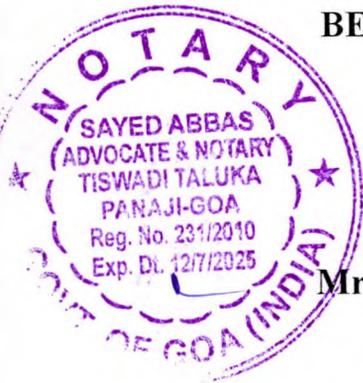


BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL,  
WESTERN ZONE BENCH PUNE AT PUNE  
ORIGINAL APPLICATION NO. 118 OF 2024



Mr. Navnath Andre Kankonkar (Gomes) ... Applicant

Versus

Union Of India And Ors. ... Respondents

**ADDITIONAL AFFIDAVIT ON BEHALF OF APPLICANT**

I, **MR. NAVNATH ANDRE KANKONKAR (GOMES)**, Age: 32 Yrs,  
Occupation: Business, R/o: House No. 22/223 opposite NIO colony Goa  
University Road, Donapaula Goa 403004, (MH), do take oath and state on  
solemn affirmation that:

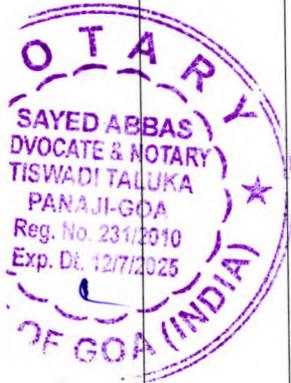
1. I state that I have filed the present proceeding raising the substantial question of environment arising out of non-compliance of the terms and conditions of the Environmental Clearance dated 28.11.2019 and Consent to Operate dated 15.03.2019.
2. I say and submit that I am residing as well as carrying out my livelihood at the project site where the Respondent Nos. 9 and 10 have developed their project. Therefore, I have personally witnessed the entire construction and development of the project of the Respondent Nos. 9 and 10 for which the Environmental Clearance dated 16.5.2007 and thereafter Environmental Clearance dated 28.11.2019 was granted. A copy of map pointing out the residence of the Applicant at the project

*Navnath Andre Kankonkar*

site of the Respondent No. 9 and 10 is annexed herewith and marked as **“Annexure A.”**

3. I state that below mentioned is the list of non-compliances of the Environment Clearance witnessed by me along with the available proofs in support of the same.

Sr. No.	Condition in EC dated 28.11.2019	Proof of non-compliance
1	1. General Condition ii) Water Harvesting ought to be done by project proponent to the extent of 90 KLD.	<ul style="list-style-type: none"> <li>• The Respondent Nos. 9 and 10 have filed presentation dated <del>17</del>2.2.2007 before the MoEF. The said Respondents in Form I at Point 2.7 have stated that the Rainwater will be collected in three tanks of 4,50,000 litres.</li> </ul> <p>A copy of the presentation is annexed herewith and filed as <b><u>“Annexure B”</u></b></p> <ul style="list-style-type: none"> <li>• It was proposed to establish the Rain Water Harvest in the Basement having capacity of 1,50,000 litres as shown in</li> </ul>



the Sanction Plan at Exhibit J of the Original Application, but **neither the basement nor the Rain Water Harvest exists as witnessed by the Applicant himself.**

- In the same presentation the Respondent Nos. 9 and 10 have stated that there will be 2 number of recharge wells and 20 numbers of recharge pits. There are 4 Pits that are proposed to be around the house of the Applicant. Also, it is mentioned that there are 13 wells/pits proposed on the periphery of the plot of the project. **None are present as witnessed by the Applicant.**

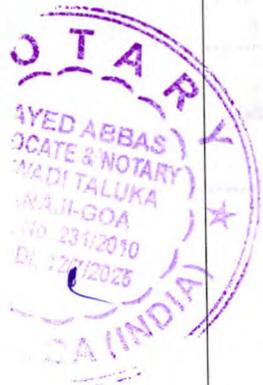
*Sayed Abbas*

2	<p>iii) The PP shall install bio methanation plant to tackle bio degradable waste.</p> <p>Construction of Transfer Station for transfer of Non-Biodegradable Waste</p>	<ul style="list-style-type: none"> <li>• Not Provided by the Respondent Nos. 9 and 10 in both Sectors 1 &amp; 4.</li> <li>• In Sector 1 the waste can be seen littered on the Ground from the main road near the entrance.</li> </ul> <p>Photographs showing the waste spread on the ground is annexed herewith and marked as <b><u>"Annexure C."</u></b></p>
3	<p>iv) E Waste shall be disposed through authorized vendors</p>	<ul style="list-style-type: none"> <li>• The E waste is also littered with the non-biodegradable waste at the entrance of sector 1 <b>as witnessed by the Applicant.</b></li> </ul>
4	<p>v) Solar Panel Installation towards south facing walls</p>	<ul style="list-style-type: none"> <li>• The Solar Panels on the south side of Sector 4 are not visible or functioning.</li> </ul>
5	<p>xiii) Solar Based electric power to each unit.</p>	<ul style="list-style-type: none"> <li>• No Solar energy deployed and in Sector 1 and Sector 4. The same has been experienced by the Applicant himself.</li> </ul>
	<p>xiii) Common Area lighting and street lighting based on Solar</p>	<ul style="list-style-type: none"> <li>• There is no installation of Solar Energy and the lights go off during power supply disruptions. If they were on solar power the same would have been running uninterruptedly at least in Summer. <b>Since</b></li> </ul>

*[Handwritten signature]*

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		<b>the Applicant is residing at the project site, he has witnessed it.</b>
6.	xiv) Plantation of trees along 6 meters periphery	<ul style="list-style-type: none"> <li>• No plantation.</li> <li>• The cars are parked on the 6 metres periphery in sector 1.</li> </ul> <p>Photographs showing cars parked within 6 meters periphery is annexed herewith and marked as <b><u>“Annexure D”</u></b></p>
7.	xvi) Year marking of No development Zone. No construction in said NDZ	<ul style="list-style-type: none"> <li>• No such year marking done</li> <li>• The Applicant has witnessed the green open space in Sector 1 reduced to increased parking.</li> </ul>
8.	4. General Condition- j) STP of Suitable capacity shall be installed considering the quantity and quality of waste water generation.	<ul style="list-style-type: none"> <li>• Non-Installation of STP</li> <li>• The Applicant has witnessed human excreta the photographs of which is annexed herewith and marked as <b><u>“Annexure E.”</u></b></li> </ul> <p>Photograph showing no installation of STP is annexed herewith and marked as <b><u>“Annexure F.”</u></b></p>



4. I state that as a common resident, residing at the project site, I have gathered the information to highlight the non-compliance of the Environment Clearance dated 28.11.2019 which are filed along with the present affidavit. I have also gathered few documents which are filed along with the Original Application that reflects as to how from the date of commencement of the project of the Respondent Nos. 9 and 10 till

*K. K. K.*

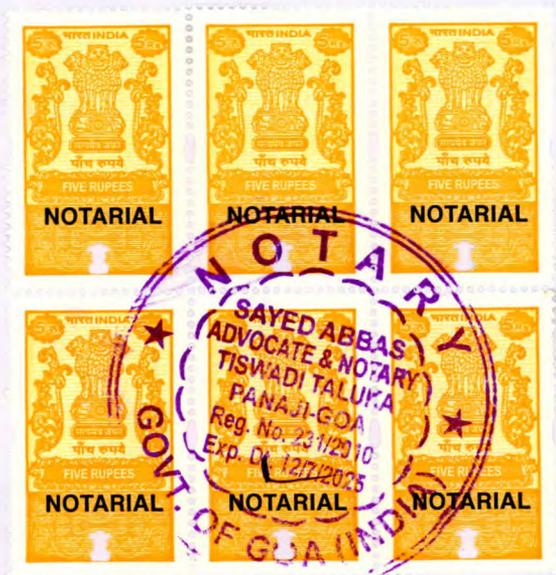
date there is no ground verification or action taken by any of the Respondent authorities for the non-compliance of the terms and conditions of the Environment Clearance dated 28.11.2019.

All the contents mentioned above are true and correct to the best of my knowledge, information, and belief. Hence, I have made this Affidavit on this the 28<sup>th</sup> day of May, 2024 at Goa.

Affiant

I know the Affiant

Advocate



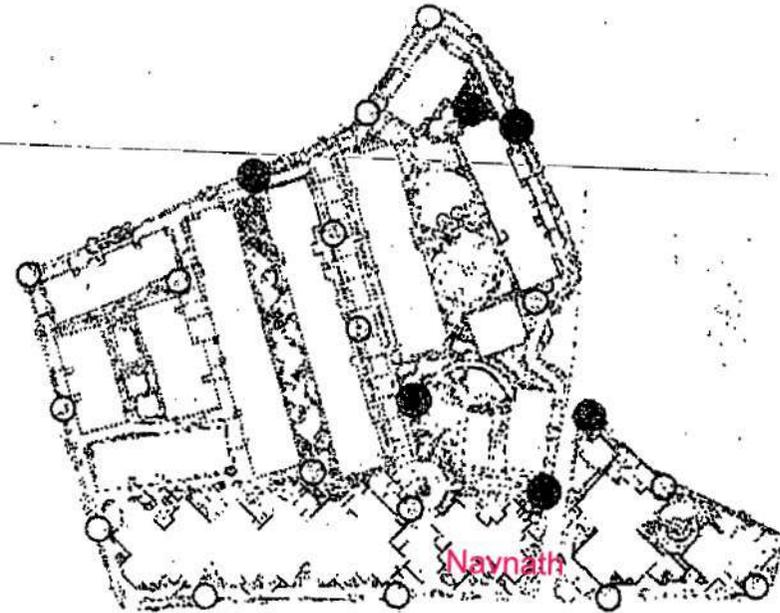
Solemnly affirmed before me by  
Shri / Smt. Navnath Andree Kankonkar  
who has been identified by  
whom I personally known  
Reg. No. 3583/2024 Dated: 28/05/2024

**SAYED ABBAS**  
Advocate & Notary  
Tiswadi Taluka  
Panaji, Goa 403001  
Reg. No.231/2010

# Infiltration Pit Locations

□ Before Recharging  
Allowing for sedimentation  
of water  
Filtering the water  
2 number of recharge wells  
and 20 number of  
infiltration pits measuring  
3'0" to 6'0" dia each, have  
been constructed within and  
around the main storm  
water drain for facilitating  
ground water recharge.  
Quality of runoff, getting  
recharged through a 15m  
dry bore installed inside the  
recharge well is controlled  
by a filter bed consisting of  
various pebbles and gravel  
(as shown in the figure 1)

- Type 1
- Type 2
- Type 3



CERTIFIED TRUE COPY



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## APPENDIX I

(See paragraph - 6)

## FORM 1

## (I) Basic Information

Name of the Project: Mathis Ocean Park

Location / site alternatives under consideration: Mumbai

Size of the Project: \* Not Applicable

Expected cost of the project:

## Contact Information:

Mr. Joe. C. Mathias

Mathias Construction Pvt. Ltd.5<sup>th</sup> Floor, Mathias Plaza,18<sup>th</sup> June Road,

Panaji-Goa 403001

Ph. No. 2425454, 5647333/34/35

## Screening Category:

- Capacity corresponding to sectoral activity (such as production capacity for manufacturing, mining lease area and production capacity for mineral production, area for mineral exploration, length for linear transport infrastructure, generation capacity for power generation etc.,)

## (II) Activity

1. Construction, operation or decommissioning of the Project involving actions, which will cause physical changes in the locality (topography, land use, changes in water bodies, etc.)

Sr. No.	Information/Checklist confirmation	Yes/ No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
1.1	Permanent or temporary change in land use, land cover or topography including increase in intensity of land use (with respect to local land use plan)	NO	

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1.2	Clearance of existing land, vegetation and buildings?	NO	
1.3	Creation of new land uses?	NO	
1.4	Pre-construction investigations e.g. bore houses, soil testing?	YES	Bore well analysis report given in REIA Report
1.5	Construction works?	YES	
1.6	Demolition works?	NO	
1.7	Temporary sites used for construction works or housing of construction workers?	NO	
1.8	Above ground buildings, structures or earthworks including linear structures, cut and fill or excavations	YES	Cutting and filling of material is 9125.20 m <sup>3</sup> and 8634.67 m <sup>3</sup>
1.9	Underground works including mining or tunneling?	NO	
1.10	Reclamation works?	NO	
1.11	Dredging?	NO	
1.12	Offshore structures?	NO	
1.13	Production and manufacturing processes?	NO	
1.14	Facilities for storage of goods or materials?	NO	
1.15	Facilities for treatment or disposal of solid waste or liquid effluents?	YES	STP will be provided for treatment of Sewage
1.16	Facilities for long term housing of operational workers?	NO	
1.17	New road, rail or sea traffic during construction or operation?	YES	Slightly increase in traffic during operational
1.18	New road, rail, air waterborne or other transport infrastructure including new or altered routes and stations, ports, airports etc?	NO	
1.19	Closure or diversion of existing transport routes or infrastructure leading to changes in traffic movements?	NO	
1.20	New or diverted transmission lines or pipelines?	NO	
1.21	Impoundment, damming, culverting, realignment or other changes to the hydrology of watercourses or aquifers?	NO	
1.22	Stream crossings?	NO	
1.23	Abstraction or transfers of water form ground or surface waters?	YES	Bore well water may be for non-potable purpose
1.24	Changes in water bodies or the land surface affecting drainage or run-off?	YES	Runoff is taken care of with RWH and Strom Water Drainage
1.25	Transport of personnel or materials for construction, operation or decommissioning?	YES	During construction phase only
1.26	Long-term dismantling or decommissioning or restoration works?	NO	

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1.27	Ongoing activity during decommissioning which could have an impact on the environment?	NO	
1.28	Influx of people to an area in either temporarily or permanently?	YES	Only during construction phase
1.29	Introduction of alien species?	NO	
1.30	Loss of native species or genetic diversity?	NO	
1.31	Any other actions?	NO	

2. Use of Natural resources for construction or operation of the Project (such as land, water, materials or energy, especially any resources which are non-renewable or in short supply):

Sr. No.	Information/checklist confirmation	Yes/No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
2.1	Land especially undeveloped or agricultural land (ha)	NO	
2.2	Water (expected source & competing users) unit: KLD	YES	The quantity will for C1 zone will be 410 m <sup>3</sup> /day, C2 zone will be 570 m <sup>3</sup> /day
2.3	Minerals (MT)	NO	
2.4	Construction material – stone, aggregates, sand / soil expected source – MT	YES	Approximately 60,000 cu.m. of sand and 30,000 cu.m. of aggregates
2.5	Forests and timber (source – MT)	NO	
2.6	Energy including electricity and fuels (source, competing users) Unit: fuel (MT), energy (MW)	YES	The connected load will be 8620 KW & demand Load will be 7959 KW during operational phase
2.7	Any other natural resources (use appropriate standard units)	NO	

3. Use, storage, transport, handling or production of substances or materials, which could be harmful to human health or the environment or raise concerns about actual or perceived risks to human health.

Sr. No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
3.1	Use of substances or materials, which are hazardous (as per MSIHC rules) to human health or the environment (flora, fauna, and Water supplies)	NO	

3.2	Changes in occurrence of disease or affect disease vectors (e.g. insect or water borne diseases)	NO	
3.3	Affect the welfare of people e.g. by changing living conditions?	NO	
3.4	Vulnerable groups of people who could be affected by the project e.g. hospital patients, children, the elderly etc.,	NO	
3.5	Any other causes	NO	

#### 4. Production of solid wastes during construction or operation or decommissioning (MT/month)

Sr. No.	Information/Checklist confirmation	Yes/ No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
4.1	Spoil, overburden or mine wastes	NO	
4.2	Municipal waste (domestic and or commercial wastes)	YES	A total of approx 3.162 MT/day of waste will be generated by domestic activity
4.3	Hazardous wastes (as per Hazardous Waste Management Rules)	NO	
4.4	Other industrial process wastes	NO	
4.5	Surplus product	NO	
4.6	Sewage sludge or other sludge from effluent treatment	YES	30 m <sup>3</sup> /day of sludge will be generated from STP
4.7	Construction or demolition wastes	YES	Pre-cut material will be used
4.8	Redundant machinery or equipment	NO	
4.9	Contaminated soils or other materials	NO	
4.10	Agricultural wastes	NO	
4.11	Other solid wastes	NO	

#### 5. Release of pollutants or any hazardous, toxic or noxious substances to air (Kg/hr)

Sr. No.	Information/Checklist confirmation	Yes/ No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
5.1	Emissions from combustion of fossil fuels from stationary or mobile sources	YES	9 nos. of DG set will be used for power backup
5.2	Emissions from production processes	NO	
5.3	Emissions from materials handling including storage or transport	NO	

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5.4	Emissions from construction activities including plant and equipment	NO	
5.5	Dust or odours from handling of materials including construction materials, sewage and waste	YES	During loading and unloading of cement bags, sand etc.
5.6	Emissions from incineration of waste	NO	
5.7	Emissions from burning of waste in open air (e.g. slash materials, construction debris)	NO	
5.8	Emissions from any other sources	NO	

#### 6. Generation of Noise and Vibration, and Emissions of Light and Heat:

Sr. No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
6.1	From operation of equipment e.g. engines, ventilation plant, crushers	YES	9 Nos. of DG (less than 72 dB)
6.2	From industrial or similar processes	NO	
6.3	From construction or demolition	NO	
6.4	From blasting or piling	NO	
6.5	From construction or operational traffic	YES	There will be a movement of trucks carrying construction material
6.6	From lighting or cooling systems	NO	
6.7	From any other sources	NO	

#### 7. Risks of contamination of land or water from releases of pollutants into the ground or into sewers, surface waters, groundwater, coastal waters or the sea:

Sr. No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
7.1	From handling, storage, use or spillage of hazardous materials	NO	
7.2	From discharge of sewage or other effluents to water or the land (expected mode and place of discharge)	NO	
7.3	By deposition of pollutants emitted to Air into the land or into water	NO	
7.4	From any other sources	NO	
7.5	Is there a risk of long term build up of pollutants in the environment from these sources?	NO	

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8. Risk of accidents during construction or operation of the Project, which could affect human health or the environment

Sr. No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
8.1	From explosions, spillages, fires etc from storage, handling, use or production of hazardous substances	NO	
8.2	From any other causes	NO	
8.3	Could the project be affected by natural disasters causing environmental damage (e.g. floods, earthquakes, landslides, cloudburst etc)?	YES	Project lies within seismic zone III. Hence structural design has been done to take care of seismic zone III required

9. Factors which should be considered (such as consequential development) which could lead to environmental effects or the potential for cumulative impacts with other existing or planned activities in the locality

Sr. No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
9.1	Lead to development of supporting facilities, ancillary development or development stimulated by the project which could have impact on the environment e.g.:  <ul style="list-style-type: none"> <li>• Supporting infrastructure (roads, power supply, waste or waste water treatment, etc.)</li> <li>• housing development</li> <li>• extractive industries</li> <li>• supply industries</li> <li>• other</li> </ul>	NO	
9.2	Lead to after-use of the site, which could have an impact on the environment	NO	
9.3	Set a precedent for later developments	NO	
9.4	Have cumulative effects due to proximity to other existing or planned projects with similar effects	NO	

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## (III) Environmental Sensitivity

Sr. No.	Areas	Name/ Identity	Aerial distance (within 15 km.) Proposed project location boundary
1	Areas protected under international conventions, national or local legislation for their ecological, landscape, cultural or other related value	NO	
2	Areas which are important or sensitive for ecological reasons - Wetlands, watercourses or other water bodies, coastal zone, biospheres, mountains, forests	NO	
3	Areas used by protected, important or sensitive species of flora or fauna for breeding, nesting, foraging, resting, over wintering, migration	NO	
4	Inland, coastal, marine or underground waters	NO	
5	State, National boundaries	NO	
6	Routes or facilities used by the public for access to recreation or other tourist, pilgrim areas	NO	
7	Defense installations	NO	
8	Densely populated or built-up area	NO	
9	Areas occupied by sensitive man-made land uses (hospitals, schools, places of worship, community facilities)	NO	
10	Areas containing important, high quality or scarce resources (ground water resources, surface resources, forestry, agriculture, fisheries, tourism, minerals)	NO	
11	Areas already subjected to pollution or environmental damage. (those where existing legal environmental standards are exceeded)	NO	
12	Areas susceptible to natural hazard which could cause the project to present environmental problems (earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions)	NO	

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245**FORM-1 A (only for construction projects listed under item 8 of the Schedule)****CHECK LIST OF ENVIRONMENTAL IMPACTS**

(Project proponents are required to provide full information and wherever necessary attach explanatory notes with the Form and submit along with proposed environmental management plan & monitoring programme)

**1. LAND ENVIRONMENT**

(Attach panoramic view of the project site and the vicinity)

1.1. Will the existing land use get significantly altered from the project that is not consistent with the surroundings? (Proposed land use must conform to the approved Master Plan / Development Plan of the area. Change of land use if any and the statutory approval from the competent authority be submitted). Attach Maps of (i) site location, (ii) surrounding features of the proposed site (within 500 meters) and (iii) the site (indicating levels & contours) to appropriate scales. If not available attach only conceptual plans.

**Ans:** The existing land use is mostly for Residential within 500 m. The existing land use will not get altered.



Project Proponent:  
Project Name:

Mathias Constructions (P) Ltd.  
Mathias Ocean Park

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1.2. List out all the major project requirements in terms of the land area, built up area, water consumption, power requirement, connectivity, community facilities, parking needs etc.

Ans: The major items are listed as below:

1. Land area, Built up area:

Sl. No	Description	Area
1.	Total Site Area	82,220.00 m <sup>2</sup>
2.	Site Area in Zone C-1	27,232.00 m <sup>2</sup>
3.	Commercial Area	184.49 m <sup>2</sup>
4.	Permissible FAR for C-1	200
5.	FAR Achieved for C-1	199.98
6.	Site Area in Zone C-2	54,988.00 m <sup>2</sup>
7.	Permissible FAR for C-2	150
8.	FAR Achieved for C-2	149.99
9.	Total Towers (C1 + C2)	13 nos
10.	Total No. of Flats	1,384.00
11.	Total Car Parking required	1,388 nos
12.	Total Car Parking Provided	1,469 nos
13.	F.A.R Achieved on total plot (C1+C2)	166.30
14.	Area reserved for Civic amenities (C1+C2)	731.32
15.	Ground floor coverage area (C1+C2)	23,327.57

2. Water consumption:

Total water requirement will be 980m<sup>3</sup>/Day.

3. Power Requirement:

Total demand load and connected load will be 7959KW and 8620 KW respectively.

4. Connectivity

Railway Station	Karamali Railway Station	16
Airport	Dabolim Airport	30
Bus Stops	Goa University Road	Near the site

5. Parking needs:

Car parking will be provided for 1469 cars.

Project Proponent:  
Project Name:

Mathias Constructions (P) Ltd.  
Mathias Ocean Park

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1.3. What are the likely impacts of the proposed activity on the existing facilities adjacent to the proposed site? (Such as open spaces, community facilities, details of the existing land use, disturbance to the local ecology).

**Ans:** There is no impact on adjacent facilities as this project proposes to build new structure in place of old existing ones.

1.4. Will there be any significant land disturbance resulting in erosion, subsidence & instability? (Details of soil type, slope analysis, vulnerability to subsidence, seismicity etc may be given).

**Ans:** Soil investigation conducted, no major cutting/filling of slope planned. The site comes under Seismic Zone III.

1.5. Will the proposal involve alteration of natural drainage systems? (Give details on a contour map showing the natural drainage near the proposed project site)

**Ans:** No. Proposed project does not alter the pattern of natural drainage system.

1.6. What are the quantities of earthwork involved in the construction activity-cutting, filling, reclamation etc. (Give details of the quantities of earthwork involved, transport of fill materials from outside the site etc?)

**Ans:**

Material Excavated = 9125.20 m<sup>3</sup> (approx);

Material Used for Backfilling = 8634.67 m<sup>3</sup> (approx);

1.7. Give details regarding water supply, waste handling etc during the construction period.

**Ans: Water Supply:** Water supply during construction period will be through Bore well/Tanker water. Drinking water will be supplied by Public Works Departments.

