ENVIRONMENTAL IMPACT ASSESSMENT (EIA)
URI-I STAGE-II HYDRO ELECTRIC PROJECT
(240 MW)

(Sector 1(c); Cat "A")

EXECUTIVE SUMMARY

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Prepared for:

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1. PROJECT DESCRIPTION

Uri-I Stage-II Hydro Electric Project is extension of Uri-I Power Station (Uri-I Stage-I/ Uri-I Project). The Uri-I HE Project was allotted to M/s NHPC Ltd. Uri-I Power Station was commissioned in the year 1997, by NHPC Ltd. consisting of 21.5m high barrage (from deepest foundation level), desilting basin, open channel, 10.63 km long Head Race Tunnel (HRT), Pressure Shaft, an underground Powerhouse, & 02 km long Tail Race Tunnel (TRT) with outfall at the Bandi village. NHPC Ltd. has signed Memorandum of Understanding (MoU) with Government of Jammu & Kashmir for execution of Uri-I Stage-II HE Project (240 MW) on Build, Own, Operate & Transfer (BOOT) basis for the period of 40 years.

The Uri-I Stage-II HE Project is located on Jhelum River, in Uri and Boniyar tehsils of Baramulla district in Union Territory of Jammu & Kashmir. The barrage site is located in Buniyar tehsil, about 2 km from Buniyar tehsil headquarter and powerhouse area lies in Uri tehsil and located about 15 km from Uri town (tehsil headquarter). The district headquarter at Baramulla is about 30 km from project site. The Project is well connected by road, all the project components are located along the National Highway 1 (NH1). The project is 347 km from Jammu and 85 km from Srinagar. The nearest railhead Udhampur Railway Station is about 265 km from project site. The nearest airport at Srinagar is about 88 km. Location map of proposed Executive Summary Draft EIA Report Uri-I Stage-II HEP is given in **Figure 1**.

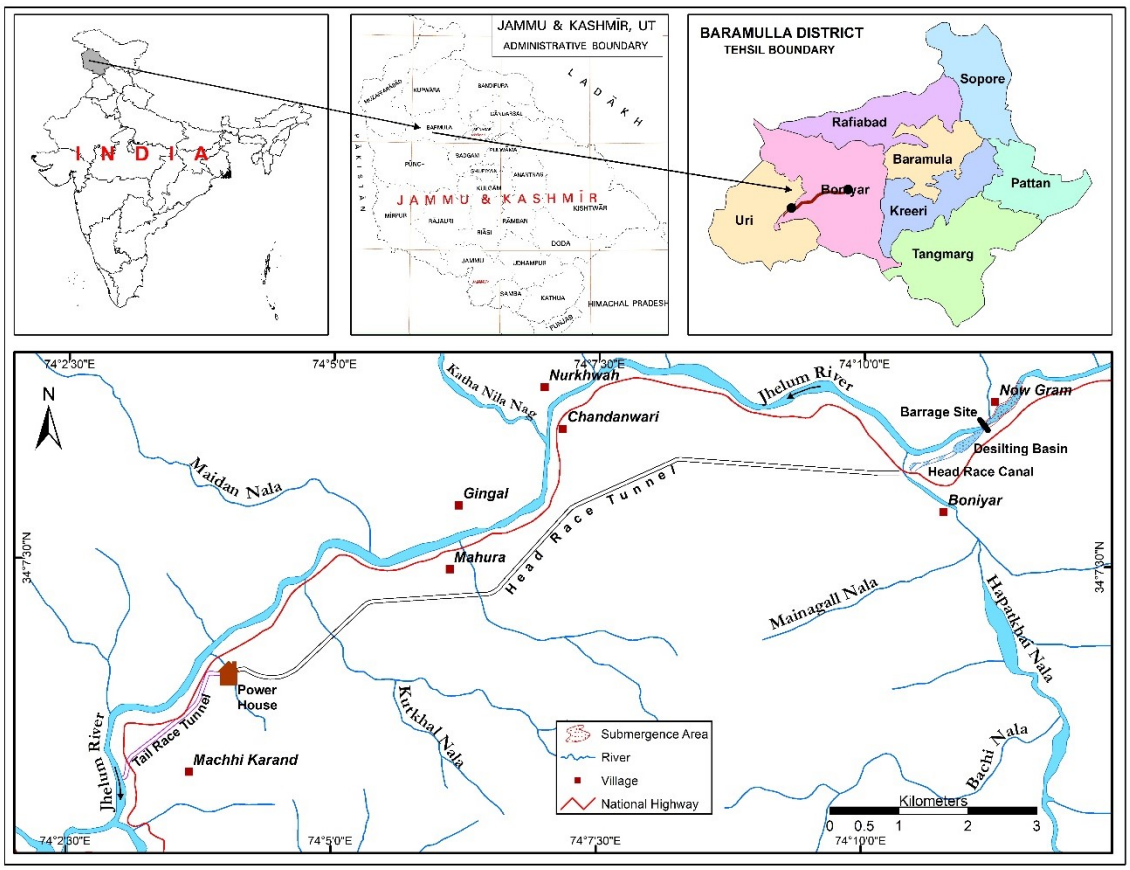

Figure 1: Location Map of Uri-I Stage-II HEP

Following are the major project components of existing Uri-I Power Station :

- Uri-I Power Station Barrage of 95m long at top of barrage and 21.5m high from its deepest foundation level. The full supply water level upstream of the barrage is EL 1491.00m and barrage top is at EL 1495.50m. Spillway consisting of 6 bays and 3 no. under sluice bays.

- A fish way is provided between bay no. 6 and bay no. 7. It is about 150m long with the inlet at EL 1489.0 and the outlet at El 1475.50.
- Head regulator of 34m length, Headrace canal of about 665m length and 12m width, intake forebay at the downstream end of the canal of 195m, a siphon type surplus escape at a water level of El 1491.30m and Boniyar Nalla Intake, culvert and tunnel intake of total length about 250.0m.

