

EXECUTIVE SUMMARY

TIUNI PLASU HYDRO ELECTRIC POWER PROJECT
(72 MW)
DISTRICT DEHRADUN, UTTARAKHAND

Project Proponent:

Uttarakhand Project Development and Construction
Corporation Ltd.
Yamuna Colony, DEHRADUN-248 001

Submitted By:



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1.0 Need for The Project

The need for the Tiuni HEP, District Dehradun, Uttarakhand, installed capacity 72 MW, in the upper reach of the Yamuna Basin, has been considered in context of power shortage in the Northern region in general and in the country as whole.

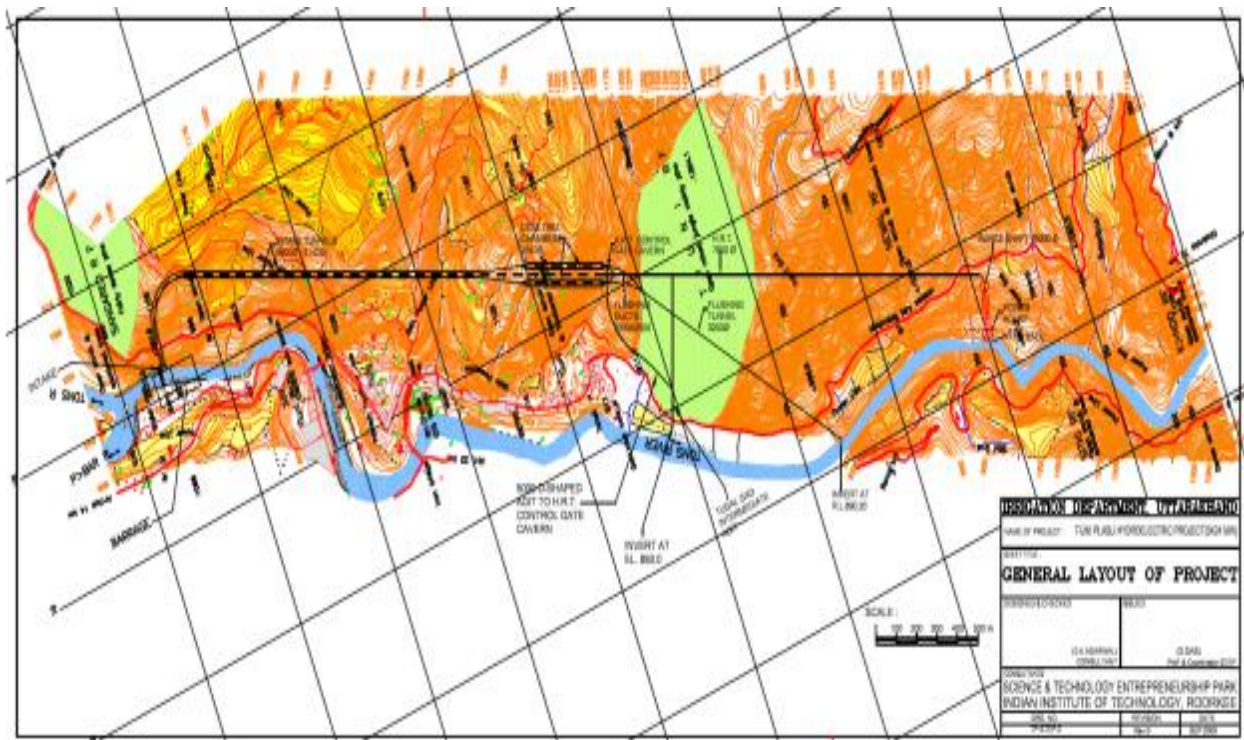
2.0 Location and Approach

The Project Site is located on SH-1 in Tehsil Tiuni, Dehradun district of Uttarakhand State and is about 190 km from the nearest railhead Dehradun.

