**Environmental Impact Assessment Report**

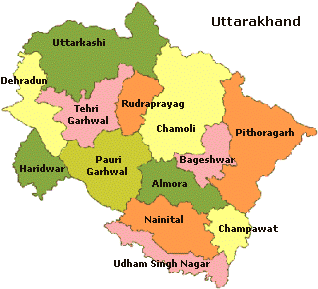
**Safeguard Policies for Environment**



With

Environmental Checklist, Management and Monitoring Plan

**EIA/ IEE for BRO – Kurkuti – Ghamsali – Niti Roads, Uttarakhand State**



**BRO: Border Road Organization,**

**November – 2019**

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**ABBREVIATIONS AND ACRONYMS**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **AADT** | Annual Average Daily Traffic |  | **MOEF** | Ministry of Environment and Forests |
| **AC** | Asphaltic Concrete | **MORT & H** | Ministry of Road Transport & Highways |
| **ADT** | Average Daily Traffic | **BRO** | **Border Road Organisation** |
| **BBD** | Benkelman Beam Deflection | **MSA** | Million Standard Axles |
| **BC** | Bituminous Concrete | **MSL** | Mean Sea Level |
| **BM** | Bituminous Macadam | **NH** | National Highway |
| **BOQ** | Bill of Quantities | **NMT** | Non – Motorized Traffic |
| **BOT** | Build Operate Transfer | **NPV** | Net Present Value |
| **BSNL** | Bharat Sanchar Nigam Limited | **NSDP** | Net State Domestic Product |
| **BT** | Bituminous Track | **NTPC** | National Thermal Power Corporation |
| **CBR** | California Bearing Ratio | **O&M** | Operation & Maintenance |
| **CD** | Cross Drainage | **O – D** | Origin Destination |
| **CGWB** | Central Ground Water Board | **OFC** | Optical Fiber Cable |
| **CMSA** | Cumulative Million Standard Axles | **OMC** | Optimum Moisture Content |
| **COI** | Corridorof Impact | **PCC** | Plain Cement Concrete |
| **CRRI** | Central Road Research Institute (India) | **PCU** | Passenger Car Unit |
| **CVPD** | CommercialVehiclePerDay | **PIU** | Project Implementation Unit |
| **DBFOT** | Design, Build, Finance, Operate & Transfer | **PPM** | Parts Per Million |
| **DBM** | Dense Bituminous Macadam | **PPP** | Public Private Partnership |
| **DLC** | Dry Lean Concrete | **PPR** | Preliminary Project Report |
| **DTM** | Digital Terrain Model | **PQ** | Pre – Qualification |
| **EA** | Environmental Assessment | **PQC** | Pavement Quality Control |
| **EASL** | Equivalent Standard Axle Load | **PWD** | Public Works Department |
| **EIA** | Environment Impact Assessment | **QAP** | Quality Assurance Plan |
| **EIRR** | Economic Internal Rate of Return | **QC** | Quality Control |
| **FFR** | Final Feasibility Report | **R&R** | Resettlement and Rehabilitation |
| **FIRR** | Financial Internal Rateof Return | **RAP** | Resettlement Action Plans |
| **GAD** | General Arrangement Drawing | **RCC** | Reinforced Cement Concrete |
| **GDP** | Gross Domestic Product | **RHS** | Right Hand Side |
| **GOI** | Government of India | **RL** | Reduced Level |
| **GPS** | Global Positioning System | **ROB/ RUB** | Road Over Bridge/ Road Under Bridge |
| **GSB** | Granular Sub – Base | **ROW** | Right of Way |
| **GTS** | Geodetic Triangulation Survey | **Rs.** | Rupees |
| **Ha** | Hectare | **SH** | State Highway |
| **HDM**–**4** | Highway Design & Maintenance Model (Series – 4) | **SIA** | Social Impact Assessment |
| **HDMQ** | Highway Designand Maintenance Model with Congestion Analysis | **Sq. Km.** | SquareKiloMeters |
| **HFL** | High Flood Level | **TBM** | Temporary Bench Mark |
| **IRC** | Indian Road Congress | **Temp** | Temperature |
| **IRR** | Internal Rate of Return | **TOR** | Terms of Reference |
| **Km** | Kilometre | **TRL** | Transportation Research Laboratory |
| **KMPH** | Kilometre Per Hour | **UG** | Under Ground |
| **LA** | Land Acquisition |  | **VDF** | Vehicles Damage Factor |
| **LT/ HT** | Low Tension/ High Tension Electric Lines |  | **Veh.** | Vehicles |
| **m** | Meters |  | **VGF** | Viability Gap Funding |
| **MDR** | Major District Road |  | **WB** | World Bank |
| **mm** | Millimetre |  | **WBM** | Water Bound Macadam |
| **Dia.** | Dia Meters |  | **WMM** | Wet Mix Macadam |
| **EPC** | Engineering, Procurement, and Construction |  | **PPE** | Personal Protective Equipment |
| **PPR** | Peste – des Petits Ruminants |  | **GAD** | General Administration Department |
| **LMI** | Labour Market Information |  | **MSE** | Mean Squared Error |
| **SARA** | Saturates, Aromatics, Resins and Asphaltenes |  | **ACZ** | Agro – Climatic Zone |
| **PET** | Poly – Ethylene Tere – phthalate |  | **SEDP** | Sustainable Environmental Development Practices |
| **FRC** | Fibre Reinforced Concrete |  | **PCM** | Public Consultation Method |
| **PCM** | Public Consultation Meeting |  | **FGD** | Focus Group Discussion |
| **UTC** | Universal Time Coordinated |  | **GPS** | Global Positioning System |
| **DEM** | Digital Elevation Model |  | **DTM** | Digital Terrain Model |
| **FCW** | Flush Cause Way |  | **CRRI** | Central Road Research Institute |
| **CVPD** | Commercial Vehicles Per Day |  | **ATTC** | Advanced Technical Training Centre |
| **CCCT** | Centre for Computers and Communication Technology |  | **CRPF** | Central Reserve Police Force |
| **NWL** | Normal Water Level |  | **TAR** | Tibet Autonomous Region |
| **CCP** | CIVIL CONSTRUCTION PRACTICES |  | **NSSDA** | National Standard for Spatial Data Accuracy |
| **GSD** | Ground Sample Distance |  | **DGPS** | Differential Global Positioning System |
| **NRSC** | National Remote Sensing Centre |  | **GIS** | Geographical Information System |
| **DEM** | Digital Elevation Model |  | **RL** | Reduced Level |

