ENVIRONMENTAL IMPACT ASSESSMENT
ENVIRONMENTAL MANAGEMENT PLAN

TUNA FISHING HARBOUR
Thiruvottriyur Kuppam, Thiruvallur District

DEPARTMENT OF FISHERIES
GOVERNMENT OF TAMILNADU

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EIA Consultants

CENTRE FOR ENVIRONMENT, HEALTH & SAFETY
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1.1. GENERAL

Department of Fisheries (DoF) is one of the core line departments of **Government of Tamilnadu(GoTN)** principally to address the welfare of fishermen community of the state and intended to establish necessary infrastructures required for their safe and hygienic fishing activities.

DoF is committed to have annual budget from GoTN to enhance the contribution of the fishery sector to the food security of the people of Tamil Nadu and establish harbor infrastructure facilities compatible to International Standard practices for ensuring fish catch rate and its hygienic handling .Perhaps, DoF is also into Erosion prevention and protection initiatives so as to protect coastal villages from eroding shorelines stretches.

Tamilnadu has around **1076 km** of coastal line that passes through 13 out of 32 districts that consists of FOUR coastal Zones viz., Coromandel Coast, Palk Bay, Gulf of Mannar and West Coast. There are **608** coastal villages, primarily fisherman community, having more than **1.9 Sq.Km** of Exclusive Economic Zone (EEZ) with **41,412 Sq.Km** (Inshore area-16,058 Sq. km., off-shore area-7,197 Sq.km and deep sea -18,157 Sq. km) of continental shelf under their activities.

The fishing community population is around **1.1 million in Tamilnadu** (2015). Tamil Nadu ranks FIFTH in total fish production of the country and the total fish production of the State during **2014-15 is 6.97 lakh tons.** (From marine resources-4.57 lakh tons; Freshwater and brackish water resources -2.40 lakh tons). Tamil Nadu is one among the leading exporter of sea food with the export of marine products of 93,477 MT and earned a foreign exchange of INR 5,308.17 Crores during 2014-15. The fisheries sector has contributed **0.7 percent of the total Gross State Domestic Product** (GSDP) of the State.

Thiruvallur District is historically known for its fishery resources and community living and presently it has a fishermen population of around 50,000 in the stretch of 25 Km that includes North Chennai. The project location is historically known for fishery resources and a strong fishermen settlements and more precisely, with a fishery harbor at about 3.5Km south as a landmark facility of Chennai since long time.

The proposed **Tuna Fishing Harbour** is a flag ship project of Government of Tamilnadu which intended to create exclusive facilities to better Tuna catching and processing to add value to benefit the fishing community of the project location, **Thiruvottriyur Kuppam**, Chennai.

The proposed fishing harbour facility is intended principally to ease out the congested Chennai Fishing Harbour as it is overflowing with more traffic and fishing activities. At times, there is an acute shortage of space to land the boats inside the harbour. The proposed Harbour location is about 3.5Km North from the Chennai Fishing Harbour which will provide location advantage and flexibility in harbour operation and fishing activities.

The Department of Fisheries was mandated to enhance the harbour facilities and to promote Tuna Catching & Processing, as huge potential is evident from the fishing data of past few decades in the project location. The project is much needed to improve the socio economic status of the local fishing community of more than a lakh in the North Chennai Zone of Tamilnadu.

The proposed harbour, as it is very close to Chennai Fishing Harbour, will serve as an **extended harbour facility** of it and intended to promote Tuna catching & processing. At present, from the Chennai Fishing Harbour, there about 300 boats are operating exclusively to venture deep into the Bay of Bengal to catch tuna and bring in about 1,000 tonnes every month.

The location of the proposed harbour is in the mid of a Groyne Field which is in place since 1998 and found as a stabilized shoreline which otherwise should have been an affected zone by erosion due to Chennai Fishing Harbour and Chennai Port which are on the Southern side of the project location and much within the influence Zone of littoral drift of about 10km.

The first level Budgetary Estimation for establishing the proposed Tuna Fishing Harbor is made for **Rs.240.00 Crores.**

1.2. PROJECT

The proposed **Tuna Fishing Harbor** is primarily to de-congest the overcrowding of fish boats and vessels in the existing Chennai Fishing Harbor which of just 3.5Km south of the project location.

The project location is geographically located between **13^0 09' 41.37"** to **13^0 10' 10.22" N Latitude** and **80^0 18' 31.34" to 80^0 18' 42.33" E Longitude** in the Coramendal Coast, in Thiruvottriyur Kuppam, Thiruvottriyur Taluk, Thiruvallur District, Tamilnadu.

The summary of total quay length required for landing, outfitting, repair and berthing of fishing vessels is as follows:

Sl. No.	Type of quay	Fishing vessel size			Quay Length (m)
		10 m FRPs	18 m trawlers	18 m Tuna boat	
1	Fish landing quay (m)	44*	140	176	316
2	Outfitting quay (m)	44*	40	44	84
3	Repair quay (m)	22*	20	22	42
4	Idle-berthing quay (m)	--	179	100	279
Total		110*	379	342	721

*Separate low level quay of 110m is proposed for landing outfitting and repair of FRP boats. However, their idle-berthing would be done in calm water or hauling on to land through RC sloping hard during non-fishing and rough weather seasons

For mechanised vessels piled quay structure of 730m length with deck elevation of RL +2.50m is proposed.

The harbour will also have fish handling halls, auction hall, cold storage, ice factory, fuelling station, power-back up centres and dormitory for workers. These land side facilities will be established in the reclaimed land area of **15.63 Ha**.

The break waters will have 852 m on the Northern side and 1088 m on the Southern side which will ensure water spread area of **30.87 Ha**.

The water spread areas and the proposed wharf facilities are envisaged with elaborate planning and engineering design to facilitate fishing activities and boat or vessel management for about 300 numbers of FRP boats(10m), 300 numbers of Trawlers(18m) and 200 numbers of Tuna boats(20m).

It is important to ensure -4m draft in the water spread area of the Harbor to facilitate the navigation of boats and vessels. On the basis of real time bathymetry study by (2015), it was assessed that 25,460 cum of dredging is must. The proposed landside facilities require land to be reclaimed as it is not feasible to acquire from the existing stretches of land. Hence, it is proposed to dredge 1,75, 240 cum of sand mud from off shore area to reclaim land of 15.46 Ha for establishing the land side infrastructures.

The net fish catching and handling capacity of the proposed Tuna Fishing Harbor is **69,000TPA.** The key Map of the proposed TUNA FISHING HARBOR is presented in **Fig.1.**

This project is a long awaited fishery infrastructure by the local fishermen community and now envisaged to complement and also to enhance the fishery activities of the existing Chennai Fishing Harbor.

1.3. PROJECT PROPONENTS

Department of Fisheries (DoF), Government of Tamilnadu is the proponent of the proposed TUNA FISHING HARBOR in Thiruvottriyur Kuppam, Thiruvottriyur Taluk, Thiruvallur District, Tamilnadu.

The project is envisaged as coastal infrastructures towards a standalone fishing Harbor. The net fish handling capacity of the proposed Tuna Fishing Harbor is **69,000TPA.**

The water spread area under the command of the proposed Fishing Harbor is envisaged for **30.87 Ha** within the break waters and a land side reclaimed area for building infrastructures will be **15.63 Ha.**

The layout of the proposed Tuna Fishing Harbor is presented in **Fig.2.**

The main facilities proposed in the fishery harbor layout are as follows:

- Breakwaters
  - Northern Breakwater 852 m
  - Southern Breakwater 1088 m
- Dredging and disposal (2,00,000 cum)
- Reclamation and leveling
- Quays (RCC bored pile) for MFVs 730 m
- Quays (RCC bored pile) for FRPs 110 m
- Internal road within the harbor complex
- Fish Handling and Auction Hall for MFVs (1273 Sqm)
- Tuna Fish Handling and Packing Hall (1200 Sqm)

Fig.1.

Fig.2.

- Fish Handling and Auction Hall for FRP boats (258 Sqm)
- Fishery Administrative Office 163 Sqm
- Fishermen gear sheds (9Nos.x176.87 Sqm) 1591.83 Sqm
- Net mending sheds (4Nos.x258.10 Sqm) 1032.4 Sqm
- Fishermen rest sheds (3Nos.x218.00 Sqm) 654.00 Sqm
- Boat repair shop (2 Nos.x100.45 Sqm) 200.90 Sqm
- Restaurant (137.79 Sqm)
- Dormitory (320.90 sqm)
- RC sloping hard
- Security/guard House (26.50 Sqm)
- Compound wall 1175 m
- Radio Communication Tower 199.80 Sqm
- Public Toilet (3Nos.x 35.86) 107.58 Sqm
- Navigational and radio-communication equipment
- Electric power supply and distribution including electric substation and general lighting
- Fresh water storage, supply and distribution with ground water sumps, pump house and overhead tank
- Seawater supply and distribution with shallow water tube well, pump house and overhead tank
- Drainage and sewerage including effluent treatment plant, storm water drains and cross drainage works
- Greeneries and landscaping in front of main gate and at other places
- Fire extinguishers, fire hydrants and other equipment

1.4. EIA CONSULTANTS

Centre for Environment, Health & Safety (CEHS), Annamalai University is an accredited EIA **organization** by QCI under NABET for **Ministry of Environment, Forests & Climate Change (MoEF & CC), Government of India.**

CEHS has been contracted for EIA consultancy by the DoF through the Project Consultant M/s. **Virgo Aqua, Ernakulum** towards getting CRZ Clearance from MoEF&CC.

1.5. EIA FRAME WORK

EIA study has been completed with **Environmental survey** in the project area, considering **10 km radius from the location as Impact area**, for evaluating the **Due-diligence** of the Environmental status. The Survey for field observations was run to generate primary data on **Micrometeorology, Air Quality, Water, Noise, Soil/sediment, Socio Economics and Terrestrial & Marine Biology** (Flora, Fauna and Biota)

The hydrodynamic survey was conducted and Mathematical Models were run using Delft Modeling Tools for the evaluation of coastal dynamics of the project location and to draw the process dynamics for the design of structural components of the Harbor.

A Comprehensive **Environmental Management Plan** is devised and provided for implementation in all three phases of the project viz., Planning & Designing, Construction and Operation & Maintenance phase.

An exclusive Plan of action is proposed to sustain the shoreline on the Northern side of the proposed Fishing Harbor, based on the Coastal Modeling studies.

EMP was framed with protocols and procedures for monitoring and maintenance of Building, environmental systems like WTP, ETP, etc,.

1.6. TUNA FISHING HARBOR

The project location is historically used by the local fishermen community and only in the recent past the coastline got eroded and it was then provided with groynes which were subsequently extended as a field with 13 numbers of groynes. It is evident that the project shoreline of about 10km stretch has been stabilized and with sand by passing over groynes over the years, the beach line has been restored and now, the project coastline is showing features of stabilization with accretion of sand and restored shoreline.

It is the sustained effort of Government of Tamilnadu that the shoreline is stable now and DoF is proposing Tuna Fishing Harbor, essentially to decongest the overcrowding in the Chennai Fishing Harbor which is 3.5 km by south from the southern Breakwater.

The project is envisaged as coastal infrastructures towards a standalone fishing Harbor. The net fish handling capacity of the proposed Tuna Fishing Harbor is **69,000TPA**.

The water spread area under the command of the proposed Fishing Harbor is envisaged for **30.87 Ha** within the break waters and a land side reclaimed area for building infrastructures will be **15.63 Ha**.

The present proposal of DoF is an effort of Government of Tamilnadu to provide safe landing area for fishing boats and vessels with engineered structures for hygienic and safe handling and management of fish catches.

1.7. PROJECT COASTLINE

The project location is located in the Coramendal Coast, in Thiruvottriyur Kuppam, Thiruvottriyur Taluk, Thiruvallur District and Tamilnadu.
The location based on the Google Imagery is shown in **Fig.3.**

A detailed site-specific curvilinear grid was constructed for Tuna Fishing Harbor region to simulate the water levels and currents for the proposed harbor layout. The detailed model for the fishing harbor is nested in intermediate model covering between Pulicat and Besanthnagar.

Sedimentation modeling carried out for the Tuna Fishing Harbor with the proposed layout. The study made use of available information on bathymetry from bathymetry survey, GEBCO/ETOPO2 and NCEP wind/wave conditions. Sedimentation and erosion patterns show the long shore transport due to wave, wind conditions and tide induced currents.

The 1D shoreline change modeling carried out for the Tuna Fishing Harbor with the proposed layout. The study made use of 10 year (2005-2015) transformed wave climate at four locations along the coast.

Based on the 1D shoreline model simulations for the Tuna fishing harbor marginal difference annual net transport observed and erosion of surrounding coastline within 800 m from the harbor noticed. Development of the proposed Tuna fishing harbor will have mild impact along the surrounding coastline.

Fig.3.

The Coastline will get stabilized within 5 years after the construction of the proposed Tuna fishing harbor and minimum changes in shoreline will be expected due to seasonal variations after 5 years. It is concluded that, the existing shoreline protection measures viz., the groin field with Rubble mound sea wall is sufficient enough to hold the new harbor facilities, without leading to accretion/erosion problems.

1.8. EXISTING SCENARIO

The proposed location is essentially an engineered stable coastline with a field of 13 groynes.

The Long shore sediment transport towards north predominates mostly. Southwards drift is seen during November and February. Maximum northerly wind drift occurs in June and July. Whereas, southerly drift is maximum in January and February about 0.3 million m^3 of sediment transport is towards north between June and September and about 0.14 million m^3 of sand is drifted towards south in a year.

The shoreline of the project location has been engineered with a groyne field and found stable with significant level accretion restored the lost shoreline.

1.9. NEED FOR TUNA FISHING HARBOR

There is a need develop Thiruvottriyur Kuppam as Tuna fishery harbor due to the non-availability of full-fledged fishery harbor infrastructure facilities at the site to de-congest the Chennai fishery harbor and also a major demand of the local to have full-fledged Tuna fishery harbor. Thiruvottriyur Kuppam is situated on the open coast and fishermen are converting their mechanized Gillnet boats as a Tuna boat and goes for Tuna fishing. They go for 20 trips in a fishing season and each trip has got 10 days in the process they get about 9 tonnes of fish in one trip and 180 tonnes in a year valuing about Rs. 100 lakhs for a vessel. The construction of fishery harbor at this centre besides mitigating the problems currently being faced by the local fishermen community will go a long way in the fishery development of the area besides decongesting Chennai fishery harbor and the construction of fishery harbor with breakwaters is likely to arrest the erosion of the coast and safeguard the fishermen kuppams in the area. Development of Tuna fishery harbor at Thiruvottriyur Kuppam is expected to generate a wide range of benefits to the fishermen and therefore the economy from many angles, especially from the point of socio-economic upliftment of fisher community and fishery industry as a whole. These include both quantifiable and non-quantifiable benefits. Development of a Tuna fishery harbor at Thiruvottriyur Kuppam is sure to generate more employment opportunities for the local unemployed people and the fishermen community. A large number of workers in the fishery harbor are from the fisher community comprising of boat crew, head-load and ice workers, women fish vendors, fish merchants etc.

1.10. CRZ MAPPING

The project activities of the proposed construction of infrastructures towards establishing a FISHING HARBOR is falling under CRZ area. The proposed construction of Fishing Harbor is falling inter tidal Zone which is critically CRZ area, classified as **Zone-I**.

The CRZ Mapping was already made through **Institute of Remote Sensing (IRS), Anna University** is presented in **Fig.4.**

The CRZ Map that delineates the LTL and HTL. The Project location is evaluated for Zone-I (Groynes) and Zone-IV for buildings, as per **CRZ Notification, 2011.**

1.11. HYDRODYNAMIC STUDIES

In order to compute the sedimentation estimates for the TUNA fishing harbour, a calibrated hydrodynamic model is required. Hence, the site specific detailed hydrodynamic modelling was conducted to determine the flow circulation for the proposed TUNA fishing harbour at Thiruvottriyur Kuppam in Thiruvallur District, Tamil Nadu. Water levels and tide, wind and wave induced flow circulation were assessed for the proposed fishing harbour.

The study was conducted using the Delft3D package. The Delft3D-Flow model solves the 2D or 3D shallow water equations on a rectangular or curvilinear grid, taking in to account:

- Tidal forcing
- The effect of the Earth's rotation (Coriolis force)
- Density driven flows (pressure gradients terms in the momentum equations);
- Advection-diffusion solver included to compute density gradients with an operational facility to treat very sharp gradients in the vertical;

Fig.4.

- Space and time varying wind and atmospheric pressure. Advanced turbulence models to account for a vertical turbulent viscosity and diffusivity based on the eddy viscosity concept. Four options are provided are k-epsilon, k-L, Algebraic and constant model;
- Time varying sources and sinks (e.g. river discharges);
- Simulation of the thermal discharge, effluent discharge and the intake of cooling water at any location and any depth;
- Robust simulation of drying and flooding of inter-tidal flats.

1.12. DUE DILIGENCE SURVEY

The project location was characterized for a detailed environmental survey on all its attributes for 10km radius of the project location as Impact area.

The Project Impact Area for 10Km radius is shown in **Fig.5.**

The study was completed with field laboratory, observatory and sampling stations in the Impact area for all attributes, using standard Protocols and Procedures.

1.12.1 Micrometeorology

A **Micrometeorological station** was established and meteorological parameters were studied for ONE season.

The parameters observe were

- ✓ Temperature
  (Maximum, Minimum)
- ✓ Wind Speed & Direction
- ✓ Relative Humidity
- ✓ Rain Fall

A comprehensive meteorological condition of the project location was evaluated for Impact Prediction studies and preparation Mitigation Plans.

Fig.5.

1.12.2 Air Environment

Ambient Air Quality (AAQ) survey program was run for a month with **Six Monitoring Stations,** spanning in 10 km of impact area of the project. The Sampling Stations were strategically selected on the basis of Wind Direction and Topography of the project location with reference to proposed project activities.

The samples were analyzed for PM_{10}, $PM_{2.5}$, SO_2, NO_x, CO and correlated with NAAQ standards of MoEF/GoI.

1.12.3 Water Environment

Water samples in three locations of sea (Saline) and two locations from land (fresh) were drawn and analyzed.

The water samples were characterized using standard protocols and parameters.

1.12.4 Soil Environment

Sediment samples were drawn from three locations and analyzed for standard characteristics.

1.12.5 Terrestrial Environment

There is no significant forest cover in the study area. There is no endangered species of flora and fauna in the project location.

The proposed project activities of the Fishing Harbor will not have any interface or interaction with the terrestrial environment.

1.12.6 Coastal Biology

The coastal and marine biological attributes were evaluated for flora and fauna and as well for Phyto and Zoo-planktons. Samples were drawn using standard protocols and were analyzed for characterizing the biota.

Terrestrial Flora and fauna also were evaluated in the due diligence survey in the Impact area.

1.12.7 Socio-Economics

The demographic and stakeholders of the proposed project activities were surveyed and studied for their response to the proposed project of Fishing Harbor. A field survey clearly indicated that the local peoples are in favor of the project and also there are repeated representations to Government of Tamilnadu for this project implementation.

1.13. IMPACT ASSESSMENT STUDIES

The proposed harbor Infrastructures towards scientific and safe fish handling in the project area will have a positive impact on the socio economic of the local population of the fishing community of more than 50,000 in the project location.

The Coastal stretch of the project location has been surveyed to have a high energy system with more amount of variance in their hydrodynamic characters. The Morphology is subjected for continual change in the natural process which is generally in cycle. Moreover, the unprecedented development in all areas with demographic and more characteristically, anthropogenic stresses are making some changes as permanent and tend to cause irrevocable changes.

The Impact assessment is largely location and project specific and negative on short term assessment and the project as whole has been assessed for net positive.

1.13.1. Location Specific: Surveys & Studies

The location specific studies and surveys were conducted for coastal features and CEHS for Environmental attributes.

A satellite Imagery with CRZ Mapping superimposed with the proposed Fishery infrastructures was made to evaluate the CRZ classification of the project location.

1.13.2. Project Specific Impacts

The proposed FISHING HARBOR will bring net-positive socio economic impact through enhancing fishing activities.

Impacts were studied at length for their short term and long term Impacts on the surrounding marine and terrestrial environment.

Project components will be evaluated for their size and activities and Mathematical Models will be used to project the likely impacts of the project in the post project scenario.

1.14. ENVIRONMENTAL MANAGEMENT PLAN

The proposed activities of Harbor were studied for the requirements of environmental resources like water and evaluated for discharges or discards like wastewater and solid waste. Necessary environmental facilities like wastewater treatment plant and solid waste management facility were planned and incorporated in the proposed Harbor to make it environmentally compatible and sustainable in the long run.

The proposed Harbor is designed to have the complementary operations to the existing Chennai Fishing Harbor to sustain a safe livelihood to the fishermen community of the project location.

The requirement of Water will be addressed with exclusive plants for providing potable water of 250 KLD capacity RO plants.

There is a demand for 500 KLD of sea water for fish washing and cleanings. It will be sourced directly through suitable intake structures.

There will be two Wastewater Treatment Plants. Fresh waster waste streams will be treated in Zero Discharge Treatment plants with Ultrafiltration package to reclaim water so that the reclaimed water will be used for green belt and flushing of toilets to offset the requirement of virgin water requirement. An exclusive wastewater Treatment Plant will be installed for brine water discharges which after treatment and disposal will be discharged into sea.

The Solidwaste generation is assessed for about 3 TPD mainly from fish handling and other domestic activities. This will be converted into manure by installing exclusive mechanized systems for composting.

The Environmental Impact Analysis on harbor requires review on the in interaction of several coastal competences, marine ecology, economy, sociology and engineering.

With the due diligence evaluated for the existing environmental attributes, the environmental management plant has been devised for environmentally sustainable coastal structures in the project location.

The proposed harbor structures will be ensured with safe structural stability with proper design and execution to perform in compliance and in complementing way.

1.15. RISK AND DISASTER MANAGEMENT PLAN

The principal activity is fish handling and management and hence there is no hazardous chemicals involved in the proposed fishing Harbor. However, the proposed Ice plant of 25 TPD will have ammonia storage. The required level of ammonia is less than 1TPD which will be handled in a standard Tonners supplied by the authorized dealers.

The Harbor management will provide and maintain all safety protocols to use the ammonia in the ice plant with required accident management tools in place as part of Risk assessment management Plan.

The proposed Harbor will have fuel storage and fuelling facilities to support the fishermen boat and vessel operations. The storage of LSD/HSD is assessed for 10KL and will be stored as per the standard procedures and will get necessary statutory approvals from the competent authorities.

Requisite account of *Emerging Management Plans, on-site* and as well for *off site*, will be prepared and kept under surveillance by Harbor administration, to meet any situations of emergency due to fire or any accident.

To manage any likely accident or fire, the harbor management will maintain an exclusive wing of fire brigades in tie up from Tamilnadu Fire Service Department and required physical systems like equipment, chemicals, transportation etc.

1.16. INTERNAL ROADS AND TRAFFIC

The internal roads within the harbor will be laid as follows:

Main Roads : 9 m width along with 2m green belt on both sides

Cross Roads : 4.5 m width along with 1.5m green belt on both sides

The junctions of roads will have 20m width.

1.17. RAIN WATER HARVESTING STRUCTURES

All building infrastructures will be mandated to put up Rain water Harvesting structures (RWHS) from their roof tops and within their boundary limits.

The RWHS be established as per the standard practices as percolation pits, as per the guidelines of Tamilnadu Water Supply and Drainage Board (TWAD).

RWHS will be under continuous monitoring for preventing any contamination due to possible mix up of waste streams or solid waste.

DoF has already carried out the contour survey for the entire project area.

Engineered structures viz., closed conduits for collection and transportation of storm water will be facilitated to collect and using it for ground water recharging.

DoF attaches the utmost importance for storm water, without any pollution so that it can be used for green belt development.

1.18. GREEN BELT DEVELOPMENT

DoF is committed to create and maintain a "green corridor" all around the boundary, with compatible coastal species of trees and shrubs.

DoF is also committed to develop green belt with a suitable avenue trees and shrubs, all along their inner roads, road junctions and open spaces.

1.19. ENVIRONMENTAL CELL

An exclusive team of managers with required number of skilled and trained man power will be formed to implement and monitor the Environmental Management Plan.

The Cell shall have financial allocation from the regular annual budget of the Harbor administration.

Executives from fishing community will be accommodated in the Consultative Committee of the Stakeholders of the Cell. At least, one Manager level person from Boat or Vessel operators will be enlisted as member of the committee that coordinates the activities of the Environmental Cell.

The protocol of the Environmental Cell is presented in **Fig.6**.

1.20. CONCLUSION

The proposed site is rated environmentally compatible for the promotion of the proposed Tuna Fishing Harbor due its proximity to Chennai Fishing Harbor that requires decongesting measures urgently.

Thiruvottriyur Kuppam and it's adjoining human settlements are largely fishermen and this project is a long time dream for them and has become indispensable to upgrade their socio economic status in the growing competitive situation for hygienic fishing activities.

DoF is committed with well devised plans and programs supported by required budgetary allocation from GoTN, to promote, develop and maintain the said Tuna Fishing Harbor to have sustainable development of the project location.

Fig.6.

I. INTRODUCTION

1.1 GENERAL

Historically, the East Coastline of 1076 Km of Tamilnadu is known to have several amenable and suitable locations by its coastal characteristics to have Ports, Harbors and the least Fish Landing Centres. This stretch of coastline has three major Cargo Ports viz., VOC Port, Chennai Port and Ennore Kamarajar Port. This has several minor Cargo Ports like L&T Port and Marg Port. This also has several Fishing Harbors and innumerous Fish Landing Centres that support more than 1 million population of fishermen community.

Chennai Fishing Harbor was functioning since 1975 which is close to Northern side of Chennai Port. The Chennai Fishing Harbor is technically having provision to 575 boats. However, there is an average boat or fishing vessel traffic of more than 1500 per day. The proposed Tuna Fishing Harbor is by 3.5 km from this Chennai Fishery Harbor.

It is evidently clear that Chennai Fishing Harbor is overcrowded and it was also extensively damaged in Tsunami, 2004. The location of Chennai Fishing is historically known for fishermen settlement and fishery activities and also known as Kasimedu and Royapuram Fishing Harbor. There is a scope for exclusive fishing and handling for Tuna fishes as the location is popular location for Tuna catch in abundance. Hence only, DoF is proposing the proposed Tuna Fishing Harbor to compliment the Chennai Fishing Harbor functionally and also to provide standalone facility for Tuna handling and marketing.

The **Department of Fisheries** (DoF) of **Government of Tamilnadu** is the implementing agency to establish **the proposed Tuna Fishing Harbor. The net fish catch and handling capacity is assesses for 69,000 TPA.**

The project location is geographically located between **13^0 09' 41.37"** to **13^0 10' 10.22" N Latitude** and **80^0 18' 31.34" to 80^0 18' 42.33" E Longitude** in the Coramendal Coast, in Thiruvottriyur Kuppam, Thiruvottriyur Taluk, Thiruvallur District, Tamilnadu.

The proposed Harbour is envisaged to have 800 m berthing facility along the shoreline. In the first assessment on the basis of requirement, it will have 300-metre-long wharf on the side of northern breakwater; a 200-metre-long wharf to accommodate fibre-reinforced plastic (FRP) boats; extension of the northern wharf by 140 metres; Quays for MFV 730 m and FRP 110 m.

The harbour will also have fish handling halls, auction hall, cold storage, ice factory, fuelling station, power-back up centres and quarters for workers. These land side facilities will be established in the reclaimed land area of **15.63 Ha**.

The break waters will have 852 m on the Northern side and 1088 m on the Southern side which will ensure water spread area of **30.87 Ha**.

1.2 PROJECT PROPONENT

The proposed Fishing Harbor is a Government sponsored project through **Department of Fisheries (DoF), Government of Tamilnadu.**

DoF has its administrative office at **DMS area, Teynampet, Chennai** and it has project office in Kanjeepuram to implement the proposed project.

DoF is the line department of the state government with a mandate to establish necessary coastal infrastructures to ensure safe fishing activities for the fishermen community. DoF has also the additional responsibility of providing livelihood support from the government resources with exclusive budget allocation from the Government of Tamilnadu.

The proposed Fishing Harbor project is a long awaited project for the local fishermen. The increased fishing activities in the project location have made the proposed project of Fishing Harbor as an important infrastructure required for safe fishing activities.

1.3 EIA CONSULTANTS

Keeping in line with the requirements to conduct Environmental Survey with Coastal studies in the Project Location and to prepare **Environmental Impact Assessment** towards getting **CRZ Clearance** under **CRZ Notification, 2011, Department of Fisheries (DoF), Government of Tamilnadu** appointed ***Centre for Environment, Health & Safety (CEHS), Annamalai University*** as **EIA Consultants.**

CEHS is a wholesome, multi disciplinary Environmental Organization of Annamalai University, who have been accredited as EIA Consulting Organization by National Accreditation Board for

Education and Training **(NABET)** /Quality Council of India **(QCI)** for **Ministry of Environment, Forests& Climate Change, New Delhi.**

Specific studies have conducted for a detailed coastal survey in the project location. Delft Mathematical Models were used for Wave and Sediment transport processes.

CEHS has conducted the Due diligence study on the project location and prepared the Environmental Impact Assessment report and Environmental Management Plan

1.4 OBJECTIVE

The EIA has been comprehended with detailed **Environmental Baseline Monitoring** (**EBM**) and **Coastal Modeling studies** for scientific implementation of the proposed TUNA FISHING HARBOR to sustain the coastline of the project location as environmentally compatible location for fishermen.

This report is envisaged to have all required inputs viz., Environmental Baseline data, Coastal Modeling, Impact Assessment, Management and Monitoring plans, Risk and Disaster Management Plans and Social Impact Assessment.

The **Environmental Baseline Monitoring** (**EBM**) and **Social Impact Assessment** (**SIA**) studies were conducted on account of the proposed Harbor Infrastructures.

The report also evaluated the feasibility to check its compliance for marine biota and social benefit to peoples in the proposed project location.

The EIA report is purposeful to evaluate the environmental dimensions of the proposed Structures and to develop environmental management and monitoring plans. The Environmental Due Diligence and evaluation of the Coastal processes with respect to project location, was under taken to prepare EIA documentation with Environmental Management Plan.

Environmental Management Plan with required budgetary recommendations is part of the EIA report. EIA report also carries all required coastal phenomena related to project specific-Risk Analysis and Disaster Management Plans.

1.5 TUNA FISHING HARBOR

The proposal for FH is a comprehensive berth facility for fishing boats / vessels and fish handling and marketing infrastructures. The proposed **Tuna Fishing Harbor** is primarily to de-congest the overcrowding of fish boats and vessels in the existing Chennai Fishing Harbor which of just 3.5Km south of the project location.

The project of FH is interestingly in a coastal stretch which is completely stabilized by the field Groynes. The project location is a typical example for solving erosion problem by engineered hard solutions.

The break waters will have 852 m on the Northern side and 1088 m on the Southern side which will ensure water spread area of **30.87 Ha**.

The water spread areas and the proposed wharf facilities are envisaged with elaborate planning and engineering design to facilitate fishing activities and boat or vessel management for about 300 numbers of FRP boats(10m), 300 numbers of Trawlers(18m) and 200 numbers of Tuna boats(20m).

It is important to ensure -4m draft in the water spread area of the Harbor to facilitate the navigation of boats and vessels. On the basis of real time bathymetry study by (2015), it was assessed that 25,460 cum of dredging is must. The proposed landside facilities require land to be reclaimed as it is not feasible to acquire from the existing stretches of land. Hence, it is proposed to dredge 1,75, 240 cum of sand mud from off shore area to reclaim land of 15.46 Ha for establishing the land side infrastructures.

The net fish catching and handling capacity of the proposed Tuna Fishing Harbor is **69,000TPA.**

The Budgetary Estimate of the proposed project is **INR 240.00 Crores.**

DoF will ensure **CRZ Clearance** for the proposed FH before they start implement the harbor structures in the project location.

1.6 LEGAL COMPLIANCE

DoF is committed to take CRZ Clearance, for the proposed Fishing Harbor, predominantly to support Tuna Fish catch activities, as per **CRZ Notification, 2011.**

1.7 SCOPE OF THE STUDY

The study is envisaged for environmental evaluation of the identified project location for 10 km radius of Thiruvottriyur Kuppam. The proposed FH structures is envisaged with respect to location-specific coastal processes like Wave and littoral drift, for necessary environmental management and monitoring to sustain the environmentally compatible.

In principle, the study has evaluated the following:

- **Project Feasibility**

  (Socio Economic and Environmental compatibility)
- **Environmental Baseline Monitoring**

  (Existing Environmental Status).
- **Coastal Modeling**

  Hydrodynamics, Sediment, Wave & Littoral drift
- **Impact Identification and Assessment**

  (Source of pollution, pathway and receptor impacts)
- **Preventive, mitigative and control measures**
- **Environmental Monitoring Program**
- **Risk and Disaster Assessment** (and Management Plans)
- **Social Impact Assessment** (and R & R Action Plans)
- **Environmental Cost Benefit Analysis.**
- **Environmental Management Plan**
- **Report finalization and submission**

The EIA study have been taken through all listed programs for evaluating the environmental dimensions of the proposed FH Structures viz., breakwaters, berthing facility and landside facilities for storage, marketing and value addition for fish catches with special reference to location specific coastal processes and to get **CRZ Clearance** from **National/State Coastal Zone Management Authority.**

II. PROJECT FEASIBILITY

2.1 GENERAL

The proposed FH project is principally to make the optimally use the suitable coastal location available on the north of the existing FH by 3.5 km. The existing FH is atleast overcrowding with more than 3 times of the vessel or boat handling facility.

The location is Thiruvottriyur Kuppam is, by revenue documents, Village. However, it is essentially major urban agglomerate with more than 50,000 strong fishermen community. The proposed Fishery Harbor structures are to be established between Chennai Fishing Harbor and Ennore Kamarajar Port.

This report intends to generate the scientific data for project feasibility and justification. This EIA report made the required assessment of existing environmental quality, coastal processes, environmental impact and preparation of maintenance and monitoring plan to sustain the functions and performance of the proposed TUNA FISHING HARBOR to enhance the fish catch in general and ensure safe and scientific this project

The project is assessed feasible on **Socio-economical front** and **sustainable on the Environmental ethos**. The proposed FH will provide required infrastructures to keep the boats/vessels safely and also ensure hygienic handling and marketing of fish catches.

2.2 TUNA FISHING HARBOR

The proposed **Tuna Fishing Harbor** is primarily to de-congest the overcrowding of fish boats and vessels in the existing Chennai Fishing Harbor which of just 3.5Km south of the project location. .

The project location is geographically located between **13^0 09' 41.37"** to **13^0 10' 10.22" N Latitude** and **80^0 18' 31.34" to 80^0 18' 42.33" E Longitude** in the Coramendal Coast, in Thiruvottriyur Kuppam, Thiruvottriyur Taluk, Thiruvallur District, Tamilnadu.

The proposed Harbour is envisaged to have 800 m berthing facility along the shoreline. In the first assessment on the basis of requirement, it will have 300-metre-long wharf on the side of northern breakwater; a 200-metre-long wharf to accommodate fibre-reinforced plastic (FRP) boats; extension of the northern wharf by 140 metres; two Quays for MFV 730 m and FRP 110 m.

The harbour will also have fish handling halls, auction hall, cold storage, ice factory, fuelling station, power-back up centres and quarters for workers. These land side facilities will be established in the reclaimed land area of **15.63 Ha**.

The break waters will have 852 m on the Northern side and 1088 m on the Southern side which will ensure water spread area of **30.87 Ha**.

The water spread areas and the proposed wharf facilities are envisaged with elaborate planning and engineering design to facilitate fishing activities and boat or vessel management for about 300 numbers of FRP boats(10m), 300 numbers of Trawlers(18m) and 200 numbers of Tuna boats(20m).

It is important to ensure -4m draft in the water spread area of the Harbor to facilitate the navigation of boats and vessels. On the basis of real time bathymetry study by (2015), it was assessed that 25,460 cum of dredging is must. The proposed landside facilities require land to be reclaimed as it is not feasible to acquire from the existing stretches of land. Hence, it is proposed to dredge 1,75, 240 cum of sand mud from off shore area to reclaim land of 15.46 Ha for establishing the land side infrastructures.

The net fish catching and handling capacity of the proposed Tuna Fishing Harbor is **69,000TPA**. The key Map of the proposed TUNA FISHING HARBOR is presented in **Fig.2.1**

This project is a long awaited fishery infrastructure by the local fishermen community and now envisaged to complement and also to enhance the fishery activities of the existing Chennai Fishing Harbor.

2.3 NEED FOR THE PROJECT

There is a need develop Thiruvottriyur Kuppam coastal line as Fishery Harbor due to the non-availability of full-fledged fishery harbor infrastructure facilities at the site, despite the fact that significant quantum of fish catch is historically enjoyed by the fishermen. All these years, they are using Chennai Fishing Harbor which is in service for the last 35 years which is now overcrowding as it facilitates more than 1500 boats or vessels where as the installed berth area and facilities are only for 575. Hence there is an urgent requirement to de-congest the Chennai fishery harbor.

Fig.2.1

There is a major demand of the local to have full-fledged Tuna fishery harbor, predominantly for Tuna Fish catch, handling and marketing. The proposed location of Thiruvottriyur Kuppam is situated on the open coast and fishermen are converting their mechanized Gillnet boats as a Tuna boat and goes for Tuna fishing.

They go for 20 trips in a fishing season and each trip has got 10 days in the process they get about 9 tonnes of fish in one trip and 180 tonnes in a year valuing about Rs. 100 lakhs for a vessel. The construction of fishery harbor at this centre besides mitigating the problems currently being faced by the local fishermen community will go a long way in the fishery development of the area besides decongesting Chennai fishery harbor and the construction of fishery harbor with breakwaters is likely to arrest the erosion of the coast and safeguard the fishermen kuppams in the area.

Development of Tuna fishery harbor at Thiruvottriyur Kuppam is expected to generate a wide range of benefits to the fishermen and therefore the economy from many angles, especially from the point of socio-economic upliftment of fisher community and fishery industry as a whole. These include both quantifiable and non-quantifiable benefits. Development of a Tuna fishery harbor at Thiruvottriyur Kuppam is sure to generate more employment opportunities for the local unemployed people and the fishermen community. A large number of workers in the fishery harbor are from the fisher community comprising of boat crew, head-load and ice workers, women fish vendors, fish merchants etc.

2.4 PROJECT METHODOLOGY

FH is envisaged with Breakwaters to ensure required water spread area. The project is envisaged as coastal infrastructures towards a standalone fishing Harbor. The net fish handling capacity of the proposed Tuna Fishing Harbor is **69,000TPA**.

The water spread area under the command of the proposed Fishing Harbor is envisaged for **30.86 Ha** within the break waters and a land side reclaimed area for building infrastructures will be **15.63 Ha**.

The proposed Harbour is envisaged to have 800 m berthing facility along the shoreline. In the first assessment on the basis of requirement, it will have 300-metre-long wharf on the side of northern breakwater; a 200-metre-long wharf to accommodate fibre-reinforced plastic (FRP) boats; extension of the northern wharf by 140 metres; two Quays for MFV 730 m and FRP 110 m.

The harbour will also have fish handling halls, auction hall, cold storage, ice factory, fuelling station, power-back up centres and quarters for workers. These land side facilities will be established in the reclaimed land area.

The break waters will have 852 m on the Northern side and 1088 m on the Southern side which will ensure the designed water spread area.

The water spread areas and the proposed wharf facilities are envisaged with elaborate planning and engineering design to facilitate fishing activities and boat or vessel management for about 300 numbers of FRP boats(10m), 300 numbers of Trawlers(18m) and 200 numbers of Tuna boats(20m).

It is important to ensure -4m draft in the water spread area of the Harbor to facilitate the navigation of boats and vessels. On the basis of real time bathymetry study by (2015), it was assessed that 25,460 cum of dredging is must. The proposed landside facilities require land to be reclaimed as it is not feasible to acquire from the existing stretches of land. Hence, it is proposed to dredge 1,75, 240 cum of sand mud from off shore area to reclaim land of 15.46 Ha for establishing the land side infrastructures.

The net fish catching and handling capacity of the proposed Tuna Fishing Harbor is **69,000TPA**. The Infrastructure component of the proposed TUNA FISHING HARBOR is presented in **Fig.2.2**. This project is a long awaited fishery infrastructure by the local fishermen community and now envisaged to complement and also to enhance the fishery activities of the existing Chennai Fishing Harbor.

2.5 SITE PLANNING AND DEVELOPMENT

DoF with Project consultancy from **Vir Aqua**, a specialist consulting firm in stabling fishery Harbor, made a holistic approach for sustainability of the proposed Tuna Fishing Harbor at Thiruvottriyur Kuppam. The coastal stretch of the proposed FH was surveyed as it is a typical stretch which was fully retrieved from erosion and stabilized to get beach in the project location. Perhaps, the proposed FH is falling between three Groynes which were successfully stabilized the shoreline in the last five years. The profile of shoreline changes occurred in the project location is presented as images from Google Image in **Fig.2.3**

Fig.2.2

Fig.2.3

The project activities of the proposed construction of infrastructures towards establishing a FH is falling under CRZ area. The proposed construction of FH is falling inter tidal Zone which is critically CRZ area, classified as **Zone-I.**

The CRZ Mapping was already made through **Institute of Remote Sensing (IRS), Anna University** and presented as **Annexure-I.**

The CRZ Map that delineates the LTL and HTL. The Project location is evaluated for Zone-I (Groynes) and Zone-IV for buildings, as per **CRZ Notification, 2011.**

DoF also have initiated the studies on Environmental Impact through **Centre for Environment, Health & Safety, Annamalai University** to prepare EIA and to get **CRZ Clearance** from SCZMA.

2.6 PROJECT STAKEHOLDERS

The project stakeholders are the fishermen living in Thiruvottriyur Kuppam, Royapuram and Kasimedu settlements, as urban agglomerates of Chennai. The project is primarily for cause fishermen community of the project location as the proposed FH is a long standing demand for enhancing the Tuna fish catch, handling and exclusive marketing. The FH will ensure safe landing place for more than 800 fishing vessels/boats/trawlers.

The project is envisaged as coastal infrastructures towards a standalone fishing Harbor. The net fish handling capacity of the proposed Tuna Fishing Harbor is **69,000TPA.**

DoF has taken a comprehensive review on the proposed FH and identified specific requirements for planning and designing of the structures as more functional during their service life. DoF will ensure CRZ Clearance from State Coastal Zone Management Authority (SCZMA) to comply with the requirements under CRZ Notification, 2011.

III. ENVIRONMENTAL BASELINE MONITORING

3.1. GENERAL

The prevailing Environmental conditions as Due Diligence of the project location need evaluation with respect to all environmental attributes to assess the natural carrying capacity of the surrounding environment with respect to probable pollutants from the proposed project activities.

The proposed **Tuna Fishing Harbor** is primarily to de-congest the overcrowding of fish boats and vessels in the existing Chennai Fishing Harbor which of just 3.5Km south of the project location.

The project location is geographically located between **13^0 09' 41.37" to 13^0 10' 10.22" N Latitude** and **80^0 18' 31.34" to 80^0 18' 42.33"** E **Longitude** in the Coramendal Coast, in Thiruvottriyur Kuppam, Thiruvottriyur Taluk, Thiruvallur District and Tamilnadu.

A detailed environmental survey was initiated during **February-March-April 2016** in the project location for assessing the due diligence of Environment of the identified project site.

3.2. VALUE ENVIRONMENTAL COMPONENTS

The area of **10 km** radius of the project location is considered as ***project impact area*** for evaluating the environmental due diligence of proposed project location.

The proposed project impact area of 10 km radius is presented in **Fig.3.1.**

The satellite imagery of impact area, showing radial distance of 10 km radius is presented in **Fig.3.2.**

The prevailing environmental status in respect of all attributes viz., ***micrometeorology, air, water, soil, noise, biological and socio-economics***, have been evaluated using the objective test results on the field samples.

The baseline data collection was initiated through a well devised environmental survey on all natural, cultural, socio-economic systems and their relationships. The intention is to describe all baseline data of all **Value Environmental Components (VECs).**

Fig.3.1.

Fig.3.2.

The EBM is envisaged on the following objectives;

1. Evaluation of environmental conditions through actual data and interpretation of data on the basis of their relationships among micro meteorology, air, water, noise, soil, terrestrial and marine biological and socio economics.
2. Specific coastal Surveys like bathymetry and collection of long term data for Wave Climate studies and Wave Modeling
3. Data and assessment of littoral drift using MIKE Models.
4. Identification of polluting sources requiring prevention, mitigation and control activities.
5. Collection and regulation of input data for prediction models.
6. Summation of baseline data against which the results of any future Environmental monitoring programmes can be compared.

Systematic observation strategies with programme for sampling, analysis, data collection on all VECs were carried out during the period, during **February-March-April, 2016.**

The study was carried out for all VECs. in **10 Km** radius from the centre of the proposed fishing harbour.

3.3. MICROMETEOROLOGY

A micrometeorological station was installed in the project site for continuous monitoring of the meteorological parameters, during **February-March-April, 2016.**

3.3.1 Wind Speed and Direction

The wind speed and directions were observed at the observatory station in the proposed project site on hourly basis.

The predominant wind direction, up wind, down wind and other wind characteristics are evaluated. The predominant wind directions were **East, South east** with percentage of wind from these directions, in diurnal characteristics.

As the project area is in coastal location, short term wind data cannot be used for assessment or prediction modeling purposes. Hence, data from UKMO Stations were drawn for nine years (1999-2007) and rose diagram was drawn.

The Characteristics Wind pattern in the study area, using nine years data, Wind Rose was drawn and presented in **Fig 3.3.**

3.3.2 Temperature

The highest temperature observed was **36.5°C** and the lowest was **27.3°C.** The comprehensive temperature profile is presented in **Table 3.1.**

3.3.3 Relative Humidity

The relative humidity was observed to vary from **66** to **79 %** during the study period.

The profile on the relative humidity during **February-March-April 2016** in the project location is presented in **Table. 3.2.**

Fig 3.3

TABLE 3.1 PROFILE OF TEMPERATURE (°C)

Month	Highest	Lowest	Highest Recorded on	Lowest Recorded on
March-2016	36.5	27.3	31/03/2016	10/02/2016

TABLE 3.2 PROFILE OF RELATIVE HUMIDITY (%)

Month	Highest	Lowest	Highest Recorded on	Lowest Recorded on
February-2016	79	66	6/02/2016	25/02/2016

3.3.4 Rainfall

The rainfall was nil during the study period.

The average annual rainfall of Thiruvallur district region is 1233mm

3.3.5 Topography

The location of is a coastal plain and mostly intertidal

- **13^0 09' 41.37" to 13^0 10' 10.22" N Latitude**
- **80^0 18' 31.34" to 80^0 18' 42.33" E Longitude**

in Thiruvottriyur Kuppam, Thiruvottriyur Taluk, Thiruvallur Coramendal Coast, in the state of Tamilnadu

3.3.6 CRZ Mapping

Institute of Remote Sensing was sourced to map the project location with reference to its location for a classified Coastal Zone, as per CRZ Notification, 2011. The Mapping is concluded with the GIS based study to demarcate the project location and declared.

The CRZ Mapping which has the project superimposed with Google Imagery, it is presented in **Fig 3.4.**

3.4. AIR ENVIRONMENT

The ambient air quality is quite clean and free from any major industrial pollution.

The Environmental survey was carried as for Ambient Air Quality Monitoring (AAQM), considering **6 AAQ** stations. The AAQM stations were chosen on the basis wind directions.

The **Three AAQ station were fixed within 4km radius** and another **Three AAQ stations were fixed between 5 -10 Km.**

The locations of the AAQM stations in the project impact area are presented in **Table 3.3**.

The locations of AAQM stations considered in the study area are presented in **Fig. 3.5.**

The standard methods recommended by MoEF used for analysis of the parameters viz., PM_{10}, $PM_{2.5}$, Sulphur Dioxide (SO_2) Nitrogen Oxides (NO_X). Carbon monoxide (CO) and Ammonia (NH_3) are presented **Table 3.4.**

The latest **National Ambient Air Quality** (**NAAQ**) standards are presented in **Table 3.5** for ready reference. The comprehensive analysis values of the parameters are presented in **Table 3.6** to **Table 3.11.**

Fig 3.4

Table 3.3.

Fig. 3.5.

TABLE 3.4 AIR QUALITY ANALYSIS – METHODOLOGY

S. No.	*Parameters*	*Method*
1.	PM_{10}	▪ Gravimetric
2	$PM_{2.5}$	▪ Gravimetric
3	Sulphur dioxide (SO_2)	▪ Ultraviolet fluorescence
4.	Nitrogen Oxides (NO_x)	▪ Chemiluminscence
5.	Carbon Monoxide(CO)	▪ Non Dispersive Infra Red (NDIR)
6.	Ammonia (NH_3)	▪ Indophenol blue method

TABLE 3.5 NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Time Weighted Average	Concentration in Ambient Air	
		Industrial Area, Residential, Rural & Other Areas	Sensitive Area
Particulate Matter,PM10 µg/m³	Annual* 24 hrs.**	60 / 100	60/ 100
Particulate Matter,PM2.5 µg/m³	Annual* 24 hrs.**	40 / 60	40/ 60
Sulfur dioxide (SO_2) µg/m³	Annual* 24 hrs.**	50 / 80	20/80
Oxides of Nitrogen as (NOx) µg/m³	Annual* 24 hrs.**	40 / 80	30/80
Carbon Monoxide (CO) mg/m³	8 hours ** 1 hour *	02/04	02/04
Ammonia (NH_3) µg/m³	Annual* 24 hrs.**	100/400	100/400

* Annual Arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform interval.

** 24 hourly or 08 hourly or 01 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time they may exceed the limits but not on two consecutive days of monitoring.

TABLE 3.6 AMBIENT AIR QUALITIES OF VARIOUS AAQ STATIONS
(PM_{10}, $\mu g/m^3$)

TABLE 3.7 AMBIENT AIR QUALITIES OF VARIOUS AAQ STATIONS
($PM_{2.5}$, $\mu g/m^3$)

TABLE 3.8 AMBIENT AIR QUALITIES OF VARIOUS AAQ STATIONS

(SO_2, $\mu g/m^3$)

TABLE 3.9 AMBIENT AIR QUALITIES OF VARIOUS AAQ STATIONS
(NO_X, $\mu g/m^3$)

TABLE 3.10 AMBIENT AIR QUALITIES OF VARIOUS AAQ STATIONS
(CO, mg/m^3)

TABLE 3.11 AMBIENT AIR QUALITIES OF VARIOUS AAQ STATIONS
(NH_3, $\mu g/m^3$)

Very near to project location **PM_{10} 76.20 µg/m³** (maximum), **72.10 µg/m³** (Average) **74.25 µg/m³** (98 percentile) and **$PM_{2.5}$** was observed at **33.90 µg/m³** (maximum), **32.58 µg/m³** (Average) **32.95 µg/m³** (98 percentile) and **SO_2** was observed for **20.75 µg/m³** (maximum) **19.08 µg/m³** (average) and **20.22 µg/m³** (98 percentile). **NOx** was observed for at **24.10 µg/m³** (maximum) **21.93 µg/m³** (average) and **23.70 µg/m³** (98 percentile). CO & NH_3 were observed nil in all stations and were observed as Below Detectable Limit.

This represents a pollution free characteristic and favors the establishment of proposed project.

3.5. WATER ENVIRONMENT

The water environment in the impact area is few fresh water surface sources are available.

The location of water resources in presented in **Fig.3.6.**

In order to characterize the water sources in the impact area, 5 samples of water from various locations (3 samples from surface sources and 2 samples from subsurface Bore well sources) in the impact area were considered, as presented in **Table 3.12.**

The locations of water sampling points that are considered in this study area are presented in Fig.3.7.

The list of Parameters and Standard Method for sample analysis were listed in **Table 3.13.**

3.5.1 Surface Water Sources

There are 3 surface water sources considered in the project impact area. The water samples were drawn from these sources for Characterization studies.

The values of the sample analysis are presented in **Table 3.14.**

Fig.3.6.

TABLE 3.12 LOCATION OF WATER SAMPLING STATIONS

Sl.No	Water Sampling Stations	Locations	Type of Source
1	W1	Ennore creek	Surface
2	W2	Kanniyamman pettai lake	Surface
3	W3	Santhan kadu lake	Surface
4	W4	Kadapakkam- Borewell	Sub surface
5	W5	Thiruvottriyur -Borewell	Sub surface

Fig.3.7.

TABLE 3.13 PARAMETERS AND METHODOLOGIES ADOPTED IN ASSESSING WATER QUALITY

Quality	Parameter	Method
Physico-chemical	Temperature °C	Thermometer
	pH	pH meter
	Turbidity (NTU)	Nephelometric method
	Total Dissolved Solids, mg/l	Evaporation method
	Total Suspended Solids, mg/l	Filtration & Evaporation method
	Total Hardness as Ca Co_3	EDTA Titrometric method
	Conductivity uS/cm	Conductivity meter
	Sulphates as SO_4, mg/l	Turbidometric method
	Chloride as Cl, mg/l	Argentometric method
	Sodium as Na, mg/l	Flame Photometric method
	Calcium as Ca, mg/l	EDTA Titrometric method
	Magnesium as Mg, mg/l	Calculation method
	Pottasium as K, mg/l	Flame Photometric method
	Nitrates as NO_3^-, mg/l	U.V Spectrophotometer method
	Ammonical Nitrogen, mg/l	Titrometric method
Biological	Dissolved Oxygen, mg/l	Azide modification
	BOD_5, mg/l	Dilution & DO by Winkler's method
	COD, mg/l	Open reflux method

TABLE 3.14 SURFACE WATER QUALITIES IN THE IMPACT AREA

Quality	Parameter	W1	W2	W3
Physico-chemical	Temperature °C	22.1	27.9	23
	PH	7.3	7.5	6.9
	Turbidity (NTU)	12	17	22
	Total Dissolved Solids, mg/l	14410	1827	952
	Total Suspended Solids, mg/l	425	150	130
	Total Hardness as Ca Co_3	430	350	650
	Sulphates as SO_4, mg/l	70	35	60
	Chloride as Cl, mg/l	9190	320	440
	Sodium as Na, mg/l	9400	80	95
	Calcium as Ca, mg/l	950	120	470
	Magnesium as Mg, mg/l	70	40	50
	Pottasium as K, mg/l	20	10	12
	Fluoride as F, mg/l	0.10	0.10	0.09
	Dissolved Phosphate as PO_4, mg/l	BDL	BDL	BDL
	Nitrates as NO_3, mg/l	12.90	20.50	15.50
	Aluminium as Ai, mg/l	BDL	<0.01	<0.01
	Manganese as Mn, mg/l	BDL	BDL	BDL
	Iron as Fe, mg/l	0.30	BDL	BDL
	Ammonical Nitrogen, mg/l	0.40	0.45	0.15
Biological	Dissolved Oxygen, mg/l	3.9	4.0	4.2
	BOD_5, mg/l	90	35	35
	COD, mg/l	160	75	70

Physico-chemical characteristics

Water samples from Thiruvottriyur Coastal water are poor in characteristics. Except pH and all other important parameters like solids, chlorides and sodium are found excess and not suitable for any kind of application, directly.

Biological characteristics

All these water samples show relatively good biological characteristics with low BOD or COD values.

3.5.2 Subsurface Sources

Subsurface Sources

The samples were drawn from the cited sampling stations in the impact area and are analyzed for important quality parameters to assess its Physico-chemical and biological qualities.

Physico-chemical characteristics

In all sampling locations, the water is relatively potable. The objectionable parts of characteristics are chloride, carbonate hardness, total hardness, but very marginally.

The local people practice no treatment for these water sources for domestic applications in the impact area.

Biological characteristics

The biological quality of the water is analysed for BOD_5, COD and DO. In all underground sources, the biological quality of water is safe.

The characteristics of the analysed samples of subsurface water sources are presented in **Table 3.15.**

3.6. NOISE ENVIRONMENT

Ten Noise observatory stations are fixed for noise sampling in the study area. The locations of noise observatory stations are presented in **Fig.3.8.**

The locations of noise observatory stations are presented in **Table 3.16.**

One station was taken very near to the project site and another 4 stations were taken in the location of road intersection points, railway station and ports.

TABLE 3.15 SUBSURFACE WATER QUALITIES IN THE IMPACT AREA

Quality	Parameter	W4	W5
Physico-Chemical	Temperature °C	19.2	20.4
	pH	6.90	7.20
	Turbidity (NTU)	2	3
	Total Dissolved Solids, mg/l	745	615
	Total Suspended Solids, mg/l	5	2
	Total Hardness as Ca Co_3	240	120
	Conductivity uS/cm	750	685
	Sulphates as SO_4, mg/l	12	15
	Chloride as Cl, mg/l	360	250
	Fluoride as F, mg/l	BDL	BDL
	Dissolved Phosphate as PO_4, mg/l	0.02	0.01
	Iron as Fe, mg/l	0.10	0.10
	Manganese as Mn, mg/l	BDL	<0.01
	Pottasium as K, mg/l	25	BDL
	Sodium as Na, mg/l	130	90
	Calcium as Ca, mg/l	180	130
	Nitrates as NO_3, mg/l	1.10	0.90
	Aluminium as Al, mg/l	BDL	BDL
	Magnesium as Mg, mg/l	20	15
	Ammonical Nitrogen, mg/l	0.5	0.4
Biological	Dissolved Oxygen, mg/l	4.2	3.7
	BOD_5, mg/l	2.50	3.90
	COD, mg/l	65	45

Fig.3.8.

TABLE 3.16 LOCATIONS OF NOISE OBSERVATORY STATIONS

Sl.No.	Noise Observatory Stations	Location
1	N1	Near Project location
2	N2	Near Chennai port trust
3	N3	Thiruvottriyur Railway Station
4	N4	Manali SH_{104} Junction
5	N5	Ennore Port (Outside)

Noise level monitoring at each observatory station was carried out three times, uniformly distributed, during the study period of one month. Noise levels were studied separately during daytime and nighttime in all ten stations. The observed noise level in the observatory stations are presented in **Table 3.17**.

3.7. SOIL ENVIRONMENT

The predominant soil found in the project location is sand and Clayey.

Thiruvottriyur taluk region is, in general, covered by sand and brown clayey soil.

The Geomorphology map is presented in **Fig.3.9**.

The locations of soil sampling stations are presented in **Table 3.18**. The characteristics of soil in the impact area are presented in **Table 3.19.** The locations of soil sampling stations are presented in **Fig.3.10**.

3.7.1 Land Use Pattern

The land use pattern of Thiruvallur District is presented in **Fig.3.11.**

The satellite imaging showing the land use pattern of the project impact area is presented in **Fig.3.12.**

The contour map of projection is presented in **Fig.3.13**.

The land environment of impact area of project site is predominantly agriculture activities.

The project location is largely barren and unused. There are no significant agricultural activities in the project lands.

3.8. BIOLOGICAL ENVIRONMENT

The study for biological environment was carried out independently and specially for **terrestrial** and **marine**.

3.8.1 Terrestrial Environment

The distribution of living organisms (terrestrial flora and fauna) in the study area represents largely the coastal Biological Environment.

TABLE 3.17 AMBIENT NOISE LEVEL IN THE OBSERVATORY STATIONS

Stations	*Day Time*			*Night Time*			*dB(A) Standard*	
	Max. dB(A)	*Min. dB(A)*	*Avg. dB(A)*	*Max. dB(A)*	*Min. dB(A)*	*Avg. dB(A)*	*Day time*	*Night time*
N1	39.50	32.10	34.00	33.25	25.60	28.50	55	45
N2	36.70	30.10	33.50	32.50	27.20	27.60	55	45
N3	35.50	33.90	34.50	30.50	25.60	28.60	55	45
N4	34.10	34.60	33.50	29.60	22.70	25.90	55	45
N5	33.90	30.80	32.50	29.15	21.60	23.10	55	45

Fig.3.9.

TABLE 3.18 LOCATIONS OF SOIL SAMPLING STATIONS

Sl.No.	Soil Sampling Stations	Location
1	S1	Project Location (Thiruvottriyur Kuppam)
2	S2	Kathivakkam
3	S3	Sadayankuppam
4	S4	Manali
5	S5	New Washermanpet

TABLE 3.19 SOIL CHARACTERISTICS IN THE SOIL OBSERVATORYSTATIONS

Fig.3.10

Fig.3.11.

Fig.3.12.

Vegetation is the sum of the various plants growing in an area. The vegetation analysis and cover studies were carried out as a part of Ecological Studies. The study area was divided into two divisions i.e., area located around 1km radius and 5 km radius in order to make a convenient study of vegetation .The study area, as divided for the conductance of Biological Survey is presented in **Table 3.20**.

A detailed survey of the study area was carried out in order to record / document the flora and fauna present on that site. Botanical survey was carried out during February and March, 2016.

Study of Vegetation

Plants growing together have the mutual relationships among themselves and with the environment. Such a group of plants in one area form a stand. Several similar stands represent a community. Community is a part of an ecological system in which transformation, accumulation and flow of energy are involved.

The structure of a plant community can be studied by taking into consideration a number of characters which are usually grouped into analytical and synthetic characters. The analytical character of a community are determined by means of area , line and point as employed in quadrate , transect and point method respectively.

Quadrate is the name given to the sampling unit, an area of a definite size. It is usually employed for the studying grassland vegetation.

A transect is a sampling strip extending across a stand or several stands depending upon objectives, one may employ line transect or Belt transect.

In the present survey, Belt transects of 10 m length and 10 m breadth was employed in order to record the name of the species and their numerical strength in a particular area. From this data frequency, density and basal area can be calculated.

