SUMMARY AND CONCLUSION

1. Introduction

The Port Department, Government of Puducherry proposes to re-commence the existing minor port in Uppalam at Puducherry District. The port was constructed between 1986 and 1993 and was in full-fledged operation from 1993 to 2006. Since 2006 the port was not in operation due to litigations against the port and improper maintenance of navigational channel which results in heavy siltation in Ariyankuppam River mouth to port.

Potential siltation at Ariyankuppam River mouth was identified at the port planning stage itself. In order to stabilize the river mouth to facilitate safe navigational depth, north breakwater, south breakwater were connected with trestle and a sand trap with submarine tunnel between south and north breakwater were constructed. The sand trap also got choked up due to siltation and improper maintenance.

Now the Government of Puducherry aims to utilise the funds sanctioned under Sagarmala from the Union Government of India. It is proposed to utilise the same structure and deepen the navigational channel and to prevent the entry of solid waste from the adjacent drainage channel (nearby the port). The Port Department, Government of Puducherry has appointed IITM as their technical consultants. Accordingly, IITM, has prepared Detailed Project Report and also conducted various Modelling studies.

The proposed project attracts both EIA Notification 2006 and CRZ Notification 2011. Hence it requires both Environmental and CRZ clearance from MoEFCC and recommendations from PCZMA respectively. The project falls under activity 7(e) 'Ports & Harbors' and categorized as category B (handling capacity <5 MTPA) as per schedule of EIA Notification, 2006. However as per EIA Notification, 2006 according to the General Conditions, the project falls under the inter-state boundaries (Tamil Nadu and Puducherry) will be treated as category A. ToR for the proposed project was issued by MoEFCC on 19th February 2019. Field studies were undertaken during March 2019.

2. Project Description

Puducherry Port is located 2 km upstream of Ariyankuppam River mouth. Based on the recommendations from IIT, the project would involve: i) capital dredging in the port basin and in navigational channel, ii) disposal of dredged sediments having sand fractions on the northern side of the shoreline for beach nourishment and clay type sediments in open sea and iii) construction of a pile supported bridge cum walkway across the drainage channel to prevent solid waste disposal into the port waters. The estimated quantity for capital and maintenance dredging are 0.73 million m^3 and 0.15 million m^3 per year respectively. The dredged material will be disposed at a distance of around 6 km and depth of (-) 20 m CD. The dredging of the harbour basin and navigational channel to the required depth of (-) 5 m, except at the submarine tunnel where the depth shall be (-) 4 m will be maintained. Suitable dredging methodology will be utilized to carry out the dredging and dredge disposal work.

Power requirement of 300 kVA will be met from Puducherry Electricity Board. Water requirement of 15 KLD will be met from PWD/ external agencies. The cost of the proposed project will be Rs. 44 Crore.

3. Description of Environment

The baseline data collection on both terrestrial and marine environment was collected during fair weather period (March 2019). The collected data were analysed by Indomer Inhouse Laboratory which is accredited by NABL.

Ambient air quality: Air quality monitoring results shows that, pollutants are within NAAQ Standard. Monitored values recorded within study can be attributed to movement of vehicles, boats, workshops etc. AQI is found to be in satisfactory level.

Ground water quality: The results of ground water quality shows that the most of parameters complies with IS 10500 – 2012.

Surface water quality: The surface water bodies within study area have good water quality and satisfy various designated uses as per CPCB criteria such as Drinking water with and without conventional treatment, irrigation, outdoor bathing and industrial cooling.

Soil quality: The soil quality results show that the soil in the project area is free from any contamination. The results of soil analysis indicate that the soil in the study area is loamy soil. The soils are acidic to neutral in reaction and are low in nutrients status. The acidic soils require application of either lime or dolomite to improve the status of basic cations.

Noise measurements: The measured noise levels were found to be within the Ambient Noise Standard prescribed under Noise Pollution (Regulation and control) Rules, 2000. The major sources of noise in the project area are vehicle movement and sea breeze.

Socio-economic environment: Most of the people are dependent on jobs/business and fishing activities as their main source of living. More than 100 numbers of boats are operated from the fishing harbour and tourism is also popular in this project region. Therefore, most of the people are dependent on these activities for their livelihood either directly or indirectly. It is noticed that almost all the houses possess modern living amenities like TV with dishes, Fridge, Washing Machines, Mobiles and Motorcycles.

