ENVIRONMENTAL IMPACT ASSESSMENT (EIA)
MALSHEJ GHAT BHORANDE PUMPED STORAGE PROJECT (1500 MW)

Tehsil Junnar & Murbad, District Pune & Thane, Maharashtra
(Sector 1(c); Cat "A")

EXECUTIVE SUMMARY

May 2026

Prepared for:

M/s Adani Renewable Energy Fifty Two Limited

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QCI Certificate No.	NABET/EIA/25-28/RA 0415
Laboratory	AGSS Analytical and Research Lab (P) Ltd. NABL Certificate Number: TC-14844 An ISO-9001: 2015 Accredited Laboratory
Baseline Data Monitoring Period	Winter (December 2023 - February 2024) Pre-monsoon (March – May 2024) Monsoon (June – September 2024)

1. INTRODUCTION

Adani Renewable Energy Fifty Two Limited (AREFTL) is one of the largest renewable companies in India has proposed to develop Malshej Ghat Bhorande Pumped Storage Project falling Pune and Thane District of Maharashtra State.

The Malshej Ghat Bhorande Pumped Storage Project is being proposed to construct an upper reservoir near Adoshi hamlet (a revenue village of Ajanawale Village) and as lower reservoir near Bhorande village. The upper and lower reservoirs are formed across the minor nallah with very little catchment areas. The catchment area up to the upper dam site is about 0.8 km^2. The catchment area up to the lower dam site is estimated to be about 3.0 km^2.

For upper reservoir, the nearest Railway station is Pune which is about 125 km & the nearest airport Pune. For the lower reservoir, the nearest Railway station is Kalyan which is about 65 km & the nearest airport is Mumbai Airport. The location of the project is shown in **Figure 1**.

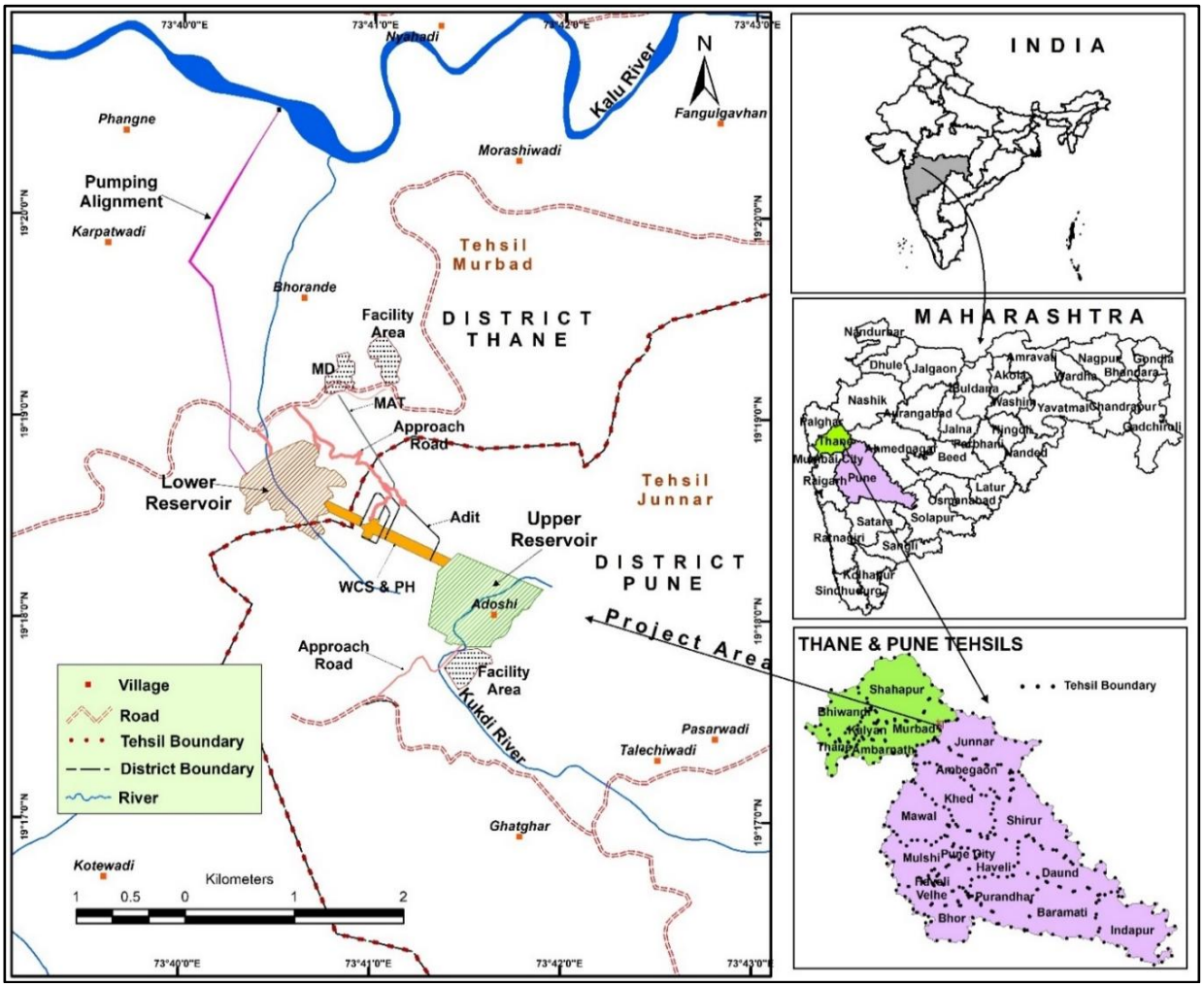

Figure 1.1: Location Map of Malshej Ghat Bhorande PSP

Scoping clearance of Malshej Ghat Bhorande Pumped Storage Project of 1440 MW project was accorded by MoEF&CC, GoI, on 24.03.2023. Due to change in configuration of project components; TOR amendment letter for 1500 MW installed capacity was accorded by MOEF&CC with ToR Identification No. TO24A0000MH5642838A issued on 27.05.2024.

The MoEF&CC granted the transfer of Terms of Reference transfer from "M/s Adani Green Energy Limited" to a new subsidiary "M/s Adani Renewable Energy Fifty Two Limited", with ToR identification no. TO25A0000MH5241143T dated 23.06.2025**.**

2. PROJECT DESCRIPTION

The Malshej Ghat Bhorande PSP will comprise of two reservoirs, both the reservoirs are proposed to be newly constructed. The proposed Malshej Ghat Bhorande PSP is planned as an 'Off stream closed loop' scheme. The proposed Malshej Ghat Bhorande PSP 1500 MW envisages following major civil structures:

1	Upper Dam	Crest length of Dam is 1967 m, maximum height 30.5 m above the deepest riverbed level. The gross storage capacity of upper reservoir is 7.95 MCM.
2	Lower Dam	Crest length of Dam is 712 m, maximum height 64.5 m above the deepest riverbed level. The gross storage capacity of lower reservoir is 8.97 MCM.
3	Upper Intake /Outlet	**Horizontal Intake**- 5 Nos. **Intake 1 to 5 –** 3.70m (W) & 3.70m (H) Including piers. (Each intake) **Trash rack bays**- 2 Nos. in each intake.
4	Lower Intake /Outlet	**Horizontal Intake**- 3 Nos. (2 nos. larger & 1 smaller). **Intake 1 & 2 –** 6 m (w) & 6 m (h) Including piers. **Intake 3 -** 5 m (W) x 5 m (H) including piers. **Trash rack bays**- 3 Nos. in larger intake & 2 in smaller intake
5	Pressure Shaft	**Larger Unit:** PS No. 1 to 4; Length: 1134 m; Shape: Circular; Diameter-3.7m; Lining-Steel
		Smaller Unit: PS No. - 5; Length: 434 m; Shape: Circular; Diameter-3.7m; Lining-Steel PS No.- 6; Length: 700 m; Shape: Circular; Diameter-2.85m; Lining-Steel
6	Powerhouse	**Underground Powerhouse:** 217.00m (L)x 22.00 m (B) x 50.00 m (H)
7(a)	Tail Race Tunnel - Unit	**Larger Unit:** Unit TRT No. 1 to 4; Length: 104 m; Shape: Circular; Diameter-4.0 m ; Lining-Steel
		Smaller Unit: Unit TRT No. 5 & 6; Length: 104 m; Shape: Circular; Diameter-4.0 m; Lining-Steel
7(b)	Tail Race Tunnel - Main	**Larger Unit:** TRT No. 1 to 2; Length: 582 m; Shape: Circular; Diameter-6.0 m; Lining-Steel
		Smaller Unit: TRT No. - 3; Length: 582 m; Shape: Circular; Diameter-5.0 m; Lining-Steel
8	Head Race Tunnel	**Nil**
9	Surge Shaft	**Nil**
10	EME: Pump Turbine	Type**:** Vertical Reversible Francis Pump Turbine. Number: Six (6) (04 Larger Units / 02 Smaller Units); Fixed speed units. Rated Head: (i) Generation- 521.83 m; (ii) Pumping: 539.57 m. Rated Discharge: 65.38 m^3/s per turbine (Generation mode); 53.80 m^3/s per turbine (Pumping mode)

