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DUAL

26/12/2015

The Member Secretary,

Ministry of Environment and Forests and Climate Change

IA-III

Indira Paryavaran Bhavan

Jor Bagh Road

New Delhi - 110 003

Sub: Submission of Additional details called for Environmental and CRZ Clearance for the proposed "Beach Resort" by M/s Dual Structuralss & Industries Pvt Ltd Located at Kadalur Village Cheyyur taluk, Kancheepuram District, Tamil Nadu for further consideration in next meeting– reg

Ref: 1. File No. 11-28/2015-IA-III

2. 153rd EAC meeting Minutes

Dear Sir,

With reference to the above subject, please find the following additional details called vide 153rd EAC meeting Minutes.

1. Revised EIA report with respect to water requirement, water sourcing and measures for water and energy conservation and impact of desalination plant.
2. Building plan to scale indicating all proposed facilities.
3. Revised affidavit with respect of ground water withdrawal.
4. Acknowledgement from TNCZMA with respect to desalination proposal to be set up.

Thanking you

For Dual Structurals & Industries Pvt Ltd

Director

RAPID ENVIRONMENTAL IMPACT ASSESSMENT REPORT

FOR

PROPOSED BEACH RESORT

VILLAGE- KADALUR,
TALUK- CHEYYUR,
DISTRICT- KANCHEEPURAM,
STATE- TAMIL NADU

BY

M/S. DUAL STRUCTURALS AND INDUSTRIES (P) LTD.

ENVIRONMENTAL CONSULTANT
HUBERT ENVIRO CARE SYSTEMS PVT LTD
CHENNAI

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CHAPTER 1.INTRODUCTION

1.1 PURPOSE OF THE REPORT

This is an Environmental Impact Assessment Report for the Coastal Regulation Zone clearance, for a proposed Beach Resort at Kadalur Village, cheyyur Taluk, Kancheepuram District, Tamil nadu. This report is to be submitted for the Coastal Regulation Zone clearance of the Beach Resort and thus explores the environmental impacts of the Resort.

Objectives of this EIA include the following:

1) To ensure environmental considerations are explicitly addressed and incorporated into the development decision-making process.
2) To anticipate and avoid, minimize or offset the adverse significant biophysical, social and other relevant effects of the above project proposal.
3) To protect the productivity and capacity of natural systems and the ecological processes.
4) To promote development that is sustainable and optimizes resource use as well as management opportunities.

1.2 INTRODUCTION OF THE PROJECT & PROJECT PROPONENT

1.2.1 Proposed Beach Resort

M/s Dual structural & Industries Pvt Ltd proposed beach Resort project at Kadalur Village, cheyyur Taluk, Kancheepuram District, Tamilnadu in an area of 82540.14 Sq m. The proposed beach resort having Cottages with all amenities like gym, Yoga, Naturopathy, Treatment Halls and extensive lawns and it is located just 10 km from Kalpakkam. The Proposed Beach resort will offer world class hospitality for both business and Leisure.

Table Error! No text of specified style in document.**-1 Details of the proposed project**

Project Name	**Beach Resort**
Project Proponent	M/s Dual structurals & Industries Pvt Ltd -Represented by Mr G. Ravindrakumar-Managing Director
Location	Kadalur Village, cheyyur Taluk, Kancheepuram District, Tamilnadu
Plot/Survey/Khasra No.	Survey No: 389B,485/2B,556/1A2,1C,2B,3B,557/1B,3,4,571/2A,2B,2C,2D,2E of NO:105, Kadalur Village
Plot Area	80239.984Sq.m
Builtup area	25346.73 Sq.m
Nearest Railway Station/Airport Along With The Distance In Kms.	Puducherry Railway station- 60 Km Chennai Airport- 60 km
Nearest Town, City, District Head Quarters Along With Distance In Kms.	Chennai
Village Panchayats, Zilla Parishad, Municipal Corporation, Local Body	Kadalur village
Registered Address	M/s Dual structural & Industries Pvt Ltd 3/355,AGS Colony Extn.,

	Venkateswara Nagar, Kottivakkam,Chennai-600041
Project Cost	Rs. 24.00 Crores

1.2.2 Promoters

This project is promoted by M/s Dual structural & Industries Pvt Ltd and their registered address is3/355, AGS Colony Extn., Venkateswara Nagar, Kottivakkam, Chennai-600041. Dual Structurals & Industries Pvt. Ltd. was started in the year 1982 by Mr. Ravindra Kumar and Mr. Anjaiah and incorporated as a Private Limited company in 1991. For over three decades the company has proudly been playing a significant role in Chennai real estate & construction business.

1.3 SCOPE OF THE STUDY

The study is limited to the proposed site, and a 10km radius around this stretch. The proposed project consists of Cottages with all amenities like gym, Yoga, Naturopathy, Treatment Halls and extensive lawns. Thus in the current EIA the construction of resort and the surrounding 10 km are considered.

This EIA is being prepared for the CRZ clearance as per CRZ notification 2011, it mainly consists of baseline study of project site covering 10km radius of the site, anticipated environmental impacts, Risk Assessment, Disaster Management Plan and the Environmental Management Plan.

1.4 METHODOLOGY ADOPTED FOR THE STUDY

The EIA process followed for this EIA is composed of the following stages:

1) Study of project information
2) Screening & Scoping
3) Collection of Detailed Project Management Plan/Report
4) Baseline Data Collection
5) Impact Identification, Prediction & Evaluation
6) Mitigation measures & Delineation of EMP
7) Risk assessment and Safety & Disaster Management Plan

8) Review & Finalization of EIA Report
9) Submission of EIA Report for implementation of Mitigation Measures & EMP

The EIA Cycle based on the above stages has been presented as illustration in subsequent Figure 1.1.

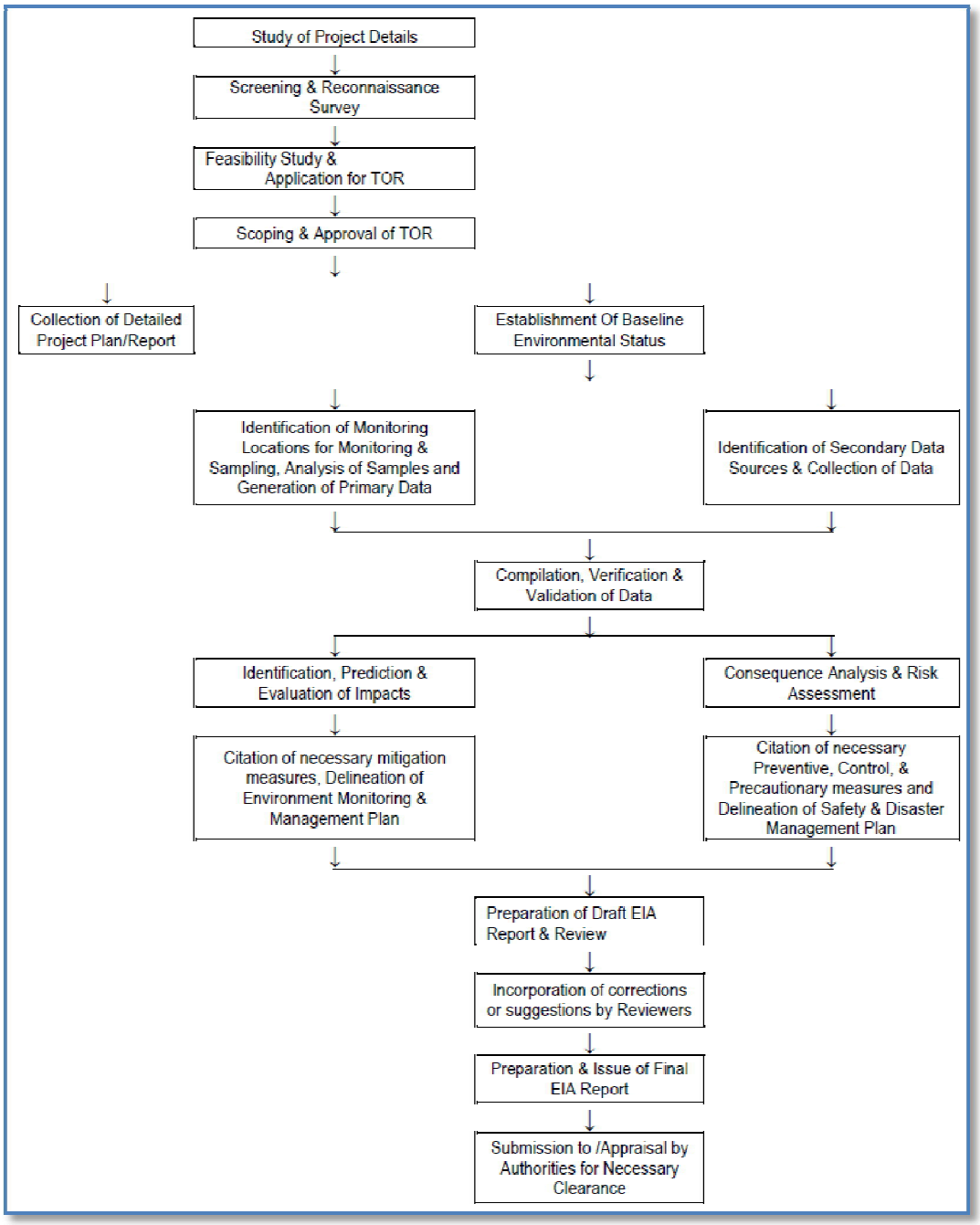
1.5 METHODOLOGY FOR EMP, RA & DMP

The distinct features of the methodology for the EMP project were as follows,

1. The existing environmental quality was assessed based on primary and secondary data.
2. Potential environmental impacts including potential benefits were identified and assessed.
3. An EMP, comprising proposed environmental management strategies was formulated to maintain and enhance the environmental quality around the project site.
4. Risk Assessment (RA) to identify the risk involved in the proposed project.
5. A scheduled Disaster Management Plan (DMP) to enunciate a sequence of emergency response to preserve life and property which may be threatened in accidental damage of the resort which may result in fire to environment etc.

Keeping in view the nature of activities envisaged and the various environmental guidelines available, it was decided to cover an area of 10 km radius from the center of the proposed project site for the purpose of Environmental Management Studies (EMS).

Figure 1-1 EIA Process Cycle



1.6 STRUCTURE OF THE EIA REPORT

Chapter-1: Introduction to the project, Scope of the study, methodology adopted

Chapter-2: Project Description, a brief description of the project & its utilities.

Chapter-3 Baseline Environmental Status, the existing environmental conditions in and around 10Km radius of the site. The methodology was strictly adhered to the Central Pollution Control Board's and TNPCB stipulated guidelines.

Chapter-4 Environmental Impacts, likely impacts caused on various environmental parameters by the various activities proposed for the project was assessed and described in this chapter. Mitigation & Enhancement Measures were suggested for the impacts caused due to various activities.

Chapter-5 Based on the findings of social and environmental impacts analysis, monitoring programme to initiated and implemented as per norms during execution phase is discussed.

Chapter-6 Risk Assessment and Disaster Management Plan.

Chapter-7 Based on potential impact and proposed mitigation measure Environmental Management Plan is prepared. Organizational framework for execution and monitoring of EMP is also prepared along with cost estimate for Environment management.

Chapter-8 This chapter concludes the project work with the summary and its positive points.

Chapter-9 The final chapter includes the various consultants involved in this project with their detailed profile.

CHAPTER

2.PROJECT DESCRIPTION

2.1 TYPE OF PROJECT

The proposed project is a Beach Resort with the plot area of 80239.984 sq.m. The site area falls in CRZ III as per CZMP Tamil Nadu, for which a CRZ clearance has to be obtained from Ministry of Environmenta and Forests. This construction activity is permissible activity as per the clause 8(III) of the CRZ Notification, 2011.

The total cost of the proposed project Rs 24 crores.

2.2 PROJECT JUSTIFICATION

Project site consists of Cottages with all amenities like gym, Yoga, entertainment halls and extensive lawns and it is located in Cheyyur Taluk which is booming out fastly. Proposed Beach resort will offer world class hospitality for both business and Leisure.

2.3 LOCATION

The proposed project is locared at 389B, 485/2B, 556/1A2, 1C, 2B, 3B, 557/1B, 3, 4, 571/2A, 2B, 2C, 2D, 2E of NO:105, Kadalur Village cheyyur Taluk, Kancheepuram District, Tamilnadu. Land documents are enclosed in ANNEXURE – 1. 500m topo map is attached as ANNEXURE-2. Location map showing the project site is given below.

Figure 2-1 Google Image showing the project site

2.4 PROJECT ACTIVITIES

2.4.1 Land Requirement

The Total land area for Beach Resorts will be 80239.984 sq.m; the Built up area will be around 25346.73 Sq.m.

a) Coastal Regulations Zone III

The proposed project is covered under the Coastal Regulations Zone III as per the MoEF guidelines. The design complies with the coastal regulations.

b) No Development Zone

- 200m from the High Tide Line (HTL) is earmarked as no development zone, and only parks and play field is proposed in this area as permissible by the Ministry of Environment and Forest.
- In the no development zone not even temporary fencing is proposed.

- No permanent structure for sports facility is proposed.

c) Development Zone

- In the development of the vacant plot, between the 200m to 500 high tide line, a resort with restaurant is being proposed, as per the norms.

As per the Ministry's regulation the land area of the project site is planned.The following table shows the permissible area and the proposed area as per the Floor Space Index (FSI) and the permissible height and the proposed height of the project.

Table 2-2 Area Statement

S. No	Area statement	Land area
1	Total Land area (Sq.m)	80239.984
2	Development Zone(200 -500m from HTL) (Sq.m)	0-200m : 0
3	No Development Zone(0-200m from HTL) (Sq.m)	200-500m : 25346.73
4	Total Built up area (Sq.m)	25346.73
5	FSI Achieved	0.315
6	Maximum Height (m)	9m
7	Ground coverage	11375 or 14.17 %
8	Road & pavements	8024
9	Green Belt	52817.98
10	Open Area	8023.00

2.4.2 FSI area Calculation:

1. Ground coverage between 200-500 metres of HTL: 11375 Sq.m
2. Coverage of first floor: 13971 Sq.m
3. Total floor area (1+2): 25396.04 Sq.m
4. Plot area within 200 meters of HTL: 27996.84 sq.m
5. Plot area between 200-500 meters of HTL: 47120.81 Sq.m
6. 100 m from creek area : 5122.3 Sq.m
7. Total (4+5+6): 80239.984 sq.m
8. Floor space index (3/7): 0.315

2.4.3 Details of proposal with area breakup

The details of the proposal with area break up is given below in table

Table 2-3 Resort Details

S.NO	Proposal	Floors	Nos
1	Single Room Type	G	92
2	Double Room Type	G+1	144
3	VIP Rooms	G	16
4	Guest Rooms	G	10
5	rooms(Staffs)	G	28
6	Recreation Rooms, Meditation Dormitory, Yoga room & Naturopathy consultation for visitors, spa & tennis court	G	-
TOTAL			**290**

Table 2-4 Built up area details for proposal

A	BUILDING DETAILS	Area (Sq.m)
1	Single room Cottage	5957.37
2	Double Room accomodation	9206.83
3	Vip Cottage	4251.67
4	Guest room	2655.67
5	Staff room	1463.21
6	Kitchen/Dinning/Meditation/ yoga/spa/tennis court	1811.29
	TOTAL Built up area	**25346.04**

2.4.4 Parking Standards

For Guest Rooms	:	1Car for 2 rooms
Required Parking	:	48 Cars
Provided Parking	:	78 Cars

2.4.5 Accessibility

The study area has a well developed communication network consisting of airport, railway station, hospitals, National Highways and other district roads and railways. Post and telegraph facilities seem to be adequate in the study area. Study area is having primary and high school facilities, primary health center, etc.

The Nearest Airport is Meenambakkam International Terminal, which is 63 km from project site. Similarly Melmaruvathur Railway station about 33 km, from the site and well connected to other parts by roadways also.

2.5 RESOURCES REQUIREMENT

2.5.1 Water

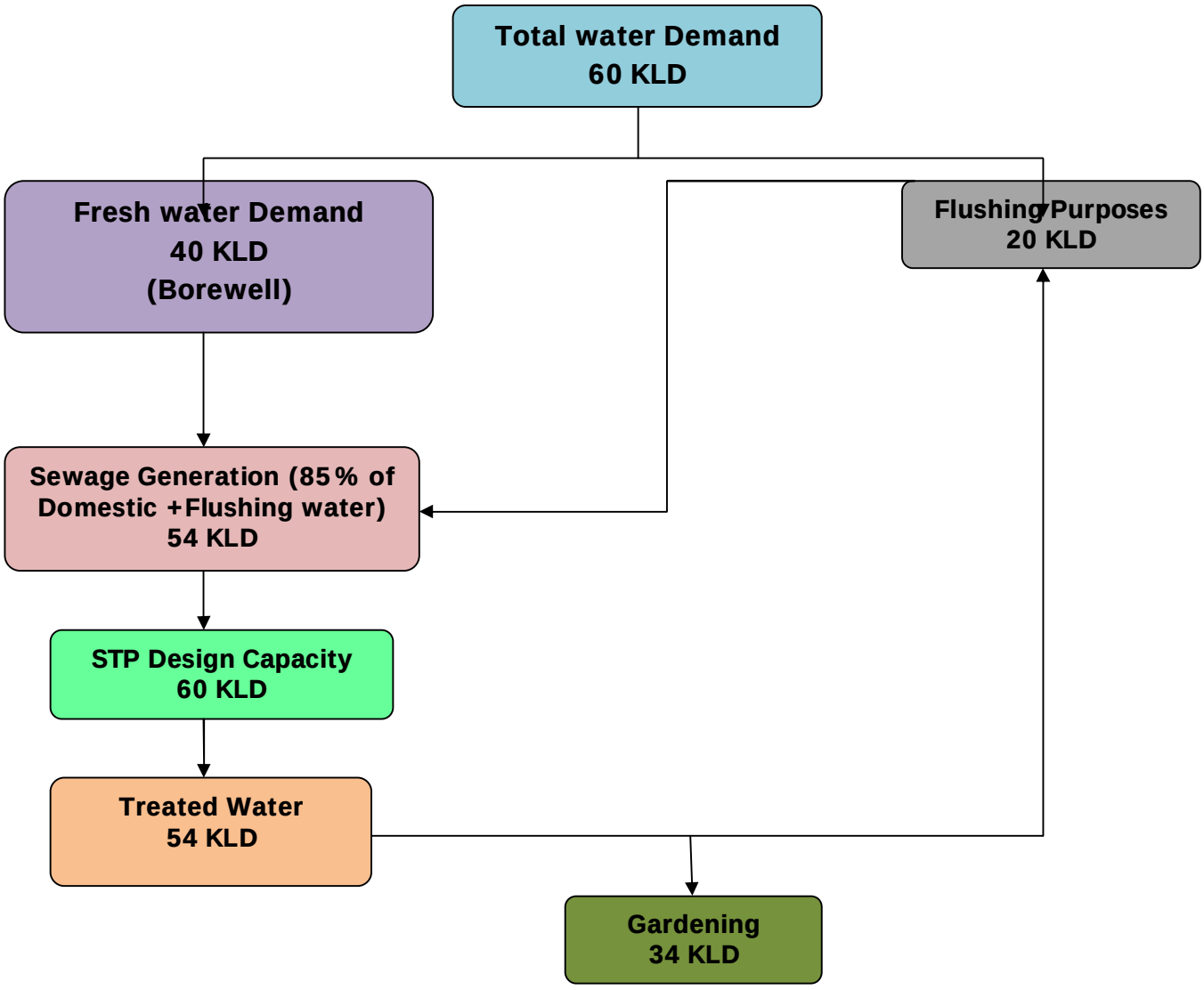
During Construction Phase: During construction phase, the work force involved will be 100Nos. The water requirement during construction phase will be 8KLD. Water for construction purpose will be outsourced and will be around 15 KLD.

During Operation Phase: The daily requirement of water will be 40.5 KLD. Fresh water demand is 27 KLD .After treatment of wastewater, treated water will be reused for green belt (23 KLD), flushing (13.5 KLD). Water requirement for the project will be met from desalination plant.

Facilities	Occupancy	Per Capita Water Requirement 135 ltrs/day		
		Domestic (LD)	Flushing (LD)	Total (LD)
Single room	92	8280	4140	12420
Double room(144x2)	288	25920	12960	38880
VIP room	16	1440	720	2160
Guest room	10	900	450	1350
Staff quarters 1BHK	28	2520	1260	3780

Maintenance staff	10	900	450	1350
Total	444	**39960**	**19980**	**59940**
Water Demand Say in KLD		**40**	**20**	**60**
Sewage Generation (85% of Domestic Water + 100 % flushing water)			54	
STP Capacity (KLD)			60	

WATER BALANCE



2.5.2 Desalination plant

To cater the fresh water requirement desalination plant of 100 KLD is proposed with a flow rate of 5KL/Hr.

2.5.3 Sewage Treatment System

During operation, 54 KLD of wastewater will be generated which will be treated in sewage treatment plants of 60 KLD capacities and the treated sewage will be utilized for flushing and gardening.

