source statement indicating the sources of all materials (including topsoil, sands, natural gravels, crushed stone, asphalt, clay liners etc), and submit these to the Engineer for approval prior to commencement of any work Where materials are borrowed (mined), proof must be provided of authorization to utilize these materials from the landowner/material rights owner and the Department of Geology and Mining Procurement of all material according to the material specification of the contract document and sourced from licensed and approved sources. A signed document from the supplier of natural materials shall be obtained confirming that they have been obtained in a sustainable manner	Engineer, EE and FPIU	IA & PMU	

Sl. No.	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
		and in compliance with relevant legislation			
2.3	Socio cultural resources-Ground disturbance can uncover and damage archaeological and historical remains`	There is not such location is anticipated on the project site. In case of chance of finding such location, Consult Archaeological Survey of India (ASI) and/or concerned dept. of Uttarakhand Govt. as applicable to obtain an expert assessment of the archaeological potential of the site; Consider alternatives if the site is found to be of medium or high risk; Develop a protocol for use by the construction contractors in conducting any excavation work, to ensure that any chance finds are recognised and measures are taken to ensure they are protected and conserved.	Engineer, EE and FPIU	Contractor, IA & PMU	
2.4	Integration of energy efficiency and energy conservation programs in design of sub-project components	The detailed designs for the sub-project components shall ensure that environmental sustainability principles, including energy efficiency, resource recycling, waste minimization, rainwater harvesting etc.	Engineer, EE and FPIU	IA & PMU	
2.5	Site clearance activities, including delineation of construction areas	Any removal of vegetation or tree felling shall be done after taking statutory permissions if required. All works shall be carried out such that the damage or disruption of flora other than those identified for cutting is minimum. Only ground cover/shrubs that impinge directly on the permanent works or necessary temporary works shall be removed with prior approval from the Environmental Expert of DSC All areas used for temporary construction operations will be subject to complete restoration to their former condition with appropriate rehabilitation procedures.as per the rehabilitation plan prepared by the contractor and approved by the EE of DSC.	Contractor,	Engineer, EE and FPIU	Contractor
2.6	Blockage of access in residential area, commercial area and sensitive location like school, college, hospitals and court	Contractor will identify such location in the preconstruction stage and prepare plan approved by DSC to minimize inconvenience to the people.	Contractor	Engineer, EE and FPIU	Contractor
2.7	Slop protection near	Retaining wall will constructed near	Contractor	Engineer, EE	The cost

Sl. No.	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
	reservoir and intake well	reservoir and intake well		and FPIU	and specification is part the bill of quantity of the contract.
3	Construction Impacts				
3.1	Construction Camps - Location, Selection, Design and Layout	<p>Siting of the construction camps, labour camp, stockpiles shall be as per the guidelines of UEPPCB, ULB, village panchayat and any other applicable guideline to the local site. The contractor will assess the impact of the construction camp and should be acceptable to the FPIU/ IA/PMU. below and details of layout to be approved by DSC.</p> <p>Construction camps shall not be proposed within 500m from the sensitive receptors, nearest settlements to avoid conflicts and stress over the infrastructure facilities with the local community.</p> <p>Location for stockyards for construction materials shall be identified at least 300m away from watercourses.</p> <p>Construction camps will be located away from settlements and drainage from and through the camps will not endanger any domestic or public water supply. Construction camps including sanitation facilities must be adequately drained.</p> <p>Sewage management through septic tanks and solid waste management through local ULB system or other alternate measures.</p>	Contractor with the Engineer and EE	FPIU, IA & PMU	
3.2	Drinking water availability	Sufficient supply of potable water to be provided and maintained as per the standards, requirements, test methods and sampling procedure according to IS:10500. If the drinking water is obtained from an intermittent public water supply then storage tanks will be provided. The cleanliness of the storage tanks will be ensured and all measures to be taken to avoid any water contamination.	Contractor	Engineer and EE	
3.3	Waste disposal	Pre-identified disposal location (identified by Contractor in compliance to relevant regulation and approved by EE-DSC) shall be part	Contractor with Engineer	FPIU, IA & PMU	