Abundance, frequency and density are the synthetic characters. Abundance is the number of individuals per quadrate of occurrence. Frequency expresses the distribution of various species in a community. Density is the number of individuals per quadrate. Relative frequency (RF) is the percentage of frequency of number of sampling units in which the species occur out

TABLE 3.20 LIST OF TREES, SHURBS AND HERBS IN STUDY AREA

1.	*Ahcyranthes aspera*	CT	Amaranthaceae	Herb
2.	*Abutilon indicum*	NV	Malvaceae	Shrub
3.	*Aegle marmelos*	NV	Rutaceae	Tree
4.	*Azadirachta indica*	NV	Meliaceae	Tree
5.	*Arachis hypogaea*	AC	Fabaceae	Herb
6.	*Acalypha indica*	NV	Euphorbiaceae	Herb
7.	*Agave angustifolia*	NV	Agavaceae	Herb
8.	*Aloe vera*	NV	Liliaceae	Herb
9.	*Albizia lebbeck*	NV	Mimosaceae	Tree
10.	*Annona squamasa*	NV	Annonaceae	Tree
11.	*Acacia melanoxylon*	NV	Mimosaceae	Tree
12.	*Bougainvillea spectabilis*	NV	Nyctaginaceae	Herb
13.	*Benkara malabarica*	NV	Rubiaceae	Shrub
14.	*Bambusa arundinacea*	NV	Poaceae	Shrub
15.	*Cyperus rotundus*	NV	Cyperaceae	Herb
16.	*Cocos nucifera*	CT	Arecaceae	Tree
17.	*Cynodon dactylon*	NV	Cyperaceae	Herb
18.	*Ceiba pentandra*	NV	Bombacaceae	Tree
19.	*Carissa carandas*	NV	Apocynaceae	Shrub
20.	*Citrulus vulgaris*	AC	Cucurbitaceae	Herb
21.	*Coccinia indica*	NV	Cucurbitaceae	Climber
22.	*Canna indica*	OP	Cannaceae	Herb
23.	*Catunaregam spinosa*	NV	Rubiaceae	Shrub
24.	*Casuarina equisetifolia*	CT	Casuarinaceae	Tree
25.	*Citrus medica*	CF	Rutaceae	Shrub
26.	*Cleome viscosa*	NV	Capparidaceae	Herb

27.	*Capsicum frutescens*	CF	Solanaceae	Herb
28.	*Commelina benghalensis*	NV	Commelinaceae	Herb
29.	*Carica papaya*	CT	Caricaceae	Tree
30.	*Dolichos lablab*	VC	Fabaceae	Herb
31.	*Delonix regia*	OP	Caesalpinaceae	Tree
32.	*Datura metal*	NV	Solanaceae	Shrub
33.	*Euphorbia hirta*	NV	Euphorbiaceae	Herb
34.	*Eucalyptus globules*	CT	Myrtaceae	Tree
35.	*Eichhornia crassipes*	NV	Pontederiaceae	Herb
36.	*Evolvulus alsinoides*	NV	Convolvulaceae	Herb
37.	*Erythrina indica*	NV	Fabaceae	Tree
38.	*Ficus religiosa*	CT	Moraceae	Tree
39.	*Helianthus annus*	FC	Asteraceae	Herb
40.	*Hibiscus rosa-sinensis*	OP	Malvaceae	Shrub
41.	*Hiniscus cannabinus*	VC	Malvaceae	Shrub
42.	*Ixora coccinea*	OP	Rubiaceae	Shrub
43.	*Justicia simplex*	NV	Acanthaceae	Herb
44.	*Leucas aspera*	NV	Lamiaceae	Herb
45.	*Lippia nodiflora*	NV	Verbenaceae	Herb
46.	*Lemna paucicostata*	AP	Lemnaceae	Herb
47.	*Lantana camara*	NV	Verbenaceae	Shrub
48.	*Lycopersicon lycopersicum*	VC	Solanaceae	Herb
49.	*Lannea coromandelica*	NV	Anacardiaceae	Tree
50.	*Muraya koengii*	CT	Rutaceae	Tree
51.	*Mimosa pudica*	NV	Mimosaceae	Herb
52.	*Musa pardisica*	CT	Musaceae	Tree
53.	*Mollugo pentaphylla*	NV	Aizoaceae	Herb
54.	*Morida tinctoria*	NV	Rubiaceae	Tree

55.	*Ocimum sanctum*	CH	Lamiaceae	Shrub
56.	*Oryza sativa*	AC	Poaceae	Herb
57.	*Oldenlandia umbellate*	NV	Rubiaceae	Herb
58.	*Physalis minima*	NV	Solanaceae	Herb
59.	*Phyllanthus niruri*	NV	Euphorbiaceae	Herb
60.	*Pithecellobium dulce*	NV	Mimosaceae	Tree
61.	*Psidium guajava*	FY	Myrtaceae	Tree
62.	*Phonix loureirii*	NV	Arecaceae	Shrub
63.	*Passiflora edulis*	NV	Passifloraceae	Climber
64.	*Phyllanthus acidus*	NV	Euphorbiaceae	Tree
65.	*Pongamia pinnata*	NV	Fabaceae	Tree
66.	*Raphanus sativus*	VC	Brassicaceae	Herb
67.	*Ricinus communis*	AC	Euphorbiaceae	Shrub
68.	*Solanum melangena*	AC	Solanaceae	Herb
69.	*Sida cordifolia*	NV	Malvaceae	Herb
70.	*Vigna sinensis*	AC	Fabaceae	Herb
71.	*Vigna mungo*	AC	Fabaceae	Herb
72.	*Vitex negundo*	NV	Verbenaceae	Shrub

NV- Natural vegetation **AC – Agricultural crops** **OP – Ornamental Plant**

CT- Cultivated Tree **CF- Cultivated Fruit** **VC- Vegetable Crop**

FP – Flowering plant **AP – Aquatic Plant.**

of the total number of sampling unit studied. These RF values were calculated and compared to Raunkiaers law of frequency. The law states that the class A is greater than B. B is greater than C.C is greater than or less than or equal to D and D is less than E .(A>B>C=D<E) This law can be explained in the form of histogram which is called Raunkiaers normal frequency

diagram. This would be very helpful in providing the information as the heterogeneity and homogeneity of plants.

Relative density is the percentage of number of individuals of species out of total number of individuals of all species. Basal area refers to the ground actually penetrated by the stems. This is measured at 2.5 cm above the ground or at ground level.

Importance Value Index (IVI)

The vegetation data were analyzed for Relative frequency (RF), Relative Density (RD) and Relative dominance (RDO). The computation of RF, RD and RDO values will give the IVI of various species in the study area. This value expresses the dominance and ecological success of any species with a single value. These values can be compared with the values of other sites differing in the intensity of biotic disturbance.

Methodology for Studying Vegetation

The study area was divided into two sectors ie. 1km radius and 5km radius in order to make a convenient study of vegetation. The various sampling sites were allotted with a code numbers. The code numbers are in order of A1 to A3; B1to B3; C1to C3 and D1to D3 for 5 KM radius and A4 to A6; B4 to B6; C4 to C6 and D4 to D6. Thus, the vegetation analysis was carried out.

Ten quadrates of 10m x 10m were constructed for the study of vegetation. The name of the species, number of individuals each species and Diameter of species at ground level was measured suitably. From this data, the frequency, density and basal area were calculated from randomly placed quadrates. Importance Value Index (IVI) can be obtained by adding Relative frequency, Relative density and Relative dominance.

Identification of Flora

A extensive floristic survey was made in the study area to document/record the vegetation present on that site.

The family Euphorbiaceae with 9 genera stands the first position. Fabaceae (7) and Rubiaceae (7) occupy the second position followed by Malvaceae (6) caselpinoideae (6) and solanaceae (6). The other families represented the number of genera from 4 to 1.

Taxonomically, a total of **72** plants species belonging to **47** families were identified. These plants were classified according to the classification of Bentham and Hooker. The names of the plant species were listed with their name of the sampling sites where they are present.

They were also categorized into trees, shrubs and Herbs as the basis of their natural habit. Among these, **Sixteen** were trees, **Fifteen** shrubs and **Thirty Four** herbs and **Two** climbers.

Apart from the above classification, the plants were also classified into Natural Vegetation (NV), Agricultural Crops (AC), Aquatic Plants (AP), Ornamental Plants (OP), Vegetable Crops (VC) and Cultivated Trees (CT), Tree Plantation (TP) according to their Nature, method and purpose of their cultivation.

The list of Fauna as listed during the survey in the study area are presented in **Table 3.21**

3.8.2. Marine Environment

The Marine environment for its biological attributes was surveyed in the project location.

It is very clear to note that the biological environment of the project location there is no rare or endanged species.

The species observed as Benthic Ecology is presented in **Table 3.22**

The Coastal Phytoplankton and Zoo plankton observed in the study area is listed in **Table 3.23**

The Coastal stretch of the proposed project area, during the study period for marine studies, was found not to have any nesting or reading sites of any marine turtle population. However, the publications of **WWF** on **Marine turtles along the Indian coast: Distribution, status, Threats and management implications,** was considered as important input for marine studies of the study area. Ironically, the WWF report has no result or information in the location of the proposed project.

In the primary survey on the coast, the survey time could not notice any nesting place for turtles in the Impact area. However, the inquiry on secondary data does not ruled out migratory turtles in the project impact area.

TABLE 3.21 FAUNA IN THE IMPACT AREA

Fresh Water Aquatic Fauna	Terrestrial Fauna	Avian Fauna
1. Protozoans 2. Coelenterata a. Hydra 3. Rotifers a. Keratella b. Diurella 4. Cladocerans a. Daphnia b. Moina c. Sida 5. Copepodes a. Calanus b. Cyclops c. Onycho camptus 6. Larvae of chironomous 7. Mosquito larva 8. Dargon fly larva 9. Water spider 10. Water scorpion (Nepa) 11. Molluscs a. Pila globosa b. Lamellidens marginalis 12. Small fishes a. Sunfish b. Copminnous c. Pike d. Channa variety i. Clarius magru ii. Channa punctatus e. Tilapia mossambicus f. Anabas testitudineus 13. Rana hexadctyla 14. Bufo 15. Tadpole larva 16. Water snake 17. Tortoise	1. Lamito mauritii (Earthworm) 2. Centipede 3. Millipede 4. Termites 5. Scorpion 6. Spider 7. Dragon fly 8. Butterflies such as a. Campylotes desgodinsill b. Eudonia mercurella c. Papilio paris d. Chetan histrio 9. Wasp 10. Grass hopper 11. Cokroach 12. Apis indica 13. Ants a. Red fire ants b. Garden ants 14. Musca domestica (housefly) 15. Culex pipens 16. Mabuya carinata 17. Calotes versicolor 18. Varanus 19. Cobra 20. Rat 21. Rabbit 22. Wild pig	1. Phalarcrocorax niger – Neer Kagam 2. Phalarcrocorax sinensis – Large cormorant 3. Anhingar.melanogaster-Snake bird 4. Egretta modesta-periya vellai kokku 5. Little egretta-Chinna vellai kokku 6. Dupetor flavicollis-Karuppunarai 7. Cygnus C. Jankowskii-Whistling swan 8. Glaucidium r.malabaricum-Jungle owlet 9. Hypothymis azurea-Madras black haped fly catcher 10. Disrurus macrocercus macrocercus-Black drango 11. Prina socialis socialis –Ashy wren warbler 12. Acridotheresristis tristics-common myna 13. Pita brachyra-Indian pitta 14. Hierococcyx varius-Common howk cuckoo 15. Hacyon smyrensis fusca-White breasted king fisher 16. Common bubular 17. Corvus splendens splendens-Common Indian house crow 18. Indian spotted dove 19. Golden backed wood pecker 20. Sun bird (swift)

TABLE 3.22 BENTHIC ECOLOGY

S.No	Polychaetes	Crustaceans and Molluscans
1.	Ancistrosyllis constricta	Clibanarius longitarsus
2.	Ceratonereis costae	Clibanarius olivaceus
3.	Cossura delta	Calappa lophus
4.	Glycera alba	Matula lunaris
5.	Heteromastus simillis	Portunus triberculatus
6.	Lumbriconereis polydemsa	Cerithidea cingulata
7.	Nephtys polybranchita	Katelysia opima
8.	Polydora ciliate	Meretrix casta
9.	Prionospio malmgreni	Umbonium vestriarium
10.	Preudopolydora kembi	Anadara sp.
11.	Tylonereis fauveli	
12.	L.simplex	
13.	Diopalra neopolitana	

TABLE 3.23 ECOLOGY OF PLANKTON

S.No	Phytoplankton	Zooplankton
1.	Cosinodiscus centralis	Acrocalanus gibber
2.	Consinodiscus radiates	Acrocalanus gracillus
3.	Chaeticeros affinis	Acrtia danae
4.	Chaetoceros coaretatus	Acartia spinicauda
5.	Odentella sinensis	Centrophages furcatus
6.	Odentella mobiliensis	Eucalanus elongates
7.	Pleurosigma angulatum	Labidocera acuta
8.	Pleurosigma elongulatum	Parocalanus parvus
9.	Rhizosolenia lata	Corycaeus catus
10.	Rhizosolenia styliforms	Oithona rigida
11.	Stephanophysis palmariana	Oithona brevicornis
12.	Leptocylindrus danicus	Euterpina acutifrons
13.	Ditylum brightwell	Macrosetella gracillis
14.	Bacteriastrum comosum	Microstella norviginea
15.	Triceratium favus	
16.	Triceratium reticulatum	
17.	Planktoniella sol	
18.	Protoperidinium oceanicum	
19.	Dinophysis caudate	
20.	Ceratium furea	
21.	Ceratium tripos	
22.	Cyclofella spp	
23.	Oscillatoria spp	

In the absence of time required to undertake a long term study in this aspect, recent studies of International Initiatives were reviewed. The decadal trend of Nesting of Turtles in the Project Location is provided in the **Table 3.24** (drawn from WWF Report).

The short-term survey of one month (February – April 2016) cab not be taken as representative in such marine life investigations. Although no nesting of Turtles were found during the study period, one cannot forgo the turtle population in the coastal habitation.

There is no endangered or rare species as per IUCN Classification.

If the proposed fishing harbour supported with Shore Protection Structures (primarily Groyne Field) is important to optimally use the fishery resources in the project location and also protect the coastal population from the threat of erosion.

If fishing harbour is allowed for execution. The project location will regain the lost beach stretches and enable to sustain the sandy beach stretches and so will offer a condusive habitation for Turtle Nesting. Hence, the proposed Structures are found necessary and environmentally sustainable.

3.9. SOCIO-ECONOMICS – HUMAN ENVIRONMENT

Thiruvallur District is located the north east part of Tamil Nadu. The district spreads over an area of **4432 Sq.km,** with the population of **39,98,252** (2011 census).

The project location is about 50 km from the district head quarters, Thiruvallur.

The coastal length of the district is 27.9 km in Thiruvottriyur Kuppam (Project Location) Sholavaram and Puzal CD blocks.

There are about 77 fishing villages with about 15181 active fisherman families.

The Population is largely fisherman in the coastline of the district. The fisherman population is 90,000, the second highest district in the state. There are 77 listed fishing villages and the fish production in 9729 T per day.

The coastal community of the district is very significant with it's over all activities. The fishing crafts in Thiruvallur are highest in the stats at 10,924 numbers (2005).

TABLE 3.24 DECADAL TREND OF NESTING ALONG THE TAMIL NADU COAST (2000-2012)
(SOURCE : WWF REPORT)

Daily Survey Period	Chennai-Marina & Besant Nagar – Neelankarai (14 km)
December	NS
January	25
February	58
March	38
Total	121

NS : No Survey Carried out

Ж The Project Location lies here

The total population in the study area is **41,41,871**. They are living in **14** villages and Chennai Metro Corporation. The number of Male is **21,41,758**. The number Female is **20,00,113**. (Source as per census 1991)

The demographic details are presented in **Table 3.25.**

The community statuses of the population in the impact area are presented in **Table 3.26**.

The literacy status of the study area is presented in **Table 3.27**.

The house hold population status is presented in **Table 3.28**.

TABLE 3.25 DEMOGRAPHIC OF THE STUDY AREA

S. No.	*Name of Villages*	*Area in Heaters/Sq.km (for village/Town)*	*Total Population*		
			Male	*Female*	*Total*
0– 10 km Radius					
1.	Vichoor	894.96	2158	2190	4348
2.	Edayanchavadi	842.05	4825	4652	9477
3.	Kadapakkam	311.37	1542	1518	3060
4.	Kosappur	238.83	359	378	737
5.	Sadayankuppam	6.95	1800	1749	3549
6.	Manali	9.00	10273	8820	19093
7.	Ennore	674.78	280	279	559
8.	Kathivakkam	4.76	14106	13063	27169
9.	Thiruvottriyur	21.42	87518	81124	168642
10.	Thiruvottriyur	17.40	25140	24116	49256
11.	Chinnasekkadu	3.00	4389	4032	8421
12.	Mattur	4.12	2459	2433	4892
13.	Sirugavur	128.59	475	471	946
14.	Chettimedu	58.22	156	170	326
15.	Chennai (M. Corporation)	174.00	1986278	1855118	3841396
	Total	**3389.45**	**2141758**	**2000113**	**4141871**

TABLE 3.26 COMMUNITY STATUS OF THE POPULATION IN THE STUDY AREA

S. No.	*Name of Villages*	*Scheduled Castes*		*Scheduled Tribes*	
		Male	*Female*	*Male*	*Female*
0– 10 km Radius					
1.	Vichoor	1308	1340	28	32
2.	Edayanchavadi	647	607	3	2
3.	Kadapakkam	468	462	-	-
4.	Kosappur	231	251	-	-
5.	Sadayankuppam	373	347	-	-
6.	Manali	2248	2053	4	7
7.	Ennore	65	59	-	-
8.	Kathivakkam	1721	1616	57	63
9.	Thiruvottriyur	9916	9529	370	384
10.	Thiruvottriyur	4515	4740	55	56
11.	Chinnasekkadu	1046	1015	11	7
12.	Mattur	626	626	35	28
13.	Sirugavur	284	296	-	-
14.	Chettimedu	119	127	-	-
15.	Chennai (M. Corporation)	271549	258163	4087	3843
	Total	**295116**	**281231**	**4650**	**4422**

TABLE 3.27 LITERACY IN THE STUDY AREA

S. No.	*Name of Villages*	*Literature*	
		Male	*Female*
0– 10 km Radius			
1.	Vichoor	994	605
2.	Edayanchavadi	3522	2812
3.	Kadapakkam	1136	706
4.	Kosappur	244	168
5.	Sadayankuppam	1335	959
6.	Manali	7926	5274
7.	Ennore	215	136
8.	Kathivakkam	10228	7044
9.	Thiruvottriyur	66442	50578
10.	Thiruvottriyur	19046	14431
11.	Chinnasekkadu	3333	2296
12.	Mattur	1629	1136
13.	Sirugavur	317	215
14.	Chettimedu	101	66
15.	Chennai (M. Corporation)	1535351	1216990
	Total	**1651819**	**1303416**

TABLE 3.28 HOUSE HOLD OF POPULATION

S. No.	*Name of Villages*	*No. of Occupied Residential houses*	*No. of House Holed*
0– 10 km Radius			
1.	Vichoor	977	977
2.	Edayanchavadi	2072	2076
3.	Kadapakkam	643	643
4.	Kosappur	154	154
5.	Sadayankuppam	795	795
6.	Manali	4524	4524
7.	Ennore	144	144
8.	Kathivakkam	5932	5938
9.	Thiruvottriyur	35360	36859
10.	Thiruvottriyur	10245	10386
11.	Chinnasekkadu	1985	1985
12.	Mattur	1060	1060
13.	Sirugavur	204	204
14.	Chettimedu	75	75
15.	Chennai (M. Corporation)	794322	798279
	Total	**858492**	**864099**

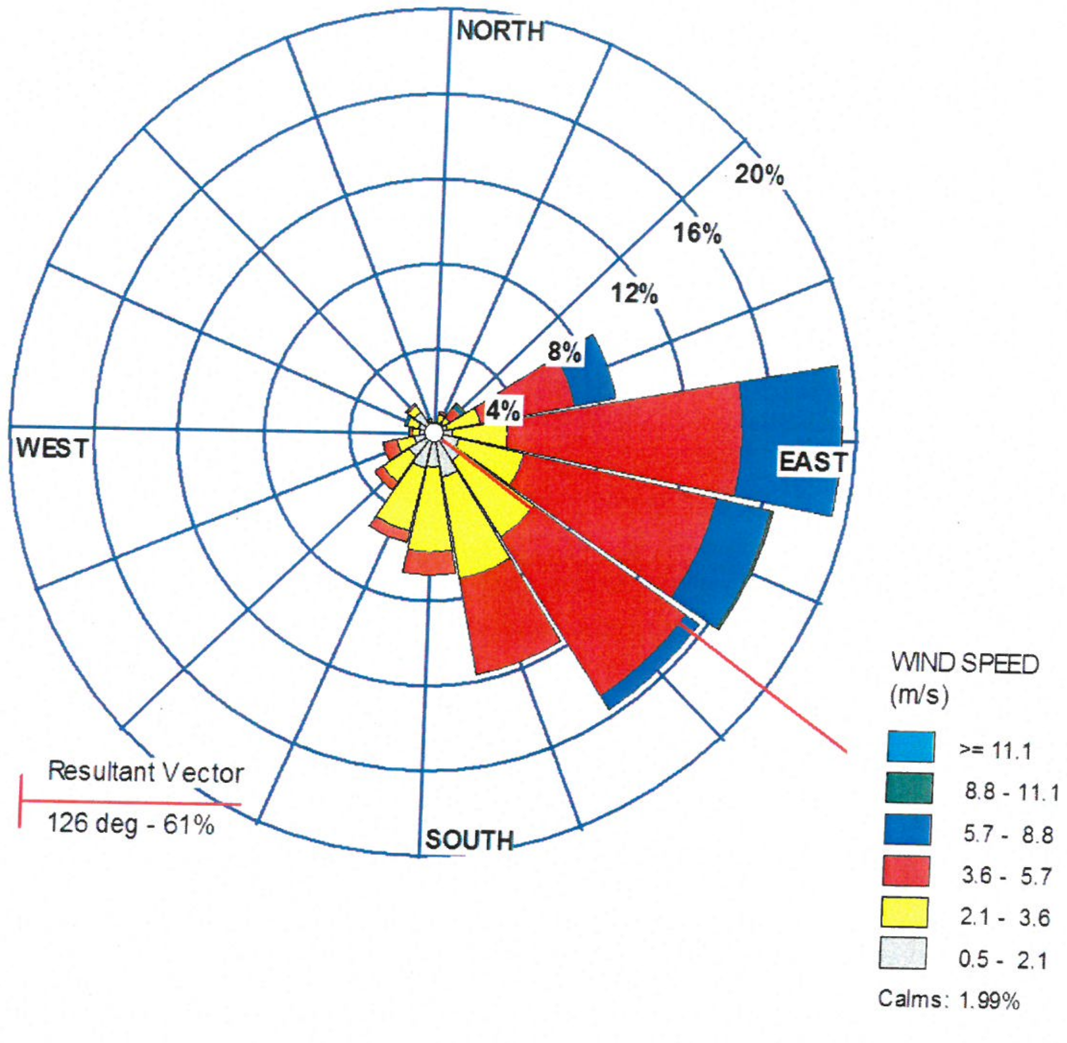


FIG.3.3. WIND ROSE DIAGRAM

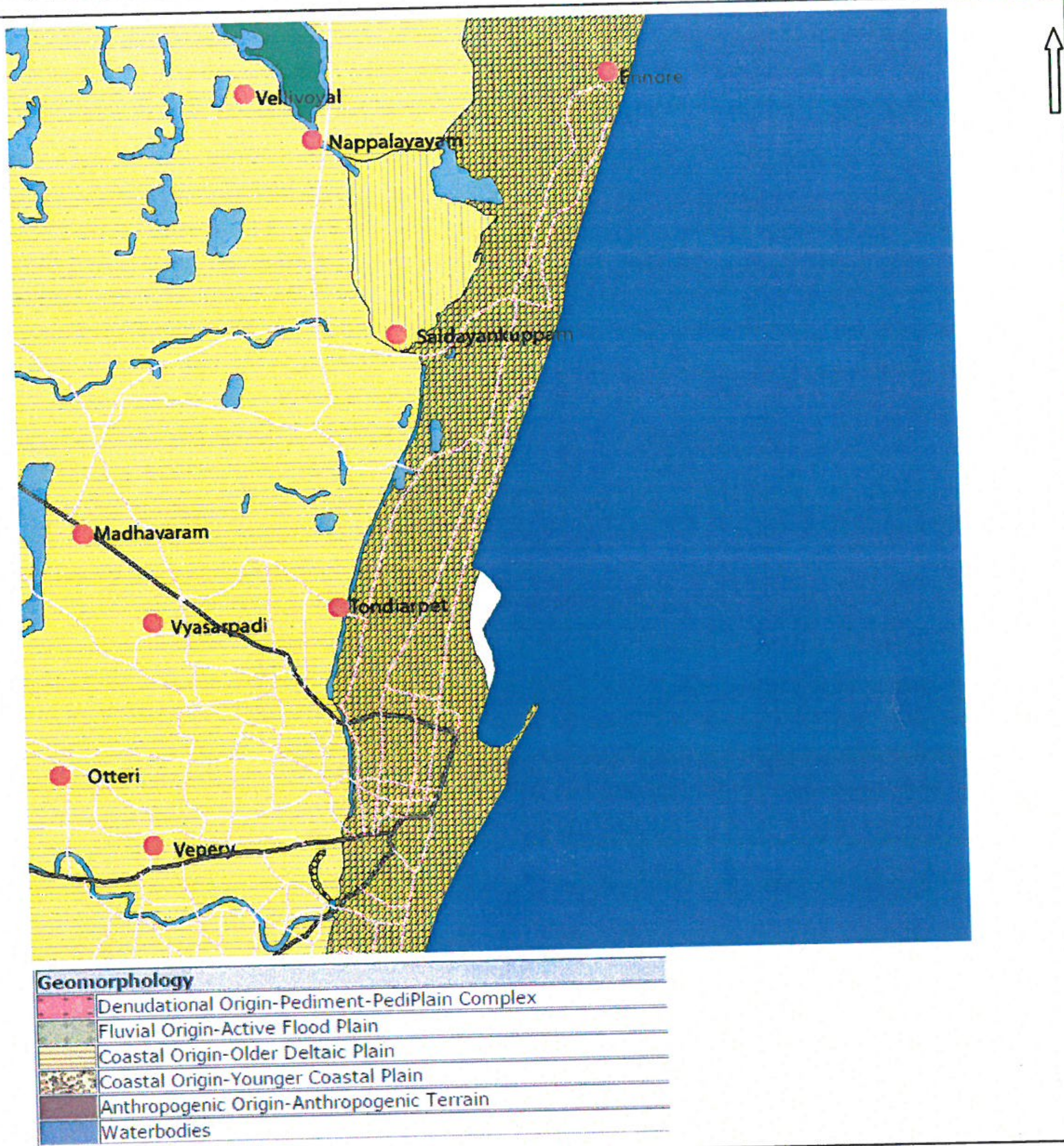


FIG.3.9. GEOMORPHOLOGY MAP

TITLE	**GEOMORPHOLOGY MAP**
STUDY	**Hydro Geological Studies**
PROJECT	**TUNA Fishing Harbour, Thiruvottriyur Kuppam**
CLIENT	**Department of Fisheries, Government of Tamilnadu**
TIME	**February-April, 2016**
APPROVAL	
	Centre for Environment, Health & Safety ANNAMALAI UNIVERSITY

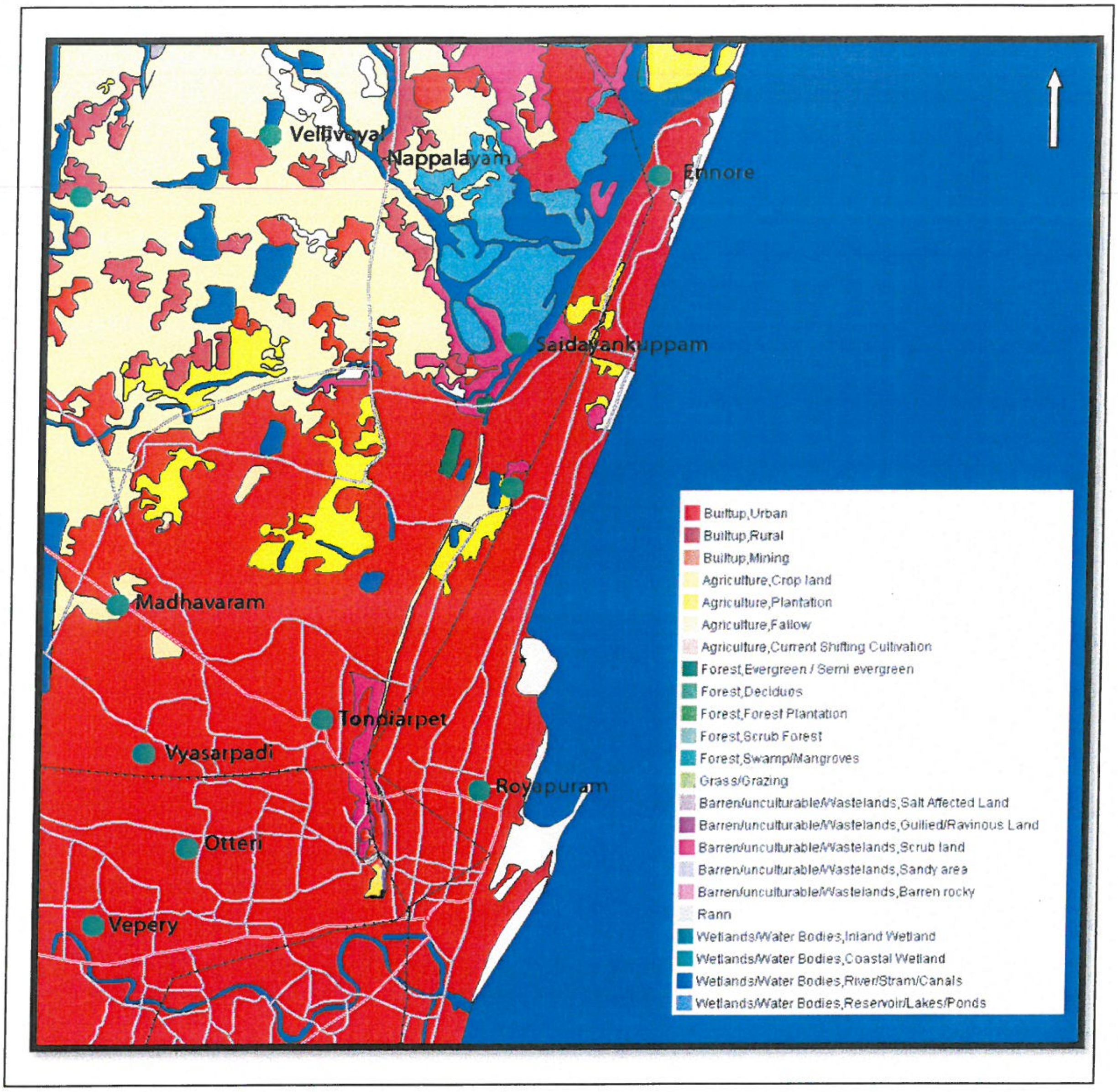


FIG.3.11. LAND USE/LAND COVER

TITLE	LAND USE/LAND COVER
STUDY	Hydro Geological Studies
PROJECT	TUNA Fishing Harbour, Thiruvottriyur Kuppam
CLIENT	Department of Fisheries, Government of Tamilnadu
TIME	February-April, 2016
APPROVAL	
	Centre for Environment, Health & Safety ANNAMALAI UNIVERSITY

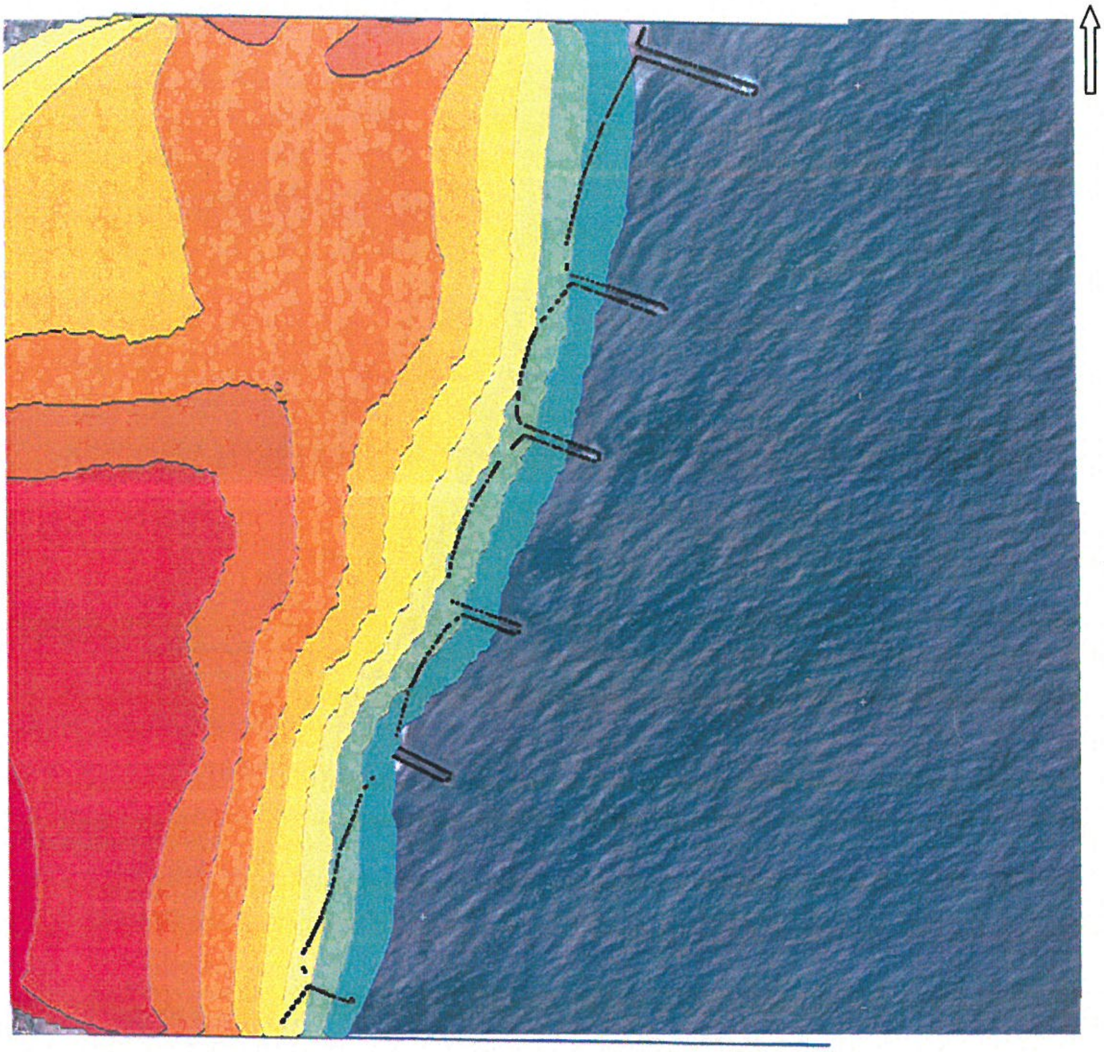


FIG.3.13. CONTOUR MAP

TITLE	CONTOUR MAP
STUDY	Hydro Geological Studies
PROJECT	TUNA Fishing Harbour, Thiruvottriyur Kuppam
CLIENT	Department of Fisheries, Government of Tamilnadu
TIME	February-April, 2016
APPROVAL	
	Centre for Environment, Health & Safety ANNAMALAI UNIVERSITY

TABLE 3.3 LOCATIONS OF AAQ STATIONS

Sl.No.	AAQ Stations	Village Name / Location	Direction	Distances (km)	Category of Wind
1	A1	Thiruvottiyur Kuppam -Project Site	NE	0.75	Up Wind
2	A2	Chennai Fishing Harbour-out side	SW	4.20	UP Wind
3	A3	Chennai Port Trust-Near	S	6.75	Cross Wind
4	A4	Ennore Port-Near	NE	6.50	Cross Wind
5	A5	Sadayankuppam	NW	3.25	Down Wind
6	A6	Chennai Petroleum Corporation Limited (CPCL)-Out side	W	3.95	Down Wind

TABLE 3.6 AMBIENT AIR QUALITIES OF VARIOUS AAQ STATIONS
(PM_{10}, $\mu g/m^3$)

Sl. No.	AAQ Stations	Village Name / Location	Maximum	Minimum	Average	98th Percentile
1	A1	Thiruvottiyur Kuppam -Project Site	58.45	54.4	56.43	53.86
2	A2	Chennai Fishing Harbour-out side	64.65	61.15	62.90	63.15
3	A3	Chennai Port Trust-Near	72.05	66.20	69.13	70.50
4	A4	Ennore Port-Near	76.20	68.00	72.10	74.25
5	A5	Sadayankuppam	41.50	39.10	40.30	40.59
6	A6	Chennai Petroleum Corporation Limited (CPCL)-Out side	45.75	41.00	43.38	44.63

TABLE 3.7 AMBIENT AIR QUALITIES OF VARIOUS AAQ STATIONS
($PM_{2.5}$, $\mu g/m^3$)

Sl. No.	AAQ Stations	Village Name / Location	Maximum	Minimum	Average	98th Percentile
1	A1	Thiruvottiyur Kuppam -Project Site	28.60	27.50	28.05	28.02
2	A2	Chennai Fishing Harbour-out side	30.75	29.20	29.98	30.13
3	A3	Chennai Port Trust-Near	33.20	29.30	31.25	32.37
4	A4	Ennore Port-Near	33.90	31.25	32.58	32.95
5	A5	Sadayankuppam	22.85	17.50	20.18	22.27
6	A6	Chennai Petroleum Corporation Limited (CPCL)-Out side	20.30	15.50	17.90	19.85

TABLE 3.8 AMBIENT AIR QUALITIES OF VARIOUS AAQ STATIONS

(SO_2, $\mu g/m^3$)

Sl. No.	AAQ Stations	Village Name / Location	Maximum	Minimum	Average	98th Percentile
1	A1	Thiruvottiyur Kuppam -Project Site	14.35	12.75	13.55	14.00
2	A2	Chennai Fishing Harbour-out side	15.20	14.30	14.75	14.87
3	A3	Chennai Port Trust-Near	18.50	16.20	17.35	18.09
4	A4	Ennore Port-Near	19.35	14.25	16.80	18.97
5	A5	Sadayankuppam	20.75	16.90	18.83	20.22
6	A6	Chennai Petroleum Corporation Limited (CPCL)-Out side	19.65	18.50	19.08	19.10

TABLE 3.9 AMBIENT AIR QUALITIES OF VARIOUS AAQ STATIONS
(NO_x, $\mu g/m^3$)

Sl. No.	AAQ Stations	Village Name / Location	Maximum	Minimum	Average	98th Percentile
1	A1	Thiruvottiyur Kuppam -Project Site	17.90	14.15	16.03	17.44
2	A2	Chennai Fishing Harbour-out side	17.50	15.60	16.55	17.01
3	A3	Chennai Port Trust-Near	22.25	18.20	20.23	23.70
4	A4	Ennore Port-Near	24.10	19.75	21.93	23.58
5	A5	Sadayankuppam	18.90	16.50	17.70	18.49
6	A6	Chennai Petroleum Corporation Limited (CPCL)-Out side	22.90	19.75	21.33	22.32

TABLE 3.10 AMBIENT AIR QUALITIES OF VARIOUS AAQ STATIONS
(CO, mg/m^3)

Sl. No.	AAQ Stations	Village Name / Location	Maximum	Minimum	Average	98th Percentile
1	A1	Thiruvottiyur Kuppam -Project Site	BDL	BDL	BDL	BDL
2	A2	Chennai Fishing Harbour-out side	BDL	BDL	BDL	BDL
3	A3	Chennai Port Trust-Near	BDL	BDL	BDL	BDL
4	A4	Ennore Port-Near	BDL	BDL	BDL	BDL
5	A5	Sadayankuppam	BDL	BDL	BDL	BDL
6	A6	Chennai Petroleum Corporation Limited (CPCL)-Out side	BDL	BDL	BDL	BDL

TABLE 3.11 AMBIENT AIR QUALITIES OF VARIOUS AAQ STATIONS
(NH_3, μg /m^3)

Sl. No.	AAQ Stations	Village Name / Location	Maximum	Minimum	Average	98th Percentile
1	A1	Thiruvottiyur Kuppam -Project Site	BDL	BDL	BDL	BDL
2	A2	Chennai Fishing Harbour-out side	BDL	BDL	BDL	BDL
3	A3	Chennai Port Trust-Near	BDL	BDL	BDL	BDL
4	A4	Ennore Port-Near	BDL	BDL	BDL	BDL
5	A5	Sadayankuppam	BDL	BDL	BDL	BDL
6	A6	Chennai Petroleum Corporation Limited (CPCL)-Out side	BDL	BDL	BDL	BDL

TABLE 3.19 SOIL CHARACTERISTICS IN THE SOIL OBSERVATORY STATIONS

Characteristics	*S1*	*S2*	*S3*	*S4*	*S5*
Type of soil (Texture)	*Sandy costal alluvium*	*Sandy costal alluvium*	*Sandy*	*sandy*	*Sandy clay*
Colour	*Yellowish brown*	*Yellowish brown*	Brown	*brown*	*Dark brown*
pH	8.25	7.65	6.55	6.25	6.70
Conductivity(micronhos/cm)	3450	2850	1560	1940	1210
Magnesium (%)	65	140	60	65	35
Nitrogen (%)	15	30	40	60	47
Phosphorous (%)	10	20	15	40	12
Potassium, as K++ mg/kg	45	45	10	15	20
Calcium, as Ca++ mg/kg	60	85	110	170	160
Sodium, as Na++ mg/kg	1860	1520	900	1200	1250
Sand (%)	82	85	65.75	69.20	38.40
Gravel (%)	2.1	4.5	24.10	27.50	8.40
Silt and Clay (%)	1.5	2.15	15.10	10.60	37.40
Infiltration (cm/hr)	3.40	2.90	1.90	1.60	1.22

IV. COASTAL SURVEY & MODELING

4.1 DATA SOURCES

The following datasets were employed in the study:

- Bathymetry survey data for the project site
- FishingHarbour layout
- Digitized admiralty charts of the area of interest,
- Tide and current measurements off Ennone
- Wind Climate: Operational Final Analysis from the National Center of Environmental Prediction (NCEP) GFS Numerical Weather Prediction Model.

Proposed fishing harbour layout used for the modeling studies is presented in **Figure 4.1**.

FIGURE 4.1 PROPOSED THIRUVOTRIYUR KUPPAM HARBOUR LAYOUT

4.2 TIDE AND CURRENT MEASUREMENTS

Virgo Aqua provided the tide and current measurements at 13 18 30.89N, 80 24 23.96E location. **Fig.4.2** show the tide and currents are presented in **Fig.4.3**. These field measurements will be used for hydrodynamic model calibration.

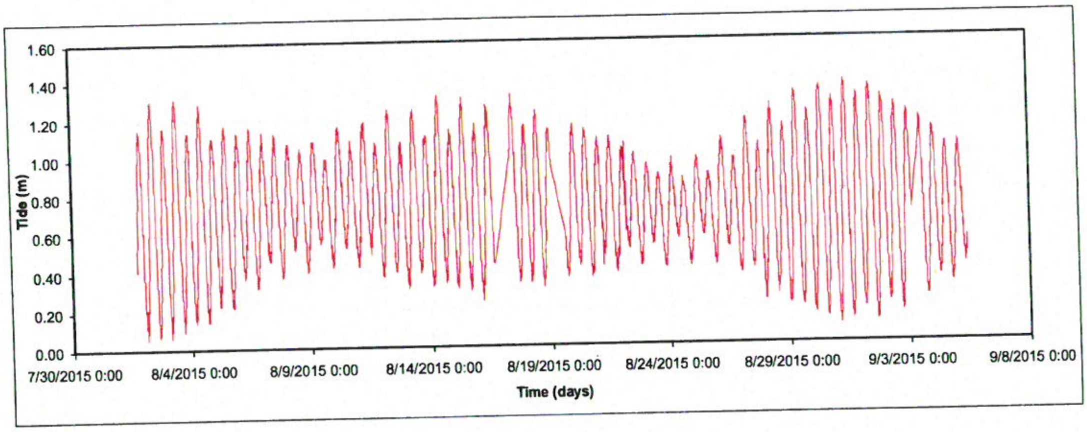


FIGURE 4.2 MEASURED TIDE AT 13 18 30.89N, 80 24 23.96E LOCATION

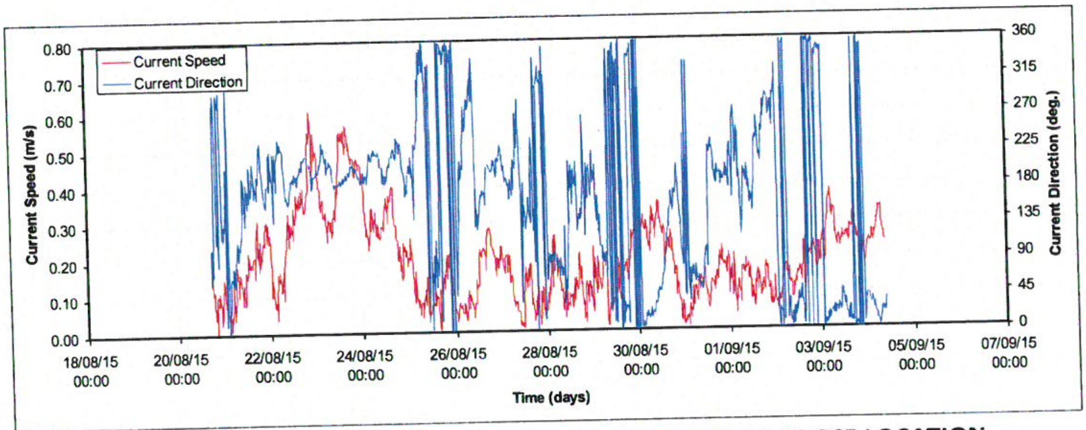


FIGURE 4.3 MEASURED CURRENTS AT 13 18 30.89N, 80 24 23.96E LOCATION

4.3 WAVE TRANSFORMATION STUDY

4.3.1 Offshore Wave Climate

Offshore wave climate off the project site at 13N, 80.5E in the form of parametric quantities (Significant wave height Hs, Peak period Tp, vector mean direction) has been extracted from NCEP.

This data also includes wind speed and direction at 10 m elevation.

Fig. 4.4 shows the locations of the offshore point and nearshore point close to the project site.

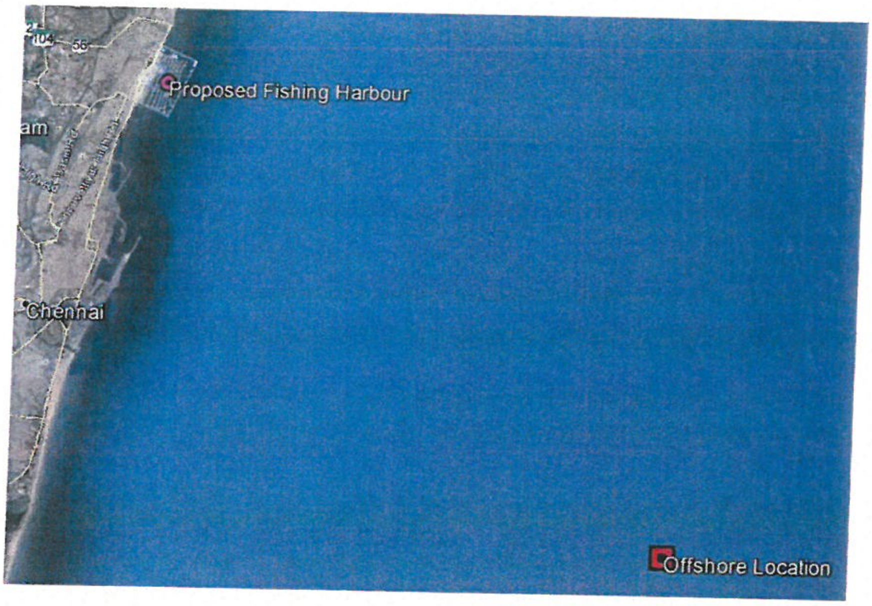


FIGURE 4.4 LOCATION MAP OF THE OFFSHORE AND NEARSHORE POINTS

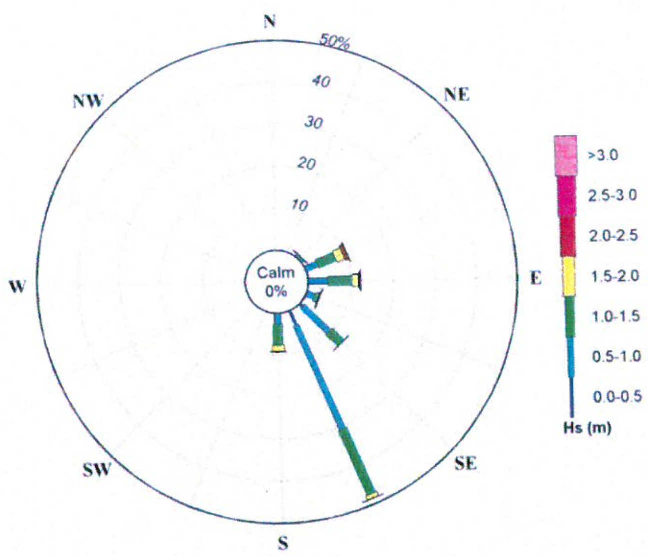


FIGURE 4.5 ANNUAL WAVE ROSE OFF CHENNAI AT 13 N AND 80.5 E

The offshore time series wave climate derived from the NCEP database off the project site at 13 N and 80.5 E is presented in the form of a wave rose. **Fig.4.5** shows the annual wave rose off Chennai.

4.3.2 Offshore Wind Climate

Offshore winds from NCEPhas been extracted at offshore location. **Fig.4.6** shows theannual wind rose. In general, the offshore winds are mild and the hourly mean wind speed exceeds 10m/s approximately 2.4% of the time.

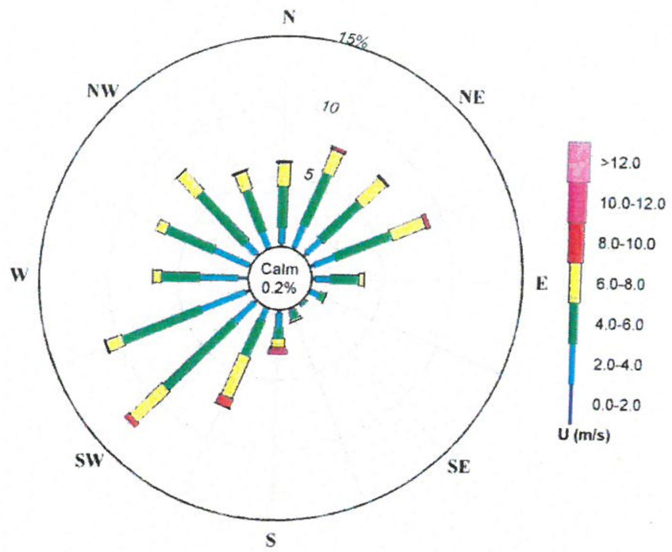


FIGURE 4.6 ANNUAL WIND ROSE OFF CHENNAI AT 13 N AND 80.5 E

4.3.3 Nearshore Wave Climate

The offshore wave climate was transformed to the project site by applying the SWAN Spectral wave propagation model. SWAN is a third-generation wave model developed by the Technical University of Delft, The Netherlands that computes random short-crested wind-generated waves in coastal regions and inland waters. SWAN version 40.81 (2010) has been used to simulate the transformation of waves as they propagate from the offshore point (NCEP, 13N 80.5E).

Unstructured mesh was applied for the SWAN computation allowing sufficient resolution at the project site as well as along the shelf. Resolution of the grid varies from 50 m at the proposed fishing harbour to 5,000 m along the open boundary and other areas within the model domain. Fine grid resolution at the project site is important to accurately model the wave transformations. **Fig.4.7** and **Fig.4.8** show the unstructured computational grid used for wave transformation study.

FIGURE 4.7 SWAN WAVE MODEL MESH

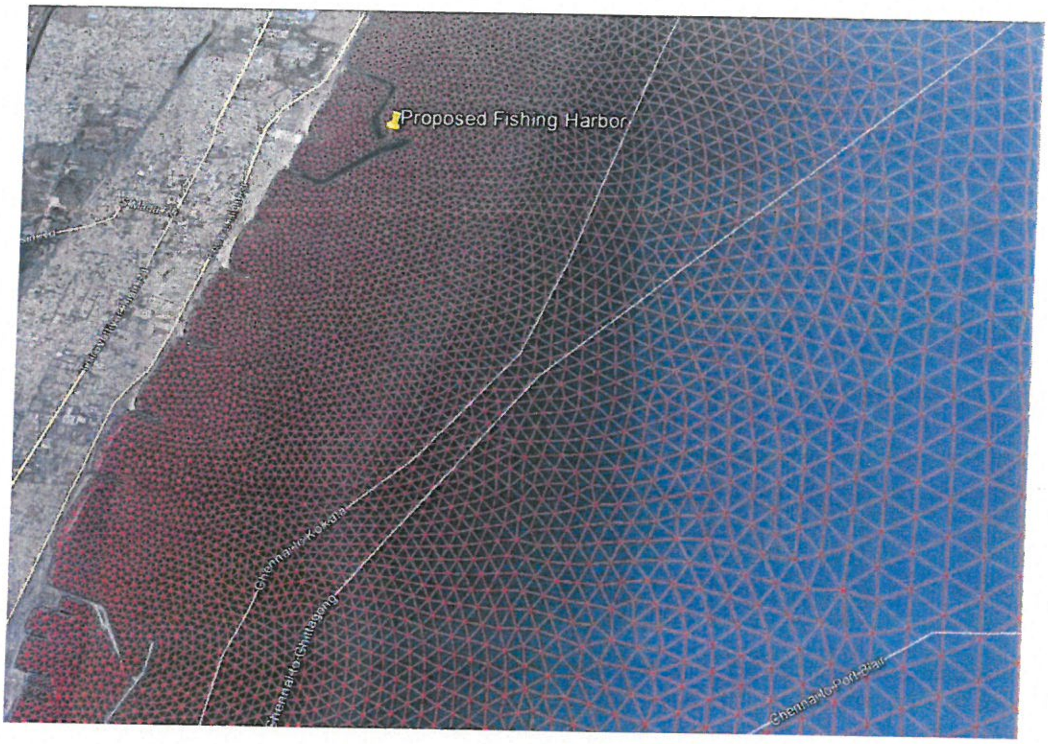


FIGURE 4.8 SWAN WAVE MODEL MESH – ZOOMED TO PROJECT SITE

4.4 BATHYMETRY

Bathymetry is an important parameter in wave modelling studies. Proper care should be taken in the bathymetry schematization particularly along the shelf and in the nearshore. The depth information for the present wave model has been digitized from the Admiralty chart and bathymetry survey data provided by the client were used and interpolated to unstructured grid by linear interpolation method. **Fig.4.9** and **Fig.4.10** presents the bathymetry used for the wave transformation study.

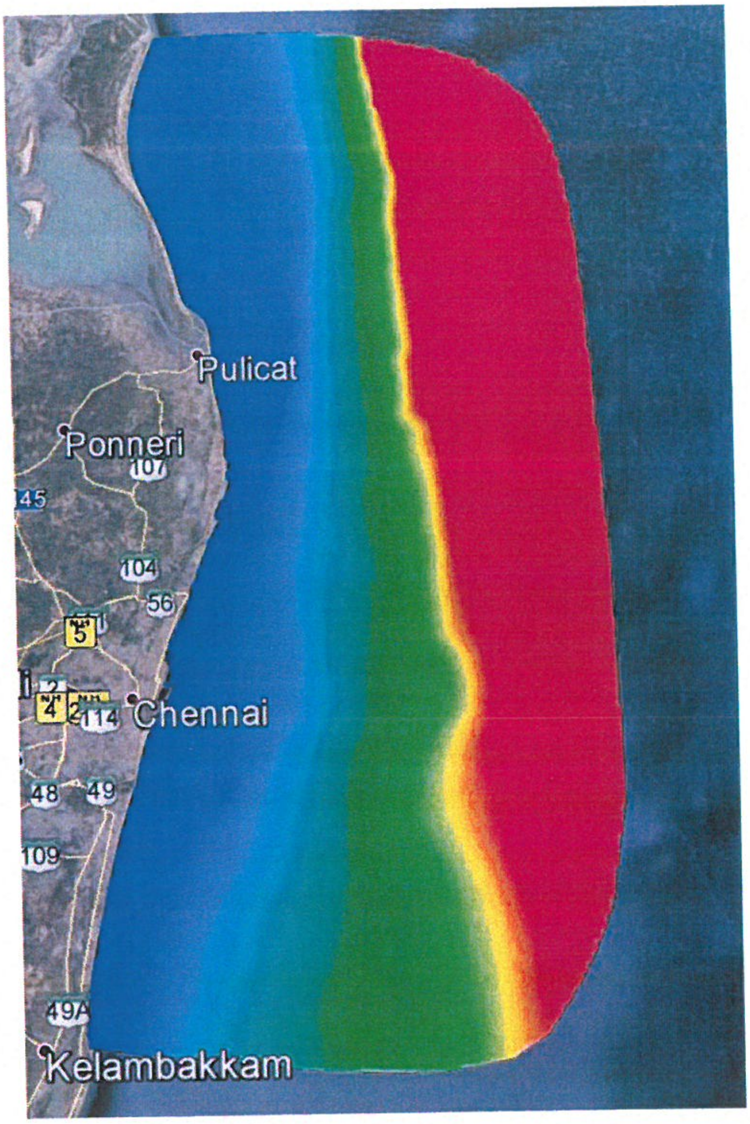


FIGURE 4.9 SWAN WAVE MODEL BATHYMETRY

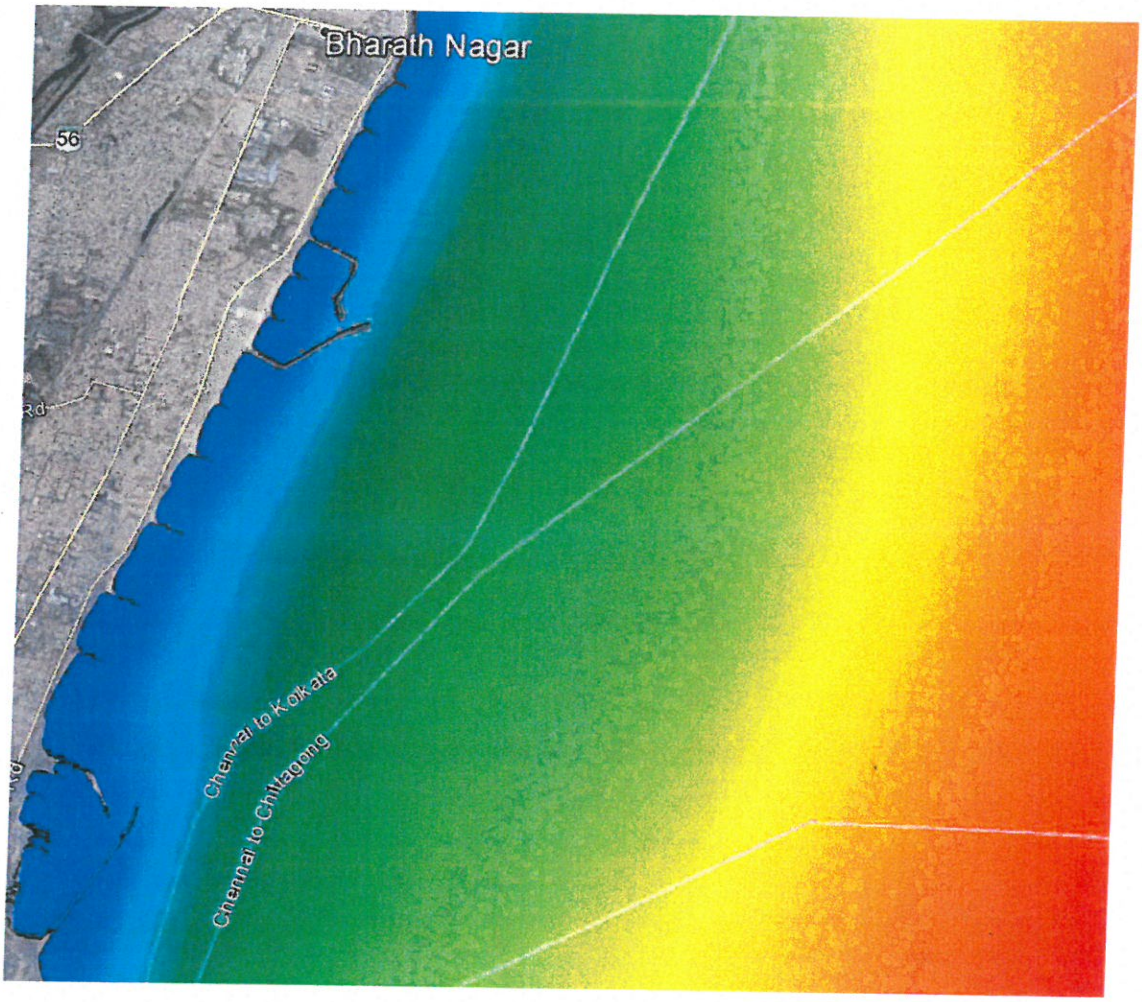


FIGURE 4.10 SWAN WAVE MODEL BATHYMETRY -DETAILS AT PROPOSED FISHING HARBOUR

Fig.4.11 shows the transformed annual wave rose at nearshore point close to project site. The nearshore wave climate is representative for the project site. Model results were not calibrated and validated against the measured wave conditions of the site.

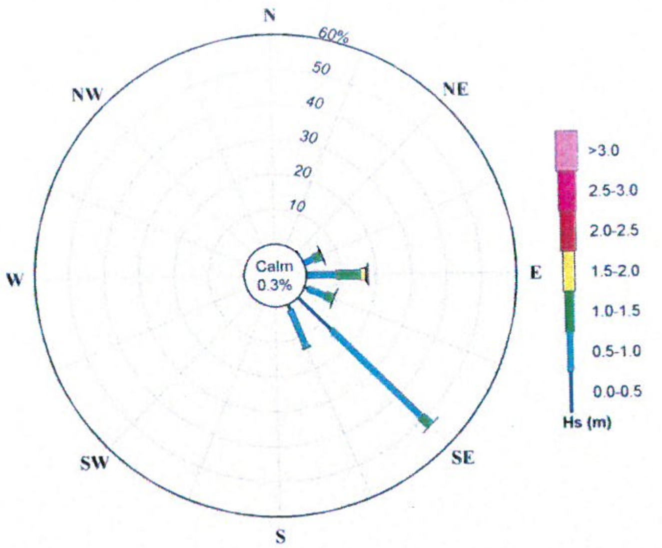


FIGURE 4.11 ANNUAL TRANSFORMED WAVE ROSE AT NEARSHORE POINT (13.163° N AND 80.317° E)

Wave period distribution has been presented in the **Fig.4.12**. The spectral peak periods are mainly between 4 and 12 sec, but can be as high as 16 sec on rare occasions. Peak periods exceed 16 sec only 1.2% of the time.

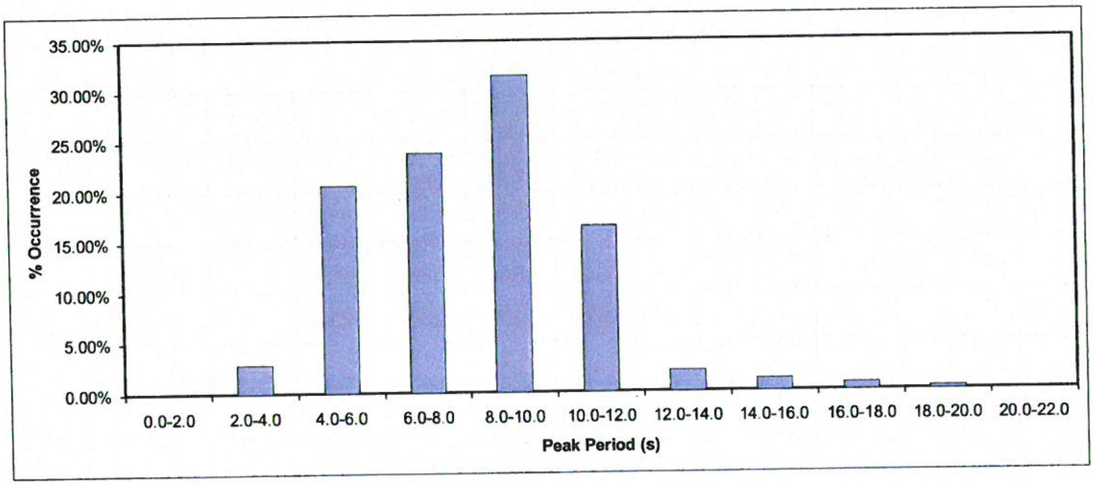


FIGURE 12 ANNUAL PEAK WAVE PERIOD DISTRIBUTION AT NEARSHORE POINT (13.163° N AND 80.317° E)

4.5 HYDRODYNAMIC MODEL:

4.5.1 Introduction

In order to compute the sedimentation estimates for the TUNA fishing harbour, a calibrated hydrodynamic model is required. Hence, the site specific detailed hydrodynamic modelling was conducted to determine the flow circulation for the proposed TUNA fishing harbour at Thiruvottriyur Kuppam in Thiruvallur District, Tamil Nadu. Water levels and tide, wind and wave induced flow circulation were assessed for the proposed fishing harbour.

