Initial Environmental Examination

Project Number: 47229-001
September 2015

IND: Uttarakhand Emergency Assistance Project

Subproject : UEAP/PWD/C-75, Pitthoragarh district, Uttarakhand

Submitted by

Uttarakhand Emergency Assistance Project (Roads & Bridges), Government of Uttarakhand, Dehardun

Asian Development Bank

GM / AM

OFFICE OF PROGRAM MANAGER

PWD Uttarakhand

UEAP Asian Development Bank (ADB) Funded Uttarakhand Emergency Assistance Project

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Letter No: 1296/75 /UEAP/PWD/2015-16 Date : 10/09/2015

To,

Country Director,
South Asia Department,
India Resident Mission,
4 San Martin Marg, Chanakyapuri,
New Delhi 110021, India.

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COUNTRY DIRECTOR'S OFFICE
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Subject: **ADB Loan- 3055 IND, UEAP (R&B) Submission of IEE Report of Civil works "Reconstruction of Internal Roads of Nagar Panchayat, Munsyari (UEAP/PWD/C-75) in Pithoragarh District of Uttarakhand"**

Dear Madam,

Kindly find enclosed IEE report and for Civil works Package C-75 for accord of approval by ADB. IEE report has already been review by Mr. Sakib Qadri, Environment Specialist, ADB, TA.

Enclosed: 1. IEE Report (as above) (including CD).

Yours Sincerely

Program Manager
PIU, UEAP (R&B)
Dehradun, Uttarakhand

Copy to: 1- Mr. A. K. Motwani, Team Leader, UEAP (R&B).
2- Mr. Prabhash Sahu, Associate Project Officer, ADB
3- Mr. Girish Mahajan, Environmental Specialist, ADB.

Program Manager
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Dehradun, Uttarakhand

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Initial Environmental Examination

September 2015

Reconstruction of Internal Roads of Nagar Panchayat, Munsyari (UEAP/PWD/C-75) in Pithoragarh District of Uttarakhand

Prepared by:- State Disaster Management Authority, Government of Uttarakhand, 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	-	Biological Oxygen Demand
BoQ	-	Bill of Quantities
CO	-	Carbon monoxide
CPCB	-	Central Pollution Control Board
DSC	-	Design and Supervision Consultant
EA	-	Executing Agency
EAC	-	Expert Appraisal Committee
EARF	-	Environment Assessment and Review Framework
EIA	-	Environmental Impact Assessment
EMP	-	Environment Management Plan
ES	-	Environmental Specialist
FPIU	-	Field PIU, Kumaon Mandal Vikas Nigam
FRP		Fiber Reinforced Plastic
GC	-	General Conditions
GMVN	-	Garhwal Mandal Vikas Nigma
GoI	-	Government ofIndia
GoUK	-	Government ofUttarakhand
IDIPT	-	Infrastructure Development Investment Program for Tourism
IEE	-	Initial environmental examination
INR	-	Indian Rupee
KMVN	-	Kumaon Mandal Vikas Nigam
MLD	-	Million Liters per day
MoEF&CC	-	Ministry of Environment, Forests& Climate Change
MFF	-	Multi- Tranche Financing Facility
NGO	-	Non-Governmental Organization
NO_x	-	Nitrogen oxide
PD	-	Project Director
PIU	-	Project Implementation Unit
PM	-	Particulate Matter
PMU	-	Project Management Unit
PUC	-	Pollution under Control Certificate
RP	-	Resettlement Plan
RPM	-	Reparable Particulate Matter
SC	-	Scheduled Castes
SEAC	-	State Expert Appraisal Committee
SEIAA	-	State Environmental Impact Assessment Authority
SO_2	-	Sulphur- di- oxide
SPM	-	Suspended Particulate Matter
SPS	-	safeguard Policy Statement
ST	-	Scheduled Tribe
UEPPCB	-	Uttarakhand Environmental Protection and Pollution Control Board
UJS	-	Uttarakhand Jal Sansthan
VS	-	Village Road

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EXECUTIVE SUMMARY

1 The State Disaster Management Authority (SDMA) has Undertaken Uttarakhand Emergency Assistance Project (UEAP), financed by the ADB. The total estimated cost of the program is about US $205 millions, out of which $96.75 million will be allotted for road and bridge sector.

2 The Uttarakhand Emergency Assistance Project (UEAP) involving **Reconstruction of Internal Road in Nagar Panchayat, Munsyari in District Pithoragarh of Kumaon region in Uttarakhand State**" sections with a total length of 9 Km out of which 6.25 km of Urban Road needs to be restored. The key road upgrading components includes restoration of disaster affected roads in hilly terrain to a single lane standard (3.75 m carriageway and 5.95m formation width), conducting patch repairs strengthening of culverts, repairs/ reconstruction of R/W & B/R and providing all necessary road furniture and roadside safety hardware.
Consistent with the Environmental Assessment and Review Framework, Reconstruction of Internal Road in Nagar Panchayat, Munsyari in District Pithoragarh of Kumaon region in Uttarakhand State" existing road were screened using ADB rapid environmental assessment (REA) checklist-roads. The environmental screening revealed that no protected or sensitive areas were traversed. All impacts are site specific; few are irreversible and can be readily mitigated supporting an environmental "Category B" classification. 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.

3 **Sensitive Environmental Features:-** The following section enumerates and describes the sensitive environmental feature that influenced the project design and mitigation measures.

a. **Geology and soils:-** The State is part of the Western Himalaya and divided into four zones according altitude namely, the Tarai-Bhabar-Shivalik (Sub-Himalayas) with altitude ranging from 750-1,200meters, Lesser-Himalayas between 1,000 – 3,500 meters, Greater-Himalayas between 3,500-4,800m with snow-line rising to 5,400m, and Trans Himalaya (Tethys) averaging 5,300m. In general, the region is geologically and pedologically unstable and prone to slides and erosion. Soils of the Uttarakhand Himalayas in general are quite shallow, gravely impregnated with un-weathered fragments of parent rocks.

b. **Climate**:- 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; viz. 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. The Kumaon region is under the Intermediate Zone, with moderate temperature and rainfall.

c. **Air Quality:-** The pristine environment and sparse population suggest that most part of the State have a very good air quality while noise pollution is not a problem except in the urban areas like Dehradun, Haridwar and Haldwani.

d. **Seismicity:-** The entire state is prone to earthquake hazards which are expected in the two highest seismic zones (IV and V). The State constitutes one of the most active domains of the Himalayan region. Several damaging earthquakes are recorded from this region. As such, the Subproject region is classified under high seismic zone V. The proposed structures have been designed in view of the threats due to seismic hazard as the sub project lie in the seismic zoneV.

e. **Forest:-** Uttarakhand is ranked 9th in all-India in terms of forest covered area with 24,495 km2of 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.

f. **Biodiversity:-** 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 National Park, Rajaji National Park, Kedarnath Wildlife Sanctuary, Askote Wildlife Sanctuary, Mussoorie Sanctuary, Binsar Sanctuary, Sanadi Sanctuary, and Govind Wildlife Sanctuary—all of which are being looked after by the Uttarakhand government. 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.

g. **Population:-** The State of Uttarakhand occupies a total land area of 53,483 sq.km. which is 1.73 percent of India's total land area. Demographically, the State has a population of 1,01,16,752 as per the 2011 census. The population is scattered between small streams and rivers and is spread over 20 to 70 degree slopes of the Himalayan and the Lesser Himalayan regions. There are 16,853 villages in the State and

7,256 gram panchayats. Of the total number of villages, 5,868 are not connected to all weather roads. The geographical area of the district Pithoragarh is 7,110.0 km2. The total population of the district was 485,993 as per the 2011 census and literacy rate was 82.93 percent.

h. **Land Use:-** Forest is the main land use in the State and nearly 64 percent of the geographical area is under the varying forest densities (cover). Agriculture is confined to areas of low reliefs, accounting for 11.5 percent of the total geographical area, is either terraced/semi-terraced or plain.

4 This Initial Environmental Examination (IEE) assesses subprojects for the Tourism Sector for the sub project "**Reconstruction of Internal Road in Nagar Panchayat, Munsyari in District Pithoragarh of Kumaon region in Uttarakhand State**". The IEE is based upon the Environmental Assessment and Review Framework (EARF) which is in consistent with the ABD's Safeguard Policy Statement (SPS) 2009. The subproject is classified as —Category "B" for Environment and does not require further Environmental Impact Assessment. In the present IEE certain baseline data is not available forwater, noise and air quality. Therefore it is proposed that before the commencement of work, sampling for these parameters be conducted.

5 **Project Area:-**Project sites lies within the district Pithoragarh of Kumaon region. The topography of area is characterized by hilly terrain, rugged and Rocky Mountains, deep valleys, passes, alpine meadows, high peaks, sharp streams and rivulets, rapid soil erosion, frequent landslides and widely scattered habitations.

6 **Significant Environmental Impacts and Proposed Mitigation Measures**:- No environmental impacts related to siting were identified in the environmental examination. The proposed subproject roads are not expected to have any impact on the Forests and does not involve any tree cutting as the scope of the work is restricted to reconstruction and rehabilitation of disaster affected section of the existing roads. No road widening is proposed. 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.

During construction phase significant impacts are expected due to risk in increase of sediment in streams affected by soil erosion; surface and groundwater quality deterioration from construction camps waste; disfiguration of landscape from cuts, fills and quarries; loss of productive soil; compaction and contamination of soil; and air quality deterioration from rock crushing, and filling works, and chemicals from asphalt processing. Majority of the significant impacts are addressed though good road construction practices such as disposal site management, oil interceptors, occupational safety, soil erosion and sedimentation control, and site and management of construction camp.

During operation phase, no significant adverse impacts are expected due to a relatively low volume of traffic, and the improvements in road safety introduced through the investment program will make these roads safer.

7 **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 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.

8 **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.

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

I. INTRODUCTION

A. Project Background/Rationale:-

1. About 90% of passenger and freight traffic in the State of Uttarakhand moves by road. Rail services offer freight and passenger connections to the neighbouring states through four rail heads in the State's southern low-lying plain region. The hilly and mountainous terrain that covers more than 90% of the State's land area would preclude the development of railway infrastructure catering to intrastate services. The roads subsector in the State comprises of road infrastructure, which is primarily administered by the Public Works Department (PWD); and transport services, which are overseen by the Transport Department. The PWD is responsible for planning, financing, constructing, and maintaining roads, bridges, and related government buildings. The overall road network in the State is 31,929 km. The road network is administered by the PWD and comprises of 1151 km of national highways (NH)1, 3,788 km of State Highways (SH), 3,290 km of Major District Roads (MDR), 2,945 km of -Other District Roads (ODR), 15402 km of Village Roads (VR), and 1773 Motor Bridges. Additionally, PWD also administers 3,736 km of bridle roads/tracks and 1,073 bridle bridges. The Border Roads Organization manages about 1,623 km of NHs, SHs, MDRs, and ODRs.

2. Roads are the lifeline of the State. The quality of the road network in Uttarakhand has however been poor and constraints the economy of the State. The mountainous terrain, rivers that are prone to flash floods, fragile geology and ecology and lack of adequate funding for development and maintenance, is further aggravated by flash floods, massive landslides, erosion and caving of roads caused by cloud bursts and heavy rains during the monsoon period. The PWD faces a major challenge in opening of disrupted roads during the monsoon season every year.
3. The state witnessed major cloud bursts, incessant rains and floods in the upper valleys during 2013 disaster that resulted in severe damages in several parts of Uttarakhand. Due to which urban and rural infrastructure was severely damaged. On the request of Govt. of India state has received a loan from ADB’s ordinary capital resources to finance the project. The project will assist the Govt. of Uttarakhand (GOU) to meet reconstruction needs due to disaster in Uttarakhand in June, 2013 that severly affected the infrastructure of the state.

B. The Uttarakhand Emergency Assistance Project (**UEAP**)

4. Based on the request of India, a Rapid Joint Damage and Needs Assessment (RJDNA) was undertaken by Asian Development Bank (ADB) and the World Bank. ADB agreed to assist the Government of India (GOI) with reconstruction and rehabilitation efforts for which the Uttarakhand Emergency Assistance (Sector) Project (UEASP) has been formulated as a multi-sector emergency loan in sector loan modality. The executing agency (EA) for the UEASP will be Government of Uttarakhand (GOU) and State Disaster

Management Authority (SDMA). The primary implementing agencies (IA) will be Public Works Department (PWD) for roads, bridges, urban roads, and trekking routes including eco-trails Department of Tourism (DOT) for tourism infrastructure through Kumaon Mandai Vikas Nigam Limited, and Garhwal Mandai Vikas Nigam Limited, Uttarakhand Civil Aviation Development Authority (UCADA) for helipads; and Uttarakhand Jal Sanstahan (UJL) for urban water supply, or any successor hereto. Some other state agencies such as Forest Department are likely to be entrusted with some works under UEASP under these primary IAs.

C. Purpose of the Environmental Assessment

5. The environmental study undertaken is aimed at identifying existing environmental conditions, predicting environmental impact associated with the project and suggesting mitigation measures to reduce or eliminate the predicted impact. The different activities that are likely to take place have been analyzed and proposed mitigation measures are assessed for their adequacy. Further mitigation measures have been proposed where considered necessary. The study also aims at reflecting the acceptability of the project to different stakeholders, and at incorporating the concerns raised by them into impact assessment and of the subsequent Environmental Management Plan.
6. The main purpose of this IEE is to provide environmental assessment of the proposed Construction of Internal Roads in Narag Panchayat in Pithoragarh District of Kumaon region. The purpose of the study is to identify the environmental issues to be considered at project planning and design stage, assesses environmental consequences due to project intervention and suggests mitigation measures to minimise the adverse environmental impacts, if any, associated with construction and operation. The key environmental impacts on natural and human environments have been assessed.
7. The Objectives of this Initial environmental examination (IEE) were to:
    - Assess the existing environmental conditions in the project area including the identification of environmentally sensitive areas
    - Assess the proposed planning and development activities to identify their potential impacts, evaluate the impacts, and determine their
    - Assess the compliance with ADB environmental safeguard requirements and applicable environmental laws,
    - Incorporate mitigation measures in the project design and preparation of environmental management and monitoring plan.

8. This IEE has been carried out to ensure that the potential adverse environmental impacts are appropriately addressed in line with ADB Safeguard Policy Statement, 2009.

D. Extent of IEE

9. IEE was conducted based on preliminary Detailed Design Report (DPR). The IEE covers all activities proposed under the project. The core zone of impact is taken as direct impact of the new construction or reconstruction or rehabilitation of the project

component. IEE also covers the direct impact of the sub-project component. Assessment is carried out for all components of environment covering terrestrial and aquatic ecology, soil, water, noise and socio economic aspects.

E. IEE Content

10. The IEE has been largely structured as per ADB's SPS, 2009 and it's Environmental Assessment Guidelines (2003) and Environmental Safeguards – A good practice sourcebook (December 2012). This includes following eight chapters including this introduction Chapter.

1.

- **i)** Chapter 1- Introduction
- **ii)** Chapter 2- Policy, Legal and Administrative Framework
- **iii)** Chapter 3- Description of Project
- **iv)** Chapter 4- Description of Environment
- **v)** Chapter 5- Anticipated Impacts and Mitigation Measures
- **vi)** Chapter 6- Information Disclosure, Consultation, and Participation
- **vii)** Chapter 7- Environment Management Plan and Grievance Redress Mechanism
- **viii)** Chapter 8 Conclusion and Recommendation

11. This IEE is based mainly on secondary sources of information, field reconnaissance surveys, review of legal requirements, identification of impacts and mitigation measures, impact assessment and institutional review and public consultation undertaken specifically for this study was also undertaken.
12. Two stand-alone companion documents form part of this IEE Report. Volume 1 is a compilation of the individual environmental screening checklists of Reconstruction of Internal Roads of Nagar Panchyat Munsiyari in Pithoraghar District and Volume 2 provides detailed good engineering practices in road construction which are referred to in Chapter 5.

F. Methodology

13. A kick-off meeting for the project was arranged between the technical and engineering team of PIU (R&B), UEAP, Dehradun and Design Consultant in order to get the team members apprised of the project background, present status, approach and methodology to be followed and sources of secondary data / reports for the project roads.
14. The environmental and social team conducted field visit and undertook environmental screening of the project road in accordance with ADB requirements as stipulated in Environmental Assessment Guidelines 2003 and MoEF Notification 2006 with relevant subsequent amendments. The identified environmental issues were assessed for their severity to further determine the environmental categories in which they fall. The ADB's REA checklist for this road section is attached as Appendix- A
15. During field environmental survey, public consultations have been conducted to obtain the views of local people, project affected persons and local administrative representatives. Focused Group Discussion has been adopted as tool for this public consultation. Consultations were also conducted with stakeholders to collect secondary as well as primary data. Various maps for project area, district planning maps etc. have been studied to have initial understanding of the project area.

16. Based on analysis of collected data and information, potential adverse environmental impacts have been identified and examined using standard "Checklist Method". Thereafter possible mitigation measures have been identified. Based on the findings of impact assessment comprising the key elements embodied in this IEE, an Environmental Monitoring and Management Plan (EMMP) have been developed. Continued discussions undertaken with the executive agency and technical team of the consultant for integrating environmental management measures into the project.

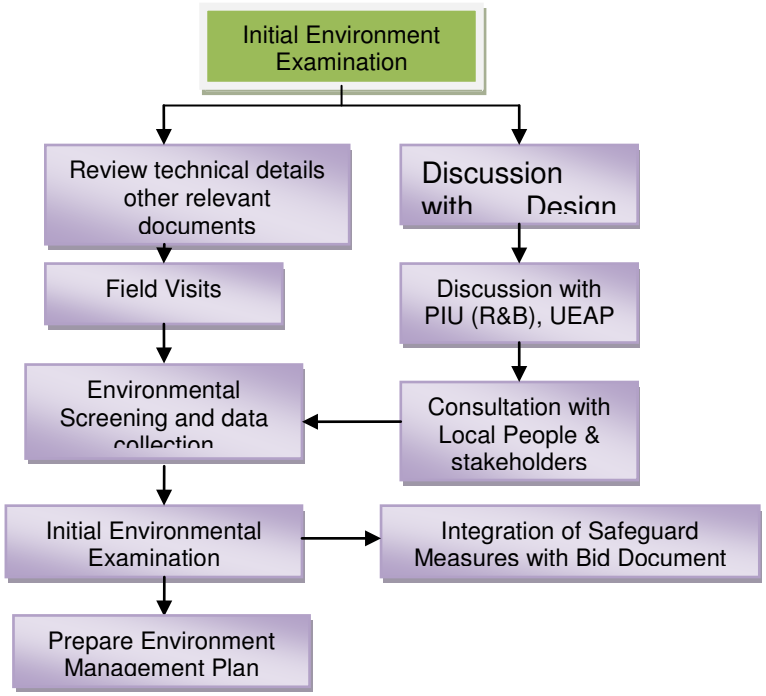


Figure 1: Process flow for carrying out IEE

G. Public Consultation

17. Keeping in view of nature of work which is limited to reconstruction and restoration of already existing roads, only Informal consultations were made with concerned stakeholder's that includes: local residents, Govt. Departments/agencies 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 measure.

II. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

18. The legal framework of the country consists of several acts, notifications, rules and regulations to protect environment and wildlife. In 1976, the 42nd Constitutional Amendment created Article 48A and 51A, placing an obligation on every citizen of the country to attempt to conserve the environment. Specifically for the UEAP, the following environmental laws and regulations are applicable.

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

S.No.	Clearances	Acts/Rules/Notifications/Guidelines and Application to Road Projects	Concerned Agency	Applicable to Contract package	Responsibility	Status of Compliance
	A. Pre-construction Stage					
1	Environmental Clearance	EIA Notification, 2006 amended till date, promulgated under Environment (Protection) Act 1986. Requires prior environmental clearance from the following road projects: The Notification and its latest amendment entails requirement of prior environmental clearance to the following road projects. Category A -i) Expansion of National Highways greater than 100 km involving additional right of way or land acquisition greater than 40 m on existing alignments and 60 m on re-alignments or by-passes **Category B-**ii) New state High ways; and ii) Expansion projects in hilly terrain (above 1000 m mean sea level (msl) and or ecologically sensitive areas) District roads are exempted from securing an environmental clearance.	State Environmental Impact Assessment Authority (SEIAA). If not constituted then MoEFCC.	No	FPIU, UEAP	Not required

S.No.	Clearances	Acts/Rules/Notifications/Guidelines and Application to Road Projects	Concerned Agency	Applicable to Contract package	Responsibility	Status of Compliance
2	Forest Clearance for felling of trees and acquisition of forest land for widening.	Forest Conservation Act (1980): i) If the forest land exceeds 40 hectare then prior permission of Central Government is required; ii) if the forest land is between 5 to 40 hectare, then permission from the Regional Office of Chief Conservator is required; iii) If the forest land is below or equal to 5 hectare the State Government can give permission. If the construction area is more than 40% forest, permission to undertake any work is needed from the Central Government, irrespective of the size of the area. ii) The Uttar Pradesh Protection of Trees in Rural and Hill Areas Act, 1976 and amended 1998 and 2001	MoEFCC/State Forest Department	No	FPIU, UEAP	Not Required
	B. Implementation Stage					
3	Permission for Sand Mining from river bed	Mines and Minerals (Regulation and Development) Act, 1957 and its amended 10th May 2012	River Board Authorities/ Department of Mining Govt. of Uttarakhand	Yes	Contractor	Contractor will obtain the consents from appropriate authority
4	Consents to establish & operate Hot mix plant, Crushers, Batching Plant	Air (Prevention and Control of Pollution) Act 1981	Uttarakhand Environmental Protection and Pollution Control Board- Dehradun	Yes	Contractor	In case Contractor establishes Hot mix plant, Crushers, Batching plant,

S.No.	Clearances	Acts/Rules/Notifications/Guidelines and Application to Road Projects	Concerned Agency	Applicable to Contract package	Responsibility	Status of Compliance
						Contractor will obtain the consents from appropriate authority or Contractor will procure the material from Compliant source.
5	Authorization for Disposal of Hazardous Waste	Hazardous Wastes (Management, Handling and Transboundary movement) Rules, 2008	Uttarakhand Environmental Protection and Pollution Control Board – Dehradun	No	Contractor	
6	Consent for Disposal of Sewage from Labour camps	Water (Prevention and Control of Pollution) Act 1974	Uttarakhand Environmental Protection and Pollution Control Board - Dehradun	No	Contractor	
7	Use of Fly ash within 100 kms around Thermal Power plants	Fly Ash Notification, 1999 as amended 03.11.2009	MoEFCC	No	Contractor	
8	Pollution Under Control Certificate	Central Motor and Vehicle Act 1988	Department of Transport, Govt. of Uttarakhand	Yes	Contractor	Contractor will obtain the required Pollution Under Control

S.No.	Clearances	Acts/Rules/Notifications/Guidelines and Application to Road Projects	Concerned Agency	Applicable to Contract package	Responsibility	Status of Compliance
						Certificates.
9	Installation of Generators	The Air (Prev. & Con. of Pollution) Act, 1981	Uttarakhand Environment Protection and Pollution Control Board Dehradun	Yes	Contractor	Contractor will obtain the required NOC/Consents.
10	Employing Labour/workers	The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996,	District Labour Commissioner	Yes	Contractor	Details to be provided
11	Permission for extraction of boulder and sand from river beds	Mines & Minerals (Regulation and Development) Act, 1957 and its amended 10th May 2012	Department of Mines and Geology, Uttarakhand Environment Protection and Pollution Control Board Dehradun	Yes	Civil Work Contractor	Details to be provided
12	License for Storing Diesel and other explosives	Petroleum (Amended) Rules, 2011. Hazardous Wastes (Management, Handling and Transboundary movement) Rules, 2008	Commissioner of Explosives and Uttarakhand Environmental Protection and Pollution Control Board – Dehradun	Yes	Contractor	

III. DESCRIPTION OF THE PROJECT

A. Project Location

19. The description of all the project roads (Urban) under Uttarakhand Emergency Assistance Project (UEAP) in Pithoragarh district considered for restoration and rehabilitation have been described under following sections.
20. Under the proposed subproject reconstruction of internal roads of Nagar Panchayat, Munsyari having cluseter of 9 no. of important urban roads in district Pithoragarh is proposed. Munsyari is a small Tehsil, which came into existence in 1961.
21. Munsyari town is located between 80° East longitude & 30° North latitude, at an altitude of 2290 metres above sea level. Munsyari is a small market town which acts as a junction between the upper and lower Johar valleys. It is also known as the Gateway of Panchachuli, Milam, Ralam glaciers and is surrounded by the folds of snow-clad mountains.

Fig 3.1 Physical map of district Pithoragah showing proposed road

B. Details of suproject

22. The Internal Roads of Nagar Panchayat Munsyari having cluster of 9 no. of important urban roads in district Pithoragarh, these roads are badly damaged during natural disaster. Total length and also affected length of the all nine roads is 6.25 km. The main outcome of this project would be restoration of the internal roads of the Nager Panchyat, Munsyari to its original shape with the construction of above mentioned. These will be constructed as per MORD/MORTH specifications.

III-1 Details of roads under the subproejct

S.N	Name of Road	Length of Road (Km.)
1	Police statin approach Road	0.100
2	Approach road to Hospital	0.175
3	Appraoch road to SBI	0.375
4	Approach road to PWD	0.150
5	Approach road to SDO Residence	0.125
6	Approach road to Veterinary Hospital	1.100
7	Approach road to Govt. Inter College	0.050
8	Thal-Munsyari Motor Road	1.600
9	Dhandadhar-Jaiti Motor Road	2.575
	Total affected Length	**6.25 km**

23. The proposed work would be reconstruction or restoration of the existing roads. The restoration work of damaged portion of road consist of reconstruction of drain, reconstruction of existing road, Dismantling of Flexible Pavement and Concrete Pavement, earthwork, subbase and base course of WBM in damage portion, Profile correction by providing BM and Surface dressing/ resurfacing by SDBC/PC of existing damaged roads, corss drainage works, drainage and protection works, making Super elevation, slope stabilization, marking and road signs. All the construction related activities will be done as per the per MORT & MORD specifications in the proposed sub project.

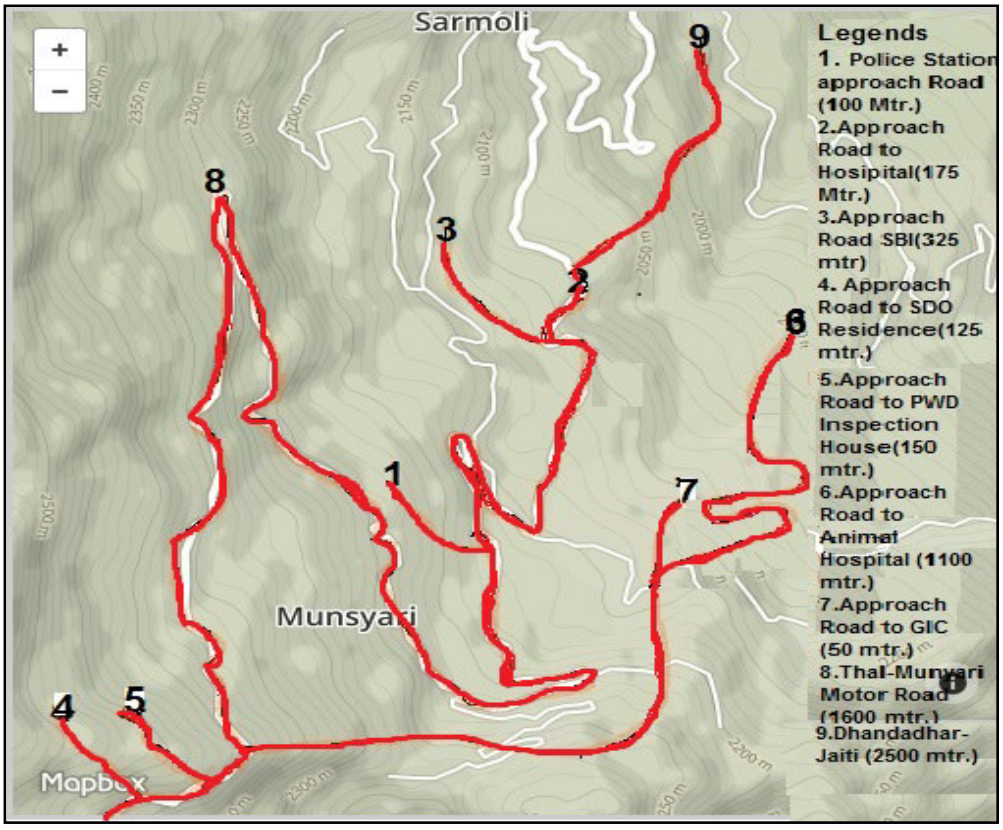


Fig. 3.2: Location Map of road

24. As per ADB Safeguard Policy Satement 2009, the sub-project (roads) is categorized under Category 'B' project but not deemed environmentally sensitive.

25. Salient features of this Subproject is provided in the Table below, whereas typical cross section's showing existing profile and proposed restoration work is given in the DPR (Drawings).

26. **The Salient features of the road are summarized in table below:**

S.No.	Description of item	Details
1	Total Road length	9 km
2	Affected Section	6.25 km
3	Carriageway width	3.75 mtr
4	Surface of carriageway	Butiminius
5	Shoulder width	1.5 mtr
6	Formation width	6.7 mtr
7	Condition of the road	Poor
8	Terrain	Hilly
9	Habitant area	yes
10	Junction	Six Junctions
11	Drain	yes
12	Land slide	No land slide zone
13	Traffic Intensity	1000 M.S.A
14	RCC Slab Culvert	Exisit
15	H.P. Culvert	Yes
16	Arch Culvert	No
17	Scupper	YES
18	Causeway	YES
19	Minor Bridge	YES
20	Major Bridge	NO
21	Land Use	Steet

Source: Sub-Project Appraisal Report-2014

27. No sensitive and valuable ecosystems (e.g., protected areas, wetlands, wild lands and habitats of endangered species); exist in the project road.The existing road does not pass by any National Park, Protected area, Biosphere reserve and ecosenstive zone. The proposed work will not have any adverse impact on these areas.No sensitive and valuable ecosystems (e.g. protected areas, wetlands, wild lands and habitats of endangered species); exist in or near the project road

C. Proposed Category of the Project

28. Pursuant to the requirements of the *ADB Safeguard Policy Statement (2009)* and Operation Manual Bank Policy on Environmental Safeguard of Internal Roads of Nagar

Panchyat Munsyari proposed for reconstruction were screened to identify significance of potential impacts, determine the most environmentally sensitive component, establish the needed level of assessment, and prescribe the information disclosure and consultations requirement to be complied by the Uttarakhand-PWD. Consistent with the Environmental Assessment and Review Framework, All roads were screened using the ADB rapid environmental assessment (REA) checklist-roads and highways for State Highways and Major District Roads.

29. The environmental screening revealed that no protected or sensitive areas were traversed through. All the internal roads are existing and no expansion or realignments are proposed. All impacts are site specific and readily mitigated supporting a Category "**B**" classification.

D Key Rehabilitation and Reconstruction Activities

30. Road improvement component will include restoration of damaged portion of urban roads, within available RoW; conducting repairs and pavement resurfacing; strengthening / repairing of culverts and bridges; constructing of cross-draining structures; and providing all necessary road furniture and roadside safety hardware. Summary of roads to be upgraded/improved is provided below:

Table III-1. Distribution of Road Sections to be upgraded under UEAP

S.No	Name of Road	Length	Total cost (in Lakhs)	Category
1.	Internal roads of Nagar Panchyat Munsyari	6.25	477.00	Urban Road

E. Project Implementation Schedule

31. 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 December 2017. The implementation period for affected 6.25 km road is 12 months.

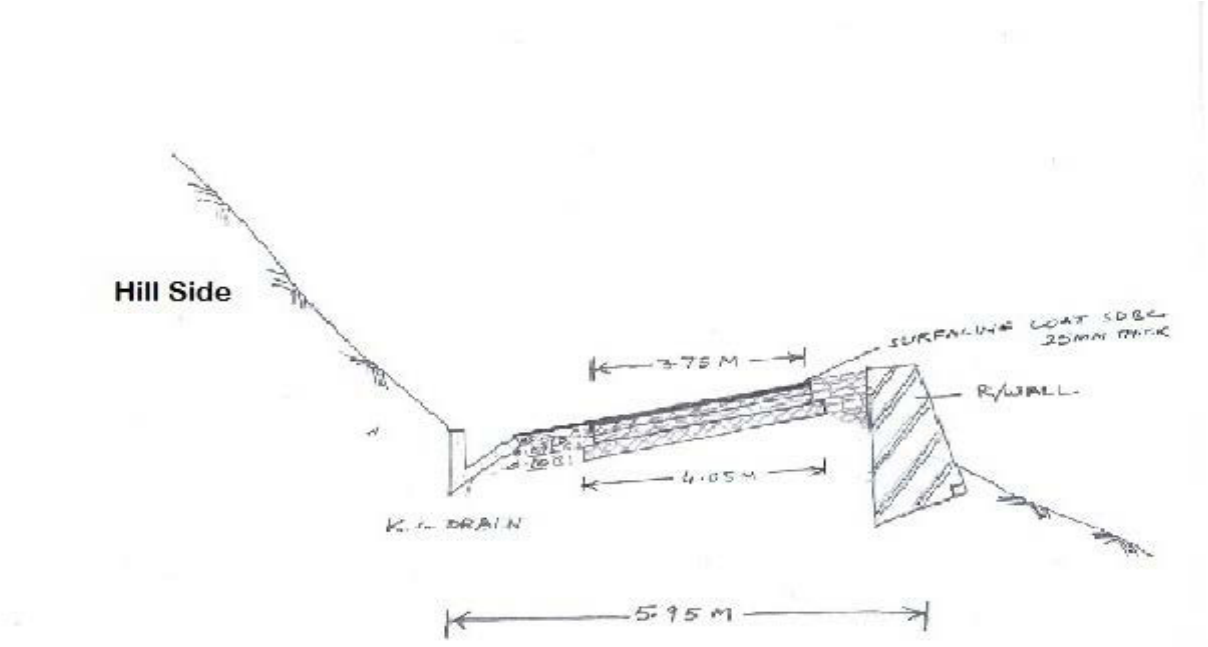


Figure III-3: Typical Cross-section of the roads

IV. DESCRIPTION OF THE ENVIRONMENT

Environment Profile-Uttarakhand

32. Uttarakhand is the newly formed hill state in the Indian Himalayan Region which became a separate state, carved out of hill districts and sub Himalayan regions of Uttar Pradesh in the year 2000. The geographical location (28°43' N to 31°27' N and 77°34' E to 81°02' E) resource setting of Uttarakhand is unique and shares its borders with China and Nepal. It borders the China on the north, Nepal on the east and the Indian states of Uttar Pradesh to the south, Haryana to the west and Himachal Pradesh to the North West. There are 13 districts in Uttarakhand which are grouped into two divisions: Kumaon division and Garhwal division.Uttarakhand has a total geographic area of 53,483 km², of which 93% is mountainous and 64.79% is covered by forest. Most of the northern parts of the state are part of Greater Himalaya ranges, covered by the high Himalayan peaks and glaciers, while the lower foothills are densely forested. The difference in altitude between the lowest parts and the highest part (snow peaks of Nandadevi) is almost 7,000 meters.

Figure IV-1 Districts of Uttarakhand

A. Physical Environment

(i) Geography

33. 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).

34. Uttarakhand lies in the northern part of India amidst the magnificent Himalayas and dense forests. The State is bordering Himachal Pradesh in the north-west and Uttar Pradesh in the South and shares international borders with Nepal and China. The State is comprised of 13 districts, these are; Pithoragarh, Almora, Nainital,

Pithoragarh, Champawat, Uttarkashi, Udham Singh Nagar, Chamoli, Dehradun, Pauri, Tehri Garhwal, Rudraprayag, and Haridwar. Geographically, the state lies in the northern Himalayas between 28°53'24" to 31°27'50" North latitude and 77°34'27" to 81°02'22" East longitude. The State has an area of 53,484 sq. km. and a population of about 1.01 crore as per census 2011.

35. The proposed subproject sites lies within district Pithoragarh which is the eastern-most district in the state of Uttarakhand. It is naturally landscaped with high Himalayan mountains, snow-capped peaks, passes, valleys, alpine meadows, Forests, waterfalls, perennial rivers, glaciers, and springs. The flora and fauna of the area have rich ecological diversity. Pithoragarh town is the district headquarters, which gives its name to the district and located at a height of 1645 meters above sea level. The district forms the north-eastern part of the Kumaon Division and lies between Lat. $29^0 27'$ N. and $30^0 49'$N. and Long. $79^0 50'$ E. and $81^0 3'$ E., the length from north to south, being about 151 Km. at its maximum, and the breadth from east to west, reaching its maximum at about 119 Km. It is bounded by China on the north, Nepal on the east, district Almora on the south and the districts Almora and Chamoli on the west. River Kali forms a continuous border with Nepal in the east.The altitude of the district varies from 1200 m to 4500 m above MSL. The slope of the district varies from very steep slope to steep slope (>600m/km to 150-300m/km).

36. The geographical area of the district is 7,110.0 km^2. The total population of the district was 485,993 as per the 2011 census and literacy rate was 82.93 percent.The Hindu pilgrimage route for Mount Kailash-Lake Mansarovar passes through this district via Lipulekh Pass in the greater Himalayas. The district is administratively divided into five tehsils: Munsyari; Dharchula; Didihat; Gangolihat; and Pithoragarh. All the roads under the proposed subproject falls under the nagar panchayat, Munsyari.