**Waste Handling:** The various forms of solid waste generated will be collected, handled and disposed off through approved vendor.

1.8. Will the low lying areas & wetlands get altered? (Provide details of how low lying and wetlands are getting modified from the proposed activity)

**Ans:** There are no low lying areas or wetlands in the site area.

1.9. Whether construction debris & waste during construction cause health hazard? (Give quantities of various types of wastes generated during construction including the construction labour and the means of disposal)

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**Ans:** Construction activity will release dust into the atmosphere. To prevent the dust from affecting the neighboring areas, the periphery will be barricaded by corrugated tin sheets of 15ft height. Water will be periodically sprinkled on the road to make the dust settle. Project authorities will provide face masks, gloves and other Personal Protective Equipments (PPE) to prevent any health hazard during construction activities to the construction labour. During the construction phase, approx 700 skilled and 500 unskilled workers per day will be working. Temporary Toilets will be provided which will be connected to a septic tank and overflow of septic tank will be discharged into the Municipal sewer line. The project team will ensure hygienic working conditions.

## 2. WATER ENVIRONMENT

**2.1.** Give the total quantity of water requirement for the proposed project with the breakup of requirements for various uses. How will the water requirement met? State the sources & quantities and furnish a water balance statement.

**Ans:**

### 1. SOURCE OF WATER SUPPLY

#### Source of Water Supply

During the operational phase, water will be available from Public Works Department for domestic use.

### 2. Water Requirement

Water demand is calculated based on the guidelines of NBC.

#### C1-ZONE:

No. Of apartments	= 544
Number of Persons in each apartment	=5
Number of Persons	=544 x5 =2720
Water requirement @ 135 lpd per person	= 2720x135 = 367,200 lpd
Adding 10% extra for wastage, cleaning etc	=403,920 lpd
<b>Say</b>	<b>410cum</b>

#### C2-ZONE:

#### Water Demand Calculation for ZONE -C2

No. Of apartments	=840
Number of Persons in each apartment	= 5
Total Number of Persons	=840 x5 =4,200
Water requirement @ 135 lpd per person	= 4,200x135 = 630,000 lpd
Adding 10% extra for wastage, cleaning etc	=567,000 lpd
<b>Say</b>	<b>570cum</b>

Project Proponent:  
Project Name:

Mathias Constructions (P) Ltd.  
Mathias Ocean Park

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2.2. What is the capacity (dependable flow or yield) of the proposed source of water?

Ans: Bore well yield: 5.0 m<sup>3</sup>/hr

2.3. What is the quality of water required, in case, the supply is not from a municipal source? (Provide physical, chemical, biological characteristics with class of water quality)

Ans: Apart from municipal water, borewell water will also be used in day to day operations of the complex. The bore well water quality details are shown below:

Sl. No.	SAMPLE NO.	Bore well water sample	Unit
1	Color	colourless	--
2	Turbidity	<5	NTU
3	pH	7.03	--
4	Total Dissolved Solids	1250	mg/lit
5	Suspended Solids	<10	mg/lit
6	Phenolphthalein Alkalinity	Nil	mg/lit
7	Total Alkalinity	178	mg/lit
8	Total Hardness	260	mg/lit
9	Calcium	64	mg/lit
10	Magnesium	24.4	mg/lit
11	Iron	0.18	mg/lit
12	Sodium	12	mg/lit
13	Nitrates	0.6	mg/lit
14	Chlorides	680	mg/lit
15	Sulphates	146	mg/lit
16	Fluoride as F	0.9	mg/lit
17	Copper	Absent	mg/lit
18	Zink	BDL	mg/lit
19	Lead	Absent	mg/lit

2.4. How much of the water requirement can be met from the recycling of treated wastewater? (Give the details of quantities, sources and usage)

Ans: STP is designed to handle 790 m<sup>3</sup>/day of waste water and sewage although the average load on the plant will be 784 m<sup>3</sup>/day. Most of the treated water will be used as make up water for the gardening, Flushing & Avenue Plantation.

2.5. Will there be diversion of water from other users? (Please assess the impacts of the project on other existing uses and quantities of consumption)

Ans: No diversion from existing users is expected.

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2.6. What is the incremental pollution load from wastewater generated from the proposed activity? (Give details of the quantities and composition of wastewater generated from the proposed activity)

**Ans:** STP will be provided which have the capacity of 790 m<sup>3</sup>/day

2.7. Give details of the water requirements met from water harvesting? Furnish details of the facilities created.

**Ans: Rain Water Harvesting from the vacant site**

- The anticipated Run-Off from the site would be 1.02m<sup>3</sup>/Sec.(C, Coefficient of Run-Off 0.45)
- The Run-off from the existing site currently flowing through the vacant land to the existing storm water drains located on Western side of the site and finally reaching the storm water to River.

**Rain Water Harvesting after project implementation**

- Rain water that can be collected in the roof =0.89m<sup>3</sup>/sec(C=0.95)
- Paved Area =0.33m<sup>3</sup>/sec (C=0.75)
- Rain water that can be collected in the garden area = 0.22m<sup>3</sup>/sec (C=0.25)

Run-Off from the site = 0.86 m<sup>3</sup>/Sec

**Mode of Usage of rain water:**

The entire rainwater will be collected in three collection ponds of 450,000 lts capacity of suitable size. This water can be used back after passing through the pressure sand and the activated carbon filter of diameter 1600-mm each.

Mode of usage of water incase of sudden flash floods / continuous rains: Though the rainy days are considered as 120 days in Goa and the total rain is divided by the no. of rainy days, practically the intensity of rain is not the same every day. It varies from day to day. Incase when there is a heavy and flash rain, the excessive rainwater can be used for the recharge of the proposed recharge pits and water body. Surplus water is led into the Existing River. This would help in recharging the ground water table.

2.8. What would be the impact of the land use changes occurring due to the proposed project on the runoff characteristics (quantitative as well as qualitative) of the area in the post construction phase on a long term basis? Would it aggravate the problems of flooding or water logging in any way?

**Ans:** No, Effective storm water drainage system has been proposed within the site

2.9. What are the impacts of the proposal on the ground water? (Will there be tapping of ground water; give the details of ground water table, recharging capacity, and approvals obtained from competent authority, if any)

**Ans:** The average depth of bore well water is currently 10-12 mtrs. The proposed rain water harvesting system intends to increase the ground water table.

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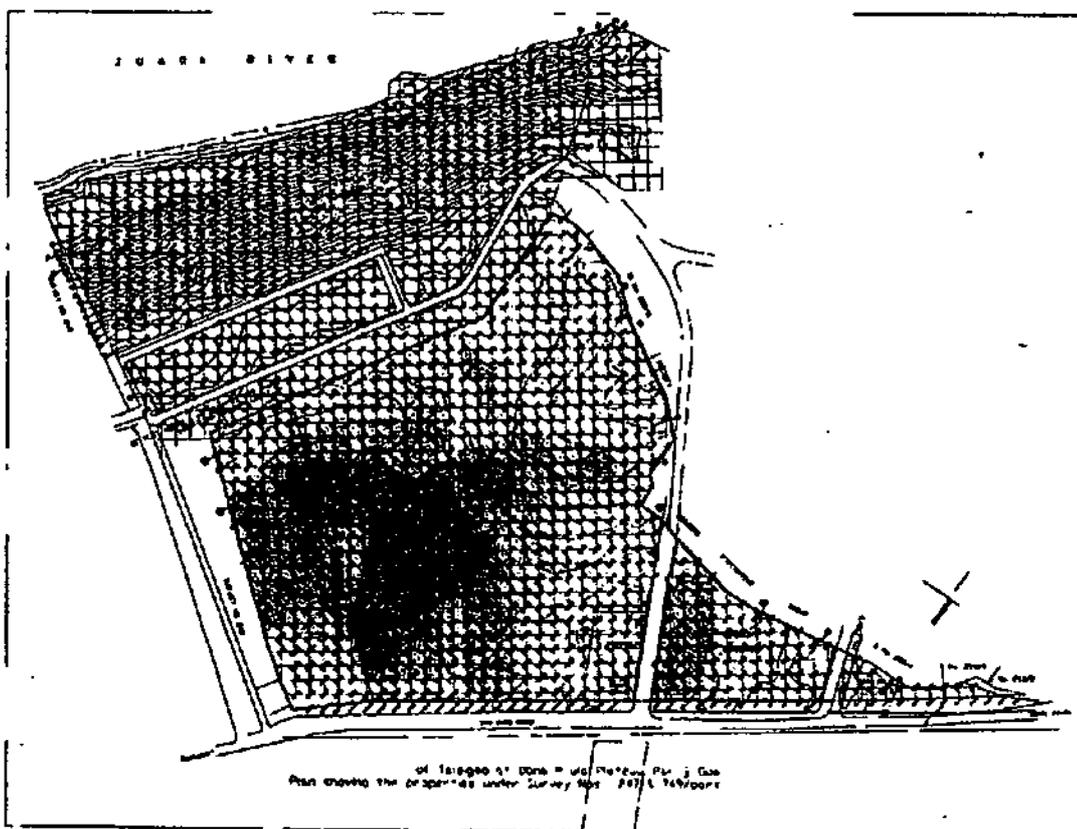
**2.10. What precautions/measures are taken to prevent the run-off from construction activities polluting land & aquifers? (Give details of quantities and the measures taken to avoid the adverse impacts)**

**Ans:**

- Proper storm water drainage will be planned.
- Project authorities propose to construct the boundary wall to prevent exit of runoff from the site.
- Proper sanitation and waste disposals facilities shall be provided to ensure hygienic disposal of waste.

**2.11. How is the storm water from within the site managed?(State the provisions made to avoid flooding of the area, details of the drainage facilities provided along with a site layout indication contour levels)**

**Ans:** An effective storm water drainage system has been proposed within the site.



**Contour Map**

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2.12. Will the deployment of construction labourers particularly in the peak period lead to unsanitary conditions around the project site (Justify with proper explanation)

Ans: There will be no labor camp. Temporary Toilets will be provided which will be connected to septic Tank and overflow of septic tank will be discharge in to Municipal sewer line.

2.13. What on-site facilities are provided for the collection, treatment & safe disposal of sewage? (Give details of the quantities of wastewater generation, treatment capacities with technology & facilities for recycling and disposal)

Ans: Sewage treatment plant (including waste from labs and pilot plant) of capacity 1000 m<sup>3</sup>/day will be provided.

The Effluent and Sewage Treatment Plant will incorporate the following units:

1. Bar Screen Chamber
2. Equalization tanks
3. Aeration tank.
4. Secondary clarifier.
5. Pre- filtration filter
6. Mechanical Filter Press
7. Pressure Sand Filter
8. Activated Carbon Filter
9. Chlorinator

The Effluent and Sewage Treatment Plant plant will be designed so that the characteristics of treated effluent will be as follows:

pH	6.5 to 8
Suspended solids	less than 20 mg/lit
BOD	less than 20 mg /lit
COD	less than 100 mg/lit

2.14. Give details of dual plumbing system if treated waste used is used for flushing of toilets or any other use.

Ans: NA, as treated waste water is not used for flushing of Toilets.

### 3. VEGETATION

3.1. Is there any threat of the project to the biodiversity? (Give a description of the local ecosystem with its unique features, if any)

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**Ans:** No, there is no threat by the project to biodiversity.

**3.2.** Will the construction involve extensive clearing or modification of vegetation? (Provide a detailed account of the trees & vegetation affected by the project)

**Ans:** No tree cutting will be done  
 No of trees will be planted: 479

**3.3.** What are the measures proposed to be taken to minimize the likely impacts on important site features (Give details of proposal for tree plantation, landscaping, creation of water bodies etc along with a layout plan to an appropriate scale)

**Ans:** No of trees planted will be 479

Landscaping layout is attached with annexure

#### 4. FAUNA

**4.1.** Is there likely to be any displacement of fauna- both terrestrial and aquatic or creation of barriers for their movement? Provide the details.

**Ans:** No. There is no terrestrial or aquatic fauna at site since it is an urban region where the peripheral areas are paved & fully developed.

**4.2.** Any direct or indirect impacts on the avifauna of the area? Provide details.

**Ans:** Not Applicable

**4.3.** Prescribe measures such as corridors, fish ladders etc to mitigate adverse impacts on fauna

**Ans:** NA as it does not exist on present site.

#### 5. AIR ENVIRONMENT

**5.1.** Will the project increase atmospheric concentration of gases & result in heat islands? (Give details of background air quality levels with predicted values based on dispersion models taking into account the increased traffic generation as a result of the proposed constructions)

**Ans:**

The number of cars at site will increase from 200 at present to around 400 in future. Considering the ambient air quality at site as well as within 10 km radius, there shall be an insignificant effect on air quality. Considering that the ambient air quality is well within the prescribed limits the air quality after the project can be predicted

to be within limits.

**Analysis of Ambient air quality monitoring at site & within 10 km.**

Sr. No.	Content	SPM $\mu\text{g}/\text{m}^3$	RSPM $\mu\text{g}/\text{m}^3$	SO <sub>2</sub> $\mu\text{g}/\text{m}^3$	NO <sub>x</sub> $\mu\text{g}/\text{m}^3$	CO $\mu\text{g}/\text{m}^3$
A1	<b>At Project Site</b>					
	Maximum	116	61	6.3	14	135
	Minimum	82	52	BDL	7	110
	Average	95	58	6.1	9	121

Sr. No.	Content	SPM $\mu\text{g}/\text{m}^3$	RSPM $\mu\text{g}/\text{m}^3$	SO <sub>2</sub> $\mu\text{g}/\text{m}^3$	NO <sub>x</sub> $\mu\text{g}/\text{m}^3$	CO $\mu\text{g}/\text{m}^3$
<b>Within 10 km Radius from project site</b>						
	Maximum	122	64	7.2	18	149
	Minimum	84	47	BDL	7	117
	Average	106	56	6.1	12.5	133

5.2. What are the impacts on generation of dust, smoke, odorous fumes or other hazardous gases? Give details in relation to all the meteorological parameters.

**Ans:** Dust problems during construction activities can be take care by barricading the site boundaries up to 15 ft, sprinkling of water on road. Gases from DG sets will be managed by providing proper stack height as per CPCB norms and they will work as a power back up only hence no continuous emission from DG.

5.3. Will the proposal create shortage of parking space for vehicles? Furnish details of the present level of transport infrastructure and measures proposed for improvement including the traffic management at the entry & exit to the project site.

**Ans:** Project Authorities has taken care to provide adequate parking facilities within the premises. Car parking will be provided for 1469 cars.

5.4. Provide details of the movement patterns with internal roads, bicycle tracks, pedestrian pathways, footpaths etc., with areas under each category.

**Ans:** Internal wide roads will be provided for smooth Traffic movement .Refer annexure

5.5. Will there be significant increase in traffic noise & vibrations? Give details of the sources and the measures proposed for mitigation of the above.

**Ans:** DG sets will provided with acoustic measures in such a way that noise will not

25.5 increase more than 72 dB, 1m from the DG room. The major components will be supported on a common open skid-base frame with anti vibration mountings inserted between the base frame and enclosure floor and CPCB certified. Sufficient tree plantation will work as a noise barrier.

5.6. What will be the impact of DG sets & other equipment on noise levels & vibration in & ambient air quality around the project site? Provide details

Ans: DG set will be used only in case of power failure.

Impacts:

Not significant as

- ▶ DG set would be used as emergency power back-up.
- ▶ DG set installed with proper precautions & acoustic insulation.
- ▶ The stack height should be maintained as per the CPCB Regulation Part III i.e.  $H = h + 0.2 \sqrt{\text{capacity of DG set KVA}}$ . Where H = Safe stack ht. and h = Roof ht. in m..

## 6. AESTHETICS

6.1. Will the proposed constructions in any way result in the obstruction of a view, scenic amenity or landscapes? Are these considerations taken into account by the proponents?

Ans. There is no obstruction of a view.

6.2. Will there be any adverse impacts from new constructions on the existing structures? What are the considerations taken into account?

Ans: No, there will be no any other impacts from new construction.

6.3. Whether there are any local considerations of urban form & urban design influencing the design criteria? They may be explicitly spelt out.

Ans: Development Control Regulations of Goa will be followed and taken into account like building setback, open space reservation, building height.

6.4. Are there any anthropological or archaeological sites or artifacts nearby? State if any other significant features in the vicinity of the proposed site have been considered.

Ans: No such site located in the vicinity of site.

## 7. SOCIO-ECONOMIC ASPECTS

7.1. Will the proposal result in any changes to the demographic structure of local population? Provide the details.

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**Ans:** No, there is no change in demographic structure.

**7.2.** Give details of the existing social infrastructure around the proposed project.

**Ans:** There is no any social infrastructure nearby the proposed site.

**7.3.** Will the project cause adverse effects on local communities, disturbance to sacred sites or other cultural values? What are the safeguards proposed?

**Ans:** No adverse impact on local communities.

## 8. BUILDING MATERIALS

**8.1.** The project may involve the use of building materials with high-embodied energy. Are the construction materials produced with energy efficient processes? (Give details of energy conservation measures in the selection of building materials and their energy efficiency)

**Ans:** Fly ash will be used as a part of construction material. It would help to make use of harmful by-product of thermal power station

**8.2.** Transport and handling of materials during construction may result in pollution, noise & public nuisance. What measures are taken to minimize the impacts?

**Answer:** Following steps will be taken to avoiding such pollution:

- ⇒ Use of barricading the periphery by corrugated tin sheet of 15 feet height
- ⇒ Sprinkling of water on road side to avoiding dust pollution.
- ⇒ Proper traffic management plan will be provided.
- ⇒ Construction activities will be carried out during day time

**8.3.** Are recycled materials used in roads and structures? State the extent of savings achieved?

**Ans:** The excavated soil will be partially used for landfilling.

**8.4.** Give details of the methods of collection, segregation & disposal of the garbage generated during the operation phases of the project.

**Ans:** The wastes shall be segregated on the basis of dry & wet waste as well as biodegradable & Non-biodegradable disposed off through approved vendors.

## 9. ENERGY CONSERVATION

**9.1.** Give details of the power requirements, source of supply, backup source etc. What is the energy consumption assumed per square foot of built-up area? How have you tried to minimize energy consumption?

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 Ans.:

- Total demand load and connected load will be 7959KW and 8620 KW respectively.
- The backup source is acoustically enclosed DG Sets
  - 1 We have proposed capacitor panel of 300 kVAR to compensate inductive load in pumps & lifts in the systems & to reduce kVA demand requirement for the project
  - 2 All lifts and pumps are proposed on VFD drives which results in 30% saving in consumption.(For calculation details refer Annexure-B)
  - 3 Most of the common area lighting are proposed to work on high energy efficient lamps(CFL) as specified in bureau of energy efficiency, which again results in saving in general consumption. The LPD is working less than 1W/ m2
  - 4 External lighting is assumed to be 150 kW. 30% of the external lighting is proposed on solar. These are set of lighting which are placed at critical junctions and which would be lit round the night. Otherwise the other 70% lighting is on timer circuits to achieve the max. savings.(For calculation details refer Annexure-A)
  - 5 The Apartments in 6th & 7th Floors in Zone C1 & 3rd & 4th floors in Zone C2 are provided with solar geysers which results in 20% saving in consumption (For calculation details refer Annexure-C)
  - 6 Also total lighting to be proposed on 30% stages operation with automatic switch on and timer based. Also presence and photo sensors are proposed at critical junctions.
  - 6 All internal common area lighting system is proposed to have either high efficiency lamps(T5/T8)/ CFL. These give us a LPD less than 10W/m2 but still achieving the required 200 LUX for ambient lighting.

9.2. What type of, and capacity of, power back-up to you plan to provide?

Ans.: DG Set will be used as a power backup.

Total Nos of DG Set: 9 Nos.

Capacity of Each: 250kVA 9No.

9.3. What are the characteristics of the glass you plan to use? Provide specifications of its characteristics related to both short wave and long wave radiation?

Ans:

**GLASS NORTH**

U factor recommended : 6.922 w/m2.k maximum  
 With 6mm clear glass : 5.7 w/m2.k  
 Meets requirement

**GLASS - NON NORTH**

U factor recommended : 3.177 w/m2.k  
 Glass with double glazing : 2.8 w/m2.k  
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Meets requirement

9.4. What passive solar architectural features are being used in the building? Illustrate the applications made in the proposed project.

Ans.: Solar water heaters are proposed for the top two floors, which will save 40 – 50% of the respective apartment consumption.

9.5. Does the layout of streets & buildings maximize the potential for solar energy devices? Have you considered the use of street lighting, emergency lighting and solar hot water systems for use in the building complex? Substantiate with details.

Ans.: Solar energy consumption Analysis:

Sr. No.	Description	Power consumed using Conventional method(in kWh)	Power consumed incorporating energy saving methods(in kWh)
1	External Lighting load	356400	249480
2	Lift load	1826535.6	1278574.92
3	Geyser Load	2989440	2391552
	<b>Total</b>	<b>5172375.6</b>	<b>3919606.92</b>

9.6. Is shading effectively used to reduce cooling/heating loads? What principles have been used to maximize the shading of Walls on the East and the West and the Roof? How much energy saving has been effected?

Ans.: Not Applicable

9.7. Do the structures use energy-efficient space conditioning, lighting and mechanical systems? Provide technical details. Provide details of the transformers and motor efficiencies, lighting intensity and air-conditioning load assumptions? Are you using CFC and HCFC free chillers? Provide specifications.

Ans.: Not Applicable

9.8. What are the likely effects of the building activity in altering the micro-climates? Provide a self assessment on the likely impacts of the proposed construction on creation of heat island & inversion effects?

Ans: There will be no effect on the micro-climate by the building activity.

9.9. What are the thermal characteristics of the building envelope? (a) roof; (b) external walls; and (c) fenestration? Give details of the material used and the U-values or the R values of the individual components.

Ans.:

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## ROOF:-

Sr. No.	Description	Conductivity W /m. k	Length	Resistance R m2. k /w
1	Outside surface	(ASHRAE Ao)		0.059
2	Clay tile	0.571	0.012	0.021
3	Brick Bat coba	0.727	0.1	0.138
4	HD Concrete	1.731	0.15	0.087
5	EPS 16Kg Density	0.035	0.075	2.568
6	Inside surface	(ASHRAE Eo)		0.121
Total Resistance				2.994
Net U Value 1 / 2.994				0.334
U Value recommended by ECB code (Climate zone warm & humid)				0.409
Roof meets the requirement				

## WALL:-

Sr. No.	Description	Conductivity W /m. k	Length	Resistance R m2. k /w
1	Outside surface			0.059
2	Aluminium composite panel	0.800	0.010	0.125
3	Airspace		0.60	0.160
4	Inside wall	1.731	0.200	0.116
5	Inside surface			0.121
Total R Value				0.581
Total U Value				1.721
Recommended U value				0.352

9.10. What precautions & safety measures are proposed against fire hazards? Furnish details of emergency plans.

Ans: Fire fighting system is as given below:

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Fire fighting system to the proposed building is designed based on the recommendations of NBC 2005. Following safety measures are envisaged.

**Following are the requirements:**

- An exclusive OHT of 25,000 lts capacity on the stair case core of each block at the terrace level shall be provided.
- One No. Terrace Pump of duty 900 lpm @ 35m head shall be provided.
- 1 No. Down comer of 100mm dia is provided near each stair case core.
- FHC is envisaged with Single headed hydrant valve and hose reel at each stair case landing level.
- Sprinkler system is proposed in the covered parking area.
- Portable fire extinguishers are proposed to be placed at strategic locations.
- Fire Brigade Inlet Connection for external pumping arrangement is envisaged.
- Yard hydrants along the building peripheral length is provided.
- Automatically operated electric fire alarm System.
- Public Address System 2-way communication type.
- Manual Call Points.

#### **Emergency Situations**

These are defined as the following

- Any fire or explosion in the premises
- Any smoke outside / inside premises
- Strong persisting smell of LPG
- Exercise fire drill.

