FEASIBILITY REPORT

FOR

THE EXPANSION OF CHENNAI AIRPORT

BY

AIRPORTS AUTHORITY OF INDIA,

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SAFDARJUNG AIRPORT,

LODHI ROAD, NEW DELHI

1.0 PREAMBLE

Madras International Airport is situated at Tirisulam, 7 Km south of Chennai. It has two terminals, Kamaraj Domestic Terminal (KDT) and Anna International Terminal (AIT).

Chennai Airport is the city's airport for both domestic and international flights and is the third busiest (after Mumbai and Delhi) in India.

Understanding the importance of Chennai as a national and international tourist destination, the Airport Authority of India has authorized the construction of the Kamaraj Domestic Terminal Phase II and for the expansion of existing Anna International Terminal and face lifting of the existing facilities at Chennai Airport.

The works are carried out by the Airports Authority of India and include the creation of a parallel runway, taxiways, aprons and new passenger handling buildings. The expansion works will involve the acquisition of land in nearby areas. The expansion of the existing airport would be taken up at Manapakkam, Kolapakkam, Kerugambakkam and Tharapakkam in Sriperumbudur taluk after a resolution to this effect was adopted by at the secretariat.

The government would provide suitable compensation to 947 households in these areas and also rehabilitation to them. The rehabilitation of the households would be done in the first phase of the expansion work itself.

1.1 Project Cost

S.No	Description	Cost
1.	Proposed new domestic, modification / extension international Terminal, Face Lifting Existing International / Domestic Terminals, City Side Development & Multilevel Car Park	1273.0 Crores
2.	Cost of extension of cross runway, Culverts, Taxi Tracks & Apron.	535.0 Crores
	Total Project Cost	**1808.0 Crores**

1.2 Details of the proposed site

Following are the details regarding the expansion project site.

a) Archaeological monuments

The location does not have any archaeological monuments in nearby 10km radius.

b) Biological resources

It was found during study period that the location is devoid of any endangered flora and fauna in 25km radius.

c) Cultural Monuments

This unit does not have any cultural monuments within the area of 25 km radius.

d) Defence

There is no defense installation within 25 km radius of this unit.

e) Employment Generation

This unit will generate the employment in the immediate surroundings of the people during the construction period.

f) Geography

The location is geographically suitable for airport expansion activity, and the project will not be disturbed by climatic and other geographical condition.

h) Socio-economic

The unit will improve the economy both at national and international level.

i) Meteorology

Both micro and macro meteorology is found to be suitable for this expansion project.

j) Natural disaster

The area is devoid of natural disasters like earthquake, cyclone, landslides etc.

k) Sensitive area

The location does not have any sensitive area as identified by MoEF in 25km radius.

l) Power

The power would be sourced from State Electricity Board from near by sub station. For the existing airport 7.5 MVA electrical load was utilized and for the proposed airport expansion project 18 MVA will be required during its operational phase.

n) Land use classification

Tamil Nadu government has recognized the location of this project site as unclassified zone suitable for expanding the existing airport.

2.0 PROJECT LOCATION

The expansion of the existing airport at Meenambakkam would be taken up at Manapakkam, Kolapakkam, Kerugambakkam and Tharapakkam villages in Sriperumbudur taluk, Kancheepuram District, Tamil Nadu. The location of this project is shown in Figure 2.1 (A) & 2.1 (B).

2.1 Area Details

The existing airport has G+ 1 floor for international and domestic terminals each. In the proposed expansion of the airport domestic terminal has Basement + 3 floors and international terminal has Basement + 3 floors. The area details for this project are listed as follows:

S.No	Description	Building footprint	Built up area	
			Existing	***Expansion***
1	Domestic Terminal	17,050 m^2	19,250 m^2	68,900 m^2
2	International Terminal	12,991 m^2	42,300 m^2	58,600 m^2
	Total	**30,041 m^2**	**61,550 m^2**	**1,27,500 m^2**

2.2 Parking Area

In the existing airport, surface parking of 41,000 m^2 area was provided. In the expansion project there would be covered Multi Level Car Park for 2400cars having floor plate area 30, 000 m^2 and total covered area of 1 00 000 m^2 .The multilevel car park has been provided with Green Landscape on the top to reduce head gain at the airport. The number of car parking details is listed below:

