EXECUTIVE SUMMARY

ES 1.0 INTRODUCTION

Torrent PSH4 Private Limited is a subsidiary of Torrent Power Limited (TPL). Torrent PSH4 Private Limited (Now known as Torrent Energy Storage Solutions 3 Private Limited) has entered into a Memorandum of Understanding (MoU) with the Department of Water Resources, Government of Maharashtra on 03.09.2024 to establish Saidongar 2 - Maval Open Loop Pumped Storage Project (PSP) of 1200 MW installed capacity with upper reservoir located in Kusur Village of Maval Taluka in Pune District and Lower Reservoir (common for both PSPs) located in Pali T. Kothal Khalathi in Karjat Taluka of Raigad District, Maharashtra. Torrent PSH4 has assigned the task of preparation of the Environmental Impact Assessment and Environmental Management Plan for obtaining Environmental Clearance from Ministry of Environment Forests & Climate Change (MoEF&CC) to M/s. Aarvee Engineering Consultants Limited, Hyderabad.

EIA Notification issued on 14th September 2006 by the MoEF&CC, GoI, including its various amendments, deals with environment clearance applicability and environment clearance process for various categories of projects. Among categories listed in Schedule of EIA Notification and amendments thereof, the proposed Saidongar 2 - Maval PSP (1200 MW) is listed at item 1(c) Category – A viz., (i) ≥ 100 MW hydroelectric power generation. Hence, an Environmental Clearance is required from MoEF&CC, New Delhi.

Accordingly, the project has obtained Fresh ToR on 18.02.2025 from 23rd ToR EAC Meeting held on 29.01.2025 (Vide File No: J-12011/05/2025-IA. I (R), Dated 18 February 2025). Based on the ToR issued by MoEF&CC, the EIA Study has been conducted and detailed in the report considering proposed project as an Open loop project due to change in technical parameters of Project & formation of SPV. Earlier ToR was obtained for Closed loop project from 50th Expert Appraisal Committee (EAC) meeting held on 11th August 2023 (Vide file no. J-12011/43/2023-IA.I (R), dated 23rd September 2023).

The objective is to carry out the Environmental impact Assessment (EIA) study to identify, predict and evaluate potential environmental, socio-economic impacts which may result from proposed "Saidongar 2 - Maval PSP in Maharashtra" and develop suitable Environmental Management Plan (EMP) to mitigate the impact. The EIA is mandatory in the environmental clearance process of such projects. Proposed project consists of common lower reservoir receiving discharge from both upper reservoir of Saidongar 1 - Karjat PSP & Saidongar 2 - Maval PSP.

Statutory Clearances: The proposed Saidongar 2 - Maval PSP (1200 MW) is attracting various National and State rules and regulations. These regulations and rules are helpful in impact mitigation and improvement of environment. The environmental impact assessment study has been carried out as per the requirement of the National/State guidelines.

Environmental Clearance: The proposed project is a hydroelectric project as listed at item **1 (c) of Schedule of EIA notification and is a Category-A Project** viz., (i) ≥ 100 MW hydroelectric power generation. Hence, an Environmental Clearance is required from MoEF&CC, New Delhi.

Wildlife Clearance: The proposed project does not require wildlife clearance as it is outside the notified Eco-sensitive Zone of the nearest protected area i.e. However, aerial

distance from the project site to the Bhimashankar Wildlife Sanctuary (WLS) is approximately 14.45 km. (Refer Section 3.8.5 for map with description).

Forest Clearances: The proposed project involves the diversion of **35.60 ha** of the Forest land & requires obtaining Forest Clearance from MoEF&CC, New Delhi. Online application seeking forest diversion is under progress. The proposal number uploaded on **PARIVESH Portal is FP/MH/HYD/IRRIG/556376/2025**.

ES 2.0 PROJECT DESCRIPTION

The proposed Saidongar 2 - Maval Open Loop Pumped Storage Project comprising of 1200 MW capacity with upper reservoir located at Kusur Village in Maval Taluka of Pune District and lower reservoir at Pali T. Kothal Khalathi village in Karjat Taluka of Raigad District, Maharashtra. The gross storage capacities of upper and lower reservoirs is 7.22 MCM & 28.96 MCM respectively, upper reservoir will be constructed on the hilltop with maximum dam height of 29 m to create the desired storage capacity while the lower reservoir will have maximum height of 59 m and shall be constructed across River Pej. The Salient Features of the Saidongar 2 - Maval PSP are given in **Table ES.1.**

Table ES.1: Salient Features of the Project

S.No	Description	Details
1.	Type	Open Loop Pumped Storage Project
2.	Capacity	1200 MW
3.	Daily hours of generation	6 Hr.
4.	Country, State, District	India, Maharashtra, Raigad & Pune
5.	Upper Reservoir	Latitude -18°53'60"N Longitude - 73°26'50"E
6.	Lower Reservoir	Latitude - 18°54'37"N Longitude - 73°25'34"E
7.	Nearest Road	Accessible from SH-55 Saidongar Village
8.	Nearest Airport	Pune & Mumbai
9.	Nearest Rail head (with unloading facilities)	Karjat Railway Station

Material Requirements: For the construction of various project components approximately **38,56,382** tons of coarse aggregate, **3,80,739** tons of fine aggregate and **1,09,858** tons of cement are required for the proposed project.

Land Requirement: For the development of the Saidongar-2 Maval Pumped Storage Project (PSP), land will be required for various project components such as the construction of reservoirs, tunnels, powerhouse, access roads, muck disposal areas, construction camps, magazines, crushers and site offices. The total land requirement for these activities is estimated to be approximately **141.44 ha (35.6 ha forest land and 105.84 ha of non-forest land)**.

Muck Generation: Substantial amount of muck would be generated during the excavation of the principal components. The total muck generation would be of the order **58.06 Lakh cum**. At present all the quantity of excavation has been planned to be directed to the designated disposal sites. However, during construction stage the excavated material shall be tested for their suitability for use as construction material. The material found suitable shall be used for construction. Two (02) Muck disposal sites have been selected and

proposed with and area of **35 ha** approximately. Detailed muck disposal plan is provided in the EMP chapter.

Proposed Schedule: Construction Programme & Methodology with the planning for equipment has been worked out keeping site constraints in view. It is proposed to construct the project within a period of **60 months** including **6 months** of pre-construction works. Pre-construction activities involve development of infrastructure facilities in the project, obtaining requisite clearances, financial approvals, land acquisition, tendering and award of work, design and engineering.

