

Government of Uttarakhand

Uttarakhand Disaster Recovery Project (P146653) World Bank Assisted

Environment Social Management Framework

October 2013

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1. Introduction

1.1 Background

1. The State of Uttarakhand was carved out of Uttar Pradesh on November 9, 2000 to become the 27th State of India. Located at the foothills of the Himalayan mountain ranges, it is predominantly a hilly State, having international boundaries with the People's Republic of China in the north and Nepal in the east. On its north-west lies the State of Himachal Pradesh, while on the south it is bounded by Uttar Pradesh. The high Himalayan ranges and glaciers form most of the northern parts of the state while the lower reaches are densely forested (covering about 60% of the state) with rich natural resources and wildlife habitats. Two of India's major rivers, the Ganga and the Yamuna, originate from Uttarakhand.

2. The State of Uttarakhand comprises of 13 districts that are grouped into two regions (Kumaun and Garhwal) and has a total geographical area of 53,484 sq. km. The economy of the State primarily depends on agriculture and tourism. The State is home to some of the most important pilgrimage centres known as the “*Char-Dham*”, i.e. the Gangotri, Yamunotri, Kedarnath and Badrinath, all of which are situated in the northern region. The state receives over 32 million tourists annually, a majority of whom visit the state during the peak summer season (May-July) for pilgrimage and recreation.

3. The State has a very fragile terrain that, by virtue of its very origin, is prone to natural disasters. The entire State falls within Zone IV and Zone V (Zone V represents the highest level of seismicity) of the Earthquake Zoning Map of India. The districts of Bageshwar, Chamoli, Pithoragarh, Rudraprayag and Uttarkashi all fall within the Seismic Zone V. In the recent past the State has witnessed two major earthquakes (Uttarkashi 1991 and Chamoli 1999). Every year, the state faces massive losses, particularly during the monsoon season, due to rains, cloudbursts, flash floods, landslides, floods, hailstorms and water logging events.

1.2 Disaster June 2013

4. The monsoon in June 2013 arrived almost two weeks earlier than expected in Uttarakhand. During June 15 to 17, 2013, cloud bursts and heavy (64.5 - 124.4 mm) to very heavy rainfall (124.5 – 244.4 mm) hit several parts of the higher reaches of the Himalayas in the State of Uttarakhand. This unprecedented rainfall resulted in a sudden increase in water levels giving rise to flash floods in the Mandakini, Alakananda, Bhagirathi and other river basins and also caused extensive landslides at various locations. Adding to this, continuous rains and melting of the Chorabari glacier caused waters in the Chorabari Lake to raise. The lake's weak moraine barrier gave way and a huge volume of water along with large glacial boulders came down the channel to the east devastating Kedarnath town, Rambara, Gaurikund and other places in its wake. According to official sources, over 900,000 people have been affected by the event in the state of Uttarakhand.

5. The districts of Bageshwar, Chamoli, Pithoragarh, Rudraprayag and Uttarkashi were most affected by this disaster. This region is among the country's most important pilgrimage

circuit and as the disaster coincided with the peak tourist and pilgrimage season, it significantly increased the number of casualties, missing, and affected population. A total of 580 human lives were lost; over 5,200 people are still reported as missing; 4,200 villages were affected; 9,200 cattle/livestock lost; and 3,320 houses were fully damaged. This event also left over 70,000 tourists and 100,000 local inhabitants stranded in the upper reaches of the mountain terrain.

6. The numerous landslides and toe erosion by the sediment loaded rivers caused breaching of roads/highways at many locations and washed away several bridges (steel girder bridges, beam bridges, suspension/cable bridges). Traffic was disrupted along all national highways and link roads along with the disruption of telecommunication lines, all adding to the impact of the disaster. Many hotels, rest houses and shops around the temple in Kedarnath were completely destroyed.

7. The Government of Uttarakhand (GoU), with assistance from the Indian Army, Indian Air Force (IAF), Indo-Tibetan Border Police (ITBP) and the National Disaster Response Force (NDRF), was extremely proactive with emergency relief and evacuation operations in the aftermath of the disaster. Despite the heavy rains that delayed and complicated the operations, the IAF, the Indian Army, the Paramilitary Troops, civilian helicopters, along with road vehicles evacuated more than 110,000 people from these flood affected areas.

8. The World Bank (WB) and the Asian Development Bank (ADB) on receiving a request from the Department of Economic Affairs (DEA), (GoI), fielded a Joint Rapid Damage and Needs Assessment (JRDNA) Mission within the State. The JRDNA team visited the State during July 29 to August 07, 2013, and in collaboration with the GoU undertook a multi-sectoral assessment of the damages and laid the grounds for an immediate recovery and reconstruction needs framework. While the disaster affected almost all districts within the state, the main focus of the assessment was on five districts that were most affected: Bageshwar, Chamoli, Pithoragarh, Rudraprayag, and Uttarkashi.

1.3 PROJECT DEVELOPMENT OBJECTIVE

1.3.1 PDO

9. To restore housing, rural connectivity and build resilience of communities in Uttarakhand and increase the technical capacity of the State entities to respond promptly and effectively to an eligible crisis or emergency.

1.3.2 Project Beneficiaries

10. The primary beneficiaries would be the communities of the affected districts in the State that would benefit from the risk mitigation infrastructures. Through strengthening of disaster risk management systems and institutions, the project has the potential to benefit the entire State of Uttarakhand.

1.3.3 PDO Level Results Indicators

24. The project objective will be monitored by the following indicators.
- Targeted affected households with multi-hazard resilient housing
 - Targeted affected villages with restored connectivity
 - Departments that make use of information generated by USDMA

1.4 PROJECT DESCRIPTION

1.4.1 Project Components

25. Based on the findings from the JRDNA, The Uttarakhand Disaster Recovery Project (UDRP) proposes the following five components that cover the immediate recovery and reconstruction needs within the most affected districts of the State and future oriented risk reduction efforts. A short description of objectives and activities in each of the components is given below:

Component 1: Resilient Infrastructure Reconstruction – US\$ 31 million

26. The objective of this component is to focus on the immediate needs of reconstruction of damaged houses and public buildings. The aim is to reduce vulnerability of the affected population and restore access to basic services of governance.

27. *Subcomponent 1.1 Resilient Permanent Housing- US\$ 27 million* - This will involve building about 2,500 permanent houses that would be multi-disaster resilient. Houses will be built under three categories; 1. Houses constructed on the land of households who have title deeds to their land and that are safe for construction; 2. Construction of cluster houses for households that have lost both their houses and land due to the disaster, on land available within the village area; 3. Construction of cluster houses relocated to a new area for households that have lost both their houses and land due to the disaster. The land for this category will be provided by GoU, developed with school building, primary health centres, community centres etc.

28. *Subcomponent 1.2 Resilient Public Buildings- US\$ 4 million*- This will support the reconstruction of damaged public buildings, such as Panchayati Raj Institution (PRI), Block and District offices and technical education institutes, including restoration of partially damaged and reconstruction of fully damaged structures, equipment and furniture.

Component 2: Rural Road Connectivity – US\$ 155 million

29. The objective of this component is to restore the connectivity lost due to the disaster through the reconstruction of damaged roads and bridges: village roads, Other District Roads (ODRs)¹, bridle roads and bridle bridges. The roads and bridges will be designed to withstand earthquake and flood forces as per the latest official design guidelines. The affected rural areas will be benefitted by the restored access to the market thereby

¹ ODRs are generally the link roads between Village Roads and Major District Roads (MDRs)

increasing the economic growth in these areas and timely access to health and education services.

30. *Subcomponent 2.1 Village/ Rural Roads - US\$ 120 million* - This will support the reconstruction of about 3,600 kms of damaged village roads, following the PMGSY program standards and will include construction of new drainage works and bridges, retaining and breast walls and other structures to prevent landslides, and minor realignments.

31. *Subcomponent 2.2 Other District Roads (ODR) - US\$ 13 million* - This will involve the reconstruction of about 675 kms of damaged ODRs, linking village roads to Major District Roads (MDRs), State Highways (SH) and/or National Highways (NH) to increase access and provide opportunities for overall economic development.

32. *Subcomponent 2.3 Bridle Roads and Bridges - US\$22 million* - This will undertake the reconstruction of about 440 kms bridle roads and about 140 bridle bridges, facilitating pedestrian connectivity for remotely located villages.

Component 3: Technical Assistance and Capacity Building for Disaster Risk Management - US\$ 38 million

33. The objective of this component is to enhance the capabilities of government entities and others in risk mitigation and response. This component would entail the following tasks:

34. *Subcomponent 3.1: Risk Assessment, Modeling and Capacity Enhancement of Uttarakhand Space Applications Center (USAC) - US\$ 10 million:* This will provide technical assistance to institutions to plan, set-up and implement a multi-hazard risk assessment of Uttarakhand. This subcomponent will include: (a) development of the framework and implementation of multi-hazard risk assessment models for Uttarakhand; (b) development of a historic hazard and loss database; (c) establishment of a technical advisory group for the multi-hazard risk assessment; (d) acquisition and processing of high-resolution satellite data for risk assessment; (e) development of training of trainers courses to build sustainable risk assessment capacity; (f) development of a monitoring and evaluation framework; (g) development of a tool that will allow the optimal utilization of risk information and increase the resilience of the communities and DRM capacity of the state; (h) capacity enhancement of USAC .

35. *Subcomponent 3.2: Establishment of a Decision Support System (DSS) - US\$ 3 million:* This will entail setting up a DSS that will integrate and analyze information from multiple sources in a geo-spatial integrated system. The system will be designed to display information and provide access in a user-friendly manner.

36. *Subcomponent 3.3: River Morphology Study - US\$ 3 million:* This will support the study of the entire morphology of some key rivers impacted by the disaster. The study will also look into analyzing and identifying critical protection works needed for river bank strengthening.

37. *Subcomponent 3.4: Slope Stabilization Study - US\$ 4 million:* This subcomponent would include learning on slope stabilization from existing successful techniques, ongoing cutting edge work and research in this sector, and introduce appropriate technology for slope

stabilization for Uttarakhand through small demonstrative works.

38. *Subcomponent 3.5: Strengthening of the Uttarakhand State Disaster Management Authority (USDMA) - US\$ 5 million:* This will entail developing the institutional set up of the USDMA, technical enhancement of the facilities at the DMMC, training, regular drills for emergency operations centers and Disaster Management Officers at the District and State levels.

39. *Subcomponent 3.6: Strengthening Hydro-meteorological network and Early Warning Systems (EWS) - US\$ 10 million:* This will review existing hydro-meteorological capabilities at the state and national level, and will develop and implement a hydro-meteorological modernization plan for Uttarakhand. This subcomponent will also review existing EWS, identify gaps and establish a robust, fail safe EWS in the state including optimum use of strengthened networks and facilities.

40. *Subcomponent 3.7: Strengthening Emergency Response Capacity - US\$ 3 million:* This subcomponent will focus on strengthening the capacity of the State's disaster response force, fire services personnel and other immediate key response agencies in responding adequately to disaster situations through better search and rescue equipment and enhanced training.

Component 4: Financing Disaster Response Expenses – US\$ 12 million

41. This component will support the financing of eligible expenses already incurred by the State during the disaster response period. The expenses eligible include fuel for helicopter rescue missions, hiring of heavy equipment for clearing of roads and any other “positive goods” listed items that are mutually agreed to for reimbursement by GoU and the World Bank.

Component 5: Implementation Support – US\$ 14 million

42. This component will support incremental operating costs of the project, including the operation of the Project Management Unit (PMU) and respective Project Implementation Units (PIUs). The component will also include creation of small, temporary field implementation offices with necessary equipment, furniture etc. In addition, the component will include consultancies required for the preparation and supervision of specific activities, trainings, exposure visits and knowledge exchange programs. An agency will be appointed to provide technical and social support to the Owner Driven Construction of Houses (ODCH).

Component 6: Contingency Emergency Response – US\$ 0 million

43. Following an adverse natural event that causes a major natural disaster, the respective government may request the Bank to re-allocate project funds to support response and reconstruction. This component would draw resources from the unallocated expenditure category and/or allow the government to request the Bank to re-categorize and reallocate

financing from other project components to partially cover emergency response and recovery costs. This component could also be used to channel additional funds should they become available as a result of an eligible emergency.

2. Environment and Social Baseline

2.1 Geographic Details

1. Uttarakhand has a total area of 53,483 square km and population density is 189 per person per square km which is less than the Indian national average of 382 persons per square km. There are 13 districts in Uttarakhand which are grouped into two divisions; Kumaun and Garhwal. The Kumaun division includes six districts (Almora, Bageshwar, Champawat, Nainital, Pithoragarh and Udham Singh Nagar), while Garhwal includes seven districts (Dehradun, Haridwar, Tehri Garhwal, Uttarkashi, Chamoli, Pauri Garhwal and Rudrapur).



Figure 1: State of Uttarakhand

2. Out of the 13 districts of the State, 3 are in plains and the remaining 10 are hill districts. Geographically the state can broadly be divided into three zones, namely;

- **Upper hills:** Uttarkashi, Chamoli, Rudrapur, Pithoragarh and Bageshwar
- **Middle hills:** Tehri Garhwal, Garhwal, Almora, and Champawat, the hill regions of Nainital and Chakrata tehsil of Dehradun
- **Foothills:** The remaining area of Dehradun, Nainital, Haridwar and Udham Singh Nagar.

2.2 Socio-Demographic Profile

3. According 2011 Census, Uttarakhand's population has is around 10.1 million, with last decadal growth being 19.17. Uttarakhand feeds approximately 0.84% of India's total population. Out of the total population, males account for 5,154,178 and females account for 4,962,574, persons. Sex Ratio in the state is 963 that was 962 in 2001 census and fares better as compared to average sex ratio of India (940) but the child sex ratio of 886 in Uttarakhand remains a matter of concern.

4. Literacy rate in the state is 79.63% that above the national average of 74.04%. Total 6,997,433 people were found literate in Uttarakhand during the last Census, out of the total literate population, 3,930,174 were males (88.33%) while remaining 3,067,259 were female (70.70%). These averages of literacy in overall and among male and female have increased since Census 2001 when the male and female literacy rates were recorded as 81.02% and 63.36% respectively.

5. The population of the districts in Uttarakhand varies considerably. Four of the 13 districts, namely Dehradun, Haridwar, Udham Singh Nagar and Nainital account for 61.5 %

of the state's total population. On adding Tehri Garhwal, Pauri Garhwal and Almora, this accounts for nearly 81%. This clearly shows that the concentration of population is quite high in the mid and foothills as compared to the remaining six districts of high hills.

6. District-wise, there are variations in the density of population with Haridwar, Udham Singh Nagar and Dehradun have higher densities of 817, 648, and 550 persons per square km respectively; while in districts like Uttarkashi, Chamoli and Pithoragarh the population density is quite low with average of 41, 49, and 69 persons per square km. The population density in the other two project districts, Bageshwar and Rudraprayag is 116 and 122 persons per square km respectively.

Table 1: Demographic Indicators

S.No.	Characteristics	Number/ Percentage
1	Geographic Area (in Sq. kms)	53,484 sq. kms
2	Number of blocks	95
3	Number of villages	16826
4	Number of towns	75
5	Total Population (2011)	1,01,16,752
	Male	5,154,178
	Female	4,962,574
6	Population Sex Ratio	963
7	Child Sex Ratio	886
8	Decadal growth rate	19.17
9	Density- per sq. km.	189
10	Literacy Rate	79.63%
	Male	88.33%
	Female	70.70%
11	% SC/ST population	
	SC	15.17
	ST	2.56

Table 2: SC and ST Population Details

S. No.	District	Population			SC Population			ST Population			% of Total
		Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total	
		305781	24305	330086	76875	3692	80567	3374	138	3512	1.06
2	Chamoli	332209	59396	391605	68000	11317	79317	9046	3214	12260	3.13
3	Rudraprayag	232360	9925	242285	46279	1400	47679	309	77	386	0.16
4	Tehri Garhwal	548792	70139	618931	94628	7502	102130	630	245	875	0.14
5	Dehradun	754753	941941	1696694	119123	109778	228901	101475	10188	111663	6.58
6	Garhwal	574568	112703	687271	109576	12785	122361	1952	263	2215	0.32
7	Pithoragarh	413834	69605	483439	109541	10837	120378	15915	3620	19535	4.04
8	Bageshwar	250819	9079	259898	69842	2219	72061	1874	108	1982	0.76
9	Almora	560192	62314	622506	140931	10064	150995	750	531	1281	0.21

10	Champawat	221305	38343	259648	41725	5658	47383	1084	255	1339	0.52
11	Nainital	582871	371734	954605	137906	53300	191206	5780	1715	7495	0.79
12	Udham Singh Nagar	1062142	586760	1648902	174919	63345	238264	117381	5656	123037	7.46
13	Hardwar	1197328	693094	1890422	307320	103954	411274	5249	1074	6323	0.33
	Total	7036954	3049338	10086292	1496665	395851	1892516	264819	27084	291903	2.89

The ST population of

3. Uttarakhand is a predominantly rural state with 16,826 rural settlements, of which 12,699 or 81% have a population of less than 500. In most of the districts, more than 75-85 % of rural settlements have a population of less than 500. Only 17 % of the rural settlements have a population ranging between 500-1999 and the villages with population of 2000 or more are few (2.7 %). The small size of settlements and their widespread distribution is a formidable challenge for service delivery in the state of Uttarakhand with such a high percentage of small and scattered hamlets in tough geographic and climatic conditions.

2.3 Livelihoods

4. The work force engaged in agricultural activities is 58.39 percent of total work force. The share of female work force in total work force is 36.31 percent. The occupational distribution (2001 census) indicates that the share of cultivators was predominant in occupational structure. The occupational structure of main and marginal workers Main workers are those workers who had worked for the major part of the reference period i.e., six months or more are termed as main workers. Marginal workers are those workers who had not worked for the major part of the reference period i.e, less than six months are termed as marginal workers.

5. The proportion of marginal workers is 1/4th of total work force and a higher proportion of marginal workers are engaged in agriculture sector. It indicates that development programs should be devised in such a manner so that adequate employment opportunities on sustainable basis are provided to the marginal workers. It would help in reduction of poverty level as also arresting in migration of labour force from rural to urban area.

Table 3: District wise details of main and marginal workers

District	Main Workers	Marginal workers	Total Workers	%age of marginal workers to total workers
Uttarakashi	114842	21062	135904	15.50
Chamoli	96900	67829	164729	41.18
Tehri Garhwal	181205	83510	264715	31.55
Dehradun	336504	63971	400475	15.97
Pauri Garhwal	171647	98224	269871	36.40
Rudraprayaga	76068	25965	102033	25.45
Haridwar	353556	71707	425263	16.86
Pithoragarh	124062	74647	198709	37.57
Almora	204649	87533	292182	29.96

Nainital	220995	57952	278947	20.78
US Nagar	300141	92015	392156	23.46
Bageshwar	85613	33231	118844	27.96
Champawat	56165	34043	90208	37.74
Total	2322347	811689	3134036	25.90

6. The district which are having high proportion of marginal workers than State average(25.90%) are Chamoli, Tehri Garhwal, Pauri Garhwal, Almora, Pithoragarh, Bageshwar and Champawat which indicates that employment opportunities on sustainable basis needs to be generated in these districts particularly under wage employment. In addition to this, the number of unemployed persons registered was 4.14 lakh (2005-06).

Table 4: Classification of Workers and Its Percentage to Total Workforce

Numbers in Lakhs					
Type of workers	Main workers	Marginal workers	Total	Male	Female
Cultivators	10.67 (34.0)	2.03 (16.1)	15.7 (5.01)	6.84 (21.8)	8.86(28.3)
Agricultural laborers	1.43(4.6)	1.17(3.7)	2.6(8.3)	1.90(6.1)	0.69(2.2)
Household Industry	0.49(1.6)	0.23(0.7)	0.72(2.3)	0.44(1.4)	0.29(0.9)
Others	10.63(33.9)	1.69(5.4)	12.32(39.3)	10.78(34.4)	1.54(4.9)
Total	23.22(74.1)	8.12(25.9)	31.34(100)	19.96(63.7)	11.98(36.3)

2.4 Land Use

7. Like most other hill economies, the people of Uttarakhand practice integrated systems of farming, forestry, horticulture, livestock and off-farm activities. The recorded forest area constitutes 64.79% of the total reported area, though the actual cover based on remote sensing and satellite imagery information is only 44 percent. The net sown area for the region is a little over 13% of the total reported area, although there are wide variations in this percentage from district to district. About 33% of the total area in Uttarakhand is either rocky/ snow covered/ glaciated or otherwise unproductive and degraded land. About 12% of agricultural land has got irrigation and about 90% land is used for growing cereals, fodder (berseem) and some vegetables. Nearly 30% of the geographical area of the State has been classified into various types of degraded land, while 53% of the area falls in the category of severe and very severe soil erosion. The land use pattern of the state is given below:

Table 5: Land Use

Land Use	Area in '000 Ha	Percentage
Total geographical area	5,348	
Reporting Area for land utilization	5,673	100.00
Forests	3,486	61.45
Not available for land cultivation	441	7.77
Permanent pastures and other grazing lands	199	3.51
Land under miscellaneous trees crops and groves	384	6.77
Culturable wasteland	303	5.34
Fallow lands other than current fallows	71	1.25

Current fallows	35	0.62
Net area sown	754	13.29

2.5 Water Regime

8. State of Uttarakhand has a varied hydrogeological setup and can be divided broadly into two distinct hydrogeological regimes viz. the Gangetic alluvial plain and the Himalayan mountain belt. The former is covered with a vast expanse of alluvium and unconsolidated sedimentary material of varying size fractions (ranging from boulder to clay) and is a promising zone for ground water development. The latter zone, being predominantly hilly, offers much less potential for large scale development of ground water. Ground water in the hilly region occurs mostly in fissures/fractures and emerges as springs. The springs are amenable to small scale development of ground water resources in the State. The yield of tube wells in Shiwalik formation ranges from 50.4 m³/hr to 79.2 m³/hr, in Bhabar formations yield is upto 332.4 m³/hr. In Tarai belt yield of tubewell ranges 36m³/hr to 144 m³/hr and in Indo-Gangetic plains yield varies from 90 m³/hr to 198 m³/hr.

9. The main drainage system in Uttarakhand has been grouped into following six catchments.

2.5.1 Yamuna Catchment

10. The Yamuna River originates from the base of Bandarpunch peak. It has carved a deep V- shaped gorge. Yamuna cuts across the Nag Tibba range and Mussoorie range near a place called Yamuna Bridge. The rivers Tons, Pabar and Aglar are its important tributaries. It passes through the Doon valley on its Western boundary.

2.5.2 Bhagirathi Catchment

11. This is one of the two rivers which join to form the river Ganga. It originates from the snout of the Gangotri glacier at Gaumukh which is at the base of Chaukhamba peak. Bhagirathi has cut a deep gorge across the granitic rocks of the higher Himalayas of Garhwal. Its main tributaries are the river Janhavi and the Bhilangan.

2.5.3 Alaknanada Catchment

12. This river joins the river Bhagirathi at Devprayag to form the river Ganga. It originates from the eastern slopes of Chaukhamba from the Bhagirathi kharak and Satopanth glaciers. The river flows along the Badrinath temple. Its main tributaries are the Khiraonganga, Pindar Dhauliganga, Birahi, Nandakini, Mandakini etc. It has formed a broad valley at Srinagar (Garhwal).

2.5.4 Mandakini Catchment

13. It comes out from the Mandakini glacier near Kedarnath. It cuts through a gorge of glacial debris. The river has formed road terraces at Augustmuni and Tilwara. At Tilwara it

is joined by the river Lastar Gad. The river Mandakini joins the river Alaknanda at Rudraprayag.

2.5.5 Pindar Catchment

14. The river Pindar originates from the Pindari Glacier which is located between Nanda Devi and Nanda kot peaks. Sundardhunga river joins the Pindar near Dhakuri. The Pindar joins the river Alaknanda near Karanprayag.

2.5.6 Kali Catchment

15. The river Kali forms the boundary between Kumaon and Nepal. The Towns of Champawat and Pithoragarh are situated on the back of the Kali River. Its important tributaries are Darma and Saryu rivers.

2.5.7 Drainage

16. The State is Drained by major perennial rivers like Ganga, Yamuna, Ramganga, Sarda, Kali and their tributaries.

2.6 Ground Water Quality

17. The groundwater quality is indicated in the below table:

Table 6: Groundwater Quality

Contaminants	Districts affected(in part)
Nitrate (>45mg/l)	Dehradun, Hardwar, udhamsinghnagar

2.7 Rainfall and Climate

18. The rain fall and climate data is given in the table below:

Table 7: Rainfall and Climate

A	Lower hills, rain fed	Below 1000mm above msl
B	Mid hills, rain fed north aspect	1000 – 1500 mm above msl
C	Mid hills rain fed south aspect	1000 – 1500 mm above msl
D	Mid hills, irrigated	1000 – 1500 mm above msl
E	High hills rain fed north aspect	1500 – 2400 mm above msl
F	High hills rain fed south aspect	1500 – 2400 mm above msl
G	Very high hills	Above 2400 mm above msl

2.8 Soil, Rain fall & Major Crops

19. The soil, rainfall and major crops data by district is presented in the table below:

Table 8: Soil, Rainfall and Major Crops by district

S.No	Districts	Major Soil	Rainfall	Major Crops
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1	Almora	Brown Forest Soil, Red to Dark, Black Clay	1192.35	Wheat ,Paddy, Ragi
2	Bagheshwar	Brown Forest Soil, Red to Dark, Black Clay	912.19	Wheat ,Paddy, Ragi
3	Chamoli	Brown Forest Soil, Red to Dark, Black Clay	1047.00	Wheat ,Paddy, Ragi
4	Rudraprayaga	Brown Forest Soil, Red to Dark, Black Clay	1159.86	Wheat ,Paddy, Ragi
5	Champawat	Brown Forest Soil, Red to Dark, Black Clay	1262.00	Wheat ,Paddy, Ragi
6	Dehradun	Alluvial, Sandy , Residual, Brown Forest soil, Red to Dark	1631.10	Wheat ,Paddy, Ragi, Sugarcane
7	Haridwar	Alluvial, Sandy , Residual, Brown Forest soil, Red to Dark	826.16	Wheat ,Paddy, Ragi, Sugarcane
8	Nainital	Alluvial, Sandy , Residual, Brown Forest soil, Red to Dark	1574.00	Wheat ,Paddy, Ragi, Sugarcane
9	Pauri Garhwal	Brown Forest Soil, Red to Dark, Black Clay	1057.09	Wheat ,Paddy, Ragi
10	Pithoragarh	Brown Forest Soil, Red to Dark, Black Clay	842.51	Wheat ,Paddy, Ragi
11	Tehri Garhwal	Brown Forest Soil, Red to Dark, Black Clay	1039.32	Wheat ,Paddy, Ragi
12	U S Nagar	Alluvial, Sandy Soil , Residual Sandy Loam	1459.53	Wheat ,Paddy, Ragi, Sugarcane
13	Uttarakashi	Brown Forest Soil, Red to Dark, Black Clay	1153.96	Wheat ,Paddy, Ragi
			1165.93	

20. Though the rainfall pattern varies from district to district and also with altitudes and slopes, the average annual rainfall in Uttarakhand is 1500 mm. In the 71 development blocks of hill being fully rainfed, the monsoon behavior like onset/ duration of precipitation, intensity of precipitation and withdrawal of monsoon etc. cast great effect on crop production. As per the Annual report of Uttarakhand Organic Commodity Board it is noted that:

- Peak rainfall is shifting from the mid July to mid August.
- The total number of rainy days is shrinking.
- During Rabi Season, rainfall was erratic/ negligible over the years.
- Peak rainfall in Rabi season is shifting towards harvesting season.

21. Of the total States area 9.38% is the net rainfed area under agriculture, 4.79% area is under Horticulture, 24.72% area is under the other categories i.e., areas under non agriculture Use (NAU), culturable wastelands, pasture lands etc. Almora, Bageshwar, Champawat, Dehradun, Pauri Garhwal, Pithoragarh and Tehri Garhwal districts have more than 10% net area under rainfed agriculture. Udham Singh Nagar, Haridwar and Paln areas of Nainital District have mostly irrigated agriculture.

2.9 Agriculture

22. Uttarakhand is largely rainfed, irrigation facilities are minimal, land holdings are small and fragmented, with a predominance of wastelands. Crop yields in Uttarakhand are low and there is a lack of effective marketing infrastructure including all post-harvest activities such as collection of the farm produce from the fields, transportation to warehouse, storage, processing, packaging, access to potential markets, information about prices, and finally marketing the produce at a price which is most remunerative to the farmer. In addition, there is a lack of availability and accessibility to horticultural inputs and the

knowledge/information about suitable and remunerative crops and scientific management practices is scanty. Limited credit facility to farmers, remains another big constraint.

23. Uttarakhand has just 14% of the total land under cultivation and about 65% of population depends on agriculture for their livelihood. The region also suffers on account of heavy soil erosion and significantly lower yields as compared to the national average. Since agricultural income cannot sustain the families for more than four months in a year, each family has almost one or two persons working outside the state that remits regular money to sustain the family for the rest of the year. In this context the state has made a conscious choice of pursuing the path of organic agriculture, which not only fetches a premium price for the farmer with minimum external inputs but is also environmentally benign. Because of a variety of agro-climatic niches that exists within the region, the state has tremendous potential to emerge as a regular supplier of seeds to other states in the country.

24. The state GDP shows clear dominance of the services sector. Given the terrain of the state and climatic conditions, agriculture continues to be the major source of income for more than three-fourths of the state's population. Agriculture and allied activities with an average share of about 37.3 per cent during 1993-94 to 2001-02, is a significant contributor to the state domestic product as against the national average of 27.8 per cent during the period considered.

2.9.1 Cropping Patterns

25. The cropping pattern, crops grown by area, is given in the table below:

Table 9: Crops grown by area

Crops	Area, Ha
Rice	896774
Barley	22508
Manduwa	125163
Sanwan	63002
Maize	28038
Wheat	280108
Others	8746
Urad	12980
Masoor	12295
Peas	3451
Gahat	4614
Groundnut	1112
Sugarcane	108255
Onion	2353
Rajma	4614

2.9.2 Livestock

26. The livestock population, based on 2001 census, are given below:

Table 10: Livestock Population

State/ Livestock	Cattle	Buffaloes	Sheep	Goat	Pigs	Dogs & Rabbits	Other	Total Animals	Total Poultry
Uttarakhand	2235116	1219518	290411	1335306	19822	256958	3309	5141011	2601852

2.10 Industries

27. Directorate of industries is the State level office responsible for implementing the policies and programmes for Industrial Development in the State. The main aim of Directorate of Industries is to provide a comprehensive framework to enable a facilitating, investor environment for ensuring rapid and sustainable industrial development in Uttarakhand and through this to generate additional employment opportunities and to bring about a significant increase in the State Domestic Product, eventually widening the resource base of the State.

Table 11: Type of Industries

Type of Industry	Number
Khadi Udyog	859
Small Scale Industries	40049
No.of Factories	2739

2.11 Forest

28. The recorded forest cover of the State is 34,651 km², which constitutes 64.79% of its geographic area. However, in the recent past this has increased to 71.04% due to declaration of previously unclassified areas as forests. These forests can be further categorized into Reserved Forests (68.74%), Protected Forests (0.36%) and Unclassed Forest (30.9%). The forest cover of the State is estimated to be about 44%, two third of which is dense and the rest is open forest. The forests in the state are spread between a very broad altitudinal range of 300m and 3500m. Eight of the sixteen known forest types in India exist here. These forests have varied vegetation types ranging from tropical deciduous to alpine vegetation. The forests can be broadly categorized into two categories; the hill forests and the lower Shiwalik hill forests, more commonly known as Bhabbar and Terai forests. Major forest types occurring in the State are Tropical Moist Deciduous, Tropical Dry Deciduous, Sub-Tropical Pine, Himalayan Moist temperate, Himalayan Dry Temperate, Sub Alpine and Alpine Forest. Forests are largely distributed throughout the State with conifers and sal being the major forest formations. The State has 6 National Parks and an equal number of Wildlife Sanctuaries covering an area of 0.71 million ha, which constitutes 13.35% of its geographic area. The famous Corbett Tiger Reserve is located in the State covering an area of 0.13 million ha. Nanda Devi Biosphere Reserve, having an area of 0.59 million ha. is also located in this State.

S. No.	District	Geographical Area	2011 Assessment				Percent of GA
			Very Dense Forest	Mod. Dense Forest	Open Forest	Total	
1	Almora	3139	222	928	427	1577	50.24
2	Bageshwar	2246	194	883	304	1381	61.49
3	Chamoli	8030	427	1586	682	2695	33.56
4	Champawat	1766	336	571	274	1181	66.87
5	Dehradun	3088	584	695	328	1607	52.04
6	Pauri Garhwal	5329	523	2094	672	3289	61.72
7	Haridwar	2360	26	353	240	619	26.23
8	Nainital	4251	601	1923	566	3090	72.69
9	Pithoragarh	7090	567	1115	412	2094	29.53
10	Rudraprayag	1984	246	581	298	1125	56.70
11	Tehri Garhwal	3642	298	1232	617	2147	58.95
12	Udham Singh Nagar	2542	171	247	128	546	21.48
13	Uttarakashi	8016	567	1959	619	3145	39.23
	Grand Total	53483	4762	14167	5567	24496	45.80

29. The forests of Uttarakhand are not only indispensable repositories of important plant species that give food, fuel, fodder and shelter, but are also vital for maintaining the ecosystems in and around the state. It is well recognized that forests play a pivotal role in building the socio-economic structures around the primary relationship with the natural resources and livelihoods. The forests are socially and economically interlinked with the people in the hills and play an important role in the general economy and development of the region.

30. In the Shiwalik, Bhabar and Terai tracts the main forest type is deciduous forest, Sal being the main species. As one moves higher in the Himalayan zone the forests are mainly coniferous, Chir pine being the main species along with some Deodar and Fir forests. The Oaks and other broad leaved species are interspersed with coniferous forests and occupy more favorable areas with better soil and moisture condition. These forests are vital for maintaining the gene pool, biodiversity, ecological balance and productivity.

31. Grasslands and other grazing resources occupy a very important position in the hill agriculture and the grassland utilization is an important component of the hill farming system. Grasslands are found in plains and high altitude. In the plains they are called *chaurs* and comprise of typical grasses, which grow up to a height of 2 m. These habitats are ideal for predators while providing forage and fawning cover for herbivores. The alpine grasslands, locally called *bugyals*, occur at altitudes above 1000 m. The herbage utilized during grazing is the largest fodder resource followed by crop residues, tree leaves,

concentrates and cultivated fodder. The land constraint has always guided the farmers to utilize most of the cultivated land for food production. Fodder cultivation is the last priority in the hills. This further strengthens the importance of grasslands for the sustenance of huge population of livestock. Besides grazing, these grasslands are also used for harvesting hay which is essential for maintaining the livestock during lean periods.

32. Van Panchayats in Uttaranchal were born out of conflicts and compromises that followed the settlements and reservations of forests in the hills at turn of the last century. The first government approved Van Panchayat was thus formed in 1921. According to recent estimates, there are 6,069 Van Panchayats managing 405,426 hectares of forests (13.63% of total forest area) in the state. Most of these have been carved out of civil (protected) forests under the jurisdiction of the Revenue Department. The area under each Van Panchayat ranges from a fraction of a hectare up to over 2,000 hectares.

33. It may be mentioned here that Community forests managed in accordance with Van Panchayat Act is a hybrid of state ownership and community responsibility. In its efforts to manage and control community forest use Forest committees are guided by Revenue Department rules and by the technical advice of the Forest Department. In contrast to civil forests, community forests or Panchayati forests as they are popularly known are not open forests. Access and use of forests is guided by rules elaborately designed and implemented by the communities. In fact four identifiable working rules exist relating to Use, Monitor, Sanctions and Arbitration. Though only notionally or nominally owned by the communities, community forests are in a very real sense common property with an identifiable user group, have finite subtractive benefits and are susceptible to degradation when used beyond a sustainable limit. However what is more important is that the local users consider them as their collective property and in real sense they are not actually divisible. These forests though are not completely immune from misuse and the condition of the forests varies from poor to very good. Despite being an excellent example of state-people partnership which has been relatively successful in managing forest resources in the region, the institutions are facing challenges from unrealistic and target driven policies which would affect its democratic functioning. There is a need to replicate such institutions in other areas rather than interfering with the existing ones.

34. Forests play an important role in the economy of the state. Timber and fuel form the major produce group, while bamboo, drugs, grasses, gum and resins etc., the minor produce group. Forests are the major source of raw materials for industries, buildings, railways and other tertiary sectors. There is an increased pressure on forests for fuel, fodder and timber requirements that is having an effect on the desired level of forest density and productivity of forests.

2.11.1 Potential for forestry and waste land development

35. The State has good forest cover which needs to be protected. The State has also large scale wood based industries in the form of paper mills, Plywood units, Katha factories and rosin factories and small scale units mainly of saw milling, carpentry, packing cases, sports goods, furniture, carving, toys, etc. with large scale building activities both in private and public sector, residential and other purpose, consumption of wood in solid and processed

form has gone up. This has resulted in increased demand of forest produce specially timber and will certainly put additional pressure on the existing forests.

2.11.2 Resin

36. Resin obtained from the chirpine trees is an important non-wood forest produce. Resin and turpentine are used in the paper, soap and paint industry. Resin extraction is an important livelihood opportunity for the rural population at present in Uttarakhand. There are 116 resin based industries in the State. Resin extraction was experimentally started in the year 1916 and from the year 1920 regular extractions started. Till the year 1993 resin extraction was done through French cup and lip technique. Though, the Resin extraction per tree varied between 1.5 to 1.75 kg, it lead to extensive 28 damage of the chirpine tree. From the year 1994 resin extraction is being done through the Rill Technique through this technique the damage of the trees is limited. Extraction is done from the month of October to March. Resin so collected is then auctioned to various industries. In the year 2006-07 Rs. 4632.87 lakh worth resin was auctioned by the State.

2.11.3 River Bed Material

37. In the Bhabar areas of the State a lot of boulders and sand collects in the rivers after the rains. Collection of this river bed material is an important livelihood option for the locals of the area. The State Forest Department takes due permission from the GoI for the removal of RBM. The amount of RBM to be removed every year from each river is calculated on technical basis and these areas are then leased out to the Forest Corporation for removal. The Corporation in turn engages local people for removal of RBM. This RBM is then taken to various stone crusher units for grading and sorting purposes. In the year 2006-07 the Forest Corporation earned revenue to the tune of Rs. 4531 lakhs through RBM removal. The main rivers in which RBM removal is done are Gaula, Sharda, Kosi, Dabka, Ganga, Yamuna and Song.

2.11.4 Bamboo

38. Uttarakhand comes under bamboo deficit area. There are 7 major species of bamboos viz. *Dendrocalamus strictus*, *D. hamiltonii*, *Bambusa nutans*, *Arundinaria faccata*, *Themonocalamus spathiflora*, *Himalecalmusfalconeri*, *Sinarundunaria jaunserensis*. Forest land under Bamboo is 139409 ha. Major bamboos markets in Uttarakhand are Haldwani, Dehradun, Ramnagar, Khatima and Jwalapur.

2.11.5 Uttarakhand Bamboo and Fiber Development Board

39. In order to promote bamboos in Uttarakhand, the State Government has set up Bamboos and Fiber Development Board. The Board has identified three naturally occurring Bamboos viz. *Bambusanutans*, *D. Strictus* & *D. hamiltonii* for promotion in the State. Recently, the State Government has signed a MoU with a Thailand based company which would invest a sum of Rs. 211 crores for bamboo plantation activities in Van Panchayats of Uttarakhand. Uttarakhand Bamboo and Fibre Development Board has set up two Ajeevika Vatika's at Peepalkoti, Chamoli and Kapkot, Bageshwar. The key components in these

Vatika are bamboo and fiber nursery, demonstration plantation, bambusetum, treatment and processing of bamboos, training facilities for artisan's production and marketing of bamboo products. The board has established a High tech Nursery in Haridwar district with a capacity of 2.0 lakh seedlings. The Board is also conducting trainings on Ringal Design Prototype Development in Ringal handicrafts, Bamboo furniture making, skill upgradation and diversification trainings, Bamboo housing demonstration and training, entrepreneur development etc., under National Bamboo mission launched by GoI.

2.11.6 Jatropha plantation

40. The State of Uttarakhand has potential for promoting Jatropha especially in the low elevation areas. For this purpose state government has set up Uttarakhand Biofuel board. The board plans to raise Jatropha plantation on Van Panchayat lands in different forest divisions by selecting intended beneficiaries from Van Panchayat members. The plantation will be raised mainly on wasteland/ degraded Van Panchayat lands. The State Government has planned to cover around 2.0 lakh ha area under Jatropha plantation in two phases through the Board. However, in the first phase, 1.0 lakh ha would be covered in four years i.e. 25000 ha each year for 2005-06, 2006-07, 2007-08 and 2008-09. The Board has assured buyback arrangement of 30 Jatropha seeds through Forest Development Corporation which in turn will supply seeds to Uttarakhand Biofuel Company for processing.

2.11.7 Carbon stock and mitigation potential of forests

41. A comprehensive study by Roy and Joshi (undated) based on the remote sensing data has reported 266.96 Mt of C in the biomass pool of state forests. As per this study total Carbon content in pools of biomass, forest floor litter and soil is 537.02 MT.

2.12 Bio diversity

42. The State is well known for its rich natural resources and varied ecosystems, both terrestrial and aquatic. Four major rivers flowing through north India originate from the State, viz., Ganga, Yamuna, Ramganga and Sharada. The State is endowed with a rich and diverse array of forest types from tropical to alpine types. Based on the Champion and Seth, 1968 classification, eight forest types are typical to the state of Uttaranchal. These are given below.

43. **Moist Alpine Scrub:** This occurs at the tree line around an altitude of 3500 m. The major species are *Betula utilis* and *Rhododendron campanulatum*.

44. **Sub-alpine Forests:** This type of forests exists at altitudes of 2900 m to 3500 m in the middle and upper Himalayas. The forests are characterized by patches of *Abeis-Betula* forests interspersed with shrubby growth and grassy patches or alpine grasslands called *bugyals*.

45. **Himalayan Dry Temperate Forests:** This type is found in the inner dry trans Himalayan valleys of the state. Major species occurring in these forests is *Cedrus deodara*, *Pinus wallichiana* and *Juniperus* species.

46. **Himalayan Moist Temperate Forests:** This type of forest is found between the altitude of 1600 to 2900 m in the Himalayas and is characterized mainly by coniferous species such as *Cedrus deodara*, *Picea smithiana*, *Abies pindrow*, *Quercus spp.*, *Betula spp.*

47. **Subtropical Pine Forests:** These forests grow in lower regions of the Himalayas and pines are the dominant species.

48. **Tropical dry deciduous forests:** These forests occur in the dry southern faces of Shiwaliks and adjoining plains. The forests are open and mixed with *Shorea robusta*, *Anogeissus latifolia*, *Terminalia tomentosa* etc. as the major species.

49. **Littoral & Swamp Forests:** This type of forest occurs at a few location in the valleys of foothills. The forests are characterized by the presence of moisture loving species such as *Syzigium cumini*, *Ficus glomerata*, *Pterospermum acerifolium* and *Diospyros embrioptyris*. The undergrowth is characterized by the presence of cane *Calamus tenuis*.

50. **Tropical Moist Deciduous Forests:** These multi storey forests are found in moist regions of the lower Himalayas and Terai arc. This type of forest is characterized by a top storey of deciduous species such as *Shorea robusta*, *Adina cardifolia*, *Anogeissus latifolia*, *Terminalia tomentosa* and a second storey of many species with some evergreen shrubby undergrowth interspersed with patches of bamboo, climbers and canes.

51. The State has considerable area (13.68% of its geographic area) under protected area network as compared to the national average of 4.8%. There are six National Parks, six Wildlife Sanctuaries, one Biosphere Reserve, and two Conservation Reserves. The Nanda Devi NP and Valley of Flowers NP have been inscribed on the UNESCO World Heritage List. In terms of floral wealth, the State harbours about 4500 species of vascular plants, of which 29 species are endemic.

52. The mammalian diversity of Uttarakhand represented by more than 75 species is one of the richest in the country. Species falling under lower risk category represent a little more than 50% indicating that the species with threatened status represent nearly half of the total species found in the State. Some of the threatened/vulnerable mammals in the State include Musk deer (*Moschus chryogaster*), Snow leopard (*Panthera uncia*), Himalayan brown bear (*Ursus arctos isabellinus*) and Asiatic black bear (*Ursus thibentanus*). About 37.80% of species fall under lower risk least concern category and 19.51% under lower risk not threatened status. It is estimated that about 650 species of birds (51% of India's avifauna) occur within the State. Some of the threatened birds in the State include Western Tragopan (*Tragopan melanocephalus*), Cheer Pheasant (*Catreus wallichii*) and Sarus Crane (*Grus antigone*). The reptile diversity in Uttarakhand encompasses over 60 species including crocodiles, turtles, tortoises, snakes and lizards. One of the endangered reptiles of the State is the Gangetic Gharial (*Gavialis gangeticus*).

53. The State of Uttarakhand which is a home for many perennial rivers of the country also has a good fish diversity represented by about 125 species. The Bhagirathi and Alaknanda river basins represent two important riparian ecosystems that have significantly contributed to the richness of the biodiversity of the State.

54. Uttarakhand is beautiful state set at the foothills of the snow clad Himalayas with lush green vegetation. There is a diverse range of flora and fauna in Uttarakhand, India. The vegetation of the state majorly comprises alpine trees and tropical rainforests. Wildlife in Uttarakhand thrives in these dense forests. With the varied flora and fauna in Uttarakhand, a number of National Parks have been set up in different parts of the country, which not only serve as a natural habitat for Uttarakhand flora and fauna, but also as a huge source of information for tourists who visit these parks. The state falls under the west Himalayan Biogeography zone and it is well-known for floral diversity similar to any other Himalayan region in the country with an estimated 4,000 species of flowering plants having great economic medicinal, aromatic and artistic value. The endemic plant wealth of Uttarakhand is worth mentioning as it ultimately forms part of the National heritage. Uttarakhand Himalayas have about 116 species as indigenous group. *Are naria ferruginea*; *Chimonobambusa jaunsarensis*, *Gentian tetrasepala*, *G. saginoides*, *Meeboldia solenoids*, *Microschoenus duthiei*, *Trachycarpus takil*, *Poa rhadina*, etc. are some such species.

63. Besides, many plant species new to science have been added from different parts of Uttarakhand. Some such species are *Anemone raui*, *Arenaria curvifolia*, *Carex nandadviensis*, *List era nandadeviensis*, *Saussurea sudhanshui*, *Euphorbia sharmae*, *Androsace garhwalicum*, etc. More interesting to note is the presence of one of the smallest flowering plants *Arceuthobium minutissimum*, parasitising over *Pinus gerardiana* (Chilgoza) and the tallest plant of Asia, the *Pinus roxburghii*, in Uttarkashi district. The sacred Mulberry, *Morus serrata*, said to have been planted by the Adi Shankaracharya at Joshimath, the tree fern *Cyathea spinulosa*, the gigantic *Aesculus indica* on way to Panwali, the tall Shore a Robusta (Raja Sal) near Byasi are some other curiosities of the area. The narrative of the plant wealth of Uttaranchal will not be complete unless a mentioned about the sacred plants commonly used in worship in "The Abode of Gods". Besides, the earlier mentioned "Brahmakamal", *Zanthmlum armatum* (Timur), *Prunus puddum* (Panya), *Skimmia laureola*, *Primula denticulata*, and *Artemisia nilagirica*, Eagle marvelous etc. are offered to deities. Some other representative and interesting plants of Uttaranchal are enumerated below with a brief description:

64. The vegetation of Uttarakhand can be divided in the following zones:

2.12.1 Sub-Tropical Zone of Uttarakhand

65. The sub-tropical zone has pure as well as mixed forests of Shore Robusta (Sa I), the others being *Lannea coromandelica* (Jhingan), *Buchanania lanzan*, *Dalbergia disso* (Shis ham), *411 Haldina cordifolia* (Haldu), *Syzygium cumini* (Jamun), *Mallotus philippinensis* (Rohini), *Mitragyna parvifolia*, *Terminalia* spp. (Myrobalans), *Ficus* spp. (Figs), *Macaranga pustulata*, *Callicarpa arborea*, *Diopoknema butyracea* (Chyura), *Bauhinia variegata* (Kachnar), *Bomb axcobia* (Semal), *Lydia claying* (Pula), *Schleicher oleos* (Kokum), *Holoptelea integrities* (Karanj), *Cassia fistula* (Amaltas), *Nyctanthes arbor-tristis* (Parijat), *Anogeissus latifolia* (Bakli, Dhaura), etc. The shrubbyvegetation is represented by *Murraya koenigii*, *Carissa opaca*, *Clerodendrum viscous*, *Adhatoda vasica*, *Jasminum multiflorum*, *Solanum erianthum*, *Cal/icarpa macrophylla*, *Eranthem um nervosum*, *Phlogacanthus thysiform is*, *Jatropha curcas*, *Rhus parviflora*, *Dodonaea viscosa*, *Woodfordia fruticosa* and many others.

2.12.2 Temperate zone of Uttarakhand

66. The Temperate zone is marked by the presence of *Quercus leucotrichophora* (Banj oak), *Rhododendron arboretum* (Burans), *Myrica esculenta* (Kaphal), *Leonia ovalifolia* (Aynor), *Ilex diphylla*, *Quercus semecarpifolia* (Kharsu Oak), *Q. dilatata* (Moru Oak), etc. The coniferous forests in this zone are unique. Pure stands of *Pinus roxburghii* (Chir Pine) and *Cedrus deodar* (Deodar, Cedar), *Abies windrow* (Raga), *Pinus wallichiana* (Kali), *Taxus wallichiana* (Thuner, Himalayan Yew) at places give a pristine look to the slopes. The slopes in temperate zone also have insectivorous plants like *Drosera peltata* and species of *Utricularia*. Another such species is *Pinguicula alpina* seen in Martoli Bugyal, Kurnaon. The Saprophytes and Parasites are also well represented by *Monotropa unitiora*, *Dendrophthoe falcata* (Banda), *Balanophora in volucrata*, and species of *Viscum*, *Korthalsella*, *Arceuthobium*, *Scurrula*, etc. The zone has a variety of useful plants, some of them well known for centuries. These include *Cedrus deodar*, *Pinus* spp, *Abies pindrow*, *Quercus* spp, *Aconitum neterophyllum*, *Paeonia emodi*, *Swertia chirata*, *Bergenia ciliate*, *Dioscorea deltoidea*, *Angelica glauca* (Choru), etc.

2.12.3 Sub-Alpine and Alpine Zones of Uttarakhand

67. The altitude above 3,000 metres is generally considered a zone of sub-alpine and alpine vegetation. The tree species are represented by *Pinus wallichiana*, *Abies pindrow*, *Prunus cornuta*, *Aber caesium*, *Betula utilis* (Bhoj Patra) and *Salix* sp. Species of the genera *Cotoneaster*, *Rosa*, *Berberis*, *Ribes*, *Junipers*, *Rhododendron anthropogenic*, *Rhododendron campanulas* are the shrubby components of the zone. The herbaceous vegetation is represented by a number of species of genera *Potentilla*, *Primula*, *Aster*, *Saxifrage*, *Achaeon*, *Delphinium*, *Polygonum*, *Corydalis*, *Pleuraspermum*, *Isoetes*, *Pedicularis*, *Saussurea*, *Rheum*, *Silene*, etc. The Bugyals of this zone are well known for a rich and diversified flora. Plant species like *Nardostachys grandiflora* (Jatamansi), *Podophyllum hexandrum* (Himalayan May-Apple, Papri), *Picrorhiza kurrooa* (Kutaki), *Gentiana burro*, *Atropa berithonic* (Bal char), *Rheum moorcroftianum* (Dole), *Ephedra Gerardiana*, *Dactylorhiza hatagirea* (Hafthajari), etc., common in this zone, are of immense medicinal value.

68. The floral diversity is further exhibited by the species that grow in the rain shadow areas of Uttarakhand. Such species develop adaptive characters to survive the wrath of adverse climate. *Labium rhomboid*, *Thylacospermum caespitosum*, *Acantholimon lycopodioides*, *Dracocephalum heterophyllum* etc are a few such examples.

2.12.4 Orchids

69. Uttarakhand has more than 225 species of this charming group, well known for ornamental flowers with great horticultural potential and long shelf life. *Aerides*, *Coologyne*, *Cymbidium*, *Dendrobium*, *Thunia* and *Rhynchostylis*, for which Mandai, Baram, Shandev, Dafia Dhoora, Kaflani, etc are rich. Among the global orchids, species of *Calanthe*, *Habenaria*, *Anoectochilus*, *Satyrium*, etc are fairly common while the Lady's Slipper Orchid-*Cypripedium* is scarcely distributed.

70. Many small river valleys offer wonderful experience to nature lovers and hikers. The vast open hay field, above the tree line presents endless views of the variously colored Himalayan flowers. The most interesting of them, aesthetically or botanically are seen in the higher altitudes, from 2,450 meters and above. The arrival of spring brings forward an uprising of colours when the Semal and Palash put the lower altitude forests on fire with their blazing red flowers. It is also the time for Burans to spread its fire at a height of or above 2,450 metres adding colour to the blue and white panorama of snow. The flowers do not grow only in the Valley of Flowers but are found on different treks habitually up to great heights as also on the hayfield and even in rock cracks or moraines.

2.12.5 Parks and Sanctuaries

71. Dev Bhoomi Uttarakhand is a place on earth where nature has bloomed into its youth and never grown old. 64% of the total land of Uttarakhand is covered with forest. There are 6 National Parks and 9 Wildlife Sanctuaries in Uttarakhand which cover 13.8% of the total area of the state providing enough space for students, biologists, ornithologists, zoologists and ecologists to research and study on plants, birds, insects and animals. The parks and sanctuaries are located from 800 meters to high altitude protected areas of 5400 meters.

72. This bio-diversity has made possible for wide variety of flora and fauna to attract national and international tourists, researchers and specialists in Uttarakhand. There are almost 300 species of wild flowers, 4048 species of plants among which 116 species are limited to Uttarakhand only. Similarly, there are 102 species of mammals, 623 species of birds, 124 species of fish, 69 species of reptiles and 19 species of amphibians in Uttarakhand.

73. Various species of birds, animals and plants including the rare and endangered animals and birds like Ghoral (goat antelopes), Monal, Musk Deer and Snow Leopard are preserved in the parks and sanctuaries of Uttarakhand. Some of the must watch species are black bear, common otter, deer, Indian tiger, jungle cat, king cobra, langur (monkey), leopard, porcupine, python, rhesus monkey, sloth bear and wild dog. The common animals in Uttarakhand forests are antelopes, butterflies, goat, oxen and wild sheep.

74. The following given are the National Parks, Conservation Areas and Wildlife Sanctuaries of the state. Though district in which they fall is mentioned, often they do not confirm to district boundaries.

National Parks

1. Jim Corbett National Park at Ramanagr in Nainital District.
2. Gangotri National Park, at Gangotri in Uttarakashi District.
3. Govind Pashu Vihar and National Park at Dharkwadi near in Uttarakashi District.
4. Nanda Devi National Park at ghangharia in Chamoli District.
5. Rajaji National Park, Dehradun in Dehradun District.
6. Valley of Flowers National Park at ghangharia at Chamoli District

Aranyam Eco Herbal Park at Gopeshwar in Chamoli District is a popular park.

Conservation Areas

1. Jhildi Tal Conservation Reserves at Haridwar Forest area in Haridwar District.
2. Asan Conservation Reserves at Dhalipur Village in Dehradun District.
3. Jhildi Jhell Conservation Reserves at Left bank of Ganga River in Chidaypur Forest range area in Haridwar District.

Wildlife Sanctuary

1. Askot wild life Sanctuary, Pithorgarh District.
2. Assam Barrage Birds Sanctuary in Dehradun District.
3. Binog wildlife Sanctuary at Mussoorie in Dehradun District
4. Binsar Wildlife Sanctuary at Near Almora city in Almora District
5. Govind Wildlife Sanctuary at purola tehsil in Uttarakashi District
6. Kedarnath Sanctuary at Garhwal in Chamoli and Rudraprayaga Districts.
7. Malan Sanctuary
8. Motichur Sanctuary at Dehradun District.
9. Sonanadi Wildlife Sanctuary at Kotdwar tehsil in Pauri Garhwal district.

3. Laws and Regulations - Environment and Social

3.1 Introduction

1. This chapter deals with the laws, regulations and policies, of Government of India, Government of Uttarakhand and the World Bank, related to environment and social issues. Only the laws, regulations and policies relevant to the project are discussed here. This sections needs to be updated as when new laws, regulations and policies are made and enforced or the existing ones are revised.

3.2 Operational Policies and Directive of The World Bank

2. The relevant and applicable safeguards policies of the World Bank are also reviewed. The below table describes the relevant safe guard policies of the World Bank and discusses their applicability to the project.

