Initial Environmental Examination

Project Number: 47229-001
May 2014

IND: Uttarakhand Emergency Assistance Project

Submitted by

Uttarakhand Jal Sansthan, Government of Uttarakhand, Dehardun

Asian Development Bank

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Letter No. 31 **/ADB/ 12/2014-15** **Dated** 19/05/2014

To,

The Country Director,
Asian Development Bank,
New Delhi.

Sub: **Loan 3055-IND: Uttarakhand Emergency Assistance Project- Regarding IEE for Kapkot, Dharchula and Bageshwar Towns.**

Dear Sir,

Kindly refer ADB email dated 21 Jan, 2014 regarding clearance of Rapid Environmental assessment (REA) for Bageshwar, Dharchula & Kapkot towns & required submission of Initial Environmental Examination (IEE) of these three towns Bageshwar, Dharchula & Kapkot.

So, I am forwarding the final Initial Environmental Examination (IEE) of Bageshwar, Dharchula & Kapkot for your review & approval.

Regards

Yours sincerely,

Enclosed- 3 Attachments

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Initial Environmental Examination

May 2014

India: Rehabilitation and Reconstruction of Dharchula Water Supply System 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_2S	Hydrogen sulphide
HDPE	High Density Poly Ehylene
HFL	High Flood level
Km	Kilometer
Leq	Sound level
Mg	Milligram
MFF	Multitranche Financing Facility
MoEF	Ministry of Environment & Forests
MLD	Million Litter Per day
Mn	Million
M	Meter
mm	Millimeter
mg/l	Milligram per Liter
m3	Cubic meter
NAAQM	National Ambient Air Quality Monitoring
NOx	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
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
UEAP	Uttarakhand Emergency Assistance Program
UEPPCB	Uttaranchal Environmental Protection and Pollution Control Board
UPJN	Uttaranchal Peya Jal Nigam
UJS	Uttaranchal Jal Sansthan
U.P	Uttar Pradesh
UPCL	Uttaranchal Power Corporation Limited
($\mu g/m^3$	Micro Gram Per Cubic Meter
%	Percentage

WEIGHTS AND MEASURES

Cm	-	centimeter
Crore	–	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
µg/m^3	–	micrograms per cubic meter
µS/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 0.190 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 SSF, reservoirs, gravity mains and distribution network.

4. To address the impact, Construction of RCC Intake Chamber at Ghatkhola Spring. Installation of Uttaranchal Koop in Ghatkhola Gadhera.Repair of Galatigarh Gadhera tapping cross wall. Construction of Horizontal flow roughing filter using existing slow sand filter with Provision of Barbed wire fencing around the filter plant. Construction of 50 KL RCC CWR against damaged 50 KL Stone Masonry CWR at Ghatkhola. Construction of 25 KL RCC CWR against damaged 25 KL Stone Masonry CWR at Manakhet. Construction of 300 KL RCC CWR against damaged 300 KL Steel CWR at Gwalgaon. Laying of Gravity line of 125 mm GI pipe of 139 M 100 mm GI pipe of 5.8 KM from Tapping Cross wall at Galatigarh Gadhera to 300 KL Steel CWR at Gwalgaon. Gap filling of gravity line with 50 mm Diameter Pipe line between Manakhet CWR to Shishu mandir CWR of 365 m. Laying of Distribution line 50 mm GI Pipe line of 150 m below the boundary of GIC field in place of damaged pipe line. Laying of Distribution line from Manakhet CWR (25 KL) to Gwalgaon (962 m).

5. Consistent with the Environmental Assessment and Review Framework (EARF), the proposed subporject 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 Dharchula 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 km^{2}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 *Kalpvriksha* 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 not 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 ADB's Safeguard Policy Statement (SPS)2009, Environmental Assessment Guidelines, 2003 and the GoI guidelines, Water (Prevention and Control of Pollution) Act-1974, the Air Act-1981 and the Environment (Protection) Act-1986.

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 EMERGECY 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 (UEAP) has been formulated as a multi-sector emergency loan in sector loan modality. The executing agency (EA) for the UEAP 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 Sanstahan (UJL) 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) asses 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 eight chapters including this introduction Chapter.

Chapter 1- Introduction
Chapter 2- Policy, Legal and Administrative Framework
Chapter 3- Description of Project
Chapter 4- Description of Environment
Chapter 5- Anticipated Impacts and Mitigation Measures
Chapter 6- Information Disclosure, Consultation, and Participation
Chapter 7- Environment Management Plan and Grievance Redress Mechanism
Chapter 8 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:

Table II-1 Applicable Environmental National and State Requirements for UEAP

S.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	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): 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 form 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 in July 2013 for state of Uttarakhand for expediting forest cleatrances 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	District Level Committee constituted by the State Govt.	No (No felling of trees or diversion of forest land required)	IA / PMU	Not Required
		B. Implementation Stage				
3	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

4	Consents to establish & operate Water Treatment Plant	Water (Prevention and Control of Pollution) Act, 1974 and amendments	Uttarakhand Environmental Protection and Pollution Control Board - Dehradun	No	IA/PMU	
5	Authorization for Disposal of Hazardous Waste	Hazardous Wastes (Management, Handling and Transboundary movement) Rules, 2008	Uttarakhand Environmental Protection and Pollution Control Board – Dehradun	No	Contractor	
6	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	
7	Use of Fly ash within 100 kms around Thermal Power plants	Fly Ash Notification, 1999 as amended 03.11.2009	MoEF	No	Contractor	
8	Pollution Under Control Certificate	Central Motor and Vehicle Act 1988	Department of Transport, Govt. of Uttarakhand	Yes	Contractor	
9	Installation of Generators	The Air (Prev. & Con. of Pollution) Act, 1980	Uttarakhand Environment Protection and Pollution Control Board - Dehradun	No	Contractor	
10	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, by Labour and Employment on March 18, 2013.	District Labour Commissioner	Yes	Contractor	
11	Permission for extraction of boulder and sand from river beds	Mines & Minerals (Regulation and Development) Act, 1957 and its amended in 1972	Department of Mines and Geology. Government of Uttarakhand	Yes	Civil Work Contractors	
12	License for Storing Diesel and other explosives	Petroleum Rules, 2011. Hazardous Wastes (Management, Handling and Transboundary movement) Rules, 2008.	Commissioner of Explosives and Uttarakhand Environmental Protection and Pollution Control Board – Dehradun	No	Contractor	

