

EXECUTIVE SUMMARY

**BHAVALI PUMPED STORAGE PROJECT (5 X 250 +2x125 MW)
District Nashik &Thane
Maharashtra**

**Section 1(c)(i) River Valley Project, Category "A"
October 2023**

Project Proponent:



**JSW Energy PSP Two Limited
JSW Centre, Bandra Kurla Complex,
Bandra East, Mumbai,
Maharashtra**

Submitted By:



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NABET Certificate No: NABET/EIA/2225/RA0303

EXECUTIVE SUMMARY

1.0 Need for The Project

The proposed Bhavali Pumped Storage Project is a self-identified, an off stream open loop, green field project by the JSW Energy PSP Two Ltd, a subsidiary of JSW Energy Limited. The need for Bhavali PSP (1500 MW), in Nashik and Thane district, Maharashtra, has been considered in context of the focus of State Government to increase the share of renewable energy which is available in plenty within the state in general and in the country as whole.

2.0 Location and Approach

The upper reservoir of the project shall be in village Jamunde, Tehsil Igatpuri, District Nashik while the lower reservoir in village Kalbhonde, Tehsil Shahpur District Thane, Maharashtra. The project site, located 50 kms from the district headquarters Nashik, is approachable from Mumbai via Shahapur by NH-160.

3.0 Project Features

The proposed Project shall comprise the following features and structures:

- 48m high (from NSL) ,954.5 m long upper rockfill dam.
- 72m high (from NSL) ,462 m long lower concrete gravity dam.
- 3 Nos. diffuser Intake
- 3 Number Intake Tunnel ,7.0m diameter circular and 67.6m length each
- 3 nos. independent, 5.2m diameter 1713m long, Steel Lined pressure shafts, 2 nos. bifurcating into 4 nos. individual units (250 MW each) and 1 no. bifurcating for 3 nos. individual units (for 1 no. 250 MW unit & 2 nos. 125 MW Units)
- Underground Powerhouse 227mx25mx52.90m
- 3 nos Concrete Lined Circular TRT is purposed, Main TRT – 7.0 m dia. Branched TRT – 3.50 m & 5.0 m Dia & total length of about 713.5 m – From Draft tube till TRT end.
- 3nos. Diffuser Type Lower Intake for pumping mode. Concrete Lined Trapezoidal TRC 450.0 m long with 40 .0 m bed width.
- Construction Period-36 months
- 3000 technician, skilled, semi-skilled and unskilled labour shall be engaged.
- Daily 8 hours of peaking the annual generation of 4158.83 MU@ 95% plant factor.
- Daily 9.25 hours of pumping the annual power required shall be 5182.34 MU.
- The basic cost of project is Rs 9058.09 Crores.
- Levelized tariff with no and Rs 3.0 /unit pumping cost shall be Rs 7.98/kWh and Rs 4.07/kWh respectively.

4.0 Environment Impact Assessment

M/s EQMS Global Private. Ltd., has conducted the Environment Impact study, as per ToR issued by the MoEF&CC vide letter No. J-12011/08/2022-IA. I(R), Dated 27th June 2022.

5.0 Existing Status of Environment

5.1 Land use/Land Cover

The dominating classes are dense forest (47.75%), agriculture land (29.87%), open forest (20.61%), settlement (0.95%) and water body (0.82%).

5.2 Land Requirement for Construction of the Project

The total land requirement under the project for upper and lower rock fill dam, reservoir & other works, has been assessed as 278.92 ha of which private land is 35.18 ha, forest land 243.74 ha.

5.3 Archaeological / Historical Monuments/Sensitive Area

No archaeological monument of national importance, Defence Establishments, exists within 10 km from the project. Kalsubai Harichandragad Wildlife Sanctuary exists within 10 km of project boundary. However, no part of the project lies within Eco-sensitive zone of the Sanctuary. The nearest project boundary is about 12.5 m from ESZ boundary.

5.4 Soil Quality

The soil is sandy clay loam and is neutral (pH: 6.6 to 7.34). It is low to high in available nitrogen content (153 to 849 kg/ha), low to high in available phosphorus (6.6 to 46.9 kg/ha), low/high in potassium content (81.8 to 826 kg/ha) and high in organic carbon (0.76 % to 3.0%).

5.5 Air and Noise Environment

The pollutants concentration in the air is well below the permissible limit, prescribed by CPCB (2009), as the maximum concentration of PM₁₀, PM_{2.5}, NO_x and SO₂ monitored at six locations was 66.3µg/m³, 25.5µg/m³, 12.8µg/m³ and 9.6µg/m³ respectively. The noise levels for all locations are within the limits set forth under Noise Pollution (Regulation and Control) Rules, 2000. standards for daytime and nighttime.

