Draft
February, 2018

ENVIRONMENTAL IMPACT ASSESSMENT
ENVIRONMENTAL MANAGEMENT PLAN

TUNA FISHING HARBOUR
Thiruvottriyur Kuppam, Thiruvallur District

DEPARTMENT OF FISHERIES
GOVERNMENT OF TAMILNADU

EIA Consultants
CENTRE FOR ENVIRONMENT, HEALTH & SAFETY
ANNAMALAI UNIVERSITY,
ANNAMALAI NAGAR - 608 002

Executive Summary

EXCECUTIVE SUMMARY

1.1. GENERAL

Department of Fisheries (DoF) is one of the core line departments of **Government of Tamil Nadu(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.

Tamil Nadu has around **1076 km** of coastal line that passes through 13 out of 32 districts that consists of FOURcoastalZonesviz.,CoromandelCoast, Palk Bay,GulfofMannarandWestCoast.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** (Inshorearea-16,058Sq.km.,off- shore area-7,197Sq.km anddeep sea-18,157Sq. km) of continental shelf under their activities.

The fishing community population is around **1.1 million in Tamil Nadu** (2015). TamilNaduranks FIFTHintotalfish productionofthe countryandthe totalfishproduction oftheStateduring**2014-15is6.97 lakhtons**.(From marine resources-4.57lakh tons; Freshwater and brackishwaterresources -2.40lakhtons).TamilNadu isoneamongthe leadingexporterofseafoodwith the exportofmarine productsof93,477 MTandearneda foreign exchangeofINR 5,308.17 Croresduring 2014-15. The fisheries sectorhascontributed**0.7 percentof the total Gross State Domestic Product**(GSDP) ofthe 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 Tamil Nadu 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 Tamil Nadu.

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.241.42Crores.**

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 Coramandal Coast, in Thiruvottriyur Kuppam, Thiruvottriyur Taluk, Thiruvallur District, Tamil Nadu.

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 2,00,000 cum of dredging is required for maintain the basin draft. The dredged material shall be used 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 Tamil Nadu is the proponent of the proposed TUNA FISHING HARBOR in Thiruvottriyur Kuppam, Thiruvottriyur Taluk, Thiruvallur District, Tamil Nadu.

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)