This is a Draft Chapter on **Environmental and Social Management Framework (ESMF)** for the proposed **Enhancing Land, Air, Water, Noise and Road Construction Resource Efficiency (ELAWNRCRE)** Project with financial assistance from the **BRO/ ITBP/ CPWD/ PWD/ MPRDC/ MSRDC/ ADB/ NDB OR World Bank** etc. This is hereby disclosed with a view to soliciting comments/ suggestions on or before **December 2019**. In this regard, please send your comments/ suggestions by email to h.g@rediffmail.com or by WhatsApp Number 09329213257 to ***Dr. Harish Kumar Gupta, Environment Expert, L. N. M. Infra Projects Pvt. Ltd., Bhopal (M.P.).***

**Chapter – 1: ENVIRONMENTAL IMPACT ASSESSMENT AND EMP FOR UTTARAKHAND STATE**

**1. INTRODUCTION AND BACKGROUND OF THE PROJECT**

Uttarakhand formerly known as Uttaranchal is a state in the Northern part of [India](https://en.wikipedia.org/wiki/India). It is often referred to as the **“Devabhumi”** **(literally “Land of the Gods”)** due to a large number of [Hindu](https://en.wikipedia.org/wiki/Hinduism) [temples](https://en.wikipedia.org/wiki/Hindu_temple) and pilgrimage centres found throughout the state. Uttarakhand is known for the natural environment of the [Himalayas](https://en.wikipedia.org/wiki/Himalayas), the [Bhabhar](https://en.wikipedia.org/wiki/Bhabar) and the [Terai](https://en.wikipedia.org/wiki/Terai). On 9th November 2000, Uttarakhand became the 27th state of the [Republic of India](https://en.wikipedia.org/wiki/Republic_of_India), being carved from the Himalayan districts of [Uttar Pradesh](https://en.wikipedia.org/wiki/Uttar_Pradesh). It borders [Tibet Autonomous Region](https://en.wikipedia.org/wiki/Tibet_Autonomous_Region) of [China](https://en.wikipedia.org/wiki/China) to the North; the [Sudurpashchim Pradesh](https://en.wikipedia.org/wiki/Sudurpashchim_Pradesh) of [Nepal](https://en.wikipedia.org/wiki/Nepal) to the East; the Indian states of [Uttar Pradesh](https://en.wikipedia.org/wiki/Uttar_Pradesh) to the South and [Himachal Pradesh](https://en.wikipedia.org/wiki/Himachal_Pradesh) to the west and North – West. The state is divided into two divisions, [Garhwal](https://en.wikipedia.org/wiki/Garhwal_division) and [Kumaon](https://en.wikipedia.org/wiki/Kumaon_division), with a total of [13 districts](https://en.wikipedia.org/wiki/List_of_districts_of_Uttarakhand). The interim capital of Uttarakhand is [Dehradun](https://en.wikipedia.org/wiki/Dehradun), the largest city of the state, which is a railhead and the [High Court](https://en.wikipedia.org/wiki/Uttarakhand_High_Court) of the state is located in [Nainital](https://en.wikipedia.org/wiki/Nainital).

Archaeological evidence supports the existence of humans in the region since [prehistoric times](https://en.wikipedia.org/wiki/Prehistoric_times). The region formed a part of the [Uttara Kuru Kingdom](https://en.wikipedia.org/wiki/Uttara_Kuru_Kingdom) during the [Vedic age](https://en.wikipedia.org/wiki/Vedic_period) of [Ancient India](https://en.wikipedia.org/wiki/Ancient_India). Among the first major dynasties of Kumaon were the [Kunindas](https://en.wikipedia.org/wiki/Kuninda) in the 2nd century BCE who practised an early form of [Shaivism](https://en.wikipedia.org/wiki/Shaivism). [Ashokan edicts](https://en.wikipedia.org/wiki/Ashokan_edicts) at Kalsi show the early presence of [Buddhism](https://en.wikipedia.org/wiki/Buddhism) in this region. During the medieval period, the region was consolidated under the [Kumaon Kingdom](https://en.wikipedia.org/wiki/Kumaon_Kingdom) and [Garhwal Kingdom](https://en.wikipedia.org/wiki/Garhwal_Kingdom). In 1816, most of modern Uttarakhand was ceded to the [British](https://en.wikipedia.org/wiki/British_Raj) as part of the [Treaty of Sugauli](https://en.wikipedia.org/wiki/Treaty_of_Sugauli). Although the erstwhile hill kingdoms of Garhwal and Kumaon were traditional rivals, the proximity of different neighboring ethnic groups and the inseparable and complementary nature of their geography, economy, culture, language, and traditions created strong bonds between the two regions which further strengthened during the [Uttarakhand movement](https://en.wikipedia.org/wiki/Uttarakhand_movement) for statehood in the 1990s.