Seawater quality: Seawater quality show that pH, Turbidity and other parameters are in the range of normal seawater /brackish water, except for marked local deviations. Thus, the values of DO, nutrients and phosphorous at Stns. SS1 to SS3 and Stn. SS7 clearly shows the influence of sewage discharged in the Ariyankuppam River. Constructing the proposed drainage barrier is expected to reduce the concentration level of nutrients in the port waters. The coastal waters at Stn. SS4 to Stn. SS6 are free from contamination.

Seabed sediment quality: The heavy metal concentration in the sediment samples indicated the absence of increase in their burden due to anthropogenic influence. Total Nitrogen and Total Phosphorus values are high due to discharge of sewage in the port water. In order to control concentrations of Total Nitrogen and Phosphorous in the port

sediments it is necessary to release the treated sewage through a pipeline at a location in the sea after proper studies to identify the release site.

Marine ecology and biodiversity: Biological parameters considered in the present study are primary production, phytoplankton biomass, diversity and population, zooplankton biomass, diversity and population, seabed and inter-tidal / sub-tidal macro benthic diversity and population, bacterial population in coastal waters and seabed sediments and fishery.

Phytoplankton: The numerical abundance of phytoplankton population varied between 7200 and 20400 nos./l from all stations.

Zooplankton: Zooplankton population analysis at various stations showed that their numerical abundance varied from 62415 to 160920 nos./100 m^3.

Benthos: The numerical abundance of the benthic fauna varied between 520 and 880 nos./m^2.

Microbiology: In the water samples, population density of microorganisms varied from 0.01 to 6.66 nos.$\times 10^3$ CFU/ml at Stns. SS1 to SS7. In the sediment samples, population density of microorganisms varied from 0.01 to 6.78 nos.$\times 10^4$ CFU/g at Stns. SB1 to SB7.

Coastal vegetation: Coastal vegetation also comprises of trees like *Casuarina* sp., palm trees, etc., and creepers like *Spinifex littoreus*, *Ipomoea pes-caprae* and *Prosopis juliflora* are almost present nearshore area.

Sea weeds: Only one green seaweed species was seen along the boulders near breakwater.

Mangroves: Avicennia marina, Rhizophora sp. and Bruguiera sp. were observed in the study site. Avicennia marina was the dominant species.

4. Anticipated Environment Impacts

4.1. Terrestrial Environment

Air Quality

Construction Phase: The proposed project is a redevelopment project and anticipated impacts will be lower than that of a green field project. The major activities are operation of construction equipment, transport of construction material etc. These activities would cause a temporary increase in air pollutants. The impacts will be temporary in nature and will cease once the construction are completed.

Operation Phase: The anticipated impacts on air quality are expected from fugitive emissions from activities like loading/unloading activities, vehicular emission and emissions from vessels during berthing hours.

Mitigation measures:

- Water sprinkling will be practiced at unpaved roads and dust-prone areas.
- Engines and exhaust systems of all vehicles and machinery and equipment will be regularly maintained to keep the emission under statutory limits.
- Vehicles with valid PUC only will be allowed to operate inside the port.

Water Quality

Construction Phase: The water requirement of about 15 KLD for the construction phase will be provided by the PWD/ external agencies. No ground water will be tapped for the construction work. Hence, no impact on local or village water resources is expected.

Operation phase: The anticipated impacts on water environment are expected from water consumption and wastewater generation. The water requirement for the proposed project will be supplied by the PWD/ external agencies. No ground water will be tapped. As there

will not be any additional water requirement impacts on the water supply of the surrounding area are not expected.

As there in no manufacturing activity within the port, no process related wastewater generation is envisaged. The sewage from the proposed project shall be sent to the septic tanks within the port.

Wastewater: Wastewater would mainly comprised of site run off and sewage.

Proper sanitation facilities like toilets and bathrooms will be provided for workers. Sewage generated will be treated through septic tanks - soak pit system or by upgrading existing underground drainage system.

Mitigation measures:

- Wastage of water during construction phase will be prevented by promoting awareness.
- Site drainage plan to prevent any water logging during the construction and operational phases will be executed. Site run off during the rainy season will be channeled through storm water drains. The runoff will be directed to the rainwater collection tank.

Noise Quality

Construction phase: The anticipated impacts on ambient noise quality are expected from construction equipment, vehicle movement etc. The impact will be localized, short term and reversible in nature.