Proposed structures (Uri-I Stage-II H.E. Project)

- Horseshoe shape HRT of 10.472 km length and 6.50 m diameter in left bank and parallel to existing HRT in valley side.
- 1 no. 5m dia. steel lined pressure tunnels/shafts and 2 no. 3.25m dia. steel lined penstocks.
- Underground powerhouse cavern housing 2 no, units of 120 MW each.
- Transformer cavern located d/s of powerhouse cavern.
- Draft tube gate operation cavern further d/s of Transformer Cavern 1 no. main TRT of size 6.5m horseshoe shape having tailrace surge galleries.
- To facilitate the construction and operation of the project components, suitable adits and access tunnels have been proposed.
- A 6.5 dia. 2.28 km long horseshoe shaped TRT of Stage-II is aligned on valley side and running parallel to the existing Stage-I TRT. The TRT is located on left bank of Jhelum River with TRT out fall near Bandi Village.

It is proposed to complete the project and commission the two units of 120 MW each within 44 months.

2. LAND REQUIREMENT

The total land requirement for Uri-I Stage-II HEP is estimated as 114.0335 ha, out of which, 97.0335 ha is non-forest land and 17.0 ha is forest land (for underground project structures). At present required 97.0335 ha of non-forest land is in possession of NHPC that will be utilized for various components of the proposed project. It is proposed to utilize same for various above ground components of Uri-I Stage-II HEP. However, 17.0 ha of afresh underground forest land is required to be diverted for proposed project.

Therefore, no revenue land (private/ government) is required for the proposed project, no acquisition of private or community assets is required and hence, displacement of the population/ persons is not involved.

For diversion of 17 ha of forest land, an online application has been submitted to MoEF&CC vide Proposal No.: FP/JK/HYD/144277/2021 (http://forestsclearance.nic.in/viewreport.aspx?pid=FP/JK/ HYD/144277/2021

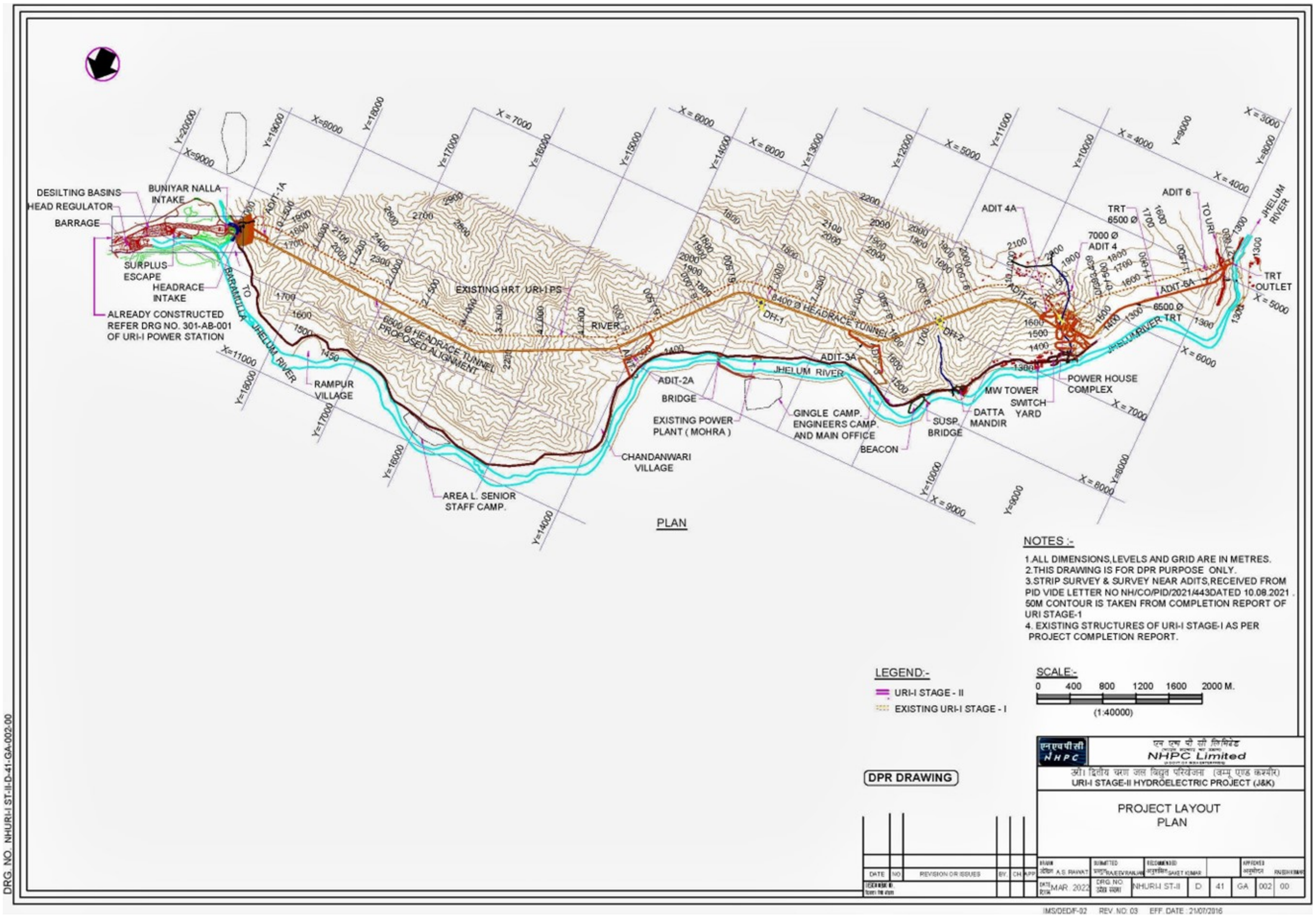

Figure 2: Uri-I Stage II HEP Layout Plan

3. DESCRIPTION OF THE ENVIRONMENT

Data on the existing environmental condition in the study area were collected to understand the present setting of the environment at the project site. The study area delineated as per the approved Terms of Reference (TOR) for EIA studies by Ministry of Environment, Forests & Climate Chang (MoEF&CC), Government of India vide letter no. J-12011/08/2021-IA-I dated 10th June 2021 for 240 MW installed capacity. The base line status is described briefly in the following sections:

3.1 Land Use/ Land Cover

The land use/ land cover pattern of the study area was interpreted from the latest satellite data and out of the classified land use/ land cover categories, Evergreen/Semi-Evergreen Forest constitutes predominant land use in the study area (about 45.0%), followed by scrub forest which constitute about 21.0% of the total study area. Scrub land covers around 19.0% of the study area. Waterbody covers around 1.17% and Snow/Glacier is comprised of 0.60%. of the study area.