The study was conducted using the Delft3D package. The Delft3D-Flow model solves the 2D or 3D shallow water equations on a rectangular or curvilinear grid, taking in to account:

- Tidal forcing
- The effect of the Earth's rotation (Coriolis force)
- Density driven flows (pressure gradients terms in the momentum equations);
- Advection-diffusion solver included to compute density gradients with an operational facility to treat very sharp gradients in the vertical;
- Space and time varying wind and atmospheric pressure. Advanced turbulence models to account for a vertical turbulent viscosity and diffusivity based on the eddy viscosity concept. Four options are provided are k-epsilon, k-L, Algebraic and constant model;
- Time varying sources and sinks (e.g. river discharges);
- Simulation of the thermal discharge, effluent discharge and the intake of cooling water at any location and any depth;
- Robust simulation of drying and flooding of inter-tidal flats.

The package includes modules for:

- The water movement (both 2D and 3D) including density variations due to salinity and temperature (including incoming solar radiation);

- Suspended sediment transport (both cohesive and non-cohesive sediment);
- Oil spill modelling
- Waves (using the SWAN program from the University of Delft, Netherlands)

For the present hydrodynamic modelling study, Delft3D has been run in a 2D depth-averaged configuration.

4.5.2 Data Sources:

The following datasets were employed in this study:

- Bathymetry survey data for the project site
- Fishing Harbour layout
- Digitized admiralty charts of the area of interest,
- Tide measurements off Ennone
- Wind Climate: Operational Final Analysis from the National Center of Environmental Prediction (NCEP) GFS Numerical Weather Prediction Model.

4.5.3 Proposed Fishing Harbour Layout

Proposed fishing harbour layout used for the modeling studies is presented in **Fig.4.13**.

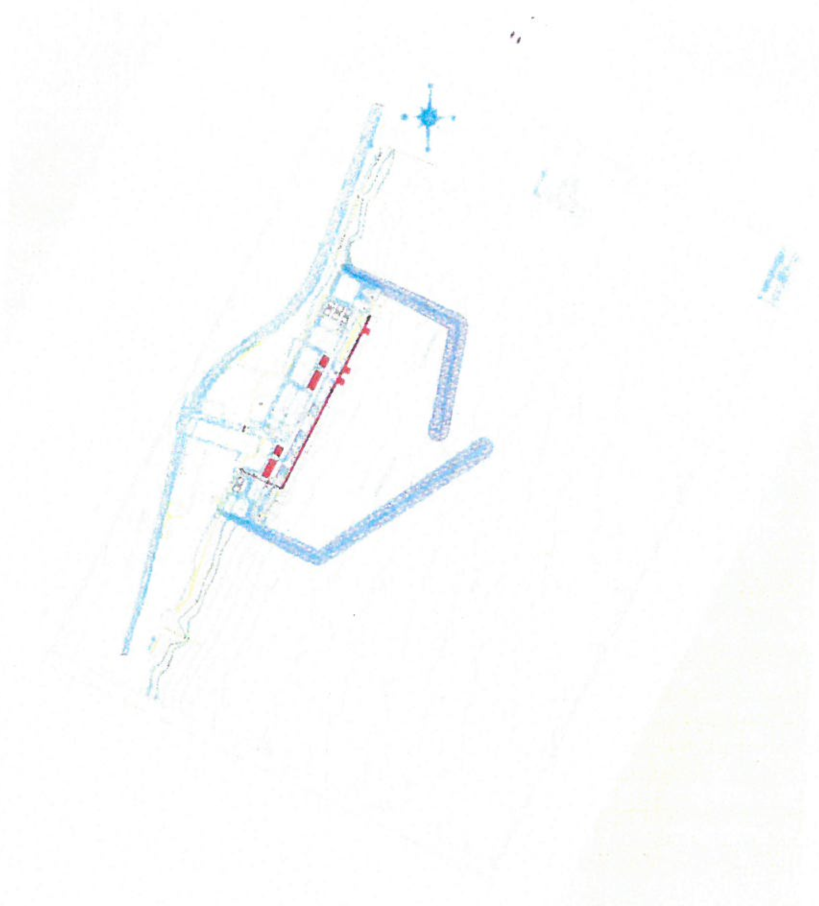


FIGURE 4.13 PROPOSED TUNA THIRUVOTRIYUR KUPPAM FISHING HARBOUR LAYOUT

4.5.4 Model Set Up

5.5.4.1 Grid and Bathymetry

A boundary fitting curvilinear grid with sizes varying from 65 meters to 415 meters was generated as part of the process of generating the bathymetry for the model. The advantage with curvilinear grids is that the grid resolution can be increased in the area of interest and in the far field the grid resolution can be decreased. This kind of grid helps in attaining great reduction in computational time without compromising on the accuracy of the results.

Fig.4.14 presents the hydrodynamic modeling grid built to simulate the water level and flow circulations at the project site and surrounding regions. Detailed grid at the project site is presented in the **Fig.4.15**.

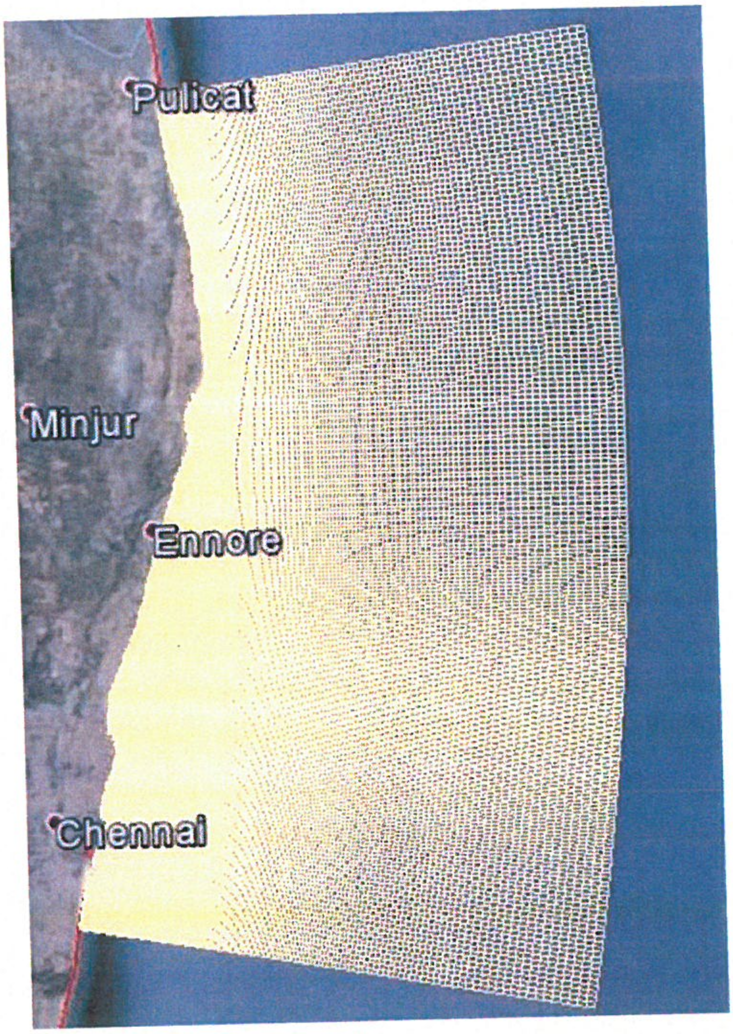


FIGURE 4.14 HYDRODYNAMIC MODELING GRID

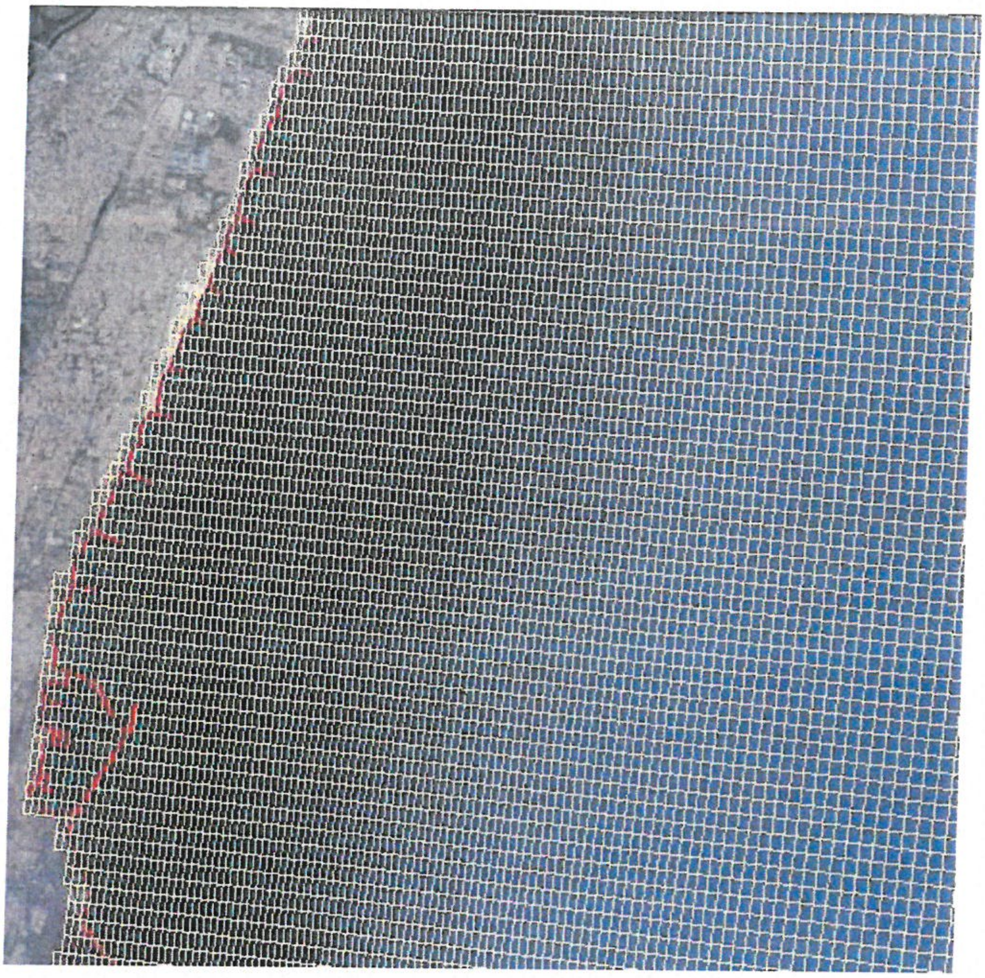


FIGURE 4.15 HYDRODYNAMIC MODELING GRID – ZOOMED TO PROJECT SITE

Bathymetry is an important parameter in hydrodynamic modelling studies. Proper care should be taken in the bathymetry schematization particularly along the shelf and in the nearshore. The depth information for the present model has been digitized from the Admiralty chart and bathymetry survey data provided by the client were used and interpolated to grid by triangular interpolation method. The surveyed bathymetry and digitised bottom depths from the Admiralty Charts are referred with respect to Chart Datum (CD). For the present project, Mean Sea Level (MSL) is taken as reference level. The bottom depths were therefore corrected to MSL with the relation: MSL = CD + 0.80 m, which is based on the information provided in the Indian Tide Table (ITT) and Admiralty charts. The bathymetry of the proposed Tuna fishing harbour flow model is shown in **Fig.4.16.**

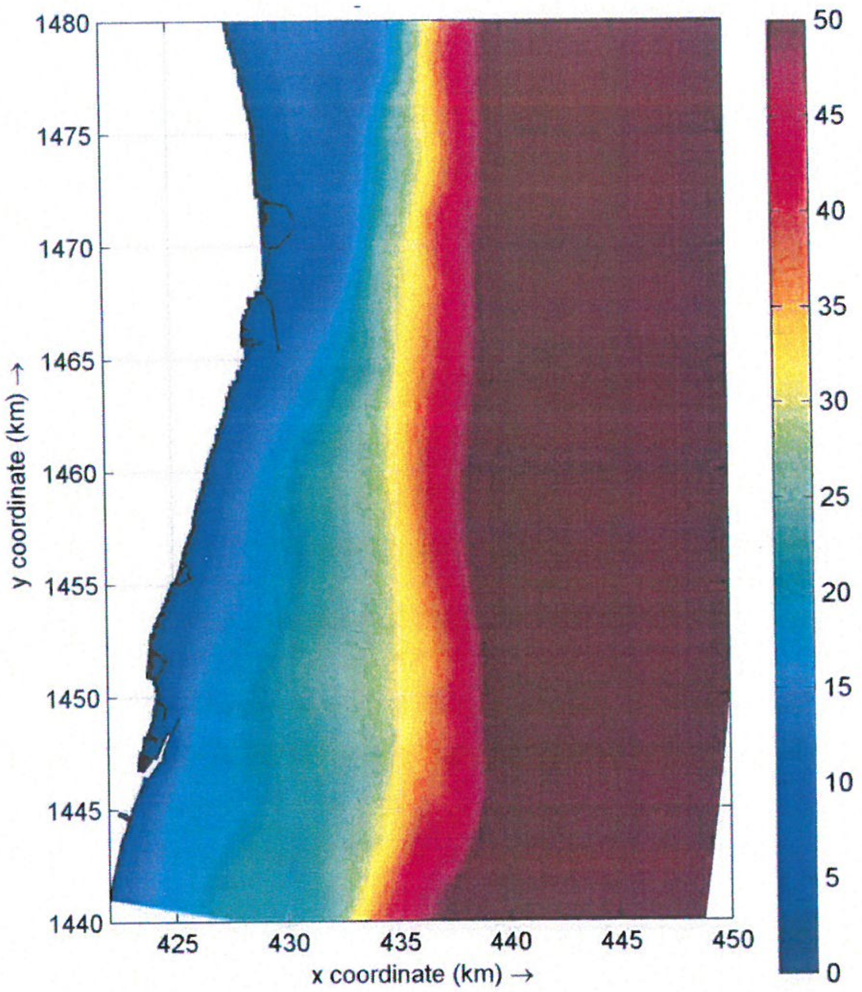


FIGURE 4.16 TUNA FISHING HARBOUR HYDRODYNAMIC MODEL BATHYMETRY

4.5.4.2 Boundary Conditions

At the open Boundaries, the Astronomical tide conditions were specified using tidal constituents, amplitudes and phases. This data for the boundaries was derived from the TPXO7.2/FES2004 database.

4.5.4.3 Calibration

Fig.4.17 shows the comparison of simulated water levels at tide measurement location off Ennore with the measured tide. A good agreement is shown between the simulated model tide and the predicted water levels at the coastal station.

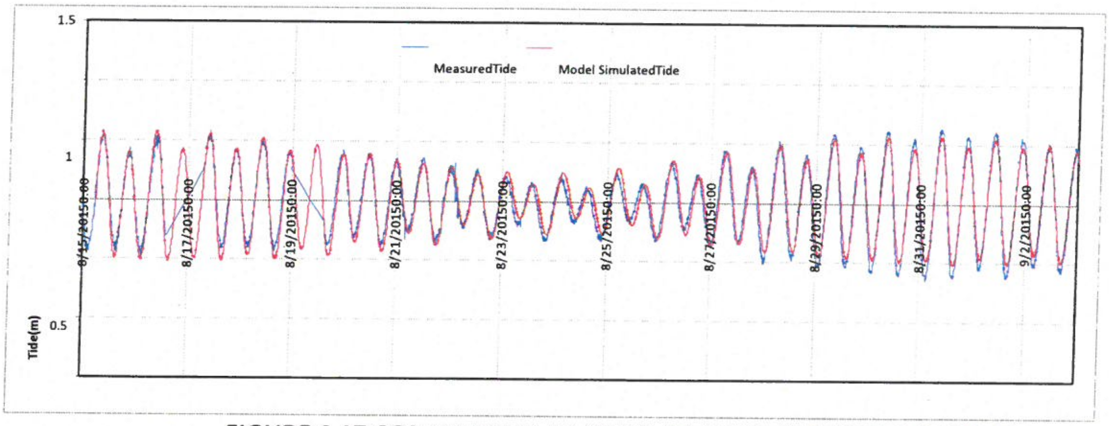


FIGURE 4.17 COMPARISON OF SIMULATED TIDE WITH MEASURED TIDE OFF ENNORE

4.5.5 Results

The maximum current velocities due to tide and wind for flood and ebb phases of spring tide are presented in **Fig.4.18** and **Fig.4.19.** Results show that the wind induced currents are dominant. Hence, both during the flood and ebb phases of tide the current are flowing in the same direction with similar magnitude. Detailed site specific flow velocity plots due to combined effect of tide, wind and wave will be presented in the sedimentation modelling report.

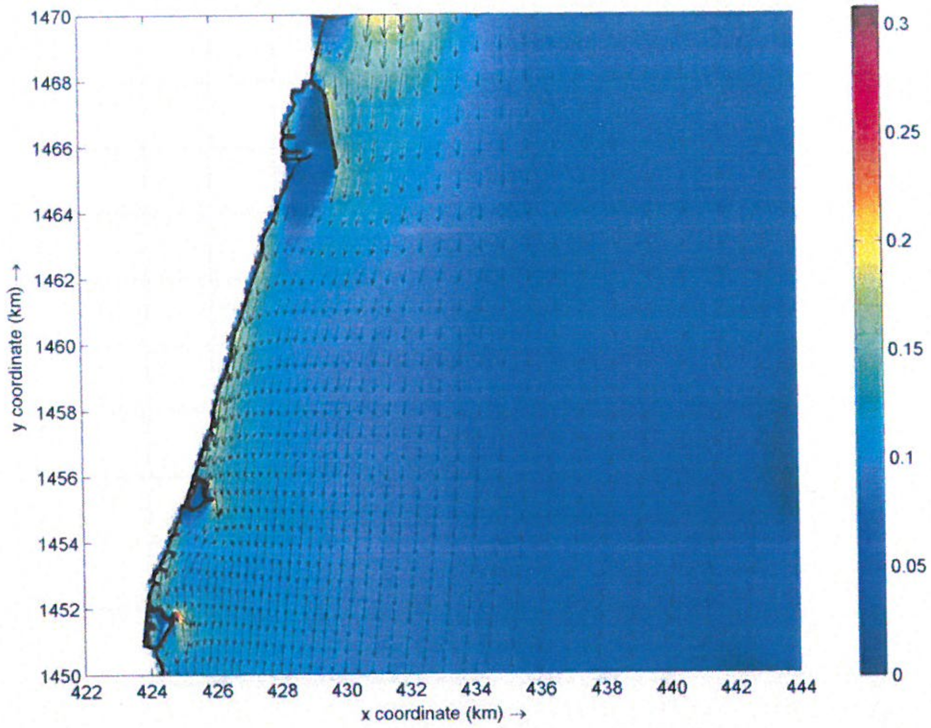


FIGURE 4.18.MAXIMUM CURRENT VELOCITIES DURING FLOOD PHASE OF THE SPRING TIDE

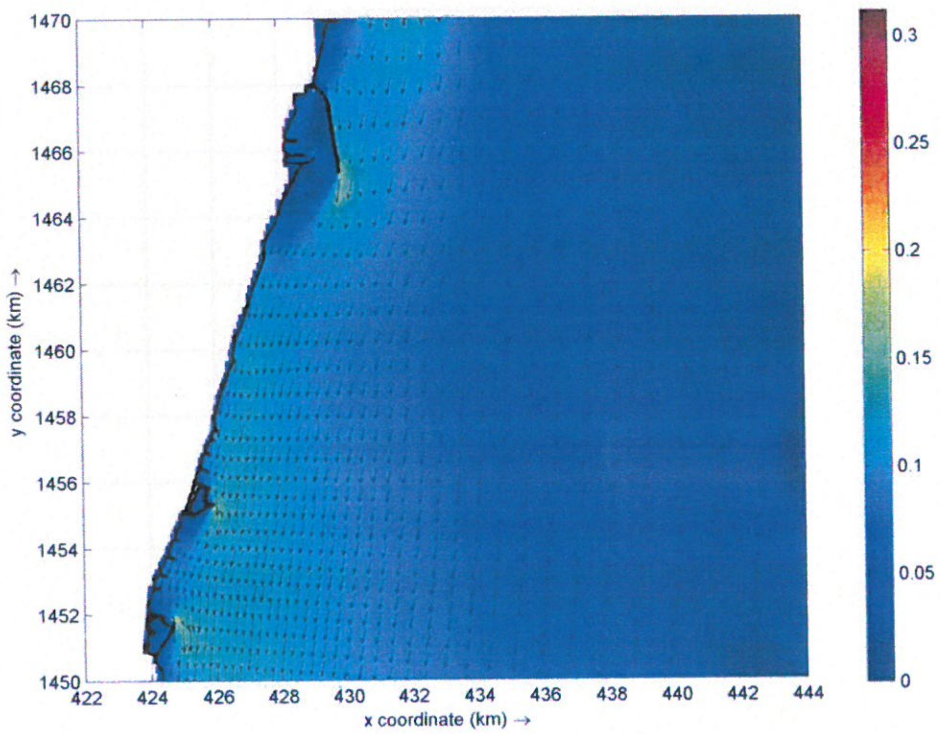


FIGURE 4.19 MAXIMUM CURRENT VELOCITIES DURING EBB PHASE OF THE SPRING TIDE

4.5.6 Conclusion

This study presents the hydrodynamic modelling carried out for the Tuna Fishing Harbour with the proposed layout. The study made use of available information and open source data to setup the models in order to obtain the water levels and current for the proposed fishing harbour.

The simulated model result for tide shows good agreement with the measured data hence the model is calibrated.

4.6 CYCLONE MODELLING STUDY

Cyclone modelling was conducted to determine the maximum wave heights and surge levels associated with cyclones that have passed within close proximity to the proposed TUNAfishing harbour at ThiruvottriyurKuppam in Thiruvallur District, Tamil Nadu. Cyclone induced increase wave height and surge levels are important parameters in the design of breakwaters for the proposed fishing harbour.

The study was conducted using the Delft3D package. The Delft3D-Flow model solves the 2D or 3D shallow water equations on a rectangular or curvilinear grid, taking in to account:

- Tidal forcing
- The effect of the Earth's rotation (Coriolis force)
- Density driven flows (pressure gradients terms in the momentum equations);
- Advection-diffusion solver included to compute density gradients with an operational facility to treat very sharp gradients in the vertical;
- Space and time varying wind and atmospheric pressure. Advanced turbulence models to account for a vertical turbulent viscosity and diffusivity based on the eddy viscosity concept. Four options are provided are k-epsilon, k-L, Algebraic and constant model;
- Time varying sources and sinks (e.g. river discharges);
- Simulation of the thermal discharge, effluent discharge and the intake of cooling water at any location and any depth;
- Robust simulation of drying and flooding of inter-tidal flats.

The package includes modules for:

- The water movement (both 2D and 3D) including density variations due to salinity and temperature (including incoming solar radiation);
- Suspended sediment transport (both cohesive and non-cohesive sediment);
- Oil spill modelling
- Waves (using the SWAN program from the University of Delft, Netherlands)

For the present cyclone modelling study, Delft3D has been run in a 2D depth-averaged configuration.

Cyclone wave heights estimations were conducted by running the SWAN (Delft3D-Wave) model. SWAN is a two-dimensional spectral wave model of the third generation. The SWANsolves the energy balance equation (Booij et al., 1999) in the whole computational domain. The wave energy is discretized in a frequency and directional domain at each node of the spatial computational grid, and allowed to propagate in space and evolve in time. The following wave processes are represented in the model:

- Wave propagation in time and space, shoaling, refraction due to current and depth, frequency shifting due to currents and non-stationary depth.
- Wave generation by wind.
- Three- and four-wave interactions.
- Whitecapping, bottom friction and depth-induced breaking.
- Dissipation due to vegetation.
- Wave-induced set-up.
- Transmission through and reflection (specular and diffuse) against obstacles.

4.6.1 Model set up

4.6.1.1 Grid and Bathymetry

The bathymetry was prepared using the bathymetry survey data and relevant naval hydrographic charts For the offshore model domain, the GEBCO global elevations database has been used. This database contains the heights and depths worldwide on a resolution of one geographical minute, based on satellite altimetry observations combined with shipboard echo-sounding measurements. These data were compared with the information from the ETOPO2 database. **Fig.4.20** shows the bathymetry used for the cyclone modelling study.

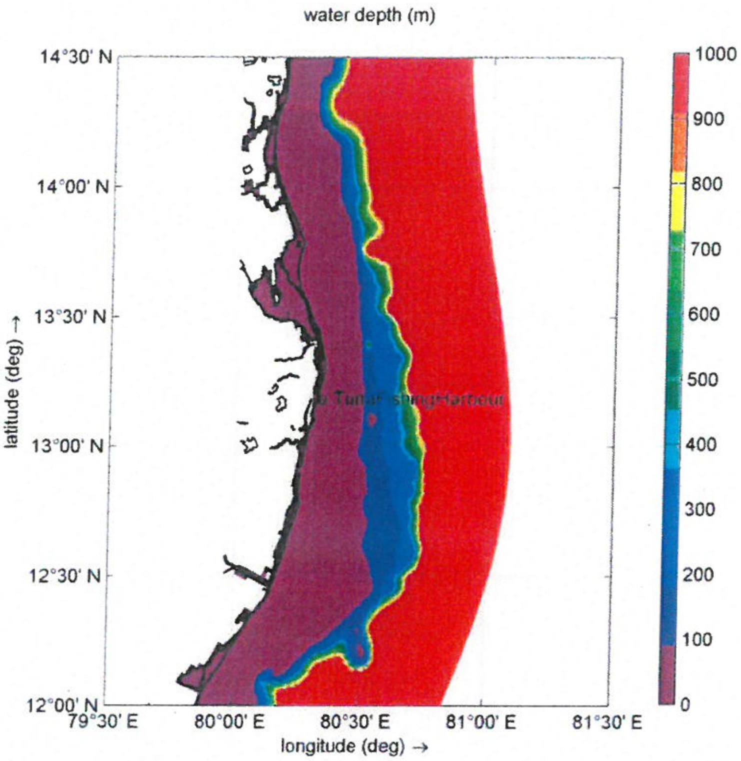


FIGURE 4.20.MODEL BATHYMETRY

Cyclone Winds

For the present cyclone modelling study, four cyclone tracks were selected viz.

- Nilam 2012
- Thane 2011
- Laila 2010
- Jal 2010

Figure 4.21 to Figure 4.24 show the cyclone tracks considered for the study.

FIGURE 4.21.NILAM CYCLONE TRACK – 2012

FIGURE 4.22.THANE CYCLONE TRACK – 2011

FIGURE 4.23.LAILA CYCLONE TRACK – 2010

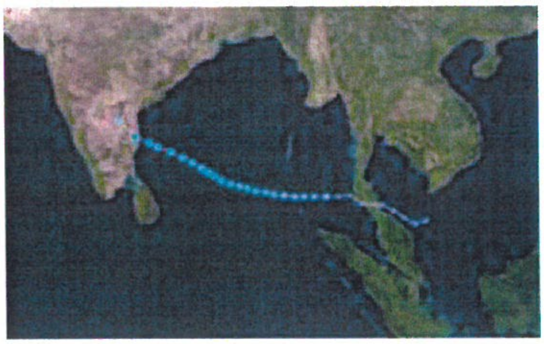


FIGURE 4.24.JAL CYCLONE TRACK - 2010

The wind speed and pressure fields over the entire model domain were computed using the expressions given by Holland (1980). Typical wind and pressure fields over the Bay of Bengal computational domain for severe cyclone Nilam in 2012 is given below in **Fig.4.25**.

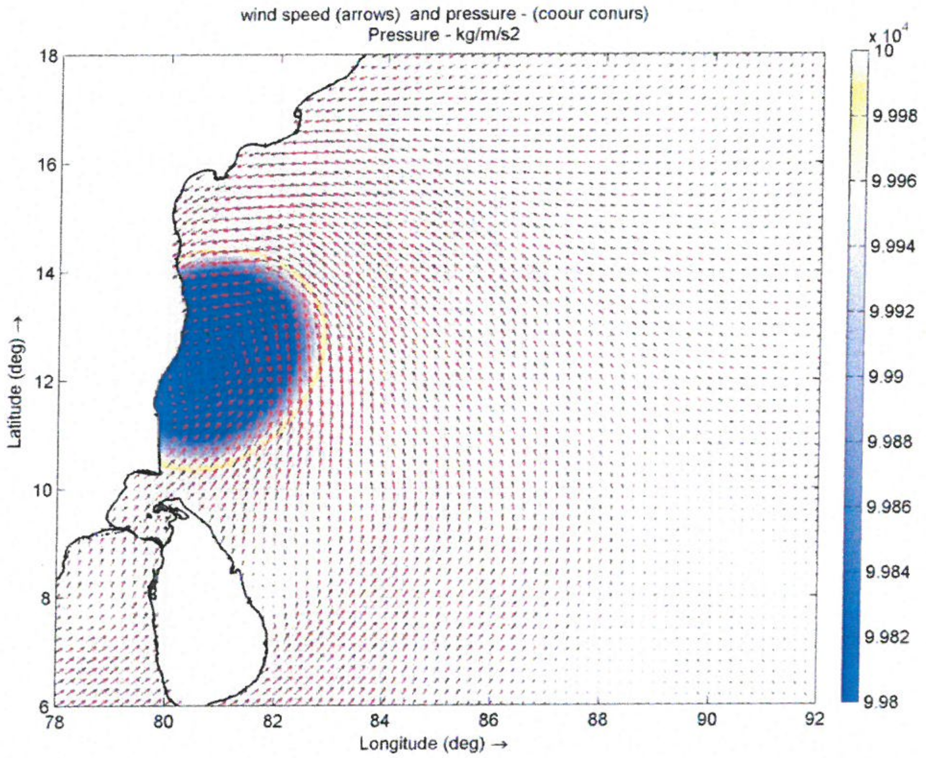


FIGURE 4.25.WIND AND PRESSURE FIELD FOR CYCLONE NILAM 2012

4.6.2 Boundary Conditions

The tidal boundary conditions for the cyclone model have been derived from the TPXO database. The cyclone model is forced with the tidal boundary conditions and cyclone wind and pressure fields for all four tracks to the simulation wave heights and surge levels.

4.6.3 Results and discussions

The variations of cyclone wave height over the model domain for all the 4 tracks are presented in **Fig.4.26** and **Fig.4.29**. The cyclonic conditions of the selected four tracks, in general higher wave heights are observed from the cyclones that pass on south of Chennai and very close to the fishing harbour.

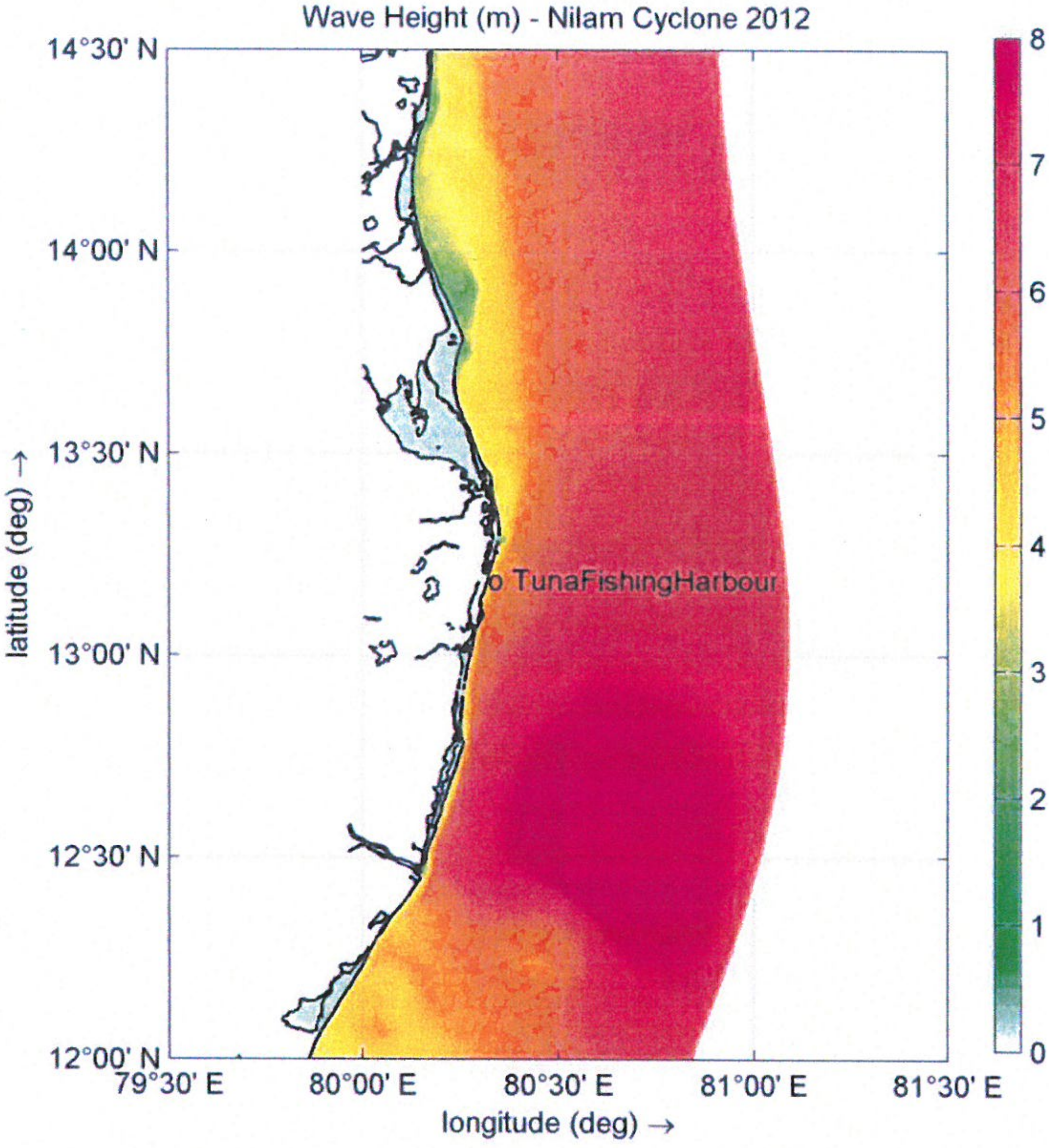


FIGURE 4.26.MAXIMUM WAVE HEIGHT DURING NILAM 2012 CYCLONE

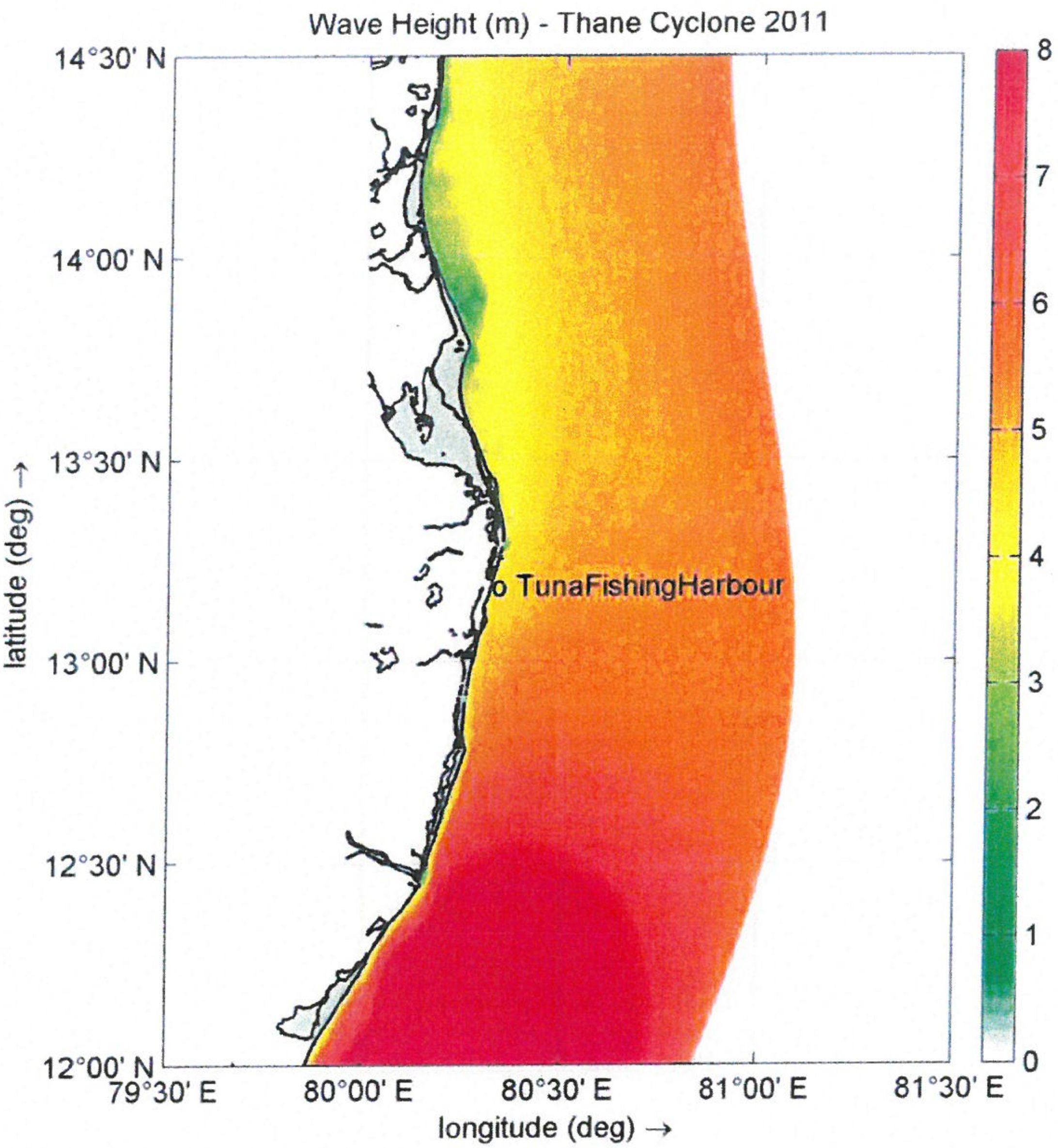


FIGURE 4.27.MAXIMUM WAVE HEIGHT DURING THANE 2011 CYCLONE

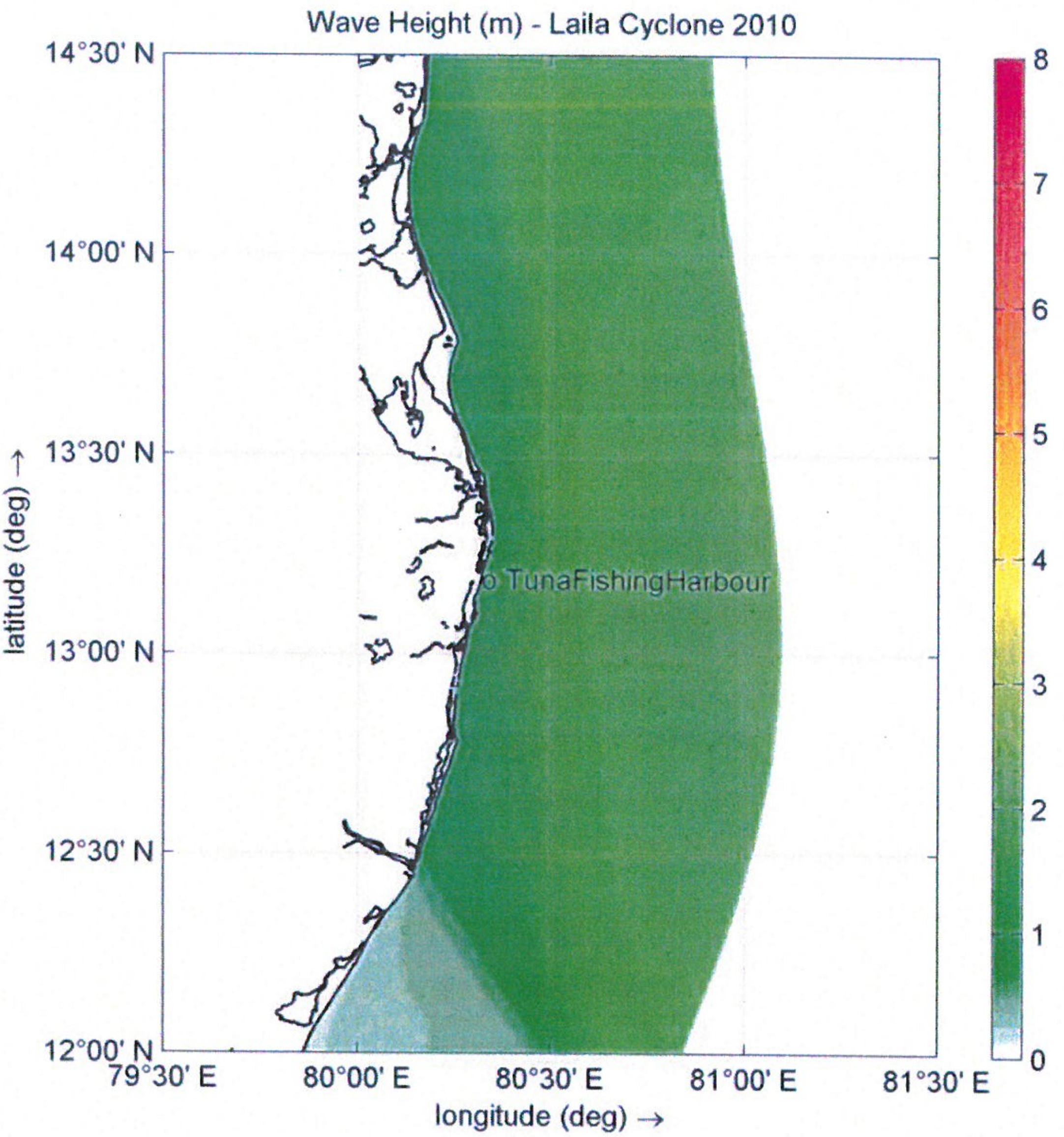


FIGURE 4.28.MAXIMUM WAVE HEIGHT DURING LAILA 2010 CYCLONE

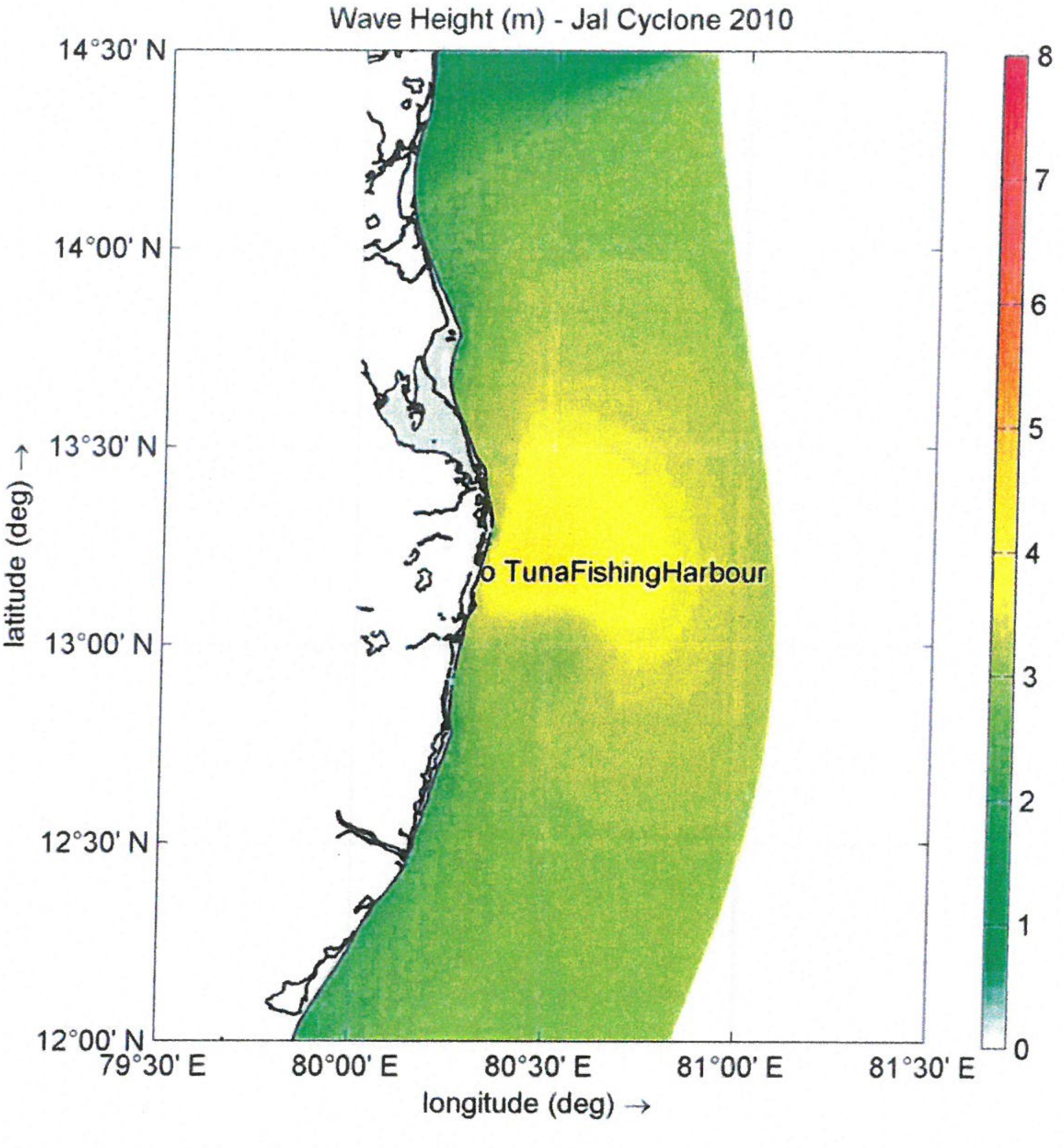


FIGURE 4.29.MAXIMUM WAVE HEIGHT DURING JAL 2010 CYCLONE

It is observed that the Nilam 2012 cyclone passing close to the proposed Tuna Fishing Harbour induced the maximum wave height at 8.5 m at head of the breakwater. **Table 4.1** presented the estimated cyclone wave heights during the four cyclone tracks. The extreme cyclone significant wave heights for the different return periods were estimated using the statistical methods such as Weibull and Gumbel distribution and are presented in the **Table 4.2.**

TABLE 4.1 .CYCLONE SIGNIFICANT WAVE HEIGHT FOR FOUR TRACKS

Cyclone Track	Cyclone wave height (m CD)
	Head of the Tuna Fishing Harbour (8.5 m)
Nilam 20112	4.71
Thane 2011	4.20
Jal 2010	4.35
Laila 2010	1.45

TABLE 4.2 .EXTREME CYCLONE SIGNIFICANT WAVE HEIGHT FOR DIFFERENT RETURN PERIODS

Return Period (year)	Cyclone wave height (m CD)
	Head of the Tuna Fishing Harbour (8.5 m)
5	4.63
10	5.32
50	6.85
100	7.50

Similarly, the estimated surge levels for four cyclones are presented in **Table 4.3** and extreme surge levels for different return periods are presented in the **Table 4.4.**

TABLE 4.3 .CYCLONEINDUCED SURGE LEVELS FOR FOUR TRACKS

Cyclone Track	Cyclone wave height (m CD)
	Head of the Tuna Fishing Harbour (8.5 m)
Nilam 20112	0.18
Thane 2011	0.12
Jal 2010	0.15
Laila 2010	0.10

TABLE 4.4 .EXTREME CYCLONE INDUCED SURGE LEVEL FOR DIFFERENT RETURN PERIODS

Return Period (year)	Cyclone wave height (m CD)
	Head of the Tuna Fishing Harbour (8.5 m)
5	0.18
10	0.21
50	0.28
100	0.30

4.7 WAVE TRANQUILITY STUDY

Wave tranquility study was conducted to check the efficacy of proposed TUNA fishing harbour (at Thiruvottriyur Kuppam in Ennore in Thiruvallur District, Tamil Nadu) layout to reduce the wave conditions in the basin. The study was conducted using the BOUSS-2D module of SMS package.

BOUSS-2D is a comprehensive numerical model for simulating the propagation and transformation of waves in coastal regions and harbours based on a time-domain solution of Boussinesq-type equations. The governing equations are uniformly valid from deep to shallow water and can simulate most of the phenomena of interest in the nearshore zone and harbour basins including

- Shoaling/ refraction over variable topography,
- Reflection/diffraction near structures,
- Energy dissipation due to wave breaking and bottom friction,
- Cross-spectral energy transfer due to nonlinear wave-wave interactions,
- Breaking-induced longshore and rip currents,
- Wave-current interaction and wave interaction with porous structures.

4.7.1 Model set up

4.7.1.1 Bathymetry

The bathymetry was prepared using the bathymetry survey data and relevant naval hydrographic charts. The model was run at MHWS which is 1.10 meters above MSL so that that the result is on the conservative side. Based on the maximum depth in the model domain a grid cell size 3.75m x 3.75m was adopted in setting the model. While establishing the model least depth in the model is kept at 4 meters so as to avoid model instabilities while running the model. This is justifiable because the 4-meter contour is within 160m from the shore and does not affect the model results. It was calculated that a damping coefficient of 0.5 was representative of the reflection characteristics of the shore and breakwater and the same was applied along the coast and breakwater structures. **Figure 4.30** shows the bathymetry used for the wave tranquility study. The details of the damping coefficients used in the model are given in **Figure 4.31.**

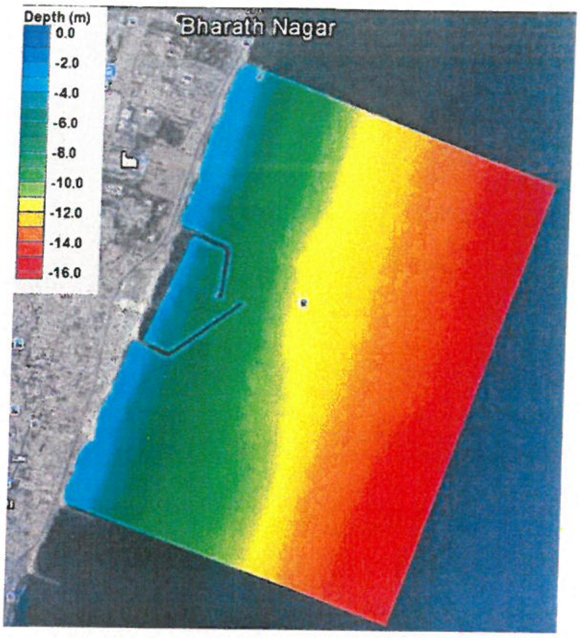


FIGURE 4.30.MODEL BATHYMETRY

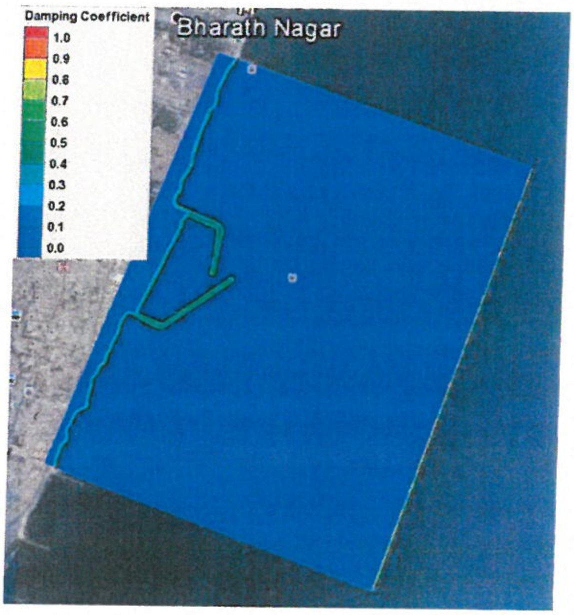


FIGURE 4.31. DAMPING COEFFICIEN

4.7.2 Boundary Conditions

To assess operability, the layout was tested for different incident wave conditions. Based on the wave climate at the site, the layout was tested with boundary conditions considered in these simulations were extracted from the wave transformation and extreme analysis study. Extreme wave conditions for 1 in 100 year return period are considered at the boundaries of wave tranquility model. **Table 4.5** presents wave tranquility model boundary conditions.

TABLE 4.5. WAVE TRANQUILITY MODEL BOUNDARY CONDITIONS

Simulation	H_S (m)	T_P (s)	Directional Sector	Water level (m)
1	3.6	10	90^0N	+1.10 MHWS
2	3.6	10	115^0N	+1.10 MHWS

4.7.3 Results and discussions

The variations of significant wave height over the domain for both simulations are presented in Figure **4.32** and **Figure 4.33**. The results from the simulations show that the wave height in the basin behind the south breakwater are in the order of 0.12 m for the 90 degrees incident wave direction whereas the same is around 0.06 m for the incident wave direction of 115 degrees. As per the PIANC guideline the allowable wave height for the fishing harbour basins is 0.20 m and the model results are below the regulations. Hence, it can be concluded the proposed fishing harbour layout will provide good operational conditions for the fishing vessels.

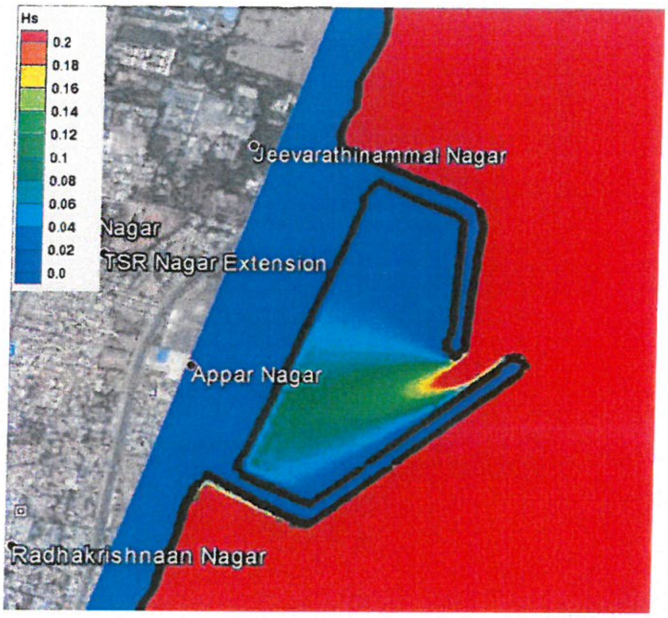


FIGURE 4.32. SIGNIFICANT WAVE HEIGHTS OVER THE MODEL DOMAIN FOR EXTREME INCIDENT WAVE CONDITION WITH 90 DEG. WAVE DIRECTION

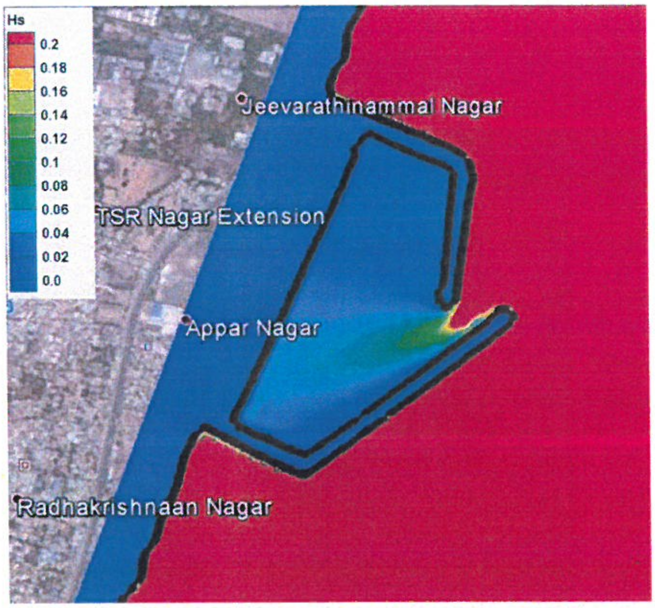


FIGURE 4.33. SIGNIFICANT WAVE HEIGHTS OVER THE MODEL DOMAIN FOR EXTREME INCIDENT WAVE CONDITION WITH 115 DEG. WAVE DIRECTIONS

4.7.4 Conclusions

This study presents the wave tranquility modelling carried out for the Tuna Fishing Harbour with the proposed layout. The study made use of available information and wave transformation study results to setup the models in order to obtain the wave conditions inside the harbour.

Extreme wave conditions for 1 in 100 year return period event with MHWS level was considered. The results show that the proposed fishing harbour layout offers excellent shielding from incident extreme wave conditions and shall provide very good operating conditions.

4.8 SEDIMENTATION MODELLING STUDY

4.8.1 Introduction

Sedimentation modelling was conducted to estimate the sedimentation and erosion rates and assessment of sedimentation patterns within close proximity to the proposed TUNAfishing harbour at Thiruvottriyur Kuppam in Thiruvallur District, Tamil Nadu. Sedimentation modeling study was conducted for combined effect of tide, wind, wave and sediment transport. Deflt3D modelling software was used and dynamic coupling between Delft3D-Flow online morphology and Delft3D-Wave modules.

The study was conducted using the Delft3D package. The Delft3D-Flow model solves the 2D or 3D shallow water equations on a rectangular or curvilinear grid, taking in to account:

- Tidal forcing
- The effect of the Earth's rotation (Coriolis force)
- Density driven flows (pressure gradients terms in the momentum equations);
- Advection-diffusion solver included to compute density gradients with an operational facility to treat very sharp gradients in the vertical;
- Space and time varying wind and atmospheric pressure. Advanced turbulence models to account for a vertical turbulent viscosity and diffusivity based on the eddy viscosity concept. Four options are provided are k-epsilon, k-L, Algebraic and constant model;
- Time varying sources and sinks (e.g. river discharges);
- Simulation of the thermal discharge, effluent discharge and the intake of cooling water at any location and any depth;
- Robust simulation of drying and flooding of inter-tidal flats.

The package includes modules for:

- The water movement (both 2D and 3D) including density variations due to salinity and temperature (including incoming solar radiation);
- Suspended sediment transport (both cohesive and non-cohesive sediment);
- Oil spill modelling
- Waves (using the SWAN program from the University of Delft, Netherlands)

For the present sedimentation modelling study, Delft3D has been run in a 2D depth-averaged configuration.

Sedimentation due to wave effects were conducted by running the SWAN (Delft3D-Wave) model. SWAN is a two-dimensional spectral wave model of the third generation. The SWAN solves the energy balance equation (Booij et al., 1999) in the whole computational domain. The wave energy is discretized in a frequency and directional domain at each node of the spatial computational grid, and allowed to propagate in space and evolve in time. The following wave processes are represented in the model:

Wave propagation in time and space, shoaling, refraction due to current and depth, frequency shifting due to currents and non-stationary depth.

Wave generation by wind.

Three- and four-wave interactions.

Whitecapping, bottom friction and depth-induced breaking.

Dissipation due to vegetation.

Wave-induced set-up.

Transmission through and reflection (specular and diffuse) against obstacles.

4.8.2 Model set up

4.8.2.1 Hydrodynamic Computational Grids

A detailed site-specific curvilinear grid was constructed for Tuna Fishing Harbour region to simulate the water levels and currents for the proposed harbour layout. The detailed model for the fishing harbour is nested in intermediate model covering between Pulicat and Besanthnagar. **Figure 4.34** shows the detailed model grid for Tuna Fishing harbour and nested in the intermediate model. The model grid presented in the UTM co-ordinate system. The grid covers an area of approximately 15 km x 7.5 km, with high resolution in side the port and along the coast and slightly less resolution in the offshore areas. The grid size varies from approximately 225 m offshore till approximately 45 m in side Tuna Fishing harbour. The grid comprises approximately 11280 active computational points.

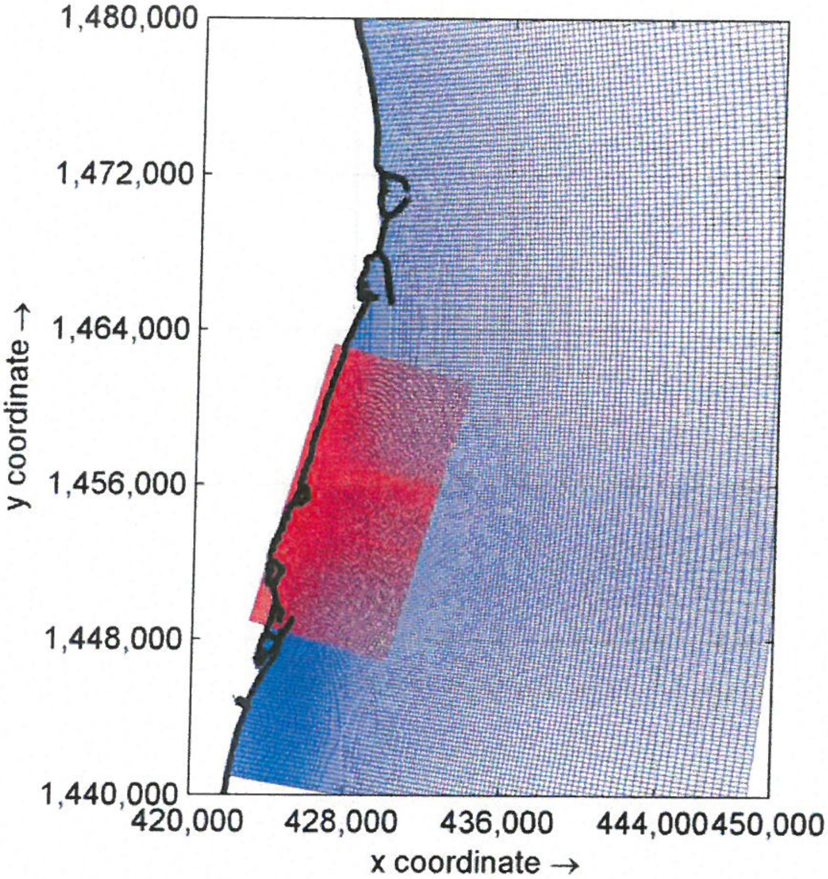


FIGURE 4.34. HYDRODYNAMIC MODEL COMPUTATIONAL GRIDS - TUNA FISHING HARBOUR.

4.8.2.2 Wave Computational Grids

The wave transformation for the present project is performed on a two dimensional horizontal rectangular grid with following information.

- The area covered by the grids;
- The spatial grid resolution;
- The use of nested grids with increasing spatial resolution. The models on the nested grids receive their boundary conditions from their host grid;

Furthermore, the spatial grid needs to meet the following requirements:

- It should be possible to define the wave conditions at the boundary of the outer computational grid. In practice, this means that they can be considered uniform or that their variation must be known.
- Boundaries where the wave conditions cannot properly be defined should not have any influence in the area of interest.
- The computational times should be acceptable.
- The grid resolution should be fine enough to reproduce the spatial depth variations that influence the wave conditions at the area of interest.
- The overall area should be kept sufficiently small to be able to consider the situation stationary.