#### **Emergency Response in Case of Emergency**

##### **Basic Actions**

- ◆ Immediate action is the most important factor in the emergency control because the first few seconds count.
- ◆ Immediate steps to stop fire and raise alarm simultaneously.
- ◆ Personnel without any specific duties should assemble at the nominated place.
- ◆ All vehicles except those that are required for emergency use should be moved away from the operating area in an orderly manner at pre nominated route.
- ◆ Electrical system except the lighting and fire fighting system should be isolated.
- ◆ If the feed to the fire cannot be cut off, the fire must be controlled and not extinguished.
- ◆ Start water spray systems in the areas involved in or exposed to fire risks.
- ◆ In case of leakage of LPG without fire and inability to stop the flow, take all precautions to avoid source of ignition.
- ◆ Block all roads in the adjacent area and enlist police support for the purpose, if warranted.

##### **Actions In the Event of Fire**

Basic actions will be same as detailed above.

- ◆ Extinguishing fires: A small fire at a point of leakage should be extinguished by enveloping with a water spray or a suitable smothering agent such as CO2 or

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DCP. However, fire should not, unless under exceptional circumstances, be extinguished until the escape of product (e.g. LPG) has been stopped.

- ◆ Fire fighting personnel working in or close to fire, must be protected continuously by water spray. Fire fighters should advance towards the fire downwind if possible.
- ◆ In case the only valve can be used to stop the leakage is surrounded by fire, it may be possible to close it manually. The person attempting the closure should be continuously protected by water sprays, fire entry suit, water jet blanket etc. The person must be equipped with a safety belt and a manned lifeline.

9.11. If you are using glass as wall material provides details and specifications including emissivity and thermal characteristics.

**Ans: GLASS NORTH**

U factor recommended : 6.922 w/m<sup>2</sup>.k maximum  
 With 6mm clear glass : 5.7 w/m<sup>2</sup>.k  
 Meets requirement

**GLASS - NON NORTH**

U factor recommended : 3.177 w/m<sup>2</sup>.k  
 Glass with double glazing : 2.8 w/m<sup>2</sup>.k  
 6 – 12 – 6  
 Meets requirement

9.12. What is the rate of air infiltration into the building? Provide details of how you are mitigating the effects of infiltration.

**Ans: Not Applicable**

9.13. To what extent the non-conventional energy technologies are utilized in the overall energy consumption? Provide details of the renewable energy technologies used.

**Ans: NA**

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## 10. ENVIRONMENT MANAGEMENT PLAN

The Environment Management Plan would consist of all mitigation measures for each item wise activity to be undertaken during the construction, operation and the entire life cycle to minimize adverse environmental impacts as a result of the activities of the project. It would also delineate the environmental monitoring plan for compliance of various environmental regulations. It will state the steps to be taken in case of emergency such as accidents at the site including fire.

**Ans:** The Management plan for Land, Water, Air, Traffic and Social impact is given below:

10.1 Environment Management Plan for Land

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Potential Impact	Potential source of impact	Control through EMP & Design	Impact Evaluation	Remarks
Soil contamination	<p><b>Construction Phase</b></p> <ul style="list-style-type: none"> <li>Excavation and construction debris.</li> </ul>	<ul style="list-style-type: none"> <li>Reuse of construction waste for filling the low lying areas at the site itself.</li> </ul>	<ul style="list-style-type: none"> <li>Minor impact</li> </ul>	Top soil will be conserved and used for landscaping in the functional phase.
	<p><b>Operational Phase:</b></p> <ul style="list-style-type: none"> <li>Collection and Storage of solid waste.</li> <li>Discharge of sewage.</li> <li>Occasional oil spills.</li> </ul>	<ul style="list-style-type: none"> <li>Treatment and reuse of sewage water.</li> <li>Integrated solid waste management plan.</li> </ul>	<p>Negligible impact</p>	

10.2 Environmental Management Plan for Water Environment:

Potential source of impact	Excepted source of impact	Mitigation Measures	Remarks
Ground water	<p><b>Construction Phase:</b></p> <ul style="list-style-type: none"> <li>Waste water generated from labor camp</li> </ul> <p><b>Operational Phase:</b></p> <ul style="list-style-type: none"> <li>Sewage generation</li> </ul>	<ul style="list-style-type: none"> <li>Septic tank / treated in makeshift arrangement and disposed in to municipal sewer</li> <li>Sewage water treated in to STP and these treated water will be reuse for toilet flushing and gardening</li> </ul>	<ul style="list-style-type: none"> <li>No Impact</li> </ul>
Ground water	<p><b>Operational Phase</b></p> <ul style="list-style-type: none"> <li>Storm Water</li> </ul>	<ul style="list-style-type: none"> <li>Rain Water Harvesting will be done for ground water recharge / gardening</li> </ul>	<ul style="list-style-type: none"> <li>No Impact</li> </ul>

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10.3 Environment Management Plan for Air Environment

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Potential source of impact	Expected source of impact	Mitigations Measures	Remarks
Dust Emission	<p><b>Construction Phase:</b></p> <ul style="list-style-type: none"> <li>All heavy construction activities like Excavation, loading, and Unloading of material like cement bags</li> </ul> <p><b>Operational Phase:</b></p> <ul style="list-style-type: none"> <li>No emission of dust</li> </ul>	<ul style="list-style-type: none"> <li>Use of                             <ul style="list-style-type: none"> <li>barricading the periphery by corrugated tin sheet of 15 feet height</li> </ul> </li> <li>use of wet jute bags</li> <li>road watering for controlling dust</li> <li>Use of face mask to avoiding inhalation of dust particles</li> </ul>	<ul style="list-style-type: none"> <li>Minor impact.</li> </ul>
Emission of SO2 NOX & CO	<p><b>Construction Phase:</b></p> <ul style="list-style-type: none"> <li>Due to the operation of construction equipments</li> </ul> <p><b>Operational Phase</b></p> <ul style="list-style-type: none"> <li>Power Generation through DG sets</li> </ul>	<ul style="list-style-type: none"> <li>Periodic maintenance of construction equipments</li> <li>DG sets installed with proper precaution</li> </ul>	<p>Not significant as DG set would be used as power back-up.</p> <p>No Impact</p>

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#### **10.4 Traffic Management Plan Construction Phase**

On the Panaji University Road, automobile pollution is expected due to traffic. However, it will affect the subject plot. The existing trees will act as noise barrier. There will be planning of planting more trees in between the site and the road, which work as noise barrier.

#### **Operational Phase**

During the operational phase, entered vehicles having Euro II / III Standard & with CNG as fuel their contribution to the automobile pollution will be almost negligible.

Moreover, large amount of big trees in the premises will work as barrier for the vehicular noise.

#### **10.5 Social Management**

##### **Construction Phase**

The construction activity will not create much impact on the general Socio-Economic aspect of the area except that it invites prospective long-term development. Since, the construction of such big projects stretches for 4 to 5 years, local economic activity receives spurt & the authorities are prompted to upgrade the civic facilities. The movement of men and material creates its own logistic demand, which enhances local development for supplies of basic facilities. Dona Paula being a commercial place, the temporary or permanent influx of people from various religions, language states, etc is an accepted phenomenon. Similarly, relocation, movement of people from one skill to another, generation of new skills changes the complexion and character of residents in the area. During construction activity direct employment to about 700-800 people & indirect employment to about 500 people will be generated.

It can be seen that, there are good public transport, markets, communication, water supply & electric supply facilities in the said area.

##### **Operational Phase**

The completion of the Mathias Ocean Park will generate socio economic activity by way of creating direct employment to about more than 700 people & indirect employment to several other people.

The land use around the project site is residential and commercial. The locality around the plot is quite civil & socially peaceful. The people mostly staying in the adjacent residential areas appear to be belonging to middle class & high middle class. The quality of people & their standard of living in the vicinity of the plot is good. There is no slum area near the Project site. There are good public transport, markets, communication, water supply & electric supply facilities in the said area. The Mathias Ocean Park will certainly help in bringing about positive improvement in the socio economic status of the nearby area.

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GREEN CIRCLE INC

REPORT NO.: GC/G/2006-07/MG\_EIA/JUL 0557



GOA

Conducted & Prepared By



**GREEN CIRCLE, INC.**  
 (In Collaboration with S & G, Australia & Envergy,  
 USA)  
 INDIA

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Project Proponent:  
Project:

Mathias Construction (P) Ltd.  
Mathias Ocean Park

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**1. NEED FOR ENVIRONMENT IMPACT ASSESMENT:**

As per MoEF, New Delhi {Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii)} dated on 14<sup>th</sup> September, 2006.

The new notification contains following conditions:

⇒ Build-up area Below 20,000 sqm are exempted

⇒ Built up area above 20,000 sqm to 1, 50,000 sqm

⇒ Built Above 1, 50,000 sqm

} Required EIA Studies

**2: OBJECTIVE OF EIA:**

- To establish the base line environment conditions.
- To identified the environmental impacts of the proposed site.
- To provide a suitable environmental management plan.

Environmental Impact Assessment (EIA) is a tool generally used to identify the environmental, social, and economic impacts of a project prior to arriving at decision. It aims to predict environmental impacts at an early stage in project planning and design, find ways and means to reduce adverse impacts, shape projects to suit the local environment and present the predictions and options to project proponent.

By using EIA both environmental and economic benefits can be achieved, such as reduced cost and time of project implementation and design, avoid treatment/clean-up costs and impacts of statutory compliance. Environmental assessment is a procedure that ensures that the environmental implications are taken into account before arriving it final decision.

The process involves an analysis of the likely effects on the environment, recording those effects in a report, undertaking a public consultation exercise on the report, taking into account the comments and the report when making the final decision and informing the public about that decision later.on.

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In principle, environmental assessment can be undertaken for individual projects such as a dam, motorway, airport or factory, any infrastructural projects, residential or commercial establishment, highways, ('Environmental Impact Assessment') or for plans, programmes, and policies ('Strategic Environmental Assessment').

The main objective of the study is to establish the base line environmental conditions and to identify the environmental impacts of Site and provide a suitable environmental management plan. The study zone is defined within radial distance of about 10 Kms from the site.

Quantitative and qualitative analysis was undertaken for air, water, soil, and noise etc. in the various areas of investigation.

### 3. PROJECT PROPONENT DETAILS

The Mathias constructions (P) Ltd. Company was established in the year 1992 and the following major Projects were completed by them.

1. Multi-storey buildings at Vasco-da-Gama
2. Group Housing Schemes of 36 Villas and 40 Apartments at Dona Paula, Goa.
3. "Mathias Portofino Park" at Sinquerim, Candolim consisting of 27 Residential Villas have been completed
4. Various residential and commercial projects at different places in Goa.

### 4. PROJECT DETAIL

#### 4.1 Introduction

Mr. Joe Mathias M.D. of M/s Mathias Constructions (P) Ltd. Is coming up with a proposed "Mathias Ocean Park" at Dona-Paula, Goa. The proposed project comes under two planning zones of the Panjim Development Authority. Namely C1 & C2.

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**C1 Zone:** F.A.R allowed is 200. The apartments in 4 nos blocks have stilt floor for carparking & 8 upper floors for apartments. There is a single block for commercial that is only ground floors.

**C2 Zone:** F.A.R allowed is 150. The apartments in 9 nos of blocks again having stilt for car parking & 5 upper floors of apartments. Only one of the blocks has an addition of a basement which is for car parking. This has been necessitated by the contours on site. The club house block has ground & 2 upper floors. The 2 upper floors being used for the housing society

#### 4.2 AREA STATEMENT

Sr. No	Description	Area	Percentage
1.	Total Site Area	82,220.00 m <sup>2</sup>	100 %
2.	Site Area in Zone C-1	27,232.00 m <sup>2</sup>	
3.	Commercial Area	184.49 m <sup>2</sup>	
4.	Permissible FAR for C-1	200	
5.	FAR Achieved for C-1	199.98	
6.	Site Area in Zone C-2	54,988.00 m <sup>2</sup>	
7.	Permissible FAR for C-2	150	
8.	FAR Achieved for C-2	149.99	
9.	Total Towers (C1 + C2)	13 nos	
10.	Total No. of Flats	1,384.00	
11.	Total Car Parking required	1,388 nos	
12.	Total Car Parking Provided	1,469 nos	
13.	F.A.R Achieved on total plot (C1+C2)	166.30	
14.	Area reserved for Civic amenities (C1+C2)	731.32	0.89
15.	Ground floor coverage area (C1+C2)	23,327.57	28.37
16.	Parking and driveway area (hardscape) (C1+C2).	36,270.92 m <sup>2</sup>	44.12
17.	Total open space for greenbelt (C1+C2).	21,890.19 m <sup>2</sup>	26.62

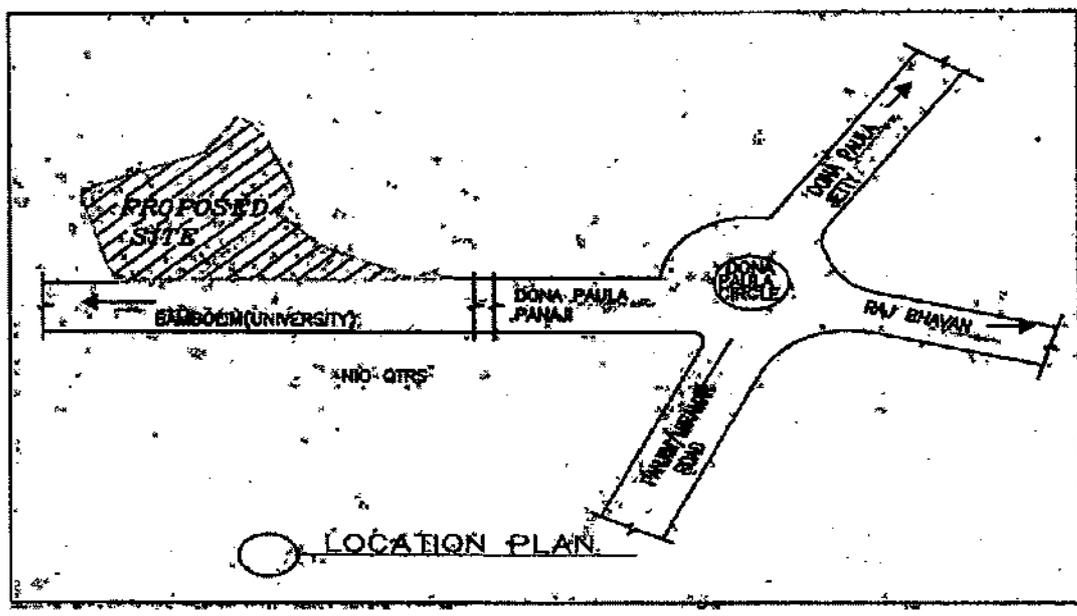
#### 4.3 LOCATION

The location of the proposed "Mathias Ocean Park" at Dona-Paula, on plot bearing Survey No.249/1-A of Village Taleigao, Tiswadi, Goa

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4.4 UTILITY REQUIREMENT

4.4.1 Water Requirement

C1-ZONE:

No. Of apartments	= 544
Number of Persons in each apartment	= 5
Number of Persons	= 544 x5
	=2720
Water requirement @ 135 lpd per person	= 2720x135
	= 367,200 lpd
Adding 10% extra for wastage, cleaning etc	= 403,920 lpd
Say	<b>410cum</b>

C2-ZONE:

Water Demand Calculation for ZONE -C2

No. Of apartments	=840
Number of Persons in each apartment	= 5
Total Number of Persons	=840 x5
	=4,200
Water requirement @ 135 lpd per person	= 4,200x135
	= 630,000 lpd

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Adding 10% extra for wastage, cleaning etc =567,000 lpd

Say 570cum

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273**4.4.2 Power Requirement**

Goa Electricity Board will fulfill the power requirement.

During Construction: 150kW Total Required

Operational phase: 4475kVA Total Required

Connected Load or Demand Load: 7959kW

**5. BASELINE DATA**

The study region for this assessment has been confined to 10 Km radius from the project site. The base line data for this project is:

**5.1 AIR ENVIRONMENT**

Air quality was measured at five locations in study area. Concentrations of SPM, RSPM, SO<sub>2</sub>, NO<sub>x</sub> & CO were measured. All the parameter was in the normal range and in conformance with their respective National Ambient Air Quality Standards. Study was carried out from March-2006 to May-2006

Only the expected amounts of air pollutions will be emitted during construction period. Pollutants like cement and dust particles and due to the operation of diesel pumps & construction equipments, there will be emission of some gases like SO<sub>2</sub>, NO<sub>x</sub> & CO etc. During the functional phase, emission will be done only because of vehicular movement & operation of DG Set during power cut.

Sr. No	Content	SPM µg/m <sup>3</sup>	RSPM µg/m <sup>3</sup>	SO <sub>2</sub> µg/m <sup>3</sup>	NO <sub>x</sub> µg/m <sup>3</sup>	CO µg/m <sup>3</sup>
<b>A1</b>	<b>AAQM: At Project Site</b>					
	Maximum	116	61	6.3	14	135
	Minimum	82	52	BDL	7	110
	Average	95	58	6.1	9	121
<b>A2</b>	<b>AAQM: At Panaji</b>					
	Maximum	128	64	6.8	15	149
	Minimum	86	47	BDL	8	117

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	Average	110	57	6	12	129
<b>A3</b>	<b>AAQM: At Dona Paula</b>					
	Maximum	122	65	6.5	14	136
	Minimum	84	49	BDL	7	121
	Average	96	55	6	11	130
<b>A4</b>	<b>AAQM: At Chicalim</b>					
	Maximum	132	64	7.2	18	140
	Minimum	116	51	BDL	12	126
	Average	128	57	6	15	132
<b>A5</b>	<b>AAQM: Near GMC</b>					
	Maximum	129	65	6.7	15	142
	Minimum	94	53	BDL	7	120
	Average	111	59	6.1	10	132

BDL: Value <6.0µg/m³

**5.2 WATER ENVIRONMENT**

Hydro geologically this region is good. Normally underground water contain salts because of the shoreline is on the South side of the Plot.

**A. Surface Water**

Estuary of River Mondovi, Zuari and Arabian Sea are the major surface water bodies observed in the study area.

**B. Ground Water**

Various ground water sources in the study region consist of bore wells and open wells. They are distributed all over the region.

Topographic features control the occurrence and movement of ground water. Ground water recharge occurs mainly by rainwater infiltration, which depends on the porosity and permeability of the soil and physiographic location of the wells.

**C. Sewage**

The domestic effluent generated mainly from the kitchen, toilets. It will be channellised as per approval design through closed drainage network and will be treated in the Sewage Treatment Plant of 790 m³/day capacity.

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### 5.3 NOISE ENVIRONMENT

Noise measurement in and around the site was carried out. At site in view of construction activities, noise level is exceeding the National Noise Standards limits. However, this source is temporary in nature. After the construction, only external source of the noise is vehicle plying on roadside.

### 5.4 ECOLOGY

The birds & animals, around the site, are the species generally observed in Goa.

### 5.5 DATA SOURCE

The study team has collected the secondary information as well as the primary information on various environmental attributes. Information on existing environmental conditions has been gathered from several sources including:

- ☛ Site surveys and field experiments to gather the information on Meteorology, Air Quality, and Water Quality, Noise Quality, Biological environment and traffic were conducted by the study team.
- ☛ The published literature on Economic Survey of Goa 2005-06.
- ☛ Statistical hand book of Goa 2001 Published by Government of Goa.
- ☛ Secondary data from IMD, Panaji.

### 5.6 METEOROLOGY

In Goa balmy tropical weather, temperature doesn't fluctuate much, mostly hovering within a narrow band of 25 C to 32 C year-round. This is very pleasant since the ideal temperature for human body is 28 C with 50 percent humidity.

A peculiarity of Goa weather is that the heat peaks twice a year- in April-May and October-November – with temperature crossing 30 C in noon. Goa thus has two summers. October and November are also sweaty and uncomfortable because of high humidity in the wake of the monsoons.

Goa falls in the high-rainfall zone. The torrential monsoon rains, heralded by thunder and lightning, last from June to September. July is the wettest, especially the first half. The rains slow down in August and taper off in

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September. They are erratic, not continuous – a week of nonstop downpour may be followed by a dry, sunny spell lasting days. Weather-wise, the monsoon months are the coolest and most pleasant.

### 5.7 TRAFFIC PATTERN

The " Mathias Ocean Park " is located on the Dona Paula – Goa University Road. The growth of residential premises has now distributed the traffic to other times, but mostly busy during the peak times in the morning & evening.

### 5.8 SOLID WASTE

Solid waste management is important concern. There will be different waste source such as construction waste during construction period like waste concrete, debris, bricks, waste plaster etc. Hence, the management plan shall focus on segregation of waste at source, collection, waste recycling, & reuse and cost effective treatment and disposal scheme as per solid waste management rules. Hazardous waste also will dispose in proper manner.

In operational Phase, Solid waste like food waste and other biodegradable waste will be generated. This domestic waste will be collected in different container and it will send to Municipal Corporation/ panchayat for final disposal.

### 5.9 SOCIO-ECONOMIC

The locality around the plot towards the Dona Paula area mostly belongs to the middle class & higher middle class & found to be quite civil & socially peaceful. The quality of people & their standard of living in the vicinity of the plot is good. There are good public transport, markets, communication, water supply & electric supply facilities in the said area.

### 5.10 AESTHETICS

- The proposed Structure is a part of urban development.
- Aesthetic point of view, the project is a step to the local development.

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■ The proposed structure is an excellent example of modern constructions so this should be encouraged.

**6. ENVIRONMENTAL IMPACT IDENTIFICATION & MANAGEMENT PLAN**

**6.1 ENVIRONMENTAL IMPACT IDENTIFICATION**

Environmental impact assessment involves identification, prediction, and evaluation of potential impacts of the proposed activities on within the study area. These activities include all actions that are required for successful construction of project and its use.

The impact identification and prediction process aims to:

- ✕ Identify potential source or cause of impact through out the life of project.
- ✕ Characterize the potential impacts affecting a target or receptor (physical, human and socio-economic).
- ✕ Assess the potential of changing likely-hood of impact through environmental management plan (EMP).

**6.2 ENVIRONMENT MANAGEMENT PLAN**

Identification and prediction of impacts further needs to suggest the mitigation measures which play a vital role in prevention of environmental pollution during construction and implementation phase of proposed project. This leads to preparation of environmental management plan. Measures which will be adopted to reduce the magnitude of negative impacts from the proposed project during construction and functional phase. Environmental management plan therefore forms an imperative part of EIA process.