S.No	Description	No. of Cars		No.of.Taxis	
		Existing	***Expansion***	***Existing***	***Expansion***
1	Domestic Terminal	500	1200	100	600
2	International Terminal	500	1200	100	600
	Total	**1000**	**2400**	**200**	**1200**

Figure 2.1 Satellite Imagery of the Project

3.0 Water Consumption (After Expansion)

Total water requirement:

Domestic Terminal

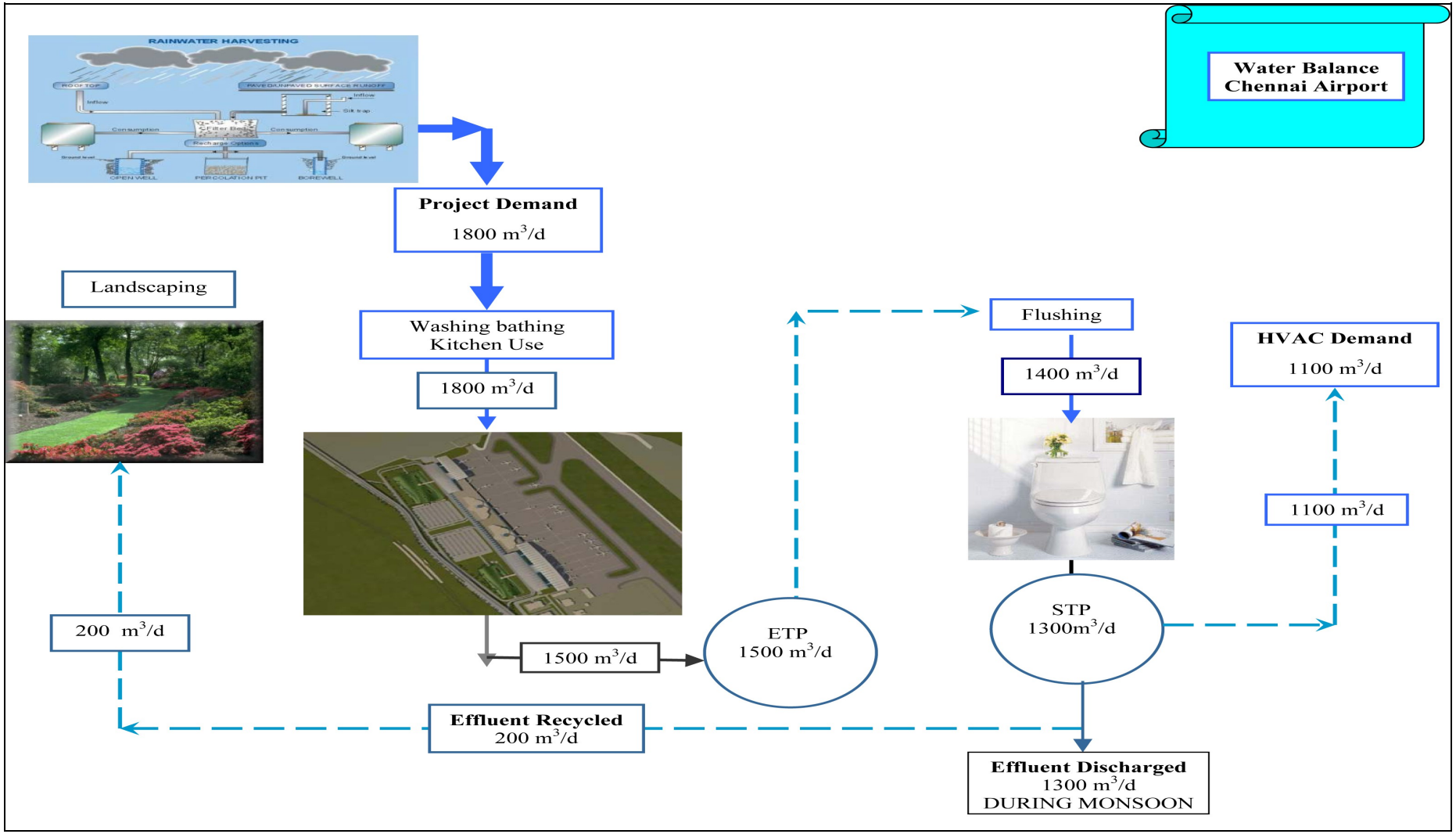
S.No.	Description	Population (Nos)	Water Requirement (Per unit)	Total Water
1	Total No. of passengers	27,400	70	19,18,000
2	Total No. of visitors	27,400	02	54,800
3	Maintenance & other staffs	750	50	37,500
	For air conditioning purpose (Recycled Water from ETP)			6,50,000
	For Evaporation purpose			10,000
	For Horticulture purpose (Recycled Water from ETP)			1,00,000
	Water Requirement (Domestic)			**27,70,300 (L/day)**