37. Pithoragarh has a lot of historical importance. It was one of the main centre of power during the Chand dynasty of Kumoan. Pithoragarh was for the whole of the remaining 14th century ruled by three generations of Pals. The kingdom extended from Pithoragarh to Askot.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 course of time, got changed into Pithoragarh. After the Chand's period, British have ruled over the region. In 1815, the British rule came in existence when they made Sugoli Treaty with Nepal. According to this treaty, Nepal has to give Himanchal to India. Under the British rule, Pithoragarh remained a tehsil under Almora district until it was elevated to a district in 1997. In 1997, part of Pithoragarh district was separated to form the new Champawat district by the Uttar Pradesh Government.

ii Geology

38. The proposed project sites in district Pithoragarh are located in in Nagar Panchayat Munsyari. Pithoragar district area is composed of two high-grade metamorphic gneiss sheets *i.e.* the Higher Himalayan Crystalline (HHC) and Lesser Himalayan Crystalline (LHC) zones. These were tectonically extruded as a consequence of the southward directed propagation of crustal deformation in the Indian plate margin. The HHC and its cover rocks i.e. the Tethyan Sedimentary Zone (TSZ) are exposed through tectonic zones within the hinterland of Kumaon Himalaya. The Central Crystallines of the Central Himalayan Zone occur as thrust sheets over the metasedimentary and sedimentary rocks of Lesser Himalayan Zone in varied tectonic settings.

39. The area shows an extremely rugged topography characterized by precipitous hills and deep gorges with sharp variation of high magnitude in surface relief. The general slope is towards south. In the northern parts the elevation of the land surface ranges from about 3000 m to 6861 m above mean sea level whereas in the valleys of southern part, the altitude is as low as 795 m.

40. Main Central Crystalline belt in the project area consists of Mylonite gneisses, phylltes, garnetiferous schist, calc, silicate rock and quartzites with associated migmatite syntectnonic granite gneisses and late to post tectonic tourmaline granite. The main structural discontinuities running through the entire length of Uttarakhand is on the Main Central Thrust (MCT) which is locally referred as the Munisiari Thrust. Thisthrust has brought the Central Crystallines in juxtaposition with rocks of low-grade complexes (lesser Himalaya belt of rock), which in a sense marks southern boundary of lesser Himalayas. Apart from the regional thrust following the Himalaya trends, a number of faults of transverse disposition dissects and displace the rock gneiss.

iii. Physiography

41. The project area is located in the inner part of lesser Himalayas and outer part of Great Central Himalayas. It represents an extremely rugged topography with very high relief. The area is drained by a number of streams (gads) which are tributaries of southerly flowing river Goriganga which itself is a tributary of Kali river (River Sarda).

42. Pithoragarh district comprises of one broad physiographic divisions from north to south viz. Central Himalayan Zone (north of the Main Central Thrust) and Lesser Himalayan Zone (south of the Main Central Thrust).

B. Pedology

43. The detailed geological studies shows that the rocks in the area is made up of low grade metamorphic rocks of the Munsyari Formation and the higher grade metamorphosis of Vertika Formation. Major rock types of Central Crystallines are migmatites, psammitic and mica gneiss, calc gneiss, quartzite, marble, mica schist and amphibolite. Granites of different ages ranging from Paleoproterozoic to Mesozoic-Tertiary intrude the Central Crystallines. Rock types in the Lesser Himalayan Zone include sedimentaries, metasedimentaries and plutonic igneous rocks. The various rock units have suffered multiple phases of deformation and metamorphism in major parts of the district.

44. The soils of Pithoragarh district can be broadly classified into two types, viz. Soils of Lesser Himalaya and Soils of Greater or Central Himalaya. Majority of the area is covered by the first type. The soils in this area are exposed in massive mountainous tracts and tangled mass of series of ridges divided from each other by deep, narrow valleys. The most predominant soil associations in these areas are red loams and brown forest soils. The other types are found only under variations of micro topography. Meadow soils occur only in depressionary pockets in valleys resulting from the accumulation of finer materials and the removal of soil humus caused by rains from the surrounding hill ranges. Soils associated with higher elevations are highly depleted of fine fractions and contain 42 percent gravel. On the other hand,

the soils associated with lower elevations (e.g. valleys) contain only 21 percent gravel. Soils associated with pastures and forests (e.g. open for grazing) seem to be highly depleted of fine soil formation. The soil depth is mostly shallow to very shallow.

45. The baseline data on soil quality will be generated by the contractor before commencement of construction works (baseline data) as per CPCB guideline.

S.No.	Name of the Road	Number of Sample	Sampling Location
1-	Reconstruction of Internal Roads of Nagar Panchyat Munsiyari	3	Dhandadhar – Jaiti Motor Road
			Thal Munsiyari Motor Road
			Approach road to Animals Hospital

46. During Construction the sampling locations proposed are, where the construction/restoration work will be done.

C. Climate and Meterology

47. The climate of Uttarakhand is sharply demarcated in case of its two distinct divisions: the predominant hilly terrain and the smaller plain region. The climate in the northern part of Uttarakhand is typically Himalayan. This mountain range itself exerts an appreciable extent of influence on monsoon and rainfall patterns. Within the Himalayas, climate differs depending on altitude and position. Climate ranges from subtropical in the southern foothills, averaging summer temperatures of about 30°C and winter temperatures of about 18°C. Warm temperate conditions prevail in the Middle Himalayan valleys, with summer temperatures usually hovering about the mark of 25°C and cooler winters. Cool temperate conditions dominate the higher areas of the Middle Himalayas, where the summer temperatures are usually around 15^0C to 18°C and winters drop below the freezing point. At altitudes over 4,880 m (16,000 feet), the climate is bitterly cold with temperatures consistently below the freezing point and the area perennially shrouded in snow and ice. The eastern flanks of the Himalayan ranges are subject to heavy rainfall while the western section is relatively dry.

48. The elevation of the district ranges from 500 meter in the valleys in the south to over 7000 meter in the snow-bound Himalayas in the north and north-west. The climate, therefore, largely depends on altitude and varies according to aspect and elevation. Although tropical beat may be experienced in the southern valleys during the summer, the winters are severe. As most of the district is situated on the southern slopes of the Himalayas, monsoon currents penetrate through the deep valleys and rainfall is at the maximum in the monsoon season (June to September), particularly in the southern half of the district. The northern half of the district also gets considerable rain during the winter season which lasts from mid-November to March.

i.Rainfall

49. Records of rainfall in the district are available for eight rain recording stations which, however, are so located that the records are more properly representative of rainfall in the river valleys. Most of it occurs during the monsoon period, being between 75 per cent and 85 per cent of the annual precipitation in the south and between 50 per cent and 70 per cent in the extreme north and north-east. July and August are the rainiest months. In September depressions from the Bay of Bengal occasionally affect the weather and, in association with them, heavy rain may occur causing floods. In the monsoon season there are a few occasions when there are spurts of heavy rain in the hills causing floods in the rivers. The rainfall decreases rapidly after September and is the lowest in November. During winter, from December to March, considerable precipitation occurs in association with the passage of western disturbances across the region, particularly in the northern parts where it is considerably higher than in the rest of the district, being about 20 per cent of the annual total.

ii.Temperature.

50. January is the coldest month with mean maximum temperature of 10°C, the mean minimum temperature being about 2°C. Temperature drops down to –6°C during January and February in the northern part of the district. June is the warmest month with the mean maximum and the mean minimum temperatures of 25°C and 15°C respectively. The maximum temperature recorded in the district was 38ºC (May 2003) whereas the minimum temperature recorded was -8.0ºC (January 2003).

iii .Humidity

51. The Relative Humidity increases rapidly with the onset of monsoon and reaches at about 80% during July to September. The driest part of the year is the pre-monsoon period, when the humidity is as low as 30% in the afternoons. Skies are heavily clouded during the monsoon months and for short spells when the district is affected by Western Disturbances. Two broad wind patterns are observed in the district viz. north easterly to easterly (May to September) and south easterly to westerly (October to March).

D. Ambient Air Quality and Noise Level.

55. The pristine environment and sparse population suggest that the area has 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. The air pollution level is well within the permissible limits because there are no major sources of pollution in the region. The baseline data on ambient air quality will be generated by the contractor before commencement of construction works (Baseline data) as per CPCB guideline.

S.No.	Name of the Road	Number of Sample	Sampling Location
1-	Reconstruction of Internal Road of Nagar Panchyat Munsiyari	6	Dhandadhar – Jaiti Motor Road
			Thal Munsiyari Motor Road
			Approach road to Animals Hospital
			Approach road to SBI
			Approach road to PWD
			Approach road to Hospital

56. During Construction the sampling locations proposed are, where the construction/restoration work will be done.

Ambient Noise Level

57. Noise above a certain level can have a very disturbing effect on the people and animals exposed to it. Hence, it is important to assess the present noise level of the area in order to predict the potential impacts of future noise levels due to this project in the construction as well as operation phases. In the preliminary survey it was observed that the noise pollution level is well within the permissible limits.

58. The baseline data on ambient noise level will be generated by the contractor before commencement of construction works. The noise quality monitoring at pre construction stage (Baseline data) will be done as per CPCB guideline.

S.No.	Name of the Road	Number of Sample	Sampling Location
1-	Reconstruction of Internal Road of Nagar Panchyat Munsiyari	6	Dhandadhar – Jaiti Motor Road
			Thal Munsiyari Motor Road
			Approach road to Animals Hospital
			Approach road to SBI
			Approach road to PWD
			Approach road to Hospital

59. During Construction the sampling locations proposed are, where the construction/restoration work will be done.

E. Hydrology

i. Water Drainage

60. Drainage of the area is mainly controlled by Kali (Sharda) river and its tributaries i.e. Gori, Dhauli, Sarju, N. Ramganga (E)and their sub tributaries. These rivers are primarily fed by snowmelt with relatively smaller contribution from ground water. However, during the lean period, the rivers are fed by ground water occurring as base flow.

Table IV.1: Average annual surface flow of the rivers of district Pithoragarh.

Rivers	Av. Annual flow (Milliard m3)	Discharge recorded at	Source region
Dhauli	2.6	Nyu	Greater Himalaya
Gori	3.8	Bangapani	Greater Himalaya
Ramganga (E)	3.1	Thal	Greater Himalaya
Sarju	5.8	Shera	Greater Himalaya
Kali	5.8	Shera	Greater Himalaya

Groundwater

61. Ground water, in general, occurs locally within disconnected bodies under favourable geohydrological conditions such as in channel and alluvial terraces of river valleys, joints, fractures and fissures of crystalline and meta-sedimentary rocks, well vegetated and relatively plain areas of valley regions and in subterranean caverns of limestone and dolomitic limestone country rocks. The occurrence and movement of ground water depend not only on the nature of the litho units and the nature of the interspaces/interstices, but also on the degree of interconnection between them, the vertical and aerial extension of joints, faults and/or shear zones and the local and regional geomorphology. Ground water emerges as springs and seepage (locally called *Srots* and *Naolas*) under favourable physiographic conditions such as in gently sloping areas, broad valleys of rivers and along the lithological contacts.

62. Rainfall is the principal source of ground water replenishment. Out of the total annual rainfall (1852.7 mm), the southern and central parts of the district receive considerable amount of precipitation. A part of the precipitation is lost into the atmosphere as evaporation and evapo-transpiration from soils and plants, another considerable part flows as surface run off due to extremely rugged and undulating topography with steep slope and the remaining part directly infiltrates through the soil profile to form the ground water storage in joints, fractures, fissures etc. In hilly areas, ground water flows out as springs and seepage where the water table intersects the ground surface.

ii Water Quality

63. The proposed subproject sites are located in the high hilly area away from surface water bodies as such there will be no case of water pollution due to construction and operation of proposed subproject. The only sources of water in these areas arerivulets, and other natural water sources are generally good and no major source of water pollution was found. Natural water seeping out from mountains locally called as "*Naula*", and natural water springs locally called as "*Gadhera*" represent the ground water sources in the hills. There are no major sources of water pollution in terms of point or non – point sources aside from natural landslides leading to deposition of debris in streams. The baseline data on water quality will be generated by collection of representative samples by the contractor before the commencement of construction activity.

64. Water quality monitoring in pre construction stage will be done as per CPCB guideline.

S.No.	Name of the Road	Number of Sample	Sampling Location
1-	Reconstruction of Internal Road of Nagar Panchyat Munsiyari	5	Dhandadhar – Jaiti Motor Road
			Thal Munsiyari Motor Road
			Approach road to Animals Hospital
			Approach road to SBI
			Approach road to PWD

65. During Construction the sampling locations proposed are, where the construction/restoration work will be done.

F. Mineral Resources

66. 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.

67. A number of minerals are found in the district, and brief details of these minerals area given as under:-

Copper—The region around the town of Pithoragarh has been one of the important centres of copper mining in the past. The remnants of old copper mines which collapsed long ago are found at Agar Barabisi and south of Askot. Such a mine is also reported to have existed below Pithoragarh town where there in now a natural spring, of which the water has a metallic taste. These mines were abandoned due to the poor quality of ore and difficult mining conditions. Copper ore is found to occur as disseminations in crystalline dolomites and as segregations in quartz veins traversing the former. Chalcopyrite, tetrahydrite, cuprite and malachite are said to have been found in the mine. South of village Ascot malachite is commonly found staining the country rock, which is also traversed by quartz veins bearing galena, pyrite, arsenopyrite and chalcopyrite, Chalcopyrite specks and clusters up to 4 cm. in length have been found at Bora-Agar in a band of crystalline dolomite extending for about 1,209 m. Associated minerals are cuprite, tetrahydrite and malachite and azurite, disseminated in quartz stringers and also in crystalline dolomite, occurs near Dewal Thal.

Magnesite—Several scattered deposits of magnesite are found in the area around Pithoragarh. They are associated with the dolomite limestone. Very little work has been done on these deposits. Extensive deposits of the mineral occur at several scattered localities in the neighborhood of Dewal Thal. Some of the more promising ones being located at Dewal Thal, Chandag, Phadyari and Satsilang. Other promising deposits occur at Osail, Bevalthal, Harali, Pathrauli, Ramkot, Bunga

Chhina and Masum Bheo. Between Tong and Dhurai in Rani Agar occur two promising zones of crystalline magnesite which extend for almost a kilometre. The deposits in the northern zone are about 23 m. and in the southern about 60meter in thickness.

Soapstone—Several small deposits of soapstone occur in association with magnesite at Dewal Thal and Chandag.

Arsenic—Orpiment deposits exist near Munsyari. Both orpiment and realgar are reported to be available in scattered fragments on the moraines of the Shunkalpa glacier. The ore had probably come down from the hill face immediately above.

Sulphur—This mineral is found in the bed of the Ramganga (eastern) and in tahsil Munsyari.

Kyanite—At Girgaon (south of Malpa) there is a thin layer of blue scaly kyanite, the rocks also bearing sericite quartzite.

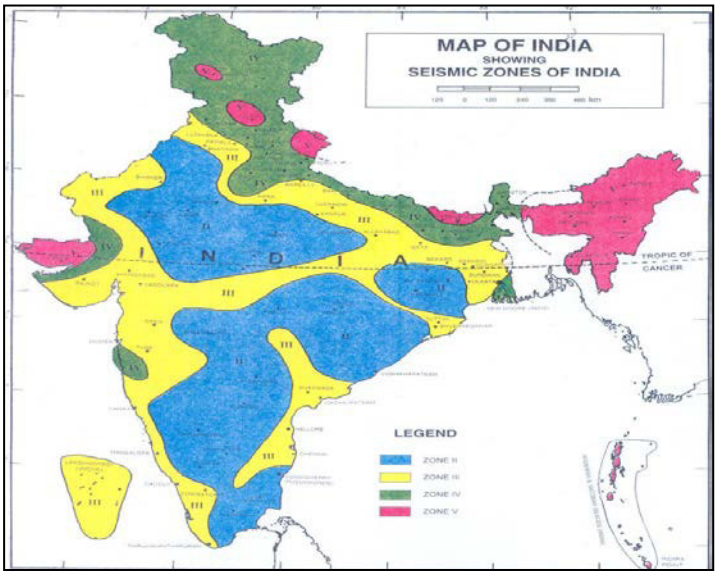
Graphite—Graphitoid pigmentation in schistose rocks is found near villages Sobala and Dar in the Dhauli valley and north of Sirdang in the Kali valley.

Slate—Slate quarries exist throughout the district and it is utilized locally for building purposes.

Limestone—Though vast reserves of limestone exist in the district, they are dolomite and appear to be fit only for ballast.

G. Seismology

68. The entire state is prone to earthquake hazards which are expected in the two highest seismic zones, IV and V, as per the seismic zoning map of India (BIS: 1983-2002). Out of 13 districts in Uttarakhand large parts of 11 districts have PGA (Peak Ground Acceleration) values above 0.4g, which indicates a very high level of seismic hazard. This includes Almora, Pithoragarh, Chamoli, Champawat, Dehra Dun, Nainital, Pauri, Pithoragarh, Rudraprayag, Tehri and Uttarkashi districts. Only two districts, Haridwar and Udham Singh Nagar, south of the MBT, show accelerations below 0.3g. These phenomena often result in adverse consequences such as damage to the built environment and loss of life and injuries. The proposed structures have been designed in view of the threats due to seismic hazard as the sub project lie in the seismic zoneV.



Seismic Zone of India

H. ECOLOGY

i. Forestry

i) According to The India State of Forest report 2011, the recorded forest area of the Uttarakhand state is 34,651 km^2 which constitutes 64.79% of its geographical area. Reserve forests constitute 71.11%. Protected Forests 28.52% and Unclassed Forests constitutes 0.35% of the total forest area.

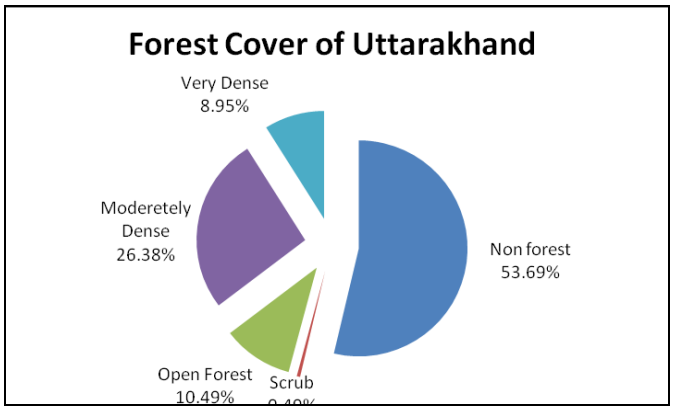


Figure IV-2: Percentage wise Category of forest in Uttarakhand as per State of Forest Report, 2013.

69. The distribution of forest cover by district is presented in the succeeding Figure and Table. The Garhwal region has more forest cover with 14,639 km^2 compared to the Kumaon region with 9,869 km^2. However, they are almost equal in terms of distribution over its territory with 45% and 47% of covered with forest. The district of Pauri Garhwal, Uttarkashi, Nainital, and Chamoli have the largest forest cover accounting for 50% of all the state's total

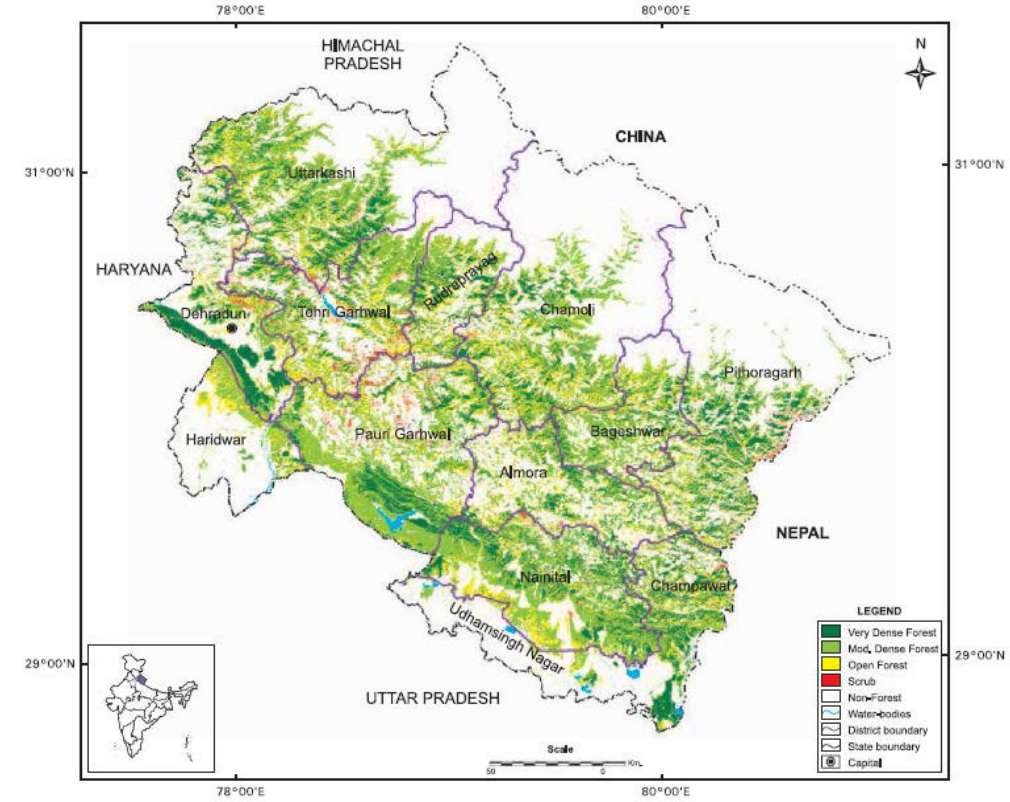


Figure IV-3: Uttarakhand's Forest Cover Map

Table VI-2. District-wise Forest Cover, Uttarakhand

(Area in km^2)

Region	District	Geographic Area	Forest Cover 2013 Assessment			Total Forest	% ofGA
			Very Dense	Moderate Dense	Open Forest		
Garhwal	Uttarkashi	8,016	570	1957	618	3145	39.23
	Rudraprayag	1,984	241	592	297	1130	56.96
	Chamoli	8,030	441	1,573	686	2700	33.62
	Pauri Garhwal	5,329	520	2,095	676	3291	61.76
	Tehri Garhwal	3,642	298	1,232	618	2148	58.98
	Dehradun	3,088	583	695	332	1610	52.14
	Haridwar	2,360	25	333	257	615	26.06
Sub-Total		**32,449**	**2,678**	**8,477**	**3,484**	**14,639**	
Kumaon	Pithoragarh	7,090	571	1,113	416	2100	29.62
	Bageshwar	2,246	197	883	305	1,385	61.67
	Almora	3,139	222	927	428	1,577	50.24
	Nainital	4,251	605	1899	570	3,074	72.31
	Champawat	1,766	337	576	274	1,187	67.21
	Udham Singh Nagar	2,542	175	236	135	546	21.48
Sub-Total		**21,034**	**2,107**	**5,634**	**2,128**	**9,869**	
Grand Total		**53,483**	**4,785**	**14,111**	**5,612**	**24,508**	**45.82**
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: India State of Forest Report 2013

70. 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.

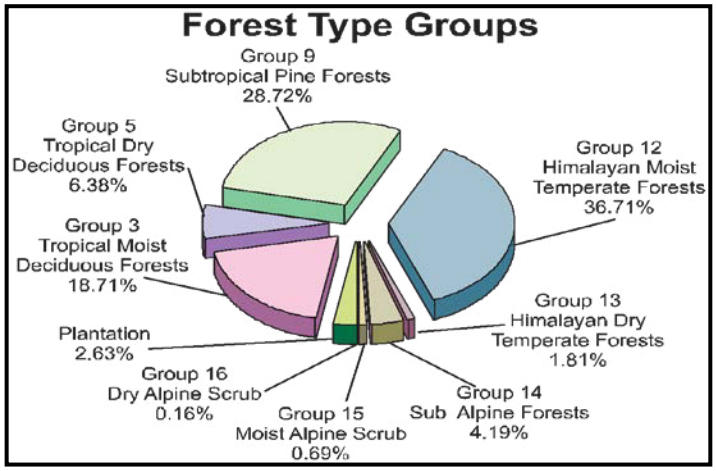


Figure IV-4. Forest type groups of Uttarakhand as per State of Forest Report, 2013

71. 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 setylized 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) asource 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 variegata*	600-900
2.	Cheed	Chir Pine	*Pinus roxburghii*	600-900
3.	Shal tree	Shal tree	*Shorea robusta*	600-750
4.	Banj	Oak tree	*Quercus incana*	1700-2000
5.	Kail	Blue pine	*Pinus wallichiana*	1800-2400
6.	Buransh	Rose tree	*Rhododendron arboretum*	200-2100
7.	Deodar	Cedar tree	*Cedrus deodara*	1800-2400

Sl. No.	Common Name	English Name	Botanical Name	Altitude (m.)
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

Source: Uttarakhand forest Department website (http://forest.uk.gov.in/files/sTATISTICS_2013/ Uttarakhand_Statistics_2013.pdf)

ii Biodiversity

Floral diversity

72. The floristic analysis of Angiosperm and Gymnosperm in Uttarakhand reveals that there are about 4,048 species belonging to 1,198 genera under 192 families. The floristic diversity reveals that the state harbors 4,000 species of vascular plants of which nearly 116 species are endemic to Uttarakhand as they have confined their distribution to the state. The state has 500 algal species, 751 species of mosses, 18 endemic species of pteridophyta, 435 species of lichens. (Singh and Singh 1992)[1]

73. A total number of 135 species of plant are abundant in the sub project area, out of which 46species are of trees, 23species are of shrubs, 50 species are of herbs, 10 ferns and 6 species belongs to Broyophytes (Garyal, 2005)[2]. A detailed list of plant species found in the study area is given in Table IV.4.

Table IV.4: List of Floral species in the study area

S.No	Botanical Name	Local Name
	TREES	
1.	*Acer caesium*	Kanchula
2.	*Abies spectabilis*	Raga
3.	*Aesandra butyracea*	Chiura
4.	*Aesculus indica*	Pangar
5.	*Aesculus indica*	Cypress/Surai
6.	*Alnus nepalensis*	Utees
7.	*Betula alnoides*	Saur
8.	*Betula utilis*	Bhojpatra
9.	*Carpinus viminea*	Putli
10.	*Cedrus deodara*	Cedre tree

[1] J.S. Singh and S.P. Singh (1992) Forests of Himalaya (Nainital, Gyanodaya Prakashan

[2] Garbyal, S.S. (2005). TRADITIONAL knowledge of PLANT resources in Dharchula region: Biotechnological Potential, Conservation and Management Strategies, Thesis submitted to Guru Gobind Singh Indraprastha University, New Delhi

11.	*Cedrella toona*	Tun
12.	*Celtis australis*	Kharik
13.	*Cinnamomum tamala*	Dalchini, Tejpat
14.	*Cornus capiltata*	Strawberry tree
15.	Cupress torulosa	Spruss
16.	*Dalbergia sissoo*	Sisham
17.	*Dandroclamus strictus*	Bans
18.	*Ehretia laevis*	Chamror
19.	*Erythriana arborescens*	Dhauldhak
20.	*Ficus glomerata*	Gular
21.	*Ficus hispida*	Totmila
22.	*Ficus palmata*	Bedu / Anjir
23.	*Fraxinus micrantha*	Himalayan Ash
24.	*Ilex excelsa*	Gauloo
25.	*Juglans regia*	Akhrot
26.	*Litsea glutinosa*	Singrau/Maida lakri
27.	*Myrica esculenta*	Kaphal
28.	*Phoenix sylvestris*	Khajoor
29.	*Pinus wallichiana*	Kail
30.	*Pinus roxburghii*	Chir
31.	*Pterocarpus marsupium*	Bija Sal
32.	*Pyrus pashia*	Mehal
33.	*Quercus leucotrichophora*	Banj
34.	*Quercus semecarpifolia*	Kharsu
35.	*Quercus floribunda*	Chirla
36.	*Rhododendron arboreum*	Rosewood/ Burans
37.	*Rhododendron campanulatum*	Rosewood/ Semru
38.	*Rhus japonica*	Beshmeel
39.	*Salix acutifolia*	Bhains
40.	*Sapindus mukorossi*	Reetha
41.	*Sapium insigne*	Khinna
42.	*Shorea robusta*	Sal tree
43.	*Sorbus aucuparia*	Mohli
44.	*Spondias pinnata*	Amra
45.	Taxus baccata	Thuner
46.	*Trewia nudiflora*	Gutel

SHRUBS

1.	*Artemisia niligirica*	Kunuja
2.	*Argemone maxicana*	Mexican prickly poppy, Shialkanta
3.	*Arundinella nepalensis*	reed grass
4.	*Athyrium sp*	Fern
5.	*Berberis aristata*	Kingor
6.	*Euphorbia prolifera*	Asthma plant, Baridhudi,
7.	*Cannabis sativa*	Bhang
8.	*Daphne papyracea*	Indian Paper Plant
9.	*Desmodium gangeticum*	Sal Leaved Desmodium, Dhurva
10.	*Duchesnea indica*	Indian Strawberry
11.	*Indigofera heterantha*	Saknya
12.	*Mahonia sp.*	Mahonia

13.	*Myrsine africana*	Cape Myrtle
14.	*Nerium sp.*	Kaner
15.	*Pyracantha crenulata*	Phunli
16.	*Polystichum sp.*	Common Shield Fer
17.	*Pteridium sp*	Eagle fern
18.	*Pteris sp.*	Fern
19.	*Pyracantha crenulata*	Himalayan firethorn
20.	*Rubus biflorus*	Kala Hissar
21.	*Rubus ellipticus*	Hinsal
22.	*Thamnocalamus spathiforus*	Kandali
23.	*Urtica dioca*	
HERBS		
1.	*Acorus calamus*	Bauj, Bach
2.	*Agrostis nervosa*	
3.	*Anaphalis adnata*	Bugla
4.	*Anemone vitifolia*	Mudeela
5.	*Apium leptophyllum*	
6.	*Arabidopsis himalaica*	
7.	*Arabidopsis thaliana*	
8.	*Artemisia japonica*	Patee, Pamsi
9.	*Artemisia nilagirica*	
10.	*Bergenia ciliata*	Silpara, *Pashan bedh*
11.	*Bistorta amplexicaulis*	Kutrya
12.	*Centella asiatica*	Brahmibuti
13.	*Clematis tibatiana*	
14.	*Convolvulus arvensis*	Deer's foot
15.	*Corallodiscus lanuginosus*	
16.	*Curcuma aromatica*	Ban Haldi
17.	*Cymbopogon flexuosus*	Himalayan Lemon grass
18.	*Cymbopogon msrtinii*	Priya-ghas
19.	*Cynodon dactylon*	Dubla,
20.	*Cynoglossum glochidiatum*	Indian Hound's tongue
21.	*Didymocarpus pedicellata*	
22.	*Echinops cornigerus*	Kantela
23.	*Eulaliopsis bineta*	Babula
24.	*Geranium nepalense*	Neap Geranium
25.	*Geranium wallichianum*	Robert Geranium
26.	*Heracleum canescens*	Hogweed
27.	*Hydrocotyle nepalensis*	Penny wort
28.	*Impatiens balsamina*	Balsa weed
29.	*Iris kumaonensis*	
30.	*Meconopsis aculeata*	Royal Himalayan Poppy
31.	*Meconopsis paniculata*	Himalayan yellow Poppy
32.	*Oxalis corniculata*	
33.	*Persicaria hydropiper*	Water pepper
34.	*Plantago depressa*	Plantain

35.	*Potentilla fulgens*	Vajradantii
36.	*Polygonum glabrum*	Phyaktuli
37.	*Polygonum recumbens*	
38.	*Reinwardtia indica* r	Phiunli
39.	*Rumes nepalensis*	Khatura
40.	*Rumex nepalensis*	
41.	*Solanum nigrum*	Makoi
42.	*Stephania glabra*	Gindadu
43.	*Tanacetum dolichophyllum*	Long leaved Tansy
44.	*Themeda anathera*	Golda
45.	*Thespesia lampas*	Jangli Bhindi
46.	*Trifolium repens*	White clover
47.	*Torilis leptophylla*	
48.	*Verbascum thapsus*	Asron's Rod,Cow's Lungwort
49.	*Vilo biflora* L	Vanafsa
50.	*Withania somnifera*	Ashwa gandha
FERN		
1.	*Adiantum capillus-veneris*	
2.	*Adiantum edgeworthii*	
3.	*Deparia allantodioides*	
4.	*Araiostegia beddomei*	
5.	*Microlepia dubia*	
6.	*Sphenomeris chinensis*	
7.	*Cyrtomium caryotedium*	
8.	*Polystichum discretum*	
9.	*Elaphoglossum stelligerum*	
10.	*Hypodematium crenatum*	
BRAYOPHYTES		
1.	*Anomobryum filiforme*	
2.	*Blepharostoma trichophyllium*	
3.	*Dicranella heteromalla*	
4.	*Grimmia alpicola*	
5.	*Herbertus* sp	
6.	*Pogonatum aloides*	

Source: *Management Plan of Pithoragarh Forest Division 2011-22, Forest Department of Uttarakhand.*
Garbyal, S.S. (2005). TRADITIONAL knowledge of PLANT resources in Dharchula region: Biotechnological Potential, Conservation and Management Strategies, Thesis submitted to Guru Gobind Singh Indraprastha University, New Delhi

Faunal diversity

74. Uttarakhand is home for many species of birds, mammals, reptiles as also for the threatened and endemic species. An annotated list of 2,248 species of animals, including 1,405 invertebrates species and 843 vertebrates species have been reported (Uttarakhand Biodiversity Board)[3]

[3] Biodiversity of Uttarakhand, Report by Uttarakhand Biodiversity Board (http://sbb.uk.gov.in/files/Publications/PDF%20Files/Threatened_Species_Book-CTP.pdf)

75. During the survey and investigations a total number of 26 species of mammals from 14 families, 50 avian species from 20 families and 5 reptiles species were recorded in the project area. A detailed list of plant species found in the study area is given in Table IV.5.