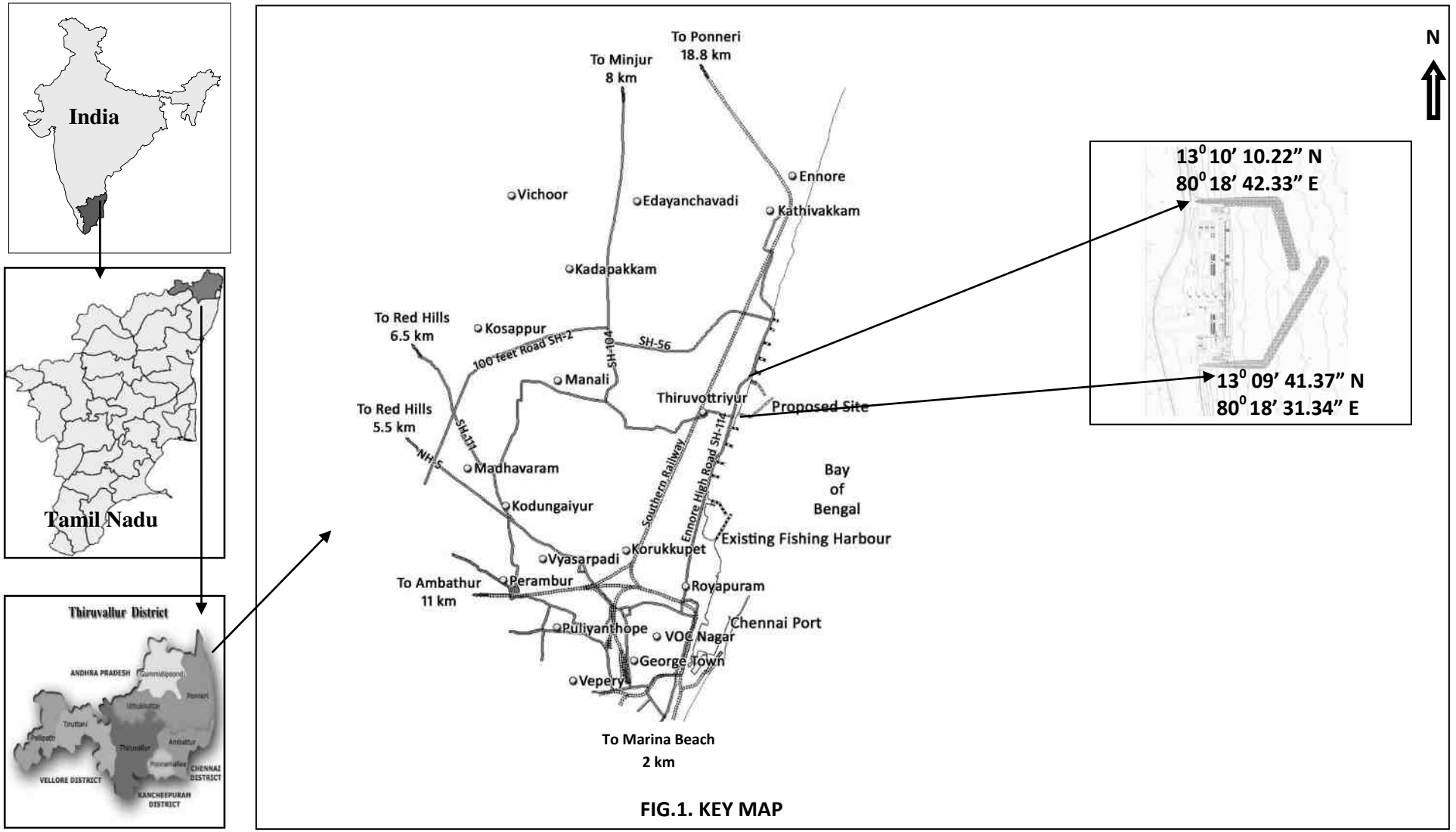
India
Tamil Nadu
Thiruvallur District
ANDHRA PRADESH
VELLORE DISTRICT
CHENNAI DISTRICT
KANCHEEPURAM DISTRICT
N
To Ponneri
18.8 km
To Minjur
8 km
Ennore
Vichoor
Edayanchavadi
Kathivakkam
Kadapakkam
To Red Hills
6.5 km
Kosappur
100 feet Road SH-2
SH-104
SH-56
Manali
Thiruvottriyur
Proposed Site
To Red Hills
5.5 km
SH-111
NH-5
Madhavaram
Southern Railway
Ennore High Road SH-114
Bay
of
Bengal
Kodungaiyur
Existing Fishing Harbour
Korukkupet
Vyasarpadi
To Ambathur
11 km
Perambur
Royapuram
Chennai Port
Puliyanthope
VOC Nagar
George Town
Vepery
To Marina Beach
2 km
13⁰ 10’ 10.22” N
80⁰ 18’ 42.33” E
13⁰ 09’ 41.37” N
80⁰ 18’ 31.34” E