3.2 Physiography

The study area of the proposed project lies between 1116 m and 3893 m elevation. About 34 % of the study area lies in 2000 to 2500 m elevation band and about 29% of project components are restricted to 1500 to 2000m elevation band. Nearly 45% of the study area is characterized by steep slopes and about 36% area by moderately steep slopes.

3.3 Geology

Uri-I Stage-II Hydroelectric Power project is an extension of Uri-I Power Station is located on the eastern part of the Kashmir syntaxial bend of the northwest Himalaya where the arcuate ridges are aligned nearly along NESW. Geologically, the area exposes rocks of Salkhala Formation, Dogra Group, Pir Panjal Group, Kazinag Granite, Palaeozoic basics, Subathu Formation, Murree Group, Karewa Group and undifferentiated Quaternary deposit. Jhelum River flanked on either side by the rocks of Dogra (≡ Buniyar) Group with faulted contact in the north and thrusted contact (Chhulan Thrust) the in south, which is concealed under Quaternary sediments.

3.4 Hydrology

Uri-I Hydroelectric Project, a runoff the river scheme, is situated on river Jhelum in Uri Tehsil of Baramulla district of UT Jammu and Kashmir. The Jhelum is the principal water-way of Kashmir. It has its source from a spring called Verinag.

The catchment area of the Jhelum River at the Uri-I Barrage is fan shaped and has an area of 12,750 km2. About 20 percent of the catchment lies downstream of Wular Lake. The catchment area of Jhelum at Uri-I Power Station lies between Longitude 73°55’ E to 75°35’ E and Latitude 33°25’ N to 34°40’ N. The highest peaks in the Jhelum catchment reach above 5000 m, but most of the area is located between elevation 1400 and 4000 m.

3.5 Meteorology

The study area of the proposed project lies in Baramulla District of UT of Jammu & Kashmir. The average maximum temperature of 33.3°C was recorded in Uri tehsil during June. The average minimum temperature of 2.3°C was recorded during January. The area receives

maximum rainfall during the southwest monsoon i.e., between June and September when about 49.5% of the annual average rainfall is received during monsoon months. The mean annual average rainfall of the Uri tehsil was recorded as 1645.48 mm. The Humidity is generally low throughout the year, except during monsoon months, humidity in the study area is close to 66% in the month of August. The average maximum wind speed of 4.18 m/s is observed during May.

3.6 Soil

As per soil maps collected from National Bureau of Soil Survey & Land Use Planning, Regional Centre, New Delhi, soils in the project area in general are predominantly Entisols and Inceptisols i.e. they have weakly developed soil profiles. Predominant soil type in the study area was pre-dominantly represented by Lithic Udorthents associated with Typic Udorthents characterized by Shallow, somewhat excessively drained, mesic, loamy-skeletal soils on steep slopes with loamy surface, severe erosion and strong stoniness.

The soil fertility based upon Nutrient Index in terms of NPK shows that Nitrogen is in the 'Low' range Phosphorus fertility rating 'Medium' range during monsoon but in pre-pre-monsoon and winter season is in the 'Low' range whereas, Potassium fertility status of soil in the 'medium' range.

3.7 Ambient Air and Noise Quality

The Ambient Air Quality monitoring was carried out conforming to the National Ambient Air Quality Standards for Industrial, Residential, Rural & Other Areas and Ecologically Sensitive Areas. The concentrations of $PM_{2.5}$, PM_{10}, SO_2, and NO_2 at all the sites were well within the Residential & Rural area permissible limits prescribed by National Ambient Air Quality Standard 2009 notified by CPCB.

The results of monitoring show that $PM_{2.5}$, PM_{10}, SO_2, and NO_2 levels at all the sites are well within the Residential & Rural area permissible limits prescribed by National Ambient Air Quality Standard 2009 notified by CPCB. Air quality was also assessed using 24hr averages of $PM_{2.5}$, PM_{10}, SO_2, and NO_2 levels in the AQI calculator of CPCB. All the locations fall under the 'Satisfactory' category in the different seasons in the study area except AQ2/ Near Barrage Site Village, AQ4/ Near NHPC complex and AQ6/ Gurudwara near TRT during monsoon season fall under 'Good' category in the study area.

3.8 Water Quality

Surface water quality of Jhelum and its tributaries samples collected during winter, pre-monsoon, and monsoon seasons was compared with the Water Quality Criteria of Central Pollution Control Board (http://www.cpcb.nic.in/Water_Quality_Criteria.php) fall under Class 'A' with Drinking-Water Source without conventional treatment but after disinfection.

Analytical results of Groundwater samples were compared with drinking water standards IS-10500:2012 to assess the status of Groundwater taken from Spring water as this water is used for drinking purposes in villages. All the samples were found within permissible limits as per drinking water standards prescribed by CPCB.

3.9 Floristic Diversity

Forest is dominant land use pattern in the study area as more than 66% of the study area is under good forest cover. ii) According to 'A Revised Survey of the Forest Types of India' by Champion and Seth (1968). Forests in the study area are comprised of Group 12-Himalayan Moist Temperate Forest and Group 13-Dry Temperate Forest.

The most common tree species in the project area are *Cedrus deodara, Pinus wallichiana. Picea smithiana, Celtis australis, Fraxinus xanthoxyloides* and *Robinia pseudo-acacia* are dominant in area. Shrub vegetation in the area was represented by *Sorbaria tomentosa, Cotoneaster microphyllus, Desmodium elegans, Spartium junceum, Artemisia nilagirica, Boehmeria platyphylla, Gerardiana heterophylla, Indigofera cassioides, Viburnum grandiflorum, Caryopteris odorata*, *Prinsepia utilis and Myrsine africana*, etc. are the grass species in the catchment, mostly grown on barren rocky steep slopes.

