



सत्यमेव जयते

File No: J-12011/53/2023-IA.I (R)
Government of India
Ministry of Environment, Forest and
Climate Change
IA Division



Dated 14/12/2023



To,

M/s Torrent Power Limited
"SAMANVAY " 600 TAPOVANAMBAWADI ,AHMEDABAD, GUJARAT, 380015
tpl-moef@torrentpower.com

Subject: Closed Loop off stream Sashnai Pumped Storage Project of capacity 1760 MW located at Tehsil Robertsganj, District Sonbhadra (Uttar Pradesh) by M/s Torrent Power Limited – Terms of References (ToR) - reg.

Sir/Madam,

This is in reference to your application for grant of Terms of Reference under the provision of the EIA Notification 2006, as amended in respect of project Closed Loop off stream Sashnai Pumped Storage Project of capacity 1760 MW located at Tehsil Robertsganj, District Sonbhadra (Uttar Pradesh) by M/s Torrent Power Limited to Ministry vide proposal number IA/UP/RIV/449359/2023 dated 30/10/2023.

2. The particulars of the proposal are as below :

(i) TOR Identification No.	TO23A0000UP5532036N
(ii) File No.	J-12011/53/2023-IA.I (R)
(iii) Clearance Type	TOR
(iv) Category	A
(v) Project/Activity Included Schedule No.	1(c) River Valley/Irrigation projects
(vi) Sector	River Valley and Hydroelectric Projects
(vii) Name of Project	Sashnai Pumped Storage Project (1760 MW)
(viii) Name of Company/Organization	TORRENT POWER LIMITED
(ix) Location of Project (District, State)	SONBHADRA, UTTAR PRADESH
(x) Issuing Authority	MoEF&CC
(xii) Applicability of General Conditions	yes
(xiii) Applicability of Specific Conditions	no

3. In view of the particulars given in the Para 2 above, the project proposal inter-alia including Form-1 (Part A and B) were submitted to the Ministry for an appraisal by the Expert Appraisal Committee (EAC) in the Ministry under the provision of EIA notification 2006, as amended.

4. The above-mentioned proposal has been considered by Expert Appraisal Committee (River valley and Hydroelectric projects) in its 03rd meeting held on 10th November, 2023. The minutes of the meeting and all the documents submitted viz. Form-1 (Part A and Part B) are available on PARIVESH portal which can be accessed by scanning the QR Code above.
5. The brief about configuration of plant/equipment, products and by products and salient features of the project along with environment settings, as submitted by the Project proponent in Form-1(Part A and B) and presented during EAC meeting are annexed as **Annexure 3**.
6. The EAC in its in its 03rd meeting held on 10th November, 2023, based on information & clarifications provided by the project proponent and after detailed deliberations recommended the proposal for grant of Standard Terms of Reference along with additional Terms of Reference under the provision of EIA Notification, 2006, as amended for conducting EIA study as detailed in **Annexure 1**.
7. The MoEF&CC has examined the proposal in accordance with the Environment Impact Assessment (EIA) Notification, 2006, as amended and after accepting the recommendations of the Expert Appraisal Committee hereby decided to grant Terms of Reference for instant proposal Sashnai Pumped Storage Project of capacity 1760 MW located at Tehsil Robertsganj, District Sonbhadra (Uttar Pradesh) by M/s Torrent Power Limited, under the provisions of EIA Notification, 2006, as amended.
8. The Ministry reserves the right to stipulate additional conditions, if found necessary.
9. The Terms of Reference (ToR) to the aforementioned project is under provisions of EIA Notification, 2006, as amended. It does not tantamount to approvals/consent/permissions etc. required to be obtained under any other Act/Rule/regulation. The Project Proponent is under obligation to obtain approvals /clearances under any other Acts/Regulations or Statutes, as applicable, to the project.
10. You are requested to kindly submit the final EIA/EMP prepared as per ToRs to the Ministry for considering the proposal for environmental clearance within 5 years as per the extent rule of the Ministry notified time to time.
11. The consultants involved in the preparation of EIA/EMP report after accreditation with Quality Council of India/National Accreditation Board of Education and Training (QCI/NABET) would need to include a certificate in this regard in the EIA/EMP reports prepared by them and data provided by other Organization(s)/Laboratories including their status of approvals etc.
12. This issues with the approval of the Competent Authority.

Copy To

1. The Secretary, Ministry of Power, Shram Shakti Bhawan, Rafi Marg, New Delhi - 110 001.
2. The Chairman, Central Electricity Authority, Sewa Bhawan, R. K. Puram, New Delhi - 110 066.
3. Deputy Director General of Forests (C), MoEF&CC, Regional Office (CZ) Kendriya Bhawan, 5th Floor, Sector H, Aliganj, Lucknow – 226020
4. The Principal Secretary, Department of Environment, Government of Uttar Pradesh, Sachivalaya, Babu Bhawan, Adjacent to Vidhan Sabha, **Lucknow** - 226001 (UP)
5. The Member Secretary, Central Pollution Control Board Parivesh Bhawan, CBD-cum-Office Complex, East Arjun Nagar, **Delhi** – 32
6. The Member Secretary, Uttar Pradesh Pollution Control Board, PICUP Bhawan, Vibhuti Khand, Gomti Nagar, Lucknow (UP)

Specific Terms of Reference for (River Valley/Irrigation Projects)

1. Socio-economic Study

S. No	Terms of Reference
1.1	<ol style="list-style-type: none"> 1. Declaration by the project proponent by way of affidavit that "No" Inter-state issue/ policy issue is involved with any State in the project. 2. All the tasks including conducting public hearing shall be done as per the provisions of EIA Notification, 2006 and as amended from time to time. Public hearing issues raised and compliance of the same shall be incorporated in the EIA/ EMP report in the relevant chapter. 3. Statement on the commitments (activity-wise) made during public hearing to facilitate the discussion on the CER in compliance of the Ministry's OM F.No.22- 65/2017- IA.III dated 30th September, 2020 shall be submitted. 4. Tentative no. of project affected families shall be identified and accordingly appropriate Rehabilitation & Resettlement plan shall be prepared. 5. Details of settlement in 10 km area shall be submitted.