FIG.1. KEY MAP

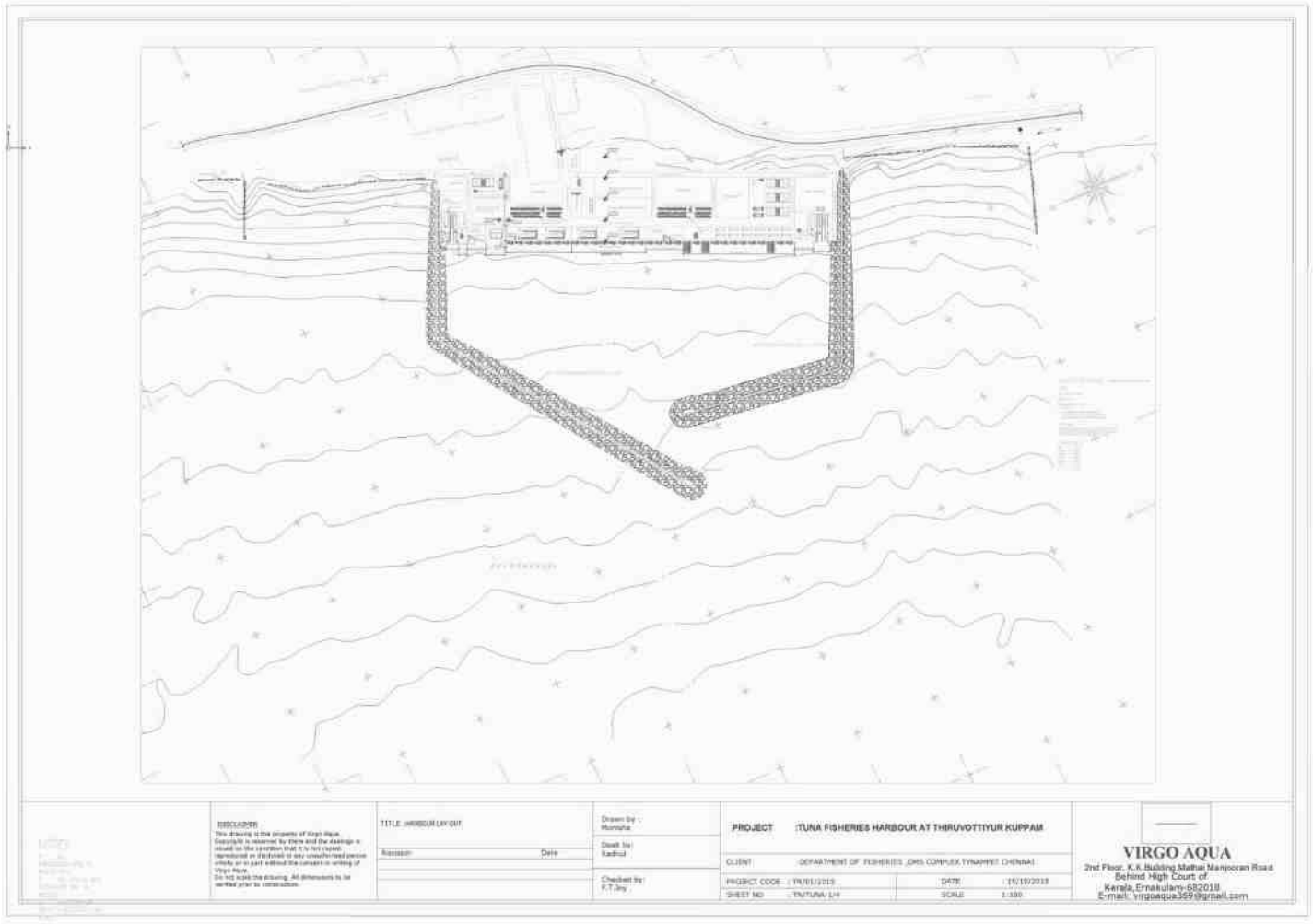

FIG.2. PROJECT LOCATION & SCHEMATICS OF THE PROJECT

- 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 Tamil Nadu 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 Tamil Nadu 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 Coramandal Coast, in Thiruvottriyur Kuppam, Thiruvottriyur Taluk, Thiruvallur District and Tamil Nadu.
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 BesantNagar.

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.

