



Government of India
Ministry of Environment, Forest and Climate Change
(Impact Assessment Division)

To,

The GM Environment
VIZHINJAM INTERNATIONAL SEAPORT LIMITED
9th Floor KSRTC Tower, Thampanoor, THIRUVANATHAPURAM-
659001,,Thiruvananthapuram,Kerala-695001

Subject: Grant of Environmental Clearance (EC) to the proposed Project Activity under the provision of EIA Notification 2006-regarding

Sir/Madam,

This is in reference to your application for Environmental Clearance (EC) in respect of project submitted to the Ministry vide proposal number IA/KL/INFRA1/420053/2023 dated 28 Feb 2023. The particulars of the environmental clearance granted to the project are as below.

- | | |
|--|---|
| 1. EC Identification No. | EC24A033KL158955 |
| 2. File No. | 11-122/2010-IA.III |
| 3. Project Type | New |
| 4. Category | A |
| 5. Project/Activity including Schedule No. | 7(e) Ports, Harbours |
| 6. Name of Project | EC Amendment Rail Connectivity (Tunnel) to Vizhinjam Port |
| 7. Name of Company/Organization | VIZHINJAM INTERNATIONAL SEAPORT LIMITED |
| 8. Location of Project | Kerala |
| 9. TOR Date | N/A |

The project details along with terms and conditions are appended herewith from page no 2 onwards.

Date: 17/07/2024

(e-signed)
Amardeep Raju
Scientist E
IA - (INFRA-1 sector)

Note: A valid environmental clearance shall be one that has EC identification number & E-Sign generated from PARIVESH. Please quote identification number in all future correspondence.

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Subject: Amendment in Environment and CRZ Clearance vide letter no.11-122/2011-IA.III dated 03rd January, 2014 for rail connectivity of 10.70kms (out of which 9.43 kms underground and the remaining length of 1.20 kms land above the tunnel will continue to be used in its current form) from Balaramapuram Station to Vizhinjam International Seaport at Vizhinjam International Container Transshipment Terminal at Thiruvananthapuram, Kerala by M/s Vizhinjam International Seaport Limited–Amendment in Environmental and CRZ Clearance-reg

Sir,

This has reference to your application 28th February, 2023, submitting the above mentioned proposal to this Ministry for grant of amendment in environmental clearance in terms of the provisions of the Environment Impact Assessment Notification (EIA), 2006 under the Environment (Protection), Act, 1986.

2. The proposed project is for amendment in the Environmental and CRZ clearance for ‘Underground tunnel’ in project of Vizhinjam International Deepwater Multipurpose Seaport at Vizhinjam in Thiruvananthapuram District, Kerala by M/s Vizhinjam International Seaport Ltd.

3. Environmental and CRZ Clearance for phase 1 of the development of Vizhinjam International Deepwater Multipurpose Seaport at Vizhinjam in Thiruvananthapuram District, Kerala by m/s Vizhinjam International Seaport Ltd was granted vide letter no.11-122/2011-IA.III dated 03rd January, 2014. The validity of clearance(s) was extended by MoEF and CC, vide letter of even no dated 29.12.2020 which is valid up to 02.01.2024.

4. The proposed project falls under 7(e)-Ports, Harbours, Category-A, as per EIA notification 2006. Total investment/cost of the project is Rs.1,06,012.3 Lakhs.

5. The Environmental/CRZ Clearance dated 03rd January, 2014 was obtained for the development included rail connectivity for the port through an elevated structure. However, the rail connectivity is now planned to be provided through an underground tunnel of 9.43km out of which 0.8kms section falls in CRZ area. The rail connectivity shall be parallel to the harbour road on elevated structure at +4/5.00m level without affecting the entry to the existing harbour. Proposed development is having the length of 10.70km out of which 9.43 kms will be underground and the remaining length of ~1.20 kms land above the tunnel will continue to be used in its current form. Underground tunnel passing through villages of Balaramapuram, Pallichal, Athiyannur and Vizhinjam in Neyyattinkara Tehsil, of Thiruvananthapuram District, in Kerala. This being a deviation to the project development considered in the current Environmental/CRZ Clearance, VISL intends to obtain an amendment to the existing Environmental/CRZ Clearance.