Overall, the study area harbors 192 plant species belonging to different plant groups like Angiosperms, Gymnosperms, Pteridophytes, Bryophytes and Lichens. Angiosperms were represented by 174 species, Gymnosperms by 8 species, 3 species of Pteridophytes, 2 species Bryophytes and 5 species of Lichens were recorded during the survey.

As per the IUCN Red List of Threatened Species Version. 2022-2, *Saussurea costus* was listed under Critically Endangered (CR), *Angelica glauca* under Endangered (EN), *Ephedra gerardiana, Marchantia paleacea and Ulmus wallichiana* under Vulnerable (VU), *Sonchus mauritanicus* and *Fraxinus excelsior* were listed under Near Threatened (NT) category. The rest of the species evaluated are either Least Concern (LC) or Data Deficient (DD) category.

As per the Red Data Book of Indian Plants published by Botanical Survey of India, *Acer caesium*, *Dioscorea deltoidea* and *Inula racemose* are listed as Vulnerable (VU) species, while *Saussurea costus* is listed as Endangered (EN) species.

3.10 Faunal Diversity

Mammals: During field surveys only Rhesus macaque (*Macaca mulatta*) and Small Indian Mongoose (*Herpestes auropunctatus*) are the species sighted in the study area. Besides these, no other wild animal was sighted during field investigation.

Presence of Common Leopard (*Panthera pardus*), Common Langur (*Semnopitheaus entellus*), Himalayan Goral (*Naemorhedus goral*) and Asiatic black bear (*Ursus thibetanus*) were confirmed by forest officials and villagers in the project area.

Avifauna: A total of 25 species of bird species 5 Order and 17 families were recorded during the field survey from the study area. Most commonly found birds were Himalayan Bulbul, Red-vented Bulbul, Russet Sparrow, Black Drongo, Black Kite, Water Redstart, Slaty-headed Parakeet and Long-tailed Shrike were the most frequently sighted bird species in the study area. A large portion of avifauna species comprised of resident birds in the project study area.

Herpetofauna: During the survey, During the survey, Garden lizard (*Calotes versicolor*), Kashmir Rock Agamid (*Laudakia tuberculata*), and Skinks (*Asymblepharus ladacensis*) were

commonly sighted species in the area. Common Rat Snake (*Ptyas mucosa*) and Himalayan Pit Viper (*Gloydius himalayanus*) are also reported in the Working Plan of Jhelum Valley Forest Division.

Butterflies: 6 species of butterflies were recorded during the field survey. Indian Tortoiseshell, Indian Cabbage White, and Pearl white were the frequently sighted species observed all along the water bodies.

Aquatic Ecology: Among the aquatic organisms, 33 species of phytobenthos and 17 species of phytoplankton were recorded from river Jhelum and its tributaries. During sampling 12 species of zooplankton and 10 genera of macro-invertebrates (MI) were recorded from various sampling site.

Fish fauna: During the experimental fishing Snow trout (*Schizothorax plagiostomus*) is the only species captured during experimental sampling. According to published literature, 18 fish species were reported from the area.

Conservation Status

As per Wildlife Protection Amendment Act, 2022, Common Leopard (*Panthera pardus*), Himalayan Musk Deer (*Moschus leucogaster*), Himalayan Goral (*Naemorhedus goral*), Jungle Cat (*Felis chaus*), Leopard Cat (*Prionailurus bengalensis*), Grey mongoose (*Herpestes edwardsii*), Small Indian mongoose (*Herpestes auropunctatus*), Golden Jackal (*Canis aureus*), Red Fox (*Vulpes vulpes*), Bengal Fox (*Vulpes bengalensis*), Wild Dog (*Cuon alpinus*), Asiatic Black Bear (*Ursus thibetanus*), Himalayan Weasel (*Mustela sibirica*), Common Otter (*Lutra lutra*), Red Giant Flying Squirrel (*Petaurista petaurista*) and Indian Crested Porcupine (*Hystrix indica*) are the mammalian species listed as Schedule I species (Table 3.46). All other species are either listed under Schedule II or not included in any schedule of IWP Amendment Act, 2022.

All the avifaunal species sighted from the study area fall under Least Concern (LC) category as per IUCN 2022-2. As per WPA (1972), Crested-serpent eagle (*Spilornis cheela*) is under schedule-I. Rest of the avifaunal species recorded from the area are listed as Schedule II except House crow and Rock dove which are not listed under any schedule of IWP Amendment Act, 2022.

3.11 Proximity to Protected Area

Kazinag National Park, Lachipora Wildlife Sanctuary and Limber Wildlife Sanctuary are the nearest protected areas from Uri-I Stage-II HE Project. All the project components area outside the notified ESZ of protected areas.

3.12 Social Environment

The proposed project falls in the Uri & Buniyar tehsil of Baramulla district of Union Territory of Jammu & Kashmir. According to the 2011 census, Baramulla district has a population of 1,008,039. Of the total population, 534,733 (53.05%) were males and 473,306 (46.95%) were females, the sex ratio being 885 females for every 1,000 males. The district has a population density of 305 inhabitants per square kilometre. Baramulla district has a literacy rate of 66.93% with male literacy 77.35% and female literacy 55.01%. Baramulla town is the largest

town in the district and the fourth most populous town in the Union Territory of J&K with a population of 1, 67,986 as per 2011 census.

Baramulla is the largest producer of Horticulture products in the Jammu & Kashmir. Baramulla has a Rabbit Farm at Palhallan, Pattan, one of the only two rabbit farms in Northern India. Baramulla has a Silkworm breeding unit at Mir Gund, Pattan.