2. Muck Management/ Disaster Management

S. No	Terms of Reference
2.1	<ol style="list-style-type: none"> 1. Details of quantity of muck generation component wise and disposal site along with transportation plan and its monitoring to be provided. 2. Details of Muck Management plan prepared along with estimated cost incorporated in EIA/ EMP report. 3. Techno-economic viability of the project must be recommended from CEA/ CWC

3. Miscellaneous**

S. No	Terms of Reference
3.1	<ol style="list-style-type: none"> 1. Pre-DPR Chapters viz. Layout Map and Power Potential Studies duly approved by CWC/CEA shall be submitted.

S. No	Terms of Reference
	<ol style="list-style-type: none"> 1. Undertaking need to submitted on affidavit that regarding no activities has been yet started on the project site and water allocated to this scheme shall not be diverted to other purpose. 2. Both capital and recurring expenditure under EMP shall be submitted. 3. The photograph should bear the date, time, latitude & longitude of the monitoring station/ sampling location. In addition to this PP should submit the original test reports and certificates of the labs which will analyse the samples. 4. Arial view video of project site shall be recorded and to be submitted. 5. Detailed plan to restore wider roads and convert them into narrow upto 10m after construction of the project. 6. Specific Terms of Reference (ToRs) issued by the Ministry vide Office Memorandum No. F. No. IA3-22/33/2022-IA.III dated 14.08.2023 for Pump storage projects shall be used for preparation of EIA/ EMP reports.

4. Environmental Management & Biodiversity Conservation

S. No	Terms of Reference
4.1	<ol style="list-style-type: none"> 1. Cumulative Impact of project on carrying capacity and sustainability of Sone River due to tapping of water for filling reservoir through reputed government expert institution. 2. Submit data on availability of water in Son River. 3. Alternative sites for various components shall be identified in terms of loss of forest area and other environmental aspects with respect of change of Installed capacity. 4. Explore the possibilities to reduce forest area for the construction of proposed project. Reduction of forest land with changing installed capacity. 5. Conduct geological survey and find out availability of mineral in study area. Take Geological opinion from GSI regarding mineral zone in the project study area. 6. Proposed project is located around 4.3 km away from boundary of Kaimur WLS boundary, therefore density of forest and its types including tentative nos of tree felled during construction of the project and details of plants species to be planted under compensatory plantation be mentioned in Compensatory Afforestation Plan under EIA/EMP. 7. MoU for water uses for the project signed and approved by concerned State Government Authority be submitted. 8. Impact assessment on the fish diversity based on the hydrological alteration at the water drawing from Sone River shall be studied. 9. Identify the sand mining/ quarrying sites in submergence area and downstream of reservoir. Source of construction material and its distance from the project site along with detailed transportation plan for construction material. 10. Conduct Environmental Cost Benefit Analysis in terms of loss of Forest ecosystem due to diversion of Forest land/ loss of biodiversity and its impacts on ecosystem, water availability, water uses for generation of hydro power in study area 10 km from periphery of Project

S. No	Terms of Reference
	<p>components.</p> <ol style="list-style-type: none"> 11. Impact zone decided prior to base line data generation and accordingly, sampling location shall be finalized. Baseline data as mentioned in Standard ToR shall be collected for preparation of EIA/ EMP report along with soil characteristics which shall be studied at minimum 10 locations. The ground water level at 10 locations shall be measured in project area in all three seasons. 12. A study shall be carried out on impact of project activity on the aquatic and terrestrial ecosystem, within project area classifying the impact zones (highly impact/low impact zone) based on seasonal variations and covering the aspects related to impacts on aquatic ecosystem/ primary productivity due to quantity of water to be lifted for power generation and thermal stratification. Accordingly, Environment Management plan shall be prepared. 13. Sampling locations be located to cover villages situated near the reservoir and around boundary of forest area for collection of baseline data and data to be incorporated in EIA/ EMP report. 14. A detailed reclamation/ restoration plan of quarrying site/sites be incorporated in the EIA/EMP report. 15. Certificate and certified map from Chief Wildlife Warden shall be submitted mentioning that project boundary is located outside the Eco Sensitive Zone (ESZ) and Wildlife Sanctuary. 16. A detailed wildlife conservation plan for Schedule-I species be prepared duly approved by the Chief Wild Life Warden be submitted. 17. In case any Wildlife corridor is located within 10 km radius of the project site a detailed study shall be conducted to assess the impact of project on safe movement of wild animals. 18. Reservoir/ River banks protection plan all along the submergence need to be prepared and incorporated in EIA/ EMP. 19. Scope of watershed development in the 10 km radius of the project shall be studied in consultation with Govt. institutions/ Indian Council of Agriculture Research (ICAR) and accordingly a detailed Water Shed Development Plan shall be prepared and incorporated in EIA/ EMP report. 20. Environmental matrix during construction and operational phase needs to be submitted. 21. Matrix formulated on the basis of detailed study and field survey of flora and fauna methodology used shall be mentioned in the EIA report. 22. Endemic plant and animal species found in the area concerned shall be provided instead listing entire endemic species found in the State. 23. Details of Flora and Fauna reported in submergence area, Nos. of tree along with their density and nomenclature of the tree species required to be felled for reservoir creation and other project component. 24. Project impact on avi-fauna shall be studied and incorporated in EIA/ EMP report. 25. NBWL recommendations & Stage-I Forest Clearance shall be obtained. 26. The project proponent must also include information if any, on the critical mineral zone mining or potential in the projected area from Geological Survey of India /Mineral Exploration Corporation Ltd or similar such Government organizations.