In the present study a large grid and one detailed grid were used to compute the wave conditions for the proposed Tuna Fishing Harbour. The wave model grid was set up along similar lines to the hydrodynamic grids. Two nested grids were applied for the SWAN (Simulating Waves Nearshore) computational model, the wave model employed in Delft-3D.

These grids allowed for sufficient resolution to predict results accurately. Based on the NCEP wind and wave data, the boundary conditions were defined along the outer grid boundaries. The boundary conditions for the nested inner grid for the Tuna Fishing Harbour were supplied by the outer grid through nesting procedure. **Figure 4.35** shows the nesting arrangement of the wave grids.

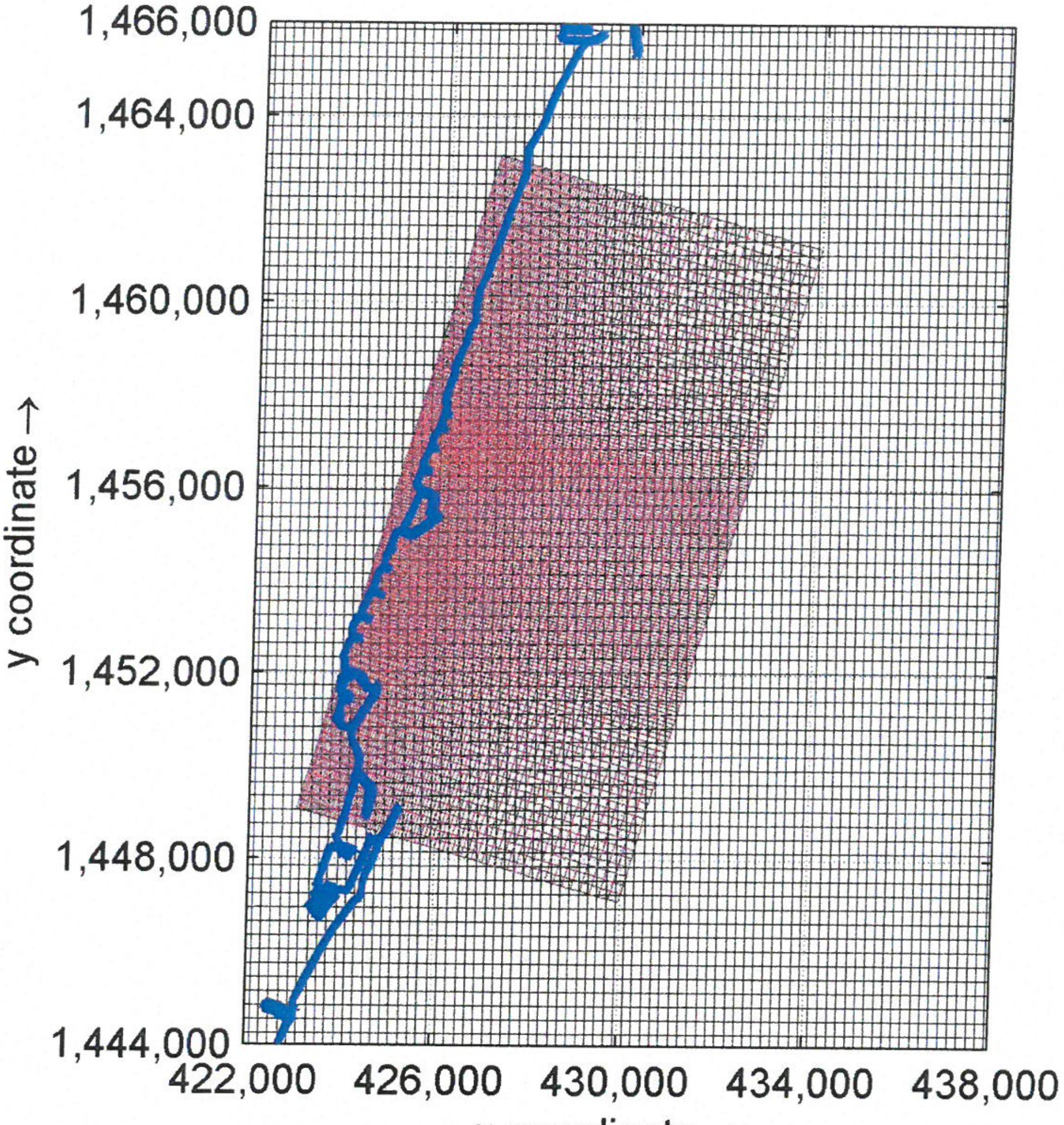


FIGURE 4.35.WAVE MODEL COMPUTATIONAL GRIDS - TUNA FISHING HARBOUR

4.8.2.3 Bathymetry

The bathymetry was prepared using the bathymetry survey data and relevant naval hydrographic charts For the offshore model domain, the GEBCO global elevations database has been used. This database contains the heights and depths worldwide on a resolution of one geographical minute, based on satellite altimetry observations combined with shipboard echo-sounding measurements. These data were compared with the information from the ETOPO2 database. **Figure 4.36** shows the bathymetry used for the cyclone modelling study.

For the present project, Mean Sea Level (MSL) is taken as reference level. The bottom depths were therefore corrected to MSL with the relation: MSL = CD + 0.80m, which is based on the information provided in the hydrographic charts.

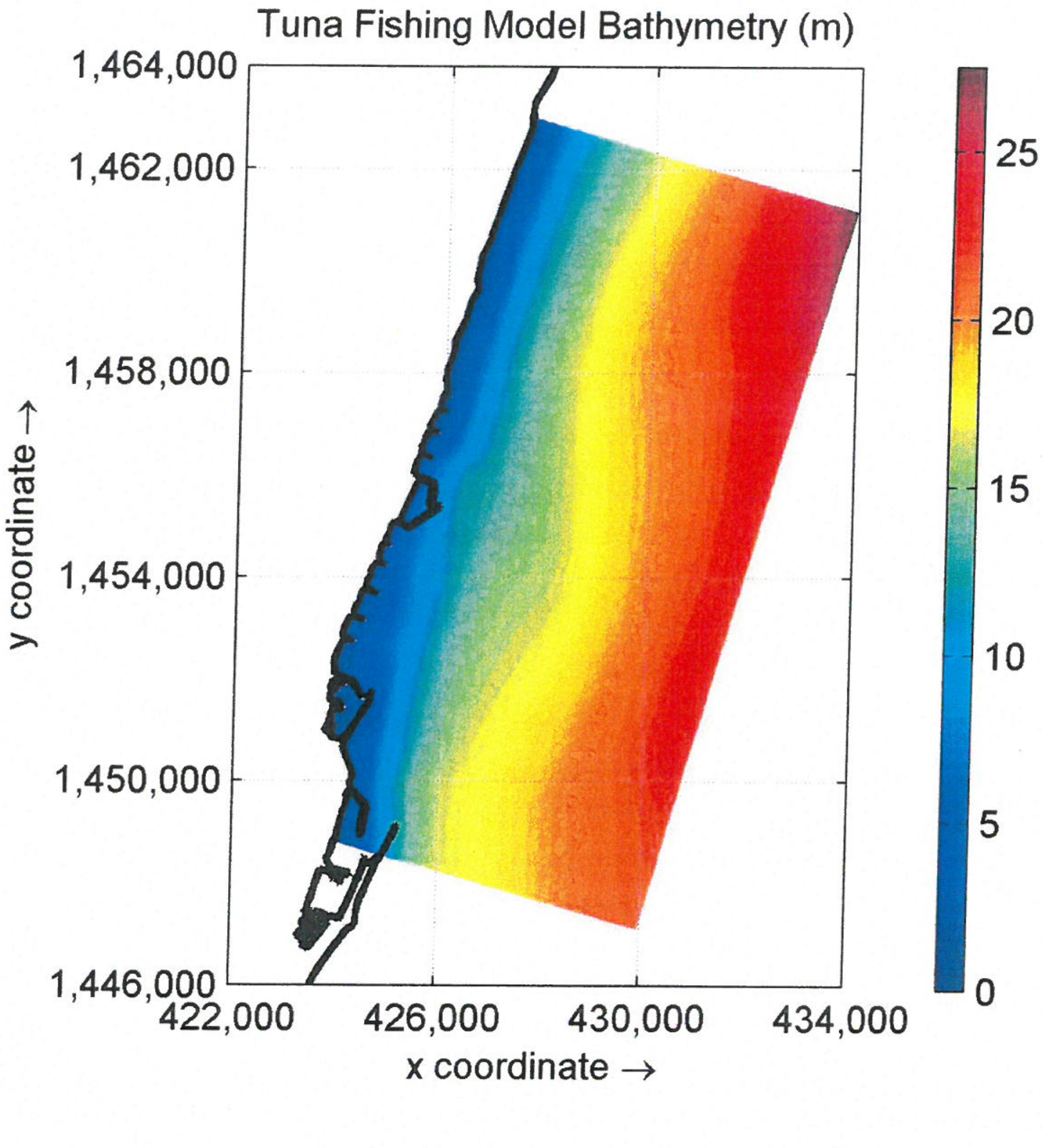


FIGURE 4.36.MODEL BATHYMETRY- TUNA FISHING HARBOUR.

4.8.2.4 Boundary Conditions

Tides

The boundary conditions for the site specific detailed Tuna Fishing harbour model was derived from the intermediate model (Pulicat to Besantnagar) using nested procedure within the Delft3D-Flow. Model is forced with time-series water level boundary conditions.

Wind and Waves:

The offshore wave data was derived from the NCEP wave database, covers the entire globe from the year till 2015.

4.8.2.5 Sea Bed Sediments

Sea bed sediment samples were not provided by client. Hence, the sea bed sediments were selected based on the literature. From a review of the literature, it is taken that the mean grain size of the sea bed material varies from 0.25 mm to 0.40 mm in this region. On this basis it was decided to adopt a sea bed sediment grain size of 0.32 mm for the present sedimentation modelling study.

4.8.2.6 Results

Tuna Harbour detailed model was set up and run for the proposed fishing harbour layout. Tuna Fishing Harbour sedimentation model was set up for the combined effect of tide, wind, wave and sediment transport for the estimation of siltation rates. Two representative wind and wave conditions for SW monsoon and NE monsoon were simulated for sedimentation estimation. Based on the grain size analysis, seabed sediments with D50 of 0.32 mm were considered in the present study.

Transformed wave heights with the Tuna fishing harbour during the SW monsoon and NE monsoon were presented in **Figure 4.37** and **Figure 4.38.**

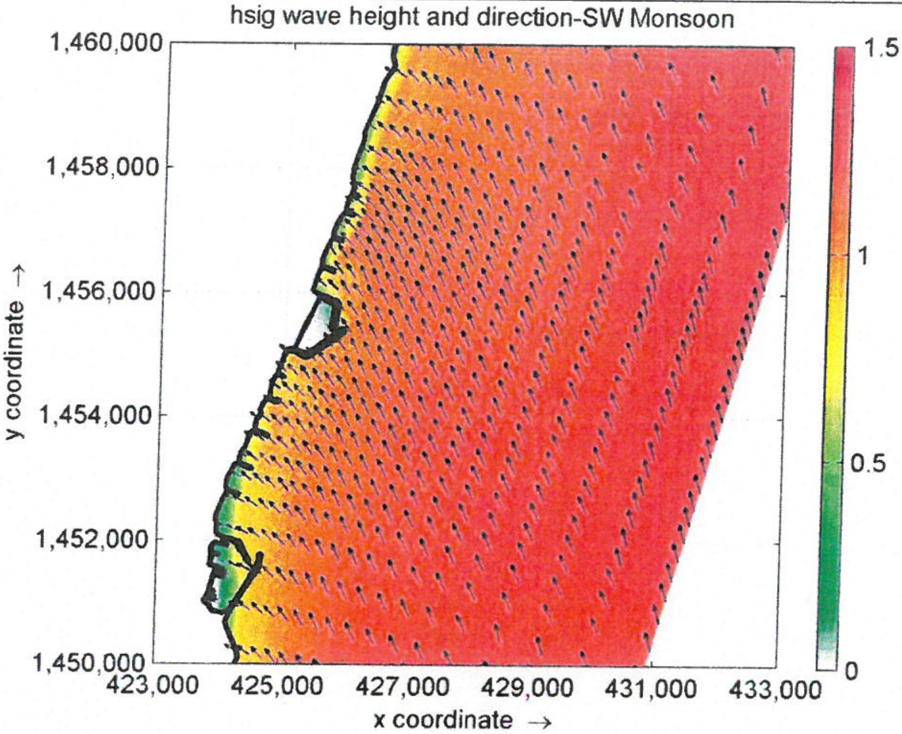


FIGURE 4.37.TRANSFORMED WAVE HEIGHT DURING SW MONSOON

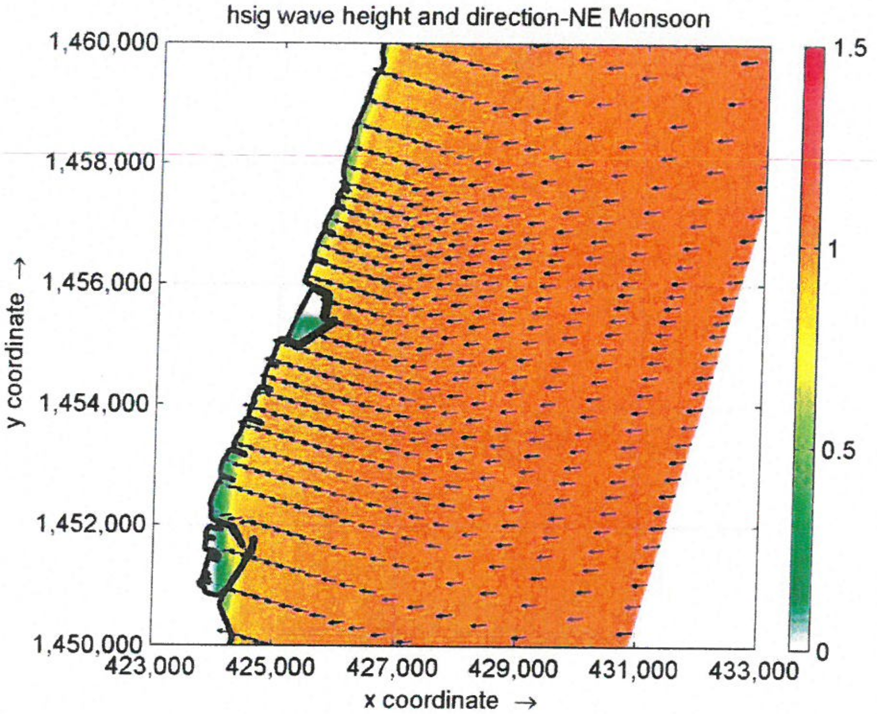


FIGURE 4.38.TRANSFORMED WAVE HEIGHT DURING NE MONSOON

Sediment transport model simulations were set up for 15 days period covering the complete spring neap tidal cycle with SW monsoon and NE monsoon conditions for the Tuna Fishing Harbour. **Figure 4.39, Figure 4.40** and **Figure 4.41** the model predicted sedimentation and erosion patterns during the SW monsoon, NE monsoon seasons and annual over the entire model domain.

Based on the sedimentation model simulations with the Tuna fishing harbour hardly any siltation noticed within the harbour basin and access channel.

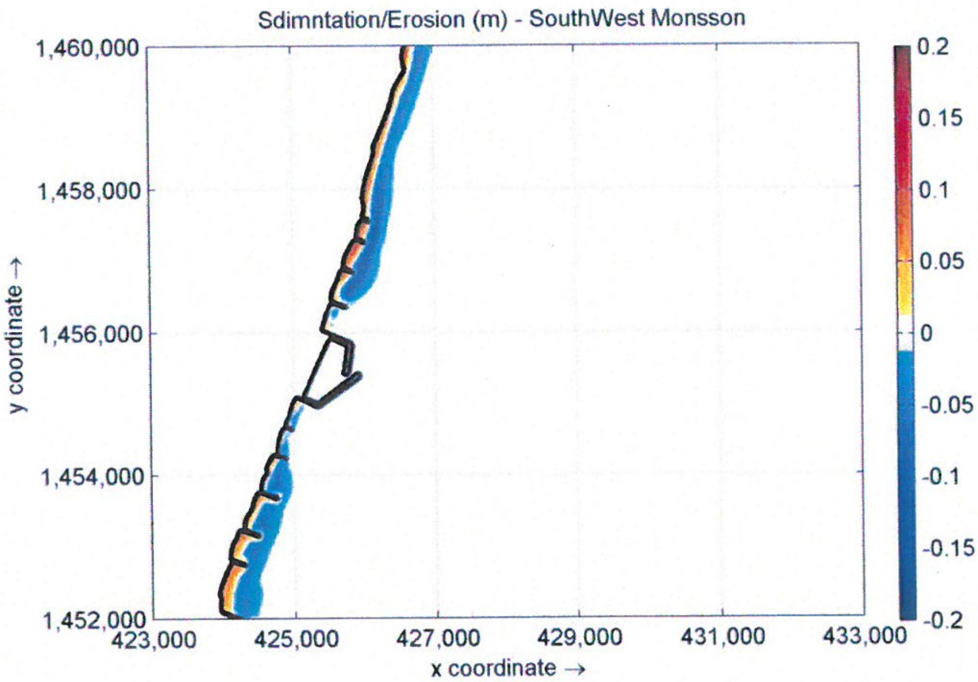


FIGURE 4.39.SEDIMENTATION AND EROSION PATTERNS WITH TUNA FISHING HARBOUR - SW MONSOON

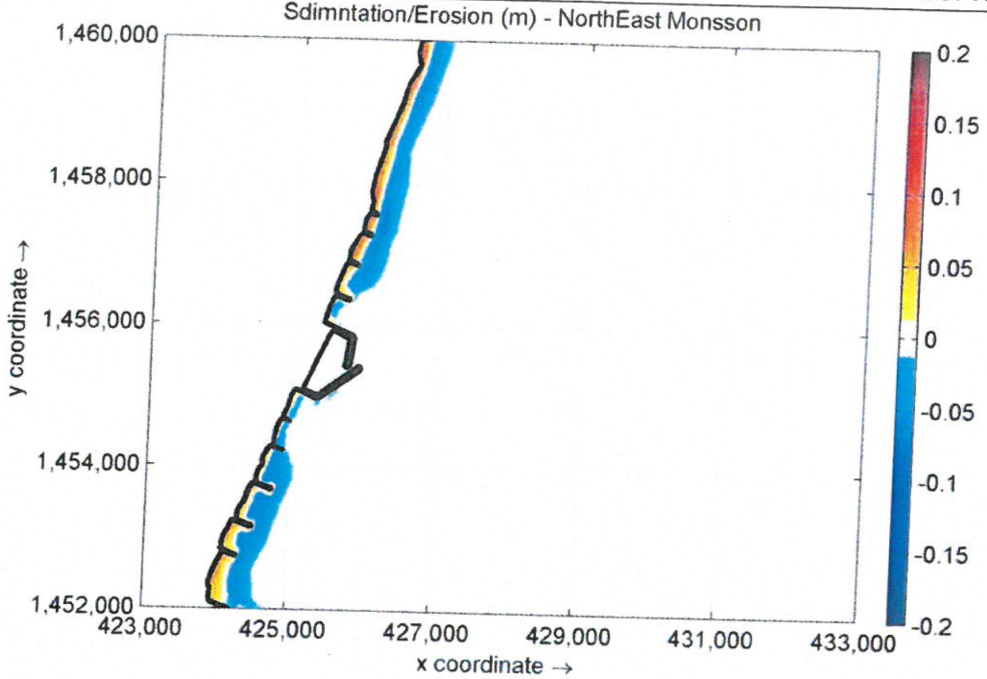


FIGURE 4.40.SEDIMENTATION AND EROSION PATTERNS WITH TUNA FISHING HARBOUR - NE MONSOON

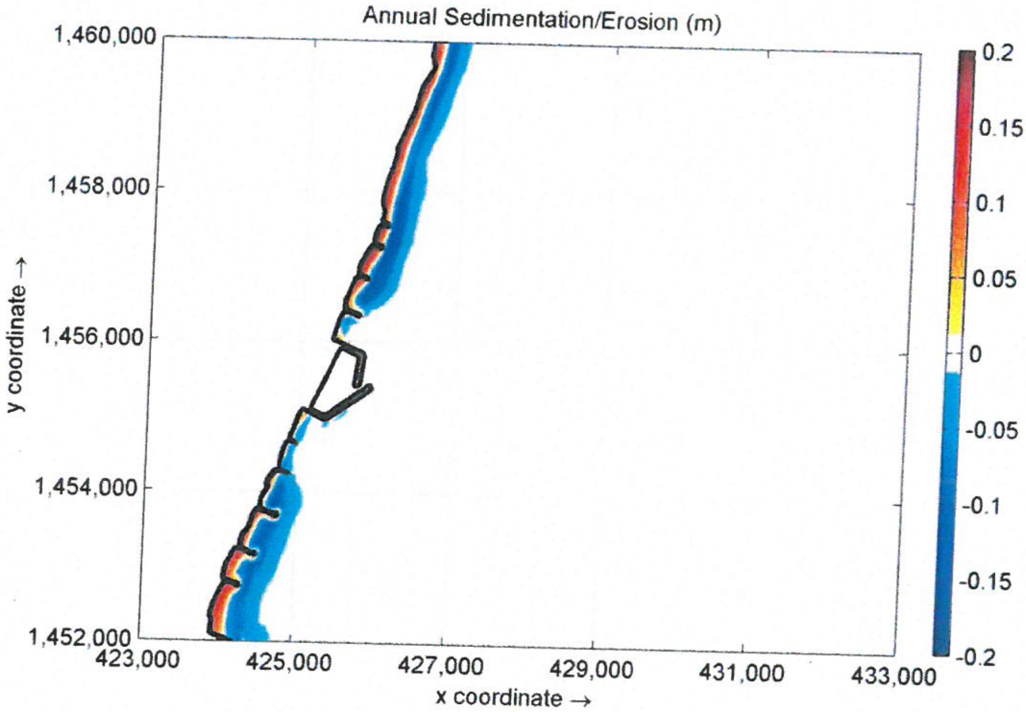


FIGURE 4.41.SEDIMENTATION AND EROSION PATTERNS WITH TUNA FISHING HARBOUR – ANNUAL

4.8.3 Long shore Sediment Transport

This section presents the quantitative estimation of longshore sediment transport using CERC formula. **Table 4.6** presents the monthly longshore transport at the nearshore point using the CERC formula. **Figure 4.42** presents the monthly longshore sediment transport at along this part of the coast. The transformed nearshore wave conditions were made use for the longshore sediment transport.

TABLE 4.6.MONTHLY LONG SHORE SEDIMENT TRANSPORT

S.No	Month	Longshore Sediment Transport (m^3/month)
1	January	134707
2	February	59159
3	March	-40587
4	April	-66328
5	May	-105811
6	June	-123430
7	July	-151574
8	August	-151574
9	September	-146685
10	October	-151574
11	November	158042
12	December	222324

Note: Minus sign (-) indicates Northerly moving longshore sediment transport and plus sign (+) indicates southerly moving Longshore sediment transport.

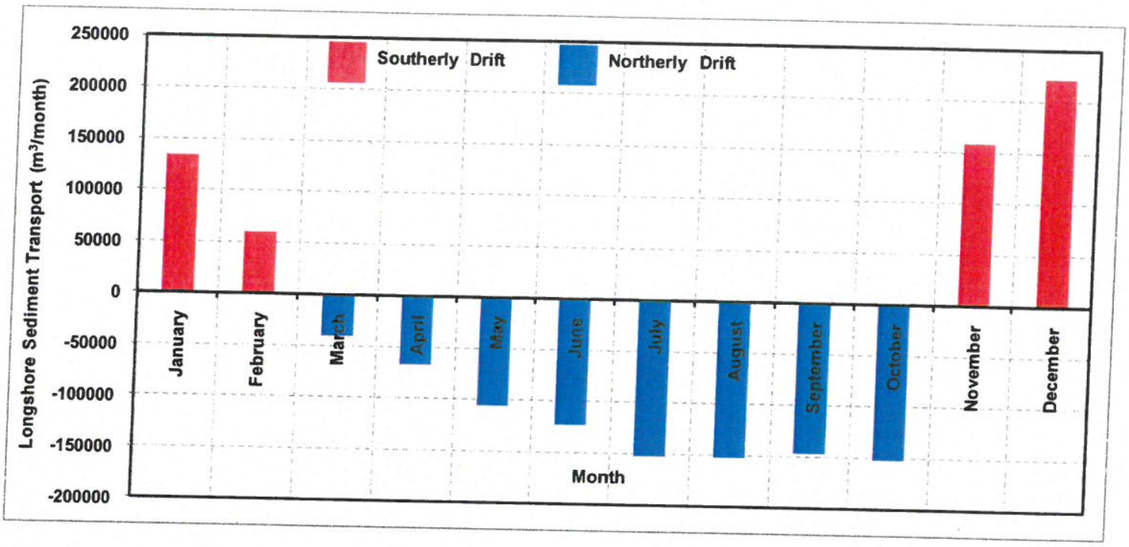


FIGURE 4.42.MONTHLY LONGSHORE SEDIMENT TRANSPORT

CERC estimates the net annual longshore transport of 363330 m3/year towards NORTHERLY direction. Usually CERC method estimates a conservative quantitative longshore transport. A 2D hydro-morphodynamic (sedimentation) modelling study presented in the section 2 provides the sedimentation/erosion patterns in this region with Tuna fishing harbour.

4.8.4 Conclusions

This study presents the sedimentation modelling carried out for the Tuna Fishing Harbour with the proposed layout. The study made use of available information on bathymetry from bathymetry survey, GEBCO/ETOPO2 and NCEP wind/wave conditions. Sedimentation and erosion patterns shows the longshore transport due to wave, wind conditions and tide induced currents.

Based on the sedimentation model simulations for the Tuna fishing harbour hardly any siltation noticed within the harbour basin and in the access channel.Development of the proposed Tuna fishing harbour will have mild impact along the northern part of the coastline.

4.9 1D SHORELINE CHANGE MODELLING STUDY

4.9.1 Introduction

1D shoreline change modelling was conducted to determine the change in shoreline due to the proposed TUNAfishing harbour at Thiruvottriyur Kuppam in Thiruvallur District, Tamil

Nadu. 1D modeling study was conducted using 10 year transformed nearshore wave climate at four locations.

The study was conducted using the numerical shoreline evaluation model ***GenCade,*** is a regional model for calculating coastal sediment transport, morphology change, and sand bypassing at inlets and engineered structures. GenCade simulates shoreline change produced by spatial and temporal differences in longshore sand transport. Shoreline movement such as that produced by beach fills and river sediment discharges can also be represented. The main utility of the modelling system lies in simulating the response of the shoreline to structures sited in the nearshore. Shoreline change produced by cross-shore sediment transport as associated with storms and seasonal variations in wave climate cannot be simulated; support of cross-shore processes are being considered for future versions of the model.

Capabilities of GenCade:

- Almost arbitrary numbers and combinations for groins, jetties, detached breakwaters, beach fills, and seawalls
- Compound structures such as T-shaped, Y-shaped, and spur groins
- Bypassing of sand around and transmission through groins and jetties
- Diffraction at detached breakwaters, jetties, and groins
- Coverage of wide spatial extent
- Offshore input waves of arbitrary height, period, and direction
- Multiple wave trains (as from independent wave generation sources)
- Sand transport due to oblique wave incidence and longshore gradient in height
- Wave transmission at detached breakwaters

4.9.2 Study Area

The following figure shows the study area for the 1D model.

FIGURE 4.43 STUDY AREA FOR THE SHORELINE MODEL

The data for the shoreline evolution study was obtained from Google Earth images. It is noted that the proposed Tuna fishing harbour site is located inside the groins, 13 in numbers, forms a groin field. The groins, put up over four km, vary in length from 165-300 metres. On an average the groins are spaced 300 m apart. Their height is four metres above the mean sea level. The length of Rubble mound sea wall is found to be more than 8.2 km. From the proposed site, the northern side sea wall accounts to be more than 5 km and 2.8 km in the southern side. A few beach pockets are visible in the stretch mainly to land the country boats.

4.9.3 Model set up and Calibration

1D model has set up based on the 2005 and 2015 coastline digitized from Google Earth. Transformed nearshore wave climate for 10 year period (2005 to 2015) at four locations along the north Chennai has utilized. 1D model grid was built at 20 m spacing and the existing groins as well seawall represented in the model set up.

Model has calibrated by simulated based on the 2005 initial coastline digitized from Google earth and compared with the 2015 coastline. **Figure 4.44** Shows the 1D model set up and comparison model simulated coastline with present coastline on Google earth map.

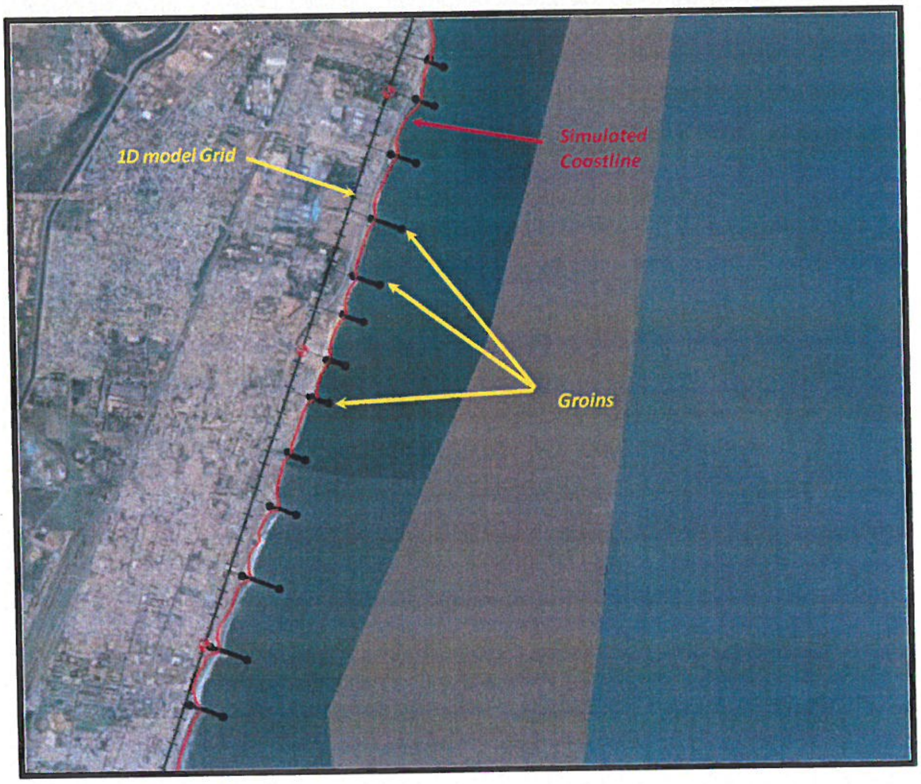


FIGURE 4.44 1D MODEL GRID AND COMPARISON OF COASTLINE OVER 10 YEARS

4.9.4 Shoreline Change with Tuna Fishing Harbour

Then, 1D model has set up run for the present shoreline without and with proposed Tuna fishing harbour layout. Shoreline change due to Tuna Fishing Harbour was set up using 10 year period transformed nearshore wave climate at four locations. Based on the grain size analysis, seabed sediments with D_{50} of 0.32 mm were considered in the present study.

Figure 4.45 and **Figure 4.46** show the 1D model set up and shoreline change after 5 and 10 years due to proposed Tuna Fishing Harbour.

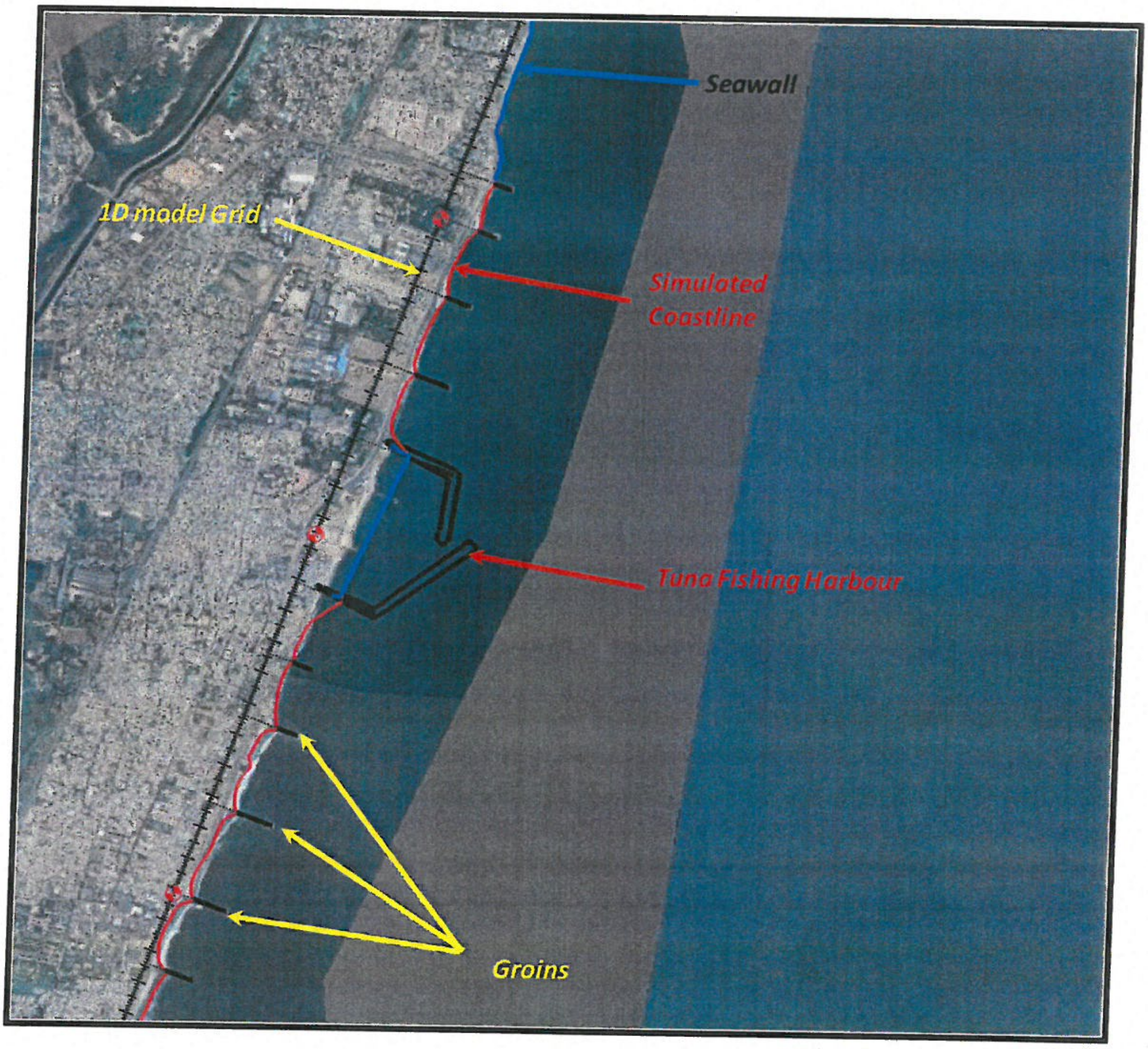


FIGURE 4.45.1D MODEL GRID AND SHORELINE CHANGE AFTER 5 YEARS DUE TO PROPOSED TUNA FISHING HARBOUR

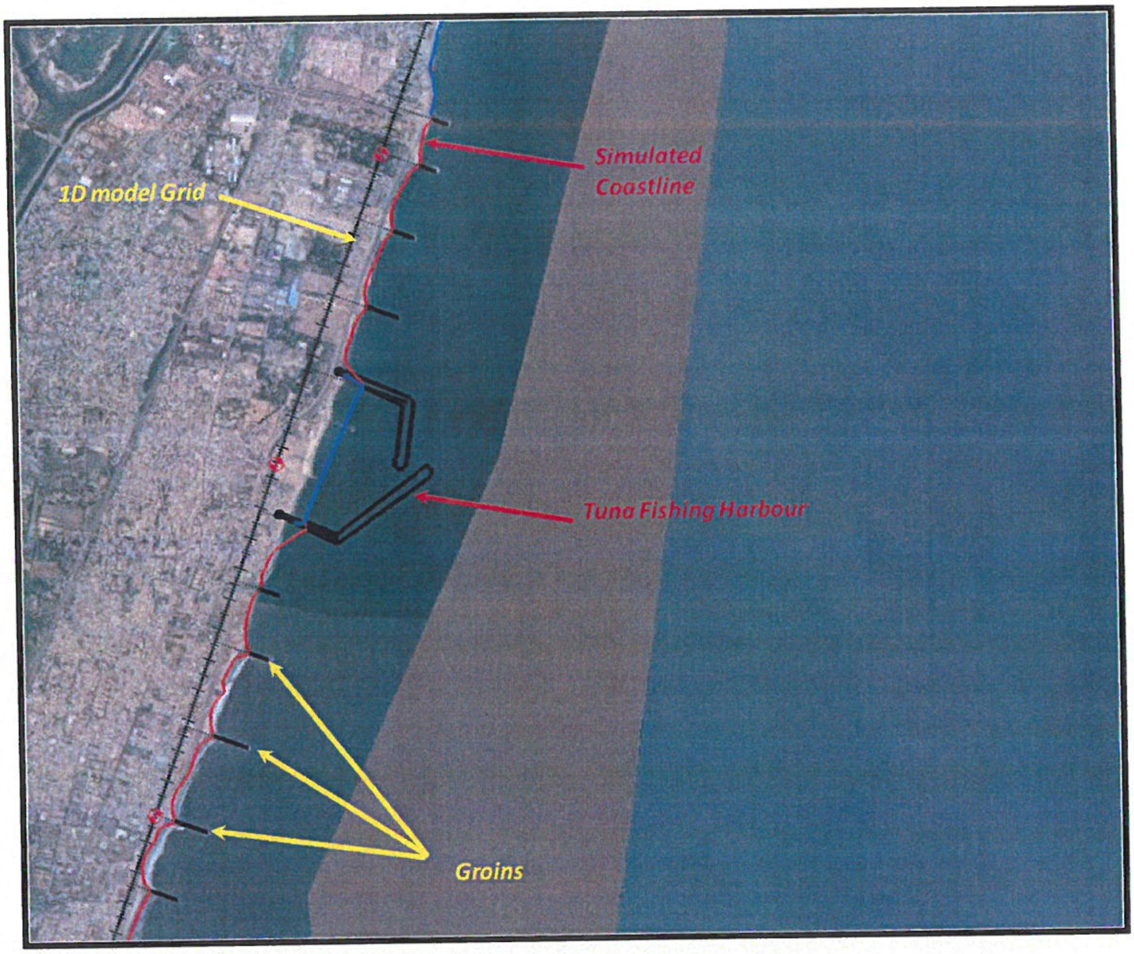


FIGURE 1.46 ID MODEL GRID AND SHORELINE CHANGE AFTER 10 YEARS DUE TO PROPOSED TUNA FISHING HARBOUR

Detailed shoreline change on the north and south of proposed Tuna Fishing harbour after 5 and 10 years are presented in **Figure 4.47** and **Figure 4.48**. Coastline will get stabilized within 5 years after the construction of the proposed fishing harbour and minimum changes in shore line will be expected due to seasonal variations after 5 years.

FIGURE 4.47.DETAILED SHORELINE CHANGE ON NORTH AND SOUTH OF THE PROPOSED TUNA FISHING HARBOUR AFTER 5 YEARS

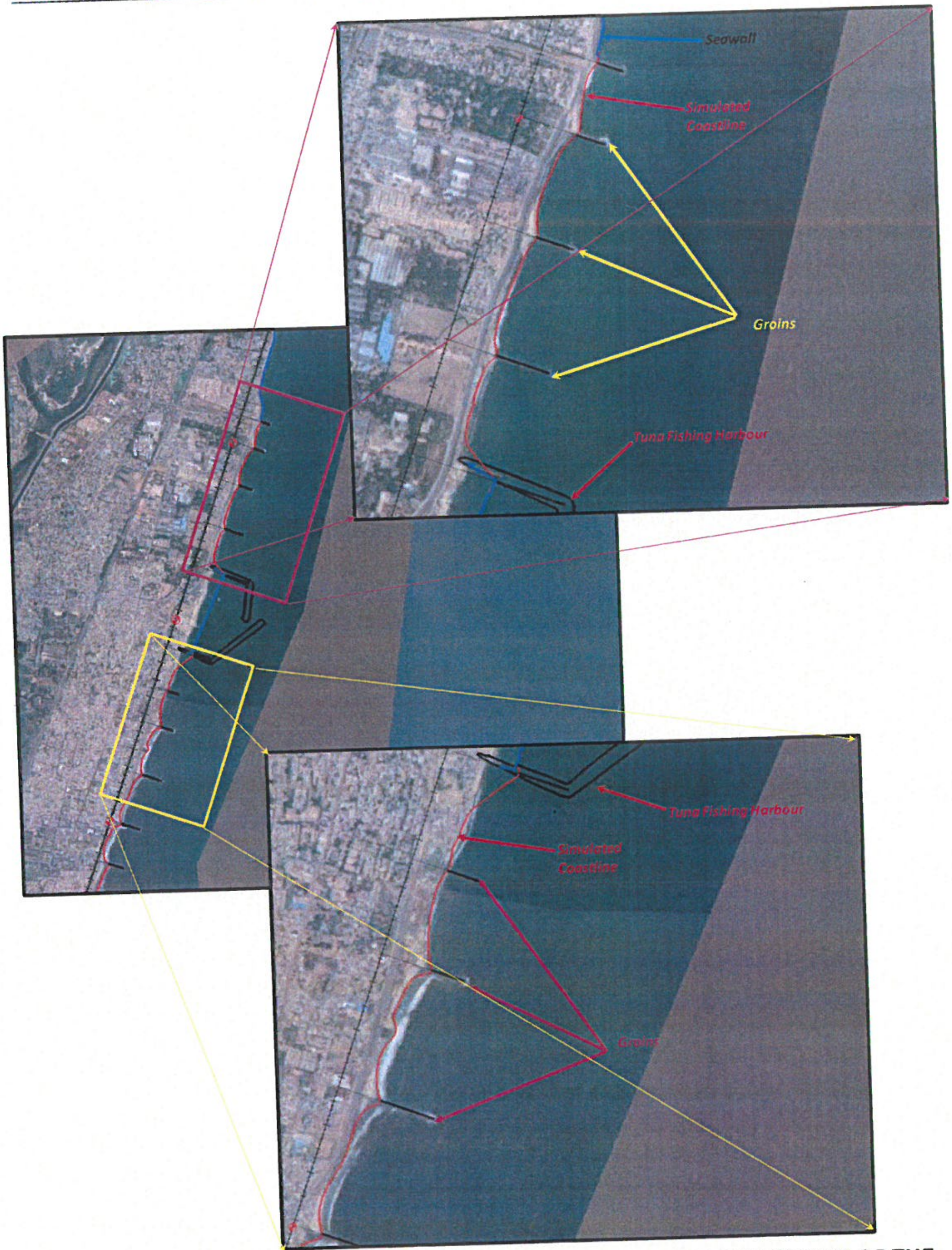


FIGURE 4.48.DETAILED SHORELINE CHANGE ON NORTH AND SOUTH OF THE PROPOSED TUNA FISHING HARBOUR AFTER 10 YEARS

4.9.5 Net Transport

This section presents the quantitative estimation of longshore sediment transport using CERC formula. Table 1 presents the monthly longshore transport at the nearshore point using the CERC formula. Figure 7 presents the monthly longshore sediment transport at along this part of the coast. The transformed nearshore wave conditions were made use for the longshore sediment transport.

1D model results of mean annual net transport at few points (**Figure 4.49**) on both side of the proposed Tuna fishing harbour is presented in the **Table 4.7**. The net transport is moves Northerly Direction. Mean annual net transport for the existing coastline, with proposed fishing harbour and the difference in net transport are presented in the **Figure 4.50**.

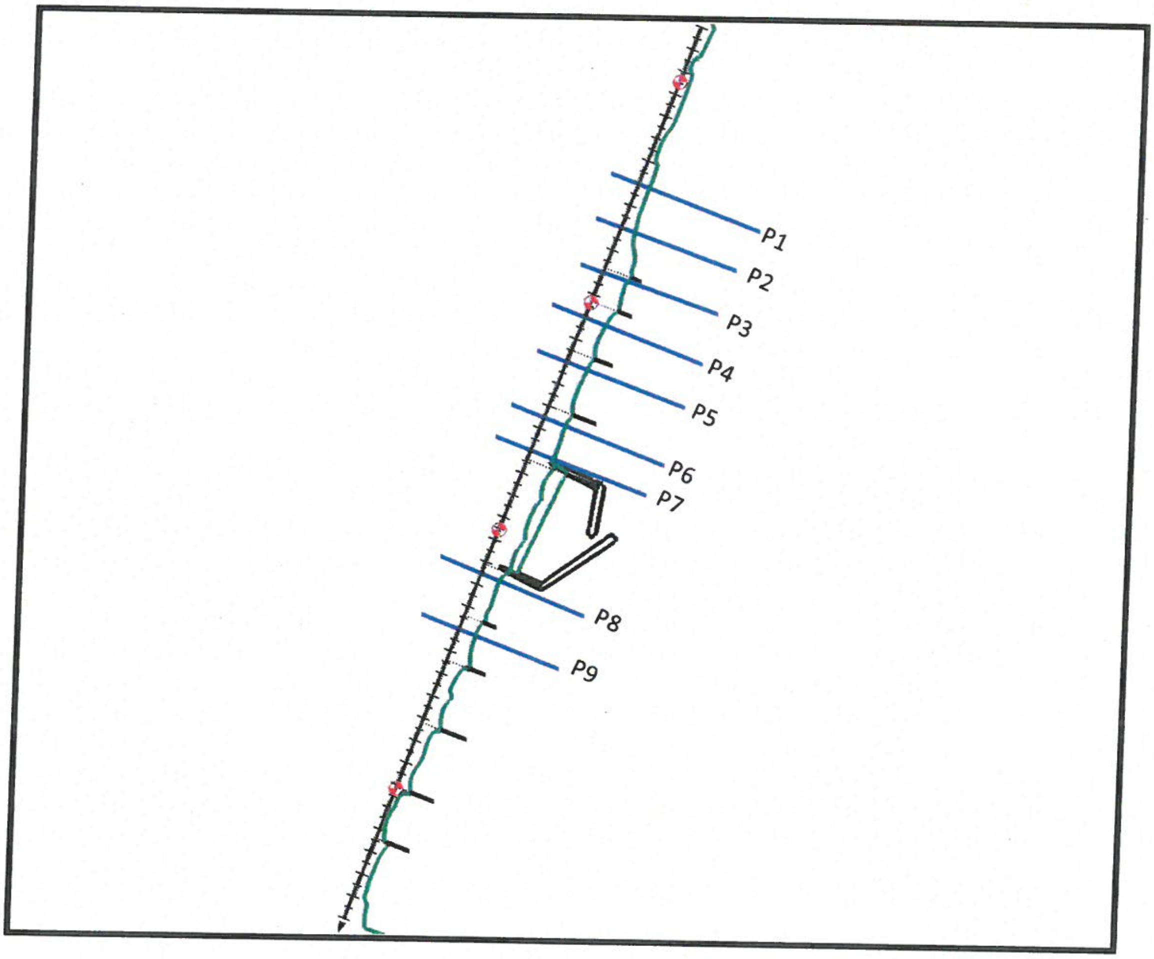


FIGURE 4.49.LOCATIONS OF POINTS FOR NET TRANSPORT ESTIMATION

TABLE 4.7.MEAN ANNUAL NET TRANSPORT AT VARIOUS POINTS.

Point Number	Mean Annual Net transport (m^3/year)		
	Exiting Shoreline	With Tuna Fishing Harbour	Difference
P1	51886	55227	3341
P2	51854	55252	3398
P3	54678	61162	6484
P4	47291	49378	2087
P5	39066	38640	-426
P6	29607	26319	-3288
P7	27308	23733	-3575
P8	40555	41026	471
P9	44602	42681	-1921

Note: Minus sign (-) indicates Erosion and plus sign (+) indicates Accretion

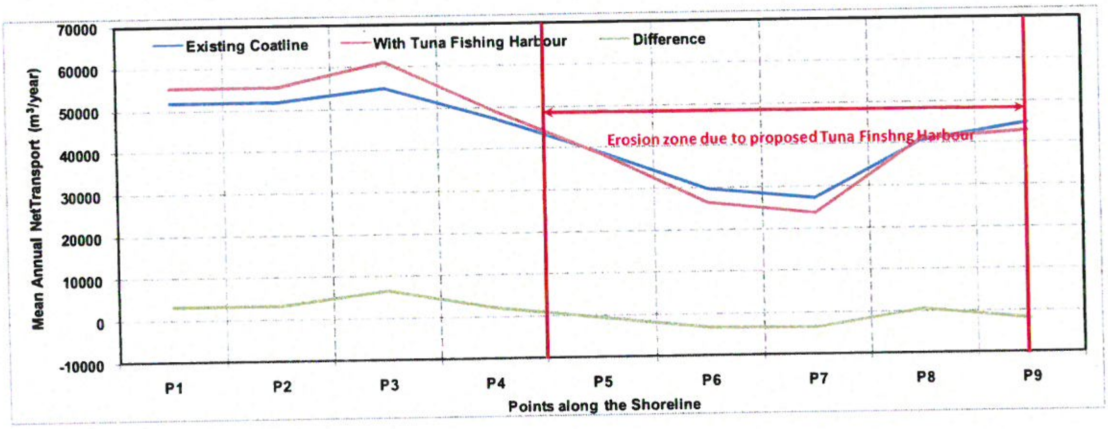


FIGURE 4.50.MEAN ANNUAL NET TRANSPORT AT VARIOUS POINTS

Discernible accretion is observed in P3, which the point considered is in southern side of groin, prone to accretion.

The mean annual net transport is towards ***NORTHERLY*** direction. Erosion of coastline due to proposed Tuna fishing harbour is observed within 800 m.

4.9.6 CONCLUSIONS

This study presents the 1D shoreline change modelling carried out for the Tuna Fishing Harbour with the proposed layout. The study made use of 10 year (2005-2015) transformed wave climate at four locations along the coast.

Based on the 1D shoreline model simulations for the Tuna fishing harbour marginal difference annual net transport observed and erosion of surrounding coastline within 800 m from the harbour noticed. Development of the proposed Tuna fishing harbour will have mild impact along the surrounding coastline.

The Coastline will get stabilized within 5 years after the construction of the proposed Tuna fishing harbour and minimum changes in shoreline will be expected due to seasonal variations after 5 years. It is concluded that, the existing shoreline protection measures ie. the groin field with Rubble mound sea wall is sufficient enough to hold the new harbour facilities, without leading to accretion/erosion problems.

V. IMPACT EVALUATION AND ASSESSMENT

5.1 GENERAL

The proposed **Fishing Harbor** is intended to predominantly address the infrastructural requirements of Tuna fish catch, handling, transfer and marketing. Nevertheless, the proposed FH will principally function as a Fishing Harbor with state of the art facilities. The proposed FH will enable the fishermen to increase their fish catch and eventually enhance their selling price of their catch.

The landside fishery structures will also support transfer of fish catch to distance places in a scientific way with increased shelf life. The existing coastline of the project location is learnt to have a stabilized shoreline in the presence of a field of Groynes to prevent coastal erosion along project line.

The proposed fishing harbour facility is intended principally to ease out the congested Chennai Fishing Harbour as it is overflowing with more traffic and fishing activities. At times, there is an acute shortage of space to land the boats inside the harbour. The proposed Harbour location is about 3.5Km North from the Chennai Fishing Harbour which will provide location advantage and flexibility in harbour operation and fishing activities.

The proposed Harbour is envisaged to have 840 m berthing facility along the shoreline. In the first assessment on the basis of requirement, it will have 379-metre-long wharf for 18 m trawlers; a 342-metre-long wharf for tuna boats; a 110 – metre long wharf to accommodate fibre-reinforced plastic (FRP) boats.

The harbour will also have fish handling halls, auction hall, cold storage, ice factory, fuelling station, power-back up centres and dormitory for workers.

The harbour will also have fish handling halls, auction hall, cold storage, ice factory, fuelling station, power-back up centres and quarters for workers.

The location of the proposed harbour is in the mid of a Groyne Field which is in place since 1998 and found as a stabilized shoreline which otherwise should have been an affected zone by erosion due to Chennai Fishing Harbour and Chennai Port which are on the Southern side of the project location and much within the influence Zone of littoral drift of about 10km.

The project is envisaged as coastal infrastructures towards a standalone fishing Harbor. The net fish handling capacity of the proposed Tuna Fishing Harbor is **69,000TPA.** The first level Budgetary Estimation for establishing the proposed Tuna Fishing Harbor is made for **Rs.240.00 Crores.**

5.2 PROJECT

The proposed **Tuna Fishing Harbor** is primarily to de-congest the overcrowding of fish boats and vessels in the existing Chennai Fishing Harbor which of just 3.5Km south of the project location.

The project location is geographically located between **13^0 09' 41.37" to 13^0 10' 10.22" N Latitude** and **80^0 18' 31.34" to 80^0 18' 42.33" E Longitude** in the Coramendal Coast, in Thiruvottriyur Kuppam, Thiruvottriyur Taluk, Thiruvallur District, Tamilnadu.

The proposed Harbour is envisaged to have 840 m berthing facility along the shoreline. In the first assessment on the basis of requirement, it will have 379-metre-long wharf for 18 m trawlers; a 342-metre-long wharf for tuna boats ; a 110 – metre long wharf to accommodate fibre-reinforced plastic (FRP) boats.

The harbour will also have fish handling halls, auction hall, cold storage, ice factory, fuelling station, power-back up centres and quarters for workers. These land side facilities will be established in the reclaimed land area of **15.63 Ha**. The break waters will have 852 m on the Northern side and 1088 m on the Southern side which will ensure water spread area of **30.87 Ha.**

The water spread areas and the proposed wharf facilities are envisaged with elaborate planning and engineering design to facilitate fishing activities and boat or vessel management for about 300 numbers of FRP boats(10m), 300 numbers of Trawlers(18m) and 200 numbers of Tuna boats(20m).

It is important to ensure -4m draft in the water spread area of the Harbor to facilitate the navigation of boats and vessels. On the basis of real time bathymetry study by (2015), it was assessed that 25,460 cum of dredging is must. The proposed landside facilities require land to be reclaimed as it is not feasible to acquire from the existing stretches of land. Hence, it is proposed to dredge 1,75, 240 cum of sand mud from off shore area to reclaim land of 15.46 Ha for establishing the land side infrastructures.

The net fish catching and handling capacity of the proposed Tuna Fishing Harbor is **69,000TPA.**

5.3 TUNA FISHING HARBOR– ANALYSIS OF IMPACTS

The proposed FH will have net positive impacts as it is intended to provide fish handling, storage, and marketing, transfer systems which eventually will improve the socio economic status of the fishermen community of the project location. The fishermen will find it easy and safe to have parking of their fishing boats and catamarans.

Principally, there could be only three significant negative impacts due to fish handling, breakwater construction and dredging.

5.3.1 Air Pollution

The mechanized boat/vessels/crafts will get parking area and the discharge of emission is little and short term. Also, the intermittent operation of the DG Set will pose a short term problem in the ambient air quality.

Such emissions, however, are intermittent, insignificant and non-quantifiable as the boats or vessels are moving sources. The DG set emission is only intermittent and temporary only during the hours power break down.

5.3.2 Water Pollution

The water requirement for FH is assessed for 250 KLD of potable water which will be sourced by operating Reverse Osmosis Plant. The reject disposal can be safely ensured into sea and hence, there will not be any impact.

The requirement of water for fish washing and other secondary requirements is assessed for 500 KLD of sea water for fish washing and cleanings. It will be sourced directly through suitable intake structures.

There will be two Wastewater Treatment Plants. Fresh waster waste streams will be treated in Zero Discharge Treatment plants with Ultrafiltration package to reclaim water so that the reclaimed water will be used for green belt and flushing of toilets to offset the requirement of virgin water requirement. An exclusive wastewater Treatment Plant will be installed for brine water discharges which after treatment and disposal will be discharged into sea.

5.3.3 Solidwaste

The Solidwaste generation is assessed for about 3 TPD mainly from fish handling and other domestic activities. This will be converted into manure by installing exclusive mechanized systems for composting.

The general waste out off domestic activities like food waste will be sent to the local body for managing in their Solidwaste management facility.

5.3.4 Noise

There is no noise generating processes. However, the intermittent operation of 100KVA Generators may have noise. DoF will install MoEF&CC certified DG sets with acoustic enclosures in order to keep the noise level within the permitted levels.

5.3.5. Biological Environment

No discharge of effluent from FH. There also no discharge of effluent or any emission from the activities in the proposed FH. Hence, no change in coastal biology is foreseen. The strata made out of Rubble/Stone Surfaces of the Break water will host specific species of microorganisms which may lead some change in the amount of specific species like, green algae will profusely grow.

The coastline also has no biological sensitivity other than the common coastal biology of flora and fauna. The impact due to infrastructure developments like road and building and construction materials on biodiversity will be negligible. There are no major impacts on under water marine biodiversity due to dredging activities. However, this change on the account of microorganisms and benthic organisms due to dredging will become acclimatized to the changed environment of physical strata. This will not, anyway spoil the biological attributes of the shoreline.

5.3.6 Socio Economics

The proposed project is essentially to enhance the fishing activities in the project location and also to provide fishery infrastructures to enable the fishermen to handle and market their products positively for a higher price. The proposed FH will provide safe landing and parking area for the boats/crafts/trawlers is need based to provide infrastructures for the fishermen in the project location.

Peoples of urban agglomerate of Thiruvottriyur Kuppam, Kasimedu and Royapuram and also in the nearby areas have made several representations to Government of Tamilnadu for the proposed FH to have better socio economic growth.

The proposed project will make the project location as more protected coastal areas which eventually enhance fishing and allied activities. This will minimize the vulnerability of property loss due to high wind and strong waves of the prevailing conditions. The fishing activities will improve and their life will prosper. The fear of damages to their vessels and safety of their vessels will improve the socio economic conditions of the project location.

CEHS was found the villagers demanding for the early completion of this project, during every visit during the environmental survey.

5.4 EVALUATION OF IMPACTS

The impacts due to the proposed FH is net positive and the project is essentially for cause of fishermen of the project location and to encourage fishing activities through safe landing places and buildings for quick and proper handling of fish catch to ensure a good marketing.

The impacts are required to be evaluated for potential significances and value indexes.

The environmental impacts are considered in four accounts as follows;

Impact I : Mitigated by EMP and systems

Impact II: Not yet fully and qualitatively assessed.

Impact III: Not yet fully and quantitatively assessed.

Impact IV: Positive impacts.

The potential significance of impacts are denoted as Viz., short term (S), long term (L) and permanent (P).

However, the elaborate methodology of constructing **EIA Matrix** is not required as the proposed project is not to pose any type of pollution and environmental impact on the project location.

5.5 IMPACT QUANTIFICATION

To quantify the assessed impacts, they are assigned certain arbitrary weightage on the basis of standards and listed in **Table 5.1.**

TABLE 5.1 ARBITRARY WEIGHTAGE VALUES FOR IMPACT ASSESSMENT

S.No.	*Parameters*	Importance Value
1	Air Quality	100
2	Water Resources	100
3	Land Use Pattern	100
4	Solid waste disposal	100
5	Noise Level	50
6	Coastal /Marine Environment	200
7	Human Settlement (Predominantly Fishermen)	250
8	Public Health/Safety	100
	TOTAL	**1000**

The values of the importance of the environmental parameters are related to the impacts of the proposed project activities of **DoF/GoTN.**

To sum up impact score, the coefficient of impacts for different environmental parameters is assumed. The values are ranging from **0 – 5** are used in Quantification of total impact value for the proposed project of **DoF** and listed in **Table 5.2.**

The assumed coefficients of impact, which are devised based on the impact quality, are for quantifying the total impact values of the proposed project of **DoF.**

The total impact value, as calculated in the Table is **+1300**, which favor the implementation of the proposed project of **FH** by **DoF.**

The total impact score is an assertive, positive score, which favors the implementation of the project.

TABLE 5.2 COEFFICIENT VALUES FOR IMPACT ASSESSMENT

Sl.No.	Coefficient Criteria	Coefficient of Impact
1.	No impact	0
2.	No appreciable impact	0
3.	Significant impact-short term	-1
4.	Major impact-long term reversible	-1
5.	Major impact-long term irreversible	-2
6.	Permanent impact	-2
7.	Positive impacts	+1, +2

VI. ANALYSIS OF ALTERNATIVES

6.1 GENERAL

The proposed FH is primarily in a location which is historically known for fishing and fishermen settlements. Despite the location is in the urban limits of the Chennai city, the location is active for fishing with the Chennai FH at 3.5Km south of it.

Within the total coastline of 33.75 Km from Chennai to interstate boundary with Andhra Pradesh, there are two major Cargo Ports, one FH and one Container Port.

The project is proposed for implementation by DoF as an extended activity to the existing Chennai FH to promote predominantly support Tuna fish catching and also reduce the crowded traffic of boats/vessels/crafts in the Chennai FH.

The scope of evaluating site conditions and positive index value is very much limited to address the requirement or demand of the local fisherman community, for DoF, Government of Tamilnadu. However, DoF examined other options of locations in the stretch and developed a Site Matrix for screening the feasibility and site compatibility.

Erosion of the project shoreline has been stabilized in the last one decade of time with the field of groynes performed to reclaim the area lost earlier to erosion. Although, such FH at the proposed site will make the further North shore vulnerable to erosion, the project is need based and required systems can be incorporated on the leeside of the Northern Break waters to safeguard the project shoreline.

6.2 CHOICE OF ALTERNATIVE SITES

Three sites were considered for promoting the FH to decongest the Chennai FH by DoF. The three alternative sites are shown in the **Fig.6.1.**

The proposed location was chosen on the basis of its physical status, direct access, shoreline contour, present use, availability of land, erosion with loss of beach, etc,.

Strategically under compelling situation, the sites were chosen on the Northern side of the Chennai FH and also before the Ennore Kamarajar Port. The proposed location was identified and recommended for the proposed FH, primarily by the major stakeholders - the nearby fishing community.

The Site Analysis and Environmental advantage of the project location is presented in **Table 6.1.**

The project location of **30.87** hectare is fully owned by Government and the land delineated by Government for the promotion of the proposed FH.

The fisherman communities at Thiruvottriyur Kuppam and nearby areas like Royapuram and Kasimedu have made several representations to the line departments of State Government including the district Collectorate for a new FH as the Chennai FH has become excessively crowded. The proposed FH is, thus, to address the long pending representations of the fishing community.

This location is learnt to have a erosion prone coastal stretch. However, it is observed now for a completely stabilized coastal features and characteristics with a strongly formed beach between the groynes. The sand by passing was found naturally occurred and the site has become fully recovered to have a strong, sandy shoreline.