Sl. No.	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
		<p>of Comprehensive Waste Disposal Plan Solid Waste Management Plan to be prepared by the Contractor in consultation and with approval of Environmental Specialist of DSC. The Environmental Specialist of DSC shall approve these disposal sites after conducting a joint inspection on the site with the Contractor. Wherever, possible Solid waste management shall be through local ULB system or other alternate measures.</p> <p>Contractor shall ensure that waste shall not be disposed off near the water course or agricultural land, Orchards and Natural Habitats like Grasslands.</p>			
3.4	Stockpiling of construction materials	Stockpiling of construction materials and excavated earth or silt in case of construction of river bed filtration does not impact obstruct the drainage and Stockpiles will be covered to protect from dust and erosion.	Contractor with Engineer	FPIU, IA & PMU	
3.5	Access to Site	<p>Contractors shall ensure that all side and mitre drains and scour check walls on access and haul roads are functioning properly and are well maintained.</p> <p>Contractors shall ensure that access roads are maintained in good condition by attending to potholes, corrugations and storm water damage as soon as these develop. If necessary, staff must be employed to clean surfaced roads adjacent to construction sites where materials have been spilt.</p> <p>Unnecessary compaction of soils by heavy vehicles must be avoided; construction vehicles must be restricted to demarcated access, haulage routes and turning areas. Cognizance of vehicle weight / dimensions must be taken when using access constructed out of certain materials. e.g. paved surfaces / cobbled entranceways.</p>	Contractor with Engineer	FPIU, IA & PMU	
3.6	Quarry Operations	Contractor shall finalize the quarry for procurement of construction materials after assessment of the availability of sufficient quantity of materials, quality and other logistic arrangements.	Contractor with Engineer	FPIU, IA & PMU	

Sl. No.	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
		<p>The Contractor shall obtain materials from approved quarries only after consent of the Department of Mines and Geology and District Administration.</p> <p>Adequate safety precautions will be ensured during transportation of quarry material from quarries to the construction site. Vehicles transporting the material will be covered to prevent spillage.</p>			
3.7	Arrangement for Construction Water	<p>The contractor shall use ground/surface water as a source of water for the construction with the written consent from the concerned Department.</p> <p>To avoid disruption/ disturbance to other water users, the Contractor shall extract water from fixed locations and consult DSC & line agencies before finalizing the locations.</p> <p>The Contractor shall provide a list of locations and type of sources from where water for construction shall be extracted.</p> <p>The Contractor shall need to comply with the requirements of the State Ground Water Department for the extraction and seek their approval for doing so and submit copies of the permission to DSC.</p>	Contractor with Engineer	FPIU, IA & PMU	
3.8	Soil/land Erosion	<p>Slope protection measures will be undertaken as per design to control soil erosion.</p> <p>The Contractor shall not in any way modify nor damage the banks or bed of streams, rivers, other open water bodies and drainage lines adjacent to or within the designated area</p> <p>Earth, stone and rubble is to be properly disposed of so as not to obstruct natural water pathways over the site. i.e.: these materials must not be placed in storm water channels, drainage lines or rivers.</p> <p>There shall be a periodic checking of the site's drainage system by DSC, FPIU/IA and PMU to ensure that the water flow is unobstructed.</p>	Contractor with Engineer	FPIU, IA & PMU	
3.9	Water Pollution from Construction Wastes	<p>The Contractor shall take all precautionary measures to prevent entering of wastewater into streams, water bodies or the irrigation system during construction. Contractor shall</p>	Contractor with Engineer	Engineer, FPIU & PMU	

Sl. No.	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
		<p>not wash his vehicles in river/stream water and shall not enter riverbed nearby the water resource area for that purpose. Mixing / decanting of all chemicals and hazardous substances must take place either on a tray or on an impermeable surface. Waste from these shall then be disposed of to a suitable waste site in accordance with Hazardous Wastes (Management, Handling and Transboundary movement) Rules, 2008 and amendments till date and applicable norms</p> <p>Site staff shall not be permitted to use any stream, river, other open water body or natural water source adjacent to or within the designated site for the purposes of bathing, washing of clothing or for any construction or related activities. Municipal water (or another source approved by the Engineer) shall instead be used for all activities such as washing of equipment or disposal of any type of waste, dust suppression, concrete mixing, compacting etc.</p>			
3.10	Water Pollution from Fuel and Lubricants	<p>The Contractor shall ensure that all construction vehicle parking locations, fuel/ lubricants storage sites, vehicle, machinery and equipment maintenance and refueling sites shall be located at least 300 m away from rivers/streams and irrigation canal/ponds if any Contractor shall ensure that all vehicle/machinery and equipment operation, maintenance and refueling shall be carried out in such a manner that spillage of fuels and lubricants does not contaminate the ground. Wastewater from vehicle parking, fuel storage areas, workshops, wash down and refueling areas shall be collected and separated through an oil interceptor before discharging it on land or into other treatment system as per specified standards and UEPPCB and ULB norms if any.</p>	Contractor	EE of DSC, Engineer, FPIU & PMU	
3.11	Soil Pollution due to fuel and lubricants, construction waste	The fuel storage and vehicle cleaning area will be stationed such that spillage of fuels and lubricants does not contaminate the ground. All	Contractor	Engineer, FPIU & PMU	