1. Scope Of Eia Study

S. No	Terms of Reference
1.1	The EIA Report should identify the relevant environmental concerns and focus on potential impacts that may change due to the construction of proposed project. Based on the baseline data collected for three (3) seasons (Pre-monsoon, Monsoon and Winter seasons), the status of the existing environment in the area and capacity to bear the impact on this should be analysed. Based on this analysis, the mitigation measures for minimizing the impact shall be suggested in the EIA/EMP study.

2. Details Of The Project And Site

S. No	Terms of Reference
2.1	General introduction about the proposed project.
2.2	Details of Project and site giving L-Sections of all U/S and D/S Projects with all relevant maps and figures. Connect such information as to establish the total length of interference of Natural River and the committed unrestricted release from the site of Dam/Barrage into the main river.
2.3	A map of boundary of the project site giving details of protected areas in the vicinity of 25 km of project location.
2.4	Location details on a map of the project area with contours indicating main project features. The project layout shall be superimposed on a contour map of ground elevation showing main project features (viz. location of dam, Head works, main canal, branch canals, quarrying etc.) shall be depicted in a scaled map.
2.5	Layout details and map of the project along with contours with project components clearly marked with proper scale maps of at least 1:50,000 scale and printed at least on A3 scale for clarity.
2.6	Existence of National Park, Sanctuary, Biosphere Reserve etc. in the study area, if any, should be detailed and presented on a map with distinct distances from the project components.
2.7	Drainage pattern and map of the river catchment up to the proposed project site.
2.8	Delineation of critically degraded areas in the directly draining catchment on the basis of Silt Yield Index as per the methodology of Soil and Land use Survey of India.
2.9	Soil characteristics and map of the project area.
2.10	Geological and Seismo-tectonic details and maps of the area surrounding the proposed project site showing location of dam site and canal sites.
2.11	Remote Sensing studies, interpretation of satellite imagery, topographic sheets along with ground verification shall be used to develop the land use/land cover pattern of the study using overlaying mapping techniques viz. Geographic Information System (GIS), False Color Composite (FCC)

S. No	Terms of Reference
	generated from satellite data of project area.
2.12	Land details including forests, private and other land.
2.13	Demarcation of snow fed and rain fed areas for a realistic estimate of the water availability.
2.14	Different riverine habitats like rapids, pools, side pools and variations in the river substratum bedrocks, rocks, boulders, sand/silt or clay etc. need to be covered under the study

3. Description Of Environment And Baseline Data

S. No	Terms of Reference
3.1	To know the present status of environment in the area, baseline data with respect to environmental components air, water, noise, soil, land and biology & biodiversity (flora & fauna), wildlife, socioeconomic status etc. should be collected within 10 km radius of the main components of the project/site i.e. dam site and power house site. The air quality and noise are to be monitored at such locations which are environmentally & ecologically more sensitive in the study area. The baseline studies should be collected for 1 season (Preferably Monsoon season). Flora-Fauna in the catchment and command area should be documented. The study area should comprise of the following:
3.2	(i) Catchment area up to the dam/barrage site.
3.3	(ii) Submergence Area.
3.4	(iii) Project area or the direct impact area should comprise of area within 10 km radius of the main project components like dam, canals etc.
3.5	(iv) Downstream upto 10 km from the tip of the reservoir.

4. Details Of The Methodology

S. No	Terms of Reference
4.1	The methodology followed for collection of base line data along with details of number of samples and their locations in the map should be included. Study area should be demarcated properly on the appropriate scale map. Sampling sites should be depicted on map for each parameter with proper legends. For Forest Classification, Champion and Seth (1968) methodology should be followed.

5. Methodology For Collection Of Biodiversity Data

S. No	Terms of Reference
5.1	The number of sampling locations should be adequate to get a reasonable idea of the diversity and other attributes of flora and fauna. The guiding principles should be the size of the study area (larger area should have larger number of sampling locations) and inherent diversity at the location, as known from secondary sources (e.g. eastern Himalayan and low altitude sites should have a larger number of sampling locations owing to higher diversity).

S. No	Terms of Reference
5.2	<p>The entire area should be divided in grids of 5kmX5km preferably on a GIS domain. There after 25% of the grids should be randomly selected for sampling of which half should be in the directly affected area (grids including project components such as reservoir, dam, powerhouse, tunnel, canal etc.) and the remaining in the rest of the area (areas of influence in 10 km radius form project components). At such chosen location, the size and number of sampling units (e.g. quadrates in case of flora/transects in case of fauna) must be decided by species area curves and the details of the same (graphs and cumulative number of species in a tabulated form) should be provided in the EIA report. Some of the grids on the edges may not be completely overlapping with the study area boundaries. However, these should be counted and considered for selecting 25% of the grids. The number of grids to be surveyed may come out as a decimal number (i.e. it has an integral and a fractional part) which should be rounded to the next whole number.</p>
5.3	<p>The conventional sampling is likely to miss the presence of rare, endangered and threatened (r.e.t.) species since they often occur in low densities and in case of faunal species are usually secretive in behaviour. Reaching the conclusion about the absence of such species in the study area based on such methodology is misleading. It is very important to document the status of such species owing to their high conservation value. Hence likely presence of such species should be ascertained from secondary sources by a proper literature survey for the said area including referring to field guides which are now available for many taxonomic groups in India. Even literature from studies/surveys in the larger landscapes which include the study area for the concerned project must be referred to, since most species from adjoining catchments is likely to be present in the catchments in question. In fact such literature form the entire state can be referred to. Once a listing of possible r.e.t. species form the said area is developed, species specific methodologies should be adopted to ascertain their presence in the study area which would be far more conclusive as compared to the conventional sampling. If the need be, modern methods like camera trapping can be resorted to, particularly for areas in the eastern Himalayas and for secretive/nocturnal species. A detailed listing of the literature referred to, for developing lists of r.e.t. species should be provided in the EIA reports. The conventional sampling is likely to miss the presence of rare, endangered and threatened (r.e.t.) species since they often occur in low densities and in case of faunal species are usually secretive in behaviour. Reaching the conclusion about the absence of such species in the study area based on such methodology is misleading. It is very important to document the status of such species owing to their high conservation value. Hence likely presence of such species should be ascertained from secondary sources by a proper literature survey for the said area including referring to field guides which are now available for many taxonomic groups in India. Even literature from studies/surveys in the larger landscapes which include the study area for the concerned project must be referred to, since most species from adjoining catchments is likely to be present in the catchments in question. In fact such literature form the entire state can be referred to. Once a listing of possible r.e.t. species form the said area is developed, species specific methodologies should be adopted to ascertain their presence in the study area which would be far more conclusive as compared to the conventional sampling. If the need be, modern methods like camera trapping can be resorted to, particularly for areas in the eastern Himalayas and for secretive/nocturnal species. A detailed listing of the literature referred to, for developing lists of r.e.t. species should be provided in the EIA reports.</p>
5.4	<p>The R.E.T. species referred to in this point should include species listed in Schedule I and II of Wildlife (Protection) Act, 1972 and those listed in the red data books (BSI, ZSI and IUCN).</p>