Project Cost: The total project cost has been estimated at **₹6,088.67 Crores.**

ES 3.0 DESCRIPTION OF THE ENVIRONMENT

ES 3.1 Introduction

This section presents the ambient air quality, ground and surface water quality, noise levels, land environment including soil quality, land-use pattern, forest cover, biological environment, socio-economic and health status of the population, demography and quality of life in the study area of the proposed project

Baseline monitoring to assess existing environmental conditions is required to be conducted for two (02) seasons (Pre-Monsoon and Post-Monsoon) covering all major environmental components, including the physical, biological and social environments, for open-loop Pumped Storage Projects, as per the MoEF&CC EIA Notification, 2006, and its subsequent amendments through Office Memorandum No. IA3-22/33/2022-IA. III (E18815) dated 14th August 2023. In line with these provisions, the baseline studies for the present project were undertaken during the Pre-Monsoon season (March 2025 to May 2025) and the Post-Monsoon season (October 2024 to December 2024) as part of the EIA & EMP study.

ES 3.2 Topography and Climate

The Project falls in Raigad district and is located on the border of Raigad and Pune District in the state of Maharashtra.

Raigad district is bordered by Mumbai Harbour to the northwest, Thane to the north, Pune to the east, Ratnagiri to the south, and the Arabian Sea to the west. The Sahyadri range covers much of its hilly terrain, particularly in the east, which features rugged, forested slopes and uneven topography. The district has a typical west coast climate with heavy seasonal rainfall, humid conditions year-round, and hot summers. Long-term rainfall data (2002–2012) show annual rainfall in Karjat taluka ranging from 2,335 mm to over 4,800 mm, averaging about 3,670 mm.

Pune district is bounded by Ahmednagar to the northeast, Solapur to the southeast, Satara to the south, Raigad to the west, and Thane to the northwest. Situated at the foothills of the Sahyadri Mountains, it forms part of the tropical monsoon region with marked seasonal variations in temperature and rainfall. The western hilly areas are cooler, forested, and receive higher rainfall, while the eastern parts are hotter, drier, and experience lower rainfall.

ES 3.3 Hydrogeology

The proposed project comprises of upper and lower reservoirs. The upper reservoir on high plateau terrains has no significant catchment area, while the lower reservoir will be

on seasonal nala with a small catchment area of about 23.4 km^2. Thus, the Saidongar 2 - Maval Pumped Storage Project will comprise of Upper and lower reservoirs with a gross storage capacity of 7.22 MCM & 28.96 MCM respectively, out of which upper reservoir is to be constructed on the hilltop with maximum dam height of 29m to create the desired storage capacity.

ES 3.4 Natural Hazard

Seismicity of the Project Area: The project area is located in the border districts of Raigad and Pune of Maharashtra state. The Raigad and Pune district area falls under Seismic zone-III as per BIS.

Flood Prone: The project area is not prone to frequent flooding areas of Maharashtra State.

ES 3.5 Micro-Meteorology of Project site

Meteorological data station has been established at Pali T. Kothal Kalathi (18°55'21.00" N 73°25'07.6" E) and collected the data for the study period Pre monsoon Season (March 2025 to May 2025), Post monsoon season (October 2024 to December 2024).

Table ES.2 Summary of the Micro meteorological data for Pali T. Kothal Khalathi Station

Climatic Factor	Premonsoon Season (March 2025 to May 2025)	Post Monsoon Season (October 2024 to December 2024)
Max. Rainfall (mm)	5.7	Nil
Min. Rainfall (mm)	0.0	Nil
Max. Temp. (°C)	42.5	32.3
Min. Temp. (°C)	11.6	25.25
Max. Relative Humidity (%)	81.1	90.4
Min. Relative Humidity (%)	15.6	64.36
Max. Wind Speed (m/s)	1.8	0.97
Min. Wind Speed (m/s)	0.0	0.76
Calms (%)	9.27	0
Wind Direction	Blowing from SE	Blowing from SE & South

Source: Primary Survey by NABL Accredited Laboratory

ES 3.6 Air Environment

The baseline data generated for the study period during Pre monsoon Season (March 2025 to May 2025), Post monsoon season (October 2024 to December 2024). **Six (06)** monitoring stations were selected. The criteria adopted for selecting the monitoring stations, sampling and analysis was carried out as recommended by IS: 5182 and CPCB. The AAQ results during these three seasons are given below.

Pre monsoon Season

- All the locations where Ambient Air Quality Monitoring was carried out falls under residential category. The recorded concentrations are compared with the latest National Ambient Air Quality Standards (NAAQS)-2009 as notified by CPCB.
- The maximum value for PM_{10} observed at Vaijanath (AAQ-6) is 93 µg/m3 and minimum value for PM_{10} at Pali T. Kothal Kalathi (AAQ-1) is 60.2 µg/m3. Generally, the most consistent sources for PM_{10} concentrations are from dirt, soil and road dust

and vehicular movements in the area. The values are well within the 24-hour average limit of 100 µg/m3 standards by NAAQS.

- The maximum and minimum value for $PM_{2.5}$ observed at Vadap (AAQ-4) is 48.6 µg/m3 and 26.2 µg/m3. The concentrations are medium in range which may be due to the reason that there is no major economic activity except for some agriculturally based activities. $PM_{2.5}$ values observed at all the locations were below the 24 hours average suggested by NAAQS for residential areas which is 60 µg/m3.
- The maximum and minimum value for SO_2 was observed at Vaijanath (AAQ-6) which is 18.9 µg/m3 and 8.4 µg/m3 respectively. The SO_2 values observed at all the locations are below the 24 hours average standards suggested by NAAQS for residential and industrial areas which is 80 µg/m^3. It can also be seen that the values are well within the annual limits too.
- The maximum value for NO_2 observed at Vaijanath (AAQ-6) is 33.7 µg/m3 and minimum value for NO_2 at Pali T. Kothal Kalathi (AAQ-1) is 16.4 µg/m3. The NO_2 values observed at all the locations are below the 24 hours average stipulated for residential category by NAAQS which is 80 µg/m^3. It can also be seen that the values are well within the annual limits too.
- The maximum value for CO observed at Vaijanath (AAQ-6) is 0.57 mg/m3 and minimum value for CO at Tiwane (AAQ-3) is 0.32 mg/m3. The CO values observed at all the locations are below the one-hour average standard stipulated for residential category by NAAQS which is 4.0 mg/m^3.