The natives of the state are generally called Uttarakhandi, or more specifically either Garhwali or Kumaoni by their region of origin. According to the [2011 Census of India](https://en.wikipedia.org/wiki/2011_Census_of_India), Uttarakhand has a population of 10,086,292, making it the 20th [most populous state](https://en.wikipedia.org/wiki/List_of_states_and_union_territories_of_India_by_population) in India.

***Etymology***

Uttarakhand's name is derived from the [Sanskrit](https://en.wikipedia.org/wiki/Sanskrit) words ***uttara* (उत्तर)** meaning **“North”,** and ***khanda* (खण्ड)** meaning **“Land”,** altogether simply meaning **“Northern Land”**. The name finds mention in early [Hindu scriptures](https://en.wikipedia.org/wiki/Hindu_scriptures) as the combined region of **“Kedarkhand”** (present day [*Garhwal*](https://en.wikipedia.org/wiki/Garhwal_division)) and **“Manaskhand”** (present day [*Kumaon*](https://en.wikipedia.org/wiki/Kumaon_division)). Uttarakhand was also the ancient **“**[**Puranic**](https://en.wikipedia.org/wiki/Puranic)**”** (पौराणिक) term for the central stretch of the Indian [Himalayas](https://en.wikipedia.org/wiki/Himalayas).

However, the region was given the name *Uttaranchal* by the [Bharatiya Janata Party](https://en.wikipedia.org/wiki/Bharatiya_Janata_Party) led central government and [Uttrakhand](https://en.wikipedia.org/wiki/Uttrakhand) state government when they started a new round of state reorganization in 1998. Chosen for its allegedly less separatist connotations, the name change generated enormous controversy among many activists for a separate state who saw it as a political act. The name Uttarakhand remained popular in the region, even while Uttaranchal was promulgated through official usage.

In August 2006, [Union Cabinet of India](https://en.wikipedia.org/wiki/Union_Cabinet_of_India) assented to the demands of the [Uttaranchal Legislative Assembly](https://en.wikipedia.org/wiki/Uttarakhand_Legislative_Assembly) and leading members of the [Uttarakhand statehood movement](https://en.wikipedia.org/wiki/Uttarakhand_movement) to rename Uttaranchal state as Uttarakhand. Legislation to that effect was passed by the Uttaranchal Legislative Assembly in October 2006, and the Union Cabinet brought in the bill in the winter session of Parliament. The bill was passed by Parliament and signed into law by then President [A. P. J. Abdul Kalam](https://en.wikipedia.org/wiki/A._P._J._Abdul_Kalam) in December 2006, and since January 1st, 2007 the state has been known as Uttarakhand.

***History***

[**History of Uttarakhand**](https://en.wikipedia.org/wiki/History_of_Uttarakhand)**and**[**Uttarakhand Movement**](https://en.wikipedia.org/wiki/Uttarakhand_movement): Ancient rock paintings, rock shelters, [paleolithic](https://en.wikipedia.org/wiki/Paleolithic) stone tools (hundreds of thousands of years old), and [megaliths](https://en.wikipedia.org/wiki/Megaliths) provide evidence that the mountains of the region have been inhabited since prehistoric times. There are also archaeological remains which show the existence of early [Vedic](https://en.wikipedia.org/wiki/Vedic_period) (c. 1500 BCE) practices in the area. The [Pauravas](https://en.wikipedia.org/wiki/Paurava), [Nandas](https://en.wikipedia.org/wiki/Nanda_Dynasty), [Mauryans](https://en.wikipedia.org/wiki/Mauryan_Empire), [Kushanas](https://en.wikipedia.org/wiki/Kushan_Empire), [Kunindas](https://en.wikipedia.org/wiki/Kuninda_Kingdom), [Guptas](https://en.wikipedia.org/wiki/Gupta_Empire), Gurjara – Pratihara, [Katyuris](https://en.wikipedia.org/wiki/Katyuri_Kings), [Raikas](https://en.wikipedia.org/wiki/Doti), [Palas](https://en.wikipedia.org/wiki/Pala_Empire), [Karkotas](https://en.wikipedia.org/wiki/Karko%E1%B9%ADa_Empire), [Chands](https://en.wikipedia.org/wiki/Chand_Kings), [Parmars](https://en.wikipedia.org/wiki/Parmar) or Panwars, and the [British](https://en.wikipedia.org/wiki/British_Raj) have ruled Uttarakhand in turns.

It is believed that the sage [Vyasa](https://en.wikipedia.org/wiki/Vyasa) scripted the Hindu epic [Mahabharata](https://en.wikipedia.org/wiki/Mahabharata) in the state. Among the first major dynasties of Garhwal and Kumaon were the Kunindas in the 2nd century BCE who practised an early form of [Shaivism](https://en.wikipedia.org/wiki/Shaivism) and traded salt with Western [Tibet](https://en.wikipedia.org/wiki/Tibet). It is evident from the [Ashokan](https://en.wikipedia.org/wiki/Ashoka) edict at Kalsi in Western Garhwal that [Buddhism](https://en.wikipedia.org/wiki/Buddhism) made inroads in this region. [Folk Hindu shamanic](https://en.wikipedia.org/wiki/Folk_Hinduism) practices deviating from Hindu orthodoxy also persisted here. However, Garhwal and Kumaon were restored to nominal [Vedic Hindu](https://en.wikipedia.org/wiki/Vedic_Brahmanism) rule due to the travels of [Shankaracharya](https://en.wikipedia.org/wiki/Shankaracharya) and the arrival of migrants from the plains.