The coastline also has **no biological sensitivity other than the common coastal biology of flora and fauna.**

Among the alternative sites, the proposed site at Thiruvottriyur Kuppam has been surveyed to require less dredging for a depth of 4m in the harbor area. Also, the landside facilities can be developed with less amount of dredged sand (1,70,000m^3), for an extent of 20 Ha.

6.3 ALTERNATIVES OF TECHNOLOGIES

The FH is envisaged to promote with fishery infrastructures to enable the fishing community to handle predominantly, Tuna catches in a more efficient way and market it profitably. However, the proposed FH is not standalone for Tuna Fishes. Instead, it is envisioned to act as an extended facility of Chennai FH.

The FH design is done by DoF on the basis of the requirements to ensure safe navigation and parking for fishing vessels, boats and crawls. The FH will also have land side facilities to support the fish handling, marketing and facility management. A total extent of 5 hectare was used to promote the land side support facilities with larger sanitary complex to ensure the operation of the FH to meet the International Standards for safe and hygienic fish handling, storage, packing, transfer and marketing.

Table.6.1. ENVIRONMENTAL ADVANTAGE- PROJECT LOCATION

Sl.No	Environmental Attributes	Advantage- Proposed location
1.	Location	Thiruvottriyur Kuppam, Thiruvottriyur Taluk, Thiruvallur District. Land of 30.87 Hectare is readily available with DoF. No acquisition of land is required.
2.	Access	Direct Access is Available from (SH114)
3.	Coastal area	Historically a Tuna fishing harbour
4.	Erosion/Accretion	Stable/No Interface
5.	Dredging	1,75,240m^3 dredging is used to reclaim land of 15.63 Ha for establishing the land side infrastructures.
6.	Tourism	In Thiruvottriyur Kuppam Near to Chennai
7.	Socio Economic	Enhancing local fishing activities. Indirect benefits for value addition to their sell price of the fish catch.
8.	Air	AAQ is well within the prescribed levels
9.	Water	External source – 750 KLD
10.	Noise	Insignificant
11.	Marine Sensitivity	No Marine species of Importance. No interface No Mangrove will be cut or removed, as there is no plantation of Mangrove in the project location
12.	RR Plan	No displacement as the area has any settlement. No RR Plan is required
13.	Over all Environmental Compatibility	No Discharge/ Disposal, as there is no direct interface or interaction with sea.

The FH was designed to optimally use the available coastal stretch to develop both waterside and landside facilities, by Virgo Aqua, Bangalore.

The FH is planned to have all required facilities in a water spread area of 30.87 Ha and infrastructural facilities in the reclaimed land area of 15.63 Ha. The following are salient facilities proposed in the FH with state of art planning and designing tools to promote the FH with world class standards;

The summary of total quay length required for landing, outfitting, repair and berthing of fishing vessels is as follows:

Sl. No.	Type of quay	Fishing vessel size			Quay Length (m)
		10 m FRPs	18 m trawlers	18 m Tuna boat	
1	Fish landing quay (m)	44*	140	176	316
2	Outfitting quay (m)	44*	40	44	84
3	Repair quay (m)	22*	20	22	42
4	Idle-berthing quay (m)	--	179	100	279
Total		**128***	**110***	**379**	**342**

*Separate low level quay of 110m is proposed for landing outfitting and repair of FRP boats. However, their idle-berthing would be done in calm water or hauling on to land through RC sloping hard during non fishing and rough weather seasons.

For mechanized vessels piled quay structure of 730m length with deck elevation of RL +2.50m is proposed.

The revised layout of the fishery harbour has been planned so as to get maximum protection inside the harbour to accommodate the design fishing fleet vessels for normal operation and to take shelter during bad weather. Two breakwaters are advocated for providing a sheltered basin of the required area. The layout has been finalized by incorporating the results of numerical model studies and in consultation with the Fishery Harbour Circle under the State Fisheries Department.

The main facilities proposed in the fishery harbour layout are as follows:

- Breakwaters
  - Northern Breakwater 852 m
  - Southern Breakwater 1088 m
- Dredging and disposal
- Reclamation and leveling
- Quays (RCC bored pile) for MFVs 730 m
- Quays (RCC bored pile) for FRPs 110 m
- Internal road within the harbour complex
- Fish Handling and Auction Hall for MFVs (1273 Sqm)
- Tuna Fish Handling and Packing Hall (1200 Sqm)
- Fish Handling and Auction Hall for FRP boats (258 Sqm)
- Fishery Administrative Office 163 Sqm
- Fishermen gear sheds (9Nos.x176.87 Sqm) 1591.83 Sqm
- Net mending sheds (4Nos.x258.10 Sqm) 1032.4 Sqm
- Fishermen rest sheds (3Nos.x218.00 Sqm) 654.00 Sqm
- Boat repair shop (2 Nos.x100.45 Sqm) 200.90 Sqm
- Restaurant (137.79 Sqm)
- Dormitory (320.90 sqm)
- RC sloping hard
- Security/guard House (26.50 Sqm)
- Compound wall 1175 m
- Radio Communication Tower 199.80 Sqm
- Public Toilet (3Nos.x 35.86) 107.58 Sqm
- Navigational and radio-communication equipment

- Electric power supply and distribution including electric substation and general lighting
- Fresh water storage, supply and distribution with ground water sumps, pump house and overhead tank
- Seawater supply and distribution with shallow water tube well, pump house and overhead tank
- Drainage and sewerage including effluent treatment plant, storm water drains and cross drainage works
- Greeneries and landscaping in front of main gate and at other places
- Fire extinguishers, fire hydrants and other equipment

VII. ENVIRONMENTAL MONITORING PROGRAM

7.1 GENERAL

In the post project scenario, FH do require to be monitored for disposals or discharges from fish handling activities and vessel or boat traffic. The generation of wastewater must be treated and recycled for secondary uses and the solid waste can be managed for energy recovery or manure/compost development.

The recycle or reuse of treated effluent and solid waste management strategies are very important in the post project monitoring scenario for ensuring pollution-free activities of FH. DoF is committed to keep the coastal area without getting contaminated from the activities of proposed FH.

The Monitoring program for landside and waterside activities of FH will be utmost important to keep or upkeep the value of fish catch in a hygienic way.

The monitoring mechanism will be having two different mode viz., Continuous and Periodical.

The Environmental monitoring for FH have been devised with an integrated approach which will eventually sustain the shoreline without losing it to coastal vulnerability.

7.2 AUGMENTATION OF FH

DoF is proposing to suitably augment the location as Fishing Harbour with required buildings for handling the Fish Drying Yard, Ice Plant, Fish storage-in-transit and marketing.

The water use pattern, operation & maintenance of ETP, Solid waste collection & disposal are required to be properly addressed with exclusive funding and protocol of office.

7.3 GROYNE FIELD

Groynes should be monitored continuously for accretion on the foreside and down drift erosion on the lee side.

The sand nourishment of the areas between the Groynes should be periodically carried out which will not only stop or prevent erosion, will also enable to gain the shoreline.

7.4 MONITORING FOR MARINE ENVIRONMENT

The marine flora and fauna prior to the project implementation has been already surveyed in the Due Diligence studies. The survey on the marine environment for the available species of marine flora and fauna is important in the pre project time.

Annual basis of sampling of specified biological attributes on the coastal and marine environment should be continued for studying the impacts, if any, out off its role of in providing surface for attached growth systems of micro biology.

VIII. ADDITIONAL STUDIES

8.1 GENERAL

Specific additional studies were carried out on **Coastal processes** and **Socio Economic status** of the project Location. Also, conceptual studies were carried out for **Risk Analysis and Management** and **Disaster Management Plans.**

Notwithstanding the field studies like bathymetry, it is required to collect a long term data on wind and wave to model the wind, wave and other dynamic coastal processes like littoral drift, along shore sediment transport, etc,.

The project is for the cause of fishermen community to provide them safe boat/vessel landing Berths as water facility and fishery infrastructures to handle their catch as land side facility. Fish unloading, handling, storage and marketing of fishes are the major land side activities of the proposed FH. This project of FH has envisaged to predominantly addressing the requirements for Tuna fish catches and so only, the proposed FH is named after Tuna Fishery Harbor.

The possible catastrophic coastal hazards, like Cyclone, Hurricane, Storm, Earth quake, etc., have been evaluated conceptually through a *Disaster Management Plan (DMP)*.

A Comprehensive Risk Analysis and Management Plan also were carried out by correlating the proposed facilities like Ice Manufacturing where ammonia storage is required. Also, natural hazards, coastal processes and vulnerability of human security were addressed in the DMP.

8.2 COASTAL MODELLING

As the project location is known for its coastal vulnerability including erosion and to natural hazards like storm, a comprehensive coastal modeling exercise was carried out. Met oceanic data of long term and also primary level short term data were generated for wind, cyclones, rainfall, humidity, visibility, tide, current, littoral drift and shoreline oscillation were collected for modeling all coastal process towards designing the Harbor infrastructures including breakwaters.

Site specific bathymetry was carried out for base the modeling studies for coastal processes specific to project impact area.

The Coastal Modeling of different processes and characteristics like wave tranquility, cyclone modeling, wave tranquility, sedimentation models were are carried out using Delft modeling software. The elaborate coastal modeling studies pertaining to the proposed FH was presented in **Chapter-IV**.

8.3 RISK ANALYSIS & MANAGEMENT PLAN

The construction of FH will provide safe place for docking the boats and land side facilities to enhance the fish catch and to provide hygienic handling of fishes. The proposed construction of FH may cause difficulty in the easy negotiations of fishing boat with areas for docking and repairs.

The ammonia storage is understood to have only less quantity. It is much lesser to cause any credible risk as it is much lesser than the prescribed cut off value as per HW (M,H &T) Rules.

A comprehensive Risk Analysis and Management Plan was carried out and annexed as an exclusive document with this report on EIA/EMP.

8.4. DISASTER MANAGEMENT PLAN

The project location is historically prone for storm surges and cyclone during the monsoon periods. The District is known for coastal events which resulted in property loss in the coast.

An exclusive DMP was drawn and provided as an Annexure to this report on EIA/EMP.

It must be noted that the proposed activity will not have any cause and stand reason for any Disaster situation in the project location.

IX. PROJECT BENEFITS

9.1 GENERAL

The proposed Fishing Harbor as Tuna Fishing Harbor is a long time project sought by the fisher community who predominantly run special crawls/boats for Tuna fish catch in the project zone of Thiruvallur district. Interestingly, the project location is close to Chennai Fishing Harbor by 3.5KM on the south and as well surrounded on west by the Chennai urban agglomerates of Thiruvetriyur Kuppam, Royapuram and Kasimedu which are all predominantly fishermen settlements.

The project is located in the revenue boundary of Thiruvetriyur Kuppam. The project location is historically used by the fishermen for boat landing, however due to erosion of its coastline this stretch line was under retrieval mode with engineered hard structures that comprises o a Groyne field. In the past five years, the shoreline have seen accretion and it is virtually a stabilized shoreline with sand by passing between the groynes and further erosion in the project location is not expected.

The location with its close affinity to Chennai fishing harbor is a credible location by its coastal characteristics for establishing a FH. DoF/GoTN has come out with this project to establish a FH with land side infrastructures to handle the fish catch to benefit the fishermen in a big way to have their fishing safely and more profitably through organized markets.

9.2 COASTAL PROCESSES

Despite it close proximity to Chennai Fishing Harbor and its historical use by Fishermen for fishing activities and boat landing, this practice is not there in the last one decade because of the coastal erosion .However, in the last one decade, a field of groyne was established and the coastal stretch between the Chennai Fishing Harbor and Ennore Kamarajar Port which is around 8 Km North of the project location. With sand by passing during the seasons of cyclone and storm, the inter space between the groynes was filled with sand by nature and the project location is a stable coast by its prevailing coastal conditions.

Wave and littoral drift are natural coastal processes which are to keep the shoreline with its natural physical and biological characteristics. A detailed study was carried out to generate primary data integrating with long term secondary data coastal process were modeled and presented in Chapter-IV.

The DPR consultants Virgo Aqua have provided planning and design of FH based on the output of coastal modeling for the proposed project.

With the near shore coastal processes have been regulated to avoid erosion with the groyne field along the coastline, the natural conditions of living systems like flora, fauna and benthic organisms have been placed safely.

The physical characters will change with rubble mounds in the form of break waters. The strata provided by these structures through the surfaces of the inert media influence the specified micro and macro organisms. Eventually, there will be some disturbances to coastal biology and benthic organisms, which will be short term. There will not be any harm impact on the marine life in the long term.

The intended FH will handle only fishes and there will not be any bulk chemicals or minerals. Hence, there will not be any pollution from the disposals or discharge residues from the proposed FH.

A complete field survey to appreciate the ground truthing on the marine life was carried out by CEHS and presented in Chapter-III.

9.3 HUMAN SECURITY

The intended FH will provide safety to the landing of fishing boats, vessels and crafts. The infrastructures with Ice Plant will ensure protection to quality of fish during its transfer, storage and marketing. The proposed marketing facility in the FH will provide financial security to the fishermen in selling their fish for a correct price.

Already, the installed Groyne Field has ensured the safe coastal conditions from the vulnerability of erosion and prevention of sea level rise and flow landwards for the entire project line. This also provides a sense of security among the peoples who are in the nearby villages. The present project location is having a historical and rather a favorable coastal condition for a FH and this will be judiciously used by DoF in establishing the proposed FH and it envisaged to be operated by state government.

A significant flow of boats into overcrowding Chennai FH which is the northern side of the project line will be decongested and thus the proposed FH will improve the safety protocols of Chennai FH and will enable the nearby fishermen to optimally concentrate on high end Tuna Fishing.

9.4 FISHING ACTIVITIES

The fishing activities will improve multifold with the proposed FH in place, in the given location as it will provide safety and necessary infrastructures to handle and market the fish catch.

The proposed harbour, as it is very close to Chennai Fishing Harbour, will serve as an **extended harbour facility** of it and intended to promote Tuna catching & processing. There about 300 boats will be operated exclusively to venture deep into the Bay of Bengal to catch tuna and bring in about 1,000 tonnes every month.

The net fish catching and handling capacity of the proposed Tuna Fishing Harbor is **69,000TPA**.

Development of Tuna fishery harbor at Thiruvottriyur Kuppam is expected to generate a wide range of benefits to the fishermen and therefore the economy from many angles, especially from the point of socio-economic upliftment of fisher community and fishery industry as a whole. These include both quantifiable and non-quantifiable benefits. Development of a Tuna fishery harbor at Thiruvottriyur Kuppam is sure to generate more employment opportunities for the local unemployed people and the fishermen community. A large number of workers in the fishery harbor are from the fisher community comprising of boat crew, head-load and ice workers, women fish vendors, fish merchants etc.

This project is a long awaited fishery infrastructure by the local fishermen community and now envisaged to complement and also to enhance the fishery activities of the existing Chennai Fishing Harbor.

9.5 MARINE BIOLOGY

The change in the physical characters through the intervening Break Waters which will be out off stone rubbles in place of sand will change the type and account of species of micro organisms.

However, the change is natural and will not destroy or inhibit any species of marine life. Perhaps, the availability of stone surfaces will provide substrate and congenial environment for certain species which are good in attached-growth state.

Hence, the proposed project will have net-positive impact and will benefit the people around with no harm done to marine life.

X. ENVIRONMENTAL COST BENEFIT ANALYSIS

10.1 GENERAL

The proposed FH is a fishery infrastructure to support the fishermen cause and to ensure safety and value addition to fishing activities in Thiruvottriyur Kuppam. The project will rely on the Theme of **"Fishing Resource Conservation and Environmental Security"** for fishermen community and marine life. The environmental policies and programs were envisaged for providing safe and hazard and risk-free operating and working environment, which always possible to be based directly on the Environmental **Cost Benefit Analysis (CBA)**.

DoF/GoTN is committed to comply with the Central and State Government Guidelines, Acts and Notifications on environmental management for sustaining the proposed FH towards its Environmental Compliance.

The cost benefit analysis, anyhow, carried out conceptually to achieve superior environmental results at a lower overall cost to stakeholders. The CBA is aimed to have economics of fishermen's welfare in the proposed project location. The decision making on Environmental issues by DoF will be based on the Environmental Acts and Notifications and seldom will on the basis of CBA.

The CBA cannot be evaluated on the basis of money value or expenditure and income. Rather, it was conceptually evolved to ensure better environmental quality with available environment –friendly technologies towards providing safety and security to fishermen community for benefitting out of the proposed FH.

10.2 COST OF ACTION Vs COST OF BENEFIT

The cost of action viz., construction of RH is high and will also involve unforeseen expenses. The quantum and value of benefit, especially on social front, is very significant with more than 20 000 peoples directly and around 1,00,000 peoples indirectly.

The first level Budgetary Estimation for establishing the proposed Tuna Fishing Harbor is made for **Rs. 240.00 Crores.**

A comprehensive study underlines the benefit on the socio-economic, with quantifiable and preventable environmental impacts.

The conceptual **CBA** for the proposed FH has been essentially evaluated in terms of fishery development of state and in particular, the fishermen well being of Thiruvottriyur Kuppam and other urban fishery agglomerates like Royapuram in Chennai. Any benefit is defined as anything that increases human well being and a cost is anything that decreases it.

A conceptual evaluation has been made to enable DoF to frame in-house environmental policy and to formulate a framework for installing **Environmental Cell** for implementing the **Environmental Management Plan**.

Being a government sponsored project, the budgetary for environmental management is essentially notwithstanding, to draw plans for making the project for social and economic development of the fishing activities in the project area.

10.3 ECONOMIC VALUE OF ECOSYSTEM

The proposed FH will enhance the optimal harvest of fishery resources and value addition to the fishing and its allied activities for the betterment of fishermen community of the project location. The likely changes in coastal behavior and response will make the project of FH as an environmentally compatible project to benefit the fishermen. The Index of **Total Economic Value** (**TEV**) for the proposed FH is a myth for the coastal fishing environment.

The vast extent of shoreline which is resourceful, yet highly dynamic with natural qualities in the proposed project site and features with significant extent of green cover and water sources (Ponds, Lakes and river) have been assessed and qualified in the *Environmental due diligence for the project location*, which are presented in **Chapter –III** as the baseline data for arriving the TEV.

The elaborate work on CBA shall be made on assessing the complex account of coastal environment and community.

10.4 VALUING HEALTH AND LIFE

The value index of health of fishermen, in particular around the project location as the major stakeholder, is governed by **"Value of a Statistical Life" (VoSL)**. The transfer of VoSL from the non-environmental context to environmental context is an issue to be resolved.

The baseline data observed in EBM suggests that community in the project impact map is free from any kind of specific diseases, pertaining to any exclusive source of pollution. The health records found in the **Primary Health Center (PHC)** are not suggesting any localized disease or any common health disparity.

Age is very relevant for valuing future health risks. So, the impact value on children and bringing into the domain of CBA is more important, with a default position being to use the adult valuations of "Own" life risks for the risks faced by children.

10.5 CBA-PROJECT ESTABLISHMENT

The data on coastal and Environmental profile of the proposed project location, CBA can be evaluated in the terms of application.

The cost on the construction of proposed FH is get justified with its objectives towards fishermen well being.

Anyhow, as stated earlier, DoF will not formulate its Environmental Policies and Programs on the basis of CBA only. Rather, it will do so on the basis of statutory requirements and Socio Economic development of the Project location.

XI. ENVIRONMENTAL MANAGEMENT PLAN

11.1. GENERAL

Department of Fisheries, Government of Tamil Nadu is proposing a **Fishing Harbor** to meet the growing demands and requirements for native fishing activities and to facilitate marketing of fish in North Chennai, more precisely Thiruvottriyur Kuppam, Thiruvallur district.

The proposed Fishery Harbor is a full-fledged facility and standalone. However, this is proposed to decongest the overcrowding Chennai Fishing Harbor which is available 3.5 km south of the proposed location.

The net fish handling capacity of the proposed Tuna Fishing Harbor is **69,000TPA**.

The water spread area under the command of the proposed Fishing Harbor is envisaged for **30.87 Ha** within the break waters and a land side reclaimed area for building infrastructures will be **15.63 Ha**.

Environmental Management Plan (EMP) is envisaged as framework action plan for the FH, to ensure sustainable development, distinctly and exclusively for three different phases Viz.,

- *Planning & Designing Phase*
- *Establishment and Construction Phase*
- *Operation and Maintenance Phase*

Requisite **EMP** framework shall be in force, right from site clearing and development. Perhaps, the course of activities shall continue for ensuring the sustainable development of the FH, after the operations are commissioned.

Environmental Management Systems (EMS) are the Policies and programs for action to implement the EMP by DoF. The Site development, Technology evaluation for Infrastructures, Fish Handling, Storage & Marketing, Resource management, Pollution control, Risk management and Disaster management are the Core of activities be defined for the development of EMS for EMP framework.

The requirement of water was optimized with pure water for domestic requirements and sea water for fish washings. Specifically, the waste Management Systems that are to be in place in the proposed Fishing Harbor are considered as core issues.

11.2. EMP - PLANNING AND DESIGNING PHASE

The proposed project location is traditionally known for fishing activities and DoF is proposing to develop a FH as a State sponsored project to support the local fishing community.. The location is strategically close to Fishing harbor activities as the Chennai Fishing Harbor is located by 3.5k from the southern breakwater. Added to this location advantage on the waterside, a host of fishing community in Thiruvottriyur Kuppam and also in the nearby urban agglomerates, which comprises of Royapuram and Kasimedu, the project assumes significance on the account of fishermen welfare.

DoF already evaluated the location for its historical land use, optimal conservation of local resources, regulated and compatible fishing, pollution control and monitoring systems, risk assessment and Disaster Management Systems.

EMS is the explicit environmental policy with environmental performance objectives for all Enterprises, and for the whole of the proposed Fishing Harbor.

DoF has taken all care in respect of Environment and Socio Economics of the environment of the project location. The FH establishment shall be determined by the following factors, as recommended in the guidance document of **Ministry of Environment, Forests & Climate Change and Government of India.**

- Selection of Site
- Shoreline characteristics
- Extent of land
- Extent of Activities
- Infrastructures
- Material Storage
- Water and its Source Development
- Effluent Treatment Plant
- Waste Receiving Facility
- Waste Management: On-Site/Off-Site
- Pollution control and Monitoring
- Risk Analysis, Mitigation and Management
- Disaster Management

11.2.a. Land Allocation

The water spread area under the command of the proposed Fishing Harbor is envisaged for **30.87 Ha** within the break waters and a land side reclaimed area for building infrastructures will be **15.63 Ha**.

11.2.b. Water

Water is an important environmental resource required for the FH activities. On conservation measure, water at potable quality and its requirement is assessed so that for other uses, Saline water is planned for secondary use only for fish and floor washings.

The requirement of Water will be addressed with exclusive plants for providing potable water of 250 KLD capacity RO plants.

There is a demand for 500 KLD of sea water for fish washing and cleanings. It will be sourced directly through suitable intake structures.

The requirement of water is assessed as follows:-

11.2.c. Water

Requirement is taken at 1 litre/kg of fish handled in fish handling and auction hall in peak season/day.

i) For 10 m FRP per 3 days trip @ 40 lit/boat/day
= 90 (no. of boats) x 40 litres x 3 days = 10,800 litres

ii) For 18 m trawlers per 10 days trip @ 200 litres/boat/day
= 27 (no. of boats) x 200 litres x 10 days = 54,000 litres

iii) For 20 m tuna boats per 10 day trip @ 300 litres/boat/day
= 18 (no. of boats) x 300 litres x 10 days = 54,000 litres

Total quantity of water required = 10,800 + 54,000 + 54,000 = 1, 18,800 litres say **1.2 lakh litres**

a) For Ice Plants

Capacity of ice plant considered = 30 tonne

Considering 2 days reserve capacity for making ice, Requirement of fresh water for ice making = 2 x 30,000 = **60,000 litres.**

b) For Fishermen and fishery industry people working within the FH complex

Taken at 2,000 Nos. x 30 litres/day = **60,000 litres.**

c) Fish handling – fresh water requirements

An approximate provision of **10,000 litres/day** is made.

Total daily fresh water requirement = A+B+C+D

= 1,20,000 + 60,000 + 60,000 + 10,000

= 2,50,000 litres

= **250 KLD**

The water balance for the Harbor Project is presented in **Fig. 11.1.**

The **daily requirement of seawater** in the fishery harbour is computed as below:

i) Fish washing:

Requirement is taken at 1 litre/kg of fish handled in fish handling and auction hall in peak season/day.

For total catch to all the three fish handling and auction halls

= [600 kg (catch) x 108 (boats) x 1 litre] + [4800 kg x 27 nos. x 1 litre] + [9000 kg x 18 nos. x 1 litre]

= 64,800 + 1,29,600 + 1,62,000

= 3,56,499 litres. Say 3.60 lakh litres.

ii) Cleaning of fish handling and auction hall premises:

Requirement is taken as 5 litres/sqm of floor area/day (considering 50% less for high pressure cleaning system). For the newly proposed fish handling and auction hall (3 No)

= (1273+258+1500) x 5 lit x 0.5

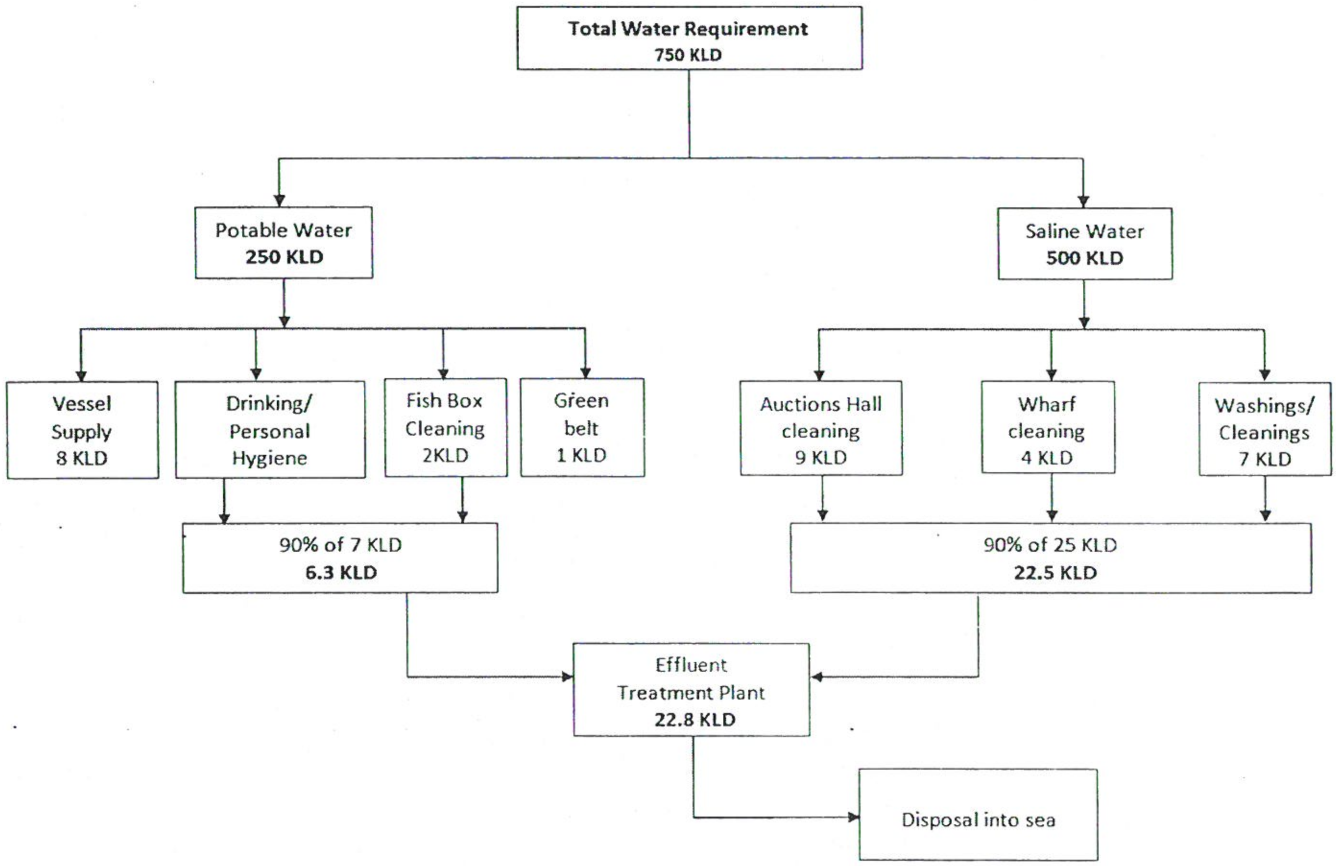
= 7,577.5 litres Say 8,000 litres

iii) Fish box washing:

Requirement is taken as 10 litres/box/day (Considering 50% less for high pressure cleaning system)

Box size is 0.6 m x 0.4 m x 0.3 m which holds 25 kg of fish.

Fig.11.1. WATER BALANCE



For the total catch in fish handling and auction hall

Total no. of boxes = 3,56,499 kg (catch) /25 kg = 14,260 nos.

Quantity of seawater required = 10 lit x 14,260nos. = 1,42,600 lit

Total requirement of seawater for fish handling and auction hall

= 3,60,000lit + 8,000+ 1,42,600= 5,10,600 lit/day

say **500 KLD.**

11.2.d. Water Treatment Plant

Membrane based plant will be installed for 250KLD product water.

A package plant of RO with required pre treatment systems will be installed. Sea water will be drawn to treatment plant with suitably constructed Intake well.

The Schematics of the proposed WTP is presented in **Fig 11.2.**

The WTP will be installed on Turn Key basis with the design of supplier side with specifications of membranes and with Performance Guarantee for minimum Five Years.

Exclusive O & M contract is recommended by the suppliers during the performance Guarantee period.

11.2.e. Effluent Treatment Plant

The effluent from Cleaning of fish handling areas and from the conveniences will be taken to exclusive ETP as treat the effluent to confirm to Disposal standards into sea. However, the treated effluent will be finally disinfected and reused for green belt development.

The combined effluent from fresh water consumption is assessed for **30 KLD**. However, The Effluent Treatment Plant is designed for **30 KLD** of combined waste stream.

The Typical Characteristics of the Combined Waste steam are presented in **Table 11.1.**

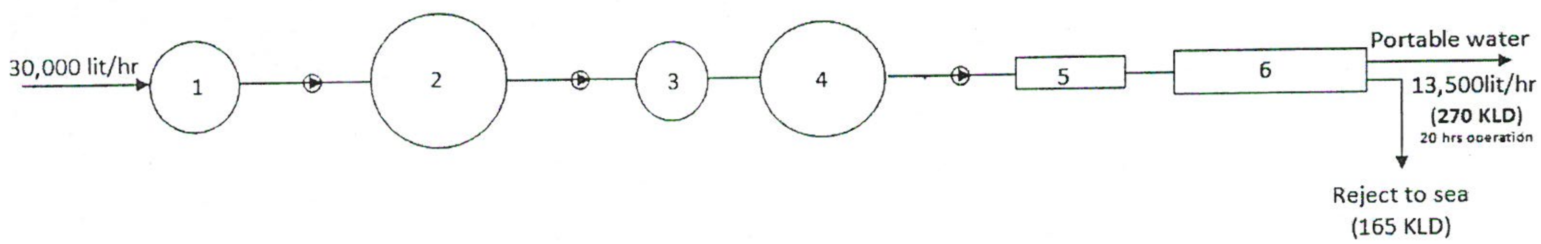
11.3. CHARACTERESTICS OF COMBINED WASTE STREAMS

11.3.a. Typical Characteristics

The waste stream from service office and conveniences is typically like domestic sewage. The fish collection, auction and storage activities are largely free from using chemicals and hazardous substances, unlike in industries. Hence, such combined waste streams are non hazardous and have been evaluated to have bio degradable characteristics.

Fig.11.2. WATER TREATMENT PLANT*
(Sea Water Reverse Osmosis)

Plant Capacity : 250 KLD
Recovery permeate : 45%
Operation : 20 hrs/day



Legend:

1. Beach Well/Bore Well
2. Sea Water Collection Sump (250KL)
3. Multi Media/Grade Filter
4. Filtered Water sump (200KL)
5. MF Cartridges
6. SWRO Package: 30,000 lit/hr

* Plant will be operated on batch mode only for the daily requirement of water. The daily requirement is assessed for **250 KLD**. Hence, **18-20 hrs** of operation is required per day.

Table 11.1.TYPICAL CHARACTERISTICS OF THE COMBINED WASTE STREAM

S.No.	Parameters	Concentration
1.	pH	6.5-8.0
2.	Total Suspended Solids, mg/l	250-400
3.	Total Dissolved Solids, mg/l	750-1500
4.	Total Solids, mg/l	1200-2000
5.	Bio Chemical Oxygen Demand , mg/l	320-500
6.	Chemical Oxygen Demand, mg/l	500-900
7.	Oil & Grease, mg/l	10-20
8.	Total Nitrogen, mg/l	30-50
9.	Total Phosphates , mg/l	5-15

11.3.b. Bio Degradability

The bio degradability of the waste streams is the indication of organic rich waste constituents with requisite amount of acclimatized bio mass. The absence of toxic substances will enable the micro organisms to stabilize the waste constituents in to un harmful, stable end products and thus the waste stream will be render harmless for its reuse in green belt development.

The biodegradability of the community waste streams is found to be 0.5 to 0.75 with the characterized values of BOD and COD. Hence, such waste streams are highly susceptible to biological treatment which will stabilize the waste constituents in to un harmful end products.

11.3.c. Treatment Processes and Unit Operations

Any ETP envisaged for biodegradable waste streams will have at least five stages of treatment viz.,

- Pre treatment
- Bio Chemical-secondary Treatment
- Tertiary Treatment
- UV Radiation

These treatment processes offered in series and in sequential order will make the treatment plant as WRF.

11.4. PRE TREATMENT

11.4.a. Screening

The floating solids like rugs, cloths, plastics, etc., are to be removed and prevented its entry into ETP. The floating solids must be removed, dried and disposed along with domestic solid waste.

11.4.b. Collection-Cum-Equalization Sump

The intermittent flow of waste streams from different sources must be equalized and ensured as uniform flow at the designed rate of flow with design COD or organic loading rate.

11.5. BIO CHEMICAL SECONDARY TREATMENT

11.5.a. Fluidized Bed Biological Reactor

A high rate, extended aerobic reactor with bed of plastic modules for fluidization has been evaluated for its compatibility and competency to make part of the water reclamation facility, to oxidize the influent COD for an average of 95 to 99.99% removal.

The High rate aeration for an average of 24 hrs of HRT, will make the organics through oxidative pathway of microbial oxidation and they will be completely mineralized in to stable compounds. Bed plastic modules for 20 to 30% volume of the reactor will be placed in fluidized state so as to support effective mixing and complete aerobic state in the reactor.

A Secondary Clarifier will be incorporated to clarify the aerobically treated effluent.

The Organic Loading Rate will be 0.1 to 0.15 Kg COD/Kg MLSS day. This would be requiring an operating condition to have a high concentration of biomass at 3000 to 6000 mg/l. This can be achieved by complete recirculation of activated sludge from the secondary Clarifier. As there will be continual requirement of active micro organisms, as the oxidative pathway is intended to be in the endogenous phase, the sludge will not require any wasting, which will ultimately make the sludge wasting as seldom practiced, resulting in very less area for Sludge Drying Beds.

11.6. TERTIARY TREATMENT; TWIN FILTER SYSTEM

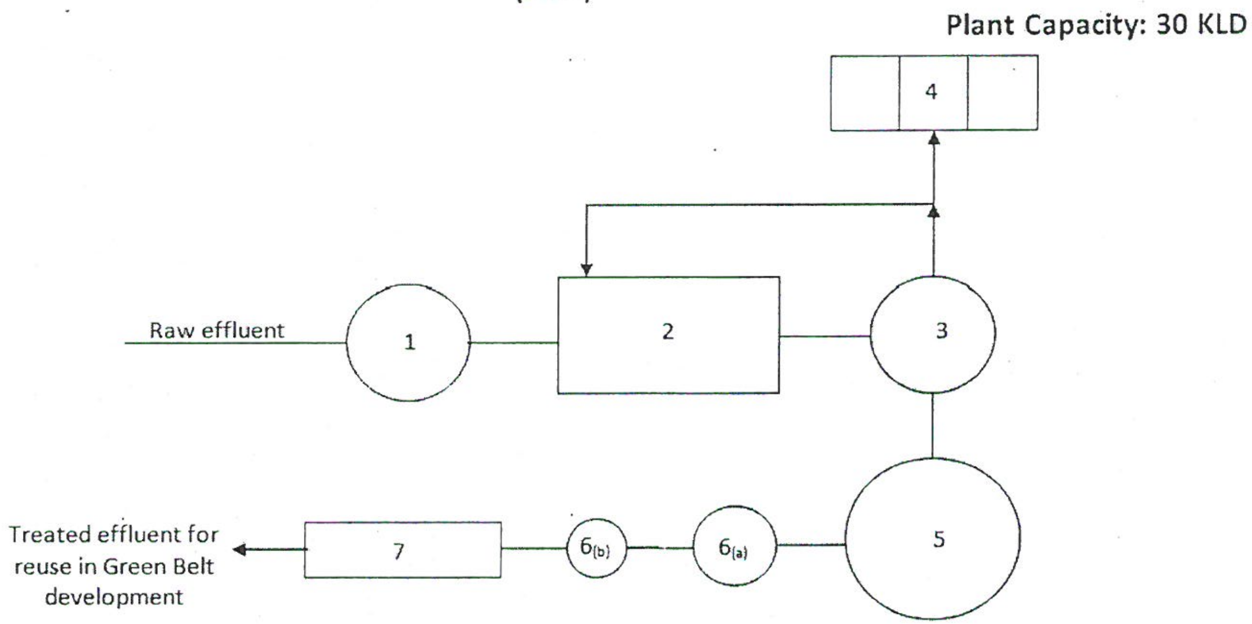
The aerobically treated effluent , after clarification will be collected and filtered in a Twin Filter Plant, where a Pressure active, Sand Filter and Activated Carbon Filter are placed in series.

The Sand Filter will remove the solids up to 50 micron size that will completely remove the turbidity. The Activated Carbon will remove the colour, odour and all residual organic dissolved solids.

The final filtrate will be collected and will be the feed to UU Radiation package and the disinfected treated water will be fully recycled for green belt development.

The schematics of ETP with its the processes and unit operations are presented in **Fig 11.3.**

Fig.11.3 EFFLUENT TREATMENT PLANT
(FBBR)



Legend:

1. Collection –cum-Equalization Sump :1.60m ϕwith 3.50m depth
2. Aerobic FBBR : 1.50×2.50×3.50m depth
3. Secondary Clarifier : 1.25ϕm with 3.50m depth
4. Sludge Drying Beds : 2.50×2.50×1.80m;3 Nos.
5. Clarified Effluent Sump : 1.60mϕwith 3.50m depth
6. (a). Pressure Sand Filter : 0.30mϕwith 2.10m depth
   (b). Activated Carbon Filter : 0.23mϕ with 2.10m depth
7. UV Radiation : 1000 Lit/hr³

DESIGN PARAMETERS AND GUIDANCE VALUES

Fluidized Bed Biological Reactor

Organic loading rate	:	0.05-0.15 Kg COD /Kg MLSS day
MLSS	:	4000-6000 mg/l
Oxygen requirement	:	2 to 2.5 times of COD
Hydraulic Retention time	:	24 hrs
Solids retention time	:	20-30 days

Secondary Clarifier

Hydraulic loading rate	:	20-25 m^3/m^2 day
Hydraulic retention time	:	6-12 hrs
Solids loading rate	:	40-90 kg TSS/m^2 day
Weir loading rate	:	125-180 m^3 per Meter per day

Pressure Sand filter

Filtration Rate	:	10-15 m^3/m^2.hr
Activated Carbon Filter		
Filtration rate	:	25-30 m^3/m^2 hr

Ultra filtration

: UV Radiation ;2000 lit/hr.

11.7. WASTE RECEIVING FACILITY

An exclusive **waste receiving facility** is planned, where the entire solid waste needs to be collected for handling, treatment and Disposal.

The biodegradable solid waste that includes spoiled or damaged fish and their residue is estimated for **4 to 5 Tonnes/day**. Other non-biodegradable waste will be taken for a sanitary landfill of the local body. In case, if it cannot be managed like that DoF will establish a Sanitary Landfill within the premises of FLC, till such a time that such a facility by local body become operational. The Solid Waste Management Facility is presented **Fig.11.4.**

11.8. NON CONVENTIONAL ENERGY

DoF on its own initiatives and also through major user industries will make an effort to adopt solar energy for hot water generation and area lighting in the inner roads.

The incentives from Governmental sources will be addressed for energy from solar farms.

11.9. EMP-ESTABLISHMENT AND CONSTRUCTION PHASE

The FLC and SPS development involves very elaborated works at site viz.,

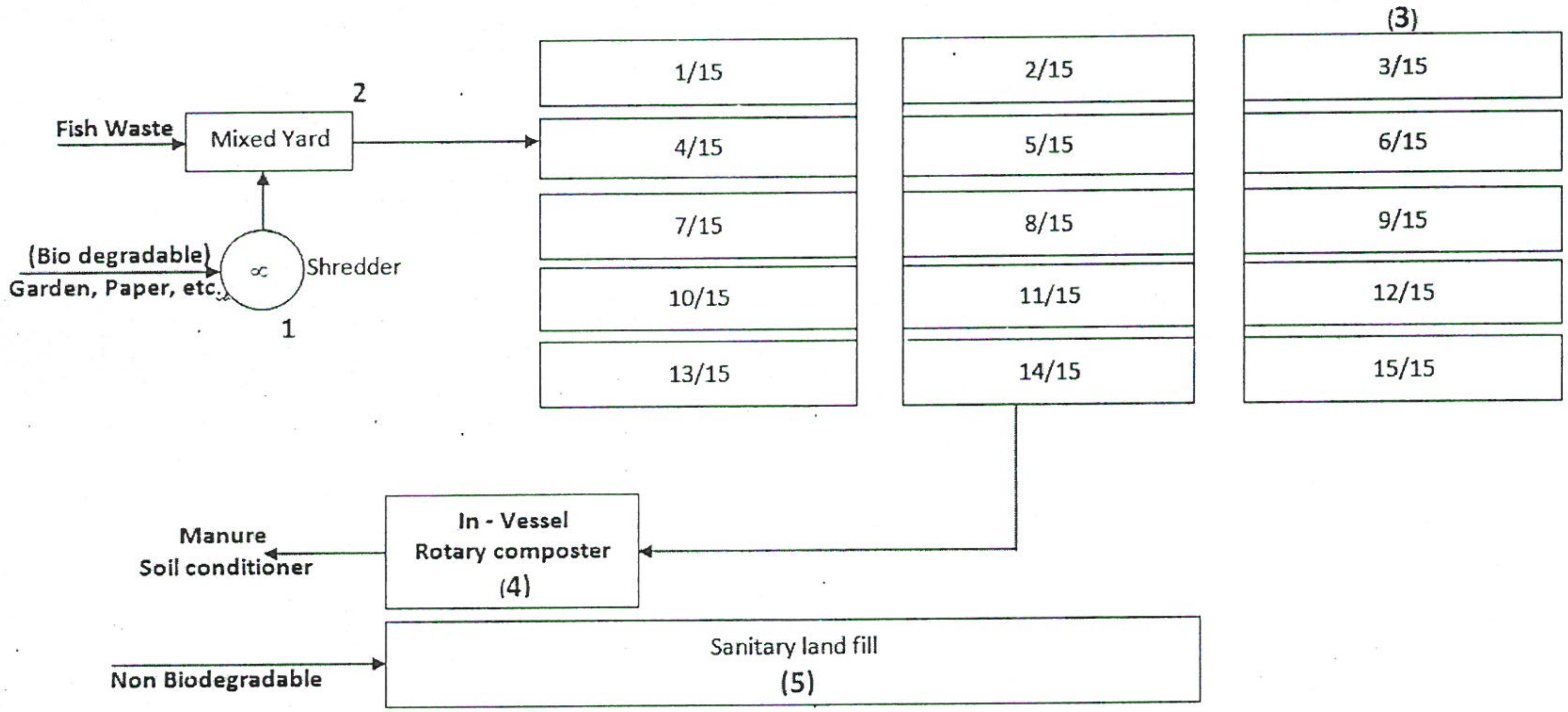
- Site Cleaning
- Leveling and land development
- Marine Infrastructures
- Fish Handling, Auction, Storage and Marketing Facilities
- Inner roads & fencing
- Waste Receiving Facility
- Wastewater Treatment Plant
- Drainage systems
- Green belt development
- Rain water Harvesting structures

No Significant impacts on the construction will be restricted within the water spread area of Port inside the Breakwater

11.9.a. Site Cleaning

The proposed project area has been already surveyed for physical and biological resources of Marine and coastal environment. The layout planning shall be made strategically without any disturbances to the Coastal conditions and marine profile.

FIG.11.4. SOLIDWASTE MANAGEMENT FACILITY



Legend:

1. Shredder (20 HP) : Counter Shaft –Roller Blade System
2. Mixing Yard : 5.00 x 10.00m / ACC shed; 2 Numbers
3. Composting Yard -15 Bays : 10.00 m x 25.00m/ACC Shed : 2 Numbers
4. In vessel Rotary Composter : 2.10m ϕ with 3.50m long; 2 Numbers
5. Sanitary land fill : 5.00 x 10.00m;10 Numbers

11.9.b. Leveling and Land Development

The area is largely a plain terrain, with very insignificant undulations. Anyhow, the terrain has a natural slope towards east direction that should be maintained so that the run-off can be safely transferred to Rain water harvesting structures in the strategic locations and to Sea.

Perhaps, the proposed land side area is reclaimed area with dredged soil and hence it can be suitably reclaimed.

11.9.c. Buildings

All buildings shall be planned as per Building Rules and take approval from local body or Country and Town Planning Authority.

All buildings shall be designed to make use of the local materials.

As there is no demolition works involved, dumping sites are not required. Any surplus building materials and refuse be transferred off site, with due approval from competent authorities. Fire Safety systems shall be provided in all the buildings as per the standard practices. All Buildings will be mandated to have Fire Fighting Equipments.

All buildings shall be planned as per the Standard Codes and in adherence to **ECBC, 2005.**

11.9.d. Inner Roads and Fencing

Inner roads shall be planned for **12m width** of each lane; and in two lanes for a total of **24m width** for traffic. The roads will be planned and constructed for a middle road divider with **2m** width grass field and shrub in the constructed soil strata.

Fencing shall be provided at all boundaries and be guarded by a **"Green Corridor"** of trees for **40m** width, all around. This will prevent any trespassing and possibility of sabotage and security threat.

11.9.e. Drainage Facilities

The project area shall be provided to have comprehensive storm water drainage systems.

The site has been already surveyed for the contour and topography for planning the drainage patterns for the project site.

Drainage channels are envisaged as open channels on the sides of the roads, which will take the run-off strategically to the proposed Rainwater Harvesting Structures, may in turn; the excess will flow down to natural drainage lines and ultimately in to sea.

Care will be taken to completely prevent any contaminated run-off from Harbor activities, into these drainage systems.

Fish Handling facilities and Auction hall will be mandated to have their own drainage lines, management of storm water and effluent.

DoF is committed to adhere to set of standards and guidelines of **MoEF, CPCB** as formatted in the Guidance Documents for **EIA** for Port & Harbor projects and provision of **EIA** Notification, 1996.

11.9.f. Sitting

DoF has identified the proposed site with due Survey on Coastal and Marine Environmental conditions of the proposed project location.

The site has already been evaluated for the advantages of the following:

1. Present status of land use pattern
2. Bathymetry
3. Availability and extent of land
4. Land acquisition
5. Sensitivity of Area Biological, social and economical
6. Drainage pattern & Topography
7. Physical infrastructures like approach roads
8. Availability of water
9. Pollution index of the area
10. Economics of FH Establishment
11. Procedural difficulties for getting **NoC** from statutory bodies etc.,

The proposed project location at Thiruvottriyur Kuppam has been selected for the promotion as it is understood for the best available Coastal conditions in this zone and historical background.

11.9.g. Green Belt Development

FH Administration through their exclusive wing from Environmental Cell will develop a green belt in all recommended areas of the project location.

The entire boundary, along the fence, will be developed as **"green corridor" 40m** width with exclusive species of trees and plants.

All along road side area along the entire inner roads, a width of green belt will be developed and also in the areas under the purview of common facilities.

11.9.h. Rain Water Harvesting Structures

The area under green corridor will be provided with rain water collection pits (one in every **100m)**. The drainage pattern of the land will be made to have the run off towards the green corridor to facilitate the run off to charge these pits. .

11.10. EMP - OPERATIONS AND MAINTENANCE PHASE

FH Administration will have very elaborate program of schedule and plan of actions for a detailed EMP, during the operation and maintenance phase.

The operation and maintenance of FH will largely on the extent of fish handling facilities and marine infrastructures and vessels.

Harbor Administration, through the Environmental cell and **"Consultative Committee"** will evaluate the Environmental Management Plan, on annual basis with budgetary allocation.

The **EMP** for FH administration will, anyhow, largely for

- Monitoring the berth areas
- Monitoring the water spread area/ break waters
- Monitoring the Fish Handling Facilities

- Maintaining the common facilities like waste Receiving Yard, Waste Storage, Water Treatment Plant, Effluent Treatment Plant, etc,.
- Sustaining the green belt

The natural aquatic life system will acclimatize such Biologically alien species situation. However, in case of any such occurrence, it will be dealt on the case to case basis for a brief and definite time for treatment and management.

11.10.a. Environmental Monitoring

FH Administration will initiate to provide systems for monitoring or outsource the accredited agencies to monitor the Value **Environmental Components (VECs)** viz., Water and Wastewater, Emission and Fugitive dust and Solid waste.

The guidelines and permit values of these compounds are defined by state **PCB** in their permit orders. They be maintained by different mechanisms viz.,

- Independently by in house monitoring systems or Out Sourcing Agencies.
- State **TNPCB**

The frequency of monitoring be as advised by state **PCB** in their consent orders to Fishing Harbor.

11.10.b. Sustaining Green Belt

The green belt development and its daily maintenance in the green corridor, open spaces and on the roads sides will be the sole responsibility of FH Administration.

The maintenance of green belt is not only to mitigate the pollutants in the long run and also will be drawn and maintained for a scenic beauty to Harbor, as a whole.

11.10.c. Stabilization of Groyne Field

The area between the Groynes, if needed and as and when required, shall be nourished with sand so that sand by passing over Groynes will not hamper and continue to occur which will get the shoreline stabilized and the shoreline will be prevented from erosion.

11.11. ENVIRONMENTAL CELL

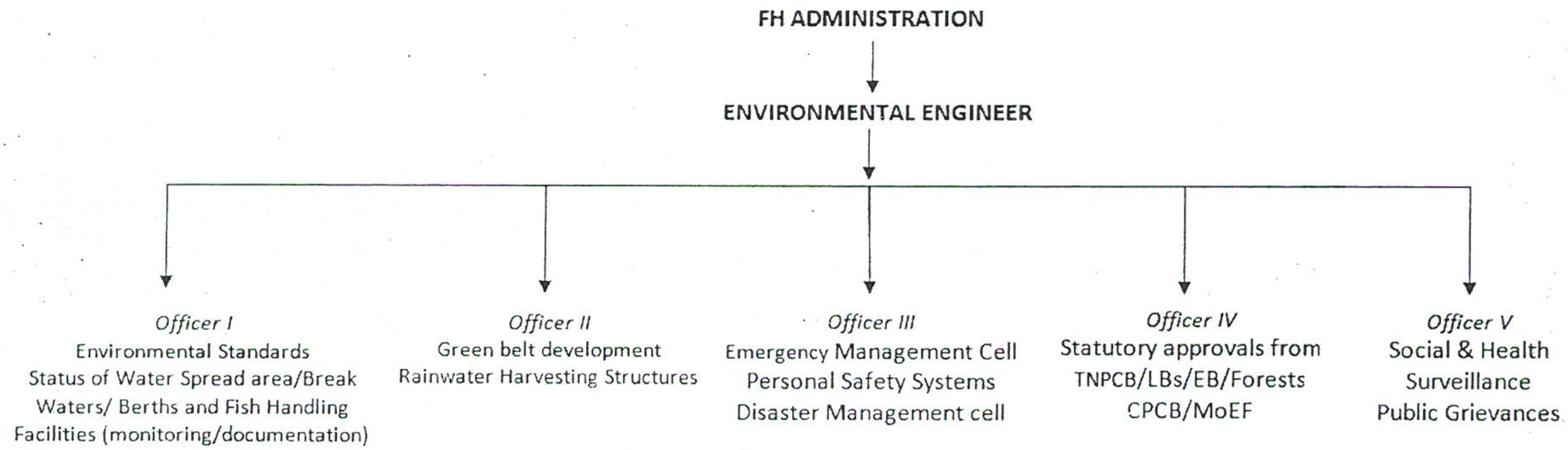
An exclusive set up of executives and a team of skilled peoples will be formed as core active group as **Environmental Cell**.

The cell will have a head with approvals for financial allocation, and responsibility drawn.

The cell will evaluate the **EMP** on annual basis and will envisage a budgetary allocation to implement from the FLC administration.

Fig.1.5 PROTOCOL OF ENVIRONMENTAL CELL

FISHING HARBOR
Thiruvottriyur Kuppam



XII. SUMMARY AND CONCLUSION

Department of Fisheries (DoF), Government of Tamilnadu is intended to establish a Fishing Harbor, to facilitate dominantly Tuna fish catch and handling, the historically known place near Chennai. The exact project location lies in between Chennai Fishing Harbor and Ennore Kamarajar Port.

The project location is geographically located between **13^0 09' 41.37"** to **13^0 10' 10.22" N Latitude** and **80^0 18' 31.34" to 80^0 18' 42.33" E Longitude** in the Coramendal Coast, in Thiruvottriyur Kuppam, Thiruvottriyur Taluk, Thiruvallur District, Tamilnadu.

The proposed Harbour is envisaged to have 840 m berthing facility along the shoreline. In the first assessment on the basis of requirement, it will have 379-metre-long wharf for 18 m trawlers; a 342-metre-long wharf for tuna boats; a 110 – metre long wharf to accommodate fibre-reinforced plastic (FRP) boats.

The harbour will also have fish handling halls, auction hall, cold storage, ice factory, fuelling station, power-back up centres and dormitory for workers.

The location of the proposed harbour is in the mid of a Groyne Field which is in place since 1998 and found as a stabilized shoreline which otherwise should have been an affected zone by erosion due to Chennai Fishing Harbour and Chennai Port which are on the Southern side of the project location and much within the influence Zone of littoral drift of about 10km.

The first level Budgetary Estimation for establishing the proposed Tuna Fishing Harbor is made for **INR 240.00 Crores.**

The project is envisaged as coastal infrastructures towards a standalone fishing Harbor. The net fish handling capacity of the proposed Tuna Fishing Harbor is **69,000TPA.**

FISHING HARBOR

The harbour will also have fish handling halls, auction hall, cold storage, ice factory, fuelling station, power-back up centres and quarters for workers. These land side facilities will be established in the reclaimed land area of **15.63 Ha.**

The break waters will have 852 m on the Northern side and 1088 m on the Southern side which will ensure water spread area of **30.87 Ha.**

The water spread areas and the proposed wharf facilities are envisaged with elaborate planning and engineering design to facilitate fishing activities and boat or vessel management for about 300 numbers of FRP boats(10m), 300 numbers of Trawlers(18m) and 200 numbers of Tuna boats(20m).

It is important to ensure -4m draft in the water spread area of the Harbor to facilitate the navigation of boats and vessels. On the basis of real time bathymetry study by (2015), it was assessed that 25,460 cum of dredging is must. The proposed landside facilities require land to be reclaimed as it is not feasible to acquire from the existing stretches of land. Hence, it is proposed to dredge 1,75, 240 cum of sand mud from off shore area to reclaim land of 15.46 Ha for establishing the land side infrastructures.

The net fish catching and handling capacity of the proposed Tuna Fishing Harbor is **69,000TPA.** This project is a long awaited fishery infrastructure by the local fishermen community and now envisaged to complement and also to enhance the fishery activities of the existing Chennai Fishing Harbor.

The main facilities proposed in the fishery harbor layout are as follows:

- Breakwaters
  - Northern Breakwater 852 m
  - Southern Breakwater 1088 m
- Dredging and disposal (2,00,000 cum)
- Reclamation and leveling
- Quays (RCC bored pile) for MFVs 730 m
- Quays (RCC bored pile) for FRPs 110 m
- Internal road within the harbor complex
- Fish Handling and Auction Hall for MFVs (1273 Sqm)
- Tuna Fish Handling and Packing Hall (1200 Sqm)
- Fish Handling and Auction Hall for FRP boats (258 Sqm)
- Fishery Administrative Office 163 Sqm

- Fishermen gear sheds (9Nos.x176.87 Sqm) 1591.83 Sqm
- Net mending sheds (4Nos.x258.10 Sqm) 1032.4 Sqm
- Fishermen rest sheds (3Nos.x218.00 Sqm) 654.00 Sqm
- Boat repair shop (2 Nos.x100.45 Sqm) 200.90 Sqm
- Dining Area
- Rest Area
- RC sloping hard
- Security/guard House (26.50 Sqm)
- Compound wall 1175 m
- Radio Communication Tower 199.80 Sqm
- Public Toilet (3Nos.x 35.86) 107.58 Sqm
- Navigational and radio-communication equipment
- Electric power supply and distribution including electric substation and general lighting
- Fresh water storage, supply and distribution with ground water sumps, pump house and overhead tank
- Seawater supply and distribution with shallow water tube well, pump house and overhead tank
- Drainage and sewerage including effluent treatment plant, storm water drains and cross drainage works
- Greeneries and landscaping in front of main gate and at other places
- Fire extinguishers, fire hydrants and other equipment

The proposed activities of Harbor were studied for the requirements of environmental resources like water and evaluated for discharges or discards like wastewater and solid waste. Necessary environmental facilities like wastewater treatment plant and solid waste management facility were planned and incorporated in the proposed Harbor to make it environmentally compatible and sustainable in the long run.

The proposed Harbor is designed to have the complementary operations to the existing Chennai Fishing Harbor to sustain a safe livelihood to the fishermen community of the project location.

The requirement of Water will be addressed with exclusive plants for providing potable water of 250 KLD capacity RO plants.

There is a demand for 500 KLD of sea water for fish washing and cleanings. It will be sourced directly through suitable intake structures.

There will be two Wastewater Treatment Plants. Fresh waster waste streams will be treated in Zero Discharge Treatment plants with Ultrafiltration package to reclaim water so that the reclaimed water will be used for green belt and flushing of toilets to offset the requirement of virgin water requirement. An exclusive wastewater Treatment Plant will be installed for brine water discharges which after treatment and disposal will be discharged into sea.

The Solidwaste generation is assessed for about 3 TPD mainly from fish handling and other domestic activities. This will be converted into manure by installing exclusive mechanized systems for composting.

The Environmental Impact Analysis on harbor requires review on the in interaction of several coastal competences, marine ecology, economy, sociology and engineering.

With the due diligence evaluated for the existing environmental attributes, the environmental management plant has been devised for environmentally sustainable coastal structures in the project location.

The proposed harbor structures will be ensured with safe structural stability with proper design and execution to perform in compliance and in complementing way.

The proposed site is rated environmentally compatible for the promotion of the proposed Tuna Fishing Harbor due its proximity to Chennai Fishing Harbor that requires decongesting measures urgently.

Thiruvottriyur Kuppam and its adjoining human settlements are largely fishermen and this project is a long time dream for them and has become indispensable to upgrade their socio economic status in the growing competitive situation for hygienic fishing activities.

DoF is committed with well devised plans and programs supported by required budgetary allocation from GoTN, to promote, develop and maintain the said Tuna Fishing Harbor to have sustainable development of the project location.

EIA CONSULTANTS

CENTRE FOR ENVIRONMENT, HEALTH AND SAFETY
ANNAMALAI UNIVERSITY
ANNAMALAI NAGAR – 608 002

List '2' – ACOs in process of complying - as on January, 2019(#)

<table>
<tr><th rowspan="3">S. No.</th><th rowspan="3">Consultant Organization</th><th colspan="4">Scope of Accreditation</th></tr>
<tr><th colspan="3">As per NABET Scheme</th><th rowspan="2">Project or Activity as per Schedule of MoEFCC Notification dated September 14, 2006 and subsequent Amendments</th></tr>
<tr><th>Sector Number</th><th>Name of Sector</th><th>Category</th></tr>
<tr><td rowspan="8">1</td><td rowspan="8">Center for Environment, Health and Safety

Address: Department of Civil Engineering
Faculty of Engineering and Technology Annamalai University, Annamalai Nagar – 608002

E-mail: centreforehs@gmail.com
nehrukumar.v.158@annamalaiuniversity.ac.in

Tel: 04144-238731,
09443223091

Conditions apply</td><td>1</td><td>Mining of minerals including Open cast/ Underground mining</td><td>A</td><td>1 (a) (i)</td></tr>
<tr><td>3</td><td>River Valley Projects</td><td>A</td><td>1 (c)</td></tr>
<tr><td>9</td><td>Cement plants</td><td>A</td><td>3 (b)</td></tr>
<tr><td>22</td><td>Distilleries</td><td>A</td><td>5 (g)</td></tr>
<tr><td>31</td><td>Industrial Estates/ parks/ complexes/ Areas, export processing Zones (EPZs), Special economic zones (SEZs), Biotech Parks, Leather Complexes</td><td>A</td><td>7 (c)</td></tr>
<tr><td>32</td><td>Common hazardous waste treatment, storage and disposal facilities (TSDFs)</td><td>A</td><td>7 (d)</td></tr>
<tr><td>33</td><td>Ports, harbours, break waters and dredging</td><td>B</td><td>7 (e)</td></tr>
<tr><td>36</td><td>Common effluent treatment plants (CETPs)</td><td>B</td><td>7 (h)</td></tr>
<tr><td rowspan="2">2</td><td rowspan="2">Centre of Research for Development, University of Kashmir</td><td>3</td><td>River Valley projects</td><td>A</td><td>1 (c)</td></tr>
<tr><td>39</td><td>Townships and Area development projects</td><td>B</td><td>8 (b)</td></tr>
</table>

EIA Co-ordinators

Dr. G.B. Jaiprakash Narain, B.Sc., B.E., M.Sc (Engg.),D.S.E.(Delft.),Ph.D
EIA Co-ordinator.

Dr. V. Nehru Kumar, B.E., M.E., Ph.D
Associate EIA Co-ordinator,
Professor & Director,
Centre for Environment, Health and Safety,
Annamalai University.