Post-Monsoon Season

- All the locations where Ambient Air Quality Monitoring was carried out falls under residential category. The recorded concentrations are compared with the latest National Ambient Air Quality Standards (NAAQS) as notified by CPCB.
- The maximum value for PM10 observed at Kusur (AAQ-2) is 96.3 µg/m3 and minimum value for PM10 at Vadap (AAQ-4) is 57.4 µg/m3.
- The maximum value for PM2.5 observed at Vadap (AAQ-4) is 52.6 µg/m3 and minimum value for PM2.5 at Bhaliwadi (AAQ-5) is 25.4 µg/m3. The concentrations are low, which may be due to the reason that there is no major economic activity except for some agriculturally based activities. PM2.5 values observed at all the locations were below the 24 hours average suggested by NAAQS for residential areas which is 60 µg/m3.
- The maximum value for SO2 observed at Kusur & Vadap (AAQ-2 & AAQ-4) is 9.6 µg/m3 and minimum value for SO2 at Kusur, Tiwani & Vadap (AAQ-2, 3 & 4) is 7.0 µg/m3.
- The maximum value for NO2 observed at Baliwadi (AAQ-5) is 27.6 µg/m3 and minimum value for NO2 at Pali T. Kothal Kalathi & Kusur (AAQ-1&2) is 14.6 µg/m3.
- The maximum value for CO observed at Pali T Kothal kalathi & Kusur (AAQ-1&2) is 0.57 mg/m3 and minimum value for CO at Tiwane (AAQ-3) is 0.3 mg/m3. The CO values observed at all the locations are below the one hour average standard stipulated for residential category by NAAQS which is 4.0 mg/m3.

ES 3.7 Noise Environment

To determine the baseline noise levels and assess the noise impacts due to the proposed project, noise monitoring was carried out covering residential, commercial and sensitive receptors within the study area with integrating sound level meter as per IS: 3029-1980. The noise levels were monitored at Twelve (12) locations as per CPCB: 2015, protocol for Ambient Level Noise Monitoring.

Pre monsoon Season

The day and night time noise levels were monitored at Twelve (12) locations. The Day time Leq values are in the range 50.4 dB(A) to 61.7 dB(A) and Night time Leq values are in the range 43.5 dB(A) to 47.2 dB(A). According to CPCB the standards for Leq day and night noise levels for commercial areas is 65 dB(A) and 55 dB(A) respectively and the monitored values were within the limits

Post-Monsoon Season

The day and night time noise levels were monitored at Twelve (12) locations. The Day time Leq values are in the range 51.1 dB(A) to 62.5 dB(A) and Night time Leq values are in the range 41.2 dB(A) to 46.3 dB(A). According to CPCB the standards for Leq day and night noise levels for commercial areas is 65 dB(A) and 55 dB(A) respectively and the monitored values were within the limits

ES 3.8 Water Environment

Surface Water Quality

During the study period **Fourteen (14)** Nos. of samples were collected from Thokarwadi Dam, Vaijanath, Bhilawadi other lakes and streams. The Samples are taken at Fourteen (14) locations depending upon its utility by the people in the region. The study area is drained by Thokarwadi Dam and its tributaries/streams. The rivers and all the streams are carrying swift flow during monsoon only i.e. they are ephemeral and torrential in nature. The surface water quality during these three seasons is given below

Pre monsoon Season

- pH value ranging in between 7.03 to 7.83 which are within the IS 2296 Class C limits of 6.5 to 8.5.
- Hardness values are in the range of 12.8 to 259.4 mg/l which are within the IS 2296 Class C limits of 600 mg/l.
- At all the sampling locations DO levels are more than the IS 2296 Class C limits of 4.0 mg/l.
- TDS values are in the range of 174 to 986 mg/l which are within IS 2296 Class C limits of 1500 mg/l.
- The EC values are varying in the range 285 µS/cm to 1561 µS/cm. The water with EC in this range can be safely used for irrigation purpose.
- Concentrations of Chlorides and Sulphates in all the samples were below the IS 2296 Class C limits of 600 mg/l and 400 mg/l respectively.
- Heavy metals such as Iron, Zinc, Lead, Chromium, Cadmium etc., are well within the limits.

Post-Monsoon Season

- pH value ranging in between 6.96 - 8.20 which is within the prescribed limit 6.5 to 8.5 of IS: 2296 Class C Limits.
- Alkalinity values are ranging from 48 to 160 mg/L which were found to be below acceptable limits of IS-10500.
- Iron levels are in the range of Below Desirable Limits (BDL) of IS 2296 Class C limits.
- Magnesium levels are in the range 5.56 to 17.23 mg/L which are falling within the acceptable limit of IS:10500
- Calcium levels are in the range 14.04 to 43.24 mg/L which are falling within the acceptable limit of IS-10500.
- The EC values are varying in the range 134 µS/cm to 442 µS/cm.
- DO Levels at all the sampling locations are greater tha the IS: 2296 Class C limits.

Overall, the surface water quality during pre-monsoon and Post monsoon of the study area covering Saidongar-2 PSP, and their upstream and downstream locations are found to well within the stipulated IS 2296 Class-C Water quality values standards.

Ground Water Quality

For assessing the ground water quality in the study area, **twelve (12)** locations were selected and anlysed during the study period. Ground water samples were collected from the identified bore wells and open wells. Selection has been considered as per the utilization pattern of the villagers for domestic, drinking & irrigation purposes. The sampling and analysis were done as per standard methods prescribed IS 3025 parts and APHA 22nd. The ground water quality during the three seasons is given below.

Pre monsoon Season

- pH value ranging in from 7.62 to 9.06, indicating that the water is mildly alkaline nature. At some locations pH exceeded permissible limits of IS: 10500.
- Electrical conductivity values are in the range of 206 to 681 µS/cm.
- Hardness values are in the range 42 mg/L to 134 mg/L which are well within the IS: 10500 drinking water acceptable limits i.e. 200 mg/L.
- Iron concentrations ranged from 0.05 mg/L to 0.82 mg/L, with some values exceeding the permissible limit of 0.3 mg/L as prescribed by IS 10500 drinking water limits.
- Manganese (Mn) concentrations in the all samples were found <0.02 mg/L, in compliance with the acceptable limit of 0.3 mg/L specified under IS 10500 limits.
- TDS values varying from 143 to 451 mg/L which are well within the IS 10500 acceptable limits of 500 mg/L.
- Fluoride concentrations in all samples were observed to be well within the permissible limit of 1.5 mg/L, as stipulated by IS 10500:2012.
- Similarly, zinc levels complied with the permissible limit of 15 mg/L under the same guidelines.