Table 2-5 Sewage Quantity, Treatment, Reuse & Disposal

Quantity of sewage	54 KLD
STP Capacity	60 KLD
Collection of sewage	Sewage generated during the operation phase will be collected through underground sewerage system (pipe drain) for treatment in STP. Separate storm water drainage system will be provided for rainwater.
Treatment of sewage	Sewage will be treated up to the tertiary level in a Sewage Treatment Plant based on Activated sludge process. The secondary treated sewage will be treated in UF plant.
Reuse / recycle and disposal of treated sewage	Out of 54 KLD of treated sewage, 20 KLD recycled for toilet flushing, 34 KLD for gardening

2.5.4 Power Requirement

The Power requirement during the construction as well operational phase will be 15 KVA which will be acquired from TNEB. DG set of about 1 no. of 16 KVA will be utilized during power failure. The DG is not attached to the building and the location of DG is given in Site Plan.

DG Details

Table 2-6 DG Capacity & Stack Height

S.No	DG Capacity	No.	Stack Height (m)
1	16 kVA	2	9 m (Open DG)

2.5.5 Energy Saving Measures

- Use of Energy Efficient CFL & T-5 Fluorescent Lamps in car park/ lobby areas.
- Use of Photo cell or timer switch for street lighting.
- Use of timers in external lighting distribution board
- Use of Energy Efficient Transformers as per ECBC.
- Use of Energy Efficient Motors as per ECBC.
- Maximum utilization of natural light as per NBC.
- For common area internal lights, LPD shall be maintained as per ECBC.
- Provision of solar energy in solar water heating and solar lighting

2.5.6 Fire Fighting Systems

All buildings are constructed with fire resistant material to a large extent. Electrical panels have been provided in each building so that fire occurring at any point of time does not spread and will get localized.

- Fire Retardant Low Smoke (FRLS) wires and PVC conduits are used to prevent spreading of fire.
- Emergency staircase, Refuge area and Assembly area will be provided.
- Underground water storage tank
- Wet riser
- Fire pump, hydrant pump & jockey pump
- Hydrant
- Fire alarm system
- Public address system

2.5.6.1 Fire Extinguishing Systems

- All buildings are constructed with fire resistant material to a large extent. Electrical panels have been provided in each building so that fire occurring at any point of time does not spread and will get localised.
- Fire Retardant Low Smoke (FRLS) wires and PVC conduits are used to prevent spreading of fire.
- Emergency staircase, Refuge area and Assembly area will be provided.

2.5.6.2 Process

- Fire extinguishing systems are in place, which are checked thoroughly once in a quarter and inspected on a daily basis.
- All fire fighting equipment are approved by the appropriate regulatory body. Basically 4 types of fire extinguishing systems are in place.
- Mechanical Foam types – General paper, wood, cloth and other carbonaceous materials; inflammable liquids like oil, gasoline, chemicals, paints and solvents.
- Dry Chemical powder - inflammable liquids like oil, gasoline, chemicals, paints and solvents; gases in the compressed form, electrical and electronic installations, motors, switch gear; metal-reactive metals, such as magnesium, sodium and potassium.
- CO_2 based - General paper, wood, cloth and other carbonaceous materials; inflammable liquids like oil, gasoline, chemicals, paints and solvents; inflammable liquids like oil, gasoline, chemicals, paints and solvents; gases in the compressed form, electrical and electronic installations, motors, and switch gear.
- The electrical system has air circuit breakers, which do help in preventing fires due to short circuits.

2.5.6.3 Underground water storage tank

- An underground water storage tank will be provided for the fire fighting purpose as per the specified regulations.

2.5.6.4 Wet riser

Wet riser as per N.B.C will be provided in the duct adjoining the staircase/common corridor with the hydrant outlet and hose reel on each floor, in such a way as not to reduce the width of the staircase/common corridor. Pressure reducing discs or orifices will also be provided at lower level. A fire service inlet on the external face of the building near the static tank directly fronting the courtyards will be provided to connect the mobile pump of the fire service to the wet riser. The wet riser will be extended up to the basement level.

2.5.6.5 Fire pump, hydrant pump & jockey pump

Wet riser will be connected to a fire pump of sufficient capacity at ground level so that appropriate pressure can be maintained even at the topmost hydrant outlet. Jockey pump of

6.4 KW capacities will be provided. Electric supply (normal) will be provided to these pumps on independent circuit. Alternate supplies of all pumps are to be connected through the Generator

2.5.6.6 Hydrant

External hydrants, internal hydrant and landing valves will be provided as stipulated by N.B.C.

2.5.6.7 Fire alarm system

The building will be provided with automatic fire alarm system with manual back up. Main control panel will be located at the ground floor level and pillboxes and hooters at each floor of the upper floor levels. The layout of the fire alarm system shall be in accordance with the Indian Standard Specification/T.A.C. specification.

2.5.6.8 Public address system

The building will be provided with siren in order to alert the Out side People in the Surrounding area.

2.5.7 Greenbelt Development

It is proposed to have tree plantation along the periphery of the site and also to develop lawn and greenery inside the project area for 57590 Sqm. The vegetation for the greenbelt will be selected from the native species adapted to the local environment.

CHAPTER
3. DESCRIPTION OF THE ENVIRONMENT

3.1 STUDY AREA, PERIOD, COMPONENTS & METHODOLOGY

To assess the environmental impacts from any proposed project at a specific location, it is essential to monitor the pre-project environmental quality status in the surrounding impact zone prior to implementation of the proposed project. The pre-project environmental status within the impact zone could be used for identification of significant environmental issues to be addressed in the impact assessment study. The same environmental quality data can also serve the purpose of baseline status over which the predicted impacts exclusively from proposed project could be superimposed to derive final environmental status theoretically representing after implementation of the project under study.

The objective of the present study is to assess environmental impacts due to proposed Beach Resort. The study area constitutes of 10 km radius along the project site. The pre-project status of environmental quality is assessed through field surveys corresponding to different components of environment, viz. air, noise, water, land, biology/ecology and socio-economics. The current environmental quality status around the site becomes the baseline status for proposed developments, but at the same time it does include the environmental impacts from the already existing industrial, commercial, infrastructure activities as well as residential zones in the study area. In this EIA study, the baseline status of all environmental components has been monitored during April- June 2014.

3.2 ESTABLISHMENT OF BASELINE FOR VALUED ENVIRONMENTAL COMPONENTS

3.2.1 Air Environnent

Reconnaissance

The project site is located in East Coast Road of Cheyyur Taluk, Kancheepuram District, Tamil Nadu state. The study area lies in a flat terrain. The project site falls near Bay of Bengal in East. The local influence of sea and land breeze phenomena is significant at the project site.

The baseline status of air environment includes identification of specific air pollution parameters expected to have significant impacts and assessing their existing levels in ambient air within the impact zone. The baseline status of air environment with respect to the identified air pollutants can be assessed through air quality monitoring programme using methodically designed air monitoring network.

There are numbers of well established techniques for measuring the concentration of pollutants in air. Knowledge of the significant sources of air pollutants is essential before any action can be taken to improve air quality in a particular area.

Micro-meteorological data collection is an indispensable part of any air pollution study. The meteorological data collected during ambient air quality monitoring is used for interpretation of baseline status and to simulate the meteorological conditions for prediction of impacts. The baseline studies for air environment within the impact zone were carried out through reconnaissance survey followed by ambient air quality monitoring programme and micro-meteorological study.

3.2.2 Design of Ambient Air Quality Monitoring Network

The studies on air environment consist of assessment of existing status of ambient air quality and collection of meteorological data to delineate the baseline status of the region. Representative selection of sampling locations is primarily guided by the topography and micro-meteorology of the region. A methodically designed ambient air quality monitoring (AAQM) network covering 5 sampling locations was designed using the following criteria:

a) Persistence of wind direction and speed

b) Representation of regional background

c) Inclusion of all the major conventional air pollution parameters

To establish the baseline monitoring status of air environment in the study area during April-June 2014, 5 AAQM locations were selected using network design criteria and monitor as per CPCB guidelines (Twice a week sampling and 24 hr continuous sampling each day) .The selected sampling locations are reported in Table 3.1. The pollutants were analyzed during ambient air quality monitoring as listed in latest CPCB notification.

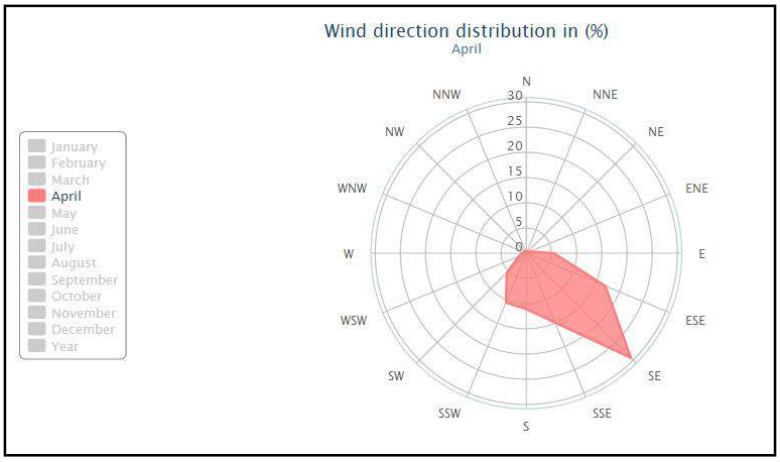
3.2.2.1 Micrometeorology

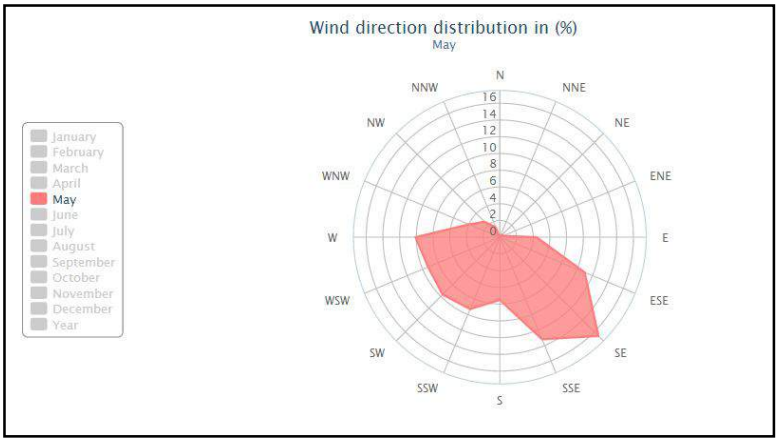
The study of micro-meteorological conditions of a particular region is of utmost importance to understand the variations in ambient air quality status in that region. The prevailing micrometeorology at project site plays a crucial role in transport and dispersion of air pollutants released from the project. The persistence of the predominant wind direction and wind speed at the project site will decide the direction and extent of the air pollution impact zone. The principal variables which affect the air pollution dispersion and resultant air quality status micrometeorology are horizontal transport and dispersion (average wind speed and directions), convective transport and vertical mixing (atmospheric stability) and also topography of the area towards local influences.

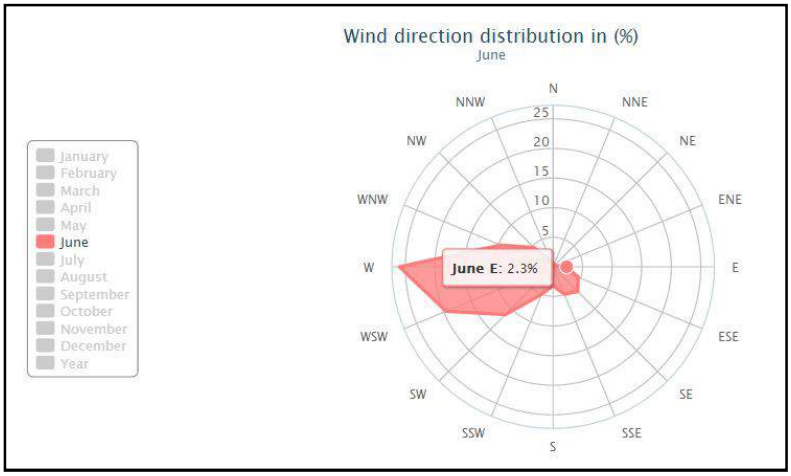
With an objective of determining the prevailing micro-meteorological conditions during the study period, an automatic continuous recording type digital weather station was installed at project site and sensors were fixed on an elevated platform to provide good exposure to free wind flow. The hourly meteorological data of wind speed, wind direction, temperature and solar radiation were recorded at the project site. These frequencies were computed on 8 hourly as well as 24 hourly basis and the corresponding results are used to draw windrose for 00-08hrs, 08-16 hrs, 16-24 hrs and 00-24hrs corresponding to study period(winter season) as shown in subsequent sections.

The 24 hourly windrose shows the predominant winds from W and NW directions directions during study period. The average wind speed has been observed about 11 kmph with the considerable frequency of higher wind speed range (6-22 kmph). The ambient temperature at project site varied between 19-37^{O}C during the study period, while the relative humidity was observed in the range of 83-96% at project site.

The wind rose for the mmonths of April to June 2014 is enclosed below







Error! No text of specified style in document.**-2 Wind Rose Pattern For Months of April- June 2014**

3.2.3 Ambient Air Quality Status

At all the sampling locations SPM, PM_{10} and $PM_{2.5}$ as well as gaseous pollutants like SO_2, NO_x, CO were monitored within the study area. The data collected was subjected to statistical analysis like minimum, maximum, average and standard deviation.

3.2.3.1 Baseline Status

The observed ambient air quality data within the study area from the project site is reported in Tables 3.5 The air quality in terms of individual parameter is described in the following sections:

3.2.3.2 Particulate Matter

The concentration values and 24 hourly average PM_{10} concentrations varied in the range of 48-65 $\mu g/m^3$ respectively. The maximum concentration was observed at Pudupattinam and minimum at remaining locations which may be due to windblown dust, unpaved road etc. The PM_{10} concentrations for all locations were observed to be below stipulated standards for NAAQS.

The concentration values and 24 hourly average $PM_{2.5}$ concentrations varied in the range of 20- 32 $\mu g/m^3$ respectively. The maximum concentration was observed at Pudupattinam and minimum at remaining locations. The $PM_{2.5}$ concentrations for all locations were observed within stipulated standards for NAAQS.

3.2.3.3 Gaseous Pollutants

3.2.3.3.1 Sulfur dioxide and Oxides of Nitrogen

The average concentrations of SO_2 were observed in the range of 6-10 $\mu g/m3$ respectively. Similarly, NO_x varied in the range of 11.5- 19 $\mu g/m^3$. The concentrations of SO_2 and NO_x were observed below the stipulated standards of NAAQS.

3.2.3.3.2 Carbon Monoxide

Carbon monoxide is a colorless and odorless gas. It is formed when substances containing carbon are burned with an insufficient supply of air. The combustion of fuels such as petrol, gas, coal and wood generate emissions of carbon monoxide. Gas and wood can be used for cooking and heating in appliances like stoves and barbecue add to its contributions. Apart

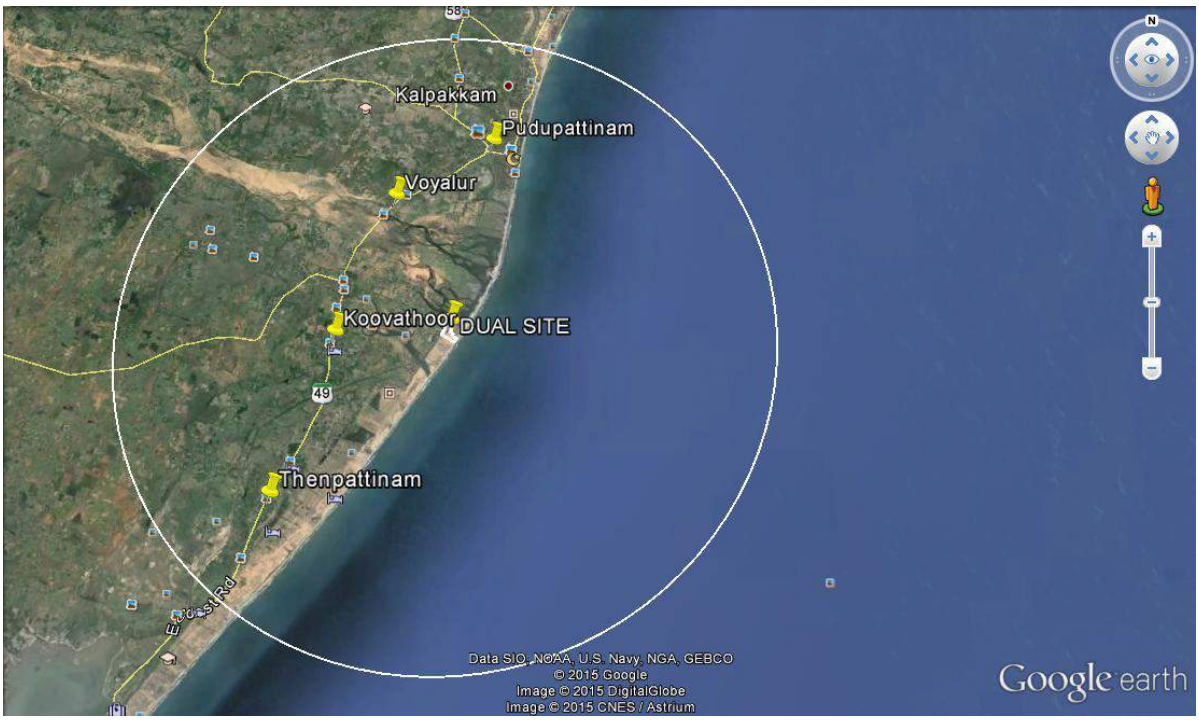
from it, motor vehicles are also the main source of carbon monoxide pollution in urban and sub-urban environment.

In order to assess the concentration of carbon monoxide, samples were collected in Tedlar bags and analysed within 24 hrs by carbon monoxide analyzer based on the principle of infrared radiation at wavelengths near 4.7 microns. The results of CO are presented in Table 3.5. The observed carbon monoxide concentrations at all the locations are below detection limit which is negligible. The values are within the permissible limits of National Ambient Air Quality Monitoring (NAAQM) standards for the respective designated areas.

Table 3-7 Ambient Air Quality Stations

Station Code	Name of the Station	Distance with respect to Project Site/ Direction
1	Project Site	---
2	Pudupattinam	6.2 Km (N)
3	Voyalur	4.3 Km (NE)
4	Koovathur	3.4 Km (E)
5.	Thenpattinam	7 Km (S)

Figure 3-3 Ambient Air Monitoring Locations



Frequency and technique of monitoring

PM 2.5 and 10, SOx and NOx were monitored using samplers for 24 hours, twice a week, for a total of 12 weeks as per the guidelines specified by the MoEF. The volumetric flow rate of each sampler was maintained at 1.1-1.2 l/min. Grab samples of CO were collected using glass tubes and estimated by Gas Chromatography techniques. Samples are collected and analyzed as per IS: 5182 (part II, IV, VI and X). Using High – Volume samplers and Eurotron Kit, the samples were collected and analyzed for various parameters by using different absorbing solutions.