The proposed 1500 MW Malshej Ghat Bhorande Pumped Storage Project envisages utilizing 7.04 MCM of water for operation purposes.

The quantum of water required for initial/one time filling of reservoirs (i.e. 9.88 MCM) and annual makeup water requirement, which comprises of evaporation and other transmission losses shall be pumped from nearby Kalu River.

DPR of the project and the techno-economic viability along with general layout is under approval by CEA/CWC/GSI. Pre-DPR chapters-Layout Plan and Power potential Studies are

duly approved by CWC/CEA. The salient features are given in **Table 1** and Layout map of is given at **Figure 2.**

Table 1: Salient Features of Proposed Malshej Ghat Bhorande Pumped Storage Project

S. No.	Description	Upper Dam	Lower Dam
1	**LOCATION**		
	a) State	Maharashtra	Maharashtra
	b) District	Pune	Thane
	c) Taluka / Village	Adoshi, Taluka - Junnar	Bhorande, Taluka-Murbad
	d) Latitude	N 19°17'59.3"	N 19°18'43.1"
	e) Longitude	E 73°41'27.7"	E 73°40'30"
	f) Nearest rail head	Pune railway station (125km from Project site)	Kalyan railway station (65km from Project site)
	g) Nearest airport	Pune Airport (119km from Project Site)	Mumbai Airport (107km from Project Site)
2	**HYDROLOGY**		
	a) Catchment Area	0.8 km^2	3.0 km^2
	b) Design Flood	69 m^3/s	312 m^3/s
	c) Quantity of water required daily for 6.0 hours power generation	7.06 MCM	
	d) Source for initial filling	Kalu River (at 4 km distance)	
3	**DAMS/ RESERVOIRS**		
	Dam Type	Concrete Gravity Dam	Concrete Gravity Dam
	a) MDDL	RL 752.00 m	RL 206.00 m
	b) FRL	RL 769.50 m	RL 243.50 m
	c) Top of Dam	RL 771.50 m	RL 245.50 m
	d) Live Storage	7.04 Mm^3	8.15 Mm^3
	e) Gross Storage	7.95 Mm^3	8.97 Mm^3
	f) Length	1967m	712m
	g) Max. Height	30.5m	64.50m
4	INTAKE		
	a) Type	Horizontal - 5 No.	Horizontal - 3 No.
	b) Trash Rack Size (Each Intake)	2 bays of 6.0m wide & 8.7m high	Larger Unit -3 Bays of 5.1m (W) x 10.2m(H) Smaller Unit -2 bays 5.1m (W) x 9.2m(H)
	c) Intake Gate Size	3.7mx3.7m	Larger Unit -6mx6m
5	PRESSURE SHAFT		
	Number	5 no.	
	Length	1134 m	
	Shape	Circular	
	Diameter	3.7m	
	Lining	Steel	
	Unit Penstock Diameter	3.7m / 2.85m	
6	POWERHOUSE		
	Type	Underground	
	Installed Capacity	6 no's (4 X 300MW & 2 X 150 MW)	
	Size	217 m x 22 m x 50 m	
	C/L of Unit	RL 137.00 m	
	Service bay level	RL 152.00 m	
	Type	Underground	
	Installed Capacity	6 no's (4 X 300MW & 2 X 150 MW)	
7	TAILRACE TUNNEL		
	Tail Race Tunnel – Main 3 no.	**Larger Unit:** TRT No. 1 to 2; Length: 582 m; Shape:	

S. No.	Description	Upper Dam	Lower Dam
		Circular; Diameter-6.0 m; Lining-Steel	
		Smaller Unit: TRT No. - 3; Length: 582 m; Shape: Circular; Diameter-5.0 m; Lining-Steel	
	Tail Race Tunnel – Unit 6 no.	Unit TRT No. 1 to 4; Length: 104 m; Shape: Circular; Diameter-4.0 m; Lining-Steel	
		Unit TRT No. 5 & 6; Length: 104 m; Shape: Circular; Diameter-4.0 m; Lining-Steel	
8	**ELECTRO-MECHANICAL EQUIPMENT**		
	Pump - Turbine		
	a. Type	Vertical Reversible Francis Pump Turbine	
	b. Number	Six (6) - Fixed speed units. (04 Larger Units / 02 Smaller Units);	
	c. Rated Head	521.83 m Generation mode 539.57 m Pumping mode	
	d. Rated discharge	65.38 m^3/s per turbine (Generation mode) 53.80 m^3/s per turbine (Pumping mode)	
	e. Annual average daily hours of generation	6.00 Hours	
	f. Annual average daily hours of pumping	6.74 Hours	
9	**ANNUAL POWER**		
	a. Annual average generation (95% machine availability)	3120.75 MU	
	b. Annual average pumping (95% machine availability)	3916.47 MU	
	c. Cycle efficiency	79.7 %	

Source: Pre-Feasibility Report of Malshej Ghat Bhorande PSP

2.1 Land Requirement

The total permanent land requirement for the proposed Malshej Ghat Bhorande Pumped Storage Project has been worked out as 166.0646 ha, based on detailed topographical surveys, geotechnical investigations and engineering design optimization. In addition, 9 ha would be taken on lease for Concrete Batching Plant and Ferrule Handling/stacking Area and Workshop. The details of the land to be acquired is reproduced below in **Table 2.**

Table 2: Land Requirement of Proposed Malshej Ghat Bhorande Pumped Storage Project

S. No.	Project Components	Revised Land Requirement (ha)		
		Forest	Non- Forest	Total
1	Facility Area			
1.1	Site Office	0.0000	2.0000	2.000
1.2	Concrete Batching Plant*	0.0000	0.0000	0.000
1.3	Ferrule Handling/Stacking Area and Workshop*	0.0000	0.0000	0.000
1.4	Labour Camp	0.0000	6.0000	6.000
1.5	Crusher	0.0000	4.000	4.0000
1.6	Magazine	0.0000	0.1348	0.1348
	Sub Total (Facility Area)	0.0000	12.1348	12.1348
2	Muck Disposal Area	0.0000	18.5979	18.5979
3	Upper Reservoir (Proposed)	0.0000	65.4736	65.4736
4	Lower Reservoir (Proposed)	41.7066	0.0000	41.7066
5	WCS, PH, Pothead Yard, Adit and MAT Area	8.6876	3.9836	12.6712
6	Approach Road to Project Component	10.0712	4.1093	14.1805
7	Pumping Facilities	0.4113	0.8887	1.3000
Total Area in ha		**60.8767**	**105.1879**	**166.0646**