6. Current land use along the corridor above the proposed tunnel has mostly buildings upto G+1 or maximum G+2 heights only as well as coconut trees and homestead gardens.

7. Hydro geological Study and Geo-Hydrological Study and Vibration/Ground Movement and its mitigation measures was carried out.

8. CRZ details: The total rail connectivity length of ~10.70 kms, out of which ~0.8 kms at the Vizhinjam end falls under the purview of the CRZ Notification. The railway line in CRZ area passes through CRZ IB (~192 m length) and CRZ II (~608 m) categories. CRZ Mapping, Layout on CRZ Map in 1:4000 scale has been carried out by National Centre for Earth Science Studies, Ministry of Earth Sciences, Government of India, Thiruvananthapuram.

9. The proposal has been appraised by Kerala Coastal Zone Management Authority (KCZMA) in the 123rd meeting of KCZMA held on 29.06.2022 and recommended to the Ministry vide letter no. 1540/A2/2022/KCZMA dated 01.08.2022.

10. Reason for Amendment: Vizhinjam being densely populated coastal town and the area already attaining urban status, the rail alignment proposed in the current EC has land constraints and requirement of more Resettlement and Rehabilitation (R&R). Also, four (04) religious structures are seen as impacted along the alignment. Hence instead of running across the settlements and to minimize the disturbance to existing settlements/structures, this current proposal of rail connectivity through an underground tunnel is planned. The tunnel alignment is mostly beneath the Balaramapuram to Vizhinjam road. There are several structures along the road under which the tunnel will pass through; as land will not need to be acquired above the tunnel portion, these structures will not be impacted due to land acquisition. Also, project will have benefits in the form of temporary employment for at least few locals during the construction stage (envisaged to be for a period of ~42 months).

11. Risk Assessment Due to flood in the proposed railway tunnel alignment from Vizhinjam Port to Balaramapuram was prepared by the Department of Civil Engineering College of Engineering Trivandrum Thiruvananthapuram.

12. As suggested by the EAC, M/s Vizhinjam International Seaport Limited has undertaken the various studies with institute of repute, and submitted the following:

S.no	Studies conducted
1	Ground Subsidence Prediction Study Ground Subsidence Prediction studies were conducted by the CSIR-Central Institute of Mining and Fuel Research (CSIR-CIMFR), based on the study conducted made recommendations to keep the subsidence and the tensile strain within the limits so as to protect the impotent surface features.

2	Blasting Impact Assessment	Blasting Impact Assessment study was conducted by the CSIR-Central Institute of Mining and Fuel Research (CSIR-CIMFR) based on the detailed overview of the site's conditions, surface features observed above the tunnel, CSIR-CIMFER made recommendations for the viability of excavating hard rock for the proposed rail tunnel, and safe blasting techniques to safeguard these structures
3	Impact of Train Traffic Movement	<p>Impact of Train Traffic Movement performed by CSIR-CIMFR for Prediction of train induced vibrations while train movement through the proposed underground tunnel route between Vizhinjam and Balaramapuram. Geotechnical properties and lithology of the study area has been studied for this purpose.</p> <p>The predictions of train induced ground vibrations has been done considering the worst-case scenario. Based on predictions, it can be concluded that the building on the alignment tunnel is safe from the train induced vibration.</p>
5	Hydrogeological and Geo-Hydrological Study	<p>Hydrogeological and Geo-Hydrological Studies In and around the Proposed Railway Tunnel Connecting Vizhinjam and Balaramapuram of Thiruvananthapuram District, Kerala was conducted by the Ground Water Department, Government of Kerala.</p> <p>Based on the data collected and detailed field investigations conducted, the area is found to be ideal for tunnel construction with minimum hydrogeological and hydrological impact to the natural environment. Recommendations has been given for continuous monitoring of ground water level in the buffer zone.</p>
6	Study on Geological and Geomorphological Features in	Study on Geological and Geomorphological Features in and around the proposed New Rail route for the