International Terminal

S.No.	Description	Population (No)	Water Requirement (Per unit)	Total Water
1	Total No. of passengers	7950	70	5,56,500
2	Total No. of visitors	15,900	02	31,800
3	Maintenance & other staffs	500	50	25,000
	For air conditioning purpose (Recycled Water from ETP)			4,50,000
	For Evaporation purpose			10,000
	For Horticulture purpose (Recycled Water from ETP)			1,00,000
	Water Requirement (International)			**11,73,300**
	Total water requirement			**3944 m^3/day**
	Total water requirement (Considering 10 % excess)			**4500 m^3/day**

Water Balance Chart:

The schematic representation of water consumption is given below:



Source of Water

It is expected that part of the daily domestic water requirement for the Terminal Building shall be through municipal mains supply. Since it is unlikely that municipal authorities would be able to meet the total daily requirement, it is proposed to provide 4 number tube wells in the complex to supplement domestic water requirement on-need basis.

4.0 WASTEWATER DETAILS

From the expansion project, wastewaters of about 2500 m^3/day will be produced and they are treated in the effluent and sewage treatment plants.

Effluent Treatment Plant

We shall provide effluent treatment plant with capacity of 1500 m^3 per day and the treated effluent shall be of a quality suitable for use as flushing water in WCs.

Sewage Treatment Plant

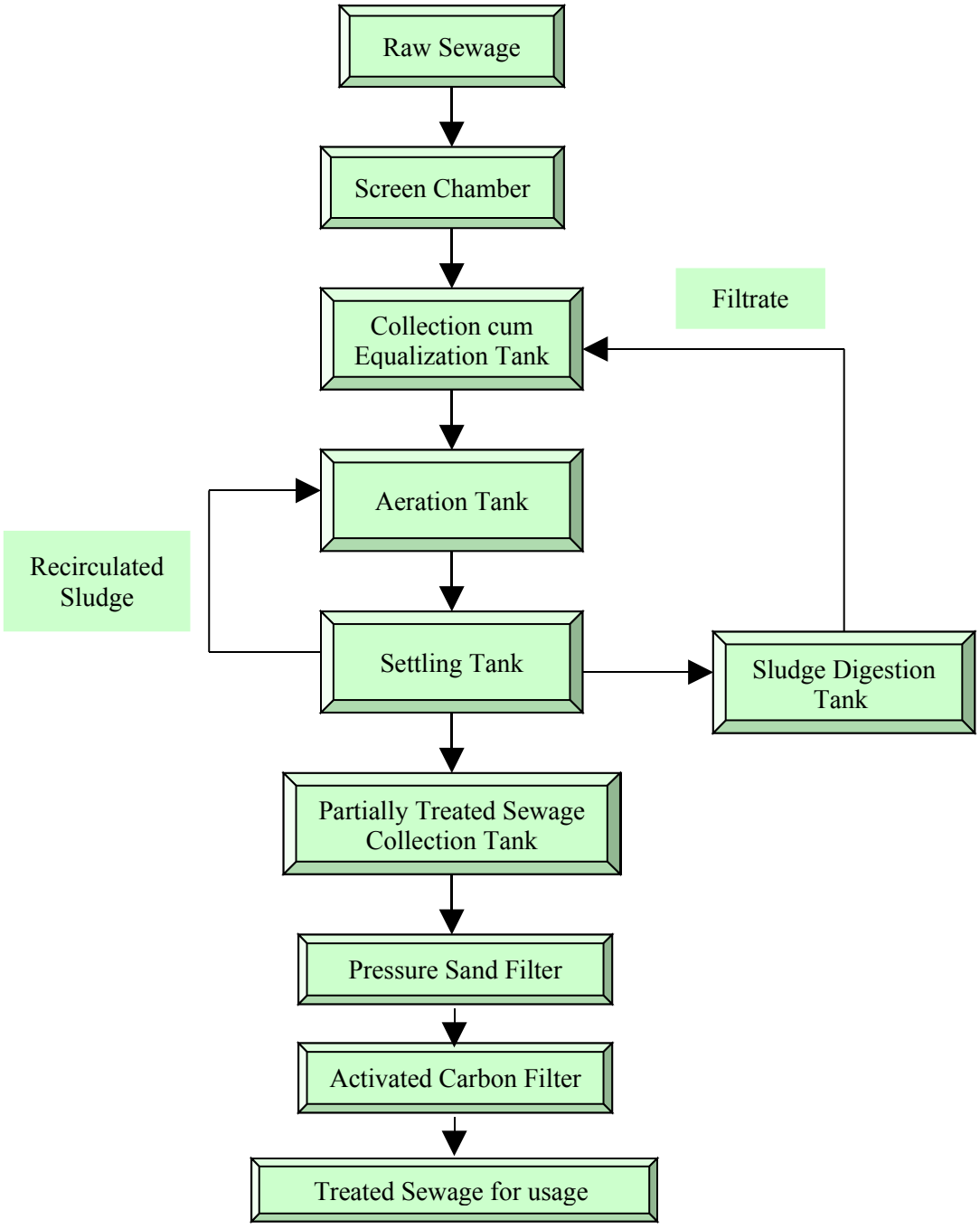
We shall provide sewage treatment plant with capacity of 1300 m^3 per day and the treated effluent shall be of a quality suitable for use as make-up water in cooling towers of air conditioning system and of DG sets and for horticulture.

