Initial Environment Examination

Project Number: 47229-001
July 2017
Part A: Main Report (Pages 1 - 118) and Annexures (Pages 119 – 131)

IND: Uttarakhand Emergency Assistance Project (UEAP)

Package: Supply, Installation & Commissioning of Sewage Treatment Plants (STPs) and Installation of Solar Street Lights at various TRHs in Disaster Affected Districts of Pithoragarh & Bageshwar of Kumaon Region, Uttarakhand

Submitted by

Project implementation Unit –UEAP, Tourism (Kumaon), Nainital

Asian Development Bank

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GM/AS

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UNDER DEPARTMENT OF TOURISM, GOVERNMENT OF UTTARAKHAND

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Letter No: 1922 /PIU/UEAP(T)/KMVN/2017 Dated 3 – July,2017

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To,
The Country Director,
INRM, ADB
4, San Matrin Marg,
Chankyapuri
New Delhi 110021, India

Reference : ADB Loan No. 3055- IND, UEAP(Tourism Sector),
Package No.: UK/UEAP-T(KMVN)/NTL/13/Lot 1P & Lot 2B

Subject : Supply, Installation and Commissioning of Sewage Treatment Plant (STP) at Various Tourist Rest Houses (TRHs) in Disaster affected Districts of Pithoragarh and Bageshwar of Uttarakhand for Tourism(KMVN) under UEAP

Dear Sir,

Please find enclosed herewith the submission of "Initial Environmental Examination Report" (IEE) for Supply, Installation and Commissioning of Sewage Treatment Plant (STP) at Various Tourist Rest Houses (TRHs) in Disaster affected Districts of Pithoragarh and Bageshwar of Uttarakhand under tourism of Uttarakhand Emergency Assistance Project for your kind perusal & approval.

(Dhiraj S. Garbyal)
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(Program Manager)
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ADB

Project Number: 3055-IND June: 2017

IND: Uttarakhand Emergency Assistance Project

Submitted by

Project Implementation Unit, Tourism (Kumaon), UEAP

This report has been submitted to ADB by the Project implementation Unit, UEAP, Kumaon Mandal Vikas Nigam, Dehradun **and is made publicly available in accordance with ADB's** public communications policy (2011). It does not necessarily reflect the views of ADB.

Asian Development Bank

Initial Environmental Examination

June: 2017

India: **Uttarakhand Emergency Assistance Project (UEAP): - Supply, Installation & Commissioning of Sewage Treatment Plants (STPs) and Installation of Solar Street Lights at various TRHs in Disaster Affected Districts of Pithoragarh & Bageshwar of Kumaon Region, Uttarakhand**

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	Biochemical Oxygen Demand
CO	Carbon Monoxide
CFE	Consent for Establishment
CH_4	Methane
CFO	Consent for Operation
DO	Dissolved 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
KMVN	Kumaon Mandal Vikas Nigam
Leq	Sound level
Mg	Milligram
MFF	Multitranche Financing Facility
MoEF & CC	Ministry of Environment, Forests & Climate Change
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 Department
PIU	Project Implementation Unit
RCC	Reinforced Cement Concrete
RoW	Right of Way
RSPM	Respirable Suspended Particulate Matter
RP	Resettlement Plan
SEIAA	State Environment Impact Assessment Authority
SPCB	State Pollution Control Board
UEPPCB	Uttarakhand Environmental Protection and Pollution Control Board

SS	Suspended Solids
SBR	Sequential Batch Reactor
UEAP	Uttarakhand Emergency Assistance Project
UJS	Uttarakhand Jal Sanasthan
SPM	Suspended Particulate Matter
SO_2	Sulphur dioxide
ST	Scheduled Tribes
SC	Scheduled Castes
SOP	Standard Operational Procedures
UDD	Urban Development Department
UJS	Uttaranchal Jal Sansthan
U.P	Uttar Pradesh
UPCL	Uttaranchal Power Corporation Limited

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**
=		**10^{-6} meter**
µg/m^3	**-**	**micrograms per cubic meter**
=S/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 Saryu. 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. Tourism was worst hit in the state with destruction of tourism infrastructure on one hand and loss of livelihoods on the other. The tragedy besides claiming thousands of lives badly hit the industry stakeholders especially, those involved in religious and adventure tourism on account of the major portion of the season of the chardham yatra being washed out. According to estimates from the Uttarakhand Hotel and Restaurant Association, the floods washed away over 100 small hotels which were constructed right on the riverbanks. Uttarakhand Tourism Department' Assets run by Kumaon Mandal Vikas Nigam (KMVN) and public toilets located in various locations suffered heavy damages due to flash floods incessant rain and landslides. The tragedy also brought realization that the mushrooming of hotels along river banks was triggered by tourist boom and contrary shortage of accommodation / dwelling units to meet the ever-increasing numbers of tourists. This also contributed to the mushrooming of illegal structures, some of which were constructed right on the riverbanks.
4. In compliance with the order issued by The National Green Tribunal, Principal Bench, New Delhi dated 19.07.2016 and subsequent office order no. UEPPCB/HO/Gen-256/2016/862-193 dated 03.05.2016 of Uttarakhand Pollution Control Board, conventional sewage system of septic tank and soak pit in various TRHs are to be replaced by environment friendly Sewage Treatment Plants (STP).The objective of installation of STPs in various TRHs is to replace existing septic tanks and soak pits with Environment Friendly Sewage Treatment Plant of appropriate capacity, as the STP disposes off the sewage in more efficient and Eco friendly manner.
5. India is endowed with abundant of solar radiation. The country receives solar radiation equivalent to more than 5,000 trillion KWH/year, which is far more than its total annual energy requirement. At present conventional Street light system is being used for campus lighting at KMVN TRHs. It

is proposed to install Solar Street Lights at following TRHs run by KMVN, with the objective of saving the power consumption and reduction in electricity bills.

6. Consistent with the Environmental Assessment and Review Framework, the proposed subproject were screened using ADB rapid environmental assessment (REA) checklist-General (Tourism). All impacts are site specific; few are irreversible and can be readily mitigated supporting an environmental Category 'B' classification.
7. **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 Bageshwar and Pithoragarh town. The baseline of air quality and noise level will be generated before commencement of the construction.
8. **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 IV & V.
9. **Forest.** Uttarakhand is ranked 9th in all-India in terms of forest covered area with 24,508 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.
10. **Sensitive Ecosystem:** The subproject location does not fall within any sensitive ecosystem except for Baijnath site for which PIU tourism has secured permission from Secretary, Cultural Department for undertaking the proposed works at Baijnath, which is at a distance of 256m from an ASI protected site vide letter no. 758/ PIU-KMVN dated 30/3/17.
11. The subproject involves installation supply and commissioning of STP and installation of solar lights at various TRH's.
12. **Significant Environmental Impacts and Proposed Mitigation Measures.** No environmental impacts related to citing 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.
13. **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.

14. **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.

I. Introduction

A. Project Background/Rationale

15. 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 Saryu. 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)

16. 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.

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 (WB). ADB agreed to assist the Government of India (GOI) with reconstruction and rehabilitation efforts for which the Uttarakhand Emergency Assistance (Sector) Project (UEASP) has been formulated as a multi-sector emergency loan in sector loan modality. The executing agency (EA) for the UEASP will be Government of Uttarakhand (GOU) and State Disaster Management Authority (SDMA). The primary implementing agencies (IA) will be Public Works Department (PWD) for roads, bridges, urban road, and trekking routes including eco-trails Department of Tourism (DOT) through Kumaon Mandal Vikas Nigam Limited, and Garhwal Mandal Vikas Nigam Limited for tourism infrastructure, Uttarakhand Civil Aviation Development Authority (UCADA) for helipads; and Uttarakhand Jal Sansthan (UJS) for urban water supply, or any successor hereto.

C. Purpose of the Environmental Assessment

17. 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 minimize the adverse environmental impacts, if any, associated with construction and operation.

Initial environmental examination (IEE) has four basic objectives; (i) asses relevant potential impacts and risks associated with the proposed reconstruction and rehabilitation of damaged tourism assets, (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

18. IEE was conducted based on preliminary Detailed Design Report (DPR). The IEE covers all activities proposed under the project. The corridor of impact is taken as direct impact of the installation of STP and solar lights 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.

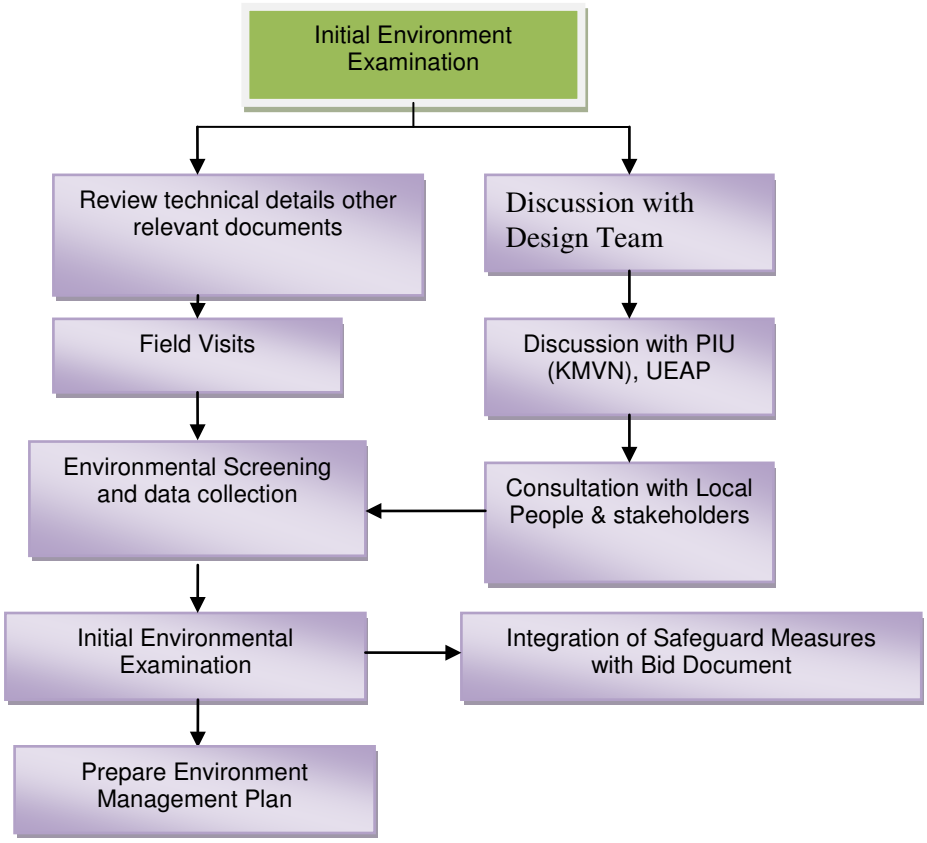
E. IEE Contents

19. 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.

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

F. Methodology

20. 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.



Process flow for carrying out IEE

G. Public Consultation

21. Extensive consultations were held with all stakeholders's that includes: local residents, govt. 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

22. 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/ Notification/guideline and Application to the proposed project	Concerned Agency	Applicable to contract package	Responsibility	Status of Compliance
	A. Pre -Construction Stage					
1.	Environment Clearance	EIA Notification, 2006 amended till date, promulgated under Environment (Protection) Act 1986 The Notification and its latest amendment entails requirement of prior environmental clearance to the projects listed in schedule of this notification	State Environmental Impact Assessment Authority (SEIAA). If not constituted then MoEF	No	F-PIU, KMVN	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 and 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.	District Level Committee constituted by the State Govt.	No	F-PIU, KMVN	Not required

S. No	Clearances	Acts/rules/ Notification/guideline and Application to the proposed project	Concerned Agency	Applicable to contract package	Responsibility	Status of Compliance
3.	Permission for working in protected area	The Indian Wildlife (Protection) Act, 1972, amended 1993, The Wild Life (Protection) Amendment Act, 2002. This Act provides guidelines for protection of Wild animals, birds and plants and for matters connected therewith or ancillary or incidental there to. It also states the norms for hunting of wild animals, prohibition of picking, uprooting, etc., of specified plants. The Act deals with the declaration of area as Sanctuary, National Park, and closed area and also states the restriction of entire in the sanctuary.		No	F-PIU, KMVN	
4.	Permission for working in protected area.	The Ancient Monuments and Archaeological Sites and Remains Act, 1958, and the rules, 1959 provide guidance for carrying out activities, including conservation, construction and reuse in and around the protected monuments.		No	F-PIU, KMVN	Permision secured from Secretary, Department of Culture, Govt. of Uttarakhand for the Baijnath Site, not required for the other sites
	B. Construction Phase					
1	1. Discharge of waste water	The Water (Prevention and Control of Pollution) Act 1974 and The Water (Prevention and Control of Pollution) Rules 1975 The Act and Rules outlines the activities which are prohibited on account of their potential to cause water pollution. Pollution from various sources need to be controlled as per this Act and rules.	Uttarakhand Environmental Protection and Pollution Control Board (UEPPCB)	No	Contractor	Not Required
2.	Permission for Sand Mining from river bed	Mines and Minerals (Regulation and Development) Act, 1957 as amended in 1972.	Directorate of Mining and Geology, Uttarakhand	No	Contractor	Not Required

S. No	Clearances	Acts/rules/ Notification/guideline and Application to the proposed project	Concerned Agency	Applicable to contract package	Responsibility	Status of Compliance
3.	Consents to Establish & operate STP Crushers, Batching	Air (Prevention and Control of Pollution) Act 1981	UEPPCB	Yes	F-PIU KMVN	Consent to operate will be obtained from UEPPCB
4.	Authorization for Disposal of Hazardous Waste	Hazardous Waste (Management and Handling) Rules 1989 as amended 2003	UEPPCB	No	Contractor	Not Required
5	Consent for Disposal of Sewage from Labour camps	Water (Prevention and Control of Pollution) Act 1974	UEPPCB	No	Contractor	Not Required
6.	Use of Fly ash within 100 kms around Thermal Power plant	Fly Ash Notification, 1999 as amended up to 17th August 2003:	MOEF and CC	No	Contractor	Not Required
7.	Pollution Under Control Certificate	Central Motor and Vehicle Act 1988	Department of Transport, Govt. of Uttarakhand	Yes	Contractor	
8.	Installation of Generators	The Air (Prev. & Con. of Pollution) Act, 1980	UEPPCB	No	Contractor	
9	Employing Labour/workers	The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996.	District Labour Commissioner	Yes	Contractor	

S. No	Clearances	Acts/rules/ Notification/guideline and Application to the proposed project	Concerned Agency	Applicable to contract package	Responsibility	Status of Compliance
10	Permission for extraction of boulder and sand from river	Mines & Minerals (Regulation and Development) Act, 1957 and its amended in 1972	Directorate of Mining and Geology, Uttarakhand	No	Contractor	
11..	License for Storing Diesel and other explosive.	Petroleum Rules, 2002. Hazardous Waste (Management and Handling) Rules 1989.	Commissioner Explosives	No	Contractor	
	C. Implementation Stage					
12	Consent to Establish & Consent to Operate	The Air (Prev. & Con. of Pollution) Act, 1980, Water Prevention and Control of Pollution) Act 1974.	Yes, it is applicable for sewerage Treatment Plant	Yes	F-PIU KMVN	Consent to operate will be obtained from UEPPCB

III DESCRIPTION OF THE PROJECT

District Pithoragarh

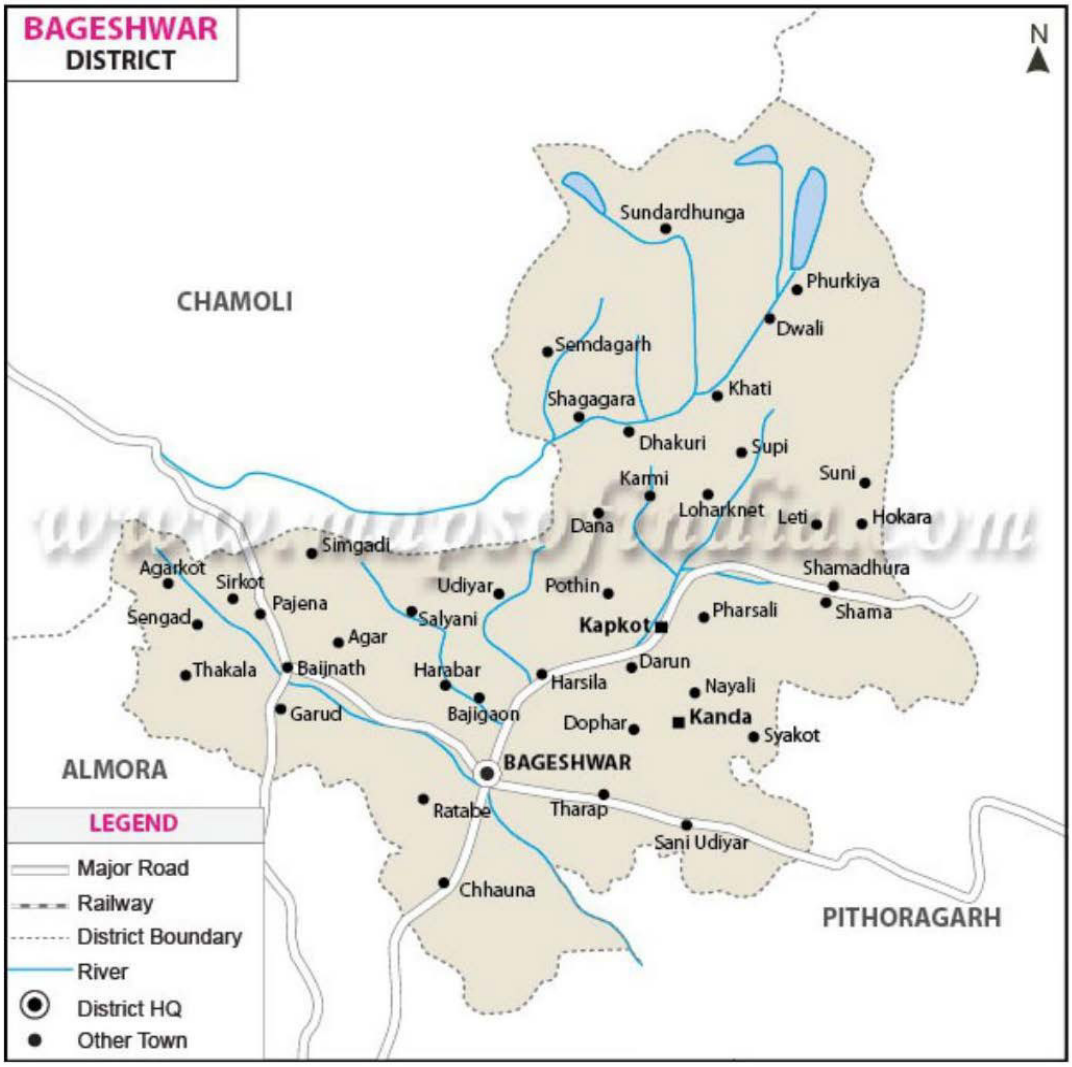
24. Pithoragarh is the easternmost Himalayan district in the state of Uttarakhand, India and was carved out of the district of Almora in 1960. Pithoragarh is located at 29.58°N 80.22°E. It has an average elevation of 1,514 metres (4,967 feet). The Tibet plateau is situated to the north and Nepal is to the east. The Kali River originates from Kalapaani and flows south, forming the eastern border with Nepal. The Hindu pilgrimage route for Mount Kailash-Lake Manasarovar passes through this district via Lipulekh Pass in the greater Himalayas.

25. The district is named after its headquarters town, Pithoragarh. Tradition has it that during the reign of the Chand Rajas of Kumaon, one Piru, also called Prithvi Gosain, built a fort here and named it Prithvigarh which in the course of time, got changed into Pithoragarh.

Map of District Pithoragarh

District Bageshwar

26. Bageshwar district is in the eastern Kumaon region of Uttarakhand, and is bounded on the west and northwest by Chamoli District, on the northeast and east by Pithoragarh District, and on the south by Almora District. Area of bageshwar 2,302 km2 (889 sq mt). Bageshwar is divided in four Tehsils,viz., Bageshwar--comprising 415 inhabited villages; 2) Kanda (with 180 inhabited villages); 3) Kapkot having 156 villages; and Garur having 197 revenue villages. The Abode of Gods'is an important Pilgrims and tourist center. It is located about 90 kms from Almora on the Confluence of the rivers Saryu and gomti. The town is famous for ancient Bagnath Temple and annual Uttaraini fair held in January. The beautiful town is also a delight for adventuers sports lovers.The famous Pindari, Sunder Dhunga and Kafni glaciers can be reached via Bageshwar.



Map of District Bageshwar

A. Project Location

i. Sewage Treatment Plant

Sl.No.	NAME OF TRH	BED CAPACITY	REQ. CAP. In KLD
	DISTRICT Pithoragarh		
1	Pithoragarh	36	5 KLD
2	Didihat	32	5 KLD
3	Gangolihat	14	5 KLD
4	Patalbhuwneshwar	12	5 KLD
5	Dharchula	42	10 KLD
6	Munsiyari	48	10 KLD
7	Chokori	60	10 KLD
8	Birthi	30	5 KLD
9	Thal	16	5 KLD
	DISTRICT BAGESHWAR		
10	Bageshwar	34	5 KLD
11	Baijnath	18	5 KLD
12	Kausani	60	10 KLD
13	Loharkhet	25	5 KLD

ii. Solar Lights

Sl.No.	NAME OF TRH	BED CAPACITY	REQ. SOLAR LIGHTS (In Nos.)
	DISTRICT Pithoragarh		
1	Pithoragarh	36	10
2	Didihat	32	6
3	Gangolihat	14	6
4	Patalbhuwneshwar	12	5
5	Dharchula	42	5
6	Munsiyari	48	8
7	Chokori	60	15
8	Birthi	30	10
	DISTRICT BAGESHWAR		
9	Bageshwar	34	10
10	Baijnath	18	8
11	Kausani	60	25
12	Khati	20	6
13	Dwali	20	6
14	Kathalia	8	4
15	Jaitoli	8	4
16	Loharkhet	25	6
17	Dhakuri	20	6

B. Proposed Category of the Project

23. Pursuant to the requirements of the ADB Safeguard Policy Statement (2009) proposed installation of Sewage Treatment Plant and Solar lights in Districts Pithoragarh and Bageshwar were screened to identify significance of potential impacts, determine the environmentally sensitive component, establish the needed level of assessment, and prescribe the information disclosure and consultations requirement to be complied by the KMVN consistent with the Environmental Assessment and Review Framework, the subproject was screened using the ADB rapid environmental assessment (REA) checklist- General (Tourism).

24. The environmental screening revealed that no protected or sensitive areas were traversed for 17 sites. There are no rare, threatened, and endangered species (flora and fauna) within the subproject corridor of impact. All impacts are site specific, and all impacts can be readily mitigated supporting a category B classification.

C. Background of the Proposed Sub-project

25. Tourism was worst hit in the state with destruction of tourism infrastructure on one hand and loss of livelihoods on the other due to heavy rains in June, 2013. The monsoon in June 2013 arrived almost two weeks earlier than expected in Uttarakhand. During June 15 to 17, 2013, cloud bursts and heavy (64.5 - 124.4 mm) to very heavy rainfall (124.5 – 244.4 mm) hit several parts of the higher reaches of the Himalayas in the State of Uttarakhand. This unprecedented rainfall resulted in a sudden increase in water levels giving rise to flash floods in Kosi, Kali, Gori Ramganga East, Saryu and Pinder other river basins and also caused extensive landslides at various locations. Adding to this, continuous rains and melting of the Pindari glacier caused rise in water levels of the Pinder River. The lake's weak moraine barrier gave way and a huge volume of water along with large glacial boulders came down the channel to the east devastating Sirkha, Gala, sausa mangti other places in its wake. According to official sources, over 7000 people were affected by the event in the state. The numerous landslides and toe erosion by the sediment loaded rivers caused breaching of roads/State highways at many locations and washed away several bridges (steel girder bridges, beam bridges, suspension/cable bridges). Traffic was disrupted along all national highways and link roads along with the disruption of telecommunication lines, all adding to the impact of the disaster. Pithoragarh and Bageshwar districts were badly affected by June- 2013 disaster. Some hotels, rest houses and shops along the river banks were partially destroyed and badly affecting the entire tourism chain in Uttarakhand.