	and around the proposed New Rail route for the Vizhunjam International Deepwater Multipurpose Sea Port	<p>Vizhunjam International Deepwater Multipurpose Sea Port was carried out by the Centre for Management Development, Thiruvananthapuram.</p> <p>From numerical modelling results, the anticipated surface subsidence purely due to any likely tunnel deformation is found to be very negligible and shall not cause any deleterious effect on the surface structures. However, tunnelling operations in permeable soil/clayey medium may result in temporary lowering of the water table, as per the study conducted by Groundwater Department, Government of Kerala.</p>
7	Flood Risk Assessment Study	<p>Study on risk assessment due to flood in the proposed Railway tunnel alignment from Vizhinjam Port to Balarampuram was conducted by the Department of Civil Engineering, College of Engineering, Trivandrum. They have made the observation that the tunnel alignment has sufficient clearance from the flood inundation boundary with minimum clearance of 300 m and average clearance of 500 m, even for the extreme flood (PMF) corresponding to the PMP of the study area and the risk associated with flooding situation for the tunnel is minimum (less than 1%). Also mentioned that as the tunnel alignment is along the watershed line, the drainage flow is always away from the tunnel nearly at right angles and there is minimum interruption with natural drainage flow, which in turn give rise to minimum risk of flooding.</p>

13. During the presentations made by the PP and the agencies who have conducted studies intimated the committee that:

- i. A literature survey was conducted to study the occurrence of surface subsidence over similar tunnelling sites world over. The literature reported showed that water table draw down was the major cause of surface subsidence, as compared to tunnel displacement.
- ii. A hyperbolic prediction equation has been designed to simulate the water table draw down and application of pore water pressure.
- iii. Modelling results indicate that the anticipated subsidence may be higher near

the sites of BH4, BH-5, BH-6 and BH8 due to the presence of thick clayey and sandy medium from the surface to further down the tunnel invert.

- iv. Various levels of water table draw down has been simulated, with the maximum being the horizon of the tunnel invert.
- v. The maximum anticipated surface subsidence (vertical displacement), when the water table is drawn down to the tunnel invert, at BH-5 location (worst case scenario), shall be 11.9 cm.
- vi. The predicted maximum surface tensile strain for the above condition shall be 0.22% at one place, which is likely to occur at about 55 m away from the tunnel axis at BH5 site, when the water table is fully drawn down till the tunnel invert, which is very unlikely.
- vii. Globally 0.1% tensile strain is considered to be the limit to protect important surface structures such as multi-storeyed buildings, roads, bridges etc. The compressive strains also may have some effect on the surface structures, but not as significant as the tensile strain.
- viii. The influence of subsidence may go max up to 70 m from the tunnel axis on both sides and ceases. From ground subsidence angle tunnelling is safe. However at 4 points i.e. at BH4, BH5, BH6 and BH8 locations only the maximum tensile strain likely to cross the permissible limit due to water drawdown of 20m,15m,15m and 35 m respectively as per the modelling study. This region roughly falls at chainage from 4600m to 9600m. At all other chainages, there is no likelihood of surface subsidence crossing the limit even after water drawdown, provided there is no pre-mature tunnel collapse during excavation and supporting.
- ix. To keep the subsidence and the tensile strain within the limits so as to protect the important surface features following recommendations are made.
 - a. During tunnelling operations in clayey and soil medium, fore poling and/or pregrouting needs to be done prior to excavation, whenever there is a chance of drawdown more than 10 m.
 - b. The lag between the excavation and supporting should be kept to a minimum, say 1m or so, in case of soft rock conditions.
 - c. Probe drilling should be done to a distance approximately 2 to 3 times the diameter of the tunnel to know the stratum prior to cutting.
 - d. Supports are to be erected immediately after the excavation.
 - e. Under no circumstances the tunnel crown, sides or face should be allowed



to collapse; this can result in larger subsidence and even pot holing (chimneying).

- f. Any such pre-mature collapse of the tunnel takes place, tunnelling operations should be suspended and a 50 m radius of the location on the surface should be cordoned off with warning signs on the surface, until the ground settles and the appropriate remedies are taken.
- g. The tunnelling method should be such that the water drainage to the tunnel is kept to a minimum so as to limit the drop in water table to not more than 10 m, especially in a 50 m radius of the surface structures those existing above the clayey medium.