Figure3-4 Ambient Air Quality Monitoring Photographs

Table 3-8 Methods of Collection of Ambient Air Parameters

Sl. No	Parameters	Absorbing solutions/ Paper	Instrument
1	PM 2.5	Whattman glass fiber filter paper	Hi-Volume Sampler- Netel Chromatograph/Enviro Tech
2	PM 10	Whattman filter paper	Hi-Volume Sampler
3	SOx	Sodium Tetra Chloride Mercury	Hi-Volume Sampler- Netel Chromatograph/Enviro Tech
4	NOx	Sodium Hydroxide	Hi-Volume Sampler- Netel Chromatograph/Enviro Tech
5	CO	-	Eurotron 8000 / Gas Chromatography

6	Lead	EPM 2000 Filter Paper	Hi-Volume Sampler- Netel Chromatograph/Enviro Tech

Table Error! No text of specified style in document.**-9 Techniques Used For Ambient Air Monitoring**

S. No.	Parameter	Technique	Technical Protocol	Minimal Detectable Limit (µg/ m³)
1	PM 2.5	Gravimetric method	IS: 5182 part 3 1970	>1
2	PM 10	Gravimetric method	IS: 5182 part 4 1999	>1
3	Sulphur di oxide	P-Rosaniline method	IS: 5182 part 2 2001	0.1
4	Nitrogen Oxide	NEDA method	IS: 5182 part VI 1975	0.01 to 1.5
5	Carbon Monoxide	Electrochemical method	NDIR 1999 (Eurotron Greenline 8000)	0-2500
6	Lead	Gravimetric method	IS : 5182 Part 22 2004	0.5

Table 3-10 National Ambient Air Quality Standards (NAAQS)

Pollutant	Time Weighted Average	Concentration in Ambient Air	
		Industrial Areas Residential, Rural & Other Areas	Sensitive Areas
PM 2.5	24 hours	60 mg/m³	60 µg/m³
PM 10	24 hours	100 mg/m³	100 µg/m³
SO_x	24 hours	80 µg/m³	20 µg/m³
NO_X	24 hours	80 µg/m³	30 µg/m³
CO	1 hour	4 µg/m³	2 µg/m³
Lead	24 Hours	1 µg/m³	1 µg/m³

Table Error! No text of specified style in document.**-11 Ambient air quality monitoring in the project study area.**

Parameters	Mean value of the sampling sites (µg/m³)				
	Project Site	Pudupattinam	Voyalur	Koovathur	Thenpattinam
PM 2.5	20.3	31.8	30.3	30.8	23.6
PM 10	47.6	65.3	53.9	50.4	56.2
SOX	6.3	10.2	8.7	7.6	9.4
NOX	11.5	19.3	16.2	17.8	18.4
CO	BDL	BDL	BDL	BDL	BDL
Lead	BDL	BDL	BDL	BDL	BDL

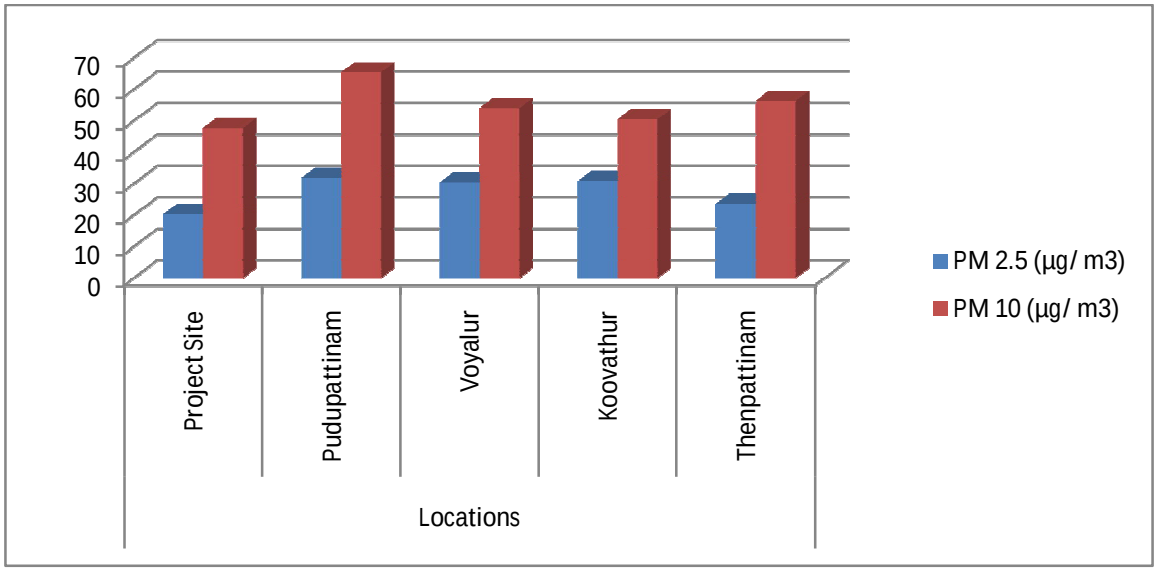


Figure 3-5 Average values of PM at various locations

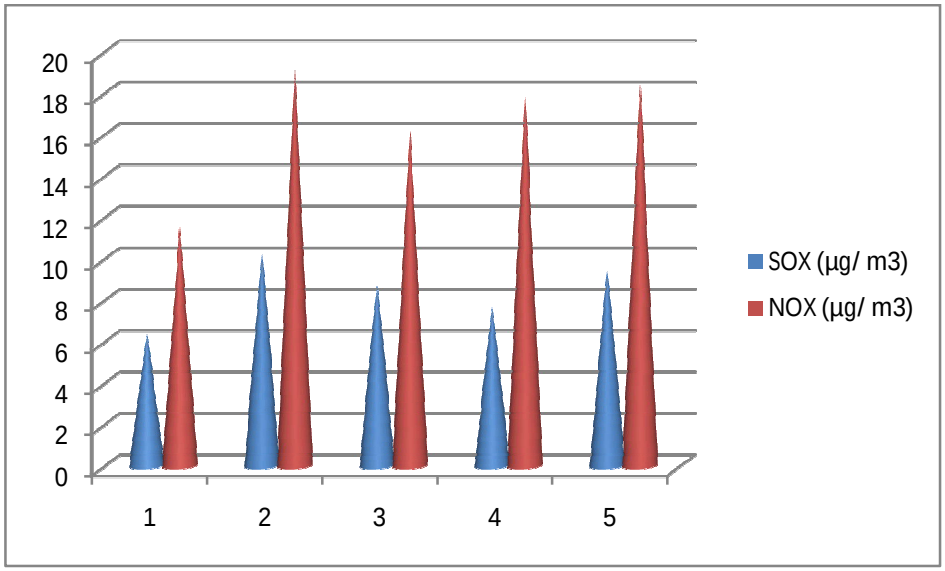


Figure3-6 Average values of SOx , NOx at various Locations

3.3 NOISE ENVIRONMENT

The noise problem is said to exist when ambient noise level interferes in human activities. People's perception of noise varies depending on number of factors such as individual's natural sensitivity/hearing ability, past experience, time of the day, socio-cultural activities etc. and the time of exposure to sound. The impact of noise at community level can have different effects varying from aesthetic impairment such as annoyance to as high as loss of hearing. The health impact of noise on individual depends on several source factors viz. physical dose (intensity of sound pressure level), frequency spectrum, intermittency etc. as well as human factors like sex, age, health condition, occupation exposure etc.

The prevailing ambient noise level at a particular location is nothing but the resultant (total) of all kinds of noise sources existing at various distances around that location. The ambient noise level at a location varies continuously depending on the type of surrounding activities. The ambient noise level generally does not reflect any seasonal variation, however, the wind direction, rain, snow, fog or any other barrier as well as direction of source play significant role in regulating the noise propagation and ultimately the intensity of impact.

The current status of noise environment around the site is assessed through identification of major noise sources, characterization of such noise sources, measurement of prevailing ambient

noise levels in the study area and measurement of noise levels due to vehicular movements, according to existing landuse pattern. The prevailing noise levels in the neighboring community areas shall represent the baseline status for assessment of noise impacts from proposed developments. The baseline study for noise environment has been carried out through reconnaissance in the impact zone, identification of representative sampling locations and monitoring of prevailing noise levels during study period.

3.3.1 Reconnaissance

The site is located in East Coast Road (ECR) which extends from Chennai to Ramnad. The vehicular traffic on ECR and the road contribute to the noise levels in project area. The prime objectives of noise monitoring in the study area is to establish the existing ambient noise levels during the day as well as during the night at residential zones existing within 10 km radial distance. The terrain of the project site as well as the surrounding area is under the influence of noise generated by heavy traffic on national highway and from commercial activities in the individual villages. The noise levels in surrounding selected villages, ECR were monitored using an imported precision noise level meter (Larson and Davis, USA, Model 831). The prevailing ambient noise levels along, ECR and in surrounding villages were monitored at total 5 locations. The details of the monitoring stations are presented in Table 3.6

3.3.2 Community Noise Levels

The community noise is determined by recording the day-night noise level (Ldn). Ldn is defined as the 24 hours equivalent sound level derived with a penalty of 10 dB (A) is added to the measured instantaneous noise level measured during night time. i.e. from 2200 hrs to 0600 hrs. This is because the same level of noise during night time is more annoying than day time.

Ldn for a given location is calculated from hourly equivalent sound levels (Leq) using the following equation:

$$Ldn = 10 \log [1/24\{16(10(Ld/10)) + 8(10(Ln+10)/10))\}]$$

Where,

Ld – equivalent noise level during day time (0600 to 2200 hrs)

Ln – equivalent noise level during night time (2200 to 0600 hrs)

3.3.3 Baseline Status

The prevailing (pre-project) status of noise level has been assessed during summer season in the surrounding villages, along ECR using a precision microprocessor based digital noise level meter. The observed data on noise levels are presented. Taking into consideration the quieter hour, the minimum equivalent noise level at a particular place is called the background noise levels.

During study period observed equivalent noise levels (Leq) in Residential areas within the study area varied in the range of 44.2- 52.5 dB (A) during day time and 42.5–49.1 dB(A) at night time

The observations related to prevailing ambient noise levels along the boundary limit along ECR as well as in surrounding villages indicate the community level noise impact within study area is insignificant.

The field observations during study period indicate that the ambient noise levels in the study area were well within the prescribed standards for residential areas and silence zones.

Table 3-12 Ambient Noise Monitoring Stations

Station Code	Name of the Station	Distance with respect to Project Site/ Direction
1	Project Site	---
2	Pudupattinam	6.2 Km (N)
3	Voyalur	4.3 Km (NE)
4	Koovathur	3.4 Km (E)
5.	Thenpattinam	7 Km (S)

Figure 3-7 Noise Monitoring Location

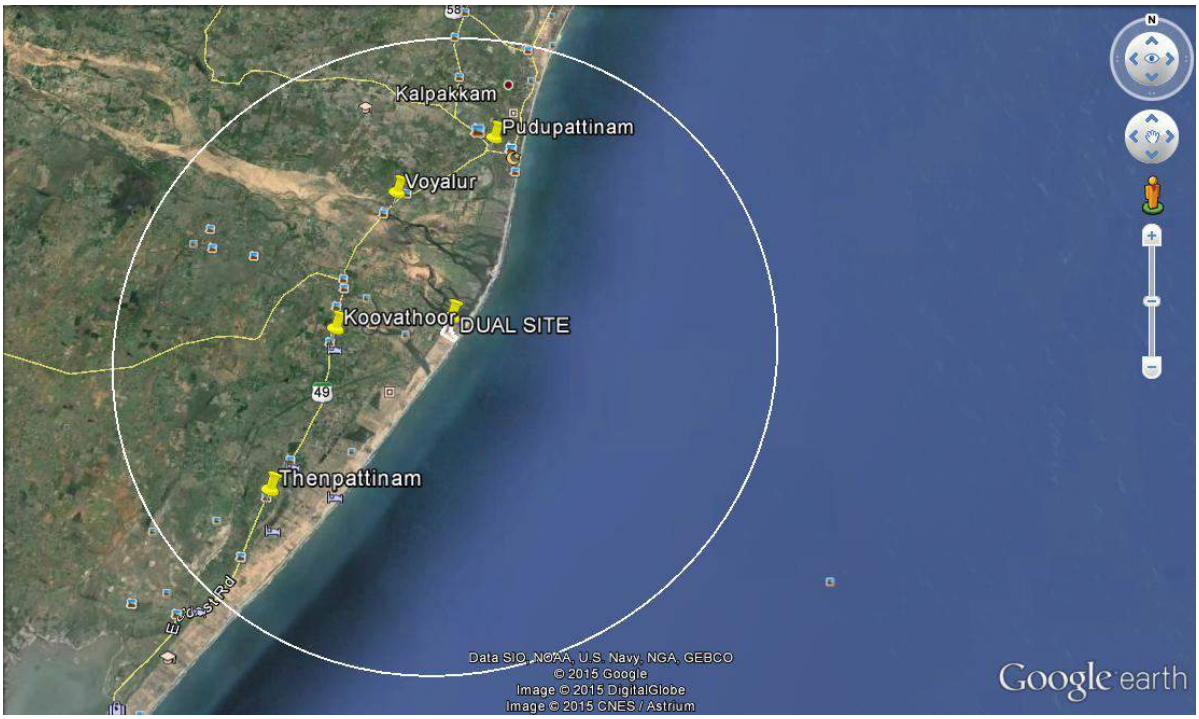
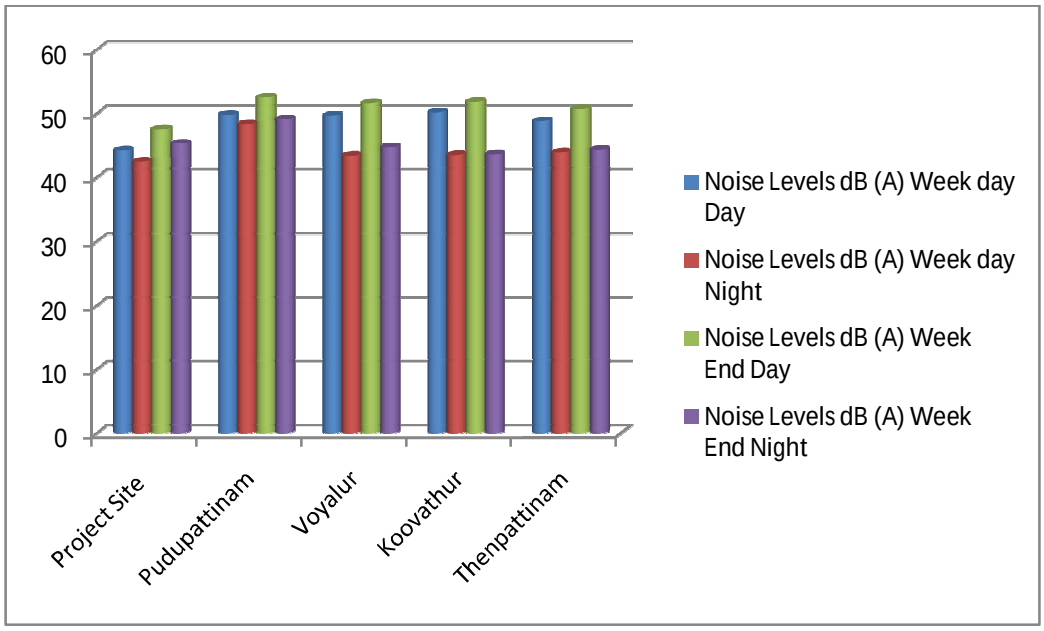


Table Error! No text of specified style in document.**-13 Ambient Noise Levels in Villages – Day/Night Time**

Sr. No.	Sampling Location	Noise Levels [dB(A)] L (eq)					
		Week day		Week End		Standards	
		Day	Night	Day	Night	Day	Night
1.	Project Site (S1)	44.2	42.5	47.5	45.3	55	45
2.	Pudupattinam	49.8	48.3	52.5	49.1	55	45
3.	Voyalur	49.7	43.4	51.6	44.7	55	45
4.	Koovathur	50.2	43.5	51.8	43.6	55	45
5.	Thenpattinam	48.8	43.9	50.7	44.3	55	45

Figure 3-8 Graph Showing Average noise Levels in study area



3.4 Water Environment

The existing water resources, both surface and ground water with the corresponding significance are identified within the study area (10 km radial distance) around project site. The representative sampling locations for surface water and groundwater are selected through reconnaissance to assess the existing status of water quality in the impact zone. Physico-chemical, nutrient, Oxygen demand, bacteriological and biological parameters having relevance to public health and aesthetic significance are selected to assess the water quality status with special attention to raw water resource and the receiving body of the treated effluent keeping in view the discharge from the proposed project. The standard methods prescribed for surface and groundwater sampling as well as the analytical procedures for individual parameters is followed in this study.

3.4.1 Reconnaissance

The proposed project comes in CRZ III area. The study area represents rural environment with sparsely located villages in all directions. The project region falls in coastal humid / perhumid agroclimatic zone with average annual rainfall of about 1133 mm. There is no irrigation facility available in the study area. Fisheries practice is predominant in the project region. Groundwater is the principal resource for domestic and irrigation purposes in almost all villages in the study area.

3.4.2 Water Quality Survey

Keeping in view the existing scenario related to water environment in the surrounding villages the water quality survey has been planned through identification of water resources and appropriate sampling locations for both surface and ground water in study area depending on topography, surface runoff as well as natural and manmade drainage/irrigation canal system. The prevailing status of water quality has been assessed during April- June, 2014. Five sampling locations (2 from Ground water and 3 Surface water) distributed in the study area were identified for water quality assessment. Groundwater sampling locations were selected in different villages around the site based on topography, landuse and utility of groundwater in the study area. Sampling locations are enlisted in Table 3.8. The standard methods prescribed for surface and groundwater sampling preservation as well as the analytical procedures for individual parameters is followed in this study.

3.4.3 Baseline Water Quality

Physico-chemical parameters alongwith biological indicators of pollution have been identified for assessing the baseline status of water environment and identification of impacts due to proposed developmental activities. In order to assess the water quality, standard methods (APHA, AWWA 2007) were followed for sample collection, preservation and analysis in the laboratory.

3.4.4 Physico-chemical Characteristics

Table Error! No text of specified style in document.**-14 Water Quality Sampling Locations**

Monitoring Locations	
1. Pudupattinam (Ground water)	2. Thenpattinam (Ground water)
3. Palar River	4. Buckingham Canal
5. Sea water near site	

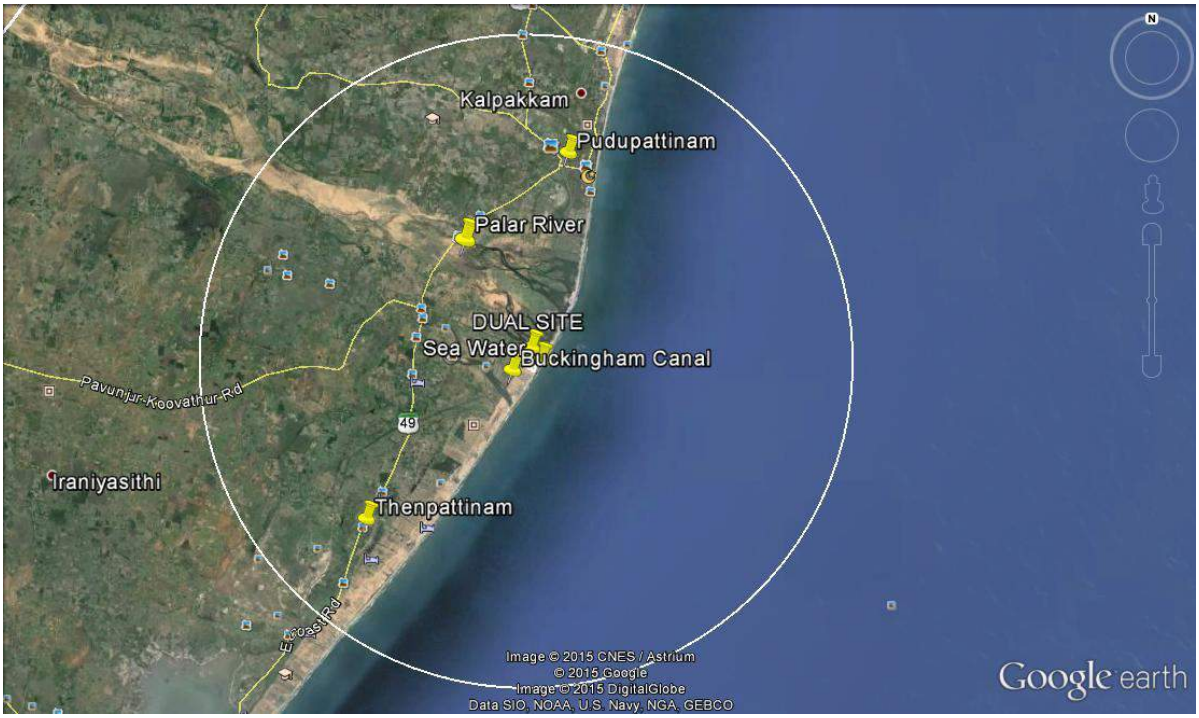


Figure Error! No text of specified style in document.**-9 Water Quality Sampling Locations**

Error! No text of specified style in document.-10 Water Quality Monitoring Photographs

Water samples were taken from the above locations and the results of the same are given in the following tables.

B) Sampling Results

Table 3-15 Sampling Results of ground water

S.No	Parameters	Units	Pudupattinam	Thenpattinam	Palar River	Buckingham Canal	Sea water	Drinking water IS 10500: 2012 Permissiblr limits	Method of analysis
1	Color	Hazen	BDL	BDL	BDL	BDL	BDL	Max 5.0	IS 3025;2, P 4 1983
2	pH	-	7.95	8.59	7.35	7.81	8.0	6.5 – 8.5	IS 3025:2 P 11 1983
	Temperature	°C	29.9	29.7	29.6	29.6	29.3	-	IS 3025; P9 1983
	Conductivity	µS/cm	1260	223	30700	29800	39400	NA	IS 3025;2 P14 1983
	Total Dissolved Solids	mg/l	2724	2746	23800	23150	36300	Max 500	IS 3025:1 P 16 1984
	Salinity	PPT	0.47	0.04	21.4	20.5	34.4	-	-
	BOD	mg/l	BDL	BDL	2	2	3	-	5201BAPHA 22nd Edn.2012
	COD	mg/l	4	BDL	3.6	3.5	4.6		IS3025 (pt 58)-2006
	Total Hardness as CaCO3	mg/l	120	42	6500	4500	7500	600	IS 3025(part 21): 1983
	Total Alkalinity	mg/l	30	48	160	100	60	600	IS 3025(part 23): 1986, ref-2009
	Chlorides	mg/l	263	22.7	11855	11339	19071	1000	IS 3025(part 32): 1988, ref-2009

	Aluminium	mg/l	BDL (DL0.02)	BDL (DL0.02)	BDL (DL0.02)	BDL (DL0.02)	BDL (DL0.02)	0.2	IS 3025(part 55): 2003, ref-2009
	Zinc	mg/l	0.15	0.01	0.04	0.05	0.06	15	IS 3025(part 49): 1994, ref-2009
	Chromium	mg/l	BDL (DL0.01)	BDL (DL0.01)	BDL (DL0.01)	BDL (DL0.01)	BDL (DL0.01)	0.05	IS 3025(part 52): 2003, ref-2009
	Copper	mg/l	BDL (DL0.01)	BDL (DL0.01)	BDL (DL0.01)	0.04	BDL (DL0.01)	1.5	IS 3025(part 42): 1992, ref-2009
	Cadmium	mg/l	BDL (DL0.01)	BDL (DL0.01)	BDL (DL0.01)	BDL (DL0.01)	BDL (DL0.01)	0.003	IS 3025(part 41): 1991
	Lead	mg/l	BDL (DL0.01)	BDL (DL0.01)	BDL (DL0.01)	BDL (DL0.01)	BDL (DL0.01)	0.01	IS 3025(part 47): 1994, ref-2009
	Sodium	mg/l	152	10	7050	6770	11390	-	IS 3025, 5 (part 45): 1993, ref-2006
	Total Coliforms	MPN/100 ml	8	<2	2	<2	<2	NA	IS 1662, 1981(Reff 2009)
	E.Coli	Per 100ml	Absent	Absent	Absent	Absent	Absent	NA	IS 1662, 1981(Reff 2009)

3.5 LAND ENVIRONMENT

Impacts on land environment from proposed project, could be mainly attributed to change in land use pattern (direct and indirect). Accordingly for impact assessment on land component., it is pertinent to study the existing landuse pattern in project area, soil characteristics and details of waste generation from the project activities including the resulting impacts on soil with respect to land application/disposal of solid hazardous wastes and the of the surrounding terrestrial and aquatic environment.