Table IV.5:-Major faunal species reported in the project area and its surroundings

S.No.	Zoological Name	English Name Local	Common Name
MAMMALS **Rodents**			
Sciuridae			
1.	*Funambulus pennantii*	Five striped Palm Squirrel	Squirrel
2.	*Petaurista petaurista Pallas*	Giant Flying Squirrel	Squirrel
Muridae			
3.	*Alticola argentatus*	Mountain Vole	Dhurmoose
4.	*Bandicota indica Bechstein*	Greater Bandicoot Rat	
5.	*Marmota himalayana hodgson*	Himalayan Marmot	Fiya
Hystricidae			
6.	*Hystrix indica* Kerr	Indian Crested Porcupine	Sehi
Lagomorpha **Muridae**			
7.	*Alticola roylei*	Royle's mountain Vole	Dhurmoose
8.	*Marmota himalayana*	Himalayan Marmot	Fiya
Ochotonidae			
9.	*Ochotona roylei*	Royle’s Pika	Gumchipichhi
10.	*Ochotona macrotis*	Large eared Pika	Dulymuse
11.	*Lepus nigricollis*	Indian hare	Khargosh
Primata **Cercopithecidae**			
12.	*Macaca mulatto*	Rhesus Monkey	Banar
13.	*Semnopithecus entellus*	Hanuman Langur	Langoor
Artiodactyla–Eventoed Ungulates			
Bovidae			
14.	*Pseudois nayaur*	Blue Sheep	Bharad
15.	*Nemarhaedus ghural*	Goral	Gural
Suidae			
16.	*Sus scrofacristatus*	Wild Pig	Wild boar
Moschidae			
17.	*Moschus leucogaster*	Himalayan Musk deer	Kasturi mrag
Cervidae			
18.	*Muntiacus muntjak*	Barking Deer	Kakar
Perissodactyla – Odd toed Ungulates			
Equidae			
19.	*Equus kiang*	Tibetan Wild Ass	Kiyang
Carnivora			
Felidae			
20.	*Felis bengalensis*	Leopard cat	Ban Biralu
21.	*Felis chaus*	Jungle cat	Ban Biralu
22.	*Panthera pardus*	Leopard	Bagh
Canidae			

23.	*Canis a. indicus*	Golden jackal	
24.	*Canis lupus chanco*	Tibetan wolf	Changu
Ursidae			
25.	*Selenarctos thibetanus*	Himalayan Black Bear	Rikh
26.	*Ursus thibetanus*	Asiatic Black Bear	
BIRDS			
Phasianidae - Pheasants and partridges			
1.	*Alectoris chukar*	Chukar	Chakor
2.	*Arborophila torqueola*	*Hill Partidage*	Phyoonda
3.	*Catreus wallichii*	Cheer Pheasant	Chair
4.	*Francolinus francolinus*	Black Francolin	Black Titar
5.	*Ophrysia superciliosa*	*Himalayan Quail*	Quail,
6.	*Tetraogallus himalayensis*	Himalayan Snowcock	Himanl
Falconiidae and Accipitridae – Raptors			
7.	*Accipiter badius*	Shikra	Shikra
8.	Accipiter nisus	Eurasian Sparrow Hawk	
9.	*Aquila chrysaetos*	Golden Eagle	
10.	*Gyps himalayensis*	Himalayan Griffon	
11.	*Gyps indicus*	Long billed Vulture	
12.	*Neophron percnopterus*	Egyptian Vulture	
Columbidae - Pigeons&Doves			
13.	*Columba leuconota*	Snow Pigeon	
14.	*Streptopelia decaocto*	Eurasian Collared Dove	Fhakhta
15.	*Streptopelia orientalis*	Oriental Turtle Dove	Ghoghot
Cuculidae - Cuckoos			
16.	*Cuculus micropterus*	Indian Cuckoo	
Tytonidae and Strigidae - Owls			
17.	*Glaucidium cuculoides*	Asian Barred Owlet	
18.	*Otus spilocephalus*	Mountain Scops Owl	
Caprimulgidae - Nightjars			
19.	*Caprimulgus asiaticus*	Indian Nightjar	
20.	*Caprimulgus indicus*	Grey Nightjar	
Apodidae - Swifts & Needletails			
21.	*Collocalia fuciphaga*	Himalayan Swiftlet	
22.	*Tachymarptis melba*	Alpine Swift	
23.	*Zoonavena sylvatica*	White-rumped Needle tail	
Upupidae - Hoopoe			
24.	*Upupa epops*	Common Hoopoe	
Coraciidae - Rollers			
25.	*Coracias benghalensis*	Himalayan Roller	
Alcedinidae - Kingfishers			
26.	*Halcyon smyrnensis*	White throated Kingfisher	
27.	*Ceryle rudis*	Himalayan Kingfisher	
Meropidae - Bee eaters			
28.	*Merops leschenaulti*	Chestnut headed Bee eater	
Picidae - Woodpeckers			
29.	*Dendrocopos himalayensis*	Himalayan Woodpecker	
30.	*Dinopium shorii*	Himalayan Flameback	
Dicruridae - Drongos			
31.	*Dicrurus macrocercus*	Black Drongo	

Corvidae - Crows, Jays & Magpies			
32.	*Corvus macrorhynchos*	Large billed Crow	
33.	*Dendrocitta formosae*	Grey Treepie	
34.	*Urocissa erythrorhyncha*	Red Billed Blue Magpie	
35.	*Urocissa flavirostris*	Yellow billed Blue Magpie	
Pyconotidae - Bulbuls			
36.	*Hypsipetes leucocephalus*	Black Bulbul	
37.	*Pyconotus cafer*	Red Vented Bulbul	
38.	*Pyconotus leucogenys*	Himalayan Bulbul	
Cisticolidae - Prinias			
39.	*Orthotomus sutorius*	Common Tailorbird	
40.	*Prinia hodgsonii*	Grey breasted Prinia	
Sylviidae - Warblers			
41.	*Cettia brunnifrons*	Grey sided Bush Warbler	
42.	*Cettia major*	Chestnut crowned Bush Warbler	
43.	*Phylloscopus collybita*	Common Chiffchaff	
44.	*Phylloscopus magnirostris*	Large billed Leaf Warbler	
Timaliidae - Babblers			
45.	*Garrulax albogularis*	White Throated Laughing Thrush	
46.	*Turdoides striatus*	Jungle Babbler	
Sturnidae - Starlings&Mynas			
47.	*Acridotheres fuscus*	Jungle Myna	
48.	*Acridotheres tristis*	Common Myna	
Passeridae - Sparrows			
49.	*Passer domesticus*	House Sparrow	
50.	*Passer rutilens*	Russet Sparrow	
REPTILES			
1.	*Agama tuberculata*	Common lizard	Chhipkali
2.	*Agama tuberculata*	Rock lizard	Rock Lizard
3.	*Calotes versicolor*	Indian Garden Lizard	Normal Lizard
4.	*Japalura major*	Garhwal mountain lizard	Lizard
5.	*Varanus bengalensis*	Indian monitor lizard	Goh

Source: *Management Plan of Pithoragarh Forest Division 2011-22, Forest Department of Uttarakhand.*

3. Protected Area

94. The State of Uttarakhand is endowed with rich bio-diversity as manifested by its approximately 64 percent forest cover. The State of Uttarakhand is represented by Biogeographic Zones 2B Western Himalaya and 7B Siwaliks 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 16 Protected Areas (PA) and a biosphere reserve in the State. Protected area has included six national parks, seven wildlife sanctuaries and three conservation reserve for the conservation of flora and fauna

Table IV.6:-Protected areas in Uttarakhand

S.No.	National Park	Year of Establishment	Area (m^2)	District
1.	Corbett NP	1936	520.82	Nainital & Pauri Garhwal
2.	Nanda Devi NP	1982	624.60	Chamoli
3.	Valley of Flower NP	1982	87.50	Chamoli
4.	Raja Ji NP	1983	820.42	Dehradun, PauriGarhwal and Haridwar
5.	Gangotri NP	1989	2390.02	Uttarkashi
6.	Govind NP	1990	472.08	Uttarkashi
WILD LIFE SANCTURY				
1.	Govind WLS	1955	485.89	Uttarkashi
2.	Kedarnath WLS	1972	975.20	Chamoli
3.	Askot WLS	1986	599.93	Pithoragarh
4.	Sonanadi WLS	1987	301.18	Garhwal
5.	Binsar WLS	1988	47.07	Almora
6.	Musoorie WLS	1993	10.82	Dehradun
7.	Nandhaur WLS	2012	269.95	Nainital
CONSERVATION RESERVE				
1.	Jhilmil Jheel C.R.	2005	485.89	Dehradun
2.	Aasan Wetland C. R.	2005	975.20	Hardwar
3.	Pawalgarh C. R.	2012	599.93	Nainital and Champawat

Source : Website of Uttarakhand Forest Department Government of Uttarakhand, (http://forest.uk.gov.in/pages/display/80-protected-area-network)

Table IV.7- Biosphere Reserves in Uttarakhand

S.No.	Sanctuary	Year of Establishment	Area (km^2)
1.	Nanda Devi Biosphere Reserve	1988	2,236.74

Source : Website of Uttarakhand Forest Department Government of Uttarakhand, (http://forest.uk.gov.in/pages/display/80-protected-area-network)

95. Any of the sites in this subproject does not fall in any protected area declared by the Ministry of Environment Forests & Climate Change, Govt. of India**.**

4. Fishery

96. Kali and Gori are the main rivers, flow in the project area. In the upper stretch of these rivers due to high gradient water flow is turbulent. Due to which this zone is considered as a 'no fish' zone. The fisheries in the project area are poorly developed since the potential has remained unexploited owing to difficult terrain, unfavourable climate and poor infrastructural facilities. The elevation, temperature, current, velocity and natural biota are the factors governing the growth of fish in the rivers and water bodies in the area. However, slightly bigger fish were observed in the lower region where water temperature is slightly higher.The common species found in the lower stretch are Asela or Saul, Mahaseer, 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.

I. Socio-Economic

1. Social and Cultural development

i. Demographic Profile As per the 2011 census, population of district Pithoragarh is 4,85,993, where contribution of male and female population were 240427 and 2,45,566respectively. This gives it a ranking of 546th among the 640 Districts of India and 8th in Uttarakhand. The district has a population density of 69 inhabitants per square kilometre (180 /sq mi). 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%.

ii Culture

97. Historically, inhabitants of the project area are the descendants of the nomadic pastoral Aryans who, in their eternal quest for fresh pastures, came to India from Central Asia and settled here. Their village comprises two communities, namely, Danus and Takulis. Intrinsically, we are pastoral agriculturists and are dependent on subsistence level agriculture, growing a wide range of food crops without external inputs. They keep livestock's, which are taken to higher pastures (alpine grasslands) during the summer months for grazing.They have been closely associated with our surrounding forests and have been heavily dependent and living off them in a non-destructive, sustainable manner. The forest holds a special significance and place in our lives and are revered and prayed to They have been harvesting the surrounding forest for ages for their own use. These forests have been providing them fuel, fodder, food, timber and medicinal plants.

98. The people are hard working community, very amicable and friendly and are great lovers of music and dance, with a storehouse of folk songs and dances. Traditionally, they never indulged in alcohol or drugs. Home brewed spirits were introduced in their region by the Bhotia tribe. They are mainly vegetarian by force of circumstance, and have maintained ourselves since Pre-history in a harmonious balance with the surrounding natural environment.

Ethnic Group

Rajput

99. The Rajputs of Kumaon are said to be of Vedic Aryan origin. Initially Rajputs came to Kumaon from Himachal Pradesh, where they had come from the Hindu Kush through Kashmir. Later Rajput settlers to Kumaon also came from plain (Mewar, Chitoor etc) to escape from the invasions of the Muslim and Mughal rulers. In some cases they started naming their settlements/surnames after the name of their places of origin. The Rajputs took over the control of Kumaon region from Kols and Khasas. Later a larger number of Khasas imbibed the Vedic traditions, culture and names.

Brahmins

100. The Brahmins of Kumaon are the descendants of the Vedic Aryan priests who migrated from the plains. A large number of Vedic Brahmins came during the migration

of the Rajputs and in some cases the Brahmins who came to visit the religious places in Kumaon decided to settle there for good. Like in case of Rajputs they started naming their settlements/surnames after the name of their places of origin. Later a larger number of Khasas imbibed the Vedic traditions, culture and names.

iii Tribal communities :

101. 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 tribe is spread among the three valleys of Darma, Chaundas, and Byans.

Bhotias

102. Bhotiya are the main tribal community in inhabiting in the project area. The Bhotias have distinctive Mongolian-like physical appearance.The Bhotias in Kumaon region are mostly living around Dharchula area, Pithoragarh region. Some familires of this tribe are scattered in villages of the project area and engaged in the tourism business. The tribes of Bhotia living in Kumaon region are from the "Shauka" tribes and are referred as "Shaukas". The other two tribes of Bhotias (Jadhs and Marchas/Tolchas) mostly have been living in the Garhwal region of Himalayas. The Jadhs are mostly in Uttarkashi region and the Marchas (traders) and Tolchas (farmers) in Chamoli region.

Rajis or Banrajis

103. The Rajis/Banrajis, as the name suggest were mainly residing in the forest of around Askot in southern Pithoragarh (South Eastern part of Kumaon). Some families of the Rajis are also settled in the villages located in the project area. Traditionally the Rajis practiced shifting cultivation until it was banned by the forest department. The Raji religion has a reputation of living in isolation in relation to their surroundings. The tribes have their own separate pantheons but they also worship a few Hindu gods. However their ceremonies are simple and do not complex rituals and are done Brahmin priests The Raji construct simple open-air altars with prayer flags and cloth swaying in nearby trees.

2. Land Use and land use pattern

104. Most of the land in district is under the pasture land. Forest land is the major land use in the hills of Uttarakhand and the forest department is the sole owner of the forest land. A clear distinction can be made between land use patterns in the hill and the plain districts in terms of net area sown, barren land, culturable waste, permanent pastures. Some of these classifications show degradation in the upland lowland ecosystems and the others indicate the important role certain land use(s) play in maintaining the ecological balance. For example, the cultivable waste land and fallow lands are generally lands left fallow temporarily to regain soil fertility. The geographical area of district Pithoragarh is 7250.0 km^2. Out of which the land under forest cover is 5401.5 km^2, land under cultivation is 532.78 km^2, Cultivable barren land is 407.59 km^2 and land under the human settlement is 110.1 km^2

J. Health

105. The health care system of district Pithoragarh is a three tier structure. It has "Sub-center" at the most peripheral level, "Primary Health Centre" at the intermediate level and "Community Health Centre" at the secondary level. The population covered by a "Sub Centre", "Primary Health Centre" and "Community Health Centre" are "3,000-5,000", "20,000-30,000" and "100,000", respectively. In addition, there are Private Voluntary Healthy Facilities, also. As per Uttarakhand government organizational set up, the District is headed by a District Magistrate, who is also the chair person of the Integrated District Health Society of Pithoragarh district. The District health set up of Uttarakhand government is headed by the Chief Medical Officer followed by a Deputy CMO as second-in-command. Chief Medical Superintendent looks after the Uttarakhand government hospitals in the district. There are 308 government health care facilities in the district, as can be seen from the table given below:-

Table IV.8: Health facilities and infrastructure in district Pithoragarh

Public Health Centre	Community Health Centre	Family and Mother Child Centre	Family and Mother Child Welfare Sub Centre	Ayurvedic Hospital	Homeo-pathic Hospital	Allopathic Hospital
18	4	8	156	63	13	46

Source: Economic and Statistical Department of Pithoragarh-Annual Magazine, 2012(http://pithoragarh.nic.in /pages/view/80-statistical-handbook-2012)

K Literacy

106. Literacy rate in Uttarakhand has seen upward trend and is 79.63 percent as per 2011 population census. Of that, male literacy stands at 87.40 percent while female literacy is at 67.06 percent. In 2001, literacy rate in Uttarakhand stood at 71.62 percent of which male and female were 81.02 percent and 63.36 percent literate respectively. In actual numbers, total literates in Uttarakhand stands at 6,880,953 of which males were 3,863,708 and females were 3,017,245.

107. Average literacy rate of Pithoragarh in 2011 were 82.25 compared to 75.95 of 2001. If things are looked out at gender wise, male and female literacy were 92.75 and 72.29 respectively. For 2001 census, same figures stood at 90.06 and 62.59 in Pithoragarh District. Total literate in Pithoragarh District were 345,550 of which male and female were 189,623 and 155,927 respectively.

L. Cultural and archaeological resources

108. The lineage of Pithoragarh can be traced to the age of Puranas when it flourished under different names, though no documents from that era has been recovered. What is known though, that Pithoragarh used to be an important stopover en route Kailasa Parbat. Ancient religious texts such as Rig Veda and Skanda Purana mention about the various tribes that inhabited the area. They were probably the first people to establish a human population in the area.

109. The first recorded history is from the time of the great Rajputa King Prithviraj Chauhan. It is said that when he expanded his kingdom, he named this place as 'Rai Pithora' since it was a Rajput tradition to name a place after settling there. Gradually, with time and usage, the name became 'Prithigarh' under the Chand and Katyuri dynasties. With

the Mughal invasion, the linguistics further evolved and its present name of Pithoragarh became famous.

110. The functions and festivals of district Pithoragarh are not only an expression of the religious social and the cultural urges of the people but have also sustained the folk culture and have been central to the economic activities of the people. Also at remotely located places of hilly terrain, especially where communication is difficult and the land is cut up by mountain or water, the need is felt for periodical meetings at convenient centers, where exchange and sale of commodities may take place. A district like Pithoragarh holds many valleys which are absolutely dependent on such meetings for their supply of common necessaries, and consequently fairs or periodical markets are numerous.

Livelihood

111. Majority of population (59.94%) is engaged in the agricultural activities and 0.50% of the population is engaged as agriculture labourers. About 36.0% of total population in the project area involves in the tourism sector and work as porter and 3.56% of the population is engaged in their family business (trading).

M. Economic development

Transportation and communication

112. 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. Uttarakhand State Road Transport Corporation and Kumoan Motor Owner Union (KMOU) Ltd provide transportation facility to most of the important routes. Some private taxi and cabs operators are giving their service to all the small villages.
113. Uttarakhand has a total road length of 41,041 km. The road density in the State stands at 767.4 km per 1,000 sq km and 432 km per lakh population. The State has National highway (NH) of 2,042 km and State highways of 1,576 km (as on 31st March 2010).Density of road length per 100 sq. Km. is 45 km which is very low compared to the national average of 97 km.
114. Pithoragarh district is connected to other major stations of Kumoan region through state highways and district highways. The overall road network in the district Pithoragarh is 1514 km, out of which 223.0 km comes under National Highway and maintained by Border Road Organization, 243.0 km comes under state highways, 890.0 km comes under district road state highway and 215.46 km is under village road.

Table IV.9:- Category wise description of road in district Pithoragarh.

S.No.		Category of Road	Length of Road
A.	**National Highways under BRO**		223.0
B.	**Roads under PWD**		
	I.	State Highways	243.0
	II.	District Road	890.0
	III.	Village Road	143.0
C.	**Nagar Panchayat/ Jila Panchayat**		15.0
	Total Length		**1514.0**

Source: Economic and Statistical Department of Pithoragarh-Annual Magazine, 2012 (http://pithoragarh.nic.in/pages/view/80-statistical-handbook-2012)

2. Industrial Development

115. As of now Uttarakhand has 300 hundred registered large and medium scale industrial units in operation. Total number of workers employed by these units was 41,777 in 2005. These industrial units, not large in number, and are concentrated mostly in the in the plains. Three districts in the plains viz., Dehradun, Haridwar, and Udham Singh Nagar together account for 82% of the workers employed in 40% of the total number registered units in the State.On the other hand the hill districts in Uttarakhand (other than Nainital), are lagging far behind the districts in the plain. Due to long distances, hilly terrain, scattered population and limited markets, industrialization, especially in hilly areas of the State, has been extremely limited. Excluding Nainital, the four hill districts (Pauri Garhwal, Tehri Garhwal, Almora and Bageswar) together account for 32% of the total registered units in the State and 9.3% of total industrial workers. In Pithoragarh Wool spinning and weaving are old cottage industries which are said to have existed in the region covered by the Pithoragarh district for centuries. Woolen goods like *thulmas*, *chuktas* (types of blankets), *namdas* (carpets) and tweed are produced in about 25,000 units, engaging about 75,000 persons, at Bering, Dharchula, Didihat, Munsyari, Pithoragarh, Sirkha and Thal. It has been estimated that a sum of about Rs 12,25,00,000 was invested in the industry, and wool and woolen goods worth Rs 12,98,154 were manufactured.Indo-China wool trade had helped in the growth of this industry. The inhabitants of the northern *pattis* were manly engaged in this craft. Most of them spun and wove the wool of their indigenous sheep. The staple was short and the texture of the wool coarse, and rough blankets were woven. Only a few of these were sold, most of them being used by the weaver and his family. However, the Chinese sheep provided them with fine wool of long staple, which they wove into rough serge (for making garments) or made it into wraps. Another old time handicraft of the district, baskets and matting manufactured out of *ringal* found its way to China and a large number of baskets and matting were sold in the fairs at Jarajibli and Thal.

116. Besides wool weaving, leather goods, furniture, metal goods, baskets and mats, production of oil (from oil-seeds), job-work (printing) and radio repairing are the other cottage and village industries. These units are widespread and are generally situated near the dwellings of the workers and are manned by the members of the owner's family.

117. Tourism and cottage industries is also a good contributor in the economy of the project area. During Kailsh Mansarovar, Adi Kailsh yatra and trekking season most of the village population located on the rout engaged in the tourism sector in the form of porter and tourist guide. Male population gives their service as tourist porter with their ponies for the pilgrims going on the rout.

118. Very recently, a new earning opportunity has been found in the form of a fungus, colloquially known as caterpillar fungus. The fungus is known in China as yar tsa gambu. Caterpillar fungi are the result of a parasitic relationship between the fungus and the larva of the ghost moth genus Thitarodes, several species of which live on the Himalayas in India and Nepal. The fungus germinates in living organisms, kills and mummifies the insect, and then the fungus grows from the body of the insect.

119. **Animal Husbandry**

120. Animal Husbandry is an important economic activity in Pithoragarh which alongwith agriculture provides sustenance to the farmers. Domestic animals help in agricultural activitiesand also provide milk, butter, meat, wool, dung manure etc. Animal husbandryis an important source of supplementing income of the rural population. Sheep rearing is an important industry in thedistrict. In the high hills, thevillagers also rear sheep and goats. Livestock is considered to be one of theimportant sources for the economic and industrial development of an area. Sheep are largely concentrated in Kapkot due to high altitude and cold weather.

121. Sheep rearing for production of wool and meat, tourism(cottage industries) orchards, spinning and weaving of wool, copper, fruit chalk and etc.are other small scale industries in Pithoragarh District are sericulture and Pisiculture.

3. Agriculture, Horticulture and Forestry

122. Agriculture is the predominant economic activity in the districtPithoragarhand it has the main share in the District economy. The employment opportunities in other economic activities are seasonal and very less and as such there is a high dependency on agriculture.

123. Pithoragarh is characterized by periodic soil erosion and frequent landslides. Traditional agricultural practices have been unable to support the needs of growing population, with the result out-migration from the district is reported.Agriculture in the area suffers from many constraints. The limited availability ofcultivatable land is a major constraint for the development of agriculture. As much as 88% of the area is either covered by forests or is barren or uncultivable. The fertility of land except in the valleys is low. The land holding size in the district is small. Short agricultural season,lowtemperatures, high altitude, perpetual problem of soil erosion due to steep gradients etc. are other inhibiting factors affecting agriculture. Agriculture, therefore, does not offer too much hope for improving the economic condition of the people in the area. Terrace cultivation is common in these areas because of hilly terrain and steep slopes.Some cultivation is done on steep hills also where terracing and tilling cannot be done even by burning scrubs and bushes to clear the land for cultivation. Both Rabi and Kharif crops are sown in most of the areas. The main Kharif crops are paddy, small millets and potato and chief Rabi crops are wheat and barley. These crops account for over 80 percent of the total cropped area. Major crops include (i) cereals (rice, wheat, barley, maize, manduwa, and sanwan); (ii) pulses (urad, masoor, peas, gram, and soybean); (iii) oil seeds (rape and mustard, sesame and soyabean); and (iv) other crops (potato).

Table IV.10:- Total Agricultural production in district Pithoragarh

Name of the Crop	2009-10			2010-11		
	Production (Quintal)	Rate (In Qui.)	Value of Production (Thousand Rs)	Production (InQuin.)	Rate (In Quin.)	Value of Production (Thousand Rs.)
CEREAL						
Rice	275270	2200	605594.00	284540	2300	654442.00
Wheat	338110	1400	473354.00	337340	1600	539744.00
Barley	52710	1200	63252.00	45380	1400	63532.00
Maize	27670	1500	41505.00	34940	1600	55904.00
Mandua	132610	1600	212176.00	115380	1700	196146.00
Sanwan	16870	1000	16870.00	14970	1000	14970.00
Total Cereal	**843240**		**1412751.00**	**832550**		**1524738.00**
PULSES						
Urad	5740	5800	33292.00	5250	6000	31500.00
Tur	17840	5500	98120.00	34620	5800	200796.00
Gram	10	5500	55.00	210	5600	1176.00
Lentil	490	4400	2156.00	40	400	16.00
Pease	240	5200	1248.00	350	5400	1890.00
Total Pulses	**24320**		**134871.00**	**40470**		**235378.00**

OILSHEEDS						
Mustard	1740	9500	16530.00	1600	9600	153600.00
Sesame	120	12000	1440.00	130	12500	1625.00
Soyabean	13380	4700	62886.00	10590	4900	51891.00
Total Oilseeds	**15240**		**80856.00**	**12320**		**68876.00**
Other crops						
Potato	56800	1800	102240.00	9685	1600	15496.00
GRAND TOTAL	**939600**		**1730718.00**	**895025**		**1844488.00**

Source: Economic and Statistical Department of Pithoragarh-Annual Magazine, 2012 (http://pithoragarh.nic.in/pages/view/80-statistical-handbook-2012)

Horticulture

124. Pithoragarh district due to its geographical setting and traditional linkages with horticulture has vast potential for its expansion in the near future. Demographic and occupational pattern in the district clearly highlight the dependency of majority of the population that resides in villages on agricultural and horticultural activities.The District is rich in the production of pear, citrus and mango, but the value addition of this activity in the District is poor and farmers don't get good price for their produce. Due to this, farmers have to sell their produce as soon as they are harvested on minimal price.

Fishery

125. The large water resources in the district offer the possibility of developing fisheries on commercial scale but this is a very insignificant part of the economic activities in the district, although the Fisheries department has distributed fish seeds in large proportion. 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, Mahaseer, 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.

O Energy and electric power potential

126. Pithoragarh is known for its beauty. The Kali and Gori are the main rivers flowing through this district. In the district Pithoragarh, Uttarakhand Renewable Energy Development Agency (UREDA) and Private Hydro Power Companies have been engaged in the electric generation and Uttarakhand Power Corporation is engaged in the remote village electrification as well as for grid feeding.

Table IV.11:- Details of Electric generation and distribution in district Pithoragarh

S.No.		Unit	Details
A.	**Total electric generation capacity**	MW	294
B.	**Electric Generation**	MU	MU
C.	**Length of Electric Line**		
I.	33 KW	KM	229
II.	11 KW	KM	2795
III.	LT	KM	3336
D.	**Electric Consumption**		
I.	Domestic	Thousand KW	50082
II.	Commercial	Thousand KW	15828

III.	Industrial	Thousand KW	1504
IV.	Public Lights	Thousand KW	3810
V.	Agriculture	Thousand KW	272
VI.	Public water and savage treatment plant	Thousand KW	18128
E.	**Village electrification**		
1.	Electrified Village	No.	1540

Source: Economic and Statistical Department of Pithoragarh-Annual Magazine, 2012 (http://pithoragarh.nic.in/pages/view/80-statistical-handbook-2012)

P. Aesthetic and tourism

127. Pithoragarh is rich in natural beauty and it offers best view of the Himalaya. Some of the peaks like Nanda Devi, Panchchuli, Trishul and Nandakhat falls in this district. It is also rich in flora and fauna and is famous for its bugyals or pasture grounds of velvet-like green grass. With the start of the Kailash-Mansarovar Yatra, tourist interest in the area is increasing by leaps and bounds. Kapileshwar Mahadev the cave temple dedicated to Lord Shiva, affords fine view of the Soar valley and lofty Himalayan peaks. Askot Sanctuary, 54 kms. from Pithoragarh, is popular among wildlife enthusiasts and nature lovers. It is a safe haven for snow leopards, Himalayan black bears, musk deers, snow cocks, tehra, monals, chirs, koklas and chukors. The Patal Bhubaneshwar literally means the sub-terranean shrine of Lord Shiva and this cave temple is 91 kms. from Pithoragarh. The way to the temple is through a tunnel which leads into the cavern through a narrow dark passage of water. In fact cave temple complex is said to be the abode of thousands of deities and people believe that these deities were consecrated by Adi Shankracharya. Munsyari is a small Himalayan township about 127 kms. north of Pithoragarh and 66 kms. from Jauljibi. It is a base for treks to Milam, Namik and Ralam glaciers. Pithoragarh is also one of the border districts of India, surrounded by China and Nepal.

128. The main festival of Pithoragarh are is the Uttraini festival which, is organized in the month of January for a period of one week and is frequented by traders, on barter or money lending intent, and by the Bhotiyas from the snows, as well as by a great multitude of people from the surrounding villages. The chief articles of merchandise are: ponies, goats, sheep, furs, yak tails, musk pods, borax, salt horns, books, shoes, fruit dried and fresh. The Bhotiyas bring down excellent ponies, which breed in a wild or semi-wild state over the China border. They also have a number of local fairs, like Kandali and Theejam, dedicated to the Bhumiyal deity (*deity of soil*) and celebrated once in 12 years. In this festival native people gathered in native village and celebrate. Thus, all their fairs and festivals have some links to bio-resources and they have various practices, which have inherent conservation values. Their other main festivals are Diwali, Dusshera, Kalyon, Phooldeyi, Ghughutia, Kojagar, Sankat Chaturthi, Sankrati, Harishayani Ekadashi and Harela, which they celebrate with a lot of fervour and gaiety.

Table IV.12:- Number of Tourist and tourist facilities available in district Pithoragarh

S.No.			Duration	Unit	Details
A	**Tourist Facility**				
	I.	Main Tourist Destination	2010-11	No.	24
	II.	Tourist Rest House	2010	No.	9
	III.	Available beds in TRH	2010	No.	392
	IV.	Rain Baser	2010	No.	01
	V.	Available beds in TRH	2010-11	No.	30

	VI.	Hotels and Paying guest	2010-11	No.	92
B	**Data of Tourists**				
	Tourist (including pilgrims)				193732
	I.	Indian Tourist	2011	No.	193059
	II.	Foreign Tourist	2011	No.	673

Source: Economic and Statistical Department of Pithoragarh-Annual Magazine, 2012 (http://pithoragarh.nic.in/pages/view/80-statistical-handbook-2012)

V. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

129. Urban roads were screened using the ADB's rapid environmental assessment (REA) checklist for Roads and Highways.

i) The environmental screening checklist is provided in Appendix A of this report.
ii) **No environmental impacts related to siting**. The proposed roads are passing through the township of Munsyari and the work will be confined to the existing ROW belonging to Uttarakhand Public Works Department. The proposed subproject is not expected to have any impact on the Forests and do not involve any tree cutting as the scope of the work is restricted to reconstruction and rehabilitation of disaster affected section of the existing roads. No road widening is proposed. Not any section is located inside or near a cultural heritage site, protected area (national park/sanctuary /biosphere reserve), wetland, mangrove, estuarine, buffer zone of protected area or special area for protecting biodiversity.
iii) **Potential significant environmental impacts.** Are related to encroachments and inconvenience to local community near market place and other populated area. No such road sections are prone to landslides, except for localized flooding, increased erosion, siltation, hazardous driving conditions.

130. The beneficial impacts still outweighs the potential significant environmental impacts. Beneficial impacts include reduction in travel time and lower vehicle operating costs; better internal and external access to and from Uttarakhand; and better access to agricultural production areas, markets, religious and tourist areas. The road design is also a mitigation measure to existing road safety and accessibility issues as it addresses erosion, landslides, poor drainage, and inadequate road safety. Improved roads will also contribute to the community climate change resiliency as it can better withstand more extreme weather events allowing continued accessibility and flow of materials under such conditions.

4.1 Impacts Related to Project Location, Preliminary Planning and Design Impact and mitigation measure during planning and design phase

131. There are no significant adverse environmental impacts during the planning and design phase based on the environmental screening of the road sections. Since the road sections to be improved are located in the township area and there will no increase in landslides and siltation anticipated. Rehabilitation of existing and construction of additional side- and cross drains like culverts and scuppers to control surface water flow below scouring velocity and volume will be done as per the provision given in DPR.

132. Off-site impacts associated with the road upgrading related to material sourcing from quarries, hot mix plant, and stone crushers will be minimized by relying solely on

existing and licensed quarries. All hot or stone crushers to be utilized will have will have prior consent from the UEPPCB.

4.2 Impacts during Construction Phase

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

a. Impacts on the Physical Environment and Mitigation Measures

i. Alteration of surface water hydrology of waterways crossed by roads, resulting in increased sediment in streams affected by increased soil erosion at construction site.

134. During the construction phase, erosion is expected to intensify due to vegetation removal, soil disturbance and exposure of bare soil surface. Soil erosion is anticipated during repaire of slab culvert. Problem will be more pronounced if the construction is taken up in rainy season. Construction activities such as cuttings and fillings will initiate soil erosion within road alignment, quarries and access roads to these areas.
135. These impacts will be mitigated by: i) avoiding construction activities during monsoon, ii) maintain embankment slope ratio of 1:2, iii) compliance to IRC 59-1974 on treatment of embankment slopes for control of erosion, iv) stone pitching and retaining structures shall be provided to control to soil erosion wherever necessary, v) turfing of embankment slopes particularly near bridge locations, vi) construction of silt traps at regular points along the road, and vi) immediate cleaning of all construction debris to prevent unconsolidated soil being eroded by either wind or runoff water. (see I, Appendix 14 Soil Erosion and Sedimentation Control).
136. To prevent soil erosion along the embankment during operation phase, regular monitoring inspections should be undertaken to ensure that drainage, bridge approaches and re-vegetated areas are maintained and strengthened to prevent re-occurrence of soil erosion.

ii. Impacts on water quantity

137. Road construction decreases available water to the host community in terms of its substantial requirement for processing, dust suppression, and domestic use of camps, and to a certain extent decrease the water availability by reducing groundwater recharge due to pavement of road surface. The risk of contaminating both surface and groundwater from untreated camp sewage also impacts availability of water to its most beneficial users. Although the construction requirement is temporary, mitigation measures must ensure the additional water demand will not burden existing water supply and sanitation systems. All road construction water requirements shall be exclusively extracted from government permitted sources. All borewells will secure permission from the state groundwater authorities to ensure no disruption to customary users. Contractors may draw water from the irrigation canal provided written consent is issued by the Irrigation Department.
138. To avoid contamination of water, no wastewater will be disposed without treatment. This will include the treatment of sewage through septic tank and interception of all oil-contaminated wastewater for oil recovery prior to disposal. All petroleum-based storage and handling areas will be paved to prevent groundwater contamination and facilitate easy clean-up and recover of spills. Prohibit the cleaning of tools and equipment on or near rivers, canals, and other waterbodies. To conserve water and promote recycling, no drinking quality water will be used for dust suppression.

iii. Disfiguration of landscape by road embankments, cuts, fills, and quarries.

139. During the improvement works for the sub-project sections and because of the cutting of hill slope, filling and stone quarrying will disfigure the landscape if require any. Although this impact is unavoidable, it becomes significant as the roads are located on hilly terrain as the land is unstable. Mitigation measures to minimize impacts are: i) source rock and sand from existing license quarries; ii) balance cut and fill; iii) prohibit blasting; iv) prohibit disposal of spoils on the valley side; and v) proper construction of drainage facilities to prevent soil from being saturated and increase susceptibility to erosion and maintain the original flow of water.

140. All contractors are required to submit a Debris Transportation and Disposal Plan no later than 30 days after the issuance of Notice to Proceed. The issuance of the Completion Certificate by the Engineer will also be reckoned, among others, a certification from the Construction Supervision Consultant-Environment Specialist the Contractors successful implementation of the EMP.

141. During road operation, the compensatory forestation will be maintained in coordination with the DFO. All drainage and erosion control infrastructure will be maintained on a regular basis to ensure optimum condition as part of the post-construction maintenance component of the Project.

iv. Loss of productive soil

142. The proposed subproject works are restricted to reconstruction and rehabilitation of damaged sections of roads due to disaster of 2013. All construction camps, labour camps, borrow areas[4], access roads will be located on barren lands.

v. Compaction and contamination of Soil

143. Soils of productive agricultural area adjoining subproject road, haul roads, construction camp area, labour camp area and at other construction establishment may be compacted due to the movement of heavy equipment, transport vehicles, and storage of materials. Mitigation measure includes control of movement of construction vehicles; new haulage roads will limited on the barren lands; and rehabilitation of construction camps, labour camps, material storage areas near to its original condition after the completion of work;

144. During project operation, the Uttarakhand-PWD will ensure that avenue trees will not obstructs the visibility to traffic and roadsigns, or pose hazard of falling on motor vehicles or overhead electrical and telephone wires. Regular trimming will be undertaken exclusively using mechanical means. No herbicide or weedicide will be used for roadside vegetation maintenance.

b. Impacts on Environmental Quality

i. Increase in local air pollution due to rock crushing, and filling works, and chemicals from asphalt processing.

145. Most of the dust during construction arises from excavation and filling during site preparation works, loading, unloading and transportation of construction material, drilling, blasting; use of heavy equipment and machinery in the earthworks and pavement works. Gaseous emissions like, oxides of sulphur (SO_2), oxides of nitrogen (NOx), carbon monoxide (CO), and hydrocarbon (HC) are emitted from mobile sources, hot mix plant, batching plants and diesel generator sets. Elevated concentration or these parameters cause pollution, albeit short term.

[4]Appendix 13 Borrow Area Management

146. Exposure to episodes of air pollution causes numerous health problems like pulmonary, cardiac, vascular, and neurological impairments. High-risk groups such as the elderly, infants, pregnant women, and sufferers from chronic heart and lung diseases are more susceptible to air pollution. Children are at greater risk because they are more active outdoors and their lungs are still developing. “Exposure to air pollution can cause both acute (short-term) and chronic (long-term) health effects. Acute effects are usually immediate and often reversible when exposure to the pollutant ends. Some acute health effects include eye irritation, headaches, and nausea. Chronic effects are usually not immediate and tend not to be reversible when exposure to the pollutant ends. Some chronic health effects include decreased lung capacity and lung cancer resulting from long-term exposure to toxic air pollutants (USEPA, 2010).
147. To minimize impacts on community areas, the location of all construction establishments such as hot mix plants, WMM plants, crusher plants, construction camps, and offices will be located at least 1000 m away.
148. To control gaseous emission during construction, Consent to Establish (CTE) and Consent to Operation (CTO) will be obtained for construction establishments such as hot mix plants, batching plants and stone crushers from the UEPPCB. Pollution control devices such as cyclone separators /scrubbers will be installed to control emissions from hot mix plants, crushing units and concrete batching plants. Height of the stacks will comply with statutory requirements. All vehicles and construction equipment operating for the contractor and the consultant will obtain and maintain “Pollution under Control” (PUC) Certificates.
149. To control dust emissions, vehicles deployed for borrow material, sand and aggregate haulage, shall be covered with tarpaulins to be spillage proof. Regular sprinkling of water during excavations, loading, unloading, vehicular movement and raw material transport, provisions shall be made construction period.
150. Other control measures to control emissions include the use of LPG or low sulphur diesel shall be used in the diesel generator sets and fitted with the stack of required height. The use of firewood for cooking is prohibited.
151. Periodic air quality monitoring to ensure emissions comply with standards will be conducted as per the agreed environmental monitoring plan given in table VIII - 3. The Contractor will submit annual emission monitoring results required by the SPCB as part of the annual CTO renewal. Ambient monitoring along active construction fronts and major community areas will be the conducted by the contractor in consultation with the DSC.
152. Limited mitigation measures are available to the Uttarakhand PWD to control emissions from mobile sources as this is beyond their authority. Still, posters and signboards promoting the proper maintenance of vehicles will be installed along key points highlighting safer, cheaper, and more environment friendly use of the roads.