26. The tragedy besides claiming thousands lives badly hit the industry stakeholders especially, those involved in Religious and Adventure Tourism on account of the major portion

of the season of the Kailash Mansarover yatra and Adi kailash Yatra being partially washed out. The tragedy also brought realization that the mushrooming of hotels along river banks was triggered by tourist boom and contrary shortage of accommodation/dwelling units to meet the ever-increasing numbers of tourists. This also contributed to the mushrooming of illegal structures, some of which were constructed right on the river banks.

27. As a part of Tourism Restoration Drive, it was decided by the Govt. of Uttarakhand that Uttarkhand Tourism Department's Assets (camps) in the route of Kailash Mansrover Yatra run by K.M.V.N., in Pithoragarh District and Pindari Glacier route in Bageshwar District which were partially damaged during disaster June 2013 be reconstructed /Restored/Rehabilitated so as to compensate for the loss of tourist accommodation and to provide improved accommodation facilities to the tourist / pilgrims visiting the shrine Kailash Mansarover Yatra and Pindari Glacier Trek route Camp. Now it is proposed to take up installation of Sewage Treatment Plants and Solar lights in the TRH's of District Bageshwar and Pithoragarh. The following assets run by KMVN are proposed to be undertaken for installation of Sewage Treatment Plants and Solar Street Light.

D. Sub project Description

28. **Pithoragarh:** Pithoragarh is a small town, which gives its name to the district. It lies in the centre of the western half of the Soar Valley which resembles the Kashmir valley on a miniature scale. The view from some of the higher altitudes in Pithoragarh captures the snow-capped peaks of Panchachulhi, Nanda Devi and Nanda Kot.The town is set in a valley popularly known as "Soar" (root meaning is Cool) and lies in the centre of four hills Chandak, Dhwaj, Kumdar and Thal Kedar, and stretches in the southern flank to Jhulaghat demarcated by the Kali river adjoining the barren peaks of Nepal Hills. Pithoragarh is known as the gateway to the Himalayas from the north, as pilgrims trek through this town to the Kailash, Lake Manasarovar, and Om Parvat.

29. It is proposed to replace the existing system of sewage disposal of septic tank and soak pit with the STP of 5 KLD capacity and to install 10 nos. 20 watts solar street lights at 36 bedded KMVN TRH for lighting of premises.

Pithoragarh TRH

30. **Didihat**: It is a deep Himalayan tourist destination situated 54 km from Pithoragarh. The small hilly town is full of pure natural beauty with lush green flora at an altitude of 1725 m. Didihat is situated on the hill top plain of 'Digtarh' and river Charamgad or Bhadigad streaming below. Below the town there is a fertile 'Haat valley'. In Didihat the famous temple (mandir) is known as Sirakot (Malaynath Mandir) of Lord Shiva (Bholenath). Another famous mandir is situated in the top hill of the Nanpaupu village is well known as Dechula. Clear view of Himalayan snow-capped peaks is observed from this place especially Panchachuli and Trishul.

31. It is proposed to replace the existing system of sewage disposal of septic tank and soak pit with the STP of 5 KLD capacity and to install 06 nos. 20 watts solar street lights at 32 bedded KMVN TRH for lighting of premises.

TRH DIDIHAT

32. **Dharchula:** An ancient trading town for the trans-Himalayan trade routes, it is surrounded by very high mountains and is situated in a valley, on the banks of the Kali River at 915 m (3,002 ft) elevation. The Kali is the western boundary of Nepal with India. Nepalese and Indian nationals cross unrestricted, however there is a customs checkpoint for goods. Dharchula lies about 83 km northerly of Pithoragarh along the route of the Kailash-Mansarovar pilgrimage tour. The name of the town may originate from the Hindi words for "mountain peak" (*dhar*) and

"stove" (*chulha*) because the valley in which it lies resembles a stove. The town is situated in a beautiful valley at 915 m elevation and is 83 km from its district headquarters, Pithoragarh.

33. It is proposed to replace the existing system of sewage disposal of septic tank and soak pit with the STP of 10 KLD capacity and to install 5 nos. 20 watts solar street lights at 3 bedded KMVN TRH for lighting of premises.

TRH DHARCHULA

VIEW OF PARKING ROAD

34. **Gangolihat:** It is a place 77 km from Pithoragarh at Gangolihat, famous for an ancient Temple of Goddess Kali-Mother Deity of Indian Army's Kumaon Regiment. Hatkalika Temple was established by Sankaracharya as a Mahakali Shakti Peeth at Gangolihat.

35. It is proposed to replace the existing system of sewage disposal of septic tank and soak pit with the STP of 5 KLD capacity and to install 06 nos. 20 watts solar street lights at 14 bedded KMVN TRH for lighting of premises.

TRH GANGOLIHAT

36. **Patalbhuneshwar:** At a distance of 14 km from Gangolihat, there is a village located in Tehsil Didihat, named Bhubneshwar, where beautiful underground cave of Patal Bhubaneshwar, the subterranean shrine of Lord Shiva is situated with sprawling interiors exist. Limestone rock formations have created various spectacular stalactite and stalagmite figures. This cave has

narrow tunnel like opening which leads to a number of caves. The cave is fully electrically illuminated.

37. It is proposed to replace the existing system of sewage disposal of septic tank and soak pit with the STP of 5 KLD capacity and to install 05 nos. 20 watts solar street lights at 12 bedded KMVN TRH for lighting of premises.

T.R.H PATALBHUVANESHWAR

38. **Munsyari:** Its name refers to a 'place with snow'. Situated on the banks of Goriganga River, it is a fast-growing tourist destination, and mountaineers, glacier enthusiasts, high altitude trekkers and nature lovers commonly use it as their hub or base camp. Munsyari also falls on the ancient salt route from Tibet and is at the entrance of the Johar Valley, which extends along the path of the Goriganga River to its source at the Milam Glacier. It is inhabited mainly by the Shauka tribe. The town is surrounded by snow-capped peaks, with a key attraction being the trekking route to Khalia Top.

39. It is proposed to replace the existing system of sewage disposal of septic tank and soak pit with the STP of 10 KLD capacity and to install 08 nos. 20 watts solar street lights at 48 bedded KMVN TRH for lighting of premises.

T.R.H MUNSYARI

40. **Chaukori:** Chaukori is a hill station in the Pithoragarh District set among the lofty peaks of the western Himalayan range in the Kumaon division of Uttarakhand, India. Chaukori is located in

Berinag tehsil of Pithoragarh district. It is situated 10km away from sub-district headquarter Berinag and 86km away from district headquarter Pithoragarh. Chaukori's elevation is 2010 m with spectacular panoramic views of the snowy peaks of Nanda Devi, Nanda Kot and the Panchchuli group.

41. It is proposed to replace the existing system of sewage disposal of septic tank and soak pit with the STP of 10 KLD capacity and to install 15 nos. 20 watts solar street lights at 60 bedded KMVN TRH for lighting of premises.

TRH CHAUKORI

42. **Birthi:** Birthi falls is located about 14 Km from Tejam, near Munsiyari in Pithoragarh District Uttarakhand. The Cascading Fall surge from 400 feet above sea level and can also be reached from Kalamuni pass. The Birthi falls is about 35 Km's from Munsiyari and can be approached easily by a short trek.

43. It is proposed to replace the existing system of sewage disposal of septic tank and soak pit with the STP of 5 KLD capacity and to install 10 nos. 20 watts solar street lights at 30 bedded KMVN TRH for lighting of premises.

TRH Birthi

44. **Thal:** Thal is a village in Berinag Tehsil in Pithoragarh district of Uttarakhand State, India. It is located 32 Km towards North from District head quarters Pithoragarh and 7 Kms from Berinag.

It is proposed to replace the existing system of sewage disposal of septic tank and soak pit with the STP of 5 KLD capacity at 16 bedded KMVN TRH.

Proposed Project Area in the district Bageshwar

45. **Bageshwar:** Bageshwar is a district of Uttarakhand state in northern India. The town of Bageshwar is the district headquarters and is in the eastern Kumaon region of Uttarakhand, and is bounded on the west and northwest by Chamoli District, on the northeast and east by Pithoragarh District, and on the south by Almora District.

46. It is proposed to replace the existing system of sewage disposal of septic tank and soak pit in the 34 bedded TRH at Bageshwar. A STP of 5 KLD capacity and installation of 10 nos. 20 watts solar street lights for lighting of premises is proposed.

TRH Bageshwar

47. **Kausani:** Kausani is located 52 Km north of Almora. There are very few places in the Himalayas that can compare with the beauty of Kausani - a picturesque hill station famous for its scenic splendour and its spectacular 300 km-wide panoramic view of Himalayan peaks like Trisul, Nanda Devi and Panchchuli. Kausani lies atop a ridge at an altitude of around 1890 m amidst dense pine trees overlooking Someshwar valley on one side and Garur and Baijnath Katyuri valley on the other. Mahatma Gandhi called this place the 'Switzerland of India', due to similarity in landscape.

48. It is proposed to replace the existing system of sewage disposal of septic tank and soak pit with the STP of 10 KLD capacity and to install 25 nos. 20 watts solar street lights at 60 bedded KMVN TRH for lighting of premises.

TRH KAUSANI

49. **Baijnath:** Baijnath has remained the capital of Katyuri Kings, who ruled the area from 7th-11th century AD then it was known as Kartikeyapura and lies in the centre of 'Katyur' valley; in 1901. There is a famous Baijnath Mandir (Lord Shiva) on the bank of the river which is said to have been built by the Kumaon Katyuri king in around 1150 A.D. and it was capital of the Katyuri dynasty of kings who ruled Uttarakhand during 12th and 13th century, also the town of Baijnath draws its name from the temple. Situated on the left bank of the Gomti River at an elevation of 1126 mts, the temples are constructed in stone.

50. It is proposed to replace the existing system of sewage disposal of septic tank and soak pit with the STP of 5 KLD capacity and to install 08 nos. 20 watts solar street lights at 18 bedded KMVN TRH for lighting of premises.

TRH BAIJNATH

51. **Khati:** Khati is a village panchayat located in the Bageshwar district of Uttarakhand state, India. Khati village is located in Kapkot Tehsil of Bageshwar district in Uttarakhand, India. It is situated 35km away from sub-district headquarter Kapkot and 59km away from district headquarter Bageshwar. It is proposed to install 06 nos. 20 watts solar street lights at 20 bedded KMVN TRH for lighting of premises.

TRH KHATI

52. **Dwali:** Dwali is a small village located in Bageshwar of Bageshwar district, Uttarakhand with total 18 families residing. In 2011, literacy rate of Dwali village was 68.00 % compared to 78.82 % of Uttarakhand. The male literacy stands at 90.48 % while female literacy rate was 51.72 %. It is proposed to install 06 nos. 20 watts solar street lights at 20 bedded KMVN TRH for lighting of premises.

TRH Dwali

53. **Kathaliya:** Kathalia is a halt on the famous pindari glacier trek route situated at an elevation of 3206 mtrs. Kathalia is the last inhabited village enroute sunderdhunga glacier. It is proposed to install 04 nos. 20 watts solar street lights at 8 bedded KMVN TRH for lighting of premises.

CAMP KATHALIA

54. **Jatoli:** Jatoli is a halt on the famous pindari glacier trek route situated at an elevation of 2440 mtrs. Jatoli can be reached after a trek of 15 km from Dhakuri- Khati- Jaitoli. It is proposed to install 04 nos. 20 watts solar street lights at 8 bedded KMVN TRH for lighting of premises

TRH JATOLI

55. **Loharkhet:** Loharkhet is situated at an elevation of 1760mtrs and is the first step towards the pindari glacier trek route and kafni glacier trek route. The trek from here is easy but quite steep and goes through dense forest. It is proposed to replace the existing system of sewage disposal of septic tank and soak pit with the STP of 5 KLD capacity and to install 06 nos. 20 watts solar street lights at 25 bedded KMVN TRH for lighting of premises.

TRH LOHARKHET

56. **Dhakuri:** Dhakuri is a very famous halt in the pindari glacier trek route and starts from loharkhet to dhakuri. Dhakuri is situated at an elevation of 2680 mtrs amisdt dense forest. View of snow capped peaks of southern walls of the nanda devi sanctuary is visible from Dhakuri khal. It is proposed to install 06 nos. 20 watts solar street lights at 20 bedded KMVN TRH for lighting of premises.

TRH DHAKURI

E. Project Implementation Schedule

57. The implementation period for the UEAP is around 3 years with a construction period of around 3 years. All UEAP components are expected to be completed by October 2017.

F. Design features

Design Basis

58. The works under the project are proposed to be designed as per norms/directions recommended by Govt. of India, such as BIS, Forest-conservation act, ADB Safeguards Policy (Environment), Union Government's Laws, Policies, and Regulations, State Government's Policies, Safeguards Policy, Indigenous People, forest rulers Policy Principles and Uttarakhand Pollution Control Board etc.

Design Basics, Treatment Scheme & Process

Design Basics:

- Flow rate: 5 m3/day or 0.25 m3/hr.
- Nature of wastewater: Combined Sewage.
- Characteristics of inlet/outlet of STP: (Assumed as Standard Design)

Parameters	Inlet/Raw	Outlet/Treated
pH	6.5 to 8.5	7.0 to 8.5
SS	150-300 mg/l	< 10 mg/l
BOD	200-350 mg/l	< 10mg/l
COD	400-600 mg/l	< 50 mg/l
Oil & Grease	20-50 mg/l	< 5 mg/l

Treatment scheme & process:

- Screening, collection, equalization and transfer of wastewater to FAB/ MBBR reactor.
- Biological treatment of wastewater using FAB/MBBR Media.

- Secondary clarification of biologically treated wastewater using Tube Deck Media.
- Dis-infection of treated water using sodium hypochlorite.
- Optional Filtration of Chlorinated treated water using Sand media filter and carbon filter.
- Reuse of treated water in horticulture, plantation, floor washing, Fountain & Toilet Flushing after followed by Tertiary Treatment.

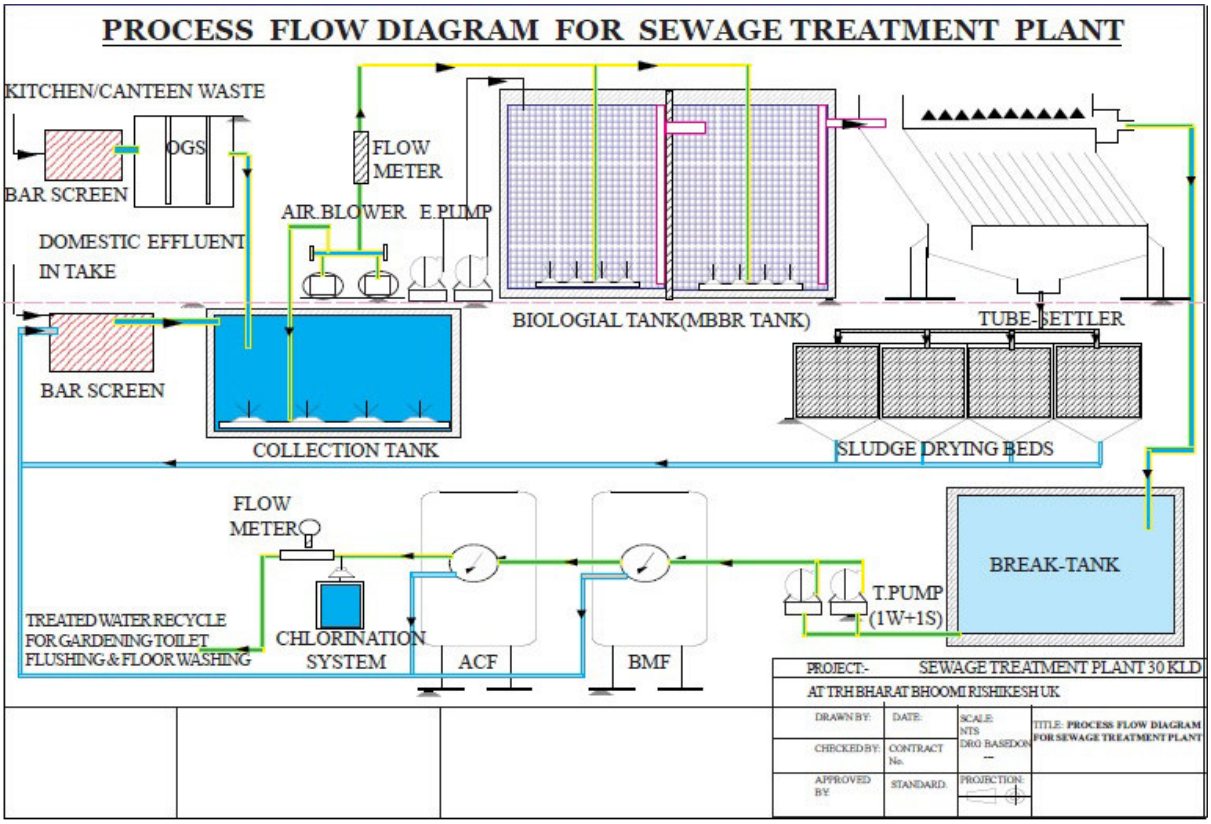
Technical Specifications

1. STP shall be MSEP prefabricated compact package type made of 5mm thick M.S. sheet, smell free and shall consume less power.
2. **Bar Screen**: The Bar Screens of SS materials are considered in the scope for better life. The perforated Bar Screens are considered to get maximum area for trapping of large floatable & rubber, plastic etc. and to avoid the mechanical abrasion of downstream equipments. Two bar screens of 15 mm spacing followed by 10 mm spacing are considered in series. The screens can be easily removed & cleaned as required.
3. **Equalization Tank/Aeration tank**. The tank is to be provided with air distribution piping with adequate number of Coarse Bubble diffusers. Existing S.T shall be used after necessary modification by GMVN.
4. **Fludized aerobic bed reactor:** The reactor tank is provided with Fixed Media of PVC material. The media is in fixed condition. The Sewage Water flows down keeping in contact with media. The air in form of fine bubbles coming from the bottom of tank comes in contact with Water & FAB /MBBR media. The tank is provided with fine bubble non-clog diffusers for the biological oxidation of sewage.
5. Air shall be used in FAB tank and will also be used in collection cum equalization tank to avoid the anaerobic conditions, smell problem and sedimentation of solids in to the tank.
6. **Tube Deck Media Clarifier**: The overflow of FAB/MBBR is to be taken in to the Tube Deck Media Clarifier. The Tube Settler Media in PVC is arranged to facilitate solid liquid separation.
7. **Clarified/Clear Water Tank**: The clear water from Tube Deck Media Clarifier flows in to this tank. A Sodium Hypochlorite solution is dosed in this tank using a metering pump.
8. **Dual Media Filtration & Carbon Filtration System**: The clarified & chlorinated water is to be pumped to Media Filter followed by Carbon Filter to further polish the treated effluent. The Carbon Filter removes colour & odor.
9. All civil work shall be carried out by G.M.V.N. as per site requirement.
10. Metering type dosing pump to have a better control on dosing rate and to avoid the wastage of chemicals to be provided.

Details of mechanical & electrical equipment						
	Description	**Qty**	**Specification**	**5kld**	**Material**	**Make**
A.	Bar screen	2 no	Dimension	300x450mm	SS	Fabricated
			Size	15 mm & 10 mm		
B.	Ogsmechanism alongwith tank	1 no	Design flow	5 kld	PP	Fabricated
			PP syphon along with perforated system	Size4“		
C.	Collection tank	1 no	Capacity	5 kl	Civil	Brick masonry
D.	Effluent pump	2 no	Flow	0.25 m3/hr	SS	Kirloskar/ crompton or equivalent
		(1w+1s)	Head	10 mtr		
			Solid handling capacity	35 mm		
			Motor rating	1 hp		
			Type	Submersible		
E	Air blower	2 no	Capacity	15 m3/hr	CI	Beta/ airvac or equivalent
		(1w+1s)	Head	4kg		
			Motor rating	1 hp		
			Along with all required accessories			
F	Air diffusing system	2 lot	Disc diffuser		Silicon	nrvi/ dollar/ or equivalent
			Qty	2 no		
			Air distribution system	1 no		
			Quadrant distribution along with di aeration system			
			Fine diffuser			
			Qty	02 nos		
			Air distribution system for both tank having di aeration			
G	Mbbr tank I & II		Design capacity	5 kld	MSEP	Fabricated
			mbbr i & ii dimension	2 no		
			Length	1400 mm		
			Width	1000mm		
			Height	1200 mm		
			M.s.plate thickness	5 mm		
			Internal epoxy paint thk	1mm		
			External paint	S.e.		
H	Mbbr media	1 lot	Size	15 mm	PP	Vasu/dollar/ or equivalent
			Height	22 mm		
			Qty	0.7 m3		
I	Tubesettler with internal media	1 lot	Design	5 kld	MSEP	Fabricated
			Dimension		PVC	
			Length	800 mm		
			Width	1000 mm		
			Height	1000mm with hopper		
			Plate thickness	5mm		

			Internal epoxy paint thk	1mm		
			External paint	S.e.		
			Pvc media			
			Type	Hexagonal		
			Dimension	210 x 750 mm		
			Qty	0.5 m3		
I	Clear water pump	2 no	Flow	0.25 m3/hr	CI	Kirloskar/crompton/ or equivalent
		(1w+1s)	Head	28 mtr		
			Type	Mono block		
			Motor rating	0.5 hp		
J	Bimedia filter media	One set	Dia	300 mm	MSEP	Fabricated
			Height	1200 mm		
			Flow	1500 ltr/hr		
			Design pressure	3.5 kg		
			Shell thk	5 mm		
			Dish thk	7 mm		
			Valve type	Multipot		
			Make	Midas		
			Size	1 ½“		
			Media qty	200 kg		
			Four grade of internal media			
K	Actvitedcarbon filter media.	One set	Dia	450 mm	MS	Fabricated
			Height	1800 mm		
			Flow	1500 ltr/hr		
			Design pressure	3.5 kg		
			Shell thk	5 mm		
			Dish thk	7 mm		
			Valve type	Multipot		
			Make	Midas		
			Size	1 ½“		
			Media qty	100 kg		
			Internal media granular activated carbon			
			Iodine value	650		
L	Electro magnetic flow meter	one no	Typeelectro magnetic		CI	Aster/ or equivalent
			Size	1“		
M	On line digital ph meter	One set	Type	Digital	PP	Aster/ or equivalent
			Mounted	On line		
			Range	014		
N	Chlorination system	One set	Qty	01 nos	PVC	Jindal/ sheetal/ or equivalent
			Flow	57 ltr/hr		
			Pressure	3.5 kg3.5 kg		
			Type	Electronic		
			Moc	PP		
			Dosing tank Qty	One no		

0	Pressure gauges	Four set	04kg		SS	H.guru/eq
			Size	4“		
			Gilsyrine filled			
P	Internal pipe & fitting		As per requirement.		UPVC	Prince/ astral/ or equivalent
Q	Electricalpanelalong with accessories	One lot	Dimension	600 x 450 mm	MSPC	mark engg/ or equivalent
			Internal spare l&t/havells			

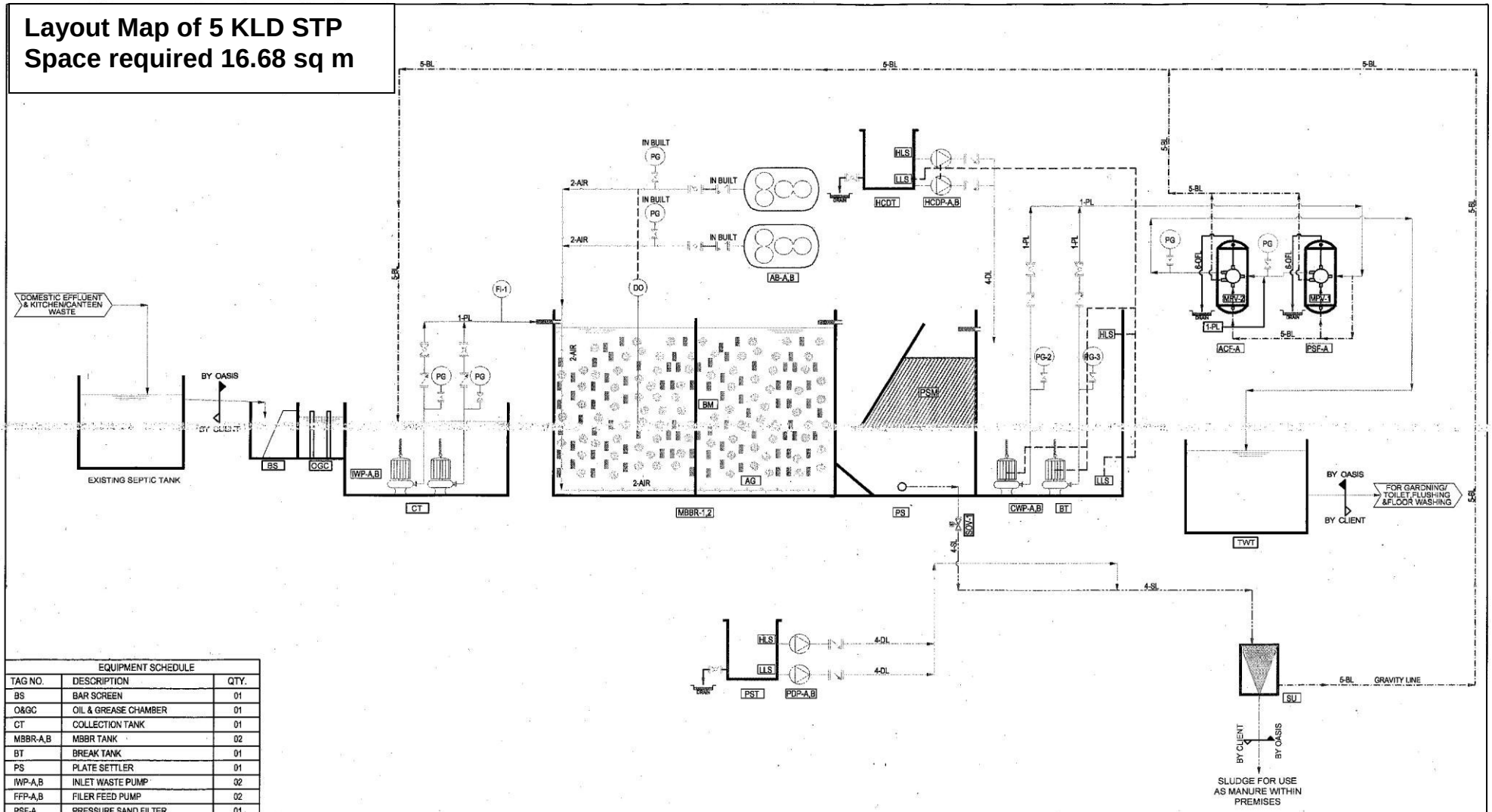


Proposed STP

G. Sludge management and treated sewage disposal

59. Treated water generated from the STPs would meet the disposal standard for BOD, TSS, Fecal coliform etc. The treated water will be collected in storage tanks and be connected by plumbing to all the flush tanks in toilets and to other points where the water can be used for washing yards, floors and also for gardening. Such STPs generate very less sludge. An impermeable layer would be constructed near the STP to collect the generated sludge. The sludge would then be used as manure for horticulture and gardening purposes.