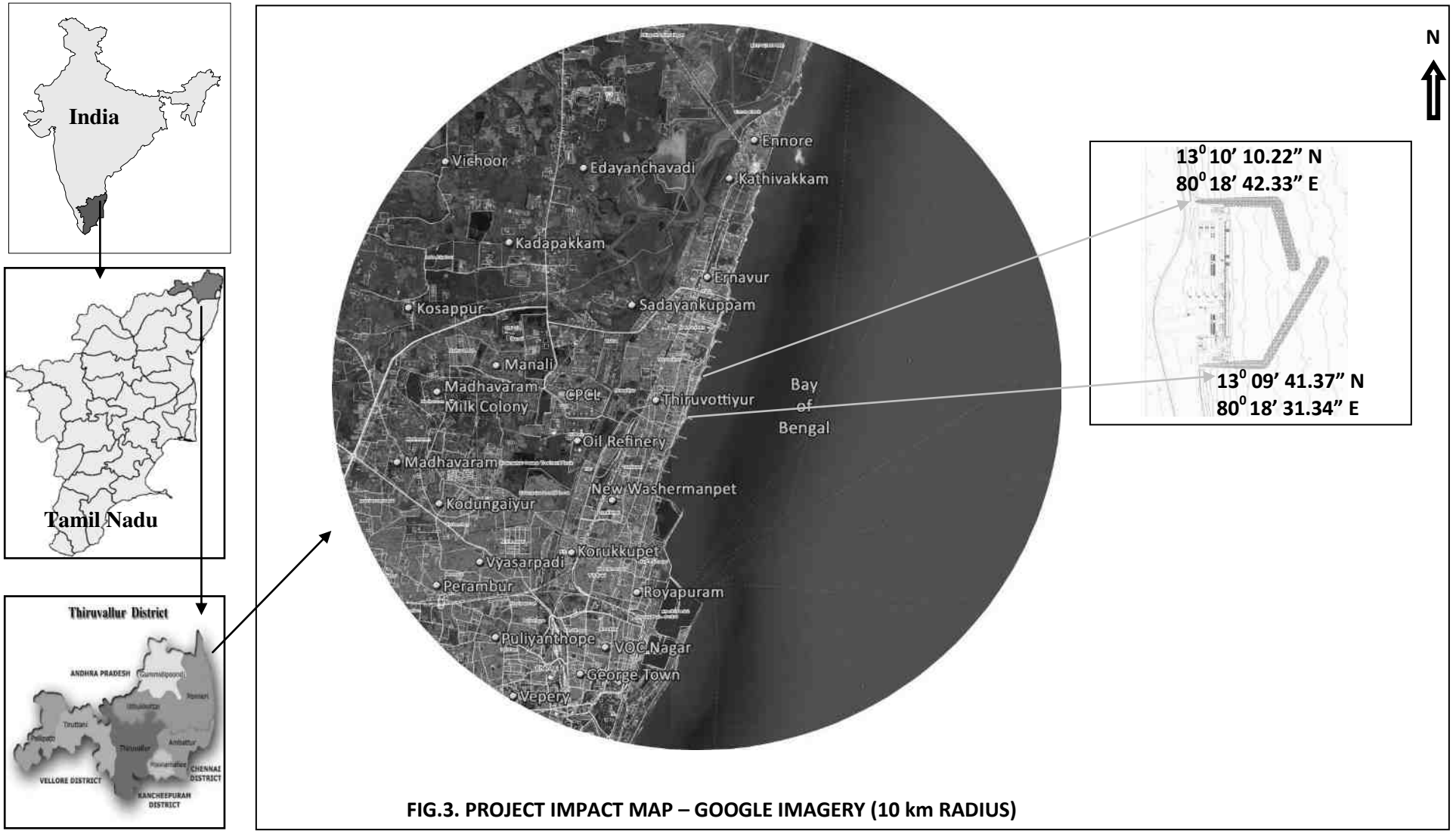

FIG.3. PROJECT IMPACT MAP – GOOGLE IMAGERY (10 km RADIUS)

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;