14. The EAC, taking into account the submission made by the project proponent had a detailed deliberation in its 363rd meeting during 25th-26th April, 2024 and **recommended** the proposal for grant of amendment in environmental clearance with the specific conditions.

15. The Ministry of Environment, Forest and Climate Change has been examined the proposal and based on the recommendations of the Expert Appraisal Committee (Infrastructure, CRZ and other miscellaneous projects) hereby accords the amendment w.r.t. 'amendment in Environment and CRZ Clearance vide letter no. 11-122/2011-IA.III dated 03rd January, 2014 for rail connectivity of 10.70kms (out of which 9.43 kms will be underground and the remaining length of 1.20 kms land above the tunnel will continue to be used in its current form) from Balaramapuram Station to Vizhinjam International Seaport at Vizhinjam International Container Transshipment Terminal at Thiruvananthapuram, Kerala by M/s Vizhinjam International Seaport Limited' with the following specific conditions.



- i. Construction activity shall be carried out strictly according to the provisions of the CRZ Notification, 2011. No construction works other than those permitted in Coastal Regulation Zone Notification shall be carried out in Coastal Regulation Zone area.
- ii. All the recommendations and conditions specified by the Kerala State Coastal Zone Management Authority (KCZMA) vide letter No 1540/A2/2022/KCZMA dated 01.08.2022 shall be complied with.
- iii. Consent to Establish/Operate for the project shall be obtained from the State Pollution Control Board as required under the Air (Prevention and Control of Pollution) Act, 1981 and the Water (Prevention and Control of Pollution) Act, 1974.
- iv. Shoreline should not be disturbed due to dumping. Periodical study on shore line changes shall be conducted and mitigation carried out, if necessary. The details shall be submitted along with the six monthly monitoring report.
- v. All the recommendations made by the Ground Subsidence Prediction studies conducted by the CSIR-Central Institute of Mining and Fuel Research (CSIR-CIMFR) shall be implemented and the status of compliance report shall be submitted along

with the six monthly report. Compliance report shall specify the compliance for individual recommendations made in CSIR-CMFIR study report.

- vi. All the recommendations made by the Blasting Impact Assessment study (Report Annexed) conducted by the CSIR-Central Institute of Mining and Fuel Research (CSIR-CIMFR) shall be implemented in letter and spirit and the status of compliance report shall be submitted along with the six monthly report. Compliance report shall specify the compliance for individual recommendations made in CSIR-CMFIR study report.
- vii. All the recommendations made by the CSIR-CIMFR (Report Annexed) for impact of Train Traffic Movement and Prediction of train induced vibrations while train movement through the proposed underground tunnel route between Vizhinjam and Balarampalam shall be implemented in letter and spirit and the status of compliance report shall be submitted along with the six monthly report. Compliance report shall specify the compliance for individual recommendations made in CSIR-CMFIR study report. 
- viii. All the recommendations made in the report of Impact of Train Traffic Movement performed by CSIR-CIMFR (Report Annexed) shall be implemented in letter and spirit and the status of compliance report shall be submitted along with the six monthly report. Compliance report shall specify the compliances for individual recommendations made in CSIR-CMFIR study report.
- ix. All the recommendations made in the report of Hydrogeological and Geohydrological Studies conducted by the Ground Water Department, Government of Kerala (Report Annexed) shall be implemented in letter and spirit and the status of compliance report shall be submitted along with the six monthly report. Compliance report shall specify the compliance for individual recommendations made in report of Hydrogeological and Geohydrological Studies conducted by the Ground Water Department, Government of Kerala.
- x. All the recommendations made in the report of Geological and Geomorphological Features in and around the proposed New Rail route for the Vizhunjam International Deepwater Multipurpose Sea Port carried out by the Centre for Management Development, Thiruvananthapuram shall be implemented and the status of compliance report shall be submitted along with the six monthly report.
- xi. All the recommendations made in the report of Study on Risk Assessment due to flood in the proposed Railway tunnel alignment from Vizhinjam Port to Balarampalam conducted by the Department of Civil Engineering, College of Engineering, Trivandrum shall be implemented and the status of compliance report shall be submitted along with the six monthly report. Compliance report shall specify the compliances for individual recommendations made in study report.