*Land on lease

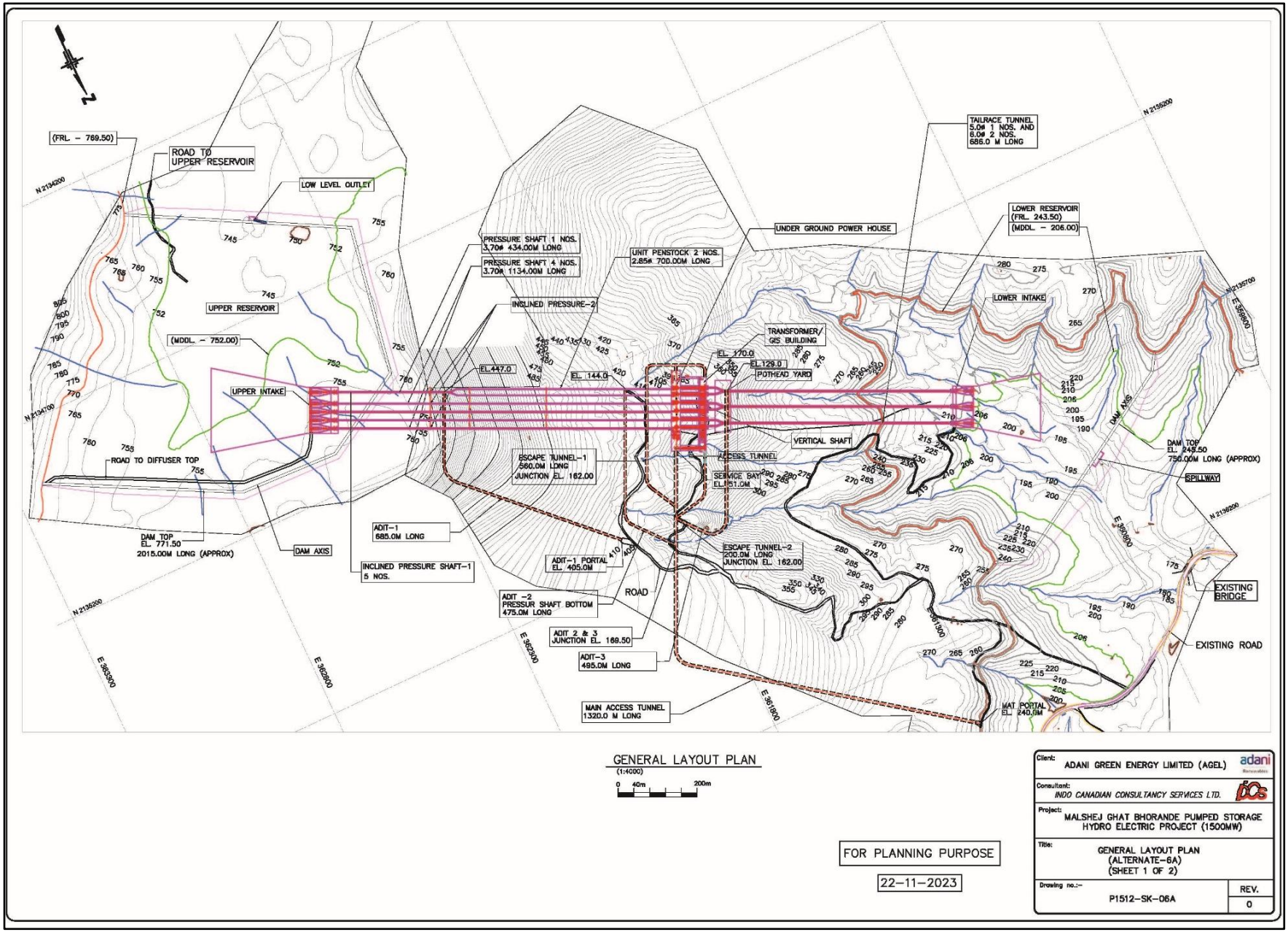

Figure 2.2: Layout Map of Malshej Ghat Bhorande Pumped Storage Project

3. DESCRIPTION OF THE ENVIRONMENT

Although MoEF&CC OM dated 14.08.2023 permits EIA based on one season baseline data (other than monsoon) for closed-loop PSPs, the present study was undertaken using three-season data to generate a more robust environmental baseline for impact assessment. Therefore, for the proposed project, the field surveys for the collection of primary data were carried out for three seasons, i.e. from December 2023 to February 2024 in winter season, March 2024 to May 2024 in pre-monsoon season and June 2024 to September 2024 in monsoon season, where information on biological & physical environmental parameters and socio-economy of the study area was collected to understand the present setting of the environment at the project site. A map of the study area is given in **Figure 3.** The base line status is described briefly in the following sections.

3.1 Physiography

The study area of the proposed project lies between 55.0 m to 1267 m elevation. About 38.79% of the project study area lies below 200 m elevation band and about 23.13% of the study area lies in 201 m to 400 m elevation band. The elevation of proposed upper reservoir is between 601-800 m, whereas areas around proposed water conducting system and lower reservoir are falling in the 401 m to 600 m and 201 m to 400 m elevational range, respectively.

Topography indicates that 40.58% of the area is Slightly Sloping (2-8 degree) category, followed by Moderately Sloping (8-15 degree) and Moderately Steep (15-30 degree), which are about 26.34% and 19.52%, respectively, of the total study area. The proposed upper reservoir is mainly slightly sloping, whereas the site proposed for water conducting system is falling under Slightly Sloping to Moderately Steep category.

3.2 Geology

The proposed PSP site is located on the western margin of Western Ghats of Indian Peninsula, which are occupied by thick pile of Thoilitic Basalt Flows, which are stratigraphically termed as 'Deccan Traps'.

Based on review of Geology & Mineral map published under the direction of Director General Geological Survey of India second edition – 2020, it is found that the entire area comprises Basalt rock of the Upper Cretaceous to Palaeocene age and Deccan Trap supergroup and Sahyadri group.

Stratigraphically, the project area exposes basaltic flows of Salher, Lower Ratangarh, and Upper Ratangarh, formations of the Sahyadri Group of Deccan Trap Supergroup corresponding to Upper Cretaceous to Palaeocene age, Laterite of Cenozoic age and Alluvium of Quaternary age.

The project area falls in the Zone III as per IS-1893 (Part 1) 2016, Seismic Zoning Map of India.