III. DESCRIPTION OF THE PROJECT

A. Project Location

I. **Intake Chamber**: New intake chamber to be constructed in Ghatkhola Spring.

II. **Uttaranchal Koop**: Installation of Uttaranchal Koop in Ghatkhola Gadehera.

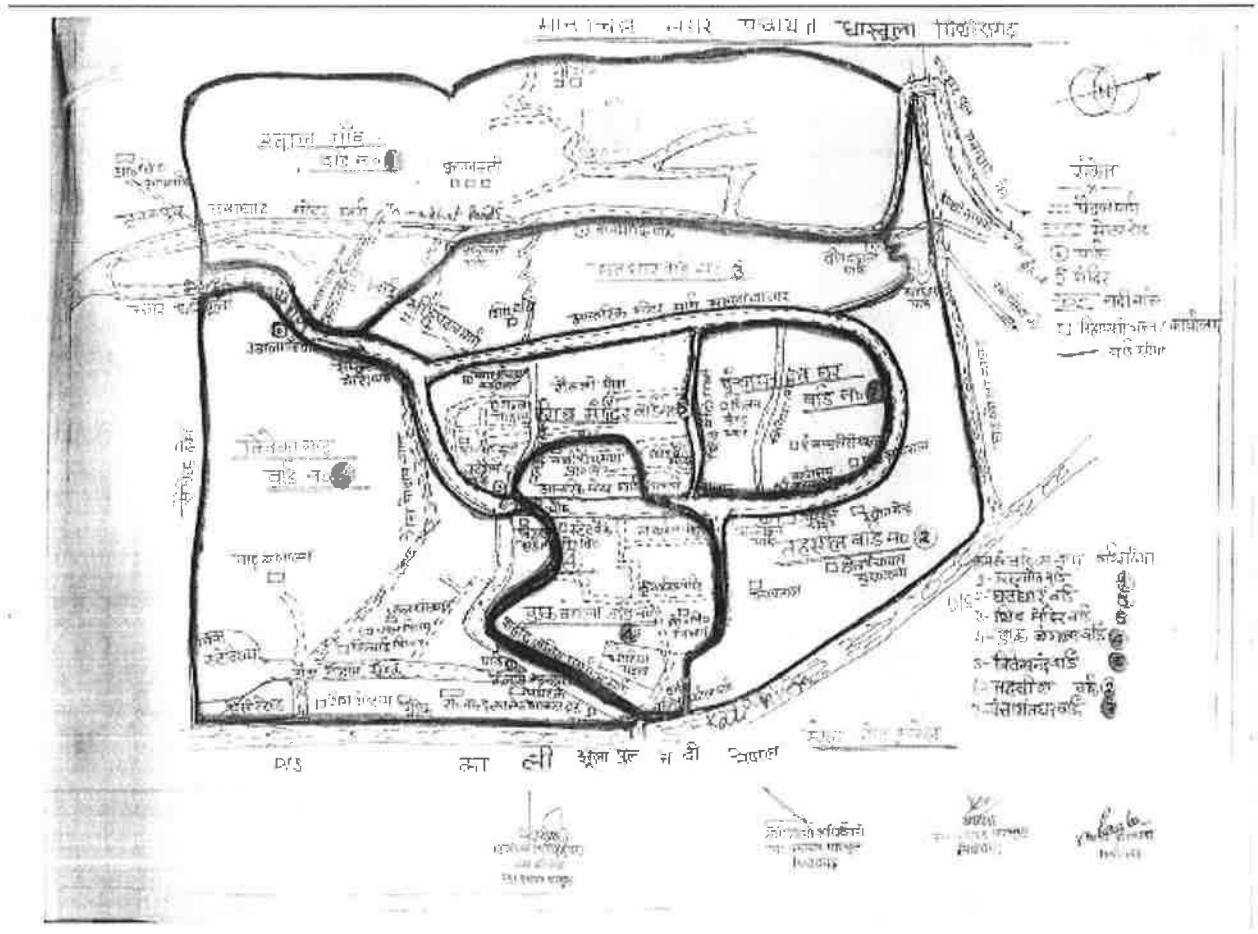
III. **Horizontal Flow Roughing Filter** : Horizontal Flow Roughing Filter to be constructed in Galatigarh Ghadera

IV. **Clear Water Reservoir** : RCC Clear water Reservoir to be constructed against the damaged Stone Masonry CWR & Steel CWR

V. **Gravity Line** : Laying of Gravity line 100 mm GI pipe of 5.8 KM & 125 mm GI pipe of 139 m from Tapping Cross wall at Galatigarh Gadhera to 300 KL Steel CWR at Gwalgaon & Gap filling of gravity line with 50 mm Diameter Pipe line between Manakhet CWR to Shishumandir CWR of 365 m.

VI. **Distribution Line** : Laying of Distribution line 50 mm GI Pipe line of 150 m below the boundary of GIC field in place of damaged pipe line & Laying of Distribution line from Manakhet CWR (25 KL) to Gwalgaon (962 m)

VII. **Repair Works** : Repair of Galatigarh Gadhera tapping cross wall



Project Location in Dharchula

B. Proposed Category of the Project

11. Pursuant to the requirements of the ADB Safeguard Policy Statement (2009) and Operation Manual Bank Policy on Environmental Safeguard for the Proposed Rehabilitation and Reconstruction of Dharchula Water Supply Scheme was screened to identify significance of potential impacts, determine the most 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.

12. 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 hills town, the most significant environmental impacts are potential increase in erosion, siltation, and landslide.

13. Existing Water supply system in Dharchula is proposed to be rehabilitated and reconstructed 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

14. The water supply system of Dharchula is severely damaged during the floods in June, 2013 affecting the water supply to the Public. The intake chamber at Ghatkhola Spring and filtration unit at Galatigarh Ghadera are damaged due to floods. The present water production of 1.237 MLD is insufficient for present population and intermediate population but due to leakages in GLSR, due to landslides damages in gravity Main & Distribution main of 515 m and uncovered Water supply Distribution for 962 m. The current service is less than the desired level (135 lpcd). The above issues need to be addressed immediately to provide a sustainable and economic water supply system to the citizens of Dharchula town. The table below shows the major demand-supply gap of different parameters.

Table III-1 Demand and Supply Gap Parameters

S. No.	Parameter	Demand	Supply after damage	Gap/ Need for the Project
1	Water production	1.427 mld (year 2013) 1.450 mld (year 2014) 1.791 mld (year 2024)	1.237 mld 1.237 mld 1.237 mld	Gap of 0.190 mld Gap of 0.213 mld Gap of 0.554 mld
2	Per Capita Demand	135 lpcd	96 lpcd at year 2014 77 lpcd at year 2024	Gap of 39 lpcd Gap of 58 lpcd
3	UFW	15%	15%	More hydraulically efficient distribution system
4	Reservoir capacity	490KL	490KL	Nil

5	Distribution lines	15.662 km	14.550 km	1112 m of Distribution line
6	Transmission Lines	18.2 Km	17.835 Km	Gap of 365 m of Gravity line

The main reasons for gaps:

IMPACT DUE TO FLOODS

- Damaged sources.
- The intake chamber at Ghatkhola Spring and filtration unit at Galatigarh Ghadera are damaged due to floods.
- 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 on permanent basis.

OTHER REASONS

15. 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 Existing Water Supply System.

    2. Inappropriate planning
       - No initiative for augmentation of surface water abstraction.

    3. Funds constraint
       - Low budget allocation for water supply rehabilitation

DESCRIPTION OF KEY REHABILITATION AND RECONSTRUCTION ACTIVITIES

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

    I. **Intake Chamber**: New intake chamber to be constructed in Ghatkhola Spring.
    II. **Uttaranchal Koop**: Installation of Uttaranchal Koop in Ghatkhola Gadehera.
    III. **Horizontal Flow Roughing Filter** : Horizontal Flow Roughing Filter to be constructed in Galatigarh Ghadera
    IV. **Clear Water Reservoir** : RCC Clear water Reservoir to be constructed against the damaged Stone Masonry CWR & Steel CWR
    V. **Gravity Line** : Laying of Gravity line 100 mm GI pipe of 5.8 KM & 125 mm GI pipe of 139 m from Tapping Cross wall at Galatigarh Gadhera to 300 KL Steel CWR at Gwalgaon & Gap filling of gravity line with 50 mm Diameter Pipe line between Manakhet CWR to Shishumandir CWR of 365 m.

VI. **Distribution Line :** Laying of Distribution line 50 mm GI Pipe line of 150 m below the boundary of GIC field in place of damaged pipe line & Laying of Distribution line from Manakhet CWR (25 KL) to Gwalgaon (962 m)

VII. **Repair Works :** Repair of Galatigarh Gadhera tapping cross wall

Following topics cover the detailed description of each individual water supply component which is proposed in this Sub-project.

Intake Chamber:

17. The old intake chamber which was constructed on Ghatkhola spring, damaged due to heavy rains. New Intake chamber of 1.5 m X 1.5 m X 2 m has to be constructed to collect the existing spring source.

Uttaranchal Koop

18. This innovation of 'Uttaranchal Koop' also named as 'French well' is based on river bank filtration technique which obtains water from aquifers, which are layers of sand and gravel near the banks of rivers that contain underground water. Uttaranchal Koop is a hollow cylindrical steel pipe with radical perforated pipes, connected with welded outlet socket at the middle of a vertical cylinder for joining outlet pipe; a 1 to 1.5 m long pipe is placed vertically 3 to 4 m below the bed of stream with the open end at the bottom and close end at the top.The device is placed over the impermeable strata of streams tapping the entire alluvial field. After placing the Koop, the space graded filter media envelops the Koop up to the natural bed level of the stream. The base flow of the stream rises inside the cylindrical pipe through its open end and perforated radial pipes due to hydrostatic pressure of the submerged surface and maintains a static level in the cylindrical pipe. The outlet socket, placed almost at the middle of the Koop is connected to the 'gravity-main' of the water supply scheme.The gravity main starts drawing water from the Koop. The static level of the well is maintained through hydrostatic pressure, thus a continuous flow is obtained. Hence we are proposing Uttaranchal Koop at Ghatkhola Gadhera.