The entire study falls under Baramulla district. In the study area, 91 inhabited villages fall within a 10 km radius of proposed project. The population of the villages in the study area is 139213 with 75260 (54.06%) males and 63953 (45.93%) females. The sex ratio was found at 849 females per 1000 males. The total Scheduled Tribes (ST) population is 14.78% of the total population. In the project study area, there are 66817 literates which constitute 47.99% of the total population of the study area. According to 2011 census total population of workers in the study area 37613 (27.01%). Main and marginal workers were 18269 (48.57%) and 19344 (51.42%) respectively.

The education facilities in the area are moderate up to middle school but for secondary and senior secondary education students travel up to 5 to 15 km. In the study area there are 3 colleges up to graduation available in the village namely Buniyar, and Nowshera. There is a one Pvt. Hospital at Buniyar.

There are 2 primary health sub and 5 primary health centres available in the surveyed area. There is no community health center in the survey villages. In addition to these NHPC Hospital at Gingal also provides basic medical facilities to the villagers. The District Hospital and Medical College at district headquarter Baramulla is the only government hospital serving as referral center for complicated cases in the district.

The livelihood of most of the people of the study area depends on job, agriculture and cattle rearing. Spring water and Piped water supply are the main source of drinking water in the study area. The most important road passes through the area are National Highway 1A (Baramulla to Uri). Transportation facilities are good in the area, all the village roads are well connected to highway through metaled roads. Most of the surveyed villages have postal and phone connectivity available.

4. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 Ambient Air Quality

Construction Phase Impacts: The air environment around project site is free from any significant pollution source at present. The construction activities including operation of crushers, concrete batch plants, construction work and movement of vehicles along unpaved road will generate dust & gaseous emission and impact air quality. The burning of waste will also affect air quality. In absence of proper fuel, construction workers at the project site may use wood for fuel burning and space heating. This will also impact air quality. Therefore, needs to be managed properly.

Operation Phase Impacts: In hydropower project, air pollution occurs mainly during project construction phase. During operation phase, no impacts are envisaged on air environment.

4.2 Noise Environment

Construction Phase Impacts: Noise in and around the construction site may affect the wildlife in the nearby areas. Due to construction activity in the area, noise levels will increase during the period of construction, however, they will remain limited to the work area. Sources of noise will be increased vehicular traffic due to project construction on approach roads and at construction sites. Other sources of noise and vibration will be the operation of various equipment and use of explosives for blasting purposes for construction activities.

The effect of high noise levels on the operating personnel may be harmful. Continuous exposures to high noise levels affect the hearing ability of the workers/operators. To prevent these effects, it has been recommended by Occupational Safety and Health Administration (OSHA) that the exposure period of affected persons be limited.

Operation Phase Impacts: No major impacts are envisaged on noise environment during project operation phase.

4.3 Water Environment

Construction Phase Impacts: Water is used in construction activities leading to wastewater generation with high suspended solids. Similarly, effluents due to washing from truck or equipment etc. would have high concentration of oil and grease. Assessment of quantum of wastewater from such activities is difficult, however, they can impact the nearby water bodies if surface run off with high suspended solid is discharged into them. Domestic wastewater will be generated from project and worker's colony to be set up during construction phase, which can find its way to river/ ground water without any treatment will cause significant impact on water environment therefore needs to be managed properly.

Operation Phase Impacts: Construction of dam to regulate water for power generation may lead to permanent change in flow regime of the river. Also, the major impact of such project is habitat disturbance of aquatic fauna. In case of proposed project, the operational barrage of Uri-I Power Station is utilized for Uri-I Stage-II HEP. The Uri-I Power Station barrage is under operation since 1997. The mitigation measures for habitat conservation like fish ladder and maintaining the downstream discharge (environmental flow) to sustain the aquatic life is already implemented during operation of Uri-I Stage-I project. Therefore, no additional impact of operation of Uri-I Stage-II has been anticipated.

4.4 Land Environment

Construction Phase: The following positive impacts are anticipated on Land environment during construction phase:

- **Impact due to Land Requirement and change in land-use:** For the development of the Uri-I Stage-II HEP, no surface area would be acquired for construction of project components, reservoir area creation, muck dumping, quarrying operations, construction camps, and colonies. The required 97.0335 ha non-forest land is already under possession of NHPC and the remaining 17.0 ha forest land is required for underground work.
- **Impact Due to Muck Generation:** Muck generation, transportation and disposal can significantly impact the land environment, if not managed properly.

- **Impact due to Waste Generation**: The main sources of waste generation can be categorized as:
  i. Municipal waste (includes commercial and residential wastes, excluding industrial hazardous wastes and bio-medical wastes)
  ii. Construction and demolition debris (C&D waste)
  iii. Bio-medical waste
  iv. Hazardous waste (generated from construction machinery and equipment)
  v. e-Waste (computer parts, Printer cartridges, electronic parts, etc.).
- **Impacts due to Quarrying**: Quarrying is normally done by cutting the face of the hill. The rock from the exposed face of the quarry due to erosion forces gets slowly weathered and they become a potential source of landslide, which needs to be managed.

4.5 Impacts on Forests and Forest Land

No surface forest land needs to be diverted for the construction of the project. Only 17.0 ha of underground forest land will be diverted for the underground construction work of the project components. Therefore, no tree felling or clearing of vegetation cover will be undertaken for the proposed project.

4.6 Flora and Fauna

Construction Phase

Impact on Terrestrial Flora: Increase in human interference could have an impact on terrestrial ecosystem. The workers may cut trees to meet their requirements for fuelwood, construction of houses, furniture etc. Thus, it is necessary to provide alternative fuel, training and awareness, community kitchens, fencing of critical areas, maintain cooking fuel supply and adequate surveillance to mitigate the adverse impacts on terrestrial flora during project construction phase.

Impact on Terrestrial Fauna: For proposed Uri-I Stage-II HEP, no deforestation will be required, only 17.0 ha underground forest land shall be acquired for HRT, TRT and Powerhouse. Hence there is no disturbance due to acquisition of land on wildlife habitat in the area. However, during the construction period, mobilization of large number of machineries, blasting activity and influx of construction workers may create disturbance to wildlife habitat in the vicinity of project area. However, these will be temporary and last during the construction period. Therefore, it is necessary to provide fencing in critical areas, controlled blasting and restrict movement of labours in forest areas and implement anti-poaching measures.