Post Monsoon Season

- pH value ranging in between 7.56 to 8.66 which shows the levels slightly crossing permissible limit 8.5.
- Concentrations of Magnesium and Calcium are in the range of 5.1 to 32.66 mg/l at and 12.27 to 77.02 mg/l. The Total Hardness lies in the range of 54 to 278 mg/l. All the values are within the permissible limits of IS 10500.
- Electrical conductivity values are in the range of 115 to 1027 uS/cm.
- Alkalinity values are in the range 8 mg/L to 256 mg/L which are well within the IS 10500 limits of Alkalinity i.e, 600 mg/L.
- Iron levels in the samples are in the Below Desirable Limits (BDL). The other physico-chemical values were well within the prescribed limits as per IS 10500: 2012 standards.

In general, the ground water quality during the Pre-monsoon and Post-monsoon season within the study area of the proposed project area is satisfactory and is matching with IS: 10500-2012 Drinking water limits.

ES 3.9 Land Environment

Land Use/Land Cover

The total land cover of the study area is **517.29** Sq. Km with majority of the land use falls under forest & agriculture. The classified land use/land cover map is represented in **Figure 3.53** which shows 22.58% is under Reserved Forest, 7.86% constitutes open/scrub forest and 34.95% constitutes Agriculture land (single & double crop). Fallow lands occupy 9.63%, Land with & without Scrub covers 8.81%, Plantation area 8.70%, Water bodies occupy 5.50% and 1.96% comes under Habitations/Settlements were identified in the study area.

Soil Quality

After careful consideration of land use and land pattern of the existing region, **twelve (12)** sampling locations are being identified and analysed. The soil quality during these seasons was given below.

Pre monsoon Season

- The quality of soil affects both crop growth and production. pH of the soils in the study area ranged from 6.46 to 7.89 showing slightly acidic to slightly alkaline in nature.
- The EC of all the soil samples is found to be in the range 56 to 298 µS/cm.
- The soil nutrients such as Nitrogen, Phosphorous and Potassium (NPK) are the index of the soil fertility. The NPK values are in the range of 596 to 827 mg/Kg, 3.2 to 30 mg/Kg and 28.5 to 790 mg/Kg respectively.
- The Organic Carbon assessed in the soil is ranging between 0.3% to 3.7% and SAR found to be 0.4 to 2.9 respectively. As the SAR values are found to be < 3, which shows the no sodium problems in the soils.
- Calcium (Ca) values are observed in ranging from 80.4 to 529.2 mg/kg is found to be very high which is reflecting on the pH values of the soils

Post-Monsoon Season

- pH of the soils in the study area ranged from 6.46 to 7.86 showing slightly acidic to slightly alkaline in nature.
- The type of Soil in the study area is found to be Clay loam to Sandy loam in nature.
- The salt levels of soil affect both crop growth and production. The Electrical conductivity (EC) of all the soil samples is found to be in the range 53 to 297 µS/cm.
- The soil nutrients such as Nitrogen, Phosphorous and Potassium (NPK) are the index of the soil fertility. The NPK values are in the range of 571 to 2528 mg/Kg, 3.4 to 31 mg/Kg and 52 to 770.5 mg/Kg respectively.
- The Organic Carbon assessed in the soil is ranging between 0.28% to 3.4% and SAR found to be 0.13 to 0.34 respectively. As the SAR values are found to be < 3, which shows the no sodium problems in the soils.
- Calcium (Ca) values are observed in ranging from 791 to 3644 mg/kg is found to be very high which is reflecting on the pH values of the soils.

ES 3.10 Biological Environment

The proposed project has been carefully designed to escape the ecologically sensitive areas but falls in draft notification for Western Ghats ESA. It involves **35.60 ha** forest land where on the plateaus a mix of thorny, succulent and xerophytic bushes are common such as *Chromolaena odorata, Urena lobata* and *Hygrophila serpyllum* whereas on the slopes and foothills trees such as *Butea monosperma, Cassia fistula, Azadirachta indica etc* are found. The slopes at the sides of the stream (i.e. lower reservoir) shows good presence of greenery with tree species like *Careya arborea*, *Terminalia alata*, *Terminalia arjuna*, *Terminalia bellerica, Euphorbia nivvulia Madhuca longifolia* var. *latifolia*, and *Diospyros melanoxylon* and *Ficus hispida etc*.

The proposed project area reported with several Schedule-I of the Wildlife Protection Act (WPA) 1972, 2022, **14 mammals** including Indian Jackal, Indian Fox, Indian Wolf, Jungle Cat, Leopard, Indian Porcupine, Sloth Bear, Bonnet Macaque, Gray Langur, Asian Palm Civet, Small Indian Civet, Four-horned Antelope, and Sambar Deer, along with Indian Pangolin, have been reported from the study area. Additionally, **6 birds** - Indian Peafowl, Brahmini Kite, Osprey, Black Eagle, White-eyed Buzzard and Shikra, and **6 reptiles** - Asian Chameleon, Russell's Viper, Indian Cobra, Rat Snake, Indian Python, and Bengal Monitor, listed under have also been recorded.

The lower reservoir will be constructed on the river Pej in which water flows only during the monsoon season or rainy days otherwise remains almost dry, therefore, **this stream does not support a significant aquatic life** and no migratory fish aspects is observed.

This project will divert a **35.60 ha forest land** hence, **Green Belt Development Plan (₹75 Lakhs), Compensatory Afforestation Plan (₹4.46 Crores)** and Biodiversity Management and Wildlife Conservation Plan for Sch-1 Species **(₹93 lakhs),** have been prepared and provided in EIA report with Budget estimation added in the EMP Cost. Compensatory Afforestation Plan shall be prepared on equivalent non-forest land. The equivalent non-forest land suitability certificate is provided by DCF of respective forest division.

ES 3.11 Observations/Recommendations of MoEF&CC EAC Sub-Committee Visit

In pursuance of the Ministry's directive vide Lr No. J-12011/42/2023-IA.I(R), dated: 15.04.2025, a sub-committee comprising Prof. G.J. Chakrapani (Chairman), Shri Ajay Kumar Lal (Member) and Dr. Krishnendu Mondal (MoEF&CC) conducted a site inspection of the Saidonnagar 2 - Maval PSP Project area from 21st to 23rd April 2025 to assess environmental safeguards and recommend additional conditions, if required. Officials from M/s Torrent Power Private Limited and their consultants facilitated the visit. The sub-committee's observations/recommendations, recorded in the 31st MoEF&CC EAC meeting dated: 14.05.2025 and MOM dated 22.05.2025 are provided in **Annexure-X** with compliance furnished after the Compliance of Terms of Reference Section.