Table 13: Operational Policy and Directives of World Bank

Policy	Key Features	Applicability to this project
OP/BP 4.01 Environmental Assessment	<p>Potential environmental consequences of projects identified early in project cycle. EAs and mitigation plans required for projects with significant environmental impacts or involuntary resettlement. EAs should include analysis of alternative designs and sites, or consideration of "no option" Requires public participation and information disclosure before Board approval.</p>	<p>Applicable. Specific interventions envisaged under the project such as those for flood control, irrigation and strengthening of transport network may have some potential adverse environmental impacts in their area of influence. Such impacts will depend upon the location, nature and magnitude of interventions - there will be clarity on this once the said details are known and the results from the environment screening process are available. OP 4.01 has been triggered to ensure that such investments are planned and designed to be sound and sustainable by integrating environmental dimensions into the over-all decision making process. Identification of any potential impacts and mitigation/enhancement measures to address likely impacts is proposed.</p>

Policy	Key Features	Applicability to this project
OP/BP 4.04 Natural Habitats	<p>Prohibits financing of projects involving "significant conversion of natural habitats unless there are no feasible alternatives".</p> <p>Requires environmental cost benefit analysis.</p> <p>Requires EA with mitigation measures.</p>	<p>Applicable.</p> <p>The proposed activities such as construction of rural roads and connectivity infrastructure could have impacts natural habitats, flora fauna and the local natural ecosystem. To mitigate such impacts, assessment procedures and mitigation measures have been put into place through the ESMF so that any likely negative impacts on the natural environment are minimized.</p> <p>After the screening results are available, the safeguard policy trigger on natural habitats will be ascertained, particularly in context of proposed activities such as improvement/ strengthening of existing embankments, channel improvements, dredging and other flood protection works. While impacts on critical natural habitats are not envisaged based on currently available information, the safeguard related studies will determine if such an issue is likely to arise on account of a such specific sub-project interventions.</p>
OP/BP 4.36 Forestry	<p>Prohibits financing for commercial logging operations or acquisition of equipment for use in primary moist tropical forests.</p>	<p>Applicable.</p> <p>No commercial logging is to be supported under the project. However, some activities under the project can have impacts on the health of forests. Some minor realignments of roads in cases where current alignments are not usable may require going into Forest areas and therefore affect forests. Also in the case of change of bridge locations this remains a possibility.</p>
OP 4.09 Pest Management	<p>Supports environmentally sound pest management, including integrated pest management, but does not prohibit the use of highly hazardous pesticides.</p> <p>Pest management is the borrower's responsibility in the context of a project's EA.</p>	<p>Not Applicable</p> <p>Project is not financing any activities related to agriculture or horticulture or procurement of any pesticides.</p>

Policy	Key Features	Applicability to this project
OP/BP 4.12 Involuntary Resettlement	<p>Implemented in projects which displace people.</p> <p>Requires public participation in resettlement planning as part of SA for project.</p> <p>identification of “those who have formal legal rights to land (including customary and traditional rights recognized under the laws of the country.</p> <p>Intended to restore or improve income earning capacity of displaced populations in addition to their resettlement.</p> <p>Intended to provide compensation for lost assets and other resettlement assistance to “those who have no recognizable legal right or claim to the land they are occupying.</p>	<p>Applicable.</p> <p>Some project interventions are likely to trigger issues such as those related to land acquisition, loss of assets and impact on livelihood sources. Identification of any potential impacts and mitigation measures to address likely impacts is proposed. Transfer of Government land under different tenure systems could trigger adverse impacts such as loss of access to natural resources – firewood, fodder, water etc and loss of sources of income/ livelihood/ shelter/ homestead.</p>
OP/BP 4.10 Indigenous Peoples	<p>Purpose is to ensure indigenous peoples benefit from Bank financed development and to avoid or mitigate adverse effects on indigenous peoples.</p> <p>Applies to projects that might adversely affect indigenous peoples or when they are targeted beneficiaries.</p> <p>Requires participation of indigenous peoples in creation of “indigenous peoples development plans”.</p>	<p>Not Applicable.</p> <p>The project is not dealing with forests or livelihoods, because of this it was considered as not triggered. However, STs, if present among the PAPs, are given certain special privileges; they are considered as vulnerable and they will be given preference in selection for any individual benefits under the project. In case if any ST population is affected, then it would trigger Bank’s policy on Indigenous Peoples.</p>
OP/BP 4.11 Physical Cultural Resources	<p>Purpose is to assist in the preservation of cultural property, such as sites having archeological, paleontological, historical, religious and unique cultural values.</p> <p>Generally seeks to assist in their preservation and avoid their elimination.</p> <p>Discourages financing of projects that will damage cultural property.</p>	<p>Applicable.</p> <p>A few project interventions may be located close to sites, structures, natural/man-made features that have historical, archeological, religious or other cultural significance. Through screening and EA/SA process, the project’s potential impacts on physical cultural resources will be determined and management measures, as required will be taken and integrated into the sub-project cycle. The ESMF also provides procedures to deal with chance finds during the sub-project implementation.</p>

Policy	Key Features	Applicability to this project
OP/BP 4.37 Safety of Dams	Applies to large dams (15 meters or more in height). Requires review by independent experts throughout project cycle. Requires preparation of EA and detailed plans for construction and operation, and periodic inspection by the Bank.	Not Applicable.
OP/BP 7.50 Projects on International Waterways	Covers riparian waterways that form boundary between two or more states, as well as any bay, gulf, strait or channel bordered by two or more states. Applies to dams, irrigation, flood control, navigation, water, sewage and industrial projects. Requires notification, agreement between states, detailed maps, feasibility surveys.	Not Applicable. None of the proposed sub-projects are crossing international boundaries.
OP/BP 7.60 Projects in Disputed Areas	Applies to projects where there are territorial disputes present. Allows Bank to proceed if governments agree to go forward without prejudice to claims. Requires early identification of territorial disputes and descriptions in all Bank documentation.	Not Applicable.

3. Other World Bank Policies important to Environmental Concerns is the BP 17.50. This policy deals with Disclosure of Operational Information. The Bank's [Policy on Disclosure of Information](#), has been incorporated in the project implementation plan.

3.3 Policy and Regulatory Framework of GoI and GoU

4. This deals with various policies, acts, rules and regulations promulgated by the central and state governments related to environment and relevant to present project.

3.3.1 Environmental Regulation

5. Scope of relevant environment regulations and implications for the ESMF are furnished in the table below.

Table 14: Environmental Regulations

S.No.	Relevant Act	Scope of the Act	Implication for the EMF
1	The Environment (Protection) Act No.29 of 1986	<ul style="list-style-type: none"> ▪ Under this Act, the central government is empowered to take measures necessary to protect and improve the quality of the environment by setting standards for emissions and discharges; regulating the location of industries; 	<ul style="list-style-type: none"> ▪ Relevant to sub-projects to be taken up, viz., buildings, roads, bridges, etc. activities ▪ Preservation of air and water quality

S.No.	Relevant Act	Scope of the Act	Implication for the EMF
		<p>management of hazardous wastes, and protection of public health and welfare.</p> <ul style="list-style-type: none"> ▪ This encompasses all legislations providing for the protection of environment in the country. ▪ It includes the power to direct the closure, prohibition or regulation of any industry, operation or process by the government 	<ul style="list-style-type: none"> ▪ Control dust pollution due to quarrying, which might harm the vegetation
2	Water and Air (Prevention and Control of Pollution) Act, 1974 & 1981 (Central Act 6 of 1974) as amended in 1988	<ul style="list-style-type: none"> ▪ This Act prohibits the discharge of pollutants into water bodies beyond a given standard and lays down penalties for noncompliance. ▪ Water act includes the maintenance or restoring the wholesomeness of the water ▪ Air act restricts the operation of any industrial plant in an air pollution control area without a valid consent 	<ul style="list-style-type: none"> ▪ Generally not relevant to project activities. ▪ Relevant to hot mix/ batching plants/ stone crushers which might be established for executing sub-projects.
3	Forest (Conservation) Act No. 69 of 1980 and amended in 1988	<ul style="list-style-type: none"> ▪ This Act restricts the powers of the state in respect of de-reservation of forests and use of forestland for non-forest purposes. ▪ All diversions of forestlands to any non- forest purpose, even if the area is privately owned, require approval of the central government ▪ Leases of forest land to any organization or individual require approval of the central government ▪ Proposals for diversion of forest land for construction of dwelling houses are not to be entertained 	<ul style="list-style-type: none"> ▪ Generally not relevant to project activities ▪ Permission is to be obtained from the Forest Department when forest land is required for the project activities.
4	National Forest Policy, 1988	<ul style="list-style-type: none"> ▪ Protect and enhance the yields of non-timber forest products in order to generate employment and income for forest and village communities 	<ul style="list-style-type: none"> ▪ Generally not relevant to project activities. ▪ Relevant if employment generation for resettlement and rehabilitation are taken up in villages near forests.
5	Joint Forest Management, 1993	<ul style="list-style-type: none"> ▪ Induces people participation in forest management sharing mechanism to distribute the benefits of interventions carried out on common resources property, government lands, wastelands, etc. ▪ Benefits are categorized into two – 	<ul style="list-style-type: none"> ▪ Not relevant to project activities. ▪ Relevant if employment generation for resettlement and rehabilitation are taken up in villages near

S.No.	Relevant Act	Scope of the Act	Implication for the EMF
		ecological benefits and economic benefits. <ul style="list-style-type: none"> If land under JFM/ Van Panchayas is transferred for project purposes, then such beneficiaries could be affected. Hence the land need to be categorized and the pattern of use recorded for mitigation. 	forests.
6	The Wildlife (Protection) Act 1972, Amendment 1991	<ul style="list-style-type: none"> This Act provides for protection to listed species of Flora and Fauna in the declared network of ecologically important protected areas such as wild life sanctuaries and national parks. The wildlife protection act has allowed the government to establish a number of national Parks and Sanctuaries, over the past 25 years, to protect and conserve the flora and fauna of the state 	<ul style="list-style-type: none"> Not relevant to project activities. Preservation of bio diversity Ecologically sensitive areas, wild life sanctuaries and national parks should be avoided while selecting sites for project components. If this is not possible, permission should be obtained from the Forest Department and appropriate safeguards must be adopted.
7	EIA Notification of MoEF 2006	<ul style="list-style-type: none"> All projects listed under Schedule-I of the Notification require environmental clearance from the MoEF. The list of project categories under Schedule I of the Environmental Impact assessment Notification is available on the MoEF Website. 	<ul style="list-style-type: none"> Could Be Applicable. If any of the roads are in Hilly Terrain (above 1000 AMSL) and passing through ecologically sensitive areas. However, the EMF is designed to ensure that environmental safety measures are integrated into the project.
8	The Ancient Monuments, Archaeological sites and Remains Act, 2010	<ul style="list-style-type: none"> The Ancient Monuments and Archaeological sites should be protected from any developmental activity. The area within the radial of 100 m and 300m from the Protected Property are designated as Protected area and Controlled Area respectively. No development activity (including building, mining, excavating, blasting etc.,) is permitted 	<ul style="list-style-type: none"> Deals with Cultural safeguards

S.No.	Relevant Act	Scope of the Act	Implication for the EMF
		in the Protected Area and developmental activities likely to damage the protected property are not permitted in the Controlled Area without prior permission of the Archaeological Survey of India.	
9	Biological Diversity Act 2002 Biological Diversity Rules 2004	<ul style="list-style-type: none"> ▪ The Biological Diversity Act, which came into force in February 2003, aims to promote conservation, sustainable use and equitable sharing of benefits of India's biodiversity resources. It provides for establishment of a National Biodiversity Authority at national level, State Biodiversity Boards at state level and Biodiversity Management Committees at the level of Panchayats and Municipalities 	<ul style="list-style-type: none"> ▪ Not relevant to project activities, except new road alignments passing through ecologically sensitive areas. ▪ Provides Ecological integration ▪ Increased ecological symbiosis (e.g. Pollination) increases production

6. This policy and regulatory analysis suggests that the proposed sub-projects to be taken does not fall under any of the project categories listed in Schedule-I of the Environmental Impact Assessment Notification and hence does not require any formal environmental clearance of the Ministry of Environment and Forests, GOI. The project area has not been notified as ecologically sensitive or fragile under the Environment Protection Act, 1986. Though the state of Uttarakhand is dotted with a number of sites of religious, cultural and historical importance, wildlife sanctuaries and national parks, the proposed reconstruction sub-projects are expected to have limited impact on these sites. The project will also ensure that the requirements of activities in the influence areas of any protected areas are also followed in the design and implementation of sub-projects.

3.3.2 Social Regulation

The Land Acquisition (LA) Act of 1894

7. The Land Acquisition (LA) Act of 1984 is commonly used for acquisition of land for any public purpose. It is used at the State level with State amendments made to suit local requirements. Expropriation of and compensation for land, houses and other immovable assets are carried out under the Land Acquisition (Amendment) Act, 1984. The Act deals with compulsory acquisition of private land for public purpose. The procedures set out include:

- Preliminary notification(Section 4)
- Declaration of Notification (Section 6)
- Notice to persons interested (Section 9)
- Enquiry and award (Section 11)
- Possession (Section 16)

8. The 1984 amendments to the LA Act addressed the matter of compensation and delays in payment. As regards, the level of compensation, the rate of solatium was increased from 15 per cent to 30 per cent. For delays, the amendment requires that:

- A time of one year was fixed for completing all formalities between the issuance of Section 4 and Section 6; and
- The compensation award must be determined within two years of the issuing of section 6 notification. Interest is payable at a rate of 12 per cent per year from the date of preliminary notification to the date of dispossession. These changes apply to cases before the Civil Courts even for awards made before the enactment of the amendments.

National Resettlement and Rehabilitation Policy, 2007

9. Prior to this policy evolution, there was no uniform approach adopted by states towards the project affected population, as there were no safeguard policy to deal with resettlement and rehabilitation of displaced persons in the country. In the absence of such policies, ad-hoc administrative instructions, in conformity with the land acquisition act were in practice. This policy was developed and promulgated by the GoI during October 2007. This policy takes into consideration the safeguard policies of international development bodies like the World Bank, Asian Development Bank etc. The salient features of this policy are given below:

- Makes SIA mandatory for all projects involving displacement of four hundred or more families, en-masse in plain areas, or two hundred or more families, en-masse in tribal or hilly areas etc.
- Public hearing co-ordination with EIA done in the project affected area shall also cover issues related to SIA.
- Consultations with affected people and disclosure of relevant information to them at various stages of resettlement planning.
- Assistance to affected people without legal rights; affected people categorized as landless agricultural workers, forest dwellers, tenants and artisans who are critically dependent on the acquired assets for their subsistence/ livelihoods.
- Preparation of resettlement plans that are disclosed to the affected people in draft form, and reviewed and approved by competent authorities.
- Collection of socio-economic base line information of the project affected households.
- Vulnerable project affected people will get extra cash/kind assistance.
- The Grievance Redress Cell shall have representatives of women, Schedule Castes, Schedule Tribes residing in the affected zone. The Cell shall have the power to consider and dispose of all complaints relating to resettlement and rehabilitation against the decision of the Administrator/R&R Committee at Project level.
- Constitution of a monitoring cell under the project.
- Each project affected family comprising of rural artisan/small trader and self-employed person shall get one-time financial assistance for construction of working shed/shop for livelihood support.

The Right to Fair Compensation and Transparency in Land Acquisition and Resettlement Act 2013

10. This is an act which replaces both the Land Acquisition Act 1894 and National Resettlement and Rehabilitation Policy 2007. This is an Act to ensure, in consultation with institutions of local self-government and Gram Sabhas established under the Constitution, a humane, participative, informed and transparent process for land acquisition for industrialisation, development of essential infrastructural facilities and urbanisation with the least disturbance to the owners of the land and other affected families and provide just and fair compensation to the affected families whose land has been acquired or proposed to be acquired or are affected by such acquisition and make adequate provisions for such affected persons for their rehabilitation and resettlement and for ensuring that the cumulative outcome of compulsory acquisition should be that affected persons become partners in development leading to an improvement in their post acquisition social and economic status and for matters connected therewith or incidental thereto.

3.3.3 Other Applicable Acts

11. The following acts are applicable for the sub-projects to be taken up under the present project:

- Minimum Wages Act, 1948
- Contract Labour Act, 1970
- The Bonded Labour System (Abolition) Act, 1976
- Child Labour (Prohibition and Regulation) Act 1996 along with Rules, 1988
- Children (Pledging of Labour) Act, 1933 (as amended in 2002)
- The Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act, 1995
- The Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Rules, 1996
- Untouchability Offences Act, 1955
- The Scheduled Castes and the Scheduled Tribes (Prevention of Atrocities) Act, 1989
- The Scheduled Castes and the Scheduled Tribes (Prevention of Atrocities) Rules, 1995

3.4 List of Statutory Clearances and Authorizations Required

12. It is expected that certain permission, clearances and authorizations need to be obtained from competent authorities during the design, planning and implementation of the sub-projects. This will depend mainly on the area, type, size and scope of the sub-project. This requirement is summarized below:

Table 15: List of Statutory Clearances and Authorization Requirement

S.No.	Clearance/ Authorization	Relevant Act	Competent Authority	Responsibility
1	Environment Clearance/NOC (For sub-projects which requires such clearance, ex.: housing and new roads, roads in hilly terrain (above 1000 AMSL) and in ecologically sensitive areas, if their location requires)	EIA Notification, 2006 (including amendments) issued under Environment Protection Act, 1986; F. No.11-48/2002-FC, MoEF, dated 14 th September 2004 (Annexed to this report) F. No. 6-10/2011 WL, MoEF, dated December 2012 (Annexed to this report)	State Pollution Control Board; MoEF, Govt. of India, National Board of Wildlife	PMU/ Line Department
2	Forest clearance	Forest Conservation Act, 1980	State Forest Department, MoEF, Govt. of India	PMU/ Line Department
3	Tree Cutting Permission	Forest Conservation Act, 1980	State Forest Department, MoEF, Govt. of India	PMU/ Line Department
4	Hot mix plants, Wet Mix Macadam plants, Crushers, Batching Plants	Air (Prevention and Control of Pollution) Act, 1981 and Noise Pollution (Regulation and Control) Rules, 2000	State Pollution Control Board	Concerned Contractor
5	Storage, handling and transport of hazardous materials	Hazardous Waste (Management and Handling) Rules, 1989 and Manufacturing, Storage and Import of Hazardous Chemicals Rules, 1989	State Pollution Control Board	Concerned Contractor
6	Location/ layout of workers camp, equipment and storage yards	Environment Protection Act, 1986 and Manufacturing, Storage and Import of Hazardous Chemicals Rules, 1989	State Pollution Control Board	Concerned Contractor
7	Discharges from Labor Camp	Water (Prevention and Control of Pollution) Act, 1974	State Pollution Control Board	Concerned Contractor
8	Permission for sand mining from river bed	Environment Protection Act, 1986	Mines and Geology Department, GoU	Concerned Contractor

4. Environmental and Social Impacts

4.1 Prediction of Impacts

1. The UDRP aims to reconstruct the houses, public building, improve connectivity through reconstruction of rural roads and bridges leading to overall improvement, to the quality of life in the habitations of the project area. Hence, from the project development objective, it can be seen that this project and the sub-projects would yield positive and beneficial impacts on the target population. However, any and all development interventions will also have some negative impacts. Keeping this in view the likely positive and negative impacts are listed below. The significance of these listed impacts would vary depending on the individual sub-project, its size and location. The size of the sub-projects would normally be small both physically and financially. Due to the likely small size of the sub-projects, adverse impacts, if any, would be at its minimum localized and reversible for the following reasons:

- Proposed project is reconstruction of damaged buildings and roads; in a sense it is a mitigation measure for floods, as flood resilient structures are built including several technical assistance and capacity building initiatives to mitigate future oriented risks
- Significantly low social and environmental impacts

2. The following environmental and social impacts are predicted based on the assessment. The impacts could occur during the construction phase and/or operation phase. These possible positive impacts are listed below:

- Improved public safety and security
- Reduced sufferings during monsoons and adverse climatic conditions
- Better infrastructure and connectivity
- Improved access to services
- Productive use of time
- Improvements in income patterns
- Health and Environmental improvements
- Improvements in quality of life and human dignity
- Opportunities for social interaction
- Improved community participation and sense of ownership

3. The negative environmental and social impacts for each type of sub-projects are summarized in the table below:

Table 16: Negative environmental and social impacts																			
Project Type	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1. Resilient Infrastructure Reconstruction	M	M	M	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
2. Rural Road Connectivity	L	M	L	L	M	M	L	L	L	L	L	L	L	L	L	L	L	L	L
2.a. Construction of Bridges	L	L	L	L	M	M	L	L	L	L	L	L	L	L	L	L	L	L	L
3. Technical Assistance: Sustainable Recovery and Disaster Risk Management	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
4. Financing Disaster Response Expenses	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
5. Capacity Building in Disaster Risk Reduction	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
5. Implementation Support	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
6. Contingency Emergency Response	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L

Code	Impact	Code	Impact	Code	Impact
A	Land acquisition	H	Ground Water Quality	O	Noise
B	Transfer of Government Land under Different Tenures	I	Destruction of Habitat/Flora Fauna	P	Smell
C	Involuntary Resettlement	J	Insect and Pest Menace	Q	Smoke
D	Land Use	K	Increased chemical pesticides/ fertilizers use	R	Disturbance to Other Services
E	Hydrology and drainage Pattern	L	Public Health	S	Air Quality
F	Water logging	M	Safety		
G	Surface Water Quality	N	Bio-diversity		

Impacts: S – Significant M – Moderate L - Low

4. The impacts indicated above are indicative. The actual impacts will only be known when the sub-projects are identified. If the impacts are significant, then a detailed Environmental/ Social Assessment will be carried out, then an EMP and RAP will be prepared as per the guidelines given in this ESMF.

5. These adverse environmental and social impacts are described in detail below:

4.1.1 Environmental Impacts

6. Since the sub-projects are yet to be finalized, mostly generic impacts which mostly could be caused by typical projects are listed under this section. However, certain specific impacts due to Housing and Buildings and Roads and Bridges sub-projects are also listed below:

Specific Impacts due to Housing and Buildings

- Loss of trees due to tree cutting
- Impact on land and soil like loss of productive soil and soil erosion
- Impacts due to quarrying of material

- Compaction and contamination of soil due to vehicular movements
- Impact on surface water bodies due to siltation
- Potential changes to local drainage patterns in and beyond the construction zone
- Impacts on surface water quality of rivers and other water bodies
- Impacts on aquatic ecology due to deposition of debris and temporary sedimentation and turbidity
- Impacts due to construction debris/waste
- Health and safety of construction workers and local people/ community
- Impacts due to transportation and storage of construction materials
- Reduction in air quality due to construction activities
- Increase in noise levels during construction

Specific Impacts due to Roads and Bridges

- Loss of trees due to tree cutting
- Impact on land and soil like loss of productive soil and soil erosion
- Changes in land use
- Impacts due to borrow areas and quarries
- Compaction and contamination of soil due to vehicular movements
- Impact on surface water bodies due to siltation
- Impacts on surface water quality of rivers and other water bodies
- Changes in hydrology and drainage
- Impacts due to construction debris/waste
- Health and safety of construction workers and local people/ community
- Obstruction and disruption of traffic
- Impacts due to transportation and storage of construction materials
- Reduction in air quality due to construction activities
- Increase in noise levels during construction
- Loss/ impact on common property resources

7. The generic impacts for typical projects to be taken up under the project are listed below:

Impacts on Topography

8. There will not be major adverse impacts on the topography on account of the sub-projects to be proposed. Yet there might be the following temporary impacts, which could be mitigated using the specified mitigation measures.

- Erosion and sedimentation
- Temporary disruption of natural drainage pattern
- Loss of fertile top soil of the agriculture lands
- Accumulation of excess excavated earth in the area of construction and operation
- Excess earth and debris blockage and change in drainage pattern

- Changes to hydrological regime, increased flooding, siltation hampering stream flows, etc.

Impacts on Climate

9. No changes in climatic conditions or impacts on climate are anticipated due to the sub-projects to be proposed as part of the UDRP.

Impacts on Surface Water

10. The sub-project activities during construction or operations are not expected to interfere with the surface water characteristic of the river or its tributaries. Hence, impacts on surface water are not anticipated. The following temporary impacts are identified.

- Reduced flow to the downstream users at specific points due to river diversions
- Surface water pollution due to oil and grease from construction vehicles
- Degradation of river banks due to excavation and construction activities

Impacts on Air Quality

11. During the construction phase excavation process, suspended particulate matter and dust are major sources of pollution impairing air quality. However, on the road sub-project construction sites the impact on air quality due to the sub-projects is likely to be higher. During construction and sometimes during operation, use of hot mix plants, generators, transportation and lifting machinery will be unavoidable. Emissions from the exhaust of these are likely to cause localized and temporary air quality impacts. Adequate dust suppression measures and protective measures to the work force will significantly reduce impacts. As the sub-projects to be proposed would be small by nature, the impact of air pollution will not be very significant. Since these impacts are temporary, adequate precautions during the construction period will mitigate them. There will not be any significant air quality impacts during the operation phase of the sub-projects. However, the following possible impacts are listed.

- Increased dust levels due to earth work excavation and construction activities
- Increased air pollution and smell
- Air pollution through ventilating shafts of machinery, plant and equipment

Impacts on Noise Levels

12. Movement of vehicles transporting construction material and noise generating activities at the construction site, are major sources of noise pollution during construction. Material movement and associated work are the primary noise generating activities on site. These will be distributed over the entire construction period. Construction activities are expected to produce noise levels that can affect the personnel working on site. Activities involving vehicles, plant and equipment in the close proximity of households will have an adverse impact due to noise pollution. These impacts are temporary and limited to the construction phase. Except during regular maintenance activities, no noise generating activities are envisaged during the sub-projects operation phase. Hence, no noise impacts are predicted. However, the some possible impacts are listed.

- Increased Noise Levels during Construction
- Noise due to movement of vehicles
- Increased Noise Levels during operation
- Noise impact due to operation of DG sets

Impacts on Ecological Resources

13. The sub-project activities do not involve encroachment of sensitive environmental features, cutting of trees or removal of vegetation. The proposed sub-projects are not in an eco-sensitive zone or coastal zone. Hence, there will not be any adverse ecological impacts due to the project. However, the following impacts are enumerated, which need to be taken care of in the ESMF.

- Ecological impacts due to cutting of trees

Other Issues

Visual impacts

- Disruption to visual resources
- Standing out as Eyesore in the surroundings
- Ugly and unsightly conditions

Damage

- Damage to road surface /other utilities

Hazards

- Digging of unplanned borrow pits on the road side causing inconvenience to public and leading to accidents

Nuisance

- Storage of materials causing disturbance to public and traffic
- Mosquito and fly nuisance

Disease

- Disease transmission and Public Health issues
- Spills of solid waste enroute construction sites

Other probable issues

- Plying vehicles on unpaved roads
- Stagnation of water inside facilities and on roads
- Tree branches obstructing the vision of the drivers of vehicles
- Oil spillages

4.1.2 Social Impacts

14. The proposed works may not have significant social impacts due to the nature, type and size of the works. However, the following social impacts could possibly arise out of the proposed projects:

- Deprivation and Displacement
 - Due to acquisition of private residential or agricultural or commercial land and also transfer of Government land under different tenure systems
 - Loss of assets/ infrastructure
 - Loss of Common Property Resources/ Community Assets
 - Loss of Livelihoods
 - Loss of access to houses/ businesses
- Inconvenience and nuisance to Public
 - Due to accumulation of excavated earth
 - Disturbance to traffic and resulting congestion
 - Disruption of utilities such as water, electricity, telephone, cable, etc.
- Social issues
 - Social disruption in the area of construction
 - Social unrest issues on construction sites
 - Regional labour issues
- Safety hazards
 - To the households in the neighborhood during construction
 - Due to impact of vehicles on land outside RoW
 - Due to risk of accidents
- Health Hazards
 - Due to stagnation of water leading to mosquito breeding and public health problems
 - Due to spread of AIDS at construction sites
 - Due to surface water pollution
 - Due to groundwater pollution

15. Implementing an appropriate Environment Management Plan and an R&R policy and entitlement framework along with proper implementation of the Environmental Social Management Framework could mitigate the above mentioned negative social impacts.

16. Presently the sub-projects are yet to be fully identified, for the reason that the project is in the process of taking a final shape. As this situation was envisaged beforehand, GoU went ahead with the preparation of ESMF for UDRP. This ESMF has a system for Environmental and Social categorization of sub-projects and Environmental and Social Mitigation measures. As the sub-projects are yet to be identified and are yet to be prepared, no sub-project specific mitigation measures could be identified. As the sub-projects are continued to be identified and the identified ones are under preparation, check lists have been provide for screening the sub-projects and categorize them for further action.

5. Environment and Social Management Framework

5.1 Introduction

1. The UDRP sub-projects are yet to be identified. Further the implementation of these sub-projects will take place over a period of time and this time lag will lead to changes in the environmental and social assessments. For such reasons preparation and implementation of an ESMF is proposed for this project.

5.2 Screening

2. During the screening, as a first step, the environmental and social impacts are identified through filling in an environmental and social data sheet. The basic objective of the filling in this data sheet is to collect basic information on environmental and social aspects of the proposed sub-project. Further the ESMF requires that basic environmental and social data pertaining to the proposed sub-project be compiled during the field data collection stage. For this purpose, a simple Environment and Social Data Sheets (ESDS) were formulated for Housing and Public Buildings sub-projects and Roads and Bridges sub-projects and annexed to this ESMF. The sub-project Implementing Agency fills up these ESDS with the facilitation support of the DPIUs duly identifying the environmental and social issues of concern. Supplementary notes on environmental and social concerns will also be added to those ESDS. The sub-project Implementing Agency will do the screening through collection of necessary field data. PMU would supervise the screening categorization process ensuring that the person/ Unit has the capacity and familiarity with Bank safeguards policies/ framework approach to undertake these activities. These ESDS are attached to the sub-project project proposal/ concept note.

3. Several steps are taken by the project to avoid and/or minimize adverse impacts on the environment and people. These include a) use of existing locations and alignments wherever possible and appropriate, b) fresh alignments for roads, especially those within Reserved Forest Areas, and Protected Areas, activities that require clearance from MoEF under the Environmental Impact Assessment Notification, 2006 (as amended from time to time) and sub-projects without the requisite clearances and approvals. However, for all sub-projects environment clearances and approvals, when required, will be acquired before bidding. This screening process will determine the requirement of approval/ clearances. List of approvals to be obtained are given in section 3.4.

4. During the screening process, the sub-projects are also categorized. The basic objective of this categorization is to ensure that sub-projects with potentially significant environmental/ social issues are identified at an early stage for detailed environmental/ social assessment. Further evaluation of all the available information on environmental and social aspects as provided in the ESDS and assessment based on the level of expected environmental and social impacts (including any field visits if required), whether the proposed sub-project is qualified for categorization as Ea/Eb and Sa/ Sb takes place during this phase. As a part of ESMF process the screening and sub-project categorization will be cleared by The World Bank, before taking up EA/SA. This is further detailed in the paragraphs below.

5. The results of Screening of sub-projects will be shared with the World Bank for review prior to sub-project categorization.

5.3 Categorization

6. In order to give an indication of scale and size of environmental and social impacts, the sub-projects are categorized. This categorization is required to carry out the appropriate level of assessments for different types of sub-projects based on the nature, scale and magnitude of their social and environmental impacts. Categorization would help in focussing time and effort in sub-projects that have significant impacts. The social and environmental categorization of sub-projects is proposed to be as under:

5.3.1 Environmental

7. Based on environmental impacts the sub-projects are categorized into two categories;

- 1) E1, where there are significant adverse environmental impacts
- 2) E2, where there are moderate to minimal adverse environmental impacts

8. The E1 category sub-projects require conducting a comprehensive Environmental Impact Assessment (EIA) and preparation of an Environment Management Plan (EMP) by Independent Consultants prior to preparation of DPR for appraisal by PMU. This EIA and EMP need to be disclosed before the start of procurement for that sub-project. Annexure 6 provides the contents of an EIA for sub-projects categorized as E1. Additional guidance on EMP contents is also attached as Annexure 7.

9. The E2 category sub-projects need not conduct an EIA, but require an EMP, which is to be prepared by Design Consultants following the guidelines given in this ESMF. This EMP becomes a part of the DPR, which will be appraised by PMU. If, under special circumstances, PMU identifies a need for a limited environmental assessment, then it needs to be conducted.

The rationale for using the design consultant to prepare the EMP for E2 category sub-projects is that the impacts are moderate to minimal and the model EMP given in the ESMF need to be adopted and modified to prepare a specific sub-project EMP.

5.3.2 Social

10. Based on social impacts the sub-projects are categorized into two categories;

- 1) S1, where there are more than 20 Project Affected Families (PAFs),
- 2) S2, where there are less than 20 PAFs

The NRRP 2007 suggests that a Social Impact Assessment be done when a Project involves involuntary displacement of 400 families or more en masse in plain areas or 200 families or more en masse in tribal or hilly areas. Since the UDRP will have several sub-projects, the requirement for conducting Social Assessment is fixed at displacement/ impacts on 20 families.

11. The S1 category sub-projects require conducting a comprehensive Social Assessment (SA) and preparation of a Resettlement Action Plan (RAP), as per format attached in Annexures, by Independent Consultants prior to preparation of Detailed Project Report (DPR) for appraisal by PMU. This SIA and RAP need to be disclosed before the start of procurement for that sub-project.

12. The S2 category sub-projects need not conduct SA but need to prepare an Abbreviated Resettlement Action Plan (ARAP), as per format attached in Annexures, and need to include the Social Management Plan (SMP) which is to be prepared by Design Consultants following the guidelines given in this ESMF. The preparation of ARAP requires a census survey of the PAFs. This SMP becomes a part of the DPR, which will be appraised by PMU. If, under special circumstances, PMU identifies a need for a limited social assessment, then it needs to be conducted.

The rationale for using the design consultant to prepare the ARAP for S2 category sub-projects is that the impacts are less than 20 PAFs and the entitlement matrix given in the ESMF need to be adopted and modified to prepare a specific sub-project ARAP by conducting a census survey of the PAFs.

5.4 Environmental Impacts and Mitigation

13. The sub-project categorization as E1 or E2 need to be done on the basis of field visits, primary and secondary data and analysis. After identifying the impacts, the mitigation measures need to be determined. Some generic mitigation measures are included as a guidance, in this ESMF. These have not been included here to avoid repetition. This guidance table also includes information on whether these mitigation measures have to be undertaken in the planning/ design, construction and operation phases. However, each category of sub-projects needs to incorporate mitigation measures as given below:

5.4.1 E1 Category

12. For E1 category sub-projects, a social and environmental consultant, independent of the design consultants, need to be engaged to carry out an Environment Impact Assessment and prepare an Environment Management Plan. In this regard PMU need to prepare a Terms of Reference (ToR) for the environmental consultants for EIA of this category of projects. This ESMF needs to be shared with these consultants for following the procedures and using the relevant information in their assessment. This EIA and EMP need to be disclosed before the start of procurement for that sub-project.

5.4.2 E2 Category

13. For E2 category sub-projects, the design consultants would have to prepare the EMP. PMU need to share this ESMF containing the impacts and mitigation measures with the design consultants for them to use in the preparation of the EMP that needs to be submitted along with the DPR. PMU will ensure that the Terms of Reference for the Design Consultants will include these. The rationale for using the design consultant to prepare the EMP for E2 category sub-projects is that the impacts are moderate to minimal and the model EMP given in the ESMF need to be adopted and modified to prepare a specific sub-project EMP.

5.4.3 EMP to be Part of Contract Documents

14. In case of E1 and E2 sub-projects, PMU need to ensure that the EMP is provided as a part of the contract documents to the contractor facilitating its integration into the main works. This integration of relevant management provisions in the bid/contract document, will need to be reviewed and confirmed by the World Bank.

5.5 Social Impacts and Mitigation

15. The UDRP in the process of planning and implementing sub-components that require land will consider alternative engineering designs to avoid or minimize land acquisition and transfer of Government land under different tenure in order to avoid and minimize adverse social impacts on the people and communities. Particularly focus will be made to (i) avoid or minimize displacement from homesteads resulting in involuntary resettlement; (ii) avoid or minimize displacement from buildings/structures used for permanent business/commercial activities other such sources of income; (iii) avoid or minimize transfer of public land that will have adverse social, economic and cultural impacts on families and communities who depend on them causing involuntary resettlement and loss of access to natural resources.

16. As mentioned earlier, all the sub-projects under the UDRP aim at improving safety and security of the target population from floods and improving their living standards. Many of the sub-projects under UDRP are reconstruction of damaged infrastructure. These investments would improve the performance of the existing infrastructure. However at this stage, it is not possible to identify as to how many and who will be affected by which sub-project. The individual sub-projects proposals will mention the number and categories of the population likely to be affected. Hence, a Resettlement Policy Framework is prepared for the following reasons:

- Most sub-projects are mere reconstruction of existing damaged infrastructure
- The sub-projects are yet to be finalized/ proposed
- Likely inclusion of new sub-projects
- Time lag between sub-project identification and implementation

The following guidelines of UDRP will address any adverse impacts caused by it.

Impact Mitigation

17. Resettlement of Project Affected Persons (PAPs) will be planned and implemented as an integral part of UDRP where acquisition of private land and transfer of public land are unavoidable. The impacts covered are (i) loss of homestead resulting in involuntary resettlement; (ii) loss of assets or access to social, economic and cultural assets and (iii) loss of income sources or means of livelihood, whether or not the affected persons must move to another location.

Vulnerability in terms, such as, of social, economic, age, differential abilities and gender differentiations of the PAPs will be identified and mitigated with appropriate actions as part of Resettlement Action Plan (RAP).

Eligibility Criteria

18. The criteria for eligibility for compensation to lost assets and resettlement assistance will include (i) those who have title and rights to land and other assets, including those with customary and traditional rights recognized under Indian legal framework; (ii) those who do not have title and formal legal rights to land and other assets at the time of census survey but have a claim to such land and such assets if such claims are recognized under Indian legal framework or could become recognized through a process identified in the RAP and (iii) those who do not have recognizable legal right or claim to the land and other such assets they are occupying.

Those who are included in (i) and (ii) in the above mentioned paragraph will be eligible for compensation for land and other assets in addition to resettlement assistance. However, those included in (iii) will be eligible for compensation only for the assets lost and also for resettlement assistance.

19. The proposed Resettlement Policy Framework would address these impacts. PMU will screen all the sub-projects prior to approval to ensure their consistency with the Resettlement Policy Framework provided as guidance. The Entitlement Matrix of the project reflect the project plan to address adverse impacts and mitigation based on the eligibility criteria mentioned above.

5.5.1 S1 Category

20. As per the categorization of the projects, for S1 category sub-projects, if the number of PAFs exceeds 20, then PMU would ask the concerned department to conduct a comprehensive Social Assessment and prepare a Resettlement Action Plan (RAP), as per format attached in Annexures before project appraisal. Like in case of Environmental Impact

Assessment, this Social Assessment too will be done by a consultant independent of the design consultants and this SIA and RAP need to be disclosed before the start of procurement for that sub-project. For S1 category sub-projects the project would provide a detailed terms of reference to the SIA consultants. Apart other tasks the SIA would include the following:

- Definition of component/sub-component area
- Assessment of land required under different tenure systems
- Options for land – land acquisition, transfer of Government land under different tenure systems and voluntary land
- Assessment of current patterns of use of such land
- Identification of PAPs
- Census socio-economic survey
- Findings of SIA – socio, economic and cultural impacts
- Categorization of all Project Affected Persons including those without title

5.5.2 S2 Category

21. For these category sub-projects, PMU will ensure that an Abbreviated Resettlement Action Plan (ARAP) is prepared as per format attached in Annexures and the project proposals prepared by design consultants would include measures to mitigate adverse impacts as per the Resettlement Policy Framework. PMU will ensure that the ToR for the Design Consultants will include these. The rationale for using the design consultant to prepare the ARAP for S2 category sub-projects is that the impacts are less than 20 PAFs and the entitlement matrix given in the ESMF need to be adopted and modified to prepare a specific sub-project ARAP by conducting a census survey of the PAFs.

5.6 Sub-project Cycle and Environmental and Social Requirements

22. The environmental and social required to be fulfilled during the sub-project cycle; i.e., during pre-planning, planning, implementation and Operation and Maintenance (O&M) are listed in the below table and the flow chart.

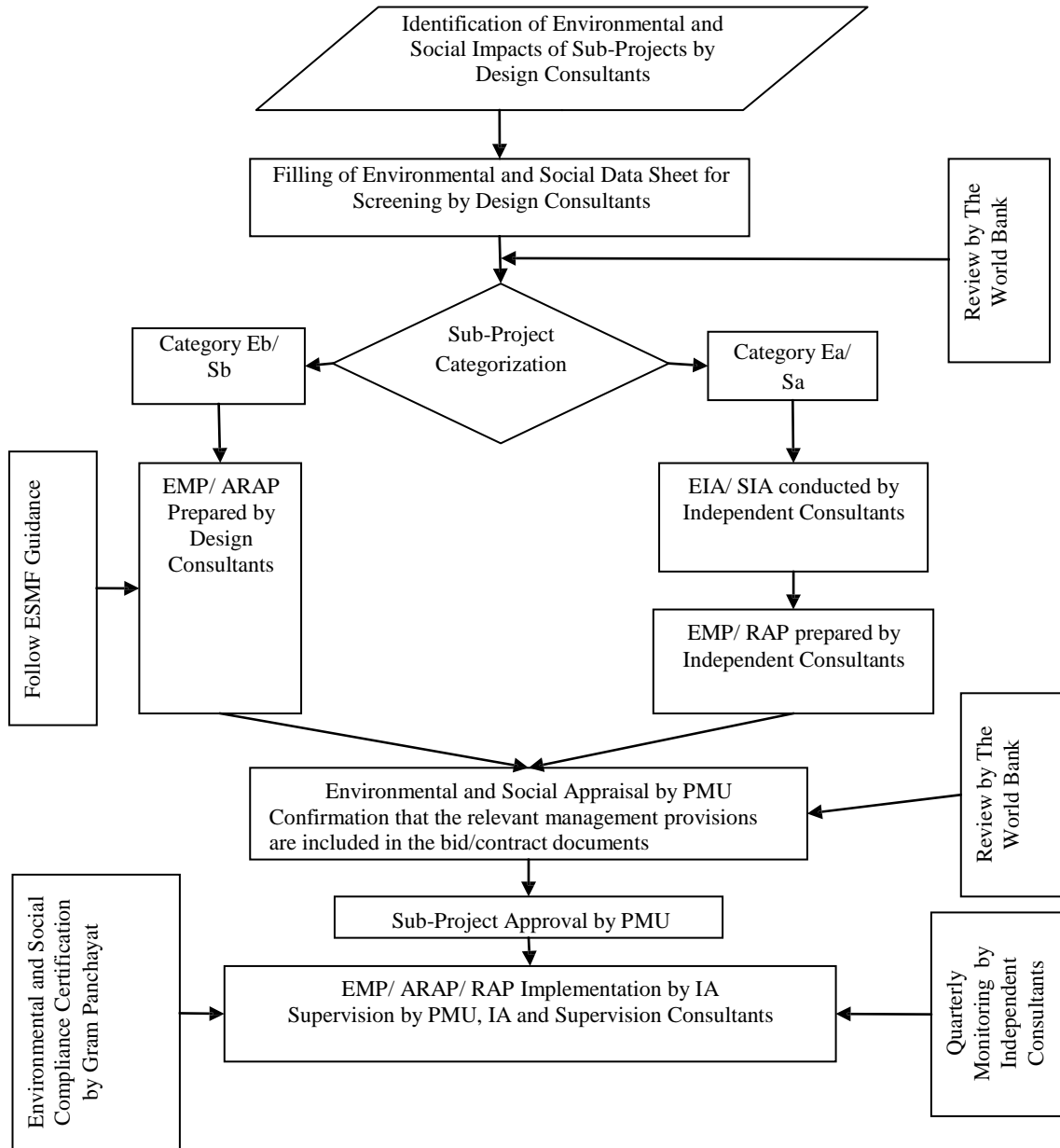


Figure 2: Environmental and Social Management Flow Chart

Table 17: Environmental and Social Activities and Responsibilities to be fulfilled during the sub-project cycle

Phase	ESMF Activity	Objectives	Process	Responsibility	Result
Preplanning	Identification Environmental and Social Data Sheet	To collect basic information on environmental and social aspects of the proposed sub-project.	The ESMF requires that basic environmental and social data pertaining to the proposed sub-project be compiled at the field data collection stage. For this purpose, a simple Environmental and Social Data Sheet (ESDS) and a simple Socio-Economic Survey format were formulated for sub-projects. The formats for the ESDS are furnished under annexures. The sub-project Implementing Agency (IA) fills up the ESDS with the facilitation support of the DPIUs duly identifying the environmental and issues of concern. Supplementary notes on environmental and social concerns to be added to those data sheets.	Implementing Agencies (IAs)	ESDS prepared and attached with the project proposal / concept note
Planning	Screening and Categorization Environmental and Social classification of the sub-project	To ensure that sub-projects with potentially significant environmental/ social issues are identified at an early stage for detailed environmental/ social assessment.	Evaluate all the available information on environmental and social aspects as provided in the ESDS and assess, based on the level of expected environmental and social impacts (including any field visits if required), whether the proposed sub-project is E1/E2 and S1/ S2. For E2 and S2, the design consultants will prepare EMP and ARAP along with the DPR.	DPIU, Design Consultants	Sub-project classified as E1/E2 and S1/S2. As a part of ESMF process the screening and sub-project categorization need to be cleared by The World Bank, before taking up E1/S1.
Planning	Preparation Environmental and Social Assessment and Management Plans	To conduct Environmental/ Social Assessment and Prepare Management Plans for integration into sub-project DPR	For E1/ S1 category sub-projects for which detailed environmental/ social assessment is required, this E1/S1 and preparation of EMP/ RAP will be done by consultants independent of the Design Consultants.	Independent Consultants	EA/ SA done. EMP/ RAP Prepared and disclosed prior to start of procurement for that sub-project.

Phase	ESMF Activity	Objectives	Process	Responsibility	Result
Planning	Appraisal Environmental and Social appraisal	To ensure that relevant environmental and social issues have been identified and appropriate mitigation measures have been designed to address them.	For E2 and S2 sub-projects, there shall be no separate environmental/ Social appraisal but environmental/ social aspects shall be included in the normal appraisal and evaluation process for the proposed sub-project, based on the ESDS included in the DPR. All these sub-projects need to follow the mitigation measures detailed in the ESMF Guidance. This will be ensured by the DPIUs. For projects requiring a detailed Environmental/ Social Assessment, including evaluation of environmental/ social impacts, risk assessment if needed, and design of mitigation measures, will be done by the PMU Environmental and Social Managers.	PMU Environmental Expert Social Expert	Environmental and social appraisal of the project is made and approval of proposed sub-project, with decision to (i) accept scheme as submitted, or (ii) accept scheme with modification suggested in the environmental/ social appraisal.
Planning	Approval Environmental and Social approval required	To ensure that mitigation measures and their cost are integrated in scheme design and implementation plans	Approval for the sub-project will not be accorded without the appraisal by PMU and the review of ESA by The World Bank	PMU	Technical Sanction for sub-projects with environmental and social mitigation measures and accordingly its costs are integrated in sub-project design and implementation plans.
Implementation	Implementation Implementation of Environmental and social mitigation measures.	To ensure that the prescribed environmental and social mitigation measures (including construction stage) are implemented.	The prescribed environmental and social mitigation measures (including construction stage measures) as identified through the environmental and social appraisal process are adequately implemented. Implementation Completion Report (ICR) for sub-project will need to include an Environmental Compliance Certificate and Social Compliance Certificate given by the Gram Panchayat indicating that the mitigation measures	Gram Panchayat PMU	ICR with environmental and social compliance information.

Phase	ESMF Activity	Objectives	Process	Responsibility	Result
			identified in the appraisal (including construction stage) have been implemented.		
O&M	Supervision, Monitoring and Evaluation Environmental supervision, monitoring and evaluation IEC and capacity building on environmental and social issues.	To ensure that environmental and social aspects are integrated in the O&M phase.	Monitoring of indicators will be conducted as per project monitoring protocol. Supervision will be conducted by the designated environmental officers of the implementing agencies for all the sub-projects All sub-projects will be monitored by PMU. Capacity building and IEC activities are undertaken to enable effective implementation of the ESMF including assessment procedures, supervision, monitoring, etc. as well as for community awareness and sensitization. This will be done by the IA and in turn the IA will be trained by PMU.	PMU External Consultants	PMU will submit quarterly reports to The World Bank on Safeguards Implementation. Quarterly monitoring reports by Independent Consultants. Periodic environmental and social supervision reports. Training and IEC activity reports.

5.7 Monitoring and Evaluation

19. The ESMF requires detailed supervision, monitoring and evaluation of the impact of the project on the environment and social aspects. In order to carry out this, PMU will have specific arrangements made at state and district level. This includes appointment of an Environmental Manager and Social Manager for the project period. Further the PMU will instruct PIUs and DPIUs on how to implement the provisions of this ESMF. At the field level the staff of the implementing agencies has experience of implementing projects concerning their departments and does land acquisition for their project. Implementation of the provisions of ESMF will be new to these staff and hence several orientations and trainings are proposed as a part of this ESMF to build their capacity. In order to achieve the objectives of this ESMF and to ensure the safeguards are implemented in a proper manner, the following provisions are made in this ESMF:

- Independent Agency for Quarterly Monitoring of ESMF

20. The PMU will be in charge of implementing the ESMF. The Environmental and Social Managers of PMU will guide and oversee the implementation of the ESMF at field level. This overall guidance will be given by them. Further the PMU will incorporate the provisions of this ESMF as actionable points in the Project Operations Manual or other similar document for the project. These will be non-negotiable and will have to be followed by all PIUs and DPIUs. The Environmental and Social Managers will oversee the application of these provisions and guide the process, while at the same time building the capacity of the PIUs and DPIUs.

21. At the field level the designated environmental engineers of the implementing agencies / the supervision consultants will ensure the implementation of the ESMF.

22. The following provisions include the arrangements made for the effective implementation of the ESMF:

5.7.1 Environmental supervision

23. This is basically done by PMU. All the sub-projects will be visited at regular intervals by PMU to check if all safeguard requirements are met and to identify any issues that need to be addressed. PMU would submit quarterly progress reports to The World Bank on safeguards implementation.

5.7.2 Environmental and Social Parameters

24. Once every year, the PMU will prepare a report of the environmental and social situation in the project districts including data and analysis of relevant parameters as given below:

- Environmental parameters
 - Rainfall
 - Water quality
 - Soil erosion

- Soil quality
 - Sand casting
 - Sedimentation in water bodies
 - Changes in land use
- Social parameters
- Adequacy of entitlements (replacement cost, allowances, income generation grant, etc.)
 - Payment of compensation and entitlements before replacement
 - Number of houses/cluster houses reconstructed and relocated within specific time frame
 - Time taken for land acquisition and transfer of Government land under different tenure system
 - Number of grievances registered and resolved within specified time frame
 - Number of court cases
 - Income
 - Land holding status
 - Housing
 - Ownership of household assets

25. This report also should give a listing of relevant new legislation and regulations that have a bearing on the environmental social performance of the project. PMU will submit this report to The World Bank. The ESMF will be suitably revised annually on the basis of this document by the PMU.

5.7.3 Quarterly Monitoring

26. The concurrent internal environmental social monitoring will be done as part of the regular monitoring by the design and supervision consultants and implementing agencies. However, independent consultants appointed by PMU, will do the quarterly environmental and social monitoring of sub-projects for safeguards compliance.

5.7.4 Monitoring Plan

27. Given in the table below are indicators for project investments, for which monitoring need to be taken up by PMU in a regular manner.

Table 18: Indicators for project investments			
Project Components	Monitoring Indicators	Frequency	Agency
1. Resilient Infrastructure Reconstruction	Environmental parameters <ul style="list-style-type: none"> ● Rainfall ● Water Availability rate (lpm) in downstream sources 	<ul style="list-style-type: none"> ● Quarterly by Independent Consultants 	<ul style="list-style-type: none"> ● PMU guiding the collection of information on indicators
2. Rural Road Connectivity 2.a. Construction of Bridges	<ul style="list-style-type: none"> ● Drinking Water quality – Surface and Groundwater 	<ul style="list-style-type: none"> ● Annually by PMU 	

Table 18: Indicators for project investments			
Project Components	Monitoring Indicators	Frequency	Agency
3. Technical Assistance and Capacity Building in Disaster Risk Management	<ul style="list-style-type: none"> • Soil erosion – Area Affected Sq. m • Soil quality – Presence of Heavy Metals • Sand casting • Sedimentation in water bodies - Turbidity • Debris deposits on lands – Area/ No. of locations • Changes in land use <p>Social parameters</p> <ul style="list-style-type: none"> • Adequacy of entitlements (replacement cost, allowances, income generation grant, etc.) • Payment of compensation and entitlements before replacement • Time taken for land acquisition • Number of grievances registered and resolved • Number of court cases • Income patterns • Land holding status • Income from land • Changes in occupations • Housing status (area, floor, walls, roof, etc.) • Ownership of household assets • Length of rural roads (connectivity inside and outside the village) • Journey time <p>Other</p> <ul style="list-style-type: none"> • No. of training programs conducted • No. of personnel trained • Trainees’ understanding of the training content • Achievement of learning objectives • Application of methods, tools and techniques learnt during training • Adherence to contract conditions and standards (housing, sanitation, crèches, use of local labour, equal wages to men and women, avoidance of child labour, etc.) • Absence of inconvenience, nuisance and complaints • No. of sub-projects completed without time and cost overruns • Adherence to ESMF provisions/ guidelines during sub-project preparation and implementation 		<ul style="list-style-type: none"> • Independent Quarterly Monitoring Consultants • Implementing Agencies/ Departments for department specific information
4. Implementation Support			
5. Contingency Emergency Response			
6.			

5.8 Stakeholder Consultation

28. Due to bad weather, continued flooding and landslides in some areas and affected areas being largely inaccessible, the team was unable to undertake independent on-site

assessment. In the circumstances the damage and loss assessment carried out by the State government of Uttarakhand has been relied upon. During the JRDNA mission several consultations were held with the line departments, where several details regarding the actual situation in the affected area were gathered. Discussion with implementing agencies of on-going projects also helped to negate the absence of stakeholder consultations. The issues presented in these sections are the summary of those consultations. A Stakeholder Consultation Workshop with the participating departments and other stakeholders will be held to gather their feedback on the ESMF and accordingly the ESMF will be revised.

5.8.1 Stakeholder Involvement and Consultation

29. PMU would engage Design consultants to assist them in preparing the sub-project DPRs. In the ToR for these consultants, there is an explicit requirement for the consultants to carry out public/ stakeholder consultations. This is a mechanism to ensure the upfront public/ stakeholder inputs in the preparation of the sub-projects.

30. For all sub-projects, PMU would have to direct the consultants to preparing the DPRs/ SA/ EA / RAP/ ARAP / EMP to involve all the stakeholders and conduct consultations. In the ToRs for the preparation of these outputs, public/stakeholder consultations form an integral part. For such type of sub-projects obtaining consent of the local agencies and necessary clearances from competent authorities is mandatory and should form part of the preparation of DPRs/ SA/ EA / RAP/ ARAP / EMP. These outputs will be reviewed by the World Bank.

31. During sub-project implementation GPs, NGOs, Community Based Organizations (CBOs) will be involved. Project monitoring reports would be disseminated in the public consultation meetings in the GPs. The stakeholder meetings would discuss the sub-project progress reports and make recommendations for sub-project control and modifications. These recommendations would be made use for future sub-project design. Consultations are required for preparation of all safeguards mitigation documents and these consultations should be an on-going activity over the life of the project. These would be documented in the DPRs/ SA/ EA / RAP/ ARAP / EMP for each sub-project.

5.6 Disclosure

5.9.1 State Level

33. PMU and the implementing agencies shall disclose this entire ESMF and all Safeguards related documents and mitigation plans, viz., SA/ EA / RAP/ ARAP / EMP, at their website. These need to be translated into local language (Hindi) and placed on the website. The Resettlement Policy Framework will be disclosed along with the entitlement framework, though this is a part of the ESMF, these documents shall be separately identified and disclosed in the PMU website. These two documents shall also be translated into Hindi and made available at the PMU's website.

5.9.2 District Level

34. PMU will also arrange to disclose the final versions of the ESMF, SA/ EA / RAP/ ARAP / EMP, Resettlement Policy Framework and Entitlement Matrix, in Hindi and English, in all the District Collectors Offices, PIUs, DPIUs and the local offices of the implementing agencies. These would be in place once the final versions are ready. When this document is updated, then the copies in the different locations would also be updated.

5.9.3 Disclosure by the World Bank at the Infoshop

35. The World Bank will disclose this ESMF and any future EA/ SA along with EMP/ RAP at the infoshop for downloading and reference by interested parties.

36. During the implementation phase, all the sub-project ESAs shall be disclosed by PMU and the implementing agencies both at the local level and at the state level. These ESAs will also be disclosed at the Infoshop of The World Bank.

5.10 Comprehensive ESMF Review and Updation

37. UDRP would undertake one thorough/ comprehensive review of the ESMF during the project period. Based on the review, the ESMF would be updated if necessary. UDRP would undertake this review and revision prior to mid-term review by the World Bank. Any revision of this ESMF will have the concurrence of the World Bank.