i. Plant Details

It is proposed to use activated sludge process working on the principle of extended aeration based on a Diffused Aeration System. The treatment flow chart is given in Figure 4.1

Raw Sewage will flow through a bar screen chamber to an Equalization Tank. The bar screen shall be so designed that it can be cleaned manually from outside the Tank. Two submersible solid handling pumps shall be provided in the Equalization Tank to pump the collected Raw Sewage to the Aeration Tank. An automatic level controller shall be provided in the Equalization Tank to turn the pump off at the low water level in the Tank and so to start the pump automatically when water level is high.

4.1 Process flow sheet for Sewage Treatment Plant (STP)



Air will be introduced in the Equalization Tank through submerged air diffusers, to prevent the sewage from becoming septic during long retention or low load conditions.

The Raw Sewage that comes into the Aeration Tank shall be aerated by using Fine Bubble Diffusers mounted in a grid at the bottom of the tank. Facility will be made to pull up the Diffusers for cleaning if necessary. Air will be supplied to the diffusers by twin lobe rotary air blowers located in the plant room. The aeration system shall be designed in a way so as to achieve complete mixing of the sludge organisms with raw sewage in order to achieve a MLSS of between 3000 – 4000 mg/l in the Aeration Tank.

Form the aeration tank this mixed liquor passes into a Settling Tank. The liquid in the settling tank is maintained in quiescent condition allowing the solids to settle to the bottom of the clarifier for collection.

The accumulated solids (Activated Sludge) shall be consistently pumped back into the aeration tank by sludge recycle pumps. This return sludge undergoes further digestion in the aeration tank and also provides the active organism needed to digest the incoming raw sewage.

Excess sludge from the bottom of the settling tank shall be wasted into an adjoining aerobic digester cum thickener tank. In this tank sludge shall be aerated. The air shall be shut off periodically and supernatant water will be led back into the Equalization Tank. This way the sludge shall be thickened and its volume shall be reduced. The thickened sludge will be further solidified using a centrifuge or a filter press and the solid cakes will be used as manure in horticulture.

The treated and disinfected water from the Chlorine Contact Tank will be passed through a Pressure Sand Filter followed by an Activated Carbon Filter and a Softener and then stored in a Treated Sewage Water Tank. Water From this tank will be used for the gardening, Toilet flushing & Car parking area within the site. The Wastewater characteristics after treatment are given below:

pH	6.0 – 8.0
BOD_5	Less than 20 mg/L
Suspended Solids	Less than 10 mg/L

The proposed STP consists of bar screen chamber, collection tank, Aeration tank, Settling Tank, Pressure Sand Filter and Activated Carbon Filter and Sludge drying beds is given below.