[](https://en.wikipedia.org/wiki/File:Sun_Temple,_Katarmal.jpg)

[**Katarmal**](https://en.wikipedia.org/wiki/Katarmal)**Sun Temple** constructed by the [**Katyuri Kings**](https://en.wikipedia.org/wiki/Katyuri_Kings) in the 9th century CE.

[](https://en.wikipedia.org/wiki/File:Dandeshwar_temple_complex_(6133874878).jpg)

[**Jageshwar Temples**](https://en.wikipedia.org/wiki/Jageshwar_Temples,_Uttarkhand)are a group of over 100 **Hindu Temples** dated between 7th and 12th century.

Between the 4th and 14th centuries, the Katyuri dynasty dominated lands of varying extent from the *Katyur Valley* (Modern – Day [**Baijnath**](https://en.wikipedia.org/wiki/Baijnath,_Uttarakhand)) in Kumaon. The historically significant temples at [Jageshwar](https://en.wikipedia.org/wiki/Jageshwar) are believed to have been built by the Katyuris and later remodelled by the Chands. Other peoples of the [Tibeto –Burman](https://en.wikipedia.org/wiki/Tibeto-Burman) Group known as [*Kirata*](https://en.wikipedia.org/wiki/Kirata) are thought to have settled in the Northern highlands as well as in pockets throughout the region, and are believed to be ancestors of the modern day [Bhotiya](https://en.wikipedia.org/wiki/Bhotiya), [Raji](https://en.wikipedia.org/wiki/Raji_people), [Buksa](https://en.wikipedia.org/wiki/Buksa_people), and [Tharu](https://en.wikipedia.org/wiki/Tharu_people) people.

***Princely Flag of***[***Kingdom of Garhwal***](https://en.wikipedia.org/wiki/Garhwal_Kingdom)

By the medieval period, the region was consolidated under the **“**[**Garhwal Kingdom**](https://en.wikipedia.org/wiki/Garhwal_Kingdom)**”** in the West and the [Kumaon Kingdom](https://en.wikipedia.org/wiki/Kumaon_Kingdom) in the East. During this period, learning and new forms of *Painting* (the [**Pahari**](https://en.wikipedia.org/wiki/Pahari_painting)**School of Art**) developed. Modern – day Garhwal was like wise unified under the rule of Parmars who, along with many [Brahmins](https://en.wikipedia.org/wiki/Brahmins) and [Rajputs](https://en.wikipedia.org/wiki/Rajputs), also arrived from the plains. In 1791, the expanding [Gorkha Empire](https://en.wikipedia.org/wiki/Gorkha_Kingdom) of [Nepal](https://en.wikipedia.org/wiki/Nepal) overran [Almora](https://en.wikipedia.org/wiki/Almora), the seat of the Kumaon Kingdom. It was annexed to Kingdom of Nepal by [Amar Singh Thapa](https://en.wikipedia.org/wiki/Amar_Singh_Thapa). In 1803, the Garhwal Kingdom also fell to the Gurkhas. After the [Anglo – Nepalese War](https://en.wikipedia.org/wiki/Anglo-Nepalese_War), this region was ceded to the British as part of the [Treaty of Sugauli](https://en.wikipedia.org/wiki/Treaty_of_Sugauli). The Garhwal Kingdom was then re – establishedfrom a smaller region in [Tehri](https://en.wikipedia.org/wiki/Tehri_Garhwal_district).

***Uttarakhand as a Part of the***[***United Province***](https://en.wikipedia.org/wiki/United_Provinces_of_Agra_and_Oudh)***, 1903***

After India attained independence from the British, the Garhwal Kingdom was merged into the state of [Uttar Pradesh](https://en.wikipedia.org/wiki/Uttar_Pradesh), where Uttarakhand composed the Garhwal and Kumaon Divisions. Until 1998, Uttarakhand was the name most commonly used to refer to the region, as various political groups, including the **“**[**Uttarakhand Kranti Dal**](https://en.wikipedia.org/wiki/Uttarakhand_Kranti_Dal)**” (Uttarakhand Revolutionary Party),** began agitating for separate statehood under its banner. Although the erstwhile hill kingdoms of Garhwal and Kumaon were traditional rivals the inseparable and complementary nature of their geography, economy, culture, language, and traditions created strong bonds between the two regions. These bonds formed the basis of the new political identity of Uttarakhand, which gained significant momentum in 1994, when demand for separate statehood achieved almost unanimous acceptance among both the local populace and national political parties.