5.11 Grievance Redress Mechanism

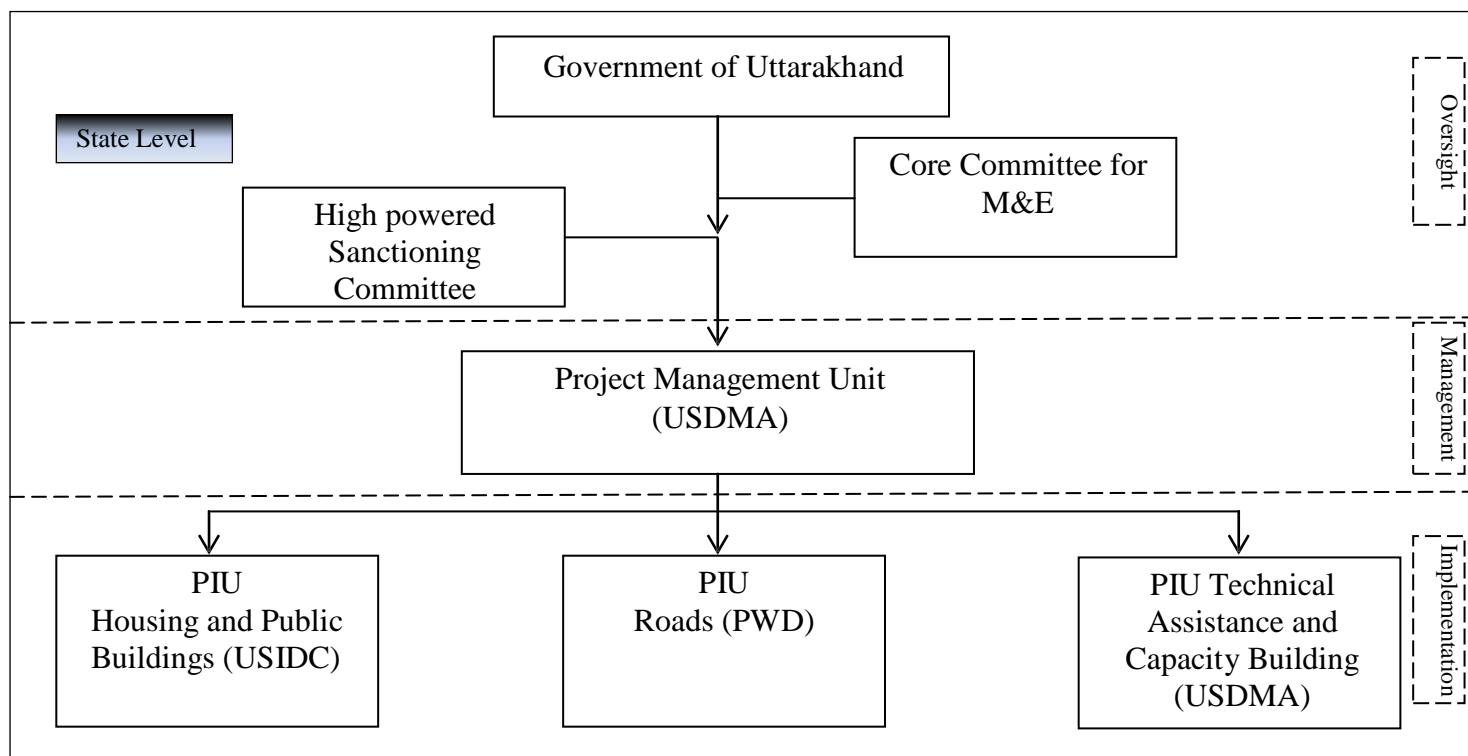
38. PMU will have a grievance redress mechanism which will look into all aspects of sub-projects and their activities apart from R&R related grievances. The Resettlement Policy Framework can be referred for details on Grievance Redress Mechanism.

6. Institutional and Implementation Arrangements

6.1 Introduction

1. Under the Disaster Management Act 2005, Uttarakhand constituted the State Disaster Management Authority (USDMA). The State has also established the Disaster Mitigation & Management Centre (DMMC) which works as an autonomous institute under aegis of Department of Disaster Management Government of Uttarakhand. DMMC is the apex center in the field of Disaster Mitigation & Management in Uttarakhand which functions as a think-tank for the State and incorporate prevention, preparedness and mitigation aspects for all projects.

2. The Government of Uttarakhand will setup a three level project monitoring and implementation mechanism. At state level over all oversight will be ensured by a setup of two committees one headed by the Chief Secretary for monitoring and another headed by the Additional Chief Secretary for providing sanctions and overall coordination of the reconstruction program. The second level will consist of a Project Management Unit, headed by full time project director supported by coordinators for each of the components and supported by function and technical experts. Third level consists of PIUs in the implementing agencies that at state level will have individual project coordinators supported by the functional experts and at field level implementing units with technical staff. Entire implementation setup will be exclusive to the project and work full time. At district level additional coordination and oversight will be ensured by the District Magistrates. The following diagram gives a schematic arrangement of the project implementation and monitoring arrangements:

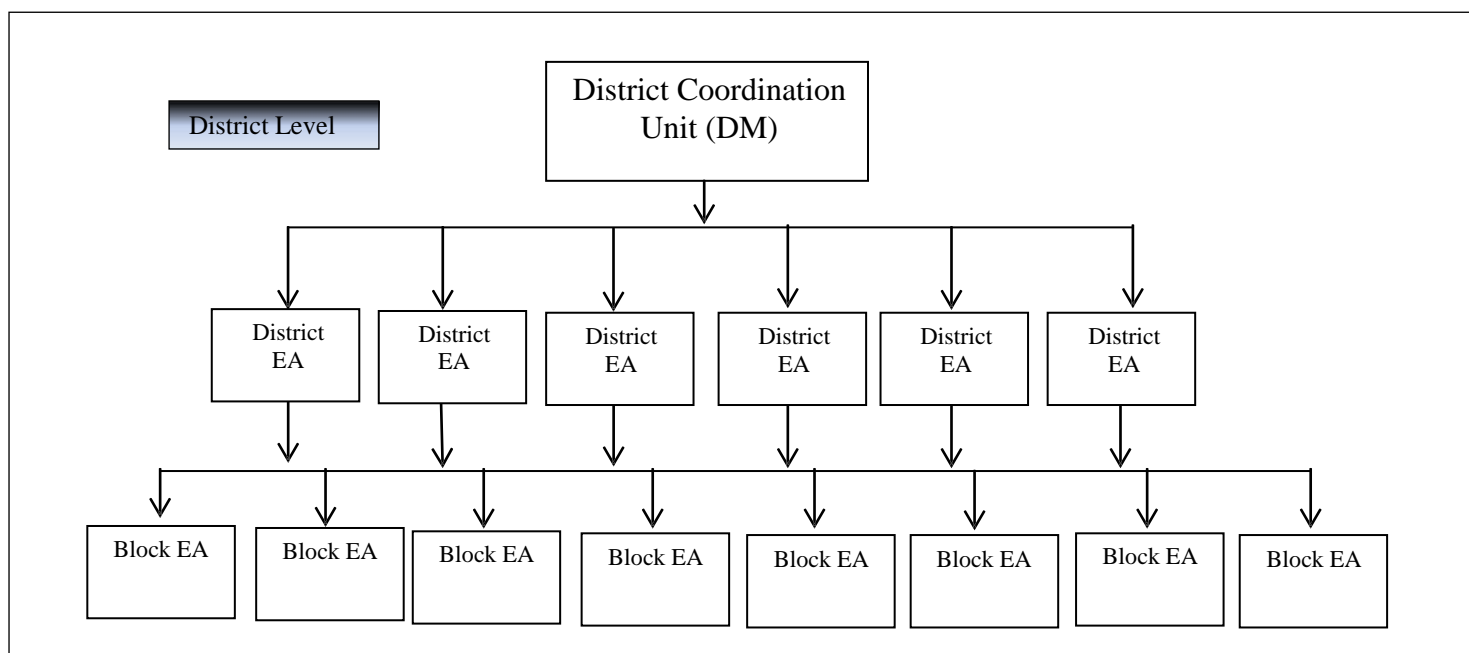


3. The PMU will be responsible for the following:

- a. Coordination with the line agencies in approval of designs, assisting the PIUs in preparation of: DPRs, bidding documents, tendering schedules, etc.
- b. Appointment of technical assistance consultants and others safeguards management support to the implementing agencies.
- c. Quality Assurance through third party audits
- d. Maintaining MIS and Quarterly reporting.
- e. Progress reporting, financial management, monitoring and reporting.
- f. Ensuring compliance with agreed implementation procedures and other Bank requirements, etc.

4. The PIU will be responsible for

- a. Preparation of Detailed Project Reports including technical designs, surveys and investigations etc.
- b. Tendering, bid evaluation, contract award, contract management etc.
- c. Financial Management and safeguards compliance
- d. Progress and expense reporting to the PMU
- e. Coordination with district level coordination committees, etc.



5. In addition there would be a District Level Coordination Unit headed by the District Magistrate that will have the following functions:

- a. Coordinate and monitor among various district/block level executing agencies
- b. Identification and disclosure of beneficiaries
- c. Identification of small works such as bridge bridges and roads at block and district levels

- d. Grievance redress
- e. Resolving issues related to land identification, etc.

I. Project administration mechanisms

6. The follow table 7 lists the implementing arrangements for individual components and subcomponents.

Table 19: Implementation Department for Project Components

Components		Implementing agency	Comments
Resilient Housing	Resilient Relocated Cluster Housing	USIDC	Under overall guidance of the PMU and in coordination with the district magistrate and block offices and in accordance with GoU guidelines
	Resilient ODCH	PMU	
Resilient Public Buildings		USIDC	Upon completion the assets will be handed over to the concerned department
Roads and Bridges		PWD	
Risk Assessment and Modelling; and Capacity Building		PMU	A separate PIU under direct control of PMU will take up the component and partner with USAC, DMMC and other technical agencies for specific activities.
Decision Support Systems		PMU	
Integrated Hydro-met and Early Warning Systems		PMU	
Technical Studies		PMU	

7. **Support and Monitoring of Reconstruction components:** The PMU will put in place a monitoring mechanism that includes photo identification and tracking system for individual beneficiaries. In addition the PMU will also put in place a GIS based reporting and monitoring system for all other reconstruction works in the state. Partnership with NGOs/CBOs and consultations with communities will be integral to the reconstruction work particularly the housing and bridge roads and bridges.

8. **Project Management Consultants:** PMU will hire consultants using pre-agreed Terms of References, for:

- Technical Support and Advise
- Financial/Procurement Management and Project Audit
- Developing the GIS based reporting and monitoring system
- Result monitoring and impact evaluation, etc.

6.3 Monitoring and Evaluation

9. **Monitoring and Evaluation (ME):** Concurrent Monitoring and Evaluation (ME)

would be carried out by the PMU with oversight from the Core Committee of the state. The assignment could be outsourced and will have periodic monitoring. The monitoring will incorporate both qualitative and quantitative analysis and will also be used as a course correction if necessary.

10. The PMU will have the overall responsibility for project implementation including, but not limited to, reporting, monitoring and evaluation, procurement control, financial management, audit and disbursements, compliance with the environmental and social policy requirements, as well as coordination with the line agencies and the World Bank. Within the PMU, full time Environment Manager and Social Managers will be deployed to handle all matters pertaining to environment and social management under the project, including implementing the ESMF. These Environment Manager and Social Managers will be available for the entire project life.

11. The key responsibilities of the Environment and Social Managers include: (a) orientation and training of implementing agency teams and the contractors on environmental and social management, (b) leading/ providing oversight on the EA/SA process and its outputs, (d) review of monitoring reports submitted by the implementing agencies on ESMF/EMP implementation, (d) conducting regular visits to project sites to review ESMF compliance during sub-project planning, design and execution, (e) providing guidance and inputs to the implementing agency teams on environment and social management aspects. These Managers will also deal with matters pertaining to integration of ESMF into the sub-project design and contract documents; preparation of Terms of References for studies (such as for EA/SA); reporting, documentation, monitoring and evaluation on environment and social aspects and will ensure overall coordination with the Implementing Agencies and PIUs and PMU. The representative offices of the PMU at the district and block level will support the Environment and Social Managers in carrying out the responsibilities listed above. The Environment and Social Managers of the PMU will be supported by full time Environment and Social Experts positioned in the PIUs. These Environment and Social Experts will be available for the entire project life.

12. Further to the support the Environment and Social Managers, an 'Independent Safeguard Audit' (ISA) consultant will review the implementation of various EMP / RAP activities by all the sub-projects. In addition to providing regular inputs on improving the safeguard implementation practices in the project, the ISA will submit quarterly reports to PMU, which will be an important resource for Bank team's assessment on safeguards management of the project.

13. Social and Environmental Monitoring: This will comprise of the following sets of activities:

- a) Monitoring compliance with environmental regulations, social safeguards and Environmental and Social Assessment provisions
- b) Continuous Social Impact Monitoring at the Community Levels
- c) Monitoring the performance of NGOs
- d) Overall State-Level Monitoring and Oversight of Social Issues at state/project levels.

6.4 Training and Capacity Building

14. The UDRP staff will need to have awareness, sensitivity, skills and experience regarding the environmental and social aspects of sub-projects planning and implementation. For sustainability and seamless adaption of the environmental and social principles and safeguards by all the implementing partners, awareness creation and capacity building becomes necessary. This capacity building and IEC strategy has been outlined as part of the ESMF program developed for the project aims at building environmental and social awareness and environmental and social management capacity in the project administration structure as well as in the intended target communities. Capacity building for environmental and social management will be integrated with overall capacity building component of the project.

15. The objectives of the capacity building initiatives are:

- To build and strengthen the capability of UDRP staff, participating departments, and other partners to integrate sound environmental and social management into sub-project implementation.
- To orient the UDRP staff, participating departments and IAs at district level and communities to the requirements of the project's ESMF.

16. Systematic capacity building initiatives need to be introduced only after completion of training needs assessment. The training should be of cascade mode. All the trained staff and others will in turn conduct further trainings at district, block and village levels. However, since capacity building goes beyond mere imparting training, institutionalization of best practices becomes a prerequisite for improved sub-project environmental and social management. The training outcomes like trainees' understanding of the training content, achievement of learning objectives, application of methods, tools and techniques learnt during training, etc. need to be monitored and audited. This will be done by the monitoring consultants.

17. In view of the specialized training and capacity building envisaged under the ESMF of the project, it is necessary to identify nodal training institutes that will work closely with PMU for conceptualizing, designing, conducting and managing training programs on the ESMF. Some such specialized institutions are:

- Selected Expert Staff of Participating Departments
- Selected Expert Staff of Disaster Management Department, Environment and Forest Department, Mines and Geology Department, etc.
- Indian Institute of Technology, Roorkee
- Uttarakhand State Pollution Control Board
- Engineering Staff College of India, Hyderabad
- Other Identified Consultants

18. The details of the proposed training programs are as below:

- Orientation/ Learning Training Programs
- Training on the ESMF and Mitigation Plans
- Training on Environmental and Social Management
- Workshops on ESMF

19. The likely participants are key officials of the project, PMU staff, PIUs and DPIUs

staff, Participating Departments' staff, IAs and State Level Environmental and Social Specialist, District level Environment and Social Experts, Resource Persons, GP Representatives, Community Representatives, NGOs, CSOs, CBOs, Women Groups, etc. About 20 to 30 trainees would participate in each of the training programs. It is intended that these trained persons will in turn provide onsite training to Participating Departments' Staff, IAs, Resource Persons, GP Representatives, Community Representatives, NGOs, CSOs, CBOs, Women Groups, etc.etc. onsite at district/ block level.

20. The total estimated cost of training on environmental and social management for members of UDRP, PMU, PIU, DPIUs, Participating Departments' Staff, IAs, etc, under the proposed project is presented in the table below:

S. No.	Training	No. of Programs	Estimated Unit Cost in Rs.	Total Cost In Rs.
1	Orientation/ Learning Training Programs	20	1,00,000	20,00,000
2	Training on the ESMF and Mitigation Plans	10	5,00,000	50,00,000
3	Training on Environmental and Social Management	5	10,00,000	50,00,000
4	Workshops (State)	10	2,00,000	20,00,000
5	Workshops (District)	10	1,00,000	10,00,000
6	Provision for travel, allowance, other training expenses, etc.			1,00,00,000
7	Total			2,50,00,000

6.5 ESMF Budget

The total administrative budget for environmental and social management activities under the UDRP has been worked out as Rs. 8.25 crore. The cost of implementing the proposed mitigation measures is not included in this costing. The cost of mitigating environmental and social impacts need to be included in the respective sub-projects' budgets. The detailed breakup of the administrative budget is presented in the table below.

S No.	Activity	Amount in Rs.
1	Training and workshops (as estimated)	2,50,00,000
2	Community Mobilization Staff Costs (lump sum)	2,00,00,000
3	Quarterly Environmental Social Safeguards Monitoring by Independent Consultants for 4 Years @ Rs. 50 Lakhs per year	2,00,00,000
4	Preparation of specific environment and social related community awareness materials (lumpsum)	1,00,00,000
5	Sub Total	7,50,00,000
6	Contingencies @ 10%	75,00,000

7	Total		8,25,00,000
		Say	I.Rs. 8.25 Crores

7. Environment Impact Mitigation Plan - Guidance

7.1 Introduction

1. This guidance includes a generic Environment Impact Mitigation Plan (EMP) listing mitigation measures for the possible impacts caused by the sub-projects under UDRP. This also includes the project phase, where each of the mitigation measures needs to be considered and also indicates the implementation responsibility. The use of Environmental Codes of Practice (ECoPs) for various stages in the sub-projects for village roads for management of environmental and social impacts already being used in the PMGSY program being supported by the World Bank becomes mandatory since the unit operations of the project are the same as PMGSY. These are annexed to this report.

7.2 How to use this Guidance

7.2.1 For E1 sub-projects

2. This category of sub-projects requires a full-fledged EA that is to be done by environmental consultants separate from the design consultants. The impacts and mitigation measures given in this section should be used to identify the key/ important issues. The relevant management measures must then be integrated into the bid/contract documents. This would be confirmed by the PMU to the Bank for such sub-projects.

7.2.2 For E2 sub-projects

3. For this category of sub-projects, the design consultants have to prepare an EMP. This mitigation measures section should be referred to develop the EMP by the design consultants to prepare a table of mitigation measures in the sub-project EMP. The PIU would ensure that relevant mitigation measures are implemented as sub-projects go into implementation.

7.3 Budget

4. The budget for complying with the EMP needs to be worked out for each sub-project by working out the cost of implementing each EMP mitigation measure. Where this is not possible, provision of a minimum of 2% of the sub-project cost needs to be earmarked for complying with the EMP.

Table 22: Environment Impact Mitigation Plan – Guidance

S. No.	Issues / Impacts	Mitigation Measures	Project Phase	Responsibility
1	Utility Relocation and common property resources	In case of utilities and common property resources being impacted due to the project, they will be relocated with prior approval of the concerned agencies before construction starts, on any sub-section of the project road. The relocation site identification will be in accordance with the choice of the community.	Pre-construction	Contractor, PIU, DPIU
2	Relocation of Cultural Property	In case there is an impact on cultural properties, they will be relocated at suitable locations, as desired by the community before construction starts. Local Community meetings, will be held to discuss relocation aspects, siting of structures etc.	Pre-construction	Contractor, PIU, DPIU
3	Site clearance	Site clearance will be done only in the area required for the sub-project.	Pre-construction	Contractor, PIU, DPIU
4	Tree Cutting	Trees will generally not be removed unless they are a safety hazard. Removal of trees shall be done only after the permissions / approvals are obtained. Disposal of cut trees is to be done immediately to ensure that the traffic movement is not disrupted.	Pre-construction	Contractor, PIU, DPIU
5	Debris disposal site identification	Site for temporary storage and disposal of debris refuse to be identified. These disposal sites shall be finalized such that they are not located within any designated forest or other eco-sensitive areas, does not impact natural drainage courses and no endangered / rare flora is impacted by such disposal. Pre-designated sites for disposal by PMU could be used with prior permission from PMU.	Pre-Construction	Contractor, PIU, DPIU
6	Joint Field Verification	The Engineer and the Contractor will carry out joint field verification of the EMP. The efficacy of the mitigation measures suggested in the EMP will be checked.	Pre-Construction	Contractor/ PIU, DPIU, Social and Environmental Managers and Experts
7	Modification of the Contract Documents	If required, the Engineer will modify the EMP and Contract documents (particularly the BOQs).	Pre-construction	PIU, DPIU, Contractor, Design Consultant, Social and Environmental Managers and Experts

S. No.	Issues / Impacts	Mitigation Measures	Project Phase	Responsibility
8	Crushers, Hot-mix plants & Batching Plants	Specifications hot mix plants and batching plants (existing or new) will comply with the requirements of the relevant national, state and local pollution control requirements. Hot mix plants and batching plants will be sited sufficiently away from habitation, agricultural operations or industrial establishments. Such plants will be located at least 1000m away from the nearest habitation, preferably in the downwind direction.	Pre-Construction	Contractor, PIU, DPIU
9	Other Construction Vehicles, Equipment and Machinery	The discharge standards promulgated under the Environment Protection Act, 1986 will be strictly adhered to. All vehicles, equipment and machinery to be procured for construction will conform to the relevant Bureau of Indian Standard (BIS) norms. Noise limits for construction equipment to be procured such as compactors, rollers, front loaders, concrete mixers, cranes (moveable), vibrators and saws will not exceed 75 dB (A), measured at one meter from the edge of the equipment in free field, as specified in the Environment (Protection) Rules, 1986.	Pre-Construction	Contractor, PIU, DPIU
10	Material sourcing (sand, borrow material and stone material)	Procurement of construction material only from permitted sites and licensed / authorized quarries. Farm land and forest belts shall not be used for material sourcing or borrow sites. Arable land shall not be selected as borrow sites as much as possible. If excavation has to be done in arable land, top soil layer (30 cm) shall be saved and returned after construction work is completed, so as to minimize impacts.	Pre-Construction	Contractor , PIU, DPIU
11	Quarries	The Contractor will identify materials from existing licensed quarries with the suitable materials for construction. Apart from approval of the quality of the quarry materials, the Engineer's representative will verify the legal status of the quarry operation. The quarry operations will be undertaken within the rules and regulations in force.	Pre-Construction	Contractor
12	Water	The Contractor will be responsible for arranging adequate supply of water for the entire construction period. The contractor shall consult the local people before finalizing the locations. The contractor will preferentially source all water requirements from surface water bodies. The contractor will be allowed to pump only from the surface water bodies. Boring of any tube wells will be prohibited. Any groundwater to be extracted requires permission from PIU/ DPIU and Department of Mines and Geology. The contractor will minimize wastage of water during construction.	Pre-construction	Contractor

S. No.	Issues / Impacts	Mitigation Measures	Project Phase	Responsibility
13	Sand	The contractor will identify sand quarries with requisite approvals for the extraction of sand.	Pre-construction	Contractor
14	Labour Requirements	The contractor will use unskilled labour drawn from local communities to avoid any additional stress on the existing facilities (medical services, power, water supply, etc.) Planning of labour camps, if required, needs to be done to ensure adequate water supply, sanitation and drainage etc., in conformity with the Indian Labour Laws.	Mobilization	Contractor
15	Generation of Debris from dismantling of pavement structures	Debris generated due to the dismantling of the existing pavement structure shall be suitably reused in the proposed construction, subject to the suitability of the material and the approval of the Engineer. The contractor shall suitably dispose unutilized debris material; either through filling up of borrows areas created for the project or at pre-designated dump locations, subject to the approval of the Engineer. Debris generated from pile driving or other construction activities shall be disposed such that it does not flow into the surface water bodies or form mud puddles in the area. Dumping sites shall be identified by the contractor as per regulations in force. The identified locations will be reported to the Engineer.	Construction	Contractor, PIU, DPIU
16	Bituminous wastes disposal	The disposal of residual bituminous wastes will be done by the contractor at secure landfill sites, with the requisite approvals for the same from the concerned government agencies.	Construction	Contractor, PIU, DPIU
17	Non-bituminous construction wastes disposal	Location of disposal sites will be finalized prior to completion of the earthworks on any particular section of the road. The Engineer shall approve these disposal sites conforming to the following (a) These are not located within designated forest areas. (b) The dumping does not impact natural drainage courses (c) No endangered/rare flora is impacted by such dumping. (d) Settlements are located at least 1.0km away from the site. (e) Not located 1 Km within any mangrove vegetation/ecologically sensitive areas.	Construction	Contractor, PIU, DPIU
18	Stripping, stocking and preservation of top soil	The topsoil from borrow areas, areas of cutting and areas to be permanently covered will be stripped to a specified depth of 150mm and stored in stockpiles. At least 10% of the temporarily acquired area will be earmarked for storing topsoil. The stockpile will be designed such that the slope does not exceed 1:2 (vertical to horizontal), and the height of the pile is to be restricted to 2m. Stockpiles will not be surcharged or otherwise loaded and multiple handling will be kept to a minimum to ensure that no compaction will occur. The stockpiles will be covered with gunny bags or tarpaulin. It will be ensured by	Construction	Contractor, PIU, DPIU

S. No.	Issues / Impacts	Mitigation Measures	Project Phase	Responsibility
		the contractor that the topsoil will not be unnecessarily trafficked either before stripping or when in stockpiles. Such stockpiled topsoil will be returned to cover the disturbed area and cut slopes. The management of topsoil shall be reported regularly to the Engineer.		
19	Blasting	Except as may be provided in the contract or ordered or authorized by the Engineer, the Contractor will not use explosives. Where the use of explosives is so provided or ordered or authorized, the Contractor will comply with the requirements of the regulations in force besides the law of the land as applicable. The Contractor will at all times take every possible precaution and will comply with appropriate laws and regulations relating to the importation, handling, transportation, storage and use of explosives and will, at all times when engaged in blasting operations, post sufficient warning flagmen, to the full satisfaction of the Engineer. The Contractor will 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 will 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 will be strictly followed. Blasting will be carried out during fixed hours (preferably during mid-day), 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.	Construction	Contractor, PIU, DPIU
20	Transporting Construction Materials	All vehicles delivering materials to the site will be covered to avoid spillage of materials. All existing highways and roads used by vehicles of the contractor, or any of his sub-contractor or suppliers of materials or plant and similarly roads which are part of the works will be kept clean and clear of all dust/mud or other extraneous materials dropped by such vehicles. The unloading of materials at construction sites close to settlements will be restricted to daytime only.	Construction	Contractor, PIU, DPIU
21	Planning Traffic Diversions & Detours	Temporary diversions will be constructed with the approval of the Engineer. Detailed Traffic Control Plans will be prepared and submitted to the Engineer for approval, 5 days prior to commencement of works on any section of road. The traffic control plans shall contain details of temporary diversions, details of arrangements for construction under	Construction	Contractor, PIU, DPIU, Social and Environmental Managers and

S. No.	Issues / Impacts	Mitigation Measures	Project Phase	Responsibility
		<p>traffic, details of traffic arrangement after cessation of work each day, safety measures for transport of hazardous material and arrangement of flagmen. Environmental personnel of the Engineer will assess the environmental impacts associated as the loss of vegetation, productive lands and the arrangement for temporary diversion of the land prior to the finalization of diversions and detours. Special consideration will be given to the preparation of the traffic control plan for safety of pedestrians and workers at night. The Contractor will ensure that the diversion/detour is always maintained in running condition, particularly during the monsoon to avoid disruption to traffic flow. He shall inform local community of changes to traffic routes, conditions and pedestrian access arrangements. The temporary traffic detours will be kept free of dust by frequent application of water.</p>		Experts
22	Infrastructure provisions at construction camps	<p>The Contractor during the progress of work will provide, erect and maintain necessary (temporary) living accommodation and ancillary facilities for labour to standards and scales approved by the Engineer.</p> <p>There shall be provided within the precincts of every workplace, latrines and urinals in an accessible place, and the accommodation, separately for each for these, as per standards set by the Building and other Construction Workers (regulation of Employment and Conditions of Service) Act, 1996. Except in workplaces provided with water-flushed latrines connected with a water borne sewage system, all latrines shall be provided with dry-earth system (receptacles) which shall be cleaned at least four times daily and at least twice during working hours and kept in a strict sanitary condition. Receptacles shall be tarred inside and outside at least once a year. If women are employed, separate latrines and urinals, screened from those for men (and marked in the vernacular) shall be provided. There shall be adequate supply of water, close to latrines and urinals.</p> <p>All temporary accommodation must be constructed and maintained in such a fashion that uncontaminated water is available for drinking, cooking and washing. The sewage system for the camp must be designed, built and operated so that no health hazard occurs and no pollution to the air, ground or adjacent watercourses takes place. Compliance with the relevant legislation must be strictly adhered to. Garbage bins must be provided in the camp, shall be regularly emptied and the garbage disposed in a hygienic manner.</p>	Construction	Contractor, PIU, DPIU, Social and Environmental Managers and Experts

S. No.	Issues / Impacts	Mitigation Measures	Project Phase	Responsibility
		<p>Construction camps are to be sited at least 1000m away from the nearest habitation and adequate health care is to be provided for the work force. Unless otherwise arranged for by the local sanitary authority, arrangement for disposal of excreta by putting a layer of night soils at the bottom of a permanent tank prepared for the purpose shall be taken up by the contractor. It should be covered with 15 cm layer of waste or refuse and then with a layer of earth for a fortnight (by then it will turn into manure).</p>		
23	<p>Operation of construction equipments and vehicles</p>	<p>All vehicles and equipment used for construction will be fitted with exhaust silencers. During routine servicing operations, the effectiveness of exhaust silencers will be checked and if found to be defective will be replaced. Noise limits for construction equipment used in this project (measured at one meter from the edge of the equipment in free field) such as compactors, rollers, front loaders, concrete mixers, cranes (moveable), vibrators and saws will not exceed 75 dB(A), as specified in the Environment (Protection) Rules, 1986</p> <p>Notwithstanding any other conditions of contract, noise level from any item of plant(s) must comply with the relevant legislation for levels of noise emission. The contractor will ensure that the AAQ concentrations at these construction sites are within the acceptable limits of industrial uses in case of hot mix plants and crushers and residential uses around construction camps. Dust screening vegetation will be planted on the edge of the RoW for crushers. Monitoring of the exhaust gases and noise levels will be carried out by the agency identified for Environmental Monitoring for the project.</p>	Construction	Contractor, PIU, DPIU
24	<p>Material Handling at Site</p>	<p>All workers employed on mixing asphaltic material, cement, lime mortars, concrete etc., will be provided with protective footwear and protective goggles. Workers, who are engaged in welding works, would be provided with welder's protective eye-shields. Workers, engaged in stone breaking activities will be provided with protective goggles and clothing and will be seated at sufficiently safe intervals.</p> <p>The use of any herbicide or other toxic chemical will be strictly in accordance with the manufacturer's instructions. The Engineer will be given at least 6 working days' notice of the proposed use of any herbicide or toxic chemical. A register of all herbicides and other toxic chemicals delivered to the site will be kept and maintained up to date by the Contractor. The register will include the trade name, physical properties and</p>	Construction	Contractor, PIU, DPIU

S. No.	Issues / Impacts	Mitigation Measures	Project Phase	Responsibility
		<p>characteristics, chemical ingredients, health and safety hazard information, safe handling and storage procedures, and emergency and first aid procedures for the product.</p> <p>No man below the age of 14 years and no woman will be employed on the work of painting with products containing lead in any form. No paint containing lead or lead products will be used except in the form of paste or readymade paint. Face masks will be supplied for use by the workers when paint is applied in the form of spray or a surface having lead paint dry rubbed and scrapped.</p>		
25	Precautionary/Safety Measures During Construction	<p>All relevant provisions of the Factories Act, 1948 and the Building and other Construction Workers (regulation of Employment and Conditions of Service) Act, 1996 will be adhered to. Adequate safety measures for workers during handling of materials at site will be taken up. The contractor has to comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches and safe means of entry and egress.</p>	Construction	Contractor, PIU, DPIU
26	Protection of Religious Structures and Shrines	<p>All necessary and adequate care shall be taken to minimize impact on cultural properties (which includes cultural sites and remains, places of worship including temples, mosques, churches and shrines, etc., graveyards, monuments and any other important structures as identified during design and all properties/sites/remains notified under the Ancient Sites and Remains Act). No work shall spillover to these properties, premises and precincts.</p> <p>Access to such properties from the road shall be maintained clear and clean.</p>	Construction	Contractor, PIU, DPIU
27	Dust contamination at construction sites and along the roads	<p>Unpaved haul roads near/passing through residential and commercial areas to be watered thrice a day. Trucks carrying construction material to be adequately covered. All earthwork will be protected in a manner acceptable to the Engineer to minimize generation of dust. The contractor will take every precaution to reduce the level of dust along construction sites involving earthworks, by frequent application of water.</p>	Construction	Contractor, PIU, DPIU
28	Earth work Excavations	<p>Ensure unobstructed natural drainage through proper drainage channels/structures. Dispose surplus excavated earth at identified sites. Ensure minimum hindrance to normal local activities and business. Avoid damage to permanent structures. All excavations will be done in such a manner that the suitable materials available from excavation are satisfactorily utilized as decided upon beforehand. The excavations shall conform to the</p>	Construction	Contractor, PIU, DPIU

S. No.	Issues / Impacts	Mitigation Measures	Project Phase	Responsibility
		lines, grades, side slopes and levels shown in the drawings or as directed by the engineer. While planning or executing excavation the contractor shall take all adequate precautions against soil erosion, water pollution etc and take appropriate drainage measures to keep the site free of water, through use of mulches, grasses, slope drains and other devices. The contractor shall take adequate protective measures to see that excavation operations do not affect or damage adjoining structures and water bodies. For safety precautions guidance may be taken from IS:3764.		
29	Earth fill	Embankment and other fill areas, unless otherwise permitted by the Engineer, be constructed evenly over their full width and the contractor will control and direct movement of construction vehicles and machinery over them	Construction	Contractor, PIU, DPIU
30	Slope protection and control of erosion	Embankments and other areas of unsupported fill will not be constructed with steeper side slopes, or to greater widths than those shown in design drawings. While planning or executing excavations the Contractor will take all adequate precautions against soil erosion as per regulations. Turfing on critical road embankment slopes with grass sods, in accordance with the recommended practice for treatment of embankment slopes for erosion control. The work will be taken up as soon as possible provided the season is favorable for the establishment of sods. Other measures of slope stabilization will include mulching, netting and seeding of batters and drains immediately on completion of earthworks. Dry stone pitching for apron and revetment will be provided for bridges and cross drainage structures.	Construction	Contractor, PIU, DPIU
31	Drainage requirements at construction sites	In addition to the design requirements, the contractor will take all desired measures as directed by the Engineer such measures to prevent temporary or permanent flooding of the site or any adjacent area.	Construction	Contractor, PIU, DPIU
32	Contamination of soil	Vehicle/machinery and equipment operation, maintenance and refueling will be carried out in such a fashion that spillage of fuels and lubricants does not contaminate the ground. Oil interceptors will be provided for vehicle parking, wash down and refueling areas within the construction camps. Fuel storage will be in proper bunded areas. All spills and collected petroleum products will be disposed in accordance with MoEF and SPCB guidelines. Fuel storage and refilling areas will be located at least 1000m from rivers and irrigation	Construction	Contractor, PIU, DPIU

S. No.	Issues / Impacts	Mitigation Measures	Project Phase	Responsibility
		ponds or as directed by the Engineer. In all fuel storage and refueling areas, if located on agricultural land or areas supporting vegetation, the topsoil will be stripped, stockpiled and returned after cessation of such storage and refueling activities.		
33	Compaction of soil	To minimize soil compaction construction vehicle, machinery and equipment will move or be stationed in designated area (RoW or CoI, haul roads as applicable) only. The haul roads for construction materials should be routed to avoid agricultural areas.	Construction	Contractor, PIU, DPIU
34	Silting, Contamination of Water bodies	Silt fencing will be provided around stockpiles at the construction sites close to water bodies. The fencing needs to be provided prior to commencement of earthworks and continue till the stabilization of the embankment slopes, on the particular sub-section of the road. Construction materials containing fine particles will be stored in an enclosure such that sediment-laden water does not drain into nearby watercourses. All discharge standards promulgated under Environmental Protection Act, 1986, will be adhered to. All liquid wastes generated from the site will be disposed as acceptable to the Engineer.	Construction	Contractor, PIU, DPIU
35	Cutting/Filling of Surface water bodies	Earth works shall be undertaken such that the existing embankments of water bodies are not disturbed. In case of cutting of embankments, the same shall be reconstructed with appropriate slope protection measures and adequate erosion control measures. Filling of surface water bodies will be compensated by digging an equal volume of soil for water storage. Such dug-up soil will be used for spreading as topsoil. Wherever digging is undertaken, the banks will be protected as designed or as approved by the Engineer. The excavation will be carried out in a manner so that the side slopes are no steeper than 1 vertical to 4 horizontal, otherwise slope protection work, as approved by the Engineer will be provided. As far as practicable, and as approved by the Engineer, excavation for replacement of water bodies will be at the closest possible place/location, with respect to the original water body or part thereof consumed by filling.	Construction	Contractor, PIU, DPIU
36	Sub-Base & Base	The contractor will take all necessary measures/ precautions to ensure that the execution of works and all associated operations are carried out in conformity with statutory and regulatory environmental requirements. The contractor will plan and provide for remedial measures to be implemented in event of occurrence of emergencies such as spillage of oil or bitumen or chemicals. The contractor will provide the Engineer with a statement of measures that he intends to implement in event of such an emergency, which will include a statement of how he intends to adequately train personnel to	Construction	Contractor, PIU, DPIU

S. No.	Issues / Impacts	Mitigation Measures	Project Phase	Responsibility
		implement such measures. Adequate safety measures for workers during handling of materials at site will be taken up. The contractor will take every precaution to reduce the level of dust along construction sites by frequent application of water as per regulations. Noise levels from all vehicles and equipment used for construction will conform to standards as specified. Construction activities involving equipment with high noise levels will be restricted to the daytime. Transport of materials for construction will be as specified. The contractor will provide for all safety measures during construction as per regulations in force.		
37	Surfacing	The contractor will take all necessary means to ensure that all surfacing works and all associated operations are carried out in conformity with regulations. All workers employed on mixing asphaltic material etc. will be provided with protective footwear as specified. Noise levels from all vehicles and equipment used for surfacing will conform to standards as specified. Construction activities involving equipment with high noise levels will be restricted to the daytime. Transport of materials for construction will be as specified. The contractor will provide for all safety measures during construction as per regulations in force.	Construction	Contractor, PIU, DPIU
38	Mitigation Measures for Noise Sensitive Receptors	Noisy construction operations in residential and sensitive areas (hospitals, schools and religious places) should be restricted between 7.30 a.m. to 6.00 p.m. Preventive maintenance of construction equipment and vehicles would be done to meet emission standards and to keep them with low noise. Provision of ear plugs to operators of heavy machinery and workers in near vicinity. During night, material transport should be uniformly distributed to minimize noise impacts.	Construction	Contractor, PIU, DPIU
39	Road Furniture	Road furniture including footpaths, railings, storm water drains, crash barrier, traffic signs, speed zone signs, pavement markers and any other such items will be provided as per design. The contractor shall provide Recharge pits for Urban drains. The drains will be provided for each kilometer of the road through urban settlements and near the outfall to a natural drain if the road crosses one inside a settlement. As part of this recharge pits could be proposed as an enhancement measure.	Construction	Contractor, PIU, DPIU
40	Disposal of construction debris	Daily inspection at haul roads and sites for construction debris for safe collection and disposal to land fill sites. Collection and disposal of refuse. Minimize construction debris	Construction	Contractor, PIU, DPIU

S. No.	Issues / Impacts	Mitigation Measures	Project Phase	Responsibility
		by balancing cut and fill requirements, if relevant.		
41	Adjoining water bodies	Provide slope protection works of water bodies, if any, abutting the road.	Construction	Contractor, PIU, DPIU
42	Bridge Works & Culverts	While working across or close to the rivers, avoid obstructing the flow of water. If an obstruction is required, to serve notice on the downstream users of water sufficiently in advance. Construction over and close to the non-perennial streams will be undertaken in the dry session. Construction work expected to disrupt users and impacting community water bodies will be taken up after serving notice on the local community. Dry stone pitching for apron and revetment will be provided for bridges and cross drainage structures, if necessary.	Construction	Contractor, PIU, DPIU
43	Safety practices during construction	The Contractor is required to comply with all the precautions as required for the safety of the workers as per the International Labour Organization (ILO) Convention No. 62 as far as those are applicable to this contract. The contractor will supply all necessary safety appliances such as safety goggles, helmets, masks, etc., to the workers and staff. The contractor has to comply with all regulation regarding, working platforms, excavations, trenches and safe means of entry and egress.	Construction	Contractor , PIU, DPIU
44	Social disruptions	Minimize interruptions to utility services through proper planning and scheduling of activities and inter-departmental co-ordination. Construction of temporary road/access and diversion of traffic.	Construction	Contractor , PIU, DPIU
45	Aesthetic impairment	Aesthetic enhancement through proper housekeeping of construction sites. Disposal of construction wastes at the approved disposal sites. Immediate closure of the trenches after pipe laying/ completion of work. Complete construction activity by removing all temporary structures, restoring the sub-project and surrounding areas as near as possible to the pre-construction condition.	Construction	Contractor, PIU, DPIU
46	Tree plantation	Trees felled will be replaced as per the compensatory afforestation criteria in accordance with the Forest (Conservation) Act, 1980. Two trees will be planted for every tree lost along the sub-project roads in locations to be identified with support from the PIU.	Construction	Contractor, PMU, Forest Dept.
47	Risk of accidents	In order to guarantee construction safety, efficient lighting and safety signs shall be installed on temporary roads during construction and adequate traffic regulations shall be	Construction	Contractor, PIU, DPIU

S. No.	Issues / Impacts	Mitigation Measures	Project Phase	Responsibility
		adopted and implemented for temporary roads.		
48	Traffic and Transportation	Adequate actions to direct and regulate traffic shall be taken in consultation with PIU/ DPIU/ Traffic Police to prevent jamming roads during construction period. While planning alternative routes, care to be taken to minimize congestion and negative impacts at sensitive receptors such as schools and hospitals. Traffic controls and diversions marked with signs, lights and other measures (flags) should be provided. Prior to creating diversions and detours the citizens should be consulted well in advance through citizen's meetings. It should be an informed decision taken through public participation. Diversion works to be dismantled to restore the area to original condition after completion of construction.	Construction	Contractor, PIU, DPIU, Traffic Police
49	Cultural relics / Chance finds	If fossils, coins, articles of value or antiquity, structures, and their remains of geologic or archaeological interest are found, local government shall be immediately informed of such discovery and excavation shall be stopped until identification of cultural relics by the authorized institution and clearance is given for proceeding with work. All the above discovered on 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 precaution 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 Engineer of such discovery and carry out the Engineer's instructions for dealing with the same, awaiting which all work shall be stopped. The Engineer shall seek direction from the Archaeological Society of India (ASI) before instructing the Contractor to recommence work on the site.	Construction	Contractor, PIU, DPIU
50	Monitoring Environmental Conditions	The contractor will undertake seasonal monitoring of air, water, 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 will be as per the Monitoring Plan prepared.	Construction	Contractor, SPCB, Social and Environmental Managers and Experts
51	Clearing of Construction of	Contractor to prepare site restoration plans for approval by the Engineer. The plan is to be implemented by the contractor prior to demobilization. On completion of the works,	De-mobilization	Contractor, PIU, DPIU

S. No.	Issues / Impacts	Mitigation Measures	Project Phase	Responsibility
	Camps & Restoration	all temporary structures will be cleared away, all rubbish burnt, excreta or other disposal pits or trenches filled in and effectively sealed off and the site left clean and tidy, at the Contractor's expense, to the entire satisfaction of the Engineer. Residual topsoil will be distributed on adjoining/proximate barren/rocky areas as identified by the Engineer in a layer of thickness of 75mm - 150mm.		
52	Monitoring Operational Performance	The PIU will monitor the operational performance of the various mitigation measures carried out as a part of sub-project. The indicators selected for monitoring include the survival rate of trees, water bodies, status of rehabilitation of borrow areas and utility of double glazing for noise sensitive receptors.	Operation	PIU, DPIU, Social and Environmental Managers and Experts
53	Orientation of implementing agency and contractors	The PIU shall organize orientation sessions during all stages of the project. The orientation session shall involve all staff of DPIU and field level implementation staff of Contractor. The contractor needs to comply with the World Bank's Environmental, Health, and Safety Guidelines.	Pre-Construction & Construction	Social and Environmental Managers and Experts, PIU, DPIU
54	Handling of flora/fauna found in project sites	The Contractor shall train the workers to handle any accidental finds of important species of flora and/or fauna and on the procedures to be followed to intimate the Forest Department, and PIU	Pre-Construction & Construction	Contractor, PIU, PMU, Forest Department
55	Handling of Natural Habitats and Biodiversity Issues	The PMU and PIUs and DPIUs will ensure that sub-project planning, preparation, implementation and operation and maintenance will follow the ECoPs given under PMGSY. These are annexed to this report.	Pre-Construction & Construction	Contractor, PIU, PMU, Forest Department

8. Resettlement Policy Framework

8.1 Introduction

1. This Resettlement Policy Framework for UDRP is drawn in accordance with the World Bank's Safeguard Policy on Involuntary resettlement (OP 4.12). The framework comprises of the following sections:

- Objectives of RPF
- Project Components Requiring Land Under Different Tenures
- Requirement of Land – acquisition of private land and transfer of public land under different tenureship
- Usual Practice in Uttarakhand
- Options for UDRP
- Social Impact, Mitigation, Eligibility Criteria and Entitlement (as set out in section 5.5)
- Entitlement Matrix
- Process of Social Impact Assessment including census socio-economic survey
- Categories of Project Affected Families
- Legal Framework (as described in detail in earlier chapter)
- Grievance Redress
- Consultation and Participation

2. The framework has been developed based on the following policies/ legislations:

- The Land Acquisition Act 1894
- National Resettlement and Rehabilitation Policy 2007
- **The Right to Fair Compensation and Transparency in Land Acquisition and Resettlement Act 2013**

3. This framework will act as guide for mitigating the social impacts that would be triggered by the sub-projects under UDRP.

8.1.1 Objective of RPF

4. The primary objective of this RPF is to provide better standard of living to the project affected persons or at least restore their standard of living to that of before project. If the affected persons belong to Below Poverty Line (BPL) category before the project, then this RPF aims to bring them Above Poverty Line (APL). The other objectives of this RPF are to;

- Avoid or minimize involuntary resettlement where feasible, exploring all viable alternative project designs.

- Assist displaced persons in improving their former living standards, income earning capacity, and production levels, or at least in restoring them.
- Encourage community participation in planning and implementing resettlement.
- Provide assistance to affected people regardless of the legality of land tenure.

5. The following guidelines will be followed during implementation:

- Compensation and Rehabilitation assistance will be paid before displacement.
- Compensation will be at replacement cost.
- No civil works will be initiated unless compensation for land and assets and rehabilitation assistance is provided to all eligible PAPs.
- Livelihood assistance will be given in form of Income Generation Assets (IGA) to be chosen by the PAPs.
- IA will provide information to the PAPs on alternative income generation activities suitable for the area and help them in making choices.
- The IA and PMU will monitor the provision of the IGA.
- The IA will monitor the performance of the IGA and report to PMU.

8.2 Land Requirement

6. UDRP proposes various types of sub-projects to be taken up. These sub-projects will require land depending on their type and size. The land requirement would vary across sub-projects and locations. The type and size of the sub-projects dictate the land requirement. The extent of land required would vary across the sub-projects and can't be estimated at this stage.

8.3 Usual Practice

7. GoU is implementing similar projects on a regular basis, which require land, of which the ownership could be either public or private. Accessing public land is easier, but arrangements will have to be made for securing privately owned land. When additional lands are required, GoU, as a first step, would try and secure public lands under different tenure systems where feasible and available. If private lands are required, then GoU would resort to, either through voluntary donation or by outright direct purchase or through using LA Act.

8.4 Voluntary Donation

8. Wherever there is requirement of additional land for rural roads, the GoU has procured these lands through voluntary donations. As there is good demand for reasonable rural roads, housing and public buildings, many times the Gram Panchayat and the villages have come forward to donate any additional land. As the demand outstrips supply, cases of hindrance to rural roads construction for want of additional land were not heard. In the case of subcomponents under the present project, it is rather simple for the GoU, as the requirements are not only minimal but also that:

- almost all roads proposed will be existing roads (sometimes in badly damaged and not motor-able) and the project intervention will be restricted to improving/strengthening the existing road which would mean land requirement will be nil or limited;
- most of these rural roads do have sufficient RoW; and
- in case, it becomes inevitable, the local communities will secure lands either through voluntary donations subject to fulfillment of certain conditions or outright purchase or acquisition using LA Act.
- Very small land parcels, if any would be required for housing and public buildings in addition to government land.

9. With the immediate necessity of reconstructing these badly damaged roads, houses and other buildings and several benefits that are likely to accrue due to these roads, the villagers might remove any encroachments and even donate land if necessary. There may not be much of a problem in procuring/ acquiring the additional land required for project components in a dire necessity.

8.5 Options for UDRP

10. However, keeping in mind any eventuality, the following options are proposed for procuring/ acquiring private lands:

- Voluntary Land Donation
- Land acquisition using **The Right to Fair Compensation and Transparency in Land Acquisition and Resettlement Act 2013**
- **Direct Purchase**

8.5.1 Voluntary Land Donation

11. UDRP will completely avoid or at least minimize land acquisition. Whenever there is additional land requirement, UDRP will interact with the land owners and facilitate voluntary donation of land required for taking up sub-projects under the project. This use of voluntary donation option will be limited to small strips of land for rural roads and small plots of land for buildings. Under no circumstances, the titleholder/ encroacher will be subjected to any pressure, directly or indirectly, to part with the land. These actions are expected to minimize adverse impacts on the local population and help in project benefits reaching all sections of community.

12. UDRP will ensure that the process of voluntary donation of land will be meticulously documented at all levels to avoid confusions, misunderstandings, litigations, etc. at a later stage. A format for this purpose is enclosed in the Annexures. This process will be taken up mainly at three levels as described below:

Table 23: Process of voluntary donation of land			
Level	Process	Output	Responsibility
GP/	Based on the revenue survey, lands will be identified and	Willingness	Sarpanch, GP,

Village Level	the list of titleholders/ encroachers will be prepared. This will be done by GP with the help of IA and GP Secretary. GP motivates the title holders and encroachers for voluntary land donation required for the project. The DPIU will help in this process and will document the willingness to donate land by the titleholders and encroachers in the presence of the Sarpanch and GP Secretary in the form of a Willingness Letter. The list of such persons will be displayed at the Gram Panchayat Office.	Letters	DPIU, GP Secretary, and affected persons (Titleholder/ Encroachers)
Block Level	BDO or concerned Revenue Official surveys the land and demarcates the extent of area required. The survey will identify if the land is public, private or encroachment. Based on the survey, maps are prepared. The entire process will be carried out along with GP, DPIU, and GP Secretary. The maps will be signed by Sarpanch, GP Secretary, and concerned Revenue Officer.	Survey map signed by relevant persons indicating the extent of land required.	BDO, Surveyor, Sarpanch, GP Secretary, DPIU
District Level	Formalize relinquishment of land rights where concerned local people voluntarily donate their private land for the project for public purpose.	Effect Changes in Land Revenue Records	District Collector, BDO

13. Original copies of all documentation of voluntary donation of land will be kept with the Block Development Officer with copies at GP. Complete documentation along with a copy of the final document will be sent to PMU for records and for inspection at a later date. In order to make this process transparent, the following rules are prescribed:

- The Titleholder/ Encroacher should not belong to the vulnerable sections/ BPL category.
- Identification of vulnerable PAPs: The vulnerability shall be assessed by the project based on the census of the affected persons. The following categories of PAFs/ PAPs shall be entitled for support as vulnerable groups:
 - BPL households (with a valid proof), as per the State poverty line for rural areas;
 - BPL households without a proof of the same and belonging to the following social categories (i) Women headed households with women as sole earner (ii) Scheduled Caste/Scheduled Tribe and (iii) Handicapped person, and is subject to any of the following impacts;
 - Loses land holding,
 - Loses shelter and
 - Loses source of livelihood.
- The project provides for targeted support/ assistance to the vulnerable groups.
- The Titleholder/ Encroacher should be holding more than the minimum prescribed land, i.e., 1 hectare of wet land and 2 hectares of dry land after donation.
- The impacts must be minor. The voluntary donation should not be more than 10 percent of the area of that particular holding of the Titleholder/ Encroacher in that category of land (dry, wet or commercial/ residential). This should not require any physical

relocation of the Titleholder/ Encroacher. The land donated should not be more than 1 acre in case of dry land, 0.5 acre in case of wet land and 0.25 acre in case of commercial/ residential.

- The land must be jointly identified by the GP, and DPIU and PMU Representative or other implementing agencies or project authorities. However the project technical authorities should ensure that the land is appropriate for sub-project purposes and that the sub-project will not invite any adverse social, health, environmental, safety, etc. related impacts by procuring this land.
- The land in question must be free of squatters, encroachers, or other claims or encumbrances.
- Buildings/structures on the land donated is not accepted as donation.
- Verification of the voluntary nature of land donations must be obtained from each of the persons donating land. This should be in the form of notarized witnessed statements.
- In case of any loss of income or physical displacement is envisaged, verification of voluntary acceptance of community devised migratory measures must be obtained from those expected to be adversely affected.
- The land title must be vested in the GP and appropriate guarantees of public access to services must be given by the private titleholder.
- The Titleholder/ Encroacher donating land should be provided access on priority basis, subject to eligibility, to the Government housing/ poverty reduction/ livelihoods/ etc. programs operating in the area.
- The Titleholder/ Encroacher donating land should made to understand that they will have equal access to the infrastructure built on the donated land like any other community member and that they cannot claim for any priority treatment.
- Grievance Redress Mechanism must be available.
- The donations and the process followed is documented, monitored and reflected in the monitoring reports.

8.5.2 Land Acquisition using The Right to Fair Compensation and Transparency in Land Acquisition and Resettlement Act 2013

14. The land acquisition to be done under this project will be according to The Right to Fair Compensation and Transparency in Land Acquisition and Resettlement Act 2013.

8.5.3 Direct Purchase

15. Enquiries reveal that GoU has experience of direct purchase of private lands for public purposes. Hence, this method can be adopted, on a willing seller and willing buyer basis, to avoid delays.

8.6 Compensation for Structures and other Assets

16. **Structures:** The compensation for structures includes market price of the assets to build/ procure a replacement asset, or to repair, if affected partially. In determining the

replacement cost, depreciation of the asset and the value of salvage materials are not taken into account. Compensation for trees, crops and other assets will be based on the replacement value using existing prices prepared by relevant agencies, taking into account their productivity and/or local market prices. An addition of 30% is made to the replacement value.

17. **Common Property Resources:** Grazing lands, places of worship, places of heritage value, burial grounds, water points, community wells, bore wells for drinking water, roads, path ways, community meeting places, wood lots, etc. are categorized under this heading. These resources will be restored to an acceptable level at an appropriate place as agreed with the community. Community will be fully involved in their replacement.

8.7 Categories of Project Affected People

18. GoU has implemented several projects similar to the sub-projects proposed under several externally aided projects in the past. From this experience, it is established that lands acquired will normally be rural agricultural lands. Residential and commercial lands may not be required to be acquired. In any case, project need not acquire any structures. Taking these into account, and given that a generic framework is being developed, following broad categories of Project Affected People (PAPs) are identified:

1. Titleholders
 - a. Agricultural
 - b. Residential
 - c. Commercial
2. Encroachers/ Squatters with no valid title
 - a. Agricultural
 - b. Residential
 - c. Commercial
3. Groups losing Livelihoods and/ or Access

8.7.1 Cut-Off Date

19. For preparing a list of PAPs, a Socio-economic survey of the affected families done during the planning phase of a sub-project. The list will be appended to the sub-project DPR. This date on which the socio-economic survey is conducted will serve as the cut-off date. No additions to this list will be made unless authorized with concrete proof by Project Director, PMU.

8.7.2 Identification of PAPs

20. UDRP proposed community participation through participation of Gram Panchayats, to shoulder some responsibilities such as identification of PAPs, mobilizing community for voluntary land donations, implementing RAPs (if any), and grievance redressal. The following process will be adopted to identify PAPs:

- GP identifies the affected area at the village level along with IA duly involving Gram Panchayat members, Panchayat Secretary, in identifying affected area.
- Once the land required is identified, it is classified as either government land or encroached land and/or private land based on ownership status
- GP with the Implementing Agency announces a cut-off date as the Base line Socio-Economic survey date for identification of affected people.
- GP identifies the encroachers and titleholders as per the ownership status with the help of community members.
- Based on this information arrive at the number of PAPs

21. A detailed census based socio-economic survey will be conducted and extensive consultations will be held with the project affected families, i.e. the land losers. Each target community will be identified and differentiated on the basis of their source and level of income. The survey will focus on land and various productive assets including wages. This information will be used to determine the nature and extent of livelihood support/assistance (over and above the provision made for compensation) required to restore adequate income levels. All these measures will be taken only after consulting the affected families and wider community. This approach will help the project in achieving its objective of ensuring that no affected household becomes poorer with the intervention.

8.7.3 Valuation of Structures and Assets

22. PMU or the concerned Department shall deploy its expert in civil engineering/ geology/ agriculture/ horticulture as required or alternatively hire the services of government approved valuer for valuation of structures and other immovable assets. The objective of this exercise is to establish the extent of loss and estimation of replacement cost. The major tasks are as follows:

1. Measurement of affected structure/ immovable assets
2. Establishing construction typology
3. Establishing extent of loss
4. Estimation of replacement cost

23. Measurement provides required information for valuation. For valuation the latest Schedules of Rates (SR) applicable to assets being valued need to be used. This SR provides the consolidated unit rates for permanent, semi-permanent and temporary construction. Details as to how such consolidated unit rates have been arrived at is also explained in the SR. Using the analysis as guide, the expert/ valuer can arrive at the compensation value of a structure/ asset. Various SRs also provides rates for hand pumps, dug-wells, tube wells etc including installation charges. Extent of loss would be determined primarily in terms of the portion of the structure affected. While calculating replacement cost the following principles need to be kept in mind:

- If a structure/ asset is affected 50% or more, then consider the whole structure as affected.
- Do not depreciate the cost of the structure/ asset for its age.
- Add 30% extra over and above the estimated cost to arrive at replacement value.

- Allow the PAPs to salvage and carry, for free, any materials for their use. Do include the cost of salvaged material in the replacement cost.