Noise and vibration from civil works

153. Noise pollution affects both workers and nearby communities. Impacts to exposure are hearing loss, and sleep disruption. Sleep disruption in turn can cause poor concentration and performance, weight changes, and a general decrease in health and overall well being. The combination of stress and lack of sleep can also lead to frustration and aggravation. The social consequences include becoming short-tempered or potentially aggressive resulting in more accidents, poor familial and social relationships, and poor work performance.
154. Sources of noise pollution include construction activity, traffic, and heavy equipment operation. Mitigations measures to be implemented will include: use of enclosures, walls, installation of mufflers around noisy equipment and the noise sources reduce noise generated during construction and demolition activities; preference to quieter equipment or construction methods; minimizing time of operation and locating

equipment farther from sensitive receptors; timing of noisier construction and demolition activities to between 6 AM and 10 PM would reduce construction noise impacts during night; detouring construction trucks away from noise-sensitive areas such as schools and hospitals would eliminate construction truck noise from those areas; mandatory use by workers of personal protective equipment (PPE) such as ear plugs and earmuffs; and temporary traffic by-passing of community areas. Appendix 5 provides typical noise barriers that maybe required during project construction and operation. Monitoring of noise levels in potential problem areas as per the monitoring plan will be carried out.

155. During project operation the PWD will explore the need to establish permanent noise control structures like avenue vegetation, and prohibition on use of horns and speed restrictions at noise sensitive areas like schools, civil courts and major hospitals reduce roadway noise levels.

c. Impacts on the Socio-Economic

i. <u>Encroachment on historical and cultural areas.</u>

156. No historical or cultural areas will be shifted as a result of the road restoration works in disaster affected sections. However, several religious structures are near the road which will be affected in terms noise, dust, and temporary partial/full blockade of access causing inconvenience.

157. The same mitigation measures addressing noise, and dust discussed earlier will be implemented on these sensitive areas. Traffic re-routing as provided in Appendix 10 Arrangement of Traffic during Construction will be implemented by the Contactor.

ii. <u>Impacts on Occupational Health and Safety</u>

158. Employers are required to implement precautions to protect the health and safety of workers. Road construction exposes workers to various physical hazards that may result to minor, disabling, catastrophic, or fatal injuries. Work close to rotating and moving equipment like hot mix plant operation, materials handling, motorpool repairs/machining and the like create trap hazards putting extremities at risk. Exposure to loud noise can cause temporary or permanent hearing impairment. Hand-arm vibration, electrical, welding/works, and working close to moving vehicles also expose workers to injuries. , Appendix 6 “Work Safety in Common Operation and Construction” provides a range of mitigation measures to promote occupational safety.

iii. <u>Impacts on Community Health and Safety</u>

159. These impacts pertain to those that take place outside the project boundaries, in this case the ROW and camp site, but are related to road construction and operation. Impacts on water quantity, and air and water qualities were discussed in other sections. Other impact on community health and safety related to road construction pertains to road crashes, structural safety, transport of hazardous materials, communicable and vector borne diseases, and emergency preparedness in case or road failures such as slides rendering villages inaccessible.

160. Risk of road crashes will increase during construction when a construction related and transport vehicles, and workers are co-located along restricted construction fronts. During operation phase, the projected increase in the number of motorized road users traveling at higher speeds also increases the chances of injuries and fatalities from road crashes. To mitigate these risks, the contactor needs to adopt safety measures for workers, and road users particularly those that are more vulnerable to crashes. Contractors need to emphasize safety among drivers, ensuring drivers have adequate skills, avoiding dangerous routes and times of day to reduce chances of crashes, speed control devices, and regular maintenance of

vehicles to avoid premature failure. To address the risk caused by increase in traffic, the Contractor will: i) minimize pedestrian interaction with construction vehicles, ii) install signages, visibility and overall road safety particularly near schools or where children are present, iii) coordinate with local emergency groups on location of active construction fronts to facilitate appropriate first aide, iv) use of local materials to the extent possible to reduce hauling distance, v) employ flag persos to warn dangerous conditions.

161. Accident risks associated with increase in vehicular traffic, leading to accidental spills of toxic materials is also magnified during construction. Contractor's or its third party suppliers of fuel, lubricants, and bitumen will be required to demonstrate proofs of capability to handle spills to include: i) proper labeling of container content, hazards, and operator's contact details; ii) ensure the intergrity of the packaging/containers and transport vehicle are commensurate to the hazardous material; iv) drivers and assistants are trained on transport and emergency procedures; v) operator has the means to respond to emergencies on a 24 hour basis. (see , Appendix 16 Storage, Handling, Use and Emergency Responses for Hazardous Chemicals)

162. The construction camps pose risk of communicable and vector-borne diseases not only among its workers but to the host communities through poor camp sanitation and living conditions, migrant workers might carry sexually-transmitted diseases such as HIV/AIDS. Measures to properly maintain hygiene inside Camps are provided in , Appendix 17 Site Management of Construction. The Contractor will undertake health awareness and education through information and promoting individual protection. The Contractor will link with existing state and national health programs on STDs, HIV/AIDS, and immunization. Contractors will cause the provision of treatment of communicable diseases in community health care facilities, access to medical treatment, confidentiality particularly with respect to migrant workers. The Contractor, will implement mosquito, rodent, and arthropod-borne diseases control that will have the following components: i) prevention of propagation by eliminating all breeding habitats close to the camps, ii) elimination of all unusable impounded water; iii) increase water velocity in channels near camps; iv) judicious use of insecticides on building walls; v) promoting the use of mosquito nets; vi) monitoring and treatment of diseases and collaboration with health officials, vii) distribute educational materials among workers and host communities, and viii) proper handling and use of insecticides to minimize human exposure and spills.

Roads and bridges failures due to inadequate designs may cause injuries to community and other road users. This risk is mitigated through the compliance with appropriate engineering design standards by the design engineers and review and approval of engineering plans by the PWD.

VI. INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION

Public participation during the preparation of the IEE

163. The public participation process included identifying interested and affected parties (stakeholders); informing and providing the stakeholders with sufficient background and technical information regarding the proposed development; creating opportunities and mechanisms whereby they can participate and raise their viewpoints (issues, comments and concerns) with regard to the proposed development; giving the stakeholders feedback on process findings and recommendations; and ensuring compliance to process requirements with regards to the environmental and related legislation.

164. 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 (on either side of the project road)

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 (along the road) and macro-level (e.g. District/State level institutional consultations) helped planners to integrate the short term and long terms requirements of the local, regional, state and national goals in to the planning process. The regional, state and national goals are generally set by the legislations and policies by controlling or limiting the activities in order to reduce and nullify the adverse impact generated by infrastructure projects like roads and highways.

Public consultation

165. The following methodologies were adopted for carrying out public consultation:-

[i] Local communities, Individuals affected, traders and local shopkeepers who are directly affected were given priority while conducting public consultation.
[ii] Walk-through informal group consultations along the proposed subprojects area
[iii] One to one meeting were generally held with a few members of local communities. These consultations sometimes focused on one or more specific issues in a given section (link) of the project corridor. Focus group consultations were conducted with a sample section of the community with a good representation from the affected communities. Such meetings usually provide substantial information about the community concerns. Details of the local consultations are given below:

Internal Roads of Nagar Panchayat-Munsyari

Place: Munsyari Town
District: Pithoragarh
Date: 23/01/2015
Participants: Villagers, Farmers etc.

1.	**Issues Discussed:** • Discussion has been conducted among public for sharing of information related to project (environmental safeguard policy, direct and indirect impacts of improvement options on environmental). • Any damage to historical or cultural monuments along project road? • Problem faced by the local people to meet up their daily requirement due to improper road network. • Impact on the local environment due to construction and strengthening of the road. • Scope of employment generation for the local people during construction phase. • Construction activity whether causing any type of health hazard or not? • Any loss of land or property due to construction activity? • Any damage to historical or cultural monuments along project road ?
2.	**Stakeholder's Response:** • Local people are aware about the environmental degradation due to felling of trees and cutting of hills but they think there will be negligible impact on the environment due to construction of the road. • In some places road requires widening and proper drainage is also required for rain water. • Villagers want deployment of local village people for local road construction. • Villagers think that construction activity will not cause any major health hazard. • Some stretches of road are earthen and gravel road which cause immense problem,

	especially in rainy season things are getting more difficult for villagers, so people want metalled road. • As per consultation, no cultural or historical place is along the road alignment.
3.	**Recommendations & Suggestions:** • The project road does not involve any expansion work only overlaying work will be done within the available width • Slope stabilization measures will be adopted in design. Repairing of Culverts. • Tree cutting should be avoided; all trees present on edge of road should be saved. • Efforts should be taken for the generation of employment for local people in construction work. Preference should be given to locals for unskilled work. • Damaging of crops by Wild Boar problem is widespread and needs to be addressed by Forest Department

166. During consultation the following general opinions/suggestions were noted: i) Most of the people were not happy with the existing road infrastructure post June 2013 disaster and they need improvement of the roads, ii) people wanted the road of minimum width so that much of their land property is not affected, iii) road works should be completed at the earliest and people should not face any further inconvenience, iv) after construction, proper maintenance of the road should be carried out, v) noise pollution control measures during construction shall be devised at village settlements, particularly at schools.

B. Future consultation and Disclosure

167. 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

168. 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.

169. 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.

170. The PIU/PMU, with assistance of DSC will conduct information dissemination sessions in the subproject area. During EMP implementation PIU, DSC, and PMU shall organize public meetings and will apprise the communities about the progress on the implementation of EMP in the subproject works

D. Consultation during Construction

171. 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.

172. 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. Public Disclosure

173. The IEE report will be disclosed in the English language at PMU, IA / PIU-PWD division office and will also be available in the website of ADB. The full reports will also be available to interested parties upon request from PMU.

174. 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. The road closure together with the proposed detours will be communicated via advertising, announcements, road signage, etc.

175. For the benefit of the community the IEE will be disclosed to the affected people and other stakeholders in a form and language(s) understandable to them at an accessible place in a timely manner and made available at: (i) PIU/PMU office; (ii) District Magistrate Office; and, (iii) DSC office. It will be ensured that the hard copies of IEE are kept at such places which are conveniently accessible to citizens as a means to disclose the document and at the same time creating wider public awareness. Electronic version of the IEE will be placed in the official website of the SDMA UEAP and the official website of ADB after approval of the IEE by ADB. The PIU will issue Notification on the locality-wise start date of implementation of the subproject. Copies of the IEE will be kept in the PMU/PIU office and will be distributed to any person willing to consult the IEE.

VII. ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN AND GRIEVANCE REDRESS MECHANISM

A. Environmental Management Plan

176. The EMP will guide the environmentally -sound construction of the subproject and ensure efficient lines of communication between the DSC (Engineer), contractors, and PIU/PMU. The EMP identifies the three phases of development as: (i) Site Establishment and Preliminary Activities; (ii) Construction Phase; and (iii) Post Construction/Operational Phase.

177. The purpose of the EMP is to ensure that the activities are undertaken in a responsible non detrimental manner with the objectives of: (i) provide 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.

178. A copy of the EMP must be kept on site during the construction period at all times. The EMP 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 preventative measures to reduce or prevent further pollution and/or environmental damage. (The polluter pays principle).

179. The Contractor is deemed not to have complied with the EMP if:
- Within the boundaries of the site, site extensions and haul/ access roads there is evidence of contravention of clauses.
- If environmental damage ensues due to negligence.
- The contractor fails to comply with corrective or other instructions issued by the Engineer/PMU/PIU within a specified time.
- The Contractor fails to respond adequately to complaints from the public

180. An environmental management plan (EMP) translates recommended mitigation and monitoring measures into specific actions that will be carried out by the contractor and proponent. Environmental Management Plan deals with the management measures and implementation procedure of the guidelines along with enhancement

measures recommended to avoid, minimize and mitigate foreseen environmental impacts of the project.

181. The succeeding Table presents a standarized EMP to guide the contractors in mitigating environmental impacts.

B. Institutional Arrangement

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

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

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

185. UEAP SDMA (EA) shall be responsible for ensuring compliance to environmental requirements of the ADB as well as central/state governments and reporting the same to ADB. A relevant portion of EMMP will be a part of contract with the civil works contractors engaged for execution of the works. The primary responsibility of implementation of EMMP is of the IA during pre-construction and operation and maintenance phases; and of the civil works contractor during the construction phase as defined in the EMMP. The responsibility of supervision of EMMP implementation is of the DSC; and it would guide the IA and the civil works contractors in this regard. , DSC with IA and EA, UEAP will act as monitoring agency as delegated in EMMP. All applicable statutory environmental clearances, consents, and/or permits (at national, state and local levels) as required for the implementation of the subproject would be obtained by the IA or by the civil works contractor in line with India's national/state/local laws and regulations, and in accordance with ADB's SPS 2009 requirements. Redressal of grievances shall be the responsibility of UEAP SDMA (EA). Apart from the mechanism for the grievances receiving and redressal at the level of EA, the provision shall be kept in the EMP of the subprojects wherein the contractor will depute one Environmental Safeguard Officer who shall be responsible for implementation of EMP, reporting and grievance redressal on day-to-day basis. The grievances/complaints received at the level of contractor shall be recorded on the Complaints Register and the same shall be forwarded to the DSC (Engineer of the Contract) within 48 hours along with the details of action taken to redress the grievance. The Team Leader of DSC shall immediately try to resolve the issues and forward the details to the Field Program Implementation Unit FPIU / IA. If the action taken by Contractor and DSC is found to be inadequate, then necessary instructions shall be issued by the FPIU. IA for implementation of rectification measures.

(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 (DSC) and/or Safeguards Staff of UEAP SDMA for the duration of the Contract;
- May, on the recommendation of the EE DSC and/or Safeguards Staff of UEAP SDMA, through the DSC order the Contractor to suspend any or all works on site if the Contractor or his subcontractors/ suppliers fail to comply with the said contractual stipulations with respect to environment and EMMP.

- Act as overall monitoring agency.
- Addressing complaints and redressal of grievances.

(ii) UEAP, IA FPIU

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

(iii) The Engineer (DSC)

- Guides EA, IA, FPIU and Contractors with respect to environmental regulations and associated requirements, and facilitates ensuring compliance with those.
- Arranges information meetings for and consults with interested and affected parties about the impending construction activities;
- Maintains a register of complaints and queries by members of the public at the site office. This register is forwarded to the Project Manager of FPIU on weekly basis
- Enforces and monitors compliance the requirements of the EMMP on site;
- Assesses the Contractor's environmental performance in consultation with Environmental Expert
- Documents in conjunction with the Contractor, the state of the site prior to commencing construction activities.
- Documents state of implementation of EMMP and clearly delineate if any item of EMMP is pending partially or fully before issue of completion certificate of the work.

(iv) Environmental Expert of Engineer (DSC)

- Briefs the Contractor about the requirements of the Environmental Specification and/ or EMMP, as applicable;
- Facilitates statutory compliance related activities for the IA and Contractors;
- Advises the Engineer about the interpretation, implementation and enforcement of the Environmental Specification and other related environmental matters;
- Monitors and report on the performance of the contractor/project in terms of environmental compliance with the EMMP to the Engineer and UEAP, SDMA-PMU;
- Provides technical advice relating to environmental issues to the Engineer.
- Organise and ensure public consultation and information disclosure are done as per the EMMP and ADB requirements. Monitor complaints and grievances

are handled as per the Grievance Redressal Mechanism and report the same as per the environmental reporting.

(v) The Contractor

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

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

187. For monitoring of environmental parameters as outlined in the EMMP, appropriate monitoring agencies would be engaged by the contractor (cost has been included in each contract based on subproject specific monitoring plans) or by the IAs for the monitoring works not included in the civil works contracts (cost included in the budget given in table VII.1

C. Environmental Monitoring Plan

The succeeding Table presents the monitoring plan for UEAP. The objectives of environmental monitoring are: ensure effective implementation of EMP; comply with all applicable environmental, safety, labour and local legislation; ensure that public opinions and obligations are taken in to account and respected to the required satisfaction level; and modify the mitigation measures or Implementing additional measures if required.

- The environmental monitoring plan contains:
- All performance indicators
- Environmental monitoring programme
- Necessary budgetary provisions

D. Performance Indicators

188. The physical, biological and social components identified to be particularly significant in affecting the environment at critical locations have been suggested as

Performance Indicators (Pls). The Performance Indicators shall be evaluated under three heads as:

a) Environmental condition indicators to determine efficiency of environmental management measures in control of air, noise and water pollution.
b) Environmental management indicators to determine compliance with the suggested environmental management measures.
c) Performance indicators that have been devised to determine efficiency and utility of the proposed mitigation measures.

189. The Performance Indicators and monitoring plans prepared are presented in Table VII.2

Table VII-1. Environmental Management and Monitoring Plan

Sl. No.	Environmental Issue	Mitigation Measures	Approximate location	Reference law/guidelines	Responsibility	
					Planning and Execution	Supervision/ Monitoring
PRE-CONSTRUCTION STAGE						
P 1	Land Acquisition (If required)	The acquisition of land and private properties shall be carried out in accordance with the RAP and entitlement framework of the Project. UEAP has to ascertain that acquisition of land in the post design phase are addressed and integrated into the EMP and relevant contract documents.	Wherever existing RoW is less than proposed RoW	Right to fair Compensation & Transparency in Land Acquisition, Rehablitation and Resettlement Act, 2013	PMU/PIU, Revenue Dept, Collaborating Agencies	PMU
P 2	Clearance of Encroachment/Squatters (change in land use)	Advance notice, as per RAP shall be given to the encroachers and squatters present in the Corridor of Impact, who need to be relocated. All R&R activities shall be undertaken. Entitlements as per UEAP entitlement framework shall be completed before construction starts.	Where compulsory resettlement of people is involved	RAP documents	PIU, PMU and Revenue Authority	PMU
P 3	Tree Cutting (If required)	Trees shall be removed from the Corridor of Impact before the actual commencement of the work with the permission from the state Forest Department. Cutting shall not start until the implementation of the project in that particular location of cutting is confirmed. Stacking, transport and storage of the wood shall be done as per the relevant norms.	Trees along the subproject road falling within proposed RoW	MoRTH 201.1 and 201.6	Forest Department	DSC and / PMU
P 4	Preservation of Trees	All efforts shall be made to preserve trees including evaluation of minor design adjustments/alternatives (as applicable) to save trees. Specific attention shall be given for protecting giant trees, green tunnels and locally important trees (religiously important etc.). Tree cutting is to proceed only after all the legal requirements including attaining of In-principle and Formal Clearances form the Forest Dept./MoEFCC	At green tunnels and trees present at the toe line of the carriage way and trees of valuable species having	MoRTH 201.2 and 301.5	Contractor/Agency engaged by PMU	DSC and / PMU

Sl. No.	Environmental Issue	Mitigation Measures	Approximate location	Reference law/guidelines	Responsibility	
					Planning and Execution	Supervision/ Monitoring
		are completed and subsequently a written order is issued to the Contractor. Particular species declared as "protected" by the State Forest Dept. in the private land shall be felled only after due clearance from the Forest Dept. is obtained. In the event of design changes, additional assessments including the possibility to save trees shall be made. Systematic corridor level documentation for the trees cut and those saved shall be maintained by the UEAP	ecological value.			
P 5	Relocation of Community Utilities and Common Property Resources	All community utilities and properties i.e., hand pumps, open wells, water supply lines, sewer lines, telephone cables, buildings and health centers shall not be relocated before construction of subproject road starts.	Throughout the corridor	RAP document	PIU/PMU, other Agencies / Contractor	PMU
P 6	Relocation of affected Cultural and Religious Properties	All religious property resources such as shrines, temples and mosques within the project road shall be relocated. No such utilities will be relocated.. If there is any relocation of the religious structures may happen then it shall be identified in accordance with the choice of the community. UEAP in consultation with local people shall finalize those. The entire process (i.e. selection of relocation sites and design) shall be under supervision of Environmental Specialist of DSC, during the construction stage by the Contractor. The relocation shall be completed before the construction starts in these sites.	Throughout the stretch especially nearby settlements	MoRTH 110.7	PIU/ Contractor	DSC/ PMU
Pre-construction activities by the Contractor/Environmental Specialist of DSC						
P 7		**Field Verification and Modification of the Contract Documents**				

Sl. No.	Environmental Issue	Mitigation Measures	Approximate location	Reference law/guidelines	Responsibility	
					Planning and Execution	Supervision/ Monitoring
P.7.1	Joint Field Verification	The Environmental Specialist of DSC and the Contractor shall carry out joint field verification to ascertain any possibilities of saving trees, environmental and community resources, and these activities are to be taken up by the construction contractor.	Throughout the stretch o f subproject	MoRTH 201.2	Contractor/ Environmental Specialist of DSC	PMU
P.7.2	Assessment of Impacts due to Changes/Revisions/additions in the Project Work	The Environmental Specialist of DSC shall assess impacts and revise/modify the EMP and other required sections of the project document/s in the event of changes/revisions (including addition or deletion) in the project's scope of work.	Where ever changes are applicable		Contractor/ Environmental Specialist of DSC	PMU
P.7.3	Crushers, Hot-mix plants and Batching Plants Location	All construction plants shall be sited sufficiently away from settlements and agricultural operations or any commercial establishments. Such plants shall be located at least 1000 m away from the nearest dwelling preferably in the downwind direction. The Contractor shall submit a detailed layout plan for all such sites and approval of Environmental Specialist of DSC shall be necessary prior to the establishment. Arrangements to control dust pollution through provision of windscreens, water sprinklers, and dust extraction systems shall have to be provided at all such sites. Specifications for crushers, hot mix plants and batching plants shall comply with the requirements of the relevant emission control legislations. Consent for the Establishment and Operation from UEPPCB shall be obtained before establishment and operation respectively and a copy should be submitted to the DSC and UEAP. Wherever there is extremely water scarcity areas	At all Crushers, Hot-mix plants and Batching Plants opened up for the construction of Subproject road	MoRTH 111.1, Air (prevention of control of pollution) Act, 1981and Noise Rules	Contractor/ Environmental Specialist of DSC	PMU

Sl. No.	Environmental Issue	Mitigation Measures	Approximate location	Reference law/guidelines	Responsibility	
					Planning and Execution	Supervision/ Monitoring
		exist the Water sprinkling shall be limited to one time in the morning. To balance this deficient information boards shall be erected at appropriate locations with a message to "Dust prone area take precautions.				
P.7.4	Other Construction Vehicles, Equipment and Machinery	All vehicles, equipment and machinery to be procured for construction shall confirm to the relevant Bureau of India Standard (BIS) norms. The discharge standards promulgated under the Environment Protection Act, 1986 and Motor Vehicles Act, 1988 shall be strictly adhered to. The silent/quiet equipment available in the market shall be used in the Project. The Contractor shall maintain a record of PUC for all vehicles and machinery used during the contract period which shall be produced to EO, UEAP verification whenever required.	Applicable to all vehicles used in the construction	Air pollution Control Act, and Noise Rules and Motor Vehicle Act, 1988	Contractor/ Environmental Specialist of DSC	PMU
P 8		**Identification and Selection of Material Sources**				
P.8.1	Borrow Areas	Finalising soil borrowing earth and all logistic arrangements as well as compliance to environmental requirements, as applicable, shall be the sole responsibility of the Contractor. The Contractor shall not start borrowing earth from selected borrow area until the formal agreement is signed between landowner and Contractor and a copy is submitted to the DSC. Locations finalized by the Contractor shall be reported to the Environmental Specialist of DSC and he shall submit the report to UEAP. Planning of haul roads for accessing borrows areas shall be undertaken during this stage. The haul roads shall be routed to avoid agricultural areas as far as possible and shall use the existing village roads	Borrow sites	IRC Guidelines on borrow areas and quarries; EPA 1986 and MoRTH 111.2 and 305.2.2	Contractor/ Environmental Specialist of DSC	PMU

Sl. No.	Environmental Issue	Mitigation Measures	Approximate location	Reference law/guidelines	Responsibility	
					Planning and Execution	Supervision/ Monitoring
		wherever available. The environmental personnel of the DSC shall be required to inspect every borrow area location prior to approval. The DSC should include the Request for Inspection form for borrow area approval from the environmental point of view.				
P.8.2	Quarry	Contractor shall finalize the quarry for procurement of construction materials after assessment of the availability of sufficient quantity of materials, quality and other logistic arrangements. In case the Contractor decides to use quarries other than recommended by DPR consultant, then the Contractor should give substantiation. Contractor shall also work out haul road network and report to Environmental Specialist of DSC and DSC shall inspect and in turn report to UEAP before approval.	Quarry sites	MoRTH 111.3	Contractor	Environmental Specialist of DSC
P.8.3	Arrangement for Construction Water	In view of the special situation in Uttarakhand, Contractor shall prepare and implement the approved Water Management Plan in accordance with the Appendix-11, and BOQ Environment mitigation works The contractor shall use ground/surface water as a source of water for the construction and may set up own bore well facility for construction work. Contractor may take surface water from the Irrigation Canal with the written consent from the Irrigation Department. To avoid disruption/disturbance to other water users, the Contractor shall extract water from fixed locations and consult Environmental Specialist of DSC before finalizing the locations. The Contractor shall provide a list of locations and	Throughout the subproject	As per the contract document and Clause No. 1010 EPA, 1986	Contractor	Environmental Specialist of DSC

Sl. No.	Environmental Issue	Mitigation Measures	Approximate location	Reference law/guidelines	Responsibility	
					Planning and Execution	Supervision/ Monitoring
		type of sources from where water for construction shall be extracted. The Contractor shall need to comply with the requirements of the State Ground Water Department for the extraction and seek their approval for doing so and submit copies of the permission to DSC and UEAP.				
P 9	Sand	The Sand shall be procured from identified statutorily approved sand mines as far as possible. The Contractor shall obtain copy of the Lease Agreement of the supplier and submit to DSC before procuring the sand.	Sand quarries being used for the construction	As per the contract document4	All riverbeds recommended for sand extraction for the project.	
P 10	Labour Requirements	The Contractor shall preferably use unskilled labour drawn from local communities to give maximum benefits to the local community.	Throughout the subproject road	As per the Contract Document	Contractor	Environmental Specialist of DSC
P 11	Construction Camp Locations – Selection, Design and Layout	Siting of the construction camps shall be as per the guidelines below and details of layout to be approved by DSC Resident Engineer and environment specialist. Construction camps shall not be proposed within 1000 m from the nearest settlements to avoid conflicts and stress over the infrastructure facilities with the local community. Location for stockyards for construction materials shall be identified at least 300m away from watercourses. The Sewage Treatment Plant and solid waste treatment for the camp shall be designed, built and operated. Contractor's camps shall be identified at least 2km away from the Forest Reserves.	Construction camps	As per IRC guidelines and contract documents.	Contractor	Environmental Specialist of DSC
P 12	Arrangements for	The Contractor as per prevalent rules shall carry out	Construction	MoRTH 108.3	Contractor	Environment

Sl. No.	Environmental Issue	Mitigation Measures	Approximate location	Reference law/guidelines	Responsibility	
					Planning and Execution	Supervision/ Monitoring
	Temporary Land Requirement	negotiations with the landowners for obtaining their consent for temporary use of lands for construction camp/construction/borrow areas etc. Temporary land arrangements shall not be from the forest reserves except under special permission circumstances where it is un avoidable due to the vast forest reserves in the PIA.	camps and borrow areas			al Specialist of DSC
P 13	Orientation of Implementing Agency and Contractors	The UEAP shall organize Orientation Sessions and regular training sessions at all stages of the project. This shall include on-site training (general as well as in the specific context of a sub-project). These sessions shall involve all staff of UEAP involved in the implementation of EMP, Environmental Specialists of DSC and Contractors.	Throughout the implementation period.	EMP and other training plan developed by UEAP	Contractor/ DSC and UEAP	PMU
	CONSTRUCTION STAGE					
	Activities to be Carried Out by the Contractor					
C 1		**Site Clearance**				
C.1.1	Clearing and Grubbing	If required vegetation shall be removed from the construction zone before commencement of construction. All works shall be carried out such that the damage or disruption of flora other than those identified for cutting is minimum. Only ground cover/shrubs that impinge directly on the permanent works or necessary temporary works shall be removed with prior approval from the Environmental Expert of DSC. The Contractor, under any circumstances shall not cut or damage trees and forest reserves. Trees identified under the project shall be cut only after receiving clearance from the Forest Dept./DoEF/MoEFCC (as applicable) and after the receipt of UEAP's written permission in this regard.	Throughout the corridor	MoRTH 201	Contractor	Environmental Specialist of DSC, PMU

Sl. No.	Environmental Issue	Mitigation Measures	Approximate location	Reference law/guidelines	Responsibility	
					Planning and Execution	Supervision/ Monitoring
		Vegetation only with girth size of over 30 cm shall be considered as trees and shall be compensated, in the event of UEAP's instruction to undertake tree cutting.				
C.1.2	Disposal of Debris from dismantling structures and road surface	Appendix-1 & 4 provides guidelines for the preparation of the contractors Debris disposal plan. This is mainly to deal with surplus debris materials that would be available after adjusting for all insitu applications. Other debris generated due to dismantling of the existing road shall be suitably reused in the proposed construction zone, subjected to the structure suitability of the materials and approval of the Resident Engineer and Environmental Expert of DSC as follows: For filling and leveling of School grounds and proposed parking areas. The sub grade of the existing pavement shall be used as embankment fill material. Existing base and sub-base material shall be recycled as sub-base of the haul road or access roads. The existing bitumen surface may be utilized for the paving of cross roads, access roads and paving works in construction sites and campus, temporary traffic diversions, haulage routes etc. The Contractor shall suitably dispose off unutilized debris materials either through filling up of borrows areas located in wasteland or at pre-designated disposal locations, subject to the approval of the Environmental Expert of DSC. At locations identified for disposal of bituminous wastes, the disposal shall be carried out over a 30	All debris disposal sites	MoRTH 202	Contractor	Environmental Specialist and Resident Engineer of DSC, EC, PMU

Sl. No.	Environmental Issue	Mitigation Measures	Approximate location	Reference law/guidelines	Responsibility	
					Planning and Execution	Supervision/ Monitoring
		mm thick layer of rammed clay so as to eliminate the possibility of scarified percolation of leachate into the ground water. The Contractor shall ensure that the surface area of such disposal pits is covered with a layer of soil and subsequent turfing. All arrangements for transportation during construction including provision, maintenance, dismantling and clearing debris, shall be considered incidental to the work and shall be planned and implemented by the Contractor as approved and directed by the Environmental Expert of DSC. The pre-designed disposal locations shall be a part of Waste Disposal Plan in consultation and with approval of Environmental Expert of DSC. Debris generated from pile driving or other construction activities shall be disposed such that it does not flow into the surface water bodies or for mud puddles in the area. The Contractor shall identify dumping sites as per the Debris Disposal Plan prepared using the Guidelines provided in the Appendix 1; The identified locations shall be reported to the Environmental Expert of DSC. These locations shall be checked on site and accordingly approved by Environmental Expert of DSC prior to any disposal of waste materials.				
C.1.3	Other Construction Wastes Disposal	The pre-identified disposal location shall be part of Comprehensive Waste Disposal Plan Solid Waste Management Plan to be prepared by the Contractor in consultation and with approval of Environmental Specialist of DSC. Location of disposal sites shall be finalized prior to initiation of the works on any particular section of the	All waste disposal sites	MoRTH: 202.5 MoRTH: 301.11	Contractor	Environmental Specialist of DSC, PMU

Sl. No.	Environmental Issue	Mitigation Measures	Approximate location	Reference law/guidelines	Responsibility	
					Planning and Execution	Supervision/ Monitoring
		road. The Environmental Specialist of DSC shall approve these disposal sites after conducting a joint inspection on the site with the Contractor. Contractor shall ensure that any spoils or material unsuitable for embankment fill shall not be disposed off near any water course or agricultural land, Orchards and Natural Habitats like Grasslands. Such spoils from excavation can be used to reclaim borrow pits and low-lying areas located in barren lands along the project road (if it so desired by the owner/community and approved by the Environmental Specialist, DSC). Non-bituminous wastes shall be dumped in borrow pits covered with a layer of 30cm soil to ensure that borrow pit is restored to original use. No new disposal site shall be created as part of the project, except with prior approval of the Environmental Specialist of DSC. All waste materials shall be completely disposed and the site shall be completely cleaned and certified by Environmental Specialist of DSC before handing over. The Contractor at his cost shall resolve any claim, arising out of waste disposal or any non-compliance that may arise on account of lack of action on his part.				
C.1.4	Stripping, stocking and preservation of top soil	The topsoil from all areas of cutting and all areas to be permanently covered shall be stripped off to a specified depth of 150 mm and stored in stockpiles. A portion of the temporarily acquired area and/or Right of Way shall be earmarked for storing topsoil. The	At all construction material storage areas	MoRTH: 301.3.2 MoRTH: 301.7 MoRTH: 305.3.3 and MoRTH: 305.3.9	Contractor	Environmental Specialist of DSC, PMU

Sl. No.	Environmental Issue	Mitigation Measures	Approximate location	Reference law/guidelines	Responsibility	
					Planning and Execution	Supervision/ Monitoring
		locations for stock piling shall be pre-identified in consultation and with approval of Environmental Specialist of DSC. The following precautionary measures shall be taken to preserve them till they are used: (a) Stockpile shall be designed such that the slope does not exceed 1:2 (Vertical to horizontal), and height of the pile is restricted to 2 m. To retain soil and to allow percolation of water, silt fencing shall protect the edges of the pile. (b) Stockpiles shall not be surcharged or otherwise loaded and multiple handling shall be kept to a minimum to ensure that no compaction shall occur. The stockpiles shall be covered with gunny bags or vegetation. (c) It shall be ensured by the Contractor that the topsoil shall not be unnecessarily trafficked either before stripping or when in stockpiles. Such stockpiled topsoil shall be utilized for – ➢ Covering all disturbed areas including borrow areas, only in case where they are to be rehabilitated. ➢ Dressing of slopes of road embankment/agricultural fields of farmers acquired temporarily land.				
C.1.5	Accessibility	The Contractor shall provide safe and convenient passage for vehicles, pedestrians and livestock to and from roadsides and property access connecting the project road, providing temporary connecting road. The Contractor shall also ensure that the existing accesses shall not be undertaken without providing	Throughout the project corridor		Contractor	Environmental Specialist of DSC, PMU

Sl. No.	Environmental Issue	Mitigation Measures	Approximate location	Reference law/guidelines	Responsibility	
					Planning and Execution	Supervision/ Monitoring
		adequate provisions. The Contractor shall take care that the cross roads are constructed in such a sequence that construction work on the adjacent cross roads are taken up one after one so that traffic movement in any given area not get affected much.				
C.1.6	Planning for traffic diversions and detours	Temporary diversions shall be constructed with the approval of the Resident Engineer and Environmental Specialist of DSC. Detailed Traffic Control Plans shall be prepared by the Contractor and approved by Environmental Specialist and Resident Engineer of DSC seven days prior to commencement of works on any section of road. The Traffic Control Plans shall contain details of temporary diversions, traffic safety arrangements for construction under traffic, details of traffic arrangement after cessation of work each day, safety measures for night time traffic and precaution for transportation of hazardous materials and arrangement of flagmen. The contractor shall ensure that the diversion/detour is always maintained in running condition, particularly during the monsoon to avoid disruption to traffic flow. The Contractor shall also inform local community of changes to traffic routes, conditions and pedestrian access arrangements with assistance from DSC and UEAP. The temporary traffic detours shall be kept free of dust by sprinkling of water three times a day and as required under specific conditions (depending on weather conditions, construction in the settlement areas and volume of traffic).	Throughout the project corridor especially at intersections and settlements and schools	MoRTH: 112 and its Amendments	Contractor	Environmental Specialist and Resident Engineer of DSC, EO, PMU
C.2		**Procurement of Construction Material**				
C.2.1	Earth from Borrow	No borrow area shall be opened without permission	All borrow areas	MoRTH: 305.2	Contractor	Environmenta

Sl. No.	Environmental Issue	Mitigation Measures	Approximate location	Reference law/guidelines	Responsibility	
					Planning and Execution	Supervision/ Monitoring
	Areas for Construction	of the Environmental Specialist of DSC. The location, shape and size of the designated borrow areas shall be as approved by the Environmental Specialist of DSC and in accordance to the IRC recommended practice for borrow pits for road embankments (IRC: 10: 1961). The borrowing operations shall be carried out as specified in the guidelines for siting and operation of borrow areas. The unpaved surfaces used for the haulage of borrow materials, if passing through the settlement areas or habitations; shall be maintained dust free by the Contractor. Sprinkling of water shall be carried out twice a day to control dust along such roads during their period of use. During dry seasons (winter and summer) frequency of water sprinkling shall be increased in the settlement areas and Environmental Specialist of DSC shall decide the sprinkling time depending on the local requirements. Contractor shall rehabilitate the borrow areas as soon as borrowing of soil is over from a particular borrow area in accordance with the approved Borrow Area Redevelopment Plan.				l Specialist of DSC, PMU
C.2.2	Quarry Operations Crushers	The Contractor shall obtain materials from quarries only after consent of the Department of Mines and Geology and District Administration. In view of special situation of excavation of the hill ward side, Contractor shall get an opportunity to use the same material for road construction. This shall require establishment of a number of crushers along the roadsides. The crushers and all related activities shall be under taken as per the Policy guidelines for	At quarries and Crushing units.	MoRTH: 111.3	Contractor	Environmenta l Specialist of DSC, PMU

Sl. No.	Environmental Issue	Mitigation Measures	Approximate location	Reference law/guidelines	Responsibility	
					Planning and Execution	Supervision/ Monitoring
		installation of stone Crushers.				
C.2.3	Blasting	Except as may be provided in the contract or ordered or authorized by the Engineer, the Contractor shall not use explosives. Where the use of explosives is so provided or ordered or authorized, the Contractor shall comply with the requirements of the following Sub-Clauses of MoRTH 302 besides the law of the land as applicable. The Contractor shall at all times take every possible precaution and shall comply with appropriate laws and regulations relating to the importation, handling, transportation, storage and use of explosives. The contractor shall at all times when engaged in blasting operations, post sufficient warning flagmen, to the full satisfaction of the Engineer. The Contractor shall at all times make full liaison with and inform well in advance and obtain such permission as is required from all Government Authorities, public bodies and private parties whomsoever concerned or affected or likely to be concerned or affected by blasting operations. Blasting shall be carried out only with permission of the Engineer. All the statutory laws, regulations, rules etc., pertaining to acquisition, transport, storage, handling and use of explosives shall be strictly followed. Blasting shall be carried out during fixed hours (preferably during mid-day) or as permitted by the Engineer. The timing should be made known to all the people within 1000m (200m for pre-splitting) from the blasting site in all directions.	Quarry sites	MoRTH:302.4	Contractor	Environmental Specialist of DSC, PMU