Operation Phase

Uri-I Stage-II HEP utilize operational barrage of Uri Stage-I Power Station. Operation phase impacts on flora and fauna will be positive due to restoration of construction areas, restoration of the muck disposal area, green belt development, implementation of Biodiversity Management and Wildlife Conservation Plan, etc. The increase of greenery and increased moisture due to the presence of the reservoir have a positive impact on avifauna.

The operation of hydroelectric project has impact on fisheries resources. *Schizothorax* species, a fish species migratory in nature was observed by the study team in the upstream and

downstream of Uri Power Station barrage site. In addition to fish ladder/ fish pass in the Uri-I barrage, fish passage for easy upstream movement of fish species along the rapids and steep slopes on Buniyar nala has been also constructed and maintained regularly with the help of J&K Fisheries Department.

4.7 Socio-Economic Environment

a) **Positive Impacts on Socio-Economic Environment:** The following positive impacts are anticipated on the socio-economic environment of the villages in vicinity of project area during the project construction and operation phases:
   i) A number of marginal activities and jobs opportunities with employment with contractors, new market ventures, etc. would be available to the locals during construction phase.
   ii) Developer bringing large scale investment to the area will also invest in local area development and will benefit the locals. Education, medical, transportation, road network and other infrastructure will improve.
   iii) The availability of alternative resources provided by developer in the rural areas will reduce the dependence of the locals on natural resources such as forest.
   iv) Petty contracts and R&M works will be available to PAFs and locals as per NHPC policy.

b) Negative Impacts on Socio-Economic Environment
   i) Impact due to influx of outside population may lead to various social and cultural conflicts during the construction stage. Therefore, permits/ restrictions will be imposed on movement of labours.
   ii) Increased incidence of Diseases.

5. MITIGATION MEASURES FOR AIR, WATER AND NOISE POLLUTION

Proposed project involves construction of underground structures like HRT, Powerhouse, TRT, and other associated infrastructure. Major construction activities have potential of pollution generation as discussed above. Impacts arising out of construction activities can be mitigated significantly by taking appropriate mitigation measures, as discussed below.

Control of Air Pollution: For the control of air pollution during construction phase of the project, it is suggested that it should be made mandatory for the contractor/s engaged in the construction works to ensure the implementation of pollution control measures as per CPCB guidelines with regular monitoring of ambient air quality in the project area. Vehicles should have valid PUC and all project roads should be metalled.

Control of Noise Pollution:

- Diesel Generator sets are to be placed in acoustic enclosures to reduce the noise.
- Proper and regular maintenance/lubrication of machines should be done.
- Noise producing machines (such as crushers, aggregate processing plants, etc.) should be provided with sound barriers.
- Quieter machines and vehicles with high quality silencers should be used.
- Ambient noise should be monitored periodically at different locations.

Control of Water Pollution:

- Provision of septic tank/ soak pit of adequate capacity for labour camp.

- Commission of suitable treatment facilities to treat the sewage generated from the colony & offices.
- Oil interceptors/ catchers will be provided and residue of petroleum products, batteries, e-wastes, etc. will be disposed in accordance with SPCB guidelines.
- Provision of sedimentation cum grease traps to prevent entry of contaminants to the water bodies.

A lump sum budget of **Rs. 40.0 lakh** per annum has been proposed for the mitigation measures for control of air, noise and water pollution during project construction phase.

6. ENVIRONMENTAL MONITORING PROGRAMME

Environmental Monitoring shall be performed during all stages of the project (namely: construction and operation) to ensure that the impacts are no greater than predicted, and to verify the impact predictions. The monitoring program for the proposed project will be undertaken to meet the following objectives:

- To monitor the environmental conditions of the project area and nearby villages.
- To check on whether mitigation and benefit enhancement measures have actually been adopted and are proving effective in practice.

A total of **Rs. 46.60 lakh** have been allocated to implement various activities envisaged under Environmental Monitoring Programme.

7. ADDITIONAL STUDIES

7.1 Resettlement & Rehabilitation Plan

No private land is required for the construction of various components of proposed Uri-I Stage-II HE Project. Therefore, acquisition of private or community assets and displacement of the population/ persons is not involved. Hence, requirement of preparation of Resettlement & Rehabilitation Plan is not envisaged in the present case.

7.2 Public Consultation

On completion of draft EIA report and its Executive Summary in English and vernacular language (Urdu) will be submitted to J&K Pollution Control Committee to initiate the process of Public Hearing (PH).

7.3 Local Area Development Fund

The aim of Local Area Development Activities is to focus sustainable development to improve the quality of life of neighborhood communities. The activities proposed under Local Area Development Activities have been refined keeping in view the needs and requirements of local population. Activities to be implemented will be discussed and finalized with District Administration by LADC. The provisional budget of **Rs. 2.50 crore** has been allocated for implementing the various local area development activities.

8. PROJECT BENEFITS

a. **Minimal impact on Environment and Forest Aspect**: There is no requirement of additional private and revenue land for the construction of the said project. The Forest

land involved for the construction of HRT, Powerhouse and TRT is underground and hence there is no involvement of trees in their alignment of the structures.

b. **R&R Aspect/ No displacement of the Population**: No acquisition of private land and displacement of families is involved in the proposed project.
c. **Optimum Utilization of the additional Kishanganga Water:** By tapping surplus water of inter basin Kishanganga Hydroelectric project, NHPC will be able to generate additional electricity that would be beneficial to the nation.
d. **Generation of Local Employment and Livelihood sources**
e. **Benefits to farmers:** Implementation of Catchment Area Treatment shall reduce soil erosion, maintain soil moisture, increase sub-surface water and fertility of fields.
f. **The future is Clean Ethical Energy**
g. **Hydro Power Generation:** The harnessing of enormous hydropower potential which can help in overall growth in the Union Territory and country as well.

9. ENVIRONMENTAL MANAGEMENT PLAN (EMP)

Pollution generation mainly during construction phase will be in the form of air, water and noise pollution, which will be mitigated by adopting various mitigation measures and implementation of environment management plans.

