

# Environmental Impact Assessment for Infrastructure Development project in Chennai

Porkodi S<sup>1</sup>, Valarmathi S<sup>2</sup>

<sup>1</sup>PG student, Civil Engineering, DR MGR University, Tamil Nadu, India

<sup>2</sup>Assitant Professor, Civil Engineering, DR MGR University, Tamil Nadu, India

\*\*\*

**Abstract** - Environmental impact assessment study for medical and engineering colleges in Chennai-Tamilnadu. Based on the TOR issued by the SEIAA, the Rapid Environmental Impact Assessment Report has been prepared for the Existing and Proposed expansion of Institution, "Deemed University" (Medical College & Hospital Engineering College, College of Engineering & Technology and School of Architecture) at S.Nos. 78/3, 79, 80, 81, 82/1, 82/2, 83/1A, 83/2, 84, 85/2, 86/4B, 88/1, 88/3, 299 of Mevalurkuppam Village and S.Nos. 300, 301, 302, 303/1, 303/2, 303/3, 303/5, 304, 305/3B, 305/3B, 305/4, 306, 308 of Chettipedu Village, Sriperumbudur Taluk, Kanchipuram District by Medical and Educational Trust. Major environmental attributes has considered identifying the Impacts and providing solutions with mitigation measures. Mainly covered Water, noise and solid waste management sector.

**Keywords:** Water, Noise, solid waste, impact, mitigation measures & EIA

## 1. INTRODUCTION

One of the Medical and Educational Trust proposes to expand its Institutional Buildings in Mevalurkuppam & Chettipedu villages, Sriperumbudur Taluk, Kanchipuram District in the state of Tamil Nadu. The project proponent proposes to obtain Environmental Clearance for the land area of 5, 03,914.56 Sqm (124.51 acres) and the built up area of 2, 90,710.17 Sqm (Existing Buildings – 2, 48,516.13 Sqm & Proposed Buildings – 42,194.04 Sqm). The proposed project falls under 8(b) category as per MoEF, EIA Notification, and 14th September 2006. Hence it is required to submit TOR and Rapid Environmental Impact Assessment (REIA) study as per State Environmental Impact Assessment Authority, Chennai.

In this regards, Medical and Educational Trust, Chennai has engaged for preparing Rapid Environmental Impact

Assessment (REIA) study and to prepare the Environmental Management plan for the proposed development for obtaining the Environmental Clearance for their proposed building construction project from the State Environmental Impact Assessment Authority (SEIAA), Chennai.

## 1.1 Land Details

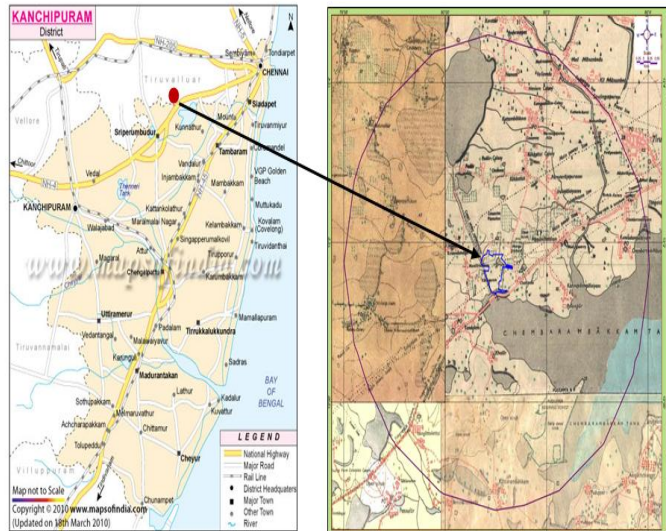
Table-1 – Land details

Land Description:	
Total Plot area (Sqm)	5,03,914.56 Sqm (124.51 acres)
Total Built up area (Sqm)	2,90,710.17 Sqm
Plot/Survey/Khasra No	S.Nos. 78/3, 79, 80, 81, 82/1, 82/2, 83/1A, 83/2, 84, 85/2, 86/4B, 88/1, 88/3, 299, 300, 301, 302, 303/1, 303/2, 303/3, 303/5, 304, 305/3B, 305/3B, 305/4, 306, 308
Village	Mevalurkuppam & Chettipedu villages
Taluk	Sriperumbudur Taluk
District & State	Kanchipuram & Tamilnadu