Horizontal Flow Roughing Filter

19. Slow Sand Filters are located at Galatigarh Gadhera near Cross wall. Existing Slow sand filters have been discarded due to flood damage in june 2013 and proposing a Horizontal Flow Roughing Filter of dimension 6.1 m X 30 m at the same location. Horizontal Flow Roughing Filters have six chambers i.e., Inlet chamber, Gravel I chamber, Gravel II chamber, Gravel III chamber, Sand Chamber and outlet chamber. The outlet of the outlet chamber is connected to the proposed gravity main. The raw water runs in horizontal direction from the inlet chamber through a series of differently graded filter material separated by perforated walls to the filter outlet. Drainage facilities, such as perforated pipes, allow hydraulic filter bed cleaning. These drainage systems are placed at the filter bottom perpendicular to the direction of flow. The diameter of the Perforated pipes is 100 mm P.V.C. The perforated pipes are kept at each Filter chamber (4 Perforated pipes). All the perforated pipes are connected to washout chamber of size 1 m X 1 m. Sluice Valves have been installed before the inlet chamber; Scour Valves have been installed at the exit of 4 perforated pipes. During Filter drainage, scour valves have been opened at perforated pipes. Back washing water is collected at the washout

chamber. During Filter drainage open the valve at bye pass pipe and by pass arrangements had been made to divert the flow directly connected to the outlet chamber of Horizontal flow roughing filter.

Clear Water Reservoir:

- Demolition of Damaged 25 KL stone masonry CWR and Construction of 25 KL RCC CWR at Manakhet
- Demolition of Damaged 50 KL stone masonry CWR and Construction of 50 KL RCC CWR at Ghatkhola
- Demolition of Damaged 300 KL Steel CWR and Construction of 300 KL RCC CWR at Gwalgaon

Gravity Mains:

- Gap filling of gravity line with 50 mm GI Pipe line between Manakhet CWR to Shishumandir CWR of 365 m.
- Laying of New Gravity Main 125 mm GI Pipe of 139 m from Tapping Cross wall at Galatigarh Ghadera to Horizontal Flow Roughing Filter
- Laying of New Gravity Main 100 mm GI Pipe of 5800 m from Tapping Cross wall at Galatigarh Ghadera to 300 KL Gwalgaon CWR
- Scour valves and Air valves to be installed.

Distribution Mains:

- Proposed Distribution Main from Manakhet CWR to Gwalgoan 0f 962 m.
- Proposed Distribution line 50 mm GI Pipe line of 150 m below the boundary of GIC field in place of damaged pipe line

Repair works:

- Gadhera tapping works on Galatigarh Gadhera have been damaged due to heavy rains. The cross wall has to be repaired

IV. DESCRIPTION OF THE ENVIRONMENT

A. Physical Environment

20. This section presents a brief description of the existing environment, including its physical, ecological resources, and socio-economic development of Sub project of Dharchula. 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 rehabilitation of water supply system in Dharchula 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

21. 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.

Figure IV-1 Districts of Uttarakhand

22. 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 Garwhal 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.

23. 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

24. Topography – Dharchula is the town and a nagar panchayat in Pithorgarh district in the Kumaon region and lies between 29°84'N Latitude and 80°54'E Longitude. The town is surrounded by very high mountains and situated in a valley on the banks of the Kali River at 915 m. River Kali is the western boundary of Nepal with india. The area of town is 15.19 Sq. Km.

25. The Dharchula Formation is dominantly represented by rocks of the calcareous facies together with rocks of the argillaceous facies. It conformably overlies the Hatsila Formation but at a number of places the contact is tectonic; either marked by a fault or local shears. Marked dolomistisation and recystallisation is a common feature of the limestone.

26. 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 Uttranchal Koop – 1 Samples
2. Location of Construction of Reservoir – 3 samples
3. Location of Construction of Horizontal Flow Roughing Filter – 1 sample
4. Within the city limits where pipe laying will be done – 4 Samples
5. Construction Camp/ storage yard – 1 Samples
6. Location of labour camp – 1 samples

B. Climate and Meteorology

27. 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.

28. 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.

29. 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.

30. 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.

31. In Dharchula, Summers are warm and shiny, whereas the winters are cold. Average annual temperature varies from 5°C to 33.5°C. Average annual rainfall recorded is approx. 261 mm.

C. Ambient Air Quality

32. 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.

33. 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 Horizontal Flow Roughing Filter – 1 Samples
2. Location of construction of Reservoir – 3 Samples
3. Within the city limits where pipe laying will be done – 1 Samples

D. Ambient Noise Level

34. 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 Dharchula.

35. 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.

36. 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 Horizontal Flow Roughing Filter – 1 Samples
2. Location of construction of Reservoir – 3 Samples
3. Within the city limits where pipe laying will be done – 1 Samples
4. Near Construction Camp – 1 Samples

E. Hydrology

37. 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.

38. 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 and decrease in base flow water in channels and rivers.
- Extensive soil erosion and landslips are recurring phenomena in the region.

39. The Sub-project is located on the Kali River is Dharchula (see Appendix 1. Rapid Environmental Assessment Checklist).

Water Drainage

40. 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.

41. 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

42. The Dharchula City situated on the bank of Kali River. The raw and treated water quality during construction will be monitored. Construction debris will be disposed away from the source.

43. 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.

44. 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. Proposed subproject is not expected to have any adverse impact on the surface water quality. 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. At the Tapping cross wall of Galatigarh Ghadera – 1 Samples
    2. At the Uttaranchal Koop of Ghatkhola Ghadera – 1 Samples

F. Seismology

45. 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.

46. 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

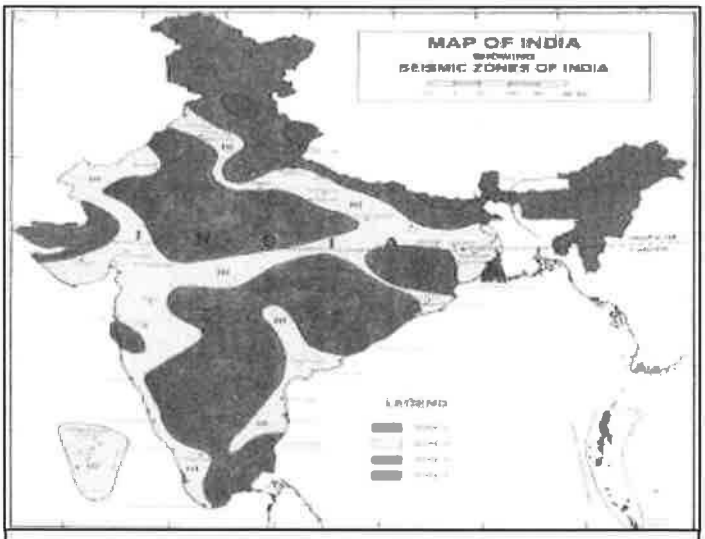


Figure IV-2 Seismic Zone of India

is IX. The succeeding Figure shows the seismic zones of India.

G. Ecology

Forestry

47. 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 km^2 where Madhya Pradesh, Arunachal Pradesh, and Chhatishgarh leads with 77,700; 67,353; 55,870 km2, respectively.

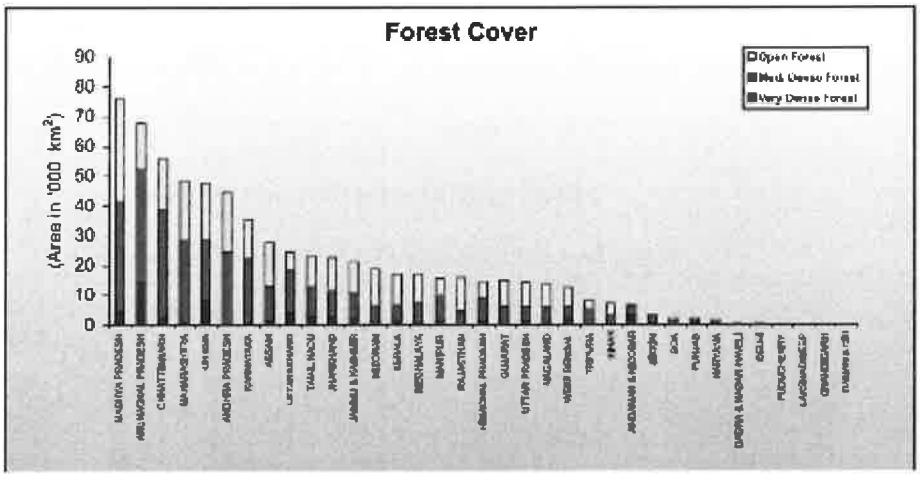


Figure IV-3
Forest Cover by State, 2007 (FSI, 2009)

48. 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 km^2. 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.