Sl. No.	Environmental Issue	Mitigation Measures	Approximate location	Reference law/guidelines	Responsibility	
					Planning and Execution	Supervision/ Monitoring
C.2.4	Transporting Construction Materials and Haul Road Management	Contractor shall maintain all roads (existing or built for the project), which are used for transporting construction materials, equipment and machineries as précised. All vehicles delivering fine materials to the site shall be covered to avoid spillage of materials. All existing roads used by vehicles of the Contractor or any of his subcontractor or suppliers of materials and similarly roads, which are part of the works, shall be kept clear of all dust/mud or other extraneous materials dropped by such vehicles. Contractor shall arrange for regular water sprinkling as necessary for dust suppression of all such roads and surfaces.	All roads used for haulage of construction materials	As per IRC guidelines and contract documents	Contractor	Environmental Specialist of DSC, PMU
C.2.5	Construction Water	Contractor need to implement the finally approved contractors Construction Water Management Plan as per the guidelines provided in Appendix 11. This is linked to the contractor's work plan. Contractor shall arrange adequate supply and storage of water for the whole construction period at his own cost. The contractor shall submit a list of source/s from where water shall be used for the project to DSC and UEAP. The Contractor shall source the requirement of water preferentially by conjunctive use of Surface water and groundwater but with prior permission from the Groundwater Authority. A copy of the permission shall be submitted to DSC and UEAP prior to initiation of construction. The Contractor shall take all precaution to minimize the wastage of water in the construction process/operation.	Throughout the project corridor	Environmental. Protection Act 1986 and MoRTH Spec. for Roads and Bridges	Contractor	Environmental Specialist of DSC, PMU

Sl. No.	Environmental Issue	Mitigation Measures	Approximate location	Reference law/guidelines	Responsibility	
					Planning and Execution	Supervision/ Monitoring
C.3		**Construction Work**				
C.3.1	River training and disruption to other users of water	While working across or close to any perennial water bodies, Contractor shall not obstruct/prevent the flow of water. Construction over and close to the non-perennial streams shall be undertaken in the dry season. If construction work is expected to disrupt users of community water bodies, notice shall be served well in advance to the affected community.	Near major cross drainage structures (River crossings)	MoRTH:304.3.2	Contractor	Environmental Specialist of DSC, PMU
C.3.2	Drainage and flood control	Contractor shall ensure that no construction materials like earth, stone, or appendage disposed off in a manner that block the flow of water of any water course and cross drainage channels. Contractor shall take all necessary measures to prevent any blockage to the water flow. In addition to the design requirements, the Contractor shall take all required measures as directed by the Environmental Specialist of DSC to prevent temporary or permanent flooding of the site or any adjacent area.	Construction sites of cross drainage structures	MoRTH:305.3.7 MoRTH:306	Contractor	Environmental Specialist of DSC, PMU
C.3.3	Siltation of water bodies and degradation of water quality	The Contractor shall not excavate beds of any stream/canals/any other water body for borrowing earth for embankment construction. Contractor shall construct silt fencing at the base of the embankment construction for the entire perimeter of any water body (including springs and wells) adjacent to the project road and around the stockpiles at the construction sites including ancillary sites close to water bodies. The fencing shall be provided prior to commencement of earthwork and continue till the stabilization of the embankment slopes, on the particular sub-section of the road. Contractor shall ensure that construction materials	Construction sites of cross drainage structures	MoRTH:06	Contractor	Environmental Specialist of DSC, PMU

Sl. No.	Environmental Issue	Mitigation Measures	Approximate location	Reference law/guidelines	Responsibility	
					Planning and Execution	Supervision/ Monitoring
		containing fine particles are stored in an enclosure such that sediment-laden water does not drain into nearby watercourse.				
C.3.4	Slope protection and control of soil erosion	All temporary sedimentation control works and maintenance thereof shall be deemed as incidental to the earth work or other items of work and as such no separate payment shall be made for them. Contractor shall ensure the following aspects: ➢ After construction of road embankment, the side slopes shall be covered with grass and shrubs (refer Appendix-7 and 14) as per design specifications. ➢ Turfing works shall be taken up as soon as possible provided the season is favorable for the establishment of grass sods. Other measures of slope stabilization shall include mulching netting and seeding of batters and drains immediately on completion of earthworks. ➢ In borrow pits, the depth shall be so regulated that the sides of the excavation shall have a slope no steeper than 1 vertical to 2 horizontal, from the edge of the final section of the bank. ➢ Along sections abutting water bodies, pitching as per design specification shall protect slopes.	At bridge approaches; high embankment sections (Low lying areas) and borrow pits	MoRTH: 305.2.2.2 MoRTH: 306.2	Contractor	Environmental Specialist of DSC, PMU
C.4		**Pollution**				
C.4.1		**Water Pollution**				
C.4.1.1	Water Pollution from Construction Wastes	The Contractor shall take all precautionary measures to prevent entering of wastewater into streams, water bodies or the irrigation system during construction. Contractor shall avoid construction works close to the streams or water bodies during monsoon. Contractor shall not wash his vehicles in river water	At all surface water bodies intercepting with the project corridor	MoRTH: 111.4 MoRTH: 111.1	Contractor	Environmental Specialist of DSC, PMU

Sl. No.	Environmental Issue	Mitigation Measures	Approximate location	Reference law/guidelines	Responsibility	
					Planning and Execution	Supervision/ Monitoring
		and shall not enter riverbed for that purpose.				
C.4.1.2	Water Pollution from Fuel and Lubricants	The Contractor shall ensure that all construction vehicle parking locations, fuel/lubricants storage sites, vehicle, machinery and equipment maintenance and refueling sites shall be located at least 500 m away from rivers and irrigation canal/ponds. The Contractor shall submit all locations and layout plans of such sites prior to their establishment and shall be approved by the Environmental Specialist of DSC. Contractor shall ensure that all vehicle/machinery and equipment operation, maintenance and refueling shall be carried out in such a manner that spillage of fuels and lubricants does not contaminate the ground. Wastewater from vehicle parking, fuel storage areas, workshops, wash down and refueling areas shall be treated in an oil interceptor before discharging it on land or into surface water bodies or into other treatment system. In all, fuel storage and refueling areas, if located on agricultural land or areas supporting vegetation, the topsoil shall be stripped, stockpiled and returned after cessation of such storage. Contractor shall arrange for collection, storing and disposal of oily wastes to the pre-identified disposal sites (list to be submitted to DSC and UEAP) and approved by the Environmental Specialist of DSC. All spills and collected petroleum wastes shall be disposed off in accordance with Petroleum Rules and PCB guidelines.	At all surface water bodies intercepting with the project corridor; refueling stations and construction camps	MoRTH: 111.4 MoRTH: 111.1 (Oil Interceptors) Petroleum Act and Rules MoEFCC/CPCB Notifications	Contractor	Environmental Specialist of DSC, PMU
C.4.2	**Air Pollution**					
C.4.2.	Dust Pollution	The Contractor shall take every precaution to reduce	Construction	MoRTH:111.1	Contractor	Environmenta

Sl. No.	Environmental Issue	Mitigation Measures	Approximate location	Reference law/guidelines	Responsibility	
					Planning and Execution	Supervision/ Monitoring
1		the level of dust from construction plants, construction sites involving earthwork by sprinkling of water, encapsulation of dust source. Due to the acute water scarcity in certain areas, Contractor should limit water sprinkling once in the early morning hours. Contractor should erect warning boards on dust nuisance to the road users. The Contractor shall procure the construction plants and machinery, which shall conform to the pollution control norms specified by MoEFCC/CPCB/UEPPCB. The concentration of suspended particulate matter at a distance of 40m from a construction plant located in a cluster of industries should be less than 500 µg. The environmental monitoring is to be conducted as per the monitoring plan. Alternatively, only crushers licensed by the UEPPCB shall be used. The Environmental Specialist, EO and UEAP through the Engineer shall submit required certificates and consents.	sites and construction establishment such as batching plants, hot mix plants	MoRTH:111.5 MoRTH:111.9 MoRTH:111.10 Contract Agreement		l Specialist of DSC, EO, PMU through Engineer
C.4.2.2	Emission from Construction Vehicles, Equipment and Machineries	Contractor shall ensure that all vehicles, equipment and machinery used for construction are regularly maintained and confirm that pollution emission levels comply with the relevant statutory requirements of CPCB and/Motor Vehicles Rules. The Contractor shall submit PUC certificates for all vehicles/equipment/machinery used for the Project.	The Air (prevention and control of pollution) Act, 1981 and EPA, 1986	Annexure 'A' to MoRTH 501	Contractor	Environmental Specialist of DSC, PMU
C.4.3		**Noise Pollution**				
C.4.3.1	Noise Pollution: Noise from Vehicles, Plants and Equipments	The Contractor shall confirm the following: ➢ All Construction plants and equipment used in construction shall strictly conform to the MoEFCC/CPCB noise standards. ➢ All Vehicles and equipment used in construction	Trhough out the project corridor and other construction establishments	The noise pollution (regulation and control) rules, 2000	Contractor	Environmental Specialist of DSC, PMU

Sl. No.	Environmental Issue	Mitigation Measures	Approximate location	Reference law/guidelines	Responsibility	
					Planning and Execution	Supervision/ Monitoring
		shall be fitted with exhaust silencers. ➢ Servicing of all construction vehicles and machinery shall be done regularly and during routine servicing operations, the effectiveness of exhaust silencers shall be checked and if found defective shall be replaced. ➢ The equipment available in the market should be procured, if the Contractor plans to purchase new equipment. For the old equipment, necessary or possible alterations must be carried out to reduce the noise levels to the possible extent. ➢ Maintenance of vehicles, equipment and machinery shall be regular and up to the satisfaction of the Environmental Specialist of DSC to keep noise levels at the minimum. At the construction sites within 150 m of the nearest habitation, noisy construction work such as crushing, operation of DG sets, use of high noise generation equipment shall be stopped during the night time between 10.00 pm to 6.00 am. Working hours of the construction activities shall be restricted around educational institutions/Health Centers (silent zones) up to a distance of 100 m from the sensitive receptors i.e., School, Health Centers and Hospitals etc. Contractor shall provide noise barriers to the suggested locations of select Schools. Noise monitoring shall be carried out at the locations specified in monitoring plan by the UEAP and the Engineer through the approved monitoring agency.				
C.5		**Safety**				
C.5.1	Personnel Safety Measures for	Contractor shall provide: ➢ Protective footwear, protective goggles and nose	Throughout the project corridor	Building and other Construction	Contractor	Environmental Specialist of

Sl. No.	Environmental Issue	Mitigation Measures	Approximate location	Reference law/guidelines	Responsibility	
					Planning and Execution	Supervision/ Monitoring
	Labour	masks to the workers employed in asphalt works, concrete works, crusher etc. ➢ Welder's protective eye-shields to workers who are engaged in welding works ➢ Earplugs to workers exposed to loud noise, and workers working in crushing or compaction ➢ The Contractor shall comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches and safe means of entry and egress. The Contractor shall comply with all the precautions as required for ensuring the safety of the workmen as per the International Labour Organization (ILO) Convention No. 62 as far as those are applicable to this contract. The Contractor shall make sure that during the construction work all relevant provisions of Building and other Construction Workers (regulation of Employment and Conditions of Services) Act, 1996 are adhered to. The Contractor shall not employ any person below the age of 14 years for any work and no woman shall be employed on the work of painting with products containing lead in any form The Contractor shall also ensure that paint containing lead or lead products is used except in the form of paste or readymade paint.	and construction phase of the project	Workers (regulation of Employment and Conditions of Services) Act, 1996;		DSC, PMU
C.5.2	Traffic and Safety	The Contractor shall take all necessary measures for the safety of traffic during construction and provide erect and maintain such barricades, including signs, markings, flags, lights and flagmen as proposed in the Traffic Control Plan/Drawings and as required by	Throughout the project corridor especially at intersections and settlements	MoRTH: 112.4 MoRTH: 112.1 IRC: SP:55	Contractor	Environmental Specialist of DSC, PMU

Sl. No.	Environmental Issue	Mitigation Measures	Approximate location	Reference law/guidelines	Responsibility	
					Planning and Execution	Supervision/ Monitoring
		the Environmental Expert of DSC for the information and protection on traffic approaching or passing through the section of any existing cross roads. The Contractor shall ensure that all signs, barricades, pavement markings are provided as per the MoRTH specifications. Before taking up of construction on any section of the existing lanes of the highway, a Traffic Control Plan shall be devised and implemented to the satisfaction of the Environmental Expert of DSC.				
C.5.3	Risk from electrical equipments	The Contractor shall take all required precautions to prevent danger from electrical equipment and ensure that – ➢ No material shall be so stacked or placed as to cause danger or inconvenience to any person or the public. ➢ All necessary fencing and lights shall be provided to protect the public in construction zones. All machines to be used in the construction shall conform to the relevant Indian Standards (IS) codes, shall be free from patent defect, shall be kept in good working order, shall be regularly inspected and properly maintained as per IS provision and to the satisfaction of the Environmental Expert of DSC.	Construction sites and storage areas	The Building and Other Construction workers (Regulation of Employment and Conditions of Service) Act, 1996 and Factories Act, 1948	Contractor	Environmental Expert of SC, PIU
C.5.4	Risk force measure	Contractor shall take all reasonable precautions to prevent danger to the workers and public from fire, flood etc. resulting due to construction activities. Contractor shall make required arrangements so that in case of any mishap all necessary steps can be taken for prompt first aid treatment. Construction Safety Plan prepared by the Contractor shall identify necessary actions in the event of an emergency.	Throughout the construction phase	Contract Agreement and Annexure 'A' to MoRTH Clause 501	Contractor	Environmental Specialist of DSC, PMU

Sl. No.	Environmental Issue	Mitigation Measures	Approximate location	Reference law/guidelines	Responsibility	
					Planning and Execution	Supervision/ Monitoring
C.5.6	First Aid	The Contractor shall arrange for – A readily available first aid unit including an adequate supply of sterilized dressing materials and appliances as per the Factories Rules in every work zone. Availability of suitable transport at all times to take injured or sick person(s) to the nearest hospital. Equipment and trained nursing staff at construction camp.	Construction sites; labour camps and construction establishments	The Building and Other Construction workers (Regulation of Employment and Conditions of Service) Act, 1996	Contractor	Environmental Specialist of DSC, PMU
C.5.7	Informatory Signs and Hoardings	The Contractor shall provide, erect and maintain informatory/safety signs, hoardings written in English and local language, wherever required or as suggested by the Environmental Specialist of DSC.	Construction sites and construction establishments	MoRTH:801 MoRTH:802	Contractor	Environmental Specialist of DSC, PMU
C.6		**Flora and Fauna: Plantation/Preservation/Conservation Measures**				
C.6.1	Road side Plantation Strategy	The Contractor shall do turfing on embankment slopes, plantation of shrubs as specified in the Contract. The compensatory plantation shall be carried out by the State Forest Department. Minimum 80 percent survival rate of the saplings shall be acceptable otherwise the Contractor/Forest Department shall replace dead plants at his own cost. The Environmental Specialist of DSC shall inspect regularly the survival rate of the trees planted by the Contractor in accordance with the plantation strategy suggested.	Throughout the length of project corridor	As per the contract document and MoRTH 301.3.3	Contractor	Environmental Specialist of DSC, PMU
C.6.2	Flora and chance found Fauna	The Contractor shall take reasonable precaution to prevent his workmen or any other persons from removing and damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body and hunting of any animal. If any animal is found near the construction site at any point of time, the contractor shall immediately upon discovery	Throughout project corridor especially near forest stretches including surface water bodies		Contractor	Environmental Specialist of DSC, PMU

Sl. No.	Environmental Issue	Mitigation Measures	Approximate location	Reference law/guidelines	Responsibility	
					Planning and Execution	Supervision/ Monitoring
		thereof acquaint in the Environmental Specialist of DSC and carry out his instructions for dealing with the same. Environmental Specialist of DSC shall report to the nearby forest office (range office or divisional office) and shall take appropriate steps/measures, if required in consultation with the forest officials.				
C.6.3	Chance Found Archaeological Property	All fossils, coins, articles of value of antiquity, structures and other remains of archaeological interest discovered on the site shall be the property of the Government and shall be dealt with as per provisions of the relevant legislation. The Contractor shall take reasonable precautions to prevent his workmen or any other persons from removing and damaging any such article or thing. He shall, immediately upon discovery thereof and before removal acquaint the Environmental Specialist of DSC of such discovery and carry out the DSC's instructions for dealing with the same, waiting which all work shall be stopped. The DSC shall seek direction from the Archaeological Survey of India (ASI) before instructing the Contractor to recommence the work in the site. The Archaeological structures identified along the road sides should be protected/ preserved or enhanced as per the law.	Throughout project corridor	The Ancient Monuments and Archaeological Sites and Remains Act, 1958	Contractor	Environmental Specialist of DSC, PMU
C.7.1	Accommodation	Contractor shall follow all relevant provisions of the Building and the other Construction Workers (Regulations of Employment and Conditions of Service) Act, 1996 for construction and maintenance of labour camp. The location, layout and basic facility provision of each labour camp shall be submitted to DSC and	Labour camps	The Building and Other Construction workers (Regulation of Employment and Conditions of Service) Act, 1996	Contractor	Environmental Specialist of DSC, PMU

Sl. No.	Environmental Issue	Mitigation Measures	Approximate location	Reference law/guidelines	Responsibility	
					Planning and Execution	Supervision/ Monitoring
		UEAP prior to their construction. The Construction shall commence only upon the written approval of the Environmental Specialist of DSC. The Contractor shall maintain necessary living accommodation and ancillary facilities in functional and hygienic manner and as approved by the DSC.				
C.7.2	Potable Water	The Contractor shall construct and maintain all labour accommodation in such a fashion that uncontaminated water is available for drinking, cooking and washing. The Contractor shall also provide potable water facilities within the premises of every camp at an accessible place, as per standards set by the Building and other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996. The Contractor shall also guarantee the following: a) Supply of sufficient quantity of Potable Water (as per IS) in every workplace/labour camp (Site at suitable and easily accessible places and regular maintenance of such facilities. b) If any water storage tank is provided that shall be kept such that the bottom of the tank at least 1 m above the surrounding ground level. c) If water is drawn from any existing well, which is within 30 m proximity of any toilet, drain or other source of pollution, the well shall be disinfected before water is used for drinking. d) All such wells shall be entirely covered and provided with a trap door, which shall be dust proof and water proof. e) A reliable pump shall be fitted to each covered	Construction site, Labour camp	The Building and Other Construction workers (Regulation of Employment and Conditions of Service) Act, 1996	Contractor	Environmental Specialist of DSC, PMU

Sl. No.	Environmental Issue	Mitigation Measures	Approximate location	Reference law/guidelines	Responsibility	
					Planning and Execution	Supervision/ Monitoring
		well. The trap door shall be kept locked and opened only for cleaning or inspection, which shall be done at least once in a month. f) Analysis of water shall be done every month as per parameters prescribed in IS 10500-1991. Environmental Specialist of DSC shall be required to inspect the labour camp once in a week to ensure the compliance of the EMP				
C.7.3	Sanitation and Sewage System	The Contractor shall ensure that – ➢ The Sewage system for the camp are designed, built and operated in such a manner that no health hazards occurs and no pollution to the air, ground water or adjacent water courses take place ➢ Separate toilets/bathrooms, wherever required, Screened from those form men (marked in vernacular) are to be provided for women ➢ Adequate water supply is to be provided in all toilets and urinals ➢ Night soil can be disposed of with the help of local municipal extractor or disposed of by putting layer of it at the bottom of a permanent tank prepared for the purpose and covered with 15 cm layer of waste or refuse and then covered with a layer of earth for fortnight.	Labour camps	The Building and Other Construction workers (Regulation of Employment and Conditions of Service) Act, 1996 MoRTH:114.14	Contractor	Environmental Specialist of DSC, PMU
C.7.4	Waste Disposal	The Contractor shall provide garbage bins in the camps and ensure that these are regularly emptied and disposed off in a hygienic manner as per the Comprehensive Solid Waste Management Plan approved by the Environmental Specialist of DSC.	Labour camps	Annexure 'A' to MoRTH Clause 501	Contractor	Environmental Specialist of DSC, PMU
C.8		**Contractor's Demobilization**				

Sl. No.	Environmental Issue	Mitigation Measures	Approximate location	Reference law/guidelines	Responsibility	
					Planning and Execution	Supervision/ Monitoring
C.8.1	Environmental Conditions	The UEAP shall undertake seasonal monitoring of air, water and noise and soil quality through an approved monitoring agency. The parameters to be monitored, frequency and duration of monitoring as well as the locations to be monitored shall be as per the Monitoring Plan prepared. National Standard of Air, Noise and Water given in Appendix-2.	Representative locations as directed by Environmental Engineer, DSC.	Environmental Protection Act, 1986	Contractor	Environmental Specialist of DSC and PMU
C.8.2	Continuous Community Participation	The Environmental Specialist of DSC shall have continuous interactions with local people around the project area to ensure that the construction activities are not causing undue inconvenience to the locals residing in the vicinity of project site under construction due to noise, dust or disposal of debris etc.	Along the project corridor		Environmental Specialist of DSC	Environmental Specialist of DSC and PMU
C.8.3	Clean-up Operations, Restoration and Rehabilitation	Contractor shall prepare site restoration plans, which shall be approved by the Environmental Specialist of DSC. The clean-up and restoration operations are to be implemented by the Contractor prior to demobilization. The Contractor shall clear all temporary structures; dispose all garbage, night soils and POL (Petroleum, Oil and Lubricants) wastes as per Comprehensive Waste Management Plan and as approved by DSC. All disposal pits or trenches shall be filled in and effectively sealed off. Residual topsoil, if any shall be distributed on adjoining/proximate barren land or areas identified by the Contractor and approved by the Environmental Specialist of DSC in a layer of thickness of 75 mm – 150 mm. All construction zones and facilities including culverts, road side areas, camps, Hot Mix plant sites, Crushers, batching plant sites and any other area used/affected due to the	Throughout the project corridor	MoRTH 111.9, 111.10 and 111.11	Contractor	Environmental Specialist of DSC, PMU

Sl. No.	Environmental Issue	Mitigation Measures	Approximate location	Reference law/guidelines	Responsibility	
					Planning and Execution	Supervision/ Monitoring
		project operations shall be left clean and tidy, at the Contractor's expense, to the entire satisfaction to the Environmental Specialist of DSC.				
C.9	**Construction Activities by UEAP**					
C.9.1	Tree Plantation	The plantation at the following locations shall be implemented by the UEAP through the State Forest Department; as per Appendix-7 and 8 1. Road side 2. Enhancement sites 3. Forest land 4. Community Forestation	Throughout the project corridor	The Uttar Pradesh Protection of Trees in Rural and Hill Areas Act, 1976 and amended 1998 and 2001	State Forest Department	PMU
	OPERATION STAGE					
	Activities to be Carried Out by the UEAP					
O.1	Monitoring Operation Performance	The UEAP shall monitor the operational performance of the various mitigation/enhancement measures carried out as a part of the project. The indicators selected for monitoring include the survival rate of trees; utility of enhancement provision made under the project; status of rehabilitation of borrow areas; and effectiveness of noise barriers.	Throughout the project corridor	As per the contract document	PMU	PMU
O.2	Maintenance of Drainage	PWD shall ensure that all drains (side drains, median drain and all cross drainages) are periodically cleared especially before monsoon season to facilitate the quick passage of rainwater and avoid flooding.	Throughout the project corridor		PMU	PMU
O.3	Pollution Monitoring	The periodic monitoring of the ambient air quality, noise level, water (both ground and surface water) quality, soil quality in the selected locations as suggested in pollution monitoring plan through the UEPPCB or its approved monitoring agency.	At representative locations as per the instructions of Env. Engineer	Environmental Protection Act, 1986 and The noise pollution (regulation and control) rules, 2000	Pollution Monitoring Agency	PMU
O.4	Soil Erosion and	Visual Monitoring and inspection of soil erosion at	Borrow areas	MoRTH 305.2.2.2	PMU	PMU

Sl. No.	Environmental Issue	Mitigation Measures	Approximate location	Reference law/guidelines	Responsibility	
					Planning and Execution	Supervision/ Monitoring
	Monitoring of Borrow Areas	borrow areas, quarries (if closed and rehabilitated), embankments and other places expected to be affected, shall be carried out once in every three months as suggested in monitoring plan.	and embankment slopes	and 306.3		
O.5	Public awareness on Noise levels and Health Affects	However the public shall be advised to construct the noise barriers such as walls, double glazed windows and tree plantation between the roads and their property. The public awareness is necessary regarding the human health through the news papers and consultations and distribution of pamphlets during the operation stage.	Throughout the project corridor	Corporate Social Responsibility	PMU	PMU

Table VII-2. Performance Indicators of EMMP

Performance Indicators	**Target**	**Achievement in Semi-annually and annually**
Budget	Environmental Budget (EMMP Budget)	Expenditure till date
Performance Indicators of Monitoring Plan		
Ambient Air Quality	Total Number of samples as per Environmental Monitoring Plan	Total Number of samples collected
Noise Level	Total Number of samples as per Environmental Monitoring Plan	Total Number of samples collected
Water Quality	Total Number of samples as per Environmental Monitoring Plan	Total Number of samples collected
Soil	Total Number of samples as per Environmental Monitoring Plan	Total Number of samples collected
Safety of Workers	List of PPE as per the number labours	List of PPEs actually provided in the project
Performance Indicators of Environmental Management Plan		
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.
Public Consultation	Total Number of planned Public Consultation with timeline and coverage of people.	Number of public consultation conducted till date and actual coverage of the people.
Grievance redressal	Total number of complaints received, its timeline to response and resolution	Actual number of complaints resolved in percentage, response time.
Issues raised in public consultation	Target to attend the issues raised in the Public Consultation	Status of compliance to the issues of Public consultation
Information disclosure	List of information and locations where information to be disclosed	Actual locations where information has been disclosed.
Education of site staff on Environmental training	Total Number of staffs to be trained	No of staff actually
Capacity Building	Total number of sessions to be covered Total Number of contractors, PIUs and DSCs to be covered	Number of Sessions completed and Number of contractors, PIUs and DSCs.
Implementation of EMP mitigation Measures	All items of Environmental Management Plan with timeline	Implementation status of EMP items till date
Reporting	List and number of Report to be submitted	List and number of reports submitted

Table VII-3. Environmental monitoring for Air, Water, Noise and Soil

Attribute	Parameter	Special guidance	Standards	Frequency	Duration	Location	Implementation
Air	CO, NOx, PM10, PM2.5, Pb and SO_2	High volume sampler to be located 50m from the plant in the down wind direction. Use method specified by CPCB for 24 hr sampling	Air (prevention and control of pollution) Rules. CPCB, 1994	Once in every three months during construction and operation stage.	Two years	Construction Sites and major establishments along the subproject including base line monitored stations	Contractor (Responsible) through approved monitoring agency
Water	Please refer Appendix 2 for water quality parameters to be monitored or parameters as decided by the Environmental Specialist of the DSC	Grab sample collected from source and analyze as per standard methods for examination	IS for Inland surface waters (IS:2296,1982) and for drinking water (IS: 10500-2012)	Once in every three months during construction and operation stage.	Two years	Drinking water samples from the labour camps and from hand pumps, Surface water from the water courses along the road project.	
Noise	Noise quality as per National Ambient Noise Standards on db (A) scale	Equivalent noise levels using and integrated noise level meter kept at a distance of 15m from edge of pavement Leq in db (A) of day time and night time	MOEFCC Noise Rules 2000	Once in every three months during construction and operation stage.	Two years	Near the construction camps, working zones, sensitive receptors at major human settlements along the road.	
Soil	Monitoring of pH, Nitrogen, Phosphorus, Potassium, Sodium, Chloride, Organic Carbon and Lead	Sample of soil collected and analyzed using absorption spectrometer	Indian Standards (IS-2720)	One sample each during the pre and post monsoon for construction and operation stage.	Two years	Construction camp /plant sites, Labour camps, Batching plants and productive agricultural lands abutting traffic detours and traffic diversions and major intersections.	

*Accidental spillage of hazardous and non-hazardous substances need to be dealt with as special cases largely depends on the circumstances including state of the substance (liquid or solid)
Monitoring shall be carried out at all locations used for collection of primary data in the study.

E. Environmental Budget

190. Based upon the environmental issues identified, preliminary assessment of the project impact on the environment, EMP cost is estimated to implement the key environmental measures and environmental management and monitoring plan.

Table VII-4 Environmental Budget for internal roads in nagar panchayat Munsyari

S.No	Description	Quantity	Unit	Rate (in Rs)	Amount (in Rs)	Reponsibilty
6.A	Legislation, permits and Agreements (Consents to Establish and Operate for plants and machinery of the contractor)					These consents are to be obtained by contractor on own cost
6.B	Public consultations and information disclosure (Construction phases)		Lump sum	50,000	50,000	PIU
6.C Environmental Monitoring (Pre-construction Stage)						
1	Air Quality	6	No	6,685	40,110	DSC
2	Noise Levels	6	No	2,022	12,132	
3	Water Quality	5	No	5,157	25,785	
4	Soil	3	No	4,551	13,653	
Total Cost					**91,680**	
6.D Environmental Monitoring (Construction Stage)						
1	Air Quality	18	No	6,685	1,20,330	Contractor
2	Noise Levels	18	No	2,022	36,396	
3	Water Quality	12	No	5,157	61,884	
4	Soil	6	No	4,551	27,306	
Total Cost					**2,45,916**	
6.E Environmental Monitoring (Operation Stage)						
1	Air Quality	6	No	6,685	40,110	PIU
2	Noise Levels	6	No	2,022	12,132	
3	Water Quality	5	No	5,157	25,785	
	Soil	3	No	4,551	13,653	
Total Cost					**91,680**	
6.F	Water Sprinkling to suppress dust	150	Hrs	500	**75,000**	Contractor
Total Cost					**75,000**	
6.G Training/Workshops						
1	EMP Training at site	1		20,000	**20,000**	Contractor
	Total Cost				**20,000**	
Grand Total (A+B+C+D+E+F+G)					**5,74,276**	
G	PMC & Agency Charges @ 6% on total				**34,457**	
H	For the provision of slope protection/ landslide, Bill No..... may be referred.					
I	For the Road furnitures, Bill No. may be referred					
	Total Budgeted Cost (Total+G)				**6,08,733**	
Grand Total (in Lac)					**6.09**	

F. Grievance and redress mechanism

191. A joint social and environmental redress mechanism will be implemented under the project. Grievances and suggestions from local and affected people may come-up related to inappropriate implementation of the project and components of EMP. The expected range of grievances to be handled through this mechanism will encompass but not limited to the following:

a- nuisance from noise, dust, and temporary blocking of access;
b- contamination of receiving water from runoff;
c- emissions from increase vehicular traffic and stationary sources like hot mix plant;
d- conflict between local residents and migrant workers;
e- ownership of vegetation for clearing; and
f- Damage compensation

192. These issues will be addressed through acknowledgement, evaluation and corrective action and response approach. Grievances from public or stakeholders concerning the project and EMP implementation will be received by the concerned Executive Engineer of UEAP division.

193. The Executive Engineer shall refer the application to Construction Supervision Consultants (DSC) who then assess the grievances/suggestions and if they are found to be genuine and acceptable, will be resolved at division level itself within 15 to 30 days from the date of receipt. In case, the issue is unable to be resolved, the matter will be forwarded to the PMU, UEAP.

194. This mechanism is non-judicial in nature and does not preclude the affected people coursing their grievances to the courts. The corrective action will be started as per the action plan indicated to the stakeholder. The action taken and the outcome shall form a part of quarterly report to ADB.

VIII. CONCLUSION AND RECOMMENDATION

195. The proposed Project has been categorized as Category 'B' based on environmental screening and assessment of likely impacts of road sections. The initial environmental examination (IEE) ascertains that it is unlikely to cause any significant environmental impacts. Few impacts were identified attributable to the proposed sub-project, all of which are localized and temporary in nature and easy to mitigate.

196. All road sections proposed to be upgraded do not pass through or located nearby any national park, wildlife sanctuary, reserved forests, or any other ecologically sensitive or protected areas. No archaeological/protected monument is located in the project vicinity.

197. Potential significant environmental impacts are related to encroachments or near to historical and ecologically sensitive areas, road sections are prone to landslides, localized flooding, increase erosion, siltation, and hazardous driving conditions.

198. The beneficial impacts still outweighs the potential significant environmental impacts. Beneficial impacts include reduction in travel time and lower vehicle operating costs; better internal and external access to and from Uttarakhand; and better access to agricultural production areas, markets, religious and tourist areas. The road design is also a mitigation measure to existing road safety and accessibility issues as it addresses erosion, landslides, poor drainage, and inadequate road safety. Improved roads will also contribute to the community climate change resiliency as it can better withstand more extreme weather events allowing continued accessibility and flow of materials under such conditions

199. In general, the sub-project received immense support from local people. Majority welcomes several benefits related to better roads like facilitate transport, employment, and boost economic development. Concerns were expressed related to construction camps may put stress on local resources and the infrastructure in nearby communities.

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

Appendix- I

RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLIST

COUNTRY/PROJECT TITLE: INDIA / UTTARAKHAND EMERGENCY ASSISTANCE PROJECT (UEAP)
SECTOR DIVISION: ROAD AND HIGHWAYS
ROAD SECTION: RECONSTRUCTION OF INTERNAL ROAD OF NAGAR PANCHAYAT MUNSIYARI, IN DISTRICT PITHORAGARH (PACKAGE NO.: UEAP/PWD/C- 75)
ROAD CATEGORY: URBAN ROAD

Screening Questions	Yes	No	Remarks
A. Project siting Is the project area adjacent to or within any of the following environmentally sensitive areas?		√	The project is not adjacent to any environmental sensitive zone. The project is internal roads of Nagar Panchayat Munsiyari, connected 9 numbers of important urban roads in district Pithoragarh. Total length of the all 9 roads is 6.25 Km. Through this project would be restoration of the internal roads of Nagar Panchayat to its original shape which provides local benefits.
Cultural heritage site		√	Nil
Protected area		√	Nil
Wetland		√	Nil
Mangrove		√	Nil
Estuarine		√	Nil
Buffer zone of protected area		√	Nil
Special area for protecting biodiversity		√	Nil
B. Potential environmental impacts Will the project cause…			
Encroachment on historical/ cultural areas; disfiguration of landscape by road embankments, cuts, fills, and quarries?		√	There is no historical/cultural area coming to ROW or close to ROW. All the construction activities will be carried out within available formation width without acquiring additional land. Stone aggregates required for widening shall be brought from approved quarry sites. Existing/ Licensed quarries will be used with necessary redevelopment to avoid any disfiguration of landscape.
Encroachment on precious ecology (e.g. Sensitive or protected areas)?		√	The subproject road section is located in urban/ semi urban/other built up and opens area. No trees are affected or no encroachment on precious ecology is anticipated since all construction activities shall be limited to the available formation width only.
Alteration of surface water hydrology of waterways crossed by roads, resulting in increased sediment in streams affected by increased soil erosion at construction site?		√	The Road passes through hilly terrain. Project involves rehabilitation of badly affected sections of the existing roads and improvements of CD structures which will improve the drainage system. Permanent and Temporary anti-erosion measures will be implemented according to the detailed design.
Deterioration of surface water		√	No direct impact on surface water quality. However,

Screening Questions	Yes	No	Remarks
quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?			measure like locating camps away from water bodies and providing septic tanks & soak pits as sewage disposal facilities will be provided in the construction camp. Chemical shall be stored as per specifications. Accidental spills can be avoided through good practices.
Increased local air pollution due to rock crushing, cutting and filling works, and chemicals from asphalt processing?	√		In general most of the civil work creates some kind of air pollution in area of their influence. However, the nature and volume of work is not so voluminous so significant increase in air pollution is not expected. Appropriate measure shall be taken including conformance to Emission standards and norms, use of locally available materials (licensed quarry), scheduling the activity preferably in wet months, avoiding the use of wood as fuel for heating bitumen, hot mix plant location to be preferably on waste lands, reuse of land filling of bituminous wastes, use of dust suppressants. Haul trucks will be covered and will strictly observe speed < 30 km / hr when traversing these locations. Contractor with concerned PIU will conduct consultation during construction phase to identify other measures to control dust.
Risk and vulnerabilities related to occupational health and safety due to physical, chemical, biological and radiological, hazard during project construction and operation during project construction and operation?		√	As the volume of work is not so large but the road passes through hilly terrain where frequent landslide and slip occurs especially during monsoon season. However physical risk can be reduced by providing Personal Protection Equipments (PPE) to workers etc. Dismantling of existing structures and disposal by manual and mechanical means shall be adopted.
Noise and vibration due to blasting and other civil works?	√		Since the nature of the work is restoration, no blasting will be done. During construction, nuisance would be created due to the movement of heavy machineries like excavators, dumpers etc. Proper mitigation measures will be in place like PPEs, noise enclosures, engine maintenance schedules and standards (or use alternative fuels) shall be taken to reduce noise pollution. No work will be permitted near the Schools and Colleges during the study hours.
Dislocation or involuntary resettlement of people?		√	Not involved
Dislocation and compulsory resettlement of people living in right-of way?		√	Not involved
Disproportionate impact on the poor, women and children, Indigenous people or other vulnerable group.		√	After restoration and reconstruction of subproject road, it will improve access of marginal upland dwellers to market centers and social services.
Other social concerns relating to inconveniences in living conditions in the project areas that may trigger	√		Hauling of fill materials and spoils over unpaved road at uncontrolled speeds will increase fugitive dust emissions resulting in increase of SPM concentration

Screening Questions	Yes	No	Remarks
cases of upper respiratory problems and stress?			above standards during the construction phase. Water sprinkling to suppress the dust along built-up areas of the Project Road for twice a day (1000 hrs and 1500 hrs). Ambient Air quality monitoring will also be carried out in some of these locations during construction phase to evaluate its effectiveness of dust control measures. Trucks carrying fine material will be covered and will strictly observe speed <30 km/hr when traversing these locations. Contractor with concerned PIU will conduct consultation during construction phase to identify other measures to control dust.
Hazardous driving conditions where construction interferes with pre-existing roads?	√		Interference with pre-existing roads will mostly occur in settlement areas and when existing alignment intersects with access paths leading to individual houses. Suitable road safety measures to be incorporated in design and creating awareness amongst road users on safe driving Existing IRC 55 and MoRTH Specification for Roads & Bridges shall be followed with design of proper markers on roads for reducing such impacts. Works along with planned construction to minimize impact on road users.
Poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases from workers to local populations?		√	Being a hilly area, limited apace suitable for construction camp site are available along the alignment. Most of the level areas/Plane areas are either inhabited or farmed. Employing local labour will decrease the needed scale of the construction camps. Construction camps will be established away from any local human settlement area and preferably located on lands, which are barren/ waste lands. Construction camps will be provided with necessary health systems with provision of regular health check-ups and awareness camps for communicable diseases. The Contractor will link with existing national and state programs on HIV awareness.
Creation of temporary breeding habitats for mosquito vectors of disease?		√	Being a hilly terrain accumulation of water is not expected. However, Proper disposal of liquid effluent at camps to avoid water stagnation and creation of breeding grounds. Mosquito replant and Mosquito net will be provided to worker staying in worker camp.
Accident risks associated with increased vehicular traffic, leading to accidental spills of toxic materials and loss of life?	√		Suitable road safety measures to be incorporated in design and creating awareness amongst road users on safe driving. The transport of toxic materials during construction is not expected. During construction, bitumen will be transported and this material is considered hazardous (flammability) but not toxic. All workers handling bitumen will be given informal training on its management as provided in the material safety data sheet.