6. Components Of The Eia Study: Various Aspects To Be Studied And Provided In The Eia/emp Report Are As Follows:

S. No	Terms of Reference
6.1	No Data Found

6.1. Physical And Chemical Environment

6.1.1. Geological & Geophysical Aspects and Seismo- Tectonics:

S. No	Terms of Reference
6.1.1. 1	Physical geography, Topography, Regional Geological aspects and structure of the Catchment.
6.1.1. 2	Tectonics, seismicity and history of past earthquakes in the area. A site specific study of the earthquake parameters will be done. The results of the site specific earthquake design shall be sent for approval of the NCSDP (National Committee of Seismic Design Parameters, Central water Commission, New Delhi for large dams.
6.1.1. 3	Landslide zone or area prone to landslide existing in the study area should be examined.
6.1.1. 4	Presence of important economic mineral deposit, if any.
6.1.1. 5	Justification for location & execution of the project in relation to structural components (dam /barrage height).
6.1.1. 6	Impact of project on geological environment.

6.1.2. Meteorology, Air And Noise

S. No	Terms of Reference
6.1.2. 1	Meteorology (viz. Temperature, Relative humidity, wind speed/direction etc.) to be collected from nearest IMD station.
6.1.2. 2	Ambient Air Quality with parameters viz. Suspended Particulate Matter (SPM), Respirable Suspended Particulate Matter (RSPM) i.e. suspended particulate materials < 10 microns, Sulphur dioxide (SO ₂) and Oxides of Nitrogen (NO _x) in the study area at 5-6 Locations.
6.1.2. 3	Existing Noise Levels and traffic density in the study area at 5-6 Locations.

6.1.3. Soil Characteristics

S. No	Terms of Reference
6.1.3. 1	Soil classification, physical parameters (viz., texture, Porosity, Bulk Density and water holding capacity) and chemical parameters (viz. pH, electrical conductivity, magnesium, calcium, total alkalinity, chlorides, sodium, potassium, organic carbon, available potassium, available phosphorus, SAR, nitrogen and salinity, etc.) at @ one sample/ha of command area.

6.1.4. Remote Sensing And Gis Studies:

S. No	Terms of Reference
6.1.4.1	(i) Generation of thematic maps viz, slope map, drainage map, soil map, land use and land cover map, etc. Based on these, thematic maps, an erosion intensity map should be prepared.

6.1.5. Water Quality

S. No	Terms of Reference
6.1.5.1	History of the ground water table fluctuation in the study area.
6.1.5.2	Water quality for both surface water and ground water for (i) Physical parameters (pH, temperature, electrical conductivity, TSS); (ii) Chemical parameters (Alkalinity, Hardness, BOD, COD, NO ₂ , PO ₄ , Cl, SO ₄ , Na, K, Ca, Mg, Silica, Oil & Grease, phenolic compounds, residual sodium carbonate); (iii) Bacteriological parameter (MPN, Total coliform) and (iv) Heavy Metals (Pb, As, Hg, Cd, Cr-6, total Cr, Cu, Zn, Fe) (6 locations).
6.1.5.3	Delineation of sub and micro-watersheds, their locations and extent based on the All India Soil and Land Use Survey of India (AISLUS), Department of Agriculture, Government of India. Erosion levels in each micro-watershed and prioritization of micro-watershed through silt yield index (SYI) method of AISLUS

6.2. Water Environment & Hydrology

S. No	Terms of Reference
6.2.1	Hydro-Meteorology of the project viz. precipitation (snowfall, rainfall), temperature, relative humidity, etc. Hydro-meteorological studies in the catchment area should be established along-with real time telemetry and data acquisition system for inflows monitoring.
6.2.2	Run off, discharge, water availability for the project, sedimentation rate, etc.
6.2.3	Basin characteristics
6.2.4	Catastrophic events like cloud bursts and flash floods, if any, should be documented.
6.2.5	For estimation of Sedimentation Rate, direct sampling of river flow is to be done during the EIA study. The study should be conducted for minimum one year. Actual silt flow rate to be expressed in ha-m km ² year ⁻¹ .
6.2.6	Set up a G&D monitoring station and a few rain gauge stations in the catchment area for collecting data during the investigation.
6.2.7	Flow series, 10 daily with 90%, 75% and 50% dependable years discharges.
6.2.8	Information on the 10-daily flow basis for the 90 per cent dependable year the flow intercepted at the dam, the flow diverted to the power house and the spill comprising the environmental flow and additional flow towards downstream of the dam for the project may be given.
6.2.9	The minimum environmental flow shall be 20% of the flow of four consecutive lean months of 90% dependable year, 30% of the average monsoon flow. The flow for remaining months shall be in

S. No	Terms of Reference
	between 20-30%, depending on the site specific requirements. A site specific study shall be carried out by an expert organization.
6.2.10	Sedimentation data available with CWC may be used to find out the loss in storage over the years.
6.2.11	Hydrological studies/data as approved by CWC shall be utilized in the preparation of EIA/EMP report. Actual hydrological annual yield may also be given in the report. Sedimentation data available with CWC may be used to find out the loss in storage over the years.
6.2.12	A minimum of 1 km distance from the tip of the reservoir to the tail race tunnel should be maintained between upstream and downstream projects.