3.0 Project Features

The proposed Tiuni Plasu Hydro Electric Project comprises the following structures:

- 138 m long gated barrage comprising of one under sluice and 7 barrage bays of 15m width fitted with radial gates (9mx12.248m) each designed for 6946 cumec.
- One Intake structure with 6 bays of 4.5m each
- Two nos. of 6 m diameter Intake tunnel of length 2.035 km each.
- Two nos. desilting chamber with hoppers to exclude silt particle six above 0.15 mm.KI
- 3.2 m diameter and 1300 m long flushing tunnel
- 7.6 m dia., 1.85 km long Head race tunnel for design discharge 145 cumec.
- 35 m dia X 28 m high restricted Orifice type surge shaft.
- 3 Steel lined four m internal diameter penstocks of 110 m
- Surface Power House of 66.0 m (L) x 19.50 m (W) x 45.2 m (H) having an installation of 3 Nos. Vertical Francis type turbines of 24MW each operating under rated head of 63.0 m.
- 40m long tail race channel.
- Annual energy generation 293.9 MU at 90% dependability.
- Construction Period-5years
- 1200 technician, skilled, semi-skilled and unskilled labour shall be engaged



LAY OUT PLAN

4.0 Environment Impact Assessment

M/s. EQMS India Pvt. Ltd., Karkardooma, Delhi, has conducted the Environment Impact study, as per ToR issued by the MoEF&CC vide letter No. J-12011/22/2017-IA-I(R) dated 06-09-2017.

5.0 Existing Status of Environment

5.1 Land use / Land Cover

The predominant land use class is by open forest (45.4%) followed by dense forest (43.6%), agriculture land (8.6%), settlement (1.3%) and waterbody (1.1%).

5.2 Land Requirement for Construction of the Project

For execution of the project 76.9086 ha land shall be required of which the apportionment between Private, Forest land shall be 8.7087 ha and 68.1999 ha respectively.

5.3 Archaeological / Historical Monuments/Sensitive Area

No archaeological monument of national importance, Defence Establishments, exists within 10 km from the project.

5.4 Soil Quality

The results of the soil analysis show that the soil is neutral at all the locations having pH varying from 7.42 to 7.85. The texture of the soil varies from loam to clay loam. Available nitrogen content in the surface soils ranges between 278.4 to 332.6 kg/ha thereby indicating that soils are low to medium in available nitrogen content. Available phosphorus content ranges between 16.8kg/ha to 32.5kg/ha thereby indicating that soils are medium to high in available phosphorus. Available potassium content in soils ranges between 117.2kg/ha to 136.2kg/ha, thereby indicating medium in potassium content. The organic carbon varies from 0.88% to 1.86% thereby implying that soils have high organic carbon.

5.5 Air and Noise Environment

The pollutants concentration in the air is well below the permissible limit, the maximum concentration of PM₁₀, PM_{2.5}, NO_x and SO₂ was 58.4 µg/m³, 36.4 µg/m³, 16.7 µg/m³ and below 5µg/m³ respectively, there are no industries in the area and the density of vehicular traffic is not alarming. The noise monitoring shows day and night time noise levels are higher at barrage site and near power house site due to flow of river. The noise levels for the rest of stations are within the prescribed limits.

5.6 Water Environment

The pH values of all analysed samples ranged between 7.12 – 7.72 and are within the tolerance limit (6.5-8.5). The TDS levels ranged from 85 to 123 mg/l and were well below the tolerance limit of 500 mg/l. Total hardness levels ranged from 54 to 78 mg/l and were well below the tolerance limit of 300 mg/l. The dissolved oxygen values ranged between 8.0-9.5 mg/l and were within the tolerance limit of 6mg/l.

The chlorides level in surface water samples ranged from 11 -19 mg/l and were below the tolerance limit of 250 mg/l. The sulphates level ranged from 4.4 to 6.0 mg/l and were below the tolerance limit of 400 mg/l. The nitrate level ranged between 0.90 to 1.24 mg/l and was lower than the tolerance limit of 20 mg/l.

5.7 Status of Biological Environment

Flora of the Project Area

- During Primary survey, herb flora was recorded as the dominant flora with 49 species (26 families) followed by shrub with 29 species (22 families), tree with 22 specie (14 families) and 10 grasses (2 families).
- About 10 economically important plant species were recorded from the study area.
- About 32 important medicinal/ethnobotanical importance plant species were recorded
- No RET species falling under IUCN Red List was recorded/reported from study area.

Fauna

The faunal study for the proposed project was carried out in both the submergence and influence zone of both upstream and downstream

- 11 mammalian species were recorded /reported during the survey of which none to Schedule-1 of WPA, 1972.
- 23 bird species were observed /reported during the survey.
- As many as 4 species of herpetofauna were recorded /reported.
- 13 species of butterflies were recorded/reported
- 9 species of fish were recorded/reported

5.8 Social and Cultural Background of The Area

Demography of Project Affected Villages

As per the Census of India 2011, the total population of the project affected villages comprising of 619 households is 3236 of which male and female population is 1661 and 1575 respectively. The overall sex ratio is 948 females per thousand males. The Literate male and

female in the study are 1285 and 1028 which implies that the literacy rate is 71.5%. The main workers are 1085 (46.9%) and marginal workers are 280 (12.05%) respectively of the total population while the remaining 41.05% constitute non-workers.