ES 3.12 Social Environment

The proposed Saidongar-2 PSP (1200 MW) project with upper reservoir located in Kusur village in Maval Tauka of Pune district and lower reservoir in Pali T. Kothal Kalathi village in Karjat Taluka of Raigad district, Maharashtra state. The project consists of land acquisition of **141.44 ha** in which **35.60 ha** is forest area and remaining **105.84 ha** is almost private and Government land in Pali T. Kothal Kalathi and Saidongar villages of Raigad District and Kusur Village of Pune District.

ES 4.0 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

This section summarizes the pollution potential of the proposed Saidongar 2 - Maval Pumped Storage Project and its possible impact on the surrounding environment during construction and operational phases.

ES 4.1 Impact on Air Quality

The FDE during the construction phase are mainly due to the disposal of muck generated in the project. The total quantity of muck generated is around 58.06 Lakh Cum out of which 22.32 Lakh cum shall be reused in the project. Considering the swelling factor, the total quantity of muck to be disposed from the project shall be around 50.03 Lakh Cum. The FDE is predicted for key activities such as (i) Excavation; (ii) Loading and Unloading of Muck (iii) Haulage roads and (iv) Truck.

Mitigation Measures

During construction phase all above impacts discussed above can be avoid or minimized by applying/adopting following mitigation measures.

- Access roads will be developed/paved which avoid local people's moving route.
- Regular watering/sprinkling (two/three times a day) on the access roads and construction site for suppression of dust, especially in the dry season, and using cover sheets on trucks for the transportation of soil, and wind barriers will be applied to reduce dust generation.
- Speed limits will be applied for vehicles.
- For mitigation of pollutant emissions, periodic maintenance and management of all the construction machinery and vehicles will be conducted to reduce exhaust gas discharged from construction machinery and vehicles.

ES 4.2 Impact on Noise Quality

Impacts on ambient noise levels are expected only during the project construction phase, due to earth moving machinery, etc. Likewise, noise due to quarrying, blasting, vehicular movement will have some adverse impacts on the ambient noise levels in the area.

Noise level due to construction activities are expected to be of **73.3 dB (A)** at a distance of 100m. Since, the nearest settlement is about 1km away; the incremental noise due to blasting is expected to be 40-50 dB (A). As the blasting is likely to last for 4 to 5 seconds depending on the charge, noise levels over this time would be instantaneous and short in duration.

The noise assessment has been carried out with the help of Roadway Construction Noise Model (RCNM) is the Federal Highway Administration's (FHWA) national model (refer Chapter 4).

Mitigation Measures

Noise generated during blasting and excavation activities is a significant concern for both the surrounding communities and the workforce involved in the construction of the Saidongar 2 - Maval Pumped Storage Project. To address this, a comprehensive noise mitigation plan will be implemented to minimize the impact of noise pollution. The following measures will be adopted to ensure compliance with regulatory standards and to safeguard the health and well-being of nearby residents, wildlife, and workers:

- **Barricading the Construction Site:** The construction site will be barricaded to minimize noise levels outside the site boundary. Construction equipment will be located at least **250 meters away from inhabited areas** to reduce noise exposure for nearby communities.
- **Timing of Construction Activities:** Project activities will be scheduled to coincide with periods when people are least likely to be affected. Construction activities, including blasting, will be **strictly prohibited between 10 PM and 6 AM** in residential areas to avoid disturbance during night-time hours. Additionally, blasting activities will be conducted during **noon hours** to minimize impact on wildlife.
- **Noise Masking for Workers:** Adequate noise masks or hearing protection will be provided to all workers, including the **1,000 workers during peak construction activity** and **600 workers during non-peak activity**, to protect them from high noise levels.
- **Acoustic Enclosures for Stationary Noise Sources:** Stationary noise sources such as generator sets will be equipped with **acoustic enclosures** to reduce noise emissions and prevent sound from spreading beyond the construction site.
- **Restriction on Honking:** Honking will be strictly restricted at the project site to minimize unnecessary noise pollution and maintain a quieter environment for both workers and nearby residents.
- **Hearing Tests for Workers:** Workers will undergo **hearing tests prior to deployment** at the site, especially for those working in high-noise areas. Periodic hearing tests will be conducted **every six months** to monitor and address any hearing loss or damage.

- **Job Rotation System:** A **job rotation system** will be implemented for workers assigned to high-noise areas. This will reduce their continuous exposure to high noise levels and lower the risk of long-term hearing damage.

ES 4.3 Impact on Soil quality

For some distance downstream of major construction sites, such as upper and lower dam, powerhouse, etc. there is a possibility of increased sediment levels.

Mitigation measures

- The total quantity of muck generated from the project shall be around **58.06 Lakh** cum. Muck disposal has to be done in line with the **Muck Disposal Plan** given in EMP to avoid any negative impact.
- **Sanitation and Solid Waste management plan** is provided in the EMP chapter. Accordingly, the solid waste to be generated from construction camp site as well as staff colonies during operation phase requires management plan as per the Solid Wastes Management Rules (SWM) 2016. For that, an efficient waste management system will be required to put in place to keep the environment of the region clean and healthy.

Management of Solid Waste

- The solid waste generated from the camp site shall be collected, transported and disposed of in the nearby municipal land fill sites. Any solid waste generated in the project complex/project colony/labour colony, shall be managed and handled appropriately.
- The construction activity will also generate hazardous waste like waste oils, used batteries, empty cans etc. These wastes should be collected, handled and disposed as per the Hazardous and Other Wastes (Management & Trans-boundary Movement) Rules, 2016.

ES 4.4 Impact on Biological Environment

The direct impact of construction activity of any project is majorly due to the tree cutting to clear the site for the construction of the project components. The proposed Pump Storage development involves the formation of a reservoir at the top of the hillock adjacent to the reservoir. This project will require **35.60 ha** Forest land and cutting of about **9,554 trees** along with the shrubs and other vegetation on the identified land. This will impact to the wildlife by disturbing their habitat.

The other major impact on the flora in and around the project area would be due to increased level of human interferences. The workers may also indulge in tree cutting to meet their timber requirement for temporary houses, fuel wood and space heating, however, this will be controlled by implementing energy conservation measures as proposed in EMP. Also, during construction of various components of the project, e.g., submergence area in Upper Reservoirs, road, muck disposal, etc., trees will have to be cleared.

Due to vehicular movement and blasting dust is expected to be generated during blasting, vehicle movement for transportation of construction material or construction waste. The dust particles shall settle on the foliage of trees and plants, thereby reduction in amount

of sunlight falling on tree foliage. This will reduce the photosynthetic activity. Such impacts are expected upto 500m from the source.