3.5.1 Reconnaissance

The proposed project area is located in CRZ III. The surrounding study area (10 km radial distance) falls in coastal belt of Bay of Bengal. Major part of the study area is covered with terrain. The study area is surrounded by sparsely populated villages.

The project area in east coast (plain) falls in hot humid zone receiving about 1133 mm average annual rainfall. The mean ambient temperature varies in the range; 21.1^{0}C – 36.1^{0}C with the extremes of 15.9^{0}C the lowest and 39.0^{0}C the highest temperature. There are no reserve forests in the study area (10 km radius) and also no sensitive locations.

3.5.2 Baseline Data

Keeping in view the proposed activities at the site, the baseline data related to nature & quality of soil, landuse and cropping patterns in impact zone are collected through field survey and available data sources including project proponents. To assess existing soil quality, total 4 samples villages were identified within 10 km radial distance around the project site. The list of villages and the corresponding directions and distances from the project site and the relative locations are depicted in following tables. Representative soil samples at each site were collected from (0-20 cm) depth. Standard methods have been followed for analyzing the oil samples for physico-chemical, bacteriological characteristics and parameters related to agriculture productivity.

3.5.3 Physical Characteristics

The international pipette Method (Back, 1964) was adopted for determination of particle size analysis. Physical parameters such as bulk density, porosity and water holding capacity were determined by KR Box Method (Keen and Raczkowski, 1921).

Air-dried and sieved samples have been used for determination of physical properties of soil. The particle size distribution of the soil samples collected from different villages in terms of percentage sand, silt and clay are presented in following sections. The other physical characteristics, viz. bulk density, porosity and water holding capacity are also presented in following sections. The bulk density of the soil in the study area has been found in the ranges: 1.2-1.4 g/cm3.

3.5.4 Chemical Characteristics

The chemical characteristics of soil were determined by preparing saturate expact of soil with distilled water in 1:2 ratio (as per Jackson procedure, 1967). Organic matter was determined in terms of organic carbon by Walkely & Black method (1972). Fertility status of soil in terms of available nitrogen, phosphorus and potassium were determined by extracting soil with KCL, sodium carbon and ammonium acetate (FAO Soils Bulletin, 38/2 Rome) and Olsen's method (1954) respectively.

Specific chemical parameters were selected for determined soil characteristics. The parameters selected were pH, electrical conductivity, soluble anions and cations, nutrients and organic matter content. These results are presented in subsequent setions.

The pH of soil is an important factor which indicates the soil reaction. The pH of most of the soil samples is acidic to neutral (5.6-7.3). The pH of the soil at project site is slightly basic and conducive for plant growth.

3.5.5 Heavy Metals

The heavy metals occur in the solution as cations and are associated by the negatively charged soil particles. They are held strongly as complex on the surface of clay domino silicates hydrated oxides and humus. In general, adsorption increases with pH. Heavy metals pollution is serious because it can persist for many decades. The heavy metals also create problems in the nutrient utilization in plant and also marked reduction in chlorophyll content.

Soil samples were also analysed for heavy metals such as Zinc (Zn), Lead (Pb), Boron (B), Manganese (Mn), Iron (Fe) and Copper (Cr) and their concentration are presented in subsequent sections. The presence of heavy metals at proper pH enhanced the microbial activity for soil.

Table 3-16 Soil Sampling Locations

S.No	Locations
1	Project Site
2	Pudupattinam
3	Voyalur
4	Adayalacheri

Figure 3-11 Soil Textural Class

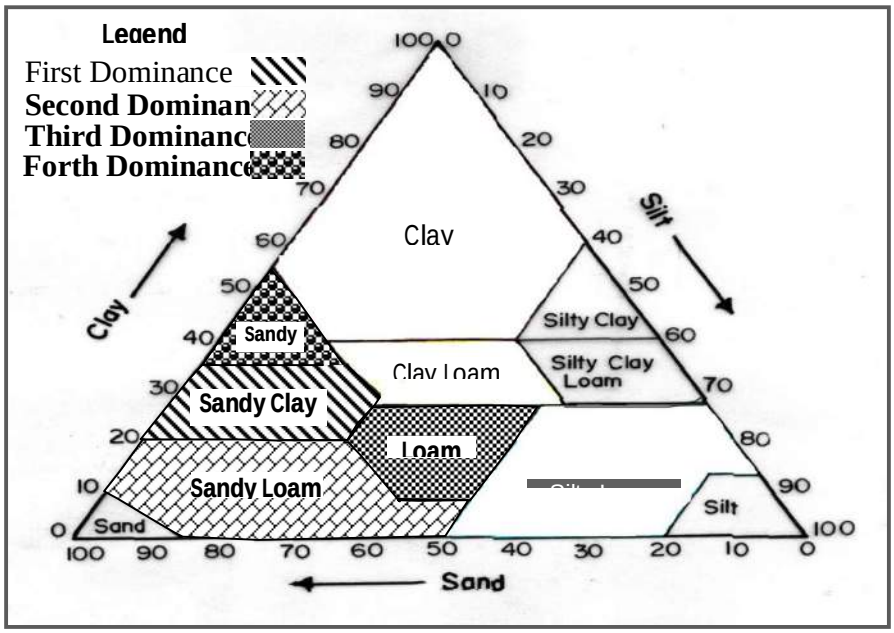


Figure Error! No text of specified style in document.**-12 Soil Monitoring Locations**

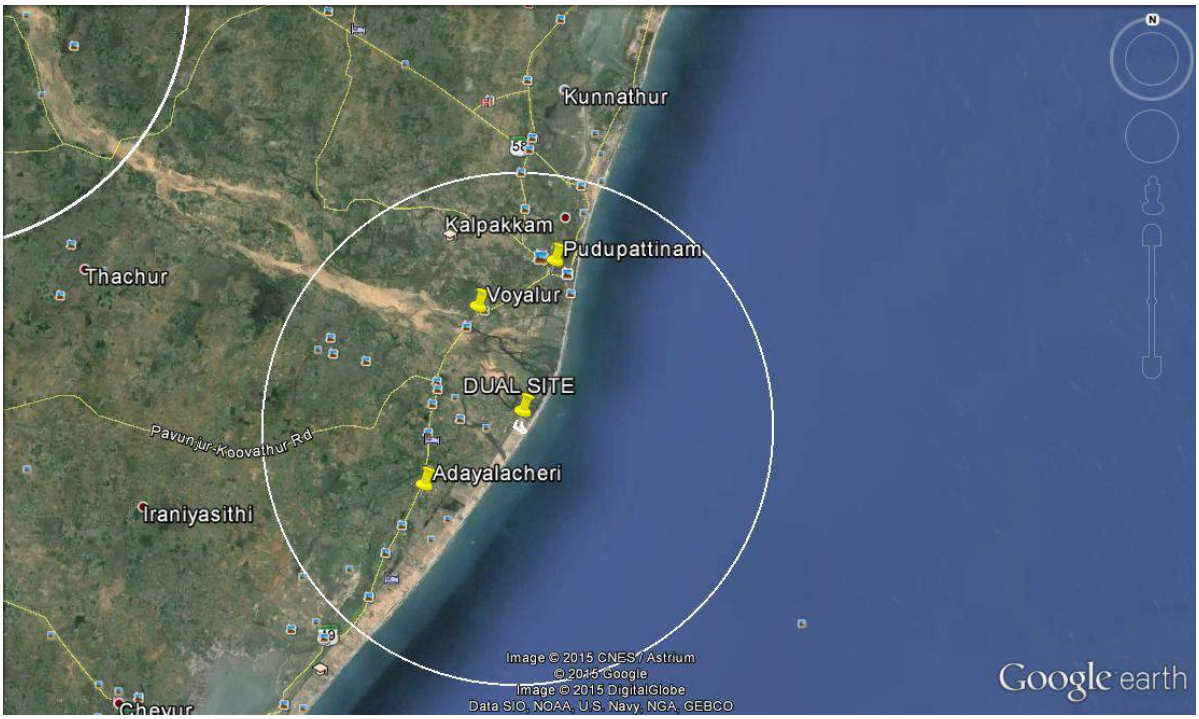


Table 3- 17Soil Test Results

S.No	Parameters	Units	Soil1	Soil 2	Soil 3	Soil 5
1	Colour	-	Yellowish	Yellowish	Yellowish	Yellowish
2	Silt & Clay	%	0.1	1.24	5.2	7.8
3	Sand	%	99.9	98.76	79	87
4	PH of 10% Solution	-	8.02	7.26	6.61	6.34
5	Bulk Density	g/cc	1.6	1.64	1.8	1.6
6	Infiltration Rate	% W/W	17.6	20.7	22.7	21.6
7	Specific gravity		1.23	1.29	1.28	1.24
8	Moisture Content	%	14.5	25.7	26.8	24.4
9	Organic Matter	%	3.5	11.14	12.23	11.48
10	Alkalinity	mg/l as $CaCO_3$	0.56	0.64	0.71	0.77
11	Acidity	mg/l as $CaCO_3$	BDL	BDL	BDL	BDL
12	Sodium Absorption Ratio	%	0.007	1.06	1.11	1.09
13	Conductivity	Micromhos	119	152	163	144
14	Availability Nitrogen as N	%	0.43	0.46	0.42	0.41
15	Availability Phosphorous as P	%	0.46	0.30	0.28	0.31
16	Availability Potassium as K	%	0.04	0.12	0.16	0.32
17	Availability Boron as B	ppm	0.001	0.001	0.001	0.001
18	Availability Na Cl	%	5.7	2.6	2.9	3.9
19	Availability Na_2CO_3	%	0.01	0.01	0.01	0.03

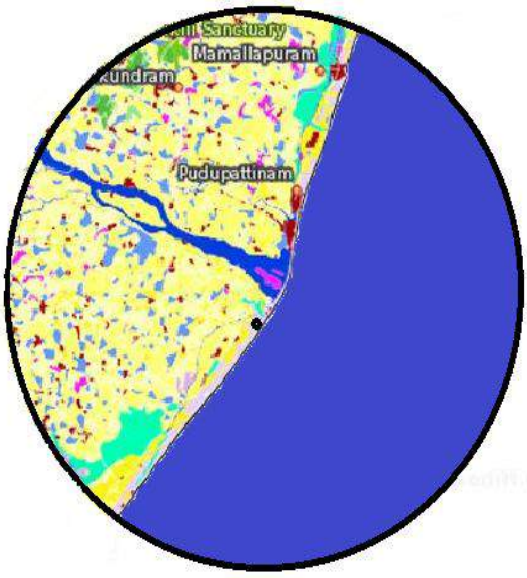
20	Availability iron as Fe	%	0.52	0.4	0.58	0.61
21	Availability Manganese as Mn	%	0.01	0.01	0.01	0.01
22	Availability Copper as Cu	%	0.01	0.01	0.01	0.03
23	Availability Zinc as Zn	%	0.37	0.41	0.48	0.51

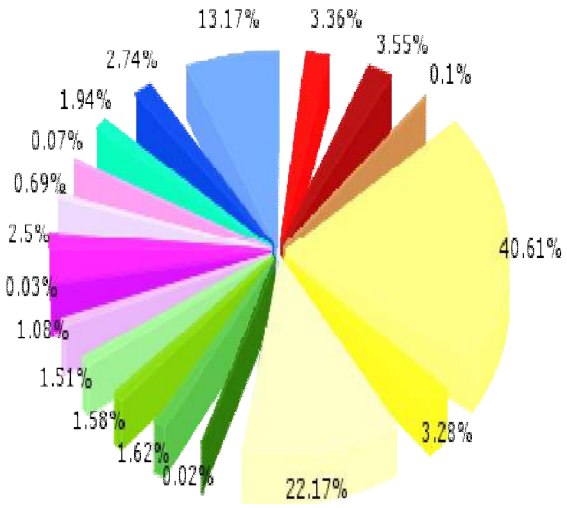
3.5.6 Land Use Pattern

Area use for agriculture is unirrigated mostly rainfed crops are grown due to inadequate irrigation facilities. Land use pattern as per revenue/census records in different villages is given in subsequent setions and percentage distribution of land under different villages is given in subsequent setions. Rice and maize are the major crop grown in the villages;

S.No	Classification	Area (Ha)
1	Forests	23856
2	Barren & Uncultivable Lands	10948
3	Land put to non-agricultural uses	146085
4	Cultivable Waste	10430
5	Permanent Pastures & other grazing lands	18328
6	Groves not included in the area sown	16273
7	Current Fallows	8156
8	Other Fallow Lands	73136
9	Net Area sown	135998
10	Total	443210

Table 3-18 Land use classification





LULC Class	Area (Sq.Km)	LULC Class	Area (Sq.Km)
Builtup,Urban	148.54	Builtup,Rural	156.99
Builtup,Mining	4.21	Agriculture,Crop land	1797.71
Agriculture,Plantation	145.21	Agriculture,Fallow	981.14
Forest,Evergreen/ Semi evergreen	0.75	Forest,Deciduous	71.53
Forest,Forest Plantation	69.95	Forest,Scrub Forest	67
Barren/unculturable/ Wastelands, Salt Affected land	47.97	Barren/unculturable/ Wastelands, Gullied/Ravinous Land	1.19
Barren/unculturable/ Wastelands, Scrub land	110.6	Barren/unculturable/ Wastelands, Sandy area	30.56
Barren/unculturable/ Wastelands, Barren rocky	2.96	Wetlands/Water Bodies, CoastalWetland	85.98
Wetlands/Water Bodies, River/Stream/canals	121.22	Wetlands/Water Bodies, Reservoir/Lakes/Ponds	582.95
Total			**4433.00**

Figure Error! No text of specified style in document.**-13 Land Use pattern**

3.5.7 Seismicity

As per the Seismic zonation map enclosed, Kancheepurm District falls under Zone III (Moderate). Suitable seismic coefficients in horizontal and vertical directions will be adopted while designing the structures.

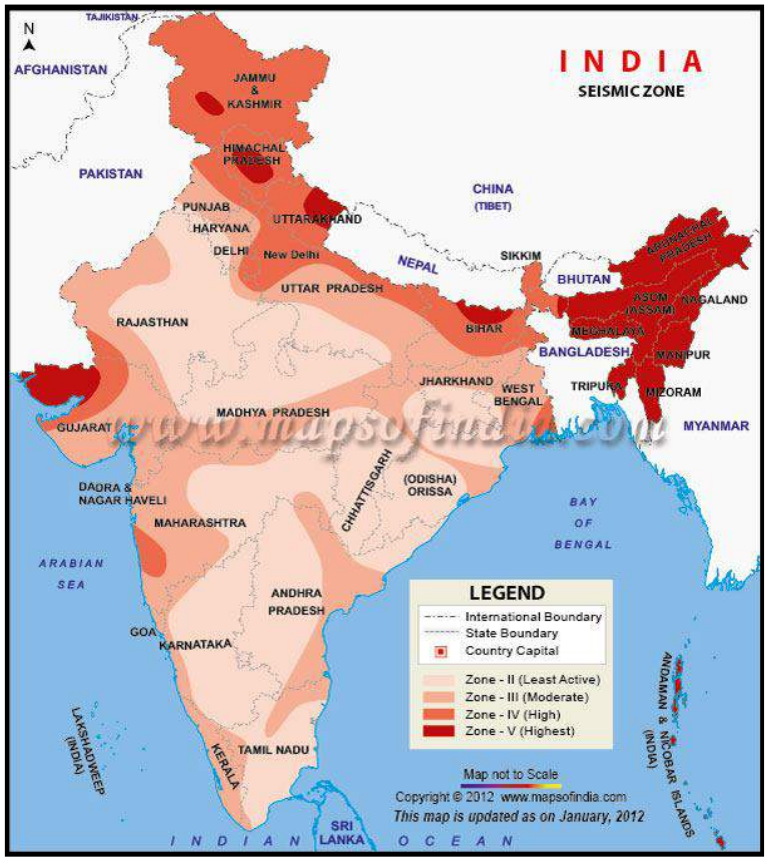


Figure Error! No text of specified style in document.**-14 Seismic Zonation Map of India**

3.6 BIOLOGICAL ENVIRONMENT

Natural flora and fauna are important features of environment. They are organized into communities with mutual dependencies among their member families and show various responses and sensitivities to outside influences. A biological system comprises of both plant and animal communities, which interact not only among them selves but also with the abiotic components, viz. physical and chemical characteristics of the environment. Therefore, nature of developments and baseline characteristics of terrestrial and aquatic flora and fauna around the site of proposed activities is required to be assessed.

Plants and animals are more susceptible to environmental stress. A change in the composition of biotic communities is reflected by a change in the distribution pattern, frequency, density and abundance of natural species of flora and fauna existing in the ecosystem. These changes over a span of time can be quantified and related to the existing environmental factors. Assessment of area surrounding the site for plant and animal species was carried out by field survey and collecting the available information from authentic sources.

3.6.1 Reconnaissance

The study area for the Biological Environment for this project area was divided into two sectors with an interval of 5km between the sectors. Ecological studies were carried out by dividing the study area into four equal quarters (four quarters in the first 5 km circle and four quarters in the 5-10 km circle).

3.6.2 Vegetation Analysis

The analysis of the results of vegetation in the entire 10 km radius of the site indicated that there was an abundance of plant community in the entire area and its distribution was heterogeneous. Since the project is construction of Beach Resorts, the impact on biological environment will be less. Flora inside the premises was shrubs and bushes.

The presence of dry deciduous floral species in the region indicated that the study area had low soil fertility. The availability of water was good, but because of the sandy loam texture of the soil, the water holding capacity of the soil was low. This was conspicuous due to the presence of Spinifex spp and other thorny shrubs. These results were well supported by the IVI values and the Raunkiaer's frequency tables.

3.6.3 Terrestrial Flora

The natural vegetation of the area may be broadly noted under two types: the hilly vegetation and river bed vegetation, apart from roadside and avenue trees. Observations on the Trees, Shrubs, Herbs, climbers, grasses, agricultural fields, medicinal plants, and social plantations were made. The vegetation cover falls into following broad categories:

Natural vegetation

Grass lands

Aquatic flora

Agriculture fields

Social Plantations

3.6.4 Greenbelt Plantation

The study area was surveyed and preliminary data on vegetation type, wild animals and birds was collected. This data was supplemented by information obtained through enquiry with villages and secondary data collected from different sources. The floristic characteristics within the study area around the site are listed in Table 3.14.