Screening Questions	Yes	No	Remarks
Increased noise and air pollution resulting from traffic volume?	√		During construction phase, the use of paver, rollers and other heavy equipment will be operated during daytime only. Near places of worship, schools, and hospitals, major sources of noise shall be confined by temporary barrier. Post construction, improved road connectivity can enhance the noise and air pollution.
Increased risk of water pollution from oil, grease and fuel spills, and other materials from vehicles using the road?		√	It will be ensured that the fuel storage and refuelling sites are kept at least 300m away from drainage channels and important water bodies Accidental spills oil/lubricant/fuel shall be avoided through good practice.
Social conflict if workers from other regions or countries are hired?		√	Local labour will be employed on priority.
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 local labour will be employed. Construction camps will be provided with necessary water supply, sanitation, storm water drainage, solid waste management etc. during the construction period and necessary provision for rehabilitation or restoration after completion of construction.
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 blasting will be required during construction. No chemicals will be used for site clearing, and the contractor is limited to manual or mechanical means to clear thorny areas. All refueling, lubrication, and equipment cleaning and maintenance will be conducted exclusively inside the construction site's designated motor pool. The area shall be paved and drained into one canal equipped with oil-water separator/grease trap. All collected grease will either be disposed to an approved site, or re-used for emergency roadside illumination during construction.
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.	√		Since the project road is hill road, landslides due to natural cause, extreme weather event or earthquake may result to injury. Affected road sections that are undergoing slides and erosions will be mitigated through stone/concrete masonries, hill side drains, weep holes, and toe protection. During operation, the PWD will advise communities and motorist of warnings during expected extreme weather events issue travel limitations or bans, when necessary. An awareness program will also be conducted to road users.

Climate Change & Disaster Risk Questions	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?		√	The sub-project road entirely located on hilly terrain. Therefore, no chances of floods, tsunami or volcanic eruptions. However, flash flood has been experienced in region. There is a possibility of landslides during rainy season and earthquakes prone zone. However, project activities are not expected to increase any of the extreme natural activities.
Could changes in temperature, precipitation, or extreme events patterns over the Project lifespan affect technical of financial sustainability, (e.g. Increased erosion or landslides could increase maintenance costs, permafrost melting of increased soil moisture content could affect sub-grade)?		√	The nature and volume of project activities will not impact significantly meteorological condition. As the restoration work is confined to existing alignment, the civil work will not cause to increase erosion or land slide activity. However, good resurfacing of road and drainage work reduces the chance of erosion. Breast wall and retaining wall is also being provided/reconstructed at affected location which will further reduce possibility of land slide and erosion.
Are there any demographic or socio-economic aspects of the Projects area that are already vulnerable (e.g. high incidence of marginalized, populations, rural-urban migrants, illegal settlements, ethnic minorities, women of children)?		√	Not likely to be. Good road network boost the economy of the region and will help to decrease migration of local people
Could the Project potentially increase the climate of disaster vulnerability of the surrounding area (e.g. by encouraging settlement in areas that will be more affected by floods in the future, or encouraging settlement in earthquake zones)?		√	The project road is already there since long time, the project work only involves restoration of existing road and in such a condition it is very unlikely to encourage the settlement of people in the project influence area.

x	Should be categorized as an A project.
√	**Should be categorized as a B project.**
x	Should be categorized as a B project in an environmentally sensitive area.
x	Should be categorized as a C project.
x	Should be categorized as an A/B project because (give reason).
x	Requires additional information for classification. Therefore, an Environment Specialist should be involved in the PPTA Fact-finding Mission. the Mission Leader should gather additional information during the PPTA Fact- finding Mission

Appendix- II

PUBLIC CONSULTATI ON RECORD
(जन–परामर्श अभिलेख)

Name of the Project	:	Uttarakhand Emergency Assistant Programme (उत्तराखण्ड आपतकालीन सहायक परियोजना)
Project Package No.	:	(UEAP/PWD/C-75)
Location to be improved (सुधार हेतु चयनित स्थल)	:	Internal roads (nine) in Nagar Panchayat, Munsyari (मुनस्यारी नगर पंचायत के अन्तर्गत विभिन्न सडकें)
Place of Public Consultation (जन–परामर्श हेतु चयनित स्थल)	:	Munsyari town market
Tehsil/ Village (तहसील / गांव)	:	Munsyari (मुनस्यारी)
District (जिला)	:	Pithoragarh (पिथौरागढ)
Date (दिनांक)	:	

List of the stakeholder/ Participant in Public Consultation
(जन सुनवाई में उपस्थित साझेदार / प्रतिभागी)

क्रम सं	Name & Address (नाम एवं पता)	Occupation (व्यवसाय)	Signature (हस्ताक्षर)
1.	Davandar Martoliya.	Shop keepar	Dwarkhya
2.	Mohan Martoliya.	"	
3.	Gopal Rawat	"	
4.	Pankaj Rawat	"	
5.	Hariesh. Rawat	"	
6.	Suresh. Rawat.	"	Suresh
7.	Rajendra Rawat	"	
8.	Sanjay Rawat	Student.	
9.	Deepak Karki	Army Man.	
5.	Ravi Dhami	Shopkeepar.	
7.	Kamal Martoliya	"	Kamal
8.	Manoj. Martoliya.	"	
9.	Kamala Dhami	Hause wife.	
10.	Mohini Martoliya	Teacher	
11	Laxmi Martoliya.	Teacher.	Laxmi
12	Ganga Rawat	House wife.	Deepa
13.	Deepa Rawat	House. wife.	
14	Hema Rawat	House wife	
15	Jaya Martoliya.	House wife.	

Appendix- III

Site & Public Counsultation Photographs


THAL-MUNSIARI
M/R
(END POINT)


APPROACH
ROAD- ANIMAL
HOSPITAL- 0.95
KM


APPROACH
ROAD POLICE
STATION 0.05
KM


APPROACH
ROAD - A.E.
RESI. - 0.100
KM


APPROACH
ROAD- ANIMAL
HOSPITAL- 0.45
KM


APPROACH
ROAD HOSPITA
CH- 25M

APPENDIX – IV

DISPOSAL SITE MANAGEMENT

SELECTION OF DISPOSAL SITES:

The locations of Disposal sites have to be selected such that:

- Disposal sites are located at least 1000 m away from sensitive locations like Settlements, Water body notified forest areas, Sanctuaries or any other sensitive locations.
- Disposal sites shall not contaminate any water sources, rivers etc so the site should be located away from water body and disposal site should be lined properly to prevent infiltration of water.
- Public perception about the location of debris disposal site has to be obtained before finalizing the location.
- Permission from the Village/local community is to be obtained for the Disposal site selected.
- Environment Engineer of DSC and Executive Engineer of Contract Management Unit must approve the Plan before commencement of work.

PRECAUTIONS TO BE ADOPTED DURING DISPOSAL OF DEBRIS / WASTE MATERIAL

The Contractor shall take the following precautions while disposing off the waste material

- During the site clearance and disposal of debris, the Contractor will take full care to ensure that public or private properties are not affected, there is no dwellings around the dumpsite and that the traffic is not interrupted.
- The Contractor will dispose off debris only to the identified places or at other places only with prior permission of Engineer-in-Charge of works.
- In the event of any spoil or debris from the sites being deposited on any adjacent land, the Contractor will immediately remove all such spoil debris and restore the affected area to its original state to the satisfaction of the Engineer-in-Charge of works.
- The Contractor will at all times ensure that the entire existing canal and drains within and adjacent to the site are kept safe and free from any debris.
- Contractor will utilize effective water sprays during the delivery and handling of materials when dust is likely to be created and to dampen stored materials during dry and windy weather.
- Materials having the potential to produce dust will not the loaded to a level higher than the side and tail boards and will be covered with a tarpaulin in good condition.
- Any diversion required for traffic during disposal of debris shall be provided with traffic control signals and barriers after the discussion with local people and with the permission of Engineer-in-Charge of works.
- During the debris disposal, Contractor will take care of surrounding features and avoid any damage to it.

While disposing debris / waste material, the Contractor will take into account the wind direction and location of settlements to ensure against any dust problems.

GUIDELINES FOR REHABILITATION OF DISPOSAL SITES

The dumpsites filled only up to the ground level could be rehabilitated as per guidelines below and to be decided by the Engineer and the supervision consultant

- The dumpsites have to be suitably rehabilitated by planting local species of shrubs and other plants. Local species of trees has also to be planted so that the landscape is coherent and is in harmony with its various components.
- In cases where a dumpsite is near to the local village community settlements, it could be converted into a play field by spreading the dump material evenly on the ground. Such playground could be made coherent with the landscape by planting trees all along the periphery of the playground.
- Some of the dumpsites could be used either for plantation or for growing agricultural produce such as ginger, turmeric or oranges etc.
- Care should always be taken to maintain the hydrological flow in the area.

Identification of Disposal Areas:

The Contractor should also try to make use of all disposal areas identified during the project preparation stage. If the road execution is approaching hilly area, rolling terrain, mountainous area or rocky area then importance should be given to screening i.e., to screen the debris into useful materials. Useful stones can be utilized as construction material and non-useful can be used as development of the public, social and cultural properties as already written above such as parking places, school playground, bus bays, ground near any temple and Mosque so that people participation can be assured in the implementation of the project. So it would be good if NGOs are introduced to perform this task more efficiently.

Disposal methods and its limitations:

There are several constraints in the disposal of materials in the identified locations. They are

- Disposal areas are uneven and irregular in shape in the hilly terrain
- Most of the disposal areas would require construction of retaining walls
- Disposal areas would require compaction
- Disposal areas would require plantation
- No overloading and should be in small trucks or dumpers
- Need to transport safely with covered trucks using tarpaulin
- Consultation with all concerned
- Written permission from all concerned
- To transport through difficult haul roads- may require maintenance

Local community Groups

At each identified debris disposal locations, it is necessary to form local community groups. Entrust the duty of the supervision and all other assistance to dumping process. Ultimately the disposed area should be compacted using road rollers.

Information display boards

The capacity of the disposal locations, name of the location etc shall be written in an information board at each identified disposal locations.

Proposed design:

Contractor needs to plan the disposal in the following way

- Identify the disposal area
- Need to photograph the present land use and condition of the area

- Consult with all stakeholders
- Get written agreement from all concerned
- Prepare a suitable design for the safe disposal
- Construct all required structures (e.g. retaining wall)
- Planting of fast growing popular trees on the outer potion of the retaining wall in the form of a linear wall parallel to the retaining wall
- Compact of the materials after disposal
- Prepare a Contractors debris disposal plan with design drawings for each identified area
- With regards to plan, there would be only one disposal plan with small changes for each location. Contractors need to get approvals for specific design for each identified disposal area.

Penalties:

Stringent action & penalties for dumping of materials in locations other than the pre-identified locations is to be worked out to avoid clandestine disposal in the midnight hours. There are several cases of dumping of material randomly in many locations.

APPENDIX – V

ENVIRONMENTAL STANDARDS

National Ambient Air Quality Standards

Pollutants	Time Weighted	Industrial Area	Residential Rural & Other	Sensitive Area[5]	Method of Measurement
Sulphur Dioxide (SO_2)	Annual*	80µg/ m^3	60µg/ m^3	15µg/ m^3	Improved West and Gaeke method
	24 hours**	120µg/ m^3	80µg/ m^3	30µg/ m^3	Ultraviolet fluoresce
Oxides of Nitrogen (NO_x)	Annual*	80µg/ m^3	60µg/ m^3	15µg/ m^3	Jacobe and Hochheiser
	24 hours**	120µg/ m^3	80µg/ m^3	30µg/ m^3	Gas phase Chemiluminescence
Carbon Monoxide (CO)	8 hours	5000µg/ m^3	2000µg/ m^3	1000µg/ m^3	Non dispersive infrared spectroscopy
	1 hour	1000µg/ m^3	4000µg/ m^3	2000µg/ m^3	
Hydrocarbon (HC)		Not Establish	Not Established	Not Establis	
Lead (Pb)	Annual*	1.0µg/ m^3	0.75µg/ m^3	0.50µg/ m^3	AAS Method 24 hours after sampling using EPM 20000 or equivalent filter paper
	24 hours**	1.5µg/ m^3	1.00µg/ m^3	0.75µg/ m^3	
Respirable Particulate (RPM)- size less than 10 µ	Annual*	120µg/ m3	60µg/ m3	50µg/ m3	
	24 hours**	150µg/ m3	100µg/ m3	75µg/ m3	
Suspended Particulate Matter (SPM)	Annual*	360µg/ m3	140µg/ m3	70µg/ m3	Average flow rate not less than 1.1cu.m/minute
	24 hours**	500µg/ m3	200µg/ m3	100µg/ m3	

* *Average Arithmetic mean of minimum 104 measurements in a year taken for a week 24 hourly at uniform interval.*

** *24 hourly/8 hourly values should meet 98 percent of the time in a year.*

Sensitive area may include:

One km around the periphery of health resorts so notified by SPCB in consultation with Department of public Health.

One km around the periphery of Biosphere Reserves, Sanctuaries and National parks so notified by MOEF.

One km around the periphery of an Archaeological Monuments declared to be national importance or otherwise so notified by ASI in consultation with SPCB.

Areas where crops sensitive to air pollution are grown, so notified by SPCB in consultation with Department of Agriculture.

One km around the periphery of tourism or pilgrimage sites due to their religious, historic, scenic or other attraction so notified by Department of Tourism of the concerned state in construction with SPCB.

Indian Standards of Drinking Water Specifications-IS 10500: 2012

S. No.	Parameters	Desirable Limit	Max. Permissible Limits in the absence of alternate source
Essential Characteristics:			
1.	Colour	5	25
2.	Odour	Unobjectionable	Unobjectionable
3.	Taste	Agreeable	Agreeable
4.	Turbidity, NTU	5	10
5.	pH Value	6.5 to 8.5	No relaxation
6.	Total Hardness (as $CaCO_3$), mg/l	300	600
7.	Iron as Fe, mg/l	0.3	1.0
8.	Chloride as Cl, mg/l	250	1000
9.	Residual free Chlorine, mg/l	0.2	-
Desirable Characteristics			
10.	Dissolved Solids, mg/l	500	2000
11.	Calcium as Ca, mg/l	75	200
12.	Copper as Cu, mg/l	0.05	1.5
13.	Manganese as Mn, mg/l	0.10	0.3
14.	Sulphate as SO_4, mg/l	200	400
15.	Nitrate as NO_3, mg/l	45	100
16.	Fluoride as F, mg/l	1.0	1.5
17.	Phenolic Compounds as C_6H_5OH, mg/l	0.001	0.002
18.	Mercury as Hg, mg/l	0.001	No relaxation
19.	Cadmium as Cd, mg/l	0.01	No relaxation
20.	Selenium as Se, mg/l	0.01	No relaxation
21.	Arsenic as As, mg/l	0.05	No relaxation
22.	Cyanide as CN, mg/l	0.05	No relaxation
23.	Lead as Pb, mg/l	0.05	No relaxation
24.	Zinc as Zn, mg/l	5.0	15.0

25.	Anionic detergent as MBAS, mg/l	0.2	1.0
26.	Chromium as Cr^{6+}, mg/l	0.05	No relaxation
27.	Polynuclear aromatic hydro carbon as PAH, g/l	-	-
28.	Mineral Oil, mg/l	0.01	0.03
29.	Pesticide, mg/l	Absent	0.001
30.	Radioactive materials: i. Alpha Emitters, Bq/l ii. Beta Emitters, Bq/l	 - -	 0.1 1.0
31.	Alkalinity, mg/l	200	600
32.	Aluminum as Al, mg/l	0.03	0.2
33.	Boron, mg/l	1.0	5.0

Source: Indian Standard Drinking water Specification- IS 10500: 2012

Noise Level Standards

Category	Noise level for Day Time Leq dB (A)	Noise level for Night Time dB (A)
Industrial area	75	70
Commercial area	65	55
Residential area	55	45
Silence Zone	50	40

Note:
Day Time- 6.00 am –10.00 pm (16 hours)
Night Time- 10.00 pm –6.00 am (8 hours)

Silence Zone*: The silence zone includes a radius of 100 m around premises where loud noise is prohibited (including hospitals and educational institutions)*
Source: CPCB, 1989, GOI.

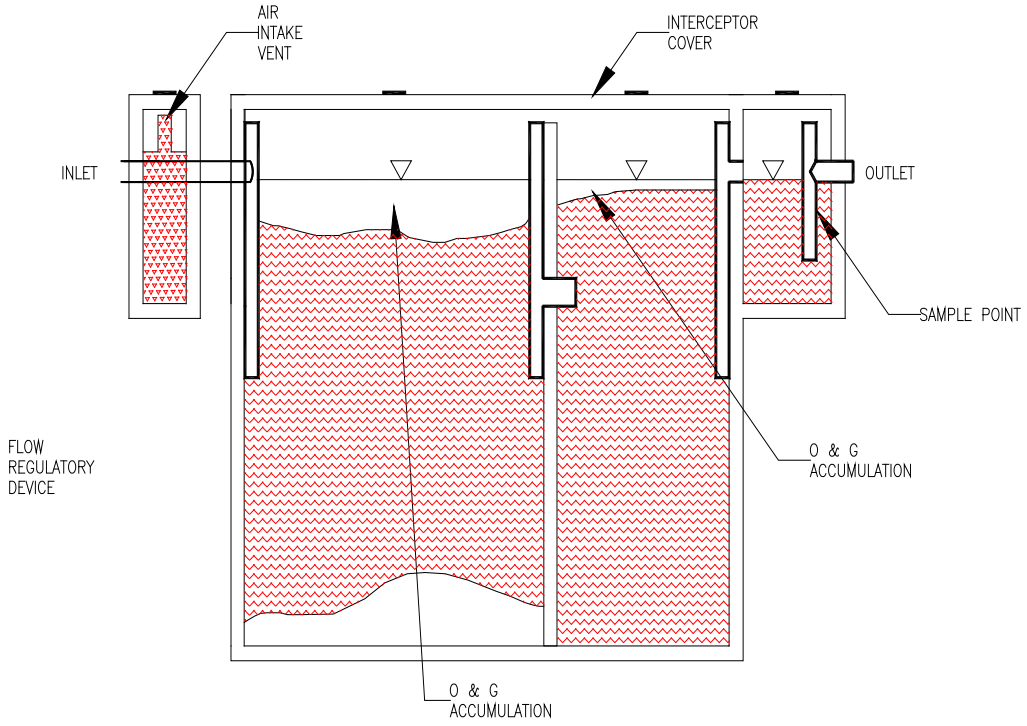
a. Standards for Suspended Particulate Matter for Stone Crushing Unit

The suspended particulate matter measured between 3 to 10 meters from any process equipment of a stone crushing unit shall not exceed 600 $\mu g/m^3$

(Source: EPA Notification [G.S.R. 742(E) dt. 30th Aug; 1990] & [S.O. 8(E) dt. Dec. 31, 1990)

APPENDIX - VI

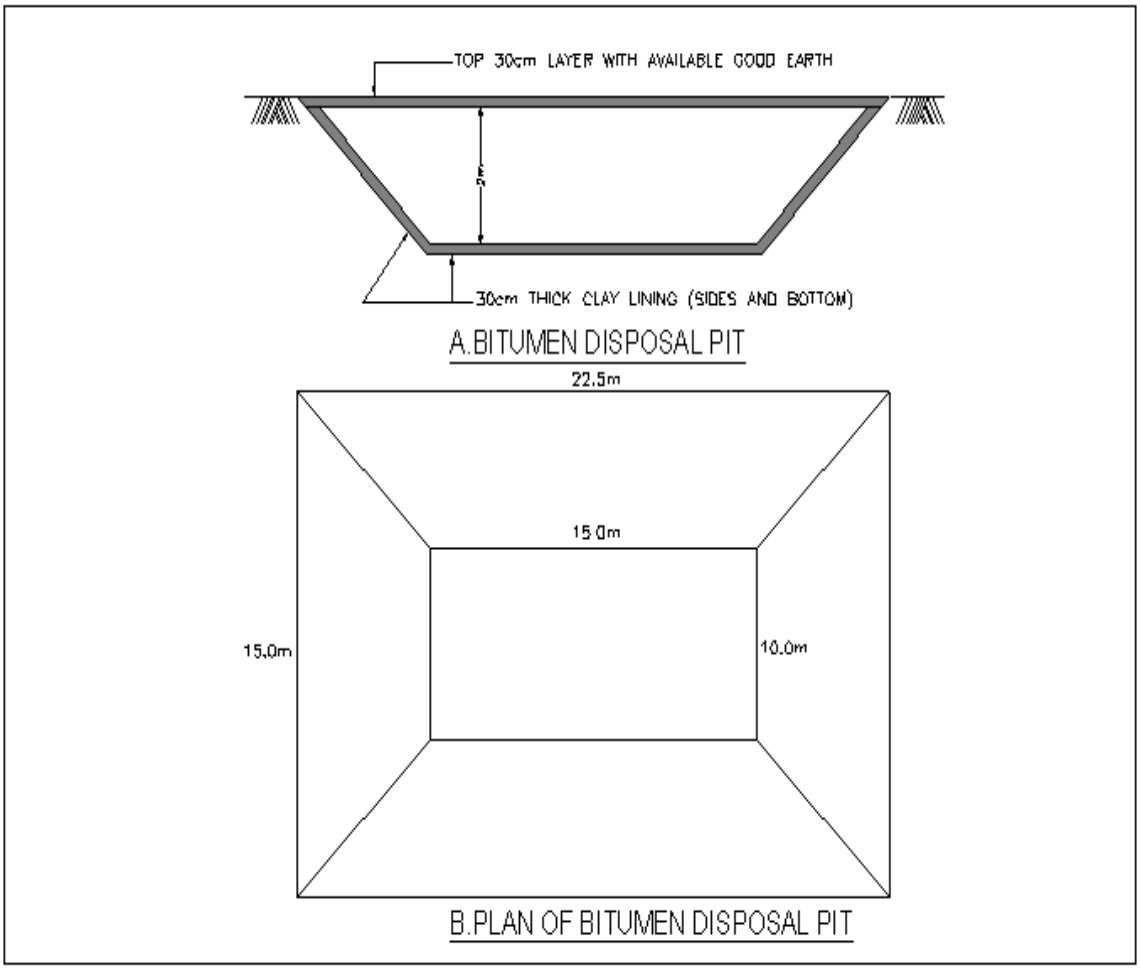
OIL INTERCEPTORS



Location of Oil Interceptors has been considered such that each construction camp having refueling stations, oil and lubricants storage places will have one oil interceptor to stop & separate the floating oils. However the number of interceptors shall be increased as the situation demands or during the accidental spillages with the consent of Environmental Engineer of Construction Supervision Consultants. Provision has been made to provide one oil interceptor for each construction campsite in the EMP BoQ.

APPENDIX – VII

TYPICAL BITUMEN DISPOSAL PIT



APPENDIX – VIII

WORKERS SAFETY IN COMMON OPERATION AND DURING CONSTRUCTIONS

HOUSE KEEPING PRACTICES

1. Maintain washrooms and canteens clean
2. Keep all walkways clear and unobstructed at all times
3. Ensure that no spillages of oil and grease occurs in the construction camp
4. Stack raw materials and finished products clear of walkways or out of roads
5. Do not leave tools on the floor or in any location where they can be easily dislodged
6. Keep windows and light fittings clean
7. Maintain the workplace floors dry and in a non-slippery condition
8. Provide and maintain proper drainage system to prevent stagnant water.
9. Use metal bins for oily and greasy rags and store all flammable materials in appropriate bins, racks or cabinets. Ensure that the meal bins for storing oily and grease rags should be covered with lids.
10. Ensure that protruding nails in boards or walls are removed or bent over so that they do not constitute an hazard to people
11. Make sure that hazardous/dangerous chemicals are kept in the stores with the appropriate labeling, display of the material-safety-data-sheet (MSDS) and other precautionary measures
12. Display 'no smoking' signs in areas with high fire risks such as paint stores, wood working areas, etc.

SAFE LAYOUT IN THE CONSTRUCTION PLANT, CAMP AND QUARRY AREAS

1) Arrange perimeter fencing for construction plant
2) Ensure good visibility and safe access at site entrances
3) Provide adequate warning signs at the entrance and exit and where ever necessary
4) Provide adequate space/area for loading, unloading and storage of materials, plant and machinery
5) Display emergency procedure and statutory notices at conspicuous locations
6) Consider provision of welfare facilities required
7) Provide areas for dumping garbage and other waste materials, and also arrange their regular clearance and safe disposal
8) Arrange storage, transport and use of fuel, other flammable materials and explosives in lines with the license requirements to be obtained from appropriate authorities
9) Plan emergency assembly points, fire escape routes and location of fire-fighting equipment
10) Provide access roads and plant movement areas within the site.
11) Ensure the availability of first aid facilities and display notices to show the location of these facilities
12) Provide proper drainage and sewage facilities

TREE FELLING

- Use hard hats during tree felling works
- Ensure that tools such as axes are in good condition
- Determine proper foot and body position while using the axe
- Wear appropriate foot protection while felling trees
- Carry a first aid kit to the site
- Determine possible hazards in the area, with reference to electrical or telephone or other utility lines
- Determine the safest direction for the tree fall prior to felling
- Determine the proper hinge size before directing the tree fall.

NOISE HAZARDS AND ITS CONTROL

1) Observe the indications of noise levels

2) Use sound level meters to measure. If the sound level exceeds 85 dB(A), then preventive and protective measures should be taken
3) Make personnel aware of noisy areas by using suitable warning signs and insisting that ear protective devices should necessarily be worn.
4) Reduce noise at source by improved maintenance, replacing noisy machines, screening with noise absorbing material, making changes to the process/equipment, controlling machine speeds, ensuring that two noise-generating machines are not running at the same time, using cutting oils and hydraulic breakers.
5) Appoint a competent person to carryout a detailed noise assessment in the site, designate ear protection zone, and give instructions on the necessary precautionary measures to be observed by site personnel, including the use of suitable type of ear protections.
6) Wear and maintain ear muffs and ear plugs as required
7) In construction or repair works, noise should be kept to a low-level bearing in mind the disturbance to local residents.

ROAD WORKS

1) The use of signage is most important to caution the road users of possible unsafe conditions due to the road works.
2) Use appropriate signage devices as required by the site conditions/situation. The devices include regulatory signs, delineators, barricades, cones, pavement markings, lanterns and traffic control lights.
3) While using signs, make sure that they are (i) simple, easy-to-understand and convey only one message, (ii) luminescent and with reflective properties and (iii) prominent and of appropriate size.
4) While using barricades, make sure that you keep traffic away form work areas and you guide the drivers to keep along a safe and alternative path.
5) Ensure that proper personal protective equipment (PPE) is provided to all the workers.
6) Cover existing road signs and install new ones at appropriate locations taking into account the distances that would be required and reaction times.
7) Plan layout and traffic management so that hazards do not occur.
8) Deploy flagmen to control traffic at the work areas. The flag should be 600mm x 600mm fastened to a 1m length staff.
9) Flagmen should wear reflective safety vests along with hard hats.
10) If required, use wireless devices for flagmen to co-ordinate form either ends of the road, where works are being carried out.

ELECTRICAL HAZARDS IN CONSTRUCTION AREAS

1) Treat all wires as live wires
2) Never touch dangling wires but report them to the manager
3) Unless you are a qualified electrician do not attempt electrical repairs
4) Never use electrical equipments if your hands are wet or you are standing in water
5) If electrical equipment is sparking or smoking, turn the power off and report the condition to the supervisor
6) Never use electrical wires having physical damage
7) Never allow equipment or traffic to run over the electrical wires.

USE AND STORAGE OF GAS/LPG

1) Store filled gas/LPG cylinder in an open area or outside the building
2) Transport, store, use and secure cylinders in upright position
3) Ensure proper ventilation at the ground level where the gas/LPG is in use
4) Avoid physical damage to the cylinder
5) Never weld or cut on or near the cylinder
6) Store empty cylinders secured and in upright position.
7) Make sure that the cylinder is closed immediately after use.
8) Investigate immediately if there is thea smell of LPG or gas.

9) Never use destenched gas/LPG on site.
10) Make sure that there is no fire in the vicinity of the cylinder.

OPERATION OF EXCAVATORS

1) Ensure that excavators are operated by authorized persons who have adequately trained.
2) Prevent unauthorized movement or use of excavators
3) Check regularly and maintain the machine thoroughly
4) Ensure that all relevant information, including those related to instruction, training, supervision and safe system of work are provided to the operators.
5) Ensure that the operation and maintenance manuals, manufacturer's specifications, inspection and maintenance log books are provided for the use of machines to service engineers or other safety personnel during periodic maintenance, inspection and examination.
6) During tipping or running along the trenches, excavators must be provided with stop blocks.
7) Excavators must be rested on firm ground during operation.
8) Avoid operating the machine too close to an overhand, deep ditch or slope.
9) Locate and identify underground utility services by checking with all utility companies before the excavations.
10) Ensure that all excavations are supervised by experienced and competent persons.
11) When reversing or in case the operator's view is restricted, adequate supervision and signaling should be provided.
12) Ensure that the type and capacity of the excavator are properly chosen for the intended purposes and site conditions. Never use a machine for any purposes other than it is designed for.
13) Check and report for excessive wear and any breakage of the bucket, blade, edge, tooth and other working tools of the excavator.
14) Check that all linkages/hinges are properly lubricated and ensure that the linkage pins are secured. Never use the improper linkage pins.
15) Never get down or climb a moving machine
16) Ensure adequate ventilation and lighting in the working place.
17) Ensure that the protective front screen of the driving cabin is fixed in position during excavations to avoid eye injury to the operator.
18) Ensure to switch-off the unattended vehicle.

OPERATION OF TRUCKS AND DUMPERS

1) Ensure that only trained, authorized and licensed drivers operate the vehicles.
2) Provide the help of another worker before reversing the vehicle.
3) Switch-off the engine of an unattended vehicle.
4) Lower the tipping bodies when the machine is unattended, but if it is necessary to leave them in the raised position they should be blocked to prevent their fall.
5) Wear safety boots or shoes to avoid injuries during loading and unloading.
6) Carryout periodic servicing to the manufacturer's requirements. All records of maintenance and repairs should be in writing and kept in the site.
7) Keep the vehicle tidy and its cabin free from tools and materials which might obstruct the controls.
8) Do not exceed speed limits.
9) No passenger should be carried on a dumper except the driver
10) Never drive the vehicle across a slope
11) Provide stop blocks when the vehicle is tipping into or running towards excavations
12) Do not overload the vehicle.
13) Carry only well secured loads.
14) Park only on level ground, in neutral with the parking brake applied.
15) Never climb or get down from a moving vehicle.

GAS WELDING

1) Use the following personal protective equipment during welding
    - Face or hand shield fitted with filters,
    - Goggles, particularly while chipping slag,
    - Gloves long enough to protect wrists and forearms against heats, molten metal and radiation,
    - High-top boots to prevent sparks from burning foot.
2) Screen the work area with sturdy opaque or translucent materials as glare can cause eye injury.
3) Key for opening the acetylene cylinder valve must be kept ready while the cylinder is in use so that the cylinder valve may be immediately shut-off in an emergency.
4) Ventilate the workplace using air blowers and exhaust fans to remove poisonous fumes and gases that are being used during welding
5) Take precautions against flying spark and hot slag where welding is being done near flammable materials and check the area before leaving.
6) Do not weld the material degreased with solvents until it is completely dry.
7) Do not use gas cylinders for supporting work or as rollers.
8) Do not use oil/grease on oxygen cylinder fittings.
9) Do not use cylinders with damaged valves.
10) Do not use too much force if valves are stuck.
11) Replace valve caps after use
12) Search for leaks in equipment by using a solution of soap water.
13) Shut the cylinder valve if acetylene from a cylinder catches fire at the valve or regulator due to leakage at a connection.
14) Treat all gas cylinders as “full” unless you are sure otherwise.
15) Never attempt to transfer acetylene from one cylinder to another or attempt to refill an acetylene cylinder.
16) Keep portable fire extinguishers near the welding area
17) Secure all cylinders against accidental displacement.
18) Always lift gas cylinders. Do not slide them along the ground or drop them from trucks.
19) Keep gas cylinders in vertical position both in store and when it is in use.
20) Keep the work place dry, secure, free from combustible materials and obstruction.
21) Store the acetylene and oxygen cylinders separately and in a proper store.
22) Keep the gas cylinders away from source of heat, flammable materials, corrosive chemicals and fumes.

MANUAL HANDLING AND LIFTING

1) Use mechanical equipment in place of manual handling as far as possible.
2) Assess the manpower required to handle or lift the load safely and arrange the manpower accordingly.
3) While handling hazardous materials, the workers shall be informed of the hazards and safety precautions.
4) All relevant persons shall be trained on proper methods of lifting and carrying.
5) Where team work is required, select the persons whose ages and physical builds are compatible for teaming up. Coordinate the actions of the team members by giving necessary instructions.
6) Always lighten or suitably shape the load for manual handling. As far as possible keep a look for splinters, sharp edges, loose banding and nails.
7) Clear path or obstruction and tripping hazards.
8) Stack and secure goods safely on trucks, otherwise they fall off and injure passers-by.
9) Use personal protective equipment such as gloves, safety shoes, etc.
10) Adopt the following procedure when you lift a load.
    Stand close to the object, have a firm footing with feet spread on either side of the road.
    Bend the knees and keep your back as straight as you can.
    Grasp object firmly & be sure grip will not slip

Breathe in and throw the shoulder back wards.
Straighten the legs, continuing to keep the back as straight as you can.
Hold the object firmly & close to the body
Always lift smoothly, avoid jerky motions and turn with feet instead of twisting the back.

FIRST AID

1) Provide first aid boxes at every site.
2) Ensure that training on the use of first aid box is provided to a handful of staff working in the site.
3) Display the list of persons who are trained on providing first aid.
4) Ensure that every first aid box is marked plainly "First Aid" in English and local language.
5) The responsible person or first aider should replenish the contents of the first aid box as necessary.

PERSONAL PROTECTIVE EQUIPMENT

List of personal protective equipment (PPE)

Sl. No.	Part of the body	Personal protective Equipment
1	Eye	Safety glasses, Goggles
2	Face	Face shields
3	Nose	Nose masks
4	Head	Helmets
5	Feet	Safety shoes
6	Hands and Arms	Gloves
7	Body	Vests
8	Hearing	Earplugs, Earmuffs

Cost of Personal Protective Equipment (PPE):

Cost of Personal Protective Equipment per person per project has been considered based on the assumption that one person/labour requires two set of PPE till the completion of the project. Cost per set of PPE is taken as Rs. 750 on an average for EMP BoQ estimate. So cost / person / project will be Rs. 1500.00

General:

1) Ensure that sufficient personal protective equipment are provided and that they are readily available for every person who may need to use them.
2) The management should ensure that all persons make full and proper use of the personal protective equipment provided.
3) Provide instruction and training on the proper use and care of protective equipment.
4) Do not willfully misuse, interfere with or ill-treat any protective clothing and equipment provided.
5) Ensure that the personal protective equipments are in good condition. Report immediately any damage to the management for replacement. Always keep the personal protective equipment as clean as possible.