Sl. No.	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
		pollution parameters will be monitored as per monitoring plan. Wastewater from vehicle parking, fuel storage areas, workshops, wash down and refueling areas shall be collected and separated through an oil interceptor before discharging it on land or into other treatment system			
3.12	Generation of dust	The contractor will take every precaution to reduce the levels of dust at construction site. Regular sprinkling of water and Stockpiles of soil will be kept covered in such a manner to minimize dust generation	Contractor	Engineer, FPIU & PMU	
3.13	Emission from Construction Vehicles, Equipment and Machinery	All vehicles, equipment and machinery used for construction shall confirm to the relevant Bureau of India Standard (BIS) norms. The discharge standards promulgated under the Environment Protection Act, 1986 shall be strictly adhered to. The use of silent/quiet equipment compliant with India ambient noise standards and standards specified for manufacturers shall be encouraged in the sub Project. The Contractor shall maintain a record of PUC for all vehicles and machinery used during the contract period which shall be produced for verification whenever required.	Contractor	Engineer, FPIU & PMU	
3.14	Noise Pollution	The Contractor shall confirm that all Construction equipment used in construction shall strictly conform to the MoEF/CPCB noise standards and all Vehicles and equipment used in construction shall be fitted with exhaust silencers. At the construction sites noisy construction work such as crushing, operation of DG sets, use of high noise generation equipment shall be stopped during the night time between 10.00 pm to 6.00 am. Noise limits for construction equipment used in this project will be in conformity to the BIS/SPCB/CPCB standards. Regular monitoring of ambient noise levels to ensure compliance to Uttarakhand Environment Protection & Pollution Control Board standards.	Contractor with Engineer	EE, FPIU & PMU	
3.15	Material Handling at Site	Workers Employed on mixing	Contractor	Engineer, FPIU	

Sl. No.	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
		<p>cement, lime mortars, concrete etc., will be provided with protective footwear and protective masks and goggles.</p> <p>Workers, who are engaged in welding works, will be provided with welder's protective eye-shields.</p> <p>Workers engaged in stone breaking activities will be provided with protective goggles, masks, and clothing.</p> <p>Stockpiles shall not be situated such that they obstruct natural water pathways.</p> <p>Stockpiles shall not exceed 2m in height unless otherwise permitted by the Engineer.</p> <p>If stockpiles are exposed to windy conditions or heavy rain, they shall be covered either by vegetation or cloth, depending on the duration of the project. Stockpiles may further be protected by the construction of berms or low brick walls around their bases.</p> <p>All concrete mixing must take place on a designated, impermeable surface</p> <p>The use of any toxic chemical will be strictly in accordance with the manufacturer's instructions and applicable regulations.</p> <p>The Engineer will be given at least 6 working days notice of the proposed use of any chemical. A register of all toxic chemicals delivered to the site will be kept and maintained up to date by the contractor.</p>		& PMU	
3.16	Damage, and disturbance to other infrastructure in the construction site	<p>Confirm location of infrastructure. Finalize alignment in coordination with agencies like Uttarakhand Power Corporation Limited, Bharat Sanchar Nigam Limited, etc. Ensure prior permission of respective agency</p> <p>Realign pipelines, if required and subsequently revise IEE</p> <p>Provide public information in case of service disruptions</p>	Contractor	Engineer, FPIU & PMU	
3.17	Disposal of Construction Waste / Debris / Cut Material	<p>The Contractor shall confirm that Safe disposal of the construction waste will be ensured in the pre-identified disposal locations. In no case, any construction waste will be disposed around the project site indiscriminately.</p>	Contractor	Engineer, FPIU & PMU	

Sl. No.	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
3.18	Disruption / cessation of existing water supply systems due to construction activity..	Care be taken during improvement of existing water supply systems, so that disruption in existing water supply would not occur. Tentative schedule of closure should be known to affected people prior to cessation of water supply. In case disruption of water supply exceeds the intimated schedule, arrangement for supply of potable water should be made.	Contractor with Engineer and FPIU	EE, IA and PMU	
3.19	Safety Measures During Construction	Personal Protective Equipment for workers on the project and adequate safety measures for workers during handling of materials at site will be taken up. The contractor has to comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches and safe means of entry and egress. The contractor has to comply with all regulations for the safety of workers. Precaution will be taken to prevent danger of the workers from fire, etc. First aid treatment will be made available for all injuries likely to be sustained during the course of work. Contractor shall also organize periodic visits by a qualified registered medical practitioner to the site and workers camp. Contact information of Doctor, availability & location of first aid box shall be displayed in appropriate language both at work site and workers camp. The Contractor will conform to all anti-malaria instructions given to him by the Engineer. The Contractor will also ensure that the interests of the community are preferably not disturbed, and if unavoidable then disturbed to the minimum. Provide traffic management personnel, barricade, appropriate signage and safety information in and around the construction site and prevent local people entering into the construction site.	Contractor	Engineer, FPIU & PMU	
3.20	Clearing of Construction of Camps and Restoration	Contractor to prepare site restoration plans for approval by the Engineer. The plan is to be implemented by the contractor prior to demobilization. On completion of the works, all	Contractor	Engineer, FPIU & PMU	