FUNCTIONAL AREA EXPERTS

Water	:	**Dr. S. Poongothai, B.E., M.E., Ph.D.,** Professor of Civil Engineering
Wastewater	:	**Dr.B. Asha, B.E., M.E., Ph.D.,** Associate Professor of Environmental Engineering
Air Pollution Control	:	**Dr.V.Nehru Kumar, B.E., M.E., Ph.D.,** Professor & Director of Centre for Environment, Health and Safety
Air, Micro meteorology and Modelling	:	**Dr. S. Palanivelraja, B.E., M.E., Ph.D.,** Professor of Environmental Engineering
Solidwaste	:	**Dr. V.Nehru Kumar, B.E., M.E., Ph.D.,** Professor & Director of Centre for Environment, Health and Safety
Risk Assessment	:	**Dr. K. Saravannan, B.E., M.E., Ph.D.,** Professor of Chemical Engineering
Land Use and SolidWaste	:	**Dr. K. Balaji, B.E., M.E., Ph.D.,** Associate Professor of Environmental Engineering
Soil and Geological Survey	:	**Dr. G.R. Senthil Kumar, M.Sc., M.Phil., Ph.D.,** Associate Professor of Earth Sciences
Biological Survey	:	**Dr. M. Gomathinayagam, M.Sc., M.Phil., Ph.D.,** Associate Professor of Botany
	:	**Dr. C.Elanchezhiayan, M.Sc., M.Phil., Ph.D.,** Associate Professor of Zoology
Ecology	:	**Dr. V. Imayavaramban, B.Sc., M.Sc., Ph.D.,** Professor of Agriculture
Socio –Economic Survey	:	**Dr. B. Mathavan, M.A., M.Phil., Ph.D.,** Professor of Economics
Environmental Survey	:	**Vimta Labs Limited** Hyderabad

LIST OF ANNEXURE

Annexure No.	Title
I	Ambient Air Quality Data
II	G.O
III	ToR

ANNEXURE – I

AMBIENT AIR QUALITY

Sampling Station: A1, Thiruvottiyur Kuppam, Project Site

Month	Date	Pm_{10}	$Pm_{2.5}$	SO_2	NO_x	CO	NH_3
Feb-16	04/02/2016	55.65	27.80	12.75	15.60	BDL	BDL
	15/02/2016	56.50	27.50	13.50	15.15	BDL	BDL
Mar-16	08/03/2016	54.40	27.75	13.10	16.55	BDL	BDL
	16/03/2016	54.70	28.35	14.15	17.90	BDL	BDL
	27/03/2016	55.80	28.60	14.35	17.20	BDL	BDL
Apr–16	07/04/2016	55.00	28.40	14.30	16.35	BDL	BDL
	13/04/2016	58.45	28.00	13.90	15.50	BDL	BDL
	22/04/2016	57.20	28.50	14.00	14.15	BDL	BDL

Sampling Station: A2, Chennai Fishing Harbour

Month	Date	Pm_{10}	$Pm_{2.5}$	SO_2	NO_x	CO	NH_3
Feb-16	04/02/2016	63.75	29.80	14.55	17.10	BDL	BDL
	15/02/2016	62.55	29.30	15.05	17.50	BDL	BDL
Mar-16	08/03/2016	61.15	30.45	15.20	16.75	BDL	BDL
	16/03/2016	64.00	30.75	14.80	16.10	BDL	BDL
	27/03/2016	62.40	29.50	14.70	16.50	BDL	BDL
Apr-16	07/04/2016	64.65	29.90	14.46	15.60	BDL	BDL
	13/04/2016	63.35	29.20	14.40	16.00	BDL	BDL
	22/04/2016	62.50	30.25	14.30	15.75	BDL	BDL

Sampling Station: A3, Near Chennai Port Trust

Month	Date	Pm $_{10}$	$Pm_{2.5}$	SO_2	NO_x	CO	NH_3
Feb-16	04/02/2016	72.05	30.10	18.10	18.70	BDL	BDL
	15/02/2016	71.45	29.30	16.35	22.25	BDL	BDL
Mar-16	08/03/2016	70.10	29.80	16.50	19.10	BDL	BDL
	16/03/2016	68.85	31.10	16.20	21.95	BDL	BDL
	27/03/2016	69.15	33.20	17.25	19.25	BDL	BDL
Apr-16	07/04/2016	66.20	31.75	18.50	18.20	BDL	BDL
	13/04/2016	71.80	30.50	17.65	21.20	BDL	BDL
	22/04/2016	68.50	30.00	17.00	20.75	BDL	BDL

Sampling Station: A4, Near Ennore Port

Month	Date	Pm $_{10}$	Pm $_{2.5}$	SO_2	NO_x	CO	NH_3
Feb-16	04/02/2016	71.90	31.50	15.25	23.50	BDL	BDL
	15/02/2016	73.40	32.10	14.75	20.85	BDL	BDL
Mar-16	08/03/2016	70.65	31.25	18.35	24.10	BDL	BDL
	16/03/2016	68.00	33.00	19.35	23.95	BDL	BDL
	27/03/2016	68.50	32.40	15.00	21.50	BDL	BDL
Apr-16	07/04/2016	71.30	33.65	14.60	19.75	BDL	BDL
	13/04/2016	76.20	33.90	14.25	20.60	BDL	BDL
	22/04/2016	75.95	33.15	16.45	22.20	BDL	BDL

Sampling Station: A5, Sadayankuppam

Month	Date	Pm 10	Pm 2.5	SO_2	NO_x	CO	NH_3
Feb-16	04/02/2016	39.75	17.55	19.10	17.00	BDL	BDL
	15/02/2016	40.25	19.10	17.25	18.90	BDL	BDL
Mar-16	08/03/2016	41.10	22.85	17.60	17.10	BDL	BDL
	16/03/2016	41.50	17.60	17.65	16.60	BDL	BDL
	27/03/2016	40.70	18.75	20.75	18.10	BDL	BDL
Apr-16	07/04/2016	40.00	17.50	18.00	16.50	BDL	BDL
	13/04/2016	39.60	18.35	17.95	17.35	BDL	BDL
	22/04/2016	39.10	19.10	16.90	18.60	BDL	BDL

Sampling Station: A6, Chennai Petroleum Corporation Limited (CPCL)

Month	Date	Pm 10	Pm 2.5	SO_2	NO_x	CO	NH_3
Feb-16	04/02/2016	41.00	16.00	19.50	22.50	BDL	BDL
	15/02/2016	42.25	20.30	19.65	22.30	BDL	BDL
Mar-16	08/03/2016	42.90	17.90	18.65	21.90	BDL	BDL
	16/03/2016	45.75	18.15	18.80	20.25	BDL	BDL
	27/03/2016	43.65	15.50	18.50	21.60	BDL	BDL
Apr-16	07/04/2016	45.10	15.60	19.00	22.90	BDL	BDL
	13/04/2016	44.65	15.75	19.20	19.75	BDL	BDL
	22/04/2016	43.50	16.30	18.90	20.65	BDL	BDL

ANNEXURE – II

[illegible]
CDAKP |7P1U| 9.11.2014

ABSTRACT

Fisheries - Announcement 2014-2015 - Preparation of Techno Economic Feasibility Report and conducting Model Studies for the Construction of (i) Tuna Fishing Harbour in Ennore at Thiruvottriyur Kuppam in Tiruvallur District (ii)Fishing Harbour at Vellapallam in Nagapattinam District and (iii) Renovation of Existing Fishing Harbour at Old Town in Cuddalore District at an estimated cost of Rs.4.00 crore - Administrative approval and Financial sanction - Orders - Issued.

Animal Husbandry, Dairying and Fisheries (FS-1) Department

G.O.(D)No.373 Dated.22.12.2014

Thiruvalluvar Aandu - 2045
Maargazhi - 7

Read

From the Commissioner of Fisheries, letter Rc.No.T1/25083, dated.29.9.2014.

ORDER:

While moving the Demand for Grant (Demand No:7) for Fisheries Department, the Hon'ble Minister (Fisheries) had announced that "Detailed Techno Economic Feasibility and Model Studies would be conducted at an estimated cost of Rs.4.00 crore for construction of a Fishing Harbour at Ennore with Tuna handling facilities, construction of a new Fishing Harbour at Vellapallam in Nagapattinam district and for the renovation of the existing Fishing Harbour at Cuddalore Mudhunagar in Cuddalore District" (Announcement No:2).

2. Based on the above announcement, the Commissioner of Fisheries had sent necessary proposal to Government in the letter read above wherein it has been reported that the site originally selected for Tuna Fishing Harbour at Ennore is protected from sea erosion with Rubble Mounted Sea Wall (RMS Wall) by the Public Works Department and hence the site would not be suitable for construction of a Fishing Harbour. Therefore, an alternative site has been identified in Thiruvottriyur at a distance of 5 km south of the Ennore site.

3. The Commissioner of Fisheries has further informed that the detailed estimates for preparation of Techno Economic Feasibility Report and conducting Model Studies for the construction of the proposed Fishing harbours have been prepared at a cost of Rs.4.00 Crore as detailed below:-

(i)	Tuna Fishing Harbour in Ennore at Thiruvottriyur Kuppam in Tiruvallur District	: Rs.1.40 crore.

(P.T.O)

ii)	Fishing Harbour at Vellapallam in Nagapattinam District	: Rs.1.30 crore
(iii)	Renovation of Existing Fishing Harbour at Old Town in Cuddalore District	: Rs.1.30 crore
	Total	: Rs.4.00 crore

4. The Commissioner of Fisheries has requested the Government to accord approval for the above proposal and to allocate funds to prepare Techno-Economic Feasibility Report and to conduct model studies at (1) Thiruvottriyur Kuppam (2) Vellapallam and (3) Old Town in Cuddalore, at a total cost of Rs.4.00 Crore.

5. The Government have examined the proposal of the Commissioner of Fisheries and accord administrative approval and financial sanction for a sum of Rs.4.00 crore (Rupees Four crore only) for the preparation of Techno-Economic Feasibility Report and conduct of model studies for construction of Fishing Harbours at Thiruvottriyur Kuppam in Tiruvallur District, Vellapallam in Nagapattinam District and Renovation of existing Fishing Harbour at Old Town in Cuddalore District.

6. The expenditure sanctioned in para-5 above shall be debited to the following head of account:

> 2405-00 FISHERIES-103 Marine Fisheries-SCHEMES IN THE TWELFTH FIVE YEAR PLAN-II.State Plan-JA Hydrographic Survey, Investigation of Harbour Sites - 33 payments for Professional and Special Services-03 Special Service.
> (DPC:2405 00 103 JA 3338)

7. The expenditure sanctioned in para-5 above, shall constitute an item of 'New Service' and the approval of the Legislature will be obtained in due course. Pending approval of Legislature, the expenditure shall be initially met from the Contingency Fund. Orders regarding this will be issued by Finance (BG-I) Department separately. The Commissioner of Fisheries shall apply for the sanction of Contingency Fund advance to Finance (BG-I) Department in the prescribed format with the copy of this order at the appropriate time. The Commissioner of Fisheries is also directed to send necessary explanatory notes for inclusion of the above expenditure in the Supplementary Estimates 2014 - 2015 without fail.

8. This order issues with the concurrence of the Finance Department vide its U.O.No.70285/Finance(AH&F)/14, dated.22.12.2014 and with Additional Sanction Ledger Number 1870 (One thousand eight hundred and seventy)

(BY ORDER OF THE GOVERNOR)

S.VIJAYAKUMAR
Secretary to Government

To
The Commissioner of Fisheries, Chennai-6 (we).
The Chief Engineer, Fishing Harbour Project Circle, Chennai-6.
The Principal Accountant General (E&RSA), Chennai -18/18 (By Name).
The Pay and Accounts Officer (South), Chennai-35.
The Resident Audit Officer,
Office of the Principal Accountant General (G&SSA), Chennai-9.

ANNEXURE – III

THIRU A.V. VENKATACHALAM,I.F.S
MEMBER SECRETARY

STATE LEVEL ENVIRONMENT IMPACT
ASSESSMENT AUTHORITY – TAMIL NADU
3rd Floor, Panagal Maaligai,
No.1 Jeenis Road, Saidapet,
Chennai-15.
Phone No.044-24359973
Fax No. 044-24359975

TERMS OF REFERENCES (ToR)

Letter No.SEIAA-TN/F.No. 6440/SEAC – C/7(e)/ToR - 301/2017 dated: 22.01.2018

To
M/s. Fisheries Department,
Fishing Harbour Project Division
DMS Complex
Teynampet, Chennai – 600 006.

Sir,

Sub: SEIAA-TN – Terms of Reference (ToR) – Proposed Tuna Fishing Harbour at S.F.No. 7/4, 39, 40, 41, 42 & 49, Thiruvottiyur Kuppam Village, Ennore Taluk, Thiruvallur District, Tamil Nadu – Category "B1" and Schedule S.No. 7(e) - Port, Harbour, Fishing Harbour – ToR issued – Preparation of EIA Report – Regarding.

Ref: 1. Your application dated: 22.08.2015
2. Minutes of the 100th SEAC Meeting held on 20.12.2017 & 21.12.2017.
3. Minutes of the 266th SEIAA Meeting held on 22.01.2018

Kindly refer to your proposal submitted to the State Level Impact Assessment Authority for Environmental Clearance.

The proponent of **M/s. Fisheries Department**, submitted application for ToR on 22.08.2015, in Form-I, Pre- Feasibility report and draft TOR for the Tuna Fishing Harbour at S.F.No. 7/4, 39, 40, 41, 42 & 49, Thiruvottiyur Kuppam Village, Ennore Taluk, Thiruvallur District, Tamil Nadu.

The proposal seeking ToR was placed in the 100th SEAC meeting item No. 100 - 03 held on 20.12.2017 & 21.12.2017. Based on the proposal submitted and the presentation made, the SEAC decided to prescribe TOR for the preparation of EIA report along with Public Hearing. The proposal was considered in the SEIAA meeting held on 22.01.2018 vide Item No.266 - 01 and after detailed discussion, the authority decided to prescribe following

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MEMBER SECRETARY
SEIAA-TN

TOR for the preparation of EIA report along with the **following additional ToR.**

1. Bio diversity listed shall be classified as per IUCN classification as endangered, rare, etc as per the schedules of the Wildlife Act.
2. The EIA report shall be prepared as per the Harbor Mining Manual prescribed by the MOEF&CC and through accredited consultants for Ports & Harbours sector.
3. Loss to bio diversity anticipated with dredging operation both offshore and onshore may be elaborated.
4. The impact on bio diversity due to infrastructure development like roads, buildings, etc.
5. The anticipated threat for the underwater habitat due dredging.
6. Effect on fauna and flora due to the construction activities with materials like cements, paints, etc.
7. The project activities results increased intrusion, pathogens, virus, etc introduced due to the increased boating and other activities, etc.
8. The impact on migratory bird population due to the activity.
9. Impact on local community, their health and lifestyle may be discussed in detail.
10. Aesthetics of the beachscape and landscape be lost with the harbour construction.
11. Along with tuna harvesting, will the other marine species also be harvested if so the sustainable harvest model envisaged
12. The copy of the fishing policy of Tamil Nadu may be appended.
13. The possibility of displacement of people due to such activities?
14. Effect on the traditional fishing beach due to harbour construction
15. Why not the existing harbour facilities be enhanced to meet the objectives
16. Details of the critical elements to make it a sustainable harbour
17. Chance of plumeting of Tuna population leading to degradation of the critical marine habitat due to increased construction activities
18. The location of disposal point shall be arrived in consultation with the NIOT, Wetland and Coastal Zone Authorities by obtaining their approval.

A. STANDARD TERMS OF REFERENCE

1) Reasons for selecting the site with details of alternate sites examined rejected/selected on merit with comparative statement and basis for selection. The committee should justify site suitability in terms of environmental angle, resources sustainability

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MEMBER SECRETARY
SEIAA-TN

associated with selected site as compared to rejected sites. The analysis should include parameters considered along with weight age criteria for short-listing selected site.

2) Details of the land use break-up for the proposed project. Details of land use around 10 km radius of the project site. Examine and submit detail of land use around 10 km radius of the project site and map of the project area and 10 km area from boundary of the proposed/existing project area, delineating project areas notified under the wild life (Protection) Act, 1972/critically polluted areas as identified by the CPCB from time to time/notified eco-sensitive areas/interstate boundaries and international boundaries. Analysis should be made based on latest satellite imagery for land use with raw images.

3) Submit the present land use and permission required for any conversion such as forest, agriculture etc. land acquisition status, rehabilitation of communities/ villages and present status of such activities.

4) Examine and submit the water bodies including the seasonal ones within the corridor of impacts along with their status, volumetric capacity, quality likely impacts on them due to the project.

5) Submit a copy of the contour plan with slopes, drainage pattern of the site and surrounding area

6) Submit the details of terrain, level with respect to MSL, filling required, source of filling materials and transportation details etc.

7) Examine road/rail connectivity to the project site and impact on the existing traffic network due to the proposed project/activities. A detailed traffic and transportation study should be made for existing and projected passenger and cargo traffic.

8) Submit details regarding R&R involved in the project

9) Submit a copy of layout superimposed on the HTL/LTL map demarcated by an authorized agency on 1:4000 scale along with the recommendation of the SCZMA.

10) Submit the status of shore line change at the project site

11) Details of the layout plan including details of channel, breakwaters, dredging, disposal and reclamation.

12) Details of handling of each cargo, storage, transport along with spillage control, dust preventive measures. In case of coal, mineral cargo, details of storage and closed conveyance, dust suppression and prevention filters.

13) Submit the details of fishing activity and likely impacts on the fishing activity due to the project. Specific study on effects of construction activity and pile driving on marine

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MEMBER SECRETARY
SEIAA-TN

life.

14) Details of oil spill contingency plan.

15) Details of bathymetry study.

16) Details of ship tranquillity study.

17) Examine the details of water requirement, impact on competitive user, treatment details, use of treated waste water. Prepare a water balance chart.

18) Details of rainwater harvesting and utilization of rain water.

19) Examine details of Solid waste generation treatment and its disposal.

20) Details of desalination plant and the study for outfall and intake.

21) Examining baseline environmental quality along with projected incremental load due to the proposed project/activities.

22) The air quality monitoring should be carried out according to the notification issued on 16th November, 2009.

23) Examine separately the details for construction and operation phases both for Environmental Management Plan and Environmental Monitoring Plan with cost and parameters.

24) Submit details of a comprehensive Risk Assessment and Disaster Management Plan including emergency evacuation during natural and man-made disasters.

25) Submit details of the trees to be cut including their species and whether it also involves any protected or endangered species. Measures taken to reduce the number of the trees to be removed should be explained in detail. Submit the details of compensatory plantation. Explore the possibilities of relocating the existing trees.

26) Examine the details of afforestation measures indicating land and financial outlay. Landscape plan, green belts and open spaces may be described. A thick green belt should be planned all around the nearest settlement to mitigate noise and vibrations. The identification of species/ plants should be made based on the botanical studies.

27) The Public Hearing should be conducted for the project in accordance with provisions of Environmental Impact Assessment Notification, 2006 and the issues raised by the public should be addressed in the Environmental Management Plan. The Public Hearing should be conducted based on the ToR letter issued by the Ministry and not on the basis of Minutes of the Meeting available on the web-site.

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MEMBER SECRETARY
SEIAA-TN

28) A detailed draft EIA/EMP report should be prepared in accordance with the above additional TOR and should be submitted to the Ministry in accordance with the Notification.

29) Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.

30) The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.

31) Any further clarification on carrying out the above studies including anticipated impacts due to the project and mitigative measure, project proponent can refer to the model ToR available on Ministry website "http://moef.nic.in/Manual/Port and harbour".

Further the following **additional TOR** shall also be furnished in the EIA report.

1. One of the major environmental issues concerning the project is that 2 lakhs m3 of sea bed material will be dredged and proponent says that this will be used for shore line management. The characteristics of the dredged materials should be furnished along with the possible adverse impact of the dumping of the dredged material for shoreline management.
2. Another issue will be the impact of diesel spillages from the boats on the sea water quality.
3. The proponent should prepare a comprehensive line diagram in which all the facilities to be created should be marked. Then for each facility, the probable effluent generation and waste generation should be indicated with quantity and quality. Finally, the methodology for collection, treatment and reuse/disposal of the liquid and solid waste should be indicated. Specific attention should be paid to the marine discharges.
4. Within 10km radius all the parameters like air, sediment and biology should be studied in detail.
5. The impact of dredging should be evaluated in detail in the comprehensive EIA report.
6. The sampling should be done in grid pattern and every one kilometre the samples (air, water, sediment and biological samples) within the 10km of radius. Atleast 10 samples should be studied in detail.
7. Heavy metal studies in water and sea surface sediments can be studied

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MEMBER SECRETARY
SEIAA-TN

Besides the above, the below mentioned **general points** are also to be followed:

a. Executive Summary of the EIA/EMP Report

b. All documents to be properly referenced with index and continuous page numbering.

c. Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated.

d. Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF&CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project.

e. Where the documents provided are in a language other than English, an English translation should be provided.

f. The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.

g. While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF&CC vide O.M. No. J-11013/41/2006-IA.II(I) dated 4th August, 2009, which are available on the website of this Ministry, should be followed.

h. Changes, if any made in the basic scope and project parameters (as submitted in Form-I and the PFR for securing the TOR) should be brought to the attention of MoEF&CC with reasons for such changes and permission should be sought, as the TOR may also have to be altered. Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation.

i. As per the circular no. J-11011/618/2010-IA.II(I) dated 30.5.2012, certified report of the status of compliance of the conditions stipulated in the environment clearance for the existing operations of the project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable.

j. The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological maps and sections and (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.

STATE LEVEL ENVIRONMENT IMPACT ASSESSMENT AUTHORITY

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In addition to the above, the following shall be furnished:-

The Executive summary of the EIA/EMP report in about 8-10 pages should be prepared incorporating the information on following points:

1) Project name and location (Village, District, State, Industrial Estate (if applicable).
2) Products and capacities. If expansion proposal then existing products with capacities and reference to earlier EC.
3) Requirement of land, raw material, water, power, fuel, with source of supply (Quantitative)
4) Process description in brief, specifically indicating the gaseous emission, liquid effluent and solid and hazardous wastes.
5) Measures for mitigating the impact on the environment and mode of discharge or disposal.
6) Capital cost of the project, estimated time of completion.
7) Site selected for the project - Nature of land - Agricultural (single/double crop), barren, Govt/ private land, status of is acquisition, nearby (in 2-3 km.) water body, population, with in 10km other industries, forest, eco-sensitive zones, accessibility. (note - in case of industrial estate this information may not be necessary)
8) Baseline environmental data - air quality, surface and ground water quality, soil characteristic, flora and fauna, socio-economic condition of the nearby population
9) Identification of hazards in handling, processing and storage of hazardous material and safety system provided to mitigate the risk.
10) Likely impact of the project on air, water, land, flora-fauna and nearby population
11) Emergency preparedness plan in case of natural or in plant emergencies
12) Issues raised during public hearing (if applicable) and response given
13) CSR plan with proposed expenditure
14) Occupational Health Measures
15) Post project monitoring plan

Besides the above, the below mentioned general points should also be followed:-

a. A note confirming compliance of the TOR, with cross referencing of the relevant sections / pages of the EIA report should be provided.
b. All documents may be properly referenced with index, page numbers and continuous page numbering.
c. Copy of permission related to Port facility, Desalination plant, wind mill /solar power plant from competent Authority.
d. Where data are presented in the report especially in tables, the period in which the data were collected and the sources should be indicated.
e. While preparing the EIA report, the instructions for the proponents and instructions for the consultants issued by MoEF vide O.M. No. J-11013/41/2006-IA.II(I) dated 4th

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August, 2009, which are available on the website of this Ministry should also be followed.

f. The consultants involved in the preparation of EIA/EMP report after accreditation with Quality Council of India (QCI)/National Accreditation Board of Education and Training (NABET) would need to include a certificate in this regard in the EIA/EMP reports prepared by them and data provided by other organization/Laboratories including their status of approvals etc. In this regard circular no F. No.J-11013/77/2004-IA-II(I) dated 2nd December, 2009,18th March 2010, 28th May 2010, 28th June 2010, 31st December 2010 & 30th September 2011 posted on the Ministry's website http://www.moef.nic.in/ may be referred.

- After preparing the EIA (as per the generic structure prescribed in Appendix-III of the EIA Notification, 2006) covering the above mentioned points, the proponent will take further necessary action for obtaining environmental clearance in accordance with the procedure prescribed under the EIA Notification, 2006.
- The final EIA report shall be submitted to the SEIAA, Tamil Nadu for obtaining Environmental Clearance.
- The TORs prescribed shall be **valid for a period of three years** from the date of issue, for submission of the EIA/EMP report as per OMNo.J-11013/41/2006-IA-II(I)(part) dated 29th August 2017.

The receipt of this letter may be acknowledged.

MEMBER SECRETARY
SEIAA-TN

Copy to:

1. The Principal Secretary to Government, Environment & Forests Dept, Govt. of Tamil Nadu, Fort St. George, Chennai - 9.
2. The Chairman, Central Pollution Control Board, PariveshBhavan, CBD Cum-Office Complex, East Arjun Nagar, New Delhi 110032.
3. The Member Secretary, Tamil Nadu Pollution Control Board, 76, Mount Salai, Guindy, Chennai-600 032.
4. The APCCF (C), Regional Office, Ministry of Environment & Forest (SZ), 34, HEPC Building, 1st & 2nd Floor, Cathedral Garden Road, Nungampakkam, Chennai - 34.
5. Monitoring Cell, IA Division, Ministry of Environment & Forests, ParyavaranBhavan, CGO Complex, New Delhi 110003
6. Stock File.

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MEMBER SECRETARY
SEIAA-TN

Compliance report
SEIAA-TN/F.No.6440/SEAC-C/7(e)/ToR-301/2017 dated 22.01.2018
TUNA FISHING HARBOUR
Thiruvottriyur kuppam, Thiruvallur District

S.No	Activity	Observations
	Additional ToR	
1.	Biodiversity listed shall be classified as per IUCN classification as endangered, rare, etc as per the schedules of the wildlife act	The project location has no specific marine or terrestrial biodiversity. Neither Coastal Wetland is falling under the project area in the project impact area. No notified Biodiversity zone fall under the project impact area and project area The inventory of marine and terrestrial fauna and flora is presented in **Table 3.20 to Table 3.23 in Chapter III.** No endangered or rare species found in project area / project impact area as per IUCN Classification.
2.	The EIA report shall be prepared as per the harbor manual prescribed by the MoEF&CC and through accredited consultants for ports and harbors' sector	The EIA report was prepared as per the Guidance manual of MoEF&CC for Ports & Harbors. Centre for Environment Health and Safety(Annamalai University) who is an accredited EIA Consultation Organization. Please refer www.qcin.org And www.envfor.nic.in.
3.	Loss of biodiversity anticipated with the dredging operation both offshore and onshore may be elaborated	The impact of dredging on the Biodiversity on the project Impact area of 10km radius is presented in **Chapter V Para 5.3.5, page number 5.4** in EIA report
4.	The impact on biodiversity due to infrastructure development like roads, buildings, etc.	Full report for Impact on Biodiversity is described in **Chapter –V Impact Evaluation and Assesment**
5.	The anticipated threat for the underwater habitat due dredging	It is elaborated in **Chapter V (Para 5.3.5, page number 5.4)** in EIA report
6.	Effect on fauna and flora due to the construction activities with the materials like cements, paints, etc	The impact of project establishment and construction is presented in **Chapter XI (Para No. 11.9 page No. 11.14).**
7.	The project activities results increased intrusion, pathogens, virus, etc introduced due to the increased boating and other activities, etc.	It is presented in Chapter XI **(Para No. 11.10 page No. 11.19).**
8.	The impacts on migratory bird population due to the	No migratory birds is reported

S.No	Activity	Observations
	activity	
9.	Impact on local community, their health and lifestyle may be discussed in details	It is discussed in **Chapter III & V Para3.48 & 5.3.5** of the report
10.	Aesthetics of the beachscape and landscape be lost with the harbor constructions	It is described in **Chapter IV** (Coastal Modeling)
11.	Along with Tuna harvesting, will the other marine species also be harvested if so the sustainable harvest model envisaged	Other species and marine fishes depending upon the season and catch, it will be harvested by fishermen. No specific data is available as such. For the feasibility report, it is only Coastal modeling is described in **Chapter IV**
12.	The copy of the fishing policy of Tamilnadu may be appended	The copy of Fishing Policy of Tamil Nadu is appended
13.	The possibility of displacement of people due to such activities.	Replacement & Rehabilitation Plan is not required as no displacement of human settlement is required.
14.	Effects on the traditional fishing beach due to harbor constructions	At present there is no traditional fishing activities is in force at project site as all the fishermen operating their boats from the nearby Chennai Fishing Harbour. Hence it will not affect the traditional fishing activities of the project site
15.	Why not the existing harbor facilities be enhanced to meet the objectives,	The existing Chennai Harbor is already overcrowded and the proposed Harbor will complement the much required additional berthing places for the fishermen community.
16.	Details of the critical elements to make it a sustainable harbor	Exclusive fishing activities for Tuna variety of fishes.
17.	Chance of plummeting of Tuna population leading to degradation of the critical marine habitat due to increased construction activities.	Construction activities are brief and within the Harbor area. Hence, there will not be any impact on the habitats.
18.	The location of the disposal point shall be arrived in consultation with the NIOT, wetland and Coastal Zone Authorities by obtaining their approval	Tamil Nadu SCZMA already approved the proposed point of disposal and recommended the CRZ clearance to MoEFCC
	Standard ToR	
1.	Reasons for selecting the site with details of alternate sites examined rejected or selected on merit with comparative statement and selection basis for selection. The examination should justify site suitability in terms of environmental angle, resources, sustainability associated	Reason for selection of site with respect to alternative sites described briefly in **Chapter VI- Analysis of Alternatives** of the EIA report

S.No	Activity	Observations
	with selected site as compared to rejected sites. The analysis should include parameters considered along with the weight age criteria for short listing selected sites.	
2.	Details of the land use breakup for the proposed project. Details of land use around 10 km radius of the project site. Examine and submit detail of land use around 10 km radius of the project site and map of the project area and 10 km area from the boundary of the proposed/ existing project area, delineating project areas notified under wildlife (protection) act, 1972. Critically polluted areas as identified by CPCB from time to time / notified eco sensitive areas interstate boundaries and international boundaries. Analysis should be made based on latest satellite imagery for land use with raw images.	Land use:- **page number 3.30; Para No.3.7.1** Land use **Map page number 3.36 Figure No.3.11** Satellite Map **page number 3.2 Figure No. 3.3** All details described in **Chapter III (Para 3.7.1)** of the EIA report
3.	Submit the present land use and permission required for any conversion such as forest agriculture etc. land acquisition status, rehabilitation of communities village and present status of such activities	No agricultural or Forests land is involved. No land acquisition is envisaged.
4.	Examine and submit the water bodies including the seasonal ones within the corridor of impacts along with their status, volumetric capacity, and quality likely impacts on them due to the projects.	No water bodies are involved
5.	Submit a copy of the contour plan with slopes, drainages pattern of the site and surrounding area	Map enclosed in **Chapter III** of the report i.e. **Fig no. 3.13**
6.	Submit the details of the terrain level with respect to MSL, filling . required, source of filling materials and transportations details etc.	Details are covered in **Chapter II & III** of the report
7.	Examine road/rails connectivity to the project site and impact on the existing traffic network due to the proposed project/activities. A detailed traffic and transportation study should be made for existing and projected passenger and cargo traffics.	Presented in **Figure 2.1 Page No.2.3**
8.	Submit details regarding R&R involved in the projects	Replacement & Rehabilitation Plan is not required as no displacement of

S.No	Activity	Observations
		human settlement is required
9.	Submit a copy of layout superimposed on the HTL/LTL map demarcated by an authorized agency on 1:4000 scale along with the recommendation of the SCZMA	Copy of CRZ Superimposed map enclosed in **Chapter III(Fig. No. 3.4, Page No. 3.9)**
10.	Submit the status of shore line changes at the project sites.	Shoreline changes studied in **Chapter IV** (Coastal Modeling) **Para No. 4.9 Page No. 4.48-4.57**
11.	Details of the layout plan including details of channel, breakwaters, dredging, disposal and reclamation.	Layout plan for fishing harbor is discussed in **chapter II (Fig No.2.2, Page No. 2.6)**
12.	Details of handling of each cargo, storage, transport along with the spillages control, dust preventive measures. In case of coal, mineral, cargo, details of storage and closed conveyance, dust suppression and prevention filters	No Cargo. Only Fish Handling. Details Studied in **Executive Summary, Chapter II, V, IX & XI**
13.	Submit the details of fishing activity and likely impacts on the fishing activity due to the project. Specific study on effects of construction activity and pile driving on marine life	Briefly described in chapter **V (Para No. 5.3.5) , page no 5.4**
14.	Details of oil spill contingency plan	No Oil handling in the proposed FH.
15.	Details of bathymetry study	Bathymetry Study is described in **Para No 4.4 Page No. 4.7 of Chapter IV**
16.	Details of ship tranquility study	Tranquility Study is described in **Para No 4.7 Page No. 4.29-4.37 of Chapter IV**
17.	Examine the details of water requirement, impacts on competitive user, treatments details, use of treated waste water, prepare a water balance chart	All details examined and reported in **Chapter XI** of the Report
18.	Details of rain water harvesting and utilization of rain water	Rainwater Harvesting Discussed in **Chapter XI (Para No. 11.9.h Page No. 11.19)**
19.	Examine details of solid waste generation treatment and its disposal	Solidwaste discussed in **Chapter V (Para No. 5.3.3 Page No. 5.4)**
20.	Details of desalination plant and the study for outfall and intake	Nc Desalination Plant
21.	Examine baseline environmental quality with projected incremental load due to the proposed projects/activities	All Environmental Baselines is discussed in **Chapter III** of the Report
22.	The air quality monitoring should be carried out according to the notification issued on 16th November, 2009	It is carried out from AAQ Guidelines,2009 and described in **Chapter III (Para No. 3.4 Page No. 3.8)**

S.No	Activity	Observations
23.	Examine separately the details for construction and operations phases both for Environmental Management Plan and Environmental Monitoring Plan with cost and parameters	All are elaborated briefly in **Chapter XI** and Cost benefits analysis done in **Chapter X**
24.	Submit details of a comprehensive risk assessment and Disaster Management Plan including emergency evacuation during natural and manmade disasters	Details are described in **Chapter VIII** of the Report **(Para No. 8.3 &8.4 Page No. 8.2)** RA& DMP has been submitted in online portal
25.	Submits details of the trees to be cut including their species and whether it also involves any protected or endangered species. Measure taken to reduce the number of trees to be removed should be explained in detail. Submit the details of compensatory plantation. Explore the possibilities of relocating the existing trees.	No removal of trees are required.
26.	Examine the details of afforestation measures indicating land and financial outlay, landscape plan, green belts and open spaces may be described. A thick green belt should be planned all around the nearest settlements to mitigate noise and vibrations. The identifications of species plants should be made based on botanical studies	No removal or cutting of trees. The proposed green belt area is presented in the Project layout **Figure No. 2.2 Page No.2.7**
27.	The public hearing should be conducted for the project in accordance with provisions of Environmental Impacts Assessment Notification 2006 and the issue raised by the public hearings should be conducted based on the ToR letter issued by Ministry and not on the basis of minutes of the meetings available on the website.	Public notice informing the public hearing was published on 21.06.2019 in the English daily "The New India Express" and in the Tamil Daily "Dinamani" through DPIR, Government of Tamil Nadu and also through local body in the nearby villages. (Copy of the advertisement is attached) Public hearing was conducted at Annai Sivagami Mahal Tirumana Mandabam, Annai Sivagami Complex, No. 378, T.H. Road, Theradi, Thiruvottriyur, Chennai – 600 019 on 25.07.2019 at 11.00 am. **Public hearing report is appended.**
28.	A detailed draft EIA/EMP report should be prepared in accordance with the above additional ToR and should be submitted to the Ministry in accordance with the notification	Full report prepared on the basis of MoEF&CC (ToR) Guidelines
29.	Details of litigation pending against the project, if any , with	Nil

S.No		Activity	Observations
		direction order passed by any court of Law against the Project should be given	
30.		The cost of the Project (capital cost and recurring cost) as well as the cost towards implementations of EMP should be clearly spelt out	Capital Cost of Project is **240 Cr.** No recurring cost
31.		Any further clarification on carrying out the above studies including anticipated impacts due to the project and mitigative measure, project proponent can refer to the model ToR available on Ministry website http://moef.nic.in/Mannual/Port and harbour. Further the following additional ToR shall also be furnished in EIA report.	Full report prepared on the basis of MoEF&CC (ToR) Guidelines
	1.	One of the major environmental issues concerning the project is that 2 lakhs m^3 of sea bed material will be dredged and proponent says that this will be used for shore line management. The characteristics of the dredged materials should be furnished along with the possible adverse impact of the dumping of the dredged material for shoreline management	All are discussed in **Chapter IV** i.e. Coastal Modeling
	2.	Another issue will be impact of diesel spillages from the boats on the sea water quality	Minor Impacts i.e. negligible
	3.	The proponent should prepare a comprehensive line diagram in which all the facilities to be created should be marked. Then for each facility, the probable effluent generation and waste generation should be indicated with quantity and quality. Finally, the methodology for collection, treatment and reuse/disposal of the liquid and solid waste should be indicated. Specific attention should be paid to be the marine discharges.	Yes, All things done by Project proponent
	4.	Within 10km radius all the parameters like air, sediments and biology should be studied in details	Full details studied in **Chapter III** of the report
	5.	The impact of dredging should be evaluated in	Dredging had evaluated in **Chapter IV, Para No. 4.8** Sediment Modeling

S.No		Activity	Observations
		details in the comprehensive EIA report.	
	6.	The sampling should be done in grid pattern and every one kilometer the sample (air, water, sediment and biological samples) within the 10km of radius. At least 10 samples should be studied in details.	Every sampling was done with in 10km radius and shown for every Parameter in **Chapter III**
	7.	Heavy metals studied in water and sea surface sediments can be studied	Heavy metals studied in **Chapter III (Para No. 3.5 Page No. 3.20 -3.26)**
	Besides the above, the below mentioned general points are also to be followed		
	a)	Executive summary of the EIA/EMP report	It is within EIA report
	b)	All documents to be properly referenced with index and continuous page numbering	Full report is Properly arranged
	c)	Where data are presented in the report especially in tables, the period in which data were collected and sources should be indicated	All data are taken from Secondary and Primary sourced properly mentioned in EIA report
	d)	Project proponent shall enclose all the analysis/testing report of water, air, soil, noise etc using MoEF&CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the project.	All testing done by Vimta Lab, Hyderabad/Coimbatore.
	e)	Where the documents provided are in a language other English, an English translation shall be provided	All documents are in English language if not we are responsible for converting in English
	f)	The questionnaire for environmental appraisal for mining projects as devised earlier by the Ministry shall also be filled and submitted	Not Applicable
	g)	While preparing EIA report, the instructions for the proponents and instructions for the Consultants issued by MoEF&CC vide OM No. J-11013/41/2006-IA.II(I) dated 4th August, 2009, which are available on the website of this Ministry, should be followed	All instruction given by MoEF&CC for making EIA report were followed
	h)	Changes, if any made in this basic scope and the	No Change

S.No		Activity	Observations
		project parameters (as submitted in Form-I and the PFR for securing the ToR) should be brought to the attention of MoEF&CC with reasons for such changes and permission should be sought, as the ToR may also have the altered Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modification arising out of the P.H. process) will entail conducting the public hearing again with the revised documentation.	
	i)	As per the Circular no J-11011/618/2010-IA.II(I) dated 30.05.2012, certified report of the status of the compliance of the conditions stipulated in the environment clearance for the existing operation of the project should be obtained from the regional office of Ministry of Environment, Forest and Climate change, as may be applicable.	yes
	j)	The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area. (ii) Geological maps and sections and (iii) sections of the mine pit and external dumps, if any clearly showing the land features of the adjoining area.	EIA report covered all details which required our Project to get Environmental Clearance

Public Hearing Meeting

Public Hearing Meeting of Proposed Construction of M/s Tuna Fishing Harbour with Fish handling capacity of 69000 tonne/Annum at Thiruvottriyur Kuppam, Ennore, Thiruvottriyur Taluka, Chennai District.

As per Environmental Impact Assessment Notification, 2006 (as amended) Public hearing has been conducted for the Proposed Construction of M/s Tuna Fishing Harbour with Fish handling capacity of 69000 tonne/Annum at Thiruvottriyur Kuppam, Ennore, Thiruvottriyur Taluka, Chennai District.

Public notice informing the public hearing was published on 21.06.2019 in the English daily "The New India Express" and in the Tamil Daily "Dinamani" through DPIR, Government of Tamil Nadu and also through local body in the nearby villages. (Copy of the advertisement is attached)

Public hearing was conducted at Annai Sivagami Mahal Tirumana Mandabam, Annai Sivagami Complex, No. 378, T.H. Road, Theradi, Thiruvottriyur, Chennai – 600 019 on 25.07.2019 at 11.00 am.

Panel Present during the public hearing meeting are given below.

1. Tmt. R.Seethalakshmi, I.A.S, District Collector, Chennai District
2. Tmt. S. Indiragandhi, District Environmental Engineer, TNPCB, Ambattur
3. Thiru. R. Rajendran, Revenue Division Officer, North Chennai Division, Chennai District.
4. General public (List provided in the Minutes of Meeting)

Details of public hearing issues raised are provided in the Minutes of Meeting provided

THE NEW INDIAN EXPRESS
Date. 21/06/2019

TAMILNADU POLLUTION CONTROL BOARD

PUBLIC NOTICE

Whereas, as per Environmental Impact Assessment Notification, 2006, (as amended) Public Hearing has been made as mandatory for certain projects covered in Schedule of the said Notification.

Whereas, Public Hearing has to be conducted by State Pollution Control Board as per paras (2) and (3) of Appendix – IV of Environmental Impact Assessment Notification, 2005 (as amended).

Whereas, as required under paras (2) and (3) of Appendix – IV of Environmental Impact Assessment Notification, 2006, (as amended) public hearing is to be conducted by Tamilnadu Pollution Control Board for the following project as detailed below.

Sl. No.	Name and location of the Project	Date & time of Public hearing	Place of Public hearing
1.	Proposed Construction of M/s. Tuna Fishing Harbour with fish handling capacity of 69000 Tonne/Annum at Thiruvottriyur Kuppam, Ennore, Thiruvottriyur Taluk, Chennai District by Department of Fisheries, Government of Tamilnadu.	25.07.2019 at 11.00 AM	Annai Sivagami Mahal Thirumana Mandapam, Annai Sivagami Complex, No. 378, T.H Road, Theradi, Thiruvottriyur, Chennai – 600 019.

In this connection, it is informed that the Executive Summary of EIA in English & Tamil and draft EIA report in soft and hard copies of the above said project is made available for reference to the public at the following places.

i. Office of the District Collector, Chennai District ii. Office of the Regional Director, Chennai District, Department of Industries and Commerce, Thiru. Vi. Ka. Industrial Estate, Guindy, Chennai – 600 003. iii. Tamilnadu Pollution Control Board, 76, Mount Salai, Guindy, Chennai- 32. iv. Office of the District Environmental Engineer, Tamilnadu Pollution Control Board, No. 77A, SIDCO Industrial Estate, Ambattur, Chennai – 600058. v. Office of the Zonal Officer, Zone-I, Thiruvottriyur, Greater Chennai Corporation. vi. Office of the Village Administrative Officer, Thiruvottriyur Village, Thiruvottriyur Taluk, Thiruvallur District. vii. Office of the BDO, Minjur Panchayat Union, Gummidipoondi Taluk, Thiruvallur District. viii. Office of the Tashildar, Thiruvotriyur Taluk, Thiruvallur District ix. Ministry of Environment, Forest and Climate Change, Regional Office (SEZ), 1st & 2nd Floor, Handloom Export Promotion Council, 34, Cathedral Garden Road, Nungambakkam, Chennai -34. x. Office of the Assistant Director of Fisheries, 11, Thiruvotriyur N.H Road, Near to New Bus Stand, Ponneri, Thiruvallur District – 601 204.

Summary of the draft EIA report is displayed in TNPCB website www.tnpcb.gov.in for public reference.

Suggestions, views, comments and objections from the public are invited on or before the date of public hearing by the District Environmental Engineer, Tamilnadu Pollution Control Board, Ambattur.

All persons including bonafide residents, Environmental groups and others located at the project site / sites of displacement / sites likely to be affected can participate in the public hearing and express their suggestions, views, comments and objections. They can also make written views, suggestions, comments and objections to the District Environmental Engineer, Tamilnadu Pollution Control Board, Ambattur on the above subject.

The proceedings of the public hearing will be displayed at the following places for general information:

1. Office of the Village Administrative Officer, Thiruvottriyur village. 2. Office of the Tashiidar, Thiruvotriyur Taluk, Thiruvallur District. 3. Office of the District Collector, Chennai District 4. Office of the District Environmental Engineer, Tamilnadu Pollution Control Board, No. 77A, SIDCO Industrial Estate, Ambattur, Chennai – 600058. 5. Office of the Zonal Officer, Zone-I, Thiruvottriyur, Greater Chennai Corporation, and 6. Office of the Assistant Director of Fisheries, 11, Thiruvotriyur N.H Road, Near to New Bus Stand, Ponneri, Thiruvallur District – 601 204.

Comments if any, on the proceedings may be sent directly to the Ministry of Environment & Forests, Government of India, Paryavaran Bhawan, C.G.O. Complex, Lodi Road, New Delhi – 110 003 and to the applicant concerned.

Member Secretary,
Tamilnadu Pollution Control Board,
Chennai.

DIPR/518/DISPLAY/2019

DINA MANI
Date. 21/06/19

தமிழ்நாடு மாசு கட்டுப்பாடு வாரியம்

பொது அறிவிப்பு

மத்திய சுற்றுச்சூழல் மற்றும் வனத்துறை அமைச்சகம், புது தில்லி, 14.09.2006 அன்று வெளியிடப்பட்ட சுற்றுச்சூழல் தாக்க மதிப்பீடு அறிக்கை மற்றும் திருத்தங்கள் எஸ்.ஓ.1533–ன்படி பொதுமக்கள் கேட்புரையானது சொல்லப்பட்ட அறிவிக்கையின் அட்டவணையில் உள்ளடக்கப்பட்ட தொழிற்திட்டங்கள் அனைத்திற்கும் பின்இணைப்பு 4–ன்படி அவசியமானதாக சொல்லப்பட்டுள்ளது.

உள்ளூர் மக்களின் கருத்துக்களை கேட்டறிவதற்காக 14.09.2006 அன்று வெளியிடப்பட்ட சுற்றுச்சூழல் தாக்க மதிப்பீடு அறிவிக்கையின் பத்தி 7 மற்றும் பின் இணைப்பு 4–ன்படி கீழ்க்காணும் தொழில் திட்டத்திற்கான பொதுமக்கள் கருத்து கேட்புணர்வு கூட்டம், கீழே குறிப்பிட்ட தேதி, நேரம் மற்றும் இடத்தில் தமிழ்நாடு மாசு கட்டுப்பாடு வாரியத்தால் நடத்தப்பட உத்தேசிக்கப்பட்டுள்ளது.

வ. எண்	தொழிற் திட்டத்தின் பெயர் மற்றும் அமைவிடம்	தேதி மற்றும் நேரம்	கூட்டம் நடைபெறும் இடம்
1.	**திட்டத்தின் பெயர்:** வருடம் ஒன்றிற்கு 69,000 டன் மீன் கையாளும் திறனுடைய தி/ள். டுனா மீன் பிடி துறைமுகம், திருவொற்றியூர் குப்பம், திருவொற்றியூர் தாலுகா, திருவள்ளூர் மாவட்டம். **உரிமையாளர்:** மீன் வளத்துறை, தமிழ்நாடு அரசு	25.07.2019 at 11.00 AM	தி/ள். அன்னை சிவகாமி திருமண மண்டபம், அன்னை சிவகாமி காம்ப்ளக்ஸ், எண் 378, T.H. ரோடு, தேரடி, திருவொற்றியூர், திருவள்ளூர் மாவட்டம்.

இதன் தொடர்பாக இத்தொழிற்திட்டத்தின் வரைவு சுற்றுச்சூழல் தாக்க மதிப்பீடு அறிக்கை மற்றும் அதன் சுருக்கம் (ஆங்கிலம் மற்றும் தமிழ்) பின்வரும் இடங்களில் பொதுமக்கள் பார்வைக்காக வைக்கப்பட்டுள்ளது என தெரிவிக்கப்படுகிறது.

1. மாவட்ட ஆட்சித்தலைவர் அலுவலகம், சென்னை மாவட்டம், சென்னை–1. 2. மண்டல இயக்குநர் அலுவலகம், தொழில் மற்றும் வர்த்தக துறை, சென்னை மாவட்டம், திரு.வி.க. இண்டஸ்டிரியல் எஸ்டேட், கிண்டி, சென்னை–3. 3. தமிழ்நாடு மாசு கட்டுப்பாடு வாரியம், 76, மவுண்ட் சாலை, கிண்டி, சென்னை – 600 032. 4. மாவட்ட சுற்றுச் சூழல் பொறியாளர் அலுவலகம், தமிழ்நாடு மாசு கட்டுப்பாடு வாரியம், 77, தெற்கு அவென்யூ சாலை, அம்பத்தூர் இண்டஸ்டிரியல் எஸ்டேட், அம்பத்தூர், சென்னை 600 058. 5. மண்டல அலுவலர் அலுவலகம், மண்டலம்– 1, திருவொற்றியூர், பெருநகர சென்னை மாநகராட்சி. 6. கிராம நிர்வாக அலுவலர் அலுவலகம், திருவொற்றியூர் கிராமம், திருவொற்றியூர் 7. வட்டார வளர்ச்சி அலுவலர் அலுவலகம், மீஞ்சூர் ஊராட்சி ஒன்றியம், திருவள்ளூர் மாவட்டம். 8. வட்டாட்சியர் அலுவலகம், திருவொற்றியூர் தாலுகா, திருவள்ளூர் மாவட்டம். 9. உதவி இயக்குநர் (கடல் வளம்) அலுவலகம், 11, திருவொற்றியூர் N.H.ரோடு, புதிய பேருந்து நிலையம் அருகில், பொன்னேரி, திருவள்ளூர் மாவட்டம்–601 204. 10. சுற்றுச்சூழல் வனத்துறை அமைச்சகம் மற்றும் பருவநிலை மாற்றம், (தென் கிழக்கு மண்டலம்) அலுவலகம், 1st & 2nd Floor, கைத்தறி வளர்ச்சி ஏற்றுக் குழுமம், 34, கதீட்ரல் கார்டன் ரோடு, நுங்கம்பாக்கம், சென்னை – 34.

வரைவு சுற்றுச்சூழல் தாக்க மதிப்பீடு அறிக்கை மற்றும் அதன் சுருக்கம் பற்றிய தகவல்கள் தமிழ்நாடு மாசு கட்டுப்பாடு வாரியத்தின் www.tnpcb.gov.in இணையதள முகவரியில் பார்வையிடலாம்.

பொதுமக்கள் தங்கள் கருத்துக்கள், மதிப்புரைகள், மறுப்புரைகள் ஆகியவற்றை தமிழ்நாடு மாசு கட்டுப்பாடு வாரியத்தின் அம்பத்தூர் மாவட்ட சுற்றுச் சூழல் பொறியாளரிடம் பொதுமக்கள் கருத்து கேட்டுணரும் கூட்டம் நடைபெறும் நாளன்றோ அல்லது அதற்கு முன்போ எழுத்து மூலம் தெரிவிக்கலாம்.

பொதுமக்கள் கருத்து கேட்டுணரும் கூட்டத்தில் கலந்து கொண்டு தங்களது கருத்துக்கள், மதிப்புரைகள், மறுப்புரைகள் தெரிவிக்குமாறு கேட்டுக்கொள்ளப்படுகிறது. மேலும் பொதுமக்கள் தங்களுடைய கருத்துக்கள், மதிப்புரைகள், மறுப்புரைகள் ஆகியவற்றை எழுத்து மூலமாகவும் மாவட்ட சுற்றுச் சூழல் பொறியாளர், தமிழ்நாடு மாசு கட்டுப்பாடு வாரியம், அம்பத்தூர் அவர்களிடம் தெரிவிக்கலாம்.

பொதுமக்கள் கருத்து கேட்புணர்வு கூட்ட நடவடிக்கைகள் பற்றிய விவரம் கீழ்க்காணும் இடங்களில் பொதுமக்கள் தகவலுக்காக வைக்கப்படும். 1. கிராம நிர்வாக அலுவலர் அலுவலகம், திருவொற்றியூர் கிராமம், திருவொற்றியூர். 2. வட்டாட்சியர் அலுவலகம், திருவொற்றியூர் தாலுகா, திருவள்ளூர் மாவட்டம். 3. மாவட்ட ஆட்சித்தலைவர் அலுவலகம், சென்னை மாவட்டம், சென்னை–1. 4. மாவட்ட சுற்றுச் சூழல் பொறியாளர் அலுவலகம், தமிழ்நாடு மாசு கட்டுப்பாடு வாரியம், 77, தெற்கு அவென்யூ சாலை, அம்பத்தூர் இண்டஸ்டிரியல் எஸ்டேட், அம்பத்தூர், சென்னை 600 058. 5. மண்டல அலுவலர் அலுவலகம், மண்டலம்–1, திருவொற்றியூர், பெருநகர சென்னை மாநகராட்சி. 6. உதவி இயக்குநர் (கடல் வளம்) அலுவலகம், 11, திருவொற்றியூர் N.H.ரோடு, புதிய பேருந்து நிலையம் அருகில், பொன்னேரி, திருவள்ளூர் மாவட்டம்–601 204.

கேட்புணர்வு கூட்ட நடவடிக்கைகள் தொடர்பான பொதுமக்களின் கருத்துக்கள் ஏதேனும் இருப்பின் அவைகளை நேரடியாக சுற்றுச்சூழல் மற்றும் வனத்துறை அமைச்சகம், இந்திய அரசு, பரியாவரண்பவன், சிஜிஓ காம்ப்ளக்ஸ், லோதி ரோடு, புது தில்லி–110 003 என்ற முகவரிக்கும், தொழிற்திட்டத்தின் பொறுப்பாளருக்கும் / உரிமையாளருக்கும் நேரிடையாக அனுப்பலாம்.

உறுப்பினர் செயலர்,
தமிழ்நாடு மாசு கட்டுப்பாடு வாரியம்,
சென்னை.

செ.ம.தொ.இ/818/வரைகலை/2019

MINUTES OF THE PUBLIC HEARING CONDUCTED ON 25.07.2019 AT 11.00AM FOR THE PROPOSED CONSTRUCTION OF M/S. TUNA FISHING HARBOUR WITH FISH HANDLING CAPACITY OF 69000 TONNES/ANNUM AT THORUVOTTIYUR KUPPAM, ENNORE, TIRUVOTTIYUR TALUK, CHENNAI DISTRICT BY TAMILNADU FISHERIES DEPARTMENT.

Name of the Project	:	Proposed construction of M/S. TUNA FISHING HARBOUR with fish handling capacity of 69000 tonnes/annum at Thoruvottiyur Kuppam, Ennore, Tiruvottiyur Taluk, Chennai District by Tamilnadu Fisheries Department falling under the Category of 7(e)Ports, Harbours.
Venue	:	Annai Sivagami Mahal Thirumanamandapam, Annai Sivagami Complex, No.378,T.H.Road,Theradi, Thiruvottiyur,Chennai – 19.
Date & Time		25.07.2019 at 11.00AM

Participants:

1.	**Tmt.R.Seethalakshmi,I.A.S**	**District Collector, Chennai District**
2.	**Tmt. S. Indiragandhi,**	**District Environment Engineer, Tamilnadu Pollution Control Board, Ambattur**
3.	**Thiru.R.Rajendran,**	**Revenue Divisional Officer, North Chennai Division, Chennai District.**
4.	**General Public**	**As per the Annexure**

The public hearing meeting started with Thamizhthai Vazhthu.

The District Environmental Engineer, Tamilnadu Pollution Control Board, Ambattur welcomed the District Collector, all Government officials, media people and general public who were assembled at the venue and informed that the Tamilnadu

Fisheries Department has proposed to construct M/s. Tuna Fishing Harbour with fish handling capacity of 69000Tonnes/Annum at Tiruvottiyur Kuppam, Ennore, Tiruvottiyur taluk, Chennai district. This public hearing is conducted with the approval of District Collector, as per the Terms of reference granted by the State Level Environment Impact Assessment Authority(SEIAA), Tamilnadu vide letter dated 22.01.2018. She also stated that the Public notice informing the Public hearing was published on 21.06.2019 in the English daily "The New Indian Express" and in the Tamil daily "Dinamani" through DPIR, Government of Tamilnadu and also through local body in the nearby villages. Further she informed that, the opinion of the public is recorded and the same shall be forwarded to the concerned Authority SEIAA-TN by Tamilnadu Pollution Control Board with the approval of District Collector and requested the assembled general public to register their opinion clearly one by one and cooperate to conduct the hearing peacefully. Further she requested the Tamilnadu Fisheries Department to make a detailed presentation about the proposed project of construction of M/s. Tuna Fishing Harbour with fish handling capacity of 69000Tonnes/Annum at Tiruvottiyur Kuppam, Ennore, Tiruvottiyur taluk, Chennai district. She also added that the audio & video recordings of the public hearing will be sent to the State Level Environment Impact Assessment Authority (SEIAA), Tamilnadu.

On behalf of the Tamilnadu Fisheries Department, Dr. V. Nehru Kumar, EIA Consultant and professor & Director, Centre for Environment, Health & safety, Annamalai University, Annamalai Nagar has narrated elaborately that the place where the project to be arrived, how the project to be implemented, technical parameters to be considered, significance of the project, what are all the facilities to be brought in the place, pollution control measures of various waste and benefits and beneficiaries of the project etc.,

Following the presentation, the public were invited to express their views, concerns and questions, if any by clearly mentioning their name and the village to which he/she belongs to. The Views, concerns and queries of the public are detailed below:

1. **Mr.S.Sankar, Thiruvottiyur Kuppam, Thiruvottiyur.**

   This project is historically special project. This project will improve the livelihood of the fisheries community. Due to this project 1 lakh people will benefit. On behalf of Thiruvottiyur Kuppam administration and public, I welcome the proposed construction of M/s. Tuna Fishing harbour Project.

2. **Mr.C. Rajendiran, President, Palagaithotti Kuppam, Thiruvottiyur**

   We welcome the fishing harbour project coming to Thiruvottiyur Kuppam.

3. **Mr.Jeyavel, Thiruchinnan Kuppam, Thiruvottiyur**

   On behalf of my kuppam, I welcome the fishing harbour project coming to Thiruvottiyur Kuppam.

4. **Mr.Jaisingh, Ondikuppam, Thiruvottiyur**

   This project is our dream for many days. We wholeheartedly welcome the fishing harbour project coming to Thiruvottiyur Kuppam.

5. **Mr. Chinnapillai, Thiruvottiyur Kuppam Pothunala Sangam, Thiruvottiyur**

   We wholeheartedly welcome the fishing harbour project coming to Thiruvottiyur Kuppam.

6. **Mr. Lokesh, Thiruvottiyur Kuppam, Illaingargal Pothunala Sangam,Thiruvottiyur**

   I thank the people who proposed to bring this project to Thoruvottiyur Kuppam and I wish to implement this project early so as to provide employment and benefits to fisher men.

7. **Mr. K Kuppan, Ex.M.L.A., Thiruvottiyur Kuppam, Thiruvottiyur**

   He informed that this project is coming here by the former Hon'ble Chief Minister of Tamilnadu, Puratchi Thalaivi, J.Jayalalitha. Avl. and to be implemented by the present Hon'ble Chief Minister of Tamilnadu.

   Further he informed to extend his full cooperation and support to bring the harbour in Thiruvottiyur Kuppam. He requested the Tamilnadu Fisheries Department to engage the fishermen community while construction and operation period of the harbour and their participation should be there and their representatives should be there in all the committees. He also added that, all the works that is security, parking tender and all the works of the harbour should be awarded to the fisher men community.

   With the above, he welcomed the fishing harbour project coming to Thiruvottiyur Kuppam on behalf of all the fishermen..

Tmt. R.Seethalakshmi, , I.A.S., District Collector, Chennai District

The District collector thanked the people who gathered in the meeting and said that the public hearing meeting was concluded.

Finally, the public hearing ended with national anthem.

30/7/19

District Environment Engineer,
Tamilnadu Pollution Control Board
Ambattur

1/8/19

District Collector
Chennai

0/3

சென்னை மாவட்டம், திருவொற்றியூர் தாலுகா, திருவொற்றியூர் குப்பம் கிராமத்தில் தமிழ்நாடு அரசின் மீன் வளத்துறையால் அமைக்கப்பட உள்ள ஆண்டொன்றிற்கு 69000 டன் கையாளப்படவுள்ள தி/ள்.சூரை மீன்பிடி துறைமுகத்தில் பொது மக்கள் கருத்துக்கேட்பு கூட்டத்தின் நடவடிக்கை விபரங்கள்.

திட்டத்தின் பெயர்	சுற்றுச்சூழல் தாக்க அறிவிக்கையில் இடம்பெற்ற பட்டியல் 7(e) துறைமுகங்கள் கீழ் வரும் சென்னை மாவட்டம், திருவொற்றியூர் தாலுகா , திருவொற்றியூர் குப்பம் கிராமத்தில் தமிழ்நாடு அரசின் மீன் வளத்துறையால் முன்மொழிந்துள்ள ஆண்டொன்றிற்கு 69000 டன் கையாளப்படவுள்ள தி/ள்.சூரை மீன்பிடி துறைமுகம் அமைப்பதற்கான திட்டம்.
இடம்	தி/ள். அன்னை சிவகாமி மஹால் திருமண மண்டபம், அன்னை சிவகாமி காம்ப்ளக்ஸ், எண்.378, டி,எச்.ரோடு,தேரடி, திருவொற்றியூர், திருவள்ளூர் மாவட்டம்.
தேதி மற்றும் நேரம்	25/07/2019, காலை 11.00 மணி

கலந்து கொண்டவர்கள்

1	திருமதி.ஆர்.சீத்தா லெட்சுமி, இ.ஆ.ப	மாவட்ட ஆட்சியர், சென்னை மாவட்டம்
2	திருமதி.செ.இந்திரா காந்தி,	மாவட்ட சுற்றுச்சூழல் பொறியாளர், தமிழ்நாடு மாசு கட்டுப்பாடு வாரியம், அம்பத்தூர்.
3	திரு.ஆர்.இராஜேந்திரன்	வருவாய் பிரிவு அதிகாரி, வடக்கு சென்னை பிரிவு, சென்னை மாவட்டம்.
4	பொது மக்கள்	இணைப்பில் உள்ளபடி

பொது மக்கள் கருத்துக்கேட்பு கூட்டம் தமிழ்தாய் வாழ்த்துடன் ஆரம்பிக்கப்பட்டது.

மாவட்ட சுற்றுச்சூழல் பொறியாளர், தமிழ்நாடு மாசு கட்டுப்பாடு வாரியம், அம்பத்தூர் அவர்கள் மாவட்ட ஆட்சியர், அனைத்து அரசு நிர்வாகிகள், ஊடகங்கள் மற்றும் அங்கு கூடியிருந்த பொதுமக்கள் அனைவரையும் வரவேற்று தமிழ்நாடு அரசின் மீன் வளத்துறை ஆண்டொன்றிற்கு 69000 டன் கையாளக் கூடிய துறைமுகம் ஒன்றினை சென்னை மாவட்டம்,

திருவொற்றியூர் குப்பத்தில் அமைக்கப்பட முன்மொழிந்துள்ளனர் என தெரிவித்தார். இந்த பொது மக்கள் கருத்துக்கேட்பு கூட்டம் தமிழ்நாடு மாநில சுற்றுச்சூழல் தாக்க மதிப்பீடு ஆணையத்தின் 22.01.2018 தேதியிட்ட குறிப்பு விதிமுறையின் படி மாவட்ட ஆட்சியரின் ஒப்புதலுடன் நடைபெறுகிறது என்று தெரிவித்தார்.