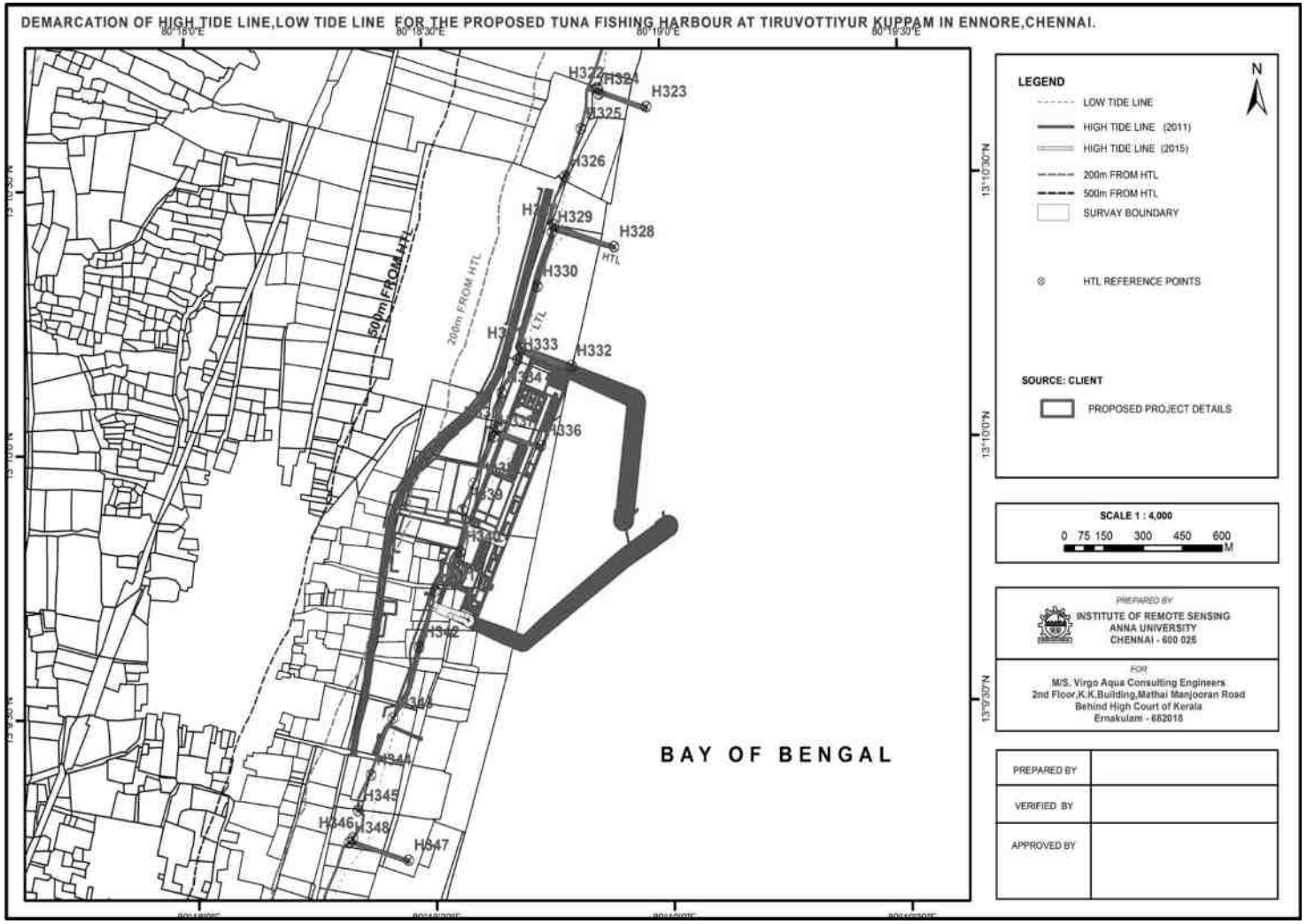
DEMARCATION OF HIGH TIDE LINE,LOW TIDE LINE FOR THE PROPOSED TUNA FISHING HARBOUR AT TIRUVOTTIYUR KUPPAM IN ENNORE,CHENNAI.
80°18'0"E
80°19'30"E
80°19'0"E
80°18'30"E
13°10'30"N
13°10'0"N
13°9'30"N
H322
H324
H323
H325
H326
H329
H328
H330
H333
H332
H336
H342
H344
H345
H346
H348
H347
50m FROM HTL
200m FROM HTL
HTL
LTL
BAY OF BENGAL
N
LEGEND
LOW TIDE LINE
HIGH TIDE LINE (2011)
HIGH TIDE LINE (2015)
200m FROM HTL
500m FROM HTL
SURVAY BOUNDARY
HTL REFERENCE POINTS
SOURCE: CLIENT
PROPOSED PROJECT DETAILS
SCALE 1 : 4,000
0 75 150 300 450 600
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

- 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.