5.6 Water Environment

The pH values of all analysed surface samples ranged between 6.97 – 7.6 and are within the acceptable limit (6.5-8.5). The TDS levels ranged from 74 to 107 mg/l and Total hardness levels ranged from 56 to 77 mg/l and were well below the acceptable limit. The dissolved oxygen values ranged between 6.9-8.4 mg/l and were more than 4 mg/l, i.e., the limit under CPCB Water Quality Criteria for designated best use (C). The concentration of other parameters like chlorides, sulphates, nitrates, iron, fluoride were within their acceptable limits. The BOD values ranged between 1.1 to 2.8mg/l and exceeded the CPCB criteria of 2mg/l or less for Class A water. The Total Coliform level ranged between 52-116 MPN/100ml and were less than 500 MPN/100ml for Class B water. The water is suitable for meeting drinking water requirements after conventional treatment and disinfection.

In ground water samples the concentrations of water parameters included in terms of reference were analyzed and physical and general parameters were observed within the acceptable/desirable limit as per IS10500:2012 (Second Revision).

5.7 Flora of the Project Area

84 tree species, 41 shrub species, 40 herbs, 18 grasses species and 14 species of climbers were recorded from the study area. About 36 medicinal/ethnobotanical importance plant species were recorded. There are three Near Threatened species viz., *Aegle marmelos*, *Pterocarpus marsupium* and *Habenaria grandifloriformis* and two "Vulnerable Species" viz., *Dalbergia latifolia* and *Acacia ferruginea* present in study area.

5.8 Fauna

16 mammalian species were recorded /reported during the survey of which eight belong to Schedule-1 of WPA, 1972, as amended in December,2022. 49 bird species were observed /reported during the survey of which ten belong to Schedule-1 of WPA, 1972. 10 species of herpetofauna were recorded/confirmed in the study area of which 2 belong to Schedule-I of

WPA,1972. 8 species of butterflies were recorded/reported of which none belong to Schedule I. 14 Species of fish were recorded/reported of which none belongs to Schedule-I

5.9 Demography of Study Area

As per the Census of India 2011, the total households under study area villages are 9190. The total population of villages is 52201 composed of 26398 males and 25803 females with sex ratio of 977. The cast wise composition of the total population made up the Scheduled Cast population is 2234 (4.28%) and Scheduled Tribe population is 32079 (61.45%), which shows that the Scheduled Tribe is the dominant cast in most of the villages in study area. The total literate population is 28605, of which male and female population is 16974 and 11631 respectively. Total literate population is 64.83%, of which male and female literates are 76.40 % are 53.09 % respectively. The total working population is 24293 (46.53%) which comprises of main workers 18849 (36.10%) and marginal workers 5444 (10.43%) while non-workers are 27908 (53.47%). Among main workers, cultivators constitute the highest category (54.3%), followed by cultivators (29.7%) and other workers (15.90%). Among marginal workers agricultural labour constitutes the highest category (50.7%) followed by cultivators (31.9%) and other workers (15.4%).

6.0 Identification, Prediction and Evaluation of Impacts

- The land use class of forest and non-forest land involved in dam seat shall change into built-up area. The land use class of non-forest land required for underground components will not change. The land use class of forest and non-forest land required for roads will change to built-up area. The land use class of forest land required for muck sites shall not change. During the operation phase the forest and non-forest land within reservoir shall change into waterbody.
- Soil erosion due to excavation of project components and roads will accelerate soil erosion.
- The intensity of anticipated impact on geology of the area will be weak and localised.
- Being an off-stream project there shall not be any remarkable change in hydrological cycle.
- Due to labor influx, pressure on land and water resource would occur.
- Temporary changes in air quality during construction phase are expected. Nonetheless, the resultant impact due to construction activities on the Ambient air quality for PM10, PM2.5, NOx and SO2 at within project area and nearby settlement are within the standard.
- Temporary increase in noise levels by 4 dB(A) to 5 dB (A) are expected during construction.
- Due to blasting/tunnelling, the resulting PPV at the nearest settlement shall be considerably lower than the limiting values 5.0 mm/sec for excitation frequency less than 8 Hz.
- The discharge coming out of surface and underground works, aggregate crushing and processing plants shall carry sediments which will be trapped in the silt trapping tanks.
- The sewage from the labour camp shall be treated through STP.
- Problems due to eutrophication and stratification are not anticipated.
- Forest land and private land shall be submerged along with trees.
- Increase in temporary stress levels of wildlife during construction phase due to noise, human interference, and reduction in present habitat. Threat due to poaching might increase.
- Improved habitat for mainly water birds due to creation of new reservoir.