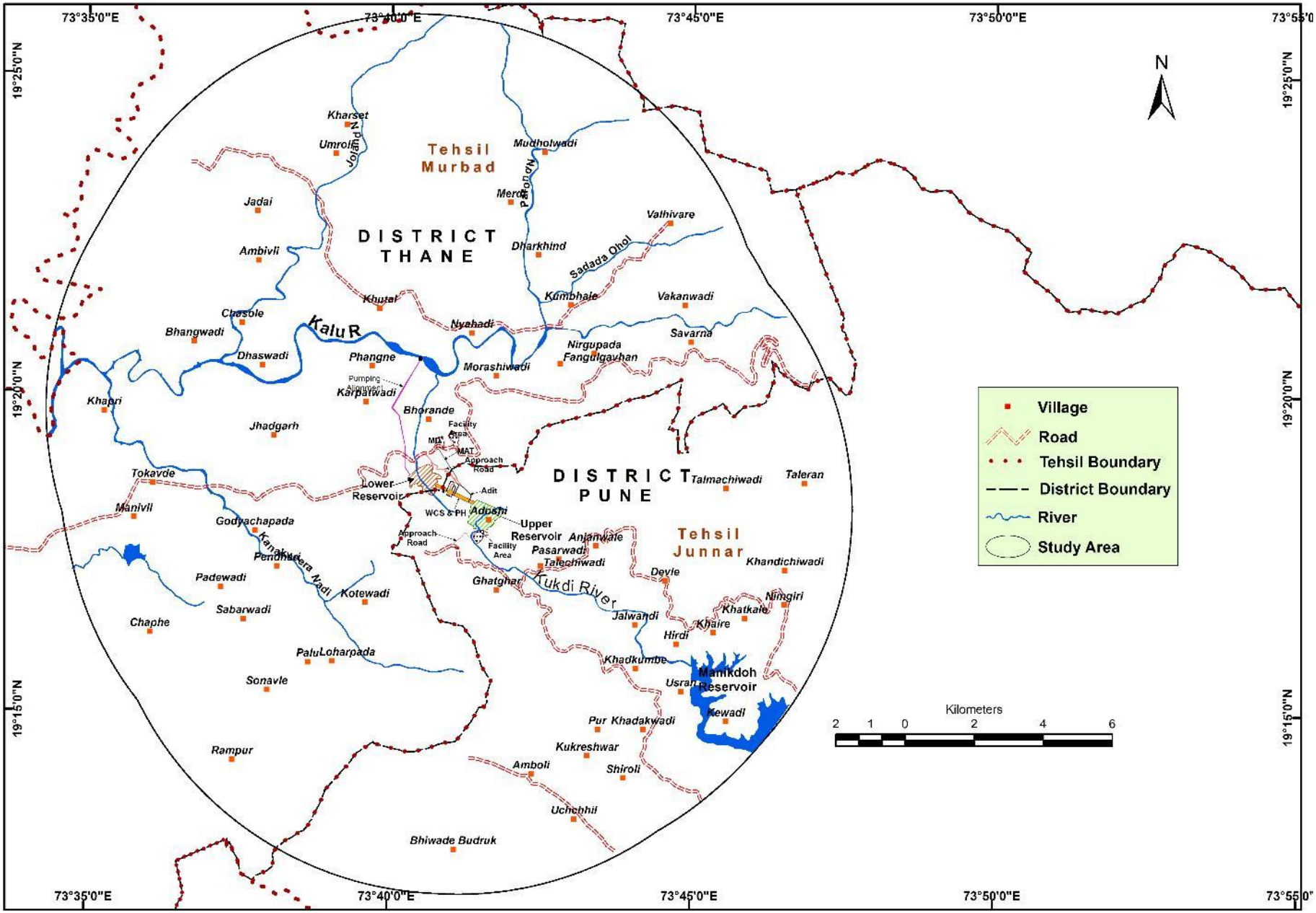

Figure 1: Map Showing Study Area

3.3 Hydrology

As the scheme is off-stream closed loop, the catchment yield will be released downstream through the provision of spillway/ bottom outlet in dam. To meet the annual makeup water requirement, which comprises of evaporation and other transmission losses shall be done from the nearby water source i.e. Kalu River. Initial one-time abstraction of 9.88 MCM and annual make-up requirement of about 1.14 MCM are proposed during monsoon months, when the estimated available yield at the pumping point is substantially higher (37.57 MCM in 90% dependable year and 69.88 MCM on average). Water availability certificate has been issued by Water Resources Department, Government of Maharashtra.

3.4 Land Use/ Land Cover

In the study area of Malshej Ghat Bhorande PSP, Deciduous Forest (21.93 %) comprises of most of the study area, followed by Scrub Land (20.84%) and Evergreen/Semi-evergreen Forest (20.29%). The area in and around proposed lower Reservoir is mostly represented by Evergreen or Sem-evergreen Forest. The proposed upper reservoir is mostly characterized by the scrub land with few patches of agricultural land/fallow land.

3.5 Meteorology

The study area of the project lies in the Pune and Thane district, which experiences mostly hot summer and dry climate except in the monsoon season. Average maximum temperature of 36.9°C was recorded during April. The average minimum temperature of 19.0°C was recorded during January. The area receives maximum rainfall during the south-west monsoon i.e., between June and September when about 92.29% of the annual average rainfall is received during these months. The relative humidity is generally low throughout the year, except during monsoon month when the average humidity in the study area is close to 86.80% in July. The lowest humidity is generally in February (39.80%) month.

3.6 Soil

Soil of the study area is Clay Loamy and Sandy Clay Loam in nature. In general, all the physical and chemical soil quality indicators reflect the good quality of the soil. The soil fertility based upon Nutrient Index in terms of NPK shows that Nitrogen is in 'Low' to 'Medium' range. Whereas Phosphorus is in 'Low' to 'Medium' range and Potassium is having 'Medium' to 'High' Nutrient Index.

3.7 Ambient Air and Noise Quality

The Ambient Air Quality monitoring was carried out conforming to the National Ambient Air Quality Standards for Industrial, Residential, Rural & Other Areas and Ecologically Sensitive Areas. Traffic movement is the source of air pollution in the area. The results of monitoring show that $PM_{2.5}$, PM_{10}, SO_2, and NO_2 levels at all the sites are well within the Residential & Rural area permissible limits prescribed by National Ambient Air Quality Standard 2009 notified by CPCB. Air quality was also assessed using 24h averages of $PM_{2.5}$, PM_{10}, SO_2, and NO_2 levels in the AQI calculator of CPCB and calculated AQI values shows the AQI values fall under 'Good' category in the study area.

3.8 Water Quality

The data on water quality has been collected to evaluate surface and ground water quality in study area.

Surface water

- All the surface water samples fall under Class 'B' i.e., Outdoor bathing (Organized), according to CPCB, Water Quality Criteria.
- Based upon the classification of Irrigation water suitability, the SAR (0.40–1.00) and EC (142–250 µS/cm) values indicate that the surface water in the study area is suitable for irrigation, with low sodium hazard and low salinity hazard.
- WQI values ranging between 57 and 66 indicate moderate water quality typical of rural surface water bodies influenced by natural organic load and seasonal runoff. These values are consistent with CPCB Class B waters and are suitable for outdoor bathing.

Groundwater

- According to BIS standards for Drinking Water (2012), all the Groundwater samples collected from the study area fall within permissible limits of the same.
- According to DWQI all the samples of groundwater fall in 'Excellent' water quality class.

3.9 Floristic Diversity

The project area falls in the Pune and Thane Forest Divisions of Maharashtra Forest Department. As seen from the land use map of the study area, a large part of the area is comprised of deciduous forest, evergreen/semi-evergreen forest and scrub land. According to 'A Revised Survey of the Forest Types of India' by Champion and Seth (1968) the major forest area falls under **Group 2: Tropical Semi-evergreen Forest, Group 3: Tropical Moist Deciduous Forest** and **Group 5: Tropical Dry Deciduous Forests**.

The detailed inventory of plant species reported from the study area has been done based on primary survey and same has been supplemented with available secondary data. During primary field surveys 113 species of angiosperm were recorded from the study area, when supplemented with secondary data, a total list of 273 species was compiled for the study area. Therefore, a list of 273 species of angiosperm plants, belonging 77 families, was compiled which includes plant species growing in forested areas, scrub land, near agricultural fields and settlements, abandoned land, etc. This list includes 108 species of trees, 47 species of shrubs, 57 species of herbs, 33 species of climbers and 28 species of grasses. Most of the vegetation is found mainly in the forest area. Based on the plant species reported from the study area, Fabaceae was found to be the most dominant family with 38 plant species, which was followed by Poaceae (27 species), Lamiaceae (15 species), Acanthaceae (13 species), Rubiaceae (11 species), Combretaceae (11) and Malvaceae (11).

The majority of the species have not been assessed yet by IUCN (2025-2). Out of 273 species reported from the area, 90 species have been assessed. Among these species, 2 plant species viz. *Tectona grandis* and *Syzygium zeylanicum* are listed under Endangered (EN) category, *Strobilanthes ciliata, Garcinia indica, Actinodaphne hookeri, Dalbergia latifolia and Santalum album* under Vulnerable (VU) category and *Dalbergia horrida, Pterocarpus marsupium* and *Aegle marmelos* are listed under Near Threatened (NT)

category of IUCN ver. 2025-2. While other species are listed either under the Least Concern (LC) or Data deficient (DD) category.