## 2. VARIOUS ENVIRONMENTAL ATTRIBUTES

### 2.1 Project Location

Picture-1 – Location info



### Details of Environmental Setting

Table-2-Enviro Setting

S. No.	Particulars	Details
1.	Latitude	13° 1'27.49"N
2.	Longitude	80° 0'56.02"E
3.	Total Plot Area	5,03,914.56 Sqm (124.51 acres)
5.	Nearest Highway	NH - 4
6.	Nearest Railway Station	Pattabiram (11.70 km)
7.	Nearest Airport	Chennai Airport (16 km)
8.	Nearest Harbor	Chennai Harbor (38 km)

### 2.2 Site Selection and Planning

The project site is owned by Medical and Educational Trust, Chennai. The project site is in Mevalurkuppam & Chettipedu villages and it is classified as Primary Residential Zone by the Chennai Metropolitan Development Authority. The site selection was done based on proximity to local communities, existing drainage pattern, ecologically sensitive areas, Geo technical report has been covered in the EIA study.

### 2.3 Project objectives

The total land area of proposed expansion of Institutional Buildings complex is 5,03,914.56 Sqm (124.51 acres). Project consists of institutional buildings for Medical College & Hospital, Engineering College, College of Engineering & Technology, School of Architecture and other related facilities planned for the development include Sewage Treatment Plant, power, captive power generation (DG back up) and landscapes. The Area split up and space utilization details for the existing and proposed developments are given in the following sections.

### 2.4 Land Area Breakup -Total activity area

Description	Area (in Sqm)
Description	Area (in Sqm)
Total Land Area	5,03,914.56
Total Ground Coverage Area of Buildings (14.19%)	71,513.69
Roads and Pavement Area (9.56%)	48,151.68
OSR area (10.00%)	50,391.45
Greenbelt – Garden Area (15.29%)	77,038.88
Utilities area covering STP, ETP, Transformers, Substation, SWM facility (0.62%)	3,114.55
Parking Area (4.43%)	22,312.50
Open Area (45.92%)	231,391.81

Table-3 – Land area

## 2.5 Attributes with Detailed analysis

Table-4 – Attributes info

Name of the Attributes	Detailed analysis	Name of the Attributes	Detailed Analysis
Land Environment	Topography	Biological Environment with assessment	Objectives
	Soil Characteristic		Flora
	Methodology & sampling		Fauna
	Geology & Hydrology		Biological Enviro assess for flora/fauna
Air Environment	Meteorology	Ecology	Methodology
	Methodology & Sampling		Flora
	Data Analysis		Fauna
	Temperature		Point survey methods
	Relative Humidity		Road side count
	Wind speed and Direction		Pellet and track counts
Noise Level Study	Identification of sampling location	Description about the study sites	Core Zone
	Method of monitoring		Buffer zone
	Observation of ambient noise levels		Assessment of flora in the study area
Water Environment	Sampling and analysis	Assessment of flora/fauna in the study area	Plant communities
	Water requirement		Stratification
	Water balance with usage summary		Periodicity / vitality
			IVI-Plant data
Rainwater Management	Construction phase	Solid waste management	Biodegradable waste
	Operation phase		Non bio degradable waste
	Rain harvest pit-Roads/land		Bio medical waste

## 2.6 Noise Level study

The physical description of sound concerns its loudness as a function of frequency. Noise in general is sound, which is composed of many frequency components of various loudness, distributed over the audible frequency range. Various noise scales have been introduced to describe, in a single number, the response of an average human to a complex sound made up of various frequencies at different loudness levels. The most common and universally accepted scale is the A weighted Scale which is measured as dB (A). This is more suitable for audible range of 20 to 20,000 Hz. The scale has been designed to weigh various components of noise according to the response of a human ear. The impact of noise sources on surrounding community depends on:

- Characteristics of noise sources (instantaneous, intermittent or continuous in nature). It can be observed that steady noise is not as annoying as one, which is continuously varying in loudness;
- The time of day at which noise occurs, for example high noise levels at night in residential areas are not acceptable because of sleep disturbance; and
- The location of the noise source, with respect to noise sensitive land use, which determines the loudness and period of exposure.

### Ambient Noise Level of the Study Area

Table-5- Noise level data

Location Code	Name of the Location	Noise Level (dBA)		
		Leq (Min)	Leq (Max)	Leq (Avg)
N 1	Project Site	53.0	54.0	52.0
N 2	Palanjur Village	45.0	49.0	44.0
N 3	Irulapalayam village	49.0	55.0	42.0
N 4	Tandalam village	53.0	54.0	51.0

- 1) \* - The Noise Pollution (Regulation and Control) Rules 2000 – Ambient Air Quality Standards in respect of Noise.