இந்த பொதுமக்கள் கருத்துக் கேட்புக் கூட்டத்தை 25-07-2019 அன்று சிவகாமி அம்மாள் திருமண மண்டபத்தில் நடத்த மாவட்ட ஆட்சியர் அவர்களின் அனுமதி பெற்று 21-06-2019 அன்று தி நீயூ இந்தியன் எக்ஸ்பிரஸ் என்கின்ற ஆங்கில நாளிதழிலும் மற்றும் தினமணி என்கின்ற தமிழ் நாளிதழிலும் அறிவிப்பு தமிழ்நாடு அரசின் செய்தி மற்றும் விளம்பரத்துறை மூலம் வெளியிடப்பட்டுள்ளது. அருகிலுள்ள கிராமங்களில் உள்ளாட்சி அமைப்பு மூலமாகவும் தெரிவிக்கப்பட்டுள்ளது. மேலும் இக்கூட்டத்தில் நடைபெறும் கருத்துக்களை ஒலி/ஒளி காட்சிகளை ஆவணப்படுத்தி மாநில சுற்றுச்சூழல் தாக்க மதிப்பீடு ஆணையத்திற்கு அனுப்பிவைக்கப்படும். இங்கு குழுமியிருக்கும் பொதுமக்கள் தங்களின் கருத்துகளை ஒருவர் பின் ஒருவராக தெளிவாக பதிவு செய்யுமாறும் மற்றும் இக்கூட்டத்தினை அமைதியான முறையில் நடைபெற ஒத்துழைக்குமாறும் தெரிவித்தார்.

தமிழ்நாடு மீன் வளத்துறையினை இத்திட்டத்தினை குறித்த விரிவான விளக்கத்தினை கூறுமாறும் கோரினார்.

தமிழ்நாடு மீன் வ்ளத்துறையின் சார்பில், முனைவர்.வை.நேரு குமார், சுற்றுச்சூழல் தாக்க மதிப்பீடு ஆலோசகர், பேராசியர் மற்றும் இயக்குனர் சுற்றுச்சூழல் சுகாதாரம் மற்றும் ஆபத்தின்மை பாதுகாப்பு மையம் அண்ணாமலை பல்கலைக்கழகம் அவர்கள் இத்திட்டம் எந்த இடத்தில் வரவிருக்கிறது, எப்படி இத்திட்டத்தினை செயலாக்க போகிறார்கள், என்னென்ன தொழில்நுட்ப அளவீடுகள் கருத்தில் கொள்ளப்படுகின்றன, இத்திட்டத்தின் முக்கியத்துவம், என்னென்ன வசதிகள் இத்துறைமுகத்தில் வரவிருக்கின்றன, மாசுகட்டுபாடு நடவடிக்கைகள் மற்றும் இத்திட்டத்தால் ஏற்பாடு பயன்கள் மற்றும் பயன்படுவோர்கள் பற்றிய விரிவான விளக்கத்தினை விவரித்தார்.

இதனைதொடர்ந்து, பொதுமக்கள் தங்களது கருத்தினை அவர்களது பெயர் மற்றும் ஊரின் பெயரை கூறி பதிவு செய்யுமாறு கேட்டுக்கொள்ளப்பட்டார்கள் அவர்களது கருத்துக்கள் பின்வருமாறு.

1. திரு.S.சங்கர், திருவொற்றியூர் குப்பம், திருவொற்றியூர்

இத்திட்டம் வரலாற்று சிறப்புமிக்க திட்டம். இத்திட்டம் மீன்வர்களின் வாழ்வாதாரத்தை மேம்படுத்தக்கூடியது. இதனால் 1 இலட்சம் பேர் பயனடைவார்கள். திருவொற்றியூர் குப்பம் நிர்வாகம் மற்றும் பொது மக்கள் சார்பில் நான் இத்திட்டத்தினை வரவேற்கிறேன்.

2. திரு.C.இராஜேந்திரன், ஊர் தலைவர், பலகைத்தொட்டி குப்பம், திருவொற்றியூர்

நாங்கள் திருவொற்றியூர் குப்பத்தில் அமைக்கப்படவுள்ள மீன்பிடித் துறைமுகத்தை வரவேற்கிறோம்.

3. திரு.ஜெயவேல், திருச்சினாங் குப்பம், திருவொற்றியூர்

எனது குப்பத்தின் சார்பாக, மீன்பிடித் துறைமுகம் அமைவதை வரவேற்கிறோம்.

4. திரு.ஜெய்சிங், ஒண்டிக்குப்பம், திருவொற்றியூர்

இத்துறைமுகமானது எங்களது பல நாள் கனவு. எனவே திருவொற்றியூர் குப்பத்தில் மீன்பிடித் துறைமுகம் வருவதை நாங்கள் மனப்பூர்வமாக வரவேற்கிறோம்.

5. திரு.சின்னபிள்ளை, திருவொற்றியூர் குப்பம் பொது நலச்சங்கம் திருவொற்றியூர்

நாங்கள் முழுமனதுடன் மீன்பிடித் துறைமுகம் வருவதை வரவேற்கிறோம்.

6. திரு.லோகேஷ், திருவொற்றியூர் குப்பம், இளைஞர்கள் பொது நலச்சங்கம், திருவொற்றியூர்

இத்திட்டத்தினை திருவொற்றியூர் குப்பத்தில் கொண்டு வர முன்மொழிந்தவர்களுக்கு நன்றி தெரிவித்துக்கொள்கிறேன். மேலும், இத்திட்டத்தை நிறைவேற்றி மீன்வர்களுக்கு வேலைவாய்ப்பு மற்றும் நன்மை பெறும் வகையில் விரைவில் கொண்டுவர ஆதரவு தெரிவிக்கிறோம்.

7. திரு.K.குப்பன், முன்னாள் சட்டமன்ற பேரவை உறுப்பினர், திருவொற்றியூர் குப்பம், திருவொற்றியூர்

இத்திட்டம் தமிழ்நாட்டின் மாண்புமிகு முன்னாள் முதலமைச்சர் புரட்சி தலைவி அம்மா ஜெ.ஜெயலலிதா அவர்களால் இவ்விடத்திற்கு கொண்டு வரப்பட்டது. இத்திட்டமானது தற்போதைய மாண்புமிகு தமிழக முதலமைச்சர் அவர்களால் செயலாக்கப்படவுள்ளது.

திருவொற்றியூர் குப்பத்தில் மீன்பிடித் துறைமுகம் வருவதற்கு எங்களது முழு ஒத்துழைப்பு மற்றும் ஆதரவினை தெரிவிக்கிறோம். மேலும், துறைமுகத்தின் கட்டுமான மற்றும் செயல்பாடுகளில் மீனவர் சமுமாயத்தை ஈடுபடுத்துமாறும், ஒவ்வொரு செயலிலும் எங்களது பங்களிப்பு முழுவதுமாக இருக்க வேண்டும் எனவும் அனைத்து குழுவிலும் மீனவர் சமுதாயத்தில் ஒருவர் உறுப்பினராக சேர்க்க வேண்டும் எனவும் மீன்வளத்துறையினை கோரியுள்ளார். மேலும், பாதுகாப்பு, பார்க்கிங் என அனைத்து பணிகளிலும் எங்கள் மீனவர் சமுதாயத்திற்கு மட்டும்தான் கொடுக்கப்படவேண்டும் எனவும் கோரியுள்ளார். மேலும், அவர் மீனவர் சமுதாயத்தின் சார்பில் இந்த மீன்பிடி துறைமுகத் திட்டம் திருவொற்றியூர் குப்பத்தில் வருவதை வரவேற்கிறேன் என தெரிவித்தார்.

8. திரு.R சீத்தாலெட்சுமி, இ.ஆ.ப, மாவட்ட ஆட்சியர், சென்னை மாவட்டம்

மாவட்ட ஆட்சியர் குழுமியிருக்கும் அனைத்து மக்களுக்கும் நன்றி தெரிவித்து பொதுமக்கள் கருத்துகேட்பு கூட்டத்தினை முடித்துவைத்தார்.

முடிவில், தேசிய கீதத்துடன் கருத்துக்கேட்பு கூட்டம் முடிவடைந்தது.

30/7/19.

மாவட்ட சுற்றுச்சூழல் பொறியாளர்,
தமிழ்நாடு மாசு கட்டுப்பாடு வாரியம்,
அம்பத்தூர்,

மாவட்ட ஆட்சியர்,
சென்னை மாவட்டம்.
சென்னை—58.

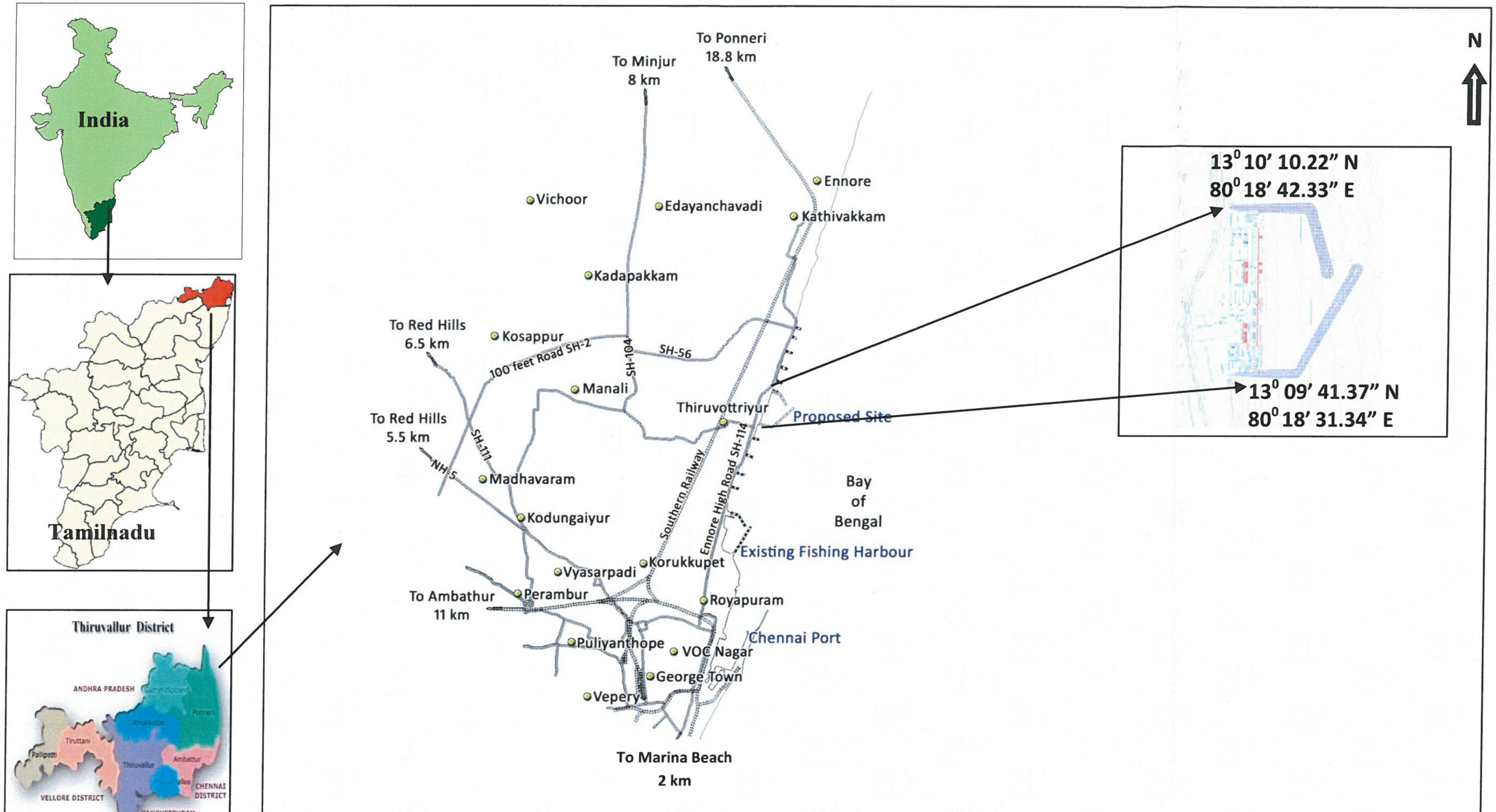

India
Tamilnadu
Thiruvallur District
ANDHRA PRADESH
VELLORE DISTRICT
CHENNAI DISTRICT
KANCHEEPURAM DISTRICT
N
To Ponneri 18.8 km
To Minjur 8 km
Vichoor
Edayanchavadi
Ennore
Kathivakkam
Kadapakkam
To Red Hills 6.5 km
Kosappur
100 feet Road SH-2
SH-104
SH-56
Manali
Thiruvottriyur
Proposed Site
To Red Hills 5.5 km
SH-111
NH-5
Madhavaram
Kodungaiyur
Southern Railway
Ennore High Road SH-114
Bay of Bengal
Existing Fishing Harbour
Vyasarpadi
Korukkupet
To Ambathur 11 km
Perambur
Royapuram
Chennai Port
Puliyanthope
VOC Nagar
George Town
Vepery
To Marina Beach 2 km
13^0 10' 10.22" N
80^0 18' 42.33" E
13^0 09' 41.37" N
80^0 18' 31.34" E

FIG.1. KEY MAP

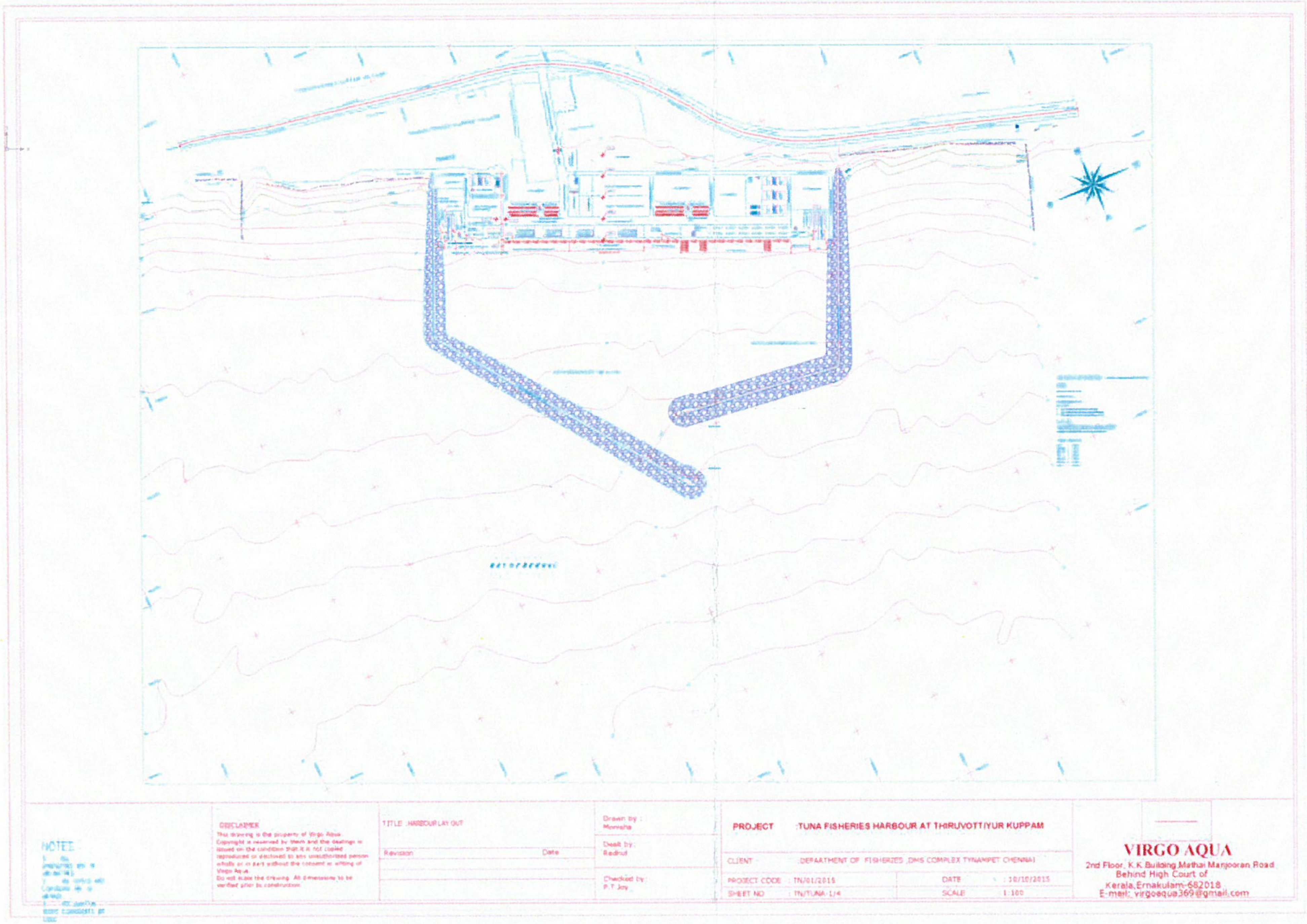


FIG.2. PROJECT LOCATION & SCHEMATICS OF THE PROJECT

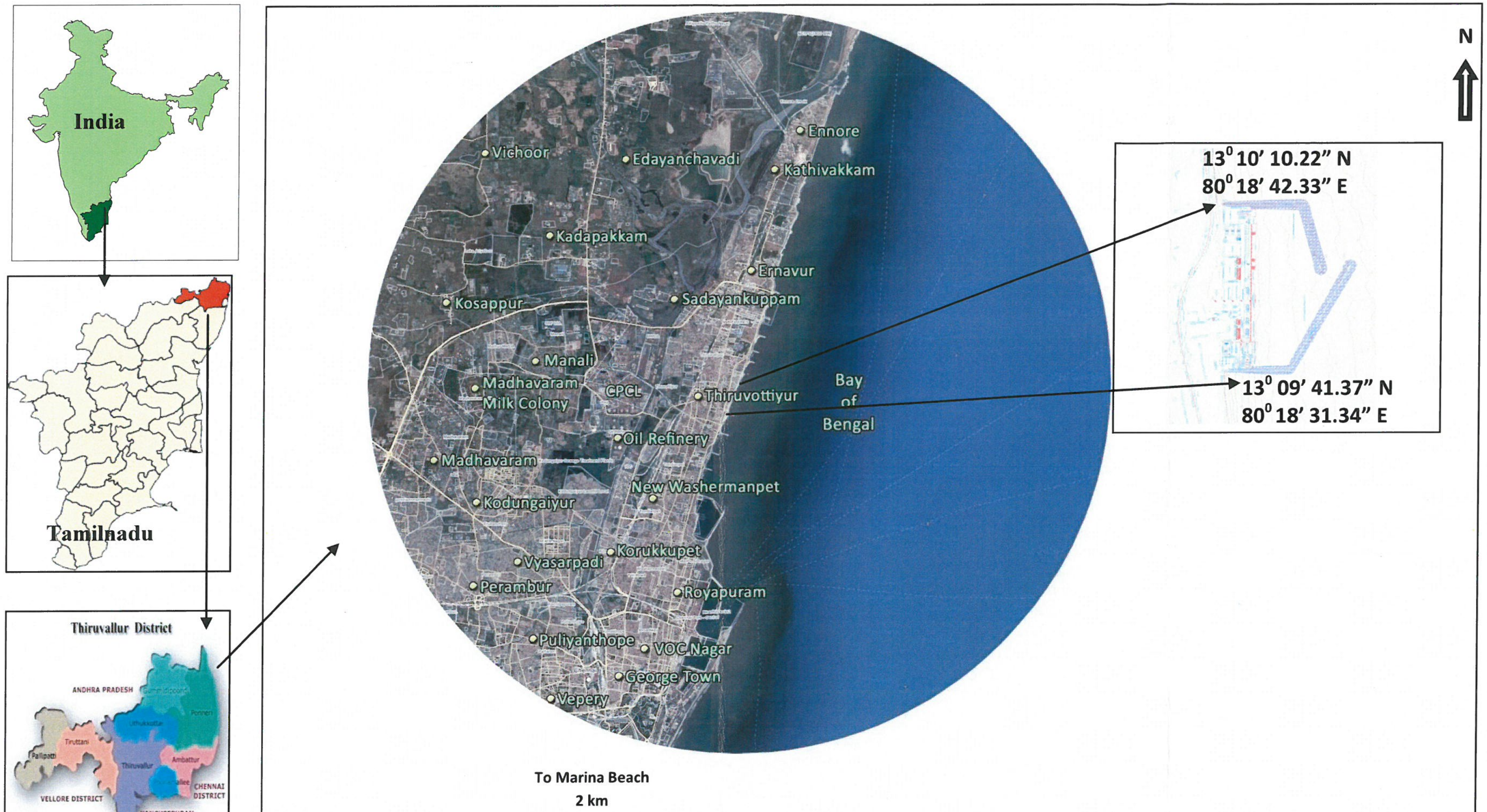


FIG.3. PROJECT IMPACT MAP – GOOGLE IMAGERY (10 km RADIUS)


DEMARCATION OF HIGH TIDE LINE AND LOW TIDE LINE FOR THE PROPOSED TUNA FISHING HARBOUR AT TIRUVOTTIYUR KUPPAM IN ENNORE,CHENNAI
N
BAY OF BENGAL
LEGEND
HIGH TIDE LINE (2011)
HIGH TIDE LINE (2015)
LOW TIDE LINE
SURVEY BOUNDARY
HTL REFERENCE POINTS
SOURCE: CLIENT (PROJECT SITE)
PROPOSED PROJECT DETAILS
Note : SINCE THE COAST IS DYNAMIC THE HTL AS PER 2011 AND THE CURRENT POSITION (2015) IS SHOWN
SCALE 1 : 4,000
0 50 100 200 300 400 M
PREPARED BY
INSTITUTE OF REMOTE SENSING
ANNA UNIVERSITY
CHENNAI - 600 025
FOR
M/S. Virgo Aqua Consulting Engineers
2nd Floor,K.K.Building,Mathai Manjooran Road
Behind High Court of Kerala
Ernakulam - 682018
PREPARED BY
VERIFIED BY
APPROVED BY

FIG.4. CRZ MAP

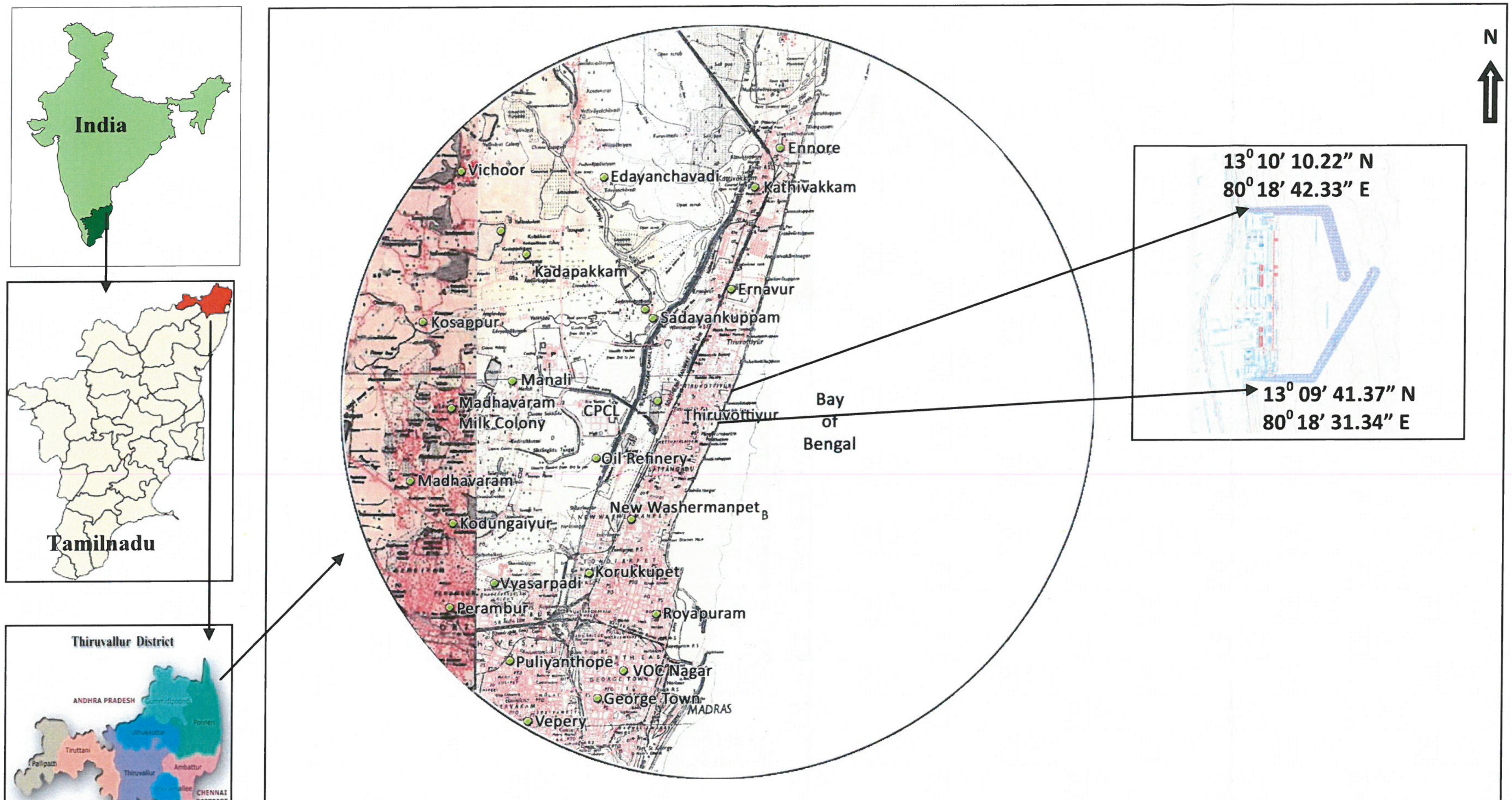


FIG.5. PROJECT IMPACT MAP – (10 km RADIUS)

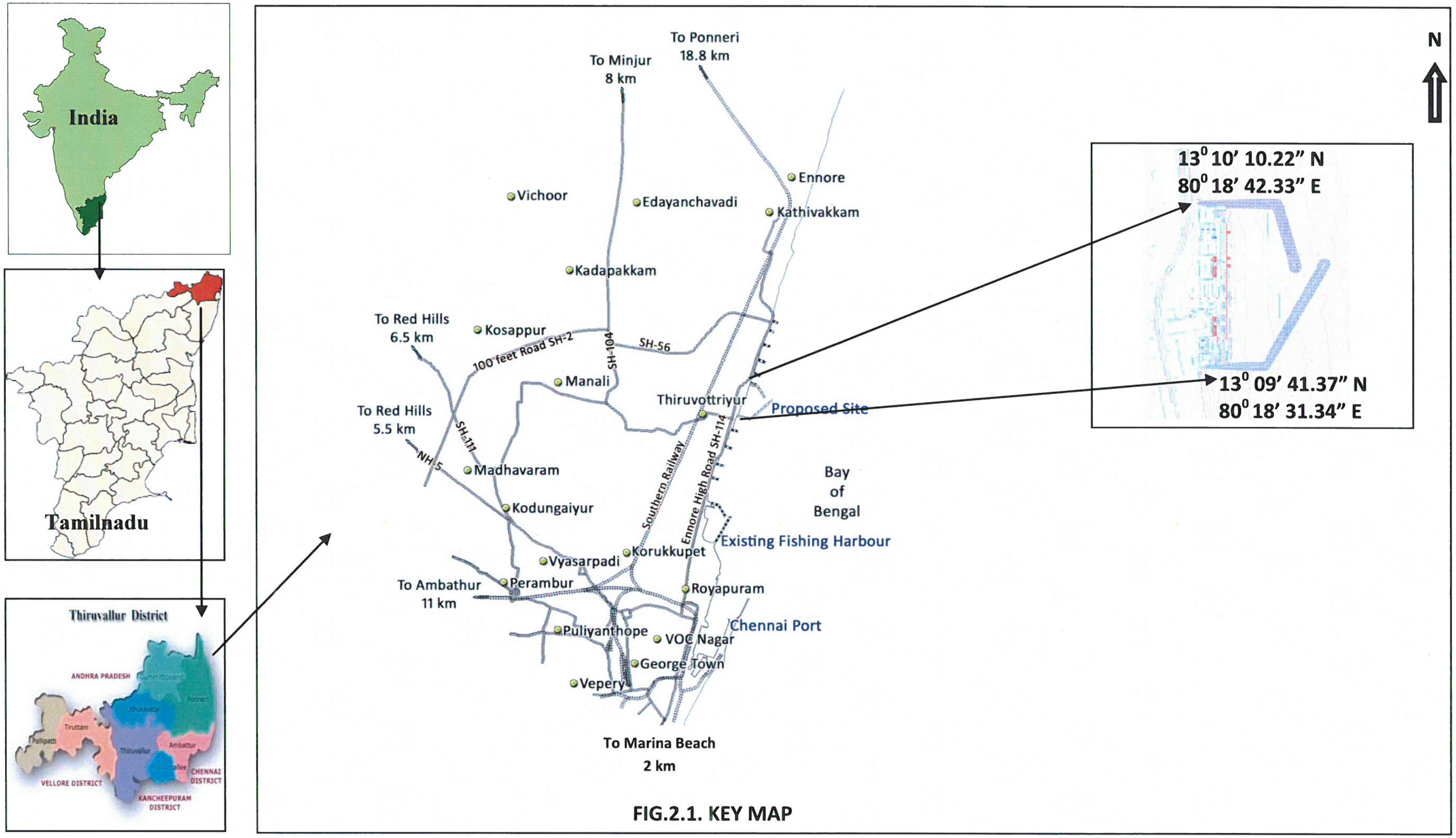


FIG.2.1. KEY MAP

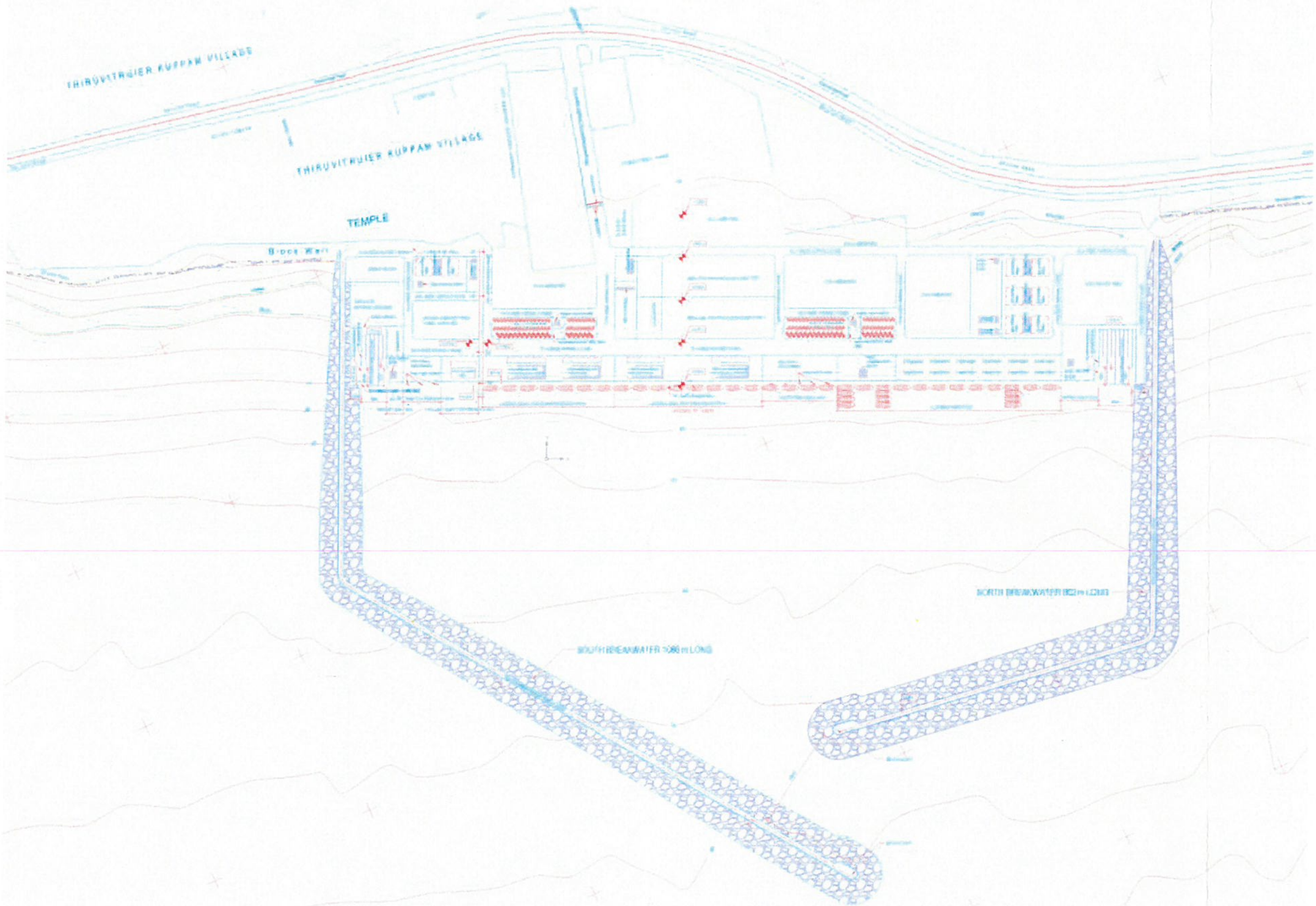
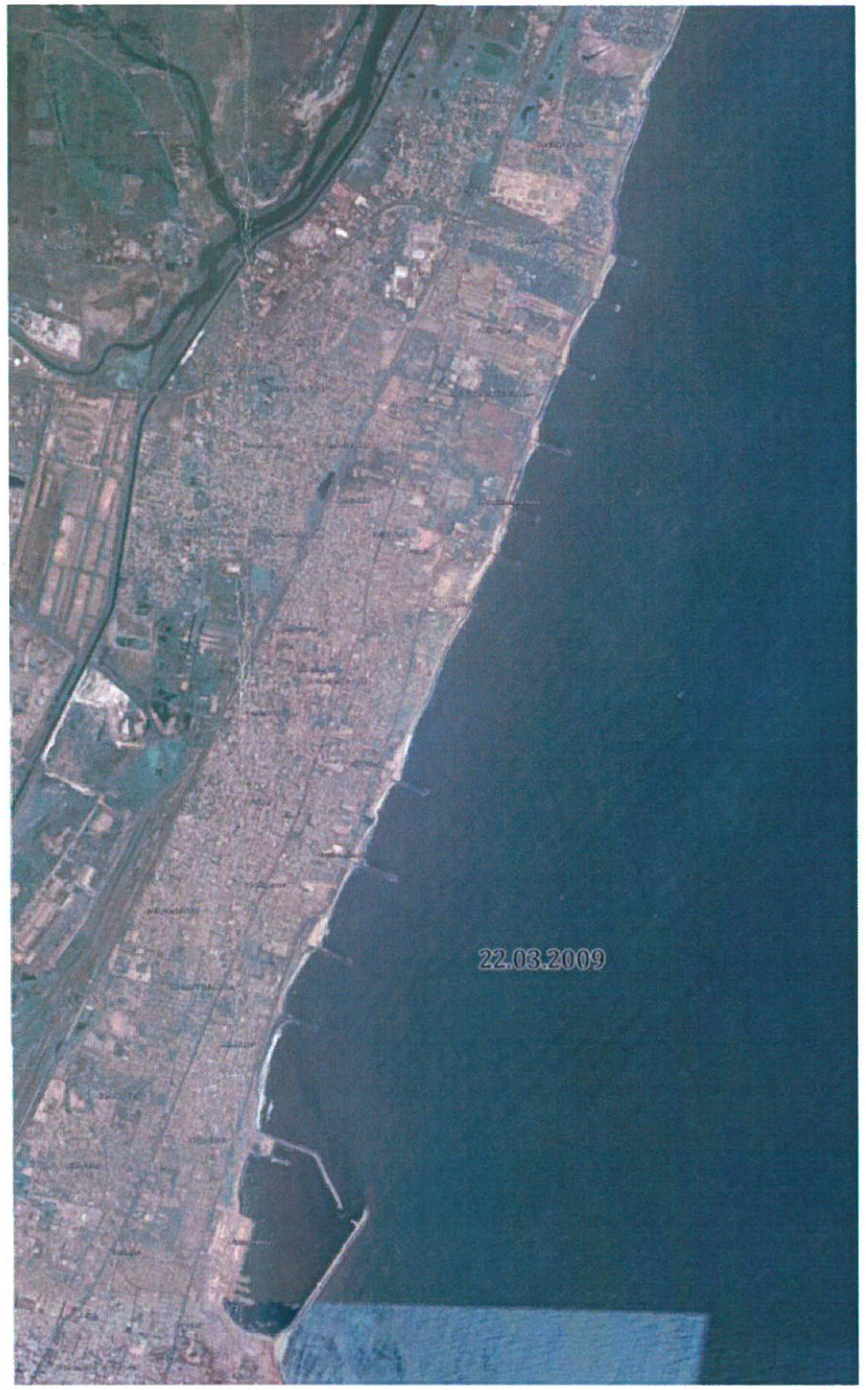


FIG.2.2. INFRASTRUCTURE COMPONENT OF THE PROPOSED

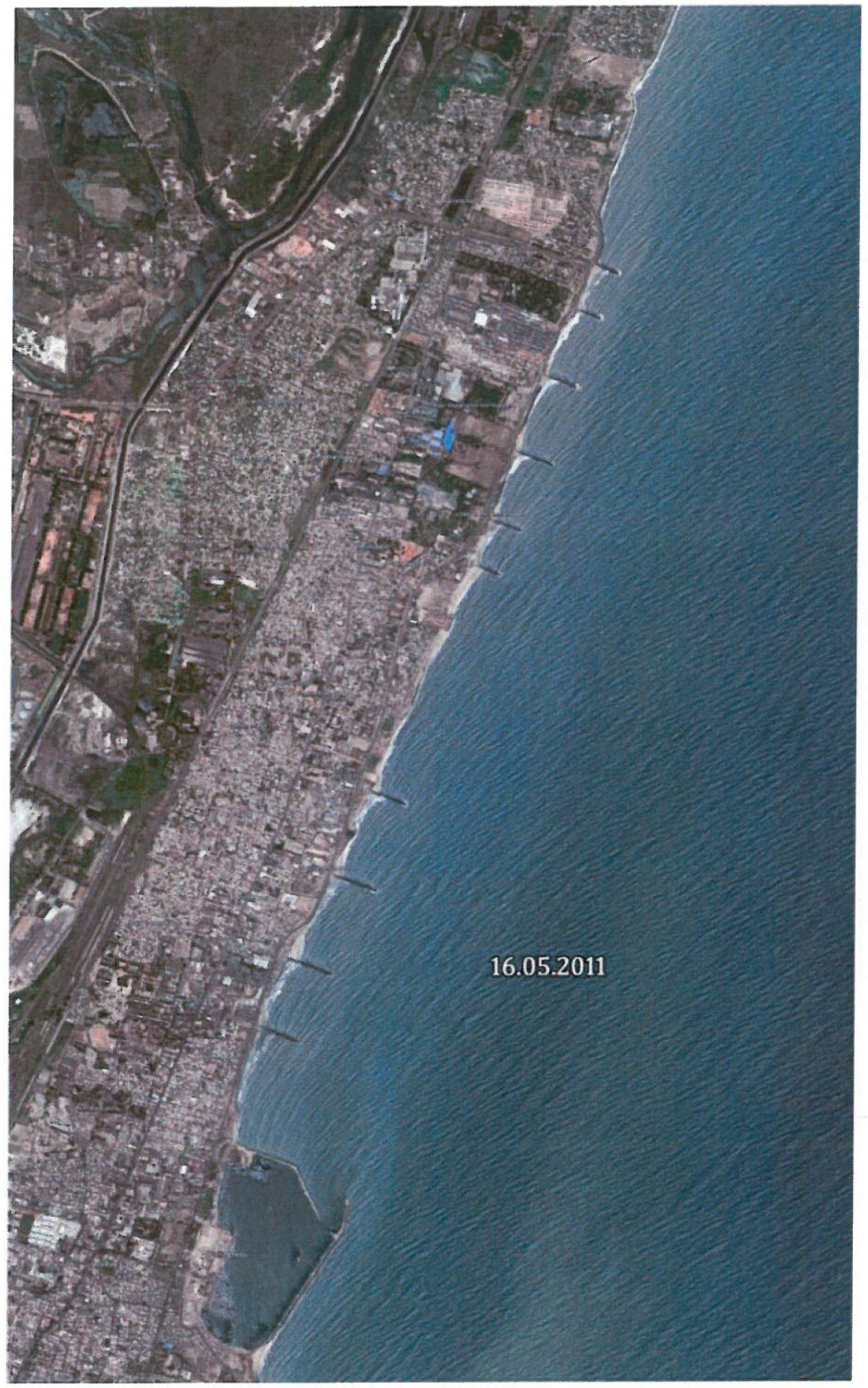
FIG.2.3. SHORELINE CHANGES IN THE PROJECCT LOCATION DURING 2004 - 2016


19.05.2005


14.05.2008


22.03.2009


15.06.2010


16.05.2011


18.02.2012


04.05.2013


01.04.2014


24.02.2015


04.07.2016

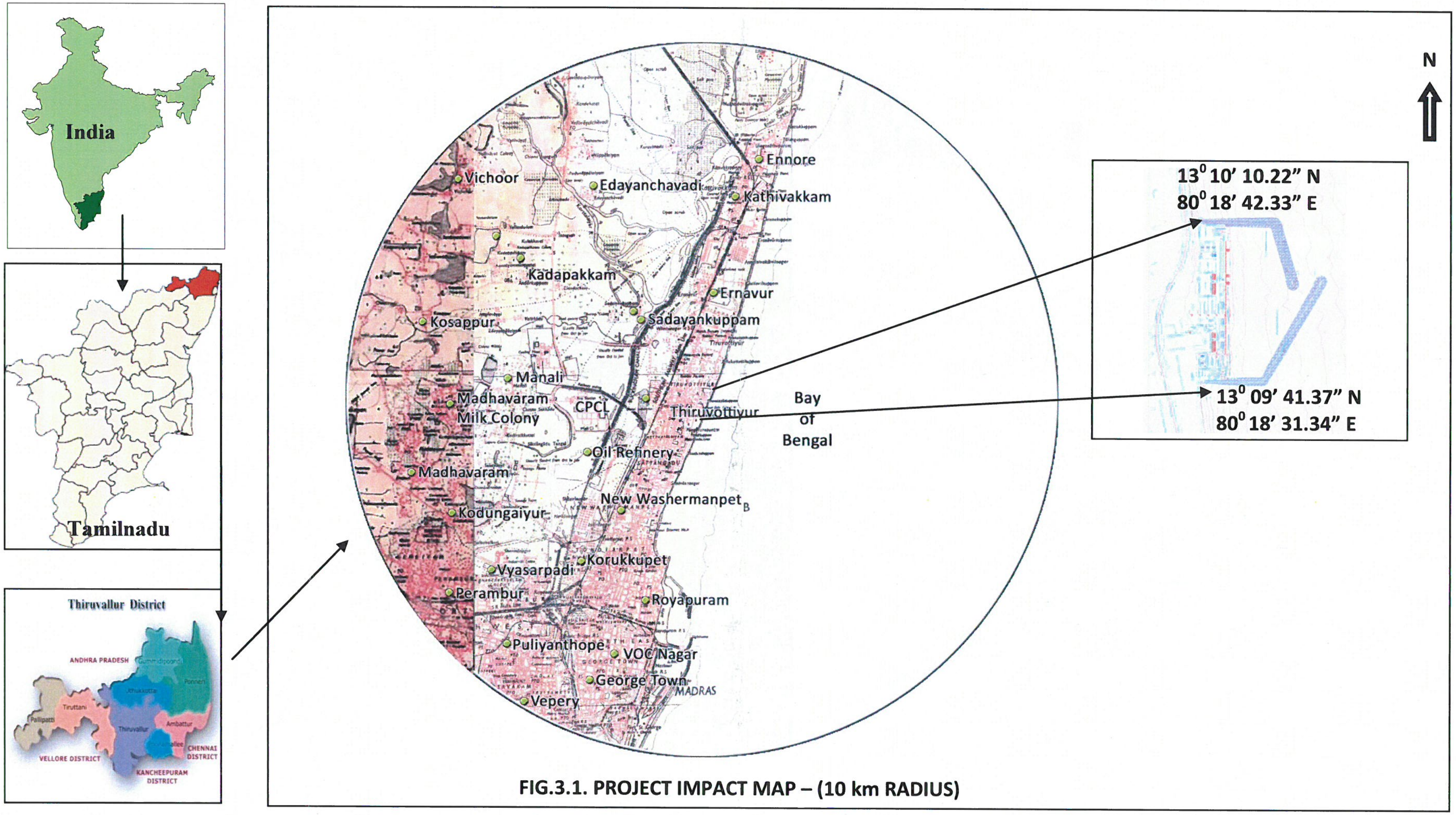


FIG.3.1. PROJECT IMPACT MAP – (10 km RADIUS)

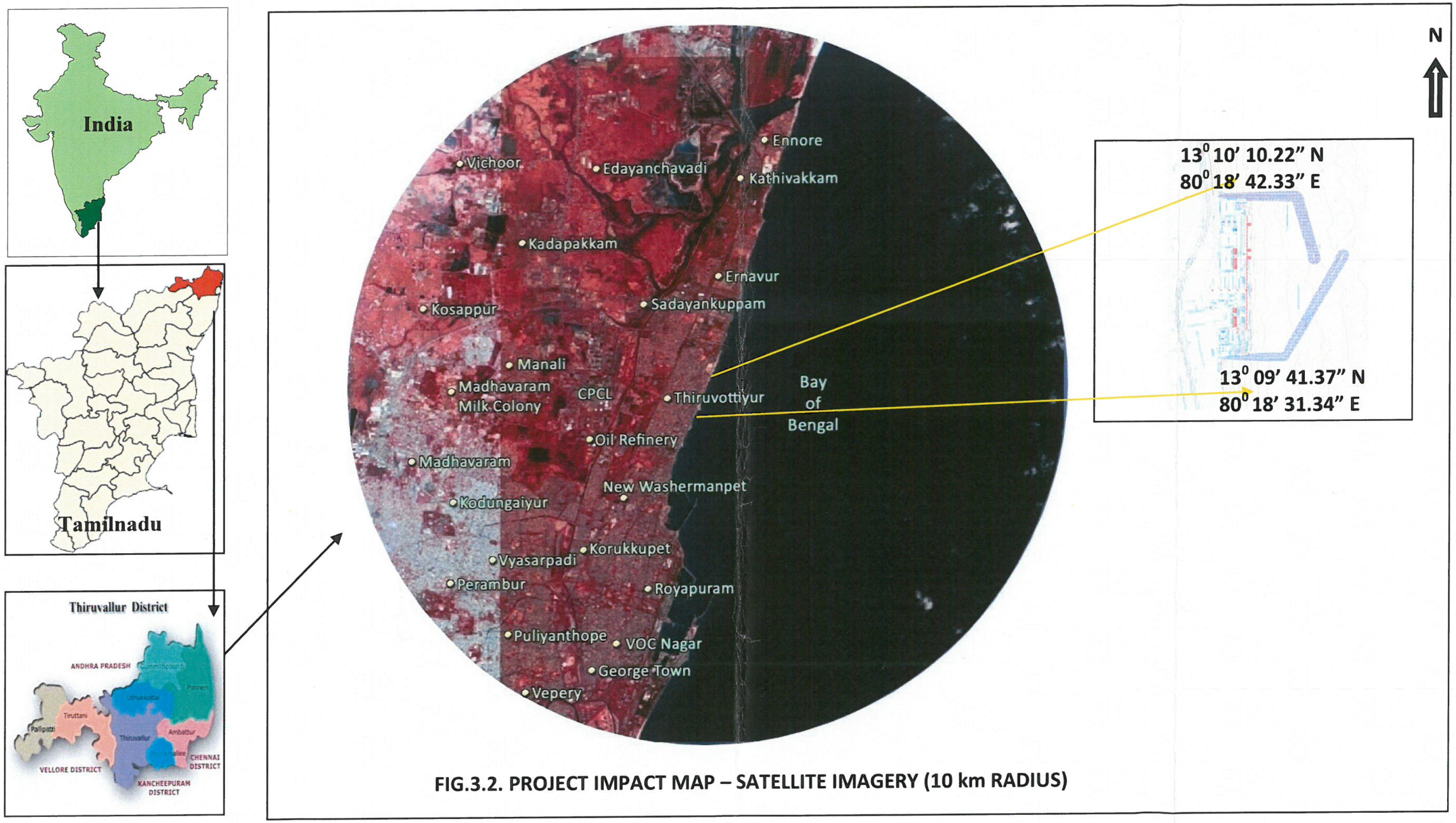


FIG.3.2. PROJECT IMPACT MAP – SATELLITE IMAGERY (10 km RADIUS)

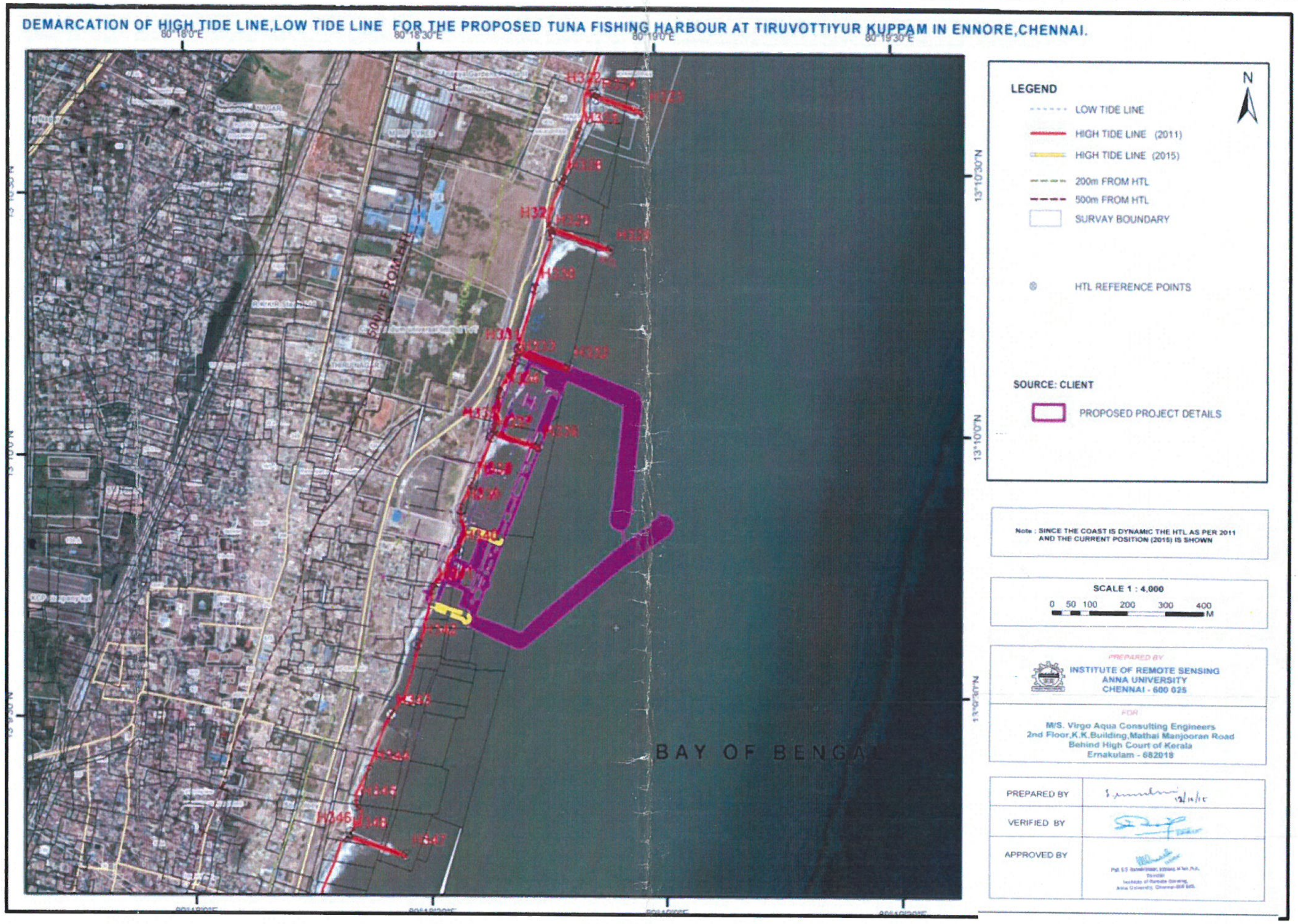


FIG.3.4. CRZ MAP (Superimposed with Google Image)