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ENVIRONMENTAL IMPACT AND MANAGEMENT PLAN DURING CONSTRUCTION PHASE

Sr. No.	Environmental components	Predicted Impacts	Probable Source of Impact	Mitigation Measures	Remarks
1.	Ambient Air Quality	There will be Minor impact on air.	<ul style="list-style-type: none"> <li>The SPM &amp; RSPM conc. will be emitted due to flying dust by unloading and handling of sand, cement etc &amp; concrete mixing processes.</li> <li>Gaseous emission due to the operation of Construction equipments</li> </ul>	<ul style="list-style-type: none"> <li>RSPM and SPM conc. will be brought down by sprinkling of water on road.</li> <li>PPE will be provide</li> </ul>	Minor Impact
2.	Water	There is no impact	<ul style="list-style-type: none"> <li>Surface runoff from the project site.</li> <li>Leakage of oil from the construction equipments.</li> </ul>	<ul style="list-style-type: none"> <li>Ground water will not be used for construction.</li> <li>Tanker water shall be used for construction activity and other domestic purposes.</li> </ul>	Minor Impact
3.	Noise	Minor impact near noise generation sources inside premises.	<ul style="list-style-type: none"> <li>Noise generated from construction activities and operation of construction equipment &amp; DG Set.</li> </ul>	<ul style="list-style-type: none"> <li>Use of well-maintained equipments.</li> <li>Use of earplugs/muffs by construction staff.</li> <li>DG Set will be installed with appropriate acoustic.</li> </ul>	Minor Impact

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4.	Land	Minor impact	<ul style="list-style-type: none"> <li>☞ Construction debris &amp; waste from labour.</li> <li>☞ Oil leakage from construction machinery.</li> </ul>	<ul style="list-style-type: none"> <li>☞ Waste generated from the construction raw materials will be disposed properly.</li> <li>☞ Leakage of oil if any shall be removed immediately.</li> </ul>	Minor Impact
5.	Traffic Pattern	Slight Impacts	<ul style="list-style-type: none"> <li>☞ 10 to 12 heavy and medium vehicles shall enter and leave the subject plot on daily basis.</li> </ul>	<ul style="list-style-type: none"> <li>☞ Proper Traffic Management plan will be done.</li> </ul>	No Impact
7.	Solid Waste	Slight Impact	<ul style="list-style-type: none"> <li>☞ Disposal of Construction waste and Metallic waste</li> </ul>	<ul style="list-style-type: none"> <li>☞ Reused for land filling in the project premises.</li> <li>☞ Metallic waste collected separately and reused it.</li> </ul>	No Impact
8.	Socio-Economic	Positive Impact	<ul style="list-style-type: none"> <li>☞ Direct employment for 700-800 people will be expected.</li> </ul>	<ul style="list-style-type: none"> <li>☞</li> </ul>	Positive Impact

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<b>ENVIRONMENT IMPACT AND MANAGEMENT PLAN DURING OPERATIONAL PHASE</b>
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Sr. No.	Environmental components	Predicted Impacts	Probable Source of Impact	Mitigation Measures	Remarks
1.	Ambient Air Quality	Slight Impact	☞ Gaseous emissions from DG sets and vehicle movement.	☞ Use of DG set as a power Back up.	Minor Impact
2.	Water	No Impact	☞ Discharge of sewage. ☞ Discharge of contaminated storm water.	☞ Sewage will be treated in STP and reuse for non-potable purpose. ☞ Rainwater harvesting & recharge of groundwater aquifer is proposed.	Minor Impact
3.	Noise	Minor Impact	☞ Noise from vehicle movement and operation of DG set during power failure.	☞ DG set will be installed with appropriate acoustics. ☞ Traffic management measures to reduce noise. ☞ More trees will be planted in the Project premises.	Minor Impact
4.	Land	No Impact	☞ Storage and disposal of solid wastes.	☞ Solid waste will be collected in the garbage room and then will be disposed off as per solid waste management rules.	Minor Impact

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5.	Traffic	No Significant Impact	<ul style="list-style-type: none"> <li>☛ Above 350 vehicles are expected to enter &amp; leave the subject property on daily average basis.</li> </ul>	<ul style="list-style-type: none"> <li>☛ There will be proper Entry and exist for vehicle</li> </ul>	Minor Impact
6.	Solid Waste	No Significant Impact	<ul style="list-style-type: none"> <li>☛ Solid waste will be in the form of wet garbage &amp; Dry Garbage.</li> <li>☛ No hazardous waste shall be generated.</li> </ul>	<ul style="list-style-type: none"> <li>☛ Solid waste will be handled and treated in the proper way.</li> <li>☛ Wet garbage to be disposed off through the Municipa/ panchayat van on the daily basis.</li> </ul>	Minor Impact
8.	Socio-Economic	Positive impact	<ul style="list-style-type: none"> <li>☛ Direct employment to about 50-100 people &amp; indirect employment to several other people will be expected.</li> </ul>		Positive and long term Impact.

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**7. PROJECT BENEFITS**

The "Mathias Ocean Park" will certainly help in bringing about positive improvement in the socio economic status of the nearby the area. It has been planned to plant more trees so the air quality will be good. The project does not interfere the ecology of the surrounding.

**8. CONCLUSION**

Overall, the project has no negative impacts on the environment, thus this project should be awarded necessary Environmental clearances.

## SCOPE OF SERVICES

### ENVIRONMENTAL HEALTH & SAFETY DIVISION

#### A. ENVIRONMENTAL ENGINEERING SERVICES

- Stack & Ambient Air Quality Monitoring
- Water Potable & effluent analysis
- Environmental Impact Assessment : Rapid & Comprehensive EIA/ Environmental Management Plan
- Public Hearing & MoEF Clearance
- Personal Monitoring /Workplace Monitoring
- Environmental Audit /Statement
- Health & Socioeconomic Survey
- ETP & STP Designing & Turnkey Projects
- ETP & STP -Operation & Maintenance
- Feasibility & Treatability Study
- Waste Water Management Study & Storm Water Distribution System -designing & construction
- Water Management Audit & Water Harvesting
- Hydrological & Limnological Study
- Water Supply & Drainage system Designing
- Hazardous Waste management System/ Land filling
- Energy Audit & Illumination or Lighting Audit
- Environmental Accounting
- Responsible Care System & ISO 14001 (EMS)

#### B. SAFETY ENGINEERING SERVICES

- Safety Survey, Safety Audits & Fire Audits
- Hazard & Operability Study (HAZOP) & Hazard Analysis (HAZAN)
- Safety Report (Under EPA 1986 (Rule No.10), Hazardous Chemicals )
- On-site & Off-site Emergency Plans/Disaster Management Plan
- Risk Assessment /Analysis & Management : Environmental, Social & Financial
- Mock Drills & Preparation of Booklets under Factory Act 1948 / State Factory Rules
- Behaviourial Safety Audit, PPE'S Audit & Ergonomic Audit
- Dispersion Modeling /Mathematical Modeling /Fire Pool & Ball modeling
- Occupational Health ,Hygiene & Work Environments survey/audits
- Food Hygiene & HACCP survey ,training & audits
- Reliability Study & Safety Management System(SMS)
- HSE Policy & Safety Management System(SMS)
- Illumination or Lighting Audit
- Process Safety & Plant Safety Manual
- Plant O & M Manual / Corporate Protocols
- Process Safety Analysis/Safety Diagnosis
- Accident Investigations
- Electrical Safety Audit
- Loss Prevention Programs
- Mock Drill for emergency preparedness
- In-plant HSE Training & OHSAS 18000

For more Information, Please contact/ write/email your inquiries to:



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## IN PLANT EHS MANAGEMENT TRAINING PROGRAMES

We offer proven EHS & FIRE Management Training Programs that can improve EHS & Fire Management Rating high, in turn it would lead to better & effective management of Environment, Health & Safety, further it would increase competitiveness, boost business performance and build a positive reputation. The training programs are so designed to help the management to reduce losses, improve production, save time & money.

### ENVIRONMENTAL MANAGEMENT TRAINING PROGRAMES

1. Environmental Management- 2 days
2. Effluent Treatment Plant/Sewage Treatment Plant: Operation & Maintenance -2 days each
3. Environmental Monitoring & Analysis : Air /Water /Noise (Laboratory & Field Exercise )-3 days
4. Water Management- 2 days
5. EMS : ISO 14001 Awareness Programs & Training - 1 day
6. EMS : ISO 14001 Internal Auditors Training Program - 2 days

### SAFETY & HEALTH MANAGEMENT TRAINING PROGRAMES

- |   |   |
|---|---|
| 1. Safety Management                                    | 29. Permit System                           |
| 2. Use of Personal Protection Equipment(PPE's)          | 30. Observing Unsafe Acts & Reporting       |
| 3. Housekeeping   | 31. Risk Management                         |
| 4. Chemicals Management                                 | 32. Emergency Preparedness                  |
| 5. Machine Guarding                                     | 33. MSDS                                    |
| 6. Safe Maintenance                                     | 34. Evacuation                              |
| 7. Accident Report Writing & Investigation              | 35. Hazard Communication                    |
| 8. Job Safety Analysis (JSA)                            | 36. Mock Drill- 2 days                      |
| 9. Fire Safety Management/Fire Prevention & Control     | 37. Legal /Statutory Requirements           |
| 10. First Aid   | 38. EHS Policy Training                     |
| 11. Accident Prevention & Control                       | 39. Static Electricity                      |
| 12. Loss Prevention & Control                           | 40. Rescue Methods                          |
| 13. Safety in Construction /Projects                    | 41. Material Handling /Fork Lift            |
| 14. Office Safety                                       | 42. Safety Committee                        |
| 15. Occupational Health & Hygiene                       | 43. Contractors Safety                      |
| 16. Safety in Computer Operations                       | 44. Electrical Safety                       |
| 17. Transportation Safety                               | 45. Drivers Training                        |
| 18. Hazard & Operability Study (HAZOP)-2 Days           | 46. Safety in Welding /cutting              |
| 19. Safety Audit  | 47. Safety in Engineering Industries        |
| 20. Safety Consideration in Designing of Chemical Plant | 48. Dock /Port Safety                       |
| 21. Stores & Warehouse Safety                           | 49. Safety of tank farms /bullets / Spheres |
| 22. Public Liabilities Act (PLA)                        | 50. Working at Heights                      |
| 23. Safety & Productivity                               | 51. Working in Hazardous Area               |
| 24. Handling ,Storing & Use of LPG / NG                 | 52. Handling ,Storing & Use of Chlorine     |
| 25. Working with Compressed Gas Cylinders               | 53. Safety Discipline                       |
| 26. Vessel Entry /Working in Vessel/Confined Space      | 54. Operational Safety of Pressure Vessels  |
| 27. Noise & Vibration                                   | 55. Non Destructive Tests (NDT's)           |
| 28. Human Factors in Process Control                    | 56. Stress Management                       |

The Training Programs & Literature are offered in Hindi /Local Languages (Indian) & English .At a time 2 topics from above list (Safety) could be selected for one day program, for a batch of 20 persons. However for comprehensive programs the modules would be customized to the plant needs.

*For more information, please contact/ write/email your inquiries to:*



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# MATHIAS OCEAN PARK

## Goa

Conducted & Prepared By



**GREEN CIRCLE, INC.**

(In Collaboration with S & G, Australia & Everegy,  
USA)  
INDIA

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# ENVIRONMENTAL IMPACT ASSESSMENT & ENVIRONMENT MANAGEMENT PLAN

PREPARED FOR

**Mr. Joe Mathias****Managing Director****M/s Mathias Construction Pvt. Ltd.**502, Mathias Plaza, 18<sup>th</sup> June Road,

Panjim, Goa – 403001

FOR THEIR SITE

**"MATHIAS OCEAN PARK"**

Sy. No.249/1-A,

Dona Paula, Goa University Road,

Taleigao Village,

Tiswadi, Goa-04



## GREEN CIRCLE, INC.

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## GREEN CIRCLE, INC.

(In Collaboration with S & G, Australia & Envergy, USA)

### EIA CERTIFICATE

GREEN

This is to certify that M/S. Green Circle Inc., Mumbai, has conducted the EIA Study for "MATHIAS OCEAN PARK", to be developed at Dona, Paula, Goa. BY MR. JOE MATHIAS, MANAGING DIRECTOR, OF M/S MATHIAS CONSTRUCTION PVT. LTD., PANAJI, GOA and observed that the project does not have major negative impact to the environment.

For Green Circle, Inc.

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# ACKNOWLEDGEMENT

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WE EXPRESS OUR SINCERE THANKS TO THE MANAGEMENT & EMPLOYEES OF M/s MATHIAS CONSTRUCTION PVT. LTD., 502, Mathias Plaza, 18<sup>th</sup> June Road, Panjim, Goa - 403 001 FOR THEIR CO-OPERATION & UNSTINTED HELP WITHOUT WHICH THE ENVIRONMENTAL IMPACT ASSESSMENT COULD NOT HAVE BEEN POSSIBLE. THE COURTESY EXTENDED TO OUR EIA TEAM IS HIGHLY APPRECIATED.

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## ABBREVIATIONS

1.	AC	:	AIR CONDITION
2.	AVG	:	AVERAGE
3.	BOD	:	BIOCHEMICAL OXYGEN DEMAND
4.	CNG	:	COMPRESSED NATURAL GAS
5.	CO	:	CARBON MONOXIDE
6.	CO <sub>2</sub>	:	CARBON DIOXIDE
7.	COD	:	CHEMICAL OXYGEN DEMAND
8.	CPCB	:	CENTRAL POLLUTION CONTROL BOARD
9.	E. Coli	:	ESCHERETIA COLI
10.	EIA	:	ENVIRONMENTAL IMPACT ASSESSMENT
11.	EMP	:	ENVIRONMENT MANAGEMENT PLAN
12.	EPI	:	EXAPANDED PROGRAMME OF IMMUNIZATION
13.	FSI /FAR	:	FLOOR SPACE INDEX/ FLOOR AREA RATIO
14.	GoI	:	GOVERNMENT OF INDIA
15.	H <sub>2</sub> S	:	HYDROGEN SULFIDE GAS
16.	IS	:	INDIAN STANDARD
17.	ISO	:	INTERNATIONAL ORGANIZATION FOR STANDARDIZATION
18.	KV	:	KILO VOLTS
19.	m <sup>2</sup>	:	SQUARE METRE
20.	MAX	:	MAXIMUM
21.	MIN	:	MINIMUM
22.	MLD	:	MILLION LITERS PER DAY
23.	MoEF	:	MINISTRY OF ENVIRONMENT AND FOREST
24.	GPCB	:	GOA POLLUTION CONTROL BOARD
25.	MPN	:	MOST PROBABLE NUMBER

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26.	GSEB	:	GOA STATE ELECTRICAL BOARD
27.	MTPD	:	MILLION TONES PER DAY
28.	NAAQS	:	NATIONAL AMBIENT AIR QUALITY STANDARDS
29.	NH <sub>3</sub>	:	AMMONIA
30.	NO <sub>x</sub>	:	OXIDES OF NITROGEN
31.	NTU	:	NEPHELOMETRIC TURBIDITY UNIT
32.	°C	:	DEGREE CENTIGRADE
33.	PUC	:	POLLUTION UNDER CONTROL
34.	RCC	:	REINFORCED CONCRETE CEMENT
35.	RSPM	:	RESPIRATORY SUSPENDED PARTICULATE MATTER
36.	RTO	:	REGIONAL TRANSPORT OFFICE
37.	SO <sub>2</sub>	:	SULFUR DIOXIDE
38.	SPM	:	SUSPENDED PARTICULATE MATTER
39.	Sq. ft	:	SQUARE FEET
40.	Sq. mt.	:	SQUARE METRE
41.	SS SINK	:	STAINLESS STEEL SINK
42.	STP	:	SEWAGE TREATMENT PLANT
43.	SWD	:	STORM WATER DRAINAGE
44.	TDS	:	TOTAL DISSOLVED SOLIDS
45.	TSP	:	TOTAL SUSPENDED PARTICLES
46.	TSS	:	TOTAL SUSPENDED SOLID
47.	TVC	:	TOTAL VIABLE COUNT
48.	WC	:	WATER CLOSET
49.	WHO	:	WORLD HEALTH ORGANIZATION

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# NEED OF ENVIRONMENTAL IMPACT ASSESSMENT

As per MoEF, New Delhi (GoI dtd. 7<sup>th</sup> July 2004) PART II – Section 3 – Sub-Section (II), all any construction project falling under entry 31 of Schedule-I including new townships, industrial townships, settlement colonies, commercial complexes, hotel complexes, hospitals and office complexes for 1,000 (one thousand) persons or above or discharging sewage of 50,000 (fifty thousand) litres per day or above or with an investment of Rs.50,00,00,000/- (Rupees fifty crores) or above. Any industrial estate falling under entry 32 of Schedule-I including industrial estates accommodating industrial units in an area of 50 hectares or above but excluding the industrial estates irrespective of area if their pollution potential is high. (Reproduced GoI Caption).

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# CHAPTER 1

## Introduction to EIA

### Content

- 1.1 Introduction to EIA
- 1.2 Methodology of EIA
- 1.3 Flow Chart of EIA

Project Proponent:  
Project Name:

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Mathias Ocean Park

1.0

## 1.1 INTRODUCTION TO EIA

Environmental Impact Assessment (EIA) is a tool generally used to identify the environmental, social and economic impacts of a project prior to arriving at decision. It aims to predict environmental impacts at an early stage in project planning and design, find ways and means to reduce adverse impacts, shape projects to suit the local environment and present the predictions and options to project proponent.

By using EIA both environmental and economic benefits can be achieved, such as reduced cost and time of project implementation and design, avoid treatment/clean-up costs and impacts of statutory compliance. Environmental assessment is a procedure that ensures that the environmental implications of decisions are taken into account before the decisions are made.

The process involves an analysis of the likely effects on the environment, recording those effects in a report, undertaking a public consultation exercise on the report, taking into account the comments and the report when making the final decision and informing the public about that decision later on.

In principle, environmental assessment can be undertaken for individual projects such as a dam, motorway, airport or factory, any infrastructural projects, residential or commercial establishment, highways, ('Environmental Impact Assessment') or for plans, programmes and policies ('Strategic Environmental Assessment').

The main objective of the study is to establish the base line environmental conditions and to identify the environmental impacts of Site and provide a suitable environmental management plan. The study zone is defined within radian distance of about 10 Km from the site.

Quantitative and qualitative analysis was undertaken for air, water, soil etc. in the various areas of investigation.

Project Proponent:  
Project Name:

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1.1

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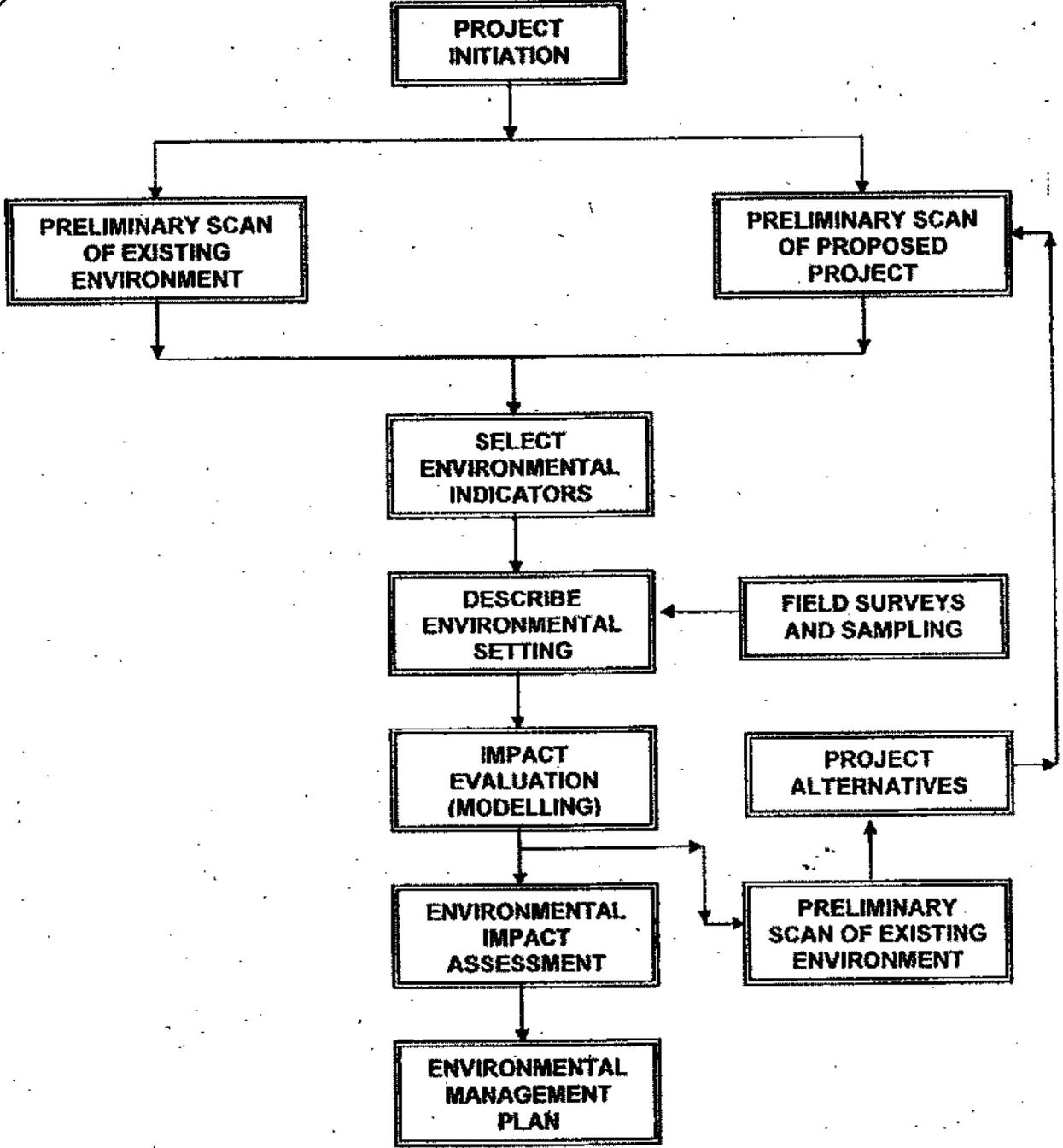
**1.2 METHODOLOGY OF EIA**

- The study was carried out to know and to predict the impact on the natural resources of the region, the region hydrology, air, water and soil quality, the regions Socio-economic forum, the infrastructure, etc.
- It was studied whether the local population or dust problem or by other means which may have likely been created by the site.
- The waste generated in the form of air, water and solid waste from the site requiring to be treated before its final disposal into the atmosphere or on the ground and requires a continuous monitoring and checking for their treatment prior to its final disposal.
- The safety of the individuals or any other associated utility services or the population located nearby shall always be protected.
- The methodology adopted is that of identifying the nearby natural resources, the vegetation and other ecosystem, the population residing near by, their usage of the natural resources and the likely impact on these factors directly or indirectly.
- The environmental data related to the air, water etc. would be studied to see that these factors of the site do not have an adverse effect to the local population as well as their natural resources. The EIA study covers the environmental impact of the site established on the present scenario of the environment status.
- It shall cover the potential of the pollution likely to be generated, prediction of the pollutants likely to be generated from the site. It is monitoring methodology as well as its strict control on emission of the gaseous, water and solid waste to the atmosphere or on land prior to the conformity of the necessary regulatory standards.
- The Environmental Impact study also recommends the measures to be taken to see that the implementation of the site does not have much environment effects.

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1.3 FLOW CHART OF EIA

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# CHAPTER

# 2

## Project at a Glance

### Content

- 2.1 Project Proponent Details
- 2.2 Project Detail
- 2.3 Location
- 2.4 Topography
- 2.5 Conveyance
- 2.6 list of equipments and materials used at project site
- 2.7 Land Use Pattern around the Site
- 2.8 Aesthetics
- 2.9 Project Benefits

Project Proponent:  
Project Name:

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Mathias Ocean Park

2.0

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## 2.1 PROJECT PROPONENT DETAILS

The Mathias constructions (P) Ltd. Company was established in the year 1992 and the following major Projects were completed by them.

1. Multi-storey buildings at Vasco-da-Gama
2. Group Housing Schemes of 36 Villas and 40 Apartments at Dona Paula, Goa.
3. "Mathias Portofino Park" at Sinquerim, Candolim consisting of 27 Residential Villas have been completed
4. Various residential and commercial projects at different places in Goa.

## 2.2 PROJECT DETAIL

### 2.2.1 Introduction

Mr. Joe Mathias M.D. Of M/s Mathias Construction (P) Ltd. is coming up with a proposed "Mathias Ocean Park" at Dona-Paula, Goa... The proposed project comprises of 2 Zones C1 and C2.

**C1 Zone:** comprises of stilt floor, Ground floor, Elevated Ground floor and upper seven floors.

Stilt floor comprises of car parking, Ground floor comprises of Commercial units, Elevated Ground floor and the upper seven floors comprises of Residential units.

**C2 Zone:** comprises of stilt floor, Ground floor, Elevated Ground floor and upper four floors.

Stilt floor comprises of car parking, Ground floor comprises of Club House, Elevated Ground floor comprises of residential units, First floor comprises of Residential and Club House and the upper three floors comprises of Residential units.