Table Error! No text of specified style in document.**-19 List of Plants in Study Area**

Sr. No.	Family name	Botanical Name	Local name
Trees			
1.	Anacardiaceae	*Mangifera indica**	Aam
2.	Annonaceae	*Annona squamosa*	Staphal
3.	Apocynaceae	*Alstonia scholaris**	Kodale
4.	Bignoniaceae	*Steriospermum suaveolens*	Billmara
5.	Bombacaceae	*Bombax ceiba**	Booruga
6.	Caesalpinaceae	*Bauhinia malabarica**	Basavanapada
7.		*Bauhinia recemosa**	-
8.		*Caesalpina pulcherima*	Kenjige
9.		*Cassia fistula**	Kakke
10.		*Cassia siamea*	-
11.	Casuarinaceae	*Casuarina equisitifolia**	Casuarina
12.	Euphorbiaceae	*Bridelia retusa*	Gurige
13.	Fabaceae	*Butea frondosa**	Palasha
14.		*Dalbergia latifolia**	Beete
15.	Lythraceae	*Lagerstroemia speciosa*	Holenandi
16.	Meliaceae	*Azadirachta indica**	Neem
17.	Mimosaceae	*Acacia concinna**	Seege
18.	Myrtaceae	*Eucalyptus globulus**	Nilgiri
19.	Palmae	*Cocos nucifera**	Narial
Shrubs			
20.	Asclepidaceae	*Gymnosporia Montana**	
21.	Celastraceae	*Maytenus emarginata*	

22.	Euphorbiaceae	*Jatropha curcas**	
23.		*Jatropha gossypifolia*	
24.		*Ricinus communis*	
25.	Fabaceae	*Sesbania grandiflora*	
26.	Flocourtiaceae	*Flacourtia indica*	
27.	Malvaceae	*Hibiscus cannabinus**	
28.	Rubiaceae	*Atalantia monophylla*	
29.		*Atalantia racemosa*	
30.	Verbenaceae	*Lantana camara*	
		*Vitex nigundo**	Lakkili
Herbs			
31.	Acanthaceae	*Barleria prionitis**	
32.		*Dipteracanthus prostrates*	
33.		*Justicia simplex**	
34.	Tiliaceae	*Grewia hirsute**	
35.	Apocynaceae	*Cathartanthus pusillus**	
36.		*Vernonia cinerea*	
37.	Caesalpinaceae	*Cassia occidentalis**	
38.		*Cassia tora**	
39.	Convolvulaceae	*Evolvulus alsinoides**	
40.	Fabaceae	*Tephrosia purpurea**	
41.	Zygophylaceae	*Tribulus terrestris**	
Grasses			
42.	Cyperaceae	*Fibristylis aphylla**	
43.		*Fimbristylis miliacea*	
44.	Poaceae	*Cynodon dactylon**	
45.		*Apluda mutica*	
46.		*Aristida funiculate*	
47.		*Aristida hystrix*	
48.		*Aristida setacea*	

Table 3-20 Mammals in Study Area

Sr. No.	Zoological Name	Common Name
1.	*Funambulus**	Squirrels
2.	*Herpestes mungo**	Mangoose
3.	*Lepus ruficaudatus*	Hare
4.	*Oryctolagus cuniculus*	Rabbit
5.	*Pteropus**	Bat
6.	*Rattus rattus**	Rat

Table 3-21 Avifauna Observed in Study Area

Sr. No.	Zoological Name	Common Name
1.	*Alcedo atthis*	Kingfisher
2.	*Athene brama*	Owlet, spotted
3.	*Centropus sinensis*	Crow, Pheasant
4.	*Chloropsis aurifrons*	Green Bulbul
5.	*Clamator jacobinus*	Cuckoo, Pied Crested
6.	*Elanus caervleus*	Kite
7.	*Spilornis cheela*	Eagle
8.	*Streptopelia chinensis*	Dove, Spotted
9.	*Streptopelia senegalensis*	Dove, Little Brown
10.	*Sturnus pagodarum*	Myna
11.	*Treron phoenicopteras*	Pigeon, Common green

Table3-22 Reptiles Observed in Study Area

Sr. No.	Zoological Name	Common name
1	*Calotes versicolor**	Common garden lizard
2	*Calotes calotes*	Souther green calotes
3	*Mabuya carinata**	Common skink
4	*Ptyas mucosus* (NP)	Dhaman/common ratsnake

5	*Trimeresurus gramineus* (P)	Green/bamboo pit viper

3.7 SOCIO-ECONOMIC ENVIRONMENT

Major developmental activities are to meet the basic as well as luxurious requirements of civilized modern society, economical development, creation of employment opportunities (direct as well as indirect), which ultimately results in improvement of quality of life through upliftment of social, economical, health, education, infrastructure etc. status in the project region. In this manner all developmental projects have direct as well as indirect relationship with socioeconomic aspects. Thus the study of socio-economic component incorporating various facets related to social & cultural conditions and economic status in the project region is an important part of EIA study. The study includes demographic structure, population dynamics, infrastructure resources, status of human health and economic attributes like employment, per-capita income, agriculture, trade and industrial development etc.

The aesthetic environment refers to the scenic value of the area, tourist attraction, forest and wildlife, historic and cultural monuments. The studies of these parameters help in identifying, predicting and evaluating the likely impacts on socioeconomic aspects due to proposed project developments.

1.7.1 Reconnaissance

The proposed project is located in Kancheepuram district of Tamilnadu. Kancheepuram district is situated on the northern East Coast of Tamil Nadu and is adjacent to Bay of Bengal and Chennai city and is bounded in the west by Vellore and Thiruvannamalai district, in the north by Thiruvallur district and Chennai district, in the south by Villuppuram district in the east by Bay of Bangal. It lies between 11° 00' to 12° 00' North latitudes and 77° 28' to 78° 50' East longitudes.

1.7.2 Baseline Status

The latest available data has been complied to delineate the baseline socio- economic profile in study area. The data base thus compiled from secondary sources of various official records, viz. Census records, District statistical abstract, Primary Health Centres etc. and primary data collection through field survey as well as the observations by survey team study period include:

- Demographic structure
- Infrastructure base road network, communication, electricity,

- Education
- Health Status
- Economic attributes
- Socio economic status with reference to Quality of Life
- Awareness and opinion of people about the proposed project

The sample villages identified for socioeconomic survey in study area are shown in while they are listed in subsequent sections.

1.7.3 Demographic Structure

The demographic details are complied from Kancheepuram district of Tamil Nadu state, which was obtained from the Tamilnadu Census Department. The demographic details of the study area are given in subsequent sections while the summarized information is presented below which highlights information on household, population, employment, literacy and community structure. The salient features of the study area are as follows:

- The district consists of 10 taluks with 1137 revenue villages. For development reasons, it is divided into 13 development blocks with 648 Village Panchayats

Table 3-23 Demographic Structure as per 2001 census data

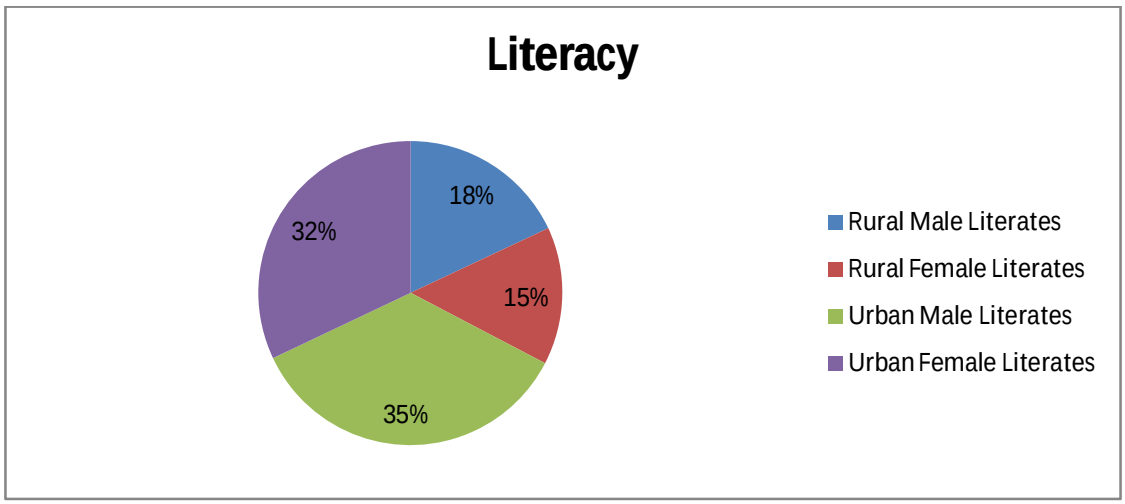
Description	Rural	Urban
Population (%)	36.41 %	63.59 %
Total Population	1,453,072	2,537,825
Male Population	730,454	1,279,855
Female Population	722,618	1,257,970
Sex Ratio	989	983
Child Sex Ratio (0-6)	967	966
Child Population (0-6)	145,699	250,555
Male Child(0-6)	74,054	127,445
Female Child(0-6)	71,645	123,110
Child Percentage (0-6)	10.03 %	9.87 %
Male Child Percentage	10.14 %	9.96 %
Female Child Percentage	9.91 %	9.79 %

Literates	1,001,425	2,064,374
Male Literates	552,540	1,081,574
Female Literates	448,885	982,800
Average Literacy	76.60 %	90.25 %
Male Literacy	84.18 %	93.85 %
Female Literacy	68.96 %	86.60 %
Schedule caste	563.37	295.71
Schedule Tribe	20.70	10.68

1.7.4 Infrastructure

The infrastructure resources base of the study area with reference to education, medical facility, water supply, post & telegraph, transportation & communication, power supply facility is presented in subsequent sections.

1.7.5 Education:



1.7.6 Other Facilities:

Medical Facility: Most of the villages having health facility in the form of Primary health Sub center.

Drinking Water: The water supply in the study area is through wells, tap water, hand pumps Tube well, river and canal allied sources. Source of Drinking Water is shown in subsequent sections.

Power Supply: Almost all villages are electrified in the region and electricity used for all-purpose in all the villages.

Approach Road: Most of the villages having road approach routes are either paved road, mud road or foot path.

Communication and Transportation: Almost all villages having Bus service in the region. Most of the villages in the study area have to available the communication facility i.e. post office, Telegraph Office, Post and Telegraph Office and as well as Telephone connections in the region.

1.7.7 Health Status

Health of the people is not only a desirable goal, but it is also an essential investment in human resources. As per the National Health Policy (1983), Primary Health Care has been accepted as main instrument for achieving this goal of development and strengthening rural health infrastructure through a three-tier system, viz. sub - centre, primary health centre (PHC) and community health center (CHC), which have been established.

Lack of building, shortage of manpower and inadequate provision of drug supplies are hampering the operation of these units. The standards to be met according to National Health Policy are given below:

Table 3-24 Standards according to National Health Policy

Population	Infrastructure	Personnel
3,000 – 5,000	1 Sub centre	1 ANM
25,000 – 30,000	1 PHC, 6 beds	2 Medical officers
1,00,000	Rural	Medical superintendent

During discussion it was revealed that the general prevailing diseases in the project region are malaria, diarrhea, dysentery and viral fever. The health problems as reported could be attributed to improper sanitation, mosquito nuisance and also water logging in the villages. Vital Health Statistics Data (Mortality Rate and Morbidity Pattern 2009 – 2010) in Study Area is presented below.

Table 3-25 Health Statistics

Type	Rural	Urban	Total
Birth Rate(Per 1000 Population)	20.6	16.6	19.6
Death Rate(Per 1000 Population)	6.0	4.3	5.6
Infant Mortality Rate (Per 1000 Live Births)	30.0	19.0	27.0

1.7.8 Economic Attributes

Economic resource base of any region mainly depends upon its economically active group i.e. the working population involved in productive work. Work- Work may be defined as participation in any economically productive activity. Such participation may be physical or mental in nature. Work involves not actual work but also effective supervision and direction of work. It also includes unpaid work on farm or in family enterprise

There are different types of workers that may be classified as - Those persons who had worked for at least six months or 183 days are treated to be Main Workers, on the other hand if person categorized as worker has participated in any economic or productive activity for less than six months or 183 days during the last one year are treated as Marginal Workers and Non – Workers are those who have not worked any time at all in the year preceding the enumeration.

The workers coming under the main and marginal workers category are; cultivators, agricultural labors, live stock, forestry, fishing, hunting, and plantations, orchards and allied activities, mining and quarrying, manufacturing, processing, servicing and repairs in household industry, construction trade and commerce, transport, storage and communication, other services

The summary of employment pattern in study area is as follows.

The total main workers of the District was 8, 92, 700 persons forming 38.06% of total population in the District. Of this, 6,65,386 were male workers & 2,73,518 were Female workers & 5,86,533 were from rural & 3,52,371 were from Urban & 1,62,140 were of cultivators & 2,96,212 of Agricultural labourers & 39,571 of Household industry and rest in other activities.

1.7.9 Cultural and Aesthetic Attributes

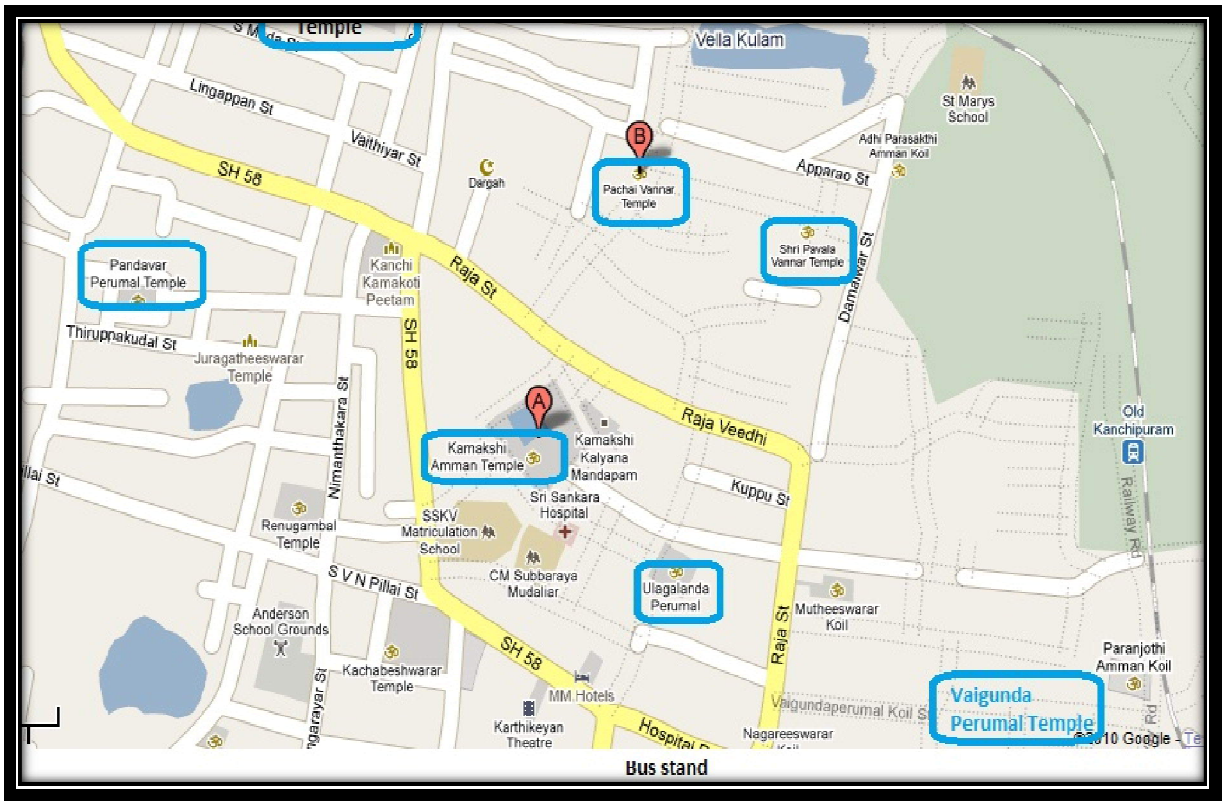
Kancheepuram district has been reckoned for location of historical places, picturesque spots and religious centers. The district embodies thousands of temples and hence called temple town. Kancheepuram is popular for its renowned crafted world famous silk sarees, a traditional home industry. Kancheepuram is also known for its culture and civilization. Kancheepuram is easily accessible from the state capital Chennai

Ancient Kanchipuram, the city of thousand temples , is one of the seven most sacred pilgrim centres Ayodya, Madura, Maya, Kasi, Kanchi, Avanthi, Duvaragai for the Hindus. Kanchipuram owns 108 temples dedicated to siva and 18 to vishnu besides scores of other temples, mosques

and churches and Adi Shankara Mutt. It has within its limits historical places like kanchipuram and mahabalipuram which are steeped in south Indian culture and have won acclaim for their great edifices and magnificient temples of exquisite architectural beauty.

Temple festivals are held throughout the year and apart from the temple car (ratha) festivals which are held in January, April and May. There are other days when the idols in the temples are taken out in procession on their respective vahanas or vehicles

Kancheepuram town is also known as Silk City, since the main profession of the people living in and around is weaving silk sarees. The silk weavers of Kanchi settled more than 400 years ago and have given it an enviable reputation as the producer of the best silk sarees in the country. Woven from pure mulberry silk and have an enviablereputation for texture, lustre, durability and finish. The sarees in dazzling colours are available in every imaginable design and variety, which can make the job of selection quite challenging.



1.7.10 Socio-economic Survey

In order to assess and evaluate the likely impacts arising out of any developmental project on socio-economic environment, it is necessary to gauge the apprehensions of the people in the project area. Socio-economic survey serves as an effective tool for fulfilling this requirement.

The nearby 7 villages identified for socio-economic survey the list is given in subsequent sections. Sarpanch of each village and respondents (adult's male-female) were chosen for the collection of awareness and opinion, by using purposive judgmental sampling method representing various socio-economic sections of the community.

Table 3-26 List of Socioeconomic Survey Villages

Sr. No.	Villages
1	Project Site
2	Pudupattinam
3	Vayalur
4	Veepancheri
5	Adayalacheri
6	Koovathur
7	Mugaiyur

The salient observations recorded during the survey are:

- Literacy level amongst the respondents is moderate. People expecting job facility in near by developments as per their qualification
- Mainly wood is used as fuel for cooking purpose and very few are using LPG fuel
- Bore wells are the main source of drinking water supply. Portability also appears to be good. People reported water scarcity problem in the summer season, may be due to hilly area
- Sanitation facilities are not satisfactory in some villages. Due to improper planning of drainage system respondents have reported the problem of mosquito nuisance
- Health facilities are available within the study area and some villagers are required to go 5-10 km for medical facilities
- In most of the villages, respondents reported that their monthly income is nearly Rs. 4,000-5,000/- Unemployment problem is prevailing in the study area.
- The mode of transport is buses and they are most frequent. The respondents expressed satisfaction with respect to transportation facilities
- All villages have electric supply, but power cut is frequent problem.

CHAPTER

4.ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

4.1 INTRODUCTION

The Study of Impact is necessary to identify and assess various environmental impacts caused on the existing environs due to the proposed project, with a view to arrive at an objective assessment of the possible harmful fall-outs and to plan necessary corrective and remedial measures well in advance to contain these within the prescribed limits set by Ministry of Environment and Forests (MOEF) and Tamilnadu State Pollution Control Board (TNPCB).

1.2 IMPACTS OF PROPOSED PROJECT

The impact assessment has been identified due to the proposed project components during the construction, operational and the existing activities affecting environmental components for "No Project Scenario". The impacts due to the proposed projects are described for the following components:

- Impact on Topography
- Impact on Air Quality
- Impact on Water Quality
- Impact on Climate
- Impact on Coastal Regulation Zone
- Impact on Noise Levels
- Impact on Aquatic Ecology
- Impact on Soil
- Impact on Socio-Economic Factors

The proposed project is construction of a Beach Resort (and thus have no or negligible impacts)

1.3 IMPACTS ON TOPOGRAPHY

The impacts could be categorized as

1. Impact during Constructional phase
2. Impact during Operational phase

1.3.1 Impact during Construction Phase

For the proposed construction of Beach Resort, construction site is limited to 200-500m from the HTL line. Flora affected due to construction activities shall be replanted during the construction stage itself and maintained till they achieve sufficient growth. It shall be ensured to maintain the ground level of the project area.

1.3.2 Impact during Operational Phase

Proposed activity will lead to permanent change in land use. However restoration of existing trees will be taken up.

4.4 IMPACTS ON AIR QUALITY

4.4.1 Impact during Constructional Phase

The major activities during construction phase of the project will be:

- Excavation
- Cutting and leveling, loading and unloading of construction materials
- Preparation / processing of construction materials
- Transportation of construction materials from the proposed project location

Impacts of these activities on various components of the environment are predominantly dust in the area of construction.

Mitigation Measures

Adequate temporary canopies and sprinkling of water on surface areas alongside the construction works would be done. These measures would control the dust pollutions and thus no impacts on SPM or RPM levels in the ambient air quality are envisaged.

It must be noted that most of the impacts during construction phase will be temporary and localized. Dust will be generated during excavation for building foundations which may affect communities in the immediate vicinity of construction site. To mitigate the impact due to Suspended Particulate Matter (SPM) regular sprinkling of water will be envisaged during construction activity. Most of the impacts will not be felt at the end of the construction phase.

Strict norms will be follwed for vehicles to ensure Pollution under Control and periodical checking will be conducted for all the vehicles entering at site.

These impacts will not be felt in areas, which are not in the immediate vicinity of the proposed project. As such the impacts during the constructional phase on various environmental factors will be extremely marginal.

4.4.2 Impact during Operation phase

Air Environment

All the construction activities during the operational phase will be stopped. Hence no air emissions are envisaged during operation.

Post project Air quality

Since the proposed project shall involve construction of resort alone, it must be noted that impacts during operational phase will from DG sets. Adequate stack height will be provided as per CPCB norms. So no major emissions are envisaged after construction of the same.

4.5 IMPACTS ON WATER QUALITY

The existing water quality has been assessed by studying water samples in and around the site.

4.5.1 Construction Phase

As the proposed project is located in CRZ III, water demand will be met from external water source and water will be drawn from ground within the CRZ area. Basement is not proposed in the Resort project. Hence there is no impact in the ground water quality.

4.5.2 Operational Phase

During operation, water requirement will be outsourced from authorized vendors. Adequate STP installation is proposed at site for the treatment of the sewage water generated. The treated water will be used for toiled and greenbelt development.

Rain water harvesting is also proposed which will enhance the ground water table.

Conclusions

Hence there is no appreciable adverse impact on the water environment in both construction and operational phases.

4.6 IMPACT ON COASTAL REGULATION ZONE (CRZ)

- As per the Environment (Protection) Rules, 1986, the Central Government has declared the coastal stretches of sea, bays, estuaries, creeks, rivers and backwaters which are influenced by tidal action (in the landward side) up to 500 metres from the High Tide Line

(HTL) and the land between the Low Tide Line (LTL) and the HTL as Coastal Regulation Zone (CRZ), which is compiled as CRZ Notification, 2011 (Annexure 3) and its amendment. As per approved the Coastal Zone Management Plan, the area of the proposed site falls in CRZ III, Proposed location is near to Bay of Bengal.