3.10 Faunal Diversity

Mammals: The sighting of mammals in the project area is quite rare. During the faunal survey, no mammalian species was spotted in the study area. However, the local people have confirmed the presence of the species like Leopard, Wild Pig, Nilgai, Golden Jackal, Mongoose, Monkey, Langur and Hare near forest area, agriculture fields and settlements. The data on mammals reported from the study area was compiled from the Forest Working Plan of the Pune and Thane Forest Divisions and after consultation with local people. Based on this information, a list of 15 species of mammals has been prepared which are reportedly found in the area

Avifauna: A large portion of avifauna species is comprised of resident birds in the project study area. During the survey, 27 species were directly sighted in their natural habitat composed by small bushy vegetation, bare stone grounds and nearby the human habitation.

Herpetofauna: Among the herpetofauna, Green Pond Frog was the only amphibian species and Changeable Lizard & Indian Softshell Turtle were the reptiles sighted during the survey. After consulting with the concerned forest working plan and local peoples, a list of 14 species of reptiles and 3 species of amphibians has been prepared

Butterflies: During field survey total 7 species of butterflies sighted from the study area of proposed project was compiled. Most of the species belong to Nymphalidae family. Common Sailor and Chocolate Pansy are frequently sighted species in the area.

Fish: For the documentation of fish fauna in the project area, experimental fishing could not be possible in the various stretches of River. A list of common fishes of the area has been prepared with the help of the literature on the fish species reported by Kawade and Pandarkar (2016) at Kalu Dam constructed on Kalu River. Based on this, a list of 26 species has been prepared.

According to IUCN Red List 2025-2, Kolus Barb (*Gonoproktopterus kolus*) and Tilapia (*Oreochromis mossambicus*) are listed under Vulnerable (VU) category and Catfish (*Mystus malabaricus*) and Butter Catfish (*Ompok bimaculatus*) are listed under Near Threatened (NT) category. Rest of the species are under the Least Concern (LC) category and Data Deficient (DD) category.

Conservation Status

Different faunal species like mammals and birds were assessed for their conservation status according to IUCN Red List categories (Ver. 2025-2) accessed in July 2024 and WPAA (2022) Schedules.

Among the reported mammals, 8 species are categorised as schedule I species. As per the IUCN Red List of Threatened Species, version 2025-2, Leopard and Bonnet Macaque under are listed under Vulnerable (VU) category and Striped Hyaena is listed under Near Threatened (NT) category.

As per the IUCN Red List of Threatened Species version 2025-2, all birds have been listed under Least Concern (LC) category. As per the WPAA 2022, Indian Peafowl (*Pavo cristatus*) is listed as Schedule I species.

In case of herpetofauna, Indian Softshell Turtle is listed under Endangered (EN) category and Bengal Monitor Lizard is listed under Near Threatened (NT) category. As per the WPAA, 2022, Asian Chameleon, Indian rat Snake, Indian Cobra, Bengal Monitor Lizard, Russel's Viper and Indian Softshell Turtle are categorised as schedule I species.

Among the butterflies, Blue Pansy (*Junonia orithya*), Common Crow (*Euploea core*) and Common Batwing (*Atrophaneura varuna*) is listed under Least Concern (LC) category of IUCN Red List categories (Ver. 2025-2). No species of butterfly is categorised as a schedule species as per the WPAA 2022.

3.11 Proximity to Protected Area

No project component falls in any notified protected area. Nearest Protected Area to the Project Components is Bhimashankar Wildlife Sanctuary (WLS) which is at a distance of around 10.80 km from proposed approach road. The other nearest protected area is Kalsubai Harishchandragad WLS which is at a distance of around 11.80 from proposed upper reservoir.

3.12 Social Environment

The study area falls under Junnar tehsil in Pune district and Murbad tehsil in Thane district of Maharashtra. All the project components are spread over these two districts. The upper dam is located on a table-top hill near Adoshi hamlet (which is under Ajanawale revenue village) in Junnar tehsil of Pune district, while the lower dam is located near Bhorande village in Murbad tehsil of Thane district. The project covers a total of 79 villages in the study area. Out of the 79 villages, 24 are located in Junnar tehsil of Pune district, and 55 are located in Murbad tehsil of Thane district.

As per Mission Antyodaya 2020, the total population in the study area is 68930, belonging to 17609 households, and the average family size is 3-4 members. Of the total population, male population is 35835 (51.9%) and female population is 33095 (48%). The sex ratio is 923 females per 1,000 males. Children population (0-6 age group) is 12.4% of total population in the study area villages.

According to Census 2011, the total percentage of Scheduled Tribe population in the study area is 64.2%, of which 50% are males and 49.9% are females. The main tribal groups in the study area are *Thakur* and *Mahadev Koli*. The total percentage of Scheduled Caste population in the study area is 2.3%, of which 51.9% are males and 48% are females

According to Census 2011, the literacy rate in the study area is 72.9%. Among the workers, 81.3% are main workers, while 18.6% are marginal workers. Among specific occupational categories, 51.3% are cultivators, 36.2% are Agricultural labourers and 1.9% Household industrial workers. The other workers constitute 10.4% of the total.

The study area is equipped with basic amenities and infrastructure, as detailed in Mission Antyodaya 2020. Educational facilities include primary schools in 71 villages, middle

schools in 22, high schools in 16, higher secondary schools in 10, and degree colleges in 3 villages. Healthcare infrastructure comprises 11 primary health sub-centers, 7 primary health centers, 4 community health centers, 5 dispensaries, and 11 veterinary hospitals, though emergency care is accessible only in Junnar town, over 10 km away. Drinking water sources include wells, hand pumps, tap water, and springs, with electricity available for domestic and agricultural uses across all villages. Roads in the study area are well-developed, with 77 villages having all-weather roads and 72 featuring concrete or brick internal roads. Financial services are limited, with 17 post offices, 5 banks, 25 agricultural credit societies, and self-help groups in all villages, supporting the local community's financial and developmental needs.

Socio-Economic profile of the villages adjacent to the proposed project site

Based on the primary survey, the project will involve submergence of forest, revenue (government and private) land in Ghatghar, Ajanawale of Junnar tehsil of Pune district and Bhorande villages of Murbad tehsil of Thane district. In the Bhorande revenue village, there are three hamlets: Bhoirwadi, Shengarewadi, and Awalewadi. A few habitations of Adoshi hamlet which is under Ajanawale revenue village exist within the proposed upper reservoir area.

A survey was conducted to study and understand the socio-economic conditions of the project affected families and to assess the likely impact of the proposed project on them.

The affected villages comprise 505 households and a population of 2,653, with a sex ratio of 1,036 females per 1,000 males. Scheduled Tribes constitute 93% of the population, predominantly Mahadev Koli, Thakur, and Konkani tribes, while Bhorande is an entirely tribal village. About 58.1% of the population are workers, with 93.6% engaged in agriculture and allied activities. The region also benefits from tourism-related employment, while farmers primarily rely on rain-fed irrigation and river water, with limited water availability during summers. Paddy is the main crop cultivated, with limited cultivable land due to hilly terrain, and vegetables are grown in small plots. Rain-fed systems and borewells are the primary irrigation sources, with water scarcity prevailing from February to May. Animal husbandry is common, with households raising cows, goats, and hens primarily for self-consumption and occasional sales, though there are no organized dairy farms in the region. The area has 2299.22 hectares of forest cover and 1335.75 hectares under agricultural use, while 184.91 hectares are barren land. Land serves as a vital resource for fuelwood and fodder. Villagers depend on forests for essentials like food, fuel, and construction materials, and they sell products like Karonda fruit and firewood to support their livelihoods. LPG is a common cooking fuel, but some villagers still rely on forest wood as a secondary source. All villages have primary schools, but middle schools are limited, and high schools and higher education facilities are located more than 10 km away, creating challenges for students. Healthcare facilities are scarce, with primary health centers located in nearby towns over 5 km away, and major hospitals situated in Pune and Thane. Drinking water is sourced from rivers, borewells, and wells, but its availability reduces significantly during summer, causing hardships for villagers. Basic infrastructure such as banks and drainage systems is lacking, although electricity and transport services are available. Markets in nearby towns provide essential goods and services. The region is culturally vibrant, with Marathi and tribal dialects widely spoken, Hinduism as the

predominant religion, and festivals celebrated enthusiastically. The area is accessible by road, with some unpaved roads, and has mobile connectivity and public transport, though villagers often walk to access bus services.