Eye Protection

1) Issue eye protection equipment where there is a foreseeable risk of eye injury.
2) Ensure an adequate supply of goggles/shields is available.
3) Keep the goggles clean and make sure they fit well.
4) Do not watch welding operations unless your eyes are protected.

Head Protection

1) No person shall enter a construction site unless he is wearing a suitable safety helmet
2) Wear a safety helmet:
    - When there is the risk of being hit by falling objects
    - While on or near a construction site
    - During adverse weather conditions

- When in any area designated as a “hard hat” area.

3) Provide identification labels to all helmets in some way to prevent random exchange among wearers, with one helmet exclusive to each person.
4) Inspect helmets for cracks, sign of impact or rough treatment before each usage and replace defective or damaged helmets.

Hearing Protection

1) Provide ear plugs or ear muffs as required. Use re-usable ear plugs when the reduction required (15-25 dB (A) is not excessive. Use ear muffs where a large attenuation of up to 40 dB (A) is demanded.
2) Do not use dry cotton wool for hearing protection because it cannot provide protection.
3) Provide disposable ear plugs for infrequent visitors and ensure that they are never re-used.
4) Provide re-usable ear plugs for those who need to work continuously for a long period in a high noise area.
5) Use ear muffs with replaceable ear cushions because they deteriorate with age or may be damaged in use.
6) Avoid wearing spectacles with ear muffs.
7) Use soap and water or the recommended solvent for cleaning ear muffs.
8) Provide ear muffs for those who may need to get in and out of a high noise area frequently.

RESPITATORY PROTECTIVE EQUIPMENT

1) Wear suitable respirable mask for protection against small particles entering the lungs, e.g. while emptying of cement bags.
2) Provide training to all persons using the respirators for their correct fitting, use, limitations and symptoms of exposure.
3) Clean and inspect all respirators before and after use.
4) Store respirators properly when it is not in use.

Safety Footwear

1) Wear suitable footwear while working.
2) Use safety footwear on site or in dangerous areas.
3) Wear suitable safety shoes or ankle boots when working where there is a high risk of foot injuries from slippery or uneven ground, etc.
4) All Safety footwear including safety shoes, ankle boots and rubber boots should be fitted with steel toecaps.
5) Avoid wearing flip flops, high heeled shoes, slippers, light sport shoes in situations where there is a risk of foot injury.
6) Keep shoe lace knots tight.

Hand Protection

1) Wear suitable gloves for activities such as welding & cutting and manual handling of materials & equipment.
2) Do not wear gloves where there is a risk of them becoming entangled in moving parts of machinery.
3) Wash hands properly with disinfectant soap before eating & drinking. Wash hands immediately after each operation on site & when the situation warrants.

FIRE PREVENTION, FIGHTING AND EQUIPMENT

Before fire breaks out

1) Store flammable material in proper areas having adequate fire protection systems.
2) Display sufficient warning signs.
3) Train selected personnel to use these fire extinguishers.
4) Inspect fire extinguishers regularly and replace as necessary.

5) Fire escape route should be kept clear at all times and clearly indicated.
6) Know the escape route and assembly point.
7) Display escape route maps prominently at prominent places.
8) Carryout fire drill regularly. Designate fire Officers.
9) Install fire alarm wherever required and test regularly.
10) Provide sufficient exit signs at prominent locations for directing people to the escape route.

When fire breaks out

1) Alert all persons.
2) Put off the fire with appropriate fire extinguishers when you are sure that you are safe to do so.
3) Escape if you are in danger through the fire escape route to assembly point.
4) Fire officers should carryout head count at the assembly point.

GUIDELINES FOR WORKERS SAFETY DURING CONSTRUCTION

Sl. no.	Stage and Nature of construction Hazard	Safety measures expected to be taken by the contractors and site Engineers
1	Excavation in soft, loose & slushy soil above 2m depths sliding of earth or collapsing of sides.	The Excavation beyond 1.5m to 2m to be done in steps of minimum 500mm offsets and also planking and strutting should be done.
2	Excavation in slippery area (water logged) - the labour may fall or machinery on site may slip.	Try to dewater the area and spread minimum 150mm thick sand layer to avoid slipping
3	Excavation in rock where chiseling involved – The fall of hammer may injure the hand, small rock pieces may injure the eyes and legs.	For hammer work, only experienced and skilled labour should be employed. Chisel should not be allowed to be held by hand, while hammering but chisel holding clamp should be provided. The labour should be provided with goggles and leg cover to protect eyes and legs, from injuries due to small rock pieces.
4	Excavation in Rock where blasting is involved – careless handling may lead to injury to worker or a passerby.	The work of blasting should be entrusted to only experienced persons. Provide sufficient length of fuse to give ample margin of time from the time of lighting to the time of explosion. A danger zone at least 180m diameter is to be flagged off 10 minutes before actual firing. All workmen should be sent way from danger zone except the firing man, who should be provided with a whistle.
5	Excavation for drain across road or manhole adjacent to a road – chances of a passer by falling into the excavated portion.	The area should be well barricaded & a red lamp provided at night. A watchman should be deputed to prevent any movement of persons or vehicles.
6	Centring and scaffolding – formwork collapse while concreting or just before concreting or just before concreting especially when wooden ballies are used.	Many a times ballies joined together give way due to weak joint. Hence the use of joined ballies should be restricted. Only 2 joined ballies out of 8 ballies should be allowed. Incase of double staging for a slab at a height, utmost care should be taken to see that the top balli rests on the bottom balli. Particular care that should be taken during each concreting, operating of slabs and beams is that one carpenter and two helpers with spare ballies, nails etc. should be deputed below the slab/beam that is being concreted to watch any disturbance in the supports of the form-work below, during concreting and in case of any doubt

Sl. no.	Stage and Nature of construction Hazard	Safety measures expected to be taken by the contractors and site Engineers
		concreting should be stopped immediately and the form work to be strengthened. Never allow bricks below a balli to make up the required height. This is most dangerous.
7	Form- work for beams and slabs – opening the form – work accident due to fall of materials during removing the forms.	In fact, this is a most dangerous work. One should be very careful while formwork is removed. Only trained carpenters should be deputed for the work. A safe resting place outside the area of slab as a temporary measure should be constructed from where the slab can be removed safely. Removal of form-work during night should not be permitted under any circumstances.
8	Scaffolding – Fall of work–man, supervision staff, standing on challis not tied properly or toed only at one end. (Challis mainly made of Bamboos)	This is a very common negligence on the part of labour who do scaffolding work. The Challis on which they work either span over its complete length or is tied loosely and many a times at one end only. Hence, care must be taken that the challis do not span over the full length but some middle support should be provided and also the same is tied properly on both ends.
9	Ladders - Balli or bamboo ladders – The horizontal member breaks and the person falls. Some times the top face just rests on wall and the whole ladder tilts causing an accident.	The ladders should be strong enough to bear the weight of a labour with materials on head. As for as possible a hand rail should be provided at one end. The horizontal member should be preferably fixed with bolt & nuts or strong nails. When the ladder is placed across a wall the top portion should be tied firmly to a strong support so that the ladder does not move laterally.
10	Dismantling – Dismantled materials may fall on passer by or the person engaged in dismantling work may fall due to slipping. The dismantled materials may fall on persons working below.	When work of demolition is to be taken up the area should be closed for all outsiders. No one should be allowed up to 50m from the place of demolition. The workers engaged in demolition should be asked to wear safety belts. Helmets must be worn by all the workers engaged in dismantling work. The place should be strictly guarded at night with red lights at prominent places, and watchman should be posted.
11	Electrical connections/ cables etc., - HT / LT electric wire passing near the slab structure – while bending, lifting or tying reinforcements the bar benders may sustain the electric shock, causing fatal injury.	The work in such places should not be allowed to the workers themselves, but in such position the work must be executed under the strict supervision of a responsible Foreman or a Supervisor.
12	Electric- connections/cables, etc., - cables below ground may get punctured during excavation & thus electrocute the labour working. Similarly when connecting is in progress the punctured cable may prone to be fatal to the labour.	Before taking up the work all available drawings should be studied, local enquiry to be made to know the position of cables and work in such area should be got executed under strict supervision of an experienced Foreman or a supervisor.
13	Electric connections/cables etc.,- Temporary Electric lines near damp walls, near joinery stretched on a considerable length – There is every chance that the wire may get cut due to usage and may develop short	The Electric wires should be maintained by an electrician who should regularly check up the insulation of wires especially placed near steel items & damp areas. The temporary wiring should be supported

Sl. no.	Stage and Nature of construction Hazard	Safety measures expected to be taken by the contractors and site Engineers
	circuits/leakages etc., and may electrocute the person touching the wire accidentally.	properly. As far as possible a good quality wire should be used which may not get damaged easily.
14	Electric and gas welding work – Drilling, polishing work – Done by temporary cables used on a number of works – Due to the fact that the wires are old & when they come in contact with water even in the process of curing the surrounding area may get affected due to leakage in the electric current thus causing damage to the workers & supervision staff.	All wiring works to be inspected by experienced electrician. All wires to be properly insulated and fixed at height on temporary poles. No welding work should be permitted near damp area. The welders to be provided with welder's goggles & gloves. As far as possible machine in good condition should be used.
15	Construction machinery – Concrete mixers – Safety precautions. A mixer with hopper tried to be operated by an helper could not release brake in time thus causing injury to the person near hopper – some times fatal one.	The Mixers with hopper should be operated by an experienced mixer operator and such mixers should not be allowed to be handled by a helper or a labour.
16	Water storage Tank for general use & curing - chances of children of workers falling in the tank with fatal accident.	The water tanks constructed on site should be protected by at least 1.0m high walls on four sides, so that the children do not fall.
17	Site cleaning – Cleaning top floors of buildings – Upper portion of any structure – throwing waste materials broken concrete pieces, brick bats, sand etc., straightway fro top to ground injuring person below or even a passerby.	This dangerous practice should not be allowed at all. The materials should be brought to the ground with the help of lift or the use of rope over pulley with a bucket, thus bringing down materials safely.
18	Bar bending work – Helpers of bar benders to follow short cut method, throw surplus steel pieces from top floors to ground and may cause fatal injuries.	This is a very bad practice. The helpers should bring the rods to ground with help of lift or rope & pulley.

APPENDIX –IX

TREE PLANTATION STRATEGY

1. Introduction

This is the most common impact of any road-widening project. If the location of the project road is in dry areas, the degree of impact is more than in a wet area where the trees can be planted and grown easily. In the case of Uttarakhand thick vegetation exists in the Project Implementation Area.

The scopes for tree planting along roads sides is good and also there are many isolated patches of unutilized land along the project road. A typical plantation scheme proposed for two lane road in plains with shoulders at the rate of 200 plants per km length.

Avenue Plantation:

It is proposed to plant 100 trees per kilometer on each side of the trees. The number of trees proposed to be planted (Avenue plantation) along the road length on both sides of the road is given as follows.

Median Plantation:

No median plantation is suggested as there is no proposed cross section having median.

2. Purpose of tree plantation

The objectives of planting trees and shrubs at selected enhancement sites against the felled trees are as follows.

- To reduce the impacts of air and dust pollution and act as a natural filter to traffic emissions
- To provide shade for the traffic as well as the pedestrians
- To reduce the impact of vehicular noise caused by vehicles
- To arrest soil erosion on slopes
- Beautification of sites by planting selective ornamental shrubs, landscaping and turfing with grasses.
- Planting trees on the roadsides is to produce a softer greener landscape.
- To act as a natural filter to the traffic emissions

3. Impacted Trees

3.1 Public owned trees

These are trees within the legal ROW of project road within the control of PWD.

All these trees with in the forest reserves are also termed as public trees. However the procedure for cutting of these trees is different from the normal trees within the PWD ROW.

3.2 Private owned trees

The number of private owned trees to be acquired outside the right of way will be high compared to the public trees within the right of way. The private trees that will be affected during widening and improvement will be subjected to compensation at the appropriate market rates. In addition to this the project will plant two trees for every tree removed as a compensatory tree planting measure irrespective of the size, species etc.

4. Selection of trees species

The selection of the plants for greenery development is to be made as per the following criteria;

- Plants should be fast growing & have dense canopy cover
- Preferably tropical to temperate species with large leaf area index
- Indigenous species
- Species resistant to air pollutants and
- Should help to maintain the ecological and hydrological balance of the region

The plant species that are selected based on the climatic condition, soil characteristics and conditions of the area. The row closest to the main carriage way will be of shade plants. Similarly, subsequent rows will comprise of ornamental and flowering species. Mainly native deciduous species, which retain their foliage longest, with high crown forms, resistant to fungus and insects with rapid growth rate are selected for avenues. Lists of the species recommended as shade plants and most recommended trees for planting along the roadsides are provided in the following table.

Table: Trees recommended for planting

Sl. No.	Main Species
1	Banyan
2	Pipal
3	Arjun
4	Mango
5	Jamun
6	Tamarind
7	Jakranda
8	Neem
9	Kheia
10	Peakcock tree
11	Gulmour
12	Jack Fruit

5. Compensatory Tree plantation programme

All trees are cut and removed will be accountable as per the Forest laws and efforts will be maintained to plant minimum of two times the number of trees cut according to this tree plantation strategy.

Indigenous species of trees recommended above are most suited for the tree plantations. In order to make it tourist friendly and beautiful same types of trees would be planted in the same location so that for every Kilometer the trees would change to new species.

6. Tree planting during construction

6.1 Tree planting along the roadsides

Tree plantation will be the responsibility of the Forest department. Necessary budget has been allocated in the EMP.

6.2 Tree planting along Oxbow lands

In some areas, the improvement of roads will result in the formation of ‘oxbow lands’ all along the roads due to suitable curve improvements and realignments. The oxbow lands are the existing roads where the road realignments are proposed. This is similar to the Oxbow Lakes formed during the evolution of rivers hence the name for easier identification for environmental management. The importance of the proper management of these oxbow lands is there for an unavoidable outcome of the project. Tree planting all along these oxbow

lands could be very useful for the environmental enhancement of the region. This will help positively for tourism industry. The oxbow lands along the corridors are available as described in the Environmental management plan for individual corridors.

7 Protection Measures

The protection measures are as follows.

7.1 Barbed wire Fencing

Barbed wire fencing around the plantation area will be provided to protect the plants. Iron Angles will be fixed at a spacing of 5m with 3-stand stretched barbed wire.

7.2 Precautionary Measures

- Plantation will be made in the monsoon months (July-August)
- The height of the plants should not be less than 30 cm and should be supplied in polythene bags which are not to be removed until the moment of planting
- All plants supplied must be planted within three days of removal from the nursery
- Arrangements must be made to water in case of insufficient rains after planting
- Provide compost/manure suggested quantity for each pit before plantation

7.2.1 Shrubs

Prior to planting it is suggested to remove all loose debris, fill up with good soil and level the area. To ensure better growth and survival of grasses and shrubs, the surface should have sufficient layer of good quality soil (up to 45 cm). Shrubs which are suggested for the roadside and open area spaces where available should be selected from the following and agreed with the Environmental Specialist of the construction supervision consultants.

Shrubs:

1	Bougainville
2	*Nerium odorum* ait
3	*Carissa spinarum*
4	*Capparis decidua*
5	*Capparis zeylanica*
6	*Zizyphus nummularia*
7	*Artemisia species*
8	*Xanthium strumarium*
9	*Cassia tora*
10	*Capsicum fruitescens*
11	*Tabernaemontana coronaria*
12	*Achyranthes aspera*

The contractor will be responsible for planting of shrubs at enhancement sites and along bridge approaches during construction phase.

7.2.2 Turfing with grasses

The contractor will be responsible for turfing at enhancement sites and along bridge approaches during construction phase.

The cost for the turfing along the bridge approaches and high embankments are part of the civil construction contract.

Grass lines are used to provide a strong surface cover at the slope but it also needs a well – prepared surface. If grass is to be effective, then it must be allowed to establish property on a slope, which is not subject to undue stress from erosion and mass movement in its stages. To ensure this the following measures are suggested for the grass turfing.

- A cover of 25 grams of grass seeds per Sq. m of surface will be prepared.
- Bed will be prepared in June. The seed sowing must be carried out before the onset of monsoon so that they yield desired results. Till the onset of the monsoon, watering of the surface to be done by tankers with controlled flow sprinklers.
- After sowing, mulch of prepared and dried out herbs will be laid over the whole seeded area in a thin layer so that the direct sunlight and transpiration loss may not affect the grasses
- The grass species recommended for median are khabbal, Dhaula, Palwan, Sariala and Kahi.

Contractor will ensure that the condition of the site is good enough for the successful establishment of grasses and quality of grass seeds used.

8 Tree plantation costs

The plantation cost has been included in the bill of quantity (BOQ) under the non-civil contracts and provided in section EMP BoQ

A tree- planting strategy is being developed which will meet all compensatory tree planting that will be cut during the improvement of the roads including private trees. The cost provisions have been included in the EMP BOQ.

9 Maintenance of trees planted

The trees planted once will be maintained at least for a period of six years.

A programme of compensatory afforestation has been proposed, not only to replace the trees, which are cut to accommodate road widening and improvements in geometric design, but also to upgrade the condition of adjacent areas. Trees will be replanted at a rate of two for each one removed depending upon the location.

Tree felling in other sites such as borrow areas – shall be accommodated by the contractor in the borrow area management plan.

APPENDIX – X

ENHANCEMENT MEASURES

Enhance measures include

- Plantation of trees along the length of the proposed roads wherever enough space available within RoW.
- Enhancement by tree planting along the oxbow land and the other left over portions of the original PWD land.
- Cultural property enhancement as a part of the cultural property rehabilitation plan.
- Public amenities such as bus lay byes (new), rain shelters (in addition to the compensatory rain shelters for the impacted ones), comfort stations (toilets) and parking areas.
- To improve the water table in this region recharge pits are constructed wherever feasible along the project road.
- Median plantation in urban location.
- Pond and catchment area improvements to protect ground water and harvest rain water
- Information boards for the tourists, pilgrimage and other important structures of importance.

List of Enhancement sites:

a) Archaeological sites

None identified along this road.

b) Valley view location

None identified along this project road.

c) Proposed Bus bays & Parking areas

As the work is to

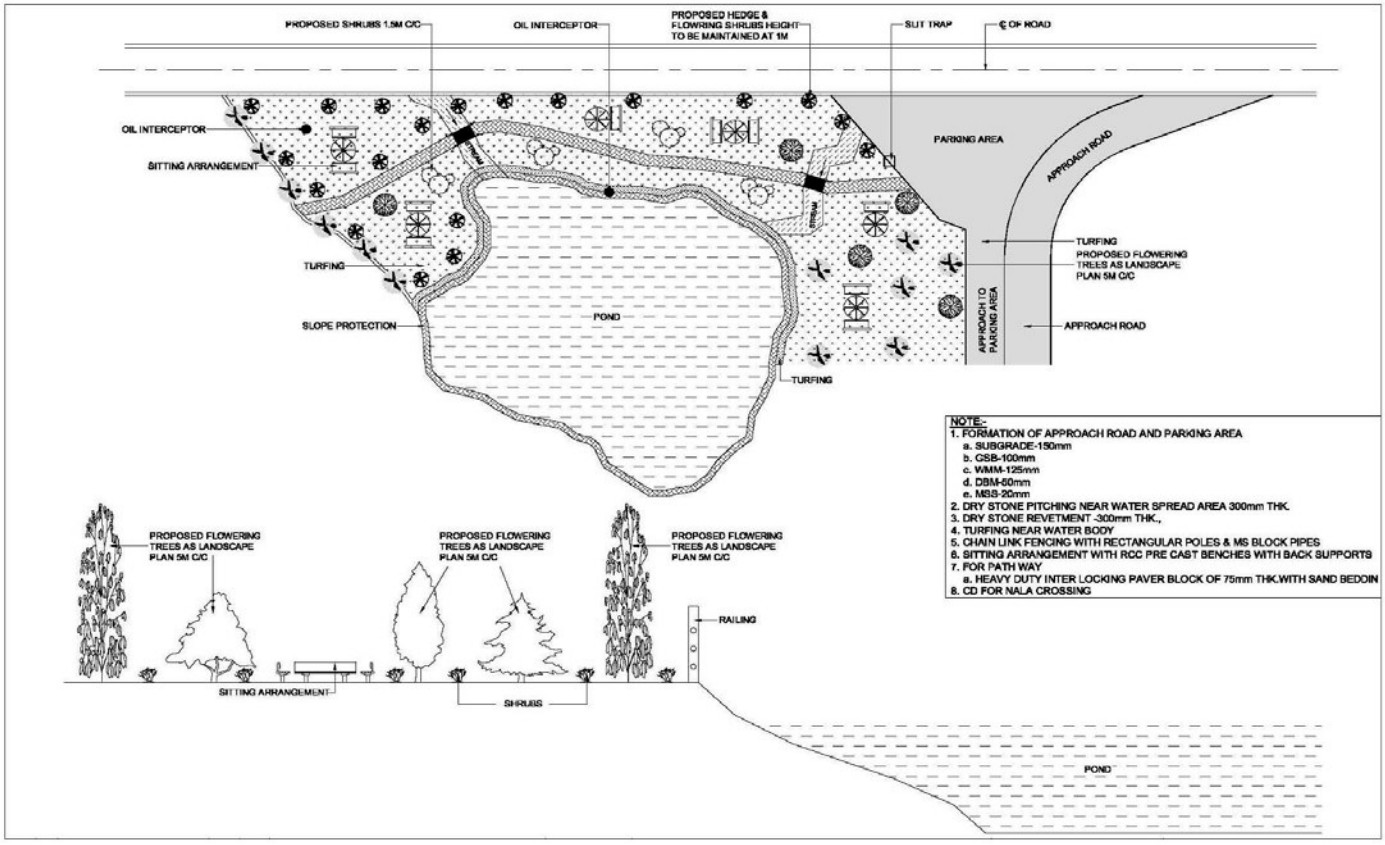
d) Pond enhancement

There are many streams and rivers along the project road. The typical pond/water body enhancement drawing is given below

e) Oxbow land and other left over land

There are oxbow land spaces at realignment locations along the proposed road and where ever width of CoI is less than width of the RoW, the space available along the sides of the project road can be utilized for tree plantation.

TYPICAL DRAWING FOR POND ENHANCEMENT



APPENDIX –XI

GUIDELINES FOR THE MANAGEMENT OF ROAD SECTION THROUGH FOREST AREAS

1. Introduction

A Management plan for the impacted or adjacent forest area is required for mitigation and enhancement measures during construction and operational phases of the project road. This will not allow any room for neglecting /avoiding of the implementable measures. This will also define responsibilities of various institutions in this regard. This requirement is the basis of the preparation of this document. The document addresses the issues relating to the forest areas in the PIAs as well as immediately adjacent to the project road. The mitigation measures are to be addressed during the design, construction and operational phases of the project.

Incorporation of effective mitigation measures is therefore necessary and important. This will be based on the recommendations of the biodiversity studies.

2. Status of the work relating to the up-gradation

The actual construction work cannot be started until all environmental clearances are obtained. The environmental clearance also includes forest clearance basically for the required land from forest reserves. Application for both clearances has to be routed through two different agencies viz., PCB and State Forest Department.

3. Impact mitigation and Enhancement measures

This includes the legal requirement according to the (1) GoI Forest laws and (2) the requirement according to the other laws.

4. Compensatory Afforestation Programme

Compensatory afforestation will be carried out against the loss of trees for road project. According to the affforestation programme PWD shall plant thrice the number cut for the project. Preferably this amount will be deposited with forest Department.

In addition, a number of impact mitigation and enhancement measures are required for the Forest area that will be impacted. The Forest reserves adjacent to the project road do have high faunal value.

1) Considering this aspect, the project will not provide demarcation of the forest boundary with the Project road, as it will be a barrier for the wildlife movement.

2) PWD is committed to compensate plant trees according to the compensatory afforestation programme required according to the Forest conservation Act 1980

3) Further, contractors have to set-up construction camps and plants (Hot mix, WMM plant etc) at least 5 Km away from the forest boundary. In this regard;

- Adequate training will be provided to contractors
- The labour force will not allowed to enter forest reserves for the purpose of hunting, fuel wood collection, nuts and fruits collection etc.,]
- The debris and waste materials shall not be dumped inside / immediately outside forest areas and other water sources.
- Debris shall be disposed off according to the contractors debris disposal plan

- The source of construction water shall not be from the forest areas or immediately adjacent (within 2 km) to the forest areas.
- The construction work within the forest stretches should adhere to all international environmental standards as laid out by the environmental management plan under the GoI/GoU/ADB rules, regulation and policies.

During construction, the following measures will be taken in to consideration for effective implementation

- No construction camps or other polluting plants within 5 Km of the forest reserves.
- No blasting shall be allowed during nighttime.
- Blasting should be silent blasting along the forest reserves.
- Blasting shall be confined to a particular time only. Best time would be 2-3 pm in daytime.
- Hunting is strictly prohibited.
- No cutting of trees from the forest reserves for any purpose relating to the construction work nor shall the people associated with the project construction should enter the forest reserves other than any legal requirements.
- Contractor should erect appropriate signboards during construction.
- After construction, the DSC/PWD should advice the locations for erecting the signboards including advance signboards notifying the forest reserves.
- Immediately after construction fencing should be carried out parallel to the Forest reserves.
- Any sign/indication of forest fire will be immediately notified to all considered agencies

Immediately after construction, the contractors shall erect signboards and information boards close to the forest boundaries according to the Environmental Management plan (EMP) prepared.

During operational period erection of sign/ information boards will be required. With regards to institutional responsibilities the PWD and Forest Department need to coordinate the various requirements.

- PWD– Maintenance of the road furniture, signboards, information boards
- State Forest Department – to coordinate with the PWD for various roadside arrangements change in the status of the forest
- To facilitate Contractor do his job of construction

NGO Participation

Participation of NGO may be useful for the smooth implementation of the project.

APPENDIX – XII

ARRANGEMENT FOR TRAFFIC DURING CONSTRUCTION

The Contractor shall at all times carry out work on the road in manner creating least interference to the flow of traffic with the satisfactory execution. For all works involving improvements to the existing state highway, the Contractor shall, in accordance with the directives of the DSC, provide and maintain, during execution of the work, a passage for traffic either along a part of the existing carriageway under improvement, or along a temporary diversion constructed close to the state highway. The Contractor shall take prior approval of the DSC regarding traffic arrangements during construction.

1. TRAFFIC SAFETY AND CONTROL

(i) Where subject to the approval of the Engineer the execution of the works requires temporary closure of road traffic use, the Contractor shall provide and maintain temporary traffic diversions. The diversions shall generally consist of 200 mm thickness of gravel 4.5 meters wide laid directly upon natural ground and where any additional earthworks are required for this purpose that will be provided under the appropriate payment items.

(ii) Where the execution of the works requires single-lane operation on public road, the Contractor shall provide and maintain all necessary barriers, warning signs and traffic control signals to the approval of the Engineer.

(iii) With the exception of temporary traffic arrangements or diversions required within the first 4 weeks of the Contract, the Contractor shall submit details of his proposals to the Engineer for approval no less than 4 weeks prior to the temporary arrangement or diversion being required. Details of temporary arrangements or diversions for approval as soon possible after the date of the Letter of Acceptance.

(iv) The colour, configuration, size and location of all traffic signs shall be in accordance with the code of practice for road sign. In the absence of any detail or for any missing details, the signs shall be provided as directed by the Engineer (DSC).

(v) The Contractor shall take all necessary measures for the safety of traffic during construction and provide, erect and maintain such barricades, including signs, marking, flags, lights and flagmen as may be required by the Engineer for the formation and protection of traffic approaching or passing through the section of the road under improvement. Before taking up any construction, an agreed phased programme for the diversion of traffic or closer of traffic on the road shall be drawn up in consultation with the SE.

(vi) At the points where traffic is to deviate form its normal path (whether on temporary diversion or part width of the Carriageway) the lane width path for traffic shall be clearly marked with the aid of pavement markings, painted drums or a similar device to the directions of the SE. At night, the passage shall be delineated with lanterns or other suitable light source.

(vii) One-way traffic operation shall be established whenever the traffic is to be passed over part of the carriageway inadequate for two-lane traffic. This shall be done with the help of temporary traffic signals or flagmen kept positioned on opposite sides during all hours. For regulation of traffic, the flagmen shall be equipped with red and green flags and lanterns/lights.

(viii) On both sides, suitable regulatory / warnings signs as approved by the SE shall be installed for the guidance of road users. On each approach, at least two signs shall be put up, one close to the point where transition of carriageway begins and the other 120 m away. The signs shall be of design and of reflectory type, if so directed by SE.

(ix) Upon completion of the works for which the temporary traffic arrangements or diversions have been made, the Contractor shall remove all temporary installations and signs and reinstate all affected roads and other structures or installations to the conditions that existed before the work started, as directed by the Engineer.

2. MAINTENACE OF DIVERSIONS AND TRAFFIC CONTROL DEVICES

Signs, lights, barriers and other traffic control devices, as well as the riding surface of diversion shall be maintained in a satisfactory condition till such time they are required as directed by the SE. The temporary traveled way shall be kept free of dust by frequent applications of water, if necessary.

Examples of some good practice in traffic control safety during construction

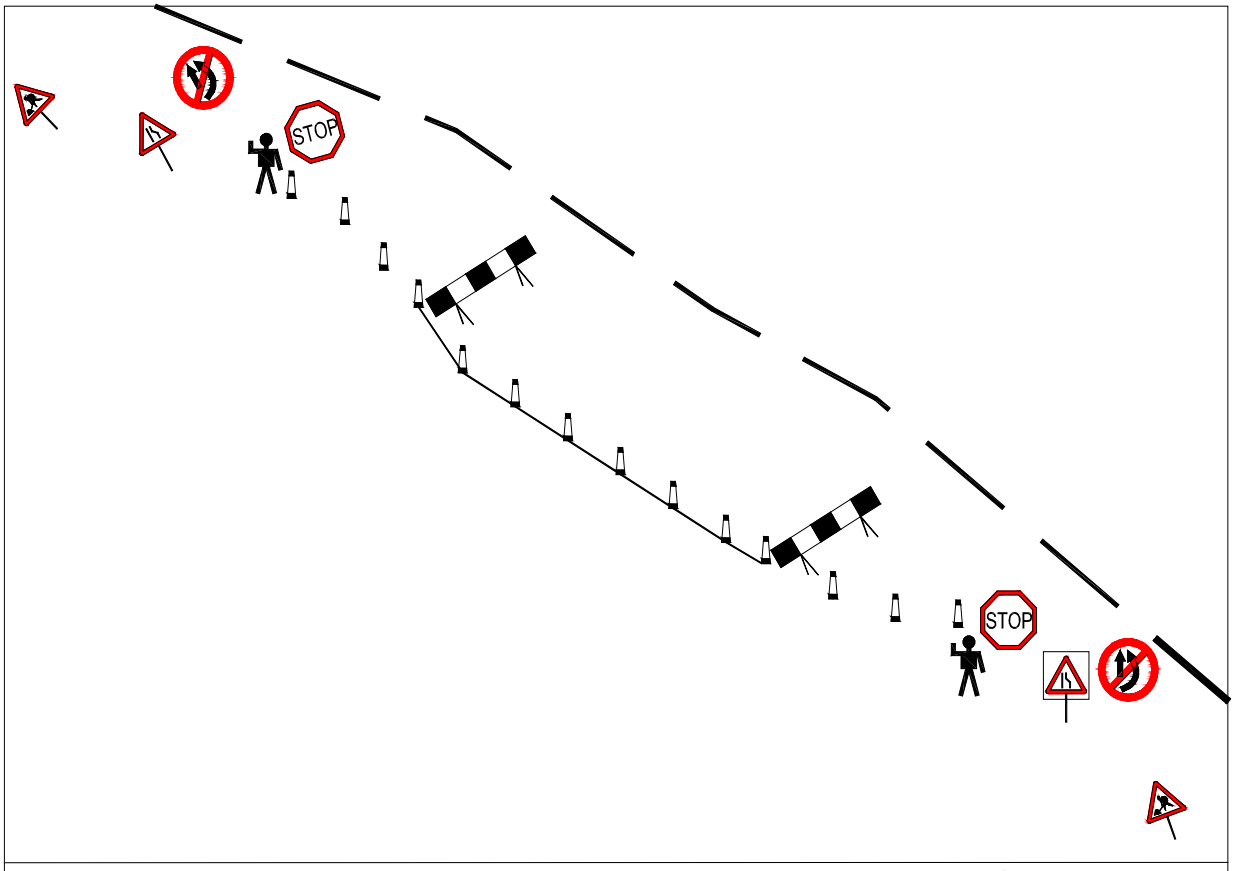


Figure-1 : Diversion of Traffic on Half of the Road Width (Say Left)

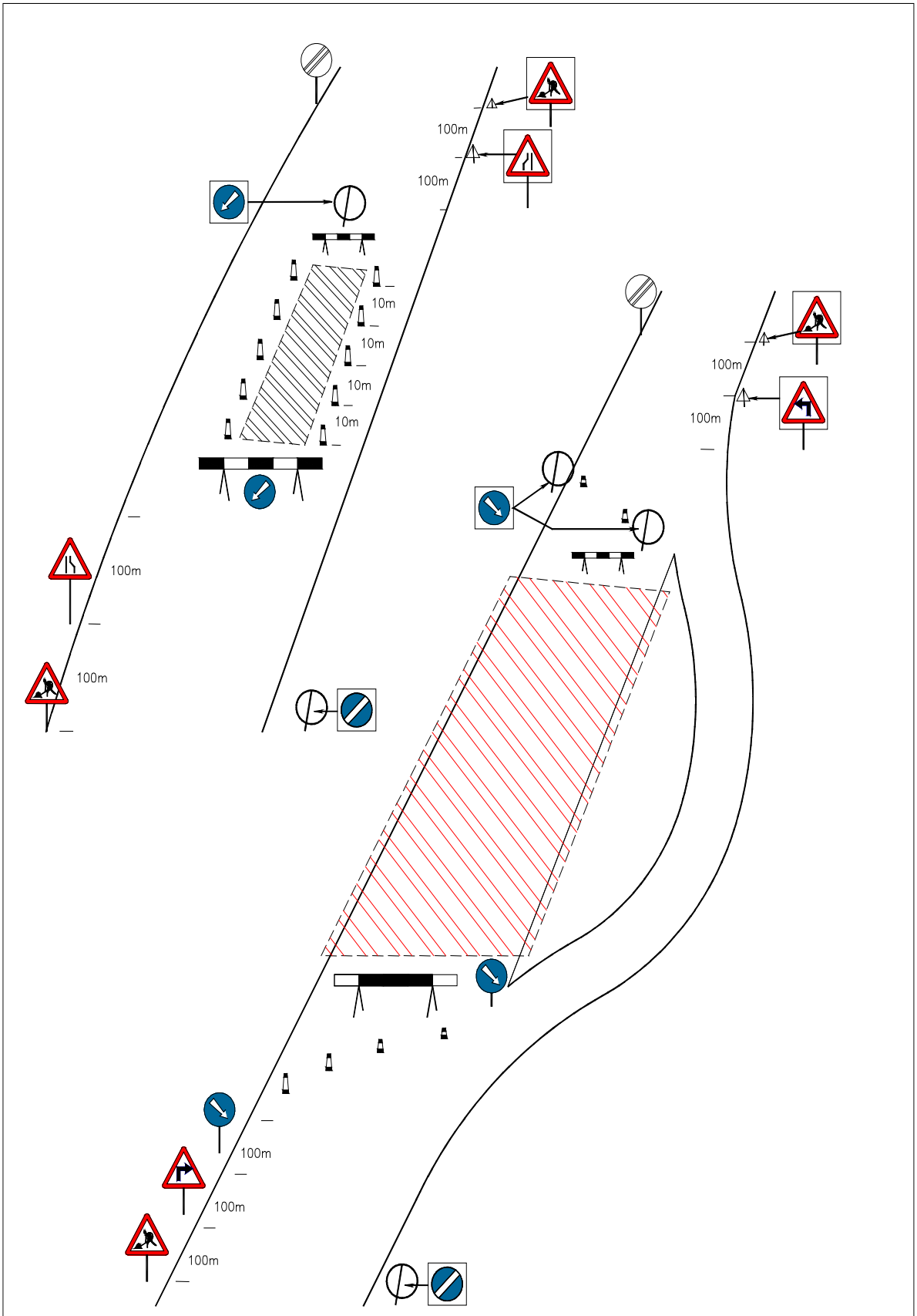


Figure : 2

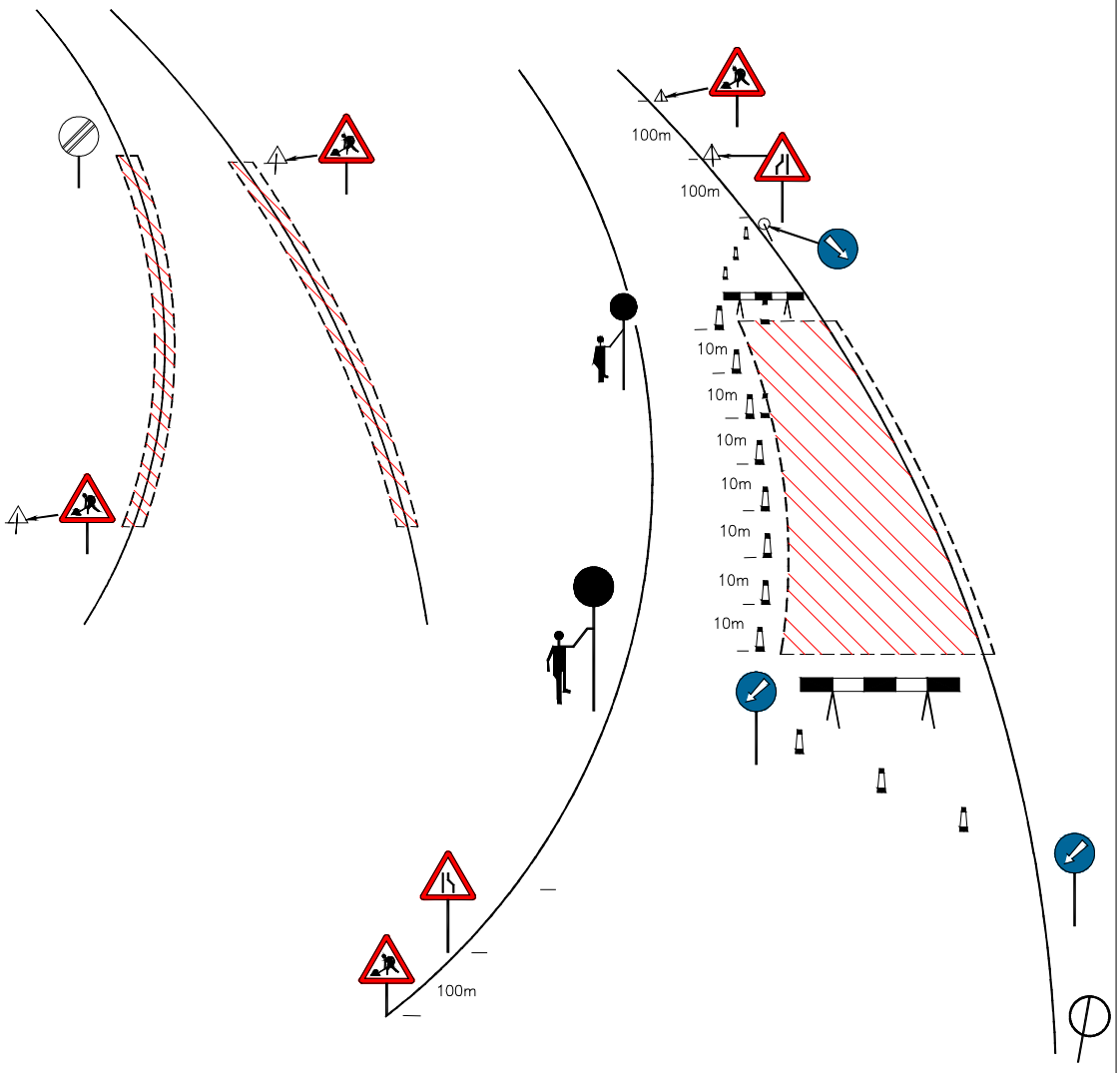


Figure : 3

SIGN LAYOUT FOR LANE CLOSURE

(Drawn for Driving on Left)

List of Traffic safety Signs/Equipment (Guideline)

Sl. No.	Signs
1	Barricading
2	Men at work
3	Keep Left
4	Go slow
5	Flag men
6	Narrow signs
7	Lantern(Amber Blinker)
8	Traffic control Lights
9	Cones

Note:

- Safety jackets and helmets should be provided to all the workers/ Engineers working on the road.
- Fixed mobile solid barricades must be placed between the workmen and traffic or pedestrian and traffic.
- All the safety signs should be according to IRC: 67 and IRC: SP: 55: 2001

APPENDIX – XIII

GENERAL GUIDELINES FOR CONTRACTOR'S CONSTRUCTION WATER MANAGEMENT PLAN

Dos and Don'ts for the contractor

There are a number of dos and don'ts for the contractor as provided below

- Contractor's vehicles shall not be allowed to wash in the river or stream. This is to avoid potential pollution from oil residues.
- Contractors shall not use water from the community drinking water sources such as;
  - Public water supply schemes
  - Community spring water sources
  - Community hand pumps
  - Community bore wells / shallow tube wells
  - Location of the streams from which the Community takes drinking water
- Contractor shall obtain all legal approvals and clearances from the concerned departments.
- Contractor shall consult the local communities where the water source has been identified.
- If the source is a spring – check discharge, dependency in consultation with local communities.
- If the source is river/stream- discharge data for the past several years need to be analyzed, whether source is perennial, or non-perennial, any irrigation scheme is running over it or not, if IPH* department is using it, or local people are using it or not. NOC* from all concerned authorities will be required.
- If the source is Major River - In addition to the local permission, Contractor may require obtaining written permission from State level authorities at Dehradun.
- If the sources is groundwater (a hand pump/bore well or open deep well)- then its chemical composition and water related tests are required to be obtained from the competent authority and an NOC* is obtained from the competent authority.