- The development or construction activities in different categories of CRZ area (CRZ I,II,III, & IV) shall be regulated by the concerned authorities at the state / Union Territory level, in accordance with the MoEF norms.

* Applicable Classification

As per CRZ notification, 2011, the proposed "Beach Resort" requires CRZ clearance from MOEF. As per the said notification, Rapid Environmental Impact Assessment, Risk Assessment and Disaster Management Plan are to be submitted with Form 1 for clearance.

4.7 NOISE ENVIRONMENT

Noise levels higher than the threshold limit values can affect human beings at audio logical, biological and behavioural levels. Continuous exposure of high level noise may result in the following disorders in humans.

1. Fatigue
2. Annoyance
3. Temporary shift of threshold limit of hearing
4. Hypertension, high cholesterol
5. Detrimental Biological Disorders

4.7.1 Impacts on Construction phase

As evident during construction phase, the clearing, excavation and other works will create noise sources.

Protective measures like earplug / ear muffs will be provided in noise generating areas and this would mitigate impact on construction workers.

4.7.2 Impacts on operational phase

The major noise sources during operation is DG sets. This will be mitigated by providing acoustic enclosures. Thus there is going to be no escalation of noise levels due to the proposed project.

Adequate Green Belt will be provided with in the site during the construction phase which will help in noise attenuation.

Conclusion

From the above background it is envisaged that there will not be any impact on noise levels in and around the area, due to the proposed project.

4.8 IMPACTS ON AQUATIC ECOLOGY

The project is proposed in 200- 500m from the HTL line. There is no development in 0-200m from HTL line. But every care is being taken to avoid and not to disturb the water and ecological environment.

Conclusions

Hence there is not much impact on the Aquatic Environment during both construction and operational phases.

4.9 IMPACTS ON SOIL

4.9.1 Impacts of construction phase

Construction activities like material storage shall be carried outside the CRZ area to ensure minimum disturbance to the soil quality of the area. Some amount of soil will be cleared and labelled as required, but all care will be taken to maintain the land level as original.

4.9.2 Impacts of operational phase

During oprational phase, organic waste and inorganic waste will be generated. Organic wastes will be treated in organic waste convertor and it will be reused as manure for gardening and inorganic wastes will be disposed through authorized vendors.

Conclusion

Hence the impact on the soil environment will be negligible during construction and operational phases.

4.10 IMPACT ON SOCIO-ECONOMIC FACTORS

The proposed project will have no negative impact on local socio-economic conditions of the people in the immediate vicinity of the area. Construction of resort would provide temporary employment to the people, there by creating a positive impact on the society due to this project.

4.10.1 Impacts of construction phase

The proposed construction would develop employment to construction workers, piping technicians, electricians and engineers. Since most of the construction workers and technicians will be sourced locally, there will be enhancement of socio economic condition.

4.10.2 Impacts of operational phase

During operation phase, there will be continuous influx of people due to adequate infrastructure facilities since it is a beach resort.

Conclusion

Hence the impact on the socio economic environment will be positive during construction phase and no negative effects during operational phases.

4.11 EVALUATION OF IMPACTS

The environmental impacts of a project depend both on the proposed project activities and the existing environmental settings. The potential impact of proposed project has already been discussed in this chapter. This chapter evaluates these impacts under various scenarios. The environmental impact assessment process involves four basic steps of Identification

- Evaluation
- Interpretation
- Communication

A number of techniques are available for the assessment of impacts. Each of these techniques has its own advantages and disadvantages. The selection of any of these techniques for any particular project depends largely upon the choice of judgment of the analysis. The technique chosen should be comprehensive, easy to understand, systematic and flexible. Considering these criteria for this project, the matrix method was used, with an impact scale of -4 to +4.

4.12 MATRIX METHOD

The matrix used for EIA consists of project activities on the x-axis and the environmental components likely to be affected by these activities on the y-axis. Each cell of the matrix represents a subjective evaluation of the impact of the particular components, in terms of

magnitude importance. A blank cell indicates no impact of the activity on the component. The magnitude (m) is represented by a number from 1-4 where

1=minimal

2=appreciable

3=significant

4=severe

Positive sign (or negative sign) indicates beneficial impact and negative sign indicates adverse impact. The importance (w) of the impact is given on a scale of 1-4 in each cell. This number indicates the relative importance of impact of the activity on the concerned component for this project. The magnitude and importance are multiplied to give a score for each cell ($m_{ij}w_{ij}$). The scores of individual cells in each row are added to determine the total impact of all project activities on each component. Similarly, the scores in individual cells in each row are added to determine the total impact of each activity on all the environmental components likely to be affected. Grand total of all cells indicates the total project impact. This can be represented by the following equation:

Total project impact= $\sum\sum m_{ij}w_{ij}$

where

m_{ij} = (positive or negative) magnitude of the j^{th} activity on the i^{th} environmental component and

w_{ij} = importance of the j^{th} activity on the i^{th} environmental component

Since both m and n vary from 1-4 the total score in each cell can theoretically vary between -16 and +16, therefore the total project impact can vary between (-16* total number of cells in the matrix) and (16*total number of cells in the matrix), to compare scores from the matrices containing different number of cells, the total project score can be normalized to a scale of 100 as follows:

$$\text{Total project impact} = \frac{\text{Total project impact}}{16 * \text{Total number of cells in matrix}} * 100$$

On the scale, the overall impact can be classified as follows:

Total project impact (scale of 100)	Magnitude
-100 to –75	Severely adverse
-75 to –50	Significantly adverse
-50 to –25	Appreciably adverse
-25 to 0	Minimally adverse
0 to 25	Minimally beneficial
25 to 50	Appreciably beneficial
50 to 75	Significantly beneficial
75 to 100	Very highly beneficial

4.12.1 Limitations of Matrix Method

While assessing impact by the matrix method, the following limitations should be kept in mind:

Guidelines for use of this approach are minimal, this may lead to ambiguities.

Evaluation of impacts is based on subjective judgement, which can vary from individual to individual.

Component to component interaction cannot be represented hence inter-relationships between impacts cannot be shown.

Primary, secondary and tertiary impacts cannot be clearly distinguished.

4.12.2 Justification for Matrix Method

In spite of limitations listed above, the matrix method is useful for the purpose of this project. It identifies the impact of each project activity on each environmental component. Evaluation and interpretation of impacts do convey a holistic view of the environmental impacts of the project. In addition, the matrix method is an easy Tool to communicate the results of EIA exercise.

Table Error! No text of specified style in document.**-27 Impact Assessment Matrix for Scenario 1 (No Project)**

Environmental components likely to be affected		**Activities likely to affect Environmental components**			
		Construction Activities	**Vehicular Movement**	**DG Set Operation**	**Impacts on components**
Visibility	Magnitude	-	-	-	-

Environmental components likely to be affected		Activities likely to affect Environmental components			
		Construction Activities	Vehicular Movement	DG Set Operation	Impacts on components
	Importance	-	-	-	-
Air Quality	Magnitude	-	-	-	-
	Importance	1	-1	-	-
Noise and Vibration	Magnitude	-2	-2	-	-
	Importance	-2	-1	-	-
Surface water quality	Magnitude	-	-	-	-
	Importance	-	-	-	-
Ground water quality	Magnitude	-	-	-	-
	Importance	-	-	-	-
Soil Quality	Magnitude	-	-	-	-
	Importance	-	-	-	-
Flora and Fauna	Magnitude	-	-	-	-
	Importance	-	-	-	-
Aesthetics	Magnitude	-	-	-	-
	Importance	-	-	-	-
Land use Pattern	Magnitude	-1	-	-	-1
	Importance	-1	-	-	-1
Human Health	Magnitude	-1	-	-	-1
	Importance	-1	-	-	-1
Employment	Magnitude	2	-	-	1
	Importance	1	-	-	1
Total impact of activity		-4	-4	-	-2
Total impact of activity on a scale of 100					-10

Table Error! No text of specified style in document.**-28 Impact Assessment Matrix for Scenario 2 (Project without EMP)**

Environmental Components likely to be affected		Activities likely to affect Environmental Components			
		Construction Activities	Vehicular Movement	DG Set operation	Impacts on components
Visibility	Magnitude	-	-	-	-
	Importance	-	-	-	-
Air Quality	Magnitude	-	-1	-2	-
	Importance	-1	-1	-1	- 2

Noise and Vibration	Magnitude	-2	-2	-2	- 5
	Importance	-2	-1	-2	- 4
Surface water quality	Magnitude	-	-	-	-
	Importance	-	-	-	-
Ground water quality	Magnitude	-	-	-	-
	Importance	-	-	-	-
Soil Quality	Magnitude	-	-	-1	-
	Importance	-	-	-1	-
Flora and Fauna	Magnitude	-2	-	-	-
	Importance	-2	-	-	-
Aesthetics	Magnitude	1	-	-	1
	Importance	1	-	-	1
Land use Pattern	Magnitude	-1	-	-	-1
	Importance	-1	-	-	-1
Human Health	Magnitude	2	-	-	-1
	Importance	2	-	-	-1
Employment	Magnitude	4	3	-	5
	Importance	4	3	-	5
Total impact of activity		3	1	- 9	-3
Total impact of activity on a scale of 100					-8

Table 4-29 Impact Assessment Matrix For Scenario 3 (Project With EMP)

Environmental Components likely to be affected		**Activities likely to affect Environmental Components**			
		Construction Activities	**Vehicular Movement**	**DG Set operation**	**Impacts on components**
Visibility	Magnitude	-	-	-	-
	Importance	-	-	-	-
Air Quality	Magnitude	1	1	-	-

Environmental Components likely to be affected		Activities likely to affect Environmental Components			
		Construction Activities	Vehicular Movement	DG Set operation	Impacts on components
	Importance	1	1	-2	-
Noise and Vibration	Magnitude	-2	-2	-2	-2
	Importance	-2	-1	-	-2
Surface water quality	Magnitude	-	-	-	-
	Importance	-	-	-	-
Ground water quality	Magnitude	2	1	-	3
	Importance	1	1	-	2
Soil Quality	Magnitude	2	-	-	2
	Importance	2	-	-	2
Flora and Fauna	Magnitude	2	-	-	2
	Importance	3	-	-	3
Aesthetics	Magnitude	2	-	-	2
	Importance	2	-	-	2
Land use Pattern	Magnitude	1	-	-	-1
	Importance	1	-	-	-1
Human Health	Magnitude	1	-	-	-1
	Importance	1	-	-	-1
Employment	Magnitude	3	3	-	2
	Importance	4	3	-	2
Total impact of activity		25	7	- 4	-
Total impact of activity on a scale of 100					+ 14

4.13 CONCLUDING REMARKS

The Environment Impact Assessment through Matrix Method gives the following conclusion

1. The proposed proposal of Beach Resort will not result in any significant impact to Environment.

2. The impact of proposed unit will be fully mitigated by the Environment Management Plans (EMP's).

CHAPTER 5.ENVIRONMENTAL MONITORING PROGRAM

5.1 INTRODUCTION

The Environmental Monitoring Program is laid out based on the following definition of environmental monitoring:

"Environmental effects monitoring is the repetitive and systematic measurement of the characteristics of environmental components to test specific hypotheses of the effects of human activity on the environment. Environmental monitoring is undertaken primarily to determine the environmental effects of human activities, and secondarily to increase understanding of cause-effect relationships between human activity and environmental change."

a. ENVIRONMENTAL EFFECTS MONITORING IN EIA

Environmental effects monitoring programs provide the necessary information to:

1. Verify the accuracy of EIA predictions; and
2. Determine the effectiveness of measures to mitigate adverse effects of projects on the environment.

Feedback from environmental monitoring programs may be used to:

1. Determine whether more or less stringent mitigation measures are needed;
2. To improve the predictive capabilities of EIAs.

Environmental monitoring program is a vital process of any management plan. This helps in signalling the potential problems resulting from the proposed project and will allow for prompt implementation of effective corrective measures. The environmental monitoring will be required for the construction and operational phases.

The main objectives of environmental monitoring area:

- To assess the changes in environmental conditions,
- To monitor the effective implementation of mitigation measures,
- Warn significant deteriorations in environmental quality for further prevention action.

In order to meet the above objectives the following parameters need to be monitored:

- Afforestation;
- Water Quality and Public Health;
- Air and Noise quality;
- Soil Conservation;
- Waste Disposal.

b. POST PROJECT ENVIRONMENT MONITORING PROGRAM

The summarized form of post monitoring details is presented in the following Table 5.1. These monitoring can be used for the proposed project.

Table 5-30 Environmental Monitoring Plan

S. No	Area of Monitoring	Number of Sampling Stations	Frequently of Sampling	Parameters to be Analyzed
1.	Ambient Air Quality	Site (One upwind &one downwind location)	Quarterly 24 hourly period 8 hr period	PM 10, PM 2.5, SO_2 and NOx and CO
2	Stack Emission Monitoring	Stack of Operating DG	Quarterly	SO_2 and NOx and CO
3.	Water Quality	Sea Water, Site	Quarterly	pH, Temp, Conductivity, TSS, TDS, BOD, O&G Heavy metals
4.	Noise	Project Site	Quarterly	Day & night time in dB(A) levels
5.	Soil	Site	Once in a year	Physicochemical properties, Nutrients, Heavy metals
6.	Waste Characterization	Site	Once in a year	Physical & Chemical Composition
7.	Terrestrial Ecology	Within 10km, around the project	Once in three years	Symptoms of injuries on plants, absorption of chemicals
8.	Aquatic Ecology	Marine Water near the project site	Once in three years	Density and Diversity of fish, plankton and macro invertebrates.

c. REPORTING & DOCUMENTATION

All the necessary reports and documents shall be prepared complying with the statutory rules & regulations. Proper and due care shall be taken to adhere to the laid down rules and regulations by the government.

Regular and periodic record shall be kept in order to ensure easier, comparable and brisk review and projection of past, present and future performances. Also, the management shall ensure to prepare separate records for water, wastewater, solid waste, air, emission, soil & manure regularly and periodically in order to provide better and smooth vigilance.

The management shall look into the fact that as soon as the preparation of reports gets over it shall be forwarded to the concerned authority with due care for the purpose of reviewing.

Adhering to the rules and regulations the management shall ensure that the outcome of reports and conclusions drawn shall be prepared as per the laid down regulations and procedures.

These reports/documents shall be regularly and periodically reviewed and any changes/discrepancies found in mitigation measures/ operation/ management/ shall be brought into notice instantaneously and all possible corrective actions shall be taken to match the discrepancies been witnessed.

CHAPTER

6.RISK ASSESSMENT, EMERGENCY RESPONSE AND DISASTER MANAGEMENT PLAN

6.1 RISK ASSESSMENT

6.1.1 Introduction to risk assessment

Risk assessment is a method that has proven its value as an all-round tool for improving the safety standards prevalent in every hazardous industry. The planners and engineers now provide in-built systems for prevention of any accident but we know that these are not sufficient as amply demonstrated by the accidents all over the world. Risk assessment is a tool to help in the analysis of the risk posed by the different project activities to the surrounding population and also quantification of the same.

The findings of risk assessment are detailed into Disaster Management Plan (DMP), also known as On-site Emergency Plan/ Off-site Emergency plan.

6.1.2 Objectives

The objectives of the risk assessment

- Assessing risk levels due to the operations
- Identification of the risk mitigation measures to bring the potential risk within acceptable range
- To suggest general safety improvement measures for the facility.
- To help generate accident free hours that in turn increase production
- To identify emergency scenarios and suggest mitigation measures.

The underlying basis of risk assessment is simple in concept. It offers methods to answer the following five questions:

What are the risks?

What are the causes of risks?

What are the consequences of risks?

What is the probability of the risk causing events?

Whether the risk is socially acceptable?

6.1.3 Philosophy behind risk assessment

Risk is the unwanted consequence of an event. Risk occurs when lot of risk causing factors occur at the same time causing an accident involving a fire or explosion. Risk form an inherent part of life. Some risks are readily acceptable while some much less frequent risks that attract lot of attention and are unacceptable to public.

The influences of various factors on the public perception of risk are summarized in Table 6.1 as follows:

Table 31 Factors Influencing Public Perception

Sr. No.	Factors influencing public perception	Description
1	Control	People are more willing to accept risks they impose upon themselves than to have risks imposed upon them.
2	Dread and scale of Impact	Fear is greatest where the consequences of risks are likely to be catastrophic rather than spread over time.
3	Familiarity	People appear to be far more willing to accept risks that are familiar rather than new risks
4	Timing	Risks are more acceptable if the risk consequences are immediate or short-term, rather than delayed consequences
5	Social amplification & attenuation	Concerns are increased if media coverage or graphic depiction of events is there, reduced if there is economic hardship
6	Trust	If public trusts policy makers, public trusts regulators or industry as being honest, admit mistakes and limitations and one who take into account different views, then public is more likely to place credibility in them.

Source: British Parliamentary Office of Science and Technology – "Safety in numbers - Risk Assessment & Environment Protection"

The need for communicating acceptable risks is very important. Though setting acceptable criteria for use in quantitative risk assessments may often lead to disagreement between parties, nevertheless sound techniques and methods have led to the definition of acceptable levels of risks taking into account the need of people to feel safe in their day-to-day activities.

A risk assessment should therefore, be seen as an important component of any or all ongoing preventive actions aimed at minimizing and thus hopefully, avoiding accidents. Re-assessments should therefore follow at regular intervals, and/or after any changes that could alter the hazard, so contributing to the overall prevention programme and disaster management plan of the project.

6.2 METHODOLOGY OF RISK ASSESSMENT

The risk is measured usually by various screening techniques that vary from one technique to another. No single risk measure is sufficient for conveying all the possibilities and combinations in process risks. The basic methodology adopted for risk assessment is generally based upon the nature of the hazard, the basic need for conducting risk assessment and the information and resources available for such risk assessment.

There are many methods that can be used to assess and rank risks. Some of the methods and ranking system are listed below:

The method rates the scenarios on the basis of expected severity of incidence and the probability of occurrence. The legend given indicates the level of severity for the colour coding adopted.

Table 32 Probability of occurrence with respect to severity of incident

Probability of Occurrence	Severity of Incident			
	Major	Significant	Minor	Incidental
Frequent (Incident may occur on annual basis or more)				
Occasional (Incident may occur several times during facility life)				
Seldom (Incident may occur once during facility life)				
Unlikely (Given current practices and procedures, incident is not likely to occur at this facility)				

Legend

SEVERE | HIGH | MODERATE | LOW

The following illustrates the detailed philosophy of the classification of incidence severity.

MAJOR INCIDENTS:

- Personnel: Fatality or permanently disabling injury
- Community: One or more severe injuries

- Environmental: Event having serious on-site or off-site impact, results in offsite agency involvement and a major fine, serious negative public health or financial impacts, major local negative media coverage, international negative media coverage.
- Facility: Major or total destruction to process area(s)

SIGNIFICANT INCIDENTS:

- Personnel: One or more severe injury
- Community: One or more minor injuries
- Environmental: Event having significant on-site or off-site impact and requiring prompt agency and corporate notification, serious negative public impact or perception, significant local negative media coverage, a fine is likely.
- Facility: Major damage to process area(s)

MINOR INCIDENTS:

- Personnel: Single injury, not severe, possible lost time.
- Community: Odour or noise complaint from public
- Environmental: Event results in agency reporting or consent violation, minor negative public impact or perception, little or no local media coverage, a fine is not likely
- Facility: Some equipment damage

INCIDENTAL INCIDENTS:

- Personnel: Minor or no injury, no lost time
- Community: No hazard to public, no public complaint
- Environmental: Environmental event with no agency involvement or consent violation, no negative public impact or perception.
- Facility: Minimal equipment damage
- Another method that can be used for the classification of incidence and used for risk analysis is the NIOSH method. The NIOSH method gives in brief the methodology and the hazard risk matrix to assess the risks posed by use of hazardous substances.

METHODOLOGY:

- List of all possible hazards that exist in the study area.
- Assessment of all the possible hazards that exist in the study area.
- Selection of the identified hazards for consequence analysis.
- Consequence analysis of the identified areas.

- The hazard risk matrix is a useful tool to accord a risk rating for each hazard identified in terms high, medium or low. The hazard risk matrix is illustrated below.

Hazard Risk Matrix

1. Hazard: _____
2. Potential Location: _____

_____

_____

_____

Table - 33 Table for Hazard Risk Matrix

Probability	Severity		
	Low	Medium	High
Low			
Medium			
High			

3. Area in which potential location(s) exists:
4. Date:

6.3 HAZARD IDENTIFICATION

6.3.1 Introduction

Hazard Identification is a tool that is very useful for conducting a risk assessment as it helps in identification and detailing of hazards that exist in a given project. The hazard identification is done prior to the consequence analysis in a given project and serves as the core base of information on which whole risk assessment is based. The basic principle of risk analysis lies in the answer to the questions about risk such as type, causes, consequences and frequency.

6.3.2 Hazard identification

Variety of chemicals used in the project poses threat to the overall safety because some chemicals are highly flammable, highly volatile, etc. and some may require special care. The hazard identification is done to list all of these safety cautions that are to be taken while handling, storage or use of these chemicals. Special care has been taken to avoid clustering all the information so that only those safety aspects are mentioned which are of relevance to this company and its range of chemicals.