3.13 Historical, Religious and Archaeological Importance Places

The proposed upper dam area is located about 3 km from the famous Naneghat caves & inscription, a Centrally Protected Monument under the jurisdiction of Archaeological Survey of India, and Jivdhan Fort. The lower dam area is located near several notable tourist attractions, including Malshej Ghat, which is about 20 km away, the Bhairavgarh Fort trekking point in Moroshi village, which is located about 5 km from the lower dam area, and Kalu Waterfalls, which is about 10 km from the lower dam area.

Naneghat is an ancient trade route in western India, connecting the coastal region with the hinterland. It is located 34 km west of Junnar tehsil in Pune district of Maharashtra. Several groups of Buddhist caves are found around Junnar.

4. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 Ambient Air Quality

Construction Phase Impacts: The air environment around project site is free from any significant pollution source at present. The sources and activities that might affect air quality in the project area during construction phase are vehicular traffic, material handling and storage, dust arising from unpaved village roads, construction activities including operation of construction plant and machinery and domestic fuel burning.

Additionally, construction activities including operation of crushers, concrete batch plants, construction work and movement of vehicles along unpaved road will generate dust & gaseous emission and impact air quality. The burning of waste will also affect air quality. In absence of proper fuel, construction workers at the project site may use wood for fuel burning and space heating. This will also impact air quality. Therefore, needs to be managed properly.

Operation Phase Impacts: In pumped storage projects, no impacts are envisaged on air environment during operation phase.

4.2 Noise Environment

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

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

4.3 Water Environment

Construction Phase Impacts: Water is used in construction activities leading to wastewater generation with high suspended solids. Similarly, effluents due to washing from truck or equipment etc. would have a high concentration of oil and grease. Assessment of quantum of wastewater from such activities is difficult, however, they can impact the nearby water bodies if surface run off with high suspended solid is discharged into them.

Domestic wastewater will be generated from project and worker's colony to be set up during construction phase, which can find its way to river/ ground water without any treatment will cause significant impact on water environment therefore needs to be managed properly.

Operation Phase Impacts: Malshej Ghat Bhorande Pumped Storage Project is a closed loop PSP. The proposed scheme envisages installation of Pump Storage Project between two newly created reservoirs over non-perennial minor nallah – upper reservoir draining into Kukadi river and the lower reservoir draining into Kalu river. The water will remain in circulation between lower and upper reservoirs during power generation and pumping up during non-generation hours on daily basis. Therefore, no direct impact on natural water bodies during operation is envisaged.

4.4 Land Environment

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

- **Impact due to Land Requirement and change in land-use:** Major impact of land acquisition is permanent change of land use, which is irreversible impact. These impacts cannot be mitigated; however, compensation in terms of implementation of Compensatory Afforestation Plan, Biodiversity Conservation Plan, Green Belt Development Plan and Landscaping and Restoration of Construction Sites will help in managing and reducing the magnitude of such impacts.
- **Impact Due to Muck Generation:** Muck generation, transportation and disposal can significantly impact the land environment, if not managed properly.
- **Impact due to Waste Generation**: The main sources of waste generation can be categorized as:

  i. Municipal waste (includes commercial and residential wastes, excluding industrial hazardous wastes and bio-medical wastes)
  ii. Construction and demolition debris (C&D waste)
  iii. Bio-medical waste
  iv. Hazardous waste (generated from construction machinery and equipment)
  v. e-Waste (computer parts, Printer cartridges, electronic parts, etc.,).

- **Impacts due to Road Construction:** The impacts likely to accrued because of the construction of the roads and widening of roads due to loss of vegetation and geological changes.

4.5 Impacts on Forests and Forest Land

For the proposed project 60.8767 ha of forest land will be diverted for the construction of various project components. This shall lead to loss of vegetation cover of that area. Also,

considering the dependency of villagers on natural resources in the area, However, magnitude of these impacts will be reduced/ mitigated by implementation of Compensatory Afforestation Plan, Green belt, Biodiversity Conservation and Wildlife Management Plan, etc.

4.6 Flora and Fauna

Construction Phase

Impact on Terrestrial Flora: Due to construction activities major impact on the flora in and around the project area would be due to increased level of human interferences. Increase in human interference could have an impact on terrestrial ecosystem. The workers may cut trees to meet their requirements for fuelwood, construction of houses, furniture etc. *Tectona grandis* and *Terminalia elliptica* are the important trees species in the area. Thus, it is necessary to provide alternative fuel, training and awareness, community kitchens, fencing of critical areas, maintain cooking fuel supply and adequate surveillance to mitigate the adverse impacts on terrestrial flora during project construction phase.

Impact on Terrestrial Fauna: Loss of forest cover leads to loss of wildlife habitat. Also, during the construction period, large number of machinery and construction workers shall be mobilized, which may create disturbance to wildlife habitat in the vicinity of project area, however, these will be temporary and last during the construction period. To minimize the impact of wildlife habitat around the project area, Biodiversity Conservation and Wildlife Management Plan, including conservation Plan of Schedule-I species has been proposed in Environmental Management Plan.

Operation Phase

On completion of the construction of the project, the land used for construction activities will be restored. Construction workers who have resided in that area will move out of the project area. Operation phase impacts on flora and fauna will be positive due to green belt development, restoration of construction areas, etc. Increase of greenery in the area and creation of reservoir will have positive impact on faunal species.

4.7 Socio-Economic Environment

A project of this magnitude is likely to entail both positive as well as negative impacts on the socio-cultural fabric of the area. Project will acquire 105.1879 ha of non-forest land. Loss of agriculture land has impact on livelihood sources and income of the farmers losing their land. It has been proposed to pay full compensation as per the prevalent market rate including the cost of any standing crop and trees, to minimize impact by rehabilitation of farmers.

This is an off stream closed loop pump storage project with one time water requirement. This will not significantly impact water resources in the area and other water users dependent on Kalu river as only surplus water during monsoon will be sourced for one time filling.

a) Positive Impacts on Socio-Economic Environment

The following positive impacts are anticipated on the socio-economic environment of the

villages in vicinity of project area during the project construction and operation phases:

i) A number of marginal activities and jobs opportunities with employment with contractors, new market ventures, etc. would be available to the locals during the construction phase.
ii) Developers bringing large scale investment to the area will also invest in local area development and will benefit the locals. Education, medical, transportation, road network and other infrastructure will improve.
iii) The availability of alternative resources provided by developers in the rural areas will reduce the dependence of the locals on natural resources such as forest.

b) Negative Impacts on Socio-Economic Environment

In addition to positive impact on socio-economic environment development of such project also bring certain negative impact due to influx of outside population. This influx of people in otherwise isolated area may lead to various social and cultural conflicts during the construction stage. Developers need to take help of local leaders, Panchayat and NGOs to ensure minimum impact on this count.

Villagers in the area also depend on natural resources for fuelwood and fodder. Scrub forest in the area also used as grazing land for livestock. Loss of forest and grazing land have impact on social environment of the area. Loss of natural habitat will also lead to human wildlife conflict by means of damage of agriculture crops, fruit orchards and loss of livestock.

These impacts can be mitigated by implementing interventions proposed under biodiversity conservation and wildlife management plan along with green belt development plan and awareness programmes.

5. MITIGATION MEASURES FOR AIR, WATER AND NOISE POLLUTION

The proposed project involves construction of dam, powerhouse, reservoir, roads, and other associated infrastructure in a period of 5 years. Major construction activities have potential of pollution generation as discussed above. Impacts arising out of construction activities can be mitigated significantly by taking appropriate mitigation measures, as discussed below.

Control of Air Pollution:

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

Control of Noise Pollution:

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

- Ambient noise should be monitored periodically at different locations.