Layout Map of 5 KLD STP
Space required 16.68 sq m



EQUIPMENT SCHEDULE		
TAG NO.	DESCRIPTION	QTY.
BS	BAR SCREEN	01
O&GC	OIL & GREASE CHAMBER	01
CT	COLLECTION TANK	01
MBBR-A,B	MBBR TANK	02
BT	BREAK TANK	01
PS	PLATE SETTLER	01
IWP-A,B	INLET WASTE PUMP	02
FFP-A,B	FILER FEED PUMP	02
PSF-A	PRESSURE SAND FILTER	01
ACF-A	ACTIVATED CARBON FITLER	01
HCDP-A,B	HYPOCHLORIDE DOSING PUMP	02
HCDT	CHLORINE DOSING TANK	01
PDP-A,B	POLYMER DOSING PUMP	02
PST	POLYMER SOLUTION TANK	01
TWT	TREATED WATER TANK	01
AB-A,B	AERATION BLOWER	02
MPV	MULTI PORT VALVE	02
SU	SLUDGE UNIT	01

LINE LEGEND		
1-PL	PROCESS LINE	
2-AIR	AIR LINE	
3-SL	SLUDGE LINE	
4-DL	DOSING LINE	
5-BL	BACKWASH LINE	
6-OFL	OVER FLOW/DRAIN LINE	
	INSTRUMENT INTERLOCK	

INSTRUMENTATION SCHEDULE	
LLS	LOW LEVEL SWITCH
HLS	HIGH LEVEL SWITCH
PG	PRESSURE GAUGE
FI	FLOW INDICATOR
DO	DISSOLVED OXYGEN

SYMBOL LEGEND	
	BUTTERFLY VALVE
	NON RETURN VALVE
	BALL VALVE
	SOLENOID VALVE

REV.	DATE	DESCRIPTION

Jr. Engineer

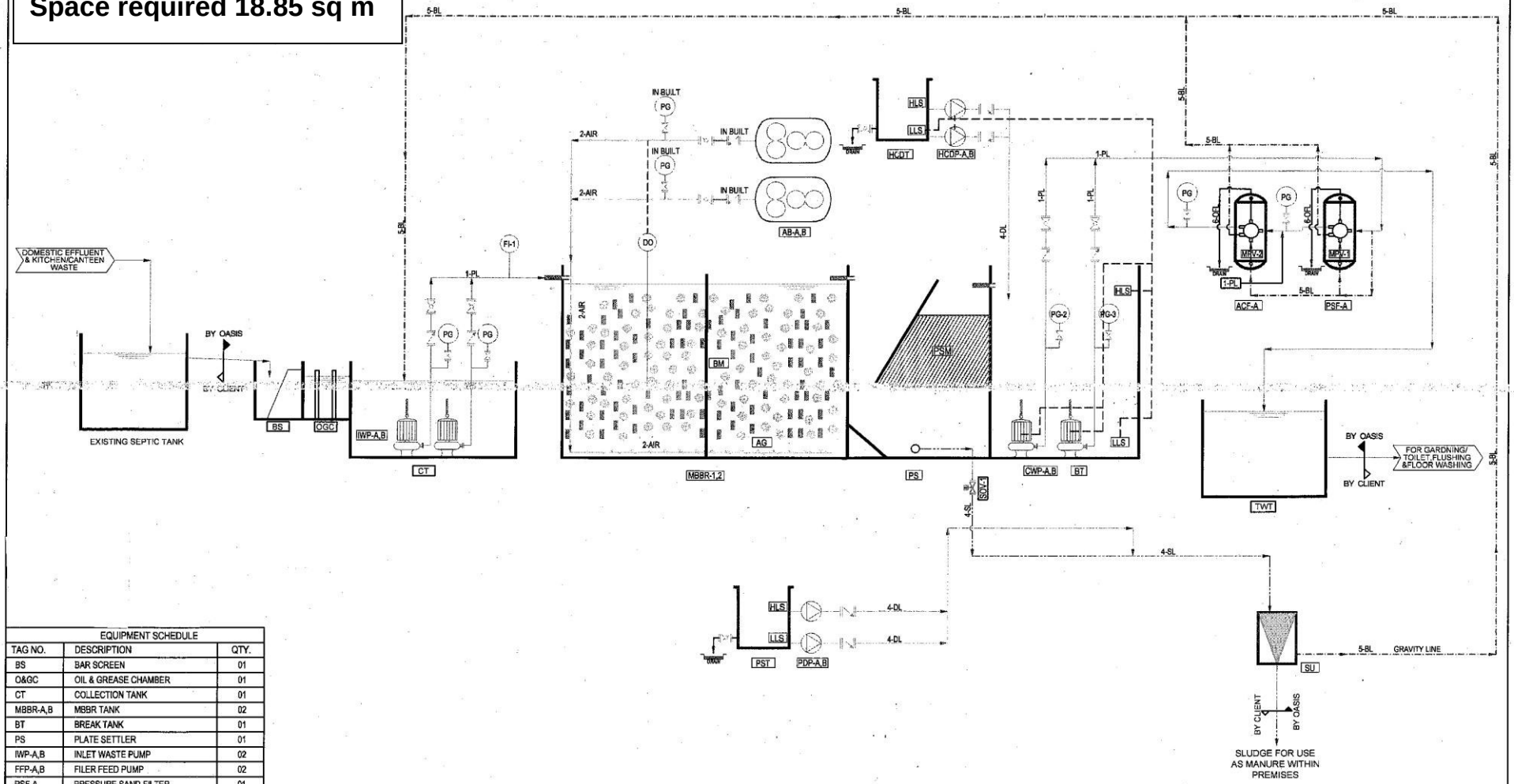
S/P.O.

FOR TENDER PURPOSE ONLY

CLIENT	GARHWAL MANDAL VIKAS NIGAM LIMITED (GMVN) BUILDING,DEHRADUN-UTTARAKHAND
	SPACE REQ - 5.75m x 2.9m = 16.68 Sqm
TITLE	P & I DIAGRAM FOR 5 KLD STP

DRAWN BY :- R.S.P	PROJECT NO	DRAWING NO	SHEET NO	SCALE
CHKD BY :- S.N.D	OESL/0084-T/17-18	OESL/0084-T/17-18/01	01/01	NTS
APPD BY :- S.N.D				
DATE :- 16/06/2017				

Layout Map of 10 KLD STP
Space required 18.85 sq m



EQUIPMENT SCHEDULE		
TAG NO.	DESCRIPTION	QTY.
BS	BAR SCREEN	01
O&GC	OIL & GREASE CHAMBER	01
CT	COLLECTION TANK	01
MBBR-A,B	MBBR TANK	02
BT	BREAK TANK	01
PS	PLATE SETTLER	01
IWP-A,B	INLET WASTE PUMP	02
FFP-A,B	FILER FEED PUMP	02
PSF-A	PRESSURE SAND FILTER	01
ACF-A	ACTIVATED CARBON FITLER	01
HCDP-A,B	HYPOCHLORIDE DOSING PUMP	02
HCDT	CHLORINE DOSING TANK	01
PDP-A,B	POLYMER DOSING PUMP	02
PST	POLYMER SOLUTION TANK	01
TWT	TREATED WATER TANK	01
AB-A,B	AERATION BLOWER	02
MPV	MULTI PORT VALVE	02
SU	SLUDGE UNIT	01

LINE LEGEND		
1-PL	PROCESS LINE	
2-AIR	AIR LINE	
3-SL	SLUDGE LINE	
4-DL	DOSING LINE	
5-BL	BACKWASH LINE	
6-OFL	OVER FLOW/DRAIN LINE	
	INSTRUMENT INTERLOCK	

INSTRUMENTATION SCHEDULE	
LLS	LOW LEVEL SWITCH
HLS	HIGH LEVEL SWITCH
PG	PRESSURE GAUGE
FI	FLOW INDICATOR
DO	DISSOLVED OXYGEN

SYMBOL LEGEND	
	BUTTERFLY VALVE
	NON RETURN VALVE
	BALL VALVE
SOV	SOLENOID VALVE

REV.	DATE	DESCRIPTION

Jr. Engineer

P.O

FOR TENDER PURPOSE ONLY

CLIENT	GARHWAL MANDAL VIKAS NIGAM LIMITED (GMVN) BUILDING,DEHRADUN-UTTARAKHAND
SPACE REQ.	6.50m X 2.90m = 18.85 Sq.m.
TITLE	P & I DIAGRAM FOR 10 KLD STP

DRAWN BY :- R.B.P CHKD BY :- S.N.D APPD BY :- S.N.D DATE :- 16/06/2017	PROJECT NO	DRAWING NO	SHEET NO	SCALE
	OESL/0084-T/17-18	OESL/0084-T/17-18/01	01/01	NTS

IV-DESCRIPTION OF THE ENVIRONMENT

A. Physical Environment

60. This section presents a brief description of the existing environment, including its physical, ecological resources, and socio-economic development of Sub project of Pithoragarh and Bageshwar. 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 and reconstruction of damaged tourism assets in Pithoragarh and Bageshwar 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.

i. Geography

61. Uttarakhand lies in the northern part of India amidst the magnificent Himalayas and dense forests. The State is bordering Himachal P radesh 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 28^0 53' 24" to 31^0 27 50" North latitude and $77^0$34"27' to $81^0$0 2^0 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.

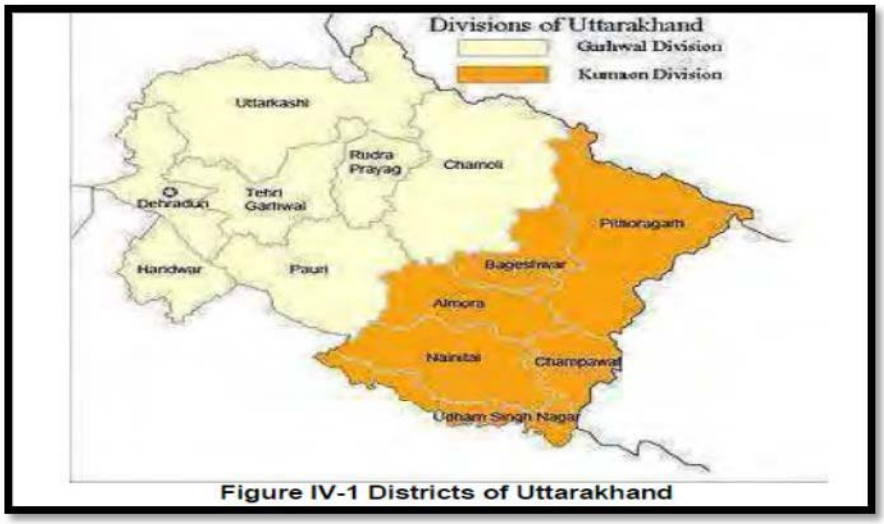


Figure IV-1 Districts of Uttarakhand

62. 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. 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).

About District Bageshwar

63. Bageshwar is a district of Uttarakhand state in northern India. The town of Bageshwar is the district headquarters. Bageshwar district is in the eastern Kumaon region of Uttarakhand, and is bounded on the west and northwest by Chamoli District, on the northeast and east by Pithoragarh District, and on the south by Almora District.

64. For administrative convenience, Bageshwar is divided in four Tehsils,viz., Bageshwar--comprising 415 inhabited villages; 2) Kanda (with 180 inhabited villages); 3) Kapkot having 156 villages; and Garur having 197 revenue villages. It is interesting to note that besides regular police at different Thanas like Bageshwar, Garur, Jhiroli, Kanda and Kapkot, Patwaris (revenue officials) are also equipped with police power. Pattis (viz., Katyur--Talla, Malla and Bichalla; Dug; Kharahi; Danpur--Talla, Malla, Bichalla; Nakuri; Dafaut and Kamsyar--Walla and Palla) and Development blocks are other administrative units.

About District Pithoragarh

65. All the project site lies within district Pithoragarh which is eastern-most district in the state of Uttarakhand. It is naturally landscaped with high Himalayan mountains, snow capped peak, passes valleys, alpine meadows, forests waterfalls, perennial rivers, glaciers and spring. The flora and fauna of the area have rich ecological diversity.

66. The geographical area of the district is 7,110 km^2. Pithoragarh town, which is located in Saur Valley , is its headquarters. The district is within the Kumaon division of Uttarakhand state. The Tibet plateau is situated to the north and Nepal is to the east. The Kali River originates from Kalapaani and flows south, forming the eastern border with Nepal. The Hindu pilgrimage route for Mount Kailash-Lake Manasarovar passes through this district via Lipulekh Pass in the greater Himalayas. Naini Saini Airport is the nearest civil airport, but it does not have regular scheduled commercial passenger service. The mineral deposits present in the district are magnesium ore, copper ore, limestone, and slate.

67. Pithoragarh town, being in a valley, is relatively warm during summer and cool during winter. During the coldest months of December and January, the tropical and temperatemountain ridges and high locations receive snowfall and have an average temperature of 5.5–8.0 °C (41.9–46.4 °F). Pithoragarh district has extreme variation in temperature due to the large variations in altitude. The temperature rises from mid-March through mid-June. The areas above 3,500 metres (11,500 ft) remain in a permanent snow cover. Regions lying at 3,000–3,500 metres (9,800–11,500 ft) become snowbound for four to six months. At places like the river gorges at Dharchula, Jhulaghat, Ghat and Sera, temperatures reach 40 °C (104 °F). The annual average rainfall is 36.7 centimetres. After June the district receives monsoon showers. Winter is a time for transhumance – the seasonal migration of the Bhotiya tribe with their herds of livestock to lower, warmer areas.

68. According to the 2011 census Pithoragarh district has a population of 485,993, roughly equal to the nation of Suriname. This gives it a ranking of 546th among the 640 Districts of India. The district has a population density of 69 inhabitants per square kilometre. Its population growth rate over the decade 2001–2011 was 5.13%. Pithoragarh has a sex ratio of 1021 females for every 1000 males, and a literacy rate of 82.93%. Native tribes in the district include the Van Rawats and Bhotiya (an exonym). Van Rawats are hunter-gatherers. Bhotiyas are traders. In Pithoragarh, the Bhotiya are divided into two main tribes – Johari Shauka and Rung. The Johari Shauka community inhabits the areas in Munsiyari while Rung tribes are spread among the three valleys of Darma, Chaundas, and Byans. Kandali Festival, celebrated once every 12 years by inhabitants of Chaundas Valley, is one of the major festivals in this area.

ii. Geology

69. The district lies in the Himalayas which are the youngest mountains in the world and the land mass now covered by them was occupied by the great geosynclinal Tethys sea during the Mesozoic period. The probable date of commencement of the elevation of the Himalayas is about the close of the Mesozoic period. According to geological formations of the district, it may be divided into four broad belts, viz., (1) the innermost Siwalik hill ranges, (2) the lesser and middle Himalayas, (3) the inner Himalayas and (4) the thin belt bordering the Tibetan Himalayas, roughly tending east-south-east.

70. The belt of the innermost hill ranges of the Siwalik group lies in the southern part of the district. In the rock formations here sandstones alternate with clayey shales. The sandstones are dirty, friable and micaceous and are, therefore, unsuitable for the building, ballast and industry.

71. The second belt, comprising the ranges of the lesser and middle Himalayas, extend north of the Siwalik group to Dharchula. It contains sedimentary and low to medium grade metamorphic rocks such as limestone, slate, quartzite, phyllite and mica-garnet schist. Mineralization of copper, magnesite, soap-stone, etc., is known to occur in this belt.

72. The third belt, containing higher ranges of the inner Himalayas, is wholly composed of crystalline metamorphic rocks such as mica and garnet schists, kyanite and sillimanite schists, gneisses, granulites and quartzites. This belt is very little known geologically. The belt extends from near Dharchula to Garbyang.

73. The fourth belt, bordering the Tibetan Himalayas has an average width of about 7 km. It contains marine sedimentary rocks such as quartzites, fossiliferous limestones and shale.

74. From geographical point of view, Bageshwar district is hilly one--amidst Shivalik ranges and high Himalayas. Drainage system is from north to south-east. Main rivers flowing across Bageshwar are --Saryu, Gomati, and Pungar, the latter two being tributary of Saryu. Many other riverines, locally known as GADHERA meet these at different places. These three river valleys have made alluvial landforms locally known as Seras where majority of population is concentrated. Other villages are settled on hillocks having mild slopes/ or some flat landforms.there are the deepest gorges.

iii. Physiography

75. 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 has international borders with Nepal and China. The State today with 13 Districts can be grouped into three distinct geographical regions, the High mountain region, the Mid-mountain region and the Terai region. Uttarakhand consists of 13 districts viz., Pithoragarh, Almora, Nainital, Bageshwar, Champawat, Uttarkashi, Udham Singh Nagar, Chamoli, Dehradun, Pauri, Tehri Garhwal, Rudraprayag and Haridwar. The project roads fall in Western Himalayas Physiographic Zones. Physiographically, Pithoragarh and Bageshwar lies in a region of tectonic or folded and overthrust mountain chains, has strata are structurally marked by complex folds, reverse faults, overthrusts and nappes of great dimensions, all these as well as frequent earthquake of varying intensity give region to believe that the region is still unstable.

B. Pedology

76. The soils are natural, dynamic, heterogeneous, non-renewable resource, which support plant and animal life. The tract of Bageshwar district consists of outward succession of ridges viz; Greater Himalaya and Lesser Himalaya of decreasing height. These hills posses very little level land. The soils have developed from rocks like granite, schist, gneiss, phyllites, shales, slate etc. under cool and moist climate. Very steep to steep hills and Glacio-fluvial valleys are dominantly occupied with very shallow to moderately shallow excessively drained, sandy-skeletal to loamy-skeletal, neutral to slightly acidic with low available water capacity soils. They have been classified as Lithic/Typic Cryorthents.

77. These soils are in general under sparse vegetation. Soil types Bageshwar and Pithoragarh districts are as follows:

i) Alpine zone soil: These soils are mostly granite and sandy loam in nature. The pH ranges from 5.5 to 6.5. The elevation varies from 3000m –4000m.

ii) Cool Temperate and Sub-Tropical Zone soil: These soils are mostly gravely and at few places sandy loam is also found. The elevation ranges from 800m – 3000m.

iii) Mid-hill zone soil: Soils are mostly sandy loam, but have enough slopes and are warm 1200 m to 1800 m.

iv) Lower valley zone soil: Soils of this zone are quite deep and fertile. These soils are suitable for agriculture.

78. The baseline data on soil quality will be generated only for STP works by the contractor before commencement of construction works.

C. Climate and Meterology

79. 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.

80. 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. 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.

81. The valley regions of the district are hot and humid during summer, while the hilly regions experience temperatures below zero degree during winter. The northern part of the district remains covered with snow for four to five months. The area experiences a mean annual rainfall of 1117.8 mm (2006). The agro-climatic zone in the district is located in the lower Himalayan Zone. The altitude of the district ranges from 600-4800 m. On the basis of altitude the district is sub divided into the following six regions: (i) Cold Tropical- sub tropical region: 600-1200 m (ii) Warm Temperate region: 1200-1800 m (iii) Cool Temperate region: 1800-2400 m. (iv) The Cold region: 2400-3000 m. (v) Alpine region: 3000-4000 m. (vi) Glacier region: 4000-4800 m.

D. Ambient Air Quality and Noise Level

82. 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.

83. 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 Monitoring will be generated by the contractor before commencement of construction works. Since most of the sites proposed for solar lights are common to STP work sites (except 5 sites) the baseline data generated for STP work will be used for solar light work as well.

Ambient Noise Level

84. 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 Pithoragarh and Bageshwar. 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. It was observed that ambient noise scenario in residential, commercial, and sensitive areas in the study area are quite low in general. Since most of the sites proposed for solar lights are common to STP work sites (except 5 sites) the baseline data generated for STP work will be used for solar light work as well.

E. Hydrology

85. 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. 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 spring' the regions 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.

i. **Water Drainage**

86. 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. 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, Dauliganga, Berahiganga, Nandakini, Mandakini, Madhuganga, 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.

ii. Water Quality

87. There is very little documentation on the pollution status of the river in the upper reaches of Himalayas and other small water bodies. 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.

88. 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 instreams. Since most of the sites proposed for solar lights are common to STP work sites (except 5 sites) the baseline data generated for STP work will be used for solar light work as well.

F. MINERAL RESOURCES

89. Uttarakhand state is not rich in mineral resources. Moreover, it is also part ecologically sensitive area, extensive quarrying is not practiced in the state. However, there are some mineral sparsely distributed in the state. It includes limestone, Gypsum, Iron Ore, Graphite and Copper. It has been estimated that there are deposits of 100 million tonnes of limestone, 35 million tonnes of dolomite, 21 million tonnes of magnesite, 9.0 million tonnes of rock phosphate, 4.0 million tonnes of gypsum, and 8.8 million tonnes of soap stone in different areas of the State. Some of the major mineral deposits are indicated in the succeeding Table.

Table: IV-1: Availability of Important Minerals (million tonnes)

Sl. No.	Mineral	Quantity
1	Limestone	430.5
2	Marble	6.4
3	Rock Phosphate	25.0
4	Barytes	0.085
5	Graphite	10.7
6	Dolomite(superior)	30
7	Magnesite	70.294
8	Copper	1.6
9	Soap stone	26.64
10	Gypsum	0.195

Source: http://rrtd.nic.in/Uttrakhand.htm)

The minerals that are found in the district are the following-

Asbestos-This is of the amosite variety and can be used for the production of asbestos, cement bricks, laboratory asbestos sheet and paper, but is not considered to be of economic importance.

