

Minutes of the 363rd meeting of Expert Appraisal Committee held on 25th-26th April, 2024 at Narmada Conference Hall, Ground Floor, Jal Wing, Ministry of Environment, Forest and Climate Change, Indira Paryavaran Bhawan, Jor Bhag Road, New Delhi for the projects related to Infrastructure Development, all Ship breaking yards including ship breaking units 7(b); Industrial Estate/Parks/Complexes/Areas, Export Processing Zones, Special Economic Zones, Biotech Parks, Leather Complexes 7(c); Ports, Harbors, Breakwaters, Dredging 7(e) and National Highways 7(f).

The 363rd Meeting of Expert Appraisal Committee (EAC) of Infra-1(IA-III) at Narmada Conference Hall, Ground Floor, Jal Wing, Ministry of Environment, Forest and Climate Change, Indira Paryavaran Bhawan, Jor Bhag Road, New Delhi held on 25th-26th April, 2024 under the Chairmanship of Shri. Manmohan Singh Negi. The list of participants is annexed as Annexure-A.

1. OPENING REMARKS OF THE CHAIRMAN.

At the outset, Shri. Manmohan Singh Negi, Chairman, EAC welcomed the Members of the EAC and requested Shri Amardeep Raju, the Member Secretary of the EAC to initiate the proceedings of the meeting with a brief account of the activities undertaken by the Ministry under Infra-1 Division.

2. CONFIRMATION OF THE MINUTES OF THE LAST MEETING.

The Committee confirmed the Minutes of 360th EAC meeting held on 21st March, 2024.

3. AGENDA WISE CONSIDERATION OF PROPOSALS

Agenda wise details of proposals discussed and decided in the meeting are as following:

Agenda Sr. No.3.1

Subject: Rail Connectivity to Vizhinjam International Seaport from Balaramapuram Station at Vizhinjam International Container Transshipment Terminal at Thiruvananthapuram, Kerala – Amendment in Environmental and CRZ Clearance. Proposal No. IA/KL/INFRA1/420053/2023 and File No. 11-122/2010-IA.III.

“The EAC noted that the Project Proponent/consultant have given undertaking that the data and information given in the application and enclosures are true to the best of their knowledge and belief and no information has been suppressed in the EIA/EMP report. If any part of data/information submitted is found to be false/ misleading at any stage, the project will be rejected and Environmental Clearance given, if any, will be revoked at the risk and cost of the project proponent.”

3.1.1. The above mentioned proposal was earlier considered by 356th meeting of Expert Appraisal Committee to be held on 06th-07th February, 2024 and 322nd meeting of Expert Appraisal Committee to be held on 20th-21st March, 2023 the proposal was deferred for want of requisite information/documents. At this instance, the aforementioned proposal was placed before the EAC during its 356th meeting of Expert Appraisal Committee held on 06th - 07th February, 2024. The project proponent requested the meeting to attend the EAC meeting through

VC. The committee agreed. However due to technical glitch PP couldn't present the proposal, therefore the committee suggested the Ministry the proposal may consider in the upcoming EAC meeting after official request received from the PP. Now PP is requested to consider their proposal. At this instance, the aforementioned proposal was placed before the EAC during its 363rd meeting of Expert Appraisal Committee held on 25th -26th April, 2024.

3.1.2. The project proponent along with the EIA Consultant M/s. L&T Infrastructure Engineering Ltd., Hyderabad made a presentation through Video Conferencing and provided the following information:-

3.1.3. During the 322rd meeting held on 21st -22nd March, 2023. The committee observed the following:

'It has been observed that the vibration studies, as suggested earlier by the EAC, for the stretch of the railway line which is passing underground through the habitation area has not been conducted. Since the stretch of the alignment has an overburden of only 10 m at several places, the EAC suggested the PP to first conduct studies on subsidence related risks from an institute of repute and submit the report to the EAC for taking further decision in the matter'.

3.1.4. In view of the above, PP mentioned that as suggested by the EAC, various studies have been conducted 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	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 Balarampuram. Geotechnical properties and lithology of the study area has been studied for this purpose.

		<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 levelin the buffer zone.</p>
6	Study on Geological and Geomorphological Features in and around the proposed New Rail route for the Vizhunjam International Deepwater Multipurpose Sea Port	<p>Study on Geological and Geomorphological Features in and around the proposed New Rail route for the 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 Balaramapuram 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</p>

		nearly at right angles and there is minimum interruption with natural drainage flow, which in turn give rise to minimum risk of flooding.
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3.1.5. 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. If 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.

3.1.6. The committee was of the opinion that at the said locations of BH4, BH5, BH6, and BH8 PP, should get more attention and continuous monitoring to be carried by the CSIR-CIMFER

3.1.7. 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, as mentioned below:

- 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 Balarampuzha 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 Balarampuram 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.

Annexure-A

Following members were present during the 363rd EAC(Infra-1) meeting held on 25th-26th April, 2024.

S.no	Name	Designation	25 th April, 2024	26 th April, 2024
1	Shri Manmohan Singh Negi	Chairman	Present	Present
2	Shri S. Jeyakrishnan	Member	Present	Present
3	Prof. V.K Jain	Member	Present	Present
4	Dr. Jaya Kumar Seelam	Member	Present	Present
5	Dr. P.K.Dinesh Kumar	Member	Present	Present
6	Shri. PrakashTewari	Member	Present	Present
7	Dr. M.V. Ramana Murthy	Member	Present	Present
8	Shri. Sharan Deep Singh	Member	Absent	Absent
9	Shri Ashok Kumar Patre	Member	Absent	Absent
10	Ms.Bindu Manghat	Member	Absent	Absent
11	Dr. Niraj Sharma	Member	Present	Present
12	Shri B. Kishor	Member	Present	Present
13	Shri Amardeep Raju	Member Secretary	Present	Present