Mitigation Measures

- The loss of trees and ecosystem shall have to be compensated through the green belt development with native species and proper care of the saplings will be taken to ensure their survival.
- Labour camps shall be setup only after obtaining proper permissions from the project Engineer and Environmental Engineer (Contractor) and alternate fuel shall be provided to the labourers in the labour camps to ensure that no firewood will be used for cooking etc.
- The camps shall have proper toilets with sanitary disposal of wastes.
- Smoking, hunting & fishing in the wild are prohibited.
- The contractor shall conduct regular awareness trainings related to non-use of firewood, prohibition on smoking in natural areas, bush fires accidents, safe handling of animals (if encountered), prohibition of fishing etc.
- Green Belt Development Plan (₹75 Lakhs) and Compensatory Afforestation Plan (₹4.46 Crores) and Biodiversity Management and Wildlife Conservation Plan for Sch-1 Species (₹93 Lakhs) have been prepared and provided in EIA report with Budget estimation added in the EMP Cost.
- As significant fish population is not supported by this river and no migratory fish aspects is observed, therefore, no especial mitigation measures or Plan for fisheries is required for the stream, however a Fisheries Management Plan for locals have been proposed separately in EMP for **₹25 Lakhs**.

ES 5.0 ANALYSIS OF ALTERNATIVES

A detailed alternative study has been carried out to find the best optimized location for lower reservoir. Detailed topographical survey was carried out for all the four (4) options and analysed for optimum storage capacity of reservoirs.

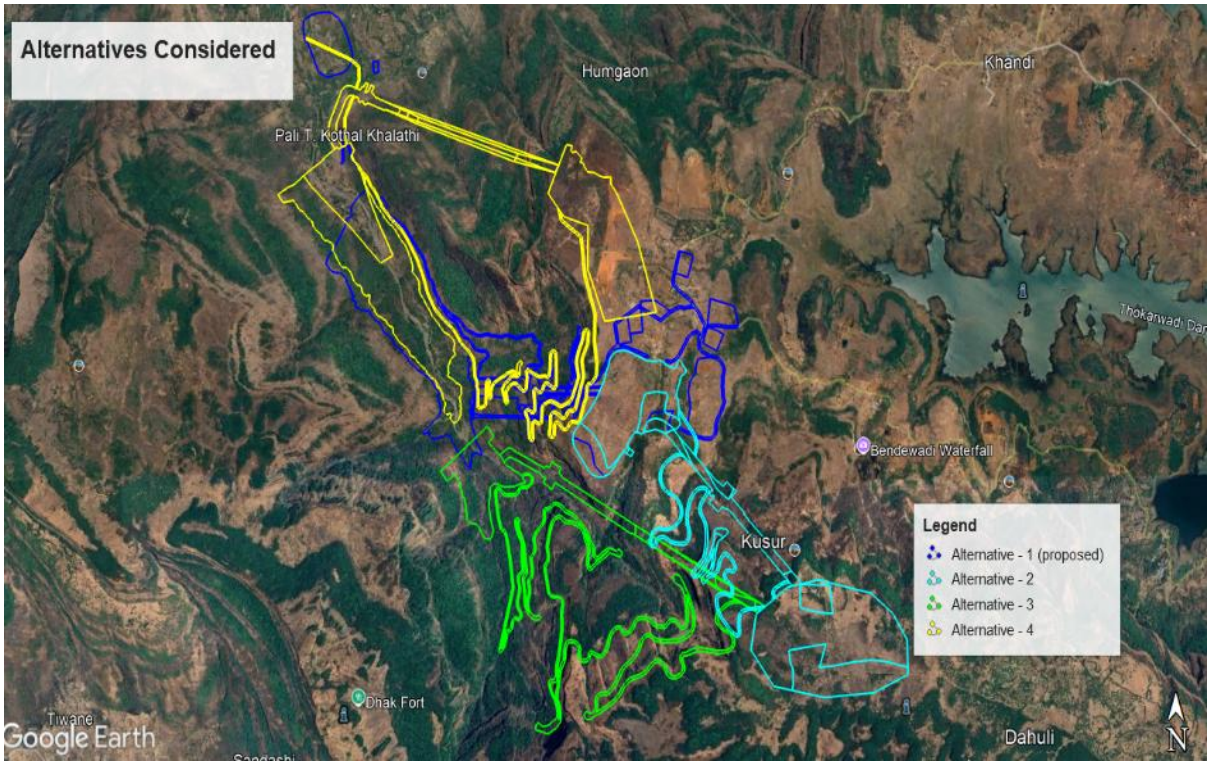

Figure ES.1: Proposed alternatives for Upper reservoir with lower reservoir

The analysis of the alternatives for alignment is evaluated using Environmental Impact Assessment Decision Support System (EIADSS). The Impact scoring criteria are mainly categorized into five groups *(viz. Natural Resource Environment, Physical Environment, Biological Environment, Social Environment, & Engineering Environment).*

For option - 1, 2, 3 & 4, the cumulative weighted percentage is worked out to be 34%, 43%, 46% and 42%. The minimum weighted percentage indicates the best alternative, and the maximum weighted percentage indicates the poorness of the proposal. So, it is concluded that the **minimum weighted percentage obtained to option-1 and recommended for this project** which will have social and environmental acceptability, technically viability and economic & financial feasibility.

ES 6.0 ENVIRONMENTAL MONITORING PROGRAM

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 will indicate where changes to procedures or operations are required, in order to reduce impacts on the environment or local population. A Budgetary provision of **₹64 Lakhs** is allotted for the environmental monitoring and programs envisaged under EMP chapter.

ES 7.0 ADDITIONAL STUDIES

Risk and Disaster management plays an important role in the prompt management of disaster events also ensuring that normally returns to the area within the shortest possible time. The plausible natural hazards such as Earthquakes, Floods, Cyclone & Drought *etc* and man-made disaster were discussed and mitigation measures and notification chart for emergency events are proposed in the Chapter.

Watershed Development Plan: The watershed development plan in 10 Km radius of the project site is being carried out by ICAR, Vasad of Gujarat and will be submitted in the final report.

Environmental Public Hearing: The Public Hearing for the proposed project will be conducted following the submission of the Draft Final EIA/EMP Report to the Regional Offices of the Maharashtra State Pollution Control Board (MPCB) in Raigad and Pune districts. The procedure for conducting the Environmental Public Hearing in both districts will follow the prescribed guidelines given in the EIA notification 2006 and its subsequent amendments.

After completion of Environmental Public Hearing for the Saidongar 2 - Maval PSP project respective issues raised, and compliance shall be incorporated in the Final EIA/EMP report. The final EIA/EMP copy prepared will be uploaded on PARIVESH Portal for consideration towards the Environmental Clearance from MoEF&CC.