The most notable incident during this period was the [Rampur Tiraha Firing Case](https://en.wikipedia.org/wiki/Rampur_Tiraha_firing_case) on the night of 1st October 1994, which led to a public uproar. On 24th September 1998, the [Uttar Pradesh Legislative Assembly](https://en.wikipedia.org/wiki/Uttar_Pradesh_Legislative_Assembly) and [Uttar Pradesh Legislative Council](https://en.wikipedia.org/wiki/Uttar_Pradesh_Legislative_Council) passed the Uttar Pradesh Reorganisation Bill, which began the process of forming a new state. Two years later the [Parliament of India](https://en.wikipedia.org/wiki/Parliament_of_India)passed the [Uttar Pradesh Reorganisation Act, 2000](https://en.wikipedia.org/wiki/Uttar_Pradesh_Reorganisation_Act,_2000) and thus, on 9th November 2000, Uttarakhand became the 27th state of the [Republic of India](https://en.wikipedia.org/wiki/Republic_of_India).

|  |
| --- |
| **“माटू हमरू, पाणी हमरू, हमरा ही छन यी बौण भी... पितरों न लगाई बौण, हमुनही त बचौण भी।**  **Soil ours, water ours, ours are these forests. Our forefathers raised them; it's we who must protect them.**  **— Old Chipko Song (**[**Garhwali Language**](https://en.wikipedia.org/wiki/Garhwali_language)**)”** |

Uttarakhand is also well known for the mass agitation of the 1970s that led to the formation of the [Chipko Environmental Movement](https://en.wikipedia.org/wiki/Chipko_movement) and other Social Movements. Though primarily a [livelihood](https://en.wikipedia.org/wiki/Livelihood) movement rather than a forest conservation movement, it went on to become a rallying point for many future [environmentalists](https://en.wikipedia.org/wiki/Environmentalists), environmental protests, and movements the world over and created a precedent for non – violent protest. It stirred up the existing civil society in India, which began to address the issues of tribal and marginalized people. So much so that, a quarter of a century later, [India Today](https://en.wikipedia.org/wiki/India_Today) mentioned the people behind the **“Forest Satyagraha”** of the Chipko Movement as amongst **“100 People Who Shaped India”**. One of Chipko's most salient features was the mass participation of female villagers. Both female and male activists played pivotal roles in the movement. ***“***[***Gaura Devi***](https://en.wikipedia.org/wiki/Gaura_Devi)***was the main activist who started this movement other participants was***[***Chandi Prasad Bhatt***](https://en.wikipedia.org/wiki/Chandi_Prasad_Bhatt)***,***[***Sunderlal Bahuguna***](https://en.wikipedia.org/wiki/Sunderlal_Bahuguna)***, and Ghanshyam Raturi, the Popular Chipko Poet”****.*

The consultancy services for carrying out preparation of **Initial Environmental Examination (IEE)**/ Detailed Project Report (DPR) and bid documents. In order to fulfil the traffic needs and road safety requirement, **Border Road Organisation (BRO)** has appointed the **M/s HIGHWAY ENGINEERING Consultant BHOPAL (MP),** for Survey, Investigation and Preparation of Detailed Project Report for improvement of Road and Bridges etc. for construction of High Altitude Hill Roads to Border Road Organization under Phase – I in the state of Uttarakhand using **Satellite Imagery** and **Geographical Information System (GIS)**. The report brings out the project background, mobilization and staffing, approach and methodology relating to surveys/ investigations and detailed design. A broad conceptualization of the project essentially based on study of available data/ reports and a detailed reconnaissance survey has been provided. ***“Uttarakhand BRO – 21 BRTF (123 – RCC) Division Suraitota, has been entrusted preparation of Initial Environmental Examination (IEE) of Kurkuti – Ghamsali – Niti from 00.000 Km to 20.000 Km (20.00 Kms) from CL – 9 to NHDL Specification in 21 – BRTF area under PROJECT – Shivalik in Uttarakhand”****.*Through Consultancy Services As Specified By MORT & H and Provisions of IRC – SP – 19 for Improvement/ Development of Road **Kurkuti – Ghamsali – Niti** from 00.000 Km to 20.000 Km (20.00 Kms) area under Project Shivalik Uttarakhand State, the assignment for **Letter No. 80260/ Consultancy/ KGN/ 48/ E8 Dated July 2018**. The report also makes proposals on issues requiring discussions with the **Border Road Organisation (BRO) by Ministry of Home Affairs, Department of Border Management, and Government of India** and decisions necessary for detailing of the project.

The report covers the following major aspects and prospects are as discussed below one by one:

1. *Project Background;*
2. *Mobilization and Progress;*
3. *Project Appreciation and Conceptualization;*
4. *Proposed Approach and Methodology;*

**Alignment Deciding Criteria andSignificant Factors**

1. *Connectivity to Indo – Tibetan Border Police (ITBP) Posts Authorities of 11th and 13th Battalion, Raised on 24th October 1962, under the Central Reserve Police Force (CRPF) Act;*
2. *Stable Side of Hilly Areas;*
3. *Avoiding of S – Bends to the Extent Possible;*
4. *Gradient Limits;*
5. *Availability of Road Construction Materials;*
6. *Minimum Number of Cross Drainage Structures;*
7. *Connectivity to Intermediate Village, If Any;*
8. *Avoiding Acquisition of Private Land;*
9. Keeping the Alignment 25 – 30 m above Normal Water Level (NWL) of River, If Any;

The consultancy services for the same have included design of best possible alignment and pavement composition, culverts and other structures in addition to analysis of costs, determining project feasibility and **Initial Environmental Examination (IEE)** Report for the Project **Kurkuti – Ghamsali – Niti** Road **Starts** from **Kurkuti Road** and **Terminates** at **Niti Road** in the **Uttarakhand State**.