### 2.2.2 AREA STATEMENT

Project Proponent:  
Project Name:

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Mathias Ocean Park

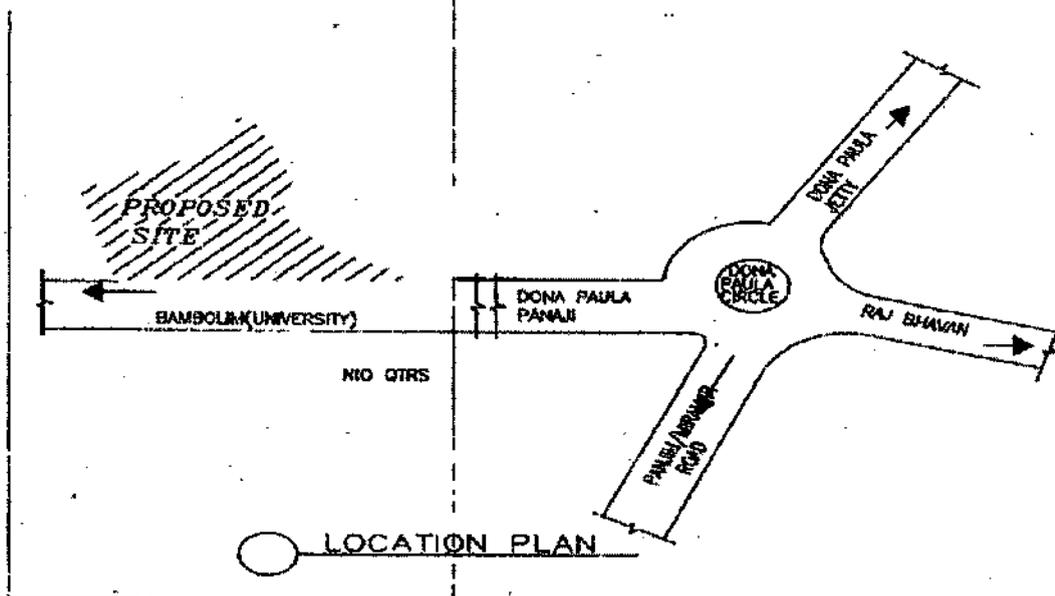
2.1

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30A

Sr. No.	Description	Area
1.	Total Site Area	82,220 m <sup>2</sup>
2.	Site Area in Zone C-1	27,232 m <sup>2</sup>
3.	Commercial Area	184.50 m <sup>2</sup>
4.	Permissible FAR for C-1	200
5.	FAR Achieved for C-1	199
6.	Site Area in Zone C-2	54,988 m <sup>2</sup>
7.	Permissible FAR for C-2	150
8.	FAR Achieved for C-2	149.936
9.	Open Space Area (16.20 %)	13333.90 m <sup>2</sup>
10.	Total Towers( C1 + C2)	15 Nos.
11.	Total No. of Flats	1418 Nos.
12.	Total Car Parking Required	1422 Nos.
13.	Total Car Parking Provided	1422 Nos.

### 2.2.3 PROJECT LOCATION

The location of the proposed "Mathias Ocean Park" at Dona-Paula, on plot bearing Survey No. 249/1-A of Village Taleigao, Tiswadi, Goa.



2.2

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## .4 Nearest Distances from the Project site:

Sr. No.	Major Emergency Services	Name of the Place	Distance from the project site (Km)
1.	Hospital	Manipal Goa Hospital	0.5
2.	Police Station	Dona Paula Police Station	0.5
3.	Fire Station	Panaji City Fire Station	4.0
4.	School / College	Goa University	3.0
		Green Rosary School & Jr. Collage	1.5
5.	Railway Station	Karamali Railway Station	16
6.	Airport	Dabolim Airport	30
7.	Bus Stops	Goa University Road	Near the site
8.	Bank	UTI Bank	1.0
9.	Post Office	Dona Paula Post Office	1.0
10.	Others	NIO Colony	0.5
		Miramar Beach	4.0
		Rajiv Gandhi IT Park	2.0
		Science Centre	3.0

## 2.2.5 LIST OF EQUIPMENTS AND MATERIALS

## a) List of Equipments to be installed at site:-

- a) Concrete mixer machine.
- b) Tower crane.
- c) DG set.
- d) JCB / Poclone
- e) Trucks.
- f) Hoist.
- g) Passenger lift.
- h) Vibrators.

## b) Comprehensive listing of building material for construction

- a) Cement.
- b) Sand.
- c) Jelly.
- d) Solid cement concrete blocks.
- e) Wood.

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Mathias Ocean Park

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- f) Aluminum.
  - g) Granite.
  - h) Ceramic tiles.
  - i) Reinforcement Steel.
  - j) Structural steel

Total Number of man power to be engaged at site: - Approximately 700+

### 2.3 TOPOGRAPHY

The total geographical area of Goa is 3,702 sq. km. on the western seacoast of India between Latitude 15 deg 48' 00" N to 14deg 53'54" N and Longitude 74 deg 20'13" E & 73 deg 40" 33" E. Goa is a part of Konkan area. Goa has hills, low and high land area. Geographically Goa has mainly three natural divisions namely the Low lands, the Plateaus and the Mountain region. Low land area is mainly coastal lines. It is about 110 km long. Many beaches are along the coast in this area. Many rivers flow east to this area therefore this area is fertile. This area is thickly populated. The project site lies in the Taleigao village, which is situated in the Low land area. Arabian Sea lies to south of Taleigao.

### 2.4 LAND USE PATTERN AROUND THE SITE

The study area is predominantly well developed urban agglomeration and hence the land use is predominantly residential and commercial in nature. Topographically the region is plain terrain and there is Slight slope towards the South-west direction from the site. The soil and sub surface is rocky The land is situated in residential zone.

### 2.5 AESTHETICS

- ◆ The proposed Structure is a part of urban development.
- ◆ Aesthetic point of view, the project is a step to the local development.
- ◆ The proposed structure is an excellent example of modern constructions, so this should be encouraged.

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**2.6 PROJECT BENEFITS**

The "Mathias Ocean Park" will certainly help in bringing about positive improvement in the socio economic status of the nearby the area. It has been planned to plant more trees so the air quality will be good. The project dose not interfere the ecology of the surrounding.

Project Proponent:  
Project Name:

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3.9

**3.1 INTRODUCTION**

Baseline environmental status forms the basis for evaluation of the proposed development on the existing conditions. This can be broadly grouped into physical, social, aesthetic and economic environment. Physical environment includes air, water, land, terrestrial flora and fauna, civic infrastructure, public services, etc. Social environment includes demography, community facilities and services, community characteristics, employment centres, commercial facilities servicing the area, etc. Aesthetics environment includes historical monuments, archaeological or architectural sites at and in the vicinity of the proposed project activity. Economic environment covers employment levels, sources and levels of income, economic base of the area, land values, land ownership, etc.

**3.2 SCOPE OF BASELINE STUDIES**

For the present EIA study, the attributes of environment considered are:

- 1. Air Environment (Ambient air, Meteorological Data and Prominent Wind Speed)
- 2. Water Environment ( Water Source: Surface water and Ground water)
- 3. Land Environment (Soil)
- 4. Biological Environment
- 5. Socio-Economic Environment

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### 3.3 AIR ENVIRONMENT

Air pollution can cause significant effects on the environment, and subsequent impact on human, animals, vegetation and materials. It primarily affects the respiratory (e.g. by fine dust), circulatory (e.g. by carbon monoxide) and olfactory (e.g. by odour) system in humans. In most cases, air pollution aggravates pre-existing diseases or degrades health status, making people more susceptible to other infections or the development of chronic respiratory diseases. Environmental impacts from air pollution can include reduction in visibility.

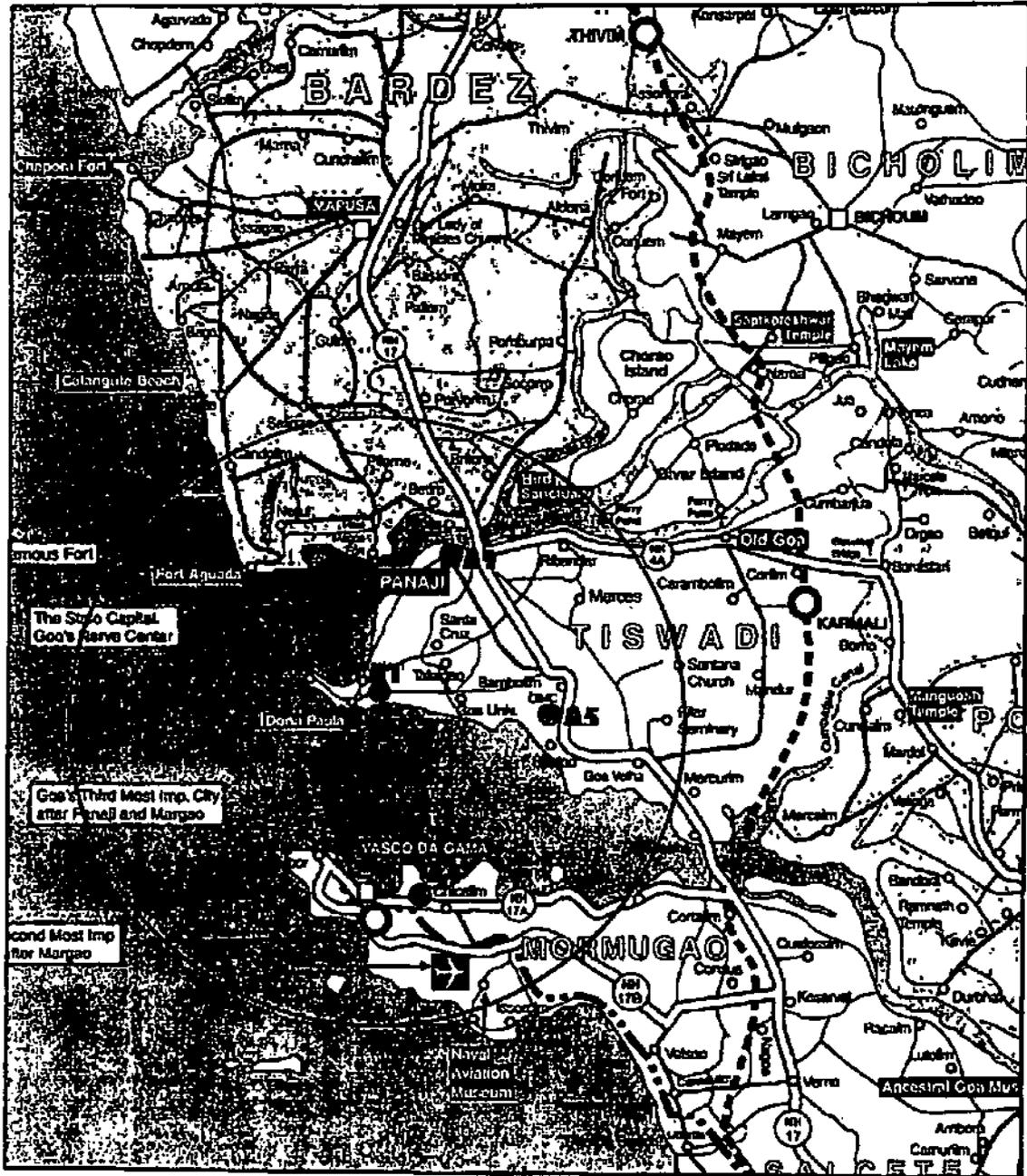
Although not a major contributor to air pollution, the commercial and residential complexes often emits pollutants into the air during both construction and operational phases of the project are as follows:

- **Construction Phase:** includes site clearance and preparation, infrastructure development, building construction and other related activities.
- **Operational Phase:** includes emissions from vehicular movement and diesel generators, negligible impact may be observed from sewage & solid waste handling & disposal.

Activities during these phases will primarily emit Suspended Particulars Matter (SPM), Oxides of Nitrogen (NOx), Carbon Monoxide (CO), Sulphur Dioxide (SO<sub>2</sub>).

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**3.3.1 AMBIENT AIR QUALITY MONITORING LOCATION (Study Period: March-06 to May-06)**



	Location Name	Direction	Distance
A1	At Project Site	---	---
A2	At Panaji	NNE	5 km
A3	At Dona Paula	SW	1.5 km
A4	At Chicalim	SSE	7 km
A5	At GMC	E	6.5 km

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Mathias Ocean Park

3.3

## 3.3.2 AIR QUALITY MONITORING

(March '06 to May '06)

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Sr.No	Content	SPM $\mu\text{g}/\text{m}^3$	RSPM $\mu\text{g}/\text{m}^3$	SO <sub>2</sub> $\mu\text{g}/\text{m}^3$	NOx $\mu\text{g}/\text{m}^3$	CO $\mu\text{g}/\text{m}^3$
A1	AAQM: At Project Site					
	Maximum	116	61	6.3	14	135
	Minimum	82	52	BDL	7	110
	Average	95	58	6.1	9	121
A2	AAQM: At Panaji					
	Maximum	128	64	6.8	15	149
	Minimum	86	47	BDL	8	117
	Average	110	57	6	12	129
A3	AAQM: At Dona Paula					
	Maximum	122	65	6.5	14	136
	Minimum	84	49	BDL	7	121
	Average	96	55	6	11	130
A4	AAQM: At Chicalim					
	Maximum	132	64	7.2	18	140
	Minimum	116	51	BDL	12	126
	Average	128	57	6	15	132
A5	AAQM: Near GMC					
	Maximum	129	65	6.7	15	142
	Minimum	94	53	BDL	7	120
	Average	111	59	6.1	10	132

BDL: Value <6.0 $\mu\text{g}/\text{m}^3$ Project Proponent:  
Project Name:Mathias Constructions (P) Ltd.  
Mathias Ocean Park

3.4

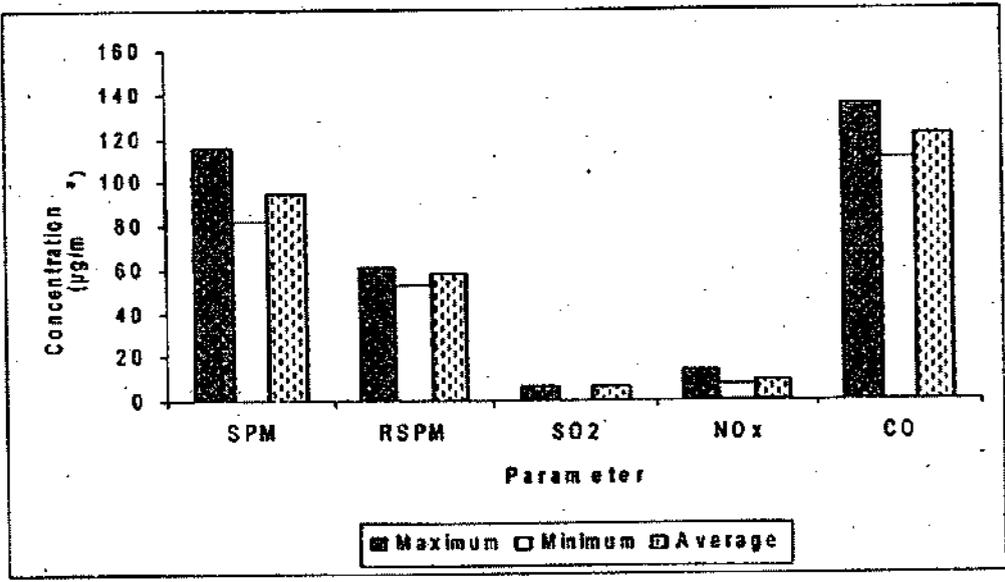
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3.3.3 STANDARDS

Pollutant	Time Avg. Weighted	Industrial Mixed Area ( $\mu\text{g}/\text{m}^3$ )	Residential/Rural Area ( $\mu\text{g}/\text{m}^3$ )	Sensitive Area ( $\mu\text{g}/\text{m}^3$ )
SO <sub>2</sub>	24hrs	120	80	30
NO <sub>x</sub>	24hrs	120	80	30
SPM	24hrs	500	200	100
RSPM	24hrs	150	100	75
CO	1hr	10,000	4000	2000

A1: At Project Site

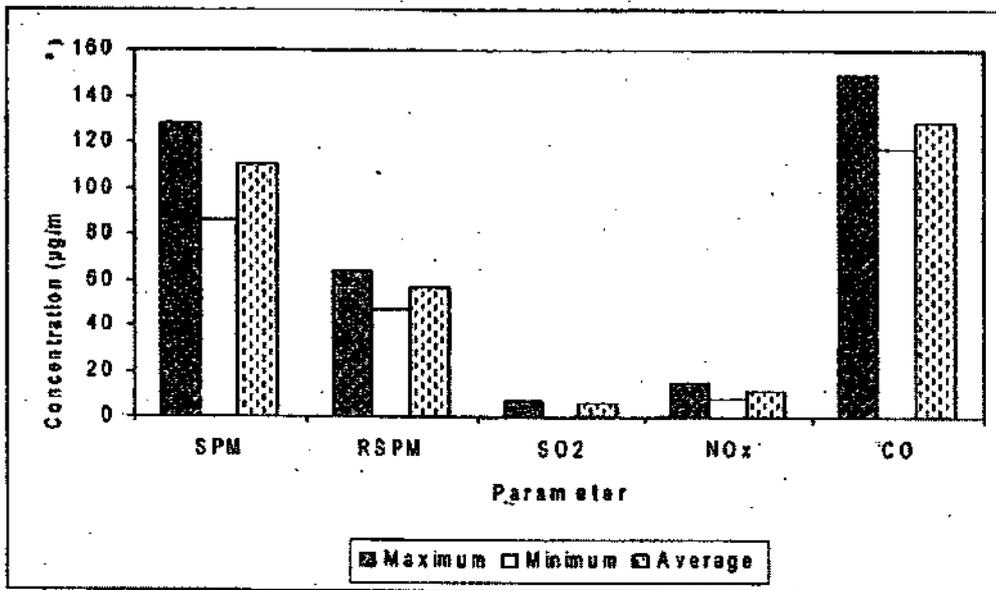


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Project Name:

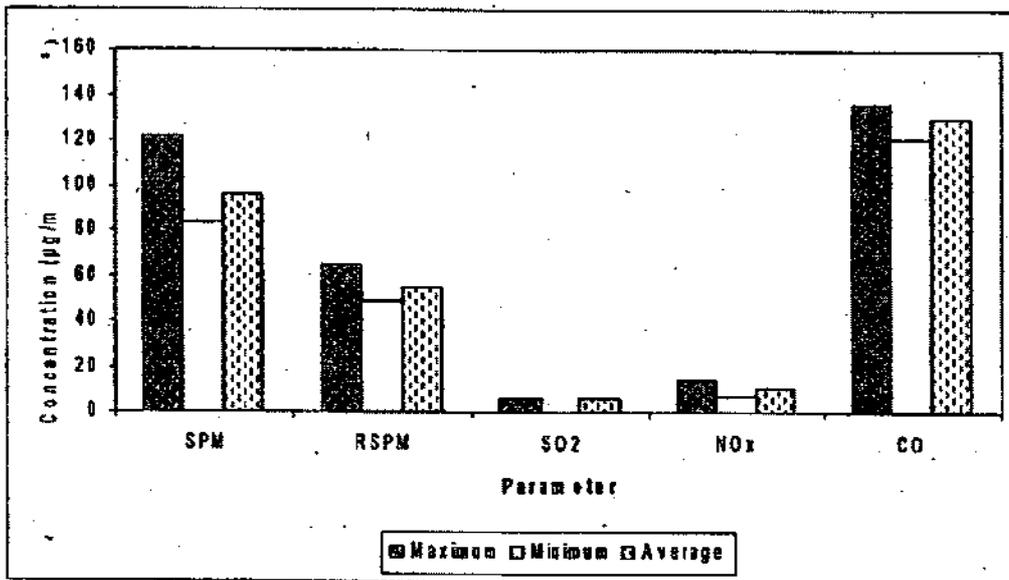
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**A2: At Panaji**



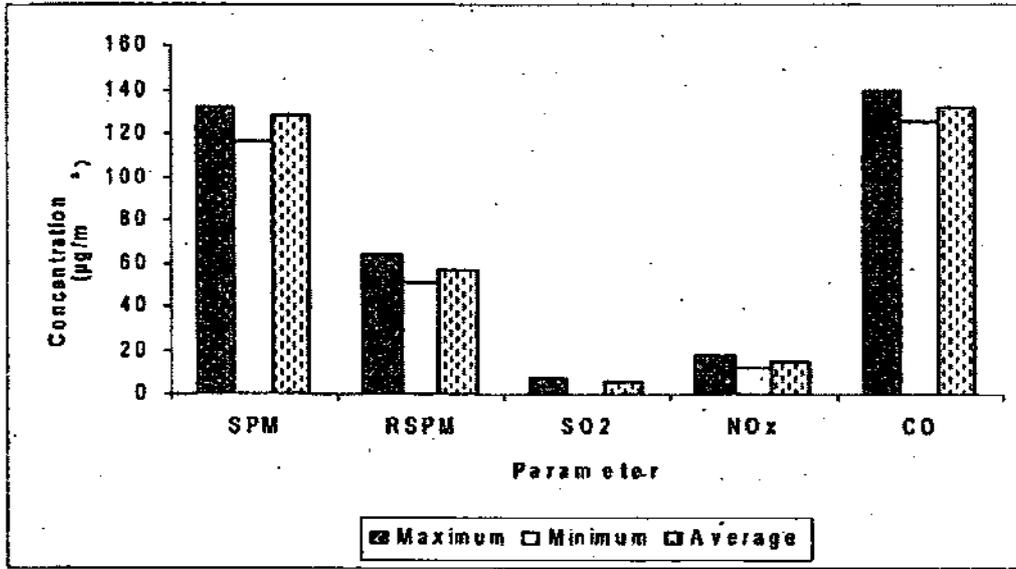
**A3: At Dona Paula**



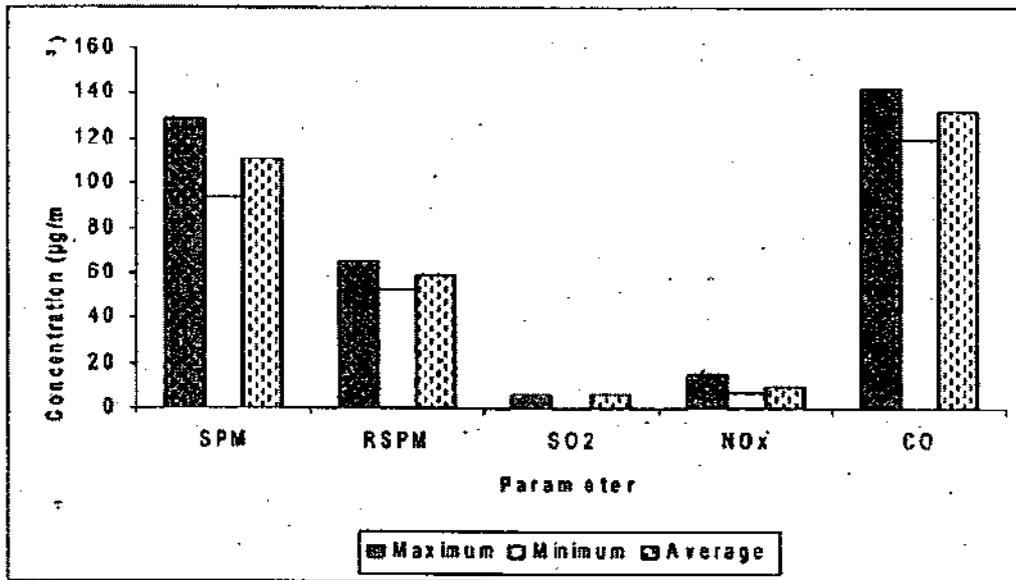
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**A4: At Chicalim**



**A5: Near GMC**



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**3.4 METEOROLOGICAL DATA**

In Goa balmy tropical weather, temperature doesn't fluctuate much, mostly hovering within a narrow band of 25 C to 32 C year-round. This is very pleasant since the ideal temperature for human body is 28 C with 50 percent humidity.

A peculiarity of Goa weather is that the heat peaks twice a year- in April-May and October-November – with temperature crossing 30 C in noon. Goa thus has two summers. October and November are also sweaty and uncomfortable because of high humidity in the wake of the monsoons.