- Due to formation of dam/reservoir the movement of fish species from downstream to headwater of streams shall be stopped.

7.0 Summary of Positive and Negative Impacts

The positive impacts are:

- Average annual generation of 4158.83 MU of energy with 95% plant availability.
- Low-cost, low-greenhouse-gas-emitting electrical energy storage project sited and designed to have minimal negative impacts.
- Generation of employment opportunities
- Benefits to economy and commerce.
- Minimal impact on hydrology.
- Improvement in environment through implementation of CAT, Compensatory Afforestation, Green belt Development and different other plans.

The negative impacts are:

- The loss of forest (243.74ha) due to construction of components of project.
- Displacement of 10 families
- Acquisition of 35.18 ha private land
- Disturbance to the fauna of the study area during construction
- Pressure on the existing road (MDR-56) will marginally increase.

8.0 Impact Management

To ameliorate the negative effects of the project construction and overall improvement of the environment following management plans are formulated.

Table -1: Summary of Total Cost Estimate of EMP

S. N.	Plans	Cost (Rs. Lakh)	Capital cost (Rs lakh)	Annual recurring cost (Rs lakh)
1.	Catchment Area Treatment Plan	250.00	220.00	10.00
2.	Compensatory Afforestation Scheme	4854.00	4854.00	0.00
3.	Wildlife and Bio-diversity Management plan	326.00	296.00	10.00
4.	Resettlement & Rehabilitation Plan	1232.00	1232.00	0.00
5.	Green Belt Development Plan	45.00	33.00	4.00
6.	Reservoir Rim Treatment Plan	30.00	30.00	0.00
7.	Fisheries Management Plan	130.00	130.00	0.00
8.	Muck Management Plan	2390.00	2360.00	10.00
9	Restoration Plan for Quarry Sites & landscaping	65.00	50.00	5.00
10.	Disaster Management Plan	30.00	27.0	1.00
11.	Water, Air and Noise Management Plan	110.00	50.00	20.00
12.	Public Health Delivery Plan	75.00	30.00	15.00
13.	Labour Management Plan	150.00	42.00	36.00
14.	Sanitation & Solid Waste Management Plan	130.00	88.00	14.00
15.	Local Area Development Plan	700.00	700.00	0.00

**Executive Summary of EIA/EMP for Bhavali PSP (1500MW)
District Nashik & Thane, Maharashtra**

16.	Environmental Safeguards During Const.	120.00	00.00	40.00
17.	Energy Conservation Measures	220.00	19.00	67.00
18.	Environmental Monitoring Plan	115.00	10.00	35.00
19.	Watershed Management	500.00	500.00	0.00
Grand Total		11472.00	10671.00	267.00