Control of Water Pollution:

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

A lump sum budget of **Rs. 100.00 lakh** for a period of 5 years has been proposed for the mitigation measures for control of air, noise and water pollution during project construction phase.

6. ENVIRONMENTAL MONITORING PROGRAMME

Environmental Monitoring shall be performed during all stages of the project (namely: construction and operation) to ensure that the impacts are no greater than predicted, and to verify the impact predictions.

The monitoring will be carried out by an NABL accredited laboratory for a period of 5 years during the project construction phase or extended if the project construction period gets extended. The monitoring program for the proposed project will be undertaken to meet the following objectives:

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

A total of **Rs. 376.25 lakh** have been allocated to implement various activities envisaged under the Environmental Monitoring Programme.

7. RESETTLEMENT & REHABILITATION PLAN

For the development of Malshej Ghat Bhorande PSP, land requirement has been worked out as 166.0646 ha. Out of which, 105.1879 ha is private land and 60.8767 ha is forest land. The entire private land identified for the project falls into three revenue villages namely Bhorande village in Murbad taluka of Thane district and Ajanawale and Ghatghar villages of Junnar taluka of Pune District of Maharashtra State.

The private land identified for the projects belongs to landowner families who will be losing their land holding. The detailed cadastral and asset-level verification will be undertaken during land procurement to confirm impacts on houses, other structures, common property resources and livelihood assets.

Private land identified for the project will be acquired as per **Section 2** and **Part (a) of Sub-Section 3** of The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act (RFCTLARR), 2013.

8. CORPORATE ENVIRONMENTAL RESPONSIBILITY

The aim of Local Area Development Activities is focused on sustainable development to improve the quality of life of neighborhood communities through equitable and proactive smart initiatives in spheres of education, health, rural development, environment, and livelihoods resulting in improvement of the overall social and economic conditions of locals as well as improvement of environmental conditions of their surroundings.

Based on the local consultations in project affected villages, the focus areas covering many important components of sustainable development such as social, economic, livelihoods and environment have been identified and set of development activities have been proposed under each focus area for the benefit of the local people under the Project. The activities proposed under the Local Area Development Plan (LADP) have been refined after Public Consultation/ Public Hearing meeting. A list of activities is prepared based on the concerns raised and discussion during public hearing and in consultation process with the local competent authorities.

The budget allocated for implementing the various local area development activities and programs envisaged under above focus areas under LADP in affected area around the project is **Rs. 10.00 Crore.**

9. PROJECT BENEFITS

Employment Generation: Malshej Ghat Bhorande PSP is planned to be completed in 60 Calendar months, at the time of peak construction work in the project, around 1000 persons may be engaged. Out of 1000 nos., about 70% will be from the local population/surrounding Villages and balance persons will be skilled/ semiskilled from other area.

In addition, the project would lead to creation of direct and indirect employment opportunities for the locals during construction and operation phase, etc. Improved power availability contributes to regional industrial and economic development.

Local Area Development: Total estimated project cost is Rs 7048 crore; an investment of this magnitude in the area will improve the local infrastructure in the region. An amount of Rs. 10.00 crore has been earmarked for local area development with a view of improving the quality of life of local residents in the project vicinity. They will have opportunities of skill development, education, better medical and health care, improved local infrastructure, etc.

10. ENVIRONMENTAL MANAGEMENT PLAN (EMP)

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

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

10.1 Catchment Area Treatment Plan

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

In the present study, CAT Plan has been formulated for for the catchment area of Malshej Ghat Bhorande Pumped Storage Project. Since the project involves construction of two different reservoirs therefore catchment area of both the reservoirs has been considered as study area. The total catchment area of both the reservoirs is 3.8 sq. km.

The catchment area treatment involves:

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

The estimated cost of implementation of CAT plan including monitoring and evaluation is **Rs. 175.12 lakh**.

10.2 Compensatory Afforestation Plan and Net Present Value

Malshej Ghat Bhorande PSP is being constructed in the jurisdiction of Pune and Thane Forest Division. The total land required for the construction of proposed project activities is 166.0646 ha with 60.8767 ha of forest land and 105.1879 ha as non-forest land.

The Compensatory Afforestation is proposed to be undertaken on non-forest land identified in consultation with the State Forest Department and District administration. The estimated cost of the Compensatory Afforestation Programme with the cost of non-forest land acquired for afforestation programme is **Rs. 608.77 lakh**. This is a budgetary estimate, and the actual cost will be determined by the forest department during the Forest Clearance (FC) process.

Forest in the project area fall in the Eco Class I as being of type Tropical Semi Evergreen Forests with dense forest type, therefore NPV @ Rs. 14,36,670/ha would be required to be deposited in the Compensatory Afforestation Fund. The total cost of NPV has been estimated as **Rs. 874.60 lakh.**

The total cost of the compensatory afforestation plan and NPV is **Rs. 1483.37 lakh**.

10.3 Biodiversity Conservation & Wildlife Management Plan

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

- **Conservation measures**
  i. Habitat Improvement by development of vegetation cover by plantation with suitable species
  ii. Biological fence (Bamboo species, Euphorbia sp., Agave americana, etc.) around the habitation and around the agriculture fields adjoining to forest area to control human wildlife conflict

iii. Farm Forestry
iv. Maintenance of existing nurseries of state forest department
v. Development and Management of Grasslands
vi. Awareness Programme

- **Management measures**

vii. Prevention of Forest Fire: Training and Infrastructure facilities
viii. Construction and filling of water holes and ponds in wildlife habitat
ix. Support/Provision of veterinary care, cages, recuse centers, etc.
x. Support to Monkey Sterilization
xi. Training and capacity building for volunteers and officials of forest department

- **Strengthening of Infrastructural Facilities of Forest Department**
- **Monitoring and Evaluation**

The total budget allocated focusing on Biodiversity and Wildlife Conservation and Management Plan including conservation and management measures for Schedule-I species is **Rs 209.00 lakh**. Biodiversity Management and Wildlife Conservation Plan has been approved by Chief Wildlife Warden, State Forest Department, Government of Maharashtra vide their letter dated 9th August 2024.

10.4 Fisheries Development Plan

The proposed Malshej Ghat Bhorande PSP is planned as an 'Off stream closed loop' scheme. The proposed project will comprise of two reservoirs, both the reservoirs are proposed to be newly constructed. For operation of proposed project water will be lifted once from Kalu river. The proposed project will not have any significant impact on habitat of fish fauna. However, considering the fact that fisheries as an important source of income for the people in the area, the Fisheries management has been proposed under this plan.

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

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

The total budget for implementation of Fisheries Development Plan has been proposed as **Rs. 109.00 lakh.**

10.5 Muck Management Plan

The construction activities of the project would generate muck from excavation of various project structures. The total quantity of 16,47,151 Cum (1,16,918 Cum soil and 15,30,233 Cum rock) muck is likely to be generated from excavation for various components.

After the utilization of muck for different project components, the total quantity of muck to be disposed of works out to 8,74,250 cum. The entire excavated material is proposed to be dumped at 2 dumping sites identified over a combined area of 18.60 ha area with a total capacity of 10,00,000 cum muck to be accommodated. The Rehabilitation plan of muck

dumping site includes engineering and biological measures. The project authorities would ensure that the dumping yards blend with the natural landscape to develop the site with patches of greenery in and around it. The site can also be developed later as a recreational park or any other purpose with sufficient greenery by planting ornamental plants. The muck dumping site would be developed as Eco-Park which would not only help in rehabilitation of disposed muck site but also help in propagating biodiversity conservations measures.

The estimated cost of the engineering measures for rehabilitation and stabilization of excavated material at designated muck disposal sites will be **Rs. 626.875 lakh**. The biological measures including financial provisions proposed to restore the muck disposal sites are discussed in Green Belt Development Plan.