## 2.7 Water environment Study

## 2.8 Solid level study

Table-6 – Water Analysis report

Table-7- Solid waste generation

S. No	Parameters	W1 Mg/l	W2 Mg/l	W3 Mg/l	Required/Limit IS 10500/2012	
					Require	Permissible
1	pH at 25°C	7.0	7.10	7.20	6.5-8.5	--
2	Total alkalinity	186	152	169	200	600
3	Total Hardness	280	150	340	200	600
4	Chloride (as Cl)	163	136	147	250	1000
5	Sodium	78	62	78	--	
6	Potassium	4	2	3	--	
7	Salinity	0.6	0.5	1.0	--	
8	Nitrate	8	2.5	11	45	No Relax
9	Calcium (as Ca)	26	21	79	75	200
10	Magnesium (as Mg)	52	12	30	30	75
11	Sulphate (as SO <sub>4</sub> )	42.1	39	57	--	--
12	Total nitrogen	BDL	BDL	BDL	45	No Relax
13	Total phosphorus	BDL (DL: 0.1)	0.16	BDL (DL: 0.1)	--	---
14	DO	5.5	6.0	5.4	4.0	--

Description	Total solid Waste generation Kg/day	Total Bio Degradable Waste generation Kg/day	Total Non Bio Degradable Waste generation Kg/day
Medical College and Hospital	2211	1327	885
Engineering college	919	552	368
School of Engineering	1256	754	503
School of Architecture	92	55	37
Total	4479	2687	1792

Per capita solid waste generation for residential is 0.6 kg / capita / day and for other working population it is 0.2 kg/capita/day.

Source: Central Public Health and Environmental Engineering Organization (CPHEEO).

### 3. RESULTS AND DISCUSSIONS

#### 3.1 study about impacts and Mitigation Measures

As seen from the water quality result Table, Calcium and Magnesium content varies between 79 to 21 mg/l and 52 to 12 mg/l respectively.

Total hardness and alkalinity expressed as CaCO<sub>3</sub> ranges between 340 to 150 mg/l and 186 to 152 mg/l respectively. The study area is fast developing commercial and residential area the extraction of ground water is envisaged in huge quantity, the proper rain water harvesting and storm water drains has been designed in the project site to increase the recharge potential of rain

water to increase the level of ground water and to improve the quality of ground water in the core area.

**Water Requirement/Usage Summary:**

Total water requirements : 1102.69 KLD

Total Daily fresh water required : 689.73 KLD

- Daily fresh water requirement for Domestic use : 589.73 KLD
- Daily fresh water requirement for Lab & Operation Theatre use : 72.00 KLD
- Daily fresh water requirement for Laundry use : 28.00 KLD

Water requirement for flushing : 412.97 KLD

Gardening water Requirement : 270.00 KLD

**Actual water requirement for Gardening:**

Area for Green belt development × 3.5 Its

= 77,038.88 Sqm × 3.5 Its/ Sqm = 269636.08 Its

**Rainwater Management:**

Rain Harvest Pit - Roads / pavements and landscape:

Design parameters:

Total Plot Area considered : 5, 03,914 Sqm.

Total Roads and Pavement : 70,463 Sqm.

Total Landscape Area : 77,038 Sqm.

Total Roof Area : 71,513 Sqm.

Intensity of rainfall considered in Chennai is 1000 mm per year

Co-efficient of runoff considered for roof area : 0.90

Co-efficient of runoff for road/paved : 0.75

Co-efficient of runoff for landscape area : 0.25

Hence, the total quantity of rainfall will be  $q = a \times p \times r$

$q$  = quantity of rainwater run-off in cum / hr.

$a$  = area of catchments drained in Sq. mtr.

$p$  = permeability factor

$r$  = rainfall intensity in m / yr.

Hence, total volume of rainwater run-off will be : (a) + (b) + (c) = 1, 36,468 Cum. /yr

Run-off during peak rainfall is (considering rainfall rate of 100mm/ day) = 11,372 cum/day

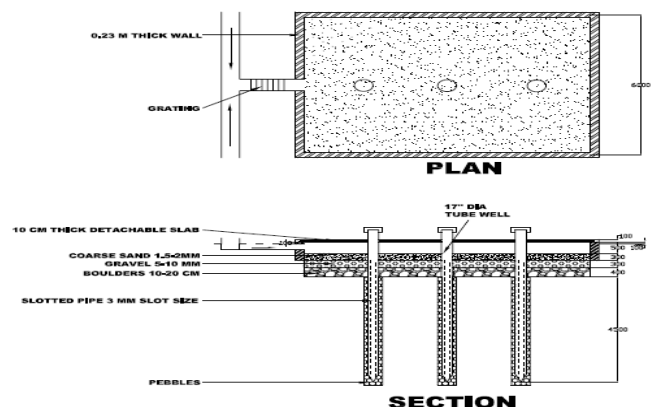
However, the rainwater collection drain and recharge pit is designed for highest hourly peak flow according to the site condition.