8.7.4 Entitlement Matrix

24. This Entitlement Matrix is developed giving various entitlements for all categories of PAPs, based on The Right to Fair Compensation and Transparency in Land Acquisition and Resettlement Act 2013.. This Matrix can be used as a guide for designing Resettlement Action Plans for sub-projects. All the families will be entitled to two broad categories of assistance; 1) compensation for land loss; and 2) livelihood (rehabilitation) assistance for starting some income generation activity, which may include the purchase of lands, as decided by the PAF. The livelihood assistance in the matrix are rather indicative (as they are average figures), whereas, the actual assistance will relate to, at the minimum restoring, if not enhancing the pre-land loss income levels. It may also be noted that livelihood assistance figures have been worked out such as to yield an annual income of Rs 50,000 per family, an income level corresponding to the initial ladder of the Above Poverty Line. The amounts given in the Entitlement matrix are for the financial year 2013-14. After this year these amounts will be increased by 10% every year to compensate for inflation. Details related to the entitlements are presented in the matrix below.

Table 24: Entitlement Matrix

Impact Type	Entitled Entity	Entitlement based on The Right to Fair Compensation and Transparency in Land Acquisition and Resettlement Act 2013.
1. Loss of Land (Titleholders)		
1A. Loss of Agricultural Land	Affected Family (Titleholder)	<ul style="list-style-type: none"> • Cash compensation at replacement cost as determined according to The Right to Fair Compensation and Transparency in Land Acquisition and Resettlement Act 2013. or replacement of land if available. • If the residual plot is not viable and PAP becomes a marginal farmer, then any of the following three options are to be given to the PAP, subject to PAP's acceptance: <ul style="list-style-type: none"> ○ Acquire the required land and pay compensation and assistance for the same. ○ If PAP so wishes acquire the remaining portion of the plot and pay compensation and assistance for the entire plot including residual part. ○ If PAP is from vulnerable group, compensation for the entire land by means of land for land will be provided, if PAP wants so, provided that land of equal productive value is available. ○ If the land for land option is exercised, then an additional Rs. 50,000/- per acre will be paid for land preparation. ○ An amount of Rs. 25,000/- will be provided for each PAP towards building a cattle shed. • If the PAP wishes to buy land with the compensation amount, then an additional Rs. 50,000/- per acre will be paid for land preparation. • Subsistence Grant of Rs. 50,000/- • One time resettlement allowance of Rs. 50,000/- • All fees, stamp duties, taxes and other charges, as applicable under the relevant laws, incurred in the relocation and rehabilitation process, are to be borne by the IA.
1B. Loss of Residential/ Commercial land	Affected Family (Titleholder)	<ul style="list-style-type: none"> • Cash compensation at replacement cost as determined according to The Right to Fair Compensation and Transparency in Land Acquisition and Resettlement Act 2013. or replacement of land if available. • Subsistence Grant of Rs. 50,000/- • One time resettlement allowance of Rs. 50,000/- • All fees, stamp duties, taxes and other charges, as applicable under the relevant laws, incurred in the relocation and rehabilitation process, are to be borne by the IA.
2. Loss of Structures (Titleholders)		
2A. Loss of	Affected Family	<ul style="list-style-type: none"> • Compensation of structure will be paid at the replacement cost to be calculated as per latest prevailing Basic

Impact Type	Entitled Entity	Entitlement based on The Right to Fair Compensation and Transparency in Land Acquisition and Resettlement Act 2013.
Residential Structures	(Titleholder)	<p>Schedule of Rates (BSR) without depreciation.</p> <ul style="list-style-type: none"> • Assistance of Rs. 30,000/- towards temporary accommodation or Rental assistance as per the prevalent rate in the form of grant to cover maximum six month rentals, whichever is higher. • Subsistence Grant of Rs. 50,000/- • Transportation assistance of Rs. 50,000/- • One time resettlement allowance of Rs. 50,000/- • Right to salvage material from demolished structure and frontage etc.
2B. Loss of Rental Accommodation (Residential/ Commercial)	Tenants	<ul style="list-style-type: none"> • Rental assistance for both residential & commercial tenants: Assistance of Rs. 30,000/- towards temporary accommodation or Rental assistance as per the prevalent rate in the form of grant to cover maximum six month rentals, whichever is higher. • Additional structures erected by tenants will also be compensated separately directly to the tenants. • Transport/ Shifting assistance based on type of house and household assets, subject to a minimum of Rs. 50,000/-. • Any advance deposited by the tenants will be refunded from owners total compensation package to the tenant on submission of documentary evidence. • Right to salvage material from demolished structure and frontage etc. erected by tenants.
3. Loss of Structures Residential/ Commercial (Non-Titleholders)		
3A. Loss of Immovable and Pucca Structures (Residential/ Commercial)	Squatters/ Encroachers	<ul style="list-style-type: none"> • Squatters and Encroachers will be notified and given one month time to remove their assets or enough time to harvest their present crops. • Compensation for loss of structures at replacement cost. All asset/structures impacted will be compensated irrespective of the notice time. • Subsistence Grant of Rs. 50,000/- • Transport/ Shifting assistance of Rs. 50,000/-. • One time resettlement allowance of Rs. 50,000/- • For Squatters and Encroachers right to salvage material from the demolished structure.
4. Loss of Crops and Trees	Titleholders Share Croppers Lease Holders	<ul style="list-style-type: none"> • Advance notice to all to harvest crops, fruits and remove trees. • In case of standing crops, cash compensation at current market prices for mature crops based on average production. • For fruit bearing trees compensation at average fruit production for next 15 years to be computed at current market value.

Impact Type	Entitled Entity	Entitlement based on The Right to Fair Compensation and Transparency in Land Acquisition and Resettlement Act 2013.
		<ul style="list-style-type: none"> For timber trees compensation at market price based on kind of trees.
5. Loss of Livelihood		
5A. Loss of Primary Source of Income/ Livelihood	Titleholders Non-Titleholders Agricultural Labourers Share Croppers	<ul style="list-style-type: none"> Subsistence Grant of Rs. 50,000/- Rs. 25,000/- for cattle shed or petty shop One time grant of Rs. 25,000/- to artisans, small traders and certain others Employment opportunity for PAPS in the sub-project construction work, if available and if so desired by them. National/State level job card under National Rural Employment Guarantee Program. Income generation skill upgrading vocational training of their choice at a rate of Rs. 10,000/- For Agricultural Labourers and Share Croppers an assistance of 500 days of wages at prevailing minimum wage rate One time resettlement allowance of Rs. 50,000/-
6. Loss of Access		
6A. Loss of Access	Titleholders Non-Titleholders Agricultural Labourers Share Croppers	<ul style="list-style-type: none"> Provision of suitable and acceptable access or compensating the losses thereby in the spirit of the principle.
7. Common Property Resources		
7A. Loss of Common Property Resources	Community	<ul style="list-style-type: none"> Reconstruction as per latest norms and guidelines, Commissioning and handing over to concerned departments/ community of all affected community property resources with community consultation and participation.
8. Vulnerables		
8A. Vulnerable PAPS	Women headed households, Widows, STs, Chronically ill,	<ul style="list-style-type: none"> A onetime assistance of Rs. 50,000/- over and above other entitlements. Handholding for ensured access to other government subsidies, schemes and services

Impact Type	Entitled Entity	Entitlement based on The Right to Fair Compensation and Transparency in Land Acquisition and Resettlement Act 2013.
	Old persons, etc.	
9. Other Unforeseen/ Unanticipated Impacts		
9A. Unforeseen/ Unanticipated Impacts		<ul style="list-style-type: none"> • Any unforeseen/ unanticipated impacts due to the sub-projects will be documented and mitigated based on the spirit of the principle agreed upon in this framework.

8.8 Grievance Redress

26. This section deals with the structures and processes of multi-level, three-tier, Grievance Redress Mechanism and also the legal options available to not only the Project Affected Persons (PAPs) but also the Project Affected Beneficiaries who would enjoy the benefits of the project in terms of access to funds for reconstruction of their fully damaged homestead structures. The multi-level includes Gram Panchayat, District and State levels.

8.8.1 R&R Committee (RRC) and Grievance Redress Committees

In order to address grievances related to land acquisition and resettlement and rehabilitation implementation, three bodies are to be established; R&R Committee at the state level and Grievance Redress Committees at the district and Gram Panchayat (GP) level.

27. It is proposed that the PAPs first register the grievances with the IA. After receipt of grievance, the IA should take them to the committee to take up the matter during the next immediate meeting and initiate measures for redress. No grievance can be kept pending for more than a month which means the committee has to meet every month. Implementation of the redress rests with the PMU. In case the aggrieved party is not satisfied with the proposed redress measures, it can take approach the state level committee. If the aggrieved party is not satisfied with the decision of state level committee, it can approach the court of law.

The GRC at Gram Panchayat level will be headed by the elected Pradhan of the Panchayat who will also be the Convener. The District Collector will be the Chairman and the official in-charge of the DPIU will be the Convener of the District Level GRC. The Principal Secretary, Planning will be the Chairman of State level GRC while the Project Director will be its Convener.

The number of Members of GRC at each level will be decided by the Project Director at the time of constituting the GRCs at three levels. The membership will follow the following principles and the number of non-Government representatives will be in proportion to Government representatives. The level of Government representatives at each level will also be determined by the Project Director.

1. Representatives of participating Departments as reflected in PIU
2. Representative of the Revenue Department
3. Representative of Disaster Management Authority
4. Representatives of NGOs/CSOs including women
5. Representatives of Project Affected Beneficiaries/Project Affected Persons

Scope of GRC

The GRCs will receive and redress all complaints and grievance that relate to the Project that are formally brought to the GRCs in writing only by the person and group of persons who have a grievance because of the project's adverse impact on him/her and them. The complaints/grievance could relate, among others, to: (1) access to project benefits such as financial assistance to house construction; (2) selection of site for cluster house relocation; (2) selection of sites of relocation of damaged Government buildings and social infrastructure such as schools, health centers that require relocation; (3) payment of compensation and resettlement

assistance in accordance with social impact mitigation and eligibility criteria as set out in section 5.5 of ESMF.

Processes of GRCs

1. The GRCs will meet on a fixed day/date of every month during the first year and this could be changed during the following years;
2. The GRCs will meet the following working day if the day/date fixed for the monthly meeting falls on a holiday
3. The GRCs will consider and redress all registered and acknowledged complaints/grievance received at least 15 days before the day/date of the meeting;
4. The GRCs will work out a time frame to redress grievance at each level if the complaint/grievance is not addressed in the first meeting;
5. The GRCs will acknowledge the receipt of complaints/grievances by registered letter within one week;
6. The GRCs will hold public meetings that would also include all those who have complained or who have a grievance expressed in writing in order to facilitate transparency and accountability;
7. The GRCs at the levels of Gram Panchayats and Districts will fix a timeframe for appealing to the next level to seek grievance redress;
8. The GRC's decisions at the State level are not final and the complainants have the right to seek judicial redress if they are not satisfied with the final decision at the State level.
9. The grievances will be received in written form, as when they arrive and registered in the Grievance Register by the IA.
10. The procedures to redress grievances will be transparent involving all the members of the committee and the aggrieved party.
11. The timeframe for redressing grievances is given in the table below. The decisions regarding Redressal will be communicated in writing to the aggrieved party within a week after arriving at the decision. The aggrieved party when not satisfied may appeal to R&R Committee within a month of the communicating the decision. If the aggrieved party is not satisfied with decision of the R&R Committee, then it may seek legal redress.

Documentation of the Processes

The GRCs at each level will maintain the following three Grievance Registers that would, among others, help with monitoring and evaluation of the functioning of GRCs but also to document the processes of GRCs.

- **Complaints/Grievances Register:** (1) Serial Number; (2) Case Number; (3) Name of Complainant; (4) Gender; (5) Name of Father/Husband; (6) Full Address of the Complainant; (7) Main complaint/grievance; (8) List of documents attached; (9) History of Previous complaint/grievance, if any (10) Date of receipt of complaint/grievance and (11) Date of acknowledgement of complaint/grievance

- **Resolution Register:** (1) Serial Number; (2) Case Number; (3) Name of Complainant; (4) Main complaint/grievance; (5) Date of field investigation, if any; (6) Date of hearing; (7) Decision of GRC at that level; (8) Progress – redressed, pending or rejected; and (9) Key agreements/commitments.
- **Closing Register:** (1) Serial Number; (2) Case Number; (3) Name of complainant/grieved person; (4) Date of hearing; (5) Decision/Response of the complainant/grieved person; (6) Date, Mode and Medium of communication to complainant/grieved person; (7) Date of closing of complaint/grievance; (8) Whether appealing to next level – yes or no; and (9) whether or not seeking legal redress.

The grievance redress process will be a continuous, transparent and participatory process that would be an integral part of the project’s accountability and governance agenda. The GRC at each level will maintain the above mentioned Registers. The GRC at each level will also keep a separate case file for each complainant/grieved persons in which all complaint/grievance related documents will be kept. The PMU will also prepare periodic reports on the grievance redress on the basis of reports received from the three levels of GRCs.

Level	Agency	Time period for redress of grievances	Issues likely to emerge	Responsibility
Village	Gram Panchayat	Maximum of two weeks	<ul style="list-style-type: none"> ▪ Encroachment ▪ Land acquisition ▪ Livelihood Assistance ▪ Compensation ▪ Inclusion of households 	GP, Project Staff; GP Pradhan as convener
District	Grievance Redress Committee	Maximum of one month		District Collector as Chairperson and DPIU in-charge as Convener
State	R&R Committee	Maximum of three months		Principal Secretary, Planning as Chairman, Project Director, PMU as Convener

8.8.2 Legal Options to PAPs

28. The PAPs will have two kinds of options for addressing their grievance s relating to the Land Appropriation. One is the grievance redressed mechanism incorporate in this framework as above. The other is the general legal environment consisting of court of law to address their grievance. These options will be disclosed to the PAPs during the public consultation process.

8.9 Consultation

29. UDRP will ensure the participation of the PAPs and other stakeholders through periodic consultations for planning and monitoring project activities. Consultations will be held at regular intervals with Project Affected Persons, GP members, Women, etc. The following consultations will be carried out during the project cycle.

- Estimation of land requirement; Title holder, extent, location, etc.
- Identification and verification of Encroachers/ Squatters
- Socio-economic survey for preparing the baseline of the displaced/affected families
- Motivation of titleholders and encroachers to facilitate the Land Acquisition process and voluntary land donations
- Implementation of the IEC/ Communication plan for awareness creation about project activities
- Identifying livelihood support programs for PAPs

30. In order to keep the momentum of consultation, activity specific consultations and a quarterly consultation will be held with all stakeholder groups.

8.9.1 Stakeholder Participation

31. UDRP recognizes the fact that PAPs are important stakeholders of the project. Hence, the GPs would ensure that these stakeholders are consulted on issues and they participate in all the sub-project activities including planning and implementation of RAP (if any). The GPs would address the PAPs legitimate concerns and provide opportunities and avenues for consultation and their participation. In order to provide a sense of ownership and ensure sustainability, the PAPs would be a part of the decision making process, where appropriate. The project has a commitment for community participation in each of the sub-projects taken up. Participation of affected community is ensured through a number of mechanisms such as:

- The PAPs as members of the GPs will be involved in the identification of R&R issues and affected people.
- The preparation and implementation of the RAPs will be done with the active involvement of PAPs.
- PAPs with grievances have opportunities to approach GRC and RRC if required for their redress
- The list of PAPs will be displayed at the Village level.

8.10 Special Attention to Women and Other Vulnerable Groups

35. The vulnerable groups include Scheduled Tribes and Castes, Women Headed Households, Destitutes, Below Poverty Line families, Old Aged, Chronically Ill and Orphans. It is envisaged that in the course of conducting Social Assessment and preparing and implementing Resettlement Action Plans, interests of these vulnerable groups would be adequately addressed and protected.

8.10.1 Information on Vulnerable Groups

36. Like in other projects, as per available experience, in these sub-projects as well, women are likely to experience differential socio-economic setbacks due to their disadvantaged positioning within socio-economic structures and processes. This is likely to be manifested most in the loss of common property resources as a result of their displacement. In order to mitigate such impacts the IA during verification and socio-economic survey shall collect information on the following:

- Number of women headed households and Tribal households and other vulnerable persons
- Socio-demographic characteristics of affected women and tribals and other vulnerable persons
- Health status including number of children per woman
- Women's role in household economy by collecting information on usual activity; occupation; etc.
- Time Disposition
- Decision making power among women PAPs

37. As women are often the worst victims of transition between displacement and resettlement, they have to be integrated in the project as full-fledged participants taking part in all the stages of the project starting from planning through implementation and on to the post-project stages. This is the only way to make sure that the process of resettlement and rehabilitation an exercise in equitable distribution of resources and benefits in a gender sensitive manner.

8.10.2 Actions to be taken

38. IA has to perform following tasks:
- Ensure participation of vulnerable in project activities
 - Ensuring facilities in construction camps
 - Carrying out other responsibilities towards vulnerable groups

Participation

39. Participation and engagement of women and other vulnerable can be ensured specifically in the following ways:

- Allow women to take part in the consultation process.
- Ensure that the women are consulted and invited to participate in group-based activities, to gain access and control over the resources. Compensation for land and assets lost, being same for all the affected or displaced families, special care needs to be taken by the IAs for women groups, while implementing the process of acquisition and compensation as well.
- Ensure that women are actually taking part in issuance of identify cards, opening accounts in the bank, receiving compensation amounts through cheques in their name, etc. This will further widen the perspective of participation by the women in the project implementation. While registering properties make sure they are registered in both the spouses names.
- Provide separate trainings to women groups for upgrading the skill in the alternative livelihoods and assist throughout till the beneficiaries start up with production and business.
- Initiate women's participation through Self-Help Group formation in each of the villages affected by the project. These groups can then be linked to special development schemes of the Government.
- Encourage women to evaluate the project outputs from their point of view and their useful suggestions should be noted for taking necessary actions for further modifications in the project creating better and congenial situation for increasing participation from women.
- Devise ways to make other vulnerable to participate in the project activities.

40. All these done in a participatory manner might bring sustainable results in terms of income restoration of women as a vulnerable group.

Involvement during Construction

41. Wherever possible, women's involvement in construction activities should be encouraged in order to help them have access to benefits of project activities. The construction works starts after the R&R activities are over and sites are clear of any encroachment and other encumbrances. The construction contractors set up their construction camps on identified locations, where labour force required for the construction activities will be provided with temporary residential accommodation and other necessary infrastructure facilities. The labour force required for the construction activities has to be of a highly skilled nature, as there is a lot of mechanized work in construction of sub-projects. In addition, there is also a requirement of unskilled labour, where women can certainly contribute.

42. Apart from this, women as family members of the skilled and semi-skilled labourers, will also stay in the construction camps and will be indirectly involved during the construction phase. The families of labourer will include their children also. The construction contractors are expected to bring along skilled labour where as local labour available will be used for unskilled activities. The labour force, both migratory as well as local will have male as well as female members.

Ensuring Facilities in Construction Camps

43. Foreseeing the involvement of women, both direct and indirect in the construction activities, IA shall ensure certain measures that are required to be taken by the construction contractor towards welfare and wellbeing of women and children during the construction phase such as:

- (a) **Temporary Housing:** During the construction the families of labourers/workers should be provided with residential accommodation suitable to nuclear families.
- (b) **Health Centre:** Health problems of the workers should be taken care of by providing basic health care facilities through health centres temporarily set up for the construction camp. The health centre should have at least a doctor, nurses, General Duty staff, medicines and minimum medical facilities to tackle first-aid requirements or minor accidental cases, linkage with nearest higher order hospital to refer patients of major illnesses or critical cases. The health centre should have MCW (Mother and Child Welfare) units for treating mothers and children in the camp. Apart from this, the health centre should provide with regular vaccinations required for children.
- (c) **Day Crèche Facilities:** It is expected that among the women workers there will be mothers with infants and small children. Provision of a day crèche may solve the problems of such women, who can leave behind their children in such a crèche and work for the day in the construction activities. If the construction work involves women in its day-night schedules, the provision of such a crèche should be made available on a 24-hour basis.
The crèche should be provided with at least a trained ICDS (Integrated Child Development Scheme) worker with 'Aahs' to look after the children. The ICDS worker, preferably women, may take care of the children in a better way and can manage to provide nutritional food (as prescribed in ICDS and provided free of cost by the government) to them. In cases of emergency, a trained ICDS worker can tackle the health problems of the children much more efficiently and effectively and can organise treatment linking the nearest health centre.
- (d) **Proper Scheduling Of Construction Works:** Owing to the demand of a fast construction work, it is expected that a 24 hours-long work-schedule would be in operation. Women, especially the mothers with infants, should to be exempted from night shifts as far as possible. If unavoidable, crèche facilities in the construction camps must be extended to them in the night shifts too.
- (e) **Education Facilities:** The construction workers are mainly mobile groups of people. They are found to move from one place to another taking along their families with them. Thus, there is a need for educating their children at the place of their work. Wherever feasible, day crèche facilities may be extended with primary educational facilities or some kind of informal education facilities could be created at the construction camp.
- (f) **Control on Child Labour:** Minors, i.e. persons below the age of 14 years, should be restricted from getting involved in the constructional activities. It will be the responsibility of IA and social and environmental experts of DPIUs to ensure that no child labourer is engaged in the activities. Exploitation of women is very common in such camps. IA shall keep strong vigilance to ensure cessation of such exploitation.
- (g) **Special Measures for Controlling STD, AIDS:** Solitary adult males usually dominate the labour force of construction camps. They play a significant role in spreading sexually transmitted diseases. In the construction camps as well as in the

neighbouring areas, they are found to indulge in high-risk behaviour giving rise to STDs and AIDS.

While it is difficult to stop such activities, it is wiser to make provisions for means of controlling the spread of such diseases. IA shall conduct awareness camps for the target people, both in the construction camp and neighbouring villages as well. IA shall have to tie up SACS for awareness and IEC materials, and supply of condoms at concessional rate (or free) to the male workers may help to a large extent in this respect.

Other Actions

- Cases of compensation to vulnerable should be handled with care and concern considering their inhibited nature of interaction.
- All compensations and assistances would be paid in a joint account in the name of both the spouses; except in the case of women headed households and women wage earners.
- IA shall prepare a list of able bodied and willing women PAPs for constructional activities and hand over the same to IAs to be forwarded to contractor.
- At least half (subject to a minimum of one third) of the IA staff and all other involved agencies (including consulting agencies) staff should be woman. When qualified/skilled women are not available, women with lesser qualifications/ skills may be employed and trained. They may be encouraged and facilitated to obtain the necessary qualifications and/or skills during the employment. The proposed women personnel shall be available to work at site for at least 50% of the duration of the contract. Women may be replaced during the period of contract, only with women persons of equivalent qualifications and experience.
- Same wage rate for men and women must be ensured.
- Scheduled tribe population identified and they should be given first preference in selection for any project benefit, viz., agriculture demonstration plots, shared tube wells, rehabilitation of silted lands, livelihoods, etc.
- The petty contracts arising out of the sub-project should be considered entrusting to SHGs on community contract basis.
- While selecting community members for training at least half of them should be women and vulnerable persons.

8.11 Means of Disclosure

44. This RPF is translated into Hindi and will be kept at the District Library, District Collector's Office and Block Development Office for interested persons to read and copy. This RPF will be made available at the project web site as well. A summary of each RAP prepared under the project, will be displayed at the Gram Panchayat Offices of the concerned villages. This summary will include the details such as names of titleholders and/or encroachers, voluntary donations made, detail of acquisition, land rate, rehabilitation assistance, etc. This summary will be displayed at the Block Development Offices and at the District Collectors offices too. Apart from this, all the RAPs will be placed on the project web site.

8.12 Budget

45. The budget for implementing the RAP/ ARAP needs to be worked out for each sub-project on actual basis and included in the DPR. This should include cost of Land Acquisition, implementing the RAP/ ARAP provisions, supervision, monitoring and evaluation, audit and impact assessment costs.

9. Annexures

Annexure 1: Environmental and Social Screening Data Sheet - Buildings

A. Environmental Screening

Part a: General Information

1. Location of the sub-project	
• Name of Sub-Project	
• Name of the State	Uttarakhand
• District	
• Block	
• Village	
2. Implementing Agency Details (sub-project level)	
• Name of the Department/Agency	
• Name of the designated contact person	
• Designation	
• Contact Number	
• E-mail Id	

Part b: Environment Screening

Question	Yes	No	Details
1. Is the sub-project located in whole or part within a radius of 1 km from any of the following environmentally sensitive areas?			
a. Biosphere Reserve			If yes, mention name and distance.
b. National Park			If yes, mention name and distance.
c. Wildlife/Bird Sanctuary			If yes, mention name and distance.
d. Game Reserve			If yes, mention name and distance.
e. Tiger Reserve/Elephant Reserve			If yes, mention name and distance.
f. Wetland			If yes, mention name and distance.
g. Natural Lake			If yes, mention name and distance.
h. Swamps/Mudflats			If yes, mention name and distance.
i. World Heritage Sites			If yes, mention name and distance.
j. Archaeological monuments/sites (under ASI's central/state list)			If yes, mention name and distance.
k. Reservoirs/Dams			If yes, mention name and distance.
2. Is the sub-project located in whole or part within a radius of 500 m from the following features?			
a. Reserved/Protected Forest			If yes, mention name and distance
b. Migratory Route of Wild Animals/Birds			If yes, mention name and distance
c. Area with threatened/rare/ endangered fauna (outside protected areas)			If yes, mention name and distance

d. Area with threatened/rare/ endangered flora (outside protected areas)			If yes, mention name and distance
e. Habitat of migratory birds (outside protected areas)			If yes, mention name and distance
f. Historic Places (not listed under ASI – central or state list)			If yes, mention name and distance
g. Regionally Important Religious Places			If yes, mention name and distance
h. Public Water Supply Areas from Rivers/Surface Water Bodies/ Ground Water Sources			If yes, mention name and distance
3. Information related to sub-project impacts:			
Will the construction, operation or decommissioning of this sub-project cause changes to or have impacts on the following?			
1. Land Use			If yes, give full details.
2. Water			If yes, give full details.
3. Air			If yes, give full details.
Will the construction, operation or decommissioning of this sub-project produce, cause or release any of the following?			
4. Solid waste			If yes, give full details.
5. Noise/ vibration/ light/ heat energy/ electromagnetic radiation			If yes, give full details.
6. Accidents			If yes, give full details.
Other			
7. Are there any areas around the project location which are used by protected, important or sensitive species of fauna or flora e.g. for breeding, nesting, foraging, resting, overwintering, migration, which could be affected by the sub-project?			If yes, give full details.
8. Any other impacts?			If yes, give full details.

Part c: Transect Walk Map

While filling in this data sheet, the implementing agency should hold a consultation with the local community through the Gram Panchayat in order to determine and sort out issues of land availability (including forest land), moderate any adverse social and environmental impacts and elicit necessary community participation in the programme. For this purpose the implementing agency should organise an informal ‘Transect Walk’ and prepare a map (Not To Scale) of this and attach the same to this data sheet. The following points should be borne in mind while preparing this map.

- The Transect walk shall be undertaken by the Officer filling in this data sheet, accompanied by the Sarpanch of the Panchayat/ Ward Member and other community members after adequate advance publicity. The local Forest official may also be associated if forest land is involved.
- During the Transect Walk, issues relating to land requirements for the embankment and its impact on landowners, encroachers, squatters, etc. need to be discussed with members of the local community present. Collect all land related revenue records, maps and gazettes for supporting the claims and attach to this report. To this check list attach a typical cross section of the structure at its widest and note the land required.

- Environmental impact on vegetation, land, soil and water etc. shall be identified and noted for resolution.
- During the walk, due opportunity shall be given to interested persons to put forward their points of view.
- At the end of the walk and after recording the issues that arose during the walk, the action taken/ proposed to resolve the issues be noted. This shall be recorded by the Secretary of the Panchayat and countersigned by the Sarpanch/ Ward Member. A copy of this document shall be attached to the data sheet.
- During or after (as convenient) the Transect Walk, a map (Not To Scale) with the location of buildings, the environmental features around the site, ownership of land need to be prepared. Identify all structures, viz., places of worship, schools, hospitals and other common property resources, forest land, etc. and locate on this Transect Walk Map.
- To this map attach some photographs showing and highlighting the most critical places.

Part d : Result/ Outcome of Environmental Screening Exercise		
1.	No EIA Required	
2.	EIA Required	
3.	Regulatory Clearance Required	If yes, mention type of clearance required.

B. Social Screening

Part a: Social Impacts Information

1. Land Requirement for the sub-project:

Details	Unit	Quantity	Classification/ Category	Present Usage and Users
Government Land	Acres			
Private Land	Acres			
Title Holders	Number			
Non-Titleholders – Encroachers	Number			
Non-Titleholders – Squatters	Number			
Various users of Govt. Land under various tenures	Number			
People losing livelihoods/ access due to loss of Govt. Lands project	Number			

2. Agricultural Land affected due to sub-project:

Details	Unit	Quantity
Total Affected	Number	
Title Holders	Number	
Non-Titleholders – Encroachers	Number	

Non-Titleholders – Squatters	Number	
BPL Families losing Agricultural Land	Number	

3. Dwellings affected due to sub-project:

Details	Unit	Quantity
Total Affected	Number	
Title Holders	Number	
Non-Titleholders – Encroachers	Number	
Non-Titleholders – Squatters	Number	
BPL Families losing Dwellings	Number	

4. Commercial properties affected due to sub-project:

Details	Unit	Quantity
Total Affected	Number	
Title Holders	Number	
Non-Titleholders – Encroachers	Number	
Non-Titleholders – Squatters	Number	
BPL Families losing Commercial Properties	Number	

5. Common Property Resources Affected: (Please give each type by number)

Type	Unit	Quantity
	Number	
	Number	
	Number	
	Number	
	Number	

S No	Items	Results
1.	Total no of HH affected due to proposed project activity (Single or multiple impacts)	
2.	Total no of vulnerable HH affected due to proposed project activity (Single or multiple impacts)	
3.	Total number of Community Property Resources affected	

Part b : Result/Outcome of Social Screening Exercise		
1.	No SA Required	
2.	SA Required	

Annexure 2: Environmental Social Data Sheet – Roads and Bridges

A. Environmental Screening

Part a: General Information

1. Location of the sub-project	
• Name of Sub-Project with length in m	
• Name of the State	Uttarakhand
• District	
• Block	
• Village	
2. Implementing Agency Details (sub-project level)	
• Name of the Department/Agency	
• Name of the designated contact person	
• Designation	
• Contact Number	
• E-mail Id	

Part b: Environment Screening

Question	Yes	No	Details
1. Is the sub-project located in whole or part within a band of 1 km from any of the following environmentally sensitive areas?			
l. Biosphere Reserve			If yes, mention name and distance.
m. National Park			If yes, mention name and distance.
n. Wildlife/Bird Sanctuary			If yes, mention name and distance.
o. Game Reserve			If yes, mention name and distance.
p. Tiger Reserve/Elephant Reserve			If yes, mention name and distance.
q. Wetland			If yes, mention name and distance.
r. Natural Lake			If yes, mention name and distance.
s. Swamps/Mudflats			If yes, mention name and distance.
t. World Heritage Sites			If yes, mention name and distance.
u. Archaeological monuments/sites (under ASI's central/state list)			If yes, mention name and distance.
v. Reservoirs/Dams			If yes, mention name and distance.
2. Is the sub-project located in whole or part within a band of 500 m from the following features?			
i. Reserved/Protected Forest			If yes, mention name and distance
j. Migratory Route of Wild Animals/Birds			If yes, mention name and distance

k. Area with threatened/rare/ endangered fauna (outside protected areas)			If yes, mention name and distance
l. Area with threatened/rare/ endangered flora (outside protected areas)			If yes, mention name and distance
m. Habitat of migratory birds (outside protected areas)			If yes, mention name and distance
n. Historic Places (not listed under ASI – central or state list)			If yes, mention name and distance
o. Regionally Important Religious Places			If yes, mention name and distance
p. Public Water Supply Areas from Rivers/Surface Water Bodies/ Ground Water Sources			If yes, mention name and distance
3. Information related to sub-project impacts:			
Will the construction, operation or decommissioning of this sub-project cause changes to or have impacts on the following?			
1. Land Use			If yes, give full details.
2. Water			If yes, give full details.
3. Air			If yes, give full details.
Will the construction, operation or decommissioning of this sub-project produce, cause or release any of the following?			
4. Solid waste			If yes, give full details.
5. Noise/ vibration/ light/ heat energy/ electromagnetic radiation			If yes, give full details.
6. Accidents			If yes, give full details.
Other			
7. Any other impacts?			If yes, give full details.

Part c: Transect Walk Map

While filling in this data sheet, the implementing agency should hold a consultation with the local community through the Gram Panchayat in order to determine the most suitable alignment, sort out issues of land availability (including forest land), moderate any adverse social and environmental impacts and elicit necessary community participation in the programme. For this purpose the implementing agency should organise an informal ‘Transect Walk’ and prepare a map (Not To Scale) of this and attach the same to this data sheet. The following points should be borne in mind while preparing this map.

- The Transect walk shall be undertaken by the Officer filling in this data sheet, accompanied by the Sarpanch of the Panchayat/ Ward Member and other community members after adequate advance publicity. The local Forest official may also be associated if forest land is involved.
- During the Transect Walk, issues relating to land requirements for the road/ bridges and its impact on landowners, encroachers, squatters, etc. need to be discussed with members of the local community present. Collect all land related revenue records, maps and gazettes for supporting the claims and attach to this report. To this check list attach a typical cross section of the structure at its widest and note the land required.

- Environmental impact on vegetation, land, soil and water etc. shall be identified and noted for resolution.
- During the walk, due opportunity shall be given to interested persons to put forward their points of view.
- At the end of the walk and after recording the issues that arose during the walk, the action taken/ proposed to resolve the issues be noted. This shall be recorded by the Secretary of the Panchayat and countersigned by the Sarpanch/ Ward Member. A copy of this document shall be attached to the data sheet.
- During or after (as convenient) the Transect Walk, a map (Not To Scale) with the road/ bridges alignment, the environmental features along the road/ bridges, ownership of land need to be prepared. Identify all structures, viz., places of workshop, schools, hospitals and other common property resources, forest land, etc. and locate on this Transect Walk Map.
- To this map attach some (a minimum of four on right side and four on left side and one each at the beginning and ending) photographs showing and highlighting the most critical places.

Part d : Result/Outcome of Environmental Screening Exercise		
1.	No EIA Required	
2.	EIA Required	
3.	Regulatory Clearance Required	If yes, mention type of clearance required.

B. Social Screening

Part a: Social Impacts Information

1. Land Requirement for the sub-project:

Details	Unit	Quantity	Classification/ Category	Present Usage and Users
Government Land	Acres			
Private Land	Acres			
Title Holders	Number			
Non-Titleholders – Encroachers	Number			
Non-Titleholders – Squatters	Number			
Various users of Govt. Land under various tenures	Number			
People losing livelihoods/ access due to loss of Govt. Lands project	Number			

2. Agricultural Land affected due to sub-project:

Details	Unit	Quantity
----------------	-------------	-----------------

Total Affected	Number	
Title Holders	Number	
Non-Titleholders – Encroachers	Number	
Non-Titleholders – Squatters	Number	
BPL Families losing Agricultural Land	Number	

3. Dwellings affected due to sub-project:

Details	Unit	Quantity
Total Affected	Number	
Title Holders	Number	
Non-Titleholders – Encroachers	Number	
Non-Titleholders – Squatters	Number	
BPL Families losing Dwellings	Number	

4. Commercial properties affected due to sub-project:

Details	Unit	Quantity
Total Affected	Number	
Title Holders	Number	
Non-Titleholders – Encroachers	Number	
Non-Titleholders – Squatters	Number	
BPL Families losing Commercial Properties	Number	

5. Common Property Resources Affected: (Please give each type by number)

Type	Unit	Quantity
	Number	
	Number	
	Number	
	Number	
	Number	

S No	Items	Results
6.	Total no of HH affected due to proposed project activity (Single or multiple impacts)	
7.	Total no of vulnerable HH affected due to proposed project activity (Single or multiple impacts)	
8.	Total number of Community Property Resources affected	

Part b: Right of Way Table (A table giving the availability of government land on both sides of centre line of the damaged portion of the road need to be presented at every 100 m interval and certified by the concerned Executive Engineer. ADD rows for subsequent chainages, until end of road / bridge.)

S.No.	Chainage, km	Government Land from Centre line of	Proposed Road Base Width	Additional Land Requirement	Remarks
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		Road						
		Left	Right	Left	Right	Left	Right	
1	0.000							
2	0.100							
3	0.200							
4	0.300							

Part c : Result/ Outcome of Social Screening Exercise		
1.	No SA Required	
2.	SA Required	

Annexure 3: Format for Voluntary Land Donation

Voluntary Donation of Land
On a Rs. 10/- Stamp Paper

1. This deed of voluntary donation is made and executed on day of between Sri/SmtS/o W/o..... Age..... Occupation Resident of herein after called the “Title holder / Encroacher” on one part. This expression shall mean and include his legal representatives, successors – in-interest, heirs, assignees, nominees etc.

AND

Sri. S/o W/o Aged..... Designation..... Herein after called the “Recipient” which term denotes to “for and on behalf of Project Management Unit, Uttarakhand Disaster Recovery Project, Government of Uttarakhand” on the other part and shall mean and include his successors –in-office, nominees and assignees etc.

2. Whereas, the details of the Location of the, land are given below:

Location Details	
Village	
Gram Panchayat	
Block	
District	
Title Holder/ Encroacher Details	
Name of Title Holder/Encroacher	
Father/ Husband’s Name of Title Holder/Encroacher	
Status:	Title Holder/ Encroacher
Age: occupation: Residence:	
Gender:	
Schedule –Land Details/Structure	
Land in Question	
Area	
Location	
North Boundary	
East Boundary	
West Boundary	
South Boundary	

Note: Detailed Map to the scale is appended.

3. Where as the Title Holder is presently using/ holds the transferable right of the above mentioned piece of land in the village mentioned above. Whereas the Encroacher does not hold any transferable rights of the above mentioned piece of land in the village mentioned above but has been a long standing encroacher, dependent on its usufruct hereditarily.

4. Whereas the Title Holder/Encroacher testifies that the land is free of encumbrances and not subject to other claims/ claimants.
5. Whereas the Title Holder/Encroacher hereby voluntarily surrenders the land/structure without any type of pressure, influence or coercion what so ever directly or indirectly and hereby surrender all his/her subsisting rights in the said land with free will and intention.
6. Whereas the Recipient shall construct and develop infrastructure facilities under the project, Uttarakhand Disaster Recovery Project, and take all possible precautions to avoid damage to adjacent land/structure/other assets.
7. Whereas both the parties agree that the infrastructure so constructed/developed shall be for the public purpose.
8. Whereas the provisions of this agreement will come into force from the date of signing of this agreement.

Signature of Title Holder/Encroacher		Signature of BDO	
Name of Title Holder/Encroacher		Name of BDO	
Date		Date	
Identified by			
1. Name:	Signature:		
2. Name:	Signature:		
Witnesses			
Signature of Gram Panchayat President			
Gram Panchayat President Name			
Signature of GP Secretary			
Name of GP Secretary			
Signature of DPIU Representative			
Name of DPIU Representative			
Designation of DPIU Representative			

Annexure 4: Format for Preparation of Resettlement Action Plan

1. Introduction

1. Brief Introduction of the sub-project
2. Description of Component(s) that cause land acquisition/alienation and resettlement
3. Overall Estimates of Land Acquisition and R&R

2. Measures to Minimize Resettlement

1. Description of Efforts Made for Minimizing Displacement
2. Description of the Results of these Efforts
3. Description of Mechanisms to Minimize Displacement and Loss of Livelihood/Income during Implementation

3. Census and Socio-Economic Surveys

1. Provide the results of the census and socio-economic surveys
2. Identify all categories of impacts and the extent of impact on each affected

4. Consultation and involvement of PAPs

1. Describe various Stakeholders
2. Summarize process of consultation on the results of socio-economic surveys
3. Describe the need and mechanisms to conduct updates to socio-economic surveys
4. Describe how this process of consultation would be continued through implementation and monitoring
5. Describe the plan for disseminating information to Project Affected Persons

5. Entitlement Framework

1. Provide a definition of PAFs and PAPs together with their categorization based on impacts
2. Describe R&R entitlements for each category of impact
3. Describe method of valuation used for affected land, structures and other assets
4. Using Entitlement Matrix, present a table of all PAFs/PAPs and their losses/ impacts and entitlements

6. Relocation (if applicable)

1. Does the Project need community relocation sites? If yes, have they been inspected and accepted by PAPs?
2. Have the Project Affected Persons agreed to the strategy for housing replacement? Will new housing be constructed/allocated? If PAPs are to construct houses, explain if compensation entitlement for housing is sufficient to help them construct houses.
3. List of proposed sites along with number of affected families to be relocated
4. Describe respective mechanisms for (i) procuring/acquiring/alienating ; (ii) developing and (iii) allotting resettlement sites

5. Provide detailed description of arrangements for development of resettlement sites including provision of social infrastructure
6. Describe the feasibility studies conducted to determine the suitability of the development of sites.

7. Income Restoration

1. Are the compensation entitlements sufficient to restore income streams for each category of impact? If not, what additional economic rehabilitation measures are necessary?
2. Briefly spell out the restoration strategies for each category of impacts, and describe institutional, financial and technical arrangements/aspects involved
3. Describe the process of consultation with PAPs to finalize strategies for income restoration
4. How do strategies for restoration vary with the area/locality of impact
5. If income restoration involves change in livelihoods or other economic activities allow substantial amount of time for capacity building, accessing institutional funds/credits/markets, preparation and implementation. Work out the rate of returns for each of the economic activities opted by the entitled person.
6. How are the risks of impoverishment proposed to be addressed?
7. Explain the main institutional and other risks for effective implementation of plans for restoration of livelihood
8. Describe the process for monitoring the effectiveness of income restoration activities

8. Institutional Arrangements

1. Describe institution(s) responsible for: (a) delivery of each item/activity in the entitlement policy; (b) implementation of resettlement and rehabilitation programs and (c) coordination of all other activities as described in the Rehabilitation Action Plan
2. State how coordination issues will be addressed in cases where resettlement and rehabilitation are spread over a number of institutional/departmental jurisdictions
3. Indicate the agency that will coordinate all implementing agencies – do they have the necessary mandate and the resources
4. Describe the external (non-Project) institutions/departments involved in the process of resettlement and restoration of income such as land development, land allocation, credit, training for capacity building and the mechanisms in place to ensure adequate cooperation and performance of these institutions/departments
5. Describe the results of the institutional capacity assessment and give the institutional development plans including staffing schedule and training requirements
6. Discuss institutional capacity for, and commitment to, resettlement and rehabilitation

9. Monitoring and Evaluation

1. Describe the internal monitoring process
2. Define key monitoring indicators for resettlement, rehabilitation and participation and provide a list of these indicators which would be used for internal monitoring
3. Describe institutional (including financial) arrangement
4. Describe frequency of reporting and contents of reports
5. Describe the process for integrating feedback from internal monitoring into implementation

6. Describe financial arrangements for external monitoring including process for awarding and maintenance of contracts for the entire duration of R&R
7. Describe the methodology for external monitoring
8. Describe frequency of external reporting and its contents

10. Redress of Grievances

1. Describe the structure and process of grievances mechanisms at various levels including step-by-step process for registering and addressing grievances and provide specific details regarding registering complaints, discussing them with PAPs, response time, communication modes etc.
2. Describe the mechanism for appeal
3. Describe the provision, if any, to enable PAPs to approach civil courts in case these provisions fail.

11. Implementation Schedule

1. List the chronological steps in implementation of R&R Action Plan including identification of agencies responsible for each activity along with a brief explanation of each activity
2. A month-wise implementation schedule (Gantt chart) of activities to be taken as part of R&R Action Plan
3. Description of the linkage between R&R implementation and initiation of civil works for each of the Project component

12. Costs and Budgets

1. Clear statement of financial responsibility and authority
2. List the sources of funds for R&R and describe the flow of funds
3. Indicate if costs of R&R are included in the overall Project costs
4. Identify R&R costs, if any, to be funded by the WB
5. Provide a cost-wise, item-wise budget estimate for the entire R&R costs including administrative expenses, monitoring and evaluation and contingencies
6. Describe the specific mechanisms to adjust cost estimates by *inflation* factor
7. Describe provisions to account for different types of contingencies

Annexure 5: Format for Preparation of Abbreviated Resettlement Action Plan

1. Introduction

1. Brief Introduction of the sub-project
2. Description of Component(s) that cause land acquisition/alienation and resettlement
3. Overall Estimates of Land Acquisition and R&R

2. Census and Socio-Economic Surveys

1. Provide the results of the census and socio-economic surveys
2. Identify all categories of impacts and the extent of impact on each affected

3. Consultation and involvement of PAPs

1. Describe various Stakeholders
2. Summarize process of consultation on the results of socio-economic surveys
3. Describe the plan for disseminating information to Project Affected Persons

4. Entitlement Framework

1. Describe R&R entitlements for each category of impact
2. Describe method of valuation used for affected land, structures and other assets
3. Using Entitlement Matrix, present a table of all PAFs/PAPs and their losses/ impacts and entitlements

5. Income Restoration

1. Are the compensation entitlements sufficient to restore income streams for each category of impact. If not, what additional economic rehabilitation measures are necessary.
2. Briefly spell out the restoration strategies for each category of impacts, and describe institutional, financial and technical arrangements/aspects involved
3. Describe the process of consultation with PAPs to finalize strategies for income restoration
4. If income restoration involves change in livelihoods or other economic activities allow substantial amount of time for capacity building, accessing institutional funds/credits/markets, preparation and implementation. Work out the rate of returns for each of the economic activities opted by the entitled person.
5. How are the risks of impoverishment proposed to be addressed?

6. Institutional Arrangements

1. Describe institution(s) responsible for: (a) delivery of each item/activity in the entitlement policy; (b) implementation of resettlement and rehabilitation programs and (c) coordination of all other activities as described in the Rehabilitation Action Plan

7. Monitoring and Evaluation

1. Describe the internal monitoring process

8. Redress of Grievances

1. Describe the structure and process of grievances mechanisms at various levels including step-by-step process for registering and addressing grievances and provide specific details regarding registering complaints, discussing them with PAPs, response time, communication modes etc.
2. Describe the mechanism for appeal

3. Describe the provision, if any, to enable PAPs to approach civil courts in case these provisions fail.

9. Implementation Schedule

1. List the chronological steps in implementation of R&R Action Plan including identification of agencies responsible for each activity along with a brief explanation of each activity.

10. Costs and Budgets

1. Clear statement of financial responsibility and authority
2. List the sources of funds for R&R and describe the flow of funds
3. Indicate if costs of R&R are included in the overall Project costs
4. Identify R&R costs, if any, to be funded by the WB
5. Describe the specific mechanisms to adjust cost estimates by *inflation* factor
6. Describe provisions to account for different types of contingencies

Annexure 6: Content of an Environmental Assessment Report for a Category E1 Project

1. An environmental assessment (EA) report for a Category A project¹ focuses on the significant environmental issues of a project. The report's scope and level of detail should be commensurate with the project's potential impacts. The report submitted to the Bank is prepared in English, French, or Spanish, and the executive summary in English.
2. The EA report should include the following items (not necessarily in the order shown):
 - (a) *Executive summary*. Concisely discusses significant findings and recommended actions.
 - (b) *Policy, legal, and administrative framework*. Discusses the policy, legal, and administrative framework within which the EA is carried out. Explains the environmental requirements of any cofinanciers. Identifies relevant international environmental agreements to which the country is a party.
 - (c) *Project description*. Concisely describes the proposed project and its geographic, ecological, social, and temporal context, including any offsite investments that may be required (e.g., dedicated pipelines, access roads, power plants, water supply, housing, and raw material and product storage facilities). Indicates the need for any resettlement plan or indigenous peoples development plan² (see also subpara. (h)(v) below). Normally includes a map showing the project site and the project's area of influence.
 - (d) *Baseline data*. Assesses the dimensions of the study area and describes relevant physical, biological, and socioeconomic conditions, including any changes anticipated before the project commences. Also takes into account current and proposed development activities within the project area but not directly connected to the project. Data should be relevant to decisions about project location, design, operation, or mitigatory measures. The section indicates the accuracy, reliability, and sources of the data.
 - (e) *Environmental impacts*. Predicts and assesses the project's likely positive and negative impacts, in quantitative terms to the extent possible. Identifies mitigation measures and any residual negative impacts that cannot be mitigated. Explores opportunities for environmental enhancement. Identifies and estimates the extent and quality of available data, key data gaps, and uncertainties associated with predictions, and specifies topics that do not require further attention.
 - (f) *Analysis of alternatives*.³ Systematically compares feasible alternatives to the proposed project site, technology, design, and operation—including the “without project” situation—in terms of their potential environmental impacts; the feasibility of mitigating these impacts; their capital and recurrent costs; their suitability under local conditions; and their institutional, training, and monitoring requirements. For each of the alternatives, quantifies the environmental impacts to the extent possible, and attaches economic values where feasible. States the basis for selecting the particular project design proposed and justifies recommended emission levels and approaches to pollution prevention and abatement.

(g) *Environmental management plan (EMP)*. Covers mitigation measures, monitoring, and institutional strengthening; see outline in [OP 4.01, Annex C](#).

(h) *Appendixes*

- (i) List of EA report preparers—individuals and organizations.
- (ii) References—written materials both published and unpublished, used in study preparation.
- (iii) Record of interagency and consultation meetings, including consultations for obtaining the informed views of the affected people and local nongovernmental organizations (NGOs). The record specifies any means other than consultations (e.g., surveys) that were used to obtain the views of affected groups and local NGOs.
- (iv) Tables presenting the relevant data referred to or summarized in the main text.
- (v) List of associated reports (e.g., resettlement plan or indigenous peoples development plan).

1. The EA report for a Category A project is normally an environmental impact assessment, with elements of other instruments included as appropriate. Any report for a Category A operation uses the components described in this annex, but Category A sectoral and regional EA require a different perspective and emphasis among the components. The Environment Sector Board can provide detailed guidance on the focus and components of the various EA instruments.

2. See OP/BP 4.12, *Involuntary Resettlement*, and [OP 4.10](#), *Indigenous Peoples*.

3. Environmental implications of broad development options for a sector (e.g., alternative ways of meeting projected electric power demand) are best analyzed in least-cost planning or sectoral EA. Environmental implications of broad development options for a region (e.g., alternative strategies for improving standards of living in a rural area) are best addressed through a regional development plan or a regional EA. EIA is normally best suited to the analysis of alternatives within a given project concept (e.g., a geothermal power plant, or a project aimed at meeting local energy demand), including detailed site, technology, design, and operational alternatives.

Annexure 7: Environmental Management Plan

1. A project's environmental management plan (EMP) consists of the set of mitigation, monitoring, and institutional measures to be taken during implementation and operation to eliminate adverse environmental and social impacts, offset them, or reduce them to acceptable levels. The plan also includes the actions needed to implement these measures.¹ To prepare a management plan, the borrower and its EA design team (a) identify the set of responses to potentially adverse impacts; (b) determine requirements for ensuring that those responses are made effectively and in a timely manner; and (c) describe the means for meeting those requirements.² More specifically, the EMP includes the following components.

Mitigation

2. The EMP identifies feasible and cost-effective measures that may reduce potentially significant adverse environmental impacts to acceptable levels. The plan includes compensatory measures if mitigation measures are not feasible, cost-effective, or sufficient. Specifically, the EMP

(a) identifies and summarizes all anticipated significant adverse environmental impacts (including those involving indigenous people or involuntary resettlement);

(b) describes—with technical details—each mitigation measure, including the type of impact to which it relates and the conditions under which it is required (e.g., continuously or in the event of contingencies), together with designs, equipment descriptions, and operating procedures, as appropriate;

(c) estimates any potential environmental impacts of these measures; and

(d) provides linkage with any other mitigation plans (e.g., for involuntary resettlement, indigenous peoples, or cultural property) required for the project.

Monitoring

3. Environmental monitoring during project implementation provides information about key environmental aspects of the project, particularly the environmental impacts of the project and the effectiveness of mitigation measures. Such information enables the borrower and the Bank to evaluate the success of mitigation as part of project supervision, and allows corrective action to be taken when needed. Therefore, the EMP identifies monitoring objectives and specifies the type of monitoring, with linkages to the impacts assessed in the EA report and the mitigation measures described in the EMP. Specifically, the monitoring section of the EMP provides

(a) a specific description, and technical details, of monitoring measures, including the parameters to be measured, methods to be used, sampling locations, frequency of measurements, detection limits (where appropriate), and definition of thresholds that will signal the need for corrective actions; and

(b) monitoring and reporting procedures to (i) ensure early detection of conditions that necessitate particular mitigation measures, and (ii) furnish information on the progress and results of mitigation.

Capacity Development and Training

4. To support timely and effective implementation of environmental project components and mitigation measures, the EMP draws on the EA's assessment of the existence, role, and capability of environmental units on site or at the agency and ministry level.³ If necessary, the EMP recommends the establishment or expansion of such units, and the training of staff, to allow implementation of EA recommendations. Specifically, the EMP provides a specific description of institutional arrangements—who is responsible for carrying out the mitigatory and monitoring measures (e.g., for operation, supervision, enforcement, monitoring of implementation, remedial action, financing, reporting, and staff training). To strengthen environmental management capability in the agencies responsible for implementation, most EMPs cover one or more of the following additional topics: (a) technical assistance programs, (b) procurement of equipment and supplies, and (c) organizational changes.

Implementation Schedule and Cost Estimates

5. For all three aspects (mitigation, monitoring, and capacity development), the EMP provides (a) an implementation schedule for measures that must be carried out as part of the project, showing phasing and coordination with overall project implementation plans; and (b) the capital and recurrent cost estimates and sources of funds for implementing the EMP. These figures are also integrated into the total project cost tables.

Integration of EMP with Project

6. The borrower's decision to proceed with a project, and the Bank's decision to support it, are predicated in part on the expectation that the EMP will be executed effectively. Consequently, the Bank expects the plan to be specific in its description of the individual mitigation and monitoring measures and its assignment of institutional responsibilities, and it must be integrated into the project's overall planning, design, budget, and implementation. Such integration is achieved by establishing the EMP within the project so that the plan will receive funding and supervision along with the other components.

1. The management plan is sometimes known as an "action plan." The EMP may be presented as two or three separate plans covering mitigation, monitoring, and institutional aspects, depending on borrowing country requirements.

2. For projects involving rehabilitation, upgrading, expansion, or privatization of existing facilities, remediation of existing environmental problems may be more important than mitigation and monitoring of expected impacts. For such projects, the management plan focuses on cost-effective measures to remediate and manage these problems.

3. For projects having significant environmental implications, it is particularly important that there be in the implementing ministry or agency an in-house environmental unit with adequate budget and professional staffing strong in expertise relevant to the project (for projects involving dams and reservoirs, see [BP 4.01, Annex B](#)).

Annexure 8: MoEF Clarification on Roads in Forest lands

Most immediate out today

F. No.11-48/2002-FC

Govt. of India
Ministry of Environment & Forests
F.C. Division

Paryavaran Bhawan, CGO Complex,
Lodhi Road, New Delhi – 110 003
New Delhi, the 14th September 2004

To,

The Principal Secretary (Forest).
Government of Rajasthan.
Jaipur

Sub.: Clarification on repair and maintenance of roads constructed on forest lands for public purpose prior to 1980.

Sir,

I am directed to refer to your letter No. F.1(17)Van/91 dated 20-7-2004 on the above mentioned subject. In this regard, the matter has been examined by the Central Government in its entirety. Since, good roads are the means of better communication and indicator of development and as these also help in better patrolling protection and management of forests, the Central Government issue the following clarifications for the repair and maintenance of roads constructed on forest lands for public purpose prior to commencement of Forest (Conservation) Act, 1980:

1. Roads constructed on forest lands prior to 25.10.1980 (date of enactment of FC Act, 1980) may be repaired and maintained and black topping may be done with prior permission of the State Forest Department. While undertaking such works, State Government shall ensure:
 - (i) No tree felling should be allowed.
 - (ii) No widening of roads should be undertaken without prior permission of the Central Government under Forest (Conservation) Act, 1980.
 - (iii) No breaking of fresh forest land is carried out.
 - (iv) While black-topping, adequate precaution should be taken by the user agency to avoid any damage to flora and fauna.
 - (v) Plantation activities are taken up along the road at the cost of user agency, if the concerned Divisional Forest Officer finds it necessary.
2. However, for the repair and maintenance of roads in protected areas like National Park/Sanctuaries, prior permission of National Board of Wildlife shall be taken by the State Government on case to case basis in view of the Supreme Court order dated: 14-2-2000 in writ Petition (C) No. 202 of 1995.

This issues with the approval of competent authority.

Yours Faithfully,

(Anurag Bajpai)
Assistant Inspector General of Forests

Copy to :

1. The Principal Chief Conservator of Forest, All States and Uts.
2. The Chief Conservator of Forests (Central), All Regional Offices, Ministry of Environment & Forests.
3. The Nodal Officer (FC), Forest Department, All States/Uts.
4. Director (FC)
5. ALGF(P)/AIGF(S)/SO(FC)
6. Guard files.

**Annexure 9 : MoEF Guidance document for taking up non forestry activities in
wildlife habitats.**

Government of India
Ministry of Environment and Forests
Wildlife Division

Paryavaran Bhawan,
CGO Complex, Lodhi Road,
New Delhi-110003

F. No. 6-10/2011 WL

Dated: 19 December 2012

Sub: Guidance document for taking up non forestry activities in wildlife habitats.