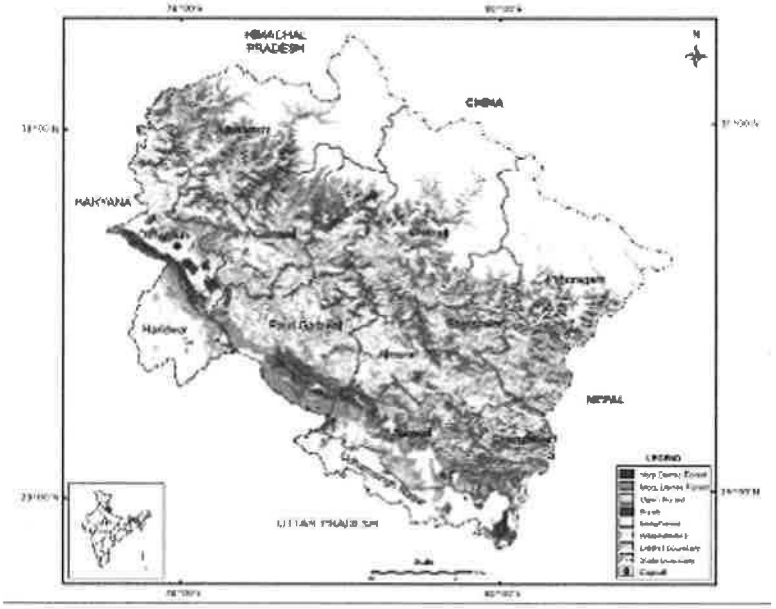


Figure IV-4
Uttarakhand's Forest Cover Map

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
	Udham Singh 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%						

49. 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 Decidous Forest, and Tropical Decidous Forests accounting for 37.15%, 28.81%, 19.08%, and 6.46%, respectively.

50. 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 *Kalpvriksha* 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.

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

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	*Bauhinia variegata*	600-900
2.	Cheed	Chir Pine	*Pinus roxburghii*	600-900
3.	Shal tree	Shal tree	*Shorea robusta*	600-750
4.	Banj	Oak tree	*Quercus incana*	1700-2000
5.	Kail	Blue pine	*Pinus wallichiana*	1800-2400
6.	Buransh	Rose tree	*Rhododendron arboretum*	200-2100
7.	Deodar	Cedar tree	*Cedrus deodara*	1800-2400
8.	Raga	Himalayan fir-low level	*Abies pindrow*	2100-2900
10.	Raga	Himalayan fir-high level	*Abies spectabilis*	2900-3600
11.	Spruce	Spruce	*Picea smithiana*	2400-2900
12.	Thuner	Himalayan Yew	*Texus baccata*	2400-2700
13.	Surai	Cypress	*Cupressus torulosa*	2300-2400
14.	Pangar	House Chestnut	*Aesculus indica*	1800-2100
15.	-	Strawberry tree	*Cornus capitata*	2000-2300
16.	Bhojpatra	Betula	*Betula utilis*	3000-3500
17.	Buransh	Rose Wood	*Rhododendron arboreum*	1700-2000
18.	Simaru	Rose Wood	*R. campanulatum*	2200-3000
19.	Moru	Oak tree	*Quercus dilatata*	2000-2500
20.	Kharsu/Khoru	Oak tree	*Quercus semicarpifolia*	2200-2400

Biodiversity

52. 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

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 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

53. 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.

54. 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 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 (sq.km)	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 and 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

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

55. 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.

56. 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

Sr No	Local Name	Scientific Name
Trees		
1.	Buransh	*Rhododendron arboretum*
2.	Deodar	*Cedrus polycarpos*
3.	Chir	*Pinus roxburghii*
4.	Surai	*Cupressus tourulose*
5.	Padam	*Prunus cornuta*
6.	Mehal	*Pyrus pashia*
7.	Otis	*Alnus nepalensis*
8.	Ayar	*Lyonia ovalifolia*
9.	Kafal	*Myrica sapida*
10.	Akhrot	*Juglana regia*
11.	Bhimal	*Grewia optiva*
12.	Ritha	*Sapijdus mukorossi*
13.	Tun	*Toona ciliate*
14.	Nimla	*Ficus auriculata*
15.	Timur	*Zanthoxylum tamala*
16.	Kharik	*Celtis eriocarpa*
17.	Chamkhirik	*Carpinus viminea*
18.	Katmon	*Betula alnoides*
19.	Kajal	*Acer acuminatum*
20.	Katoj	*Castanopsis tribuloides*
21.	Kirmola	*Acer oblongum*

Sr No	Local Name	Scientific Name
22.	Kandru	Ilese dipyrene
23.	Banj	*Quercus semicarpifolia*
Shrubs		
1.	Kala Hisalu	*Rubus lasiocarpus*
2.	Karoz	*Carissa spinarium*
3.	Kobra Plant	*Arisama helleborifollium*
4.	Kandali	*Urtica parviflora*
5.	Satavar	*Asparagus racemosus*
6.	Dudhi	*Hollerrhena antidysentricr*
7.	Bajradanti	*Potentilla fulgens*
8.	Banfasa	*Viola surpans*
9.	Bach	*Acorus calamus*
10.	Nakol	*Urticor dioica*
11.	Patyura	*Pteraacanthus angustifrons*
12.	Dudhia	*Taraxacum officinale*
13.	Vatula	*Flemingia fruticulose*
14.	Belmur	*Flacourtia indica*
15.	Nirghesi	*Delphinium denudatum*
16.	Silfoda	*Bergenia gossypina*
17.	Jula	*Gerbera grassypina*
18.	Jatamasi	*Nardostachys grandiflora*
Grasses		
1.	Dub	*Cynodon dactylon*
2.	Kush	*Sucharum spontanour*
3.	Gol ringal	*Chimonobambusa falcate*
4.	Tachita	*Apluda muticr*
5.	Dev ringal	*Thamnocalamus faclouerі*
6.	Jhugra ringal	*Arundinaria jaunsarensis*
7.	Thamgil	*Thamnocalamus spathiflorus*

Table IV-8 List of Major Fauna

S.. No.	Wild Animals	
	Local Name	**Scientific Name**
1	Guldar	*Panthera Pardus*
2	Kala Bhalu	*Selenarctos thibetanus*
3	Ghural	*Memorhaedus goral*
4	Kakar	*Muntiacus muntjak*
5	Khirao	*Capricornis sumatraensis*
6	Jangli Suar	*Sus-scrofa cristatus*
7	Chitrola	*Martes flarigula*
8	Langoor	*Presbyits entellus*
9	Khargosh	*Lepus nigricollis*
10	Sehi	*Hystrix indica*
11	Gidar	*Canis aureus indicus*
12	Jangli Billi	*Felis chaus*
13	Gilehri	*Eurambulus pennanti*
14	Bandar	*Macaques mulatta*
S. No	**Birds**	
	Local Name	**Scientific Name**
1	Chir Fijent	Catreus wallichii
2	Kalij Fijent	*Lophura Leucomelana*
3	Koklaj Fijent	*Pucrassia macrolophus*

4	Kala Irgal	*Letinaetus makavensis*
5	Karorla	*Urocissa erythsorhyncha*
6	Ullu	*Strix aluco nivicola*
7	Baaj	*Flaco severaus*
8	Kala Titar	*Francolinus francolinus*
9	Papiha	*Cuculus varius*
10	Tota	*Psittacula humalayana*
11	Chakor	*Alectoris graeca chuker*
12	Hariyal	*Treron spenura*
13	Pashchimi Tregopan	*Tragopan meloccephalus*
14	Bulbul	*Pyconotus cafer*
15	Maina	*Aerioctheres tristis*
16	Fakhta	*Streptobelia orientalis meena*
17	Gidh	*Gyps himalayensis*
18	Kauwa	*Carvus macrornynchos*
19	Saat Bahen	*Teyrdoides striatus*
20	Neelkanth	*Garrulus Lanaclatus*

Biosphere Reserves

57. 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*, N*ardostachys 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

58. 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. Noteable animals seen in the par 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).