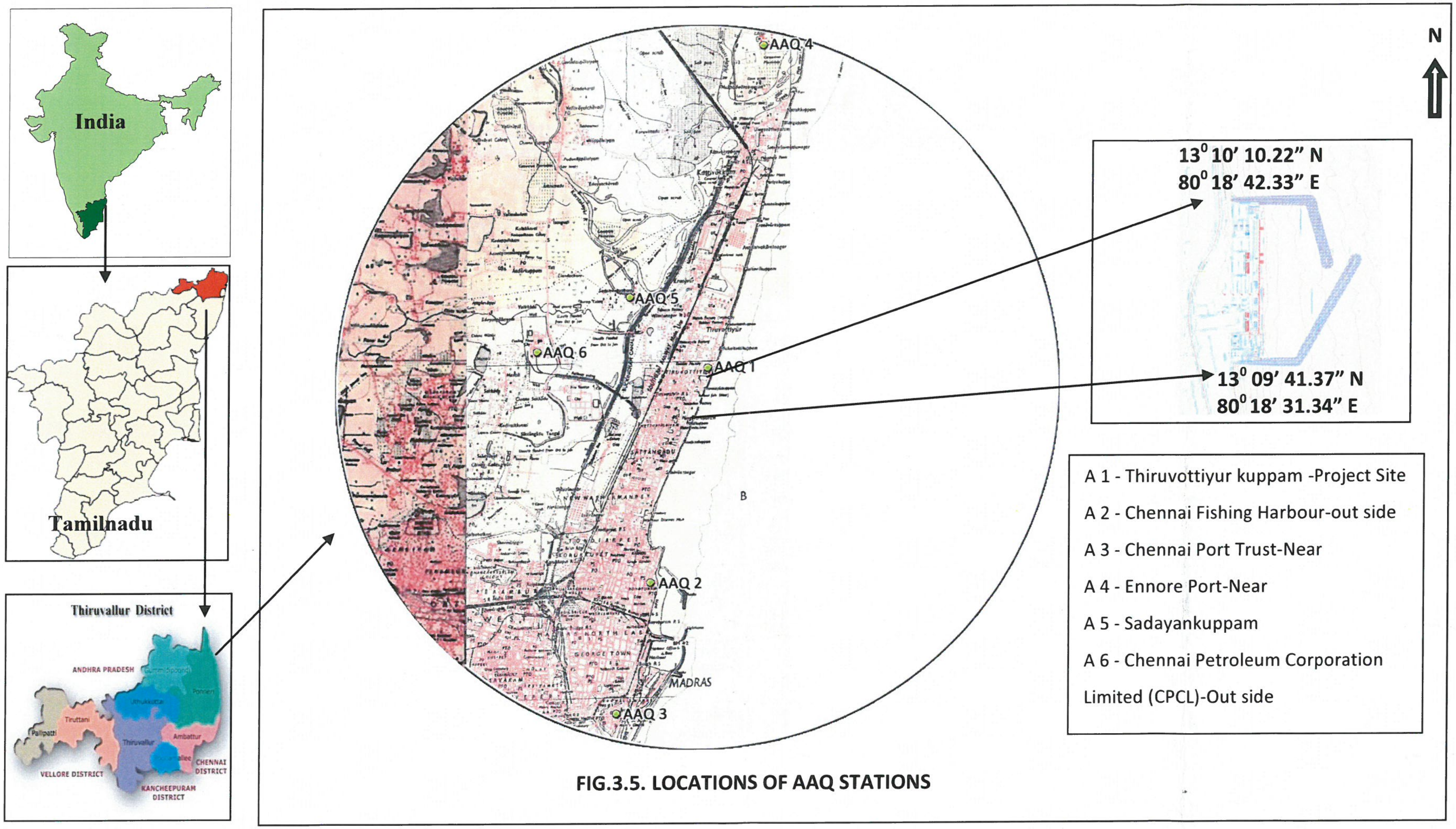


FIG.3.5. LOCATIONS OF AAQ STATIONS

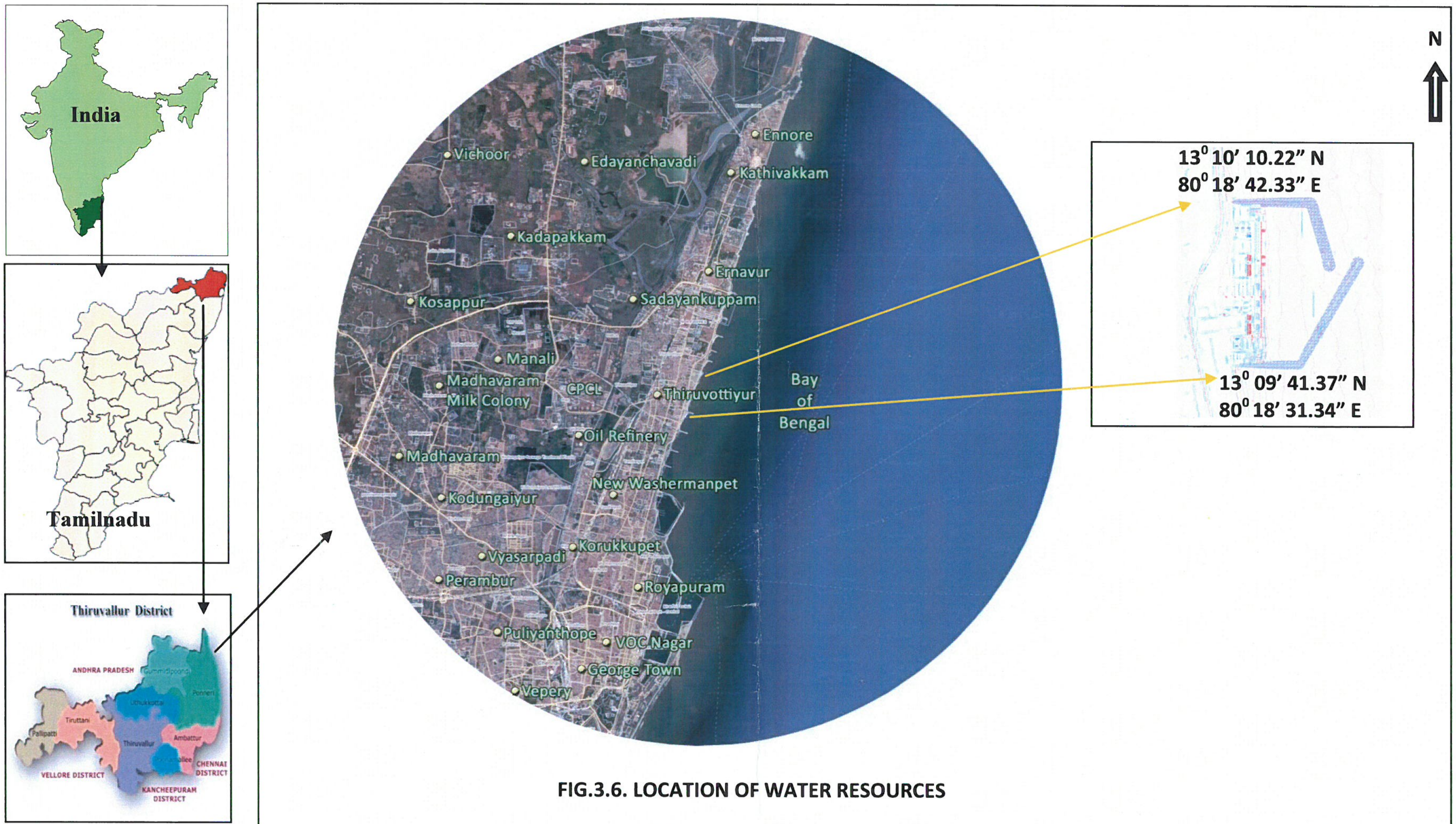


FIG.3.6. LOCATION OF WATER RESOURCES

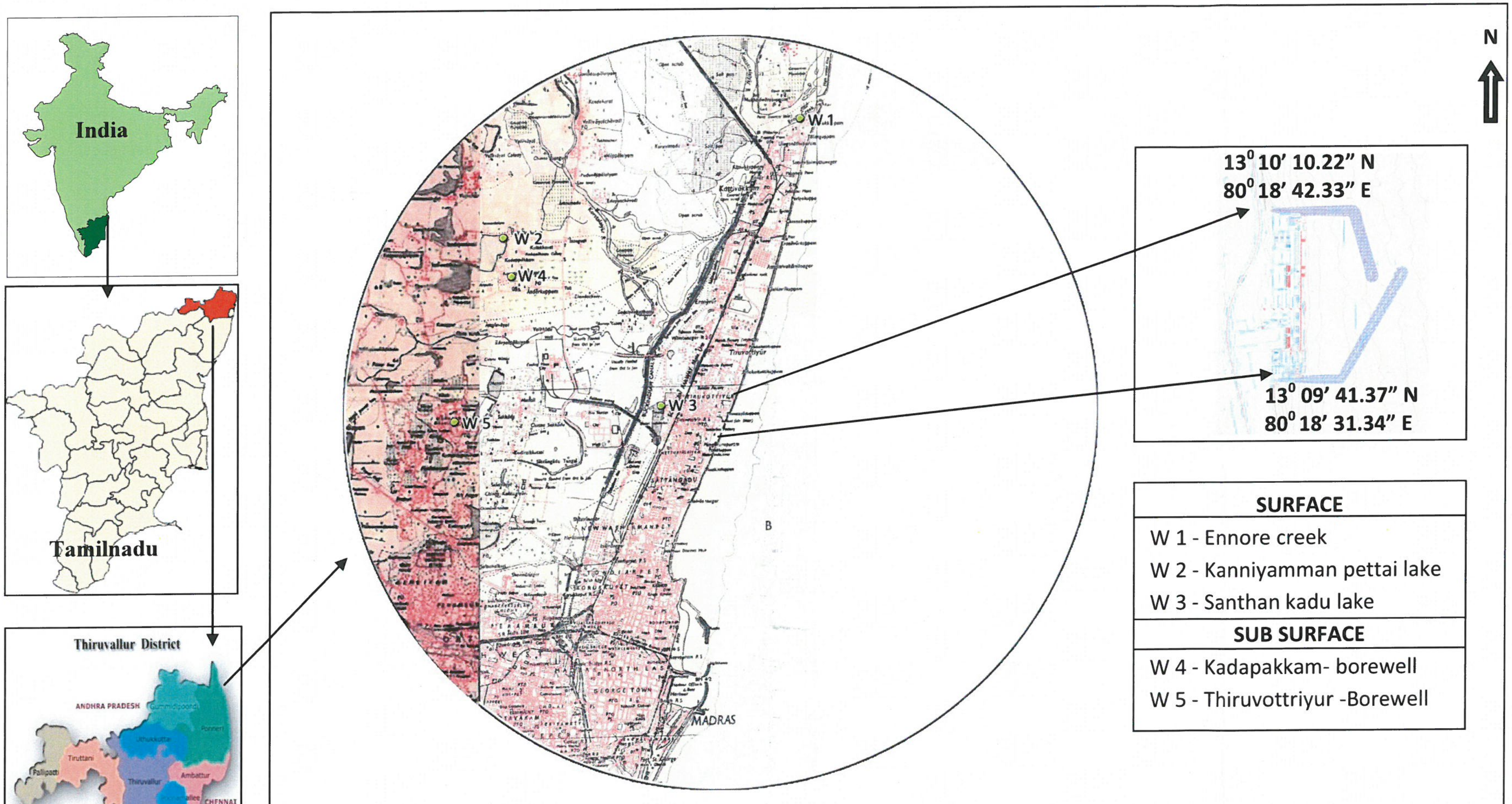


FIG.3.7. LOCATION OF WATER SAMPLING STATIONS

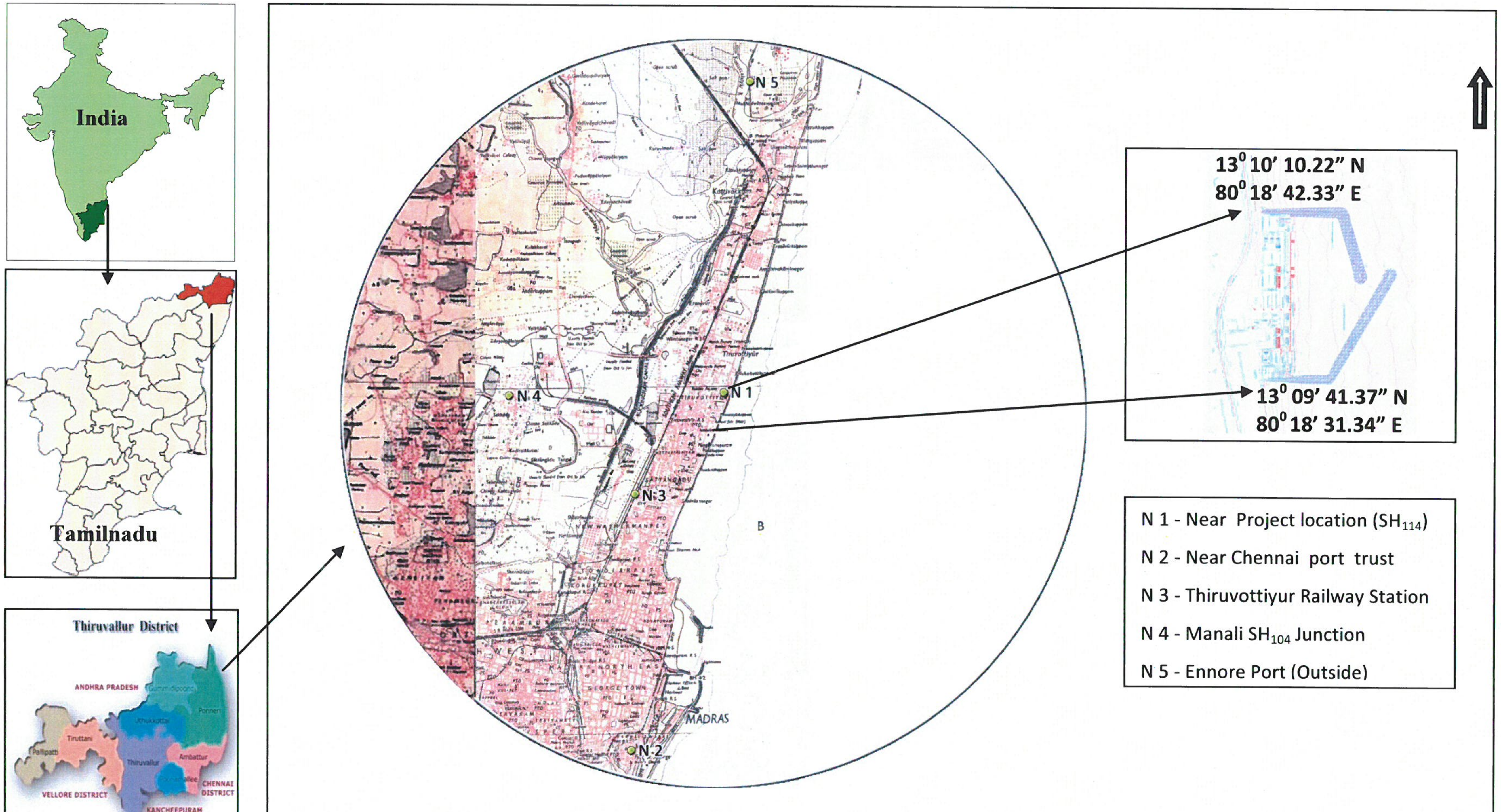


FIG.3.8. LOCATIONS OF NOISE OBSERVATORY STATIONS

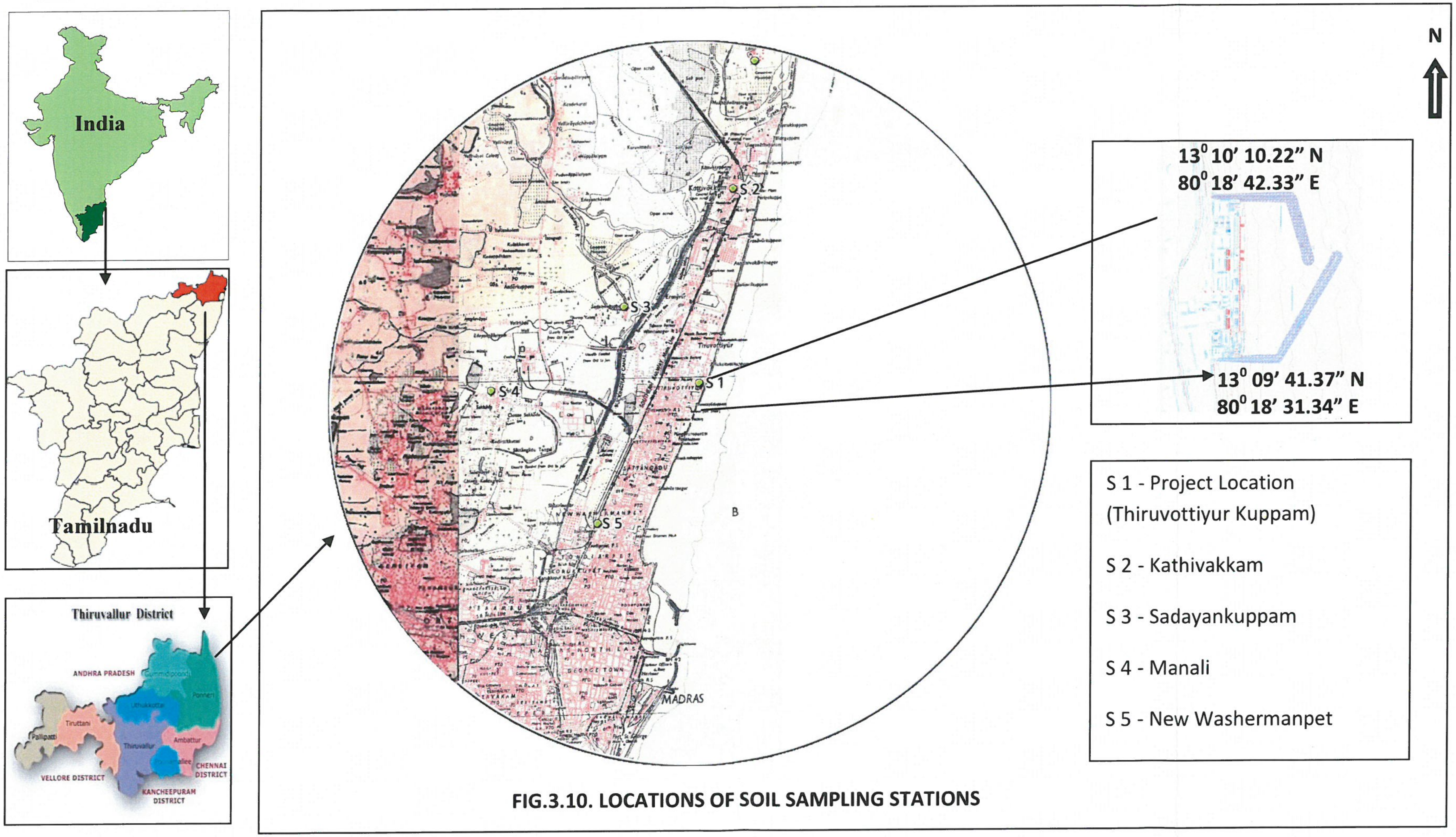


FIG.3.10. LOCATIONS OF SOIL SAMPLING STATIONS

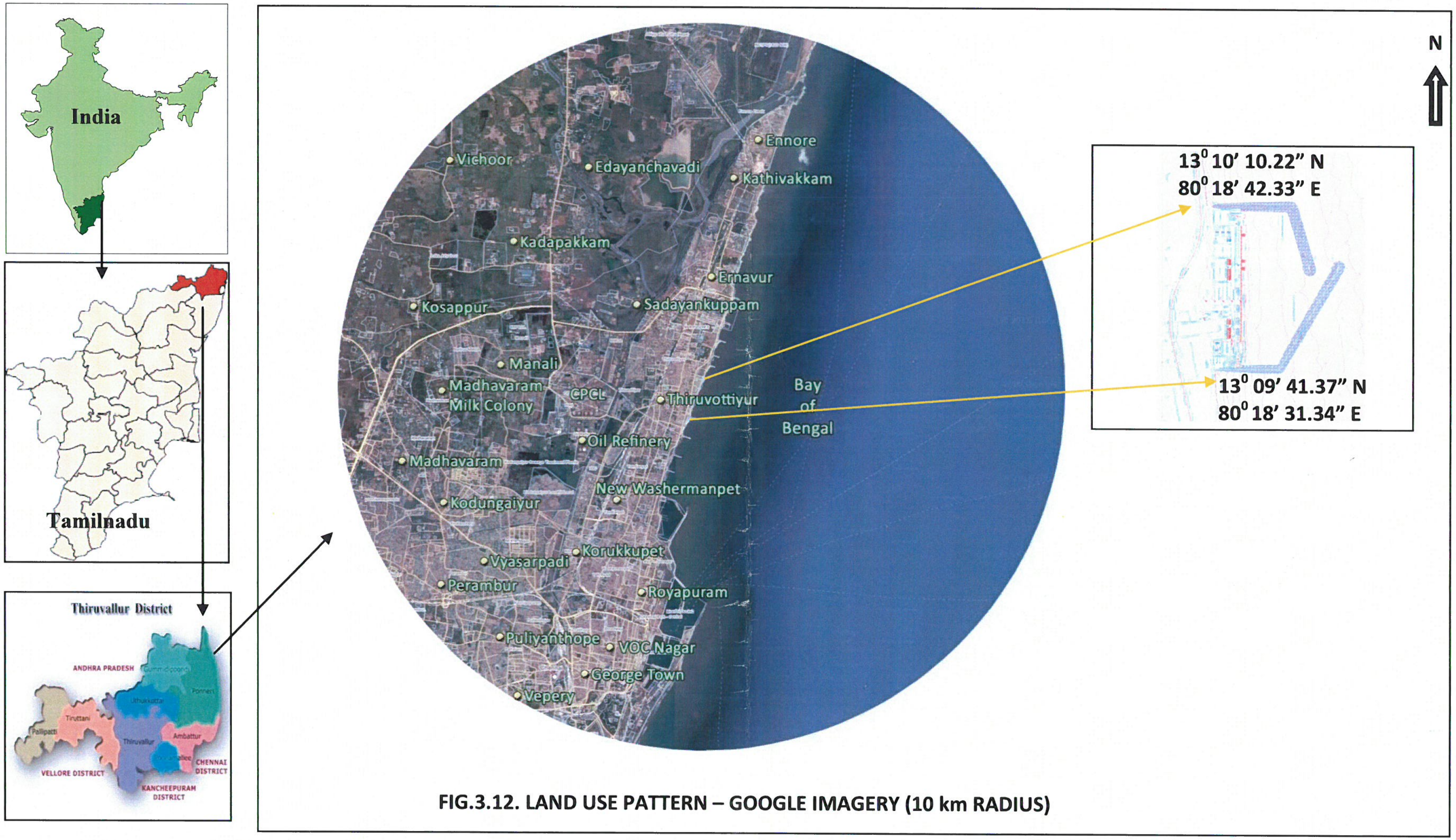


FIG.3.12. LAND USE PATTERN – GOOGLE IMAGERY (10 km RADIUS)

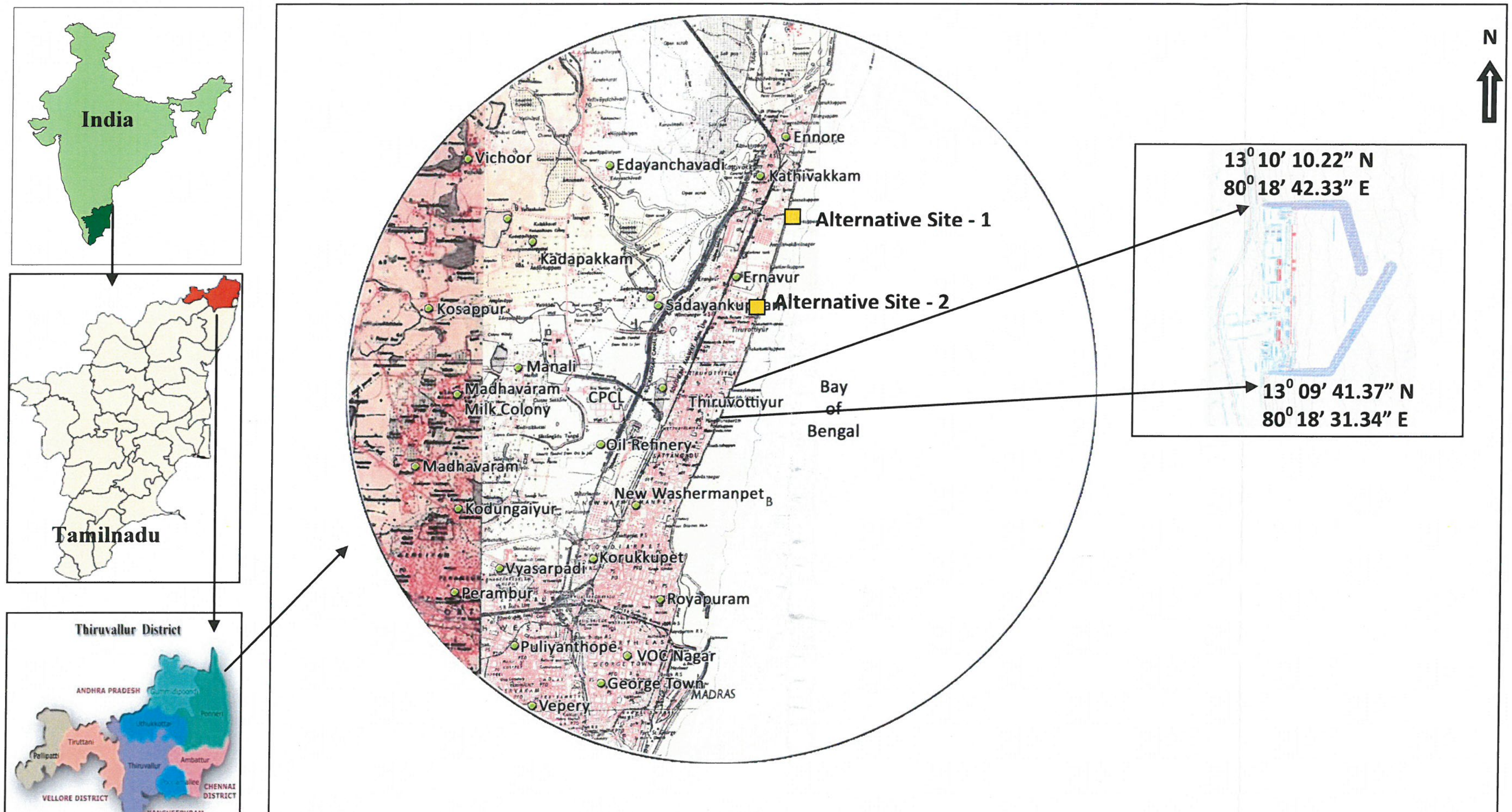


FIG.6.1. LOCATION OF ALTERNATIVE SITES

Compliance report

SEIAA-TN/F.No.6440/SEAC-C/7(e)/ToR-301/2017 dated 22.01.2018

TUNA FISHING HARBOUR

Thiruvottriyur kuppam, Thiruvallur District

S.No	Activity	Observations
	Additional ToR	
1.	Biodiversity listed shall be classified as per IUCN classification as endangered, rare, etc as per the schedules of the wildlife act	The project location has no specific marine or terrestrial biodiversity. Neither Coastal Wetland is falling under the project area in the project impact area. No notified Biodiversity zone fall under the project impact area and project area The inventory of marine and terrestrial fauna and flora is presented in **Table 3.20 to Table 3.23 in Chapter III.** No endangered or rare species found in project area / project impact area as per IUCN Classification.
2.	The EIA report shall be prepared as per the harbor manual prescribed by the MoEF&CC and through accredited consultants for ports and harbors' sector	The EIA report was prepared as per the Guidance manual of MoEF&CC for Ports & Harbors. Centre for Environment Health and Safety(Annamalai University) who is an accredited EIA Consultation Organization. Please refer www.qcin.org And www.envfor.nic.in.
3.	Loss of biodiversity anticipated with the dredging operation both offshore and onshore may be elaborated	The impact of dredging on the Biodiversity on the project Impact area of 10km radius is presented in **Chapter V Para 5.3.5, page number 5.4** in EIA report
4.	The impact on biodiversity due to infrastructure development like roads, buildings, etc.	Full report for Impact on Biodiversity is described in **Chapter –V Impact Evaluation and Assesment**
5.	The anticipated threat for the underwater habitat due dredging	It is elaborated in **Chapter V (Para 5.3.5, page number 5.4)** in EIA report
6.	Effect on fauna and flora due to the construction activities with the materials like cements, paints, etc	The impact of project establishment and construction is presented in **Chapter XI (Para No. 11.9 page No. 11.14).**
7.	The project activities results increased intrusion, pathogens, virus, etc introduced due to the increased boating and other activities, etc.	It is presented in Chapter XI **(Para No. 11.10 page No. 11.19).**
8.	The impacts on migratory bird population due to the	No migratory birds is reported

S.No	Activity	Observations
	activity	
9.	Impact on local community, their health and lifestyle may be discussed in details	It is discussed in **Chapter III & V Para3.48 & 5.3.5** of the report
10.	Aesthetics of the beachscape and landscape be lost with the harbor constructions	It is described in **Chapter IV** (Coastal Modeling)
11.	Along with Tuna harvesting, will the other marine species also be harvested if so the sustainable harvest model envisaged	Other species and marine fishes depending upon the season and catch, it will be harvested by fishermen. No specific data is available as such. For the feasibility report, it is only Coastal modeling is described in **Chapter IV**
12.	The copy of the fishing policy of Tamilnadu may be appended	The copy of Fishing Policy of Tamil Nadu is appended
13.	The possibility of displacement of people due to such activities.	Replacement & Rehabilitation Plan is not required as no displacement of human settlement is required.
14.	Effects on the traditional fishing beach due to harbor constructions	At present there is no traditional fishing activities is in force at project site as all the fishermen operating their boats from the nearby Chennai Fishing Harbour. Hence it will not affect the traditional fishing activities of the project site
15.	Why not the existing harbor facilities be enhanced to meet the objectives,	The existing Chennai Harbor is already overcrowded and the proposed Harbor will complement the much required additional berthing places for the fishermen community.
16.	Details of the critical elements to make it a sustainable harbor	Exclusive fishing activities for Tuna variety of fishes.
17.	Chance of plummeting of Tuna population leading to degradation of the critical marine habitat due to increased construction activities.	Construction activities are brief and within the Harbor area. Hence, there will not be any impact on the habitats.
18.	The location of the disposal point shall be arrived in consultation with the NIOT, wetland and Coastal Zone Authorities by obtaining their approval	Tamil Nadu SCZMA already approved the proposed point of disposal and recommended the CRZ clearance to MoEFCC
	Standard ToR	
1.	Reasons for selecting the site with details of alternate sites examined rejected or selected on merit with comparative statement and selection basis for selection. The examination should justify site suitability in terms of environmental angle, resources, sustainability associated	Reason for selection of site with respect to alternative sites described briefly in **Chapter VI- Analysis of Alternatives** of the EIA report

S.No	Activity	Observations
	with selected site as compared to rejected sites. The analysis should include parameters considered along with the weight age criteria for short listing selected sites.	
2.	Details of the land use breakup for the proposed project. Details of land use around 10 km radius of the project site. Examine and submit detail of land use around 10 km radius of the project site and map of the project area and 10 km area from the boundary of the proposed/ existing project area, delineating project areas notified under wildlife (protection) act, 1972. Critically polluted areas as identified by CPCB from time to time / notified eco sensitive areas interstate boundaries and international boundaries. Analysis should be made based on latest satellite imagery for land use with raw images.	Land use:- **page number 3.30; Para No.3.7.1** Land use **Map page number 3.36 Figure No.3.11** Satellite Map **page number 3.2 Figure No. 3.3** All details described in **Chapter III (Para 3.7.1)** of the EIA report
3.	Submit the present land use and permission required for any conversion such as forest agriculture etc. land acquisition status, rehabilitation of communities village and present status of such activities	No agricultural or Forests land is involved. No land acquisition is envisaged.
4.	Examine and submit the water bodies including the seasonal ones within the corridor of impacts along with their status, volumetric capacity, and quality likely impacts on them due to the projects.	No water bodies are involved
5.	Submit a copy of the contour plan with slopes, drainages pattern of the site and surrounding area	Map enclosed in **Chapter III** of the report i.e. **Fig no. 3.13**
6.	Submit the details of the terrain level with respect to MSL, filling required, source of filling materials and transportations details etc.	Details are covered in **Chapter II & III** of the report
7.	Examine road/rails connectivity to the project site and impact on the existing traffic network due to the proposed project/activities. A detailed traffic and transportation study should be made for existing and projected passenger and cargo traffics.	Presented in **Figure 2.1 Page No.2.3**
8.	Submit details regarding R&R involved in the projects	Replacement & Rehabilitation Plan is not required as no displacement of

S.No	Activity	Observations
		human settlement is required
9.	Submit a copy of layout superimposed on the HTL/LTL map demarcated by an authorized agency on 1:4000 scale along with the recommendation of the SCZMA	Copy of CRZ Superimposed map enclosed in **Chapter III(Fig. No. 3.4, Page No. 3.9)**
10.	Submit the status of shore line changes at the project sites.	Shoreline changes studied in **Chapter IV** (Coastal Modeling) **Para No. 4.9 Page No. 4.48-4.57**
11.	Details of the layout plan including details of channel, breakwaters, dredging, disposal and reclamation.	Layout plan for fishing harbor is discussed in **chapter II (Fig No.2.2, Page No. 2.6)**
12.	Details of handling of each cargo, storage, transport along with the spillages control, dust preventive measures. In case of coal, mineral, cargo, details of storage and closed conveyance, dust suppression and prevention·filters	No Cargo. Only Fish Handling. Details Studied in **Executive Summary, Chapter II, V, IX & XI**
13.	Submit the details of fishing activity and likely impacts on the fishing activity due to the project. Specific study on effects of construction activity and pile driving on marine life	Briefly described in chapter **V (Para No. 5.3.5) , page no 5.4**
14.	Details of oil spill contingency plan	No Oil handling in the proposed FH.
15.	Details of bathymetry study	Bathymetry Study is described in **Para No 4.4 Page No. 4.7 of Chapter IV**
16.	Details of ship tranquility study	Tranquility Study is described in **Para No 4.7 Page No. 4.29-4.37 of Chapter IV**
17.	Examine the details of water requirement, impacts on competitive user, treatments details, use of treated waste water, prepare a water balance chart	All details examined and reported in **Chapter XI** of the Report
18.	Details of rain water harvesting and utilization of rain water	Rainwater Harvesting Discussed in **Chapter XI (Para No. 11.9.h Page No. 11.19)**
19.	Examine details of solid waste generation treatment and its disposal	Solidwaste discussed in **Chapter V (Para No. 5.3.3 Page No. 5.4)**
20.	Details of desalination plant and the study for outfall and intake	No Desalination Plant
21.	Examine baseline environmental quality with projected incremental load due to the proposed projects/activities	All Environmental Baselines is discussed in **Chapter III** of the Report
22.	The air quality monitoring should be carried out according to the notification issued on 16th November, 2009	It is carried out from AAQ Guidelines,2009 and described in **Chapter III (Para No. 3.4 Page No. 3.8)**

S.No	Activity	Observations
23.	Examine separately the details for construction and operations phases both for Environmental Management Plan and Environmental Monitoring Plan with cost and parameters	All are elaborated briefly in **Chapter XI** and Cost benefits analysis done in **Chapter X**
24.	Submit details of a comprehensive risk assessment and Disaster Management Plan including emergency evacuation during natural and manmade disasters	Details are described in **Chapter VIII** of the Report **(Para No. 8.3 &8.4 Page No. 8.2)** RA& DMP has been submitted in online portal
25.	Submits details of the trees to be cut including their species and whether it also involves any protected or endangered species. Measure taken to reduce the number of trees to be removed should be explained in detail. Submit the details of compensatory plantation. Explore the possibilities of relocating the existing trees.	No removal of trees are required.
26.	Examine the details of afforestation measures indicating land and financial outlay, landscape plan, green belts and open spaces may be described. A thick green belt should be planned all around the nearest settlements to mitigate noise and vibrations. The identifications of species plants should be made based on botanical studies	No removal or cutting of trees. The proposed green belt area is presented in the Project layout **Figure No. 2.2 Page No.2.7**
27.	The public hearing should be conducted for the project in accordance with provisions of Environmental Impacts Assessment Notification 2006 and the issue raised by the public hearings should be conducted based on the ToR letter issued by Ministry and not on the basis of minutes of the meetings available on the website.	Public notice informing the public hearing was published on 21.06.2019 in the English daily "The New India Express" and in the Tamil Daily "Dinamani" through DPIR, Government of Tamil Nadu and also through local body in the nearby villages. (Copy of the advertisement is attached) Public hearing was conducted at Annai Sivagami Mahal Tirumana Mandabam, Annai Sivagami Complex, No. 378, T.H. Road, Theradi, Thiruvottriyur, Chennai – 600 019 on 25.07.2019 at 11.00 am. **Public hearing report is appended.**
28.	A detailed draft EIA/EMP report should be prepared in accordance with the above additional ToR and should be submitted to the Ministry in accordance with the notification	Full report prepared on the basis of MoEF&CC (ToR) Guidelines
29.	Details of litigation pending against the project, if any , with	Nil

S.No	Activity	Observations
	direction order passed by any court of Law against the Project should be given	
30.	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementations of EMP should be clearly spelt out	Capital Cost of Project is **240 Cr.** No recurring cost
31.	Any further clarification on carrying out the above studies including anticipated impacts due to the project and mitigative measure, project proponent can refer to the model ToR available on Ministry website http://moef.nic.in/Mannual/Port and harbour. Further the following additional ToR shall also be furnished in EIA report.	Full report prepared on the basis of MoEF&CC (ToR) Guidelines
	1. One of the major environmental issues concerning the project is 'that 2 lakhs m^3 of sea bed material will be dredged and proponent says that this will be used for shore line management. The characteristics of the dredged materials should be furnished along with the possible adverse impact of the dumping of the dredged material for shoreline management	All are discussed in **Chapter IV** i.e. Coastal Modeling
	2. Another issue will be impact of diesel spillages from the boats on the sea water quality	Minor Impacts i.e. negligible
	3. The proponent should prepare a comprehensive line diagram in which all the facilities to be created should be marked. Then for each facility, the probable effluent generation and waste generation should be indicated with quantity and quality. Finally, the methodology for collection, treatment and reuse/disposal of the liquid and solid waste should be indicated. Specific attention should be paid to be the marine discharges.	Yes, All things done by Project proponent
	4. Within 10km radius all the parameters like air, sediments and biology should be studied in details	Full details studied in **Chapter III** of the report
	5. The impact of dredging should be evaluated in	Dredging had evaluated in **Chapter IV, Para No. 4.8** Sediment Modeling

S.No		Activity	Observations
		details in the comprehensive EIA report.	
	6.	The sampling should be done in grid pattern and every one kilometer the sample (air, water, sediment and biological samples) within the 10km of radius. At least 10 samples should be studied in details.	Every sampling was done with in 10km radius and shown for every Parameter in **Chapter III**
	7.	Heavy metals studied in water and sea surface sediments can be studied	Heavy metals studied in **Chapter III (Para No. 3.5 Page No. 3.20 -3.26)**
	Besides the above, the below mentioned general points are also to be followed		
	a)	Executive summary of the EIA/EMP report	It is within EIA report
	b)	All documents to be properly referenced with index and continuous page numbering	Full report is Properly arranged
	c)	Where data are presented in the report especially in tables, the period in which data were collected and sources should be indicated	All data are taken from Secondary and Primary sourced properly mentioned in EIA report
	d)	Project proponent shall enclose all the analysis/testing report of water, air, soil, noise etc using MoEF&CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the project.	All testing done by Vinita Lab, Hyderabad/Coimbatore.
	e)	Where the documents provided are in a language other English, an English translation shall be provided	All documents are in English language if not we are responsible for converting in English
	f)	The questionnaire for environmental appraisal for mining projects as devised earlier by the Ministry shall also be filled and submitted	Not Applicable
	g)	While preparing EIA report, the instructions for the proponents and instructions for the Consultants issued by MoEF&CC vide OM No. J-11013/41/2006-IA.II(I) dated 4th August, 2009, which are available on the website of this Ministry, should be followed	All instruction given by MoEF&CC for making EIA report were followed
	h)	Changes, if any made in this basic scope and the	No Change

S.No		Activity	Observations
		project parameters (as submitted in Form-I and the PFR for securing the ToR) should be brought to the attention of MoEF&CC with reasons for such changes and permission should be sought, as the ToR may also have the altered Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modification arising out of the P.H. process) will entail conducting the public hearing again with the revised documentation.	
	i)	As per the Circular no J-11011/618/2010-IA.II(I) dated 30.05.2012, certified report of the status of the compliance of the conditions stipulated in the environment clearance for the existing operation of the project should be obtained from the regional office of Ministry of Environment, Forest and Climate change, as may be applicable.	yes
	j)	The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area. (ii) Geological maps and sections and (iii) sections of the mine pit and external dumps, if any clearly showing the land features of the adjoining area.	EIA report covered all details which required our Project to get Environmental Clearance

Public Hearing Meeting

Public Hearing Meeting of Proposed Construction of M/s Tuna Fishing Harbour with Fish handling capacity of 69000 tonne/Annum at Thiruvottriyur Kuppam, Ennore, Thiruvottriyur Taluka, Chennai District.

As per Environmental Impact Assessment Notification, 2006 (as amended) Public hearing has been conducted for the Proposed Construction of M/s Tuna Fishing Harbour with Fish handling capacity of 69000 tonne/Annum at Thiruvottriyur Kuppam, Ennore, Thiruvottriyur Taluka, Chennai District.

Public notice informing the public hearing was published on 21.06.2019 in the English daily "The New India Express" and in the Tamil Daily "Dinamani" through DPIR, Government of Tamil Nadu and also through local body in the nearby villages. (Copy of the advertisement is attached)

Public hearing was conducted at Annai Sivagami Mahal Tirumana Mandabam, Annai Sivagami Complex, No. 378, T.H. Road, Theradi, Thiruvottriyur, Chennai – 600 019 on 25.07.2019 at 11.00 am.

Panel Present during the public hearing meeting are given below.

1. Tmt. R.Seethalakshmi, I.A.S, District Collector, Chennai District
2. Tmt. S. Indiragandhi, District Environmental Engineer, TNPCB, Ambattur
3. Thiru. R. Rajendran, Revenue Division Officer, North Chennai Division, Chennai District.
4. General public (List provided in the Minutes of Meeting)

Details of public hearing issues raised are provided in the Minutes of Meeting provided

THE NEW INDIAN EXPRESS
Date. 21/06/2019

TAMILNADU POLLUTION CONTROL BOARD

PUBLIC NOTICE

Whereas, as per Environmental Impact Assessment Notification, 2006, (as amended) Public Hearing has been made as mandatory for certain projects covered in Schedule of the said Notification.

Whereas, Public Hearing has to be conducted by State Pollution Control Board as per paras (2) and (3) of Appendix – IV of Environmental Impact Assessment Notification, 2006 (as amended).

Whereas, as required under paras (2) and (3) of Appendix – IV of Environmental Impact Assessment Notification, 2006, (as amended) public hearing is to be conducted by Tamilnadu Pollution Control Board for the following project as detailed below.

Sl. No.	Name and location of the Project	Date & time of Public hearing	Place of Public hearing
1	Proposed Construction of M/s. Tuna Fishing Harbour with fish handling capacity of 69000 Tonne/Annum at Thiruvottriyur Kuppam, Ennore, Thiruvottriyur Taluk, Chennai District by Department of Fisheries, Government of Tamilnadu.	25.07.2019 at 11.00 AM	Annai Sivagami Mahal Thirumana Mandapam, Annai Sivagami Complex, No. 378, T.H Road, Theradi, Thiruvottriyur, Chennai – 600 019.

In this connection, it is informed that the Executive Summary of EIA in English & Tamil and draft EIA report in soft and hard copies of the above said project is made available for reference to the public at the following places:

i. Office of the District Collector, Chennai District ii. Office of the Regional Director, Chennai District, Department of Industries and Commerce, Thiru. Vi. Ka. Industrial Estate, Guindy, Chennai – 600 003. iii. Tamilnadu Pollution Control Board, 76, Mount Salai, Guindy, Chennai- 32. iv. Office of the District Environmental Engineer, Tamilnadu Pollution Control Board, No. 77A, SIDCO Industrial Estate, Ambattur, Chennai – 600058. v. Office of the Zonal Officer, Zone-I, Thiruvottriyur, Greater Chennai Corporation. vi. Office of the Village Administrative Officer, Thiruvottriyur Village, Thiruvottriyur Taluk, Thiruvallur District. vii. Office of the BDO, Minjur Panchayat Union, Gummidipoondi Taluk, Thiruvallur District. viii. Office of the Tashildar, Thiruvotriyur Taluk, Thiruvallur District ix. Ministry of Environment, Forest and Climate Change, Regional Office (SEZ), 1st & 2nd Floor, Handloom Export Promotion Council, 34, Cathedral Garden Road, Nungambakkam, Chennai -34. x. Office of the Assistant Director of Fisheries, 11, Thiruvotriyur N.H Road, Near to New Bus Stand, Ponneri, Thiruvallur District – 601 204.

Summary of the draft EIA report is displayed in TNPCB website www.tnpcb.gov.in for public reference.

Suggestions, views, comments and objections from the public are invited on or before the date of public hearing by the District Environmental Engineer, Tamilnadu Pollution Control Board, Ambattur.

All persons including bonafide residents, Environmental groups and others located at the project site / sites of displacement / sites likely to be affected can participate in the public hearing and express their suggestions, views, comments and objections. They can also make written views, suggestions, comments and objections to the District Environmental Engineer, Tamilnadu Pollution Control Board, Ambattur on the above subject.

The proceedings of the public hearing will be displayed at the following places for general information:

1. Office of the Village Administrative Officer, Thiruvottriyur village. 2. Office of the Tashildar, Thiruvotriyur Taluk, Thiruvallur District. 3. Office of the District Collector, Chennai District 4. Office of the District Environmental Engineer, Tamilnadu Pollution Control Board, No. 77A, SIDCO Industrial Estate, Ambattur, Chennai – 600058. 5. Office of the Zonal Officer, Zone-I, Thiruvottriyur, Greater Chennai Corporation, and 6. Office of the Assistant Director of Fisheries, 11, Thiruvotriyur N.H Road, Near to New Bus Stand, Ponneri, Thiruvallur District – 601 204.

Comments if any, on the proceedings may be sent directly to the Ministry of Environment & Forests, Government of India, Paryavaran Bhawan, C.G.O. Complex, Lodi Road, New Delhi – 110 003 and to the applicant concerned.

Member Secretary,
Tamilnadu Pollution Control Board,
Chennai.

DIPR/518/DISPLAY/2019

DINA MANI
Date. 21/06/19

தமிழ்நாடு மாசு கட்டுப்பாடு வாரியம்

பொது அறிவிப்பு

மத்திய சுற்றுச்சூழல் மற்றும் வனத்துறை அமைச்சகம், புது தில்லி, 14.09.2006 அன்று வெளியிடப்பட்ட சுற்றுச்சூழல் தாக்க மதிப்பீடு அறிக்கை மற்றும் திருத்தங்கள் எண்.எஸ்.ஓ.1533–ன்படி, பொதுமக்கள் கேட்புரையானது சொல்லப்பட்ட அறிவிக்கையின் அட்டவணையில் உள்ளடக்கப்பட்ட தொழிற்திட்டங்கள் அனைத்திற்கும் பின்இணைப்பு 4–ன்படி அவசியமானதாக சொல்லப்பட்டுள்ளது.

உள்ளூர் மக்களின் கருத்துக்களை கேட்டறிவதற்காக 14.09.2006 அன்று வெளியிடப்பட்ட சுற்றுச்சூழல் தாக்க மதிப்பீடு அறிவிக்கையின் பத்தி 7 மற்றும் பின் இணைப்பு 4–ன்படி கீழ்க்காணும் தொழில் திட்டத்திற்கான பொதுமக்கள் கருத்து கேட்புணர்வு கூட்டம், கீழே குறிப்பிட்ட தேதி, நேரம் மற்றும் இடத்தில் தமிழ்நாடு மாசு கட்டுப்பாடு வாரியத்தால் நடத்தப்பட உத்தேசிக்கப்பட்டுள்ளது.

வ. எண்	தொழிற் திட்டத்தின் பெயர் மற்றும் அமைவிடம்	தேதி மற்றும் நேரம்	கூட்டம் நடைபெறும் இடம்
1.	**திட்டத்தின் பெயர்:** வருடம் ஒன்றிற்கு 69,000 டன் மீன் கையாளும் திறனுடைய தி/ள. டுனா மீன் பிடி துறைமுகம், திருவொற்றியூர் குப்பம், திருவொற்றியூர் தாலுகா, திருவள்ளூர் மாவட்டம். **உரிமையாளர்:** மீன் வளத்துறை, தமிழ்நாடு அரசு	25.07.2019 at 11.00 AM	தி/ள. அன்னை சிவகாமி திருமண மண்டபம், அன்னை சிவகாமி காம்ப்ளக்ஸ், எண் 378, T.H. ரோடு, தேரடி, திருவொற்றியூர், திருவள்ளூர் மாவட்டம்.

இதன் தொடர்பாக இத்தொழிற்திட்டத்தின் வரைவு சுற்றுச்சூழல் தாக்க மதிப்பீடு அறிக்கை மற்றும் அதன் சுருக்கம் (ஆங்கிலம் மற்றும் தமிழ்) பின்வரும் இடங்களில் பொதுமக்கள் பார்வைக்காக வைக்கப்பட்டுள்ளது என தெரிவிக்கப்படுகிறது.

1. மாவட்ட ஆட்சித்தலைவர் அலுவலகம், சென்னை மாவட்டம், சென்னை–1. 2. மண்டல இயக்குநர் அலுவலகம், தொழில் மற்றும் வர்த்தக துறை, சென்னை மாவட்டம், திரு.வி.க. இண்டஸ்டிரியல் எஸ்டேட், கிண்டி, சென்னை–3. 3. தமிழ்நாடு மாசு கட்டுப்பாடு வாரியம், 76, மவுண்ட் சாலை, கிண்டி, சென்னை – 600 032. 4. மாவட்ட சுற்றுச் சூழல் பொறியாளர் அலுவலகம், தமிழ்நாடு மாசு கட்டுப்பாடு வாரியம், 77, தெற்கு அவென்யூ சாலை, அம்பத்தூர் இண்டஸ்டிரியல் எஸ்டேட், அம்பத்தூர், சென்னை 600 058. 5. மண்டல அலுவலர் அலுவலகம், மண்டலம்– 1, திருவொற்றியூர், பெருநகர சென்னை மாநகராட்சி. 6. கிராம நிர்வாக அலுவலர் அலுவலகம், திருவொற்றியூர் கிராமம், திருவொற்றியூர் 7. வட்டார வளர்ச்சி அலுவலர் அலுவலகம், மீஞ்சூர் ஊராட்சி ஒன்றியம், திருவள்ளூர் மாவட்டம். 8. வட்டாட்சியர் அலுவலகம், திருவொற்றியூர் தாலுகா, திருவள்ளூர் மாவட்டம். 9. உதவி இயக்குநர் (கடல் வளம்) அலுவலகம், 11, திருவொற்றியூர் N.H.ரோடு, புதிய பேருந்து நிலையம் அருகில், பொன்னேரி, திருவள்ளூர் மாவட்டம்–601 204. 10. சுற்றுச்சூழல் வனத்துறை அமைச்சகம் மற்றும் பருவநிலை மாற்றம், (தென் கிழக்கு மண்டலம்) அலுவலகம், 1st & 2nd Floor, கைத்தறி வளர்ச்சி ஏற்றுக் குழுமம், 34, கதீட்ரல் கார்டன் ரோடு, நுங்கம்பாக்கம், சென்னை – 34.

வரைவு சுற்றுச்சூழல் தாக்க மதிப்பீடு அறிக்கை மற்றும் அதன் சுருக்கம் பற்றிய தகவல்கள் தமிழ்நாடு மாசு கட்டுப்பாடு வாரியத்தின் www.tnpcb.gov.in இணையதள முகவரியில் பார்வையிடலாம்.

பொதுமக்கள் தங்கள் கருத்துக்கள், மதிப்புரைகள், மறுப்புரைகள் ஆகியவற்றை தமிழ்நாடு மாசு கட்டுப்பாடு வாரியத்தின் அம்பத்தூர் மாவட்ட சுற்றுச் சூழல் பொறியாளரிடம் பொதுமக்கள் கருத்து கேட்டுணரும் கூட்டம் நடைபெறும் நாளன்றோ அல்லது அதற்கு முன்போ எழுத்து மூலம் தெரிவிக்கலாம்.

பொதுமக்கள் கருத்து கேட்டுணரும் கூட்டத்தில் கலந்து கொண்டு தங்களது கருத்துக்கள், மதிப்புரைகள், மறுப்புரைகள் தெரிவிக்குமாறு கேட்டுக்கொள்ளப்படுகிறது. மேலும் பொதுமக்கள் தங்களுடைய கருத்துக்கள், மதிப்புரைகள், மறுப்புரைகள் ஆகியவற்றை எழுத்து மூலமாகவும் மாவட்ட சுற்றுச் சூழல் பொறியாளர், தமிழ்நாடு மாசு கட்டுப்பாடு வாரியம், அம்பத்தூர் அவர்களிடம் தெரிவிக்கலாம்.

பொதுமக்கள் கருத்து கேட்புணர்வு கூட்ட நடவடிக்கைகள் பற்றிய விவரம் கீழ்க்காணும் இடங்களில் பொதுமக்கள் தகவலுக்காக வைக்கப்படும். 1. கிராம நிர்வாக அலுவலர் அலுவலகம், திருவொற்றியூர் கிராமம், திருவொற்றியூர். 2. வட்டாட்சியர் அலுவலகம், திருவொற்றியூர் தாலுகா, திருவள்ளூர் மாவட்டம். 3. மாவட்ட ஆட்சித்தலைவர் அலுவலகம், சென்னை மாவட்டம், சென்னை–1. 4. மாவட்ட சுற்றுச் சூழல் பொறியாளர் அலுவலகம், தமிழ்நாடு மாசு கட்டுப்பாடு வாரியம், 77, தெற்கு அவென்யூ சாலை, அம்பத்தூர் இண்டஸ்டிரியல் எஸ்டேட், அம்பத்தூர், சென்னை 600 058. 5. மண்டல அலுவலர் அலுவலகம், மண்டலம்–1, திருவொற்றியூர், பெருநகர சென்னை மாநகராட்சி. 6. உதவி இயக்குநர் (கடல் வளம்) அலுவலகம், 11, திருவொற்றியூர் N.H.ரோடு, புதிய பேருந்து நிலையம் அருகில், பொன்னேரி, திருவள்ளூர் மாவட்டம்–601 204.

கேட்புணர்வு கூட்ட நடவடிக்கைகள் தொடர்பான பொதுமக்களின் கருத்துக்கள் ஏதேனும் இருப்பின் அவைகளை நேரடியாக சுற்றுச்சூழல் மற்றும் வனத்துறை அமைச்சகம், இந்திய அரசு, பரியாவரண்பவன், சிஜிஓ காம்ப்ளக்ஸ், லோதி ரோடு, புது தில்லி–110 003 என்ற முகவரிக்கும், தொழிற்திட்டத்தின் பொறுப்பாளருக்கும் / உரிமையாளருக்கும் நேரிடையாக அனுப்பலாம்.

உறுப்பினர் செயலர்,
தமிழ்நாடு மாசு கட்டுப்பாடு வாரியம்,
சென்னை.

செ.ம.தொ.இ/615/வரைகலை/2019

MINUTES OF THE PUBLIC HEARING CONDUCTED ON 25.07.2019 AT 11.00AM FOR THE PROPOSED CONSTRUCTION OF M/S. TUNA FISHING HARBOUR WITH FISH HANDLING CAPACITY OF 69000 TONNES/ANNUM AT THORUVOTTIYUR KUPPAM, ENNORE, TIRUVOTTIYUR TALUK, CHENNAI DISTRICT BY TAMILNADU FISHERIES DEPARTMENT.

Name of the Project	:	Proposed construction of M/S. TUNA FISHING HARBOUR with fish handling capacity of 69000 tonnes/annum at Thoruvottiyur Kuppam, Ennore, Tiruvottiyur Taluk, Chennai District by Tamilnadu Fisheries Department falling under the Category of 7(e)Ports, Harbours.
Venue	:	Annai Sivagami Mahal Thirumanamandapam, Annai Sivagami Complex, No.378,T.H.Road,Theradi, Thiruvottiyur,Chennai – 19.
Date & Time		25.07.2019 at 11.00AM

Participants:

1.	**Tmt.R.Seethalakshmi,I.A.S**	**District Collector, Chennai District**
2.	**Tmt. S. Indiragandhi,**	**District Environment Engineer, Tamilnadu Pollution Control Board, Ambattur**
3.	**Thiru.R.Rajendran,**	**Revenue Divisional Officer, North Chennai Division, Chennai District.**
4.	**General Public**	**As per the Annexure**

The public hearing meeting started with Thamizhthai Vazhthu.

The District Environmental Engineer, Tamilnadu Pollution Control Board, Ambattur welcomed the District Collector, all Government officials, media people and general public who were assembled at the venue and informed that the Tamilnadu

Fisheries Department has proposed to construct M/s. Tuna Fishing Harbour with fish handling capacity of 69000Tonnes/Annum at Tiruvottiyur Kuppam, Ennore, Tiruvottiyur taluk, Chennai district. This public hearing is conducted with the approval of District Collector, as per the Terms of reference granted by the State Level Environment Impact Assessment Authority(SEIAA), Tamilnadu vide letter dated 22.01.2018. She also stated that the Public notice informing the Public hearing was published on 21.06.2019 in the English daily "The New Indian Express" and in the Tamil daily "Dinamani" through DPIR, Government of Tamilnadu and also through local body in the nearby villages. Further she informed that, the opinion of the public is recorded and the same shall be forwarded to the concerned Authority SEIAA-TN by Tamilnadu Pollution Control Board with the approval of District Collector and requested the assembled general public to register their opinion clearly one by one and cooperate to conduct the hearing peacefully. Further she requested the Tamilnadu Fisheries Department to make a detailed presentation about the proposed project of construction of M/s. Tuna Fishing Harbour with fish handling capacity of 69000Tonnes/Annum at Tiruvottiyur Kuppam, Ennore, Tiruvottiyur taluk, Chennai district. She also added that the audio & video recordings of the public hearing will be sent to the State Level Environment Impact Assessment Authority (SEIAA), Tamilnadu.

On behalf of the Tamilnadu Fisheries Department, Dr. V. Nehru Kumar, EIA Consultant and professor & Director, Centre for Environment, Health & safety, Annamalai University, Annamalai Nagar has narrated elaborately that the place where the project to be arrived, how the project to be implemented, technical parameters to be considered, significance of the project, what are all the facilities to be brought in the place, pollution control measures of various waste and benefits and beneficiaries of the project etc.,

Following the presentation, the public were invited to express their views, concerns and questions, if any by clearly mentioning their name and the village to which he/she belongs to. The Views, concerns and queries of the public are detailed below:

1. **Mr.S.Sankar, Thiruvottiyur Kuppam, Thiruvottiyur.**

This project is historically special project. This project will improve the livelihood of the fisheries community. Due to this project 1 lakh people will benefit. On behalf of Thiruvottiyur Kuppam administration and public, I welcome the proposed construction of M/s. Tuna Fishing harbour Project.

2. **Mr.C. Rajendiran, President, Palagaithotti Kuppam, Thiruvottiyur**

   We welcome the fishing harbour project coming to Thiruvottiyur Kuppam.

3. **Mr.Jeyavel, Thiruchinnan Kuppam, Thiruvottiyur**

   On behalf of my kuppam, I welcome the fishing harbour project coming to Thiruvottiyur Kuppam.

4. **Mr.Jaisingh, Ondikuppam, Thiruvottiyur**

   This project is our dream for many days. We wholeheartedly welcome the fishing harbour project coming to Thiruvottiyur Kuppam.

5. **Mr. Chinnapillai, Thiruvottiyur Kuppam Pothunala Sangam, Thiruvottiyur**

   We wholeheartedly welcome the fishing harbour project coming to Thiruvottiyur Kuppam.

6. **Mr. Lokesh, Thiruvottiyur Kuppam, Illaingargal Pothunala Sangam,Thiruvottiyur**

   I thank the people who proposed to bring this project to Thoruvottiyur Kuppam and I wish to implement this project early so as to provide employment and benefits to fisher men.

7. **Mr. K Kuppan, Ex.M.L.A., Thiruvottiyur Kuppam, Thiruvottiyur**

   He informed that this project is coming here by the former Hon'ble Chief Minister of Tamilnadu, Puratchi Thalaivi, J.Jayalalitha. Avl. and to be implemented by the present Hon'ble Chief Minister of Tamilnadu.

   Further he informed to extend his full cooperation and support to bring the harbour in Thiruvottiyur Kuppam. He requested the Tamilnadu Fisheries Department to engage the fishermen community while construction and operation period of the harbour and their participation should be there and their representatives should be there in all the committees. He also added that, all the works that is security, parking tender and all the works of the harbour should be awarded to the fisher men community.

   With the above, he welcomed the fishing harbour project coming to Thiruvottiyur Kuppam on behalf of all the fishermen..

Tmt. R.Seethalakshmi, , I.A.S., District Collector, Chennai District

The District collector thanked the people who gathered in the meeting and said that the public hearing meeting was concluded.

Finally, the public hearing ended with national anthem.

30/7/19
District Environment Engineer,
Tamilnadu Pollution Control Board
Ambattur

1/8/19
District Collector
Chennai

<u>சென்னை மாவட்டம், திருவொற்றியூர் தாலுகா, திருவொற்றியூர் குப்பம் கிராமத்தில் தமிழ்நாடு அரசின் மீன் வளத்துறையால் அமைக்கப்பட உள்ள ஆண்டொன்றிற்கு 69000 டன் கையாளப்படவுள்ள தி/ள்.சூரை மீன்பிடி துறைமுகத்தில் பொது மக்கள் கருத்துக்கேட்பு கூட்டத்தின் நடவடிக்கை விபரங்கள்.</u>

திட்டத்தின் பெயர்	சுற்றுச்சூழல் தாக்க அறிவிக்கையில் இடம்பெற்ற பட்டியல் 7(e) துறைமுகங்கள் கீழ் வரும் சென்னை மாவட்டம், திருவொற்றியூர் தாலுகா , திருவொற்றியூர் குப்பம் கிராமத்தில் தமிழ்நாடு அரசின் மீன் வளத்துறையால் முன்மொழிந்துள்ள ஆண்டொன்றிற்கு 69000 டன் கையாளப்படவுள்ள தி/ள்.சூரை மீன்பிடி துறைமுகம் அமைப்பதற்கான திட்டம்.
இடம்	தி/ள். அன்னை சிவகாமி மஹால் திருமண மண்டபம், அன்னை சிவகாமி காம்ப்ளக்ஸ், எண்.378, டி,எச்.ரோடு,தேரடி, திருவொற்றியூர், திருவள்ளூர் மாவட்டம்.
தேதி மற்றும் நேரம்	25/07/2019, காலை 11.00 மணி

கலந்து கொண்டவர்கள்

1	திருமதி.ஆர்.சீத்தா லெட்சுமி, இ.ஆ.ப	மாவட்ட ஆட்சியர், சென்னை மாவட்டம்
2	திருமதி.செ.இந்திரா காந்தி,	மாவட்ட சுற்றுச்சூழல் பொறியாளர், தமிழ்நாடு மாசு கட்டுப்பாடு வாரியம், அம்பத்தூர்.
3	திரு.ஆர்.இராஜேந்திரன்	வருவாய் பிரிவு அதிகாரி, வடக்கு சென்னை பிரிவு, சென்னை மாவட்டம்.
4	பொது மக்கள்	இணைப்பில் உள்ளபடி

பொது மக்கள் கருத்துக்கேட்பு கூட்டம் தமிழ்தாய் வாழ்த்துடன் ஆரம்பிக்கப்பட்டது.

மாவட்ட சுற்றுச்சூழல் பொறியாளர், தமிழ்நாடு மாசு கட்டுப்பாடு வாரியம், அம்பத்தூர் அவர்கள் மாவட்ட ஆட்சியர், அனைத்து அரசு நிர்வாகிகள், ஊடகங்கள் மற்றும் அங்கு கூடியிருந்த பொதுமக்கள் அனைவரையும் வரவேற்று தமிழ்நாடு அரசின் மீன் வளத்துறை ஆண்டொன்றிற்கு 69000 டன் கையாளக் கூடிய துறைமுகம் ஒன்றினை சென்னை மாவட்டம்,

திருவொற்றியூர் குப்பத்தில் அமைக்கப்பட முன்மொழிந்துள்ளனர் என தெரிவித்தார். இந்த பொது மக்கள் கருத்துக்கேட்பு கூட்டம் தமிழ்நாடு மாநில சுற்றுச்சூழல் தாக்க மதிப்பீடு ஆணையத்தின் 22.01.2018 தேதியிட்ட குறிப்பு விதிமுறையின் படி மாவட்ட ஆட்சியரின் ஒப்புதலுடன் நடைபெறுகிறது என்று தெரிவித்தார்.

இந்த பொதுமக்கள் கருத்துக் கேட்புக் கூட்டத்தை 25-07-2019 அன்று சிவகாமி அம்மாள் திருமண மண்டபத்தில் நடத்த மாவட்ட ஆட்சியர் அவர்களின் அனுமதி பெற்று 21-06-2019 அன்று தி நீயூ இந்தியன் எக்ஸ்பிரஸ் என்கின்ற ஆங்கில நாளிதழிலும் மற்றும் தினமணி என்கின்ற தமிழ் நாளிதழிலும் அறிவிப்பு தமிழ்நாடு அரசின் செய்தி மற்றும் விளம்பரத்துரை மூலம் வெளியிடப்பட்டுள்ளது. அருகிலுள்ள கிராமங்களில் உள்ளாட்சி அமைப்பு மூலமாகவும் தெரிவிக்கப்பட்டுள்ளது. மேலும் இக்கூட்டத்தில் நடைபெறும் கருத்துக்களை ஒலி/ஒளி காட்சிகளை ஆவணப்படுத்தி மாநில சுற்றுச்சூழல் தாக்க மதிப்பீடு ஆணையத்திற்கு அனுப்பிவைக்கப்படும். இங்கு குழுமியிருக்கும் பொதுமக்கள் தங்களின் கருத்துகளை ஒருவர் பின் ஒருவராக தெளிவாக பதிவு செய்யுமாறும் மற்றும் இக்கூட்டத்தினை அமைதியான முறையில் நடைபெற ஒத்துழைக்குமாறும் தெரிவித்தார்.

தமிழ்நாடு மீன் வளத்துறையினை இத்திட்டத்தினை குறித்த விரிவான விளக்கத்தினை கூறுமாறும் கோரினார்.

தமிழ்நாடு மீன் வளத்துறையின் சார்பில், முனைவர்.வை.நேரு குமார், சுற்றுச்சூழல் தாக்க மதிப்பீடு ஆலோசகர், பேராசியர் மற்றும் இயக்குனர் சுற்றுச்சூழல் சுகாதாரம் மற்றும் ஆபத்தின்மை பாதுகாப்பு மையம் அண்ணாமலை பல்கலைக்கழகம் அவர்கள் இத்திட்டம் எந்த இடத்தில் வரவிருக்கிறது, எப்படி இத்திட்டத்தினை செயலாக்க போகிறார்கள், என்னென்ன தொழில்நுட்ப அளவீடுகள் கருத்தில் கொள்ளப்படுகின்றன, இத்திட்டத்தின் முக்கியத்துவம், என்னென்ன வசதிகள் இத்துறைமுகத்தில் வரவிருக்கின்றன, மாசுகட்டுபாடு நடவடிக்கைகள் மற்றும் இத்திட்டத்தால் ஏற்பாடு பயன்கள் மற்றும் பயன்படுவோர்கள் பற்றிய விரிவான விளக்கத்தினை விவரித்தார்.

இதனைதொடர்ந்து, பொதுமக்கள் தங்களது கருத்தினை அவர்களது பெயர் மற்றும் ஊரின் பெயரை கூறி பதிவு செய்யுமாறு கேட்டுக்கொள்ளப்பட்டார்கள் அவர்களது கருத்துக்கள் பின்வருமாறு.

1. திரு.S.சங்கர், திருவொற்றியூர் குப்பம், திருவொற்றியூர்

   இத்திட்டம் வரலாற்று சிறப்புமிக்க திட்டம். இத்திட்டம் மீன்வர்களின் வாழ்வாதாரத்தை மேம்படுத்தக்கூடியது. இதனால் 1 இலட்சம் பேர் பயனடைவார்கள். திருவொற்றியூர் குப்பம் நிர்வாகம் மற்றும் பொது மக்கள் சார்பில் நான் இத்திட்டத்தினை வரவேற்கிறேன்.

2. திரு.C.இராஜேந்திரன், ஊர் தலைவர், பலகைத்தொட்டி குப்பம், திருவொற்றியூர்

   நாங்கள் திருவொற்றியூர் குப்பத்தில் அமைக்கப்படவுள்ள மீன்பிடித் துறைமுகத்தை வரவேற்கிறோம்.

3. திரு.ஜெயவேல், திருச்சினாங் குப்பம், திருவொற்றியூர்

   எனது குப்பத்தின் சார்பாக, மீன்பிடித் துறைமுகம் அமைவதை வரவேற்கிறோம்.

4. திரு.ஜெய்சிங், ஒண்டிக்குப்பம், திருவொற்றியூர்

   இத்துறைமுகமானது எங்களது பல நாள் கனவு. எனவே திருவொற்றியூர் குப்பத்தில் மீன்பிடித் துறைமுகம் வருவதை நாங்கள் மனப்பூர்வமாக வரவேற்கிறோம்.

5. திரு.சின்னபிள்ளை, திருவொற்றியூர் குப்பம் பொது நலச்சங்கம் திருவொற்றியூர்

   நாங்கள் முழுமனதுடன் மீன்பிடித் துறைமுகம் வருவதை வரவேற்கிறோம்.

6. திரு.லோகேஷ், திருவொற்றியூர் குப்பம், இளைஞர்கள் பொது நலச்சங்கம், திருவொற்றியூர்

   இத்திட்டத்தினை திருவொற்றியூர் குப்பத்தில் கொண்டு வர முன்மொழிந்தவர்களுக்கு நன்றி தெரிவித்துக்கொள்கிறேன். மேலும், இத்திட்டத்தை நிறைவேற்றி மீன்வர்களுக்கு வேலைவாய்ப்பு மற்றும் நன்மை பெறும் வகையில் விரைவில் கொண்டுவர ஆதரவு தெரிவிக்கிறோம்.

7. திரு.K.குப்பன், முன்னாள் சட்டமன்ற பேரவை உறுப்பினர், திருவொற்றியூர் குப்பம், திருவொற்றியூர்

   இத்திட்டம் தமிழ்நாட்டின் மாண்புமிகு முன்னாள் முதலமைச்சர் புரட்சி தலைவி அம்மா ஜெ.ஜெயலலிதா அவர்களால் இவ்விடத்திற்கு கொண்டு வரப்பட்டது. இத்திட்டமானது தற்போதைய மாண்புமிகு தமிழக முதலமைச்சர் அவர்களால் செயலாக்கப்படவுள்ளது.

திருவொற்றியூர் குப்பத்தில் மீன்பிடித் துறைமுகம் வருவதற்கு எங்களது முழு ஒத்துழைப்பு மற்றும் ஆதரவினை தெரிவிக்கிறோம். மேலும், துறைமுகத்தின் கட்டுமான மற்றும் செயல்பாடுகளில் மீனவர் சமுமாயத்தை ஈடுபடுத்துமாறும், ஒவ்வொரு செயலிலும் எங்களது பங்களிப்பு முழுவதுமாக இருக்க வேண்டும் எனவும் அனைத்து குழுவிலும் மீனவர் சமுதாயத்தில் ஒருவர் உறுப்பினராக சேர்க்க வேண்டும் எனவும் மீன்வளத்துறையினை கோரியுள்ளார். மேலும், பாதுகாப்பு, பார்க்கிங் என அனைத்து பணிகளிலும் எங்கள் மீனவர் சமுதாயத்திற்கு மட்டும்தான் கொடுக்கப்படவேண்டும் எனவும் கோரியுள்ளார். மேலும், அவர் மீனவர் சமுதாயத்தின் சார்பில் இந்த மீன்பிடி துறைமுகத் திட்டம் திருவொற்றியூர் குப்பத்தில் வருவதை வரவேற்கிறேன் என தெரிவித்தார்.

8. திரு.R சீத்தாலெட்சுமி, இ.ஆ.ப, மாவட்ட ஆட்சியர், சென்னை மாவட்டம்

மாவட்ட ஆட்சியர் குழுமியிருக்கும் அனைத்து மக்களுக்கும் நன்றி தெரிவித்து பொதுமக்கள் கருத்துகேட்பு கூட்டத்தினை முடித்துவைத்தார்.

முடிவில், தேசிய கீதத்துடன் கருத்துக்கேட்பு கூட்டம் முடிவடைந்தது.

shml - 30/7/19

மாவட்ட சுற்றுச்சூழல் பொறியாளர்,
தமிழ்நாடு மாசு கட்டுப்பாடு வாரியம்,
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