6.3. Biological Environment

S. No	Terms of Reference
6.3.1	Besides primary studies, review of secondary data/literature published for project area on flora & fauna including RET species shall be reported in EIA/EMP report.

6.3.1. Flora

S. No	Terms of Reference
6.3.1.1	Characterization of forest types (as per Champion and Seth method) in the study area and extent of each forest type as per the Forest Working Plan.
6.3.1.2	Documentation of all plant species i.e. Angiosperm, Gymnosperm, Pteridophytes, Bryophytes (all groups).
6.3.1.3	General vegetation profile and floral diversity covering all groups of flora including lichens and orchids. A species wise list may be provided.
6.3.1.4	Assessment of plant species with respect to dominance, density, frequency, abundance, diversity index, similarity index, importance value index (IVI), Shannon Weiner index etc. of the species to be provided. Methodology used for calculating various diversity indices along with details of locations of quadrates, size of quadrates etc. to be reported within the study area in different ecosystems.
6.3.1.5	Existence of National park, Sanctuary, Biosphere Reserve etc in the study area, if any, should be detailed.
6.3.1.6	Economically important species like medicinal plants, timber, fuel wood etc.
6.3.1.7	Details of endemic species found in the project area.
6.3.1.8	Flora under RET categories should be documented using International Union for the Conservation of Nature and Natural Resources (IUCN) criteria and Botanical Survey of India's Red Data list along-with economic significance. Species diversity curve for RET species should be given.

S. No	Terms of Reference
6.3.1. 9	Cropping pattern and Horticultural Practices in the study area.

6.3.2. Fauna

S. No	Terms of Reference
6.3.2. 1	Fauna study and inventorisation should be carried out for all groups of animals in the study area. Their present status alongwith Schedule of the species.
6.3.2. 2	Documentation of fauna plankton (phyto and zooplankton), periphyton, benthos and fish should be done and analysed.
6.3.2. 3	Information (authenticated) on Avi-fauna and wildlife in the study area.
6.3.2. 4	Status of avifauna their resident/ migratory/ passage migrants etc.
6.3.2. 5	Documentation of butterflies, if any, found in the area.
6.3.2. 6	RET species-voucher specimens should be collected along-with GPS readings to facilitate rehabilitation. RET faunal species to be classified as per IUCN Red Data list and as per different schedule of Indian Wildlife (Protection) Act, 1972.
6.3.2. 7	Existence of barriers and corridors, if any, for wild animals.
6.3.2. 8	Compensatory afforestation to compensate the green belt area that will be removed, if any, as part of the proposed project development and loss of biodiversity.
6.3.2. 9	Collection of primary data on agricultural activity, crop and their productivity and irrigation facilities components.
6.3.2. 10	For categorization of sub-catchment into various erosion classes and for the consequent CAT plan, the entire catchment (Indian Portion) is to be considered and not only the directly the draining catchment.

6.4. Aquatic Ecology

S. No	Terms of Reference
6.4.1	Documentation of aquatic fauna like macro-invertebrates, zooplankton, phytoplanktons, benthos etc.
6.4.2	Fish and fisheries, their migration and breeding grounds.
6.4.3	Fish diversity composition and maximum length & weight of the measured populations to be studies for estimation of environmental flow.
6.4.4	Conservation status of aquatic fauna.
6.4.5	Sampling for aquatic ecology and fisheries and fisheries must be conducted during three seasons

S. No	Terms of Reference
	Pre-monsoon (summer), monsoon and winter. Sizes (length & weight) of important fish species need to be collected and breeding and feeding grounds should also be identified along the project site or in vicinity.

6.5. Socio-economic

S. No	Terms of Reference
6.5.1	Collection of baseline data on human settlements, health status of the community and existing infrastructure facilities for social welfare including sources of livelihood, job opportunities and safety and security of workers and surroundings population.
6.5.2	Collection of information with respect to social awareness about the developmental activity in the area and social welfare measures existing and proposed by project proponent.
6.5.3	Collection of information on sensitive habitat of historical, cultural and religious and ecological importance.
6.5.4	The socio-economic survey/ profile within 10 km of the study area for demographic profile; Economic Structure; Developmental Profile; Agricultural Practices; Infrastructure, education facilities; health and sanitation facilities; available communication network etc.
6.5.5	Documentation of demographic, Ethnographic, Economic Structure and development profile of the area.
6.5.6	Information on Agricultural Practices, Cultural and aesthetic sites, Infrastructure facilities etc.
6.5.7	Information on the dependence of the local people on minor forest produce and their cattle grazing rights in the forest land.
6.5.8	List of all the Project Affected Families with their name, age, educational qualification, family size, sex, religion, caste, sources of income, land & house holdings, other properties, occupation, source of income, house/land to be acquired for the project and house/land left with the family, any other property, possession of cattle, type of house etc.
6.5.9	Special attention has to be given to vulnerable groups like women, aged persons etc. and to any ethnic/indigenous groups that are getting affected by the project.