59. 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*.

60. 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.

61. 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

62. 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.

63. 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.

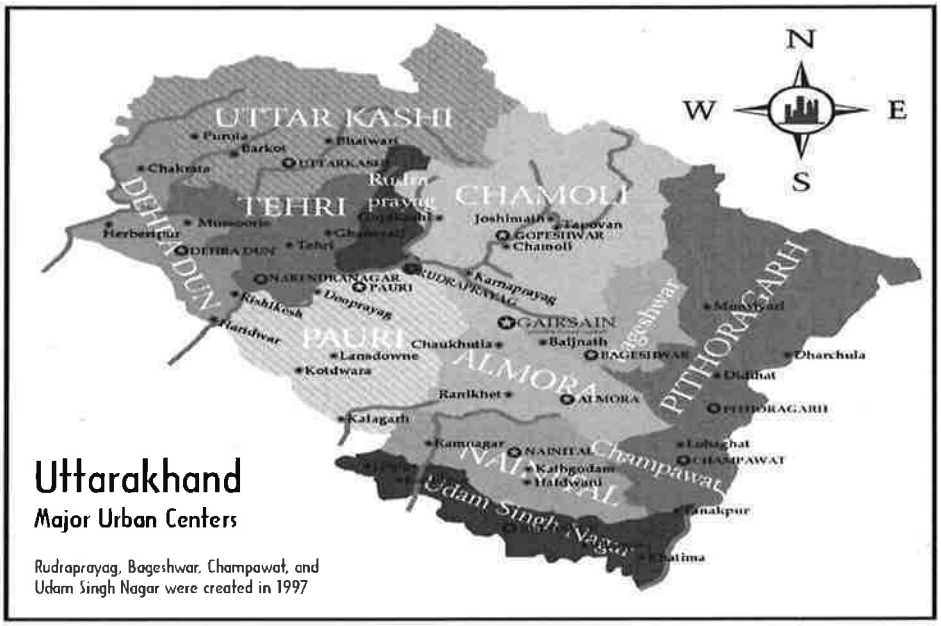


Figure IV-5
Uttarakhand Major Urban Centers

64. 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 per sq.km.—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%.

65. 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

66. 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.

67. 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

68. 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

S.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

69. 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

70. 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 suceeding 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

71. 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

72. 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. Baikunth Chaturdasi Mela is a famous fair celeberated in Dharchula. On the other hand, major fairs and festivals in the Kumaon region consist of Uttarayani Mela, Shravan Mela (Jageshwar), Kartik Poornima at Dwarahat, Kasar Devi fair, and Nanda Devi melas.

73. 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.

Economic Development :Transportation and Communication

74. 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.

75. 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.

76. 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

77. 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.

78. 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

79. 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

80. 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

81. Water supply infrastructure was screened using the ADB's rapid environmental assessment (REA) checklist for Water Supply.

i) The individual environmental screening checklist is provided in Appendix 1 of this report.
ii) **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.
iii) **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.

82. 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	Pre-Construction Stage	Construction Stage	Operation Stage
1.	**Physical Environment**	No Impact	No Impact	No Impact
	Geography	No Impact	No Impact	No Impact
	Topography, Geology and Soils	No Impact	No Impact	No Impact
2.	**Climate and Meteorology**	No Impact	No Impact	No Impact
3.	**Ambient Air Quality**	No Impact	Reversible and Insignificant	No Impact

			during Construction Stage	
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 and Cultural Development	No Impact	No Impact	No Impact
	Land Use and Land Use Pattern	No Impact	No Impact	No Impact
	Health	No Impact	No Impact	No Impact
	Literacy	No Impact	No Impact	No Impact
	Transportation and 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 and Tourism**	No Impact	No Impact	No Impact

B. Impact and mitigation measure during planning and design phase

83. 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 Dharchula .

84. Impacts on Climate. Ambient Air Qaulity, Noise Level, Seismic, Economic, Cultural and Aesthetics are insignificant in the planning and design stage.

Environmental Attributes and 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 being 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 reflective materials on site.
Lack of sufficient planning to assure long term sustainability of the improvements	Design will include provisions for ensuring effective maintenance and protection of the

and ensure protection of the assets created and the architectural/archaeological character of the surroundings	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	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 and in compliance with relevant legislation
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.
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	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.
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.
Slope protection near reservoir	Retaining wall will constructed near reservoir

C. Impacts and Mitigation Measures during Construction Phase

85. 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

86. 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

87. The project components do not have impact on the climate and meteorology of Dharchula.

Ambient Air Quality

88. 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

89. The operation of construction vehicles and equipments will generate noise. Since this operation will be located and limited to the construction site. The breaking 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

90. 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.

91. 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	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..

	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. Location for stockyards for construction materials shall be identified at least 300m away from watercourses. 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. Sewage management though septic tanks and solid waste management though local ULB system or other alternate measures.
Impacts due to poor supply of poor drinking water to the workers involved in construction.	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.
Impacts on waste disposal from the construction site and construction camp.	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. Contractor shall ensure that waste shall not be disposed off near the water course or agricultural land, Orchards and Natural Habitats like Grasslands.
Impacts on local environmenment due to loss of natural resource of earth due to poor storage.	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.

Impacts due to construction traffic on access to Site	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. 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. 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
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. The Contractor shall obtain materials from approved quarries only after consent of the Department of Mines and Geology and District Administration. 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.
Impacts on increased load on water supply source due to construction work.	The contractor shall use ground/surface water as a source of water for the construction with the written consent from the concerned Department. 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.

	The Contractor shall provide a list of locations and type of sources from where water for construction shall be extracted. 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.
Imapcts due to Soil/land Erosion	Slope protection measures will be undertaken as per design to control soil erosion. 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 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. 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.
Water Pollution from Construction Wastes	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. 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 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.
Water Pollution from Fuel and Lubricants	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.
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 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
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
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.
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.
Material Handling at Site	Workers Employed on mixing cement, lime mortars, concrete etc., will be provided with protective footwear and protective masks and goggles. Workers, who are engaged in welding works, will be provided with welder's protective eye-shields. Workers engaged in stone breaking activities will be provided with protective goggles, masks, and clothing. Stockpiles shall not be situated such that they obstruct natural water pathways. Stockpiles shall not exceed 2m in height

	unless otherwise permitted by the Engineer. 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. All concrete mixing must take place on a designated, impermeable surface The use of any toxic chemical will be strictly in accordance with the manufacturer's instructions and applicable regulations. 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.
Damage, and disturbance to other infrastructure in the construction site	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 Realign pipelines, if required and subsequently revise IEE Provide public information in case of service disruptions
Disposal of Construction Waste / Debris / Cut Material	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.
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.

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.
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 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.

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.
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.

D. Impacts during Operation Phase

Impact on Environmental Conditions due to operation of water supply system	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.
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. Sewage generated will be handled by the prevalent existing sewage management system of the town.
Algal Growth in Reservoir	Proper and regular cleaning of reservoir & provision of bleaching shall be ensured. Water sourced from Horizontal Roughing Filter will be stored in Reservoir and chlorination will be done in the reservoir.
Risk of contamination in water.	Chlorine should be added in sufficient quantity so that residual chlorine within permissible limit is available in pipeline.
Impacts due to Backwash water & Sludge generation in Water Treatment plant	Backwash water and clarifier sludge will be disposed in line with the guideline issued by UEPPCB.

Management of Chlorine stock	Chlorine stock shall be maintained in cool, dark and locked rooms, near the reservoir/treatment site and be handled with proper care and under safety measure.
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.
Chlorination in water 1. Chlorination through Chlorine solution 2. Chlorination through Chlorine Gas	• Chlorination in water will be done as per CPHEEO manual and ensure residual chlorination within permissible limit. • Regular laboratory testing for dosing and residual chlorine • Chlorine tank will be stored on impermeable platform with facility of collection of accidental leakage. • Gas Chlorination – the storage of Chlorine gas in HDPE drums. • Gas Chlorination through chlorine tunnel in covered room and controlled by chlorinator, • Provision of leak detector and alarm in the chlorination room. • Provision of Eye bath and emergency shower facility near the gas chlorination.

E. Economic Development

92. 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

93. The Public Consultation and Focussed Group Discussions had been held at PWD Guest House, Dharchula on 13/05/2013. The details are shown in Appendix II.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.

94. 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.

95. 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.