Magnestic - This is of an average quality is crystalline in nature, and is found associated with crystalline dolomites and sometimes with soapstone. The Magnesium carbonate found here is also of average quality and its mineralisation has also been reported to occur in the district.

Soapstone or Steatite - This white saponaceous stone resembling pipe clay is obtained in as lenticular body and is associated with mineral pyrites, which adds a color to it, and in places

with magnesite. it can be mined for use as filler in soap and in the cosmetic industries. In the past various utensils were made of it which, when polished, had the appearance of marble.

Copper - The copper mines in the district are extensive and of reputed during the period of Hindus and The Gorkhas rules. All the rich mines have since being exhausted and at present they do not offer a fair field for the employment of capital.

Iron - Small and sporadic occurrence of iron are known to occur in several parts of district but are of hardly any economic important. Iron ore, rich in haematite, and magnetic ore, with haematite and siderite, also occur in the district.

Graphite - In the past this mineral, also known as plumbago, found mostly in patti Lohba, was used as a dye but no large deposits have been noticed for a long time. **Gypsum -** This mineral is found on the bank of some river and was used in the past for the manufacture of saucers and bowls .when ground to a fine powder it is known as Plaster of Paris and can be used for a number of purposes.

Lead - Deposits of this metal were fairly numerous in the past but it is found in somewhat inaccessible places and has long since ceased to be worked.

Slate - This dense, fine grained metamorphic rock, which is produced from a fine clay, can be split into thin, smooth plates and is quarried throughout the district. It is suitable for roofing purposes, the thin dark blue slates being somewhat inferior in quality.

Building Stone - Stones which can be used for building purposes is available in most parts of the district. Sand stone is found in abundance in the lower hills. Gneiss and chlorite schists which are available throughout the district are frequently used for building purposes.

Sulphur - This yellow mineral, also known as brimstone is found in the district as green sulphate of iron and is obtainable from iron pyrites and copper mines, its presence being characterised by a small as of rotten eggs. Sulphur springs also occur in many parts in the district.

Bitumen - The brownish white natural sulphate of alumina known as Shilajit is found in rocks at a fairly high altitude and occur in small lumps which generally have an admixture of red sand and micaceous stone embedded in them. It is used in Ayurvedic medicine and during the season when there is an influx of pilgrims, it fetches good income to those who deal in it. Some other minerals found in the district are Antimony, Arsenic, Lignite or Brown Marble, Mica and silver.

G. Seismology

90. 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 different tectonic zones across.

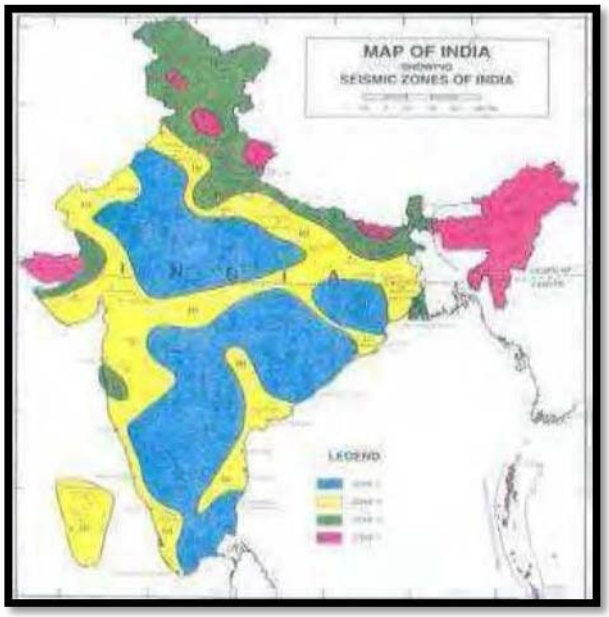


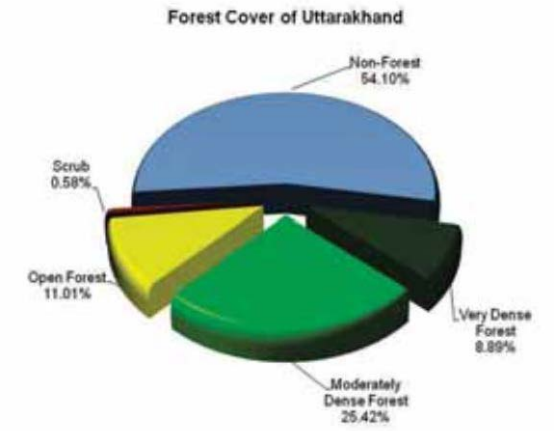
Figure IV-2 Seismic Zone of India

91. State constitutes one of the most active domains of the Himalayan region. Several recorded from this region. As such, the region is classified under high seismic zone IV and V. The modified metrically intensity broadly associated with the zone V is IX. The above Figure shows the seismic zones of India

H. Ecology

1. Forestry

92. According to The India State of Forest report 2015, the recorded forest area of the Uttarakhand state is 34,651 km^2 which constitutes 45.32% of its geographical area. Very-dense forest constitute 8.89%, moderately dense constitutes 25.42%, Open Forest constitutes 11.01% and scrub constitute 0.58% of total forest area.



93. The distribution of forest cover by district is presented in the succeeding Figure and Table. The Garhwal region has more forest cover with 14,498 km^2 compared to the Kumaon region with 9,742 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.

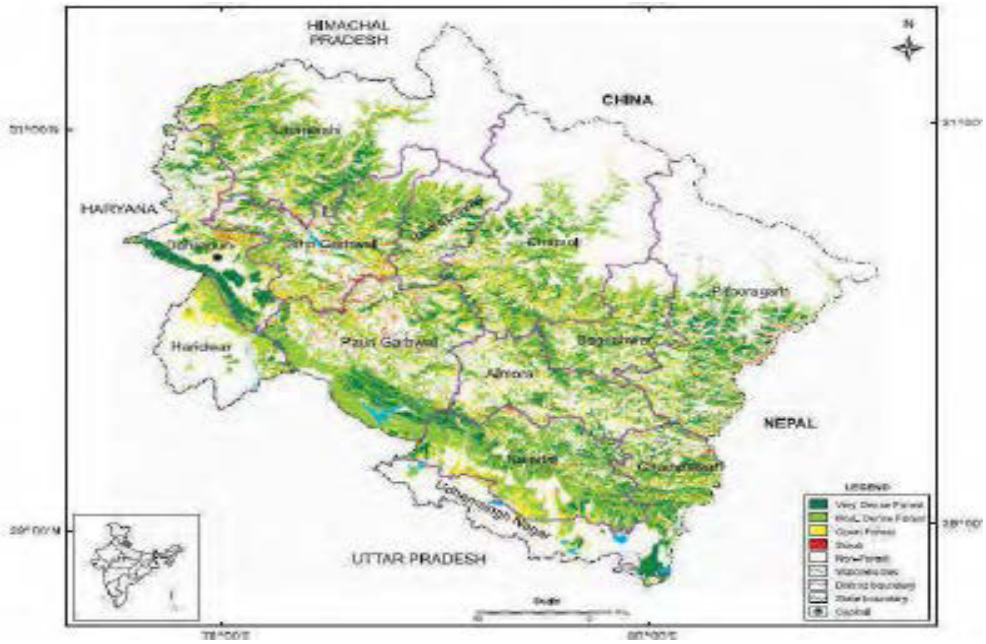


Figure IV-4 Uttarakhand's Forest Cover Map

Table IV-2 District-wise Forest Cover, Uttarakhand

Region	District	Geographic Area (GA)	Forest Cover			Total Forest	% of GA
			Very Dense	Moderate Dense	Open Forest		
Garhwal	Uttarkashi	8,016	570	1,778	724	3,072	38.32
	Rudraprayag	1,984	241	591	298	1,130	56.96
	Chamoli	8,030	441	1,561	679	2,681	33.39
	Pauri Garhwal	5,329	519	1,954	796	3,269	61.34
	Tehri Garhwal	3,642	296	1,239	621	2,156	59.20
	Dehradun	3,088	620	647	335	1,602	51.88
	Haridwar	2,360	25	301	260	588	24.92
Kumaon	Pithoragarh	7,090	509	1,013	580	2,102	29.65
	Bageshwar	2,246	200	834	329	1,363	60.69
	Almora	3,139	224	929	430	1,583	50.43
	Nainital	4,251	602	1,939	463	3,004	70.67
	Champawat	1,766	348	570	266	1,184	67.04
	Udham Singh Nagar	2,542	157	246	103	506	19.91
Total		53,483	4,754	13,602	5,884	24,240	45.32
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%						

Source: State of Forest Report, 2015

94. Forest type mapping using satellite data has been undertaken by Forest Survey of India with reference to Champion and Seth (1968) classification. As per this assessment, the state has 34 forest types which belong to eigth forest type groups, ***viz.*** Tropical Moist Deciduous, Tropical Dry Deciduous, Subtropical Pine, Himalayan Moist Temperate Forests, Himalayan Dry Temperate Forests, Sub-Alpine Forests, Moist Alpine Scrub and Dry Alpine Scrub. Percentage wise distribution of forest in different forest type groups found in the state is given in the pie diagram.

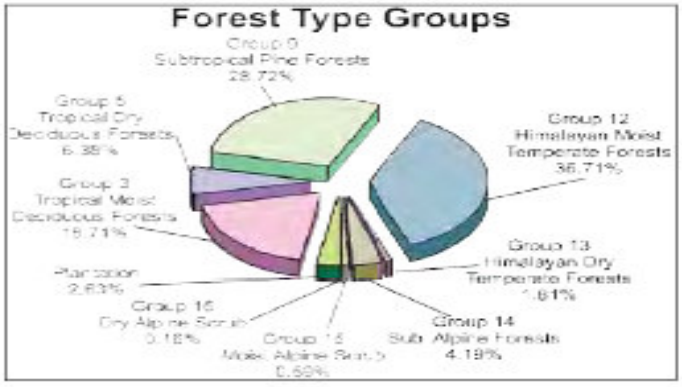


Figure IV-5. Forest type groups of Uttarakhand

95. 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.

Table IV-3: Predominant top Canopy (Tree) Species According to Altitude

Sl. No.	Common name	English Name	Botanical Name	Altitude (m)
1	Kachnar	Orchid tree	*Bauhinia variegate*	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

2. Biodiversity

96. 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-4: Wildlife in Uttarakhand

Sl. No.	Protected Areas	Year	Unit	Statistics
1.	**National Parks**			
	(i) Number	2011-12	No.	6
	(ii) Area	2011-12	Sq. Km.	4915
2.	**Wildlife Sanctuaries**			
	(i) Number	2011-12	No.	6
	(ii) Area	2011-12	Sq. Km.	2420
3.	**Important Wild Animals**			
	(i) Tiger	2008	No.	178
	(ii) Leopard	2008	No.	2335
	(iii)Elephant	2008	No.	1346
	(iv) Musk Deer	2008	No.	376
	(v) Black Bear	2008	No.	1935
	vi) Sloth Bear	2008	No.	172
	vii) Brown Bear	2008	No.	14

Source: Wildlife and Protected Areas, ENVIS, 2014

97. 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 than50 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.

98. The State of Uttarakhand is represented by Biogeographic Zones 2B Western Himalaya and 7B Shiwaliks 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-5. National Parks in Uttarakhand

Sl. No.	National Park	Year of Establishment	Area (sq.km)	District
1.	Corbett NP	1936	521	Nainital and Pauri
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

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

Table IV-6 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

99. 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.

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*
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*

Table IV-8 List of Major Fauna

Sl. No.	Wild Animals		Birds	
	Local Name	Scientific Name	Local Name	Scientific Name
1	Guldar	*Panthera Pardus*	Chir Fijent	Catreus wallichii

Sl. No.	Wild Animals		Birds	
	Local Name	**Scientific Name**	**Local Name**	**Scientific Name**
2	Kala Bhalu	*Selenarctos thibetanus*	Kalij Fijent	*Lophura Leucomelana*
3	Ghural	*Memorhaedus goral*	Koklaj Fijent	*Pucrassia macrolophus*
4	Kakar	*Muntiacus muntjak*	Kala Irgal	*Letinaetus makavensis*
5	Khirao	*Capricornis sumatraensis*	Karorla	*Urocissa erythsorhyncha*
6	Jangli Suar	*Sus-scrofa cristatus*	Ullu	*Strix aluco nivicola*
7	Chitrola	*Martes flarigula*	Baaj	*Flaco severaus*
8	Langoor	*Presbyits entallus*	Kala Titar	*Francolinus francolinus*
9	Khargosh	*Lepus nigricollis*	Papiha	*Cuculus varius*
10	Sehi	*Hystrix indica*	Tota	*Psittacula humalayana*
11	Gidar	*Canis aureus indicus*	Chakor	*Alectoris graeca chuker*
12	Jangli Billi	*Felis chaus*	Hariyal	*Treron spenura*
13	Gilehri	*Eurambulus pennanti*	Pashchimi Tregopan	*Tragopan meloccephalus*
14	Bandar	*Macaques mulatta*	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

100. 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.

101. 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).

102. 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*.

103. 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.

104. 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.

4. Fishery

105. Fish abound in almost all streams of the district and riparian villages find in it an important supplement to their ordinary food. The common species found here are asela or saul, mahasher,

kalabans or karaunch and fucta or phar kata. Other species found in the district include gadara, gadiyal or guluwa, tarra, symplu and nama, nawoo or japa. No interference with fishery activities is envisaged by execution of the proposed subprojects.

Socio-Economic

1. Social and Cultural Development

106. 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. The native people of Uttarakhand are generally called either Garhwali or Kumaoni depending on their place of origin in either the Kumaon or Garhwal region. According to the 2011 census of India, Uttarakhand has a population of 10,116,752 comprising 5,154,178 males and 4,962,574 females, with 69.45% of the population living in rural areas. The state is the 20th most populous state of the country having 0.84% of the population on 1.69% of the land. The population density of the state is189 people per square kilometre having a 2001-2011 decadal growth rate of 19.17%. The gender ratio is 963 females per 1000 males. The crude birth rate in the state is 18.6 with the total fertility rate being 2.3. The state has an infant mortality rate of 43, a maternal mortality rate of 188 and a crude death rate of 6.6.

107. 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.

2. Land Use and Land Use Pattern

108. 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.

109. 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	2010-11	Hectare	5,672636
2.	Forest Area	2010-11	Hectare	3484803
3.	Culturable Waste Land	2010-11	Hectare	310390
4.	Fallow Land	2010-11	Hectare	127793
	(i) Current Fallow	2010-11	Hectare	43295
	(ii) Fallow Land other than Current Fallow	2010-11	Hectare	84498
5.	Barren & Uncultivable Land	2010-11	Hectare	224764
6.	Land under Non-agricultural Uses	2010-11	Hectare	217648
7.	Permanent Pasture & Other Grazing Land	2010-11	Hectare	198526
8.	Land under Misc., Tree Crops and Groves not included in Net Area Sown	2010-11	Hectare	385548
9.	Net Area Sown	2010-11	Hectare	723164

Source: Uttarakhand at a Glance 2012-13, Govt. of Directorate of Economics and Statistics

E. Health

110. The Infant Mortality Rate is 36 and Maternal Mortality Ratio is 359 (SRS 2007 - 2009) which are higher than the National average. The Sex Ratio in the State is 963 (as compared to 940 for the country). Comparative figures of major health and demographic indicators are as follows :

Table IV-10 Demographic, Socio-economic and Health profile of Uttarakhand State as compared to India figures

Indicator	Uttarakhand	India
Total Population (In Crore) (Census 2011)	1.01	121.01
Decadal Growth (%) (Census 2011)	19.17	17.64
Crude Birth Rate (SRS 2011)	18.9	21.8
Crude Death Rate (SRS 2011)	6.2	7.1
Natural Growth Rate (SRS 2011)	12.8	14.7
Infant Mortality Rate (SRS 2011)	36	44
Maternal Mortality Rate (SRS 2007-09)	359	212
Total Fertility Rate (SRS 2011)	NA	2.4
Sex Ratio (Census 2011)	963	940
Child Sex Ratio (Census 2011)	886	914
Schedule Caste population (In Crore) (Census 2001)	0.15	16.67
Schedule Tribe population (in crore) (Census 2001)	0.02	8.43
Total Literacy Rate (%) (Census 2011)	79.63	74.04
Male Literacy Rate (%) (Census 2011)	88.33	82.14
Female Literacy Rate (%) (Census 2011)	70.70	65.46

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

111. The health infrastructure of the State is described in succeeding Table. There are only 14 Obstetricians / Gynecologists and 20 Pediatricians in the State. Such numbers are way below the estimated State requirement of 59 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.

Table IV-11 Health Infrastructure of Uttarakhand

Indicators	Required	In position	shortfall
Sub-centre	2341	1848	493
Primary Health Centre	351	257	94
Community Health Centre	87	59	28
Health worker (Female)/ANM at Sub Centres & PHCs	2105	2016	*
Health Worker (Male) at Sub Centres	1848	184	1664
Health Assistant (Female)/LHV at PHCs	257	88	169
Health Assistant (Male) at PHCs	257	29	228
Doctor at PHCs	257	205	52
Obstetricians & Gynecologists at CHCs	59	14	45
Pediatricians at CHCs	59	20	39
Total specialists at CHCs	236	51	185
Radiographers at CHCs	59	17	42
Pharmacist at PHCs & CHCs	316	292	24
Laboratory Technicians at PHCs & CHCs	316	81	235
Nursing Staff at PHCs & CHCs	670	243	427

(Source: RHS Bulletin, March 2012, M/O Health & F.W., GOI)

F. Cultural and Archeological resources

112. The State of Uttarakhand has a great range of cultural practices. Festivals and cultural activities are being celebrated throughout the year in the State. The major fairs and festivals of the Garhwal region include the Hatkalika Fair, Tapkeshwar Fair, Surkhanda Devi Mela, Kunjapuri Fair, Lakhawar Village Fair, and Mata Murti Ka Mela. On the other hand, major fairs and festivals in the Kumaon region consist of Uttarayani Mela, Shravan Mela (Jageshwar), Kartik Poornima at Dwarahat, Kasar Devi fair, and Nanda Devi melas.

113. Living in the mountains mostly in places that are not easily accessible the people of the district have been able to preserve their culture, folklore, folksongs and folkdances, the last, a distinctive feature of the district, being seasonal, traditional and religious, some of the better known being described below - The Thadiya dance, which is accompanied by song, is performed on Basant Panchami, the festival celebrating the advent of spring, the Mela, another dance, is perform on Deepawali and the Pandava during the winter after the harvesting of the crop and depicts the principal events of the Mahabharata. Other folk dances are Jeetu Bhagdawal and Jagar or Ghariyali. These dances enact mythological stories, the participants,

both men and women, put on their traditional colorful dress and dance to the tune of drums and Ransinghas. Another dance performed during the fairs and accompanied by song is the Chanchari in which both men and women participate. Folk songs are usually traditional and are sung particularly by the woman, who works very hard in the fields from morning till night in all kind of weather. During the month of Chaitra the women of the village gather at a central place and sing traditional song which generally relates deeds of heroism, love and the hard life which they have to lead in the hills. In the district, fairs, festivals, religious and social gatherings are the main occasions for recreation and amusement. On special occasions people arrange Swangs (open air dramatic performances) particularly depicting scenes or legends connected with Shiva and Parvati.

114. The houses in the district have not been built according to any town planning scheme but have been up haphazardly in clusters on level ground at places where water springs are accessible or on the bank of the river in the valley. The houses are built of stones and are generally double storeyed, a few having three to five storeys, the very low rooms on the ground floor, which are usually 1.8 mrts. high being used for housing the cattle. Each house has in front of it a courtyard called a Chauk. A mud or stone staircase or a wooden ladder leads to the upper storey, the roof being of wood. The height of the upper storey is generally 2.1 mtrs. and the roof is usually a sloping structures of timber covered with Patals (quartzite slabs), the well off use corrugated galvanized iron sheets. Generally the upper storey has a Verandah in front of the upper rooms.

115. The houses in the higher regions are two to three storeyes with balconies all round and paved courtyard in front where people do their threshing, weaving, spinning and other house hold works. A few houses have five or six storeyes, the topmost being used as the kitchen. At times the cattle sheds are made at some distance from the villages. The houses are built in rows of half a dozen or so and strikingly picturesque in their fort like appearance.

116. The staple grains consumed by the people of the district are wheat, rice, maze, mandua and jhanjora, the last three being coarse grains generally eaten by the poorer sections. The pulses consumed are urad, gahat, bhatt, soontha, tur, lopia and masor. The hindus of the district mostly vegetarian by habit and preference and although the Muslims, Christians and Sikhs are generally non vegetarian, those not able to afford eating meat daily due to want of fund or local unavailability often resulting to a vegetarian diet.

117. There is no Archaeological Survey of India (ASI) listed heritage sites (except Baijnath) within the study area.

G. Economic Development

1. Transportation and Communication

118. 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 2013, Uttarakhand has a total road network of 28,198.92 km of which 2,773.82 km comprises the National Highway (1,150.82 km with State PWD and 1623.00 km with BRTF); 3,788.20 km comprises the State Highway; 3,289.74 km covers the MDR; 2,945.04 km comprises the ODR and 15,402.12 km of Village Road.

119. 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.

120. 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.

Table IV-12. Transportation of Uttarakhand state.

S.No.	Category of Roads	Year	Total Length (In km)
1	Border Roads Organization (BRO)	2013	1,623.00
3	National Highway (NH)	2013	1,150.82
3	State Highway (SH)	2013	3,788.20
4	Major District Roads (MDR)	2013	3,289.74
5	Other District Roads (ODR)	2013	2,945.04
6	Village Roads (VR)	2013	11,158.36
	Villages Roads (PMGSY)	2013	4,243.76
	Total		28,198.92
Postal and Communication Services			

1	Post Offices	2011-12	No.	2718
2	Telephone Exchanges	2011-12	No.	477
3	Telegraph Offices	2011-12	No.	2
4	PCOs	2011-12	No.	8429
5	Telephone Connections (Including WLL) by BSNL	2011-12	No.	278751
6	Mobile phone by BSNL	2011-12	No.	1360674

2. **Industrial Development**

121. 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.

122. In recent years, Uttarakhand has emerged as one of the most 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.

123. Main and traditional business of the state is, Handicrafts, Handlooms, Wool Based Industry, Khadi and Village Industries. Hydro Power, tourism are the backbone of economic development in the state. No recognizable industry is located along the project corridor.

Agriculture, Forestry and Fishery

124. Agriculture is the main economic activity in the State as per latest land-use statistics. The total reported area for agricultural activity is 55.66 lakh hectares. In the hills, the major crops grown include wheat, paddy, mandua, ramdana and potato whereas in the plains the major crops are wheat, paddy, pulses, and sugarcane.

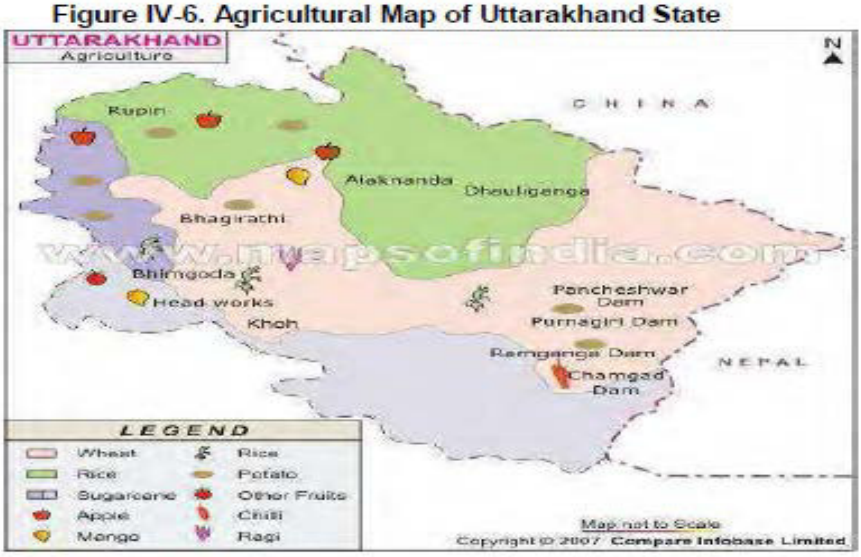
125. The pattern of land ownership is unlike that found in the rest of India. Most of the Uttarakhand farmers are owner-cultivators. Tenant farming and sharecropping are rare while landholdings are generally small and limited to family farms' approximately 50 percent of all landholdings are less than 0.5 hectares in size and 50 percent under one hectare. As such, the zamindari system of big landholders is limited to the plains. Both the geography and the Pahari cultural heritage have played roles in maintaining a traditionally more equitable, if impoverished, land distribution in Uttarakhand.