ES 8.0 PROJECT BENEFITS

The benefits of the proposed project are given below:

1. **Contribution to the Growth of National Economy:** The net increase in productivity and direct growth of the National economy for **₹43,040.70** Crores throughout the life span of the project.
2. **Creation of Direct and Indirect Employment**: The Saidongar 2 - Maval PSP is envisaged to create direct and indirect employment of 1000 persons during construction phase of the project.
3. **Reduction of Carbon Emissions:** Benefit the environment by reducing the total amount of carbon dioxide by **1.82 million tCO_2** per year. The estimated total carbon credit revenue from the proposed project for **₹5,078 Crores.** Due to which the Benefit-Cost Ratio of the project is worked out to be **7.92.**

Table ES.2: Reduction of Carbon Emission

S.No	Baseline Emission, Million tCO_2e (a)	Project Emission Million tCO_2e (b)	Total carbon sequestration through Afforestation Million tCO_2e (c)	Emission Reduction Million tCO_2e (d=a-b+c)	USD/ tCO_2e	Carbon Credit Revenue Million USD
1.	72.90	4.26	0.0006	68.64	7.23* or 14	496.30

4. **Subsidiary industrial opportunities:** The project will generate **2,496.60 MU** per Year of energy. This will play a significant role in National and State power planning.

ES 9.0 ENVIRONMENTAL COST BENEFIT ANALYSIS

Environmental Cost Benefit Analysis (CBA) is an approach to make a decision in regard to any infrastructure development. The benefit-cost ratio is the primary method to evaluate the benefits and challenges imposed by the upcoming activity in commercial terms with respective to the impact on the environmental scenario.

The estimation of Benefit-Cost ratio of Saidongar 2 - Maval PSP is assessed by means of cumulative direct benefits viz., increase in productivity attribute to the project, employment etc. and indirect benefits viz., Emission reduction due to the project. The cost

of the project including O&M and Interest on the capital cost will give the Total construction cost of the project. The Benefit-Cost Ratio of the of Saidongar 2 - Maval PSP of 1200 MW is estimated to be **7.92.**

ES 10.0 ENVIRONMENTAL MANAGEMENT PLAN

The EMP provides the best management practices which are to be adopted to mitigate environmental impacts. This plan also specifies the organizational requirements and institutional strengthening necessary for sound environmental management of the project. The major management plans provided are as below:

1. **Compensatory Afforestation:** Compensating for the loss of **35.60 ha** of class I forests category in Maharashtra requires plantation for forest density of 0.7 coverage. The estimated budget for this compensatory plantation will be **₹4.46 Crores.** (Considering CA land with NPV cost) including the preparation, saplings, labour, irrigation, and four years of crucial maintenance. However, the actual Net Present Value for the proposed forest area to be diverted shall be calculated by the Forest Advisory Committee constituted by the Ministry of Environment, Forest and Climate Change (MoEF&CC). This NPV shall be fixed during the forest clearance under FCA.

   The **₹4.46 crore** compensatory afforestation cost is a statutory requirement under the Forest (Conservation) Act, 1980, processed through CAMPA, and excluded from the EMP budget.

2. **Biodiversity Management & Wildlife Conservation Plan**: The proposed project has been carefully designed to escape the ecologically sensitive areas to avoid disturbance to the prominent wildlife. However, this project requires 35.60 ha Forest land and cutting of about 9,554 trees along with the shrubs and other vegetation on the identified land. This will impact the wildlife by disturbing their habitat. Hence, a specific Biodiversity Management and Wildlife Conservation Plan have been prepared for the project with a budget of **₹93 Lakhs** in the EMP.

3. **Fisheries Conservation and Management Plan:** The project is drained with a seasonal river Pej with very small catchment of 23.5 Sq. km. Hence, significant fish population is not supported by River Pej and no migratory fish aspects is observed, therefore, no mitigation measures or plan for fisheries is required. A budget of **₹25 Lakhs** has been allocated towards EMP.

4. **Muck Disposal Plan:** About **58.06 Lakh cum** of muck waste is expected to be generated from the excavation and other construction activities. The entire excavated material is proposed to be dumped in the identified in two (2) muck disposal sites having an area of **35 ha**. The proposed biological and engineering mitigation measures for the muck disposal site are provided in the Muck Disposal Plan. The estimated cost for the management of muck waste with engineering measures is **₹3,489.41 Lakhs** which includes Retaining Wall, Compaction and Fencing are recommended in the study.

   Biological Measures such as, Vegetation cover controls the hydrological and mechanical effects on soils and slopes. Therefore, biological measures to stabilize the loose slope are recommended in the study.

5. **Landscaping and Restoration of Construction Sites** is essential for mitigating

impact, enhancing aesthetic appeal, and promoting long-term ecological health. These processes go beyond simply covering up the remnants of construction; they involve a systematic approach to revitalizing the land. An amount of **₹100 lakhs** budgetary provision is made under this section.

6. **Sanitation & Solid Waste Management Plan:** The solid waste to be generated from construction camp site as well as staff colonies during construction phase requires management plan as per the Solid Wastes Management Rules (SWM) 2016. For that, an efficient waste management system will be required to put in place to keep the environment of the region clean and healthy. These camp and temporary settlements will also require an adequate water supply for drinking and cleaning. An amount of **₹74 Lakhs** budgetary provision is made under this section.
7. **Public Health Delivery System:** The objective of the Public Health Delivery System is to provide good health care facilities at construction sites and to improve efficiency in the allocation and use of health resources in the project area, to improve the health status of the people in the project area. The possible threats to public health are discussed along with the management measures. A budget of **₹110 lakhs** has been included in the EMP budget.
8. **Energy Conservation Measures:** Energy conservation on a project site is paramount for both environmental sustainability &cost-effectiveness. Implementing a comprehensive strategy that addresses various aspects of energy consumption is crucial. An amount of **₹70 lakhs** budgetary provision is made under this section.
9. **Labour Management Plan:** A Labour Management Plan (LMP) is a comprehensive document that outlines the strategies and procedures for managing the workforce on a project, ensuring their well-being, safety, and fair treatment. An amount of **₹40 Lakhs** budgetary provision is made under this section.
10. **Green Belt Development Plan:** The proposed project requires **141.44** ha of land involving clearing of **9,554** nos. of trees. (Trees proposed for plantation on Muck disposal area also along the sides of proposed road 4 km in length and around the office campus area.) An amount of **₹75 Lakhs** (Muck disposal area: ₹60 Lakhs + along the road: ₹15 lakhs) have been included in the EMP budget including 5 years maintenance.
11. **Dust Suppression Measures:** Proposed Project involves excavation of muck and haulage of muck which leads to emission of Particulate matter (PM), further to suppress dust, water sprinkling is advised with and EMP Budget of **₹60 Lakhs.**
12. **Environmental Monitoring:** Project involves construction phase of 60 months & including pre-construction activities and considering 2 years of recurring operation phase which requires environment monitoring of attributes with cost of **₹64 Lakhs**
13. **Reservoir Rim Treatment Plan:** The reservoir rim treatment plan is a critical component of the Saidongar 2 - Maval Pumped Storage Project (PSP) to ensure the stability and longevity of the reservoir embankments. The plan involves the implementation of measures to prevent erosion, landslides, and other potential hazards along the reservoir rim. This includes the construction of retaining walls, slope stabilization, and vegetation cover to reduce soil erosion. The rim treatment plan will be designed in compliance with environmental regulations & best practices to ensure the safety & sustainability of the reservoir & will be incorporated in the

design of the project itself. A budget of **₹150 Lakhs** is considered in EMP.