Sl. No.	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
		temporary structures will be cleared away, all rubbish burnt, excreta or other disposal pits or trenches filled in and effectively sealed off and the site left clean and tidy, at the Contractor's expense, to the entire satisfaction of the Engineer and facility owner.			
3.21	Risk of archaeological chance finds	Strictly follow the protocol for chance finds in any excavation work; Request FPIU/DSC or any authorized person with archaeological field training to observe excavation; Stop work immediately to allow further investigation if any finds are suspected; and Inform FPIU/DSC, and take any action they require ensuring its removal or protection in situ.	Contractor	Engineer, FPIU & PMU	
3.22	Conflict with locals	Contractor shall ensure that mostly the local labourers are employed and migratory laborer shall be employed only in case of unavoidable circumstances.	Contractor	Engineer, FPIU & PMU	
3.23	Environment Safeguard Officer	Contractor shall appoint one full-time suitably qualified and experienced Environment and Safety Officer who shall be responsible for assisting contractor in implementation of EMP, community liaisoning, consultations with interested/affected parties, reporting and grievance redressal on day-to-day basis. This environment and safety officer will be at site till all works related to the project including demobilization are completed.	Contractor	Engineer, FPIU & PMU	
4	Operation and Maintenance impacts				
4.1	Environmental Conditions	The periodic monitoring of the ambient air quality, noise level, water (both ground, surface water) quality and soil, in the subproject area as suggested in pollution monitoring plan through an approved monitoring agency.	Pollution Monitoring Agency appointed by IA	SDMA, PMU	
4.2	Increased Pollution due to the better water supply.	The subproject involves renovation and rehabilitation of existing system, augmentation of water supply is envisaged for 10 years project population and to fulfill the deficit of water supply to user as per 135 lpcd. Subproject does not envisage improvement in distribution system to end users as such very little increase is pollution load is anticipated.	IA, EA and Jal Sansthan	SDMA PMU & GoUK	

Sl. No.	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
		Sewage generated will be handled by the prevalent existing sewage management system of the town.			
4.3	Algal Growth in Reservoir	Proper and regular cleaning of reservoir & provision of bleaching shall be ensured. Water sourced from River Bed Filtration (RBF) will be stored in Reservoir and chlorination will be done in the reservoir.	Uttarakhand Jal Sansthan / IA	SDMA PMU & GoUK	
4.4	Water Quality	Chlorine should be added in sufficient quantity so that residual chlorine within permissible limit is available in pipeline.	Uttarakhand Jal Sansthan / IA	SDMA PMU & GoUK	

EE= Environmental Expert of Engineer (DSC), DSC= Design & Supervision Consultants, IA= Implementing Agency, EA= Executing Agency, FPIU= Field Project Implementation Unit.

E. Performance Indicator

143. The performance indicators of implementation of environmental management and monitoring plan has been provided in below table.

Table D-1: Performance Indicators of EMMP

Sl. No.	Performance Indicators	Target	Achievement in Semi-annually and annually
1.	Budget	Environmental Budget (EMMP Budget)	Expenditure till date
Performance Indicators of Monitoring Plan			
2.	Ambient Air Quality	Total Number of samples as per Environmental Monitoring Plan	Total Number of samples collected
3.	Noise Level	Total Number of samples as per Environmental Monitoring Plan	Total Number of samples collected
4.	Water Quality	Total Number of samples as per Environmental Monitoring Plan	Total Number of samples collected
5.	Soil	Total Number of samples as per Environmental Monitoring Plan	Total Number of samples collected
6.	Safety of Workers	List of PPE as per the number labours	List of PPEs actually provided in the project
Performance Indicators of Environmental Management Plan			
7.	Permissions,/ NoCs/Consents requirement	Target timeline to obtain the permit/NoC/ consents and its validity	List of Permission and NoCs / consents obtained till date and status of its validity.
8.	Public Consultation	Total Number of planned Public Consultation with timeline and coverage of people.	Number of public consultation conducted till date and actual coverage of the people.
9.	Grievance redressal	Total number of complaints received, its timeline to response and resolution	Actual number of complaints resolved in percentage, response time.
10.	Issues raised in public consultation	Target to attend the issues raised in the Public Consultation	Status of compliance to the issues of Public consultation

Sl. No.	Performance Indicators	Target	Achievement in Semi-annually and annually
11.	Information disclosure	List of information and locations where information to be disclosed	Actual locations where information has been disclosed.
12.	Education of site staff on Environmental training	Total Number of staffs to be trained	No of staff actually
13.	Capacity Building	Total number of sessions to be covered Total Number of contractors, PIUs and DSCs to be covered	Number of Sessions completed and Number of contractors, PIUs and DSCs.
14.	Implementation of EMP mitigation Measures	All items of Environmental Management Plan with timeline and its respective regulatory standards like for Ambient air Quality – NAAQS, 2009 standards, Drinking water – IS:10500 etc, Residual Chlorine – UEPPCB standards and CPHEEO manual for handling.	Implementation status of EMP items till date
15.	Reporting	List and number of Report to be submitted	List and number of reports submitted