7. Impact Prediction And Mitigation Measures

S. No	Terms of Reference
7.1	The adverse impact due to the proposed project should be assessed and effective mitigation steps to abate these impacts should be described.

7.1. Air Environment

S. No	Terms of Reference
7.1.1	Changes in ambient and ground level concentrations due to total emissions from point, line and area sources.
7.1.2	Effect on soil, material, vegetation and human health.
7.1.3	Impact of emissions from DG set used for power during the construction, if any, on air environment.
7.1.4	Pollution due to fuel combustion in equipments and vehicles
7.1.5	Fugitive emissions from various sources

7.2. Water Environment

S. No	Terms of Reference
7.2.1	Changes in surface and ground water quality
7.2.2	Steps to develop pisci-culture and recreational facilities
7.2.3	Changes in hydraulic regime and downstream flow.
7.2.4	Water pollution due to disposal of sewage
7.2.5	Water pollution from labour colonies/ camps and washing equipment.

7.3. Land Environment

S. No	Terms of Reference
7.3.1	Adverse impact on land stability, catchment of soil erosion, reservoir sedimentation and spring flow (if any) (a) due to considerable road construction / widening activity (b) interference of reservoir with the inflowing stream (c) blasting for commissioning of HRT, TRT and some other structures.
7.3.2	Changes in land use / land cover and drainage pattern
7.3.3	Immigration of labour population
7.3.4	Quarrying operation and muck disposal
7.3.5	Changes in land quality including effects of waste disposal
7.3.6	River bank and their stability
7.3.7	Impact due to submergence.

7.4. Biological Environment

S. No	Terms of Reference
7.4.1	Impact on forests, flora, fauna including wildlife, migratory avi-fauna, rare and endangered species, medicinal plants etc.
7.4.2	Pressure on existing natural resources
7.4.3	Deforestation and disturbance to wildlife, habitat fragmentation and wild animal's migratory corridors
7.4.4	Compensatory afforestation-identification of suitable native tree species for compensatory afforestation and green belt.
7.4.5	Impact on fish migration and habitat degradation due to decreased flow of water
7.4.6	Impact on breeding and nesting grounds of animals and fish.

7.5. Socio-economic Aspects

S. No	Terms of Reference
7.5.1	Impact on local community including demographic profile.
7.5.2	Impact on socio-economic status
7.5.3	Impact on economic status.
7.5.4	Impact on human health due to water / vector borne disease
7.5.5	Impact on increase traffic
7.5.6	Impact on Holy Places and Tourism
7.5.7	Impacts of blasting activity during project construction which generally destabilize the land mass and leads to landslides, damage to properties and drying up of natural springs and cause noise population will be studied. Proper record shall be maintained of the baseline information in the post project period.
7.5.8	Positive and negative impacts likely to be accrued due to the project are listed.

8. Environmental Management Plan

8.1. Biodiversity Management Plan

S. No	Terms of Reference
8.1.1	Biodiversity and Wildlife Conservation and Management Plan for the conservation and preservation of rare, endangered or endemic floral/faunal species or some National Park/Sanctuary/ Biosphere Reserve or other protected area is going to get affected directly or indirectly by construction of the project, then suitable conservation measures should be prepared in consultation with the State Forest Department and with the physical and financial details. Suitable conservation techniques (in-situ/ ex-situ) will be proposed under the plan and the areas where such conservation is proposed will be

S. No	Terms of Reference
	marked on a project layout map.
8.1.2	Compensatory Afforestation shall be prepared by the State Forest Department in lieu of the forest land proposed to be diverted for construction of the project as per the Forest (Conservation) Act, 1980. Choice of plants for afforestation should include native and RET species, if any. This will be a part of the forest clearance proposal.
8.1.3	Fisheries Conservation and Management Plan - a specific fisheries management measures should be prepared for river and reservoir. If the construction of fish ladder/ fish-way etc. is not feasible then measures for reservoir fisheries will be proposed. The plan will detail out the number of hatcheries, nurseries, rearing ponds etc. proposed under the plan with proper drawings. If any migratory fish species is getting affected then the migratory routes, time/season of upstream and downstream migration, spawning grounds etc will be discussed in details.
8.1.4	Green Belt Development Plan along the periphery of the reservoir, approach roads around the colonies and other project components, local plant species must be suggested with physical and financial details. A layout map showing the proposed sites for developing the green belt should be prepared.
8.1.5	Environmental Monitoring Programme to monitor the mitigatory measures implemented at the project site is required will be prepared. Provision for Environment Management Cell should be made. The plan will spell out the aspects required to be monitored, monitoring indicators/parameters with respect to each aspect and the agency responsible for the monitoring of that particular aspect throughout the project implementation.

8.2. Disaster Management Plan

S. No	Terms of Reference
8.2.1	Catchment Area Treatment (CAT) Plan should be prepared micro-watershed wise. Identification of free draining/ directly draining catchment based upon Remote Sensing and Geographical Information System (GIS) methodology and Sediment Yield Index (SYI) method of AISLUS, Deptt. of Agriculture, Govt. of India coupled with ground survey. Areas or watersheds falling under 'very severe' and 'severe' erosion categories should be provided and required to be treated. Both biological as well as engineering measures should be proposed in consultation with State Forest Department for areas requiring treatment. Year-wise schedule of work and monetary allocation should be provided. Mitigation measures to check shifting cultivation in the catchment area with provision for alternative and better agricultural practices should be included.
8.2.2	Study of Design Earthquake Parameters: A site specific study of earthquake parameters should be done. Results of the site specific earthquake design parameters should be approved by National Committee of Seismic Design Parameters, Central Water Commission (NCSDP), New Delhi.
8.2.3	Dam Break Analysis and Disaster Management Plan The outputs of dam break model should be illustrated with appropriate graphs and maps clearly bringing out the impact of Dam Break scenario. To identify inundation areas, population and structures likely to be affected due to catastrophic floods in the event of dam failure. DMP will be prepared with the help of Dam Break Analysis. Maximum water level that would be attained at various points on the downstream in case of dam break will be marked on a detailed contour map of the downstream area, to show the extent of inundation. The action plan will include Emergency Action and Management plan including