**METEOROLOGICAL DATA (PANAJI-GOA)  
YEAR – 2005**

Source: IMD Panaji

Month	Temperature (C)		Rainfall (mm)			Prevailing Wind		Relative Humidity (%)	
	Max	Min	Total	Days	Max	Dir	Dir	Day	Night
JAN	35.3	16.7	0.0	0	0	E,NE	NW,W	4	6
FEB	36.8	17.5	0.0	0	0	NE,N	W,W	4	6
MAR	38.7	19.2	0.0	0	0	N,E	W,NW	4	8
APR	35.3	20.2	45.0	2	27.8	S,E	W,SW	4	10
MAY	36.2	21.6	12.5	1	12.5	NW,N	NW,W	4	8
JUNE	36.0	22.3	900.2	24	202.9	SW,N	SW,W	4	8
JULY	31.5	21.6	1168.8	29	216.4	SW,W	SW,W	10	10
AUG	31.8	22.8	418.8	23	94.8	SW,W	W,SW	10	8
SEP	32.0	22.4	612.2	24	174.6	SW,W	SW,NW	4	10
OCT	34.9	20.5	120.4	6	37.8	NE,E	NW,SW	4	8
NOV	35.5	17.8	0.0	0	0	NE,E	NW,W	4	4
DEC	35.4	16.6	0.0	0	0	NE,E	W,NW	4	6

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- Average Wind speed Available only for 08:30 and 17:30 hrs. For other hours it will be kept blank. In case of 08:30 hrs, it represents average wind speed from 17:30 hrs of previous day to the 08:30 hrs of present day. In case of 17:30 hrs it means average speed from 08:30 to 17:30 hrs of the same day.

Goa falls in the high-rainfall zone. The torrential monsoon rains, heralded by thunder and lightning, last from June to September. July is the wettest, especially the first half. The rains slow down in August and taper off in September. They are erratic, not continuous – a week of nonstop downpour may be followed by a dry, sunny spell lasting days. Weather-wise, the monsoon months are the coolest and most pleasant.

### 3.5 Water Environment

There are several aquatic related parameters that may be affected by developmental projects. These parameters include water availability and water quality, which are discussed below. Water impacts may relate to either surface or ground water. Quantitative measurements of water quality and quantity are necessary to permit the assessment of impacts from and activity.

#### 3.5.1 Surface and Ground water Sources:

Estuary of River Mondovi, Zuari and Arabian Sea are the major surface water bodies observed in the study area. There are several wells observed in the area of 2-3 km.

## 3.5.2 Water Sample analysis report:

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Sl. No.	SAMPLE NO.	W1	W2	W3	W4	W5
1	Color	Slightly Brown	colourless	colourless	colourless	colourless
2	Turbidity	15	<5	<5	<5	<5
3	pH	7.38	7.29	7.15	7.03	7.01
4	Total Dissolved Solids	2530	75500	86000	1250	1360
	Suspended Solids	64	36	38	<10	<10
5	Phenolphthalein Alkalinity	Nil	Nil	Nil	Nil	Nil
6	Total Alkalinity	180	664	544	178	240
7	Total Hardness	652	5950	6370	260	256
8	Calcium	160	1440	1728	64	56
9	Magnesium	61.5	573.4	500	24.4	28.3
10	Iron	3.2	5.9	6.3	0.18	0.12
11	Sodium	110	15200	16600	12	15
12	Nitrates	13.2	9.8	10.3	0.6	0.9
13	Chlorides	980	45600	50100	680	710
14	Sulphates	127	6800	6900	146	220
15	Fluoride as.F	1.8	1.9	2.3	0.9	1.1
16	Copper	Absent	Absent	Absent	Absent	Absent
17	Zink	BDL	BDL	BDL	BDL	BDL
18	Lead	Absent	Absent	Absent	Absent	Absent

## Location of the Water Samples:

W1: Nalla sample

W2: Sea water Behind Project Site

W3: Sea Water near Miramar Beach

W4: Bore well water behind site Bungalows

W5: Well water from Panaji

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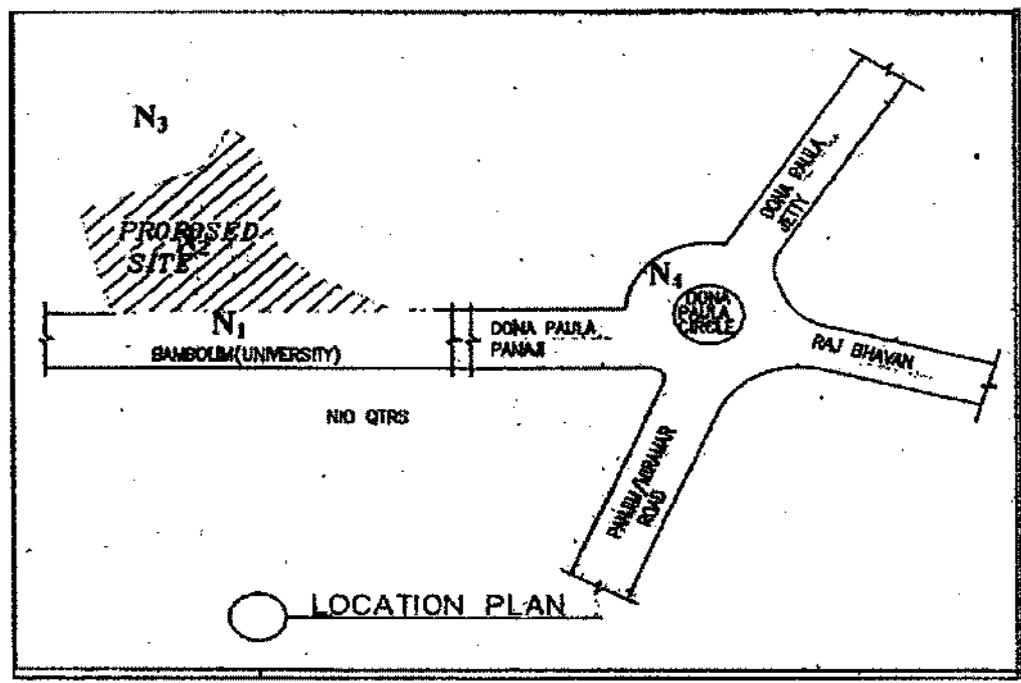
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3.6 NOISE ENVIRONMENT

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**NOISE LEVEL SURVEY**



3.6.1 Location of the Noise Survey

Sr. No.	Location of Monitoring	Reading dB A	
		During Day Time	During Night Time
N1	At the Entrance of the site	58	46
N2	At the Center of the site	52	44
N3	At backside Bungalows	48	44
N4	At Dona Paula Circle	52	46
N5	At Dona Paula Beach	59	47
N6	At Miramar Beach	62	46
N7	At Chicalim	58	48
N8	At GMC	56	48
N9	At Panaji	65	52

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Project Name:

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**RECOMMENDED NOISE EXPOSURE LIMITS**

Sr. No.	Area	C.P.C.B. Standard (dB)A	
		Day	Night
1	Residential	55	45
2	Commercial	65	55
3	Traffic	65	55
4	Airport Area	65	55
5	Silence Zone	50	40
6	industrial	75	70

**3.7 LAND ENVIRONMENT**

The Land environment includes the land use study, geology, soil analysis, current practice of the solid waste disposal, etc.

This is the highly urbanized area and the commercial and residential complexes cover major part of the region. Therefore, the overall land use of the region is residential and commercial. Topographically the region is sandwiched between the hills and the coastal strips are plateaus of iron-rich red soil. This "midland" is the core of the state and is known for iron-ore mining and spice and cashew plantations. The soil cover is generally thin here, but low-lying areas are cultivated. The government is encouraging modern industries by setting up industrial estates in this area. The inland plateaus, with their red-colored rocks, sometimes jut out into the sea and form headlands, like at the Vagator and Arjuna beaches.

There are no vast plains in Goa. The Western Ghats and the elevated midland plateaus give the entire landscape a hilly appearance. Goa is also free from natural calamities like earthquakes, cyclones, famines or floods.

### 3.7.1 Geology

The Soil in general is laterite. The agricultural lowlands especially in coastal tract are alluvian flats formed through sedimentation along the principal rivers. About 15 % of the area of North Goa is under forests and the same originates from archean rock formation which are very thick. The soil is murum on the slopes. Many commercial tree species thrive on the well aerated soils at the foothills, where the murum is mixed with the humus to form a loamy soil, where the growth is often thick and high.

### 3.7.2 SOIL SAMPLE ANALYSIS REPORT

Sr. No.	Description	Units	S1	S2
1	pH (10% aqueous Solution )	—	6.3	6.4
2	Moisture Content at 105° C	%	1.5	1.8
3	Organic Content	%	1.6	1.9
4	Inorganic Content	%	98.4	98.1
5	Sulphates as SO <sub>4</sub>	mg/Kg	130	135
6	Chloride	mg/Kg	230	210
7	Copper	mg/Kg	Absent	Absent
8	Zink	mg/Kg	0.6	0.8
9	Lead as Pb	mg/Kg	BDL	BDL
10	chromium	mg/Kg	BDL	BDL
11	Cadmium as Cd	mg/Kg	BDL	BDL

#### Location of the Soil Sample:

S1: At Project Site

S2: Behind Project Site (Near Bungalow)

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## 3.8 SOCIO-ECONOMIC DATA

## 3.8.1 POPULATION IN GOA STATE, NORTH GOA DISTRICT AND TISWADI TALUKA

Population	Goa State	North Goa District	Tiswadi Taluka
Total	1347668	757407	160091
Rural	677091	417174	55019
Urban	670577	340233	105072
S.C.	24364	16560	3350
S.T.	376	150	37

Source: Statistical Hand book

## 3.8.2 DISTRIBUTION OF POPULATION BY LITERACY IN RURAL AND URBAN AREAS (in Percentage)

	Rural			Urban			Total		
	P	M	F	P	M	F	P	M	F
Goa	79.7	87.4	71.9	84.4	89.5	79.0	82.0	88.4	75.4
North Goa District	82.0	89.9	73.8	85.4	90.2	80.3	83.5	90.0	76.7
Tiswadi Taluka	82.4	89.4	75.6	86.3	91.1	81.1	84.9	90.5	79.2

Source: Statistical Hand book

## 3.8.3 SEX RATIO OF THE NORTH GOA DISTRICT AND TISWADI TALUKA

Area	Rural	Urban	Total
<b>North Goa District</b>			
Sex Ratio (females per 1000 males)	970	931	953
Sex Ratio (0-6 Years)	939	935	938
<b>Tiswadi Taluka</b>			
Sex Ratio (females per 1000 males)	1013	947	969
Sex Ratio (0-6 Years)	932	972	958

Source: Statistical Hand book

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**3.9 ECOLOGY:**

The total forest area of the Goa is 1424.38 sq. km. which is 37.48 % of the total area of the state. In Goa, forests are largely confined to the Western Ghat hills. Less than 25 % of the total land area of North Goa is under forests. The main forest products of the districts of the district are Bamboo, Firewood, and Timber wood which are mostly used for construction purpose.

Though there is no vegetation observed at the project site: vegetation is observed in impact zone. Mangrove ecosystem of Mandovi estuary and sand dune vegetation of the beaches are the main ecosystems observed in the study area. Dr. Salim Ali Bird Sanctuary of Chorao is about 8 km from the city of Panaji. There were more than 70 different types of trees and shrub species observed in the study area. Most of these species are very common in this region and are not listed in rare, endangered or threatened category. Fourteen mangrove varieties are found in the bird Sanctuary, including the rare *Kandelia candel* species. The entire ecosystem is an important habitat for planktons, shrimps, prawns, tiny crabs and an unusual variety of mudskipper fish. Jackals, pythons, otters, turtles and marsh crocodiles are also present.

The sanctuary is popular with birdwatchers. The resident birds present here include drongos, eagles, egrets, herons, kingfishers, kites, woodpeckers, myna, hoopoe, sandpiper, redshank, and curlews. In winters, thousands of migratory birds arrive including storks, sea gulls, dabchick, teals, terns, and cormorants.

No.	Botanical Name	Family	Vernacular name
1.	<i>Acacia auriculiformis</i>	Mimosaceae	
2.	<i>Acacia nilotica</i>	Mimosaceae	Babhul
3.	<i>Alstonia scholaris</i>	Apocynaceae	Satwin
4.	<i>Anacardium occidentale</i>	Anacardiaceae	Kaju
5.	<i>Anona squamosa</i>	Anonaceae	Sitaphal
6.	<i>Artocarpus hetero phyllus</i>	Moreaceae	Phanas
7.	<i>Avicennia marina</i>	Avicenniaceae	
8.	<i>Avicennia officinalis</i>	Avicenniaceae	
9.	<i>Azadiracta indica</i>	Meliaceae	Kadu limb
10.	<i>Bambusa arundinacea</i>	Poaceae	Kalak

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11.	<i>Bauhinia purpurea</i>	Caesalpiniaceae	Kanchan
12.	<i>Bauhinia recemosa</i>	Caesalpiniaceae	Apta
13.	<i>Bombax ceiba</i>	Bombacaceae	Sawari, Sawar
14.	<i>Borassus flaballifer</i>	Aracaceae	Tad
15.	<i>Bougainvillea glabra</i>	Nyctaginaceae	Bogan vel
16.	<i>Bougainvillea spectabilis wild</i>	Nyctaginaceae	Bogan vel
17.	<i>Bridelia squamosa</i>	Euphorbiaceae	Asana
18.	<i>Bruguira cylindrical</i>	Rhizophoraceae	
19.	<i>Caesalpinia pulcherrima</i>	Caesalpiniaceae	
20.	<i>Calatropis gigantea</i>	Asclepiadaceae	Ruhi
21.	<i>Calliandra spp.</i>	Mimosaceae	Powder puff
22.	<i>Carica papaya</i>	Caricaceae	Papaya
23.	<i>Carissa congesta</i>		Karvanda
24.	<i>Caryota urens</i>	Arecaceae	Bherli mad
25.	<i>Cascabela thevetia</i>	Apocynaceae	Bitti
26.	<i>Cassia alata</i>	Caesalpiniaceae	
27.	<i>Cassia fistula</i>	Caesalpiniaceae	Bahava
28.	<i>Casuarina equisetifolia</i>	Casuarinaceae	Suru
29.	<i>Ceriops tagal</i>	Rhizophoraceae	
30.	<i>Cocos nucifera</i>	Arecaceae	Naral
31.	<i>Delonix regia</i>	Caesalpiniaceae	Gulmohar
32.	<i>Derris indica</i>	Fabaceae	Karanj
33.	<i>Dracaena terminalis</i>	Liliaceae	
34.	<i>Duranta spp</i>	Verbenaceae	
35.	<i>Erythrina indica</i>	Fabaceae	Pangara, Paranga
36.	<i>Ficus benghalensis</i>	Moraceae	Wad
37.	<i>Ficus hispida</i>	Moraceae	Kala Umbar
38.	<i>Ficus recemosa</i>	Moraceae	Umbar
39.	<i>Ficus religiosa</i>	Moraceae	Pimpal
40.	<i>Gardenia lucida</i>	Rubiaceae	Anant
41.	<i>Gliricidia sepium</i>	Fabaceae	Giripushpa
42.	<i>Hibiscus mutabilis</i>	Malvaceae	Jaswand
43.	<i>Hibiscus rosa-sinensis</i>	Malvaceae	Jaswand
44.	<i>Ixora coccinea</i>	Rubiaceae	Devhari
45.	<i>Jatropha curcas</i>	Euphorbiaceae	Mogli Erand
46.	<i>Kandelia kandal</i>	Rhizophoraceae	
47.	<i>Lagerstroemia parviflora</i>	Lythraceae	Nana Bondara
48.	<i>Lantana camara</i>	Verbenaceae	Ghaneri
49.	<i>Lawsonia inermis</i>	Lythraceae	Mehandi
50.	<i>Leucaena leucocephala</i>	Mimosaceae	Subabhul
51.	<i>Mangifera indica</i>	Anacardiaceae	Aamba
52.	<i>Moringa pterigosperma</i>	Moringaceae	Shevaga
53.	<i>Muntingia calabura</i>	Tiliaceae	
54.	<i>Musa paradisiacal</i>	Musaceae	Kela

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# CHAPTER 4

## Air Environment

### Content

- 4.1 Air Monitoring Methodology
- 4.2 Frequency of Monitoring
- 4.3 Environmental impacts
- 4.4 Environmental Management Plan

Project Proponent:  
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4.1 AIR MONITORING METHODOLOGY

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Sr. No.	PARAMETERS	CODE OF PRACTICE & METHODOLOGY ADOPTED
1	Suspended Particulate Matter (SPM)	IS: 5182 (Part IV) 1999, Gravimetric (High-volume)
2	Sulphur Dioxides (SO <sub>2</sub> )	IS: 5182 (Part II) 2001, Modified West and Gaeke
3	Oxides of Nitrogen (NO <sub>x</sub> )	IS: 5182 (Part VI) 1992, Arsenite modified Jacob and Hochheiser
4	Carbon Monoxide (CO)	IS: 5182 (Part X) 1991, Gas chromatography with methaniser

4.2 FREQUENCY OF MONITORING

Air quality was monitored at five locations 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 lit / min. Collected air samples are analyzed by using standard procedures prescribed by Central Pollution Control Board (CPCB), Indian Standards: IS 5182 and American Public Health Association (APHA).

4.3 ENVIRONMENTAL IMPACTS

Construction Phase

Construction process such as handling of sand, cement, concrete mixing are source of flying dust, though, occasion of such dust generation in the overall construction period well spread out. Increase number of vehicles carrying construction material at site may add pollutants. The movement at site may kick up dust and add other pollutants in the ambient air. However, this movement is well spread out. This is controlled by sprinkling of water on the access road and approach points. The movement of the vehicles for construction will be very less and well spread out at different times. Hence, the impact will be negligible.

### Operational Phase

Ambient Air Pollution status in & around the proposed site is within the statutory limits. The residents will not be subjected to foul smell as the Project is designed with proper natural ventilation.

The vehicles on the University Road are mostly likely to increase in numbers; hence, the ambient air quality is likely to get affected. However, due to stringent emission norms, improved technology and fuels like CNG / LPG, it is going to reduce.

The DG set will be a standby source of power to be used incase of power failure. The models chosen shall be of silent type and confirm to the govt. emission norms. The DG sets will be tested regularly. The fuel gas discharge of the DG set shall be as per the manufacturer's guidelines and govt. norms. DG sets will be used in case of electricity failure as power back up.

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REPORT NO.: GC/G/2006-07/MCPL EIA/JUL 0557 R1

4.4 ENVIRONMENTAL MANAGEMENT PLAN

Potential source of impact	Expected source of impact	Mitigations Measures	Remarks
Dust Emission	<p><b>Construction Phase:</b></p> <ul style="list-style-type: none"> <li>All heavy construction activities like Excavation, loading, and Unloading of material like cement bags</li> </ul> <p><b>Operational Phase:</b></p> <ul style="list-style-type: none"> <li>No emission of dust</li> </ul>	<ul style="list-style-type: none"> <li>Use of                             <ul style="list-style-type: none"> <li>barricading the periphery by corrugated tin sheet of 15 feet height</li> </ul> </li> <li>use of wet jute bags</li> <li>road watering for controlling dust</li> <li>Use of face mask to avoiding inhalation of dust particles</li> </ul>	<ul style="list-style-type: none"> <li>Minor impact.</li> </ul>
Emission of SO <sub>2</sub> NO <sub>x</sub> & CO	<p><b>Construction Phase:</b></p> <ul style="list-style-type: none"> <li>Due to the operation of construction equipments</li> </ul> <p><b>Operational Phase</b></p> <ul style="list-style-type: none"> <li>Power Generation through DG sets</li> <li>Emission from vehicular traffic operation</li> </ul>	<ul style="list-style-type: none"> <li>Periodic maintenance of construction equipments</li> <li>DG sets installed with proper precaution</li> <li>Use of CNG/LPG as a fuel should be encouraged</li> </ul>	<p>Not significant as DG set would be used as power back-up.</p> <p>No Impact</p>

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# CHAPTER

# 5

## Water Environment

### Content

- 5.1 Water Bodies in the Study area
- 5.2 Source of Water
- 5.3 Water Demand Calculation
- 5.4 Sewage generation
- 5.5 Rain Water Harvesting and Reduce Surface Runoff
- 5.6 Environmental Impacts
- 5.7 Environmental Management Plan

**5.1 WATER BODIES IN THE STUDY AREA**

There is no bore well or open well present at the project site. Estuary of River Mondovi, Zuari and Arabian Sea are the major surface water bodies observed in the study area. There are several wells observed in the area of 2-3 km

**5.2 SOURCE OF WATER**

The main source of water will be supplied by Public Works Department (PHE-N) during operational phase for domestic purpose. The total water requirement for the proposed Project will be 1200 m<sup>3</sup>/ day. STP Effluent will provide the balance water.

**5.3 WATER DEMAND CALCULATION**

Water demand is calculated based on the guidelines of NBC.

**C1-ZONE:****C1 Zone**

Number of apartments in each floor	=66
Number of Floors	=8
Number of apartments	=66 x 8 =528
Number of Persons in each apartment	=5
Number of Persons	=528 x 5 =2640
Water requirement @ 150 lpd per person	= 2640x150 = 396000 lpd =396 m <sup>3</sup> / day

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C2 Zone

Number of apartments in each floor =178

Number of Floors =5

Number of apartments =178 x 5  
=890Number of Persons =890 x5  
=4450Water requirement @ 150 lpd per person = 4450x150  
= 667500 lpd =667.5 m<sup>3</sup>/dayTotal Water Requirement = C1+C2  
= 396000 + 667500  
=1063500 lpdAdding 10% extra for wastage, cleaning, etc. =1169850 lpd  
Say =1200000 lpd =1200 m<sup>3</sup> / day**5.4 SEWAGE GENERATION:-**Total water requirement = 1200 m<sup>3</sup> / day

Assuming Diversity Factor of 0.8

Sewage Generated per Day = 960m<sup>3</sup> / day plantSay =1000 m<sup>3</sup> / day plantSpace required = 35.0 x 21.0 m<sup>2</sup>

Sewage Treatment Plant is envisaged for the above project to re-use treated sewage for flushing and gardening purposes.

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5.4.1 Method adopted for the STP design

The design is made keeping in mind the total quantity of generation of 1000 m<sup>3</sup> / day The modular technology is adopted in the design, i.e., when the flow increases drastically, the present units itself can be used with Additional units attaching to it in modules, which would be economical and saves on the area required too.

5.4.2 Characterization:

The general characteristic of sewage is considered as shown in the table below.

Parameters	Inlet	Outlet
pH	7 - 10	6 - 8.5
BOD5	400 mg/lt.	< 20 mg/ lts
COD	600mg/ltr	< 100 mg/ lts
SS	150mg/ltr	< 20 mg/ lts.

5.4.3 Mode of Treatment:

It is proposed to setup a treatment plant for treating the domestic waste using the Time tested and reliable activated sludge process with extended aeration through diffused aeration. The other modes of treatment considered before arriving at activated sludge process are SAFF (Submerged aerated fixed film reactor), SBR (Sequential Batch Reactor), RBC (Rotary Biological Contractor). The advantages and disadvantages of the each scheme, initial investment and maintenance cost etc were compared and finally arrived at the activated sludge process.