96. 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

~~G.~~B. Future consultation and Disclosure

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

~~H.~~C. Consultation during Detailed Design

98. 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.

99. 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.

100. 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

101. 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.

102. 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

103. 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.

104. For the benefit of the community the IEE will be 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.

105. 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

106. 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.

~~VI.~~VIII. ENVIRONMENTAL MANAGEMENT PLAN

~~.~~A. ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN (EMMP)

107. 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.

108. 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.

109. 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]

110. 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.

[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."*

Institutional Arrangements

111. 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.

112. 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.

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

114. 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 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 UEAPPMU & 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.

115. 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.

116. 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).

A. Environment Management

117. 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.

118. 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

119. The contractor will identify and seek prior approval of the engineer for quarryingoperations. 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.

120. 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.

121. 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

122. 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

123. 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.

124. 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

125. 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.

126. The Contractor shall monitor the environmental parameters periodically as specified in the monitoring plan and report to the Engineer.

127. The Contractor shall reduce the dust emission due to construction activities by regular water sprinkling in the affected areas.

128. 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.

129. All the construction equipment and vehicles should remain all time in good conditions up to satisfaction of site engineers.

130. 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

131. 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.

132. 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

~~134.~~133. 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.

~~135.~~134. 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

~~136.~~135. 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.

~~137.~~136. 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.

~~138.~~137. 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 wastes including bituminous wastes	Random checks	Contractor
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	Random checks	Contractor

Indicators	Parameters to be Monitored	Frequency	Responsibility
	sprinkling (log books to be maintained)		
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 clearance of site	Physical field verification and Satisfaction certificate from owner: Whether temporary locations for workers camp, site office, batching plant and other construction locations are restored	Post construction	Contractor

Indicators	Parameters to be Monitored	Frequency	Responsibility
	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

~~139.~~138. 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.

~~140.~~139. 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.

~~141.~~140. 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).

~~142.~~141. 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.

~~143.~~142. 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			2	9,200	18400	
4.	Soil			11	8000	88000	
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	225000	
2	Water quality		Per sample	(2 No of Location X 3 seasons in year 1	9200	55200	

Sl. No.	Particulars	Stages	Unit	Total No.	Rate (INR)	Cost (INR) *	Source of fund
				sample per location)			
3	Noise Levels		Per location	(5 No of Location X 3 seasons in year X 1 sample per location)	5000	75000	
4	Soil			(11 No of Location X 3 seasons in year X 1 sample per location)	8000	264000	
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	(2 No of Location X 3 seasons in year 1 sample per location)	9200	55200	
8	Ambient Noise Quality		Per Sample	(5 No of Location X 3	5000	225000	

Sl. No.	Particulars	Stages	Unit	Total No.	Rate (INR)	Cost (INR) *	Source of fund
				seasons in year X 3 sample per location)			
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			15,000 50,000	1,00,000	PMU/DSC
					Total INR	28,80,800	

~~.~~D. Environmental Monitoring and Reporting

~~144.~~143. 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.

~~145.~~144. Monitoring reports will be posted in a location accessible to the public.

~~146.~~145. 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

	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
.	**Site Establishment and Preliminary Activities Impacts**				
.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/machinaries 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	
.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	Contractor and EE	FPIU, IA & PMU	

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

	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
		mechanical equipment without having been trained by the Contractor			
		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: • No alcohol / drugs to be present on site; • Measures for abatement of noise due to construction related activities and conduct of work force. • 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	Contractor and EE	IA & PMU	

	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
		construction site. No worker may be forced to do work that is potentially dangerous or for what he / she is not trained to do.			
.3	Social Impacts[4]	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).	Environment and Safety officer of Contractor with the Engineer, EE & FPIU	IA & PMU	Contractor
		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	Contractor with the Engineer, EE & FPIU	IA & PMU	
		Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints.	Contractor with the Engineer, EE & FPIU	IA & PMU	
		Storage facilities, elevated tanks and other temporary structures on site shall be located such that they have as little visual impact on	Engineer and EE	IA & PMU	

[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.

	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
		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 being the form of shade cloth , temporary walls, or other suitable materials prior to the beginning of construction.	Engineer and EE	IA & PMU	
		Special attention shall be given to the screening of highly reflective materials on site.	EE	IA & PMU	
.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	
.	**Design Impacts and Pre-construction Impacts**				
.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	Engineer, EE and FPIU	IA & PMU	

	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
		project components on the ground.			
.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	Engineer, EE and FPIU	IA & PMU	

	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
		in a sustainable manner and in compliance with relevant legislation			
.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	Engineer, EE and FPIU	Contractor, IA & PMU	

	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
		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.			
.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	
.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	Contractor,	Engineer, EE and FPIU	Contractor

	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
		procedures.as per the rehabilitation plan prepared by the contractor and approved by the EE of DSC.			
.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
.7	Slop protection near reservoir and intake well	Retaining wall will constructed near reservoir and intake well	Contractor	Engineer, EE and FPIU	The co and specificatio is part th bill quantity the contrac
	Construction Impacts				
.1	Construction Camps - Location, Selection, Design and Layout	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. 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	Contractor with the Engineer and EE	FPIU, IA & PMU	

	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
		community. Location for stockyards for construction materials shall be identified at least 300m away from watercourses. 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. Sewage management though septic tanks and solid waste management though local ULB system or other alternate measures.			
.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	Waste disposal	Pre-identified disposal location (identified by Contractor in compliance	Contractor with Engineer	FPIU, IA & PMU	

	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
		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. 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. Contractor shall ensure that waste shall not be disposed off near the water course or agricultural land, Orchards and Natural Habitats like Grasslands.			
.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	
.5	Access to Site	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.	Contractor with Engineer	FPIU, IA & PMU	

	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
		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. 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.			
.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. The Contractor shall obtain materials from approved quarries only after consent of the Department of Mines and Geology and District	Contractor with Engineer	FPIU, IA & PMU	

	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
		Administration. 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.			
.7	Arrangement for Construction Water	The contractor shall use ground/surface water as a source of water for the construction with the written consent from the concerned Department. 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. The Contractor shall provide a list of locations and type of sources from where water for construction shall be extracted. 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.	Contractor with Engineer	FPIU, IA & PMU	
.8	Soil/land Erosion	Slope protection measures will be undertaken as per design to control soil erosion. The Contractor shall not	Contractor with Engineer	FPIU, IA & PMU	

	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
		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 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. 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.			
.9	Water Pollution from Construction Wastes	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. 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	Contractor with Engineer	Engineer, FPIU & PMU	

	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
		(Management, Handling and Transboundary movement) Rules, 2008 and amendments till date and applicable norms 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.			
.10	Water Pollution from Fuel and Lubricants	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	Contractor	EE of DSC, Engineer, FPIU & PMU	

	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
		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.			
.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 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	Contractor	Engineer, FPIU & PMU	
.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	
.13	Emission from Construction Vehicles, Equipment and Machinery	All vehicles, equipment and machinery used for construction shall confirm to the relevant Bureau of India	Contractor	Engineer, FPIU & PMU	

	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
		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.			
.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	Contractor with Engineer	EE, FPIU & PMU	

	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
		BIS/SPCB/CPCB standards Regular monitoring of ambient noise levels to ensure compliance to Uttarakhand Environment Protection & Pollution Control Board standards.			
.15	Material Handling at Site	Workers Employed on mixing cement, lime mortars, concrete etc., will be provided with protective footwear and protective masks and goggles. Workers, who are engaged in welding works, will be provided with welder's protective eye-shields. Workers engaged in stone breaking activities will be provided with protective goggles, masks, and clothing. Stockpiles shall not be situated such that they obstruct natural water pathways. Stockpiles shall not exceed 2m in height unless otherwise permitted by the Engineer. 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	Contractor	Engineer, FPIU & PMU	

	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
		low brick walls around their bases. All concrete mixing must take place on a designated, impermeable surface The use of any toxic chemical will be strictly in accordance with the manufacturer's instructions and applicable regulations. 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.			
.16	Damage, and disturbance to other infrastructure in the construction site	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 Realign pipelines, if required and subsequently revise IEE Provide public information in case of service disruptions	Contractor	Engineer, FPIU & PMU	
.17	Disposal of Construction Waste / Debris / Cut Material	The Contractor shall confirm that Safe disposal of the construction waste will be ensured in the pre-	Contractor	Engineer, FPIU & PMU	