S. No	Terms of Reference
	measures like preventive action notification, warning procedure and action plan for co-ordination with various authorities.
8.2.4	Reservoir Rim Treatment Plan for stabilization of land slide / land slip zones, if any, around the reservoir periphery is to be prepared based on detailed survey of geology of the reservoir rim area. Suitable engineering and biological measures for treatment of identified slip zones to be suggested with physical and financial schedule. Layout map showing the landslide/landslip zones shall be prepared and appended in the chapter.
8.2.5	Muck Disposal Plan- suitable sites for dumping of excavated material should be identified in consultation with the State Pollution Control Board and Forest Department. All Muck disposal sites should be minimum 30 m away from the HFL of river. Plan for rehabilitation of muck disposal sites should also be given. The L- section/ cross section of muck disposal sites and approach roads to be given. Financial out lay for this may be given separately. Detailed muck transportation plan delineating the path ways, number of trucks, quantity of muck to be transported along with monitoring mechanism using latest technology, shall be prepared.
8.2.6	Restoration Plan for Quarry Sites and landscaping of colony areas, working areas, roads etc. Details of the coarse/fine aggregate/clay etc. required for construction of the project and the rock/clay quarries/river shoal sites identified for the project should be discussed along-with the Engineering and Biological measures proposed for their restoration with physical and financial details. Layout map showing quarry sites vis-à-vis other project components, should be prepared.

8.3. Socio - Economic Aspects

S. No	Terms of Reference
8.3.1	Resettlement and Rehabilitation Plan needed to be prepared on the basis of findings of the socio-economic survey coupled with the outcome of public consultation held. The R&R package shall be prepared after consultation with the representatives of the project affected families and the State Government. Detailed budgetary estimates are to be provided. Resettlements site should be identified. The plan will also incorporate community development strategies.
8.3.2	Public Health Delivery Plan including the provisions of drinking water supply for local population shall be in the EIA/EMP Report. Status of the existing medical facilities in the project area shall be discussed. Possibilities of strengthening of existing medical facilities, construction of new medical infrastructure etc. will be explored after assessing the need of the labour force and local populace.
8.3.3	Local Area Development Plan to be formulated in consultation with the Revenue Officials and Village Panchayats. Appropriate schemes shall be prepared under EMP for the Local Area Development Plan with sufficient financial provisions.
8.3.4	Labour Management Plan for their Health and Safety.
8.3.5	Sanitation and Solid waste management plan for domestic waste from colonies and labour camps etc.

8.4. Miscellaneous

S. No	Terms of Reference
8.4.1	Energy Conservation Measures for the work force during construction with physical and financial details. Alternatives will be proposed for the labour force so that the exploitation of the natural resource (wood) for the domestic and commercial use is curbed.
8.4.2	Environmental safeguards during construction activities including Road Construction.
8.4.3	A summary of Cost Estimates for all the plans, cost for implementing all the Environmental Management Plans.
8.4.4	Water, Air and Noise Management Plans to be implemented during construction and post-construction periods.

Additional Terms of Reference

N/A

Annexure 2

Details of Products & By-products

Name of the product /By-product	Product / By-product	Quantity	Unit	Mode of Transport / Transmission	Remarks (eg. CAS number)
Hydro Power	Hydro Power	1760	Mega Watt (MW)	Transmission Line	

The details of the project

The project proponent and the accredited Consultant M/s R S Envirolink Technologies Pvt. Ltd, made a detailed presentation on the salient features of the project and informed that:

- i. The proposed Sashnai PSP comprises an underground powerhouse with an installed capacity of 1760 MW having 7 units of 220 MW & 2 units of 110 MW, envisages utilization of available head of upper and balancing reservoir/lower reservoir at an elevation of El.581.00 masl (at FRL) and El. 288.00 masl (at FRL) respectively.
- ii. The Palhari village is at around 0.8 km from the upper reservoir and the village Sashnai is ≈1.9 km from the lower reservoir of the project. Daily six-hour generation is considered for this project.
- iii. This scheme is a pure pumped storage project which implies that power will be generated by recirculating water between lower and upper reservoir which would use same quantity of water for generation and pumping.
- iv. The water losses due to evaporation, seepage etc. would be compensated by pumping water from nearby River Sone periodically.
- v. Underground powerhouse is envisaged in between upper reservoir and balancing reservoir. These upper and balancing reservoirs are interconnected through four individual water conductor systems and the generator-motor and pump-turbines installed at the powerhouse in between.
- vi. The balancing reservoir and lower reservoir are interconnected through Tailrace Channel.
- vii. The proposed Sashnai PSP (7 x 220 MW + 2 x 110 MW) envisages following major civil structures:
 - a) **Upper Dam:** Concrete faced rockfill dam of length 3460 m with maximum height of 51 m (above deepest bed level) with the uncontrolled Spillway
 - b) **Balancing Reservoir Dam:** Concrete faced rockfill dam of length 364 m with maximum height of 63 m (above deepest riverbed level) with the uncontrolled Spillway
 - c) **Lower Dam:** Concrete faced rockfill dam of length 1893 m with maximum height of 52 m (above the deepest bed level). with the uncontrolled Spillway.
 - d) **Power Intake:** Four nos. of diffuser type Intake structure
 - e) **Head Race Tunnel:** Four nos. of 8.0 m diameter circular shaped concrete lined head race tunnel with a length of 200.4 m.
 - f) **Pressure Tunnel / Shaft:** Four nos. of steel lined main pressure tunnel/ shaft with diameter 6.1 m of lengths 411.4 m. Each one of these pressure shafts bifurcates into two-unit pressure tunnels of diameter 4.3 m each and of 68.3 m length. One of this already bifurcated pressure tunnel further bifurcate into unit pressure tunnels for small unit with a diameter of 3.1 m