IX. CONCLUSION AND RECOMMENDATION

144. The initial environmental examination describes the environmental impact of all components of subproject of Gauchar.
145. The locations of all project components are within the Gauchar Town on the bank of Alaknanda river. There is no ecologically sensitive area having intervention with the project components neither directly nor indirectly. No felling of trees envisaged in the project and not having any intervention of cultural or archaeological site.
146. The construction activity will have impact on ambient air and noise environmental due operation of construction vehicles, equipments, excavation and disposal of earth. The laying of pipes in the residential area may cause inconvenience to the local people due obstruction on road and interrupted supply of water. Mitigation measures have been developed to reduce all negative impacts to acceptable levels. The implementation of mitigation measures are suggested in the environmental management and monitoring plan
147. The proposed subproject has been categorized as Category 'B' as per ADB SPS 2009 based on environmental screening and assessment of likely impacts of rehabilitation of water supply system of Gauchar. The initial environmental examination (IEE) ascertains that it is unlikely to cause any significant environmental impacts. Few impacts were identified attributable to the proposed sub-project, all of which are localized and temporary in nature and easy to mitigate.

148. The initial environmental examination ascertains that the subject is unlikely to cause any significant environmental impacts. No additional studies or need of undertaking detailed EIA is envisaged at this stage. The Executing Agency shall ensure that EMP and EMoP is included in Bill of Quantity (BOQ) and forms part of bid document and civil works contract. The same shall be revised if necessary during project implementation or if there is any change in the project design and with approval of ADB

APPENDICES

Appendix I: Rapid Environmental Assessment (REA) Checklist

Environmental Assessment Checklist

RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLIST

Country/Project Title India/ Uttarakhand Emergency Assistance Project

Sector/Division Water Supply – Gauchar

Screening Question	Yes	No	Remarks
A. Project Siting Is the project area...			
Densely populated?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	The habitation is on the slope of hill with population of about 8,864.
Heavy with development activities?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Adjacent to or within any environmentally sensitive areas?			
<ul style="list-style-type: none"> • Cultural heritage site 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No Cultural Heritage or notified archaeological site within 10 km from the project.
<ul style="list-style-type: none"> • Protected Area 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Project does not fall within any protected area
<ul style="list-style-type: none"> • Wetland 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No wetland area available in the vicinity of the project site
<ul style="list-style-type: none"> • Mangrove 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No mangroves available
<ul style="list-style-type: none"> • Esturine 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No estuary is available
<ul style="list-style-type: none"> • Buffer zone of protected area 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	The proposed project does not fall within the buffer zones of wildlife sanctuary or national park or biodiversity reserves.
<ul style="list-style-type: none"> • Special area for protecting biodiversity 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No such area
<ul style="list-style-type: none"> • Bay 	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No such area.
Potential Environmental Impacts			
Will the Project cause...			
Pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	There is no upstream human intervention to the water.
Impairment of historical/cultural monuments/areas and loss/damage to these sites?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No historical/cultural monuments/areas available.
Hazard of land subsidence caused by excessive ground water pumping?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No ground water abstraction is proposed.
Social conflicts arising from displacement of communities?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No additional land acquisition or displacement of people.
Conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No conflict of abstraction of water from the stream.
Unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Water will be supplied as per the drinking water standards
Delivery of unsafe water to distribution system?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Water will be supplied as per the drinking water standards
Inadequate protection of intake works or wells, leading to pollution of water supply?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Over pumping of ground water, leading to salinization and ground subsidence?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No abstraction of ground water
Excessive algal growth in storage reservoir?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No such situation is anticipated as regular monitoring and maintenance will

			be done.
Increase in production of sewage beyond capabilities of community facilities?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Gauchar has proposal of sewerage system. Till the Sewerage system is in place, the existing septic tanks at household level shall be cleaned at shorter intervals and proper drainage facilities of excess sullage water through existing drains shall be ensured by the UJS.
Inadequate disposal of sludge from water treatment plants?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No WTPs. No sludge generation
Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisance and protect facilities?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Existing Water supply is gravitational.
Impairments associate with transmission lines and access roads?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Access to the source of water and transmission line is very unsafe due to being on steep slope of hills. Immediate measure is required to prevent any accident during construction or operation.
Health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No such situation is anticipated, as sodium hypochlorite solution will be used instead of gas.
health and safety hazards to workers from handling and management of chlorine used for disinfection, other contaminants, and biological and physical hazards during project construction and operation?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No such situation is anticipated.
Dislocation or involuntary resettlement of people?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No resettlement is required since the proposed project is limited to the available land.
Social conflicts if workers from other regions or countries are hired?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No such situation is anticipated.
Noise and dust from construction activities?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No such situation is anticipated.
Continuing soil erosion/silt runoff from construction operations?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No such situation is anticipated.
Increased road traffic due to interference of construction activities?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No such situation is anticipated.
Delivery of unsafe water due to poor O&M treatment processes (especially mud accumulation in filters) and inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Due to unsafe and difficult access to the site, the maintenance may not be addressed on time and result disruption in supply.
Delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No such situation is anticipated.
Accidental leakage of chlorine gas?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No such situation is anticipated, as sodium hypochlorite solution will be used instead of gas.
Excessive abstraction of water affecting downstream water users?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	There is not competing user on the downstream of 3 sources. Dugada, Ghali Gad and Gagra Gad on the hills and one on the bank of river Alaknanda.
Competing uses of water?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No competing user of water
Increased sewage flow due to increased	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Increased sewage flows have to be