126. Agriculture in Uttarakhand is very complex and is interlinked with crop husbandry, animal husbandry and forestry to form a production system. Agriculture is the main source of employment in Uttrakhand and around 58 per cent of workers earned their livelihood from this sector in 2011. Like all India scenario, proportion of workers was the highest in agriculture followed by other workers and household industry workers. Contribution of agriculture to the Net State Domestic Product (NSDP) during the year 2001-02 was about 30 percent and its share showed a continuous decline having a percentage of 24.89 (2004-05), 17.80 (2009-10), 14.97 (2011-12), 14.71 (2012-2013) and 14.73 (2013-2014). Agriculture in the State is characterized by the following:

i. Out of 7.93 lakh hectare of agriculture land, hilly region covers 56.8 percent and plain region covers 43.2 percent.
ii. The cropping intensity in Uttarakhand is 163.79, which is much higher than country's average of 129.
iii. Both rain-fed and irrigated agriculture is practised in the State. Cereals are emphasised in the irrigated agriculture and two crops are taken in an agriculture year. In the rain-fed system millets, pulses and tuber crops are grown.
iv. Monocropping is a common practice in the irrigated areas whereas mixed cropping is common in rainfed areas.
v. 85 percent of the gross cultivated area is used only for growing food grains where value addition is low.
vi. More than 62 percent of the State Net Domestic Product comes from the three major towns of Dehradun, Nainital, and Haridwar.

127. In the mountain regions and the Himalayan agriculture specifically, farmers deviate substantially from the kinds practiced in less precipitous altitudes. Hill farmers have adapted to the difficult geography, and the terrain has likewise influenced cultural modes in mountain societies. Patterns of land ownership, subsistence versus surplus production, and level of market penetration have also been decisively affected. However, traditional Himalayan agricultural systems and knowledge-base are being steadily eroded by market pressures, bringing both economic and cultural changes in Uttarakhand. Age-old self-reliance has given way to dependency on imports from the productive plains that bear pesticide/chemical fertilizer-enhanced yields. Cultural domination from the plains also threatens Uttarakhand's traditional foods as an increasing taste for mill-polished rice is outcompeting mountain crops. Activists in the hills have responded with a Save the Seeds movement and are raising awareness about the need or agricultural biodiversity.

Figure IV-6. Agricultural Map of Uttarakhand State



128. Agriculture is also practiced in the river valleys of Uttarakhand a small 10-15 percent of the total land area. Over hundreds of years, many of the slopes have been cut into field terraces, a common characteristic of mountain agriculture throughout the world. The region's farmers have also developed advanced manure, crop rotation, and intercropping systems. Most of the land on hilly slopes is non-irrigated. Three types of agriculture can be found in most river valleys with each particularly suited to the type of land. These are as follows:

- Katil (Forest edge land)
- Hoe cultivation, with a standard rotation of 3 crops in 5 years
- Major crops are Finger millet/Mandua ***(Eleusine coracana)***, Barnyard millet/Jhangora ***(Echinochloa frumentesia)*** and Chaulai/Ram Dana ***(Amaranthus polygamous, Amaranthus blitum)***
- Upraon (Hillside land)
- Permanently terraced but unirrigated
- Major crops are Finger millet/Mandua ***(Eleusine coracana)***, Barnyard millet/Jhangora ***(Echinochloa frumentesia)*** and Chaulai (***Amaranthus polygamous***) ***etc.***
- Talaon (Valley bottom land)
- Paddy cultivation, low-lying, irrigated, double cropped
- Major crops area Wheat (***Triticum aestivum***), Paddy (***Oryza sativa***), Sugarcane (***Saccharum officinarum***) *etc.*

Table IV-13. Area under Principal Crops and Productivity in Uttarakhand

Sl. No.	Items	Year/ Period	Unit	Statistics
Area Under Principal Crops (Provisional)				
1.	Cereals	2011-12	Hectare	896774
	(i) Rice	2011-12	Hectare	280108
	(ii) Wheat (*Triticum aestivum*)	2011-12	Hectare	369209
	(iii) Barley (*Hordeum vulgare*)	2011-12	Hectare	22508
	(iv) Maize (*Zea mays*)	2011-12	Hectare	28038
	(v) Finger millet (*Eleusine coracana*)	2011-12	Hectare	125163
	(vi) Sanwan	2011-12	Hectare	63002
	(vii)Other	2011-12	Hectare	8746
2.	Pulses	2011-12	Hectare	55690
	(i) Urad (*Phaseolus radiatus*)	2011-12	Hectare	12980
	(ii) Lentil (*Lens esculenta*)	2011-12	Hectare	12295
	(iii) Pea (*Pisum sativum*)	2011-12	Hectare	3451
	(iv) Gahat (*Mycrotoma biflorum*)	2011-12	Hectare	12033
	(v) Rajma (*Dolichos lablab*)	2011-12	Hectare	4614
	(vi) Gram			766
	(vii) Bhatt (Black Soyabeen)	2011-12	Hectare	5734
	(viii) Others	2011-12	Hectare	3817
3.	Oil Seeds	2011-12	Hectare	29705
	(i) Mustard (*Brassica compestris*)	2011-12	Hectare	14294
	(ii) Seasmum (*Sesamun indicum*)	2011-12	Hectare	2020
	(iii) Groundnut (*Arechis hypogea*)	2011-12	Hectare	1112
	(iv) Soyabean (*Glycin max*)	2011-12	Hectare	12279
4.	Other Crops	2011-12		
	(i) Sugarcane (*Saccharum officinarum*)	2011-12	Hectare	108255
	(ii) Onion (*Allium cepa*)	2011-12	Hectare	2353
Agriculture Productivity (Provisional)				
1.	Cereals	2011-12	Qtl./Hectare	22.03
	(i) Rice	2011-12	Qtl./Hectare	21.20
	(ii) Wheat (*Triticum aestivum*)	2011-12	Qtl./Hectare	23.80
	(iii) Barley (*Hordeum vulgare*)	2011-12	Qtl./Hectare	12.64
	(iv) Maize (*Zea mays*)	2011-12	Qtl./Hectare	14.66
	(v) Finger millet (*Eleusine coracana*)	2011-12	Qtl./Hectare	13.92
2.	Pulses	2011-12	Qtl./Hectare	8.15
	(i) Urad (*Phaseolus radiatus*)	2011-12	Qtl./Hectare	8.13
	(ii) Lentil (*Lens esculenta*)	2011-12	Qtl./Hectare	8.19
	(iii) Pea (*Pisum sativum*)	2011-12	Qtl./Hectare	9.54
	(iv) Gahat (*Mycrotoma biflorum*)	2011-12	Qtl./Hectare	8.04
	(v) Rajma (*Dolichos lablab*)	2011-12	Qtl./Hectare	10.27
	(vi) Gram		Qtl./Hectare	7.85
	(vii) Bhatt (Black Soyabeen)	2011-12	Qtl./Hectare	9.83

3.	Oil Seeds	2011-12	Qtl./Hectare	8.34
	(i) Mustard (*Brassica compestris*)	2011-12	Qtl./Hectare	8.00
	(ii) Seasmum (*Sesamun indicum*)	2011-12	Qtl./Hectare	2.26
	(iii) Groundnut (*Arechis hypogea*)	2011-12	Qtl./Hectare	12.72
	(iv) Soyabean (*Glycin max*)	2011-12	Qtl./Hectare	14.46
4.	Other Crops	2011-12	Qtl./Hectare	
	(i) Sugarcane (*Saccharum officinarum*)	2011-12	Qtl./Hectare	609.33
	(ii) Onion (*Allium cepa*)	2011-12	Qtl./Hectare	55.69

Table IV-14. Ecological Sub-Regions and Altitude-wise Major Agriculture Crops

Sl. No.	Ecological Sub-Region	Altitudinal Gradient(m)	Major Agriculture Crops
1.	Lower Dun, Terai	300 - 600	Wheat (*Triticum aestivum*), Paddy (*Oryza sativa*) and Sugarcane (*Sachharum officinarum*).
2.	UpperDun,Bhabar, lower Shivaliks	600 - 1,200	Wheat (*Triticum aestivum*), Paddy (*Oryza sativa*), Maize (*Zea mays*) Chaulai (*Amaranthus* species) Finger millet/ Mandua (*Eleusine coracana*) and Barnyard millet (*Echinochloa frumentesia*)
3.	Middle Garhwal-Kumaon	1,200 - 1,800	Wheat (*Triticum aestivum*), Paddy (*Oryza sativa*), Cheena (*Panicum miliaceum*), Potato (*Solanum tuberosum*), Barley (*Hordeum vulgare*), Finger millet (*Eleusine coracana*) and Barnyard millet (*Echinochloa frumentesia*),
4.	Upper Garhwal-Kumaon	1,800 - 2,400	Wheat (*Triticum aestivum*) Barley (*Hordeum vulgare*) Potato (*Solanum tuberosum*), Chaulai (*Amaranthus* species), Cheena (*Panicum miliaceum*) and Phaphra (*Fagopyum tataricum*)
5.	Cold Zone	2,400 - 3,600	Summer Crops: Wheat (*Triticum aestivum*), Barley (*Hordeum vulgare*) Potato (*Solanum tuberosum*), Phaphra (*Fagopyum tataricum*) Chaulai (*Amaranthus* species), Kauni (*Setaria etalica*) Ogal (*Fagopyrum esculentum*) and Uva Jau (*Hoycleum himalayanse*)

129. Various pulses (*e.g.*, "Masur" - *Ervum lens*; "Kulat" *Mycrotoma biflorus*) are grown intercropped during the two harvest seasons early winter after the rainy season (millet), and midsummer before the hot dry season (barley-wheat). Dry and wet rice, taro, pumpkins, beans, corn, ginger, chili, cucumbers, leafy vegetables, and tobacco are also grown in the area. Likewise, potatoes have become an important cash crop being grown in areas unsuitable for other plants (Berreman, 1963).

130. The irrigation facility is only available adjoining to rivers in valleys. The irrigation and drainage system in Uttarakhand is described below.

Table IV-15. Mode of Irrigation and Drainage System in Uttarakhand

Sl. No.	Items	Year/ Period	Unit	Statistics
Net and Gross Irrigated Area				
1.	Canals	2011-12	Hectare	83687
2.	Tube Wells	2011-12	Hectare	216100
3.	Other Wells	2011-12	Hectare	11519
4.	Tanks/ Ponds	2011-12	Hectare	83
5.	Other Sources	2011-12	Hectare	24747
6.	Net Irrigated Area (NIA)	2011-12	Hectare	336136
7.	Gross Irrigated Area (GIA)	2011-12	Hectare	561733
Irrigational Infrastructure				
1.	Length of Canals	2011-12	Km.	11588
2.	Length of Lift Canals	2011-12	Km.	242
3.	Tube Wells (State)	2011-12	No.	1110
4.	Pump Sets (Boring/ Free Boaring)	2011-12	No.	54642
5.	*Hauj*	2011-12	No.	32850
6.	*Gool*	2011-12	Km.	26365
7.	Hydrum	2011-12	No.	1547
8.	C.C.A. Under State Canal	2011-12	Lakh Hect.	3.302
9.	Revenue Collection by Irrigation	2011-12	Rs. Lakh	252.27

Fisheries

131. The State has great potential for the development of fisheries. The State abounds in perennial and seasonal water bodies which hold high promise for the growth of fishery. Golden Mahseer (*Tor putitora*), one of the main game and food fish in the central Himalayan region, has decreased significantly. The fish migrate considerable distances upstream in search of suitable spawning grounds. Stocks of the Himalayan mahseer are depleted and it is now considered an

endangered species. Catch data from the major rivers are not available while studies are characterized as sporadic and preliminary in nature. According to available statistics, the Himalayan mahseer contributes significantly only in one river comprising 32.8% of the catch from the Nayar River, 9.7% from Song River, and 0.83.1% from other rivers. The important fishes commonly found in the Himalayan river basins are *Catla catla*, *Labeo rohita*, *Labeio calbase*, *Cirrihinus mirigale*, Clarius, batrachus, *Rita rita*, *Heteropneuptus fonilis*, *Notopterus nontopterus*, *N. Chitala*, *Macrobrachum rosenbergii*, *M. malconsoni*, *M. Chapral*, *Channa punetatus*, *C. gaehua*, and *C. striatus*.

I. Energy and Electric Power Potential

132. 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.

133. 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.

J. Aesthetic and Tourism

134. 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, 22.1 million in the year 2007 and 20 million in the year 2013. 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.

135. Bageshwar is a place of extreme religious and historic significance. There are numerous famous temples dedicated to Gods and Goddnesses in the proximity of Bageshwar. Bageshwar has its share of ancient temples which hold a lot of religious and spirituals significance. There are the Bagnath temples, Baijnath Temples, Chandika temples and Gauri Udhiyar. The Bhileshwar and the Nileshwar mountains border the east and west of Bageshwar while the north and south are surrounded by Suraj kund and Agni kund respectively. According to the purans, this place has the power to librate one from shackles of births and deaths. For the entire state, Bageshwar has been the symbol of faith.

136. The most important temples of Bageshwar is Bagnath temples which is dedicated to lord shiva. It is situated at the heart of city and thousand of devotees thong the temples on the occasion Mahashivratri. The temple was constructed by Laxmi Chand around 1450 AD. The temple of Baijnath is located on the left bank of Gomti. The main temple which is just below the house of Mahanta is dedicated to Lord Shiva. Since the construction of the temple is similar to Tailihat group, it can be said that it belonged to the same period as Tailihata group, it can be said that it belonged to the same period Tailihta.

137. Bageshwar also offers some of the most famous trekking opportunities in Pindari, Kafni, Bedni Roopkund, Namik and Sunderdhunga glacier treks. Every year thousand of Indians and foreign tourist come to Bageshwar for trekking. There are numerous hotels and lodges available to accommodate the influx of tourist in Bageshwar.

138. Pithoragarh is rich in natural beauty and it offer best view of the Himalaya Some of the peak like Nanda Devi, Panchuli, Trishul and Nandakhat falls in this district. It is also rich in flora and fauna and famous for its bugyal.

139. Pithoragarh is the easternmost district of Uttarakhand, neighbouring Tibet in the north and Nepal in the east. A place of exquisite natural beauty and serenity, Pithoragarh is popularly known as the 'Little Kashmir'. This captivating town with fascinating forests around it is located at an impressive height of 1,645 m and is nestled in a small valley. Pithoragarh town is a historical landmark. It was a major center of power during the regime of the Chand Kings in Kumaon. From here, pilgrims take their journey to the holy shrines, Kailash and Mansarovar.This valley also nestles the snow-crested peaks Nanda Devi East (7,434 m) and West (7,817 m). Below these mighty peaks lie the alpine valleys and glaciers like Milam, Ralam, Namik and Sundardunga.

140. Pithoragarh is a place of extreme religious and historic significance. There are numerous famous temples dedicated to Gods and Goddnesses in the proximity of Pithoragarh. Other places of interest in Pithoragarh are Patal Bhuvaneshwar (Gangolihat), Chandak, Dewalthal, Dharchula, Munsiyari and Kali Mandir of Gangolihat. Kumaon University College is the main educational institution in the district for higher studies. About 5 km. from the place, there is a small and beautiful place named Chandag which houses an asylum for lepers. It is said that a goddess killed two devils, Chand and Mund, at this place. The episode gave the place the name Chandghat. Pithoragarh Fort: It is set atop a hill on the outskirts of the town. The fort was built by the Gorkhas in 1789. Kapileshwar Mahadev (3 km). The cave temple dedicated to Lord Shiva affords a fine view of the Soar valley and lofty Himalayan peaks.

V. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

141. The assessment for environmental impacts due to the implementation of this project has been carried out for potential impacts during the following stages of the project planning and implementation:

- **Location impacts.** Impacts associated with site selection, including impacts on environment and resettlement or livelihood related impacts on communities
- **Design impacts.** Impacts arising from project design, including the technology used, scale of operations, discharge standards, etc
- **Construction impacts.** Impacts resulting from construction activities including site clearance, earthworks, civil works, etc
- **O&M impacts.** Impacts associated with the operation and maintenance of the infrastructure built in the project.

142. The ADB Rapid Environmental Assessment Checklist for Tourism as per EARF is used during preparation of this IEE to screen the subproject for environmental impacts and categorization of the project (Appendix 2). Table V-1 provides the potential environmental impacts and the mitigation measures including the responsibilities for implementing the same. Subproject components are assessed to have similar impacts and hence are grouped together.

A. Land Acquisition and Resettlement

143. The proposed subproject locations are within the lands available with the government. There are no impacts envisaged on land acquisition or resettlement due to the proposed subproject components.

1. Land Ownership

144. The sub-project area is covering 2 Districts of Kumaon region in Uttarakhand namely- Pithoragarh and Bageshwar. A total of 17 locations are proposed for proposed solar light and STP works under UEAP (Tourism). There is no case of private land acquisition. All the proposed sites are the property of Kumaon Mandal Vikas Nigam campus.

145. There is no resettlement issue envisaged in case of all 17 locations for the sub project. Since there is no encroachment noticed during site visit, also there is no livelihood loss of the community due to the construction of these structures, social due diligence is not needed to be prepared for these locations as per ADB safeguard Policy Statement 2009.

146. The location selected for renovation and up gradation was with an objective to restore tourism in the affected areas. The selection criteria are as follows:

- Land Availability- Department land
- Easy access
- Easy access to basic facilities like- water supply, electricity.
- Long term sustainability of the structure and proper maintenance.

a. Impact on existing or proposed land use

147. The proposed works in Pithoragarh and Bageshwar are inside the premise of the existing Tourist Rest Houses.. Land acquisition is not involved and there is no scope for change in land-use pattern. Hence the land use pattern in the locality will not change.

B. Environmental Impacts

i. Location Impacts

148. The locations considered for the subproject are within the areas designated for eco-tourism as part of developing Uttarakhand's conservation, heritage, natural and cultural attractions (all of the sites are existing Tourist rest houses), and are outside areas demarcated for habitat protection and conservation. The subproject location does not fall within any sensitive ecosystem except for Baijnath site for which PIU tourism has secured permission from Secretary, Cultural Department for undertaking the proposed works at Baijnath, which is at a distance of 256m from an ASI protected site vide letter no. 758/ PIU-KMVN dated 30/3/17.

Table V-1: Location Impacts for Tourism Assets in District Pithoragarh and Bageshwar

S.No	District	Land Availability	Location Impacts
A	Pithoragarh and Bageshwar	Govt. owned land	Implementation of the project will not have any bearing on ecology and environment of the locality. Since STP and solar light works proposed are inside KMVN campuses, it will not involve any displacement of people or disruption of any economic activities. The project will not involve influence the flora or fauna of the locality in any way. The subprojects will comply with environmental requirement specified in ADB'S Safeguard Policy statement 2009 and those specified in countries requirement regulation

149. The proposed works in Pithoragarh and Bageshwar are inside the premise of the existing Tourist Rest Houses, priority is to locate construction work camps, stockpile areas, storage areas, and disposal areas near the subproject area. However, if it is deemed necessary to locate elsewhere, sites to be considered will not promote instability and resultant destruction of property, vegetation, irrigation, and drinking water supply systems. Residential areas will not be considered to protect the human environment (i.e., to curb accident risks, health risks due to air and water pollution and dust, and noise, and to prevent social conflicts, shortages of amenities, and crime). Extreme care will be taken to avoid disposals near the sensitive areas. All locations will be included in the design specifications and on plan drawings.

ii. Design Impacts and Pre-Construction Impacts

150. Impacts arising from the inappropriate designs of proposed facilities would in general include the inadequate drainage provisions, contemporary designs for the traditional and cultural

environment, etc. Selection of materials, if not carefully chosen, will adversely impact the aesthetic appeal of the surroundings. The results of interventions are unobtrusive and will be integral part of the overall ambience so as to avoid impacts on the aesthetics of the site.

151. All component designs will be worked out to minimize any impacts on the adjoining properties, and considering the drainage and sewerage connections on the road. Given that the there is a need for disposal of construction wastes, the contractors will be required to consult with the Field Project Implementation Unit- KMVN (PIU) and Uttarakhand Environment Protection and Pollution Control Board (UEPPCB) for safe disposal sites.

iii. **Construction Impacts**

152. The impacts are generic to the construction activities, in all subproject locations. All construction activities to be undertaken at the site will be approved by competent authority before start of any such activity in the vicinity of the site so that the history and sanctity as well as the usability of the site are not hampered. Hence, the EMMP emphasizes on the construction impacts and necessary mitigation measures to be strictly followed by the contractor. Key impacts during construction are envisaged on the following aspects: (i) drainage, (ii) quarry/borrow pit operations, (iii) slope cutting and slope Stability (iv) water bodies and drainage courses dust generation, air and noise from construction activities, (vi) handling of construction materials at site, (vii) adoption of safety measures during construction; and community health and safety

iv. **Operation and Maintenance Impacts**

153. As existing 17 TRHs which are already being operated and maintained by KMVN, proposed in Pithoragarh and Bageshwar so, after completion of proposed work of TRHs, KMVN will continue to operate and maintain these TRHs.

154. During the natural calamity/Emergency time the district administration will have the sole right for use of KMVN TRHs and KMVN will abide by the instructions of the SDMA and district administration regarding the use of TRH.

C. Benefits

155. **Sewage Treatment Plants and Solar lights in Disaster affected districts** Pithoragarh and Bageshwar

- Solar street lights are independent of the utility grid. Hence, the operation costs are minimized. Renewable and Independent green energy source.
- Solar street lights require much less maintenance compared to conventional street lights.
- No external cabling or trenching is required.Since external wires are eliminated, risk of accidents is minimized.This is a non polluting source of electricity.
- Separate parts of solar system can be easily carried to the remote areas.
- It allows the saving of energy and also cut in electricity bills.

- The objective of installation of STPs in various TRHs is to replace existing septic tanks and soak pits with Environment Friendly Sewage Treatment Plant of appropriate capacity, as the STP disposes off the sewage in more efficient and Eco friendly manner.
- To conserve the fragile environment and promote climatic resilient and environmentally sustainable tourism infrastructure of these destinations.

D. Cumulative Impact Assessment

156. The cumulative impact assessment (CIA) examined the interaction between the subproject's residual effects (i.e., those effects that remain after mitigation measures have been applied) and those associated with other past, existing and reasonably foreseeable future projects or activities. Site-specific mitigation measures will be implemented during construction to address temporary disruptions to land use, limitations on access to roads, sidewalk closures, parking modifications, and increased volumes of construction related traffic. During operations of the improved infrastructures and services, added residential developments, commercial and business facilities increased densities are expected to develop and enhance the subproject area. This can be considered a long-term cumulative benefit of the subproject.

157. Increased tourist influx is expected to impact the environment but at the same time the routes to these destinations are open for a limited time with limited number of tourists. As the locations are mainly en route to pilgrim centres it is used by trekkers and adventure lovers, who have a different mindset towards outdoors and love for nature. This will be further addressed by the project through regular orientation programs designed both for the tourists and facility providers, and dissemination of awareness material highlighting the environmental importance of the area.

158. Implementation of the project will not have any bearing on ecology and environment of the locality. Since the all the assets are existing TRH buildings and it will not involve any displacement of people or disruption of any economic activity. The project will not influence the flora or fauna of the locality in any way.

VI. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

A. Public participation during the preparation of the IEE

159. 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.

160. Stakeholder's feedback on process findings and recommendations; and ensuring compliance to process requirements with regards to 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 and institutional stake holders such as PCB, local bodies, Water Resource Department, Environmental Department, Mines and Geology Department, Forest Department, etc. Consultations at micro-level 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.

161. During Project preparation, consultations have been held with the EA, IA, Kumaon Mandal Vikas Nigam (KMVN), District Administration and other agencies on selection of subprojects and identification of key issues including addressing the current gaps in provision of basic services and improvement of tourist infrastructure.