- g) **Underground Powerhouse:** The underground powerhouse of size 236 m (L) x 25.00 m (W) x 44 m (H), to accommodate Seven nos. of 220 MW and two nos. of 110 MW reversible pump-turbine units.
- h) **Transformer Cavern:** The underground transformer hall of size 235.00 m (L) x 17.75 m (W) x 26 m (H), to accommodate thirty (27 for units + 3 for spares) nos. single phase transformers. Transformer cavern also provide access to draft tube gates.
- i) **Tail Race Tunnel:** Two nos. of unit TRT of 4.7 m and Seven number unit pressure TRT of 6.7 diameter circular shaped concrete lined tail race tunnel with a length of 124.55 m each. Unit TRT combined to four nos. of Main TRT of 8.0 m diameter circular shaped concrete lined tail race tunnel with a length of 232.45 m each.
- j) **Pump Intake:** Structure consisting of four diffuser type Intakes.
- k) **Tailrace Channel:** Open channel of channel bottom width of 50m excavated for a length of 2160 m to link the Balancing Reservoir with the Lower reservoir.
- viii. The total land required for the construction of various components and related works for Sashnai PSP is estimated to be around 294.67 ha, out of which 95.35 ha is non-forest land and 199.32 ha is forest land.
- ix. Proposed project is located around 4.3 km away from boundary of Kaimur WLS boundary (Uttar Pradesh). ESZ of Kaimur WLS was notified on 20/03/2017 with an extent of 1 Km all around the boundary. Project being falling outside the ESZ, would not need Wildlife Clearance.
- x. The estimated project cost is Rs. 8192.70 Crore including IDC. As a preliminary estimate, a construction period of 60 months from the date of award of civil works package has been estimated for this project.
- xi. **Salient features of the project:**

Project details:

Name of the Proposal	Sashnai Pumped Storage Project
Location (Including coordinates)	<p>Upper Reservoir:</p> <ul style="list-style-type: none"> • Longitude: 83°10'44"E & Latitude: 24°31'20"N <p>Balancing Reservoir:</p> <ul style="list-style-type: none"> • Longitude: 83°11'6"E & Latitude: 24°30'45"N <p>Lower Reservoir:</p> <ul style="list-style-type: none"> • Longitude: 83°12'0"E & Latitude: 24°29'56"N

Inter- state issue involved	-
Seismic zone	Zone-III

Category details:

Category of the project	A
Provisions	
Capacity / Cultural command area (CCA)	1760 MW
Attracts the General Conditions (Yes/No)	No
Additional information (if any)	Nil

Electricity generation capacity:

Powerhouse Installed Capacity	1760 MW
Generation of Electricity Annually	3854.40 GWh
No. of Units	11 nos. (7 X 220 MW + 2 X 110 MW)
Additional information (if any)	Nil

ToR Details:

Cost of project	8192.70 Cr.
Total area of Project	294.67 ha
Height of Dam from River Bed (EL)	Lower Dam – 52 m Upper Dam – 51 m Balancing Dam – 63 m
Length of Tunnel/Channel	9148 m
Details of Submergence area	220.59 ha
Types of Waste and quantity of generation during construction/ Operation	Muck from excavation, solid waste from labour colony and construction waste
E-Flows for the Project	Not Applicable, as this is Off-Stream Closed Loop Pumped Storage Project (PSP)
Did earlier Projects study the Cumulative Impact assessment & Carrying Capacity (CIA&CC) for the River on which the proposed project is located? If yes, then a) E-flow with TOR /Recommendation by b) EAC as per CIA&CC study of	No

RiverBasin.	
If not the E-Flows maintain criteria for sustaining river ecosystem.	

Muck Management Details:

No. of proposed disposal area/ (type of land- Forest/Pvt. land)	15.86 ha Private Land
Muck Management Plan	Will be Provided in EIA/EMP report
Monitoring mechanism for Muck Disposal	Will be Provided in EIA/EMP report

Land Area Breakup:

Private Land	95.35 ha
Government land/Forest Land	199.32 ha
Submergence area/Reservoir area	220.59 ha
Land required for project components	74.08 ha
Additional information (if any)	Nil

Presence of Environmentally Sensitive areas in the study area

Forest Land/ Protected Area/ Environmental Sensitivity Zone	Details of Certificate / letter/ Remarks
Reserve Forest/Protected Forest Land	-- The proposed project is located approximately 4.3 km from the boundary of Kaimur WLS boundary (Uttar Pradesh). ESZ of Kaimur WLS was notified on 20/03/2017 with an extent of 1 Km all around the boundary. The proposed Project falls outside the ESZ, and hence may not need Wildlife Clearance.
National Park	
Wildlife Sanctuary	

Court case details:

Court Case	Nil
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Additional information (if any)	Nil
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Affidavit/Undertaking details:

Affidavit/Undertaking	Enclosed
Additional information (if any)	Nil

Previous EC compliance and necessary approvals:

Particulars	Letter no. and date
Certified EC compliance report (if applicable)	Not Applicable
Status of Stage- I FC	Yet to apply
Additional detail (If any)	Nil
Is FRA (2006) done for FC-I	Yet to apply

Miscellaneous

Particulars	Details
Details of consultant	M/s. R S Envirolink Technologies Pvt. Ltd. (RSET) (NABET Accredited)
Project Benefits	Proposed PSP will also benefit the local community by creating employment opportunities and will result in upliftment of livelihood and socio-economic conditions.
Status of other statutory clearances	Forest Clearance - Online application shall be submitted seeking forest diversion for around 199.32 Ha after receipt of ToR Approval.