	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
		identified disposal locations. In no case, any construction waste will be disposed around the project site indiscriminately.			
.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	
.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	Contractor	Engineer, FPIU & PMU	

	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
		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.			
.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 temporary structures will be cleared away, all rubbish burnt, excreta or other disposal	Contractor	Engineer, FPIU & PMU	

	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
		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.			
.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	
.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	
.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	Contractor	Engineer, FPIU & PMU	

	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
		officer will be at site till all works related to the project including demobilization are completed.			
	Operation and Maintenance impacts				
.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	
.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. Sewage generated will be handled by the prevalent existing sewage management system of the town.	IA, EA and Jal Sansthan	SDMA PMU & GoUK	
.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. Water	Uttarakhand Jal Sansthan / IA	SDMA PMU & GoUK	

	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
		sourced from WTP will be chlorinated at the WTP only and then stored in the reservoir.			
.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	
.5	Backwash water & Sludge collection	IA shall obtain Consent to Operate for WTPs from UEPPCB as per Water (Prevention and Control of Pollution) Act 1974. Backwash water and clarifier sludge will be disposed in line with the guideline issued by UEPPCB.	Uttarakhand Jal Sansthan / IA	SDMA PMU & GoUK	
.6	Disposal of Sludge form WTPs	IA shall obtain Consent to Operate for WTPs from UEPPCB as per Water (Prevention and Control of Pollution) Act 1974. Backwash water and clarifier sludge will be disposed in line with the guideline issued by UEPPCB.	Uttarakhand Jal Sansthan / IA	SDMA PMU & GoUK	
.7	Management of Chlorine stock	Chlorine stock shall be maintained in cool, dark and locked rooms, near the reservoir/treatment site and be handled with proper care and under safety measure.	Uttarakhand Jal Sansthan / IA	SDMA PMU & GoUK	
.8	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.	IA, Jal Sansthan.	IA/ Jal Sansthan, GoUK.	
.9	Chlorination in water	• Chlorination in water will be	IA	PMU	

	Activity	Management/ Mitigation	Implementation Responsibility	Supervision Responsibility	Fund Source
	3. Chlorination through Chlorine solution 4. Chlorination through Chlorine Gas	done as per CPHEEO manual and ensure residual chlorination within permissible limit. • Regular laboratory testing for dosing and residual chlorine • Chlorine tank will be stored on impermeable platform with facility of collection of accidental leakage. • Gas Chlorination – the storage of Chlorine gas in HDPE drums. • Gas Chlorination through chlorine tunnel in covered room and controlled by chlorinator, • Provision of leak detector and alarm in the chlorination room. • Provision of Eye bath and emergency shower facility near the gas chlorination.			

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

E. Performance Indicator

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

Table VIII-4 Performance Indicators of EMMP

	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
	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			
6.	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.
7.	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.
8.	Grievance redressal	Total number of complaints received, its timeline to response and resolution	Actual number of complaints resolved in percentage, response time.
9.	Issues raised in public	Target to attend the issues raised in the Public	Status of compliance to the

	consultation	Consultation	issues of Public consultation
10.	Information disclosure	List of information and locations where information to be disclosed	Actual locations where information has been disclosed.
11.	Education of site staff on Environmental training	Total Number of staffs to be trained	No of staff actually
12.	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.
13.	Implementation of EMP mitigation Measures	All items of Environmental Management Plan with timeline and its respective regulatory standards like for Amebient air Qaulity – NAAQS, 2009 standards, Drinking water – IS:10500 etc, Residual Chlorine – UEPPCB standards and CPHEEO manual for handling.	Implementation status of EMP items till date
14.	Reporting	List and number of Report to be submitted	List and number of reports submitted

IX. CONCLUSION AND RECOMMENDATION

~~149.~~147. The initial environmental examination describes the environmental impact of all components of subproject of Dharchula. This includes Construction of Intake Chamber,Uttaranchal Koop, Reconstruction of Clear water reservoirs,Horizontal flow roughing filter, Laying of Pipe line.

~~150.~~148. The locations of all project componets are within the Dharchula Town. There is no ecologically sensitive area having intervention with the porect components neither diresctly nor indirectly. No felling of trees envisaged in the project and not having any intervention of cultural or archaeological site.

~~151.~~149. 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

~~152.~~150. 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 Dharchula. 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.

~~153.~~151. The initial environmental examination ascertains that the subject is unlikely to cause anysignificant 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

APPENDIXES

Appendix I Rapid Environmental Assessment Checklist

County/Project Title:- India/Uttarakhand Emergency Assistance Sector Project

Sector/Division:- Water Supply – Dharchula

Screening Question	Current Assessment	Additional Information for Substantiating Assessment
A. Project Siting Is the project area		
• Densely populated?	☒Yes ☐No	The project is proposed within the town limit of Dharchula, which is having average population density of 460 Persons / Sq. Km. Dharchula comes under high population density categorization (national average of high population density of more than 340 Persons/ Sq. Km.
• Heavy with development activities?	☐Yes ☒No	There are no major development activities in the town
• Adjacent to or within any environmentally sensitive areas?	☐Yes ☒No	No
• Cultural heritage site	☐Yes ☒No	No
• Protected area	☐Yes ☒No	No
• Wetland	☐Yes ☒No	No
• Mangrove	☐Yes ☒No	No
• Estuarine	☐Yes ☒No	No
• Buffer zone of protected area	☐Yes ☒No	No
• Special area for protecting biodiversity	☐Yes ☒No	No

Screening Question	Current Assessment	Additional Information for Substantiating Assessment
• Bay	☐Yes ☒No	No
Potential Environmental Impacts Will the Project cause...		
• Pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff?	☐Yes ☒No	There is no pollution Sources from existing systems.
• Impairment of historical / cultural monuments / areas and loss / damage to these sites?	☐Yes ☒No	There are no historical / cultural monuments in the project area.
• Hazard of land subsidence caused by excessive ground water pumping?	☐Yes ☒No	The source of water supply is surface sources only(comprises of small streams and springs)
• Social conflicts arising from displacement of communities?	☐Yes ☒No	The project will not lead to displacement of communities.
• Conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters?	☐Yes ☒No	There are no conflicts are anticipated.
• Unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)?	☐Yes ☒No	Raw water is fit for drinking after filtration and disinfection, because dharchula have two types of source i.e., springs and streams. Water from springs can be used for direct supply and water from streams have been proposed a horizontal flow roughing filter
• Delivery of unsafe water to distribution system?	☐Yes ☒No	No
• Inadequate protection of intake works or wells, leading to pollution of water supply?	☐Yes ☒No	In take works will be protected against flooding by constructing protection works.
• Over pumping of ground water, leading to salinization and ground subsidence?	☐Yes ☒No	No ground water is proposed to be abstracted.
• Excessive algal growth in storage reservoir?	☐Yes ☒No	Regular cleaning of storage reservoir shall be ensured to avoid algal growth in the reservoir.
• Increase in production of	☐Yes	No sewerage facilities as of now

Screening Question	Current Assessment	Additional Information for Substantiating Assessment
sewage beyond capabilities of community facilities?	☒No	
• Inadequate disposal of sludge from water treatment plants?	☐Yes ☒No	No WTP have been proposed in this sub project
• Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities?	☐Yes ☒No	No Pumping and treatment plants have been proposed in this sub project
• Impairments associated with transmission lines and access roads?	☐Yes ☒No	No new transmission lines are proposed. Because the source is very limited and major source of Dharchula town was small streams and springs, we are already using the limited sources. The major river of the town is river kali and being the part of international boundary with the Nepal. That's why we are not proposing additional sources. The scope of the sub-project is only Rehabilitation and Reconstruction.
• Health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals.	☐Yes ☒No	Liquid Chlorine has been proposed for disinfection of water.
• Health and safety hazards to workers from the management of chlorine used for disinfection and other contaminants?	☐Yes ☒No	Trained operator will operate the chlorination system. Proper precautionary measures will be taken.
• Dislocation or involuntary resettlement of people	☐Yes ☒No	No displacement of people is anticipated.
• Social conflicts between construction workers from other areas and community workers?	☐Yes ☒No	No such impact anticipated, because of local workers shall be employed as much as possible in the vicinity of the project.
• Noise and dust from construction activities?	☐Yes ☒No	All Constructions are proposed manually and away from populated area. Hence noise & dust will not affect due to construction activities.
• Continuing soil erosion / silt runoff from construction operations?	☐Yes ☒No	Construction work during monsoon shall be carried out with due care so that silt run off due to construction operation is prevented. No construction will be allowed during rains.
• Increased road traffic due to interference of construction	☐Yes	Chances of little traffic-disturbance are anticipated, that will be managed through