6.3.3 General Hazards

All the probable potential hazards are classified under different heads.

i. Spillage Hazards
ii. Toxic vapor release hazards
iii. Explosion or accident hazards
iv. Corrosion hazards
v. Natural Calamities

6.4 CONSEQUENCE ANALYSIS

6.4.1 Occurrence of incident

The incidents occur as a result of combination of various individual incidents. These cannot be completely predicted and prevented; however, efforts can be made to prevent the simultaneous occurrence of events that lead to an accident. Various efforts can be made to prevent accidents such as formulation of proper SOPs, constant training, proper reporting and analysis of the near misses and minor accidents, proper communication channels, etc.

6.4.2 Evaluation of incidents

This chapter deals with the evaluation of all the incidents possible that could cause loss of lives or injury to persons. Out of the incidents selected various possible scenarios such as spillages, toxic release, fire scenarios or explosion.

6.4.3 Selection of incidents

The selection of incidents is done to restrict the total number of incidents to a reasonable level, without leaving out significant incidents. Thus, the purpose is to select a representative range of incidents from the list of incidents that is generated by the evaluation process.

6.4.4 Present case

The only risks and operational hazards foreseen from the proposed resort are listed in table 6.4.

Table - 34 Risks and Operational Hazards from the proposed project

	Scenario	Effects
During Construction Phase	Accidents to workers working at a height	Might cause injury to workers
	Spillage of construction material like concrete, cement, chemicals ,etc	Might cause water and soil pollution
During Operation	Natural calamities like Cyclones,	Might cause damage to structures,

Phase	Earth quakes	leading to injury to nearby flora and fauna
	Human tampering	Might cause damage to structures

6.4.5 Consequence calculations

In the consequence analysis and its calculations, number of mathematical and calculation models are used. In consequence analysis, number of models is used to estimate the effects of an incident (spillage) and prediction of damage of the effects. These calculations can roughly be divided in three major groups:

a) Determination of the source strength parameters;
b) Determination of the consequential effects;
c) Determination of the damage or damage distances.

The types of models that are used in a specific risk study strongly depend upon the type of material involved such as physical state of the materials, nature of hazard, storage criteria and type of failure anticipated.

6.4.6 Conclusions from the Analysis

In the given project no hazard is not anticipated as the project is a beach resort does not include any chemicals.

Thus risk analysis for the proposed project does not show any significant risk factor in the same.

The following are the objectives of the on-site emergency control plan

- Minimizing the risk and impact of event.
- Rapid control and containment of the hazard
- Effective evacuation of the affected persons and prevention of damage to the property.

Thus the element of successful hazard management can be identified as:

a. Reliable early detection
b. Careful planning
c. Efficient personnel
d. Adequate technical facilities
e. Effective communication
f. Ensuring correct responses
g. Proper training to all concerned personnel

Each employee should study the approved on- site emergency control plan very carefully to carry out the instructions set forth. The main controller, the incident controller and the safety officer with the help of the Emergency Squad will be responsible for the effective execution of the on- site emergency plan.

6.5 DISASTER MANAGEMENT PLAN

6.5.1 Disaster Management during Construction phase

During construction, the working personnel shall be given the following appropriate protective equipments:

1. Fire Helmets
2. Rubber hand Gloves
3. Industrial Safety Helmets
4. Safe Walk Ladder
5. Ear Muffs
6. Oxygen meter
7. Fire retardent suits
8. Hand Operated Siren
9. Explosive meter
10. Red / Green Flag
11. Industrial safety shoes with steel toe
12. Slash goggles
13. Gum boots

6.5.2 Safety Plan

During construction, safety is an important factor for all personnel working at the site. During excavation and erection of proposed facility, the project authority shall formulate safety policy with the following regulations:

- To provide necessary equipment, safety appliances and to ensure their proper use.
- To ensure that all safety factors are taken into account in the design, construction, operation and erection machinery and equipment
- To provide training in fire fighting operations
- To notify regulations, instructions and notices in the common language of employees

- To prepare safety rules for the employees as per the safety policy
- To allocate sufficient resources to maintain safe and healthy conditions of work

6.5.3 Safety Training

A training center shall be set up for the employees. Safety officers will be provided training by the faculty members from the corporate center and Industrial safety Institutions. Some remedial measures proposed to be adopted to prevent the hazards are:

- Reliable type of fire detection system with proper zoning
- Every employee shall cooperate and actively participate in maintaining and improving safety standards
- Proper fire watching by all concerned would be ensured.
- Safety officials shall prepare a leaflets regarding safety awareness and shall conduct safety awareness programme.

6.5.4 Natural disasters

Cyclones

Based on the weather broadcast warnings regarding impending cyclone conditions, following steps should be taken.

a. Shifting of all movable items to safer enclosed areas.
b. Project operation shall be considered depending on the intensity of the cyclone.

Earth Quakes

a. When first tremor are sensed during an Earth quake, all personnel nearby should be evacuated;
b. Emergency response plan to be activated;
c. After the status is restored; personnel should inspect the stretch for damage assessment, cleanup, restoration and recovery;
d. Safe Operating practices will be followed in design, execution and maintenance of the pipe rack systems as per OISD standards and guidelines.

CHAPTER

7. ENVIRONMENT MANAGEMENT PLAN

7.1 INTRODUCTION TO ENVIRONMENT MANAGEMENT PLAN

7.1.1 General

An Environmental Management system is a tool to regulate, monitor and audit positive and/or negative environmental impacts by considering day-to-day operations of an organization. The EMS (Environmental Management System) coexists in an organization similar to any other management systems such as financial or production management systems. An environmental management system is a process which is used by an organization to manage, review, correct, and improve the organization's approach to business. An Environment Management System (EMS) manages the impacts of an organization's activities on the environment. An EMS defines the environmental management of any organization in order to monitors and check performance of the company by incorporating all the sensitivity of individual environmental parameters such as land, water, air, soil, noise etc. An EMS is required to locate environmental issues of an organization in order to integrate and implement better management and its performance with and along the routine operations of a company. An EMS delivers environmental quality management of any organization for long and short term planning. In addition An EMS ensures regular check up to provide quality management system and take positive steps in case of any diversion with a view to ensure better and enhanced performance. Overall an EMS provides a well organised and detailed way to incorporate environmental considerations into day-to-day operations and it also promotes continual improvement of the environment and human health.

The Environmental Management Plan is an integrated component of an EMS, which will identify and address the impacts, where these are adverse in nature, and thereafter design mitigation measures to manage such impacts in a manner as to conserve environment and ecology of the area. The Environmental Management Plan gauges the current environmental scenario of the area and then based on the activities of proposed project, to carry out Environmental Impact Assessment. The EMP is most important way to deliver the objectives established in EMS for effective Environmental management in any organization. Therefore EMP has been prepared with a view to ultimately ensure that the adverse impacts are minimized if these cannot be

prevented altogether. Environmental clearance is a statutory requirement for any project of which EIA has to be prepared and submitted to respective agencies of State and Central level in line with Coastal Regulation Zone Notification, 2011 and its amendments /Environmental Impact Assessment Notification, 2006 and its amendments.

An EMS can assist a company in the following ways:

- EMS constantly manages an organization away from constraints imposed by future regulations, material shortages, community complaints, and other issues and minimize environmental liabilities;
- EMS reduces operating cost in nearly every case as an EMS reduces operating inefficiencies, waste reduction and generates energy conservation, other savings. It has been observed that the typical EMS payback period for any organization is typically 9 months to 2 years;
- EMS improvise the operational process therefore it maximize the efficient use of resources;
- EMS provides regular feedback on environmental opportunities for continual improvement;
- EMS reduce waste by achieving regular implementation of operational process;
- Well structured EMS demonstrate competitiveness within private industry sector;
- Well structured EMS helps to achieve good corporate image for any organization;
- Symbiotic relationship between experienced consultants and peers support thus enhancing superior-subordinate relationship;
- EMS improves the awareness of environmental concern among employees who inspire and guide the occupants to achieve better positive environmental performance;
- EMS detailed and planned out requires all the policies which are going to be implemented to achieve better positive environmental performance;
- EMS provides better understanding of the environmental impacts of business activities;
- EMS provides a structured framework for identifying and meeting regulatory requirements these results in fewer fines and other regulatory complications over time which would avoid legal risk and potential liabilities;

- Improved bond ratings as a formal EMS can demonstrate to the lenders a reduced risk that results in lower interest rates;
- EMS increases profit, improving environmental performance, through more efficient operations;

EMS does not impose new technical requirements, nor do they act as a substitute for existing regulatory requirements. EMS provide an exclusive way for an organization to manage its maximum possible environmental efficiently and to minimize obligations. As a result EMS can improve any organization's overall environmental performance including areas not subject to legal requirements. It can also help organizations to improve cost efficiency and health and safety management.

Although the implementation of an EMS is essentially a voluntary initiative, it can also become an effective tool for government to protect the environment as it can assist regulation and outlines the individual's objectives of environmental protection. For example, regulatory systems can encourage organizations to use EMS to meet standards, by providing incentives for strong environmental performance. Likewise, organizations can use EMS to ensure that their performance is within regulatory requirements and to keep ahead of more stringent regulations which might be introduced in the future.

7.1.2 Environment Management Plan

An Environmental Management Plan (EMP) can be defined as *"an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and commissioning of a project are prevented; and that the positive benefits of the projects are enhanced"*. EMPs are therefore important tools for ensuring that the management actions arising from Environmental Impact Assessment (EIA) processes are clearly defined and implemented through all phases of the project life-cycle. This plan also helps an organization map its progress toward achieving continual improvements.

Each organization has to achieve environmental protection objective and each organization comprises of individual operations and affairs hence each organization requires its own unique Environmental Management Plans. The component and content of individual EMP varies to suite type of organization, the complexity of its processes and the maturity of the organization in

understanding its environmental responsibilities. The level of detail and length of an EMP will vary depending on the type as well.

An EMP consists of:

- Environment Protection Plan to reduce impacts and risks. Issues related to existing legislation, codes of good engineering practice, proponent commitment, and similar other tasks are also discussed here.
- Summary of Impacts and Risks. These are the actual expected impacts and risks of the projects, which will need to be managed, monitored, and reported.
- Impact Management and Environmental Enhancement to balance adverse impacts by providing alternate benefits to adversely impacted persons or biophysical systems.
- Environmental Effects Monitoring (monitoring plans).
- Impact Reporting.

Addition sections of this chapter document:

- Implementation of Environmental Management Plan
- Institutional strengthening needs
- Training and technical assistance needs
- Public participation
- EMP Implementation Schedule
- EMP Costs

Environmental Management Planning gives the tools to assess and manage environmental issues during every phase of the project or operations. In order to do such the identification of environmental issues is very significant. The EMP provides guide for the detailed design of specific measures as part of programme and project feasibility studies. The outcome will minimize the risk of expensive and prolonged environmental issues. Further it maximizes productivity, resultant performance and goodwill. It provides a framework through which environmental priorities, responsibilities and risks are systematically managed. EMPs, which are often a key component of a project's regulatory filings, provide the basis for assurance that environmental factors will be carefully managed throughout the project lifecycle.

7.1.3 Objectives of EMP

- To establish the present environmental scenario.

- To ensure flora conservation to the extent feasible.
- To identify area for construction activities to ensure minimum disturbance to CRZ area.
- To prepare a detailed action plan for implementation of mitigation measures.
- To suggest preventive and mitigation measures to minimize adverse impact and to maximize beneficial impacts.
- To prepare an afforestation or Greenbelt Development scheme.
- To suggest a rain water harvesting scheme and energy conservation actions.
- To suggest a monitoring programmed to evaluate the effectiveness of mitigation measures.
- To suggest the formation of a core group (Environment Management Cell) responsible for implementation of environmental control & protective measures as well as monitoring of such implementation.
- To prepare a capital cost estimate and annual recurring cost for Environmental Management Plan.

7.2 ENVIRONMENTAL PROTECTION PLAN

This is an important aspect to preserve & improve the environmental quality of project area. Environmental protection plan of organization comprises of the mitigation measures, environmental management activities and pollution control techniques & technologies for the project. The details of the suggested mitigation measures, environment management activities & pollution control techniques & technologies are described in subsequent paragraphs of the chapter under respective headings.

7.3 MITIGATION FOR PRE-CONSTRUCTION AND CONSTRUCTION PHASE IMPACTS

7.3.1 Land acquisition and site preparation

The construction and development of required infrastructure will become core factor for setting up the project. The site preparation and construction will not generate any major negative impacts on the regional environmental conditions. In addition, the impacts on the regional aspects like population affected, land and allied abiotic & biotic factors of environment would be negligible. The impacts can be further minimised through effective selection and designing of environment management plans, proper resource allocation in order to minimise negative land

use change and to use infrastructural sites of least value in current use. Also, proponent has proposed to develop sufficient greenbelt area to add value to the improvement of land cover of the area thus, major mitigation measures are not required.

7.3.2 Construction activities

Construction and infrastructure development can change the land use for long term which will create harmful and/or useful impacts to the environment. Therefore construction activities are one of the most concern tasks for environmental aspects to be considered during implementation of any project. The major concern while implementing an EMP of an organization incorporates adverse impacts. For this purpose detailed information shall be collected viz. details of the components responsible for the occurrence of the negative impact, activity operation involved which led to occurrence of such impact, construction material responsible, emissions from construction vehicles, prevailing geographical & ecological conditions as well as other allied factors which have concern with occurrence of adverse impacts. These mentioned details are the most significant part of EMP as they provide core structure of the EMP. Depending upon the analysis and result of these details proper mitigation measures are formulated before the finalisation of EMP. As the main impacts of the construction phase are envisaged in terms of air pollution only, this natural mitigation would be significantly helpful in elimination of predicted impacts of the phase. However the following principal major impacts to the environment are considered for further planning of mitigation measures:

- Release of construction materials and dust into the environment from the construction site/materials can spoil the surrounding air quality;
- Improper disposal of construction wastes can damage air, water and land quality;
- The use of automobiles and machinery during construction can deteriorate the air quality and generate temporary emission;
- The use of automobiles and machinery generates noise pollution from construction activities;
- Irregular working hours, & traffic, night-working, flood-lighting and transportation damage the socioeconomic balance of surrounding region;
- Effects may occur due to accumulation of the contaminant in water resources & soil due to uptake of construction material;

- Short term changes or exploitation of environment is expected during construction which could affect life style of nearby habitats, health of the human, birds, other terrestrial animals;
- Short term heavy construction might cause increase in noise level;
- Effects on work place condition & human health due to accidents during the construction works;
- Effects on the socio-economic activity due to direct impacts or indirect impacts on socio-economic activities.

The above mentioned points express that heavy construction can contaminate air, land, water and socioeconomic balance of surrounding region but they can substantially be minimised or reduced to significant extent by practising suitable and probable mitigation methods suggested in the EMP. This explains that the EMP acts a core and base structure of these issues and shall be formulated with due and ample care and consideration. A slight negligence in the studying, selecting and implementing process can prove hazardous to abiotic, biotic, social, and economical or other related attributes of the environment. Hence, the areas of major focus of EMP shall be concentrated mainly on operational and maintenance activity of construction phase, deciding proper manner and route of working of the vehicles in order to avoid accidents and hefty traffic, providing suitable facilities and effective conditions to avoid occupational hazards and proper medical aid in case of occurrence of any accident so as to avoid any loss of life.

These were only the negative impacts but one shall never forget that every activity has an effect followed by a side-effect therefore some of the major beneficial impacts to be focused are:-

- Employment opportunities: recruitment of local labourers;
- Trading opportunities: procurement of construction materials locally;
- Clean up operations, landscaping and plantations;

Hence, the construction activities can have some moderate temporary and permanent impacts on site. The short-term impact will be mostly effective during construction phase. The land use and operational amenities might create permanent changes (open plot area to built-up resort & vegetation) on site which will be foreseen for long term. The construction phase activities could have some impacts on on-site noise and air quality, land use and ecology. It might also develop

minor impacts on on-site soils, water quantity & quality. The other impacts of construction phase will be small in magnitude as well as temporary in nature and are expected to wear out gradually once the construction activity is completed. Further, the major and long term impacts can also be reduced and minimized by proper and substantial implementation of mitigation measures. In brief during the construction phase following mitigation measures shall be taken in consideration and implemented to prevent or minimize the respective impacts.

7.4 MITIGATION MEASURES

7.4.1 Land Environment

- The small amount of unused construction material shall be stored in proper area to utilise further in construction activities and surplus excavated material shall be disposed of in suitable pre-identified areas.
- It is suggested that the construction waste containing sand, brick, gravel, cement etc. shall be used for filling or PCC for construction of internal road or project structures.
- Storage & handling of construction materials shall be done properly to avoid spillage or leakage which may cause release of the material in environment causing adverse impacts.
- Appropriate designed closed & properly lined storage area shall be provided for storage of construction materials to prevent land/soil contamination.
- Designated fuel storage & refuelling area shall be provided with impervious lining to prevent land contamination due spill/leak of fuel during storage & refuelling.
- Excavated earth shall be used for filling of low-lying area or construction works as well as landscaping.
- Proper sanitation facilities shall be provided to avoid contamination of land due to dumping of domestic waste as well as disposal of untreated sewage.

7.4.2 Water Environment

- Construction material shall be stored at adequate distance from water storage in order to prevent any chances of accidental leakage or spillage which could pollute water storage.
- Unused construction material shall be stored with utmost care.
- Wherever required impervious lining shall be provided in storage area to avoid accidental mixing.

- Runoff from the construction work shall be properly collected & treated to prevent entry of contaminant arising from construction work/site.
- Spillage or leakage of construction materials can lead to groundwater contamination and hence care shall be taken to minimise the chances of spillage or leakage of construction material.
- Construction materials like Ready Mix Concrete shall be used to prevent impact on water environment.

7.4.3 Air Environment

- To reduce the dust generation on site wherever & whenever required water shall be sprinkled on ground or stock pile of excavated soil.
- Unused construction material shall be stored immediately at designated area.
- Equipments / machineries shall be used efficiently and shall be kept shut in order to reduce air emission, noise pollution and consumption of energy resource.
- Emission from the equipments/machineries shall be monitored on regular basis and possible implementation shall be provided on site.
- Transport vehicles shall be monitored & maintain regularly to control the emission quality and fuel consumption.
- Construction materials would be stored in covered stores or enclosed spaces to prevent chance of airborne construction materials which can lead to air pollution of local area.
- Regular inspection of construction site shall be carried out to ensure regular and timely removal of construction debris to the dumping sites or for recycle/reuse.
- Vehicles used for construction work shall be kept maintained and highly efficient to keep emissions within the permissible limits.
- All necessary equipments/machineries shall be in good condition for proper operation and minimal exhaust/emission.
- Provision of necessary PPEs like face mask & eye-glasses are provided to employees /labours engaged in construction activities.

7.4.4 Noise Generation

- The machineries/equipment used on site shall be of highly maintained so they do work with optimum efficiency generating less noise.

- Operation of machineries/equipment causing high noise level shall not be operated during the night time and all such operations shall be planned for day time only.
- Transportation activities shall not be allowed at night to avoid high noise level in nearby villages/locality. Only in case of emergency the transportation activities shall be allowed at night time.
- The vehicles engaged in construction activities & transportation of materials shall be equipped with the horn of low noise level as recommended by RTO/concern authority to avoid impacts on noise level. Further, adequate silencers must be attached with all vehicles to reduce the noise.
- Construction vehicles, equipments & machinery shall be turned off when not in use.
- Proponent shall ensure that the labours engaged in construction site of high noise area are provided with necessary PPEs.

7.4.5 Biological Environment

- Construction premises shall be kept only on-site basis in order to limit the biological damage.
- Nearby agricultural area shall not be touched in any case by any activity or person engaged in construction activity.
- Regular monitoring shall be conducted to avoid and/or locate any hazards to natural habitats.
- Minimize contamination of each parameter such as air, water etc in order to maintain the biological balance of the site and adjoining region.
- Utmost care needs to be taken with the use of natural resources of site because considerable destruction or bio-magnification of contamination can occur due to imbalance of the habitats.
- Ecological protection plan like greenbelt development shall be formulated and implemented in the very inception of the construction activity.

7.4.6 Social Environment

- Construction activities shall be regulated by adequate safety codes and tools.
- The employees shall be provided with adequate safety equipments.

- Employees/contractors/ person associated with construction activities shall be provided with proper training before starting their works.
- During the construction phase proper traffic management shall be maintained to avoid problems due to the construction activities.
- Proper traffic schedule shall be prepared and made available to all transport officers with adequate guidelines for the traffic management and easy movement on approach road to national & state high ways.
- Employment for the construction work shall be conducted with priority to local villagers.
- Night shift or working hours shall be avoided.
- Any emission generation shall be monitored and possible mitigation measures shall be provided to avoid disturbance in surrounding region.

7.4.7 Miscellaneous Measures

- All activities must be conducted as per the guidelines and methodology / procedure provided by the project authority.
- In addition to the above, environment management cell shall be formulated and the cell shall update the mitigation measure depending on the details of identified impacts as mentioned in EIA Study as well as defined in environmental management record during the construction phase by the officials appointed at site.