Rain Harvest Pit - Roads / pavements and landscape

Table-8

Description	Area in Sqm	Coefficient runoff	Rainfall intensity in m	Total Rainwater Runoff Cum.yr
Roof area	71,513	0.90	1	64,362
Roads & Pavement	70,463	0.75	1	52,847
Landscape & Green Area	77,038	0.25	1	19,260
Total				1,36,468

Picture-2



### 3.2 Solid waste management:

Total bio waste generation : 0.20 Tons/day  
 OWC model proposed : OWC 300  
 Waste treatment per batch : 125 kg  
 Time taken for each batch : 15 - 20 min

Table-9 – Nature of waste

S. No	Description	Quantity (Tons/day)	Mode of treatment / disposal
1	Biodegradable waste	2.68	Proposed to be treat part of solid waste in organic waste converter and used as manure in gardening and remaining waste will be treated in bio-gas plant
2	Non biodegradable waste	1.79	Sent to authorized recyclers or local bodies for disposal
3	Bio-medical waste	0.33	Sent to authorized BMW management facility for disposal
4	STP sludge	1.00	Proposed to be treat in organic waste converter and used as manure in gardening
5	ETP sludge	0.10	Proposed to be treat in organic waste converter and used as manure in gardening

Mode of treatment and disposal:

### 3.3 Environmental management plan

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

Table-10 – EMP plan

Sl. No	Description	Frequency of Sampling and Analysis
Construction Phase		
1	Ambient Air Quality	Once in three month
2	Stack Emission from DG set	Once in three month
3	Ambient Noise Level	Once in three month
4	Soil Quality	Once in three month
5	Ground Water	Once in three month
Operation Phase		
1	Ambient Air Quality	Once in three month
2	Stack Emission from DG set	Once in three month
3	Ambient Noise Level	Once in three month
4	Treated Sewage	Once in a week

#### 4. CONCLUSIONS

The proposed project is an Institutional building construction project. During construction and operation phases there may be minor environmental issues of air, water and soil pollution.

During construction phase air pollution may be due to dust, vehicular movements by transportation and material handling, etc and during the operation phase emissions may occur from the diesel generators.

Water Pollution is not much significant due to this proposed project since proper waste water management is proposed to be carried out.

Also, the noise generated during construction and operation phase caused due to vehicular movements and machineries will be minimized using proper adequate preventive measures.

Further, the proposed project will include proper solid waste management techniques which would prevent the environment from any adverse effects caused due to solid waste generated from the proposed project site.

#### REFERENCES

- [1] Canter, L. W. 1996 Environmental impact assessment, McGraw Hill, Newyork, NY
- [2] India Institutes of technology - Patiyala- Ropar- TOR – For building expansion project.
- [3] Environmental Impact Assessment (EIA) and Construction Amit Bijon Dutta<sup>1</sup> and Ipshita Sengupta<sup>2</sup> 1Mecgale Pneumatics Pvt. Ltd, N-65 Hingna MIDC, Nagpur 440016, MS, INDIA - ISSN 2319-1414
- [4] WHO – rapid assessment of sources of air, water and lead pollution, WHO offset publication No 62, World health organization, Geneva
- [5] Environmental impact assessment of building construction systems Reto Camponovo, Catherine Merz and Laurent Vorlet LEEA, Laboratory Energy Environment Architecture EIG, Ecole d'ingénieurs de Genève Hes-so, Geneva, Switzerland

#### BIOGRAPHIES



Mrs. S. Porkodi working as a Category manager with Capgemini, handling North American projects with 11+ years of experience in strategic sourcing field. Porkodi has a special interest in environmental subjects and she presented “plastic waste management” paper in International conference for new handling methods. Currently she focuses on Environmental impact assessment for Chennai and surrounding industrial areas to identify & mitigate the pollution with other hazardous waste. Basically she is a Chemical Engineer with masters in labor management.

Correspondence to:  
kodipunnagai@gmail.com