Screening Question	Current Assessment	Additional Information for Substantiating Assessment
activities?	☒No	diversion routes.
• Delivery of unsafe water due to poor O&M treatment processes (especially mud accumulations in filters) and inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems?	☐Yes ☒No	Only filter units are proposed in this sub project. However trained and skilled staff will be deployed for O&M.
• Delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals?	☐Yes ☒No	GI pipes will be used for distribution system and are non corrosive in nature.
• Accidental leakage of chlorine gas?	☐Yes ☒No	No
• Excessive abstraction of water affecting downstream water users?	☐Yes ☒No	Abstraction will remain same since project does not involves augmentation of source works.
• Competing uses of water?	☐Yes ☒No	No
• Increased sewage flow due to increased water supply	☐Yes ☒No	There is no augmentation of source works but only rehabilitation.
• Increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater treatment plant	☐Yes ☒No	As above
▪ Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply systems)?	☐Yes ☒No	No such impact anticipated; local communities in the vicinity of the project would be employed as much as possible.
▪ 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	☐Yes ☒No	Not applicable. Construction will not involve use of explosives and chemicals.

Screening Question	Current Assessment	Additional Information for Substantiating Assessment
construction?		
▪ 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?	☐Yes ☒No	Operational area will be clearly demarcated and access will be controlled. Only worker and project concerned members will be allowed to visit the operational sites.

Climate Change and Disaster Risk Questions **The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.**	**Yes**	**No**	**Remarks**
• Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes	√		According to hazard zoning in the Vulnerability Atlas of India, the whole of Uttarakhand falls under "very high" to "high" category earthquake zone. Any facilities will require compliance with government rules for seismic design in hilly areas.
• 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)?		√	No such possibility
• 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.

As per Uttarakhand Emergency Assistance Project (RRP IND 47229), Environmental Assessment and Framework, C Anticipated Environmental Impacts, Categorized B. On the basis of point 33 Environmental Classification, After Screening by the respective IA and or the EA, duly endorsed REA checklist will be submitted to ADB for review and for ADB's confirmation of the environmental classification of each subproject.

Assessment checklist on the Categorization and Planning Requirement for this subproject?

☐ **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 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
Name of the Block: Dharchula
Name of the District: Pithoragarh
Distance from the District Head Quarter: 83 Km
Date & time of Consultation :-13.05.2013, 2:00-4:00 PM

Location : - 1. At PWD Guest House, Dharchula

Sr. No.	Key issues/Demands	Perception of community	Action to be Taken
1.	Awareness of the project – including Project Coverage area	Only few people are aware of the project. They appreciated the efforts of the Government in development of such infrastructures in the town and feel that the project will bring overall socioeconomic status	Awareness programme and disclosure of Information is a part of sub-project. An NGO is appointed for this program.
2.	In what way they may associate with the project	Sufficient numbers of labours are available in and around the Dharchula town who can be engaged for different construction works. Tractors or dumpers can also be hired locally. Local residents should also be involved in Construction work.	Engagement of Local labours may be encouraged during construction. Possibilities of engaging the local population in laying of pipeline may be explored in the sub-project
3.	Presence of any forest, wild life or any sensitive/ unique environmental components nearby the project	No forest land comes in the vicinity of our project area.	Adequate preventive measures required to be incorporated in the project to avoid all sensitive components.
4	Presence of historical/cultural/ religious sites nearby	No Historical/cultural/religious sites comes in the sub project	Adequate preventive measures required to be incorporated in the project to avoid all sensitive components.
5	Un favorable climatic condition	The temperature during summer is 5-15 °C and in Winter at around18 °C-33.5 ° C	Proper rest shed, water supply and first aid box to be provided at work site. Scheduling of works should be adjusted according to the climatic condition
6	Occurrence of flood	A heavy rain is observed in month of June – August and it becomes very difficult to work during this season. Flood was occurred in the year 2013.	All preventive measures should be taken in monsoon season and working schedule should be maintained as per seasonal conditions.
7	Drainage and sewerage problem facing	Presently there is a problem of drainage and sewerage in this area.	Sewerage problem will be solved after the commencing of Sewerage Project. While it was informed by Nagar Panchayat that a drainage plan for the city has been sent by them to

Sr. No.	Key issues/Demands	Perception of community	Action to be Taken
			Uttarakhand Govt, still to be approved.
8	Present drinking water problem- quantity and quality	Galatigarh Stream, Ghatkhola Stream,Binkana,Ghatkhola,Phul Basti Spring is the source of Water Supply and water quality is good. In some of the area there is scarcity of water.	This is a part of Drinking Water Supply Sub-Project
9	Present solid waste collection and disposal problem	At present there is no designated site for solid waste disposal. There is a major problem of collection & disposal of solid waste. The solid waste is disposed to open land and that waste creates odour and mosquitoes generation.	While it was informed by Nagar Panchayat that a Solid Waste Management plan for the city has been sent by them to Uttarakhand Govt, still to be approved.
10	Availability of Labour during construction time	Sufficient labours are available in this town.	
11	Access road to project site	The proposed project is along the road. There will be no congestion over this road.	
12	Perception of villagers on tree felling	No Trees are fells outside the actual alignment	In case of any Tree felling, will provide 3 Plants will be planted at the cost of cutting of one plant
13	Dust and noise pollution and disturbances during construction work	Dust and Noise pollution should be controlled during construction activity.	Contractor should provide all preventive measures to control the Dust and Noise during construction work.
14	Setting up worker camp site within the village/ project locality	The people of nearby village want that workers should be engaged from nearby villages for different construction activities. However they agreed to cooperate with the project authority for setting up worker camp near the work site.	Proper attention will be taken
15	Safety of residents during construction phase and applying of vehicle for construction activities	Locals feel that all safety measures would be taken for public safety during construction phase.	Contractor should appoint a safety officer to encounter the Public as well as workers safety during construction phase.
16	Whether local people agreed to sacrifice their lands (cultivable of not) for beneficial project after getting proper compensation	Local people agreed to give their own land if there is need for the project. However adequate compensation should be paid according to prevailing market rate in advance in consultation with the local people.	No acquisition of private land proposed in the sub-project

List of Participants - Public Consultation & Focused Group Discussions

Public Consultation & Focused Group Discussions (Socio-Economic and Environmental)
Uttarakhand Emergency Assistance Project: Water Supply Scheme : Dharchula
Date: 13/05/14

Sl. No	Name of the Participant	Occupation	Signature (If agreed by the participants)	
1	श्रीमती दुर्गा देवी धौर	अध्यक्ष नगरपंचायत	दुर्गा देवी धौर	7579 444325
2	Neeraj Tewari	RE DSC-II	Neeraj	
3	Kailash Rawat	Pradhan B.C.C.		9412901888
4	[illegible]	[illegible]		9456 762253
5	Jitendra Dhanik	JJ		9458222097
6	K. S. Kunwar	J.E. NBO		9458306138
7	Gopal Singh Dhami	Exo Man		7579279647 → 9456733167
8	जीवन राम	मजदूर	जीवन राम	
9	देव सिंह	मजदूर	देव सिंह	
10	मोहन सिंह	ग्रामीण		
11	वीर राम	ग्राम धारकोट		
12	भगत सिंह	ग्रामीण		
13	[illegible]	ग्रा. धारकोट		
14	Harish	"		
15	[illegible]	ग्रामीण		
16	जगत राम	ग्रा० धा०	जगत राम	
17	[illegible]	[illegible]		9410971367
18	Trivendra, Joshi	J.E, UJS Dharchula		7579053131

Photographs of Public Consultation

Appendix III Photographs

Plate -1-Tapping Cross wall at Galatigarh Gadhera

Plate -2- Slow Sand Filter at Galatigarh Gadhera

Plate -3- 300 KL at Gwalgaon

Plate -4-25 KL CWR at Shishu Mandir

Plate -5-35 KL CWR at Shishu Mandir

Plate -6- 50 KL CWR and 25 KL CWR Pipes are interconnected at Ghatkhola.