**Figure 1 (a): Uttarakhand States’ Birds, Animals and Cumulative Impact Assessment (CIA) Supporting Wealthy and Rich Diversity OR Species.**



**Figure 1 (b): Traditional Uttarakhand States’ Food Culture and Cumulative Impact Assessment (CIA) Supporting Wealthy and Rich Assortment OR Collection.**



**Figure 1 (c): Mountain Ranges, Meandering Rivers and Miles of Forests Supporting Wealthy and Rich Biodiversity.**

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**Figure 1 (d): Mountain Ranges, Meandering Rivers and Miles of Forests Supporting Wealthy and Rich Biodiversity.**







**Figure 1 (e): Mountain Ranges, Meandering Rivers and Miles of Forests Supporting Wealthy and Rich Biodiversity.**

Most of the areas being hilly, summers in Uttarakhand State are soothing as the temperature hardly crosses 30°C (about 86°F), whereas the summers are exceedingly hot with temperatures crossing the 40°C mark and considerable humidity. Winters can be chilly with temperatures going below 5°C at times. The **climate** in the Northern part of Uttarakhand is typically Himalayan. This mountain range itself exerts an appreciable extent of influence on monsoon and rainfall patterns. Within the Himalayas, **climate** differs depending on altitude and position. **Climate** ranges from subtropical in the southern foothills, averaging summer temperatures of about 30°C (about 86°F) and winter temperatures of about 18°C (about 64°F). Warm temperate conditions prevail in the Middle Himalayan valleys, with summer temperatures usually hovering about the mark of 25°C (about 77°F) and cooler winters. It lies between **Latitude 30.0668° N and Longitude 79.0193° E**. Located in the North – Eastern part of the country, Uttarakhand is surrounded by West Bengal on its South and shares international borders with Bhutan on its South – East, Nepal on its West and the **Tibet Autonomous Region (TAR)** of China on its North – East and it is often referred to as the **“Smart and Beautiful – Heritage of Himalayas”**. The beautiful mountains, the deep valleys and the biodiversity make Uttarakhand a favourite spot for tourists like **Mountain Ranges, Meandering Rivers and Miles of Forests Supporting Wealthy and Rich Biodiversity in Uttarakhand State** as shown above in **Figures 1 (a), (b), (c), (d) and (e)**. The **Initial Environmental Examination (IEE)** Report for improvement of ***“Uttarakhand BRO – 21 BRTF (123 – RCC) Division Suraitota, has been entrusted preparation of Initial Environmental Examination (IEE) of Kurkuti – Ghamsali – Niti Road from 00.000 Km to 20.000 Km (20.00 Kms) from CL – 9 to NHDL Specification in 21 – BRTF area under PROJECT – Shivalik in Uttarakhand”****.* The Projected Road **Kurkuti – Ghamsali – Niti Starts** at **Kurkuti** and **Terminates** at **Niti**. **The Project Assignment/ Task for Letter No. 80260/ Consultancy/ KGN/ 48/ E8 Dated July 2018**. The design length of proposed alignment is **191.00 Km.** and the route plan of **Kurkuti – Ghamsali – Niti Road** is given in **Table 1**.

**Table 1: The Route Plan of Kurkuti – Ghamsali – Niti Road.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Road Direction and Route Plan** | | | | |
| **Place Name** | | **Distance** | **Approximate Time for Journey** | **Mode of Vehicle** |
| **From** | **To** |
| **Kurkuti** | **Niti** | *17.56 Km.* | *04.25 Hrs* | **By Road with 4 Wheeler Drive** |
| **Total** | | **17.56 Km.** |  | |

***Physiographic Index***

Uttarakhand is the second – smallest Indian state and is geographically located at **Latitude 30.0668° N and Longitude 79.0193° E**. Landlocked in the Himalayan range, the state is bordered by Tibet on its North – East, Nepal on its west, Bhutan on its South – East and West Bengal on its South. The residents of Uttarakhand experience two kinds of climate. The Northern part of the state experiences tundra type of climate, whereas, the Southern part observes sub – tropical climatic conditions. Because of the tundra type of climate, the Northern part of the state remains covered with snow for almost 4 months in a year, when the night temperature goes below the level of 0°C. The weather condition of the state is mainly divided into 5 seasons, which are depicted below:

* *Spring;*
* *Summer;*
* *Autumn;*
* *Monsoon;*
* *Winter.*

Uttarakhandis subdivided into following units as Noteworthy and Remarkable Facts on Uttarakhand State are shown in the **Table 2** with worth mentioning and incredibleIndex of Uttarakhand State.

Table 2: Noteworthy and Remarkable Facts on Uttarakhand State.