10.6 Landscaping and Restoration of Construction Sites

During construction phase of the project, number of temporary construction sites and working areas will come up. For the restoration of proposed project affected areas to its original landscape as much as possible and retain its aesthetic values. Various engineering and biological measures will be implemented for the restoration of proposed project affected areas. The estimated cost of restoration of construction is **Rs 239.59 lakh.**

10.7 Green Belt Development Plan

Green belt development will comprise of plantations at various places like periphery of alongside roads, powerhouse area and at different project offices and colonies as well as biological measures proposed to restore the muck disposal sites. The green belt helps to provide habitat for faunal species and capture the fugitive emission and to attenuate the noise generated apart from improving the aesthetics environment in the area. The estimated cost for the plantations and creation of green belt around colony and working sites would be **Rs. 147.70 lakh.**

10.8 Sanitation and Solid Waste Management

Solid waste generated from temporary and permanent colonies in construction as well as operation phase requires special management for disposal. The project authorities will ensure sewage generated from labour colonies and site office is treated and disposed as per the CPCB guidelines. It is proposed to provide adequate septic tanks with soak pits for treatment and disposal of sewage. Various aspects of solid waste management include:

- Reuse/Recycling
- Storage/Segregation
- Collection and Transportation
- Disposal

The waste generated from the project area will be collected, segregated and disposed off in line with the provisions laid down in Solid Waste Management Rules, 2016. The total budget in order to manage the solid waste generated from this population, has been proposed as **Rs. 298.80 lakh.**

10.9 Public Health Delivery System

Project construction and operation will bring about several changes in the socio-economic environment of the area including increased threats to health of the community.

i. New Diseases due to Migratory Population
ii. Chances of increase in water borne diseases as malaria, and dengue are high
iii. Chances of increase in respiratory troubles due to increase in suspended particles during the construction phase.
iv. Chances of occurrence of gastroenteritis, cholera and typhoid in the labour camps.

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

- Ambulance: 2 no. with all the basic Medicare facilities and small DG set, etc. to cater for villages in the project area.
- Budget for running the ambulances including driver, fuel and maintenance for 5 years.
- First aid posts (02 nos.) including sheds, furniture and basic equipment.
- Budget for running the first aid post including cost of medico, para-medico/Nurses and attendant, consumables, etc. for 5 years.
- Budget for strengthening existing medical facilities.
- Budget for Health Awareness/ Vaccination Camps for 5 years.
- Mitigation measures to avoid spread of infectious diseases among workforce

Budgetary estimates for public health delivery system to be implemented have been worked out as **Rs. 258.00 lakh.**

10.10 Energy Conservation Measures

The existing facilities will become insufficient for supply of kitchen fuel for the migrant population during the construction of the project. Therefore, the project authorities would make adequate arrangements such as Community kitchen, Supply of Kitchen fuel, efficient cooking facilities and solar lantern either directly by developer or through contractor to reduce the pressure on natural resources in the project area and minimize impacts on this count. A total budget of **Rs. 283.00 lakh** have been proposed under the Energy Conservation Plan.

10.11 Labour Management Plan for their Health and Safety

Construction work has many associated risks and health impacts for the workers who are directly exposed to such health and safety risks. Therefore, there is a need to prepare complete health and safety documents for workers either by project proponent/contractor and proponent shall ensure its implementation. A detailed plan will be prepared covering the above activities before start of construction work. A tentative budget of **Rs. 82.00 lakh** for labour management have been proposed under EMP.

10.12 Disaster Management Plan

In order to visualize the worst-case scenario Dam Break Modeling exercise was undertaken

and an inundation map was prepared. Dam break modelling has been carried out for both upper and lower dams upto a length of about 17,517 m downstream upto Manikdoh dam and in lower reservoir, the valley for a length of about 12,508 m downstream upto confluence of Kalu river with Joland Nadi. Based upon the outputs generated from this modeling, a Disaster Management Plan has been formulated. From the result of simulation, it is evident that in worst case scenario time available in upper reservoir case but does not have substantial time for rescue in lower reservoir case, hence Disaster Management Plan should concentrate on preventive actions and emergency preparedness, rescue action planning and implementation of same.

This plan presents warning and notification procedures to be followed in case of failure or potential failure of the dams. The purpose is to provide timely warning to the population likely to be affected and alert key people who have to take respective actions in case of an emergency. The estimated total cost of execution of disaster management plan including the equipment would be **Rs. 400.00 lakh.**

10.13 Watershed Development Plan

Preparation of watershed development plan involves identification of watershed problems and formulation of development and management plan to be prepared in 10 km radius of the project area in consultation with Government Institutions/Indian Council of Agriculture Research (ICAR). Accordingly, Watershed Development Plan of Malshej Ghat Bhorande PSP has been prepared by ICAR-Central Inland Fisheries Research Institute, Barackpore, Kolkata to comply with the Specific Terms of Reference (ToR) for (River Valley/ Irrigation Projects) issued by Ministry of Environment Forests and Climate Change (MoEF&CC), Government of India dated 24.03.2023 for carrying out the EIA/ EMP studies of the project.

The Watershed Development Plan includes number of interventions such as capacity building/training, production activities, demonstration, soil and water conservation measures (SWC). The estimated cost of implementation of watershed development and management plan for the study area is **Rs. 758.49 lakh**.

11. SUMMARY OF COST

The total capital and recurring cost for implementing the Environmental Management Plan (EMP) for the project is estimated at **Rs. 5,063.83 lakh**, as summarized in **Table 3**. Additionally, the cost allocated for Forest Management, including Compensatory Afforestation and Net Present Value (NPV), is estimated at **Rs. 1,473.34 lakh**, as summarized in **Table 4**.

Table 3: Cost for Implementing Environmental Management Plan

S. No.	Component of EMP	Capital Cost (Rs. in lakh)	Recurring Cost (Rs. In lakh)					Total Cost (Rs. in Lakh)
			Year 1	Year 2	Year 3	Year 4	Year 5	
1	Catchment Area Treatment Plan	175.12	0.00	0.00	0.00	0.00	0.00	175.12
2	Biodiversity Conservation & Wildlife Management Plan	209.00	0.00	0.00	0.00	0.00	0.00	209.00
3	Fisheries Conservation and Management Plan	0.00	21.80	21.80	21.80	21.80	21.80	109.00
4	Muck Dumping and Management Plan	22.68	93.67	165.99	170.60	170.57	3.37	626.88
5	Landscaping, Restoration of Quarry, and Construction Sites	70.25	33.58	33.58	33.83	34.54	33.81	239.59
6	Green Belt Development Plan	0.00	32.00	32.00	32.00	32.00	19.70	147.70
7	Sanitation and Solid Waste Management Plan	147.00	30.36	30.36	30.36	30.36	30.36	298.80
8	Public Health Delivery System	129.00	25.80	25.80	25.80	25.80	25.80	258.00
9	Energy Conservation Measures	41.00	48.40	48.40	48.40	48.40	48.40	283.00
10	Labour Management Plan	15.00	13.40	13.40	13.40	13.40	13.40	82.00
11	Disaster Management Plan	275.00	25.00	25.00	25.00	25.00	25.00	400.00
12	Control of Air, Noise and Water Pollution	0.00	20.00	20.00	20.00	20.00	20.00	100.00
13	Environmental Monitoring Programme	0.00	75.25	75.25	75.25	75.25	75.25	376.25
14	Rehabilitation and Resettlement Plan*	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	CER/Local Area Development Plan	1000.00	0.00	0.00	0.00	0.00	0.00	1000.00
16	Watershed Development Plan	758.49	0.00	0.00	0.00	0.00	0.00	758.49
	Total	**2842.54**	**419.26**	**491.58**	**496.44**	**497.12**	**316.89**	**5063.83**

*Cost of private land procurement will be part of DPR cost.

Table 4: Cost for Compensatory Afforestation and Net Present Value

S. No.	Forest Components	Amount (Rs. in lakh)
1	Compensatory Afforestation (CA)	608.77
2	Net Present Value (NPV)	874.60
Total		**1483.37**

*Cost of CA and NPV shall be finalized as part of diversion proposal.