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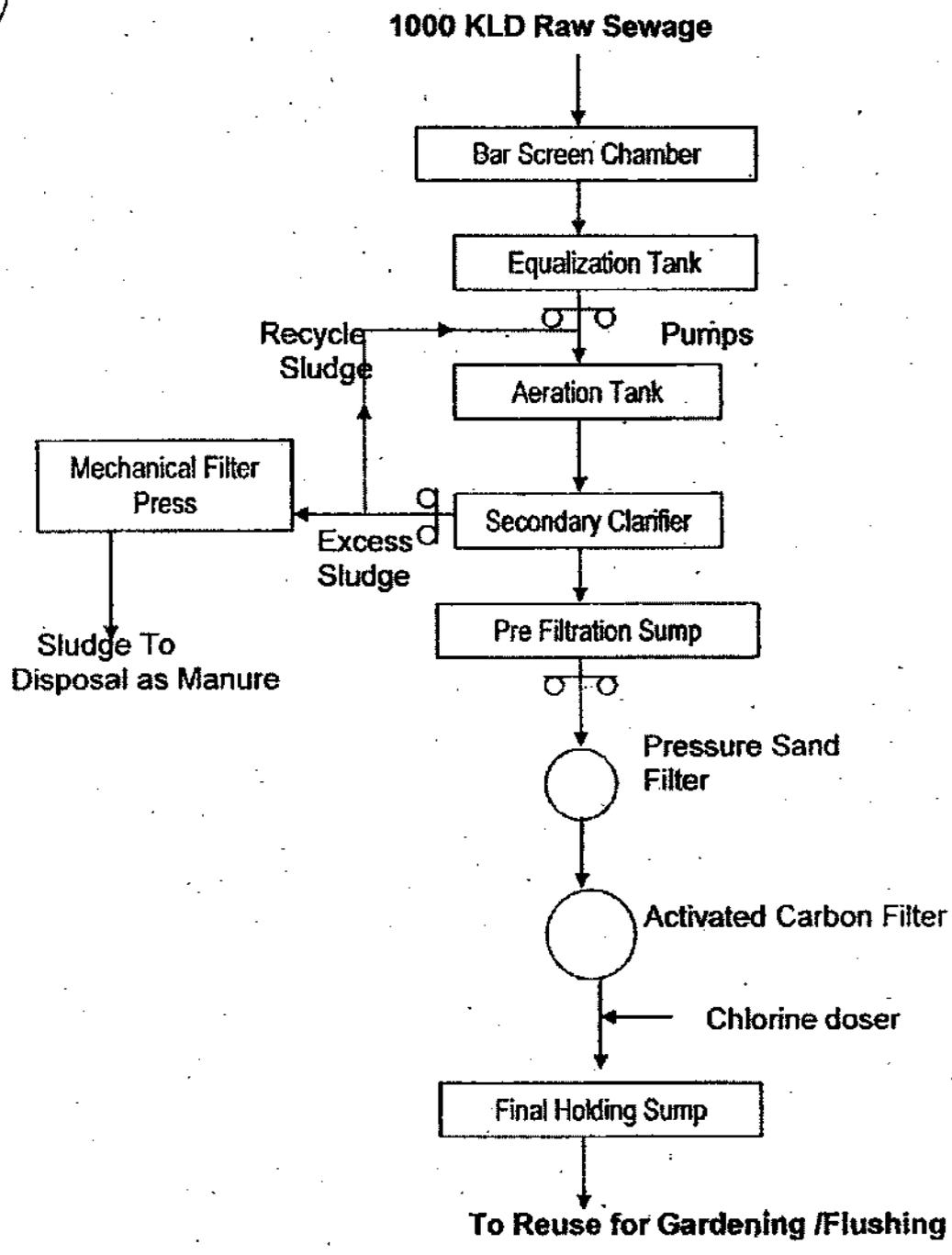
5.4.4 The units proposed for the proposed STP with activated sludge process are:

SL. No.	Name of the Unit	Purpose
1.	Bar Screen Chamber	For removing unwanted floating materials
2.	Equalization Tank	To even out the flow variations, and continuous uniform mixing operations with coarse bubble.
3.	Aeration Tank	Activated Sludge Process For developing the bacterial culture, which stabilizes the waste aerators.
4.	Secondary Clarifier	To separate out the solids from the treated sewage, And to separate clear supernatant liquid.
5.	Pre- Filtration Tank	To collect the supernatant clear liquid from the Secondary Clarifier for further treatment.
6.	Mechanical Filter Press	To de-water the sludge taken out of Secondary Clarifier and to convert the same into manure.
7.	Pressure Sand Filter	To filter out suspended solids if any in the treated water.
8.	Activated Carbon Filter	To remove color and Odor if any in the filtered water.
9.	Chlorinator	To disinfect the treated water to make it safe to come in contact with humans so that the treated water can be used for gardening / allied uses.

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5.4.5 TREATMENT FLOW CHART:

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**5.5 Rain Water Harvesting:**

Rainwater harvesting can serve as a solution to the water problem in the water crises area by capturing the runoff. Rainwater harvesting helps in utilizing the primary source of water and prevent the runoff from going into sewer or storm drains, thereby serving dual purpose: Making water available for future use and reducing the load on treatment plants. Recharging the water aquifers help in improving the quality of existing groundwater through dilution. Rainwater harvesting comprises of two components:

- Storing Rainwater in ground water reservoirs for beneficial use in future
- Rain water harvesting for artificial recharge of ground Water.

Rainwater will be collected from roofs and terraces building and also from other built-up and open areas where feasible.

Quantity of rainwater that can be generated during a rainy day in Goa:

1. Over an impervious surface like roads, rooftops, etc = 150,000 lts/100 sq.mts / Annum.

Per day = 1250 lts/100 Sq. Mt i.e. 12.5 Lt./Sq. Mt (120 days are considered as rainy days in Goa)

2. Over a garden area / lawn etc. = 95,000 lts/100 Sq. Mt per annum.

Per day = 791 lts per 100 Sq. Mt per day i.e. 7.91 Lt / Sq. Mt (120 days are considered as rainy days in Goa)

**5.5.1 Quantification of rainwater:**

Sl No	Area	Quantity In Sq. Mt	Rain water collected / Sq. Mt	Total Lt.
1	Paved area	49332	12.5	616650
2	Garden Area	32888	7.91	260144.08
	<b>Total</b>			<b>876794</b>

Say 900m<sup>3</sup>

Project Proponent:  
Project Name:

Mathias Constructions (P) Ltd.  
Mathias Ocean Park

5.6

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**5.5.2 Mode of Usage of rain water:**

The entire rainwater will be collected in six tanks of 150,000 lts capacity of suitable size. This water can be used back after passing through the pressure sand and the activated carbon filter of diameter 2500-mm each.

Mode of usage of water incase of sudden flash floods / continuous rains: Though the rainy days are considered as 120 days in Goa and the total rain is divided by the no. of rainy days, practically the intensity of rain is not the same every day. It varies from day to day. Incase when there is a heavy and flash rain, the excessive rainwater can be used for the recharge of the proposed recharge pits and water body. Surplus water is led into the natural Nalla. This would help in recharging the ground water table.

**5.5.3 The units and its sizes as designed are:**

Sl. No.	Name of the Unit	Size in m.
1.	Bar Screen Chamber	1.00m X 0.45 m
2.	Equalization Tank	10.2X9.2X3.5
3.	Aeration Tank with Activated Sludge Process	18.4X9.2X3.5m
4.	Secondary Clarifier	7.0X7.0 m with 3.5m depth
5.	Final effluent tank	10.3 X9.2X3.5 m
6.	Clear water tank	10.3X9.2X3.5m
7.	Pressure Sand Filter	2500 mm dia and 1500 mm height.
8.	Activated Carbon Filter	2500 mm dia and 1500 mm height
9.	Chlorinator	200 lts capacity
10.	Mechanical Filter Press	1000m <sup>3</sup> /day plant

Project Proponent:  
Project Name:

Mathias Constructions (P) Ltd.  
Mathias Ocean Park

5.7

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337**5.5.4 Mechanical Equipment Proposed**

SL NO	ITEM	Qty
1	Bar Screen	1 No.
2	Pumps (1HP)	6 No.
3	Diffuser membranes	190 Nos.
4	Coarse Bubble grid	1 lot
5	Blowers	5 Nos
6	Pressure Sand filter	1 No
7	Activated carbon filter	1 No
8	Chlorinator	1 No
9	Mech. Ventilation	1 Lot

**5.6 ENVIRONMENTAL IMPACTS****Construction Phase**

For Construction purposes tanker water will be use. Effluent will be generated from the labour. The leakage of oil may occur from the construction equipment. Since the construction activity handles inert materials, the contamination of ground water will not be expected. The water used for curing partly will evaporate & that percolate in the ground does not carry any dissolved contaminants.

**Operational Phase**

Since "Mathias Ocean Park" will be a Residential project, it will generate only Sewage Waste water (domestic effluent), which will be collected & treated in the STP of 1000 m<sup>3</sup> / day capacity. The treated sewage will be reused for gardening and toilet flushing purposes.

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5.7 ENVIRONMENTAL MANAGEMENT PLAN

Potential source of impact	Expected source of impact	Mitigation Measures	Remarks
Ground water	<p><b>Construction Phase:</b></p> <ul style="list-style-type: none"> <li>Waste water generated from labor camp</li> </ul> <p><b>Operational Phase:</b></p> <ul style="list-style-type: none"> <li>Sewage generation</li> </ul>	<ul style="list-style-type: none"> <li>Septic tank / treated in makeshift arrangement and disposed in to municipal sewer</li> <li>Sewage water treated in to STP and these treated water will be reuse for toilet flushing and gardening</li> </ul>	<ul style="list-style-type: none"> <li>No Impact</li> </ul>
Ground water	<p><b>Operational Phase</b></p> <ul style="list-style-type: none"> <li>Storm Water</li> </ul>	<ul style="list-style-type: none"> <li>Rain Water Harvesting will be done for ground water recharge / gardening</li> </ul>	<ul style="list-style-type: none"> <li>No Impact</li> </ul>

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# CHAPTER 6

## Noise Environment

### Content

- 6.1 Environmental Impact
- 6.2 Environmental Management Plan

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**6.1 ENVIRONMENTAL IMPACT**

**Construction Phase**

The heavy vehicles carrying construction material shall turn from the University Road to the project site and in process may make noise. The noise from the increased movement of vehicles to "Mathias Ocean Park" may be of negligible nature. Noise will be generated from construction activities and operation of construction equipments & DG Set.

**Operational Phase**

During Operational period, noise impact will be from vehicle movement and operation of DG set during power failure. The blowers, pumps and other machinery in the STP and standby DG set will be kept in enclosed area. Adequate vibration / dampening devices shall be adopted. Moreover, regular maintenance will keep the equipment in good condition. All these efforts will help to attenuate noise and vibrations.

Project Proponent:  
Ltd.

Mathias Constructions (P)

Project Name:

6.1  
Mathias Ocean Park

6.2 ENVIRONMENTAL MANAGEMENT PLAN

Potential Impact	Potential source of impact	Control through EMP & Design	Impact Evaluation	Remarks
Noise	<p><b>Construction Phase</b></p> <p>Operation of construction equipment and vehicles during site development</p>	<ul style="list-style-type: none"> <li>• Use of well maintained equipment fitted with silencers.</li> <li>• Providing earmuffs/earplug for working staff.</li> <li>• Construction Activity limited up to daytime</li> </ul>	<ul style="list-style-type: none"> <li>• No significant</li> </ul>	Minor Impact
	<p><b>Operation Phase:</b></p> <p>Noise from the vehicles movement</p> <p>Noise from the D. G. sets operation.</p>	<ul style="list-style-type: none"> <li>• Green Belt Development and well planned entry and exit point</li> </ul>	<ul style="list-style-type: none"> <li>• Not significant.</li> <li>• DG set will be used during power failure.</li> </ul>	No Impact

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# CHAPTER 7

## Land Environment

### Content

- 7.1 Environmental Impacts
- 7.2 Environmental Management Plan
- 7.3 Land Use Map of Goa

Project Proponent:  
Project Name:

Mathias Constructions (P) Ltd.  
Mathias Ocean Park

7.0

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**7.1 ENVIRONMENTAL IMPACT**

**Construction Phase**

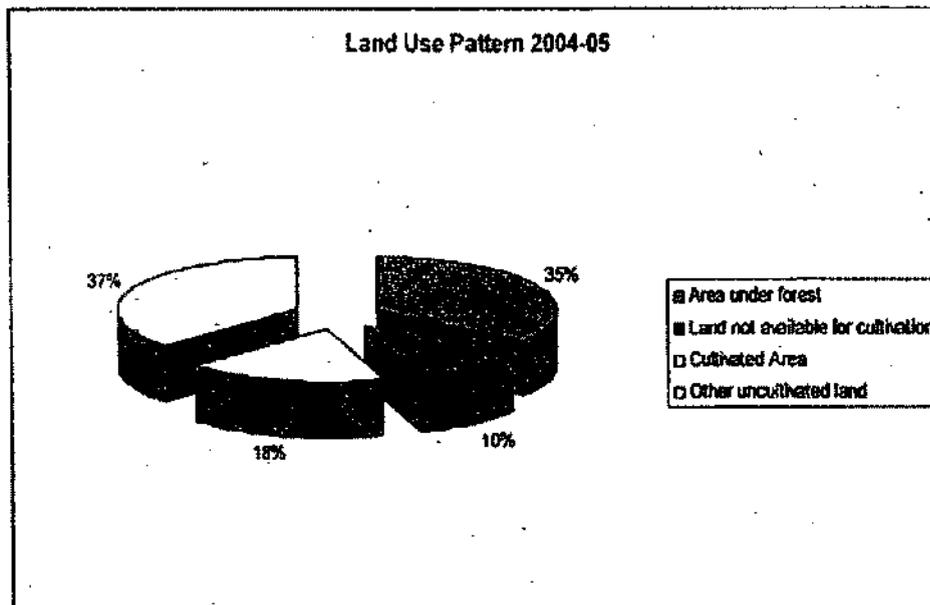
In the construction Phase, there will be generation of Construction debris. Oil leakage may occur from construction machinery. Labour will produce the waste. There will be soil run off due to storm water.

**Operational Phase**

During Operational Phase, there will be generation of solid waste from the Project site. Solid waste will require proper storage and disposal. There will be the discharge of sewage. There will some impact due to fuel and material spills.

**7.2 LAND USE PATTERN OF GOA**

Sl. No.	Item	Area in hectares	Percentage to total
1.	Area under forest	125473	34.75
2.	Land not available for cultivation	37137	10.28
3.	Cultivated Area	133611	37.00
4.	Other Uncultivated Area	64892	17.97



Source: Economic Survey of Goa 2005-06

Project Proponent:  
Project Name:

Mathias Constructions (P) Ltd.  
Mathias Ocean Park

7.1

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7.3 ENVIRONMENTAL MANAGEMENT PLAN

Potential Impact	Potential source of impact	Control through EMP & Design	Impact Evaluation	Remarks
Soil contamination	<u>Construction Phase</u> <ul style="list-style-type: none"> <li>Excavation and construction debris.</li> </ul>	<ul style="list-style-type: none"> <li>Reuse of construction waste for filling the low lying areas at the site itself.</li> </ul>	<ul style="list-style-type: none"> <li>Minor impact</li> </ul>	Top soil will be conserved and used for landscaping in the functional phase.
	<u>Operational Phase:</u> <ul style="list-style-type: none"> <li>Collection and Storage of solid waste.</li> <li>Discharge of sewage.</li> <li>Occasional oil spills.</li> </ul>	<ul style="list-style-type: none"> <li>Treatment and reuse of sewage water.</li> <li>Integrated solid waste management plan.</li> </ul>	Negligible impact	

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# CHAPTER 8

## Solid Waste Management



### Content

- 8.1 Type of Solid Waste Generated
- 8.2 Environmental Impacts
- 8.3 Environmental Management Plan

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**8.1 TYPE OF SOLID WASTE GENERATED****Construction Phase**

During constructional Phase, normal debris, concrete, empty cement bags, demolition waste, broken bricks, waste plaster etc., will be generated. There will also be generation of Metallic waste, wood, oil, Food waste and other biodegradable waste.

**Operational Phase**

After the completion of the project, solid waste like paper, plastics, kitchen waste in the form of garbage and rubbish etc. will be generated. Wet solid waste will be generated from the STP.

**8.2 QUANTITY OF SOLID WASTE GENERATED:**

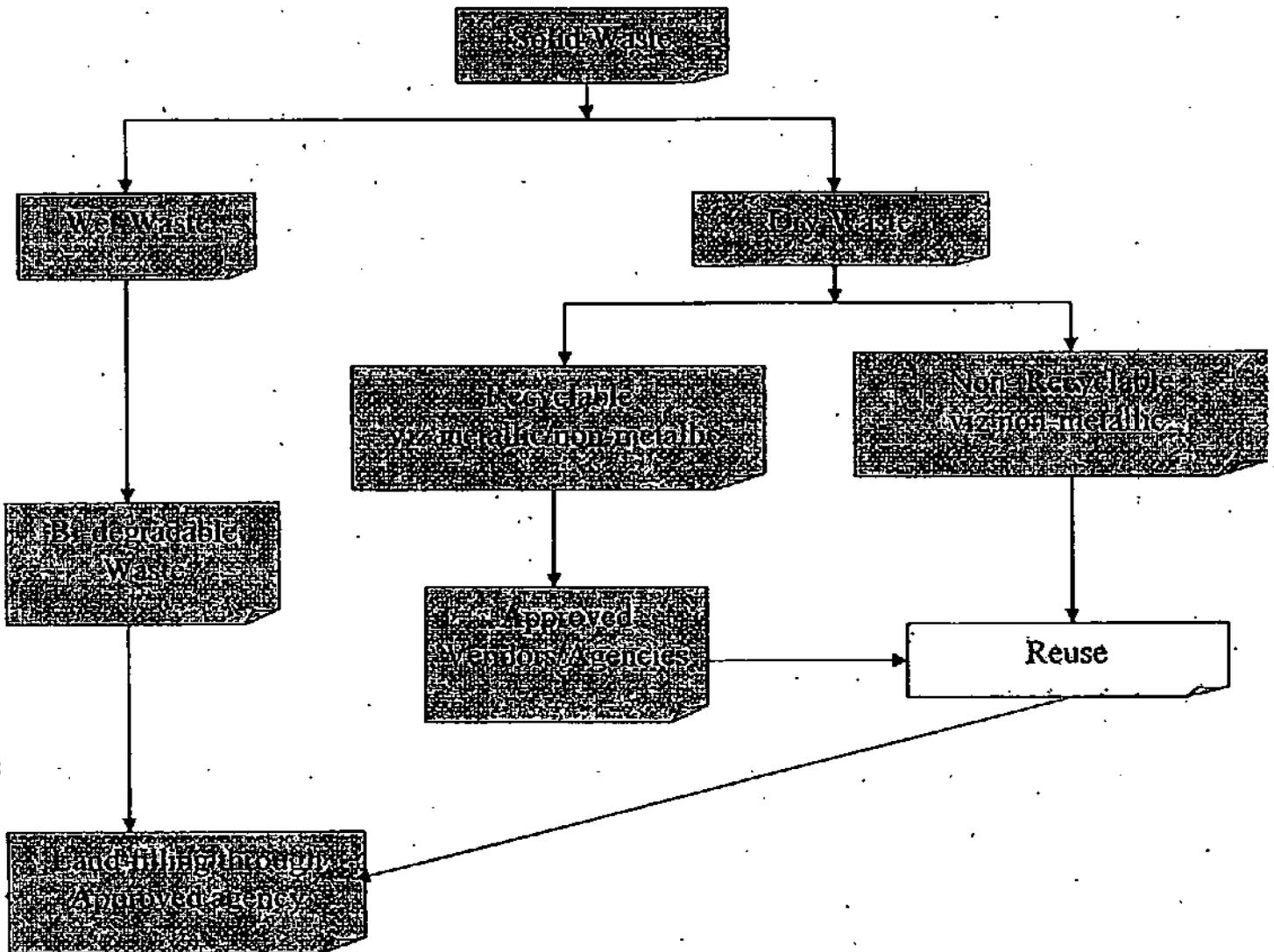
Density of Refuse	= 240 Kg / M3
Volume of Refuse / Capita / Day	= 2.83 kgs
Total number of persons	= 7090
Volume of Refuse produced/Day	= 2.83 X 7090
	= 20065 kg / Day
Quantity of Solid Waste generated	= 20065 X 240 / 1000
	= 4815 Kg / Day.

**SOLID WASTE MANAGEMENT:**

Domestic garbage generated from the proposed project is envisaged to be disposed through Trash bins, Trash cover collection system & then through the municipal Garbage collection Trucks for further disposal. Domestic household garbage would be segregated into Organic and Inorganic wastes and then kept

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ready for disposal. The volume of garbage produced from the Project is worked out as per the guidelines of IS 6924-1973.



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### 8.3 ENVIRONMENTAL IMPACT

#### Construction phase

There will be generation of demolition waste and Solid waste from the various building raw materials & consumables which being used for construction activities. The unloading of bulk raw materials such as sand, cement, metals, etc will generate dust. The construction debris are mostly inert, low lying area can be filled and elevated spaces required as per landscaping can be created. The tiles, broken bricks glass pieces will be mostly consumed in waterproofing, anti-rodent measures, etc. Experience of the construction industry show that good use is made of the waste and debris to create the required infrastructure and reduce the construction costs.

#### Operational Phase

During operational phase, solid waste will be generated – wet garbage from food waste and general waste will be generated. General solid waste shall be given to contractor for resale/ recycling & non recyclable waste shall be sent to Municipal /Panchayat dumpsite.

The premises generally will create refuse of biodegradable nature such as food cutting, leftovers, flowers, etc. The non-degradable waste generated on regular basis is usually the packaging wastes, which can be recycled partly.

The inherently recyclable waste is rendered non-recyclable due to its variety & small quantity, hence, has to be discarded into municipal/panchayat landfill. The bulk recyclable waste is such as newspapers, plastic bottles, glass items, etc. will be sold for recycle. The STP shall generate sludge in small quantities, which shall be used as manure.

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8.4 ENVIRONMENTAL MANAGEMENT PLAN

Potential Impact	Potential source of Impacts	Control through EMP	Impact Evaluation	Remarks
Minor impact as it will add to the waste disposal problem.	<p><b>Construction Phase</b></p> <p>Disposal of construction waste and metallic waste</p>	<ul style="list-style-type: none"> <li>Reuse for land filling in the project premises</li> <li>Metallic waste collected separately and reuse of it.</li> </ul>	<ul style="list-style-type: none"> <li>Impact will be local, as any waste generated will be reused for construction activities.</li> </ul>	
	<p><b>Operational Phase:</b></p> <p>The paper and the plastic used at the individual level.</p> <p>Kitchen waste in the form of garbage and rubbish.</p>	<ul style="list-style-type: none"> <li>Reuse of the paper and plastic waste.</li> <li>Planned system for the collection and storage of the solid waste at the point of generation.</li> </ul>	<ul style="list-style-type: none"> <li>Not significant</li> </ul>	<p>Solid waste will be disposed of as per solid waste management rules.</p>

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# CHAPTER 9

## Socio-Economic

### Content

9.1 Demographic Profile

9.2 Prediction of Impacts

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9.1 DEMOGRAPHIC PROFILE

This type of projects leads the demographic and socio-economic growth of the region. Construction in developing countries is a key factor influencing demographic change. The two are bound together by causing increase in prosperity and a movement away from dependence on the land and agriculture occupations. This kind of such big projects can improve the living standards and able to develop the region by so many basic infrastructure facilities like commercial, roads, etc.

9.2 PREDICTION OF IMPACTS

Construction Phase

The construction activity will not create much impact on the general Socio-Economic aspect of the area except that it invites prospective long-term development. Since, the construction of such big projects stretches for 4 to 5 years, local economic activity receives spurt & the authorities are prompted to upgrade the civic facilities. The movement of men and material creates its own logistic demand, which enhances local development for supplies of basic facilities. Dona Paula being a commercial place, the temporary or permanent influx of people from various religions, language states, etc is an accepted phenomenon. Similarly, relocation, movement of people from one skill to another, generation of new skills changes the complexion and character of residents in the area. During construction activity direct employment to about 700-800 people & indirect employment to about 500 people will be generated.

It can be seen that, there are good public transport, markets, communication, water supply & electric supply facilities in the said area.

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**Operational Phase**

The completion of the "Mathias Ocean Park" will generate socio economic activity by way of creating direct employment to about more than 700 people & indirect employment to several other people.

The land use around the project site is residential and commercial. The locality around the plot is quite civil & socially peaceful. The people mostly staying in the adjacent residential areas appear to be belonging to middle class & high middle class. The quality of people & their standard of living in the vicinity of the plot is good. There is no slum area near the Project site. There are good public transport, markets, communication, water supply & electric supply facilities in the said area. The "Mathias Ocean Park" will certainly help in bringing about positive improvement in the socio economic status of the nearby area.