Post Construction Stage

Once the Contractor finishes his job, this can be handed over to the local panchayath or for local communities. The possible alternate uses of this structure would be

- Local communities of this area can use the same source to meet their water needs
- If road passes through a plain water scarcity prone area and if no nearby water source has been identified, transportation is uneconomic, then contractor should go for Underground water option. If it is feasible and will not lead to a serious depletion of the ground water.

*IPH = Irrigation and Public Health Department.
*NOC = No Objection Certificate.

APPENDIX – XIV

ENVIRONMENT FRIENDLY CONSTRUCTION METHODOLOGY

The contractor shall be deemed to have acquainted himself with the requirements of all the current statutes, ordinances, by laws, rules and regulations or their instruments having the force of law including without limitation those relating to protection of the environment, health and safety, important of labour, demolition of houses, protection of environment and procurement, transportation, storage and use of explosives etc.

PROTECTION OF ENVIRONMENT:

i) The contractor will take all necessary measures and precautions and ensure that the execution of the works and all associated operations on site or offsite are carried out in conformity with statutory and regulatory environmental requirements including those prescribed in EMP.

ii) The Contractor will take all measures and precautions to avoid any nuisance or disturbance to inhabitants arising from the execution of works.

iii) All liquid waste products arising on the sites will be collected and disposed of at a location on or off the sites and in a manner that will not cause either nuisance or pollution.

iv) The contractor will at all time ensure that all existing water courses and drains within and adjacent to the site are kept safe and free from any contamination.

v) The contractor will submit details of his temporary drainage work system (including all surface channels, sediment traps, washbasins and discharge pits) to the DSC and CMU for approval prior to commencing work on its construction.

vi) The contractor will arrange all the equipment in good condition to minimize dust, gaseous or other air-borne emissions and carry out the works in such a manner as to minimize adverse impact on air.

vii) Any vehicle with an open load-carrying area used for transporting potentially dust-producing material will have properly fitted side and tailboards. Materials having the potential to produce dust will not be loaded to a level higher than the side and tail boards and will be covered with a clean tarpaulin in good condition.

viii) The contractor will take all necessary measures to ensure that the operation of all mechanical equipment and condition processes on and off the site will not cause any unnecessary or excessive noise, taking into account applicable environmental requirements.

ix) The contractor will take necessary measures to maintain all plant and equipment in good condition.

x) Where the execution of the works requires single –lane operation on public road the contractor will provide and maintain temporary traffic diversions subject to the approval of the DSC.

xi) Where the execution of the works requires single-line operation on public road the contractor will provide and maintain all necessary barriers, warning signs and traffic control signals to the satisfaction of the DSC.

xii) Wherever traffic diversions, warning signs, traffic control signals and barriers are required, the contractor will install them to the satisfaction of DSC prior to commencing the work, in that area.

xiii) Contractor shall install asphalt plants and other machineries away from the populated areas as per laid down regulations.

xiv) Permit for felling of trees will be obtained from the forest department before the execution of any work.

xv) Trees and plants going to be uprooted will be duly compensated and maintained up to 3 years.

xvi) Mist sprays should be provided at appropriate places for preventing dust pollution during handling and stockpiling of stones and loose earth.

xvii) Overburden waste dumps shall be sprayed with water, as they are the major source of air borne particulate matter.

xviii) Overburden waste dumps shall be reclaimed / afforested to bind the loose soil and to prevent soil erosion. The frequency of sprinkling should be fixed as per the seasonal requirement and in consultation with engineer.

xix) Regular water spraying on haulage roads during transportation of construction materials by water sprinklers. The frequency of sprinkling should be fixed as per the seasonal requirements in consultation with engineer.

xx) Transfer point for transporting construction material shall be provided with appropriate hoods/ chutes to prevent dust emissions.

xxi) Dumping of construction material should be from an optimum height (preferably not too high), So as to reduce the dust blow.

xxii) Innovative approaches of using improved machinery designs, with in-built mechanism to operator's cabin.

xxiii) Procurement of drillers, loaders, dumpers and other equipment with noise proof system in operator's cabin.

xxiv) Confining the equipment with heavy noise emissions in soundproof cabins, so that noise is not transmitted to other areas.

xxv) Regular and proper maintenance of noise generating machinery including the transport vehicles to maintain noise levels.

xxvi) Provisions should be made for noise absorbing pads at foundations of vibrating equipments to reduce noise emissions.

QUARRY OPERATIONS

The Contractor shall obtain materials from quarries only after the consent of the Forest Department or other concerned authorities and in consultation with the Engineer. The quarry operations shall be undertaken within the purview of the rules and regulations in force.

PREVENTION OF WATER COURSES FROM SOIL EROSION AND SEDIMENTATION SILTATION

The Contractor shall apply following mitigation measures to prevent sedimentation and pollution of watercourses.

- To prevent increased siltation, if need be existing bridges maybe widened downstream side of the water body;
- Cement and coal ash should be stacked together, fenced by bricks or earth wall, and kept away from water, to prevent leachate formation and contamination of surface and ground water;
- If need be, slope of the embankments leading to water bodies should be modified and re channelized to prevent entry of contaminations into the water body;
- During construction silt fencing (consists of geo-textile with extremely small size supported by wire-mish mounted on a panel made up angle frame) could be used along the road at all canals and rivers to prevent sediments from the construction site to enter into the watercourses.

POLLUTION FROM HOT-MIX PLANTS AND BATCHING PLANTS

Plants and concrete batching plants shall be located sufficiently away from habitation, agricultural operations. The Contractor shall take every precaution to reduce the levels of noise, vibration, dust and emissions from his bituminous hot-mix plants and shall be fully responsible for any claims for damages caused to the property, fields and residents in the vicinity.

HEALTH AND SAFETY

The Contractor shall take all measures and precautions necessary to ensure the health, safety and welfare of all persons entitled to be on the site. Such precautions shall include those that, in the opinion of the Engineer, are reasonable to prevent unauthorized entry upon the site and to protect members of the public from any activities under the control of the Contractor. The Contractor's responsibilities shall include but not be limited to:

- The provision and maintenance of the Contractor's Equipment in a safe working condition and the adoption of methods of work that are safe and without risks to the health of any person entitled to be on the site.

- The execution of suitable arrangements for ensuring safety and absence of risks to health in connection with the use, handling, storage, transport and disposal of articles and substances,

- The provision of lighting, including standby facilities in the event of failure that, in the opinion of the Engineer, is adequate to ensure the safe execution of any works that are to be carried out at right.

- The provision of protective clothing and safety equipment, with such personnel and equipment and such information, instruction, training and supervision as the necessary to ensure the health and safety at work of all persons employed on or entering on the site in connection with the works, including the Engineer's supervisory staff, all in accordance with the laws.

- Near towns, villages and all frequented places, trenches and foundation pits shall be securely fenced provided with proper caution signs and marked with lights at night to avoid accidents. Contractor shall take adequate protective measures to see that the excavation operations do no affect or damage adjoining structures.

- The Contractor shall not use or generate any materials in the works, which are hazardous to the health of persons, animals or vegetation. Where it is necessary to use some substances, which can cause injury to the health or workers, the Contractor shall provide protective clothing or appliances to his workers.

- The Contractor will take all measures necessary to safeguard the health; safety and welfare of all persons entitled to be on site and will ensure that works are carried out in a safe and efficient manner.

- The Contractor will provide, and ensure the utilization of appropriate safety equipment for all workmen and staff employed directly or indirectly by the Contractor. Such safety equipment will include but not be limited to the safety harnesses, safety equipment for working over water, rescue equipment, fire extinguishers and first-aid equipment. The personnel working at vulnerable locations at site will wear safety helmets and strong footwear.

- The Contractor will provide an adequate number of latrines and other arrangements at areas of the site where work is in progress and ensure that they are regularly cleaned and maintained in a hygienic condition.

FIRST AID

- The provision and maintenance of suitably equipped and staffed first aid stations throughout the extent of the works to the satisfaction of the Engineer. The Contractor shall allow in his prices and the responsible for the costs of all such site welfare arrangements and requirements.
- Injuries might occur during the construction period. It is therefore pertinent to provide first aid facilities for all the construction workers. At construction camps and at all workplaces first aid equipment and nursing staff must be provided. Since many of the workplaces may be far away form regular hospitals, an indoor health unit having one bed facility every 250 workers needs to be provided.
- Adequate transport facilities for moving the injured persons to the nearest hospital must also be provided in ready to move condition.
- The first-aid units apart form an adequate supply of sterilized dressing material should contain other necessary appliances as per the factory rules.

MAINTENANCE

- All buildings, rooms and equipment and the grounds surrounding them shall be maintained in a clean and operable condition and be protected form rubbish accumulation.
- Each structure made available for occupancy shall be of sound construction, shall assure adequate protection against weather, and shall include essential facilities to permit maintenance in a clean and operable condition. Adequate heating, lighting, ventilation or insulation when necessary to reduce excessive heat shall provide for comfort and safety of occupants.
- Each structure made available for occupancy shall comply with the requirements of the Uniform Building Code. This shall not apply to tent campus.

APPENDIX – XV

BORROW AREAS MANAGEMENT

Borrow areas will be finalized as identified by Contractor as agreed by the DSC and UEAP as per the requirements of the contract. Agreement is not reached between the Contractor and landowners for the identified borrow areas sites. In such cases arrangement for locating the source of supply of material for embankment and sub-grade as well as compliance to environment requirements in respect of excavation and borrow areas as stipulated from time to time by the Ministry of Environment, Forests and Climate Change, Government of India, and local bodies, as applicable shall be the sole responsibility of the Contractor.

The Contractor in addition to the established practices, rules and regulation will also consider following criteria before finalizing the locations.

1) The borrow area should not be located in agriculture field unless unavoidable i.e. barren land is not available.
2) The borrow pits should not be located along the roads.
3) The loss of productive and agricultural land should be minimum.
4) The loss of vegetation is almost nil or minimum.
5) Sufficient quality of soil is available.
6) The Contractor will ensure the availability of suitable earth.

The Contractor shall obtain representative samples form each of the identified borrow areas and have these tested at the site laboratory following a testing programme as approved by the concerned Engineer. It shall be ensured that the fill material compacted to the required density

The Contractor shall submit the following information to the Engineer for approval at least 7 working days before commencement of compaction

- The values of maximum dry density and optimum moisture content obtained in accordance with IS: 2720 (Part 7) or (Part 8), as the case may be, appropriate for each of the fill materials he intends to use.
- A graph of density plotted against content from which, each of the values in (i) above of maximum dry density and optimum moisture content are determined.

After identification of borrow areas based on guidelines. Contractor will fill reporting format Annexure-III and submit the same for approval of the “Engineer”.

After receiving the approval Contractor will begin operations keeping in mind following;

1) Haulage of material to the areas of fill shall proceed only when sufficient spreading and compaction plants is operating at the place of deposition.
2) No excavated acceptable material other than surplus to requirements of the Contract shall be removed from the site. Contractor should be permitted to remove acceptable material form the site to suit his operational procedure, then be shall make good any consequent deficit of material arising there from.

3) Where the excavation reveals a combination of acceptable and un-acceptable materials, the Contractor shall, unless otherwise agreed by the Engineer, carryout the excavation in such a manner that the acceptable materials are excavated separately for use in the permanent works without contamination by the un-acceptable materials. The acceptable material shall be stockpiled separately.

4) The Contractor shall ensure that he does not adversely affect the stability of excavation or fills by the methods of stockpiling materials, use of plants or siting of temporary buildings or structures.

Borrow Areas located in Agricultural Lands

(i) The preservation of topsoil will be carried out in stockpile.

(ii) A 15 cm topsoil will be stripped off from the borrow pit and this will be stored in stockpiles in a designated area for height not exceeding 2m and side slopes not steeper than 1:2 (Vertical: Horizontal).

(iii) Borrowing of earth will be carried out up to a depth of 1.5m from the existing ground level.

(iv) Borrowing of earth will not be done continuously through out the stretch.

(v) Ridges of not less than 8m widths will be left at intervals not exceeding 300m.

(vi) Small drains will be cut through the ridges, if necessary, to facilitate drainage.

(vii) The slope of the edges will be maintained not steeper then 1:4 (Vertical: Horizontal).

Borrow Areas located in Agriculture Land in un-avoidable Circumstances:

(i) The preservation of topsoil will be carried out in stockpile.

(ii) A 15 cm topsoil will be stripped off from the borrow pit and this will be stored in stockpiles in a designated area for height not exceeding 2m and side slopes not steeper than 1:2 (Vertical: Horizontal).

(iii) The depth of borrow pits will not be more than 30 cm after stripping the 15 cm topsoil aside.

Borrow Areas located on Elevated Lands

(i) The preservation of topsoil will be carried out in stockpile

(ii) A 15 cm topsoil will be stripped off from the borrow pit and this will be stored in stockpiles in a designated area for height not exceeding 2m and side slopes not steeper than 1:2 (Vertical: Horizontal).

(iii) At location where private owners desire their fields to be leveled, the borrowing shall be done to a depth of not more than 1.5m or up to the level of surrounding fields.

Borrow Areas near Riverside

(i) The preservation of topsoil will be carried out in stockpile

(ii) A 15 cm topsoil will be stripped off from the borrow pit and this will be stored in stockpiles in a designated area for height not exceeding 2m and side slopes not steeper than 1:2 (Vertical: Horizontal).

(iii) Borrow area near to any surface water body will be at least at a distance of 15m from the toe of the bank or high flood level, whichever is maximum.

Borrow Areas near Settlements

(i) The preservation of topsoil will be carried out in stockpile

(ii) A 15 cm topsoil will be stripped off from the borrow pit and this will be stored in stockpiles in a designated area for height not exceeding 2m and side slopes not steeper than 1:2 (Vertical: Horizontal).

(iii) Borrow pit location will be located at least 0.75 km from villages and settlements. If un-avoidable, the pit will not be dug for more then 30 cm and drains will be cut to facilitate drainage.

(iv) Borrow pits located in such location will be re-developed immediately after borrowing is completed. If spoils are dumped, that will be covered with a layers of stockpiled topsoil in accordance with compliance requirements with respect MOEFCC/PPCB guidelines.

Borrow Pits along the Road

(i) The preservation of topsoil will be carried out in stockpile

(ii) A 15 cm topsoil will be stripped off from the borrow pit and this will be stored in stockpiles in a designated area for height not exceeding 2m and side slopes not steeper than 1:2 (Vertical: Horizontal).

(iii) Borrow pits along the road shall be discouraged.

(iv) It permitted by the Engineer; these shall not be dug continuously.

(v) Ridges of not less than 8m widths should be left at intervals not exceeding 300m.

(vi) Small drains shall be cut through the ridges of facilitate drainage.

(vii) The depth of the pits shall be so regulated that there bottom does not cut an imaginary line having a slope of 1 vertical to 4 horizontal projected from the edge of the final section of bank, the maximum depth of any case being limited to 1.5m.

(viii) Also, no pit shall be dug within the offset width from the toe of the embankment required as per the consideration of stability with a minimum width of 10m

Re-development of Borrow Areas

The objective of the rehabilitation programme is to return the borrow pit sites to a safe and secure area, which the general public should be able to safely enter and enjoy. Securing borrow pits in a stable condition is fundamental requirement of the rehabilitation process. This could be achieved by filling the borrow pit approximately to the road level.

Re-development plan will be prepared by the Contractor before the start of work inline with the owner's will and to the satisfaction of owner.

The Borrow Areas will be rehabilitated as follows;

- Borrow pits will be backfilled with rejected construction wastes (unserviceable materials) compacted and will be given a turfing or vegetative cover on the surface. If this is not possible, then excavation slope should be smoothened and depression is filled in such a way that it looks more or less like the original ground surface.
- Borrow areas might be used for aquaculture in case landowner wants such development. In that case, such borrow area will be photographed after their post-use restoration and Environment Expert of Supervision Consultant will certify the post-use redevelopment.

The Contractor will keep record of photographs of various stages i.e. before using materials form the location (pre-project), for the period borrowing activities (Construction Phase) and after rehabilitation (post development), to ascertain the pre and post borrowing status of the area.

APPENDIX – XVI

SOIL EROSION AND SEDIMENTATION CONTROL

Prior to the start of the relevant construction, the Contractor shall submit to the Engineer for approval, his schedules for carrying out temporary and permanent erosion/sedimentation control works as are applicable for the items of clearing and grubbing, road way and drainage excavation, embankment/sub-grade construction, bridges and other structures across water courses, pavement courses and shoulders. He shall also submit for approval his proposed method of erosion/sedimentation control on service road and borrow pits and his plan for disposal of waste materials. Work shall not be started until the erosion/sedimentation control schedules are prepared and the Engineer has approved methods of operations for the applicable construction.

The surface area of erodible earth material exposed by clearing and grubbing, borrow and fill operations shall be limited to the extent practicable. The Contractor may be directed to provide immediate control measures to prevent soil erosion and sedimentation that will adversely affect construction operations, damage adjacent properties, or cause contamination of nearby streams or other watercourses. Such work may involve the construction of temporary berms, dikes sediment basins, slope drains and use of temporary mulches, fabrics, mats, seedling, or other control devices or methods as necessary to control erosion and sedimentation.

The Contractor shall be required to incorporate all permanent erosion and sedimentation control features into the project at the earliest practicable time as outlined in his accepted schedule to minimize the need for temporary erosion and sedimentation control measures.

Temporary erosion/sedimentation and pollution control measures will be used to control the phenomenon of erosion, sedimentation and pollution that may develop during normal construction practices, but may neither be foreseen during design stage for associated with permanent control features on the Project.

Where erosion or sedimentation is likely to be a problem, clearing and grubbing operations should be so scheduled and performed that grading operations and permanent erosion or sedimentation control features can follow immediately thereafter if the project conditions permit; otherwise temporary erosion or sedimentation control measures may be required between successive construction stages. Under no conditions shall a large surface area of credible earth material be exposed at one time by clearing and grubbing or excavation without prior approval of the Engineer.

The Engineer may limit the area of excavation, borrow and embankment operations in progress, commensurate with the Contractor's capability and progress in keeping the finish grading, mulching, seedling and other such permanent erosion, sedimentation and pollution control measures, in accordance with the accepted schedule.

Temporary erosion is sometimes caused due to the Contractor's negligence, carelessness or failure to install permanent controls. Sedimentation and pollution control measures then become necessary as a part of the work as scheduled or ordered by the Engineer, and these shall be carried out at the Contractor's own expense. Temporary erosion, sedimentation and pollution control work required, which is not attributed to the Contractor's negligence, carelessness or failure to install permanent controls, will be performed as ordered by the Engineer.

Temporary erosion, sedimentation and pollution control may include construction work outside the right of way where such work is necessary as a result of road construction such as borrow pit operations, service roads and equipment storage sites.

The temporary erosion, sedimentation and pollution control features installed by the Contractor shall be maintained by him till these are needed, unless otherwise agreed by the Engineer.

APPENDIX – XVII

LOCATING QUARRIES, REHABILITATING QUARRIES AND GUIDELINES FOR STONE CRUSHERS

Locating Quarries

The Contractor will finalize the locations in consultation with DSC and UEAP. The Contractor shall establish a new quarry with the prior consent of the DSC only in cases when

i) Lead from existing quarries is uneconomical and

ii) Alternative material sources are not available.

The Contractor shall prepare a redevelopment plan for the quarry site and get approved by the DSC.

The construction schedule and operation plans to be submitted to the DSC prior to commencement of work shall contain a detailed work plan for procuring materials that includes procurement, transportation and storage of quarry materials.

Operation & redevelopment plan (if a new quarry is opened)

- Photograph of the quarry site prior to commencement
- The quarry boundaries as well as location of the material deposits, working equipments, stockpiling, access roads and final shape of the pit.
- Drainage and erosion control measures at site.
- Safety measures during quarry operation.
- Design for redevelopment of exhaust site.

Option-A: Revegetating the quarry to merge with surrounding landscape: This is done by conserving and reapplying the topsoil for the vegetative growth.

Option-B: Developing exhausted quarries as water bodies: The pit shall be reshaped and developed into pond, for harvesting rainwater. This option shall only be considered where the location of quarry is at the lowest point, i.e. surrounding areas/ natural drainage slopes towards it.

Construction stage:

Development of site:

To minimize the adverse impact during excavation of material following measures are need to be undertaken

i) Adequate drainage system shall be provided to prevent the flooding of the excavated area

ii) At the stockpiling locations, the Contractor shall construct sediment barriers to prevent the erosion of excavated material due to runoff

iii) Construction of offices, laboratory, workshop and rest places shall be done in the up-wind of the plant to minimize the adverse impact due to dust and noise.

iv) The access road to the plant shall be constructed taking into consideration location of units and also slope of the ground to regulate the vehicle movement within the plant.

v) In case of storage of blasting materials, all precautions shall be taken as per The Explosive Rules, 1983.

Quarry operations including safety:

i) Overburden shall be removed and disposed inline with Guidelines of Disposal Management.

ii) During excavation, slopes shall be flatter than 20 degrees to prevent their sliding. In cases where quarry strata are good and where chances of sliding are less this restriction can be ignored.

iii) In case of blasting, procedure and safety measures shall be taken as per The Explosive Rules, 1983.

iv) The Contractor shall ensure that all workers related safety measures shall be done as per guidelines for workers and Safety attached as Annexure-8

v) The contractor shall ensure maintenance of crushers regularly as per manufacture's recommendation.

Topsoil will be excavated and preserved during transportation of the materials measures shall be taken to minimize the generation of dust and prevent accidents.

The PIU and the DSC shall review the quarry site for the management measures during quarry operation, including the compliance to pollution norms.

Post construction stage:

The Contractor shall restore all haul roads constructed for transporting the material from the quarries to construction site to their original state.

The PIU and the DSC shall be entrusted the responsibility of reviewing the quarry site for the progress of implementation of Redevelopment plan. These shall include the following two cases;

- Redevelopment of quarries opened by the contractor for the project
- Redevelopment of existing quarries operated by other agencies

In the first case, the Contractor shall be responsible for the Redevelopment plan prior to completion after five years, during the defect liability period. The DSC and PIU shall be responsible for reviewing this case of redevelopment prior to the issuing the defect liability certificate.

In the second case, the redevelopment of exhaust quarry shall be the responsibility of the agency providing the permit to ensure the implementation of Redevelopment Plan.

Geological and Geomorphologic considerations:

i) No mining shall be allowed where the slope angles are more than 45 degree from horizontal and in case of mid slope mining, the foot wall should be of hard strata.

ii) No mining lease shall be granted where the ore to overburden ratio is not economical i.e. 1:0.2 that is the waste generation should not be more than 20%

iii) Proper appraisal of the deposit for its qualitative and quantitative assessment shall be made in the form of Geological and topographical plans.

Technical consideration:

i) The area should not be highly jointed, fractured on consisting of weak planes.

ii) Relation of slope angle to angle of repose should be within mining parameters where 6x6 m benches by keeping overall angle of repose as 45degree can be made.

iii) No mining shall be allowed where subsidence of rocks is likely due to steep angle of slope.

iv) No overhangs shall be allowed to be formed during the course of mining.

v) The gradient of approach roads shall be gentle with hill-ward slope, side drains and parapet walls. Adequate number of waiting and crossing points shall be provided for safe plying of vehicles.

vi) No blasting shall be resorted to without taking proper license under Explosive Act.

General conditions:

i) Mining site shall only be handed over to the leaseholder, after it is duly demarcated by permanent boundary pillars and certified by concerned mining officer.

ii) Junction at take off point of approach road with main road shall be developed with proper width and geometric required for safe movement of traffic by crusher owner at his own cost in consultation with Executive Engineer, UKPWD.

iii) No leaseholder shall store/ stack any material in the acquired width of PWD road without the specific permission of the competent authority.

iv) In addition to above the mining operation shall be subjected to provisions of various Acts and Rules in force.

v) Dumping of waste shall be done in earmarked places as per the working plans.

Table: Parameters for new stone crushers to be set up in future

Sl. No.	Parameters	Distance
i	Minimum distance from NH/SH	150m
ii	Minimum distance from link roads / other District roads	75m
iii	Minimum distance from District Head - Quarters	1.5 km
iv	Minimum distance from town / Notified area by the committee	1 km
v	Minimum distance from village	500 m
vi	Minimum distance from Hospital/Education Institution	1 km
vii	Minimum distance from Natural water springs	500 m
viii	Minimum distance from Notified parks	2 km
ix	Minimum distance from Sanctuaries	1 km
x	Minimum distance from Bridge sites	200 m Upstream
xi	Minimum distance from Notified Lakes and Wetlands	300 m

APPENDIX – XVIII

STORAGE, HANDLING, USE AND EMERGENCY RESPONSE FOR HAZARDOUS CHEMICALS

A1. Refueling / Maintenance procedure

- Truck or suitable containers will bring in all fuel and fluids. There will be no storage of fuel, oil or fluids within 100M (or 50M) of the permanent water line.
- Prior to re-fueling or maintenance, drip pans and containment pans will be placed under the equipment. Absorbent blankets may also be required to be placed under the equipment and hoses where there is a possibility of spillage to occur.
- All used oils or fluids will be properly contained and transported to appropriately licensed (authorized) disposal facilities;
- Following re-fueling and maintenance, the absorbent blankets (if any) and spill pans will be picked up and the fuel truck or container moved outside of the 100m (or 50m) wide area.

Emergency spill procedure

Should a spill occur, trough spillage or equipment failure, the applicable emergency spill procedure outlined in sections A-2 to A-4 must follow.

A2. Spill Procedure (inside the stream)

In the case of a spill, overflow or release of fluid into the stream waterway (whether water is flowing during the spill or not), do what is practical and safely possible to control the situation, then get help.

- **Stop the flow**
    - Stop the release into the stream waterway
    - Shutdown equipment
    - Close valves and pumps
    - Plug hoses
- **Remove Ignition sources**
    - Shut off vehicles and other engines
    - Do not allow tiger torches, vehicles, smoking or other sources of ignition near the area. Keep a fire extinguisher on hand but keep it a safe distance away from the potential ignition source (if a fire starts, the extinguisher must be easily accessible)
- **Contact the environmental officer and initiate emergency response**
    - Notify the site supervisor and the Contractor's Environmental Officer as soon as possible

- The Environmental Officer will review the situation and decide if Emergency services like Fire Brigade are required
- Appropriate parties to be notified of the spill are
  - The contractor's Project Manager
  - The Engineer through his designated Environmental Officer
  - The Client
  - Regulatory Agencies like Pollution Control Board, Municipal Authorities, as applicable.
  - Site safety Officer

- **Cleanup and Disposal**

  Emergency Services will be engaged for the containment, cleanup and disposal of contamination release into the environment.

- **Reporting**

  The Contractor's Environmental Officer will document the event and submit repots to the Engineer, the client and appropriate regulatory agencies like the Pollution Control Board(s).

- **Procedure Review**

  The Engineer will review the report, determine if changes are required to procedures and recommended implementation of all required changes …

A3. Spill procedure (on land)

In the case of a spill, overflow or release fluid onto land, do what is practical and safety possible to control the situation and then get help.

- **Stop the flow**
  - Stop the release into the water body
  - Shut down equipment
  - Close valves and pumps
  - Plug hoses

- **Remove Ignition sources**

  Shut off vehicles and other engines

  Do not allow tiger torches, vehicles, smoking or other sources of ignition near the area. Keep a fire extinguisher on hand but keep it a safe distance away from the potential ignition sources (if a fire starts the extinguisher must be easily accessible).

- **Contain the Spill**
  - Dike around the spill to contain the material

- Spread absorbent or place a spill blanket on the spill
- Enlist the help of personnel on site
- Notify your supervisor as soon as possible

➢ **Notification**

Appropriate parties to be notified of the spill are

- The Contractor's Project Manager
- The Engineer through his designated Environmental officer
- The Client
- Regulatory Agencies like Pollution control Board, Municipal Authorities, as applicable
- Site Safety coordinator

➢ **Cleanup and Disposal**

The Engineer's Environmental officer will ensure that a proper cleanup and disposal method is determined. Absorbent pads will soak up the spilled material. The pads will be contained and removed from site for disposal at a licensed (authorized) facility.

➢ **Reporting**

The Contractor's Environmental Officer will document the event and submit reports to the Engineer, the Client and appropriate regulatory agencies like the Pollution control Board(s)

➢ **Procedure Review**

The Engineer will review the report, determine if changes are required to procedures and recommend implementation of all required changes.

APPENDIX – XIX

SELECTION AND MANAGEMENT OF CONSTRUCTION CAMP

1. Selection and layout of construction camp

The construction camps for labour, accommodation, offices and construction plant sites shall be identified based on the following guidelines. The construction site shall be located

- At a minimum distance of 1km away from any major settlement or village.
- At a minimum distance of 1000m of any major surface water course or body

If this is not possible the base camps should be located away from the settlements with the following precautions

- Base camp should be enclosed with boundary wall.
- Movement of the workers should be registered during the nighttime.
- There should not be any disturbance to the local community.
- Operation of the plant and machinery should be restricted to 6 am to 10 am
- Care should be taken while starting and moving the heavy vehicles, there is a possibility that children of near settlement may be playing with machinery parked outside the camps.

2. Facilities at workers camps

During the construction stage of the project, the construction contractor will construct and maintain necessary (temporary) living accommodation and ancillary facilities for labour. It will be ensured that all the temporary accommodation will be provided with uncontaminated water for drinking, cooking and washing. Adequate washing and bathing places shall be provided, and kept in clean and drained condition. Construction camps will be sited away from vulnerable people and adequate health care will be provided for the work force.

- General requirements include availability of:
- Potable water supply in quantity and quality,
- Requirement of power supply for heating as well as for cooking. Firewood shall not be used for cooking and heating purposes. Contractor must provide LPG gas / Kerosene for the construction camps.
- Safe access road is required at camps
- Waste (all kind of solid and liquid wastes) generated need to be disposed off smoothly.

2.1 Sanitation Facilities:

Construction camps shall be provided with sanitary latrines and urinals. Closed drainage systems and the proper treatment systems according to the local conditions should be constructed for the proper flow and effective treatment. The sewage system built for the camp will be operated properly to avoid health hazard, ground water and soil pollution. Compost pits will be constructed for the disposal of the garbage and other biodegradable wastes generated from the camps. Proper collection, transportation and disposal of the wastes will be ensured.

3. Shelter at work place:

At such work places where the duration of the works will prevail for more than one month some form of shelters will be provided for meals, resting, change of clothes and for keeping the tools of the work and personal protective equipment. The height of shelter shall not less than 3m from floor level to lowest part of the roof. Sheds shall be kept clean and the space provided shall be on the basis of at least 1.0 Sq.m per head.

4. Canteen Facilities:

A cooked food canteen on a moderate scale shall be provided for the benefit of workers wherever it is considered necessary. All the wastes generated from the canteen will be treated / disposed of as detailed in the other sections of the waste disposal.

5. Health care Facilities:

Health problems of the workers should be taken care of by providing basic health care facilities through a health centre set up at the construction camps. The health centre will have at least a doctor (part time), nurses, duty staff, medicines and minimum medical facilities to tackle first-aid requirements for minor accidental cases. Some arrangements will be made with the nearest hospital to refer patients of major illnesses or critical cases.

The health centre will carry out quarterly awareness programme of HIV – AIDS with the help of AIDS control society. Posters will be exhibited in the health care clinic.

6. Day crèche facilities

At construction sites where women with very young children are employed, provision of a day crèche shall be provided. At construction sites where 20 or more women are ordinarily employed, a hut for children under the age of 6 years shall be provided.

For ensuring the implementation of effective pollution control measures at the construction base camps and construction plant sites, redevelopment/ closure plans for the closure of these sites will be made part of the EMP of the construction contract.

7. Construction workers Camp

In all over India, road construction works are in peak stage. With several local / regional/ national and international contractors in place, the road construction work recently started showing seriousness towards this issue. The contractor recently started providing required legal and contractual facilities for the unskilled labour, hired from the local villages or are brought to the place of work from outside the State.

Even now the Contractor camps and other facilities are set up in worst conditions even when the contract documents are clearly specifying the required standards. The associated issues are as follows.

Forest resources could be encroached up on in all possible ways by the labour force.

Unauthorized tree felling to get fuel-wood both for cooking as well as heating even when alternative fuel is made available,

Poaching of edible animals and birds of the locality in spite of prohibition,

Poor sanitation arrangement and improper methods used for disposal of solid wastes and effluent,

Indigenous people getting invaded by imported construction labour-force, due to lack of discipline,

Transmission of communicable diseases to the local people by the construction workers due to inappropriate health monitoring facilities, and

Creating hazardous traffic flow at construction site due to lack of concern about the local needs and provision for pedestrian

No Contractor's Establishments zones

Contractor shall not establish any construction camp, crushers, hot mix plant and WWM plant in the identified locations (No Contractor's Establishment Zone). These locations will be treated as eco-sensitive. No construction campsite areas also include settlement areas provided below. These are the major settlements along the corridor. Campsites should be a minimum of 500m away from settlements.