Reference is invited to this Ministry's letter of even no. dated 15th March 2011 regarding the above mentioned subject. In this context, the undersigned is directed to mention that the matter has been discussed in great detail in the Ministry of Environment and Forests and the old guidelines have been reviewed in light of the existing provisions of laws and rules. It has been highlighted in the review that unless there is a clear legal delineation of elephant habitats and corridors, the implementation of the guidelines with respect to Elephant Reserves and corridors becomes very difficult. Therefore, the Wildlife Department is to work out a process by which these habitats acquire legal status. In the meanwhile, the revised guidelines, **annexed** to this letter, will be used as guidance for NBWL clearance for non-forestry activities are to be taken up in wildlife area.

2. It is clarified that while project proponents may simultaneously apply for Environment, Forest and NBWL clearances, in order to complete the formalities without undue delay, no rights will vest in or accrue to them unless all clearances are obtained. In other words, project proponents cannot rely upon the concept of *fait accompli*, if they have already received any of the clearances. The Environmental, Forest and NBWL clearances will all be processed on their respective merits, and the clearance of one aspect will not confer any right upon the project proponent. Complete clearance is obtained only when all the requisite clearances have been obtained by the Project Proponent. This approach would protect the integrity of the flora and fauna of the country, as well as bring in clarity and transparency in the issue of Environmental, Forest and NBWL clearance.

3. This is in supersession of the orders of even no. dated 15th March 2011, and any communication related to this document thereafter.

4. This issues with the approval of Hon'ble Minister of State (Independent Charge) for Environment and Forests.


(Vivek Saxena)

Deputy Inspector General of Forests (WL)

Encl: Revised guidelines

Distribution:

1. The Secretary, all Ministries/Departments of Government of India, New Delhi
2. The Chief Secretary, all States/Union Territories
3. The Pr. Chief Conservator of Forests, all States/Union Territories
4. The Chief Wildlife Warden, all States/Union Territories.

Copy to:

1. PS to Hon'ble MEF
2. PPS to Secretary (E&F), MoEF
3. PPS to DGF & SS, MoEF
4. PPS to Addl. DGF(WL)/PPS to Addl. DGF(FC)/PPS to Member Secretary, NTCA
5. PPS to JS (I.A Division)/ PPS to IGF (WL)/PPS to IGF& Director, PE/PPS to IGF (FC)
6. The NIC Cell- with a request to kindly upload the same on the official website of the Ministry.

GUIDELINES FOR TAKING NON-FORESTRY ACTIVITIES IN WILDLIFE HABITATS

1. General Policy:

National Parks, Sanctuaries and Conservation Reserves are notified under the Wildlife Protection Act, 1972 as dedicated areas rich in, and representing the unique biodiversity of a place. Such protected areas are considered very important for conservation of biodiversity, and for ensuring the healthy populations of its floral and faunal components, for the present and future generations alike. However, the rising human population and its growing demands for socio-economic development put increasing stress on forests including protected areas both directly and indirectly. This calls for a balance that has to be struck between development and conservation implying that any activity involving use or diversion of any part of a notified protected area may be considered only under **most exceptional** circumstances, taking fully into account its impending impact on the biodiversity of the area, and consequently on the management of the Protected Area. A critical part of this balanced approach is to spell out the feasibility of mitigation to address the impacts without compromising the management objectives of the Protected Area. The activities to be taken up in the identified wildlife habitats also need to comply with the orders of the Hon'ble Supreme Court in addition to the statutory requirements as provided in the Wild Life (Protection) Act, 1972.

2. Scope:

Measures to protect the wildlife and biodiversity in general include *inter alia*, notification of suitable wildlife habitats as Protected Areas (National Parks, sanctuaries etc.) under the Wild Life (Protection) Act (WLPA), 1972. Recommendations of the National Board for Wildlife (NBWL) are prescribed in the Act for regulating any activity inside such areas. Hon'ble Supreme Court through a number of orders has further made it essential to seek the recommendations of this advisory body for regulating activities in the adjoining areas to the Protected Areas. Protection of other forests is ensured through the Forest (Conservation) Act 1980 wherein, recommendations of the Forest Advisory Committee are prescribed for this purpose. Protected areas cover generally the known habitats of wildlife including important flagship species. Tiger Reserves represent specifically notified areas under the WLPA focusing on conservation of the charismatic big cat under the Project Tiger in view of the specially threatened status of this national animal. With a view to

ensuring conservation of elephants, the national heritage animal, 'Project Elephant' is operational. Technical and financial assistance is provided by the Central Government for conservation of elephants in the designated elephant habitats in the country. But presently such habitats are not legal entities. Though many existing elephant habitats are part of the existing Protected Areas, a proposal for enabling notification of such important habitats as elephant reserves under appropriate legal provisions is also under consideration of the government in the Ministry of Environment and Forests. It is expected that once the legal provisions for declaration of elephant reserves is in place, such areas will also be included under the regulatory regime under Wild Life (Protection) Act 1972 as proper legal entities.

These guidelines prescribe the process of obtaining recommendations of the Standing Committee of NBWL under the Wild Life (Protection) Act 1972 with respect to the areas, for which this process is mandatory under the law, and also in compliance to relevant Hon'ble Supreme Court orders. These guidelines replace the guidelines dated 15.03.2011 issued earlier in this regard, along with all amendments made therein.

3. Activities inside Protected Areas:

The process of consideration of any proposal for use of areas inside the protected areas, as a mandatory requirement under the present statutes, involves consideration and recommendation of the **National Board for Wildlife**. However, as the **Standing Committee of National Board for Wildlife** has been delegated the powers of the National Board for Wildlife, such cases are to be referred to the Standing Committee of National Board for Wildlife for consideration and recommendation. Details of such situations where such reference is warranted are described below:

3.1 Activities inside Wildlife Sanctuaries:

Section 29 of the Wild Life (Protection) Act, 1972 provides for the seeking the recommendation of the **State Board for Wildlife** (*a Board chaired by the State Chief Minister*) for any diversion of land or produce including water, etc. from a Sanctuary.

A per the proviso under Section 33 (a), no construction of commercial tourist lodges, hotels, zoos and safari parks can be undertaken inside a sanctuary except with prior approval of the Standing Committee of NBWL.

Further, in view of the directions dated 9th May 2002 of Hon'ble Supreme Court in Writ Petition (Civil) No. 337/1995, all such proposals in respect of a

Sanctuary or a National Park also require Supreme Court's approval based on the recommendation of the **Standing Committee of National Board for Wildlife** (*a Committee chaired by the Minister in charge of the Ministry of Environment and Forests*).

3.2 Activities inside National Parks:

Section 35 (6) of the Wild Life (Protection) Act, 1972 provides that the recommendation of the **National Board for Wildlife** (*a Board chaired by the Prime Minister*) is essential for any use or diversion of the habitat of any wild animal, or produce including water, etc. in a National Park.

This proviso is also applicable with respect to National Parks in view of Section 35(8) of the Act.

In the circumstances, any activity proposed within the boundaries of a National Park or Wildlife Sanctuary shall require the recommendation of the Standing Committee of NBWL, and the approval of the Hon'ble Supreme Court.

Section 33 (8) of the Wild Life Protection Act, 1972 provides that no construction of commercial tourist lodges, hotels, zoos and safari parks can be undertaken inside a National Park except with prior approval of the Standing Committee of NBWL.

3.3 Activities inside a Tiger Reserve:

A Tiger Reserve notified under the provisions 38V (1) of WLPA may include an existing Protected Area or other forests (as the buffer areas). The Tiger Reserve, once notified gets conferred protection on par with a Wildlife Sanctuary under section 38V (2). Further section 38W makes it mandatory to obtain approval of Standing Committee of NBWL for any activity including alteration of boundaries of Tiger Reserves. Therefore, any proposal involving any area under the notified Tiger Reserve will also be governed by the relevant provisions applicable to the Wildlife Sanctuaries and therefore, will be referred to the Standing Committee of NBWL for consideration.

3.4 Activities inside Conservation Reserves:

The Ministry of Law and Justice has opined that activities to be taken up inside a Conservation Reserve can also be dealt with in the Standing Committee of NBWL. Therefore, the procedure indicated under para 4 below needs to be followed for planning and executing any activity inside Conservation Reserve also.

3.5 Activities in areas other than Protected Areas:

In addition to the notified protected areas as described above, the consideration of the Standing Committee of NBWL has been prescribed in certain circumstances, which are listed below:

3.5.1 Activities within 10 Kms from boundaries of National Parks and Wildlife Sanctuaries:

In pursuance to the order of Hon'ble Supreme Court dated 4th December 2006 in Writ Petition (Civil) No. 460/2004, in case any project requiring Environmental Clearance, is located within the eco-sensitive zone around a Wildlife Sanctuary or National Park or in absence of delineation of such a zone, within a distance of 10 kms from its boundaries, the User agency/Project Proponent is required to obtain recommendations of the Standing Committee of NBWL.

3.5.2 Activities within areas connecting the Tiger Reserves, notified by NTCA for controlling the land use as per section 38 O (g):

Section 38 O (g) of the Wild Life Protection Act, 1972 entrusts the responsibility to NTCA to ensure that areas connecting Tiger habitats are not diverted for ecologically unsustainable habitats except in public interest and with the approval of NBWL. Proposals for any activities in such areas duly notified by NTCA, and recommended by it in accordance with these provisions, to be covered under such regulation will be permitted only after seeking recommendations of the Standing Committee of NBWL. Violation of this provision is required to be dealt with by the NTCA.

4. PROCEDURE TO BE FOLLOWED FOR CONSIDERATION OF PROPOSALS BY THE STANDING COMMITTEE OF NATIONAL BOARD FOR WILDLIFE:

4.1 The User Agency/Project Proponent is required to submit the proposal in the prescribed proforma that has been prescribed by the Ministry of Environment and Forests, and is available on the website of the Ministry (<http://moef.nic.in/modules/others> to be filled in) (**Annexure-1**).

4.2 The prescribed proforma has **five** parts and each part is required to be filled in by the User Agency; concerned Divisional Forest Officer/Park Manager; Concerned Chief Conservator of Forests; Concerned Chief Wildlife Warden and the Forest Secretary.

4.3 The proforma also seeks information in detail on the biodiversity of the area in question; maps of the area, other activities already in place; possible impacts of the proposal, etc.

4.4 The User agency is required to submit Part-I and Part-II of the proforma duly filled in to the concerned Forest Officer, who in turn, forwards the same to the Chief Wildlife Warden through the Chief Conservator of Forest.

4.5 The Chief Wildlife Warden, after giving his specific comments on the proposal, shall forward 15 copies of the same to the Government of India, through the Forest Secretary **after obtaining the recommendation of the State Board for Wildlife on the proposal.**

4.6 The proposal so received from the State Chief Wildlife Warden will be placed before the Standing Committee of NBWL, chaired by Minister of State (I/C) Environment and Forests. The meeting of the Standing Committee is convened once in 2-3 months.

4.7 In cases where the area proposed for diversion is large and/or the impact of the project on wildlife is considered to be serious, site inspections may be conducted by the members of the Committee or further studies/ surveys may be conducted by experts on the instructions of the Standing Committee of NBWL.

4.8 The site inspection reports are generally considered in the next meeting of the Standing Committee to enable the Committee to make its recommendation.

4.9 After the Standing Committee of NBWL recommends the proposal, the User Agency/State Government is required to approach Hon'ble Supreme Court for final clearance in view of the Court orders dated 13.11.2000 .

[Note: Hon'ble Supreme Court vide their order dated 13.11.2000 had directed that there shall be no dereservation/denotification of National Parks and Sanctuaries without approval of the Supreme Court. Therefore, to take up any such activity, a clearance from Hon'ble Court is mandatory.]

4.10 In case of Border Roads, proposals of the Ministry of Defense, a simplified proforma for simultaneous clearance under the Forest (Conservation) Act, 1980 and wildlife clearance is being adopted under 'A Single Window System'.

5. PROPOSALS FOR SURVEY WORK TO BE CARRIED OUT INSIDE NATIONAL PARKS AND WILDLIFE SANCTUARIES:

In case any kind of survey work and/or Environment Impact Assessment (EIA) studies, that is a prelude to future diversion of land, are to be taken up in areas involving a wildlife habitat, then also the entire procedure, as prescribed in paragraph 4 above would need to be followed.

FORMS

(All documents to be submitted in triplicate and signed in Blue ink)

PART I

Proposal for Investigation and Survey in the National Park / Sanctuary (Details to be provided by the Applicant)

1. Name of the Organization
2. Aims and Objectives of the Proposed Project
3. Location and Map (1:50,000 scale) of the area duly authenticated by the competent authority to be investigated/ surveyed
4. Whether investigation/survey requires clearing of vegetation
5. If yes, please specify the extent (in Ha.)
6. Opinion of the Officer In Charge of the NP/ WLS (Attach signed copy)
7. Opinion of the Chief Wildlife Warden (Attach signed copy). The following be included in the opinion:
 - i) Brief history of the protected area
 - ii) Current status of wildlife
 - iii) Current status of pressures on protected areas.
 - iv) Projected impacts of projects on wildlife, habitat management and access/ use of resource by various stakeholders.
 - v) Contiguous wildlife areas which would benefit wildlife if added to national park/sanctuary.
 - vi) Other areas in the State which have been recommended by State Government, Wildlife Institute of India, BNHS, SACON, IISC, IUCN or other expert body for inclusion in protected area network.

Signed

Signed

Signed

Project Head
Name
Organization

The Officer In Charge of the NP/ WLS
Office Seal

The CWLW
Office Seal

PART II

(To be filled in by the Applicant)

1 Project details:

- (i) Copy of the Investigation and Survey report.

(The report should include the dates of survey and the names of the investigators, surveyors and all officials of the concerned NP/ WLS who remained present during the period)

- (ii) Self contained and factual project report for which NP/WLS area is required

(Enclose copy of the Project Appraisal document)

- (iii) Map (duly authenticated by the Divisional / District Head of the Department dealing with Forests and Wildlife) on a scale of 1: 50,000 showing the boundaries of the NP/WLS, delineating the area in question in red color).

- (iv) Self contained and factual report of at least two alternatives considered by the project authorities along with technical and financial justification for opting national park/ sanctuary area.

- (v) Copy of the Bio diversity Impact Assessment report in case the proposal involves diversion of more than 50 ha. NP/WLS area.

2 Location of the project/scheme

- (i) State/Union Territory
(ii) District
(iii) Name of the National Park/ Sanctuary

3 Details of the area required (in Hectares only)

(Provide break up of the land use under the project, e.g., construction of dam, submergence, housing for staff, road etc)

- 4 Details of displacement of people, if any, due to the project
 - (i) Total number of families involved in displacement
 - (ii) Number of scheduled caste/Scheduled tribe families involved in displacement
 - (iii) Detailed rehabilitation plan

- 5 Any other information relevant to the proposal but not covered in any of the columns above.

Signed by

Project Head

Name

Organization

Date of submission to the Head of the National Park / Sanctuary

PART III

(To be completed by the Officer –in- Charge of the National Park/
Sanctuary completed and submitted to the Chief Wild Life Warden or
officer authorized by him in this behalf within 30 days of the receipt of
PART - II)

- 1 Date of receipt of the PART – II
- 2 Total Area (Ha.) of national park/sanctuary
- 3 Total area (Ha.) diverted from the NP/WLS so far for development purposes
- 4 List the past projects and the area (Ha.) diverted

Name of Project	Area Diverted	Year of Diversion
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- 5 Positive impact(s) due to the diversion of area for the projects referred
to in column 4 above

Name of the Project(s)	Positive Impact	Scientific Basis of Assessment
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(Attach separate sheet, if required)

- 6 Negative impact/s due to the diversion of area for the projects referred
to in column 4 above

Name of the Project(s)	Negative Impact	Scientific Basis of Assessment
------------------------	-----------------	--------------------------------

(Attach separate sheet, if required)

- 7 Management Plan Period

Attach copy of the Management Plan/Management Scheme/ Recommendation of
Chief Wildlife Warden

- 8 List Management actions taken/ proposed to be taken in the whole Block/
Zone in which the proposed area is located.
- 9 Type of forest in which the proposed area falls.

10 Location of the proposed area w.r.t. the critical/intensive wildlife management areas/ wildlife habitats (attach Map to scale).

11 List the likely POSITIVE AND NEGATIVE impact/s of the proposed project giving scientific and technical justification for each impact.

12 Provide COMPREHENSIVE details of the impact of the proposal in terms of Sections 29 and/or section 35 (6) of the Wild Life (Protection) Act, 1972 as the case may be.

13 Whether the project authorities have ever committed violation of the Wild Life (Protection) Act, 1972 or Forest Conservation Act, 1980. If yes, provide the EXHAUSTIVE details of the offence and the present status of the case.

(Concealing or misrepresenting the facts will lead to rejection of the case in addition to any other penalty as prescribed under Law)

14 Have you examined the Project Appraisal document and the alternatives as provided in PART – II?

15 Have you examined the Bio diversity Impact Assessment Report?

16 If Yes, please give your comments on the recommendations given in the report?

17 Dates and duration of your field visits to the proposed site.

18 Do you agree that the present proposal of diversion of NP/WLS area is the best or the only option and is viable.

19 Any other information that you would like to bring to the notice of the State Board for Wildlife, National Board for Wildlife or its Standing Committee that may be relevant and assist in decision making.

20 Do you recommend the project.

(Please provide full justification to support your recommendations)

Signed by

The Officer In Charge of the NP/ WLS

Official Seal

Date of submission to the Chief Wild Life Warden or any other officer authorized by him in this regard

PART IV

(To be completed by the Chief Wildlife Warden within 15 days of the receipt of
PART - II and Part- III)

- 1 Date of RECEIPT of PART- II and Part- III by the Chief Wild Life Warden or the officer authorized by him in this regard
- 2 Do you agree with the information and recommendations provided by the Officer – in – Charge in PART – III?
- 3 If not, please provide the reasons
- 4 Have you visited the site yourself and held discussions with the applicant?
- 5(a) Do you agree that the present proposal for permitting use of NP/WLS area is the best option or the only option, and is viable?
- 5(b) Whether the proposal sub-judice? If yes, give details.
- 6 Please provide specific comments w.r.t. Section 29 of the Wild Life (Protection) Act, 1972
- 7 Any other information that you would like to bring to the notice of the State Board for Wildlife, National Board for Wildlife or its Standing Committee that may be relevant and assist in decision making
- 8 Do you recommend the project?
(Please provide full justification to support your recommendations)
- 9 Conditions, if any, to be ensured in the interest of protection and conservation of wildlife for allowing use of the area?

Signed by
The Chief Wildlife Warden
Name
State
Official Seal
Date of submission to the State Government

PART V

(To be completed by the Department in Charge of Forestry and Wild Life in consultation with the State Board for Wild Life within 30 days of the receipt of PART – II, PART- III and PART- IV)

- 1 Date of RECEIPT of PART- II, PART- III and PART - IV by the Department
- 2 Do you agree with the recommendation(s) of the Chief Wildlife Warden
- 3 If not, please provide the reasons.
- 4 Did you provide PART- II, PART- III and PART - IV to the members of the State Board for Wild Life?
- 5 Attach copy of the opinion of the State Board for Wild Life
- 6 Give details of the recommendations of the State Government

Signed by

The Principal Secretary

Name

State

Official Seal

Date of submission to the Central Government

Annexure 10: PMGSY ECoPs

ECoP-1.0 Planning & Design

1.1 General

1.1.1 This code of practice details the factors to be considered during project preparation to avoid/address environmental concerns through modifications in project design and incorporation of mitigation measures. Guidelines specified in the IRC: SP-20:2002 and SP-48 for project preparation are to be followed in conjunction with the measures suggested as part of this ECoP.

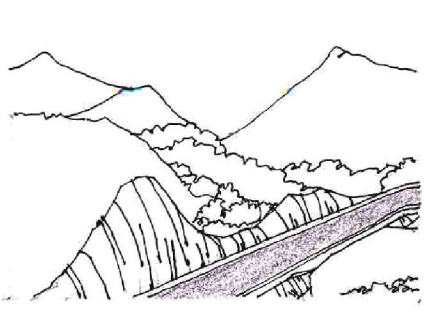
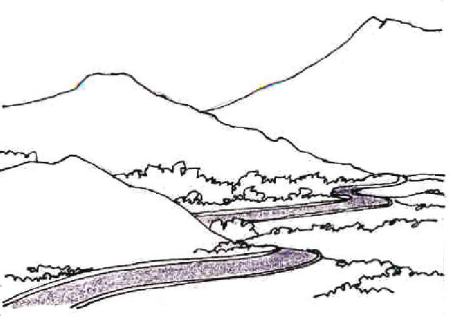
1.2 Finalization of Alignment

1.2.1 All requirements of Section 1.5 of IRC: SP-20:2002 in selection of alignment should be met with. In addition, adequate consultations with the communities to identify the concerns and preferences need to be taken up during selection of the alignment. Rural roads, being low volume roads, shall be aligned to follow the natural topography. Finalisation of alignment shall be carried out in accordance with the provisions presented below.

The alignment should be...
<ul style="list-style-type: none"> • Short • Easy and safe to construct and maintain • Economical • Laid on firm ground • Aesthetic and • Having least adverse environmental impacts.

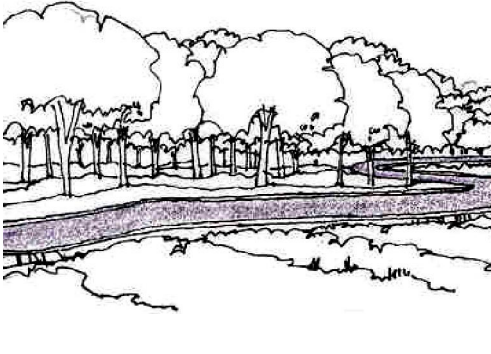
1.2.2.1 Alignment shall conform to the natural topography as far as possible to avoid excessive cut and fill. In case of hill areas the alignment selection should extend to incorporate the provisions of IRC: SP-48:1998, "Hill Road Manual".

1.2.2.2. Special care should be taken to align the roads along the hill side which is stable and where cutting on hill side causes least disturbance. The geologist shall investigate the disturbance likely to be caused keeping the geology of hill slope in view. He shall also study the affect of earthquake on the slope gradient.

High Impact Road	Low Impact Road
	
<p>High standard roads</p> <ul style="list-style-type: none"> • Good geometrics • Moves large volume of traffic rapidly and safely. • Huge cuts and fills, stability of slopes • Damage to vegetation, and • Disruption to natural drainage patterns 	<p>Low standard roads</p> <ul style="list-style-type: none"> • Conforms to the natural topography • Suitable for low volume rural roads and low travel speeds • Reduced environmental impacts <ul style="list-style-type: none"> ○ Reduces the cut and fill, ○ Reduces damage to vegetation ○ Minimise changes to natural drainage patterns.

1.2.2 An inventory of all environmental features along the proposed road is to be prepared and marked on a revenue map. This would be conducted by the PIU in co-ordination with the local community

and the revenue officials through transects. Consultations with the local communities are to be conducted during these transects to obtain their suggestions and incorporate their concerns to address the potential environmental impacts. Suggestions of the community during the transect walk are to be incorporated, to the extent possible, while finalising the alignment. The methodology for conduct of transect shall be as per ECoP-20.0, "Consultations for Environmental Aspects".

<p>Inventorize the following ...</p> <ul style="list-style-type: none"> • Trees • Forests if any • Drainage lines, rivers and water crossings • Irrigation water courses • Water bodies • Grazing lands • Cultural properties • Utilities • Community facilities • Schools • Hospitals • Major junctions • Seasonal markets or cultural congregations • Location for Ramps, Cattle Crossing and Bus Bay • Location for stacking maintenance material • Location for ducts for threading agricultural pipes 	 <p>Route Alignment to avoid felling trees</p>
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1.2.3 In case of flood prone areas and/or areas with very flat slopes, hydrological surveys have to be conducted before alignment finalisation. Inputs derived from these surveys such as the need for provision of culverts/bridges or other cross/roadside drainage structures should be considered in the alignment finalisation. Routes involving higher costs on drainage compared to alternative routes should be avoided. In case of hill areas, geological studies have to be conducted to determine locations of loose rock, soil or potential sites for land slides.

<p>Recommended Practices for Alignment Finalisation...</p>
<ul style="list-style-type: none"> • Utilise existing revenue tracts as far as possible • Follow natural topography • Conform alignment to within property boundaries within village areas • Adopt geometrics that do not compromise on safety requirements • Avoid crossing power transmission lines, water mains, gas lines etc • Avoid alignments affecting vegetation and felling of trees • Avoid alignments close to streams • Avoid encroachment of water bodies and • Avoid passing through natural habitats as designated forests, sanctuaries, national parks and wetlands

1.3 Design considerations

1.3.1 All the road designs should conform to the specifications of IRC:SP-20:2002, "Rural Roads Manual". Additional measures suggested for minimisation of environmental impacts, safety of road users and for enhancement of community benefits are indicated in this ECoP. Where it is necessary to deviate from the IRC specifications, the following design considerations shall be the absolute minimum.

1.3.2 **Design Speed:** Ruling design speed may be **reduced to 40 km/hr from 50 km/hr in plain and 35 km/hr in rolling terrain**. This speed is to be followed in link roads less than 10km length without any further relaxation. Ruling speed of 25 km/hr and minimum speed of 10 km/hr shall be followed for all the newly aligned roads in hilly areas. The minimum speed may however be relaxed (on case to case basis) in case of existing alignment where it may not be possible to realign the roads as it may involve excessive cutting or filling.

1.3.3 **Road Land Width:** If larger widths are available the existing standards of IRC:SP-20:2002 should be followed. The minimum standard road land width may be reduced to 12 m in plains in areas

where it is difficult to obtain 15 m, keeping local conditions in view and after assigning reasons of keeping reduced width. The requirement may be further reduced to 9 m in areas under intensive irrigation and where traffic is less than 100 vehicles/day. But in such cases, the roadway width shall also be reduced to 6 m.. Normally a land width of 12m shall be attempted in case of hill roads. It may be reduced to 9m only in exceptional cases.

1.3.4 **Roadway Width (Formation width):** The minimum of 7.5 m of roadway may be reduced to 6 m in case of hilly terrain¹ and short link village roads connecting single habitations. This would result in reducing the need of larger road land width and reduce quantity of soil required for embankments. A minimum of 9 m of formation / roadway width shall be adopted for cutting section in deserts areas to avoid roadblocks normally caused by dune sand accumulation where reduced width is provided.

Alignment selection criteria in hill roads ...
<ul style="list-style-type: none"> • The road should cross the ridges at their lowest elevation. Relative economics are to be worked out before deciding upon the alignment. • Hairpin bends are to be kept to a minimum. If unavoidable the alignment should be such that a flat hill slope is obtained for its location. • Unstable hill slopes to be avoided, as such slopes are prone to landslides and are subject to seepage or flow from streams. • Avoid encroaching on wetlands or water bodies. • Provide adequate cross-drainage structures to ensure that natural drainage patterns are not altered

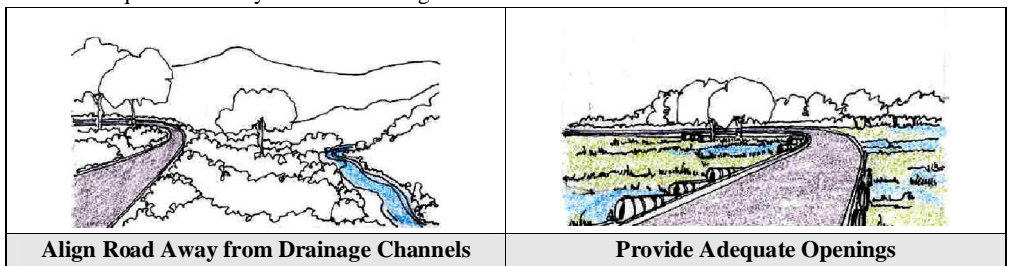
1.3.5 **Carriageway Width:** Standard carriageway width of 3.75 m is to be adopted on all roads. It may be however be reduced to 3.0 m in exceptional cases such as hilly terrain or as per provisions of IRC: SP-20: 2002. Hard shoulders of 1 m width may be provided on either side only in case longer routes or “through” village roads connecting many habitations to cater for the expected increase in traffic intensity

Low embankment height reduces...
<ul style="list-style-type: none"> • Quantity of earth work • Redevelopment costs of borrow areas • Dune sand accumulation in desert areas and • Requirement of land for construction of road

1.3.6 **Embankment height:** Lower embankment height of 0.3 – 0.4m to be provided in case of arid and sandy areas. In case of desert areas, the embankment height could be reduced since no overtopping is anticipated. In flood prone areas, height of embankment shall not be reduced and shall be a minimum of 0.6m above expected highest water level. (Based on data of last five years)

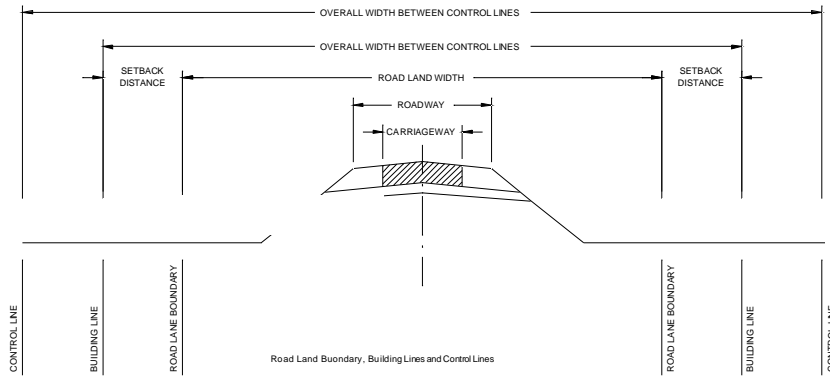
1.3.7 **Geometrics:** (i) In plain and rolling terrain the alignment should be designed for maximum possible radius of curves. Minimum absolute curve radius of 50m @ 40 km/hr and 38m @ 35 km/hr should be adopted without further relaxation due to safety reasons. (ii) Junction design of access road with collector road should be in conformity with IRC: SP-20: 2002 for both sight distance and flaring requirements. Generally a minimum radius of 14m shall be provide in case of design of hill roads but in exceptional cases it may be reduced to 12m to reduce excessive cost.

1.3.8 **Drainage:** For large catchment areas with low ground slopes, the accumulation of water causes flooding on the up-stream of the road. The increased velocity of water passing through the culverts causes scour on the down-stream and alters natural ground levels and scour of land. Hydrological studies are to be conducted in large catchment areas to limit the afflux and provide adequate waterway for cross-drainage structures.

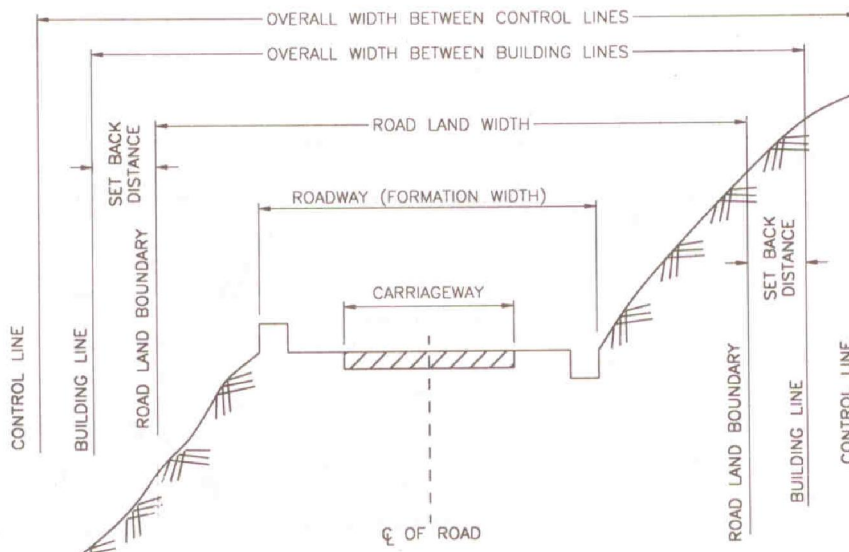


¹ In the stretches where obligatory to obtain a road land width of only 6m due to reasons of land availability, minimum roadway width of 5.2m shall be provided for the roads under first year projects.

1.3.9 **Built up areas:** It should be ensured that the road level in built up areas is lower than the plinth of the adjoining houses and drains are provided to drain the storm water

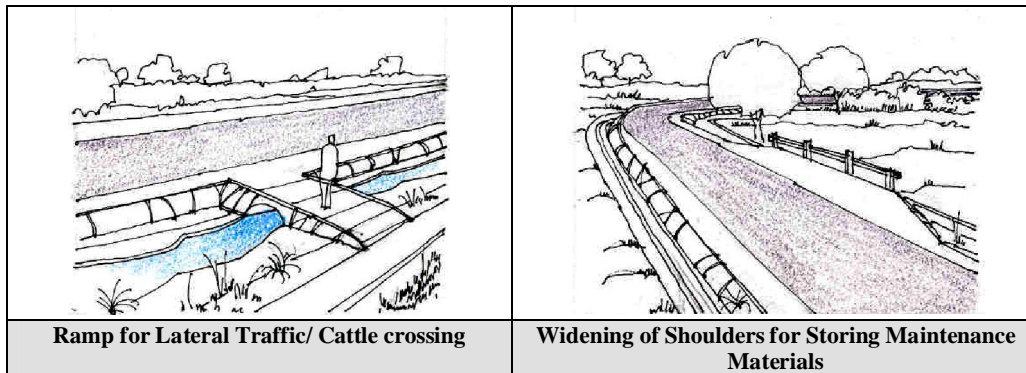


Typical Cross sections of PMGSY roads



1.3.10 Enhancements:

- i. Cattle crossings to be provided at normal crossing routes for safety of both cattle and road user.
- ii. Ramps for access to and from agriculture lands for cross traffic are to be provided to avoid damage to embankment and roadside drain.
- iii. At all CD works shall have steps constructed for inspection, repair and maintenance purpose.
- iv. Shoulders should be paved at destination/roadside villages and provide bus bays to avoid traffic obstruction and to provide for turning radius wherever feasible.
- v. Where possible, the embankment should be widened to provide a platform for stacking material for maintenance and to ensure that the shoulders are kept free for movement of traffic.
- vi. Where ever required 300mm ducts should be provided to enable cultivators to thread agricultural pipes for irrigating their fields lying on either side of the proposed road. The invert level of such ducts shall be about 300mm above high flood level.
- vii. On hill roads, passing places are required to facilitate crossing of vehicles. These shall be provided at a rate of at least two per kilometer and exact location to be based on sight condition. The length of passing places shall be about 15-20m with carriageway of 5m.



1.3.11 **Community Concerns:** Community concerns, expressed during consultations are to be addressed to the extent possible in the design of the road. The concerns need to be documented and checked for addressal. In case any of the measures are not incorporated, the same needs to be intimated to the community with adequate explanation after design finalisation.

1.3.12 **Road Signages:** Adequate informatory, cautionary and warning road signs should be provided to ensure traffic safety, especially in the event of adoption of lower standards. The signboards should be placed such that they do not block the line of sight.

1.4 Environmental considerations

1.4.1 Environmental considerations for various activities and sub-activities in the project are presented in the **Table 1-4**. Measures for the same are to be incorporated in the project preparation stage to offset environmental impacts in the subsequent stages (**Table 1-3**). The measures shall be in conformance with the ECoP referred against the activities.

1.4.2 Corridors prioritized as per the core network shall be subjected to screening² as per the screening checklist (**Annexure 1-1**). The roads so screened as per the checklist shall be subjected to greater analysis in the DPR for the issue/s due to which it is screened.

1.4.3 Environmental concerns of the community shall be incorporated to the extent possible in the project preparation and in the subsequent stages of the project. This is achieved through various consultation tools by PIU or Contractor as per the **Table 1-1**.

Key environmental concerns to be mitigated...
<ul style="list-style-type: none"> • Land, including loss of productive topsoil • Drainage • Land use and livelihood • Vegetation, cutting of trees • Forests, wild life, fisheries and aquatic habitat • Water bodies and water quality • Slope stability • Wetlands • Structures and • Common property resources • Disposal of excess material from cut sections

Table 1-1: Consultations to be conducted in various stages of the project

Sl.No.	Stage/Activities	Responsible Agencies	Stakeholders	Tools & Techniques	Desired Outputs	Reference
1	Project Prioritisation					
1.1	Dissemination of Core network	PIU	Community / PRI	Display of list of villages and length of corridor maps at gram panchayat	<ul style="list-style-type: none"> • Increasing awareness of community about PMGSY • Transparency in selection of roads 	Resettlement Framework
2	Project Preparation					
2.1	Dissemination of project information	PIU	Community	Distribution of Project Information Brochure	<ul style="list-style-type: none"> • Sensitisation of communities • Increasing awareness of community about roles and responsibilities 	Resettlement Framework
2.2	Finalisation of Alignment	PIU	Community / PRI	Transect Walk	<ul style="list-style-type: none"> • Inventory of environmental features, identification of sites for voluntary donation, identification of PAPs 	ECoP-1
2.3	Formal Consultations with PAPs	PIU	Community	Focus group discussions, public meetings	<ul style="list-style-type: none"> • Disseminate information on environmental concerns incorporated/not incorporated into design 	Annexure 20 - 2
2.4	Formal Consultation with Flood Control/Irrigation Department	PIU	PRI/PIU	Focus discussion	<ul style="list-style-type: none"> • Information about the Flood Prone areas 	ECoP 1A
3	Implementation Stage					
3.1	Consultations for temporary use of land	Contractor	Community / land owner	Individual consultations	<ul style="list-style-type: none"> • Seeking consent on temporary use of land and setting terms of use 	ECoP-3.0 ECoP-5.0 ECoP-6.0 ECoP-10.0 ECoP-13.0 ECoP-14.0
3.2	Consultations for extraction of water	Contractor	Community / Well owner	Individual consultation	<ul style="list-style-type: none"> • Seeking consent on extraction of water 	ECoP-8.0
3.3	Consultations for relocation	PIU	Community / PRI	Consultation	<ul style="list-style-type: none"> • Area for relocation of utilities and cultural properties 	ECoP-2.0 ECoP-15.0
3.4	Consultation for tree plantation	PIU	Community / PRI	Consultation	<ul style="list-style-type: none"> • Identification of persons for tree plantation • Location for plantation 	ECoP-16.0
3.5	Consultation for avoiding induced development	PIU	Community / PRI	Consultation	<ul style="list-style-type: none"> • Sensitising PRI on effects of Induced development • Identification of locations for avoiding/promoting induced development on community land 	ECoP-17.0

² Screening of the corridor would not be a deterrent towards its selection for implementation. The screening process is intended to facilitate identification of scope for analysis in the DPR stage.

1.4.4 Towards implementation of the environmental provisions by the contractor as per the ECoPs, he shall nominate one of his senior personnel to ensure that the construction practices comply with the ECoPs.

1.5 Compliance to legal requirements

1.5.1 The clearance requirements as per the various legislations in force towards the conservation of the environment during the various project stages, as applicable to the project are presented in **Table 1-2**.

Table 1-2: Environmental Clearance Requirements - PMGSY

Project Stage	Activity requiring clearance	State (s)					Agency from whom clearance to be sought	Legislative requirement	Responsibility
		U	K	B	A	M			
Pre-construction	Road Projects in Hilly areas & Forests	•	•		•	•	State Forest office/ state pollution control Board	Environmental Clearance by forest departments for rural roads if the alignment traverses forest areas	PIU
	Diversion of Forest Land	•	•	•	•	•	State forest department	Forest Conservation Act 1980	PIU
	Alignment through Sensitive Areas	•	•	•	•	•	Forest department,	Transfer of Land Forest (Conservation) Act 1980, Forest (Conservation) Rule 1980	PIU
	Alignment through Flood prone areas			•	•		Flood Control/ Irrigation Department	Irrigation Acts of the states eg 'Bihar Irrigation Act 1997' & "The Bihar Irrigation, Flood Management & Drainage Rules 2003'	PIU
	Water for Construction	•	•	•	•		GWB, Irrigation department/ Village councils	Control on Setting up of Tube Wells	Contractor
	Wild Life Protection	•	•	•	•	•	Wild Life Department/ Forest Department	Wild life Protection Acts if alignment passes through protected areas	PIU
	Quarry Area Plan	•	•	•	•	•	Mining Department	Mining Act of the state	Contractor
Construction	Setting up and O&M of Hot Mix Plants	•	•	•	•	•	State Pollution Control Board	Air (Prevention and Control of Pollution) Act 1981 Municipal Solid Waste Management Rules, 2000 & Hazardous waste management & handling rules, 2000	Contractor
	Noise from construction	•	•	•	•	•	State Pollution Control Board	Environment Protection Rules 1986	Contractor
	Blasting operation	•	•	•	•	•	Indian Explosives Mining Department	Indian Explosive Rules 1983	Contractor
	Operation of equipment and machinery	•	•	•	•	•	Road Transport Office, Pollution Control Board	Motor Vehicles Act, Emission norms and standards	Contractor
	Labour laws	•	•	•	•	•	Department of Labour	Minimum Wages Act/ Other labour laws	Contractor
	Quarry area materials extraction	•	•	•	•	•	Mining department	Mining act,	Contractor

Legend: U = Uttarakhand, K = J & k., B = Bihar AJ = Arunachal Praddesh, M = Mizoram

1.5.2 The bid document shall include the various applicable clearances pertaining to environmental management and shall contain the necessary procedures for compliance of the same.

1.5.3 The site for construction shall be handed over to the contractor, free from encumbrances and encroachments. Forest clearances, if required shall be obtained prior to start of the project and utilities shall be relocated before handing over the site.

1.6 Integrating Environmental Provisions in bid documents

1.6.1 The design and environmental considerations discussed above have to be incorporated suitably in the DPR and the bid document to ensure implementation. Towards this end, the following steps should be taken by the PIU:

1.6.1.1 Detailed Drawings if any for the environmental provisions as per the environmental codes of practice, as required, are to be included in the DPR viz., ECoP-1.0 (Project Planning & Design) Widening of carriageway for bus stops and bus-bays, widening at junctions, ECoP-3.0, Construction Camp, ECoP-11.0, Water bodies and ECoP-15.0, Cultural Properties.. The drawings are to include specifications of the materials used and also the detailed bill of quantities in the bid document.

Construction scheduling – factors to consider...

- Overall scheduling to incorporate climatic factors, snow fall, harsh weather conditions
- Agricultural practices and harvesting seasons
- Timing of specific activities to avoid special weather conditions
- Events of importance in the project area as festive seasons etc
- Availability of local labour during harvest seasons

1.6.1.2 Cost implications of environmental measures suggested by the environmental codes of practice have to be included in the estimates for the project but the state government are expected to make land available free of all encumbrance. Cost of restoration of common property resources, as detailed in social management plan, are expected to be met by the state government

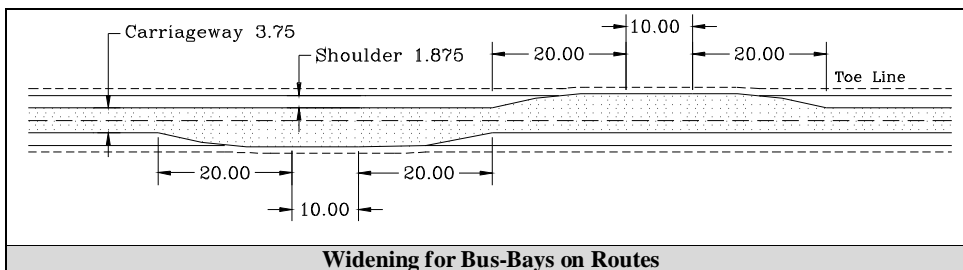
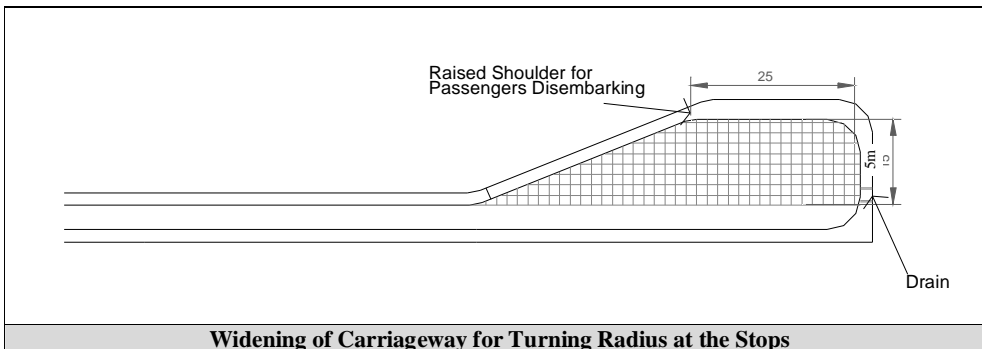
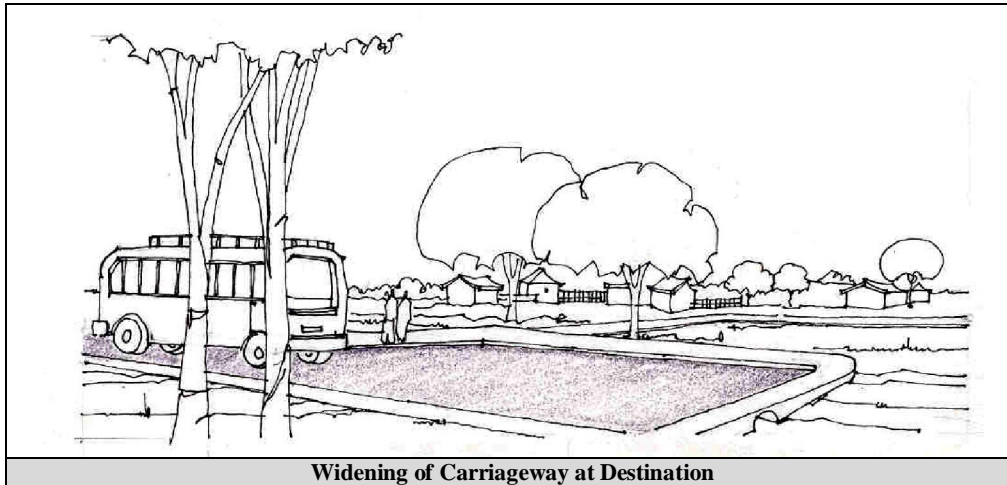
1.6.1.3 Monitoring arrangements towards the implementation of the environmental provisions are to be specified. The reporting formats are provided as per the **ECoP-18.0**, “Environment Audit”.

Timing of activities-factors to consider...

- If there is a time lag (more than a fortnight) between WBM and black-topping, the surface needs to be suitably blinded and may have to be rerolled as per the instructions of the Engineer of the PIU.
- The time lag between the prime coat and the final black-topping shall be minimum and in any event be not more than 3 days.
- Sealed coat shall immediately follow the 20mm carpet on the same day.

1.6.1.4 As per clause 26 of the Standard Bidding Document of MoRD, the contractor is expected to submit for approval of the engineer, the general methods, arrangements, orders and timing for all the activities in the works along with monthly cash flow. In scheduling the construction works, it is expected that the contractor considers all the risks and schedule the activities, which are likely to be impacted by weather phenomenon in a period in which these phenomenon are unlikely to occur. This would also need review and final approval of the engineer. In view of the above approval, the milestones indicated at Para 19 of “Standards Bidding Document-Contract Data to General Conditions of Contract”, to be achieved during the contract period may be suitably amended.

1.6.2 The environmental concerns to be addressed in the preparation of DPR are detailed out in the **Table 1-3** and **Table 1-4**.



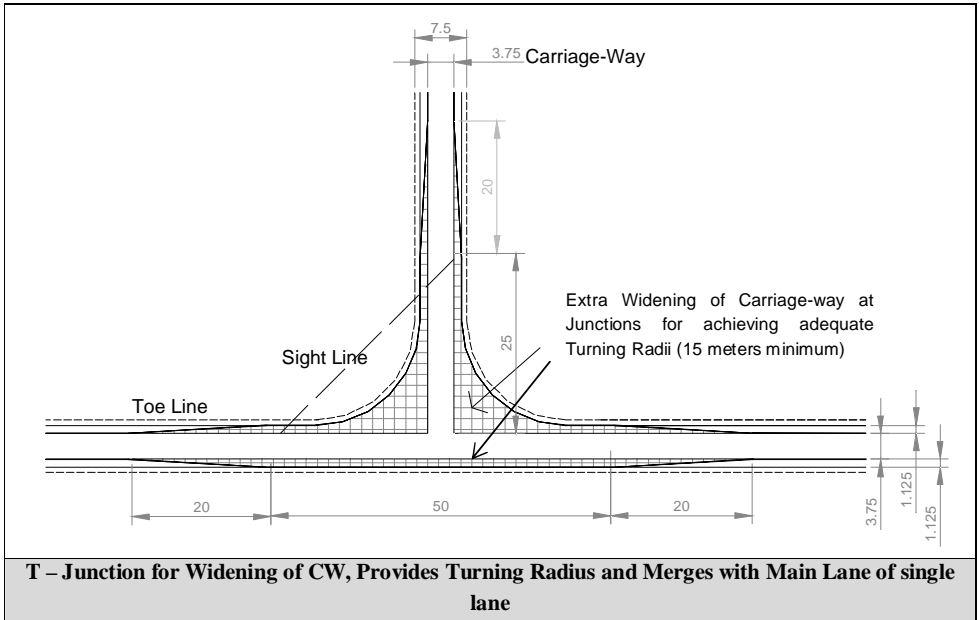


Table 1-3: Environmental concerns in DPR preparation

S.No	Activity	Items to consider	Measures to address	Detailed in
1.0	Transact Walk	Trees	Inventorisation of environmental features Avoidance, design modifications to minimize adverse environmental impacts Incorporating community concerns into finalizing alignment	ECoP 1.0/ 1.0A
		Forests		
		Drainage lines / Rivers / water crossings		
		Flood prone areas if any		
		Irrigation water courses		
		Water bodies		
		Grazing lands		
		Cultural properties		
		Utilities		
		Community facilities		
		Major junctions		
		Seasonal markets or cultural congregations		
		Location for Ramps, Cattle Crossing and Bus Bay		
		Location for stacking maintenance material		
Location of areas for disposal of debris				
Location for ducts for threading agricultural pipes				
2.0	Detailed Surveys	Geological, geotechnical studies in hill areas	Stability analysis and measures to address slope instability in hill slopes and high banks Working out requirement of cut and fill	ECoP 1.0
		Assessment of angle of hill slopes Topographical surveys		
		Hydrological surveys in flood prone areas	Identification of flood prone areas and measures to avoid high afflux Identification of agricultural use of land	
3.0	Identification of material sources	Borrow material	Utilizing alternative materials	ECoP 4.0
			Minimize requirements through design modifications	ECoP 5.0
			Location criteria	
		Quarry material	Utilizing alternative materials	ECoP 4.0
			Material extraction from existing quarries	ECoP 7.0
		Water availability	Identification of perennial/community/private sources Scheduling construction to suit water availability Utilizing community water sources without conflict of uses	ECoP 8.0
4.0	Assessment of environmental impacts	Climatic factors	Scheduling construction considering the special weather phenomena	ECoP 1.0
		Water bodies	Provision of silt fencing	ECoP 11.0
			Rehabilitation of water bodies	ECoP 20.0
		Stability of slopes	Measures for slope stabilization including bio-engineering practices	ECoP 9.0/ /9.0A
		Soil erosion	Erosion control measures	ECoP 9.0
		Land use changes	Land use control measures adjacent to the road	ECoP 17.0
			Empowering Gram Panchayat / Road Authority to regulate development along road side	
		Agriculture lands	Avoidance from setting up construction camps, borrow areas	ECoP 3.0, ECoP 5.0 ECoP 6.0
			Conservation of top soil	
			Site restoration after construction	
		Cultural properties	Avoidance through design modifications Planning for Relocation & rehabilitation	ECoP 15.0
		Common Property Resources	Avoidance through design modification	ECoP 1.0
			Planning for Relocation of consultation with community	
		Drainage	Provision of adequate number of CD Structures	ECoP 12.0
		Trees	Compensatory plantation & arrangements for roadside plantation	ECoP 16.0
		Forest areas	Avoidance through design modifications	ECoP 16.0 ECoP 19.0
Environment Management measures during construction	ECoP 13.0			
Natural Habitats/ Bio-diversity	Avoidance through design modification or formulating additional measures for avoiding impacts	ECoP 19.0 / 19.0A/		
5.0	Precautionary measures during construction to avoid environmental impacts	Top soil	Stockpile topsoil and preservation	ECoP 6.0
		Construction sites	Provision of pollution control measures	ECoP 13.0
			All measures to ensure public & worker's health/safety	ECoP 14.0
			Water Management	ECoP 10.0
		Construction camps	Criteria for identification of sites and Infrastructure arrangements	ECoP 3.0
			Safe disposal of all wastes	ECoP 10.0
			Enforcement of pollution control measures	ECoP 13.0
		Borrow areas	Arrangements with land owners to include redevelopment	ECoP 5.0
		Quarry areas	Rehabilitation of quarry areas if new quarries are opened	ECoP 7.0
		Public/workers health & safety	Personal Protective Equipment to be provided	ECoP 14.0
Public safety at construction sites to be undertaken				
Measures for worker's health & hygiene at construction camps	ECoP 3.0			

S.No	Activity	Items to consider	Measures to address	Detailed in
6.0	Consultations with community	Land for borrowing	Agreement to include borrow area rehabilitation	ECoP 5.0
		Water for construction	Agreements with owners/community for utilizing water	ECoP 8.0
		Site for construction camps	Rehabilitation of the land after construction	ECoP 3.0
		Removal of trees	Tree Plantation as per Roadside Plantation plan	ECoP 16.0
		Cultural properties	Avoidance through modification of alignment	ECoP 15.0
			Relocation costs to be covered in the project, if needs relocation	ECoP 15.0 ECoP 20.0
		Common property resources	Avoidance through modification of alignment	ECoP 2.0
Relocation, if needed in consultation with community	ECoP 2.0			
7.0	Finalization of alignment	Traffic during construction	Provision of alternate routes or prior notice to the users	ECoP 14.0
		Concerns of community	Community concerns to be incorporated	ECoP 1.0
		Environmental impacts identified	Impacts identified are to be mitigated by incorporation of provisions as per ECoPs	All ECoPs
		Design aspects	Impacts that can be mitigated through design modifications should be incorporated	ECoP 1.0
8.0	Preparation of detailed drawings	All concerns/impacts identified	Designs for enhancements and mitigation measures including cost provisions	All ECoPs
9.0	Monitoring of Progress	All environmental aspects identified	Monitoring implementation of Environmental measures	ECoP 18.0

Table 1-4: Environmental Concerns during project implementation – to be identified in DPR

Sl.No.	Activity and Sub Activity	Impact/s	Measure/s	ECoP Applicable
A	Pre – Construction Activities			
A1.0	Alignment marking	Nil-	Co-ordination with Revenue Department	ECoP 1.0 ECoP 2.0
A2.0	Relocation of utilities	Impact on current usage	Identification of relocation site in advance	ECoP 2.0
			Scheduling the activity in consonance with the community usage pattern	ECoP 2.0
A3.0	Tree Felling	Compliance with Forest Act in case trees are on forest land	Prior clearance from Forest Department	ECoP 1.0
		Loss of canopy	Tree plantation as per roadside plantation plan	ECoP 16.0
A4.0	Clearance of land	Affect on livelihood	As per project provisions	ECoP 2.0
		Affect on standing crops	Scheduling of activity and coordination	ECoP 1.0
		Affect on cultural properties	Modification of alignment or Relocation of the cultural properties	ECoP 15.0
A5.0	Diversion of forest land	Affect on natural habitats	Avoidance of natural habitats or preparation of Natural Habitat Management Plan	ECoP 19.0
		Compliance with Forest Act	Activity scheduling to avoid delays, conformance to legal requirements	ECoP 1.0
		Affect on flora	Precautionary measures during construction in forest areas	All ECoPs
		Pollution from construction activities	Precautions while operating equipment/machinery	ECoP 13.0
A6.0	Transfer of land ownership	Grievances from community	Addressal through Grievance Redressal Mechanisms & Consultations	ECoP 1.0 ECoP 20.0
		Affect on livelihood	Provision of entitlements as per resettlement framework	ECoP 1.0
A7.0	Location of Storage Yards, labour camps, and construction sites	Pollution from construction camps, storage yards & labour camps	Location criteria to be adopted	ECoP 3.0 ECoP 20.0

Sl.No.	Activity and Sub Activity	Impact/s	Measure/s	ECoP Applicable
			Obtain clearances from SPCB	ECoP 1.0
		Pressure on local infrastructure	Infrastructure arrangements to be as per guidelines	ECoP 3.0
A8.0	Procurement of equipments and machinery	Machinery likely to cause pollution at settlements and natural habitats	Machinery to be procured shall be in conformance with noise and emission standards of CPCB	ECoP 13.0 ECoP 19.0
		Safety concerns in machinery operation	Safety equipment for workers	ECoP 14.0
A9.0	Identification and Selection of Material Sources	Conflict of uses in case of water	Consultations and arrangements at contractor-individual levels, documentation of agreement	ECoP 8.0 ECoP 20.0
		Borrowing causes depressed lands	Consultations and arrangements at contractor-individual levels, documentation of agreement	ECoP 5.0
		Pollution due to material extraction from borrow and quarry areas to surrounding environment	Precautionary measures during siting of borrow areas and quarry areas	ECoP 5.0 ECoP 7.0
		Disturbance to Natural Habitats	Avoidance of location of material sources in Natural Habitats	ECoP 19.0
A10.0	Identification of designated locations of waste disposal	Pollution due to location close to settlements, water bodies & other sensitive areas	Site selection in conformance to criteria provided	ECoP 10.0
A 11.0	Information to community		Keeping local community informed about the construction schedule	ECoP. 2.0
B Construction Activities				
B1.0 Site Clearance				
B1.1	Clearing and Grubbing	Effect on roadside vegetation	Restricting movement of machinery/equipment over adjacent fields	ECoP 2.0 ECoP 13.0
		Debris generation creating unsightly conditions	Disposal / storage of grubbing waste and possible reuse	ECoP 10.0
B1.2	Dismantling of existing culverts and structures, if any	Generation of Debris creating unsightly conditions	Disposal of waste and likely reuse	ECoP 10.0
		Flooding due to interception to drainage paths	Provision of diversion channels and/or scheduling construction of culverts preferably in dry months	ECoP 12.0
B2.0	Planning Traffic diversions and Detours	Trampling of vegetation along traffic diversions	Activity scheduling, identification of alternative track	ECoP 14.0
B3.0	Material Procurement	Loss of topsoil	Stripping & Storing topsoil	ECoP 6.0
		Formation of stagnant water pools due to borrowing/quarrying	Restoration plan for borrow areas & quarry areas (new quarry)	ECoP 5.0 ECoP 7.0
		Illegal quarrying / sand mining	Conformance of quarries selected to the SPCB requirements, including quarry rehabilitation plans	ECoP 7.0
		Uncontrolled blasting at quarries	Controlled blasting to the extent required. Conformance to blasting rules as per the Indian Explosives Act	ECoP 7.0
B4.0	Transport of materials to site	Fugitive emissions from transport trucks	Covering of material with tarpaulin or use of covered box trucks during transport	ECoP 10.0
		Dust emissions from haul roads	Haul road management	ECoP 13.0
B5.0 Materials handling at site				
B5.1	Storage of materials	Contamination to water sources, leaching into ground water	Provision of impervious base to storage areas	ECoP 3.0

Sl.No.	Activity and Sub Activity	Impact/s	Measure/s	ECoP Applicable
B5.2	Handling of earth	Dust rising and increase in particulate concentration in ambient air	Use of dust suppressants	ECoP 13.0
B5.3	Handling of fly ash	Increase of particulate concentration and contamination of nearby areas	Use of dust suppressants	ECoP 4.0
B5.4	Handling of granular material	Risk of injury to workers	Use of Personal Protective Equipment	ECoP 14.0
B5.5	Handling of bituminous materials	Leaching of materials, contamination of water sources	Provision of impervious base at bitumen storage areas	ECoP 10.0
		Air pollution	Control of emissions from mixing	ECoP 13.0
B5.6	Handling of oil/diesel	Contamination from accidental spills	Prevention of accidental spills, affecting cleaning immediately after spill	ECoP 13.0
		Pollution due to incomplete burning	Ensure complete combustion of fuel through regular maintenance of equipment	ECoP 13.0
B5.7	Waste management	Littering of debris at construction site	Waste to be disposed at disposal locations only/ utilized in pavement as capping layer/ in sub-base or base course	ECoP 10.0
		Contamination of surroundings due to runoff from construction site	Prevention of runoff from entering water bodies	ECoP 11.0
B5.8	Operation of construction equipments and machinery	Air & Noise pollution	Conformance to Emission standards and norms	ECoP 13.0
		Operational safety of workers	Conformance to Safety concerns of the road users and workers in operation, first aid provision and mandatory provision of Personal Protective Equipment	ECoP 14.0
B5.9	Movement of Machinery	Trampling of vegetation	Restriction of movement within ROW	ECoP 13.0
		Damage to flora & natural habitats	Minimizing impact on vegetation	ECoP 13.0 ECoP 19.0
		Damage to road side properties	Minimizing impacts on private and common properties, including religious structures	ECoP 13.0 ECoP 15.0
B6.0	Earthworks			
B6.1	Cutting	Uncontrolled blasting in case of rock cutting	Controlled blasting to be made mandatory	ECoP 7.0
		Loss of topsoil	Preservation of topsoil for reuse	ECoP 6.0
		Waste generation	Safe disposal of waste & possible reuse	ECoP 10.0
B6.2	Embankment construction	Interruption to drainage	Drainage channels to be provided with culverts in advance to embankment construction as far as possible	ECoP 12.0
		Dust Rising	Dust suppression with water	ECoP 13.0

Sl.No.	Activity and Sub Activity	Impact/s	Measure/s	ECoP Applicable
		Excess water/material usage	Minimising height of embankment	ECoP 1.0
			Scheduling embankment construction preferably in wet months, if possible	ECoP 1.0
			Compaction with vibratory rollers is suggested	ECoP 1.0
		Erosion causing impact on embankment/slope stability	Slope stabilization measures as seeding, mulching & bio-engineering techniques	ECoP 9.0
		Formation of rills / gullies	Construction of temporary erosion control structures as per requirements	ECoP 9.0
		Contamination of water bodies/ water courses	Control measures as silt fencing, vegetative barriers etc	ECoP 9.0
			Avoiding disposal of liquid wastes into natural water courses	ECoP 11.0
B6.3	Maintenance at construction camp	Collection of rainwater in construction camps	Temporary drains during construction	ECoP 3.0
		Waste water from labour camps	Disposal of waste water into soak pits	ECoP 3.0
		Contamination of soil	Removal of oil / other chemical spills & wastes	ECoP 3.0
B6.4	Cutting embankments of surface water bodies	Impact on the drainage flows in and out of the water body	Restoration of drainage channels	ECoP 11.0
		Embankment stability	Design of slopes of the water bodies, slope protection etc	ECoP 9.0
B7.0	Sub-Base & Base courses			
B7.1	Granular sub-base	Extensive extraction of quarry materials	Use of locally available materials (licensed quarry) Use of cut material	ECoP 4.0/ ECoP 10.0
B7.2	Wet mix macadam	Extensive water requirement	Scheduling the activity preferably in wet months	ECoP 1.0
			Avoiding conflict of uses due to water extraction from construction	ECoP 8.0
B7.3	Shoulders treatment	Movement of Machinery for compaction	Restricting movement on adjacent lands	ECoP 13.0
	Slope Protection	Slope stability	Bio-engineering practices	ECoP 9.0A
B8.0	Culverts and Minor Bridge Works	Interruption to water flow	Provision of diversion channels	ECoP 12.0
		Pollution of water channels during construction	Control of sediment runoff	ECoP 12.0
		Safety of Workers	Mandatory use of Personal Protective Equipment	ECoP 14.0

Sl.No.	Activity and Sub Activity	Impact/s	Measure/s	ECoP Applicable
B9.0	Surfacing			
B9.1	Bituminous surface	Worker's safety during handling of hot mix	Mandatory use of Personal Protective Equipment	ECoP 14.0
		Damage to vegetation (burning/ cutting)	Avoiding use of wood as fuel for heating bitumen as far as possible	ECoP 13.0
			Hot mix plant location to be preferably on waste lands	ECoP 13.0
		Contamination due to bituminous wastes	Reuse or Land filling of bituminous wastes or use in sub-base	ECoP 10.0
		Impacts on Air quality	Ensuring compliance of hotmix plants with the CPCB emission standards	ECoP 13.0
B9.2	Concrete surfacing for roads crossing built up areas	Contamination of surroundings due to concrete mixing	Mixing concrete at designated locations away from habitation and agriculture lands	ECoP 3.0
B10.0	Road furniture/Signage	Nil-	To be provided as per design	
B11.0	Shoulder protection	Requires material extraction from quarries	Use locally available material (licensed quarry)	ECoP 4.0
			Ensure that all shoulders are clear of debris or construction materials	ECoP 13.0
B12.0	Enhancements	Nil-	To be included in DPR	ECoP 1.0 ECoP 20.0
B13.0	Monitoring environmental conditions	Nil-	To be as per the codes of environmental practice	ECoP 18.0
C	Post Construction Activities			
C1.0	Clearing of construction camps			
C1.1	Campsite restoration	Change of land use due to setting up of construction camp	Campsite to be restored to its original condition as per the rehabilitation plan	ECoP 3.0
			Restoration of top soil	ECoP 6.0
C1.2	Dismantling of campsite	Waste generation at the construction site	Disposal of waste at designated locations	ECoP 10.0
C2.0	Clearing of Water Channels, side drains and culverts	Generation of debris & silt	Removal of Debris and disposal	ECoP 11.0 ECoP 12.0
C3.0	Rehabilitation of borrow areas	Nil-	Top soil restoration, revegetation	ECoP 5.0
C4.0	Clearing of encroachments	Loss of livelihood	Precautionary measures to avoid encroachments	ECoP 17.0
C 5.0	Maintenance of vegetation	Loss of green cover	To ensure that there is no gap of time after handing over and proper maintenance of plants and other vegetation	ECoP 16.0/ ECoP 9.0A

ECoP 1A- Roads in Flood Prone Areas

1A.1 General

1.1.1 The code of practice details the factors to be considered while planning, designing and implementing roads in permanently inundated or flood prone areas.