The village-wise details of project affected families along with total private land to be acquired in the village is shown in **Table-1**

Table- 1 : Village-wise details of PAF

S. No.	Name of Village	No. of PAF	Total Private Land to be acquired (ha)
1	Raygi	89	7.8627
2	Brinad Bashtil	5	0.846
Total		94	8.7087

6.0 Identification, Prediction and Evaluation of Impacts

6.1 Impacts on the Micro-Climate of the Area

Due to construction activities, there shall be temporary and nominal effect on the ambient temperature and humidity. The operation stage project may not create any impact on the meteorology and climatology of the area. Due to submergence, the increase in water surface area due to creation of reservoir will result in increased evapo-transpiration and humidity.

6.2 Change in Land use / Land Cover

- The land use class of 4.9390 ha forest land involved in submergence shall change into waterbody. The change shall be permanent and irreversible. The forest land cover within the submergence area shall reduce due to project during construction.
- The land use class of forest land and agriculture land required for project components and internal roads shall have land use class changed to built-up area.
- The land use category of agriculture land acquired for construction of buildings shall change to land use category settlement.
- The land use class forest in respect of forestland required for underground components will not cause any change in the present land use.
- During the operation phase no change in land use is expected. Many of the redundant areas having no further usage will be brought under plantation.

6.3 Soil Erosion and Siltation

Soil erosion due to excavation of different components of the project, construction of roads will accelerate soil erosion. Soil erosion due to project activities will not exist in the operation phase as the construction would be completed and landscape restoration work would also be implemented

6.4 Impact on Geology

The intensity of anticipated environmental impact on geology of the area will be weak and extent of anticipated impact will be local. No impact is anticipated on the geology of the area during the operation phase.

6.5 Impact on Hydrology

Since, the quantity of the water abstracted from the river for non-consumptive use of power generation is again returned from tail race to the system without any consumption, there shall not be any remarkable change in hydrological cycle in context to the project absolutely.

6.6 Environmental Degradation due to Labour Immigration

During the construction phase congregation of approximately 1200 workers is likely to take place in the project area, which will increase pressure on land and water resource. Conflict between the migrants and the local population may occur for employment. Labour engaged in construction activity will also move away once the project work is completed; therefore, no additional impact is expected.

6.7 Impacts on Air Environment

Temporary changes in air quality during construction phase are expected due to emission of hydrocarbons from vehicles and gases from blasting operations. The predicted ground level concentration in air for PM₁₀ due to fugitive dust emissions from construction activities at the barrage complex and nearest settlement Raygi has been found to be 3.95 µg/m³ and 0.35 µg/m³ respectively, while the resultant concentration shall be 57.65 µg/m³ and 53.05 µg/m³ which is within the limits. Due to increased transportation during construction phase at 25 m, predicted concentration for PM₁₀ is 3.4 µg/m³, which reduces to 2.1µg/m³, 0.9 µg/m³ and 0.4 µg/m³ at 50m, 150m and 500m respectively. Thus, the impact on the pollutant level (PM₁₀) due to increased traffic due to transportation of mineral shall be minimal. The increased GLC in respect of NO_x were insignificant being 0.12 µg/m³ up to 25m and 0.11 µg/m³ up to 50m and 0.10 µg/m³ up to 1km.

6.8 Impacts on Noise Environment

Temporary increase in noise levels are expected during construction phase only. The maximum noise level of 58 dB(A) gets attenuated to 32 dB(A), 26 dB(A) and 20 dB(A) about 300m, 600m and 1200 m respectively from the point source (Barrage site).

6.9 Impacts due to Ground Vibration and Air-overpressures

Due to blasting, the resulting PPV shall be 3.35 mm/sec at Raygi village which shall be considerably lower than the limiting values 5.0 mm/sec for excitation frequency less than 8 Hz, in case of temporary structures. Predicted air over pressure due to blasting at Raygi shall be 112.9 dB(A).

6.10 Impacts on Water Environment

During the construction phase, the river water on d/s of barrage is supposed to catch considerable amount of sediment from the surface and underground works for which the water coming out from such area will be dislodged of sediment in the silt trapping tanks before being released to river.

The discharge coming out of batching and crushing plants would also bring considerable sediments in water due to washing of plants and aggregate material. In the operation phase of the proposed project the water environment in general will not deteriorate as the water will be continuously used for power generation and will be released simultaneously.