Design Details of the Sewage Treatment Plant

	Actual flow	:	1300 m^3/day
	No. of STP	:	2 Nos
	Design Flow	:	650 m^3/day
	Operation Time	:	24 Hours
	Flow rate	:	27 m^3/h
(a)	**Screen Chamber**		
	Flow	:	27 m^3/h
	Size	:	2.0 x 2.5 x 2.5 m (SWD)
	No. of Tanks	:	1 No.
(b)	**Collection Tank**		
	Flow	:	27 m^3/h
	Detention time	:	5 Hours
	Required Volume	:	135 m^3
	Size of the tank	:	9.0 x 5.0 x 3.0 m (SWD) + 0.5 m
(c)	**Aeration Tank**		
	Flow	:	27 m^3/h
	MLSS concentration	:	4000 mg/l
	MLVSS concentration	:	3200 mg/l
	Influent BOD	:	250 mg/l
	F/M ratio	:	0.10
	Detention period	:	18 Hours
	Oxygen requirement	:	2 kg O_2 / kg of BOD

Oxygen transfer capacity	:	1 kg O_2 / hr / hp
Capacity of the Blower	:	20 HP
Free Board	:	0.4 m
Size of the tank	:	20.0 x 7.0 x 3.5 m (SWD) + 0.5m
Available Volume	:	486 m^3

(d) Settling Tank

Flow	:	27 m^3/h
Detention period	:	5 Hours
Required volume of the tank	:	135 m^3
Size of the tank	:	9.0 x 5.0 x 3.0 m (SWD) + 0.5 m

(e) Partially Treated Collection Tank

Flow	:	27 m^3/h
Detention period	:	4 Hours
Volume of the tank	:	108 m^3
Size of the tank	:	8.5 x 5.0 x 2.5 m (SWD) + 0.5m

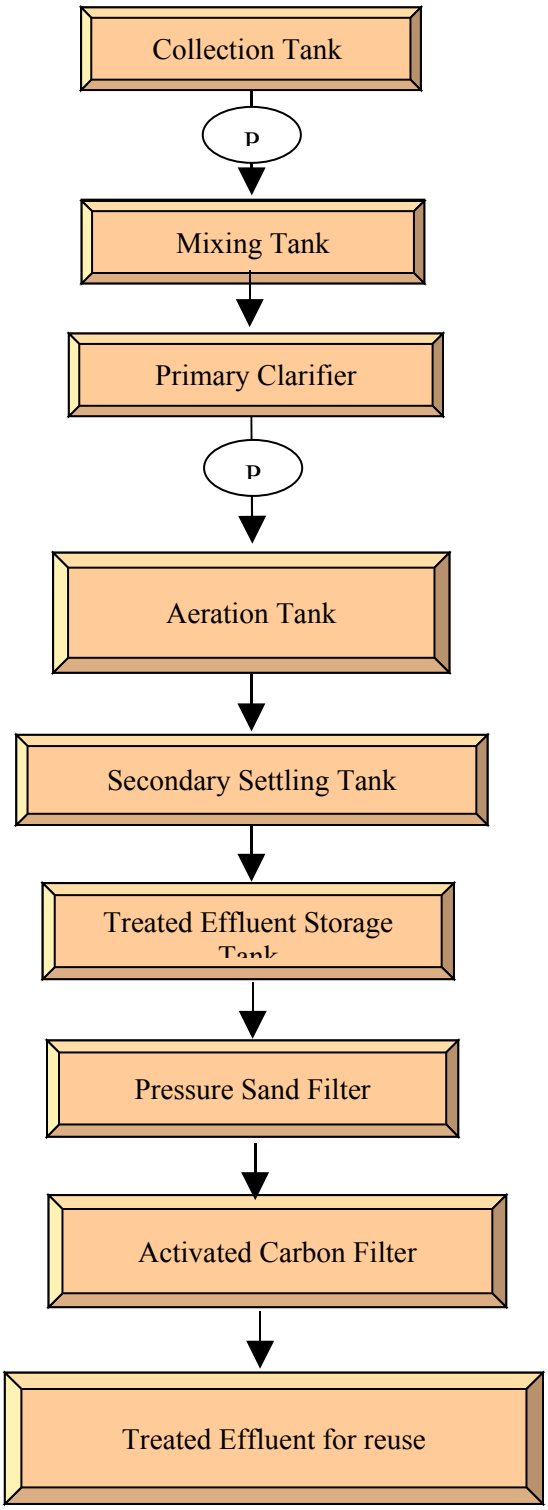
(f) Pressure Sand Filter

Flow	:	27 m^3/h
Size of the filter	:	2.5 m φ x 3.0 m
Type	:	Horizontal, cylindrical
MOC	:	MS - Epoxy