1A.2 Project Preparation and Design

1.2.1 The areas subjected to flooding and submergence shall be identified in each district and marked on the district revenue plans. These shall be based on information obtained from Department of Flood Control and/ or Disaster Management Cell at the District Commissioners office. Maps of flood prone areas, in form of Satellite imageries, are normally available with the District Management Cell of Disaster Management Cell of the District Commissioners office. Other information related to depth, frequency and intensity of floods etc is normally available with the Flood Control/ irrigation Department. The maps shall also indicate whether the area gets flooded due to precipitation in the local areas or due to breach of any dyke. The information collected should be cross checked with the community during consultation

1A.2.2 Apart from the information from flood control department and flood control maps, information on the duration of flood, velocity of flood waters and the soil types in these areas shall be obtained by contacts with local residents/ villages. The information shall form the background of map indicating the area as classified in Clause 1A.2.4. It needs also to be ascertained whether approach road only gets inundated or the habitation also gets submerged. The depth of submergence should also be recorded to help finalizing the level of top of pavement.

1A.2.3 The Executive Engineer of the respective district or his appointed representative not below the rank of Assistant Engineer, where-in rural road intervention are conceived, shall coordinate with the District Management Cell and Flood Control Department for identification of flood prone areas.

1A.2.4 For the purpose of this intervention, the area under each district shall be identified as area not affected by flood and flood prone area. The flood prone area shall be further classified as the (i) areas inundated by breach of dykes, (ii) areas subjected to flooding due to rainfall and (iii) areas where habitation and approach roads get submerged

1A.2.5 As far as possible, the approach roads should be aligned in the areas not affected by the floods and areas subjected to inundation due to breach of dykes shall be avoided even if it results in a slightly longer length. Management measures in case of areas inundated due to breach of dykes will be based on the Disaster Management Plan prepared for the district. Alignment finalization and design of roads being planned in areas subjected to flooding due to rains shall consider the measures suggested in this ECoP.

1A.2.6 Where possible the alignment in flood prone areas shall be aligned to be on higher ground contours/levels.

1A.2.7 The top of the embankment shall be designed to be a minimum of 0.6m HFL, based on data of last five years. (excluding pavement). This may increase cost on earthwork for embankments. (If necessary the embankment width may be reduced to 6m to reduce the quantity of earth work)

1A.2.8 The pavement shall be adequately protected and kept dry with a drainage layer, of at least 150mm.laid above HFL. Design of the pavement shall be on the basis of equilibrium moisture content. (CBR in soaked condition)

1A.2.9 The embankment, at places where there are chances of water eroding, the slopes and banks shall be protected with:

- Proper turf with grass sods on side slopes with extension upto 30cm outside the toe line and 30cm on the shoulders, or
- By providing lining at the toe walls along the toe line upto about 30cm above the flood line. The toe wall can be of rubble stones of brick on edge. Rest of the slope shall be covered with turf. The storm water from the road surface shall be drained with proper chutes or cascades and providing kerb stones if necessary.

1A.2.10 Adequate opening are to be provided to drain the flood water from the inundated areas and to act as balance culverts. The provision of ECoP -12, "Drainage" shall be followed where appropriate.

1A.2.11 Cement concrete pavement or CC block pavement may be adopted in sections of the roads likely to remain under submergence and in portion of the road passing through the habitations.

1A.3 Pre-Construction Stage.

1A.3.1 The construction camps and material storage yards will be located away from the areas likely to be flooded. They shall preferably be sited on raised land and away from the streams.

1.3.2 These areas shall be provided with adequate drainage.

1.3.3 No borrowing or temporary usage of land and resources shall be undertaken in flood prone areas.

1.3.4 Waste deposal sites shall be located away from the flood prone areas. No waste shall be disposed off in low lying areas that are likely to be inundated and drains into nearby water bodies.

1.3.5 The waste disposal sites shall be identified at the time of project preparation.

1A.4 Construction stage

1A.4.1 Debris generated from the clearance operations shall be deposited only at pre-identified waste disposal locations.

1.4.2 Construction shall be scheduled such that the construction of cross-drainage structures and toe walls is prioritized to enable clearing of water inundated causing least damage to the embankment/earthworks.

1A.4.3 Location of traffic diversions shall be motor able and will be sufficiently high to avoid submergence in case of floods.

1.4.4 Safety devices and flood warning signs to be erected while working over streams and canals.

1A.5 Post-Construction and Operation Stage

1A.5.1 Roads in flood prone areas shall be under constant supervision of the EE or his appointed representative not below the rank of AE. Any breach in embankment and/or damage to Cross-Drainage structure shall be immediately rectified.

1A.5.2 The contractor shall ensure that all construction wastes lying along the road and in flood prone areas are removed. This fact should be verified before issue of completion certificate.

ECoP-2.0 Site Preparation

2.1 General

2.1.1 The preparation of site for construction involves: (i) Marking and clearance of the required RoW of all encroachments by the PIU prior to mobilization of Contractor; (ii) Informing the local community about construction schedule and (iii) Site preparation by the contractor prior to commencement of construction. Scope of this ECoP includes only the measures to address environmental concerns expected during the site preparation. The land acquisition and resettlement issues involved are to be addressed by PIU as per the provisions of the Resettlement Framework for the project.

2.2 Site Preparation Activities by the PIU

2.2.1 After obtaining the consent of the community/ Gram Sabha on the alignment, the PIU shall be responsible to stake out the alignment. It shall be the responsibility of the PIU to take over the possession of the proposed RoW and hand over the land width required clear of all encumbrances to the Contractor who shall establish bench marks on ground.

2.2.2 The addressal of social and resettlement issues shall be carried out by the PIU as per the provisions of the Resettlement Framework and the Screening and Consultation Framework. Activities pertaining to the clearance of land and relocation of utilities need to be initiated by the PIU well in advance to by contact with water supply, irrigation electricity and other concerned departments to avoid any delays in handing over of site to the Contractor. Assistance of the Revenue Department shall be sought in accomplishing the task. A MoU to this effect would be signed between the PIU and the Revenue Department (Format presented as **Annexure 2-1**). Alternately the need for close cooperation shall be covered by a government order.

PIU's responsibilities before handing over site...

- Clearance of encroachments within proposed RoW
- Initiation of process for legal transfer of land title
- Alignment modification or Relocation of common property resources in consultation with the local community
- Alignment modification or Relocation/removal of utilities in consultation with the various government departments and
- Obtain clearances required from government agencies for
- Felling trees and
- Diversion of stretches of forestlands etc.
- Informing the community and local village councils about the likely schedule of construction

2.3 Site Preparation Activities by the Contractor

2.3.1 The contractor shall submit the schedules and methods of operations for various items during the construction operations to the PIU for approval. The Contractor shall commence operations at site only after the approval of the schedules by the PIU. He shall also keep the community/ village council informed about the likely mile-stones of the achievement and causes of delays if any.

2.3.2 The activities to be undertaken by the contractor during the clearing and grubbing of the site are as follows:

2.3.3 The clearance of site shall involve the removal of all materials such as trees, bushes, shrubs, stumps, roots, grass, weeds, part of topsoil and rubbish. Towards this end the Contractor shall adopt the following measures: (i) Limiting the surface area of erodable earth material exposed by clearing and grubbing (ii) Conservation of top soil and stock piling as per the provisions of

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specifications or **ECoP-6.0**, “Topsoil Salvage, Storage and Replacement” and (iii) Carry out necessary backfilling of pits resulting from uprooting of trees and stumps with excavated or approved materials to the required compaction conforming to the surrounding area.

- 2.3.4 To minimize the adverse impact on flora and vegetation, only ground cover/shrubs that impinge directly on the permanent works shall be removed. Cutting of trees and vegetation outside the working area shall be avoided under all circumstances. In case the alignment passes through forest areas, Forest Ranger shall be consulted for identification of presence of any rare/endangered species with in the proposed road way. Protection of such species if found shall be as per the directions of the Forest Department.
- 2.3.5 The locations for disposal of grubbing waste shall be finalized prior to the start of the works on any particular section of the road. The selection of the site shall be approved by the PIU. The criteria for disposal of wastes shall be in accordance with **ECoP-10.0**, “Waste management”.
- 2.3.6 In locations 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 and sedimentation control features can follow immediately, if the project conditions permit.
- 2.3.7 Dismantling of CD structures and culverts shall be carried out in a manner as not to damage the remaining required portion of structures and other surrounding properties. The disposal of wastes shall be in accordance with the provisions of **ECoP-10.0**, “Waste management”. The following precautions shall be adopted: (i) The waste generated shall not be disposed off in watercourses, to avoid hindrance to the flow, and (ii) All necessary measures shall be taken while working close to cross drainage channels to prevent earthwork, stonework as well as the method of operation from impeding cross drainage at rivers, streams, water canals and existing irrigation and drainage systems.
- 2.3.8 The designated sites duly approved by Implementing Agency shall be cleared of its existing cover for setting up of the construction sites, camps and related infrastructure facilities, borrow areas and other locations identified for temporary use during construction. The contractor shall comply with all safety requirements in consideration as specified in **ECoP-14.0**, “Public & Worker’s Health and Safety”. Before initiation of site preparation activities along these lands to be used temporarily during construction, it shall be the responsibility of the Contractor to submit and obtain approval of the site restoration plan from the implementing agency. The letter/contract agreement between the owner(s) of the land parcel for temporary usage shall include site restoration to its original status. The guidelines for the same are furnished in **ECoP-13.0**, “Construction Plants & Equipment Management”; **ECoP-3.0**, “Construction Camps”; and **ECoP-5.0**, “Borrow areas”.
- 2.3.9 Site preparation shall involve formation of the road base wherein it is ready for construction of protective/drainage works, carriageway, shoulders, parapets and other road furniture. In hilly terrain, trace cut are already undertaken by the PIU during surveys for alignment marking and design preparation. Implementing Agency shall transfer the land for civil works to the Contractor. Peg marking of the alignment and setting out for the proposed roadwork shall be carried out by the contractor as per detailed drawings and got checked by the supervising engineers.
- 2.3.10** Use of blasting for rock cutting shall be resorted to only if absolutely necessary. It need also to be ensured that the blasting operation do not cause undue instability of existing slopes or movement of rock mass. The BOQ shall provide for controlled blasting to prevent collapse of side slopes and where fly-off of debris are likely to cause damage to other properties. The community shall be informed in advance. Warning signs shall be displayed about the timing of blasting operation. Adequate care should be taken during storage, transport and use of

explosives. The shot-firer s must be adequately trained and licensed. Suggestions for supervision and observing safety during blasting are detailed in **Annexure 2-2**. A note on Safety aspects in blasting has also been appended as **Annexure-300.2 in the MoRD Specifications for Rural Roads (Clause 304 : Rock Cutting)**

- 2.3.11 All regulatory clearances shall be obtained before actual start of work on any stretch of road. Some of the N-E states require entry permits/ inner line permits for non-residents. The contractors shall seek compliance of this regulation prior to mobilization.

ECoP-3.0 Construction Camps

3.1 General

- 3.1.1 The terms and conditions of this Code of Practice pertain to the siting, development, management and restoration of construction camps to avoid or mitigate impacts on the environment. The area requirement for the construction camp shall depend upon the size of contract, number of labourers employed and the extent of machinery deployed. The key activities requiring addressal during the project stages and the significance of impacts in the project regions are presented in **Table 3-1**.

Table 3-1: Significance of Impacts across Project Regions

Stages	Key Activities	Significance of Impacts							
		Uttarakhand		J & K		Bihar		Arunachal Pradesh/ Mizoram	
		Hilly areas	Other areas	Low hills	High hills	Flood plains	Other areas	Hills	Plateau
Pre-construction	Siting								
	Development								
Construction	Maintenance								
Post-construction	Restoration								
Impacts not likely to be significant									
Impacts likely to be significant									

3.2 Pre-construction stage

- 3.2.1 The Contractor shall identify the site for construction camp in consultation with the individual owners in case of private lands and the Gram Panchayat in case of Gram Sabha (GS) lands. The suitable sites shall be selected and finalized in consultation with the PIU. Location of construction camps very close to habitations may social hazards and may have impact on life style of local population
- 3.2.2 The contractor will work out arrangements for setting up his facilities during the duration of construction with the land owner/Gram Panchayat. The arrangements will include the restoration of the site after the completion of construction. The arrangements will be verified by the PIU /GS to enable redressal of grievances at a later stage of the project.

Selection of construction camp/site locations	
<p>Avoid the following ...</p> <ul style="list-style-type: none"> • Lands close to habitations (nearer than 500m) • Irrigated agricultural lands • Lands belonging to small farmers • Lands under village forests • Lands within 100m of community water bodies and water sources as rivers • Lands within 100m of watercourses • Low lying lands • Lands supporting dense vegetation • Grazing lands and lands with tenure rights • Lands where there is no willingness of the landowner to permit its use 	<p>Prefer the following ...</p> <ul style="list-style-type: none"> • Waste lands • Lands belonging to owners who look upon the temporary use as a source of income • Community lands or government land not used for beneficial purposes • Private non-irrigated lands where the owner is willing and • Lands with an existing access road

- 3.2.3 After finalization of the site, the contractor shall submit to the PIU a detailed layout plan for development of the construction camp, indicating the various structures to be constructed including the temporary structures to be put up, drainage and other facilities. The plan will include the redevelopment of sites to pre-construction stage. The campsite should cover an

area of about 3000 sq.m for 60 Nos of workers. A conceptual drawing of the construction camp layout is presented as **Annexure 3-1**.

3.2.4 Accommodation: The contractor shall provide, free of cost in the camp site, temporary living accommodation to all the workers employed by him for such a period as the construction/maintenance work is in progress.

Arrangements with landowners...

The contractor shall submit to PIU the following:

- Written No-objection certificate of the owner/cultivator
- Extent of land required and duration of the agreement
- Photograph of the site in original condition
- Details of site redevelopment after completion

3.2.5 Towards the provision and storage of drinking water at the construction camp, the contractor shall ensure the following provisions:

- The contractor shall provide for a sufficient supply of potable water in the construction camps, in earthen pots. The contractor shall identify suitable community water sources as handpumps and ponds for procuring drinking water, in consultation with the Gram Sabha.
- Only in the event of non-availability of other sources of potable water, the Contractor shall obtain water from an unprotected source, after the testing for its potability. Where water has to be drawn from an existing open_well, the well shall be properly chlorinated before water is drawn from it for drinking. All such wells shall be entirely closed in and be provided with dust proof trap door.
- Every water supply or storage shall be at a distance of not less than 15m from any wastewater / sewage drain or other source of pollution. Water sources within 15m proximity of toilet, drain or any source of pollution will not be used as a source of drinking water in the project.
- A pump shall be fitted to each covered well, the trap door shall be kept locked and opened only for cleaning or inspection, which shall be done at least once a month.

3.2.6 In every site, adequate and suitable facilities for washing clothes and utensils shall be provided and maintained for the use of contract labor employed therein. Separate and adequate bathing facilities shall be provided for the use of male and female workers. Such facilities shall be conveniently accessible and shall be kept in clean and hygienic conditions.

3.2.7 Sanitary arrangements, latrines and urinals shall be provided in every work place on the following scale:

- Where female workers are employed, there shall be at least one latrine for every 25 females or part thereof.
- Where males are employed, there shall be at least one latrine for every 25 males or part thereof.
- Every latrine shall be under cover and so partitioned off as to secure privacy, and shall have a proper door and fastenings.
- Where workers of both sexes are employed, there shall be displayed outside each block of latrine and urinal, a notice in the language understood by the majority of the workers "For Men Only" or "For Women Only" as the case may be.
- The latrines and urinals shall be adequately lighted and shall be maintained in a clean sanitary condition at all times and
- Water shall be provided in or near the latrines and urinals by storage in suitable containers.

3.2.8 Arrangements for Waste Disposal

- Disposal of sanitary wastes and excreta shall be into septic tanks.
- Kitchen wastes shall be disposed into soak pits. Wastewater from campsites will be discharged and disposed in a kitchen sump located preferably at least 15 meters from any body of water. Sump capacity should be at least 1.3 times the maximum volume of wastewater discharged per day. The bottom of the pit should be filled with coarse gravel and the sides shored up with board, etc. to prevent erosion and collapse of the pit.
- Solid wastes generated in the construction site shall be reused if recyclable or disposed off in land fill sites

3.2.9 First Aid Facilities

- First Aid Box will be provided at every construction campsite and under the charge of a responsible person who shall always be readily available during working hours of the work place. He shall be adequately trained in administering first aid-treatment. Formal arrangement shall be prescribed to carry injured person or person suddenly taken ill to the nearest hospital.

3.2.10 Storage Site

- Storage of Petrol/Oil/Lubricants: Brick on edge flooring or sand flooring will be provided at the storage places of Petrol/Oil/Lubricants to avoid soil and water contamination due to spillage.
- Storage of cement: Damp-proof flooring, as per IS codes
- Storage of blasting materials: Shall be as per the specific provisions of law.

3.2.11 Fire fighting arrangement

- Demarcation of area susceptible to fires with cautionary signage,
- Portable fire extinguishers and/or sand baskets shall be provided at easily accessible locations in the event of fire,
- Contractor shall educate the workers on usage of these equipments

3.2.12 Interactions with host communities

- To ensure that there is no conflict of the migrant labor with the host communities, the contractor shall issue identity cards to labourers and residents of construction camps.

3.2.13 Prevention of spread of HIV/AIDS

The contractor/ PIU shall inform the District Health authorities / State AIDS control organizations about the location of the construction camp and the number of workers likely to reside in such camps. They shall arrange to hold awareness training of the workers. They shall provide all assistance to the states AIDS control organization to carry out effective surveillance.

3.3 Construction Stage

3.3.1 Construction camps shall be maintained free from litter and in hygienic condition. It should be kept free from spillage of oil, grease or bitumen. Any spillage should be cleaned immediately to avoid pollution of soil, water stored or adjacent water bodies. Following precautions need to be taken in construction camps.

- Measures to ensure that no leaching of oil and grease into water bodies or underground water takes place
- Wastewater should not be disposed into water bodies
- Regular collection of solid wastes should be undertaken and should be disposed off safely
- All consumables as the first aid equipment, cleaning equipment for maintaining hygiene and sanitation should be recouped immediately

3.3.2 PIU will monitor the cleanliness of construction campsites and ensure that the sites are properly maintained throughout the period of the contract.

3.4 Post Construction Stage

3.4.1 At the completion of construction, all construction camp facilities shall be dismantled and removed from the site. The site shall be restored to a condition in no way inferior to the condition prior to commencement of the works. Various activities to be carried out for site restoration are:

- Oil and fuel contaminated soil shall be removed and transported and buried in waste disposal areas.
- On the construction camp site, saplings of species similar to that of cut trees shall be planted.
- Saplings planted shall be handed over to the community or the land owner for further maintenance and watering
- Soak pits and septic tanks shall be covered and effectively sealed off.
- The contractor shall execute all works to restore the site and land cleared of all debris and shall hand over to the community or lesser in tidy and clean condition without any encumbrance.

ECoP-4.0 Alternate Materials for Construction

4.1 General

- 4.1.1 The use of alternate materials for construction focuses on the management and reuse of waste materials locally available in the project area with the added advantage of economizing the project cost incase lead for usual road materials is high. Potential waste materials that can be used in PMGSY include: fly ash, blast furnace slag, marble slurry, quarry overburden, and other industrial wastes. Lime or mechanical stabilization techniques should be utilised in case the materials available around the project area is not suitable for construction in its original condition. The guidelines for the use of waste materials in rural roads construction are laid down in IRC:SP-20:2002. This code of practice focuses on the feasibility of adoption of these materials for construction in the four project states.
- 4.1.1.1 Details of material available in Rajasthan for all districts along with their suitability are available with Rajasthan PWD. This information should be utilized in determining the alternate material for the particular areas. Similar information should be collected in all the districts in other states and kept for ready reference. This should include data about the location of the quarry, its distance from the main road and engineering properties of the road construction material. The data can be collected from the mining department as well the experience of the local staff responsible for road construction in the district or block. The availability of alternate and its suitability shall be also be determined and recorded in the data
- 4.1.1.2 Locally available bamboos in form of wattle mats can be used for stabilizing slopes and for erosion control measure.

4.2 Project Preparation Stage

- 4.2.1 During the DPR stage, the sources and suitability of alternate materials should be identified. In case of availability of alternate materials, the DPR shall specify the following: (i) Characteristics and availability of the material (ii) Possibility of use in the project (iii) Methods of testing, specifications, recommended usage and (iv) Mechanism for procuring and transporting to the site. The feasibility of its use shall be based on the lead from the project corridor, suitability of the material and the extent of use.
- 4.2.2 The PIU must ensure that provision shall be made in bid document under special conditions of contract specifying the use of fly ash, if available in the vicinity of the project area as per the central government directive on the issue.
- 4.2.3 A separate BoQ to be included for alternate materials in case they are available in the proximity of the project area

4.3 Pre-construction Stage

- 4.3.1 Testing shall be done as per IS specifications, in order to evaluate suitability of the alternate materials. In case test results do not match the specifications; option of blending the material with standard materials to meet the required specifications should be explored.
- 4.3.2 The Contractor shall approach the supplier identified based on lead and material suitability and shall sign an agreement specifying the quantity of the material to be procured.
- 4.3.3 In case quarry overburden is to be used as fill material, a Memorandum of Understanding (MoU) between the quarry owner and the contractor would be signed. The format for MoU would be as per **Annexure 4-1**.

4.4 Construction Stage

- 4.4.1 The procured alternate material shall be transported by the contractor at his own cost
- 4.4.2 In case of fly ash as an alternate material, as per MoEF Notification, S.O. 1164(E), dated 5th November 2002, within the 100 km radius of thermal power plants, it is the responsibility of the Contractor to transport the fly ash to the construction site.
- 4.4.3 Care should be taken that all the loose material (fly ash, quarry overburden, etc) shall be covered to avoid fugitive emissions during transportation to avoid spillages
- 4.4.4 In case of transporting slag as well as marble slurry, free board should be maintained and tailboard should be properly closed and sealed
- 4.4.5 While storing the alternate material, Contractor shall undertake all precautionary measures to prevent leaching of the materials
- 4.4.6 PIU must ensure that the use of alternate material is as per specifications

4.5 Description of Alternate Materials

- 4.5.1 Blast Furnace Slag: The iron and steel plants produce large quantities of waste known as blast furnace slag. While producing 1 ton of steel, nearly an equivalent amount of slag is generated. Hence, the disposal of this slag is of great concern. The engineering properties of this material reflect high bearing capacity as well as good interlocking between slag and aggregate.
- 4.5.2 Blast furnace slag after testing can be used as pavement material as a base or sub-base, either bound or unbound. IRC:SP-20:2002, Chapter 9, gives a brief description of different types of slag available and test method to check their suitability.
- 4.5.3 Fly Ash: MoEF Notification, S.O. 1164(E), dated 5th November 2002, GoI has made mandatory the use of fly ash within a radius of 100 km from coal or lignite based thermal power plants. Detailed design specifications for the use of fly ash are given in IRC:SP-20:2002, Chapter 9. General requirements of the material for embankment construction with fly ash is given in IRC:SP-58:2001.
- 4.5.4 With the reference to the IRC:SP-20:2002, Chapter 9, Figure 9.3 "Typical cross-section of the embankment with core of fly ash", considering the formation width 7.5 m and base / sub base height 0.33 m, only at those places where embankment height is greater than 0.83 m fly ash as an alternate material can be used. **Table 4-1** highlights the percentage reduction in the quantity of earth.

Table 4-1 Reduction in earth requirement for embankment heights 0.5 & 1.0m by using fly ash

	Embankment ht - 0.5m	Embankment ht - 1.0 m
Formation Width (m)	7.50	7.50
Carriage Way (m)	3.75	3.75
Embankment Height (m)	0.50	1.00
Surface Course + Base + Sub Base (m)	0.33	0.33
Earthen Shoulder (m)	1.88	1.88
Amount of Soil in Sub Grade (cu m)	1.56	6.81
Amount of Soil in Earthen Shoulder (cu m)	1.46	1.46
Total Soil Requirement (cu m)	3.01	8.26
In case of Fly Ash		
Amount of Flyash (cu m)	Fly ash cannot be used	1.22
Amount of Earth Require (cu m)	3.01	7.05
% Reduction in Amount of Earth	0.00	14.73

- 4.5.5 Quarry Over-Burden: While procuring the aggregates, sand and sub-base material from the quarries, large amount of overburden is generated that can be utilized as fill material for construction of embankment, bridge approaches as well as during the construction of pipe culverts as a cushion.
- 4.5.6 In case quarry operator is other than the Contractor, it is the sole responsibility of the Contractor to procure the overburden. The Contractor must sign an agreement with the quarry owner specifying the details of type of overburden, quantity and the responsibility to transport the overburden. A copy of the agreement has to be submitted to the PIU
- 4.5.7 Marble Slurry: It is a waste product of the marble industry can be successfully used in: -
- Construction of road pavement layers
 - Construction of embankments
 - Back fill material for retaining walls and
 - In mass concrete work as a replacement of fine aggregate i.e. sand upto 40%
- 4.5.8 Use of Construction Scrap / Waste:
- In case an upgradation of either National or State Highway, is in progress in the proximity of the PMGSY project road, the construction wastes generated shall be utilized as an alternate material for the PMGSY road construction.
 - Table 10-2 of **ECOP-10.0**, “Waste Management” identifies commonly generated construction waste that can be utilized during the construction of PMGSY road. Care shall be taken to segregate waste from the mix before reuse.
 - Soil Stabilisation: In soils as black cotton or clayey soils, stabilization techniques as per IRC:SP-20:2002 shall be adopted.

ENGINEERING PROPERTIES OF BLAST FURNACE SLAG

- *Gradation*: Steel slag aggregate used in hot mix asphalt and for surface treatment should meet the gradation requirement as conventional aggregate.
- *Specific Gravity*: Due to the relatively high specific gravity (3.2 to 3.6) of steel slag, steel slag aggregate can be expected to yield a higher density product compared with that of conventional mixes (2.5-2.7). Bulk relative densities are 15 to 25 percent greater than most conventional mixes.
- *Durability*: Steel slag aggregate is very hard and abrasion resistant. Steel slag aggregates display good durability with resistance to weathering and erosion.
- *Moisture Content*: The relatively rough surface texture (deep pores) of steel slag increases the susceptibility of the aggregate to differential drying and potential retention of moisture in the hot mix. Moisture retention coupled with the presence of oxides prone to hydration could result in volumetric instability. To minimize drying requirements and the potential for hydration reactions, steel slag aggregate moisture content should be limited to 5 percent prior to use in hot mix asphalt. The moisture content of the steel slag aggregate after drying should be no greater than 0.1 percent.
- *Frictional Properties*: The results of polished stone values (PSV, high values desirable) and aggregate abrasion values (AAV, low values desirable) supports the general finding that steel slag aggregate exhibits superior frictional resistance for pavements. The high frictional resistance, as well as the abrasion resistance of steel slag aggregate, is advantageous in applications where high wear resistance is required, such as intersections and parking areas.
- *Thermal Properties*: Steel slag aggregates have been reported to retain heat considerably longer than conventional natural aggregates. The heat retention characteristics of steel slag aggregates can be advantageous for hot mix asphalt repair work during cold weather.
- *Stability*: Steel slag aggregate mixes combine very high stabilities (1.5 to 3 times higher than conventional mixes) with good flow properties.
- *Stripping Resistance*: Steel slag mixes typically exhibit excellent resistance to stripping of asphalt cement from the steel slag aggregate particles. Resistance to stripping is probably enhanced because of the presence of free lime in the slag.
- *Rutting Resistance*: The high stability (1.5 to 3 times higher than conventional mixes) with good flow properties results in a mix that resists rutting after cooling, but can still be compacted. Rutting resistance is advantageous for highways, industrial roads, and parking areas subjected to heavy axle loads.

ECoP-5.0 Borrow Areas

5.1 General

5.1.1 Embankment fill material is to be procured from borrow areas designated for the purpose. The properties of the borrow material shall be got tested and recorded on Format 4.1 of IRC:SP-20:2002. Scope of this ECoP extends to measures that need to be incorporated during borrow area location, material extraction and rehabilitation. **Table 5-1** presents key activities involved in borrowing material and the significance of impacts across the project regions.

Table 5-1: Significance of Impacts across Project Regions

Stages	Key Activities	Significance of Impacts							
		Uttaranchal		J & K		Bihar		Arunachal Pradesh/ Mizoram	
		Hilly areas	Other areas	Low hills	High hills	Flood plains	Other areas	Hills	Plateau
Pre-construction	Locating Borrow Areas								
	Stripping & Stockpiling								
Construction	Material Extraction								
Post-Construction	Reclamation of Borrow Areas								
	Impacts not likely to be significant								
	Impacts likely to be significant								

5.2 Project Planning and Design Stage


Earth requirement can be reduced through...	
Measure	Extent of reduction of earth requirement
Reduction of formation width from 7.5 m to 6.0 m in stretches where traffic volume is low	23 %.
Restriction of embankment height to 0.3-0.5 m in areas receiving annual rainfall less than 400mm or at locations where natural drainage is not obstructed and the finished level of the pavement is 0.6-0.8m above the adjoining ground	24%
Use of flyash as an alternate fill material, within a radius of 100 km of Coal or Lignite based thermal power plant as per MoEF Notification, Part II, Section 3, Sub-section (ii), 2002, S.O. 1164(E)	15 %
Industrial and quarry wastes will be utilized as fill material in embankments where suitable material is available.	Varies dependent upon the nature of material

5.2.1 Design measures for reduction in quantity of earth work will have to be undertaken to reduce the quantity of material extracted and consequently decrease the borrow area requirement.

5.2.2 Borrow area siting should be in compliance with IRC:10-1961. The DPR shall contain (i) Guidelines for locating site of borrow areas (ii) The arrangements to be worked out with the land owner/community for the site and (iii) Sample designs for redevelopment of borrow areas.

5.3 Pre-construction stage

5.3.1 The contractor shall identify the borrow area locations in consultation with the individual owners in case of private lands and the Gram Panchayat in case of Gram Sabha lands, after assessing the suitability of the material. The suitable sites shall be selected and finalised in consultation with the PIU.

Borrowing to be avoided on...	Practices to avoid...
<ul style="list-style-type: none"> • Lands close to toe line, but in no case less than 1.5m • Irrigated agricultural lands • Grazing land • Lands within 0.8km of settlements • Environmentally sensitive areas <ul style="list-style-type: none"> ○ Designated protected areas / forests ○ Unstable side-hills ○ Water-bodies ○ Wetlands ○ Streams and seepage areas ○ Areas supporting rare plant/ animal species 	<ul style="list-style-type: none"> • Borrowing adjoining road embankment 

5.3.2 The Contractor will work out arrangements for borrowing with the land owner/Gram Panchayat. The arrangements will include the redevelopment after completion of borrowing. The arrangements will be verified by the PIU /GS to enable redressal of grievances at a later stage of the project. The Engineer of PIU shall approve the borrow area after inspection of the site to verify the reclamation plan and its suitability with the contractor and landowner. The contractor shall commence borrowing soil only after the approval by the PIU.

Arrangements with landowners...	Redevelopment plan to address...
<ul style="list-style-type: none"> • Contractor shall submit to PIU • Written No-objection certificate of the owner/cultivator • Extent of land required and duration of the agreement • Photograph of the site in original condition • Details of site redevelopment after completion 	<ul style="list-style-type: none"> • Land use objectives and agreed post-borrowing activities • Physical aspects (landform stability, erosion, re-establishment of drainage) • Biological aspects (species richness, plant density,) for areas of native revegetation • Water quality and soil standards • Public safety issues

5.4 Construction stage

5.4.1 No borrow area shall be operated without permission of the Engineer. The procurement of borrow material should be in conformity to the guidelines laid down in IRC:10-1961. In addition, the contractor should adopt the following precautionary measures to minimise any adverse impacts on the environment:

- i). The unpaved surfaces used for haulage of borrow materials will be maintained dust free by the contractor through sprinkling of water twice a day during the period of use.
- ii). To avoid any embankment slippage, the borrow areas will not be dug continuously, and the size and shape of borrow pits will be decided by the Engineer.
- iii). Borrow pits situated less than 0.8 km (if unavoidable) from villages and settlements should not be dug for more than 30 cm after removing 15cm of topsoil and should be drained.
- iv). The Contractor shall maintain erosion and drainage control in the vicinity of all borrow pits and make sure that surface drains do not affect the adjacent land or future reclamation. This needs to be rechecked by the engineer of the PIU.
- v). In case the borrow pit is on agricultural land, the depth of borrow pits shall not exceed 45 cm and may be dug out to a depth of not more than 30 cm after stripping the 15 cm top soil aside. In case of stripping and stockpiling of topsoil, provisions of **ECOP-6.0**, “Topsoil Salvage, Storage and Replacement” need to be followed.

- vi). To prevent damages to adjacent properties, the Contractor shall ensure that an undisturbed buffer zone exists between the distributed borrow areas and adjacent land. Buffer zone shall be 3 m wide or equal to the depth of excavation whichever is greater.
- vii). In case of riverside, borrow pit should be located not less than 15m from the toe of the bank, distance depending on the magnitude and duration of flood to be withstood.
- viii). In no case shall the borrow pit be within 1.5m from the Toe line of the proposed embankment.
- ix). The reclamation of borrow area shall begin within one month after earthworks are complete in any stretches that are served by a particular source.

5.5 Post Construction Stage

5.5.1 It needs to be ensured that all reclamation has been carried out in accordance with the redevelopment plan. The site shall be inspected by the PIU after implementation of the reclamation plan.

5.5.2 Certificate of Completion of Reclamation is to be obtained by the Contractor from the landowner that “the land is restored to his satisfaction” (format attached as **Annexure 5-1**). The final payment shall be made after the verification by PIU.

Checklist of items for inspection by PIU ...

- Compliance of post-borrowing activities and land use with the reclamation plan
- Vegetation density targeted, density achieved in case of re-vegetation, species planted as per reclamation plan
- Drainage measures taken for inflow and outflows in case borrow pit is developed as a detention pond
- Decrease of risk to public due to reclamation
- Condition of the reclaimed area in comparison with the pre-borrowing conditions

Redevelopment of borrow areas- Possible options...

Depending on the choice of the individual land owner/community, the contractor shall prepare redevelopment plans for the borrow areas. The options can be: (i) Restoring the productive use of the land (ii) Development of detention ponds in barren areas.

Option I: Suitable in locations with high rainfall and productive areas

- i). Topsoil must be placed, seeded, and mulched within 30 days of final grading if it is within a current growing season or within 30 days of the start of the next growing season.
- ii). Vegetative material used in reclamation must consist of grasses, legumes, herbaceous, or woody plants or a combination thereof.
- iii). Plants must be planted during the first growing season following the reclamation phase.
- iv). Selection and use of vegetative cover must take into account soil and site characteristics such as drainage, pH, nutrient availability, and climate to ensure permanent growth.
- v). The vegetative cover is acceptable if within one growing season of seeding, the planting of trees and shrubs results in a permanent stand, or regeneration and succession rate, sufficient to assure a 75% survival rate.

Option II: In barren land, the borrow areas can be redeveloped into detention ponds. These will be doubled up as water bodies and also for removal of sediment from runoff flowing through the ponds. Design of the detention basin depends upon the particle size, settling characteristics, residence time and land area. A minimum of 0.02 mm size particle with a settling velocity of 0.02 cm/sec (assuming specific gravity of solids 2.65) can be settled in the detention basin. The design area of detention basin is based on the following equation:

$$A = \frac{1.2 \times Q}{v}$$

Where A = Area in Sq.m, Q = Discharge in Cum and v = Settling velocity, cm/s

Following parameters are to be observed while setting up a detention pond

- i). Pond should be located at the lowest point in the catchment area. Care should be taken that the horizontal velocity should be less than settling velocity to prevent suspension or erosion of deposited materials.
- ii). Minimum Effective Flow Path: 5 times the effective width
- iii). Minimum Free Board: 0.15 m
- iv). Minimum Free Settling Depth: 0.5 m
- v). Minimum Sediments Storage Depth: 0.5 m
- vi). Maximum interior slope: 2H : 1V
- vii). Maximum exterior slope: 3H : 1V
- viii). The inlet structure should be such that incoming flow should distribute across the width of the pond.
- ix). A pre-treatment sump with a screen should provide to remove coarse sediments.
- x). Settled sediment should be removed after each storm event or when the sediment capacity has exceeded 33% of design sediment storage volume.
- xi). Accumulated sediment must be disposed of in a manner, which will prevent its re-entry into the site drainage system, or into any watercourse.

ECoP-6.0 Topsoil Salvage, Storage and Replacement

6.1 General

- 6.1.1 Loss of topsoil is a long term impact along PMGSY roads due to (i) site clearance and widening for road formation (ii) development of borrow areas (iii) temporary construction activities as construction camps, material storage locations, diversion routes etc. Scope of this ECoP includes removal, conservation and replacement of topsoil likely to be impacted. **Table 6-1** lists the key activities that need to be addressed during project stages and the significance of impacts in the project regions.

Table 6-1: Significance of Impacts across Project Region

Stages	Key Activities	Significance of Impacts							
		Uttarakhand		J & K		Bihar		Arunachal Pradesh/ Mizoram	
		Hilly Areas	Other areas	Low hills	High hills	Flood plains	Other areas	Hills	Plateau
Pre-construction	Setting up construction activities								
Construction	Stripping & Stockpiling								
	Erosion Control Measures								
Post Construction	Reuse of Topsoil								
	Impacts not likely to be significant								
	Impacts likely to be significant								

6.2 Project Planning & Design Stage

- 6.2.1 The alignment finalisation shall be done to minimise uptake of productive land, as laid down in **ECoP-1.0**, “Project Planning and Design”. At the project preparation stage, the following shall be estimated: (i) Extent of loss of top soil due to widening and siting of construction activities (ii) Estimates of borrow area requirements and (iii) Area requirement for topsoil conservation. The bid document shall include provisions that necessitate the removal and conservation of topsoil at all locations opened up for construction by the Contractor. An item need to be provided in the BoQ to cover this activity. Stripping of top soil may however be difficult in case of rocky strata and hill slopes.

6.3 Pre-construction Stage

- 6.3.1 The arrangements for temporary usage of land, borrowing of earth and materials by the Contractor with the land owner/Gram Sabha shall include the conservation / preservation of topsoil.

6.4 Construction Stage

- 6.4.1 It shall be the responsibility of the Contractor to strip the topsoil at all locations opened up for construction. The stripped topsoil should be carefully stockpiled at suitable accessible locations approved by the PIU. At least 10% of the temporarily acquired area shall be earmarked for storing topsoil. In case of

Locate stockpiles in ...

- A secure area away from
 - Grade, Subsoil & Overburden materials;
 - Pit activities; and
 - Day-to-day operations.
- Areas that do not interfere with future pit expansion and
- Areas away from drainage paths and uphill of sediment barriers.

hilly and desert areas, topsoil with humus wherever encountered while opening up the site for construction shall be stripped and stockpiled. (ref: MORD technical specification no. 301.5.3 & for measurement for payment 301.12)

6.4.2 The stockpiles for storing the topsoil shall be designed such that the slope does not exceed 1:2 (vertical to horizontal), and the height of the pile is restricted to 2m. A minimum distance of 1m is required between stockpiles of different materials.

6.4.3 In cases where the topsoil has to be preserved for more than a month, the stockpile is to be stabilised within 7 days of forming. The stabilisation shall be carried out through temporary seeding. It consists of planting rapid-growing annual grasses or small grains, to provide initial, temporary cover for erosion control.

Vegetative material for stockpile stabilisation...

- Must consist of grasses, legumes, herbaceous, or woody plants or a mixture thereof
- Selection & use of vegetative cover to take into account soil and site characteristics such as drainage, pH, nutrient availability, and climate to ensure permanent growth

6.4.4 After spreading the topsoil on disturbed areas, it must be ensured that topsoil is seeded, and mulched within 30 days of final grading.

Preserving stockpiles – Precautions

- Stockpiles will not be surcharged or otherwise loaded and multiple handling will be kept to a minimum to ensure that no compaction will occur.
- Divert runoff around stockpiles unavoidably located in drainage paths using a perimeter bank uphill.
- The stockpiles shall be covered with gunny bags or tarpaulin immediately in case they are not stored for periods longer than 1 month

6.4.5 During construction, if erosion occurs from stockpiles due to their location in small drainage paths, the sediment-laden runoff should be prevented from entering nearby watercourses.

6.4.6 Preservation of Stockpiles: The Contractor shall preserve the stockpile material for later use on slopes or shoulders as instructed by the Engineer.

6.5 Post Construction Stage

6.5.1 The topsoil shall be re-laid on the area after taking the borrow earth to maintain fertility of the agricultural field, finishing it to the required levels and satisfaction of the farmer.

6.5.2 The area to be covered with vegetation shall be prepared to the required levels and slope as detailed in the DPR. The stockpile material shall be spread evenly to a depth of 5-15cm to the designed slopes and watering the same as required. The growth of the vegetation shall be monitored at frequent intervals.

6.5.3 All temporary arrangements made for stockpile preservation and erosion control are to be removed after reusing the stockpile material.

ECoP-7.0 Quarry Management

7.1 General

- 7.1.1 This code of practice pertains to the measures to address environmental concerns in quarries. The general practice adopted is to procure materials from existing quarries operating with the requisite permits. Scope of this ECoP extends to management measures in the event of the Contractor starting up new quarries³ for extraction of material for this project only. **Table 7-1** presents the activities to be addressed during quarry operations and the significance of impacts in the project regions.

Table 7-1 Significance of Impacts across Project Region

Stages	Key Activities	Significance of Impacts							
		Uttarakhand		J & K		Bihar		Arunachal Pradesh/ Mizoram	
		Hilly areas	Other areas	Low hills	High hills	Flood plains	Other areas	Hills	Plateau
Pre-construction	Establish new quarry								
Construction	Precautions during quarry operations								
Post-Construction	Implementation of Redevelopment Plan								
	Impacts not likely to be significant								
	Impacts likely to be significant								

7.2 Project Planning and Design Stage

- 7.2.1 The PIU shall provide in the DPR, a list of licensed quarries operating within the district and adjoining districts. In addition, the DPR shall contain the following: (i) Lead from the various existing quarries and (ii) Adequacy of materials for the project in these quarries.
- 7.2.2 Only in the event of non-availability of existing quarries, shall the Contractor open a new quarry in accordance with Mines and Minerals (Development & Regulation) Act, 1957. The bid document shall include the exhaust quarry redevelopment as per needs of the landowner / community.
- 7.2.3 In the hilly areas hard stone available from cutting can be utilized and debris put to productive use as stated in ECoP-10 "Waste Management"

7.3 Pre-construction Stage

- 7.3.1 The Contractor shall select licensed quarry for procuring materials. The Contractor shall establish a new quarry only with the prior consent of the PIU 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 it approved by the PIU. No redevelopment shall be required if the material available from cutting is utilized in the road construction.

³ The management of environmental concerns in the existing quarries or the redevelopment of exhausted quarries is outside the purview of the Contractor's scope. This is due to: (i) SPCBs are the nodal agencies for ensuring the quality of air and water, and (ii) The mandate for the monitoring of redevelopment of exhausted quarries is vested with the Government agency issuing permits. Therefore, the quarry operator is not bound to adhere to any additional environmental requirements laid down by the project for the entire quarry operations, as the project is one of the many users of the quarry.

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

Operations & 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 materials 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.

7.4 Construction Stage

- 7.4.1 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) Incase of storage of blasting material, all precautions shall be taken as per The Explosive Rules, 1983.
- 7.4.2 Quarry operations including safety:
- i) Overburden shall be removed and disposed as per **ECoP-10.0**, “Waste Management”.
 - ii) During excavation, slopes shall be flatter than 20 degrees to prevent their sliding. Incases where quarry strata are good and where chances of sliding are less this restriction can be ignored.
 - iii) Incase of blasting, the 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 **ECoP-14.0**, “Public & Workers Health & Safety”.
 - v) The Contractor shall ensure maintenance of crushers regularly as per manufacturer’s recommendation.
- 7.4.3 Stockpiling of the excavated material shall be done as per stockpiling of topsoil explained in **ECoP-6.0**, “Topsoil Salvage, Storage & Replacement.”
- 7.4.4 During transportation of the material, measures shall be taken as per **ECoP-13.0**, “Construction Plants and Equipment Management” to minimize the generation of dust and to prevent accidents
- 7.4.5 The PIU and the Technical Examiner shall review the quarry site for the management measures during quarry operation, including the compliance to pollution norms.

7.5 Post Construction Stage:

- 7.5.1 The Contractor shall restore all haul roads constructed for transporting the material from the quarries to construction site to their original state.
- 7.5.2 The PIU and the Technical Examiner 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

7.5.3 In the first case, the Contractor shall be responsible for the Redevelopment Plan immediately after obtaining required quantity of construction materials say within one year.. The PIU shall be responsible for reviewing this case of redevelopment prior to the issuing the defect liability certificate. Such redevelopment shall not be required if the cut material is utilized for construction but the safety of hill slopes shall be ensured as in ECoP 9 “Slope Stability and Erosion Control”

7.5.4 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.

ECoP-8.0 Water for Construction

8.1 General

8.1.1 The terms and conditions of this Code of Practice pertain to the procurement of water required for construction. Except bituminous works, water is required during all stages of road construction such as Embankment Sub-Grade; Granular sub-base (GSB) and Water Bound Macadam (WBM). The activities requiring addressal during the project stages and the significance of impacts in the project regions are presented in **Table 8.1**.

Table 8-1: Significance of impacts across project regions

Stages	Key activities	Significance of impacts							
		Uttarakhand		J & K		Bihar		Arunachal Pradesh/ Mizoram	
		Hilly areas	Other areas	Low hills	High hills	Flood plains	Other areas	Hills	Plateau
Project Planning & Design Stage	Scheduling construction to suit water availability								
	Identification of alternate water sources								
Pre-construction Stage	Arrangements for procuring water								
Construction	Extraction of water								
	Impacts not likely to be significant								
	Impacts likely to be significant								

8.2 Project Planning & Design Stage

8.2.1 The Detailed Project Report shall contain the following information:

- Estimate of water requirement during different seasons based on construction schedule of various stages of the project,
- Identification of potential sources of water for construction,
- Arrangements to be worked out by the contractor with individual owners, when water is obtained from private sources,
- Permits required for opening up new sources, as per the requirements of the existing statutory provisions, and
- Whether scarcity of water would have any impact on schedule of construction.

In water-scarce regions, provide the following additional information in DPR...

- Exploring possibilities for use of existing perennial sources, through interactions with water user groups as the villagers, relevant Panchayat Raj Institutions (PRIs) and the Government Department, keeping in view that the water extraction does not infringe upon the usufruct rights of the existing water users.
- Identification of potable water source for domestic use of workers and for use in cement - based construction such as cement concrete roads, culverts and other cross drainage works.
- Identification of alternate water sources, water-harvesting techniques will be explored for use in hilly areas of Jammu & Kashmir, Uttarakhand, Arunachal Pradesh and Mizoram to avoid water extraction from the existing community sources.

8.2.2 In water scarce regions, if water-harvesting structures are to be constructed, suitable locations and mechanism for siting these structures will be identified. These are envisaged to be permanent water tanks for collection of stream water. Detailed drawings of water harvesting structures based on site conditions will need to be worked out and presented in the DPR. No

extra payment shall be generally made for these works and the Contractor has to include the cost of these items in his offer while quoting his tendered rate.

- 8.2.3 Scheduling Construction in Water Scarce Areas: As part of the project preparation, PIU shall conduct an assessment of water requirement and availability in water scarce regions. As far as possible, schedule for construction in these water scarce areas shall be prepared such that earthwork for embankment is carried out just before monsoon, so that water requirement for subsequent construction works such as granular sub-base and water bound macadam are met in monsoon and post monsoon season. Carrying out these activities even during the monsoon is possible as the rainfall may not be high enough to disrupt construction.

8.3 Pre-construction stage

- 8.3.1 Prior to commencement of extraction of water for construction, the contractor shall work out arrangements as specified in the DPR.

Arrangements for procuring water by contractor...
<ul style="list-style-type: none">• In case of community water sources, the Contractor will carry out consultations and obtain written consent of Gram Panchayat for extraction of water through written arrangements with the PRI towards the same. Format of the Letter of Consent is presented in Annexure 8-1.• In case of private water sources, the Contractor shall not commence procurement of water from a source unless and until the written consent of all current registered owners of the parcel or parcels on which the source is located has been obtained.• In case of new tube-wells, the Contractor shall obtain clearances required from the Ground Water Board as required. The siting of such tube-wells shall be at a distance of not less than 20m from any septic tank/soak pit or other source of pollution.• In case of water harvesting structures (if required), the Contractor shall in consultation with the residents, identify suitable locations for siting the structure and construct the same.• In case of perennial sources, the Contractor shall adhere to all administrative procedures pertaining to procurement of water from such sources.

8.4 Construction Stage

- 8.4.1 During construction, the Contractor shall be responsible to monitor the following:

- The arrangements worked out with the PRI/individual land owners for water extraction is adhered to,
 - Extraction of water is restricted to construction requirement and domestic use of construction workers
 - Water requirement for curing of concrete shall be minimized by pooling of water over the concrete or by covering with wet gunny bags
 - Water used for mixing of mortar/concrete and subsequent curing is free from injurious amount of oil, acids, alkalis, salts, sugar, organic materials or other substances that may be deleterious to concrete or steel and this water should conform to Clause 1010 of MoRT&H "Specifications for Road and Bridge works – Fourth Revision" and IS: 456, and,
 - The potable water used for drinking purposes of construction workers shall be as per the Indian Standard for Drinking Water IS: 10500, 1991.