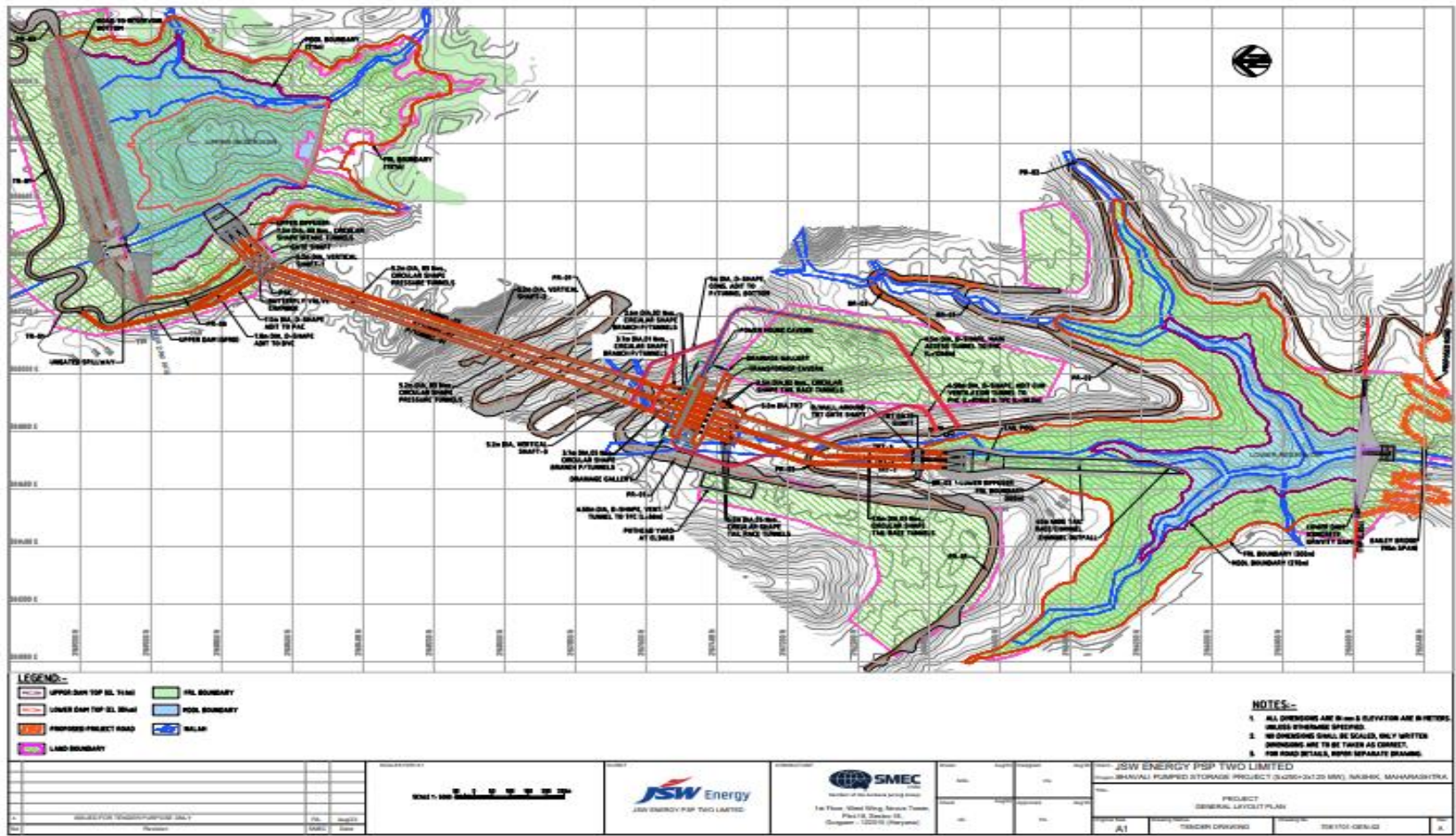


Figure: Layout Map of Project

Salient Features of Project

S. No.	Description	Project Details
1	Name of the Project	Bhavali Pumped Storage Project (1500 MW)
2	Project Location	District: Nashik & Thane, Maharashtra
3	Project Accessibility	50 km from the district HQ Nashik. Approachable from Mumbai via Shahapur by NH-160.
4	Geographical Coordinates Upper Reservoir	19°36'31.69"N & 73° 35'45.06"E Jamunde Village (Igatpuri Taluk-District Nashik)
5	Geographical Coordinates Lower Reservoir	19°34'56.38"N & 73° 35'10.00"E Kalbhonde village (Shahpur Taluk -District Thane)
6	Installed Capacity	1500 MW (5x250MW+2x125MW)
7	Annual generation/consumption energy	4158.83 MU/5182.34 MU
8	Peaking/Pumping operation duration	8 hours /9.25 hours
9	Upper Dam/Reservoir	
a	Gross/Live /Dead Storage	13.073MCM)/11.419 MCM/1.654 MCM
b	Type of Dam	Rock fill dam
c	FRL/MDDL	EL +737.000 m/EL +711.000 m
d	Length of Dam / Max Height	954.50 m/48.0 m (above Lowest NSL)
10	Lower Dam/Reservoir	
a	Gross/Live /Dead Storage	13.26MCM)/11.71 MCM/1.55 MCM
b	Type of Dam	Concrete gravity dam
c	FRL/MDDL	EL +300.000 m/EL +270.000m
d	Length of Dam /Maximum Height	462.00 m/72.0 m (above Lowest NSL)
11	Intake Structure Type/Number of vents	Diffuser/3 nos. with 4 vents in each intake
12	Intake Tunnel	3Nos., 7.0 m dia./67.60 m long
13	Penstock	3 Nos. of Independent Penstocks (5.2 m dia.)-2 nos. bifurcating into 4 nos. individual units (250 MW each) and 1 no. bifurcating for 3 nos. individual unit (1 no. 250 MW unit & 2 nos. 125MW Units).
14	Pressure Shaft	3 Nos., Steel lined – Dia. (5.20 m,3.7m and 2.60m)
15	Powerhouse	
a	Type/Installed Capacity	Underground/5x250MW+2x125MW
b	Dimension	135.40 m (L) x 18.00 m (W) x 50.00 m (H)
c	Turbines	7 Francis, vertical shaft reversible Pump turbine
15	Draft Tube Tunnel (Steel lined circular)	6 Nos, 5.50 m diameter /97.70 m each
16	Tail Race Tunnel	Main 7m dia & Branch 3.5mand 5.0m diameter
17	Base Cost of Project	Rs 9058.09 Crores
18	Levelized Tariff at no pumping cost/at Rs 3/unit pumping cost	Rs 4.07/unit ; Rs 7.98/unit