water supply?			managed with existing septic tanks by cleaning them at shorter intervals.
Increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater treatment plant	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Existing drainage system will be strengthened and drains will be regularly maintained by UJS to avoid stagnation and blockages.
Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No such situation is anticipated.
Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during operation and construction?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No such situation is anticipated.
Community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No such situation is anticipated.

Climate Change and Disaster Risk Questions	Yes	No	Remarks
The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.			
• Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunamis or volcanic eruptions and climate changes (see Appendix - I)?	√		The project area falls in the seismic zone V as per Indian Seismic Zone map as per IS: 1893 (Part-1) 2002.
• Could changes in temperature, precipitation, or extreme events patterns over the Project lifespan affect technical or financial sustainability (e.g., changes in rainfall patterns disrupt reliability of water supply; sea level rise creates salinity intrusion into proposed water supply source)?	√		Will be assessed and suitable mitigation measures will be proposed.
• Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (e.g., high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)?		√	Proposed project will not impact any marginalized population, rural-urban migrants, illegal settlement etc.
• Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., by using water from a vulnerable source that is relied upon by many user groups, or encouraging settlement in earthquake zones)?		√	No such possibility of vulnerability increase of the surrounding area.

B. The Assessment checklist on the Categorization and Planning Requirement for this sub-project?

- Category A.** A proposed project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment is required.
- Category B.** A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A projects. These impacts are site-specific, few if any of them are irreversible and in most cases mitigation measures can be designed more readily than for category A projects. An initial environmental examination is required.
- Category C.** A proposed project is classified as category C if it is likely to have minimal or no adverse environmental impacts. No environmental assessment is required although environmental implications need to be reviewed.
- Category FI.** A proposed project is classified as category FI if it involves investment of ADB funds to or through a FI .

Appendix II: Public Consultaion

Public Consultation & Focused Group Discussions (Socio-Economic and Environmental)

Name of the Sub-Project	:	Uttarakhand Emergency Assistance Project (Water Supply Sector)
Number of Participants	:	18
Name of the District	:	Chamoli
Distance from the District Head Quarter	:	60 Km
Date of Consultation	:	17/12/2013

Issues	Participant's Opinion, Comments & Suggestions
General perception about the Investment Program UEAP (WATER SECTOR). Awareness about the Investment Program especially the Water Supply Distribution System component. Support of the people for the Investment Program.	Local people are aware of the water supply investment programme. There is immense support of local people for the Investment Program.
Support of local people for the proposed Water Supply Distribution System Component of the project.	All people gathered for consultations raised one voice for the renovation of water supply system in Gauchar City.
Any critical issue or concern by the local people regarding this project?	The old water supply distribution line should be in place till the commissioning of new distribution line.
Any criteria you would like to see considered during project design, construction and operation stage?	During construction time the Executing Agency should conduct the work without affecting the common people. No suggestion for operation stage.
Number of Households in this area and Population of the village/ area	Around 150 households live in this area. Approximately 700 populations live in these wards.
Any Ethnic minorities/ tribal population living in this area (Note the name of Tribe/ indigenous community, if any). Any Vulnerable groups are in the village/ Ward (women headed, BPL, ST, PH etc.).	No ethnic minorities/ tribal population living in this area Some BPL families are living in this ward.
Do the village/ ward people face any problems of water supply to their houses?	Water supply to this ward is so erratic that hardly people get clean water. Most of the time water is not coming to their houses due to less pressure.
If there is any problem related to these services, do you think that any up-gradation is necessary?	If water comes sometime with pressure, then also people find it with full iron content or bad smelling water.
Do you have any ideas on what is to be involved in the process of up-gradation?	No idea for the process of this up-gradation.
For this up-gradation, the road/ street/ path may be affected - What is your opinion on this? Is it acceptable?	Yes, it is acceptable to the local people but not for a prolonged period. The timing and period of work should be fixed and notified to the local people before the start of civil works.
What extent this total Water Supply Distribution System civil works will affect you?	This water supply distribution civil works will affect the normal business of shopkeepers and especially livelihood of vendors selling variety of items. Even some vendors raise the concern of getting two time meal for their