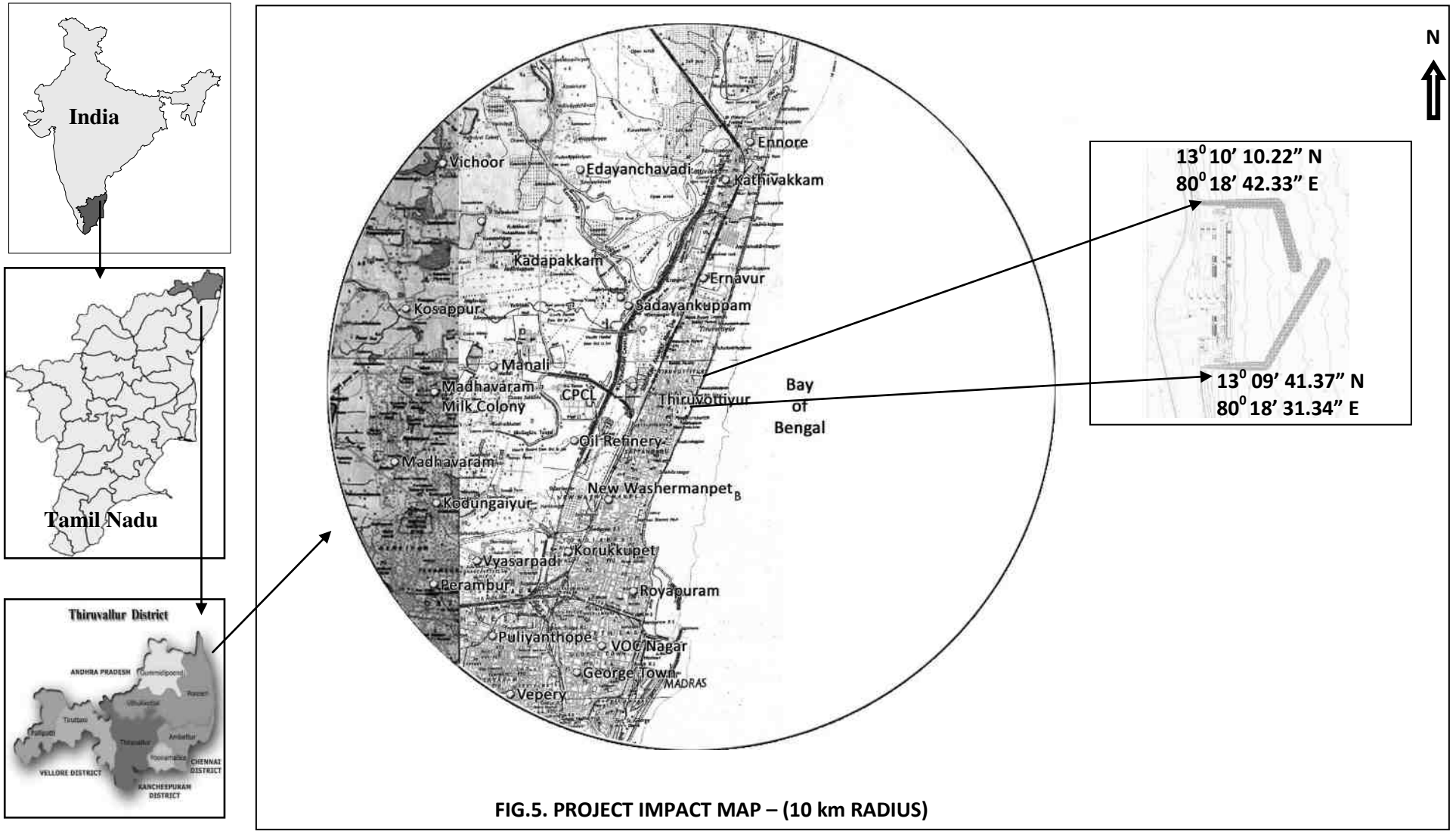

FIG.5. PROJECT IMPACT MAP – (10 km RADIUS)

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 Tamil Nadu 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 water 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 Tamil Nadu 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 Tamil Nadu 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**.

Fig.6 PROTOCOL OF ENVIRONMENTAL CELL

FISHING HARBOR

Thiruvottriyur Kuppam

FH ADMINISTRATION

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ENVIRONMENTAL ENGINEE

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Officer I	*Officer II*	*Officer III*	*Officer IV*	*Officer V*
Environmental Standards	Green belt development	Emergency Management Cell	Statutory approvals from TNPCB/LBs/EB/Forests	Social & Health
Status of Water Spread area/Break Waters/ Berths and Fish Handling Facilities (monitoring/documentation)	Rainwater Harvesting Structures	Personal Safety Systems	CPCB/MoEF&CC	surveillance

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 longtime 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.