Problems due to eutrophication are not anticipated in the proposed project. For downstream usages of river course will have a minimum environmental flow released d/s of barrage.

6.11 Impact due to Acidification of Reservoir

There will be no acidification of reservoir due to the alkaline nature of the river water at dam site and upstream having pH vary between as 7.12 to 7.72.

6.12 Impacts on Flora

It is evident from the study that from the submergence and influence zone of the proposed project none of tree species, shrub, herb or any climber or grass species are either vulnerable or endangered. Interestingly the vegetation composition of the submergence zone is also widely distributed in the influence zone in abundance and there will be no significant loss to the habitat. However, any loss of riverine vegetation during the project activity period will be restored in the reservoir periphery in due course of time.

The floral abundance of the project area in post construction phase will increase by many folds as the plantation under catchment area treatment, reservoir rim treatment, green belt, restoration and landscaping will be completed.

6.13 Impacts on Fauna

As the project activity is not going to submerge all the major habitats, there is little concern for these niche birds. There will be no alteration to the existing habitat of endangered and threatened species. There is also no wildlife sanctuary, national park and biosphere reserve near the project area. As the project is having its submergence mostly along the river valley, the project is not likely to be a threat to any of the recorded butterfly species. Increase in temporary stress levels of wildlife during construction phase due to noise, human interference and reduction in present habitat. Threat due to poaching might increase. Due to reservoir creation, there will be improvement in the habitat for mainly water birds, reptiles, mammals, amphibians and plankton and Improvement in food chain of some reptiles, birds and carnivorous mammals due to creation of reservoir and increase in humidity level. The butterfly diversity in the area would be enhanced, as scrub habitat around the submergence will receive substantial amount of moisture, which will help in natural regeneration of forest canopy.

6.14 Summary of Positive and Negative Impacts

The positive impacts are:

- Additional annual generation of 293.9 MU of energy in a 90 % dependable year
- Employment opportunities/fisheries.
- Benefits to economy and commerce.
- Access to improved infrastructure facilities.
- Recreation and tourism potential
- Improvement in environment through implementation of CAT, Compensatory Afforestation, Green belt Development and different other plans.

The negative impacts are:

- Land of two Villages shall be partially affected due to acquisition of land. No family shall be displaced due to submergence.
- The loss of agriculture land (8.7087 ha) and agriculture produce.
- Loss of livelihood and income.
- The change of river status from riverine to lacustrine regime

- The loss of forest due to construction of barrage, reservoir and appurtenant works
- Likely decrease in agriculture and horticulture production due to air pollution
- Disturbance to the fauna of the study area during construction
- Pressure on the existing provincial / state road will increase.

7.0 Impact Management

To ameliorate the negative effects of the project construction and overall improvement of the environment following management plans are formulated for implementation concurrent to the project construction. The cost of the management plans is shown in **Table-2**.

Table-2: Summary of Total Cost Estimate of EMP

S. No.	Plans	Cost (Rs. Lakh)	Capital Cost (Rs lakh)	Recurring (Rs lakh)
1.	Catchment Area Treatment Plan	1125.00	950.00	35.00
2.	Compensatory Afforestation Scheme	1055.00	965	18.00
3.	Wildlife and Bio-diversity Management plan	65.00	50.00	3.00
4.	Resettlement & Rehabilitation Plan	1265.00	1265.00	0.00
5.	Green Belt Development Plan	45.00	27.00	3.60
6.	Reservoir Rim Treatment Plan	43.00	40.00	0.60
7.	Landscape and Restoration Plan	15.00	13.00	0.40
8.	Fisheries Management Plan	100.00	60.00	8.00
9	Muck Management Plan	1040.00	960.00	16.00
10.	Restoration Plan for Quarry Sites	30.00	22.00	1.60
11.	Disaster Management Plan	15.00	15.00	0.00
12.	Water, Air and Noise Management Plan	48.00	22.00	5.20
13.	Public Health Delivery Plan	100.00	7.50	18.50
14.	Labour Management Plan	60.00	35.00	5.00
15.	Sanitation and Solid Waste Management Plan	115.00	65.00	10.00
16.	Corporate Environmental Responsibility	602.00	562.00	8.00
17.	Environmental Safeguards During Construction Activities	76.00	21.00	11.00
18.	Energy Conservation Measures	60.00	16.00	8.80
19.	Environmental Monitoring Plan	57.00	15.00	8.40
Grand Total		5916.00	5110.50	161.10