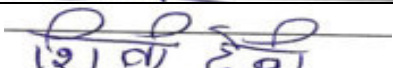



Issues	Participant's Opinion, Comments & Suggestions
	families.
Who else is to be affected due to this up-gradation process?	Local residents will also be affected for commuting to their destinations.
How intense could be the effect?	The effect could be much intense if the distribution line kept open for longer period after excavation work. The local residents will find it difficult to go office, schools, hospitals or any other destinations.
Do you think the effect will be of a permanent nature?	The effect may likely be of temporary in nature.
If it is not, how intense will be the temporary effect?	The intensity of effect may be temporary in nature and minimum to the local residents.
The work will be executed in this part of the road/footpath. You may require shifting to other side of the road. Please give your comments and suggestions.	Mostly ready to shift other side of the road by showing respect to Government work. If space and assistance provided for shifting to other side, APs have no problem.
During the time of execution of work will you shift to other side of road or any other place in the town?	Some people are positive to the idea of shifting to other side of the road and others are bit apprehensive of shifting and doing business. Because they afraid of customer loss.
In what way Executive Agency of GOU can assist you so that your daily business is not affected? What extra support you want from the Executing Agency of GOU?	They have no direct comment on this issue. But said that Government should think about their genuine problem and whatever possible way GoU can help them, it is welcome.
What are your perceived benefits from the Investment Program?	Only benefit may be un-interrupted purified water supply with good pressure. They may get good and hygienic water to drink.
Do you think that local labour force would like to participate in construction work?	Obviously, local unemployed labour force would like to participate in the construction work.
Do you think that the local people would like to get regular information regarding this Investment Program?	Yes, the local people would like to get regular information regarding this project and Investment Program.
Number of Shops/ Commercial establishments in the village/ town/ area	Around 200 shops/ commercial area in this locality.
Numbers of Industrial Units in the village/ town and surrounding area	No industrial unit available in this and surrounding area.
General socio-economic standing: What are the economic activities? Land use, cropping pattern (Seasonal), types of crops, value of the crops, Average land holding size etc.	General socio-economic standing is lower middle class or poor family background. Mainly selling vegetables, fruits, and variety of items for their livelihood and support to family.
Is the land Irrigated and what are the sources of Irrigation?	Not Applicable
Current rates for the agricultural land (Government as well as market rates).	Not Applicable
Source of drinking water in this area.	UJS water pipe line and hand pump is the source of drinking water in this area.

Issues	Participant's Opinion, Comments & Suggestions
Loss of residential/ commercial structures, if any due to the project.	No loss to residential / commercial structures due to the project.
Loss of community life like any Market Places or community activities to be affected	No loss to community activities or market places.
Shortage of water for human consumption, irrigation, and other downstream uses? How extensive are they?	Shortage of drinking water takes place frequently due to leakage of pipe and non-availability of water pressure. Sometime the water smells bad and looks un-hygienic.
Any conflicts on water use rights and its social impacts?	No conflict yet on water use rights.
Resettlement and Land acquisition (if foreseen due to setting up of Water Supply Distribution System especially on private land). Has there been land acquisition before? If yes, what was the process of land acquisition and compensation package?	No Private land acquisition and resettlement impacts are seen for this Water Supply Distribution System sub-project. No land acquisition before.
Protected areas (national park, protected forest, religiously sensitive sites, historical or archaeological sites near the project area around 3km), if any	No protected areas (national park, protected forest, religiously sensitive sites, historical or archaeological sites near to the sub-project area.
Health status, Availability of Hospitals, Is there any chronic disease prevalent in this area. Over all environmental condition of the area. Are you aware about HIV/AIDS and STD?	Health status is normal to this area. Hospital is available .Most of the people are aware of HIV/AIDS and STD.
Poverty Level: Is the village/ ward is poor or very poor or well off?	Poor
Education Status in this Village/ward: Literate, illiterate etc.	Mostly literate.
Type of compensation expected (Cash or Kind)	Cash compensation expected.
Perceived benefits from the project	Regular water supply system will be established for better facilities to the urban population.
Perceived losses from the project	Temporary loss of livelihood .
What other organizations of a social nature (NGOs/CBOs/ Civil Society) active in this village/ward? Name of these organizations.	Local people do not know about these organisations.
Organization of the village/ ward and its structure. Do you have a village/ ward committee? What is the decision-making system in your village/ward? Who are the decision makers on community related issues in your village/ward? Are they elected or selected? If elected: By	There is ward committee and the councilor is the head of the ward. Ward Committee decides issues of ward and finalize it with the presence of councilor. The committee and councilor are all elected members by majority vote.

Issues	Participant's Opinion, Comments & Suggestions
consensus or By majority vote.	
Any Other Issues you may feel to share: (Demand of any support form Authority and whether they welcome the project, will there be cooperation from the local community during the implementation, security measures, etc).	All issues depend on GoU. If Government is sympathetic to the APs then, they are also ready to cooperate and welcome the project during the implementation and security measures.
Is this consultation useful? Comments	Yes, it is useful
Will there be likely involvement of local people in the implementation of this Water Supply Distribution System Project?	It depends on the individual local APs to decide.