Table VI-1: Date and number of participants consulted

Public Consultation for Sewage Treatment Plant and Solar lights

District	Location	Date	No. of Participant
1	**2**	**3**	**4**
Pithoragarh	Pithoragarh	01.02.2017	11
	Didihat	28.03.2017	10
	Gangolihat	16.02.2017	8
	Patalbhuwneshwar	11.02.2017	7
	Dharchula	02.02.2017	24
	Munsiyari	26.03.2017	8
	Chokori	03.02.2017	13
	Birthi	27.03.2017	6
	Thal	23.03.2017	7
Bageshwar	Bageshwar	20.02.2017	7
	Baijnath	20.02.2017	6
	Kausani	20.02.2017	9
	Khati	22.02.2017	7
	Dwali	03.03.2017	6
	Kathalia	02.03.2017	7
	Jaitoli	24.02.2017	7
	Loharkhet	22.02.2017	6
	Dhakuri	22.02.2017	6

Places: Pithoragarh, Didihat, Gangolihat, Patalbhuwneshwar, Dharchula, Munsiyari, Chokori, Birthi, Thal, Bageshwr, Baijnath, Kausani, Khati, Dwali, Kathalia, Jaitoli, Loharkhet and Dhakuri **District:** Pithoragarh & Bageshwar **Participant :** Local people, shopkeepers, and KMVN staff	
1.	**Issues Discussed:** • Impact on the local environment due the proposed works • People's expectation for employing generation during the proposed works. • Any nuisance or health hazard due to construction activity • Any impact on any historical, cultural or religious monument. • Existing sewarge system. • Electricity cutoff problem.
2	**Stakeholder's Response:** • No any major impact on Environment, flora and Fauna due to construction activity but due care should be taken to preserve flora. • Program is good and acceptable to public • No proper sewerage system in town • Sewage treatment should be provided • Local people are to be consulted during all stages of project • Villagers want employment for local villages people for construction • Construction activity is not causing any major health hazard. • More solar lights to be installed than proposed along the boundary of the Tourists Rest Houses.
3.	**Recommendation and Suggestion** • Local labor should be engaged wherever possible.

B. Future Consultation and Information Disclosure

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

C. Consultation during Detailed Design

163. 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.

164. PIU/PMU will conduct information dissemination sessions at major intersections and solicit the help of the local community leaders/prominent citizens to encourage the participation of the people to discuss various environmental issues.

165. The PIU/PMU, will conduct information dissemination sessions in the subproject area. During EMP implementation PIU, 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 stage

166. 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. 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

167. A communications strategy is of vital importance in terms of accommodating traffic during road closure. Local communities will be continuously consulted regarding location of construction camps, access and hauling routes and other likely disturbances during construction. For the benefit of the community the IEE will be disclosed to the affected people and other stakeholders in a form and language(s) understandable to them at an accessible place in a timely manner and made available at: (i) PIU/PMU office; (ii) District Magistrate Office; and, 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.

VII. ENVIRONMENTAL MANAGEMENT PLAN AND GRIEVANCE REDRESS MECHANSIM

A. Environmental Management and Monitoring Plan (EMMP)

168. The EMMP designed will guide the environmentally-sound construction of the subproject and ensure efficient lines of communication between the Design & Supervision Consultants (KMVN) also an Engineer for the project, Contractors, and Field-Project Implementation Unit (F-PIU)/Project Management Unit (PMU). The EMMP identifies the three phases of development as:

(i) Pre-Construction (ii) Construction Phase; and (iii) Post-Construction/Operational Phase.

169. 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.

170. 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.

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

a. Within the boundaries of the site, and site extensions, there is evidence of contravention of clauses;
b. If environmental damage ensues due to negligence;
c. The contractor fails to comply with corrective or other instructions issued by the Engineer/F-PIU/PMU within a specified time; and
d. The Contractor fails to respond adequately to complaints from the public.

B. Institutional Arrangements

172. 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) Kumaon Mandal Vikas Nigam (KMVN) Limited for effective implementation of environmental

safeguards related requirements of the tourism infrastructure sub-projects. The institutional arrangements and responsibilities are detailed below.

173. The sub-project will be implemented and monitored by the F-PIU, KMVN under Uttarakhand Emergency Assistance Project (UEAP), which will be supported by KMVN (also working as Engineer) and overall management support shall be provided by PMU, UEAP, SDMA.

174. The Safeguard Staff of UEAP, SDMA (EA) in PMU, and IA will monitor the implementation of environmental covenants.

175. 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. An Environmental Management and Monitoring Plan (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 KMVN; and it would guide the IA and the civil works contractors in this regard. , KMVN 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 sub-project 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.

I) 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 (KMVN) and/or Safeguards Staff of UEAP, SDMA for the duration of the Contract;
- May, on the recommendation of the Environmental Expert (EE), KMVN and/or Safeguards Staff of UEAP, SDMA, through the KMVN 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; and
- Act as overall monitoring agency.
- Addressing complaints and redressal of grievances.

II) UEAP, IA & F-PIU)

- Ensures along with Engineer (PIU) that EMMP and all necessary environmental stipulations are carried in bidding documents and Contract documents with Contractor.

- 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 (KMVN) and/or Safeguards Staff of UEAP SDMA 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 SDMA;
- May, on the recommendation of the EE, KMVN and/or Safeguards Staff of UEAP, SDMA, through the KMVN order the Contractor to suspend any or all works on site if the Contractor or his sub-contractors/ suppliers fail to comply with the said contractual stipulations with respect to environment and EMMP; and
- Act as supervising & monitoring agency as delegated in EMMP.

III) The Engineer PIU KMVN

- Guides EA, IA, F-PIU 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 F-PIU 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; and
- Documents in conjunction with the Contractor, the state of the site prior to commencing construction activities.

IV) Environmental Safeguard Expert (PIU)

- 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 ; and
- Provides technical advice relating to environmental issues to the Engineer.

V) The Contractor

- Appoints one full-time suitably qualified and experienced Environmental Safeguard Officer for implementation of EMMP including Environment Health & Safety (EHS) measures, community liasoning, reporting and grievance redressal on day to day basis
- Complies with all applicable legislation, 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 KMVN, F-PIU & IA and take steps for implementation of remedial measures in consultation with the Engineer (KMVN), and reports to the Engineer (KMVN) on the status in its each monthly report till satisfactory resolution.

176. The proposed sub-project will be implemented by the F-PIU, Tourism (KMVN)**.** The F-PIU will be responsible for supervision and monitoring of day-to-day implementation of subprojects including EMMP.

177. 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 sub-project specific monitoring plans) or by the IAs for the monitoring works not included in the civil works contracts.

C. Environment Management

178. 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 BOQ of the project. The scope of works of the Contractor towards the implementation of the environmental provisions shall be as follows:

a. 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.
b. Compliance with all mitigation measures and monitoring requirements set out in the EMMP.
c. Submission of a method statement detailing how the subproject EMMP will be complied with. This shall include methods and schedules of monitoring.
d. Monitoring of project environmental performance including performance indicators defined therein, and periodic submission of monitoring reports.
e. 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.
f. 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 KMVN.
g. 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.

179. 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.

Quarry and Borrowing

180. The Contractor will identify and seek prior approval of the Engineer for quarrying and borrowing operations. Quarry and borrowing 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.

181. The Contractor shall maintain all borrow sites, 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 (topsoil, 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.

182. Borrow areas and 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

183. Dismantling of existing structures: Debris Disposal shall be maximum utilized and disposed as per norms after consultation with KMVN/F-PIU/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 Hazardous Wastes (Management, Handling and Transboundary movement) Rules, 2008 and amendments till date & applicable norms.

Precautions for Protection of Environmental Measures

184. 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.

185. 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

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

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

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

188. 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

189. 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 Labour 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; and Contractor should follow all the applicable rules and regulations for workers health and safety. 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

190. 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.

191. 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 F-PIU) a certificate to this effect from the Owner.

D. Environmental Monitoring Plan

192. 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.

193. 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 Central Pollution Control Board (CPCB) standards for air, water, soil, and noise. Indicators and Targets for Environmental Performance are provided in the annexed table (No.) in Section E of this EMMP. The frequency of sampling and selection of sampling sites are sub-project specific.

194. 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 PIU/PMU. The monitoring plan is outlined in Table below.

Table: VII-1. Environment 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, KMVN, 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 (Authorized vendor)	Random checks	Contractor
Construction Stage			
Legislation, permits and Agreements	Permissions,/ NoCs/Consents other statutory requirement	Continuous	Contractor, KMVN, IA & EA
Dust suppression	No. of tankers for water sprinkling, Timing of sprinkling, Location of sprinkling (log books to be maintained)	Random checks	Contractor
Ambient air quality	PM_{10}, $PM_{2.5}$, 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 NABL Accredited Laboratory
Ambient noise	Equivalent Day & Night Time Noise Levels (Leq)	Once in a quarter where work is in progress and near sensitive receptors during construction stage.	Contractor, to be monitored through NABL Accredited Laboratory
Water Quality	pH, Conductivity, Colour, Odour, Turbidity, Total Hardness($CaCO_3$) BOD, Iron (as Fe) m Chloride as (Cl), Residual Free Chlorine. Calcium Hardness, (as Ca) Magnesium Hardness (as Mg) Copper as Cu, Total dissolved Solid, Total Coliform, E. Coli.	Once in a quarter where work is in progress and near sensitive receptors during construction stage	Contractor, to be monitored through approved NABL Accredited Laboratory

Soil	pH, Conductivity, Chloride as Cl, Potassium as K, Organic Matter , Available Nitrogen, Phosphorus, Sulphate as SO_4, Water Holding Capacity, Porosity heavy metals (including Lead, cadmium, Zinc and Pesticides)	Once in a quarter where work is in progress and near sensitive receptors during construction stage	Contractor, to be monitored through NABL Accredited Laboratory
Heritage Protection, if needed	Visual Inspection of works, compliance with ASI regulations and norms	Continuous	ASI/F-PIU
Supply of PPE	Usage of PPE on site, adequacy of equipment	Continuous	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 to pre-project conditions as per approved closure plan	Post-construction	Contractor
Operation & Maintenance Stage			
Water quality	All parameters as per 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.

E. Environmental Budget

195. As part of good engineering practices in the project, there have been several measures as erosion prevention, rehabilitation of borrow ar eas, 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.

196. 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 KMVN 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.

197. 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).

198. 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.

199. 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 VII-2: Environmental Management & Monitoring Costs

A. Sewage Treatment Plant Works

S. No	Particulars	Stages	Unit	Total number	Rate (INR)	Cost (INR)*	Source of fund
A	Legislations, permits and agreements	Pre construction phase & Construction phases					The cost for clearance, 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	13	5,000.00	65,000.00	F-PIU KMVN
C.	**Environmental Baseline Data Generation**						
1	Ambient air quality	Preconstruction	Per sample	13	10,000	130,000.00	Contractor cost
2	Noise quality			13	4,000	52,000.00	
3	Water quality (Surface, Ground & Drinking water)			52	6,000	312,000.00	
4	Soil Quality			13	6,000	78,000.00	
D	**Environmental Monitoring**						
1	Ambient air quality	Construction	Per sample	13	10,000	130,000.00	
2	Noise quality			13	4,000	52,000.00	
3	Water quality (Surface, Ground & Drinking water)			52	6,000	312,000.00	
4	Soil Quality			13	6,000	78,000.00	
E	Dust Suppression at construction sites	Construction and Defect Liability period	Lump sum			150,000.00	
1	Ambient air quality	Operation and defect liability period	Per sample	13	10,000	130,000.00	Implementing Agencies cost/ Contractors cost
2	Water quality (Surface & Ground)			39	4,000	156,000.00	
3	Noise quality			13	6,000	78,000.00	
4	Soil Quality			13	6,000	78,000.00	
F	**Capacity Building (Includes cost estimates for entire sub project area not included in the package costs)**						
1	EMP training at site implementation of EMMP for contractor	Construction	Nos.	13	5,000	65,000.00	Contractor cost

B. Solar Works

S. No	Particulars	Stages	Unit	Total number	Rate (INR)	Cost (INR)*	Source of fund
A	Legislations, permits and agreements	Pre construction phase & Construction phases					The cost for clearance, 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	17	5,000.00	85,000.00	F-PIU KMVN
C.	**Environmental Baseline Data Generation**						
1	Ambient air quality	Preconstruction	Per sample	5	10,000	50,000.00	Contractor cost
2	Noise quality			5	4,000	20,000.00	
3	Water quality			5	6,000	30,000.00	
D	**Environmental Monitoring**						
1	Ambient air quality	Construction	Per sample	17	10,000	170,000.00	
2	Noise quality			17	4,000	68,000.00	
3	Water quality			17	6,000	102,000.00	
F	**Capacity Building (Includes cost estimates for entire sub project area not included in the package costs)**						
1	EMP training at site implementation of EMMP for contractor	Construction	Nos.	17	5,000	85,000.00	Contractor cost

F. Environmental Monitoring and Reporting

200. 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 KMVN/Engineer on day to day basis. KMVN / 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.

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

202. 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 VII-3: Standardized EMMP for Sewage Treatment Plant works to guide the contractor in mitigating environmental impacts

S. No.	Activity	Management/ Mitigation	Responsibility		Fund Source
			Implementation	Supervision	
1.0 Design & Pre- Construction Phase					
1.1	Legislation, Permits and Agreements	In all instances, EA, IA contractors and consultants must remain in compliance with relevant environmental legislation of India at the national, state and local levels.	Permissions,/ NOCs / Consents requirement – **IA** Permissions / NOCs/ Consents requirement for equipment/ machineries, Borrow area/ queries etc. – **Contractor**	PMU, F-PIU, KMVN	IA, Contractor
		Proof of compliance to statutory requirements must be forwarded by the facility owner contractor to PMU/F-PIU in relation to batching plant, diesel generators etc.	ESO-Contractor, Engineer, & Environmental Expert F-PIU	PMU, F-PIU	
		A copy of the EMP must be kept on site during the construction period	ESO-Contractor, Engineer & EE	F-PIU, IA & PMU	
1.2	Education of site staff on general and Environmental Conduct[1]	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	Environment and Safety Officer of Contractor, and EE	F-PIU, IA & PMU	
		No operator shall be permitted to operate critical items of mechanical equipment without having been trained by the Contractor	Contractor and EE	F-PIU, IA & PMU	
		All employees must undergo safety training and wear the necessary protective clothing /equipment	Contractor and EE	IA & PMU,	
		A general regard for the social and ecological well-being of the site and adjacent areas is expected of the site staff. Workers need to be made aware of the following general rules: • No alcohol / drugs to be present on site; • Measures for abatement of noise due to construction related activities and conduct of work force;	Contractor and EE	IA & PMU	

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

S. No.	Activity	Management/ Mitigation	Responsibility		Fund Source
			Implementation	Supervision	
		• 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; and • Other than pre-approved security staff, no workers shall be permitted to live on the construction site. No worker may be forced to do work that is potentially dangerous or for what he / she is not trained to do.			
1.3	Social Impacts	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 & F-PIU	IA & PMU,	Contractor
		A communications strategy is of vital importance in terms of accommodating traffic during road closure. 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 & F-PIU	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 & F-PIU	IA & PMU	
		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.	Engineer and EE	IA & PMU	
		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.	Executive Engineer	IA & PMU	
1.4	Lack of sufficient	Design will include provisions for ensuring effective	Contractor, Engineer, EE, and	IA & PMU	IA

S. No.	Activity	Management/ Mitigation	Responsibility		Fund Source
			Implementation	Supervision	
	planning to assure long term sustainability of the improvements and ensure protection of the assets created	maintenance and protection of the assets created so as to ensure the long term sustainability.	F-PIU		
1.5	General Ecological Principles applied to design	Ensure design takes into account minimal disturbance of surround ecosystems and sound management of wastes associated with the STP.	Engineer & IA	IA & PMU	IA
1.6	Environmentally responsible procurement	Specify in tender document qualified staffs are required to implement, manage, and monitor environmental and safety issues of the project. EMP included in bid documents to ensure that mitigation measures are budgeted and to prepare the contractor for environmental responsibilities. Contractor to submit site specific environmental management plan (CEMP) based on contractual EMP	Engineer & IA	IA & PMU	IA
1.7	Environmental capacity Development.	Provide general training and awareness of safeguards requirements (e.g. workshops and on-the-job training). Conduct contractor / workers' orientation on EMP provisions.	IA & Contractor	IA & PMU	IA & Contractor
1.8	Occupational Health and Safety (OH&S) measures not specified in Bid Documentation	Inclusion of OH&S requirements in Bid Documentation including: • Allocation of responsibility for safety inspections to a designated, qualified and experienced Environmental Safeguard Officer (ESO) within the Contractor's staff; • Training of workers on safety precautions, for themselves and others and for implementing emergency procedures; • Provision of protective clothing and equipment to workers as appropriate; • Ensuring that vehicle and equipment operators are properly licensed and trained; • Arranging for provision of first aid facilities; • Emergency evacuation procedures; • Provision for regular safety checks of vehicles and material;	Contractor	IA & PMU	Contractor

S. No.	Activity	Management/ Mitigation	Responsibility		Fund Source
			Implementation	Supervision	
		• Provision of hazard warning signs at the all construction sites; and • Requirement for the Contractor to maintain a register of accidents detailing date, circumstances, severity, action taken and outcomes			
1.9	Potential risks due to public not well informed on the Grievance Redress Mechanism (GRM) and how it is operated.	A stakeholder participatory meeting is required prior to commencement of work, to ensure business and general public are aware of the GRM and how it is operated.	Engineer & EE	IA & PMU	IA
2.0 Construction Period					
2.1	Site Clearance	Site clearance shall be carried out to in such a way that the clearance and grubbing waste is disposed immediately in the designated dumping site identified for the project. In no case the waste material shall be disposed in the river or any other sensitive environment components.	Contractor	Engineer, EE, and F-PIU	Contractor
2.2	Clearing of vegetation during earthworks will make the site susceptible to soil erosion in case of rains during the period that bare soil is exposed.	• It is recommended that, if possible, earthworks and site preparation be undertaken during the drier winter season. • Storm water should be channeled away from the exposed area for the duration of construction. • Soil stockpiles (if any) must not be placed in the natural flow path of storm water and must be protected from possible erosion, e.g. through covering of the stockpiles with tarpaulin or hessian, and limiting the height and angle of the stockpile. Soil stockpiles should not exceed 2 m in height. • Any erosion channel(s) that may develop should be backfilled and compacted as soon as possible, and the area(s) restored to a proper condition. The contractor should ensure that cleared areas are effectively stabilized to prevent and control erosion. • It is the responsibility of the Contractor to ensure that cleared areas are effectively stabilized to minimise erosion.	Contractor	IA & F-PIU	Contractor

S. No.	Activity	Management/ Mitigation	Responsibility		Fund Source
			Implementation	Supervision	
2.3	Possible contamination of soil by wastewater during construction	• Construction and lining of the secondary and tertiary ponds must take place first, so that the raw / semi-treated sewage which is currently held in the primary pond can be safely transferred to these ponds when construction work commences on the digesters which will take the place of the current primary pond. • Sanitation facilities must be provided at a ratio of at least 1 toilet per 15 workers. • Sufficient washing facilities must be provided for workers. Wash areas must be placed and erected in such a manner that the surrounding areas, including soil and groundwater, are not polluted. • Any soil contaminated during construction must be removed to a suitable disposal site. • Prolonged stockpiling of topsoil should be avoided in favour of returning the topsoil directly to an area to be landscaped.	Contractor	IA & F-PIU	Contractor
2.4	Possible leakage or contamination of water by runoff containing construction related substances such as cement or paint.	• The Contractor must prevent the discharge of any pollutants, such as cement, concrete, lime, chemicals, fuels or contaminated water which might infiltrate into the ground, resulting in deterioration of groundwater quality. • Mixing of cement must take place on an impermeable surface (e.g. concrete slab or plastic tarpaulin) and not directly on bare soil. • Potentially contaminated water may not be allowed to flow into the storm water drainage system or to infiltrate into the soil.	Contractor	IA & F-PIU	Contractor
2.5	Storm water may cause soil erosion on cleared construction site.	Storm water should be channelled away from the exposed area for the duration of construction.	Contractor	IA & F-PIU	Contractor
2.6	Accident risks from mobilizing construction equipment.	• To the extent possible, avoid the mobilization of heavy equipment's at night. • All vehicle movements during standard daily working hours. • Over-width and over-length vehicles should display	Contractor	IA & F-PIU	Contractor

S. No.	Activity	Management/ Mitigation	Responsibility		Fund Source
			Implementation	Supervision	
		adequate warnings such as flashing lights, signs, and flags on extending parts of equipment. • Designated routes for construction vehicles, stakeholders informed, local speed limits and road rules adhered to. • Provision of signboards for the safe movement of the pedestrians.			
2.7	Accident risk from construction activity.	Safety awareness and education will be provided to all workers and will include; • Warning and/or Precaution Signs on safety throughout the work area. • Safety Helmets. • Instruction on health and safety for the workforce engaged in the construction. • Establishment of all relevant safety measures required by Government of India laws, donor agency and good engineering practices. • Provision and accessibility of first aid facilities at the construction sites.	Contractor	IA & F-PIU	Contractor
2.8	Accidental damage to property.	• Ensuring that all works operations take place in the presence of the Contractor's Supervisor, who is responsible for ensuring all reasonable precautions are undertaken to prevent damage to property. • The contractor supervisor is fully aware of the GRM.	Contractor	IA & F-PIU	Contractor
2.9	Accidental damage to utilities	• Obtaining plans from KMVN and relevant government and public agencies showing the locations of pipelines and power cables, and mark prior to start of works program. • Consultation with local people on the location of utilities prior to commencing excavation operations.	Contractor	IA & F-PIU	Contractor
3.0	Construction waste disposal and wastewater from construction site.	• Preparation and implementation of waste management plan by contractor before start of work. • No waste should be dumped within the work site; • Waste to be immediately removed from the site and disposed off at the projects dedicated and approved waste management site. • All wastewater to be prevented as best as possible from entering the adjacent terrestrial water bodies.	Contractor	IA & F-PIU	Contractor

S. No.	Activity	Management/ Mitigation	Responsibility		Fund Source
			Implementation	Supervision	
		• Siltation traps will be placed at the construction sites to regulate and manage wastewater sedimentation issues.			
3.1	Improper disposal of solid and liquid wastes	• Segregation of wastes shall be observed and provisions supplied (e.g. Waste collection bins). • Organic (bio-degradable) waste material shall be collected and disposed of off-site by composting • All non-hazardous wastes to be disposed off at the projects dedicated and approved waste management site.	Contractor	IA & F-PIU	Contractor
3.2	Pollution due to use and storage of hazardous substances.	• Hydrocarbon and toxic materials to be stored in adequately protected sites to prevent soil and water contamination, while vehicle maintenance and refueling will be confined to areas in construction sites designed to contain spilled lubricants and fuels. • Fuel storage area shall be provided with impervious flooring and bund/containment wall to keep spilled fuel/lubricant within the storage area; • Used oil and other toxic and hazardous materials shall be disposed of in an authorized facility off-site. • Spill waste will be disposed at disposal sites approved by the Engineer. • All areas intended for storage of hazardous materials will be quarantined and provided with adequate facilities to combat emergency situations complying all the applicable statutory stipulations. • These areas should be access controlled and entry will be allowed only under authorization	Contractor	IA & F-PIU	Contractor
3.3	Noise and Vibration	• Provide information to nearby residents about the duration of noise generating operations, especially traffic moving through communities. • Planning of construction operations to minimize public nuisance. • All construction vehicles and machinery to have working mufflers and they will be properly maintained and conform to CPCB (Government of India) noise emission requirements. • Activities that will generate high noise levels will be scheduled to coincide with period when people are least likely to be affected.	Contractor	IA & F-PIU	Contractor

S. No.	Activity	Management/ Mitigation	Responsibility		Fund Source
			Implementation	Supervision	
		• All construction activities generating noise to be undertaken between the hours of 5 AM and 9 PM daily. • Enforcement of regulations subsequent to public awareness.			
3.4	Dust and Air Pollution	• Provide information to nearby community/residents about the duration of dust generating operations. • Maintain all construction vehicles to minimize toxic vehicle emission. • Sprinkle water on the road surface to prevent dust emissions, is required. • Regular wetting or coverage of stockpiled material to ensure dust is not given off during windy conditions. • Prompt removal of waste material to reduce potential dust.	Contractor	IA & F-PIU	Contractor
3.5	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 safeguard Expert of PIU. 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 PIU.	Contractor	IA & F-PIU	Contractor
3.6	Minimize social and community impacts	Methods of communication with key stakeholders, affected parties and the owners/occupiers of the neighbouring properties regarding the: • Likely timing and duration of work. • Alternative routes. • Access to properties. Details of prior consultation and outline any measures developed with such group to manage or mitigate adverse effects.	Contractor	IA and F-PIU	Contractor
3.7	Public Health & Safety	Barriers (e.g., temporary fence) shall be installed at	Contractor	IA and F-PIU	Contractor