The project level Environment Monitoring Cell (EMC) would coordinate with stakeholders for effective implementation of all environmental safeguard measures prescribed in the EMP & environment and forest clearance letters.

9.1 Catchment Area Treatment Plan

The Catchment Area Treatment (CAT) plan highlights the management techniques to control erosion in the catchment area of a water resource project. Adequate preventive measures are thus needed for the treatment of catchment for its stabilization against future erosion.

In the present study, CAT Plan has been formulated for the free draining catchment till the barrage site on Jhelum River. The total area of the free draining catchment is **135.91 sq km**. The catchment area treatment involves:

- Understanding of the erosion characteristics of the terrain and,
- Suggesting remedial measures to reduce the erosion rate.

The estimated cost of implementation of CAT Plan including monitoring and evaluation is **Rs. 1346.05 lakh**.

9.2 Compensatory Afforestation Plan and Net Present Value

The Uri-I Stage-II HEP is being constructed in the jurisdiction of Jhelum Valley Forest Division in Baramulla district, UT of Jammu & Kashmir. The total land required for the construction of proposed project activities is approximately **114.0335 ha** out of which **97.0335 ha** is non-forest land and **17.00 ha** is forest land for underground work.

As per the above guidelines Compensatory Afforestation has been proposed on 17.0 ha The Compensatory Afforestation is proposed to be undertaken on non-forest land identified after consultation with the J&K Forest Department and District administration. The estimated cost of

the Compensatory Afforestation Programme determined by J&K Forest Department is **Rs. 71,19,383.55**.

Total forest land requirement for diversion for non-forest use i.e. for the underground activities is 17 ha. As the forest in the project area fall in the Eco Class VI as being of type Himalayan Moist Temperate Forests, Himalayan Dry Temperate Forest with Dense Forest type, therefore NPV of **Rs. 686205.0/ha** (i.e. 50% of Rs. 1372410.0/ha) would be required to be deposited in the Compensatory Afforestation Fund. The total cost of NPV has been determined by J&K forest department is **Rs. 1,16,65,485/-**.

The total cost of the compensatory afforestation plan, and NPV is **Rs. 1,87,84,868.55**. Exact costs shall vary, as it will be known after issue of Forest clearance (St-I) letter, as per demand by J&K Forest Department.

9.3 Biodiversity Conservation & Wildlife Management Plan

Keeping in view of the anticipated impacts of proposed project on the biodiversity of area, the mitigation measures suggested for biodiversity conservation and wildlife management plan and conservation of Schedule-I species are as follows:

i. Wildlife Habitat Preservation & Improvement
ii. Establishment of Eco Park
iii. Biological fencing
iv. Veterinary care
v. Prevention and Control of Forest Fire
vi. Development of Grazing land/ Pastures
vii. Awareness promotion
viii. Strengthening of Infrastructural Facilities of Forest Department
ix. Biodiversity Management Committee (BMC)

The J&K Forest Department shall be the executing agency for implementation of the proposed Plan in the surrounding of proposed project site. The estimated cost of implementation of various activities envisaged in the Biodiversity Conservation and Management Plan would be **Rs. 144.00 lakh**.

9.4 Fisheries Management Plan

Proposed Fisheries Development Plan has been prepared with the following objectives:

- Conservation, Management and Stocking by Enrichment of riverine fish fauna
- Strengthen of fishing techniques and skills of fishermen/ women societies
- Upgradation of existing Govt. Fish farms.
- Stocking of Reservoirs.

The J&K Forest Department shall be the executing agency for implementation of the proposed Plan. Budgetary provision of **Rs. 49.00 lakh** has been proposed fisheries in the proposed reservoir of Uri-I Stage-II Hydro Electric Project.

In addition to abovesaid measures mandatory discharge of 14.2 cumec as environmental flow has been maintained through Uri-I Power Station barrage to sustain the aquatic life in

the downstream stretch. Fish ladder has been provided in the barrage of already constructed barrage of Uri-I Power Station which shall also be used for Uri-I Stage-II HE Project.

9.5 Muck Management Plan

The construction would involve about 11,58,300 cum of soil and rock excavation. About 2,80,000 cum of excavated muck to be used in fillings for developing areas for construction facilities. The total area for the dumping of muck is **16.90 ha** which is already in possession of NHPC and can accommodate more than **21.19 lakh cum** muck.

The main objectives of process of muck dumping and restoration of these muck disposal sites are:

- to protect and control soil erosion;
- to create greenery in the muck disposal areas;
- to improve and develop the sites into recreational sites;
- to ensure maximum utilization of muck for the construction purpose;
- to develop the muck disposal sites/ dumping yards to blend with the surrounding landscape; and
- to minimize damages due to the spoilage of muck in the project area

The estimated cost of the relocation and rehabilitation of excavated material will be **Rs. 2188.16 lakh.**

9.6 Landscaping and Restoration of Construction Sites

Landscaping and restoration of construction sites will focus restoration of sites like, Quarry & Borrow sites, job facility area, colony area, and other area engaged during construction. After the completion of mining activity, these areas will be restored to their normal habitat conditions.

Various engineering and biological measures will be implemented for the restoration of proposed project affected areas. The landscaping and restoration plan will be implemented with help of landscaping experts and in consultation with Jhelum Valley Forest Division and the coordination and funding will be provided by the project proponent. The estimated cost for the landscaping and restoration works of quarry and borrow area, job facility area, colony area, and project roads areas, would be **Rs. 130.00 lakh**.

9.7 Reservoir Rim Treatment Plan

The reservoir of Uri-I Power Station is under operation since 1997 and no changes are envisaged due to construction of stage-II project. Similarly, though no major active landslide or slope instability is present in the reservoir area.

In addition to ongoing treatment measures taken by Uri-I Power Station, treatment measures for degraded areas with financial provision has been made Catchment Area Treatment Plan. Also, enrichment plantation will be carried out on suitable areas along the banks of Uri-I Power Station reservoir (Jhelum River) under Green Belt Development Plan Therefore, no additional budget has been allocated for the Reservoir Rim Treatment Plan.