Source: FGD December 2013

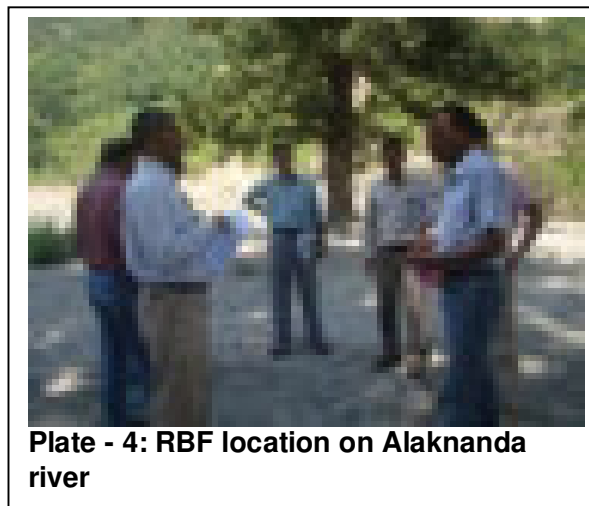
Appendix II: List of Participants - Public Consultation & Focused Group Discussions

Sl. No	Name of the Participants	Occupation	Signature (If agreed by the participants)
1	Mukesh Negi	Chairman, Municipality	
2	Umesh Shoily	Ward Member	
3	Anil Negi	Ward Member	
4	Manoj Negi	Ward Member	
5	Indu Panwar	Ward Member	
6	Shividavi	Ward Member	
7	Laxmi davi	Ward Member	
8	Anand Singh	Local representative	
9	R.S. Chander	J.E. Municipality	
10	Ajaykisore Bhandari	M.L.A. Representative	
11	Sunil Panwar	President, Vyapar mandal	
12	Tushar Pratap Singh	Design Engineer, Mott	
13	Dr. A.K. Singh	Resettlement expert, Mott	
14	Jagmohan Singh Bisht	J.E. UJS	
15	Rakesh singh	NGO representative	
16	Sunil Singh	NGO Representative	

Public Consultaion Photographs
Focus Group Discussion and Disclosure session – Gauchar (December, 2013)




Appendix III: Project Photographs



Appendix IV: 'NOC' for the Construction of Clear Water Reservoir (CWR)

NOC for Water Distribution Tank
GAUCHAR



भारतीय गैर न्यायिक

TEN RUPEES

Rs. 10

INDIA


INDIA NON JUDICIAL

वै.भा.सं. ३३३/२०१७-१८, श्री. अशोक शिंदे, नेरी, तालुका पनवाई जिल्हा अग्रसेवक यांना यांच्या भूमि जो कि राजस्व रु. ३७/३०४५ स्थित हे अल्प भूमि जो उत्तराखण्ड राज संस्थान को जलाशय बनाने हेतु घोष कर रहा है यह भूमि खाता नम्बरी ३०४५ ०१ में रकबा ५० २८.३१ तथा ४३ में रकबा क्षेत्रफल क्रमश ०.०५५ मन्दी ०.०१०, ०.०४९ मन्दी ०.०१० तथा ०.०५० मन्दी ०.०१५ हे तथा ये निजी स्वामित्व तथा कब्जे कि हे इस पर मेरे परिवार तथा सहकारी सदस्यों को कोई आपत्ति नहीं होगी भूमि इवाई पट्टी के ऊपर तथा सिविली नोकर मार्ग के नीचे स्थित है। भूमि को मेरे विभागीय अधिकारियों कर्मचारीको को नीचे पर राजस्व अधिलेखों के अनुसार विक्रयी है। विभाग कबो भी इस भूमि को जिसका क्षेत्रफल ०.०४० हेक्टेयर है। मेरे से दामनामा / रजिस्ट्री करवा सकती है। मेरे भूमि को आप्त से जो कि रकबा ५० २८.३१ तथा ४३ में रकबा ०.०५५ ०.०४९ व ०.०५ मन्दी ०.०५० हेक्टेयर है विभाग को नीचे भी है तथा विभाग इस पर निर्माण कार्य करवा सकता है। समय पर जब भी विभाग योग्य समझे मुझसे दामनामा करवा सकता है। यह लिखितनामा सहमत पर मेरे अपनी स्वेच्छा से बिना किसी के दबाव से आकर तथा सचमुच दुःख होना बलना मे विभाग को सल मे लिख दिया है।

हास्ताक्षर केवला

1 किमुवन्दि शिंदे भण्डारी

2 विलवन्दि शिंदे नेरी




हास्ताक्षर दामकर्ता

नाम-आलोक शिंदे

पुत्र २५० श्री सहाय शिंदे

ताला-पनवाई पोटा नीमर

जिल्हा-चर्मोली



T.S. Bhandari
Advocate & Oth Comm
Karanprayag (Chermoli)

Appendix V: 'NOC' for the Construction of Infiltration Well ('I' Well)