- 8.4.2 Prior to issuing project completion certificate to the contractor, the PIU shall verify that the premises of water extraction points are restored to their original status after construction.

ECoP-9.0 | Slope Stability and Erosion Control

Comment: Page: 1
Kataria: Cost escalation due to provision of slope stabilization measures – to be defended

9.1 General

- 9.1.1 Stability of slopes is a major concern in hill areas and locations of high embankment. In cases of high embankment, water retention at the embankment base initially causes toe failure and subsequently failure of the whole embankment. Soil erosion is consequent to high runoff on hill slopes. High wind velocities cause erosion of embankments made up of cohesion-less sandy soils. Embankments made up of silty and sandy soils are eroded, in the absence of vegetative cover, when the slopes are steep say more than 20 Degree.
- 9.1.2 Erosion control is provided to prevent soil damage done by moving water, either by displacement of soil by water in motion or deposit of soil by sedimentation at points of low velocity. Erosion in hilly areas occur when the natural slopes are affected due to cutting or due to ingress of water in the rock mass and leaching/ weakening of jointing compounds.
- 9.1.3 The scope of this ECoP includes measures to minimize the adverse environmental impacts on slope stability and soil erosion due to the construction of roads. The adverse environmental impact can be: (i) damage to adjacent land, (ii) silting of ponds and lakes disturbing the aquatic habitat (iii) erosion of rich and top fertile top layer of soil (iv) contamination of surface water bodies and (v) reduction in road formation width due to erosion of shoulders/berms. **Table 9-1** highlights the key activities that need to be addressed during the project stage and also the significance of impacts in different regions.

Table 9-1 Significance of Impacts across Project Region

Stages	Key Activities	Significance of Impacts							
		Uttarakhand		J & KI		Bihar		Arunachal Pradesh/ Mizoram	
		Hilly areas	Other areas	Low hills	High hills	Flood plains	Other areas	Hills	Plateau
Project Planning & Design Stage	Slope considerations								
	Erosion considerations								
During Construction	Erosion Control Measures								
Post-Construction	Slope Stabilisation								
	Impacts not likely to be significant								
	Impacts likely to be significant								

9.2 Project Planning and Design Stage

- 9.2.1 During the detailed project preparation phase, the following investigations shall be carried out prior to finalisation of alignment.
- Topographical
 - Hydrological : Interruption and disruption due to existing drainage system
 - Geo-technical and
 - Geological Investigation (in case of hill roads)
 - Aesthetic consideration
- 9.2.2 The rock profile, other information and geologically critical sections are identified based on surveys carried out by Geological survey of India. Map of the critical areas shall be notified district wise to provide a broad profile

- 9.2.3 Slope stability analysis for retaining / breast walls of height greater than 5m shall be carried out in hilly areas. The stability analysis shall be as per IRC: SP-48: 1998. Based on these investigations slope stabilisation measures are to be incorporated for finalising the alignment design.
- 9.2.4 In addition to the slope stability analysis the alignment should be such that (i) Steep as well as heavy cuts are avoided, (ii) Flora and fauna of the area are disturbed to a minimum possible extent and (iii) Natural drainage pattern is not obstructed.
- 9.2.5 For high embankments, geo-technical investigations to determine of C , ϕ , density etc.) of the available material need to be conducted to check its suitability as fill material.

9.3 Pre-construction stage

9.3.1 Interceptor ditches are constructed in hill areas to protect the road bench and hillside slope from erosion due to heavy rainfall and runoff. Interceptor ditches are very effective in the areas of high intensity rainfall and where the slopes are exposed. These are the structures designed to intercept and carry surface runoff away from erodible areas and slopes, thus reducing the potential surface erosion. **Figure 9.1** shows typical installation of interceptor ditch structure as well as ditch lining types. The PIU must ensure that the layout and siting of ditches is as per guideline on Road Drainage IRC:SP-42:1994.

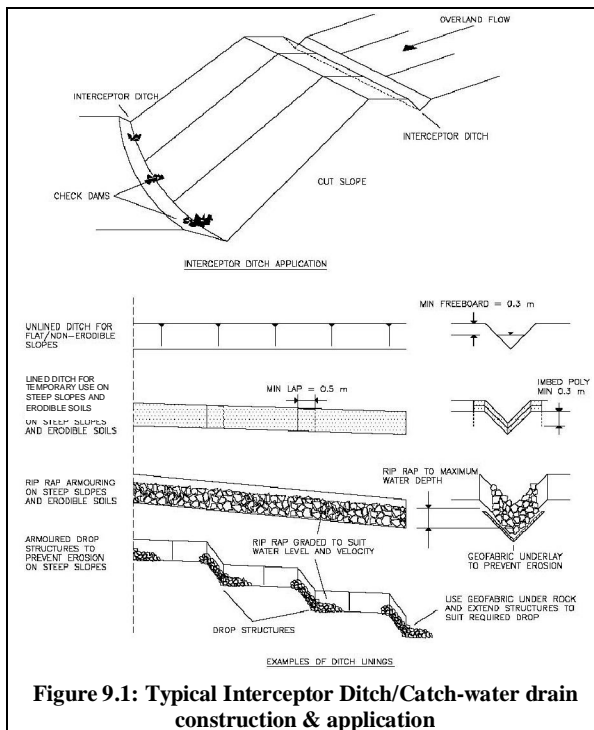


Figure 9.1: Typical Interceptor Ditch/Catch-water drain construction & application

9.4 Construction Stage

- 9.4.1 When alternative material such as fly ash is used for embankment formation, it needs to be ensured that sufficient filter bed is provided along with the top cap. All tests as per IS: 2720 (Parts: 4, 5, 8 & 40) and IRC: SP: 20-2002 are to be conducted on the embankment to keep a check on the compaction achieved.
- 9.4.2 Slope stabilisation techniques and erosion control measures as mentioned below are to be undertaken in hill areas.
- Increasing vegetation: On side slopes in hills, immediately after cutting is completed and debris is removed, vegetative growth has to be initiated by planting fast growing species of grass. This would prevent high velocities of runoff and resultant gully formation as well as pounding of water on the road bench. **Box 9-1** gives detailed specifications for provision of vegetation cover.

Box 9-1: Detailed specifications for Vegetative cover

Description:

The vegetative cover should be planted in the region where the soil has the capacity to support the plantation and at locations where meteorological conditions favours vegetative growth.

Site Preparation:

- To prevent the seeds from being washed away subsequent to sowing, the area should be protected with surface roughening and diversions.
- Soil samples should be taken from the site and analysed for fertiliser and lime requirements.

Seed Application:

- The seed should be sown uniformly as soon as preparation of the seedbed has been completed.
- No seed should be sown during windy weather, or when the ground surface is wet, or when not tillable.

Maintenance:

During first six weeks, the planting should be inspected by the PIU, to check if the growth is uniform and dense. Appropriate moisture levels shall be maintained. There may be requirement of watering the plantings regularly during the dry seasons. Fertiliser and pest control applications may also be needed from time to time.

- **Sausage Walls / Gabions:** Sausage wall (commonly termed as Gabions) are being used extensively in hilly areas. The sausage wall are made by forming sausages of galvanized iron or steel wire netting of 4 mm dia having 10 cm square or hexagonal opening and filling the sausages with hard local boulders / stones and wrapping the wire net at the top. The sausage walls can withstand large deformation without cracking and are flexible. Further, due to the open structure, they allow free drainage of water. Typical arrangements with detailed specifications are shown in **Figure 9.2**. Sausage Walls shall be constructed in-situ as per IRC: SP: 48-1998.

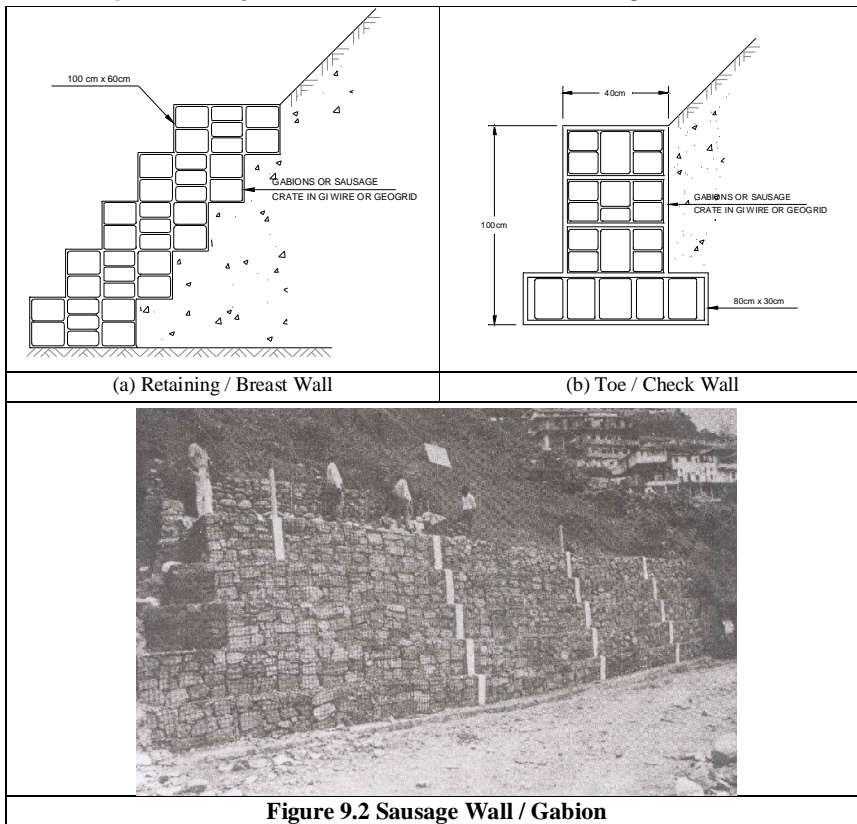


Figure 9.2 Sausage Wall / Gabion

- **Bally Benching:** To control the erosion on slopes as well as for arresting the shallow movement of top mantle slide mass at the construction location; the Contractor should provide Bally Benching. This method is also very effective in preventing gully erosion. Typical arrangements with detailed specifications are shown in **Figure 9.3**. Bally benching shall be installed as per IRC: SP: 48-1998.

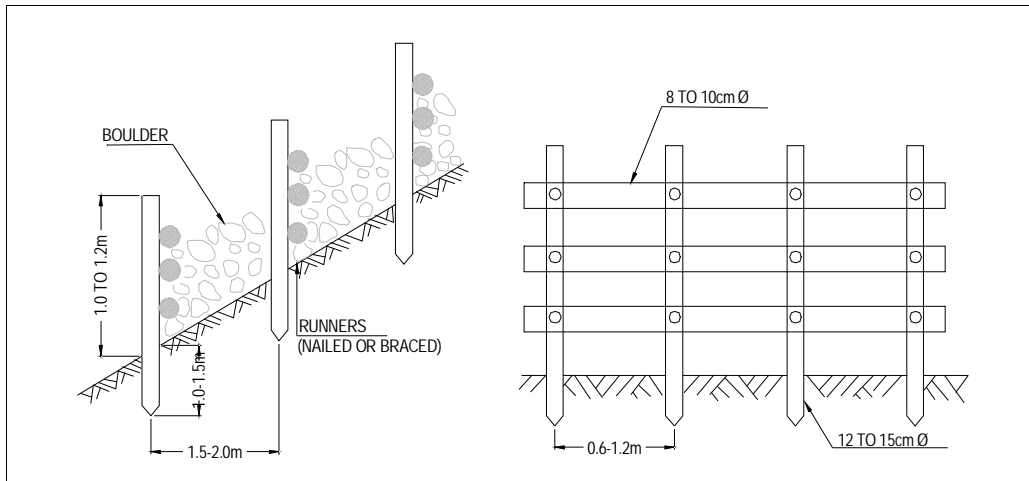


Figure 9.3: Layout and Design Specification for Bally Benching

- Check dams: Sheet and channel erosion on hill slopes gentler than 1(V):12(H) can be prevented effectively through construction of check dams. Details are provided in **Box 9-2**.

Box 9-2: Check Dam

General:

A check dam is a small dam constructed in a drainage way to mitigate sheet and channel erosion by restricting the flow velocity. On steeper slopes greater than 1: 12 (H:V), check dams are not effective.

Basic Design Criteria:

- Check dams are usually constructed of riprap, logs, sandbags, and/or straw bales.
- The maximum check dam height should be 0.6 m.
- The centre of the check dam should be a minimum of 25 cm lower than the ends to act as a spillway for runoff, as illustrated in Figure 9.3
- Overflow areas should be stabilised to resist erosion.
- Stone check dams should use 7.5 cm or larger stone with side slopes of 2:1 (H:V) or flatter and should be keyed into the sides and bottom of the channel for a minimum depth of 0.6 m. The drainage area for a stone check dam should not exceed 0.2 Sq Km

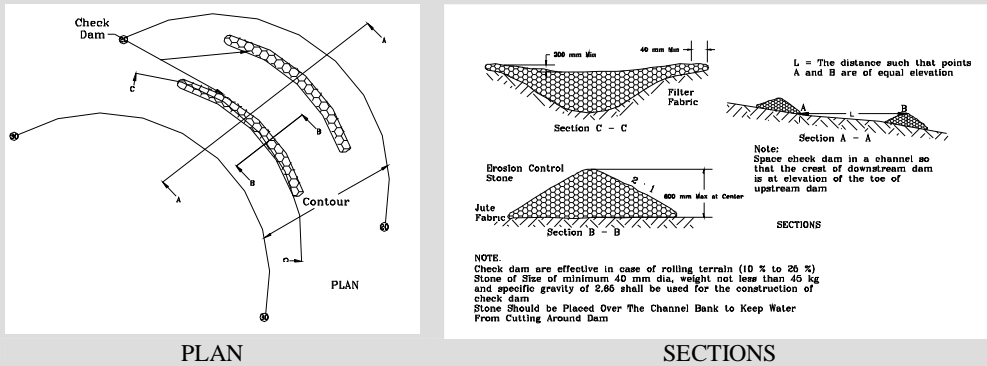


Figure 9.4: Check Dam Specification

Multiple check dams should be spaced so that the bottom elevation of the upper dam is the same as the top elevation of the next dam downstream, as illustrated in **Figure 9.4** above.

Box 9-3: Detailed Specifications For Silt Fencing

Description:

Silt fencing is a temporary sediment barrier made of woven, synthetic filter fabric supported by steel or wood post. The purpose of the silt fence is to prevent sediment carried by sheet flow from leaving the site and entering to natural drainage or any other water body located near the construction site. Silt fencing encourages the sheet flow and reduces the potential for development of rills and gullies. Care should be taken that silt fences are not installed across streams, ditches, waterways or other concentrated flow areas. All silt fencing should be installed along the contour, never up or down a slope. Where all the sheet flow run off is to be stored behind the silt fence, maximum slope length should not exceed as shown in the **Table 9-2**

Table 9-2 Criteria For Silt Fence Placement

Land Slope (%)	Maximum Slope Length (Above the fence in m)
< 2	30.0
2 to 5	22.5
5 to 10	15.0
10 to 20	7.5
> 20*	4.5
* In areas where slope is greater than 20 %, a flat area length of 3.0 m between the toe of the slope and the fence should be provided	

Construction Specification:

Silt fencing (Refer **Figure 9.5** for Cross-section) consists of 1.0 m wide filter fabric and should be placed on the contour. In case runoff flow or velocities are very high or where slope exceed vertical height of 3.0 m, silt fencing should be wire reinforced as shown in the **Figure 9.5**. The contractor should purchase silt fencing in a continuous roll to the length of the barrier to avoid the use of joint. In case of joints, filter cloth should be spliced together only at supporting post, with minimum 15 cm overlap and securely sealed. The pile is to be driven to a depth of 300 mm into the ground by pressing from the top. The frame will be installed at the edge of stockpiles and at the water bodies along which construction is in progress.

Inspection:

The PIU will inspect location as well as efficiency of silt fencing. The inspection should be done after every 15 days and in case of storm water, within 24 hours after the end of rain.

Maintenance:

The contractor should remove sediments, once they have accumulated to one-half the original height of the fence. Filter fabric should be replaced whenever it has deteriorated to such an extent that the efficacy of the fabric is reduced. Silt fence should remain in place until disturbed areas have been permanently stabilized. All the sediments accumulated should be properly disposed of before the fence is removed. The operation of removing and disposing have to be monitored by the PIU.

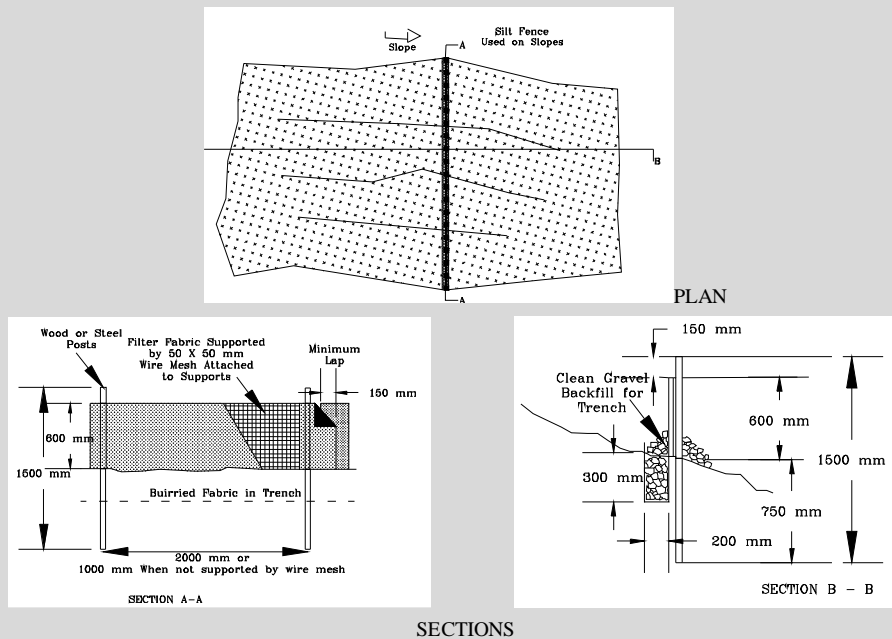


Figure 9.5 Cross-section of Silt Fencing

BOX 9-4: Erosion Control Matting

Description:

The design specifications as well as locations should be finalised during the Project Preparation Phase. During the execution period in post-construction stage, PIU must ensure that all the guidelines are to be followed as per specifications during the site preparation and installation of erosion control matting. Following are the steps need to be followed for the placing erosion control matting:

Site Preparation:

- The areas should be fertilised and seeded.
- A smooth surface free of depressions that allows water to collect or flow under matting is required.
- The soil should be left with loose surface after seeding.
- The material should be steel wire formed into “U” shape and should be 15 cm to 25 cm long.

Installation:

- Filter fabric made of biodegradable material (eg. Jute) should be placed horizontally on the slope less than 2:1
- Prior to netting, a 10 cm anchor trench should be dug at the top and toe of the slope with the top trench placed 30 cm back from the crown, or a berm over which the fabric can be carried.
- For horizontal application, work must proceed from the bottom towards the top of the slope with a 10 cm overlap. Cutting material should be folded less than 7.5 cm to 10 cm at the end, stapled and covered.
- Staples should be placed at a spacing of 22.5 cm to 30 cm apart in the trenches along the horizontal lap joints.

9.4.3 Soil erosion shall be controlled on high embankments by the following techniques:

- Silt Fencing (detailed specifications and drawings are provided in Box 9-3)
- In regions of intensive rainfall, locations of steep slopes, regions of high soil erosion potential and regions of short growing seasons, erosion control matting should be provided. Detailed specifications and drawings are provided in **Box 9-4**.
- Brush Barrier (detailed specifications and drawings are provided in Box 9-5)

BOX 9-5: Detailed Specification for Brush Barrier

Description:

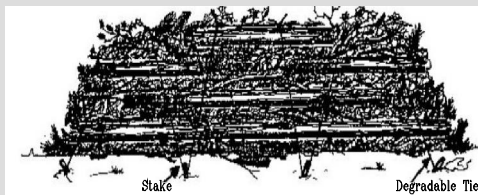
A brush barrier is a temporary barrier used to control sediment transport by using the residue materials available from clearing and grubbing.(Figure 9.6)

Design and Construction Criteria:

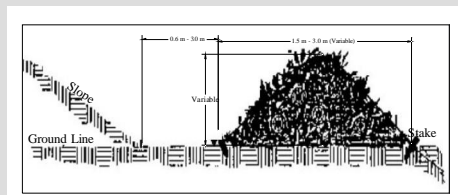
- Brush should be cut and windrowed approximately 3 m from the toe of the slope. The brush barrier should be packed densely and should be a minimum of 1.2 m high before compressing. This may be accomplished during clearing and grubbing by having equipment push the brush, tree trimmings, shrubs, stones, root mats, and other materials into a mounded row on the contour. Logs placed within the barrier, parallel to the toe, can help reduce failures.
- A brush barrier may be compressed by running a bulldozer along the top of the windrow. The compressed barrier should be 0.9 m to 1.5 m high and 1.5 m to 3.0 m wide. The top of the barrier should be at least 1.5 m below the finished roadway
- A brush barrier may be left in place after construction unless it is in an aesthetically sensitive area or it is indicated otherwise on plans.

Maintenance:

Inspect a brush barrier after each rainfall and make necessary repairs. Sediment deposits should be removed when they reach approximately half the barrier's height.



Front Elevation



Side Elevation

Figure 9.6 Brush Barrier (Tree & Residual Material With Diameter > 150 Mm)

9.5 Post Construction Stage

- 9.5.1 All the exposed slopes shall preferably be covered with vegetation using grasses, brushes etc. Locally available species possessing the properties of (i) good growth (ii) dense ground cover and (iii) deep root shall be used for stabilization.
- 9.5.2 In case of steep and bare slopes require stabilization, in order to retain the seedling to the ground, asphalt mulch treatment shall be given. Seedling are covered with asphalt emulsion and spread into a thin layer. The asphalt film gradually disintegrates and a carpet of green vegetation and deep-rooted species of grass and clovers, takes its place. *(For details refer IRC: SP 48-1998, Chapter 11)*
- 9.5.3 Anchoring shall be carried out as per IRC: SP: 48-1998, Chapter 11 in case of rocks.
- 9.5.4 Regular inspection of check dams and repositioning/replacement of dislodged or stolen stones need to be carried out
- 9.5.5 Repair and maintenance of eroded side drain inverts is to be done in order to arrest retrogradation of levels in side drains. Slopes of high embankment can give a fertile base for growth of vegetative cover / sodding.



ECoP-9A Bio-Engineering

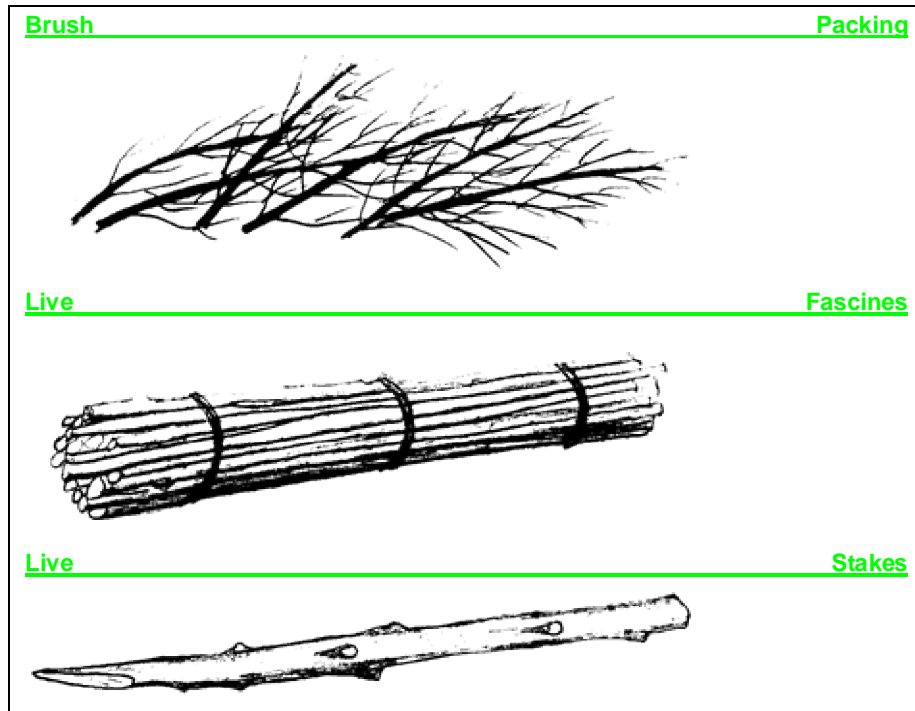
- 9A.1.1** General: Bio-Engineering is the use of living plants for engineering purposes. Vegetation is carefully selected for the functions it can serve in stabilising roadside slopes and for its suitability at site. Soil bioengineering provides attractive cost-effective and environmentally compatible ways to protect slopes against surface erosion and shallow mass movement.
- 9A.1.2** This code of practice envisages the use of Bio-Engineering techniques to be undertaken for protection of slopes against erosion either alone or in conjunction with civil engineering structures. It can also help in reducing planer movement, can be used to improve drainage and reduce slumping. A holistic approach to bioengineering incorporates the use of individual dormant un-rooted bundles of branches (live fascines), dormant unbundled branches (brush layering), and combinations with live transplanting and seeding.
- 9A.1.3.** Normally Bio-engineering alone is mostly used for relatively small-scale works, such as armouring bare cuts and fill slopes against erosion, catching debris to reduce drain blockages and so on. They are effective at depths of up to 500mm below the depth.
- 9A.1.4** The Bio-Engineering techniques in conjunction with civil engineering structures can be designed for armouring of slopes against slope failures. Where the better quality engineering solution is being sought, designs that incorporate bio-engineering are usually most effective and the most economic solutions for the shallow-seated problems listed above. Obviously, the use of bio-engineering solutions costs more in the short term than ‘do-nothing’ approach. But in the long term, there should be additional benefits from reduced maintenance costs. A list of techniques for stabilising slopes with civil and bio-engineering is enclosed at **Annexure 9A-1**. Some examples of use of Bio-engineering are given below:

How does bio-engineering work?

Bio-engineering systems work by fulfilling the engineering functions required for the protection and stabilizing of slopes. The difference between revegetation and bio-engineering is that the plant must provide one or more of the roles of catching debris, armouring the surface, reinforcing the soil, anchoring the surface layer, supporting the slope or draining the material. This means serving an engineering function.

Scope/ Examples of use of Bio-Engineering:	
<ul style="list-style-type: none"> • Prevention of scour around drains and culvert discharge points • Prevention of scour around civil engineering structures, particularly at the soil/structure interface • Protection against debris blocking the side drains • Protection against debris coming on to the carriageway • Protection of un-compacted spoil • Protection of embankments and fill areas • Protection of bare cut slopes 	<ul style="list-style-type: none"> • Protection of bare surfaces on rehabilitated land slides • Protection of slope toes from erosion, where undercutting and over-steepening may arise • Stabilising of gullies • Rehabilitation of quarries and borrow pits • Prevention of shallow planer failures (less than 0.5 m deep) • Prevention of shallow slumps (less than 0.5 m deep) • Reduction of minor falls in weak, shattered rock • Reduction of debris creep on steep, unconsolidated colluvial slopes.

In Nepal, bio-engineering is used more widely, on account of the extreme terrain conditions and the need for low cost techniques for the protecting the slopes and shallow-seated failures



- 9A.2.1 Project Planning and Design:** Bio-engineering works are planned in the same manner as other works. Unstable hill, cut slopes and likely location of unstable/vulnerable sites slides shall be identified on the basis of geological inputs and local information about the occurrence of slips.
- 9A.2.2** The technique of civil engineering or bio-engineering to be adopted shall be based on the hill slope angle as well as the local geology and optimum technique designed to stabilize such unstable slopes. The slope sites can then be divided into various segments and most appropriate technique chosen.
- 9A.2.3** The planning shall involve selection of the technique of Bio-engineering appropriate to the bio-physical conditions of the region, integration with standard civil engineering measures, the role of vegetation, plant species selection, propagation and construction techniques.
- 9A.2.4** Select the right species of plant or shrub for use, in each case, for the site keeping in view technique, propagation and suitability.
- 9A.3.1 Pre-construction Stage:** The schedule of implementation of bio-engineering works shall be scheduled precisely in line with the season. It should also take into account the time taken for vegetation to become established and reach full strength.
- 21.3.2 It shall be ensured that the site have been prepared for plantation and slopes trimmed to receive the saplings or grasses.
- 9A.3.3** Calculate the quantities of seeds or numbers of saplings required for the work and identify the source of procurement.
- 9A.3.4** Work out the requirement of water that may be required for sprinkling on the newly planted saplings.
- 9A.3.5** Identify the location of waste disposal.

9A.4 Construction Stage:

- 9A.4.1** It shall be ensured that all planting stock is of high quality and is vigorous enough to grow on the site to be planted. The plants and cutting used shall be disease resistant
- 9A.4.2** Debris generated from the clearance operations shall be deposited only at pre-identified waste disposal locations. .
- 9A.4.3** Plantation shall be scheduled immediately after the first rain when there is sufficient moisture and the grasses/saplings get established. These may have to be protected for some time from grazing cattle or other such factors. It shall also be ensured that the plants do not get dislodged due to other construction activities. The area may need to be fenced till the plants become established.
- 9A.4.4** It needs to be checked that the work has been completed to a high standard and the progress of growth monitored. Weeding may be carried out as required.
- 9A.5.1 Post Construction Stage:** It also takes time for the vegetation to become established and reach full strength. It is therefore important to ensure that the works have been completed to a high standard at the site and the sites are completely covered without any gap. This must be verified at site before finalization of the contract.
- 9A.5.2** The maintenance of bio-engineering works is a part of the road side maintenance. Like other elements of maintenance the contractor would be responsible for routine and preventive maintenance activities of all such structures.
- 9A.5.3** The progress of growth of the plants needs to be monitored by the supervisory staff and re-plantation carried out to replace any dead stock.

ECoP-10.0 Waste Management

10.1 General

10.1.1 This code of practice describes procedures for handling, reuse and disposal of waste materials during construction. The waste materials generated can be classified into (i) Construction Waste and (ii) Domestic waste. The key activities during project stages where management of wastes is required and the significance of the impacts in the project regions are presented in **Table 10-1**.

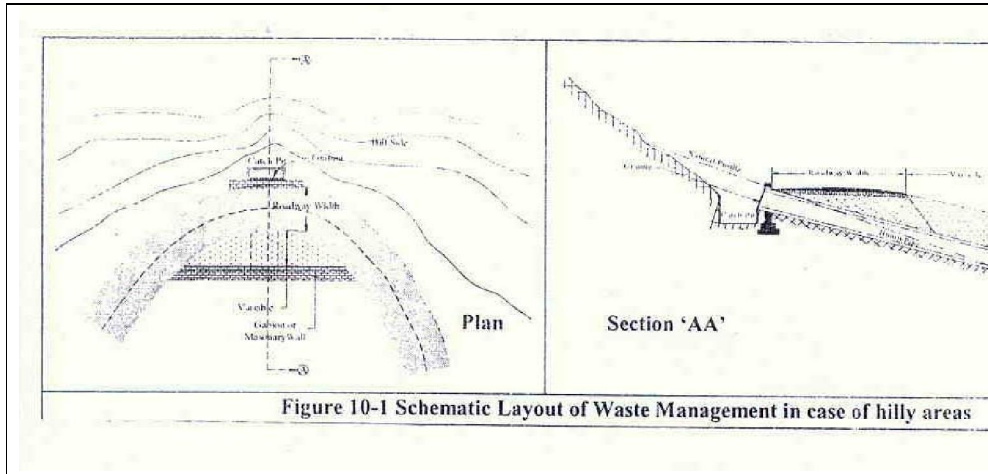
Table 10-1: Significance of Impacts across Project Regions

Stages	Activities	Significance of Impacts							
		Uttarakhand		J & K		Bihar		Arunachal Pradesh/ Mizoram	
		Hilly Areas	Other areas	Low hills	High hills	Flood plains	Other areas	Hills	Plateau
Project Planning & Design	Identification of type/ source of waste								
Pre-construction	Identification of disposal sites								
Construction	Reuse of wastes								
Post-Construction	Decommissioning								
	Impacts not likely to be significant								
	Impacts likely to be significant								

10.2 Project Planning and Design Stage

10.2.1 As part of DPR preparation, PIU shall carry out the following measures

- Finalize road design and alignment to minimize waste generation through balancing of cut and fill operations rather than aligning the entire road width in cutting and minimizing excess cuts requiring disposal.
- Identify the type of wastes as well as sources of waste during construction and suggest options for possible reuse. Assess the quantity of cut material that can be used in construction of the parking spaces, passing places and other facilities.
- In case debris generated from cutting in hill areas can not be reused, it may be disposed off properly. One suggestion is indicated in Figure 10-1. The figure indicates construction of gabion walls on valley side at ridge locations to form a trough for waste disposal. As the ridge locations usually have streams flowing through, length of pipe provided at the culvert should be extended to let runoff flow out of the disposal location. After filling up of the disposal site, it shall be grassed and suitably vegetated to prevent erosion of the disposed soil.
- Examine the possibility of utilizing the hard stones and other cut materials for pavement construction, retaining or protection walls, lining of side and chute drains, stabilizing sub-base, head walls, wing walls parapets etc.



- Provide guidelines to the contractor for locating waste disposal sites for non-toxic wastes
 - Identify locations, in consultation with the community, to use the waste material for leveling of playgrounds of village schools.
 - Utilizing the cut material for laying and compacting a capping layer on full width of formation
 - Identify existing landfill sites if available for disposal of toxic materials.
 - In case no existing landfill sites are available, identification of landfill site as well as decommissioning of these sites should be undertaken. Towards this, identify the clearance requirements.
 - Include in the bid document under the Special Conditions of Contract, a clause stating that all provisions of Environmental Codes of Practice shall be applicable to the locations of disposal of wastes. These shall include: **ECoP-6.0**, “Topsoil Salvage, Storage and Replacement”, **ECoP-9.0**, “Slope Stability and Erosion Control” and **ECoP-12.0**, “Drainage”.
- 10.2.2. Disposal sites shall be identified at the project planning stage and the location shall be marked on the plans. But it should not restrict the contractor from disposal of the waste material at alternate site after obtaining approval of the competent authority and without any extra investment. He is expected to carry out site protection measures (including toe wall protection, slope stabilizing as may be necessary) and to ensure that no leaching of toxic materials take place. No Objection certificate from the land owner shall be in place if the land belongs to any individual. The contractor shall also ensure that the debris do not spill over to the valleys. It shall be ensured that the leaching from the fill, if any, is properly drained and do not cause damage to adjoining properties or agricultural fields.

10.3 Pre-construction Stage

10.3.1 The contractor shall identify the activities during construction, that have the potential to generate waste and work out measures for the same in the construction schedule to be submitted to the PIU. A sequential listing of the activities during road construction and the nature of wastes together with the possible options for reuse are specified in **Table 10-2**. For the disposal of excess cut and unsuitable (non-toxic) materials, the contractor shall identify the location for disposal in consultation with the community / Gram Sabha. Any toxic materials shall be disposed in existing landfill sites that comply with legislative requirements. Prior to disposal of wastes onto private/community land, it shall be the responsibility of the Contractor to obtain a No-objection Certificate (NOC) from the land owner/community. The format for

NOC shall be as per **Annexure 10-1**. The NOC shall be submitted to the PIU prior to commencement of disposal.

10.3.2 The Contractor shall educate his workforce on issues related to disposal of waste, the location of disposal site as well as the specific requirement for the management of these sites.

Practices to avoid – waste disposal ...
<ul style="list-style-type: none"> • Tipping of waste into stream channels, water bodies, forests and vegetated slopes • Non-cleaning of wastes after day's work • Leaching of wastes • Littering in construction camps / sites • Storing wastes on private land

10.4 Construction Stage

10.4.1 The contractor shall either reuse or dispose the waste generated during construction depending upon the nature of waste, as specified in **Table 10-2**. The reuse of waste shall be carried out by the contractor only after carrying out the specific tests and ascertaining the quality of the waste materials used, and getting the same approved by the PIU.

10.4.2 Wastes that were not reused shall be disposed off safely by the contractor. The contractor shall adopt the following precautions while reusing wastes for construction:

- In case of bituminous wastes, dumping will be carried out over a 60 mm thick layer of rammed clay so as to eliminate any chances of leaching.
- In case of filling of low-lying areas with wastes, it needs to be ensured that the level matches with the surrounding areas. In this case care should be taken that these low lying areas are not used for rainwater storage
- In case oil and grease are trapped for reuse in a lined pit, care shall be taken to ensure that the pit should be located at the lowest end of the site.
- The heaps of waste materials, if any, shall be properly benched and sloped to ensure that the material does not spread over the adjoining areas causing damages to property or agricultural crops. Proper toe walls may be constructed to contain the waste to remain within the identified site.

10.4.3 The waste management practices adopted by the Contractor, including the management of wastes at construction camps etc shall be reviewed by the PIU during the progress of construction.

10.5 Post Construction stage

10.5.1 After decommissioning of construction sites, the Contractor shall hand over the site after clearing the site of all debris/wastes to the PIU. The site shall be inspected by the PIU. In case of disposal of wastes on private land, certificate of Completion of Reclamation is to be obtained by the Contractor from the landowner that “the land is restored to his satisfaction” (**Annexure 5-1**). The same is to be submitted to the PIU before final payment is claimed.

Table 10-2: Type of wastes and scope for reuse

S.No	Activity	Type of waste	Scope for possible reuse	Disposal of waste
I	CONSTRUCTION WASTES			
1	Site Clearance and grubbing	Vegetative cover and top soil	Vegetating embankment slopes	
		Unsuitable material in embankment foundation	Embankment Fill	Low lying areas Land fill sites
2	Earthworks			
i	Overburden of borrow areas	Vegetative cover and soil	Vegetating embankment slopes	
		Granular material	Embankment Fill, Pitching	
ii	Overburden of quarries	Vegetative cover and soil	Vegetating embankment slopes	
iii	Accidental spillages during handling	Dust		
iv	Embankment construction	Soil and Granular Material	Embankment Fill	
v	Construction of earthen drains	Soil	Embankment Fill	
3	Concrete structures			

S.No	Activity	Type of waste	Scope for possible reuse	Disposal of waste
i	Storage of materials	Dust, Cement, Sand,	Constructing temporary structure, embankment fill	
		Metal Scrap		Scrap Yard
ii	Handling of materials	Dust		
iii	Residual wastes	Organic matter	Manure, Revegetation	
		Cement, sand	Constructing temporary structure, embankment fill	
		Metal scrap	Diversion sign, Guard Rail	
4	Reconstruction works			
i	Dismantling of existing pavement	Bitumen Mix (broken to less than 75mm size), granular material	Sub-base	
		Concrete	Road sub-base, reuse in concrete, fill material and as rip rap on roads	
		Guard rail sign post, guard stone	Reuse for same	
ii	Dismantling of cross drainage structures	Granular material & bricks	Constructing temporary structure, embankment fill	
		Metal scrap	Diversion sign, Guard Rail	
		Pipes	Culvert	
5	Decommissioning of sites			
i	Dismantling of temporary structures	Granular material and bricks	Constructing temporary structure, embankment fill	
6	Hill Roads			
i)	Hill cutting	Vegetative cover	Vegetating embankment slopes	
		Soil & granular material	Embankment Fill	
ii)	Clearance of slides	Vegetative cover	Vegetating embankment slopes	
		Soil, granular material & rocky material	Embankment Fill, sub-base, gabions. Hard stones can be used as road material for WBM layers after proper screening.	
7	Maintenance operations			
i	Desilting of side drains	Organic matter and soil	Revegetation	
II	OIL AND FLUIDS			
1	Construction machinery – maintenance and refueling	Oil and Grease	Incineration, Cooking, Illumination	
2	Bituminous works			
i	Storage	Bitumen	Low Grade Bitumen Mix	
ii	Mixing and handling	Bitumen	Low Grade Bitumen Mix	
		Bitumen Mix	Sub-base, Paving access & cross roads	
iii	Rejected bituminous mix	Bitumen Mix	Sub-base, Paving access & cross roads	
III	DOMESTIC WASTES			
1	Construction camps	Organic waste,	Manure	
		Plastic and metal scrap		Scrap Yard
		Domestic effluent	Irrigation	

ECoP-11.0 Water Bodies

11.1 General

11.1.1 Water bodies may be impacted when the road construction is adjacent to it or the runoff to the water body is affected by change of drainage pattern due to construction of embankment. The following activities are likely to have an adverse impact on the ecology of the area:

- Earth moving
- Removal of vegetation
- Vehicle/Machine operation and maintenance
- Handling and laying of asphalt and
- Waste disposal from construction camps

Construction near water bodies impairs

...

- Catchment area of the water body
- Drainage system
- Flood level and water logging
- Flora and fauna dependant on the water body
- Ground water recharging
- Animal husbandry as water bodies are used by animals
- Water quality &
- Runoff (increase/decrease)

11.1.2 **Table 11-1** highlights the key activities that need to be addressed during different stages of construction and also the significance of the impacts in project regions

Table 11-1: Significance of Impacts across Project Region

Stages	Key Activities	Significance of Impacts							
		Uttarakhand		J & K		Bihar		Arunachal Pradesh/ Mizoram	
		Hilly AReas	Other Areas	Low Hills	High Hills	Flood Plains	Other Areas	Hills	Plateau
Project Planning & Design	Alignment of Road								
Pre-construction	Mitigation designs in consultation with Community								
Construction Stage	Erosion control and Embankment Protection Measures								
	Impacts not likely to be significant								
	Impacts likely to be significant								

11.2 Project Planning and Design Stage

11.2.1 All efforts are to be taken to avoid the alignments passing adjacent or close to water bodies. Where possible, it should be realigned away from the water body without cutting its embankment, decreasing the storage area or impairing the catchment area. Adequate drainage arrangements as per IRC:SP-20:2002 have to be provided. Stream bank characteristics and hydrology of the area are to be studied before finalizing the alignment, the profile and cross-drainage structures.

11.2.2 If it is not possible to shift the alignment and the road is located on the banks of a drinking water pond, the camber shall be away from water body. The embankment slopes shall be protected from erosion by providing slope protection measures. A sample drawing of the measures suggested is presented as **Annexure 11-1**.

- 11.2.3 The decision on shifting the alignment or provision of erosion control measures on embankments cutting water bodies shall be taken by the PIU. However, it shall be ensured by the PIU that no adverse affect on the water body shall take place during construction stage.
- 11.2.4 The PIU after an assessment of the likely impacts on the water body and review of the provisions of this ECoP shall prepare Rehabilitation Plan for rectifying the likely impact due to the construction of PMGSY Road.
- 11.2.5 Complete filling of water body with soil is not contemplated in the project. The rehabilitation of water body should be with the objective of restoring it to its original state or to a better state with necessary enhancement of its environs.
- 11.2.6 Besides the following, the rehabilitation plan should include activities which are required as per statutory provisions applicable in the state:
- Reconstruction and stabilization of embankment in case it is impacted
 - If storage area is lost, then the water body is to be deepened / widened to regain an equivalent volume. Deepening of the pond is to be done when the pond is dry.
 -
 - Locations of erosion protection works and silt fencing (as per **ECoP-9.0**, "Slope Stability & Erosion Control", Box 9-3) to prevent sediment laden runoff caused by construction activities, entering the water body
 - Location of side drains (temporary or otherwise) to collect runoff from the embankment before entering the water body in accordance with IRC:SP-20:2002
 - Work program in relation to the anticipated season of flooding/overflowing of the water body
 - Obstructions likely to cause temporary flooding and information to seek clearance to remove the obstruction
 - Drawings indicating the landscape details along with species of trees / bushes to be planted in the surrounding environs of the water body
 - Costs of rehabilitation.
- 11.2.7 Concurrence of the community has to be sought on the Rehabilitation Plan and community concerns, if any have to be incorporated into the plan by the PIU.
- 11.2.8 Cost estimates to mitigate impacts on water bodies through the rehabilitation plan or otherwise shall be incorporated into the DPR.

Steps for addressal of impacts on water bodies in DPR
<p>Step 1: Capture following details during Transect Walk:</p> <ul style="list-style-type: none"> (i) Location of pond in relation to existing alignment. (ii) Approximate size and depth of the water body in meters 'm'. (iii) Designated use of the water body – Household Use/Drinking/Irrigation. (iv) Visual inspection of the quality of water. <p>Step 2: Consult people regarding alternate routes that were devised to avoid the pond. If alternate routes are not available, consent of the villagers is to be sought for affecting the pond and also the measures that would be taken to mitigate the impacts.</p> <p>Step 3: If impacting the pond, the extent of impact is to be clearly indicated on a separate drawing showing blown up portion of the pond.</p> <p>Step 4: Prepare rehabilitation plan if water body is getting adversely impacted.</p> <p>Step 5: Precautionary measures while working close to the water body are to be incorporated into the DPR</p>

11.3 Pre-construction stage

11.3.1 The Rehabilitation Plan should be implemented by the Contractor immediately after completion of construction at the stretch near the water body

Working near Water Bodies – Precautions
<ul style="list-style-type: none">• Avoid locating roads on pond embankment• Collect road runoff before entering the water bodies• Runoff to be filtered of sediments before letting into water bodies• Avoid debris disposal into water bodies• Avoid disposal of oil/grease/other contaminants into water bodies

11.3.2 When there is interruption to regular activities of villagers near water body due to construction or rehabilitation work, following are the Contractor's responsibilities:

- Restriction on use of water during construction, if any, should be intimated to the community in advance
- Alternate access to the water body is to be provided in case there is interruption to use of existing access. The access provided should be convenient for use of all the existing users whether community or cattle
- If the water body affected is a drinking water source for a habitation, alternate sources of water are to be provided to the users during the period for which its use is affected

11.4 Construction Stage

11.4.1 It should be ensured by the contractor that the runoff from construction site entering the water body is generally free from sediments

11.4.2 Silt fencing and/or brush barrier (as per details presented in **ECOP-9.0**, "Slope Stability & Erosion Control) as planned shall be installed in the drainage channels for collecting the sediments before letting them into the water body.

11.4.3 Silt/sediment should be collected and stockpiled for possible reuse as surfacing of slopes where they have to be revegetated

11.4.4 Cutting of embankment reduces the water retention capacity and also weakens it, hence:

- The contractor should ensure that the decrease in water retention should not lead to flooding of the construction site and surroundings causing submergence and interruption to construction activities.
- Any perceived risks of embankment failure and consequent loss/damage to the property shall be assessed and the contractor should undertake necessary precautions as provision of toe protection, erosion protection, sealing of cracks in embankments. Failure to do so and consequences arising out of embankment failure shall be the responsibility of the contractor. The PIU shall monitor regularly whether safe construction practices near water bodies are being followed.

11.4.5 Alternate drain inlets and outlets shall be provided in the event of closure of existing drainage channels of the water body

11.4.6 Movement of machinery and workforce shall be restricted around the water body, and no waste from construction camps or sites shall be disposed into it.

11.5 Post construction stage

11.5.1 With the completion of construction, the PIU has to ensure implementation of rehabilitation plan for the water body, as planned.

11.5.2 The precincts of the water body have to be left clean and tidy with the completion of construction.

11.5.3 Drainage channels of adequate capacity shall be provided for the water body impacted.

ECoP-12.0 Drainage

12.1 General

- 12.1.1 Drainage is designed for and installed on roads to direct surface or subsurface flow away from structural elements of a roadway and then to convey it to a safe outfall without damage to the road structure, adjoining property or agricultural fields.
- 12.1.2 A road with good drainage is a good road. Inadequate and faulty drainage arrangements result in obstruction to natural drainage pattern. The problem is further aggravated in the low-lying areas and flood plains receiving high intensity rainfall, which can lead to the instability of embankment, damage to pavement, sinking of foundation, soil erosion, safety hazards and disruption in traffic. Provision of cross-drainage and longitudinal drainage increases the life of the road and consequently reduces water logging and related environmental impacts. The functioning of the drainage system is therefore a vital condition for a satisfactory road.
- 12.1.3 However, construction or up-gradation of CD structures and longitudinal side drains is likely to increase sediments, scour the banks, change water level and flow, and affect the ecology of the surrounding area.
- 12.1.4 The present code shall address the environmental concerns related to drainage aspects during different stages of the project execution. Engineering aspects brought out in this chapter are for sake of clarity. The design shall however be covered by relevant IRC codes / guidelines. Sub activities requiring incorporation during various stages of project implementation and their significance levels for drainage aspects are presented below in **Table 12-1**.

Table 12-1 Significance of Impacts across Project Regions

Stage	Key Activity	Uttarakhand		J & K		Bihar		Arunachal Pradesh/ Mizoram	
		Hilly Areas	Other areas	Low hills	High hills	Flood plains	Other areas	Hills	Plateau
Project planning & design	Hydrological Investigation								
	Geometric Design								
Pre-construction	Consultations with downstream and upstream users								
Construction	Sediment control measures								
Post-construction	Inspection and maintenance								
	Impacts not likely to be significant								
	Impacts likely to be significant								

12.2 Project Planning and Design: It is mandatory to prepare a drainage plan especially when finalization of roads in hilly regions. The drainage plan shall clearly identify longitudinal drains, outfalls, existing and proposed drainage arrangements

12.2.1 Drainage shall be broadly taken up as (i) Cross-Drainage and (ii) Longitudinal Drainage both surface & sub-surface drainage. The alignment shall be routed such that minimum drainage crossings are encountered. Also the geometric design criteria as per IRC:SP-20:2002, for effective surface drainage should be ensured.

12.2.2 All drains crossing the alignment shall be identified on site and marked on map while undertaking transect walk. Basic information on the width of channel, frequency of traffic

holdup and flow would provide inputs into screening of alternate alignments as well as fixing the alignment. Consultations with the community shall provide information on the HFL in the area.

12.2.3 In areas of high and medium intensity rainfall (>400 mm/year), flood prone areas and hilly areas design of CD structures shall be prepared to avoid scouring on the downstream side and afflux on the upstream side. In areas where the Technical Audit identifies likely incidences of flooding/scouring, additional hydrological studies will need to be conducted and designs updated accordingly. For bridges and other drainage structures the studies shall be conducted as per IRC: SP-13: 1973 “Guidelines for the Design of Small Bridges & Culverts” and IRC: SP-33:1989 “Guidelines on Supplemental Measures for Design, Detailing & Durability of Important Bridge Structures”.

12.2.4 Design of cross-drainage structures shall be based on the inputs from the hydrological studies as per clause 12.2.3 and in other areas, the C-D structure design shall be as per IRC:SP-20:2002.

12.2.5 Design of C-D structure shall be such that:

- Normal alignment of the road is followed even if it results in a skew construction of culverts and stream bank protection are incorporated
- Afflux generated is limited to 45 cm in plains with flat land slopes as it may cause flooding of upstream areas
- The fish friendly – fish passage is not interrupted either in upstream or downstream direction
- Adequate openings are provided along with adequate scour protection measures for stream bank, roadway fill as head walls, wing walls and aprons as per provisions of IRC guidelines.
- Reinforced road bed (of concrete or rock) for protection against overflow in case of low water crossing (fords/causeways) is included
- The design of C-D structure should have steps leading to the bed of the drainage channel, for regular inspection of the sub-structure.

12.2.6 Schedule of construction of C-D structures should preferably be carried out during dry months to avoid contamination of streams

12.2.7 Longitudinal drains are to be designed to drain runoff from highest anticipated rainfall as per hydrological analysis in high rainfall areas (annual rainfall > 1000 mm) and hill areas (refer Appendix “Heaviest Rainfall in One Hour (mm) IRC:SP-13: 1998, “Guidelines for the Design of Small Bridges and Culverts” for rainfall data). For design of longitudinal drains in other areas, the design shall be as per IRC: SP-20: 2002.

12.2.8 Outfall of the roadside drains shall be into the nearby stream or culvert or existing depressions in the ground. The outfall should be at such a level that there would be no backflow into the roadside drain. Wherein pond/low lying areas exist in the vicinity, the flow may be diverted into them for possible ground water recharge.

12.2.8.1 In case of Hilly areas, if no natural drainage system is found appropriate for roadside drain outfall, water-harvesting structures shall be considered to collect the runoff. The location shall be determined based on the size of the structure (which in turn depends on the discharge anticipated) imperviousness of the strata and willingness of the landowner who would be utilizing the collected water. These shall be determined by the PIU in consultation with the landowner during project preparation stage.

12.2.9 The roadside drains in high rainfall areas (annual rainfall > 1000mm) and in hill areas, shall be lined to protect from runoff of high velocities. Suitable cross-drainage culverts or scuppers, at least three per kilometer, shall be provided to direct the discharge to the valley side. The outfall of these culverts shall be suitably canalized so that the discharge does not cause erosion or damage to the agricultural fields or orchards on the valley side

12.2.10 In case of high embankment or bridge approaches, lined channels shall be provided to drain the surface runoff, prevent erosion from the slopes and avoid damage to shoulders and berms. Detailed specifications shall be in accordance with IRC SP 42:1992, Guidelines on Road Drainage and IRC: SP-20: 2002, Rural Road Manual.

12.3 Pre-Construction Stage

12.3.1 Following measures are to be undertaken by the contractor prior to the commencement of CD/Bridge construction in case it effects the surface or sub surface flow through the stream / nallah:

- The downstream as well as upstream user shall be informed one month in advance
- The contractor shall schedule the activities based on the nature of flow in the stream.
- The contractor should inform the concerned departments about the scheduling of work. This shall form part of the overall scheduling of the civil works to be approved by PIU.
- Erosion and sediment control devices if site conditions so warrant, are to be installed prior to the start of the civil works.
- Interceptor drains to be dug prior to slope cutting to avoid high runoff from slopes entering construction sites in case of hill roads
- Runoff from temporary drains and interceptor drains to be directed into natural drainage system in hill roads
- In case of up-gradation of the existing CD Structures, temporary route / traffic control shall be made for the safe passage of the traffic, depending upon the nature of the stream and volume of traffic.
- All the safety/warning signs are to be installed by the contractor before start of construction

12.3.2 In case of utilization of water from the stream, for the construction of the CD structures, the contractor has to take the consent from the concerned department (refer **ECoP-8.0**, “Water for Construction”)

12.4 Construction Phase

12.4.1 Drainage structures at construction site shall be provided at the earliest to ensure proper compaction at the bridge approach and at the junction of bridge span and bridge approach.

12.4.2 In hill areas sub-surface drains, if required, shall be provided immediately after cutting the slopes and forming the roadbed (sub grade).

12.4.3 Velocity of runoff to be controlled to avoid formation of rills/gullies as per **ECoP-9.0**, “Slope stability & erosion control”

12.4.4 While working on drainage channels, sediment control measures if required shall be provided. In such case Silt fencing / brush barrier (as per the detailed specifications given in Box 9-3 and 9-5 respectively of **ECoP-9.0**, “Slope Stability & Erosion Control”) shall be provided across the stream that carries sediment.

12.4.5 The sediments collected behind the bunds shall be removed and after drying, can either be reused or disposed off as per **ECoP-10.0**, “Waste Management”

12.4.6 Safety devices and flood warning signs to be erected while working over streams and canals

12.5 Post Construction

12.5.1 Inspection and cleaning of drain shall be done regularly to remove any debris or vegetative growth that may interrupt the flow.

12.5.2 HFL should be marked as per hydrological data on all drainage structures

12.5.3 Temporary structures constructed during construction shall be removed before handing over to ensure free flow through the channels.

12.5.4 The piers and abutments should be examined for excessive scour and make good the same if required.

12.5.5 In case of Causeway, following aspects shall be taken into consideration:

- Dislocation of stones in stone set pavements, scouring of filler material due to eddy currents.
- Floating debris block the vents. In case of large amount of floating material, debris arrestor shall be provided in upstream side.
- Damage to guide stones, information boards shall be inspected and replaced accordingly.

12.5.6 Schedule of Inspection shall be drawn up for checking cracks, settlements and unusual backpressures. It must be ensured that all the rectification shall be undertaken as and when required. Following are broadly the items to be checked:

- Settlement of piers/abutments & settlement of approach slabs have to be checked
- Cracks in C-D structures or RCC slabs
- Drainage from shoulders to be ensured
- Ditches & drains to be kept clean of debris or vegetation growth
- Repairs to parapet of culverts whenever required are to be undertaken

ECoP-13.0 Construction Plants & Equipment management

13.1 General

13.1.1 During execution of the project, construction equipments, machinery and plants always have impact on the environment. The impact can be due to the gaseous emissions, dust, noise and oil spills that concern the safety and health of the workers, surrounding settlements and environment as a whole. This code of practice describes the activities during the project stages where pollution control measures are required. **Table 13-1** highlights the key activities that need to be addressed during the project and the significance of impacts in the project region.

Table 13-1: Significance of Impacts Across Project Regions

Stages	Key Activities	Significance of Impacts							
		Uttarakhand		J & K		Bihar		Arunachal Pradesh/ Mizoram	
		Hilly areas	Other areas	Low hills	High hills	Flood plains	Other areas	Hills	Plateau
Project Planning & Design Stage	Equipment Selection								
Pre-construction Stage	Awareness of Safety Among Workers								
Construction Stage	Safety devices & Cautionary Signs								
	Waste Disposal								
Post-construction Stage	Restoration of Plant Site / Haul Roads								
	Impacts not likely to be significant								
	Impacts likely to be significant								

13.2 Project Planning and Design Stage

- 13.2.1 Selection criteria for setting up a plant area and parking lot for equipments and vehicles shall be done as per siting criteria for construction camp specified in **ECoP-3.0**, “Construction Camps”
- 13.2.2 Section 4, Part –I General Condition of Contract specified in Standard Bidding Document for Pradhan Mantri Gram Sadak Yojana (PMGSY) shall be adhered to during the preparation of bidding document.