|  |  |
| --- | --- |
| **Facts on Uttarakhand State** | |
| **Official Website** | ***https://www.euttaranchal.com and*** [***https://uk.gov.in/***](https://uk.gov.in/) ***andhttps://uktech.ac.in/*** |
| **Date of Formation** | ***Uttarakhand****formerly known as* ***Uttaranchal*** *is a state in the Northern part of India. On 9th November 2000, Uttarakhand became the 27th State of the Republic of India, being carved from the Himalayan Districts of Uttaranchal. The region formed a part of the* ***Uttara Kuru Kingdom*** *during the Vedic age of Ancient India.* |
| **Area** | *53,483 Km2* |
| **Density** | *The population density of the state is 189 People/ Km2 having a 2001 – 2011 decadal growth rate of 18.81%.* |
| **Total Population (2012 and 2019)** | *1.01 crores OR* ***10.3932 Million*** *Approximately.* |
| **Males Population (2011)** | *5,137,773* |
| **Females Population (2011)** | *4,948,519* |
| **Number of District** | *13* |
| **Capital** | *Dehradun* |
| **Rivers** | *Alaknanda River, Ganges River, Pindar River, Assan Barrage, Gaula River, Pushpawati River, Bhilangna River, Kosi River and Ramganga River. In some parts of Uttarakhand, rivers like Ganga, Tons, Yamuna, and Kali are famous for offering a wide variety of water sports.* |
| **Forests and National Park** | ***Six National Parks*** *in Uttarakhand for Your Next Getaway. Jim Corbett National Park, Rajaji****National Park,*** *Valley of Flowers****National Park,*** *Nanda Devi****National Park,*** *Gangotri****National Park,*** *Govind Pashu Vihar****National Park****and Sanctuary.* |
| **Languages** | *Garhwali or Kumaoni depending on their place of origin.* |
| **Neighbours State** | *Himachal Pradesh, Haryana, Uttar Pradesh.* |
| **State Animal** | ***“Alpine Musk Deer”*** *(Official Moschus chrysogaster).* |
| **State Bird** | ***“Himalayan Monal Pheasant”*** *(Official Lophophorus impejanus).* |
| **State Tree** | ***“Burans”*** *(Official Rhododendron arboreum).* |
| **State Flower** | ***“Brahm Kamal”*** *(Official Saussurea obvallata).* |
| **State Fish** | [*To Protect the Endangered* ***“Mahaseer” Fish,*** *Uttarakhand*](https://www.hindustantimes.com/dehradun/to-protect-the-endangered-mahaseer-fish-uttarakhand-set-to-rope-in-fishermen/story-BI4UQ3JBbjypkVytn6xjpI.html)*.* |
| **Net State Domestic Product (2011 – 12 To 2015 – 16)** | *1,62,168 (Rs. Crore)* |
| **Literacy Rate (2011)** | *78.82%* |
| **Females per 1,000 Males {Sex Ratio Females (Rural)}** | *963 {1000}* |
| **Assembly Constituency** | *General Seats 54, SC Seats 14, ST Seats 2. Total Seats 70.* |
| **Parliamentary Constituency** | *The*[*Lok Sabha*](https://en.wikipedia.org/wiki/Lok_Sabha)*(meaning* ***“House of the People”****) is the lower house of the*[*Parliament of India*](https://en.wikipedia.org/wiki/Parliament_of_India)*.*[*Uttarakhand*](https://en.wikipedia.org/wiki/Uttarakhand)*state elects 5 members and they are directly elected by the state electorates of Uttarakhand. Members are elected for five years. The numbers of seats, allocated to the state/ union territory are determined by the population of the state/ union territory.* |

***Waterfalls***

Combined with the snow capped peaks of Uttarakhand, and the lush green forests that lead you to amazing trekking memories, **Waterfalls in Uttarakhand** rejuvenate your mind, body and soul like no other. Whether it is about bathing in the medicinal natural ponds at the edge of these waterfalls, or simply admires their beauty on a day trip, the undeniable serenity of these falls adds more to your ordinary day.

If you’re one of those people for whom only thinking about such places sparks joy, then scroll down to know what awaits you at these falls to plan a perfect outing …!!! Uttarakhandis primarily a land of sky scraping mountains/ hills and the lush green vegetation on the mountain sides presents an **Eye – Soothing View** and this sight is made more panoramic by the waterfalls in Uttarakhand. Mostly perennial in nature, waterfalls abound in Uttarakhand, especially in the Northern region. The local inhabitants of Uttarakhand consider some of the waterfalls to be sacred place. The waterfalls of Uttarakhand are ideal sites for setting trekking base camps, since they fall from high altitudes and are perennial in nature; these waterfalls are also conducive for setting up hydro power projects. Witness the beauty of Uttarakhand and indulge in spiritual pilgrimages, adventure sports, and treks. Visit Nainital, Rishikesh, Haridwar, Auli, Jim Corbett, and more. The important waterfalls in Uttarakhand are:



* ***Kempty Waterfalls:****Located a few kilometers off Mussoorie, Kempty falls is a serene waterfall that is a must visit for all the tourists visiting the nearby hill station. Falling from a height of 1,364 Metres above sea level, these falls are an amazing site to admire. Nature’s beautiful creation like this one is a perfect spot for a day trip or a picnic with your loved ones and stay till the evening time to revive your senses with a fresh cool breeze that flows around this region. So, when are you planning to visit one of the****Top Waterfalls in Uttarakhand …****?*



* ***Bhatta Waterfalls:*** *Earlier a lesser known place, this charming waterfall in Mussoorie has gained popularity in recent years and is surely not to be missed while you’re planning a trip to Mussoorie. You can easily reach this place via bus or a car in the Bhatta village and have a fun outing with your folks ..!!! A rather steep fall, that comes directly from the hills above, hitting the rocks around, people belonging to different age groups visit this place to bath and enjoy the serenity of this place.*



* ***Corbett Waterfalls:*** *With a mere distance of 25 Kms from Ramnagar, you can easily reach Corbett falls in Uttarakhand for a day trip. The dense teak wood forest adds more to the charm of this place and a melodious chirping of the birds in this region will make you stay for a bit longer. You can either stay overnight and set a camp near these waterfalls or just have a picnic meal with your favourite travel folks. This is surely amongst the most****Famous Waterfalls in Uttarakhand****that you ought to visit …!!!*



* ***Vasudhara Waterfalls:*** *With a close proximity to Badrinath, Vasudhara falls make an amazing spot to witness spectacular views around and soak in the tranquility that accompanies this environment. Dropping from a height of 400 Feet and 122 Metres above sea level. Even though it is said that the true beauty of this place can only be admired by those who are guilt free, it is always a good idea to visit waterfalls to revive your senses.*