9.8 Green Belt Development Plan

Green belt development will comprise plantations at various places like alongside roads, around the construction areas, and at different project offices and colonies. A temporary nursery has been proposed to cater the requirement of plant material required for plantation proposed under various management measures proposed under Environmental Management Plan of Uri-I Stage-II HEP.

Plantation of avenue, ornamental, and fruit trees are proposed in these areas along with the area around the project road, office complex and colony area. The plants of recreational value, horticultural importance shall be planted within the colony area. The ornamental and fruit plants will be procured from the horticulture department and local market while plants for avenue plantation will be procured from the forest department nursery. A budgetary provision of **Rs. 75.59 lakh** has been kept for the development of the Green Belt in and around the project area.

9.9 Sanitation and Solid Waste Management

Solid waste generated from temporary and permanent colonies in construction as well as operation phase requires special management for disposal. The waste generated from the project area will be collected, segregated and disposed off in line with the provisions laid down in Solid Waste Management Rules, 2016. The total budget in order to manage the solid waste generated, has been proposed as **Rs. 206.56 lakh.**

9.10 Public Health Delivery System

Medical services at secondary level play a vital and complimentary role to the tertiary and primary health care systems and together form a comprehensive district-based health care system. Following activities are proposed:

- Ambulance: 2 no. with all the basic Medicare facilities to cater for villages in the project area.
- Budget for running the ambulances including driver, fuel and maintenance for 4 years.
- Two first aid posts including sheds, furniture and basic equipment.
- Budget for running the first aid posts for 4 years.
- Budget for strengthening existing medical facilities.
- Measures to control COVID19 in the project area
- Budget for Health Awareness/ Vaccination Camps for 4 years.

Budgetary estimates for the public health delivery system to be implemented have been worked out as **Rs. 166.00 lakh.**

9.11 Energy Conservation Measures

The project authorities would make adequate arrangements such as Community kitchen, Supply of Kitchen fuel, efficient cooking facilities and solar lantern either directly by developer or through contractor to reduce the pressure on natural resources in the project area and minimize impacts on this count. A total budget of **Rs. 152.00 lakh** have been proposed under the Energy Conservation Plan.

9.12 Labour Management Plan for their Health and Safety

Construction work has many associated risks and health impacts for the workers who are directly exposed to such health and safety risks. Therefore, there is a need to prepare complete health and safety documents for workers either by project proponent/contractor and proponent shall ensure its implementation. A detailed plan will be prepared covering the above activities before start of construction work. A tentative budget of **Rs. 60.00 lakh** for labour management have been proposed under EMP.

9.13 Disaster Management Plan

DAM Safety Review Panel (DSRP) for Uri-I barrage constituted for Review of Safety and Stability of Barrage had submitted its report in October 2020 with conclusion that "The Uri-I Barrage and its appurtenant structures are well maintained and in good condition. All safety norms as applicable to dam/barrage safety are adhered and applied to keep the dam/barrage and its appurtenant works in safe condition. The condition of the Uri-I barrage is satisfactory and overall safety category of dam falls under CATEGORY –III".

Following the guidelines issued by Dam Safety Organization of Central Water Commission (CWC) in May, 2006, Emergency Action Plan (EAP) has been prepared and executed by Uri-I Power Station.

10. SUMMARY OF COST

The costs involved for implementation of Environmental Management Plan for Uri-I Stage-II Hydro Electric are summarized in the table given below.

Table 1: Cost for Implementing Environmental Management Plan

S. No	Component of EMP	Capital Cost (Rs. In lakh)	Recurring Cost (Rs. In lakh)							Total Cost (Rs. In Lakh)
			Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	
1	Catchment Area Treatment Plan	1346.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1346.05
2	Compensatory Afforestation Plan	71.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	71.19
3	Biodiversity Conservation & Wildlife Management Plan	144.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	144.00
4	Fisheries Conservation and Management Plan	17.00	8.00	8.00	8.00	8.00	0.00	0.00	0.00	49.00
5	Muck Dumping and Management Plan	30.00	428.14	637.22	530.19	533.11	9.50	10.00	10.00	2188.16
6	Landscaping, Restoration of Quarry, and Construction Sites	25.00	0.00	25.00	30.00	20.00	15.00	15.00	0.00	130.00
7	Reservoir Treatment Plan*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	Green Belt Development Plan	0.00	4.13	4.12	11.01	14.48	19.93	11.18	10.74	75.59
9	Sanitation and Solid Waste Management Plan	111.00	31.64	25.64	21.64	16.64	0.00	0.00	0.00	206.56
10	Public Health Delivery System	50.00	29.00	29.00	29.00	29.00	0.00	0.00	0.00	166.00
11	Energy Conservation Measures	26.00	31.50	31.50	31.50	31.50	0.00	0.00	0.00	152.00
12	Labour Management Plan	35.00	4.00	7.00	7.00	7.00	0.00	0.00	0.00	60.00
13	Disaster Management Plan (Emergency Action Plan) **	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	Control of Air, Noise and Water Pollution	0.00	10.00	10.00	10.00	10.00	0.00	0.00	0.00	40.00
15	Environmental Monitoring Programme	0.00	11.65	11.65	11.65	11.65	0.00	0.00	0.00	46.60
16	Rehabilitation and Resettlement Plan***	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
17	Local Area Development Plan	250.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	250.00
	Total	**2105.24**	**558.06**	**789.13**	**689.99**	**681.38**	**44.43**	**36.18**	**20.74**	**4925.15**
18	NPV under B-land[#]	**116.66**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**116.66**
	Total	**2221.90**	**558.06**	**789.13**	**689.99**	**681.38**	**44.43**	**36.18**	**20.74**	**5041.81**

* Reservoir Rim Management Plan is already implemented by Uri-I Power Station and Plantation is proposed under Greenbelt Development Plan

** Emergency Action Plan is already implemented by Uri-I Power Station

*** Rehabilitation and Resettlement Plan Not required as no private land is acquired for the project.

The cost of NPV shall come under the B-LAND in the DPR