- xii. Subsidence movement on the surface; over and around the working area shall be monitored regularly by CSIR-CIMFR during the construction operation. Further, monitoring of the impact on natural drainage pattern, water bodies, vegetation, structure, roads and surroundings should also be continued till movement ceases completely. Appropriate effective corrective measures shall be taken in case of observation of any high rate of subsidence movement, to avoid loss of life and materials. Cracks should be effectively plugged with ballast and clay soil/suitable materials.
- xiii. PP shall pay more attention for the locations of BH4, BH5, BH6, and BH8 and continuous monitoring shall be carried by the CSIR-CIMFER.
- xiv. In general, fresh air to be supplied to all underground work areas in sufficient amounts to prevent any dangerous or harmful accumulation of dusts, fumes, mists, vapours, or gases. A minimum of 200 cubic feet of fresh air per minute to be supplied for each employee underground. Mechanical ventilation, with reversible airflow, to be provided in all of these work areas, except where natural ventilation is demonstrably sufficient.
- xv. Where blasting or drilling is performed or other types of work operations that may cause harmful amounts of dust, fumes, vapours, etc., the velocity of airflow must be maintained as per the guidelines.
- xvi. For gaseous—or potentially gaseous operations, ventilation systems must meet additional requirements.
- xvii. Adequate lighting shall be provided at the face and at any other point where work is in progress, at equipment installations, such as pumps, fans and transformers.
- xviii. Where workers are liable to be injured by falling or sliding material from the roof, face or wall of the tunnel, suitable measures (as per design) such as shotcreting, rock bolting or other appropriate measures should be taken to ensure the safety of the workers.
- xix. All supports including steel supports, lagging, backfill concrete, shotcreting, rock bolts etc. should be designed and installed appropriately to ensure the stability of the excavated areas.
- xx. If water is anticipated, exploratory probing or drilling ahead of the face should be carried out to confirm the quantity, the quality and the pressure. Measures shall be put in place for the evacuation of workers in case of sudden flooding.
- xxi. To avoid flooding, especially in downward sloping tunnels, pumps with adequate reserve capacity should be provided and so arranged that if flooding occurs they will not be put out of action.



- xxii. Water should be removed from the working area either by open drains or by pumps and pipes. Intermediate holding tanks and pumping stations should be set up where water has to be pumped over large distances.
- xxiii. Contingency planning should ensure that essential equipment and personnel for major emergencies (for example rescue equipment, firefighting equipment, suitable breathing apparatus, stretchers, temporary lighting etc.) shall be placed on site.
- xxiv. Disposal of muck during construction phase should not create any adverse effect on the neighbouring communities and be disposed taking the necessary precautions for general safety and health aspects of people, only in approved sites with the approval of competent authority.
- xxv. All other terms and conditions mentioned in the EC and CRZ clearance vide letter no 11-122/2011- IA.III dated 03rd January, 2014 shall remain unchanged.
16. This issues with the approval of the Competent Authority.



(Amardeep Raju)
Scientist-E

Copy to:

1. The Secretary, Department of Environment, Government of Kerala, Thiruvananthapuram.
2. The Chairman, Central Pollution Control Board, Parivesh Bhawan, CBD-cum-Office Complex, East Arjun Nagar, Delhi-110 032.
3. The Member Secretary, Kerala State Pollution Control Board, Palamoodu Junction, Pattom Place, P.O. Thiruvananthapuram - 695004.
4. Deputy Director General of Forests (C), Ministry of Environment, Forests and Climate Change, Regional Office (SZ), Kendriya Sadan, 4th Floor, E&F Wing, 17thMain Road, Koramangala II Block, Bangalore - 560034.
5. IA- Division, Monitoring Cell, MoEF, New Delhi - 110003.
6. PARIVESH Portal.
7. Guard file.



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