13.3 Pre-construction Stage

- 13.3.1 The Contractor must educate the workers to undertake safety precaution while working at the plant / site as well as around heavy equipments as per Clause 14.3.2, Section 14.3, **ECoP-14.0**, “Public and Worker’s Health & Safety”.
- 13.3.2 Before setting up the crusher and hot-mix plant the contractor shall acquire “Consents” from the State Pollution Control Board as per Air (Prevention and Control of Pollution) Act, 1981, Chapter IV, Section 21.
- 13.3.3 The Contractor must ensure that all machinery, equipments, and vehicles shall comply with the existing Central Pollution Control Board (CPCB) noise and emission norms as applicable.

13.3.4 The PIU must ensure that the Contractor shall submit a copy of the approvals and PUC Certificates as applicable before the start of relevant work.

13.4 Construction Stage

13.4.1 The Contractor shall undertake measures as per **Table 13-2** to minimize -the dust generation, emissions, noise, oil spills, residual waste and accidents at the plant site as well as during transportation of material to construction site.

Table 13-2: Measures at Plant Site

Concern	Causes	Measures
Dust Generation	Vehicle Movement	<ul style="list-style-type: none"> Water sprinkling Fine Materials shall be Transported in Bags or Covered by Tarpaulin during Transportation Tail board shall be properly closed and sealed
	Crushers	<ul style="list-style-type: none"> Water Sprinkling
	Concrete-Mix Plant	<ul style="list-style-type: none"> Educate the workers for following good practices while material handling
Emissions	Hot-Mix Plant	<ul style="list-style-type: none"> Site Selection as per Clause 6.5.2, Section 6.5, IRC's Manual for Construction & Supervision of Bitumen Work Regular maintenance of Dust Collector as per manufacture's recommendations
	Vehicles	<ul style="list-style-type: none"> Regular maintenance as per manufacture's recommendation
	Generators	<ul style="list-style-type: none"> Exhaust vent of long length
Noise	Heavy Load Vehicles	<ul style="list-style-type: none"> Exhaust silencer, Regular maintenance as per manufacture schedule
	Crushers	<ul style="list-style-type: none"> Siting as per ECoP-3.0, "Construction Camps"
	Generators	<ul style="list-style-type: none"> Shall be kept in a room that is acoustically enclosed.⁴ There shall be regular maintenance as per manufacture's recommendation.
Oil Spills	Storage and Handling	<ul style="list-style-type: none"> Good practice, ECoP-10.0, "Waste Management"
Residual waste	Dust Collector and Pits	<ul style="list-style-type: none"> ECoP-10.0, "Waste Management"
Concrete waste	Concrete-Mix plant	<ul style="list-style-type: none"> ECoP-10.0, "Waste Management"
Bitumen and bitumen mix	Hot-mix Plant	<ul style="list-style-type: none"> ECoP-10.0, "Waste Management"
Stone chips	Crushers	<ul style="list-style-type: none"> ECoP-10.0, "Waste Management"
Safety	Trajectory of Equipments	<ul style="list-style-type: none"> Caution Sign, awareness among workers
	Movable Parts of Equipments	<ul style="list-style-type: none"> Caution Sign, awareness among workers
	Plant Area / Site	<ul style="list-style-type: none"> Caution Sign, Safety Equipments
	Accidents / Health	<ul style="list-style-type: none"> First Aid Box, Periodic Medical Check up
	Break down of vehicles	<ul style="list-style-type: none"> Arrangement for towing and bringing it to the workshop

13.4.2 During site clearance, all cut and grubbed materials shall be kept at a secured location so that it does not raise any safety concerns.

13.4.3 During excavation, water sprinkling shall be done to minimize dust generation.

13.4.4 Frequent water sprinkling shall be done on the haul roads to minimize dust generation. Incase of loose soils, compaction shall be done prior to water sprinkling.

⁴ As per Environmental (Protection) Rules, 1986, Rule 3, Schedule – I, Item 83 B.

13.4.5 Cautionary and informatory sign shall be provided at all locations specifying the type of operation in progress.

13.4.6 The contractor must ensure that there is minimum generation of dust and waste while unloading the materials from trucks.

13.4.7 The construction waste generated shall be disposed as per **ECoP-10.0**, “Waste Management”.

13.4.8 The equipments, which are required to move forward and backward, shall be equipped with alarm for backward movement. It shall be ensure that the workers shall remain away from the working areas at such times.

13.4.9 The PIU shall carry out periodic inspections to ensure that all the pollution control systems are appropriately installed and comply with existing emission and noise norms.

13.5 Post-construction stage:

13.5.1 The PIU shall ensure that all the haul roads are restored to their original state.

13.5.2 In case any inner village road is damaged while transporting the procured material; the contractor shall restore the road to its original condition.

13.5.3 The PIU must ensure that the decommissioning of plant shall be done in environmentally sound fashion and the area to brought to its original state.

Safety Measures During Bitumen Construction Work...

- The Contractor shall ensure that bitumen storing, handling as well as mixing shall be done at hot-mix plant or designated areas⁵ to prevent contamination of soil and ground water.
- Skilled labour shall be used while hand placing the pre-mixed bitumen material. The hand placing of pre-mixed bituminous material shall be done only in following circumstances:
 - For laying profile corrective courses of irregular shape and varying thickness
 - In confined spaces where it is impracticable for a paver to operate and
 - For filling potholes
- The Contractor shall provide safety equipments i.e. gumboots and gloves to the workers while handling bitumen.
- While applying Tack Coat, spraying of bitumen shall be done in the wind direction. The labour shall wear jacket while spraying the bitumen.
- All the bituminous work shall be done as per IRC's Manual for Construction and Supervision of Bituminous Works.

⁵ Designated area refers to paved surfaces and barren parcels of land, with adequate drainage and disposal system. It must be ensure that these are away from agriculture land, water body and other sensitive areas.

ECoP-14.0 Public and Worker’s Health and Safety

14.1 General

14.1.1 The safety and health concerns of the workers and the public are impacted due to the hazards created during the construction of road.

14.1.2 This code of practice describes the measures that need to be taken to mitigate the impacts. **Table 14-1** highlights the key activities that need to be addressed during the different project stages and the significance of impacts in the project regions.

Safety Concerns on...
<p>General Public due to:</p> <ul style="list-style-type: none"> • Improper scheduling of construction activities especially near the settlements and sensitive areas • Parking of equipments and vehicles at the end of the day is likely to cause accidents to the public especially during night hours. • Transportation of uncovered loose material or spillage of material increases the chances of accidents to road users and surrounding settlements. <p>Workers due to:</p> <ul style="list-style-type: none"> • Improper handling of materials like bitumen, oil and other flammable material at construction sites, likely to cause safety concerns to the workers. • Lack of safety measures such as alarm, awareness and safety equipment result in accidents, especially working with or around heavy machinery / equipments.

Table 14-1 Significance of Impacts Across

Project Regions

Stages	Key Activities	Significance of Impacts							
		Uttarakhand		J & K		Bihar		Arunachal Pradesh/ Mizoram	
		Hilly areas	Other areas	Low hills	High hills	Flood plains	Other areas	Hills	Plateau
Project Planning & Design Stage	Safety considerations during design								
Pre-construction Stage	Safety & traffic control measures in construction schedule								
Construction Stage	Safety at site								
	Public safety								
Post-Construction Stage	Provision of signages								
	Impacts likely to be significant								
	Impacts not likely to be significant								

14.2 Project Planning and Design Stage

14.2.1 To address health and safety concerns of public, during setting up the following, relevant ECoPs as mentioned shall be complied with:

- Construction Camps (as per **ECoP-3.0**, “Construction Camps”)
- Borrow Areas (as per **ECoP-5.0**, “Borrow Area”) and
- New quarry areas (as per **ECoP-7.0**, “Quarry Areas”)

14.2.2 To address the safety concerns to road user during operational phase, the

Health Concerns are adversely impacted.....
<p>Public due to:</p> <ul style="list-style-type: none"> • Unhygienic conditions due to water logging, either by improper decommissioning of Construction Camps and parking lots, or improper disposal of construction wastes, leading to the breeding of vectors that are likely to impact the health of the general public • Interaction between workers and host community is likely to increase the risk of spread of communicable diseases. <p>Workers due to:</p> <ul style="list-style-type: none"> • Low quality drinking water as well as inappropriate storage of drinking water likely to cause water borne diseases among workers. • Absence of proper sanitary facility likely to act as a breeding ground for vectors raising health concerns among workers.

DPR shall contain the following:

- Selection and location of regulatory as well as informatory signs as per IRC: 67-2001, depending upon the geometry of the road.
- Incase of hill roads, provision of passing places and parapet wall shall be included in road design

14.3 Pre-construction stage

14.3.1 In order to incorporate public health and safety concerns, the PIU and the Contractor shall disseminate the following information to the community:

- Location of construction camps, borrow areas and new quarry areas.
- Extent of work
- Time of construction
- Diversions, if any
- Precaution measures in sensitive areas
- Involvement of local labours in the road construction
- Health issues - water stagnation, exposure to dust, communicable disease
- Mechanism for grievances

14.3.2 The Contractor must educate the workers to undertake the health and safety precautions. The contractor shall educate the workers regarding:

- Personal safety measures and location of safety devices.
- Interaction with the host community
- Protection of environment with respect to:
 - Trampling of vegetation and cutting of trees for cooking
 - Restriction of activities in forest areas and also on hunting
 - Water bodies protection
 - Storage and handling of materials
 - Disposal of construction waste

14.4 Construction Stage

14.4.1 During the progress of work, following are the safety requirements that need to be undertaken by the contractor at the construction site:

- Personal safety equipments (such as footwear and gloves) for the workers
- All measures as per bidding document shall be strictly followed
- Additional provisions need to be undertaken for safety at site:
 - Adequate lighting arrangement
 - Adequate drainage system to avoid any stagnation of water
 - Lined surface with slope 1:40 (V:H) and provision of lined pit at the bottom, at the storage and handling area of bitumen and oil, as well as at the location of generator (grease trap).
 - Facilities for administering first aid

14.4.2 The following measures need to be adopted by the contractor to address public safety concerns:

- The Contractor shall schedule the construction activities taking into consideration factors such as:

FIRST AID FACILITIES
<ul style="list-style-type: none"> • First Aid Kit, distinctly marked with Red Cross on white back ground and shall contain minimum of following: <ul style="list-style-type: none"> ○ 6 small-sterilized dressings ○ 3 medium and large sterilized dressings ○ 1 (30 ml.) bottles containing 2 % alcoholic solution of iodine ○ 1(30 ml) bottle containing salvolatile ○ 1 snakebite lancet ○ 1 pair sterilized scissors ○ 1 copy of first-aid leaflet issued by the Director General, Factory Service & Labour Institute, Government of India ○ 100 tablets of aspirin ○ Ointment for burns ○ A suitable surgical antiseptic solution • Adequate arrangement shall be made for immediate recoupment of the equipments, whenever necessary. • A trained personnel incharge of first aid treatment to be readily available during working hours at construction site • Suitable transport to the nearest approachable hospital should be made available.

- Sowing of crops
- Harvesting
- Local hindrances such as festivals etc.
- Availability of labour during particular periods
- All the cautionary signs as per IRC: 67-2001 and traffic control devices (such as barricades, etc) shall be placed as soon as construction activity get started and shall remain in place till the activities get completed.
- Following case specific measures need to be followed during the progress of the activity:
 - In case of blasting, the Contractor must follow The Explosives Rules, 1983.
 - In case of construction activity adjoining the water bodies, measures shall be taken as per **ECoP-11.0**, “Water Body”
 - If construction of road is within the settlement, the contractor must ensure there shall not be any unauthorized parking as well as storage of material, adjacent to road.
 - Approved chemicals should be sprayed to prevent breeding of mosquitoes and other disease-causing organisms, at all the water logging areas

14.4.3 The PIU shall carry out periodic inspections in order to ensure that all the measures are being undertaken as per the ECoP.

14.4.3 Detailed guidelines to be followed while working on hill slopes are presented as **Annexure 14-1. Annexure 2.2** indicates guidelines for observing Safety during Blasting Operations.

14.5 Post-construction Stage

14.5.1 During this stage, a major concern is on road user safety. Following are the measures that need to be undertaken by the PIU to ensure safer roads:

- Inspection and maintenance of installed regulatory and informatory signs.
- Ensure that the location of signage does not obstruct the visibility
- In case of hill roads, maintenance of parapet wall as well as of overtaking zones.

14.5.2 The PIU must ensure that during the maintenance operation of road, road materials are stored at a location such that they shall not create any risk to road users.

14.5.3 The construction site shall be cleaned of all debris, scrap materials and machinery on completion of construction for the safety of public and road users, as per the **ECoP-3.0**, “Construction Camp” and **ECoP-10.0**, “Waste Management.”

ECoP-15.0 Cultural Properties

15.1 General

15.1.1 The cultural properties located close to the road are likely to be impacted by the road construction. Most of the properties are avoided in general during finalization of alignment.

Table 15-1 below highlights the key activities that need to be addressed during different stages of the project and also the significance of the impacts in the project regions

Table 15-1: Significance of Impacts Across Project Region

Stages	Key Activities	Significance of Impacts							
		Uttarakhand		J & K		Bihar Pradesh		Arunachal Pradesh/ Mizoram	
		Hilly Areas	Other areas	Low hills	High hills	Flood plains	Other areas	Hills	Plateau
Project Planning & Design	Identification of Cultural Properties								
	Avoidance/mitigation measures								
Construction	Precautionary measures								
Post-Construction	Restoration of impacted cultural properties								
	Impacts not likely to be significant								

15.2 Project Planning and Design Stage

15.2.1 Measures for mitigation of impacts on cultural properties during project preparation shall be as per the following steps:

- Identification of locally significant cultural properties should be done
- Assessment of likely impacts on each cultural property due to project implementation
- The extent of impact on the identified culture property should be assessed and possible measures for avoidance should be devised based on the site investigation.

15.2.2 In case impact is not avoidable, identification of alternative routes or possibility of relocation of the culture property shall be assessed in consultation with the local public, based on the economic feasibility.

15.2.3 In case of relocation, relocated site should be suggested by the local people and the size of relocated structure should at least be equal to the original structure.

15.2.4 A detailed design of the relocated structure and its site plan along with the necessary BoQ are to be presented DPR. A sample of the drawing for relocation of cultural property and sample BoQ is presented in **Annexure 15-1**.

Information to be collected...

- Location
- Direction (North/ South/East/West) With Respect to Road
- Distance of the structure from existing centerline of the road
- Type of Property eg: temple/mosque/shrine/dargah etc
- Plan of the structure
- Importance of the structure – historical/social/archeological
- Ownership of the property
- Probable loss to the property
- Specific periods/durations in which large congregations as festivals/mela take place causing hindrance to vehicular movement
- Choice of community, issue of relocation

15.2.5 The relocation and other avoidance measures should be carried out before the start of the road work

15.2.6 It must be ensured by the PIU that the BoQ and rates are incorporated into the contract document.

15.3 Construction Stage

15.3.1 Major impacts on the properties during this stage are mainly due to movement of construction machinery as well as due to construction activity near the cultural property. Following are precautionary measures that need to be undertaken by the contractor while working near these structures:

- Provision of temporary barricades to isolate the precincts of the cultural property from the construction site shall be devised by the Engineer to avoid impacts.
- Restrict movement of heavy machinery near the structure
- =Avoid disposal or tipping of earth near the structure
- Access to these properties shall be kept clear from dirt and grit

15.3.2 During earth excavation, if any property is unearthed and seems to be culturally significant or likely to have archeological significance, the same shall be intimated to the Engineer. Work shall be suspended until further orders from PIU. The State Archeological Department shall be intimated of the chance find and the Engineer shall carry out a joint inspection with the department. Actions as appropriate shall be intimated to the Contractor along with the probable date for resuming the work.

15.3.3 The PIU must ensure that the contractor implements the precautionary measures as suggested.

15.4 Post Construction Stage

15.4.1 Immediately after completion of construction, the Contractor will affect clearance of the precincts of cultural properties.

15.4.2 In case access to any of the cultural properties is severed during construction; it needs to be restored at the Contractor's cost.

15.4.3 The PIU shall certify restoration of all road links as well as relocated properties before final payment is made.

ECoP-16.0 Tree Plantation

16.1 General

16.1.1 Section 21.4 of PMGSY guidelines specifies that the state governments would take up the planting of fruit bearing and other suitable trees, on both sides of the roads from their own funds. Besides improving aesthetics and ecology of the area, the trees provide fuel wood, act as noise barriers, provide visual screen for sensitive areas and also generate revenue by sale of its produce. However, certain precautions must be taken in design of avenue or cluster plantation so that the trees do not have an adverse impact on road maintenance and/or safety of the road users. This code of practice elaborates on the approach towards planting trees on PMGSY roads. Emphasis has been laid on a greater involvement of communities and Gram Panchayats in planting and maintenance of roadside trees. The activities requiring addressal during the project stages and the significance of impacts in the project region are presented in **Table 16-1**.

Table 16-1: Significance of Impacts across Project Region

Stages	Key Activities	Significance of Impacts							
		Uttarakhand		J & K		Bihar		Arunachal Pradesh/ Mizoram	
		Hilly areas	Other Areas	Low Hills	High Hills	Flood Plains	Other Areas	Hills	Plateau
Project Planning & Design Stage	Minimising tree felling								
	Plantation Strategies								
	Consultation with PRIs								
Post-construction Stage	Maintenance of trees								
	Impacts not likely to be significant								
	Impacts likely to be significant								

16.2 Project Planning and Design Stage

16.2.1 During alignment finalisation, due consideration shall be given to minimise the loss of existing tree cover, encroachment of forest areas / protected areas etc as specified in **ECoP-1.0**, “Project Preparation”. Tree felling, if unavoidable, shall be done only after compensatory plantation of at least three saplings for every tree cut is done. This shall be carried out by the PIU immaterial of the legal requirements of the state.

Plant trees along roads where there is...
<ul style="list-style-type: none"> • Availability of land for planting • Availability of water • Willingness of PRI to nurture the saplings

16.2.2 A roadside plantation plan may be prepared by the PIU as part of the DPR, and finalised in consultation with the State Forest Department and PRI. The plantations shall be in accordance with the IRC:SP:21-1979 Manual on Landscaping and IRC:66-1976. The plan may be in the form of avenue trees or cluster plantation. It should be ensured that plantation is carried out only in areas where water can be made available during dry seasons and the plant can be protected during the initial stages of their growth. The species shall be identified in consultation with officials of forest department, giving due importance to local flora, It is recommended to plant mixed species in case of both avenue or cluster plantation. The saplings for plantation shall be supplied by the Forest Department at a nominal cost or the community can develop its own nursery.

16.2.3 Consultations shall include the role of the PRIs in maintaining and managing the trees to be planted in the project. A MoU shall be signed between the Gram Panchayat, PIU and Forest

Department towards maintenance of the trees, and empowering the PRIs to be entitled to any revenue generated out of these trees. Format for the MoU is attached as **Annexure 16-1**. Alternately the need for close cooperation shall be covered by a government order. It shall be the responsibility of the Gram Panchayats through the Development Committees to work out institutional mechanisms for managing the plantation and upkeep of trees.

16.2.4 The plantation strategy shall suggest the planting of fruit bearing trees and other suitable trees. Development of cluster plantations will be encouraged in the Gram Sabha lands, at locations desired by the community. The choice of species will be based on the preferences of the community.

Do not plant trees ...

- Within the line of sight around junctions
- On the inside of curves
- Within 5 m of the proposed centre line

16.2.5 In arid areas, shelter belt plantation shall be propose as wind breaks, through plantation of local hardy shrubs and grass species in preference to plantation of trees. The location of these belts plantation shall be decided by the PIU in consultation with the PRI and State Forest Departments after considering the wind direction, velocity and likely movement of sand dunes.

16.2.6 The nurseries shall be developed as per landscape plan and subsequent upkeep. The maintenance of trees shall be the responsibility of PRI or the authority designated by them. The expenditure can be met either from their own resources or wage component from any employment generating programme such as **National Rural Employment Guarantee Act (NREGA) and Sampoarana Grameen Rozgar Yogna.**

16.3 Post-construction stage

16.3.1 Planting of saplings from the nurseries as per the plantation plan and the subsequent maintenance of the trees planted may be carried out by the PRI, with its own funds. Planting shall be undertaken immediately after rainy season or initial weeks of spring. The activities to be taken up by the PRI as part of maintenance shall include (i) cutting/lopping branches up to a height of 2.5m above ground level to ensure visibility (ii) Removal of dead wood from the roadway and storing away from roads, and (iii) Weed cutting from shoulders and keeping the shoulders free from any growth of vegetation. In addition, the PRI is to ensure a healthy survival rate by planting replacement saplings in cases where the survival rate is less than 80%.

16.3.2 Watering of trees during the initial period of two to three years shall be the responsibility of the PRI or the agency designated by it. Final payment, if any, shall be on the basis of the number of trees surviving at the end of three years of initial plantation. The shoulders of the road shall be kept clear of weeds or any undesirable undergrowth, which may hinder free flow of traffic.

16.3.3 It needs to be ensured that the branches of the trees do not obstruct clear view of the informatory and caution signs

16.3.4 Deciduous trees shed leaves every season. It is necessary to keep the roadway clear of such debris.

16.3.5 Some gaps should be left even in avenue plantation to ensure that the carriageway dries up early after an occasional shower.

Note: The species of trees to be planted has not been suggested, as this should be decided in consultation with the State Forest Department for the particular region.

ECoP-17.0 Managing Induced Development

17.1 General

17.1.1 Rural lands have a distinct character consisting of productive farmlands with natural areas and limited residential settlement. Developments allowed to grow along the village roads, unless planned and regulated, have the potential to generate traffic and pedestrian movements that can lead to unsafe traffic conditions. Lack of planning controls in the rural areas has allowed roadside development, ranging from individual commercial establishments to continuous stretches of ribbon developments. This code of practice provides measures for regulating the land uses along the roads and tackling induced developments likely along the PMGSY roads. The measures suggest a greater involvement of the Village Panchayats and the Road Authorities for the PMGSY roads. The measures suggested are in accordance with the roles and responsibilities of the PRIs as suggested in the 73rd Amendment Act, 1992 and the respective State Panchayat Acts.

17.2 Project Planning and Design Stage

17.2.1 As part of the design stage, the PIU may identify areas that are susceptible to induced development impacts. These locations will be finalised in consultation with the Gram Sabha. It is suggested that the PIU may take initiative in educating the community on the safety issues due to ribbon development.

Locations vulnerable to induced development...

- Lands within 50m of junctions
- Agricultural lands within 100m of settlements
- Stretches within 100m of temples, weekly fairs and locations of community mass gatherings

17.2.2 The design of access points to the road shall as far as possible conform to certain minimum geometric standards.

17.3 Operation stage

17.3.1 The Gram Panchayat / Road authority/ village council which ever is applicable, shall lay down restrictions on building activities along the rural roads. Towards this, the recommended standards for building lines and control lines may be followed as stipulated in Table 2.4 of IRC: SP: 20-2002.

Possible development activities along PMGSY roads...

- Residential sites
- Repair shops & Petty shops
- Commercial establishments within settlements
- Basic amenities – health, education, water pumps etc
- Village level public buildings
- Selling of produce, informal markets
- Developments around specific areas as water bodies, cultural properties
- Formal markets & agro-processing units

17.3.2 Development of Residential Sites Outside Existing Settlement: Apart from the adoption of the recommended standards for building lines, the Gram Sabha/ village council shall encourage local development through education to the communities to construct property with setback from the road rather than on the road.

17.3.3 Development of Repair Shops, Petty Shops at Junctions: A road junction, especially at locations where the village road meets a district road is a typical site where such repair shops, petty shops tend to come up. The Gram Panchayat/ village council or other regulatory authority shall ensure that no such shops or structures come up within the line of sight. Areas for their

development shall be demarcated and parking facilities shall be provided to encourage them developing away from the road.

17.3.4 While deciding upon the location of community assets, the following preventive measures to address possible induced impacts shall be taken up:

- The area around the bus stops has the potential to induce growth of kiosks and petty shops. While this is unavoidable and desirable (to minimize the impact on the road), such growth needs to be encouraged away from the road.
- Community sources of water such as hand pumps are generally sited on the shoulders. It shall be the responsibility of the Gram Sabha to identify lands outside the RoW and identify any suitable gram Sabha land accessible from the road. This approach would achieve (i) Safety and (ii) Damage to the road due to water logging, usually around such water sources.

17.3.5 The Gram Sabha shall follow the principles given hereunder while planning and developing small markets / fairs, which include the selling of agricultural produce:

- Restricting or planning the activity to one side of the road to minimise pedestrians crossing the road
- Provide parking areas if necessary, and clearly delineating the parking areas from the road
- Providing a good visibility on the approaches to the market area.
- These sites should not be within 150m of the access or egress points of a major junction.
- The commercial areas should be preferably planned lateral to the road than in parallel direction

17.3.5.1 In each state road boundary width and control width will be fixed by the road authority after its declaration as a scheduled road. The information about these parameters should be made available to the community and they be motivated towards avoidance of encroachments on the roads. Encroachments along the road length may become cause of accident by reducing sight distance and affect free flow of traffic.

17.3.6 The Gram Sabha/ Village Council shall take up appropriate measures towards the removal of encroachments onto the public land.

17.3.7 The concerns of the communities, about the traffic speed and/or volume through the villages are usually addressed through traffic calming schemes such as road humps or speed breakers/rumble strips along the road. The PIU, where applicable shall incorporate traffic calming schemes in the design aimed at changing the driver's visual perception of the road environment, as they enter the village, so that they adjust their driving style to better navigate any obstacles encountered. However, such calming devices shall be provided only in the event of provision of adequate signages and pavement marking.

ECoP-18.0 Environmental Monitoring and Audit

18.1 General

18.1.1 Environmental Monitoring provides a systematic review of planning, designing, construction practice and operation activities that may have adverse impact on the surrounding environment. Environmental monitoring enables identification of:

- Degradation/improvement of surrounding ecology
- Damage to surrounding habitation and
- Extent of compliance with ECoPs and other regulatory provisions

18.1.2 Hence PIU should assess whether construction activities comply with environmental standards and other regulatory requirements, by monitoring and conducting an Environmental Audit. These need to be carried out on a periodic basis.

Aspects for Audit...

- Alignment finalization
- Site preparation
- Material management
- Drainage
- Slope protection and erosion control
- Water management and economy of use
- Waste generation, management and disposal
- Tree cutting and compensatory plantation
- Siting construction camps, plants and equipments
- Induced Development

18.2 Monitoring Procedure

18.2.1 Safeguards Specialist⁶ of Technical Examiner shall be responsible for conduct of the periodical environmental monitoring. It will be conducted in phases corresponding to the phases of the project such as (i) DPR Preparation, (ii) Pre-Construction (iii) Construction and (iv) Post Construction. Concurrent audit can be undertaken along with quality assurance checks that need to be conducted by Technical Examiner.

18.2.2 Environmental audit shall be as per the **Checklists-1&2** provided in the ECoP. Audit for project preparation, pre-construction and post-construction stages shall be one time, while for construction stage, quarterly monitoring shall be undertaken. Audit for DPR preparation as per **Checklist –1** will be conducted by the PIU and for the other project stages, audit shall be conducted by the TA consultant. The audit findings shall be reported to the State implementing authorities and MoRD on half yearly basis for construction stage. An annual report of the monitoring shall include findings and suggestions of the Audit.

Benefits of Audit

- Determines the efficiency of practices followed during execution of the work
- Determines the performance of environmental measures suggested
- Assesses the need to undertake additional measures to minimize any adverse environmental impacts identified during the project period
- Audit develops the potential of waste minimization and adoption of recycling and reuse of waste.
- Assist in complying with local, state and national laws and regulation

⁶ Implementation arrangements for the project specify inclusion of safeguards specialist. ESMF presents the implementation aspects along with the specific responsibilities.

Check list-1: Audit Checklist for DPR Preparation

Sl. No.	Items for inclusion in DPR	Response				Attachments
		Yes	No	NA	Indicate number	
I. Transect Walk						
1	Is transect walk conducted for finalizing the alignment?					Map of Transect Walk
II. Initial Consultations						
2	Are consultations conducted with community village council before alignment finalisation					Suggestions received from community
2.1	Suggestions received on the proposed alignment					Write up on suggestions received and response of PIU
2.2	Consent of land owners towards voluntary land uptake.					Attach gift deeds/MoU
3	Are suggestions received from community been incorporated into design					
3.1	Only few suggestions are incorporated					Reasons for not incorporating suggestions from community
3.2	Are reasons for not incorporating suggestions been communicated to the community					
3.3	Has action been taken for making necessary corrections in lad records?					Indicate reference
III. Identification of PAPs						
4	Are type and extent of losses due to project identified					
5	Are PAPs due to the project identified					List of PAPs and loss suffered due to the project
6	Are vulnerable PAPs identified with respect to following:					
6.1	BPL					
6.2	Marginal land owner (less than 3-1/8 acres and losing 10% of residual land)					
6.3	WHH					
6.4	SC/ST					
6.5	Handicapped					
7	Are grievances reported					List of grievances and PAPs
7.1	Type of concerns or grievances					Mechanism for grievance redressal
7.2	Residual grievances if any					Reasons for non addressal
IV. R&R actions						
8	Are provisions for losses been made					Details of Entitled PAPs and provisions
8.1	Are provisions of alternate land site made for the identified entitled/vulnerable PAPs losing land and structure					Details of PAPs and land provided
8.2	Are provisions made for alternate land for ST in scheduled areas under PESA					Details of PAPs and type of provisions as per PESA
8.3	Are provisions made for inclusion of PAPs losing land/shelter/livelihood under any ongoing Rural Development scheme					Details of PAPs and schemes under which they are included
8.4	Are provisions made for illegal occupants					List of encroachers/squatters and provisions
9	Any consultation during implementation work					Type of consultation & issues addressed
9.1	Migrant labourers and construction camps					
9.2	Health issues including HIV/AIDS					
V. Environmental Clearances						
10	Environmental clearances to be obtained, if required					Copy of Clearance obtained
10.1	SPCB					
10.2	Forest Department					
10.3	MoEF if required					Copy of application form submitted if clearance is pending
VI. Surveys Conducted						
11	Are detailed surveys conducted for the project					Information presented in DPR
11.1	Geological Studies					
11.2	Hydrological Studies					
11.3	Topographical Studies					

Sl. No.	Items for inclusion in DPR	Response				Attachments
		Yes	No	NA	Indicate number	
11.4	Was peg marking carried out to delineate the proposed alignment					
VII. Loss of common property resources						
12	Are provisions made to community losing common property or assets, if any					Type of loss and arrangements made
13	Are provisions for relocation of cultural properties been made					
VIII. Material source identification, extraction and rehabilitation						
14	Are provisions made in specifications for identification of borrow areas to reduce cost and use waste materials					
15	Are provisions made for rehabilitation of borrow areas in the DPR/Specifications					
16	Were sources of alternate materials explored or provisions made for utilizing them, incase lead for stone ballast is excessive, to reduce cost and use waste materials.					Properties of alternative materials and extent of utilization
17	Is material from existing quarries in sufficient quantities for the project					
17.1	If answer to No. 17 is no, then are arrangements made for identification, extraction, rehabilitation of new quarries as per ECoP					
18	Is the project area water scarce?					
18.1	If answer to No. 18 is yes, are possibilities of use of existing water sources identified in consultation with the villagers, PRI or Govt. Departments? (Community water sources to be used only with their consent)					List of existing perennial sources prepared
18.2	Are provisions in the specifications made for identification, procurement and rehabilitation arrangements to be carried out by the contractor as per ECoP					
IX. Water Bodies						
19	Does the alignment cut across or passing adjacent to water body?					
19.1	Are consultation conducted with community for seeking consent and measures to be taken to mitigated impacts					
19.2	Are detailed designs prepared indicating pond to be affected					Detailed blown up drawing indicating the pond
19.3	Are provisions made for control of pollution of pond water during construction					
19.4	Are provisions made for rehabilitation of the water body, if affected					
X. Slope Stability, Soil Erosion & Top soil conservation						
20	Is stability analysis carried out for the breast walls/retaining walls					Information to be included in DPR
21	Are slope stabilization bio-engineering measures included in the DPR					Locations of measures where required along with the measures suggested
22	Are erosion control measures included in the DPR					Locations of measures required and measures suggested
23	Are species of vegetation to be grown over the steep slopes determined					List of species along with the growth & root characteristics, water requirements
24	Are provisions made for conservation of topsoil in stockpiles					
24.1	Are stockpile preservation techniques included in the specifications for the activities of the contractor					
24.2	Is reuse of topsoil by been included in the special conditions of contract					
24.3	Has special provisions such as chutes been made to protect high banks					
XI. Drainage						

Sl. No.	Items for inclusion in DPR	Response				Attachments
		Yes	No	NA	Indicate number	
25	Does hydrological studies indicate afflux greater than 450mm due to construction of cross drainage structures					Locations, height of afflux and discharge expected
25.1	Are culverts at such locations designed to handle the afflux and to ensure that upstream areas do not get flooded and excessive scour caused on downstream nor fields affected					Reasons for not providing culverts
25.2	Are outfalls identified for discharge from the openings capable of disposing it					
25.3	In case existing outfalls are not adequate, are alternate locations for discharge identified					Information on alternate discharge outfalls to be presented
26	Are provisions for stone lined side drains in high rainfall areas and hill areas made in the DPR					
27	Are provisions for channel drains in case of high embankments (> 1.5m) been made in the DPR					Locations where specified
28	Are contractor's responsibilities as per ECoP-13 in Pre-construction and construction stages included as part of specifications					
29	Are provisions made in the DPR for erection of safety devises, flood warning signs and warning posts at construction locations over drainage channels					
30	Has provision been made for construction of siphons for irrigation channels and PAPs informed about it					
XII. Forests & Tree Plantation						
31	Are trees being cut by the project, if yes indicate number of trees felled					
31.1	Is clearance from the forest department obtained					
31.2	Is land identified for compensatory plantation					
31.3	Is roadside plantation being taken up? If yes indicate number of trees being planted					
31.4	Are arrangements for supply of saplings from forest department and maintenance by PRL being made?					
32	Is any forest land being diverted for the project					
32.1	If yes to No. 32, is clearance from forest department obtained?					Clearance from Forest Department
32.2	Is land identified for handing over to forest department					Details of land use/area of land identified
32.3	Are provisions made in the specifications to avoid setting up of construction camps/borrow areas and new quarry areas in the forest areas?					
XIII. Natural Habitat						
33	Does any natural habitat as per ECoP 19 exists along the project corridor					
33.1	Is inventORIZATION of ecological features being done during transect walk					
33.2	Are provision for road design made as per ECoP					
33.3	Is Natural habitat Management Plan prepared					Natural Habitat Management Plan
33.3.1	If yes, are all aspect as per ECoP 19, Clause 19.2.7					
XIV. Pollution Prevention measures						
34	Are provisions made for administering pollution control measures at construction sites as per ECoP					
35	Are provisions made for safe disposal of wastes from construction sites					Location of disposal sites and arrangements made for safe disposal
XV. Safety						
36	Are provisions made for worker's health & hygiene at construction camps					Layout of construction camp with arrangements for health & hygiene of workers

Sl. No.	Items for inclusion in DPR	Response				Attachments
		Yes	No	NA	Indicate number	
37	Are provisions made for traffic diversions during construction					Provide in bid document
37.1	Are traffic diversions / closure of traffic been intimated to the public					
38	Are provisions made for signage, demarcating cones and tapes during construction on tracks being utilized by traffic at present					
39	Are provisions made for supply of Personal Protective Equipment to the workers					Reference to the bill of quantities
40	Are provisions made for construction of parapet walls on hill roads for safety of road user					
XVI. Finalisation of Alignment						
41	Are designs conforming to IRC standards, if no then are the following criteria adopted. Indicate RoW					
41.1	Design speed considered is not be less than 40 km/hr in plain areas and 35 km/hr in rolling terrain					
41.2	Roadway width of 6m for link routes & 9m in cutting sections in desert areas					Locations where provided
41.3	Carriageway width of 3.75m to be adopted universally.					
41.4	Embankment Height of 0.3 to 0.4 m in arid & sandy areas. Follows natural topography in desert areas					
41.5	Minimum absolute curve radius of 50m @ 40 km/hr and 38 m @ 35 km/hr					
41.6	Junction design in conformance to IRC: SP-20: 2002					
42	Are enhancements mentioned in ECoP provided in the design - mention details against each given below					
42.1	Cattle crossings at their normal crossing routes for safety of cattle and road user					Design & locations
42.2	Cross roads for access to & from agriculture lands to avoid damage to embankment and roadside drain					Design & locations
42.3	Paved shoulders at destination and villages en-route and provide bus bays					
42.4	Widening of embankment where possible to provide a platform for storing maintenance materials					Locations where provided
XVII. Induced Development						
43	Are provisions made for demarcating lands for use of service shops					Location & area
44	Are provisions made for avoiding encroachments onto the available road width					
45	Are provisions made for control of development along the road near locations vulnerable to induced development					
XVIII. Debris Disposal						
46.1	Has site for disposal of construction debris (if any) been identified					Show location on the plans in DPR
46.2	Has provision been made to ensure that the debris do not spill over in the valleys and there is no leeching from toxic waste					Show protection measures
XVIII. Monitoring						
47	Are provisions made for supervision of implementation of the environmental measures as per ECoP					
48	Are steps provided for inspection of the bridges and culverts					

Check list-2A: Environmental Audit Checklist - During Pre-Construction

Please refer Excel file [“Audit Checklist-2A”](#)

Check list-2B: Environmental Audit Checklist - During Construction

Please refer Excel File [“AUDIT CHECKLIST-2B”](#)

Check list-2B: Environmental Audit Checklist - During Post-Construction

Please refer Excel File [“AUDIT CHECKLIST-2C”](#)

ECoP-19.0 Natural Habitats

19.1 General

19.1.1 This code of practice envisages measures to be undertaken during blacktopping / widening of PMGSY Road passing through natural habitats. These measures shall be undertaken in addition to the measures laid down in the other ECoPs.

Natural Habitats means...
<ul style="list-style-type: none"> • National Park • Reserve Forest • Sanctuaries • Notified Wetlands • Fisheries and Aquatic Habitats

19.1.2 As per the World Bank OP 4.04, the conservation of natural habitats⁷, like other measures that protect and enhance the environment, is essential for long-term sustainable development. A precautionary approach to natural resource management to ensure opportunities for environmentally sustainable development has been adopted for the project.

Main features of the Bank's Natural Habitats Policy (OP 4.04)
<p>The policy on natural habitats contains two major provisions with respect to biodiversity conservation and EA. Firstly, it prohibits Bank involvement in projects, which involve significant conversion or degradation of critical natural habitats. These include: existing protected areas and adjoining or linked areas or resources (such as water sources) on which the protected areas depend; and sites identified as meriting protection. Secondly, where natural habitats out-side protected areas are within a project's area of influence, the project must not convert them significantly unless:</p> <ul style="list-style-type: none"> • There are no feasible alternatives • The EA demonstrates that benefits substantially outweigh the costs • Mitigation measures acceptable to the Bank are implemented, which would normally include support for one or more compensatory protected areas that are ecologically similar to, and no smaller than, the natural habitats adversely affected by the project

19.2 Project Planning and Design

19.2.1 To minimize the adverse impact on the ecology of the natural habitats, selection of alignment should be as per **ECoP-1.0**, "Project Planning & Design".

19.2.2 An officer of at least the rank of a forest ranger shall be deputed for detailed inventory of ecological features along the PMGSY Road. The inventory shall be carried out after the ranger travels along the proposed alignment during the transect walk.

19.2.3 The nature and type of impact on natural habitats due to road construction shall be identified. Magnitude of the impact to the extent feasible on the ecological features shall also be assessed.

Ecological Features...	Adverse Impacts...
<ul style="list-style-type: none"> • Area of natural habitat • Type and number of endangered species of flora and fauna • Stream and water bodies 	<ul style="list-style-type: none"> • Diversion of forest land • Cutting of trees • Trampling of vegetation • Contamination of water due to the usage

⁷ Natural habitats are land and water areas where (i) the ecosystems' biological communities are formed largely by native plant and animal species, and (ii) human activity has not essentially modified the areas primary ecological functions.

<ul style="list-style-type: none"> • Breeding ground and seasons • Migration season of bird species • Animal crossing 	<p>of water from the source within the natural habitat</p> <ul style="list-style-type: none"> • Loss of breeding grounds • Interruption to animal crossings during the construction
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19.2.4 Impacts identified on the natural habitats shall be minimized to the extent required. Minimization shall be through precautionary measures or through appropriate mitigation measures. Following are the measures undertaken along the road passing through natural habitats:

- Constricting the road width to 6.0 m to minimize the extent of diversion of forest land and cutting of trees
- Traffic calming devices shall be introduced where necessary.
- Signage (viz. speed limit, animal crossing, switch of headlight etc) shall be provided as per IRC: 67-2001 Code of Practice for road sign (first revision)

19.2.5 In addition to the above measures, specific impacts identified on site shall be mitigated as per the recommendation of the forest department / officer in charge of the identified natural habitat.

19.2.6 In case proposed alignment falls within the catchment of a water body or a stream, a flush causeway shall be constructed without impacting the drainage system. The length of the causeway shall be as per the existing water spread. The causeway shall be strictly in compliance with IRC:SP-20:2002. In no circumstances a water body within the natural habitat shall be cut across or filled for the purpose of laying the road.

19.2.7 A Natural Habitat Management Plan shall be prepared for the stretch passing through the natural habitat covering the following aspects:

- **Project Description**, describing the project background along with project objective and benefits.
- **Policy, legal & Administrative framework**: highlighting the institutional setting and legal framework along with the clearance required for the project.
- **Baseline environmental / ecological profile** highlighting the existing scenario along the PMGSY Road as well as in its influential area.
- **Analysis of Alternatives** describing design alternatives and analyze them to evaluate best-fit option.
- **Identification and Assessment of Impact**: adverse impact shall be identified and evaluated in compliance with ECoP's for the best-fit option.
- **Management Plan** describing the avoidance as well as mitigation measures shall be suggested along with the monitoring and implementation mechanism.
- **Budgetary Provision** describing the costs associated with the management measures.

19.3 Pre-construction Stage:

19.3.1 No Construction Camps, Stockyards, Concrete Batching or Hot Mix Plants shall be located within the natural habitat or within 500m from its boundary.

19.3.2 Contractor in consultation with forest ranger or any other concerned authority shall prepare a schedule of construction within the natural habitat. Due consideration shall be given to the time of migration, time of crossing, breeding habits and any other special phenomena taking place in the area for the concerned flora or fauna.

19.4 Construction Stage:

- 19.4.1 Procurement of any kind of construction material (as quarry or borrow material) from within the natural habitat shall be strictly prohibited
- 19.4.2 No water resources within the natural habitat shall be tapped for road construction.
- 19.4.3 Use of mechanized equipment shall be kept minimum within the natural habitat. Contractor must ensure that there will be no parking of vehicles machine and equipment within the natural habitat.
- 19.4.4 Disposal of construction waste within the natural habitat shall be strictly prohibited and as far as possible reuse shall be undertaken as per Table 10-2 type of waste of **ECoP-10.0**, “Waste Management”.
- 19.4.5 PIU shall nominate one expert to carry out audit at all stages of project in accordance with Checklist A, B and C of **ECoP-18.0**, “Environmental Audit” to ensure all provision are followed as per ECoPs.

19.5 Post Construction Stage:

- 19.5.1 The road passing through the natural habitat shall be declared as a silence zone and provisions as per clause 19.2.4 of this ECoP shall be made.
- 19.5.2 Compensatory tree plantation within the available Right of Way shall be done in accordance with **ECoP-16.0**, “Tree Plantation”.
- 19.5.3 The PIU must ensure maintenance of drainage structure shall be undertaken as per **ECoP-12.0**, “Drainage”

ECoP -19A Biodiversity

19A-1 General

- 19A.1.1 Biodiversity refers to the wealth of species and ecosystem in a certain area and of the genetic information within the population. It is of great importance at local and global levels. Areas of high biodiversity are prized as storehouse of genetic material which forms the basis of untold numbers and quantities of foods, drugs and other useful products. The more species there are, the greater the resources available for adoption and use by mankind. Species that are pushed to extinction are gone forever; they are not available for use.
- 19A.1.2 In rural setting, the key impacts usually revolve around removal of productive agricultural lands and opening up of previously inaccessible, or marginally accessible, territory to migration and large scale resource harvesting. Introduction of new sources of noise is often an issue in rural setting, where ambient noise levels are typically low. Furthermore, because rural life is so closely integrated with the biophysical aspects of the environment, issues such as water quality and biodiversity conservation deserve special concerns.
- 19A.1.3 This code of practice envisages measures to be undertaken during development and/or upgrading of rural roads under PMGSY Road passing through sensitive ecosystem. These measures shall be undertaken in addition to the measures laid down in the other ECoPs.
- 19A.1.4 The conservation of biodiversity and taking measures to protect and enhance the environment is essential for long-term sustainable development. A precautionary approach to natural resource management to ensure opportunities for environmentally sustainable development has been adopted for the project.

19A.2 Project Planning and Design

- 19A.2.1 To minimize the adverse impact on the ecosystem of sensitive areas, selection of alignment should be as per **ECoP-1.0**, "Project Planning & Design".
- 19A.2.2 An officer of at least the rank of a forest ranger shall be deputed for detailed inventory of ecological features along the proposed road.. The inventory shall be carried out after the forest officer travels along the proposed alignment during the transect walk along with the members of local community.
- 19A.2.2 The nature and type of impact on natural habitats due to road construction shall be identified. Magnitude of the impact to the extent feasible on the ecological features shall also be assessed.

Ecological Features...	Adverse Impacts...	
	Direct Impacts	Indirect Impacts
<ul style="list-style-type: none"> • Area of affected habitat • Type and number of endangered species of flora and fauna • Stream and water bodies • Breeding ground and seasons • Migration season of bird species • Animal crossing 	<ul style="list-style-type: none"> • Diversion of land • Fragmentation of ecosystem • Cutting of trees • Trampling of vegetation • Contamination of water due to the usage of water from the source within the natural habitat • Loss of breeding grounds • Interruption to animal 	<ul style="list-style-type: none"> • Increased accessibility causing modification of ecosystem • Contamination of biota: Increased humans activity • Motor vehicles introduce the potential for contamination of water, air, and soil. • Fires due to increased human activity.

	crossings leading to collision with animals <ul style="list-style-type: none"> • Interruption of biochemical cycle 	<ul style="list-style-type: none"> • Transmission of disease which may have impact on the plant and animal life.
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19A.2.3 Impacts identified along the alignment and shall be minimized to the extent possible. Minimization shall be through precautionary measures or through appropriate mitigation measures. Following are the some of the measures undertaken along the road passing through sensitive areas.

- Constricting the road width to 6.0 m to minimize the extent of diversion of forest land and cutting of trees
- Traffic calming devices shall be introduced where necessary.
- Signage (viz. speed limit, animal crossing, switch of headlight etc) shall be provided as per IRC: 67-2001 Code of Practice for road sign (first revision)
- The road and drainage designs may be modified to suit safeguard the sensitive areas, using narrower road width and ensuring that the roads do not form a barrier to free flow movement of animals.
- Plantation of shrubs and trees in the right of way and corridor with native species may provide additional habitat for migrating animals and guard against erosion.
- Provide animal crossings across or under the roadway to avoid collision. The drainage culverts can also be designed to serve this purpose
- Fencing of the road boundary can also reduce collision

19A.2.4 In addition to the above measures, specific impacts identified on site shall be mitigated as per the recommendation of the forest department / officer in charge of the identified natural habitat.

19A.2.5 In case proposed alignment falls within the catchment of a water body or a stream, a flush causeway shall be constructed without impacting the drainage system. The length of the causeway shall be as per the existing water spread. The causeway shall be strictly in compliance with IRC:SP-20:2002. In no circumstances a water body within the natural habitat shall be cut across or filled for the purpose of laying the road.

19A.2.6 Management Plan shall be prepared for the stretch passing through the sensitive areas covering the following aspects:

- **Project Description**, describing the project background along with project objective and benefits.
- **Policy, legal & Administrative framework:** highlighting the institutional setting and legal framework along with the clearance required for the project.
- **Baseline environmental / ecological profile** highlighting the existing scenario along the PMGSY Road as well as in its influential area.
- **Analysis of Alternatives** describing design alternatives and analyze them to evaluate best-fit option.
- **Identification and Assessment of Impact:** adverse impact shall be identified and evaluated in compliance with ECoP's for the best-fit option.
- **Management Plan** describing the avoidance as well as mitigation measures shall be suggested along with the monitoring and implementation mechanism.
- **Budgetary Provision** describing the costs associated with the management measures.

19A. 3 Pre-construction Stage:

19A.3.1 No Construction Camps, Stockyards, Concrete Batching or Hot Mix Plants shall be located within the sensitive areas or within 500m from its boundary.

19A.3.2 Contractor in consultation with forest officers or any other authorized authority shall prepare a schedule of construction with in the sensitive area. Due consideration shall be given to the

time of migration, time of crossing, breeding habits and any other special phenomena taking place in the area for the concerned flora or fauna.

19A.4 Construction Stage:

19A.4.1 Procurement of any kind of construction material (as quarry or borrow material) from within the natural habitat shall be strictly prohibited

19A.4.2 No water resources within the natural habitat shall be tapped for road construction.

19A.4.3 Use of mechanized equipment shall be kept to a minimum within the affected area. Contractor must ensure that there will be no parking of vehicles machine and equipment within such area.

19A.4.3 PIU shall nominate one expert to carry out audit at all stages of project in accordance with Checklist A, B and C of **ECoP-18.0**, “Environmental Audit” to ensure all provision are followed as per ECoPs.

19A.5 Post Construction Stage:

19A.5.1 The road passing through the natural habitat shall be declared as a silence zone and provisions as per clause 19.2.4 of this ECoP shall be made.

19A.5.2 Compensatory tree plantation within the available Right of Way shall be done in accordance with **ECoP-16.0**, “Tree Plantation”.

19A.5.3 The PIU must ensure maintenance of drainage structure shall be undertaken as per **ECoP-12.0**, “Drainage”

ECoP-20.0 Consultations for Environmental Aspects

20.1 General

20.1.1 All stages of project planning, preparation and implementation will involve interaction with the community. Consultations with community or other stakeholders are an integral part of the project activities. These would in general be conducted by the PIU in prioritization and project preparation and post-construction stages. While during pre-construction PIU / Contractor and in construction stages the contractor will be conducting the consultations. This ECoP is intended to provide guidelines for the PIU/Contractor for conducting the consultations.

20.2 Project Preparation Stage

20.2.1 The proposed PMGSY roads under core network shall be displayed at Zilla Parishad headquarters. Thereafter each road shall be taken up for preparation of DPR as per priority formula adopted by the State Government.

20.2.2 During the DPR stage, information on the connectivity, and other provisions of ESMF shall be disseminated at the village Panchayat of the concerned habitation in the form of Brochure as presented in **Annexure 20-1**. It shall indicate the need for adequate land width and voluntary land donation.

20.2.3 To enable incorporation of environmental and social concerns into the project preparation, an inventory of environmental and social features of the road is prepared. This is done through a Transect Walk. The transect walk shall be a participatory process organized by the PIU in coordination with the Gram Panchayat and the revenue officials at the village level. In case, the proposed alignment is likely to pass through a natural habitat (as per **ECoP-19.0**, "Natural Habitats") then an official from Forest Department would also be accompanying the team. Details of the conduct of transect walk are as per **Annexure 20-2**.

20.2.4 Within one week of conduct of transect walk, the output of transect shall be disseminated by the PIU indicating how the concerns of community have been incorporated. If due to technical or other reasons, the choices of the community are not incorporated, the reasons for not accepting any suggestion shall be communicated and subsequently alignment shall be finalized. Format for recording the consultation outputs is presented as **Annexure 20-3**.

Consultations to be conducted ...

- Information dissemination about proposed PMGSY roads under core network
- During Project Preparation
 - Dissemination of project information
 - For finalizing alignment
 - For disseminating information on incorporation/non-incorporation of environmental concerns into project design
- During Implementation for...
 - Seeking consent on temporary use of land for setting up construction facilities, borrowing, traffic diversions and disposal of wastes
 - Seeking consent on extraction of water for construction, relocation of common property resources and cultural properties
 - Encouraging tree plantation and
 - Avoiding / minimizing induced development

20.3 Pre-Construction Stage

20.3.1 Consultations during this stage will be towards seeking consent of landowners for clearance of the Road land width, temporary use of land and material provision for construction.

20.3.2 The consultations to be conducted during this stage and aspects to be covered are presented in the individual ECoP prepared for each aspect. PIU will be conducting the consultations towards clearance of the proposed road land width. While Contractor will be conducting

consultations for temporary use of land and for material provision for construction. **Table 20-1** summarizes the consultations to be conducted and provisions made in the individual ECoPs along with the responsibilities.

Table 20-1: Consultations during Pre-Construction Stage

Sl.No.	Aspects of Consultation	Desired Outputs	Reference
1	Consultations for Clearance of Road land width		
1.1	Consultation for Relocation of Common Property Resources (CPR)	<ul style="list-style-type: none"> Consent for relocation of CPR Identify area for relocation 	ECoP-2.0
1.2	Relocation of Cultural Properties	<ul style="list-style-type: none"> Consent for relocation of cultural property Discussion on design for relocated structures Identify area for relocation 	ECoP-15.0
2	Consultations for Temporary use of Land		
2.1	Setting up Construction Camp	<ul style="list-style-type: none"> Consent for setting up the camp Terms of use as: free of cost, payment of rent for use or any other Rehabilitation options for the land subsequent to its use 	ECoP-3.0
2.2	Land for Borrowing	<ul style="list-style-type: none"> Consent for use of land for borrowing Location for storage of Topsoil Rehabilitation options for the land subsequent to borrowing 	ECoP-5.0
2.3	Disposal of Wastes	<ul style="list-style-type: none"> Consent for use of land for waste disposal Type of wastes to be disposed Rehabilitation of land subsequent to waste disposal 	ECoP-10.0
2.4	Diversion of Traffic	<ul style="list-style-type: none"> Consent for use of land for temporary traffic diversion Site preparation as removal of topsoil along the route for temporary diversion Rehabilitation of land subsequent to completion of construction in the stretch 	ECoP-14.0
3	Consultations for material extraction		
3.1	Extraction of water	<ul style="list-style-type: none"> Seeking consent on extraction of water Terms of use as: free of cost or payment for water used 	ECoP-8.0
3.2	Borrowing of earth	<ul style="list-style-type: none"> Seeking consent for borrowing Terms of use as: free of cost or payment for earth, depth of borrowing 	ECoP-5.0

20.4 Construction Stage

20.4.1 The Site Engineer in charge of the road shall settle any grievances raised by the community during this stage. If grievances remain unaddressed, they shall be referred to the concerned senior officers of PIU (Assistant Engineer and Executive Engineer) and shall be addressed as per the Grievance Redressal Mechanism devised in the **Resettlement Framework**.

20.4.2 The PIU shall consult the community and PRI in identifying people volunteering for Tree plantation. All aspects of tree plantation and maintenance shall be briefed to them towards the end of construction period as per the **ECoP-16.0**, "Tree Plantation".

20.5 Post-Construction Stage

20.5.1 The PIU shall conduct consultations with the PRI and community on induced development aspects along the roads constructed. Awareness on impacts likely due to induced development will be generated during the consultations. Measures to be undertaken for its control and avoid encroachments shall be discussed and necessary arrangements shall be notified as per the **ECoP-17.0**, "Induced Development".

20.6 Consultation Schedule

Consultations to be conducted at various stages of the project and agencies responsible shall be as per the schedule given in **Table 20-2** below.

Table 20-2: Schedule of Consultations

Sl.No	Activity	Main Responsible Agency	Other Agency / Department Involved	Consultation Tool	Stakeholders	Pre-selection	DPR Preparation												Post Construction
							1	2	3	4	5	6	7	8	9	10	11	12	13
1	Prioritization																		
1.1	PMGSY road under Core Network	PIU		Dissemination	Pubic														
2	Project Preparation																		
2.1	Project Information & ESMP	PIU		Dissemination	Village Community														
2.2	Finalization of Alignment	PIU	PRI, RD & FD	Transect Walk	Village Community														
2.3	Follow up	PIU		Consultation	Village Community														
3	Pre-Construction Stage																		
3.1	Clearance of Road land width																		
3.1.1	Relocation of Common Property Resource	PIU		Consultation	Village Community														
3.1.2	Relocation of Culture Property	PIU		Consultation	Village Community														
3.2	Temporary Usage of Land																		
3.2.1	Setting up of Construction Camp	Contractor		Consultation	Property Owner / PRI														
3.2.2	Diversion of Traffic	Contractor		Consultation	Property Owner / PRI														
3.2.3	Disposal of Wastes	Contractor		Consultation	Property Owner / PRI														
3.3	Material Extraction																		
3.3.1	Borrowing of Earth	Contractor		Consultation	Property Owner / PRI														
3.3.2	Extraction of Water	Contractor		Consultation	Property Owner / PRI														
4	Construction Stage																		
4.1	Redressal of Grievances	Contractor	PIU	Consultation	Property Owner / Community														
5	Post Construction Stage																		
5.1	Identification for Voluntary Tree Plantation	PIU	PRI	Consultation	Village Community														
5.2	Induce Development Aspect	PIU	PRI	Consultation	Village Community														