7.5 MITIGATION FOR OPERATION PHASE

Not much of environmental impacts are assessed for the operation phase as the current project is limited to beach resort.

7.5.1 Water Environment

Water conservation and development measures need to be taken including all possible potential for reuse and recycling of water. These could be in the form of the following:

- Development of water sources
- Minimising water consumption.
- Promoting reuse of water after treatment

7.5.1.1 Water source development:

Water source development shall be practiced by installation of scientifically designed artificial water recharging structures. As a part of measure, Project Proponent has planned for ground water recharging through rainwater harvesting. Water will be sourced from desalination plant proposed at site. Proper intake and out fall points are proposed for the project. The intake point will have filters to avoid intake of planktons. The out fall point will be provided with proper diffuser mechanism so that the water is diffused at proper ratio in the sea. This no impact is seen due to proposed desalination plant.

7.5.1.2 Minimizing Water Consumption

Water consumption will be minimized by a combination of water saving devices and other domestic water conservation measures. Furthermore, to ensure ongoing water conservation, an awareness programme could be introduced. This is discussed in following section:

a) **Usage*:***

- Use of water efficient plumbing fixtures (ultra flow toilets and urinals, low flow sinks).
- Water efficient plumbing fixtures use less water with no marked reduction in quality and service.
- Leak detection and repair techniques.

b) Horticulture

- Use of low-volume, low-angle sprinklers for lawn areas. Select controllers with adjustable watering schedules and moisture sensors to account for seasonal variations, and calibrate them during commissioning.
- Selecting a drought resistant grass, and using lawn chemicals and fertilizer sparingly also reduces watering needs. Place 3 to 5 in. of mulch on planting beds to minimize evaporation. Promoting reuse of water after treatment & development of closed loop systems.
- To promote reuse and development of closed loop system for water, segregation of two schemes namely (i) Wastewater treatment scheme (ii) Storm water management schemes have been suggested.
- Wastewater shall be reused on site after treatment.
- Treated water is proposed for landscaping. It is estimated that reusing wastewater can save approximately 35 to 40% of potable water per day.

7.5.1.3 Storm Water Management

As discussed earlier, most of the storm water produced on site will be harvested for ground water recharge, thus proper management of this resource is a must to ensure that it is free from contamination. Contamination of storm water is possible from the following sources:

- Waste spills in the solid waste storage area.
- Oil spills and leaks in vehicle parking lots.
- Silt from soil erosion in gardens.
- Spillage of sludge from STP.

Storm Water Management Plan should be developed taking into consideration the above sources and should incorporate following best management practices:

- Regular inspection and cleaning of storm drains.
- Cover waste storage areas.
- Avoid application of pesticides and herbicides before wet season.
- Conducting routine inspections to ensure cleanliness.
- Good housekeeping in the above areas.

The Environmental Management Plan in the operational phase endeavors to mitigate the impacts on the environment in order to meet the statutory requirements.

The wastewater generated from the domestic and the food courts will be treated in a state of art sewage treatment plant with details as below and the treated water will be used for gardening.

7.5.1.4 Sewage Treatment Plant

Process : Activated Sludge Process

Plant capacity : 8.3 m^3/hr

Operation hours : 24 hrs

Disposal

Treated Sewage is proposed to be reused for gardening, toilet flushing etc., within project premises.

7.5.1.5 Land Environment

The philosophy of solid waste management will be to encourage the four R's of waste i.e. waste reduction, reuse, recycling, and recovery (materials & energy). This will result in lesser reliance on land filling.

7.5.2 Noise Environment

Noise from the DG sets will be arrested from the source itself by providing acoustic housing and by providing adequate green belt with in the premises.

7.5.3 Air Environment

To mitigate the impact of pollutants from vehicular traffic during the operational phase of the site, the following measures are recommended for implementation:

- Vehicle emission controls
- Green Belt Development
- D.G.sets operations

7.5.3.1 Vehicle emission controls

Vehicles (Cars, Buses, and Shuttles) to be used On-site should be confirmed to Euro-III norms, which are in force. Regular maintenance of vehicles should be mandatory. Restriction of speed is also helpful in reducing the emission rate. Instead of petrol, the fuels like CNG/LPG could be encouraged.

7.5.3.2 Greenbelt development

Increasing vegetation in the form of greenbelt is one of the preferred methods to mitigate air pollution. Plants generate oxygen, serve as a sink for pollutants, reduce the flow of dust and reduce the noise pollution too.

7.5.3.3 D.G Sets operations

As the DG sets are only back up and they are going to be operated only during power failures the period is going to be very less. The DG sets of 2 No of 1500 KVA capacities will be looped to stack arrangement to facilitate treatment of the flue gases and meet the TNPCB standards.

7.5.4 Biological Environment

Extensive plantation and landscaping is proposed to mitigate any impacts during this phase.

Development of a green belt in and around the building area is an effective way to check pollutants and their dispersion into the surrounding areas. The degree of pollution attenuation by a greenbelt depends on its height and width, foliage, surface area and density, dry deposition velocity of the pollutants and the average wind speed through the greenbelt.

The objectives of green belt management are:

- To create a soothing environment for people to relax

- To cultivate greenery within and outside Resort
- To maintain landscaping by optimal use of resources
- Rain water harvesting
- Garden waste is accumulated in a designated area and used in the organo converter

7.5.4.1 Drip *Irrigation System*

- Drip Irrigation is operated as per schedule.
- Drip irrigation system is used to avoid loss of moisture through evaporation. The trees should be able to thrive under local agro-climatic conditions. In order to have a ground cover, some fast growing species, have been recommended for mass plantation.

7.5.4.2 Plantation & Landscaping

Selection of the plant species will be done on the basis of their adaptability to the existing geographical conditions and the vegetation composition of the region. During the development of the green belt within the project area, emphasis shall be given on selection of plant species like nitrogen fixing species, species of ornamental values, species of very fast growth with good canopy cover etc.

7.5.4.3 Green Belt Development Plan

Plantation has to be taken up suitably keeping in view the landscaping aspects. The selection of plant species for the development depends on various factors such as climate, elevation and soil. The list of plant species, which can be suitably planted, and having significant importance are provided below. The plants should exhibit the following desirable characteristics in order to be selected for plantation.

The species should be fast growing and providing optimum penetrability. The species should be wind-firm and deep rooted. The species should form a dense canopy. As far as possible, the species should be indigenous and locally available Species tolerance to air pollutants like PM, SO2 & NOx should be preferred. The species should be permeable to help create air turbulence and mixing within the belt. There should be no large gaps for the air to spill through. Trees with high foliage density, leaves with larger leaf area and hairy on both the surfaces, and their ability to withstand conditions like inundation and drought. Soil improving plants (Nitrogen fixing, rapidly decomposable leaf litter), Sustainable green cover with minimal maintenance.

The plants that may be considered for greenbelt development are as follows:

- *Erythrina Indica*
- *Spathodea Companulata*
- *Rain Tree*
- *Terminalia Cutappa*
- *Sterculia*
- *Kristagalii*
- *Cocos Nucifera*
- *Tecoma cowdichowdi*
- *Miilingtonia*
- *Caesalpinia Pulcherimma*
- *Gulmohar*
- *Acacia auriculformis*
- *Casuarin equisetifolia*
- *Leucena mercrophulla*
- *Others which are existing*

7.6 OCCUPATIONAL SAFETY AND HEALTH

1. Review of occupational health status is being and will be done at corporate level. Regular monitoring of occupational health will be done for all employees and appropriate action will be taken to set right any problem in areas.
2. Safety is an important component, which has a direct bearing on Productivity and Quality.
3. Safety awareness and motivation will be created through safety training and education programmes for all employees.
4. The proponent will have a well laid out fire-fighting program to employees for taking prompt emergency actions when needed.
5. All the process equipment in the plant will have adequate inbuilt safety control devices for abnormal operations or parameters.
6. Safety rules / norms will be strictly adhered to in order to minimize chances of accidents (fire). Maintenance of electrical equipment will be undertaken after checking out whether all fire prevention measures have been followed.

7. All fire fighting equipment will be periodically checked and serviced as per manufacturer's guidelines.
8. Emergency communication systems will also be periodically tested. All deployed personnel will be trained in basic fire fighting and first aid. Emergency evacuation drills will be periodically carried out so that all personnel are fully aware of his/her role.
9. Copies of the contingency plan will be displayed at prominent places on boards.

7.7 ENVIRONMENTAL MANAGEMENT SYSTEM

Implementation of Environmental Management System includes

1. Management Commitment
2. Environmental Review
3. Implementation of Environmental Management System through Environmental Management Cell.
4. Setting Environmental Policy and objectives
5. Following as per Environmental Policy and upgrade the objectives after attaining the targets.
6. Conducting Environment Management Programme
7. Periodical Environment Management reviews to be conducted and records to be maintained.

7.7.1 Management Commitment

The Top management should establish an environmental policy and review it for the eco friendly environment. Many activities should be done in order to achieve the environmental objectives.

7.7.2 Environmental Review

The plant persons initially should identify the existing status of environment. Based on the various environmental management practices to be followed as per the regulatory requirements, the members of the environment Management Cell should identify the problems and rectify them, which also should be maintained in a record for future verification.

7.7.3 Environmental Management Cell

An environmental management cell (EMC) will be looking after all the environment-related activities in the piperack route. This cell will be responsible for regular environmental quality monitoring, proper operation of pollution control equipment and Liaison with regulatory bodies like TNPCB.

Functions of EMC

The EMC will be responsible for the following;

- To maintain the greenbelt
- To meet the regulatory requirements stipulated with consent orders (Air, water and hazardous waste) of CPCB / TNPCB.
- To conduct yearly environmental audit and submit environmental statement to TNPCB.

7.7.4 Setting Environmental Policy and Objectives

Environment Management Cell should develop a policy for the improvement of the environment and the proposed piperack project. The environment Policy and objectives should comprise of occupational health and safety policy, existing environment management activities and improvement activities, activities regarding sustainable development.

7.7.5 Environment Management Programme

The establishment of an environment management programme is to achieve the environmental policy and objectives. This programme can be conducted by a Management Representative who should continually monitor the activities going on in the environment and should maintain a record for the environmental management procedures and implementation.

7.7.6 Environment Management Audits and Records

Audit shall be conducted, to identify whether the activities are compiling with the environment policies and objectives. Hence, Audit findings should reveal

- Effectiveness of EMS
- Identify and record any problems inherent in the system
- Any failure in compliance and its corrective and preventive action
- Make recommendations for remedial action
- Inspection and maintenance reports
- Environmental training records, etc.

These findings should be maintained as records and the top management should review the audit report and take necessary actions for the Environmental Management.

7.7.7 Implementation of Environmental Management Plan

The proposed project should implement and maintain an Environmental Management plan in order to mitigate the possible impacts generated by the proposed project activities. The responsible personnel should review the environmental management practices and improve the quality of environment through various objectives.

CHAPTER

8.SUMMARY & CONCLUSION

The Environmental Impact Assessment report studied the proposed project and assessed its predicted impacts on land, water, air, soil and biological environment of the region. The proposed project was found to be complying with all the environmental, health and safety standards, and is planning to use efficient and advanced technologies to reduce its air emission. It has also laid down solid plans to monitor and combat any disaster or emergency situation in the project.

Social, Economical and Environmental benefits of the project:

The following benefits are anticipated from the proposed project

- Entire sewage generated will be treated in STP. Treated wastewater will be reused for cooling, gardening and flushing purpose.
- Rain Water Harvesting is proposed to recharge the ground water table.
- Solid Waste Management will be practiced. Organic waste will be treated in organic waste converter and resused as manure.
- Non Conventional Energy sources will be used to minimize energy consumption.
- Positive Impact on Social conditions in and around the site.
- Additional employment opportunities to society at large.
- Extensive Green belt development enhances the aesthetic view.
- Increase in Business development due to the proposed resort.

CHAPTER

9.DISCLOSURE OF CONSULTANTS ENGAGED

Details of the consultancy and consultants are as follows.

Table -35 Details of the Consultant

Consulant	Hubert Enviro Care Systems Pvt Ltd, Chennai
Nabet Certificate No	NABET/ EIA/ 1013/ 041 (certificate attached)
EIA Coordinator	Dr J R Moses & Dr. Rajkumar Samuel
Address	No.18, 92nd Street, Ashok Nagar, Chennai-600 083

9.1 Accreditations & Certifications of Hubert Enviro Care Systems Pvt Ltd

1) National Accreditation Board for Testing and Calibration Laboratories (NABL) accreditation for Laboratory services for ISO17025
2) ISO 9001:2008 qualified and certified
3) Environmental Management System complying ISO 14001:2004 certified
4) Occupational Health & Safety Management System complying OHSAS 18001:2007 certified
5) Approved Environmental Monitoring Laboratory for all ISO 14001 accreditation agencies viz BVQI, TUV, ISI, NQA etc.,
6) National Accreditation Board For Education & Training (NABET) for Environmental Impact Assessment (EIA) Studies
7) Approved by varios state PCB.
8) Achilles joint qualification system. Achilles Id.15148
   Kiwa Quality Management System

भारतीय गैर न्यायिक

एक सौ रुपये Rs. 100

रु. 100 ONE HUNDRED RUPEES

सत्यमेव जयते

भारत INDIA

INDIA NON JUDICIAL

தமிழ்நாடு தமிழ்நாடு TAMILNADU

BA 109220

N. JYOTHI SELVAM
L.No. 09/CH(S)2006.Dt:19.11.2006
#21[illegible] 7th CROSS STREET,
PARAMESWARAN NAGAR,
SHOLINGANALLUR, CHENNAI-6[illegible] 118

24 NOV 2015

M/s. Dual Structurals & Ind. (P) Ltd., Chennai - 600041.

AFFIDAVIT ON WATER REQUIREMENT MET FROM DESALINATION PLANT

I, A.Anjaiah, Director and Authorized Signatory of **M/s Dual Structurals and Industries Pvt. Ltd.**., having the registered address at **3/355, AGS Colony extension, Venkateswara Nagar, Kottivakkam, Chennai-600 041**, undertake and commit to the MoEF & CC that for the proposed **"Beach Resort" Located at Kadalur Village Cheyyur taluk, Kancheepuram District, Tamil Nadu** under appraisal by Expert Appraisal Committee, MoEF, New Delhi, hereby solemnly affirm and state as follows

i. We are going to install desalination plant for the proposed beach resort project. The fresh water requirement of 40 KLD will be met from the desalination plant that will be installed.

ii. There will not be any ground water extraction by us anywhere without approval from the concern authorities for the project either in the construction or operation phase

Place: Chennai

Date: 28.12.15

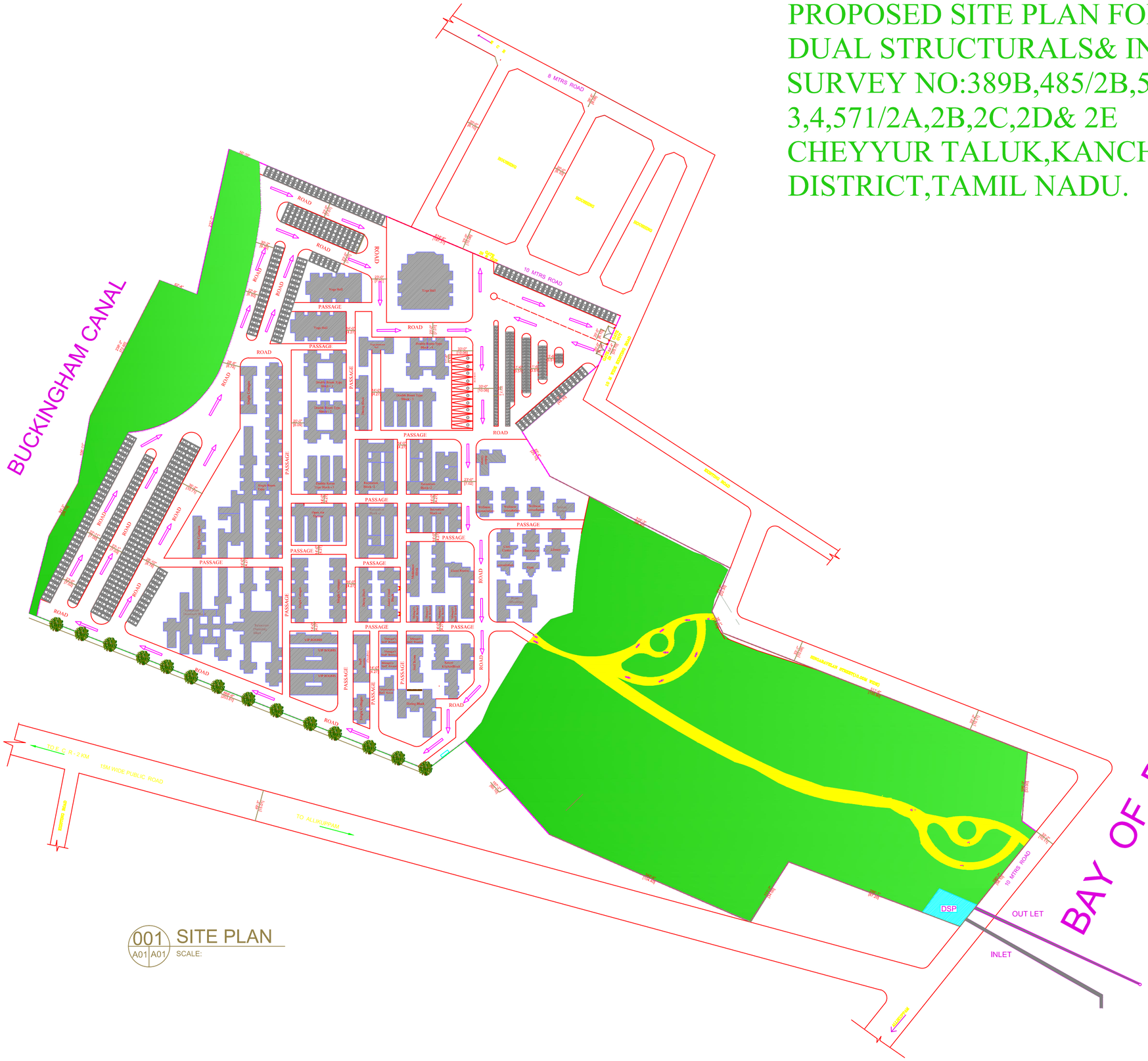
Signature of Authorized Person

Before me 28.12.15

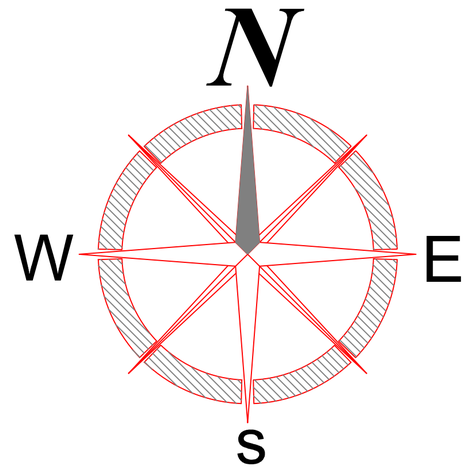
NOTARY S.K.D. BABU Chennai City G.O.Ms.No.136 Law Dept. Dt. 07.10.2014 GOVT. OF TAMILNADU

S.K.D. BABU
Advocate & Notary
No.,60/33, 4th Main Road,
C.I.T. Nagar,
Chennai - 600 035.

PROPOSED SITE PLAN FOR BEACH RESORT BY DUAL STRUCTURALS& INDUSTRIES PVT LTD AT SURVEY NO:389B,485/2B,556/1A2,1C,2B,3B,557/1B, 3,4,571/2A,2B,2C,2D& 2E AT KADALORE VILLAGE CHEYYUR TALUK,KANCHEEPURAM DISTRICT,TAMIL NADU.



001 A01 A01 SITE PLAN
SCALE:



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	ROAD
	CAR PARK
	BUS PARK BAY
	TWO WHEELER
	TREE
	BUILDINGS
	DSP

DUAL STRUCTURALS & INDUSTRIES (P) LTD.,
BUILDERS & DEVELOPERS
3/355, Venkateswara Nagar, AGS Colony Extn., (Beach Road)
Kottivakkam, Chennai - 600 041. Telefax : 044 - 2451 2480
e-mail : aa.dual@gmail.com, www.dualgroup.in

DUAL

29.12.2015

The Member Secretary,

TNSCZMA and Director, Dept of Environment,

Ground Floor,

Panagal building,

Saidapet, Chennai – 600 015

Sub: Submission of Anna university drawing with super imposing of desalination plant location for the proposed "Beach Resort" by M/s Dual Structuralss & Industries Pvt Ltd Located at Kadalur Village Cheyyur taluk, Kancheepuram District, Tamil Nadu– reg

Ref: 1.File No: 11-28/2015-IA-III

2.153rd EAC meeting minutes

Dear Sir,

In connection to the above subject & reference we herewith please find enclosed Anna university drawing with super imposing of desalination plant location for the proposed "Beach Resort" by M/s Dual Structuralss & Industries Pvt Ltd Located at Kadalur Village Cheyyur taluk, Kancheepuram District, Tamil Nadu.
Kindly acknowledge the same.

Thanking you

Yours faithfully

For Dual Structuralss & Industries Pvt Ltd

Director

Received
29/12/2015
CS. PANDIAN
Superintendent

29 DEC 2015