14. **Disaster Management Plan:** Project involves construction of Upper and Lower reservoir with installed capacity of 1200 MW, also project lies in hilly ranges where chances of disaster might occur, to mitigate the impact of disaster measure are provided along with a budgetary estimate of **₹120 Lakhs**.
15. **Watershed Development Plan:** A watershed development plan focuses on managing land, water, and natural resources within a watershed to reduce soil erosion, improve water quality, and enhance agricultural productivity. It involves activities such as afforestation, water harvesting, and soil conservation. The plan aims to ensure sustainable resource use and ecosystem health in the watershed area. The cost for watershed development plan is included in EMP for **₹320 Lakhs**.
16. **Catchment Area Treatment Plan:** The Catchment Area Treatment (CAT) Plan has been prepared considering the lower reservoir catchment area of 23.4 sq. km, which is common to both the Saidongar 1 - Karjat PSP & Saidongar 2 - Maval PSP projects. Accordingly, the cost estimates for ecological restoration and conservation measures, such as the construction of dry check dams, gabion bunds, artificial regeneration, development of forest tanks and implementation of community-based conservation activities have been comprehensively included in the CAT Plan of the Saidongar 1 - Karjat PSP. As the same catchment serves both projects, a separate budget allocation for the proposed Saidongar 2 - Maval PSP is not necessary.
17. **Large Scale Plantation in 10 Km radius of the Project:** A provision has been made for large-scale plantation within a 10 km radius of selected degraded forest patches covering about **10 ha**. A total cost of **₹120 lakhs** has been proposed, which includes **₹100 lakhs** for plantation activities & **₹20 lakhs** for maintenance and monitoring. The cost covers a five-year period for upkeep and assessment of sapling health. Monitoring will be carried out as per the standard methodology of the Forest Department, either through its own mechanism or by engaging a recognized research institute such as ICFRE.
18. **Local Area Development Plan:** Torrent PSH4 Private Limited as part of its overall business operations is committed to addressing aspects of local sustainable development like community development and environment protection in and around the proposed Project. The affected villages near to the project area are Pali T. Kothal Kalathi and Saidongar villages in Karjat Taluka of Raigad District and Kusur Village in Maval Taluka of Pune district. Based on the local consultations in project affected villages, the focus areas covering many important components of the sustainable development such as social, economic, livelihoods and environment are identified in the project. An amount of **₹200 Lakhs** budgetary provision is made under EMP budget.
19. **Resettlement & Rehabilitation Plan:** As per the Government of Maharashtra Gazette notification (Maharashtra Gazette notification No. LQN. 12/2013/C.R. 190/A-2 dated 27th August 2014) the provisions of Rehabilitation and Resettlement under RFCTLARR-2013 will apply only in case of private company purchases land through private negotiations to an extent equivalent or more than 1000 hectares and the project area is less than 1000 Ha. No R&R Plan is required as the proposed PSP project is less than 1000 Ha. However, the private land and Government barren land

of 105.84ha will be procured based on the market rate. The cost will be included under project cost.

ES 10.1 EMP Budget

The total budget for implementation of EMP works is estimated to be is **₹51.10 Crores** with Capital Cost of **₹15.18 Crores** and recurring cost spread over five years amounts to **₹35.92 Crores**. The total budget for implementation of EMP is given in **Table ES.4**

Table ES.4: EMP Cost Projection Summary

S. No	Environmental Plans	Capital Cost (₹ in Lakhs)	Recurring Cost (₹ in Lakhs)					Total Cost (₹ in Lakhs)
			Y1	Y2	Y3	Y4	Y5	
1	Biodiversity Conservation & Wildlife Conservation Plan	93.00	0.00	0.00	0.00	0.00	0.00	93.00
2	Fisheries Development Plan	25.00	0.00	0.00	0.00	0.00	0.00	25.00
3	Muck Management Plan	581.60	581.60	581.60	581.60	581.60	581.41	3489.41
4	Landscaping, Restoration of Construction Sites	25.00	15.00	15.00	15.00	15.00	15.00	100.00
5	Sanitation and Solid Waste Management Plan	24.00	10.00	10.00	10.00	10.00	10.00	74.00
6	Public Health Delivery System	60.00	10.00	10.00	10.00	10.00	10.00	110.00
7	Energy Conservation Measures	30.00	10.00	10.00	10.00	10.00	10.00	70.00
8	Labour Management Plan	15.00	5.00	5.00	5.00	5.00	5.00	40.00
9	Green Belt Development Plan	50.00	5.00	5.00	5.00	5.00	5.00	75.00
10	Pollution Mitigation Measures	20.00	8.00	8.00	8.00	8.00	8.00	60.00
11	Environmental Monitoring Program	0.00	13.00	13.00	13.00	13.00	12.00	64.00
12	Reservoir Rim Treatment Plan	20.00	26.00	26.00	26.00	26.00	26.00	150.00
13	Disaster Management Plan	85.00	10.00	10.00	5.00	5.00	5.00	120.00
14	Watershed Development Plan	320	0.00	0.00	0.00	0.00	0.00	320.00
15	Catchment Area Treatment plan	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	Large scale Plantation	120.00	0.00	0.00	0.00	0.00	0.00	120.00
17	Local Area Development Plan	60.00	40.00	40.00	20.00	20.00	20.00	200.00
18	Net Present Value, CA land & CA plantation*	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19	Resettlement and Rehabilitation*	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total	**1518.60**	**733.6**	**733.6**	**708.6**	**708.6**	**707.41**	**5110.41**
	Capital	**1518.60**	**Recurring**		**3591.81**			

**EMP Budget does not include NPV cost in Compensatory Afforestation and R&R cost*