Operation phase: The anticipated impacts on the noise environment are expected due to activities like vehicular movement and loading/unloading of cargoes. As there are no major noise generating sources the anticipated impacts on noise environment would be insignificant.

Mitigation measures:

- Proper lubrication, muffling and modernization of equipment will be done to reduce noise.
- Periodic ambient noise level monitoring will be carried out.

Land and Soil quality

Construction Phase: Anticipated impacts are from site preparation, solid waste generation, spillages etc. On completion of civil work, materials like wooden scrap, steel scrap cement, gravel etc., unused paint, diesel oil and other debris will be collected and disposed as per norms to prevent any adverse impact on the land environment and to maintain the aesthetics.

Operation Phase: Anticipated impacts on land environment associated with port operations can arise from spillages during cargo handling, storage, waste management and disposal activities.

Mitigation measures:

- Fuels, paints and lubricants will be stored at designated covered site with containment and concrete floor to prevent ground contamination and restrict spill.
- Solid waste from labour camp and barges will be collected and properly disposed.
- The ground will be leveled, compacted and strengthened with green belt as proposed.
- Usage of non-recyclable plastics will be discourage inside the port.

Socio economics

No R&R (Rehabilitation & Resettlement) is required for the project. The expansion project will generate direct and indirect employment in terms of contracts, transportation and

related activities. About 100 workers will be engaged during the construction phase and 100 personnel will be employed during the operation phase of the project.

4.2. Marine Environment

Piling for constructing the walkway and dredging for maintaining draft for navigational channel and disposal of dredged material can have impact on seawater quality, shoreline and flora and fauna. Numerical modeling using MIKE 21 by IITM has concluded that no significant changes in bed level are envisaged.

Piling and dredging have potential to disperse the bed sediment in the water column and increase the suspended sediments. The characteristic of the seabed sediment suggests that the texture is of sand and silt; and minor part inside the channel is clayey. The fine sediment particles dispersed in water may remain in suspension for some time but would be advected and dispersed easily under the influence of tidal currents. The piling and dredging would impact though locally, the sub tidal benthic communities. Thus, the benthos at pile footprint would be lost permanently while at dredged sites their recolonization would eventually occur. Since the sediment texture is mainly comprised of fine and medium sand and not hard, the noise due to piling is expected to be low. As the baseline data suggests there is limited commercial fishing inside the river mouth and there are no turtles and marine mammals within the project site, the anticipated impact is expected to be temporary and insignificant.

Mitigation Measures:

- Efficient piling and dredging equipment will be deployed and the dredging will be confined to the planned area only.
- Vessel-generated waste will not be allowed to be discharged within the port marine environment. The waste will be collected and disposed as per norms.
- Regular mock drills and training will be provided to the concerned port personnel for combating oil spills.

5. Risk Assessment and Disaster Management Plan

Disaster Management Plan including natural disasters has also been prepared and included in the report. Necessary safety procedures will be followed to minimize the impact of risks involved.

As the project is located on the coast, the area is vulnerable to natural disasters. Although, these are rare events, proper and effective coordination with local, national agencies and Govt., bodies will be the key to manage such events. Necessary facilities for emergency management will be provided to the workers. Emergency facilities include Lifesaving jackets, ropes, demarcation of Assembly Points, Evacuation Routes and Medical Facilities. An Emergency Disaster Management Cell will be formed to deal with emergency situations.

6. Project benefits

The proposed project will generate direct and indirect employment generation opportunities. About 1 % of project cost is allocated for Corporate Environment Responsibility (CER). This will help in improving the infrastructure such as drinking water supply, sanitation and health, education, skill development etc., in nearby villages.

7. Environment Management Plan

EMC is in place to ensure the implementation of Environment Management Plan. Periodic review and audits will be conducted for checking the effectiveness of implementation of mitigation measures listed in the EIA report. Both terrestrial and marine environment management plan are suggested to mitigate the impacts of the project during construction and operational phase of project. The Port Department will report environmental performance and monitoring results regularly to statutory authorities. The separate environmental budget of about Rs. 100 Lakh will be allocated for the proposed project.

8. Conclusion

Baseline environment study has been conducted to establish the prevailing status of the study area within 10 km from the project site. The significant environment parameters for the terrestrial and marine environment are compared with the available National

Standards. The impact assessment shows that there are no significant negative impacts due to proposed project activities on surrounding environment. The implementation of suggested mitigation measures and environment management plan will ensure to keep the anticipated impacts to minimum so that the project will be completed without any significant change in baseline environment status.