* ***Neer Garh Waterfalls:*** *You can easily reach Neer Garh waterfall from Rishikesh Railway Station, as it is only at a distance of 9 Km. Amongst the most popular places to visit in Rishikesh, this waterfall is known for having a fun trek abode. If you’re not in the mood to exercise, then surely a dip in the cool waters of this place will be perfect for you. There are also two bridges on this waterfall and the colourful butterflies found here add more beauty to this place.*



* ***Birthi Waterfalls:*** *Covering a mere 14 Km distance from Tejam will let you experience the splendid site of Birthi Falls in Pithoragarh district of Uttarakhand. Approximately 400 Feet above sea level, the rolling water splashes on the shore with an unparalleled gorgeous view that is more than enough to make your day. You can even choose to trek to this place and have an exciting outing with your pals (friends) at this site for sure …!!!*



* ***Tiger Waterfalls:*** *Falling from a height of 50 Metres, the renowned Tiger falls offer a relaxing bath in the pond below. You can easily access this place via a short trek of 1 Km after a drive on Chakrata – Lakhamandal route. An alternative route involving the scenic views of the forests in Chakrata via a 5 Km trek can also lead you to this place. Be careful of the narrow and rough roads that are used to reach this place and they’re only suitable for SUV Cars.*



* ***Sahastradhara Waterfalls:*** *Here as per with numerous caves around, we wouldn’t be surprised if Sahastradhara falls turns out to be your favourite waterfall in Uttarakhand. The sulphur content of this waterfall is said to have medicinal properties, which is why you can see many locals as well as tourists bathing in these falls. The best time to visit this place is the rainy season, when the falls have more water and the relatively greener region in the surrounding add to the charm of this place. You surely cannot miss out on the****Best Waterfall in Uttarakhand****on your next vacay …!!!*



**2. BACKGROUND – Scope and Study**

The construction of high altitude hilly/ mountainous roads to Indo – China Border road under phase – II in the state of Uttarakhand has been entrusted to **Border Road Organisation (BRO)** by Ministry of Home Affairs, Department of Border Management, and Government of India. The work is of National importance having strategic in nature from Border security aspect. The consultancy work for Preparation of Detailed Project Report has been awarded to **M/s HIGHWAY ENGINEERING Consultant BHOPAL (MP)**. The **Border Road Organisation (BRO)** has been entrusted with theassignment of Consultancy Services for preparation of Detailed Project Report of National Highways/ State Roads (approved as National Highway) in many States for up gradation to Two/ Four Lanes with paved shoulder configuration. **BRO** now invites proposal from Technical Consultants for carrying out detailed project report for proper structuring and implementation of projects on Engineering, Procurement, and Construction (EPC)/ Public Private Partnership (PPP) mode on **Kurkuti – Ghamsali – Niti Roadin the North Uttarakhand State**. In order to fulfill the traffic needs and road safety requirement, **BRO** has appointed the **M/s HIGHWAY ENGINEERING Consultant BHOPAL (MP)** as consultants to Providing Consultancy Services for Preparation of Detailed Project Report of **Kurkuti – Ghamsali – Niti Road** for Managementand Construction of High Altitude Hill Roads to Indo – China Border Road under **Part – 1** in the State of Uttarakhand, **Package No.: 00,** using **Satellite Imagery/ Global Positioning System**.

The **Ministry of Home Affairs (MHA)**, Govt. of India has decided to take up the development of High Altitude Hill Roads to Indo – China Border. The **Border Road Organisation (BRO)** has been entrusted with the construction of High Altitude Hill Roads to Indo – China Border road in the State of Uttarakhand. This project section is from Kurkuti – Ghamsali – Nitiin the State of Uttarakhand and the **Total Length of Proposed Road is 17.56 Km.** The Coordinates of Project roads at **Starting Point, Kurkuti** are **Latitude of 21.3199° (North) and Longitude of 82.5646° (East)**. Coordinates at the **End Point, Niti** are **Latitude of 30.7776° (North) and Longitude of 79.8412° (East)**. **Length provide by ITBP for the road is 20.00 Km., whereas the designed length is 17.56 Km.**

The project study consists of preparation of the following as shown in **Figure 2**:

*Stage 1 – Inception Report and Quality Assurance Plan;*

*Stage 2 – Reconnaissance/ Investigation/ Servey Report;*

*Stage 3 – LA and Clearances I – Report;*

*Stage 4 – Detailed Project Report (DPR);*

*Stage 5 – Technical Schedules;*

*Stage 6 – LA and Clearances II – Report.*

**Figure 2: Detailed Project Description Process (Schematic Diagram OR Flowchart Showing Project Layouts and Concluding Components).**

**Consultancy Services for preparation of feasibility study and detailed project report of INITIAL ENVIRONMENTAL EXAMINATION (IEE) assessED – controlled… areas like super communication expressway...!!!**

**Operations and Maintenances**

***CS/ CC/ Bituminous Road Construction***

***Clearing Sites/ Places/ Areas***

**Standards/ Policies/ Essential Environmental Clearances**

**Road/ Bridge Construction Network/ Activities**

**Construction of Roads/ Bridges and Pertinent/ Applicable Structures**

**FINAL PLANS/ DPR**

**Project Planning’s (Alternative Considerations)**

***Sanction from BRO and State/ Local/ Regional Government Agencies***

***Leveling/ Laying Foundation on Coat***

**Preliminary Engineering Applications**

**(Preferred Plans/ Locations/ IEE REPORT)**

***Route Inspection/ Innovations and Inventory***

**Project Development Concepts/ Baselines**