S. No.	Activity	Management/ Mitigation	Responsibility		Fund Source
			Implementation	Supervision	
	Risks	construction areas to deter access if required. The general public/local residents shall not be allowed in high-risk areas, e.g., excavation sites and areas where heavy equipments are in operation.			
3.8	Occupational Health and Safety (OH&S)	• Workers shall be provided with appropriate personal protective equipment (PPE) such as safety shoes, hard hats, safety glasses, earplugs, gloves, etc. • The contractor shall orient workers on health and safety issues related to their activities as well as on the proper use of PPE. • Install channelling devices (e.g., traffic cones and barrels) or fence to delineate the work zone. • Workers shall be provided with potable water supply. • Provision of distinguishing clothing or reflective devices or otherwise conspicuously visible material when there is regular exposure of workers to danger from moving vehicles. • Monitoringand control of the working environment and planning of safety and health precautions should be performed as prescribed by national laws and regulations. This includes; ✓ Workers who have received appropriate training in accordance with national laws and regulations shall operate construction equipment. ✓ The drivers and operators of vehicles and materials handling equipment shall be medically fit, trained and tested and of a prescribed minimum age as required by the government rules and regulation. ✓ Safety provisions shall be brought to the notice of all concerned by displaying or notice board at a prominent place at the work locations. ✓ The contractor shall be responsible for observance, by his sub-contractors, of all health and safety provisions. ✓ The contractor should take adequate measures for			

S. No.	Activity	Management/ Mitigation	Responsibility		Fund Source
			Implementation	Supervision	
		the control of malaria and other mosquito vector diseases. ✓ All vehicles used in the construction yard should have reverse horns. ✓ There should be proper demarcation of work areas with signage boards showing the work areas. The signboards should be in local language and English and/or French. ✓ Suitable warning should be displayed at all places where contact with or proximity to electrical equipment can cause danger. ✓ Persons having to operate electrical equipment should be fully instructed as to any possible danger of the equipment concerned. All the electrical equipment should be inspected before it is taken into use to ensure that it is suitable for its purpose. ✓ Water transport tanks, storage tanks and dispensing container should be designed, used, cleaned and disinfected at suitable intervals. Water that is unfit for drinking should be conspicuously indicated by notices prohibiting workers from drinking it. ✓ Secure storage areas should be provided for flammable liquids, solids and gases such as liquefied petroleum gas cylinder, paints and other such materials in order to deter trespassers. ✓ Smoking should be strictly prohibited and no smoking notices be predominantly displayed in all places containing readily combustible or flammable materials ✓ Oil rags, waste and clothes or other substances liable to spontaneous ignition should be removed without delay to a safe place. ✓ Fire-extinguishing equipment should be provided at construction camps, asphalt plants, storage areas for combustible materials and other areas where fire hazards are found. Such equipment shall be properly			

S. No.	Activity	Management/ Mitigation	Responsibility		Fund Source
			Implementation	Supervision	
		maintained and inspected at suitable intervals by a competent person.			
3.9	Construction Camps - Location, Selection, Design and Layout	Siting of the construction camps shall be as per the guidelines below and details of layout to be approved by PIU. Construction camps shall not be proposed within 500 m 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 300 m 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.	Contractor and EE	F-PIU, IA & PMU	Contractor
3.10	Infrastructure provisions at Construction camps	The contractor shall provide and maintain necessary living accommodation and ancillary facilities for labour as per the requirements of applicable labour regulations of Government of India. • All the work sites and camp sites shall also be provided with basic sanitation and infrastructure as per the requirements of Building and other Construction Workers (regulation of Employment and Conditions of Service) Act, 1996.	Contractor with the Engineer and EE	F-PIU, IA & PMU	Contractor
3.11	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	Contractor	F-PIU & PMU	Contractor

S. No.	Activity	Management/ Mitigation	Responsibility		Fund Source
			Implementation	Supervision	
		expense, to the entire satisfaction of the Engineer and facility owner.			
3.12	Risk of archaeological chance finds	Strictly follow the protocol for chance finds in any excavation work; Request FPIU 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, and take any action they require ensuring its removal or protection in-situ.	Contractor	FPIU & PMU	Contractor
3.13	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	F-PIU & PMU	Contractor
3.14	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 EMMP, community liaising, consultations with interested/affected parties, reporting and grievance redressal on day-to-day basis. This environment and safety officer will be at site till all works related to the project including demobilization are completed.	Contractor	F-PIU & PMU	Contractor
3.15	Failure to prepare and submit monitoring reports	The contractor(s) will be responsible for filing monthly monitoring checklist reports, defining the mitigative measures undertaken, issues arising and future activities-based on the EMP	Contractor	F-PIU & PMU	Contractor
4.0 Operation Period					
4.1	Health and safety risks associated with cleaning and removal of silt, oils and plastics from the drainage traps	Ensure correct OH&S procedures developed in the EMP are adopted and continued to be implemented during the operational phase, specifically including the maintenance and future repair activities of drainage systems. Maintenance schedule is defined and costed to adequately cover the cost of maintenance is secured prior to the operation phase. Maintenance schedule should at least cover the operation life of the equipment.	IA, EA and Tourism Department	SDMA, PMU & GoUK	Dept. Of Tourism, GoUK
4.2	Possible pollution of	Regular inspection of facilities for intercepting leaking	IA, EA and Tourism	SDMA, PMU	Dept. Of

S. No.	Activity	Management/ Mitigation	Responsibility		Fund Source
			Implementation	Supervision	
	streams or groundwater	and spilled liquids shall be carried out near the sewage treatment plant. Storm water will be diverted from the site to prevent ingress into open components of the system Storm water and seepage collection drains will be in place to contain possibly contaminated storm water runoff. Water quality monitoring from surface as well as ground water quality must be in place to detect any contamination that may be linked with the treatment plant All chemicals to be used for the treatment of the sewage treatment plant shall be handled only in appropriate segregated, sealed and bundled areas at site.	Department	& GoUK	Tourism, GoUK
4.3	Minimize generation of unpleasant odours	Ensure that all components of the treatment plant are in good working order at all times. If the plant is functioning properly, the generation of odours should be minimized Bimonthly monitoring needs to be conducted. This does not need to be quantitative monitoring, but simply qualitative whether odour levels are low, medium or high.	IA, EA and Tourism Department	SDMA, PMU & GoUK	Dept. Of Tourism, GoUK

EE= Environmental Expert of Engineer (KMVN), IA= Implementing Agency, EA= Executing Agency, FPIU= Field Project Implementation Unit (KMVN)

Table VII-4: Standardized EMMP for Solar light works to guide the contractor in mitigating environmental impacts

S.No	Activity	Management/ Mitigation	Responsibility		Fund Source
			Implementation	Supervision	
1.0 Design & Pre- Construction Phase					
1.1	Legislation, Permits and Agreements	In all instances, EA, IA contractors and consultants must remain in compliance with relevant environmental legislation of India at the national, state and local levels.	Permissions,/ NOCs / Consents requirement – **IA** Permissions / NOCs/ Consents requirement for equipment/ machineries, Borrow area/ queries etc. – **Contractor**	PMU, F-PIU, KMVN	IA, Contractor
		Proof of compliance to statutory requirements must be forwarded by the facility owner contractor to PMU/F-PIU	ESO-Contractor, Engineer, & Environmental Expert F-PIU	PMU, F-PIU	
		A copy of the EMP must be kept on site during the construction period	ESO-Contractor, Engineer & EE	F-PIU, IA & PMU	
1.2	Education of site staff on general and Environmental Conduct[2]	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	Environment and Safety Officer of Contractor, and EE	F-PIU, IA & PMU	
		No operator shall be permitted to operate critical items of mechanical equipment without having been trained by the Contractor	Contractor and EE	F-PIU, IA & PMU	
		All employees must undergo safety training and wear the necessary protective clothing /equipment	Contractor and EE	IA & PMU,	
		A general regard for the social and ecological well-being of the site and adjacent areas is expected of the site staff. Workers need to be made aware of the following general rules: • 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; and • Other than pre-approved security staff, no workers shall be	Contractor and EE	IA & PMU	

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

S.No	Activity	Management/ Mitigation	Responsibility		Fund Source
			Implementation	Supervision	
		permitted to live on the construction site. No worker may be forced to do work that is potentially dangerous or for what he / she is not trained to do.			
1.3	Social Impacts	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 & F-PIU	IA & PMU,	Contractor
		A communications strategy is of vital importance in terms of accommodating traffic during road closure. 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 & F-PIU	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 & F-PIU	IA & PMU	
		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.	Engineer and EE	IA & PMU	
		In areas where the visual environment is particularly important (e.g. along commercial/ tourism routes) or privacy concerns for surrounding buildings exist, the site may require screening. This could be in the form of shade cloth, temporary walls, or other suitable materials prior to the beginning of construction.	Engineer and EE	IA & PMU	
		Special attention shall be given to the screening of highly reflective materials on site.	Executive Engineer	IA & PMU	
1.4	Lack of sufficient planning to assure long term sustainability of the improvements and ensure protection of the assets created	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 F-PIU	IA & PMU	IA
1.5	General Ecological Principles applied to design	Ensure design takes into account minimal disturbance of surround ecosystems and sound management of wastes associated with the STP.	Engineer & IA	IA & PMU	IA
1.6	Environmentally responsible procurement	Specify in tender document qualified staffs are required to implement, manage, and monitor environmental and safety issues of the project. EMP included in bid documents to ensure that mitigation	Engineer & IA	IA & PMU	IA

S.No	Activity	Management/ Mitigation	Responsibility		Fund Source
			Implementation	Supervision	
		measures are budgeted and to prepare the contractor for environmental responsibilities. Contractor to submit site specific environmental management plan (CEMP) based on contractual EMP			
1.7	Environmental capacity Development.	Provide general training and awareness of safeguards requirements (e.g. workshops and on-the-job training). Conduct contractor / workers' orientation on EMP provisions.	IA & Contractor	IA & PMU	IA & Contractor
1.8	Occupational Health and Safety (OH&S) measures not specified in Bid Documentation	Inclusion of OH&S requirements in Bid Documentation including: • Allocation of responsibility for safety inspections to a designated, qualified and experienced Environmental Safeguard Officer (ESO) within the Contractor's staff; • Training of workers on safety precautions, for themselves and others and for implementing emergency procedures; • Provision of protective clothing and equipment to workers as appropriate; • Ensuring that vehicle and equipment operators are properly licensed and trained; • Arranging for provision of first aid facilities; • Emergency evacuation procedures; • Provision for regular safety checks of vehicles and material; • Provision of hazard warning signs at the all construction sites; and • Requirement for the Contractor to maintain a register of accidents detailing date, circumstances, severity, action taken and outcomes	Contractor	IA & PMU	Contractor
1.9	Potential risks due to public not well informed on the Grievance Redress Mechanism (GRM) and how it is operated.	A stakeholder participatory meeting is required prior to commencement of work, to ensure business and general public are aware of the GRM and how it is operated.	Engineer & EE	IA & PMU	IA
2.0 Construction Period					
2.1	Construction Camps - Location, Selection, Design and Layout	Siting of the construction camps shall be as per the guidelines below and details of layout to be approved by PIU. Construction camps shall not be proposed within 500 m from the sensitive receptors, nearest settlements to avoid conflicts and stress over the infrastructure facilities with the local	Contractor and EE	F-PIU, IA & PMU	Contractor

S.No	Activity	Management/ Mitigation	Responsibility		Fund Source
			Implementation	Supervision	
		community. Location for stockyards for construction materials shall be identified at least 300 m 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.			
2.2	Infrastructure provisions at Construction camps	• The contractor shall provide and maintain necessary living accommodation and ancillary facilities for labour as per the requirements of applicable labour regulations of Government of India. • All the work sites and camp sites shall also be provided with basic sanitation and infrastructure as per the requirements of Building and other Construction Workers (regulation of Employment and Conditions of Service) Act, 1996.	Contractor with the Engineer and EE	F-PIU, IA & PMU	Contractor
2.3	Noise	• Conduct activities during normal working hours • When site is close to school, consult with the school to arrange proper construction time • Use low noise equipment/tools, and enhance routine maintenance of these equipment/tools • In principle, no night-time construction is allowed. If activities must be conducted in the evening and/or weekend, provide local affected groups with at least one week notice of start and completion times, and obtain the approval from local EPB.	Contractor	F-PIU, IA & PMU	Contractor
2.4	Dust	• Use existing materials (cement, sand, wall board, steel beams, etc) supply companies with valid operating licenses • All delivery trucks carrying dust generating materials must be covered or water sprayed to prevent dust generation during transport • Any construction equipment/vehicle deemed by local environmental authorities to be discharging emissions that have excessive smoke or foul odors shall be replaced • Avoid loading/unloading dust generation material in windy situation • On-site storage of dust generating material should be	Conrtractor	F-PIU, IA & PMU	Contractor

S.No	Activity	Management/ Mitigation	Responsibility		Fund Source
			Implementation	Supervision	
		covered and/or water sprayed. • Use pre-painted parts to the extent possible. On-site painting must be conducted with proper personal protection equipment (PPE) and prevention measures for nearby community/buildings.			
2.5	Improper disposal of solid and liquid wastes	• Segregation of wastes shall be observed and provisions supplied (e.g. Waste collection bins). • Organic (bio-degradable) waste material shall be collected and disposed of off-site by composting • All non-hazardous wastes to be disposed off at the projects dedicated and approved waste management site.	Contractor	IA & F-PIU	Contractor
2.6	Management of Solid Wastes (Non-Hazardous)	Any scrap generated needs to be recycled and handled to licensed vendors to conduct recycling/recovery Waste materials (including scrap and packaging) that cannot be recycled or reused are to be disposed at sites/locations officially designated by the government.	Contractor	F-PIU, IA & PMU	Contractor
2.7	Management of Hazardous Wastes (spent lubricants, paints, adhesives, solvents)	Hazardous wastes stored at temporary facilities on-site that are well ventilated with impervious floors and locked when not in use. Wastes are then removed on a regular basis by licensed vendors to receive such materials	Contractor	F-PIU, IA & PMU	Contractor
2.8	Wastewater Management (Construction)	Construction wastewaters, if any, are to be collected, pretreated and discharged into the municipal drainage system, or sent to temporary on-site storage facilities to be collected by companies licensed to receive and manage construction wastewaters	Contractor	F-PIU, IA & PMU	Contractor
2.9	Light pollution	Proper enclosure/barrier shall be installed to block the welding light impact on nearby community	Contractor	F-PIU, IA & PMU	Contractor
3.0	Social disturbance	• For any utility disturbance (water, gas, electricity, internet etc.), prior notice shall be announced in the affected community/building, and timely restoration shall be conducted • Construction site on the ground shall be properly enclosed if possible, with clear warning signs and light (if necessary for night time safety) • Construction site and material storage site shall not block public daily accessibility • Material transportation shall be planned to minimize disruption to normal traffic patterns in the community	Contractors	F-PIU, IA & PMU	Contractor

S.No	Activity	Management/ Mitigation	Responsibility		Fund Source
			Implementation	Supervision	
		• Construction site shall be provided with mobile sanitation facility (e.g. toilet) for workers			
3.1	Occupational Health and Safety (OH&S)	• Workers shall be provided with appropriate personal protective equipment (PPE) such as safety shoes, hard hats, safety glasses, earplugs, gloves, etc. • The contractor shall orient workers on health and safety issues related to their activities as well as on the proper use of PPE. • Install channelling devices (e.g., traffic cones and barrels) or fence to delineate the work zone. • Workers shall be provided with potable water supply. • Provision of distinguishing clothing or reflective devices or otherwise conspicuously visible material when there is regular exposure of workers to danger from moving vehicles. • Monitoring and control of the working environment and planning of safety and health precautions should be performed as prescribed by national laws and regulations. This includes; ✓ Workers who have received appropriate training in accordance with national laws and regulations shall operate construction equipment. ✓ The drivers and operators of vehicles and materials handling equipment shall be medically fit, trained and tested and of a prescribed minimum age as required by the government rules and regulation. ✓ Safety provisions shall be brought to the notice of all concerned by displaying or notice board at a prominent place at the work locations. ✓ The contractor shall be responsible for observance, by his sub-contractors, of all health and safety provisions. ✓ The contractor should take adequate measures for the control of malaria and other mosquito vector diseases. ✓ All vehicles used in the construction yard should have reverse horns. ✓ There should be proper demarcation of work areas with signage boards showing the work areas. The signboards should be in local language and English and/or French. ✓ Suitable warning should be displayed at all places	Contractor	F-PIU, IA & PMU	Contractor

S.No	Activity	Management/ Mitigation	Responsibility		Fund Source
			Implementation	Supervision	
		where contact with or proximity to electrical equipment can cause danger. ✓ Persons having to operate electrical equipment should be fully instructed as to any possible danger of the equipment concerned. All the electrical equipment should be inspected before it is taken into use to ensure that it is suitable for its purpose. ✓ Water transport tanks, storage tanks and dispensing container should be designed, used, cleaned and disinfected at suitable intervals. Water that is unfit for drinking should be conspicuously indicated by notices prohibiting workers from drinking it. ✓ Secure storage areas should be provided for flammable liquids, solids and gases such as liquefied petroleum gas cylinder, paints and other such materials in order to deter trespassers. ✓ Smoking should be strictly prohibited and no smoking notices be predominantly displayed in all places containing readily combustible or flammable materials ✓ Oil rags, waste and clothes or other substances liable to spontaneous ignition should be removed without delay to a safe place. ✓ Fire-extinguishing equipment should be provided at construction camps, asphalt plants, storage areas for combustible materials and other areas where fire hazards are found. Such equipment shall be properly maintained and inspected at suitable intervals by a competent person.			

EE= Environmental Expert of Engineer (KMVN), IA= Implementing Agency, EA= Executing Agency, FPIU= Field Project Implementation Unit (KMVN)

G. Performance Indicator

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

Table VII-5: Performance Indicators of EMMP

S.No	Performance Indicators	Target	Achievements Annually & Semiannually
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 (EMP)	Total number of samples collected
3	Noise Level	Total number of samples as per EMP	Total number of samples collected
4	Water Quality	Total number of samples as per EMP	Total number of samples collected
5	Soil	Total number of samples as per EMP	Total number of samples collected
6	Safety of Workers	List of PPE as per number of labors	List of PPEs actually provided in the project
Performance Indicators of Environmental Management Plan			
7	Permissions/NOCs/Consents requirement	Target timeline to obtain the permit/ NOC/ Consents and its validity	List of permission and NOCs/ Consents obtained till date and status of its validity
8	Public Consultation	Total number of planned public consultation with timeline and coverage of people	Date and actual coverage of the people
9	Grievance redressal	Total number of complaints received, its timeline to response and resolution	Actual number of complaints resolved in percentage, response time
10	Issues raised in Public consultation	Target to attend the issues raised in the Public Consultation	Status of compliance to the issues of Public Consultation
11	Information disclosure	List of information and locations where information to be disclosed	Actual locations where information has been disclosed
12	Education of site staff on Environmental training	Total number of staffs to be trained	Number of staff actually trained
13	Capacity Building	Total number of sessions to be covered. Total number of contractors, PIUs and KMVNs to be covered	Number of sessions completed and number of contractors, PIUs and KMVNs
14	Implementation of EMP mitigation measures	All items of Environmental Management Plan with timeline and its respective regulatory standards like for Ambient air quality, NAAQS2009 standards, Drinking water IS:10500 etc, Residual Chlorine UEPPCB standards and CPHEEO manual for handling	Implementation status of EMP items till date
15	Reporting	List and number of report to be submitted	

H. Grievance Redress Mechanism

204. The EA will establish a mechanism to receive and facilitate resolution of affected people's concerns, complaints, and grievances about the Projects environmental performance. The project-specific grievance redress mechanism (GRM) is not intended to bypass the governments own redress process; rather it is intended to address affected people's concerns and complaints promptly, making it readily accessible to all segments of the affected people and is scaled to the risks and impacts of the Project.

205. The PMU and PIUs will make the public aware of the GRM through public awareness campaigns. Grievances can be filed in writing using the Complaint Register and Complaint Forms (Appendix 5) or by phone with any member of the PMU or PIU. The contact phone number of the PIUs and the PMU will serve as a hotline for complaints and will be publicized through the media and placed on notice boards outside their offices and at construction sites. The safeguard documents made available to the public in an accessible version will include information on the GRM and will be widely disseminated throughout the corridor by the safeguards officers in the PMU and PIUs with support from the NGO engaged to implement the Community Awareness Program.

206. The PIUs will convene Grievance Redress Committees (GRC) within one week of the voiced grievance at the project level consisting of members of local government, NGOs, project staff, and representatives of the affected people. Decisions on the grievance are to be made within 15 days of committee forming. If the grievance cannot be solved, the PMU is notified to further advice on the situation with higher government and legal bodies.

207. The GRC will ensure rights of vulnerable and poor are included. The grievance mechanism will be scaled to the risks and adverse impacts of the Project. It will address affected people's concerns and complaints promptly, using an understandable and transparent process that is gender responsive, culturally appropriate, and readily accessible to all segments of the affected people at no costs and without retribution. The mechanism developed will be in a manner that it shall not impede access to the existing judicial or administrative remedies. The affected people will be appropriately informed about the mechanism.

The PIU officers will be responsible for processing and placing all papers before the GRC, maintaining database of complaints, recording decisions, issuing minutes of the meetings and monitoring to see that formal orders are issued and the decisions carried out. All costs involved in resolving the complaints (meetings, consultations, communication and reporting / information dissemination) will be borne by the PMU.

208. The safeguard monitoring reports will include the following aspects pertaining to progress on grievances: (i) number of cases registered with the GRC, level of jurisdiction (first, second and third tiers), number of hearings held, decisions made, and the status of pending cases; and (ii) lists of cases in process and already decided upon may be prepared with details such as Name, ID with unique serial number, date of notice, date of application, date of hearing, decisions, remarks, actions taken to resolve issues, and status of grievance (i.e., open, closed, pending).

VIII. CONCLUSION AND RECOMMENDATION

209. The proposed subproject components do not involve any interventions in and around the natural and cultural heritage destinations and have less significant (direct/indirect) environmental impacts. It is expected that the proposed subproject will enhanced economic growth and provision of livelihood opportunities for local communities through tourism infrastructure development with a focus on preservation and development of natural and cultural heritage and incidental services. The proposed Project under the Facility is provided to support the State of Uttarakhand, to enhance and develop the tourism sector as a key driver for economic growth.

210. This IEE has identified minor likely impacts on water, air and noise during construction and operation period and has defined mitigation measures. Those mitigation measures will be implemented and monitored during the sub-project execution. Further, the provision of environmental infrastructure, including access to sanitation and waste management facilities within the tourist areas, will better the environmental conditions and minimize the pollution related and aesthetic quality.

211. The specific management measures laid down in the IEE will effectively address any adverse environmental impacts due to the subproject. The effective implementation of the measures proposed will be ensured through the building up of capacity towards environmental management within the PMU/PIU supplemented with the technical expertise of a Safeguards Specialist as part of the KMVN Consultants. Further, the environmental monitoring plans provide adequate opportunities towards course correction to address any residual impacts during construction or operation stages.

212. On the basis of the IEE It is expected that the proposed project components have only minor, negative, localized, temporary and less significant environmental impacts. These impacts can be easily mitigated through adequate mitigation measures and regular monitoring during the Design, Construction and Post Construction Phase of the project. It is recommended that PMU/PIU should have monitoring responsibility in environmental issues of all program components and to ensure the environmental sustenance.

213. In conclusion, the subproject will have overall beneficial impacts after completion, as the solar street lights are independent of the utility grid. Hence, the operation costs will be minimized due to use of renewable and green energy source. Solar street lights require much less maintenance compared to conventional street lights, no external cabling or trenching is required since external wires are eliminated and risk of accidents is minimized. This is a non polluting source of electricity and separate parts of solar system can be easily transported to the remote areas. It allows the saving of energy and also cut in electricity bills at the same time. Installation of STPs in various TRHs will

replace existing septic tanks and soak pits with Environment Friendly Sewage Treatment Plant of appropriate capacity, as the STP disposes off the sewage in more efficient and Eco friendly manner.