(g) Activated Carbon Filter

Flow	:	27 m^3/h
Size of the filter	:	2.5 m φ x 3.0 m
Type	:	Horizontal, cylindrical
MOC	:	MS - Epoxy

4.1 Process flow sheet for Effluent Treatment Plant (ETP)



Design Details of the Effluent Treatment Plant

	Actual flow	:	1500 m^3/day
	No.of STP	:	3 Nos
	Design Flow	:	500 m^3/day
	Operation Time	:	24 Hours
	Flow rate	:	21 m^3/h
(a)	**Screen Chamber**		
	Flow	:	21 m^3/h
	Size	:	2.0 x 2.0 x 2.5 m (SWD)
	No. of Tanks	:	1 No.
(b)	**Collection Tank**		
	Flow	:	21 m^3/h
	Detention time	:	5 Hours
	Required Volume	:	105 m^3
	Size of the tank	:	7.0 x 5.0 x 3.0 m (SWD) + 0.5 m
(c)	**Primary clarifier**		
	Flow	:	21 m^3/h
	Detention period	:	3 Hours
	Required volume of the tank	:	63 m^3
	Size of the tank	:	5.0 x 4.5 x 3.0 m (SWD) + 0.5 m
	Mixing tank	:	1 No
	Capacity	:	5000 Lts
	Make	:	Sintex / eq
	Flash mixer	:	1 No
	Motor	:	2 HP
	Dosing systems	:	3 Nos
	Make	:	Etatron / Milton roy / eq
()	**Aeration Tank**		
	Flow	:	21 m^3/h
	MLSS concentration	:	4000 mg/l
	MLVSS concentration	:	3200 mg/l
	Influent BOD	:	250 mg/l

F/M ratio	:	0.10
Detention period	:	18 Hours
Oxygen requirement	:	2 kg O_2 / kg of BOD
Oxygen transfer capacity	:	1 kg O_2 / hr / hp
Capacity of the Blower	:	7.5 HP
Free Board	:	0.4 m
Size of the tank	:	15.5 x 7.0 x 3.5 m (SWD) + 0.5m
Available Volume	:	378 m^3

(d) Secondary Settling Tank

Flow	:	21 m^3/h
Detention period	:	5 Hours
Required volume of the tank	:	105 m^3
Size of the tank	:	7.0 x 5.0 x 3.0 m (SWD) + 0.5 m

(e) Partially Treated Collection Tank

Flow	:	21 m^3/h
Detention period	:	4 Hours
Volume of the tank	:	84 m^3
Size of the tank	:	7.0 x 5.0 x 2.5 m (SWD) + 0.5m

(f) Pressure Sand Filter

Flow	:	21 m^3/h
Size of the filter	:	1.8 m φ x 2.8 m
Type	:	Horizontal, cylindrical
MOC	:	MS - Epoxy

(g) Activated Carbon Filter

Flow	:	21 m^3/h
Size of the filter	:	1.8 m φ x 2.8 m
Type	:	Horizontal, cylindrical
MOC	:	MS - Epoxy

5.0 AIR POLLUTION CONTROL MEASURES

Following are the air pollution control schemes that would be followed to minimize and control the emission of air pollutants as well as their effective dispersion into the atmosphere. To avoid dust

S.No.	Source of emission	APC measures (Above the ground level)
1.	DG Sets 1500 KVA – 10 Nos	Stack height of 8 m height with 900 mm dia will be provided for each DG sets.
2	Vehicle Emissions	Greenbelt areas were developed and properly maintained to reduce the pollution levels.
3	Dust	Dust monitoring will be done periodically and water will be sprayed on the roads to avoid dust in the project area.

6.0 Existing Environmental Status

6.1 Micrometeorology

Meteorological conditions play a vital role in planning orientation of stacks, operation and maintenance of factory and also on the environmental impact.

The summary of micrometeorological data of the region pertaining to the years 2004 - 2006 is presented in Table 6.1.

6.2 Temperature

May is the hottest month with monthly mean maximum temperature of 39.4^{0}C. January is the coolest month with monthly mean minimum temperature of 20.3^0 C.

Table 6.1 – Meteorological Data

Station: Meenambakkam **Period : 2004-2006**

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
I. MONTHLY AVERAGE WIND SPEED, 24 HRS, (KMPH)												
2004	5	6	7	10	8	9	8	9	6	5	5	5
2005	6	6	8	7	9	9	8	7	6	3	-	-
2006	3	*	*	8	10	8	9	8	7	5	4	5
II. MONTHLY MEAN RH, 0830 HRS (%)												
2004	81	77	77	71	72	62	66	62	80	85	84	80
2005	81	80	76	79	70	56	65	67	73	86	87	88
2006	85	83	77	73	66	66	64	68	78	84	87	80
III. MONTHLY MEAN RH, 1730 HRS (%)												
2004	64	56	62	66	67	58	57	59	74	76	72	63
2005	63	58	64	73	67	52	58	59	65	83	81	79
2006	61	54	64	62	63	58	54	64	70	77	81	64
IV. MONTHLY TOTAL RAINFALL (mm)												
2004	23.9	0.0	4.9	18.8	254.3	80.3	51.3	52.3	276.9	373.9	235.2	14.8
2005	0.0	5.5	0	12.6	34	4.8	37.8	35	50.9	211.1	134	282.8
2006	1.6	0.0	26.3	14.2	15.1	81.8	129.6	137.5	124.3	659.2	277.8	20.4
V. MONTHLY MEAN MAX. TEMP. (^{0}C)												
2004	29.8	31.2	34.2	36.7	35.3	36.4	35.5	37.1	33.5	31.6	30.1	30.2
2005	30.9	32.3	34.1	34.1	37.9	38.3	36.5	36.2	34.7	31.7	29.0	28.3
2006	30.1	32.0	34.0	36.5	38.0	37.3	36.5	35.7	33.9	32.3	30.2	30.0
VI. MONTHLY MEAN MIN. TEMP (^{0}C)												
2004	20.3	20.5	23.4	27.0	26.6	26.7	26.2	27.3	25.1	24.5	22.9	21.0
2005	21.1	21.7	24.6	26.3	27.7	28.4	26.7	26.5	25.7	24.6	22.7	22.3
2006	21.0	21.0	24.3	26.3	27.7	27.0	26.9	25.9	25.6	24.7	23.6	22.3

7.0 Solid Wastes

From this project 5000 kg/day of solid wastes will be produced. These solid wastes will be separated as biodegradable and non biodegradable and suitable disposal methods will be adopted for them. They will be sent to local municipality or authorized vendors as required.

S.No	Source	Bio-Degradable	Non-biodegradable	Method of disposal

1.	Sludge from STP	0.5 MT/day	-	Used as manure in horticulture
2.	Garbage	1.5 MT/day	3.0 MT/day	Municipality land fill
	Total	**2.0 MT/day**	**3.0 MT/day**	

8.0 ENVIRONMENTAL MITIGATION MEASURES

Table 8.1: General Environmental mitigation measures

Environmental impact	Mitigation measures	Time frame	Implementing organization	Responsible organization
CONSTRUCTION PHASE				
Environmental Management and Monitoring	This will include institutional requirements, training, environmental management and monitoring.	During and after construction	Contractor	The project proponent
Air Pollution	Vehicles and machinery are to be regularly maintained so that emissions conform to National and State AAQ Standards.	Beginning with and continuing throughout construction	Contractor	The project proponent
Noise	Noise standard at processing sites, e.g. aggregate crushing plants, will be strictly enforced to prevent exceedances of GOI noise standards. Workers in vicinity of strong noise will wear earplugs and their working time should be limited as a safety measure.	Beginning and through construction	Contractor	The project proponent
Solid Waste Management	The waste generated from labour during construction shall suitably be collected and shall be disposed at	Beginning and through construction	Contractor	The project proponent

Environmental impact	Mitigation measures	Time frame	Implementing organization	Responsible organization
	suitable site.			
OPERATION PHASE				
Air Pollution	A forestation programs – Tree Plantations.		After completion of construction	The project proponent
Noise	The use of sound barriers or other measures should be considered where warranted. The public will be educated about the regulations of noise from various sources.		After completion of construction	The project proponent
Water management	The water shall suitably be checked for various uses and shall be reported accordingly.		During operation	The project proponent
Maintenance of Storm Water Drainage System	The urban drainage systems will be periodically checked and cleared so as to ensure adequate storm water flow.		Beginning and end of monsoon	The project proponent.
Waste Management	The solid wastes generated from the airport shall be properly collected and shall be suitably disposed off at municipal landfill site with suitable arrangement with the agency.		During operation	The project proponent

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