214. The IEE carried out for the subproject show that the proposed sub-components will result in net environmental benefits, and that any adverse environmental impact can be addressed through proper location, planning, and design of the proposed subproject; control of construction activity and mitigation measures. The EMP provides for mitigation of all identified impacts and the contract clauses for the environmental provisions will be part of the civil works contracts. Further, the proposed subproject elements have been consulted with the stakeholders and no significant issues requiring redressal in terms of environmental safeguards exist.

215. Based on the findings of the IEE, the classification of the subproject as Category B is confirmed, and no further special study or detailed EIA needs to be undertaken to comply with ADB SPS (2009).

Annexure 1

From,

Secretary,
Department of Culture,
Government of Uttarakhand.

To,

Program Director,
UEAP,
Dehradun.

Ref.....33/PMU/UEAP/2017.....Dehradun/Date.....04.....May, 2017

Sub: Issuance of NOC for carrying out the STP, Solar light and minor renovation works at TRHs in Adibadri and Baijnath.

Reference No: ~~शि.नो./2017~~

Sir,

This has reference to your letter no.....33/PMU/UEAP/2017..... dated.....4/5/17.....Pertaining to the above mentioned subject. In reference to your request NOC is issued for the above said works to be done by PIU-Tourism at TRHs of Adibadri and Baijnath.

(R.Meenakshi Sundaram)
Secretary

PROJECT IMPLEMENTATION UNIT – TOURISM (KUMAON)
UNDER DEPARTMENT OF TOURISM, GOVERNMENT OF UTTARAKHAND
Uttarakhand Emergency Assistance Project (Tourism Sector Program)
OAK Park House, Mallital, Nainital – 263001, Uttarakhand, India
Tel.:+91-05942-237197/236209/235700, Fax +91-05942-236897,
Email: kmvn@yahoo.com, piutkumaon@gmail.com
Websites: www.kmvn.gov.in;

पत्र संख्याः ५१८ / के0एम0वी0एन0 / 2017 दिनाक 30 मार्च,2017

सेवा में,

सचिव
संस्कृति विभाग
उत्तराखण्ड शासन
देहरादून।

विषयः राष्ट्रीय संरक्षित स्मारक बैजनाथ मन्दिर समूह ग्राम बैजनाथ जनपद बागेश्वर के निकट निर्मित पर्यटक आवास गृह में 5 के0एल0डी0 सीवेज ट्रीटमेन्ट प्लान्टस की स्थापना तथा सोलर स्ट्रीट लाईट्स की स्थापना सम्बन्धी कार्य सम्पन्न कराने हेतु अनापत्ति निर्गत करने के सम्बन्ध में।

महोदय,

उपरोक्त विषयक अवगत कराना है कि ए0डी0वी0 सहायतित परियोजना उत्तराखण्ड आपात सहायतित परियोजना (यू0ई0ए0पी0) के अन्तर्गत प0आ0गृह बैजनाथ के परिसर में 5 के0एल0डी0 क्षमता का लघु सीवेज ट्रीटमेन्ट प्लान्टस की स्थापना तथा सोलर स्ट्रीट लाईट्स की स्थापना सम्बन्धी कार्य प्रस्तावित हैं। नेशनल ग्रीन ट्रिब्यूनल (एन0जी0टी0) द्वारा निर्गत अधिसूचना के अनुसार पर्यावरण सरक्षण के दृष्टिगत निगम के प0आ0गृहों में सीवेज ट्रीटमेन्ट प्लान्टस लगाया जाना अनिवार्य है। इसके अतिरिक्त ऊर्जा सरक्षण के दृष्टिगत पर्यावरण अनुकूल सोलर स्ट्रीट लाईट्स भी आवास गृह के परिसर में लगाया जाना प्रस्तावित है।

ज्ञातव्य है कि उक्त पर्यटक आवास गृह राष्ट्रीय सरक्षित स्मारक बैजनाथ मन्दिर समूह ग्राम बैजनाथ जनपद बागेश्वर से लगभग 246 मी0 की दूरी पर निर्मित है। यह भी अवगत कराना है कि उक्त कार्य पर्यटक आवास गृह के परिसर में कराया जाना प्रस्तावित है तथा उक्त कार्य से राष्ट्रीय संरक्षित स्मारक बैजनाथ मन्दिर समूह ग्राम बैजनाथ पर कोई प्रतिकूल प्रभाव नही पडेगा। राष्ट्रीय संरक्षित स्मारक बैजनाथ मन्दिर समूह के समीप पूर्व निर्मित कुमाऊँ मण्डल विकास निगम लि0 द्वारा संचालित पर्यटक आवास गृह, बैजनाथ में उपरोक्त कार्य कराये जाने हेतु आपकी अनापत्ति ली जानी आवश्यक है।

अतः उपरोक्त के क्रम में आपसे अनुरोध है कि पर्यटक आवास गृह बैजनाथ में उपरोक्त कार्यो हेतु अनापत्ति प्रमाण पत्र निर्गत करने का कष्ट करें।

भवदीय

(धीराज सिंह गर्ब्याल)
कार्यक्रम प्रबन्धक

Appendix I

ENVIRONMENT CATEGORIZATION

A. Instructions

(i) The project team completes and submits the form to the Environment and Safeguards Division (RSES) for endorsement by RSES Director, and for approval by the Chief Compliance Officer (CCO).
(ii) The classification of a project is a continuing process. If there is a change in the project components or/and site that may result in category change, the Sector Division submits a new form and requests for re-categorization, and endorsement by RSES Director and by the CCO. The old form is attached for reference.
(iii) In addition, the project team may propose in the comments section that the project is highly complex and sensitive (HCS), for approval by the CCO. HCS projects are a subset of category A projects that ADB deems to be highly risky or contentious or involve serious and multidimensional and generally interrelated potential social and/or environmental impacts.

• B. Project Data	
• Country/Project No./Project Title	**Loan 3055 – IND, Uttarakhand Emergency Assistance Project (UEAP)**
• Department/ Division	**Tourism Department, Government of Uttarakhand**
• Project Name	**Sub-Project: Supply, Installation & Commissioning of Sewage Treatment Plants (STPs) and Installation of Solar Street Lights at various TRHs in Disaster Affected Districts of Pithoragarh & Bageshwar of Kumaon Region, Uttarakhand**
• Processing Stage	• Sub-Project Appraisal Report (SAR) preparation
• Modality	•

[ ] Project Loan [ ] Program Loan [ ] Financial Intermediary [ ] General Corporate Finance
[ ] Sector Loan [ ] MFF [√] Emergency Assistance [ ] Grant
• [ ] Other financing modalities:

• C. Environment Category
• [√] New [ ] Re-categorization — Previous Category [ ]

• Category A	• √ Category B	• Category C	• • Category FI

D. Basis for Categorization/ Re-categorization (pls. attach documents):
[√] REA Checklist as Appendix-I
[ ] Project and/or Site Description
[ ] Other:

E. Comments

Project Team Comments: In Tourism Sector under ADB Emergency assisted UEAP, Supply, Installation & Commissioning of Sewage Treatment Plants (STPs) and Installation of Solar Street Lights at various TRHs in Disaster Affected Districts of Pithoragarh & Bageshwar of Kumaon Region, Uttarakhand are proposed. The works to be taken under the project falls under Environmental Category "B" as its potential environmental impacts are less adverse than those of category A projects. The impacts are site specific and can be mitigate readily through EMMP.	The Project Category as per ADB Safeguard Policy (SPS) 2009 is "B" and IEE is required.

F. Recommended for Approval

Prepared by: Environment Expert PIU (Tourism)	Sign. of Assistant Engineer, Field, PIU (Tourism)
Date:	**Date:**
(Sign. of Procurement Specialist , PIU (Tourism)	Reviewed by : Environment Officer PIU
Date	Date 30 03 17
(Sign. of Deputy Program Manager Tourism (GM)	**Verified: Environment Officer, PMU**
Date	Date: 30-03-17

Endorsed by: Program Manager, IA, Tourism

RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLIST

Supply, Installation & Commissioning of Sewage Treatment Plants (STPs) and Installation of Solar Street Lights at various TRHs in Disaster Affected Districts of Pithoragarh & Bageshwar of Kumaon Region, Uttarakhand

Instructions:

(i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to the Environment and Safeguards Division (RSES) for endorsement by Director, RSES and for approval by the Chief Compliance Officer.

(ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.

(iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title: India/Loan 3055-IND Uttarakhand Emergency Assistance Project (UEAP): Supply, Installation & Commissioning of Sewage Treatment Plants (STPs) and Installation of Solar Street Lights at various TRHs in Disaster Affected Districts of Pithoragarh & Bageshwar of Kumaon Region, Uttarakhand

Sector/Division: Tourism Department, Government of Uttarakhand

Screening Questions	Yes	No	Remarks
A. Project Siting is the project area adjacent to or within any of the following environmentally sensitive areas:		√	None of the project site is adjacent to any environmental sensitive zone.
▪ Cultural heritage site	√		One subproject at Baijnath lies at a distance of 246 mts from the ASI site
▪ Legally Protected Area (core Zone or buffer Zone)		√	
▪ Wetland		√	
▪ Mangrove		√	
▪ Estuarine		√	
▪ Special area for protecting biodiversity		√	
B. Potential environmental impacts will the project cause.			
• Impairment of historical/cultural areas: disfiguration of landscape or potential loss/damage to physical cultural resources?		√	
• Disturbances to precious ecology (e.g. sensitive or protected areas)?		√	

Screening Questions	Yes	No	Remarks
• Alternation of surface water hydrology of waterways resulting in increased sediment in streams affected by increased soil erosion at construction site?		√	
▪ Deterioration of surface water quality due to silt run off and sanitary wastes from worker-based camps and chemicals used in construction?	√		Minor deterioration anticipated during the construction activities. The Environmental Management & Mitigation Plan (EMMP) provides mitigation measures to reduce the impacts.
▪ Increased air pollution due to project construction and operation	√		During construction phase only minor amount of dust may arise which will be mitigated through water sprinkling, no other significant emission is expected as no use of heavy equipment is proposed.
▪ Noise and vibration due to project construction or operation?	√		Minor noise generation anticipated during the construction activities. The Environmental Management & Mitigation Plan (EMMP) provides mitigation measures to reduce the impacts.
▪ Disproportionate impacts on the poor, women and children, indigenous people or other vulnerable groups?		√	No such impact is anticipated.
▪ Poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases (such as STI's and HIV/AIDS) from workers to local populations?		√	Preference will be given to local labours. Camps (if any) will be established preferably on barren land/ wasteland and away from local human settlement. Necessary medical facilities with provision of regular health check-up and awareness camp for communicable diseases will be available in the construction camp. The Contractor will link with existing national and state programs on HIV awareness.
▪ Creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents?		√	Proper disposal of liquid effluent at camps (if any) to avoid water stagnation and creation of breeding grounds. Mosquito replant and Mosquito net will be provided to worker.
▪ Social conflicts if workers from other regions or countries are hired?		√	Preference will be given to local laborers.
▪ Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		√	Large influx of population during construction is not expected, as preference will be given to local labours.

Screening Questions	Yes	No	Remarks
▪ Risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological and radiological hazards during project construction and operation?		√	No such impact is anticipated.
▪ Risks to community health and safety due to the transport, storage and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?		√	No explosive and hazardous chemicals will be used during construction phase.
▪ Community safety risks due to both accidental and natural causes, 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?		√	No risk is involved from the proposed works.
▪ Generation of solid waste and/or hazardous waste?	√		Waste disposal shall be done in legitimate manner and will not cause water pollution and if any hazardous waste will be produced it will be handed over to authorized vendor.
▪ Use of chemicals?		√	
▪ Generation of wastewater during construction or operation?	√		Proposed work does not involve much water usage.

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 (see Appendix I)?	√		The project area falls in the seismic zone V as per Indian Seismic Zone map as per IS: 1893 (Part – 1) 2002.
▪ Could changes in precipitation, temperature, salinity, or extreme events over the Project lifespan affect its sustainability or cost?	√		Will be assessed and suitable mitigation measures will be proposed.
▪ Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (e.g. high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)?		√	Proposed project will not impact any marginalized population, rural-urban migrants, illegal settlement etc.

▪ Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., increasing traffic or housing in areas that will be more prone to flooding, by encouraging settlement in earthquake zones)?		√	No such possibility of vulnerability increase of the surrounding area.

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

☐ **Category A.** A proposed project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment is required.

☒ **Category B**. A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A projects. These impacts are site-specific, few if any of them are irreversible and in most cases mitigation measures can be designed more readily than for category A projects. **An initial environmental examination is required.**

☐ **Category C.** A proposed project is classified as category C if it is likely to have minimal or no adverse environmental impact. No environmental assessment is required although environmental implications need to be reviewed.

☐ **Category FI.** A proposed project is classified as category FI if it involves investment of ADB funds to or through a FI.

Appendix -II Public Consultation Record

PUBLIC CONSULTATION RECORD

Name Of Project : Uttarakhand Emergency Assistant Project

Project Package No. : UK/UEAP-T (KMVN)/NTL/O (ADB LOAN NO. 3055-IND)

Location to be improved : Pithoragarh

Place of Public Consultation : Pithoragarh.

Tehsil/Village : Pithoragarh

District : Pithoragarh

Date : 01.02.2017

List Of Stakeholders/Participants in Public Consultation

S.no.	Name &address	Occupation	Signature
1.	Kaulesh Goswami	Job in Powergrid	
2.	Dinesh Basera	Business	
3.	Pramod Singh.	Business	
4.	Ravi Mehta.	Business.	
5.	Mahipal Singh.	Govt. job.	
6.	Chandan Prakash Mehta	Student.	
7.	Hemraj Mehta.	Student	
8.	Kapil Mehta.	Student	
9.	Sagar Mehta	Student	
10.	Kanwaljeet Singh Mehta	Student.	
11.	Kaush Gaba.	A.E. PIU-Tourism Kumaon.	

PUBLIC CONSULTATION RECORD

Name of Project: Uttarakahand Emergency Assistant Project

Project Package No: UK/UEAPT(KMVN)NTL/0(ADB LOAN NO-3055-IND)

Location to be Improved: Didihat

Place of Public Consultation: Didihat

Tehsil / village: Didihat

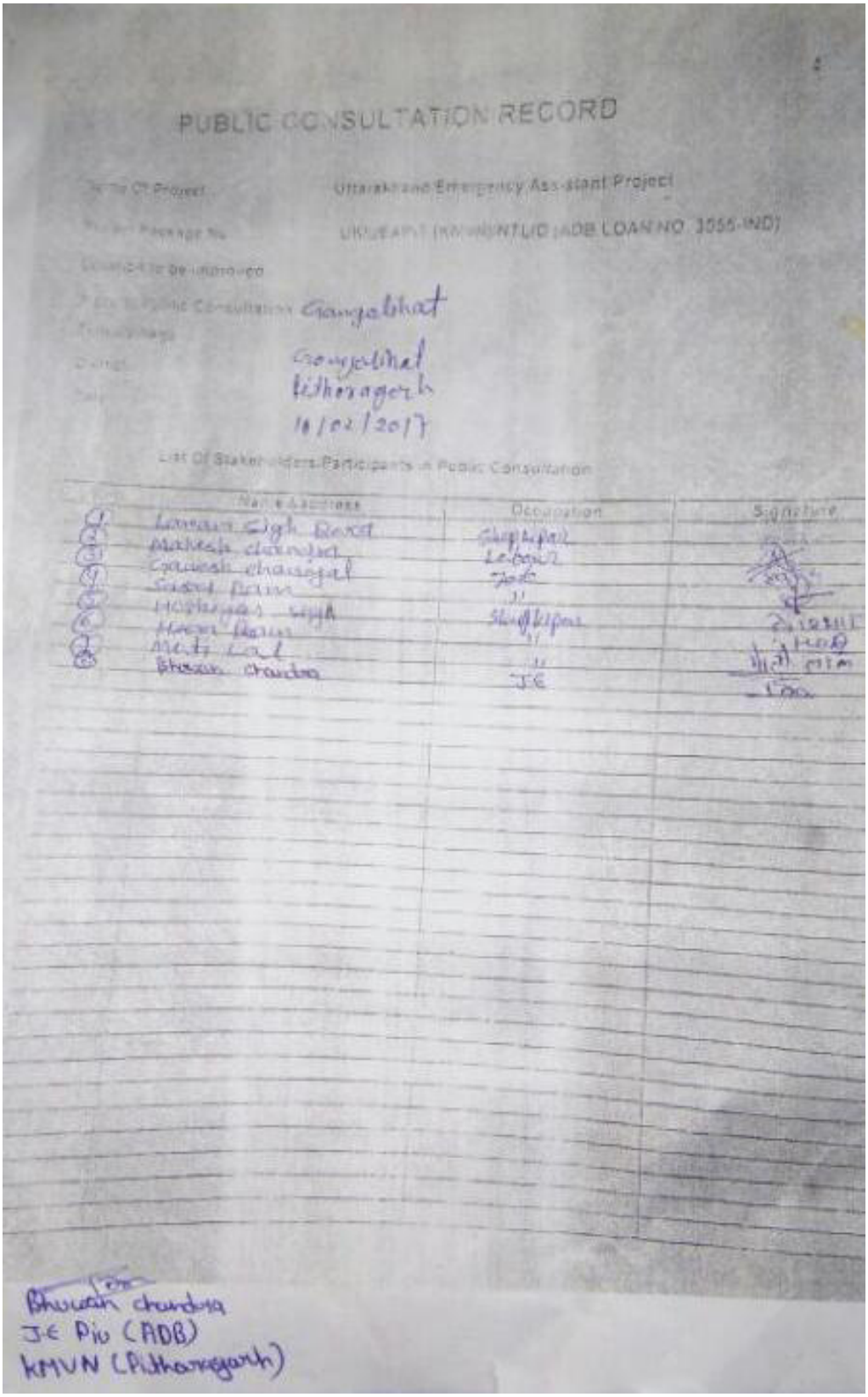
Districict: Pitthoragarh

Date: 28/3/2017

List of stakeholders' participants in Public consultation

Suto	Name & address	Occupation	Signature
①	Narayan Singh	Job	Narayan Singh
②	Gopal ram	Shopkeper	[illegible]
③	Keshar ram	〃	[illegible]
④	Jagdish Singh	Farmer	[illegible]
⑤	Naveen chandra	Shopkeper	[illegible]
⑥	Jogender Singh	Farmer	[illegible]
⑦	Harish chandra	Condecter	[illegible]
⑧	Mohan lal	Shopkeper	Mohan Lal
⑨	Harvinder	Farmer	Harvinder
⑩	Bhuwan Chandra	J. E	[illegible]

[illegible]
Bhuwan Chandra
JE PIU (ADB)
KMVN (Pitthoragarh)



PUBLIC CONSULTATION RECORD

Name Of Project: Uttarakhand Emergency Assistant Project

Package No: UK/EAP1 (NN)/NTL/D (ADB LOAN NO. 3055-IND)

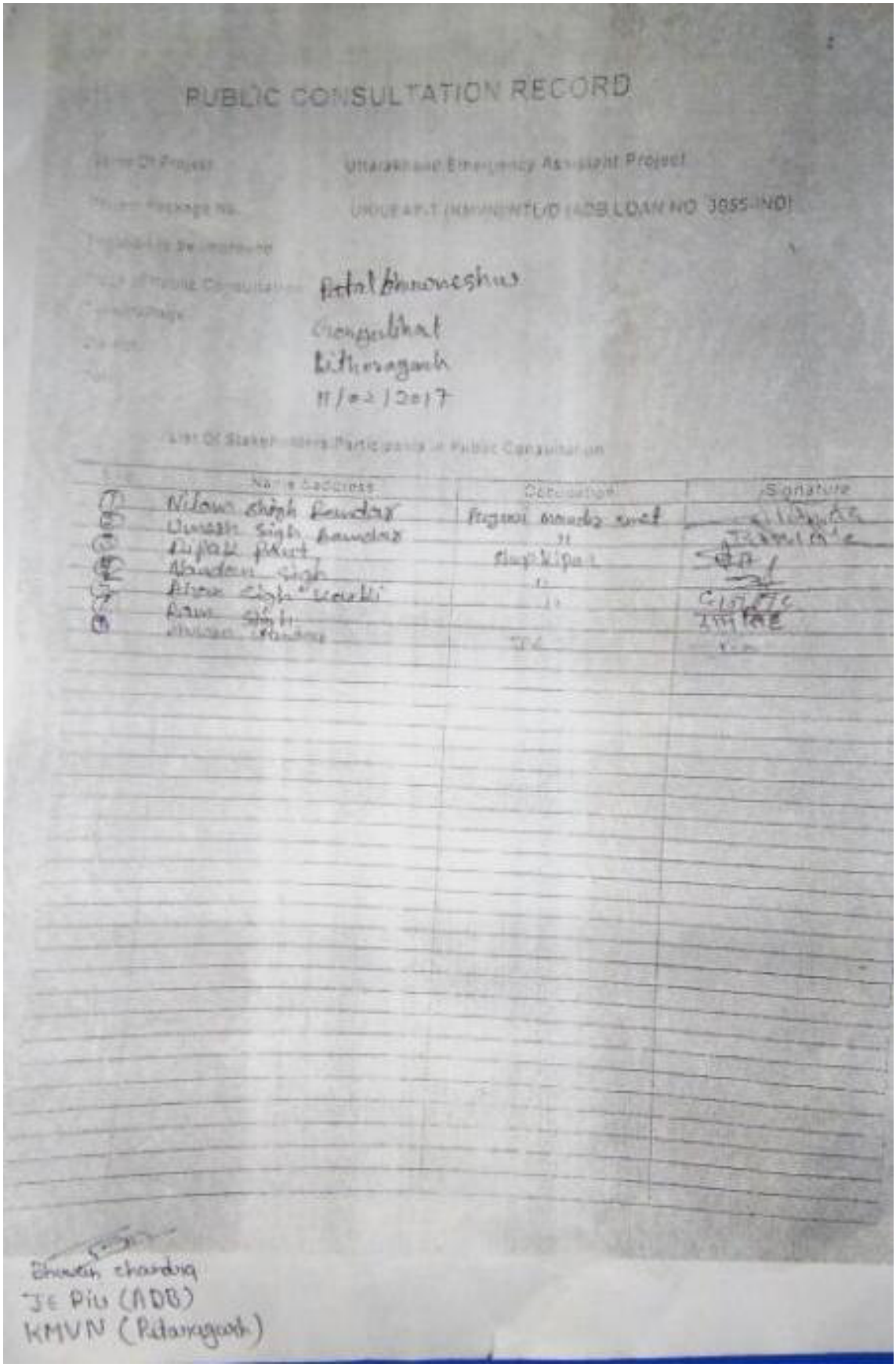
Location of Consultation: Gangolihat

Date of Public Consultation: Gangolihat
Lotharagarh
10/02/2017

List Of Stakeholders Participants in Public Consultation

	Name & address	Occupation	Signature
1	Laxman Singh Rawat	Shopkeeper	
2	Mukesh chandra	Labour	
3	Ganesh chandra	Job	
4	Sohan Ram	"	
5	Hoshiyar Singh	Shopkeeper	
6	Hasan Hasan	"	
7	Mukta Lal	"	
8	Bhuvan chandra	JE	

Bhuvan chandra
JE PIU (ADB)
KMVN (Lotharagarh)



PUBLIC CONSULTATION RECORD

Name Of Project: Uttarakhand Emergency Assistance Project

Project Package No.: UKDEAP-T (NH/WIDTH/D (ADB LOAN NO 3055-IND)

Name of Public Consultation: Patal Bhuvaneshwar

Venue: Gangolihat

Date: Litheragarh

11/02/2017

List Of Stakeholders Participants in Public Consultation

S.No	Name & Address	Occupation	Signature
1	Nilam singh Bandar	Pujari mandir evet	
2	Umesh singh Bandar	"	
3	Dipak Bisht	Shopkeeper	
4	Bhadan singh	"	
5	Bhim singh Kunwar	"	
6	Arun singh		
7	Bhuvan Bandar	JE	

Bhuvesh chanday
JE PIU (ADB)
KMVN (Pithoragarh)