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# CHAPTER 10

## Electrical Details

### Content

- 10.1 Electrical Load Estimate (EB Requirement) Transformer
- 10.2 Electrical Load Estimate DG Sector Wise
- 10.3 Transformer Recommendation
- 10.4 DG Recommendation

Project Proponent:  
Project Name:

Mathias Constructions (P) Ltd.  
Mathias Ocean Park

10.0

## 10.1 ELECTRICAL LOAD ESTIMATE (EB REQUIREMENT) TRANSFORMER

Sr.No	Description	Connected	Demand	Demand
		Load (kW)	Factor	Load (kW)
<b>A</b>	<b>ZONE - C2</b>			
1	Load for 2/3 Bedroom apartments-890Nos @ 3kW - Single phase/Apartment	2670.00	1.0	2670.00
4	Stilt + Lobby + Staircase Lighting	200.00	1.0	200.00
5	Lifts - 33 nos.(7.5kW each)	247.50	0.8	198.00
6	Pumps	120.00	0.6	72.00
7	Fire Pumps	225.00		
8	External Lighting	90.00	1.0	90.00
	<b>TOTAL</b>	<b>3552.50</b>		<b>3230.00</b>
<b>B</b>	<b>ZONE - C1</b>			
1	Load for 2/3 Bedroom apartments-528Nos @ 3kW - Single phase/Apartment	1584.00	1.0	1584.00
2	Stilt + Lobby + Staircase Lighting	140.00	1.0	140.00
3	Lifts - 22 nos.(7.5kW each)	165.00	0.8	132.00
4	Pumps	80.00	0.6	48.00
5	Fire Pumps	150.00		
6	External Lighting	60.00	1.0	60.00
	<b>TOTAL</b>	<b>2179.00</b>		<b>1964.00</b>
	<b>TOTAL-1</b>	<b>5731.50</b>		<b>5194.00</b>
<b>C</b>	<b>CLUB HOUSE</b>			
1	Community centre	50.00	0.8	40.00
2	External lighting	40.00	1.0	40.00
3	Health centre & Equipment Load	140.00	0.8	112.00
4	Miscellaneous	60.00	0.8	48.00
	<b>TOTAL-2</b>	<b>290.00</b>		<b>240.00</b>
	<b>GRAND TOTAL</b>	<b>6021.50</b>		<b>5434.00</b>

Project Proponent:  
Project Name:

Mathias Constructions (P) Ltd.  
Mathias Ocean Park

10.1

## 10.2 ELECTRICAL LOAD ESTIMATE DG SECTOR WISE

Sl.No	Description	Connected Load (kW)	Demand Factor	Demand Load (kW)
<b>A</b>	<b>ZONE C2</b>			
1	Load for 2/3 Bedroom apartments-890Nos @ 0.5kW - Single phase/Apartment	445.00	1.0	445.00
2	Stilt + Lobby + Staircase Lighting	200.00	1.0	200.00
3	Lifts - 33 nos.(7.5kW each)	247.50	0.8	198.00
4	Pumps	120.00	0.6	72.00
5	Fire Pumps	225.00		
6	External Lighting	90.00	1.0	90.00
	<b>TOTAL</b>	<b>1327.5</b>		<b>1005.00</b>
<b>B</b>	<b>ZONE C1</b>			
1	Load for 2/3 Bedroom apartments-528Nos @ 0.5kW - Single phase/Apartment	264.00	1.0	264.00
2	Stilt + Lobby + Staircase Lighting	140.00	1.0	140.00
3	Lifts - 22 nos.(7.5kW each)	165.00	0.8	132.00
4	Pumps	80.00	0.6	48.00
5	Fire Pumps	150.00		
6	External Lighting	60.00	1.0	60.00
	<b>TOTAL</b>	<b>859.00</b>		<b>644.00</b>
	<b>TOTAL-1</b>	<b>2186.50</b>		<b>1649.00</b>
<b>C</b>	<b>CLUB HOUSE</b>			
10	Community centre	50.00	0.8	40.00
11	External lighting	40.00	1.0	40.00
12	Health centre & Equipment Load	140.00	0.8	112.00
14	Miscellaneous	60.00	0.8	48.00
	<b>TOTAL-2</b>	<b>290.00</b>		<b>240.00</b>
	<b>GRAND TOTAL</b>	<b>2476.50</b>		<b>1889.00</b>

Project Proponent:  
Project Name:

Mathias Constructions (P) Ltd.  
Mathias Ocean Park

10.2

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**10.3 TRANSFORMER RECOMMENDATION**

	TOTAL DEMAND LOAD	TOTAL DEMAND LOAD	APPLYING 70-80% DIVERSITY	TOTAL KVA	RECOMMENDED NOS. OF 500KVA TRANSFORMERS
A	ZONE C2	3230.00	2261.00	2660.00	6 with 88% loading
B	ZONE C1	1964.00	1374.80	1617.41	4 with 80.85% loading
C	CLUB HOUSE	240.00	168.00	197.65	1 with 79% loading(250kVA)
	<b>TOTAL</b>	<b>5434.00</b>		<b>4475.06</b>	<b>10 Nos-500kVA + 1No-250kVA</b>

1. Lifts are calculated at 7.5kW as per the standards.
2. Common area, Pumps and Fire pumps load requirement are assumed.
3. Load for each apartment considered is as follows.
  - a) 2 & 3 Bed room apartment: 1 Phase supply - 3kW/ per apartment

**10.4 DG RECOMMENDATION**

	TOTAL DEMAND LOAD	TOTAL DEMAND LOAD	APPLYING 70-80% DIVERSITY	TOTAL KVA	RECOMMENDED NOS. OF DG SETS
A	ZONE C2	1005.00	703.50	879.38	5 Nos 200kVA
B	ZONE C1	644.00	450.80	563.50	3 Nos 200kVA
C	CLUB HOUSE	240.00	168.00	210.00	250kVA
	<b>TOTAL</b>	<b>1889.00</b>		<b>1652.88</b>	<b>8 Nos-200kVA + 1 No-250kVA</b>

1. Lifts are calculated at 7.5kW as per the standards.
2. Common area, Pumps and Fire pumps load requirement are assumed.
3. Load for each apartment considered is as follows.
  - a) 2 & 3 Bed room apartment: 0.5KW/per apartment

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# CHAPTER II

## Traffic Management



### Content

- 11.1 Traffic Survey
- 11.2 Environmental Impact
- 11.3 Environmental Management Plan

## 11.1 TRAFFIC SURVEY

The traffic survey to ascertain the traffic density in the study area was conducted for one day at Panaji University Road. The traffic survey was carried out at below location covering both opposite directions. The hourly counts were carried out for the different type / category of vehicles. The variations in the traffic flow at all the places along with the number of vehicles are presented in the following table.

Location: On the Panaji University Road,.

Sr. No.	Type of Vehicles	Rush Hrs (No. of Vehicles per hour)		Lean Hrs (No. of Vehicles per hour)	
		Up Direction	Down Direction	Up Direction	Down Direction
1.	Two Wheelers	180	162	136	121
2.	Three Wheelers	15	18	10	8
3.	Cars	204	300	150	232
4.	Buses	12	15	13	11

The results of the hourly traffic monitoring indicate:

The maximum vehicles observed are cars at the above location. The cars like light motor vehicles are high in number from Panaji to Goa University. This trend will show further increase in vehicle population during the functional phase of the project.

## 11.2 ENVIRONMENTAL IMPACT

### Construction Phase

10 to 12 heavy and medium vehicles shall enter and leave the subject plot on daily average basis over a period of 10 to 12 hours, i.e. one vehicle per hour

average; hence, pollution from these vehicles will be negligible. Construction raw materials will be transported by the heavy vehicles like trucks, etc.

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### Operational Phase

Above 350 vehicles are expected to enter & leave the subject property on daily average basis, It means the addition in the automobile pollution in 1 Sq. Km. around the subject property is expected to be 19% max or to a vary low level if the 350 vehicles run on CNG and comply with Euro II & III.

## 11.3 ENVIRONMENTAL MANAGEMENT PLAN

### Construction Phase

On the Panaji University Road, automobile pollution is expected due to traffic. However, it will affect the subject plot. The existing trees will act as noise barrier. There will be planning of planting more trees in between the site and the road, which work as noise barrier.

### Operational Phase

During the operational phase, entered vehicles having Euro II / III Standard & with CNG as fuel their contribution to the automobile pollution will be almost negligible.

Moreover, large amount of big trees in the premises will work as barrier for the vehicular noise.

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# CHAPTER 12

## Landscaping Details

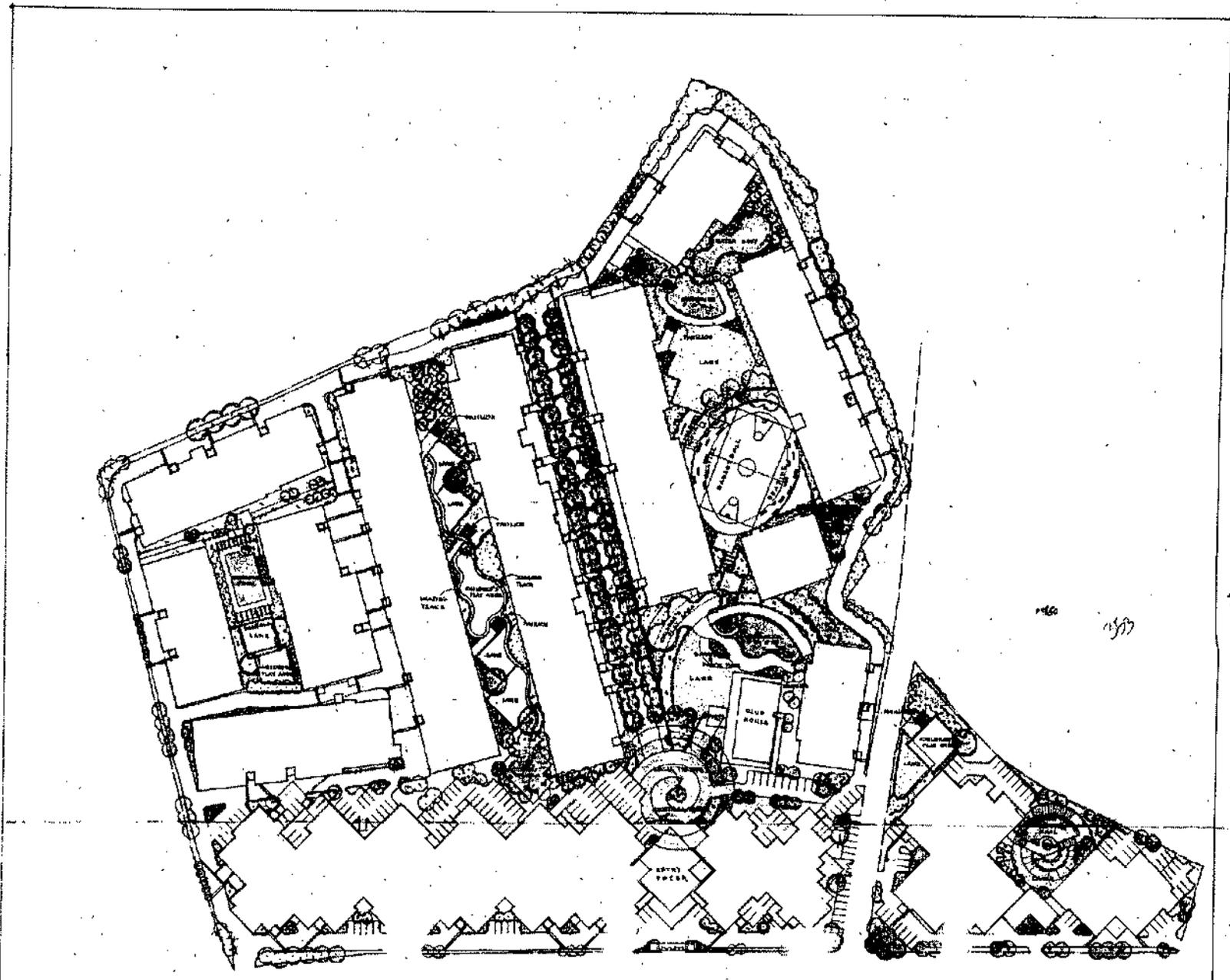
### Content

12.1 Landscaping Details

Project Proponent:  
Project Name:

Mathias Constructions (P) Ltd.  
Mathias Ocean Park

12.0



PROJECT: LANDSCAPE DEVELOPMENT FOR OCEAN PARK, DEERAPALA, S.A.  
 MATHIAS GROUP

APSE 2:  
 LANDSCAPE SCHEM

SCALE: NOT TO SCALE  
 DATE: 12.04.2024  
 DRAW:

DESIGN COVE  
 LANDSCAPE ARCHITECTURE  
 PAVILION - 002

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**Landscape Proposed**



**Landscape Masterplan**

## Area Statement

---

- Total Land Area** : 82,220.00 Sq. Mts.
- Total Ground Coverage** : 26421.88 Sq. Mts
- Total Built Up Area** : 193291.65 Sq. Mts
- Total Open Space** : 13333.90 Sq. Mts
- Hardscape** : 40% of the total open space
- Softscape Area** : 60% of the total open space

2  
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1/1/16

## Environmental Considerations in Design

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- Designed to Maximize soft areas by planting to increase runoff infiltration.
- Rain water harvesting methods have been incorporated to recharge the ground water table at various location.
- Intensive tree planting (aprox. 500 nos.) spread all around the site to reduce glare and radiation, to improve microclimate within the site and to provide habitat for avifauna.
- Trees selected are predominantly native or naturalised to area.
- Plants selected attract butterflies and other small birds and insects.
- Organic and inorganic Waste collection is done separately. The organic waste is used for manufacturing the manure for consumption at site

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# Rain Water Harvesting

## **Rain Water Harvesting:**

We need to implement measures to ensure that every drop of rain that falls on the site under consideration is tapped using various water harvesting techniques, either by recharging the ground water table or storing it for direct use. Since storing the entire runoff water would require huge structures and treatment, we've concentrated only on utilizing the storm water runoff for recharging of the ground water.

### **□ Rooftop rainwater and surface runoff harvesting:**

A network of storm water drains spread across the entire complex is utilized for harvesting the rooftop rainwater as well as surface runoff.

Various recharge solutions that are used can ensure that the rainwater percolates in the ground instead of draining away from the surface. Some of these promote the percolation of water through soil strata at shallower depth (e.g., recharge trenches, permeable parking areas), others conduct water to greater depths for recharge of the ground water table (e.g., infiltration pits, recharge bores)

It is utmost important to ensure that the rainwater collected is free from any pollutants that might be added to rainwater from the atmosphere or the catchment.

Measures that can be taken to ensure this are:

At the catchment level

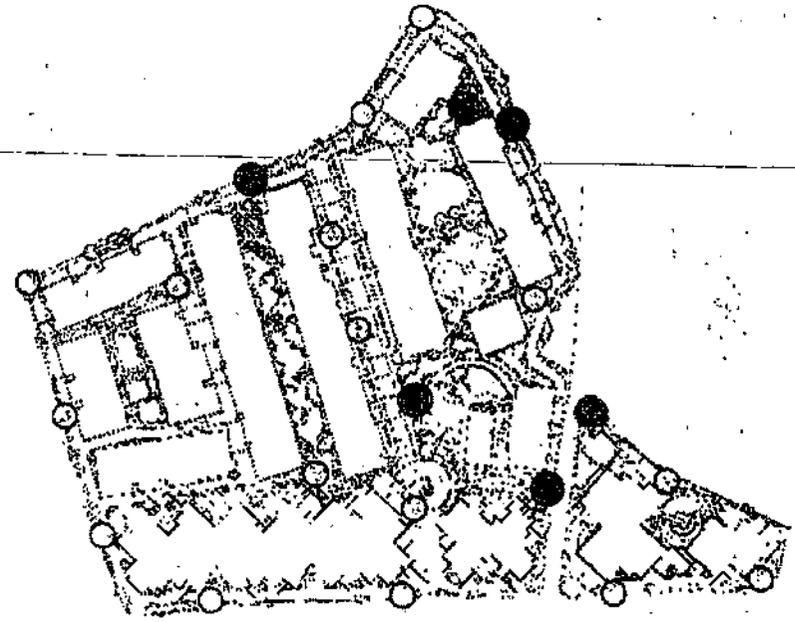
- Keeping the catchment clean
- Using gratings to trap debris at the catchment itself
- Paving the catchment with non-erosive material

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# Infiltration Pit Locations

Before Recharging  
 Allowing for sedimentation of water  
 Filtering the water  
 2 number of recharge wells and 20 number of infiltration pits measuring 3'0" to 6'0" dia each, have been constructed within and around the main storm water drain for facilitating ground water recharge.  
 Quality of runoff, getting recharged through a 15m dry bore installed inside the recharge well is controlled by a filter bed consisting of various pebbles and gravel (as shown in the figure 1)

- Type 1
- Type 2
- Type 3



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## DETAILS OF TREES, SHRUBS AND GRASS PROPOSED AT SITE:

Botanical name	Common Name			Height (M)	Canopy (M)	Nos.	Approx. Coverage (sq. m.)
	English	Marathi	Hindi				
1 Plumeria alba	Champa	Champa	Champa	2-3	2-3	17	43
2 Nerium oleander	Apocynaceae	Chandni	Kaner	3-5	4-5	5	23
3 Saraca indica	Ashok	Ashok	Ashok	7-9	7-9	4	32
4 Bauhinia variegata	Orchidtree	Kanchan	Kachnar	9-14	9-12	5	53
5 Putaranjiva roxburghi	Indian amulet	Putranjivika	Jivputra	9-15	12-17	46	667
6 Cassia fistula	Indian laburnum	Chimkani	Amaltas	11-14	9-14	48	552
7 Pongamia pinnata	Indian beech	Karanj	Karanj	12-15	12-18	58	870
8 Mimosops elengi	Indian medlar	Bakul	Bakul	12-15	12-18	112	1,680
9 Azadirachta indica	Neem	Nimbay	Neem	12-18	15-22	40	740
10 Roystonea regia	Royal palm	Royal palm	Royal palm	15-20	2-5	10	35
11 Mangifera indica	Mango	Aam	Aam	15-21	12-18	2	30
12 Gravillea robusta	Silver oak	Silver oak	Silver oak	15-21	6-9	101	758
13 Eugenia jambolana	Jamun	Jambhu	Jamun	16-20	15-18	30	495
14 Terminalia arjuna	Arjun	Arjun	Arjun	18-25	12-19	1	16
						479	5,992

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Shrubs:								
Botanical name		Common name			Height (M)	Canopy (M)	Nos.	Approx. Coverage (sq. m.)
		English	Marathi	Hindi				
1	Ocimum sanctum	-	Tulsi	Tulsi	1-2	0.5-1.2	-	20
2	Rosa Moschita	Rose	Gulab	Gulab	1-2	0.5-1.2	-	900
Total coverage								920

Grass:								
Botanical name		Common name			Height (M)	Canopy (M)	Nos.	Approx. Coverage (sq. m.)
		English	Marathi	Hindi				
1	Cynodon Dactylon	Lawn grass	-	-	-	-	-	1,100
Total coverage								sq. m. 8,012

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# CHAPTER

13

# Risk Assessment

## Content

- 13.1 Fire Safety Measures
- 13.2 Risk Assessment
- 13.3 Emergency Response
- 13.4 First Aid Center

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371**13.1 FIRE SAFETY MEASURES:**

Fire fighting system to the proposed building is designed based on the recommendations of NBC 2005. Following safety measures are envisaged.

**Following are the requirements:**

- An exclusive OHT of 25,000 lts. Capacity on the stair case core of each block at the terrace level shall be provided.
- One No. Terrace Pump of duty 900 lpm @ 35m head shall be provided.
- 1 No. Down comer of 100mm diameter is provided near each stair case core.
- FHC is envisaged with Single headed hydrant valve and hose reel at each stair case landing level.
- Sprinkler system is proposed in the covered parking area.
- Portable fire extinguishers are proposed to be placed at strategic locations.
- Fire Brigade Inlet Connection for external pumping arrangement is envisaged.
- Yard hydrants along the building peripheral length are provided.
- Automatically operated electric fire alarm System.
- Public Address System 2-way communication type.
- Manual Call Points.

**13.2 RISK ASSESSMENT**

Risk assessment forms an integral part of EIA study. Risk assessment study deals with identifying and evaluating the magnitude of impending risks to which the neighboring population is exposed due to occurrence of accidents involved in the project construction and implementation. This assists in illustrating the

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13.1

372 guidelines for preparation of disaster management plan which will be executed to handle the situation if any emergency occurs.

Following are the risks that are identified in high rise buildings.

### FIRE RISK

Fire is mainly caused in Project due to carelessness, short circuits and malfunctioning of gas regulator, tube and such related products.

At the proposed housing project, hazard occurrence may result in on-site implications like:

- Fire and/or explosion;
- Leakage of flammable material and catching fire;
- Natural calamities like earthquake, cyclone etc.

There are two worst-case scenarios for fires in very tall buildings:

- A fire burns out of control on the structure's lower floors at such a high intensity that, once extinguished, the structural damage is enough to cause the building to be considered a constructive total loss.
- A fire originating on the building's lower floors is able to spread throughout all the levels of the structure.

In spite of the clear gravity of the above scenarios, these types of fire have happened infrequently in very tall buildings. More typically, fires in very tall buildings yield only partial structural damage. However, losses of life and property can still be substantial.

Emergency prevention through good design, operation, maintenance and inspection are essential to reduce the probability of occurrence and consequential effect of such eventualities. However, it is not possible to totally eliminate such eventualities and random failures of equipment or human errors, omissions and unsafe acts cannot be ruled out. An essential part of major hazard control has therefore to be concerned with mitigating the effects of such Emergency and restoration to normalcy at the earliest.

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The overall objective of a **Disaster Management Plan (DMP)** is to make use of the combined resources at the site and outside services to achieve the following:

1. To localize the emergency and if possible eliminate it;
2. To minimize the effects of the accident on people and property;
3. Effect the rescue and medical treatment of casualties;
4. Safeguard other people;
5. Evacuate people to safe areas;
6. Informing and collaborating with statutory authorities;
7. Provide authoritative information to news media;
8. Initially contain and ultimately bring the incident under control;
9. Preserve relevant records and" equipment for the subsequent enquiry into the cause and circumstances of the emergency; and
10. Investigating and taking steps to prevent reoccurrence

The DMP has therefore to be related to the identification of sources from which hazards can arise in the concerned area. The plan takes into account actions that can successfully mitigate the effects of losses/ Emergency need to be well planned so as they would require less effort and resources to control and terminate emergencies, should the same occur.

It is increasingly acknowledged by safety authorities, such as the Loss Prevention Council, that the use of curtain walls (versus traditional wall construction) in multi-storey structures adds to the risk of fire spread in these structures. Filler material used in curtain walls is often not adequately fire-resistant, allowing the quick spread of fire throughout a structure. In structures fitted with curtain walls, significant losses have been reported in facilities without sprinkler.

In emerging economies where construction has outpaced infrastructural development, fire brigades may not be adequately equipped to deal with high-rise fires.

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**PUBLIC SAFETY**

The incidence of fire or other disasters occurring in very tall buildings often endangers the safety of the persons residing in the structure, in the event of an emergency. People present in such structures often do not know proper emergency procedures, aggravating fire and/or causing injury and death.

The only way of reducing the damage to public life and property is by conducting fire safety drills and installing well equipped fire safety equipments such as smoke detectors, heat sensors, fire panels and fire alarms. The Security staff should be made well conversant with emergency procedures, such as closing doors when fleeing a fire, as well as staying in rooms, rather than attempting to escape. It is recommended that mock-drills should be carried out at least once in six months.

**TERRORISM**

Very tall buildings, which often serve as corporate, municipal, or national symbols, are targets for terrorist attack. Appropriate security measures should be taken in and around to ensure limited access to key areas, such as attached parking garages where bombs can be easily placed. Building management should carry out surprise checks.

**13.3 EMERGENCY RESPONSE****Emergency**

1. Any fire or explosion in the premises.
2. Strong persisting smell of LPG within the premises.
3. Exercise fire drill.

**Emergency Response in Case of Emergency****Basic Actions:**

- ◆ Immediate action is the most important factor in the emergency control because the first few seconds count.

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- ◆ Immediate steps to stop fire and raise alarm simultaneously.
- ◆ All vehicles except those that are required for emergency use should be moved away from the operating area in an orderly manner at pre nominated route.
- ◆ Electrical system except the lighting and fire fighting system should be isolated.
- ◆ Start water spray system in the areas involved in or exposed to fire risks.
- ◆ In case of leakage of LPG without fire and inability to stop the flow, take all precautions to avoid source of ignition.

**Action in the Event of fire**

- Extinguishing fires: A small fire at a point of leakage should be extinguished by enveloping with a water spray or a suitable smothering agent such as CO<sub>2</sub> or DCP.
- Fire fighting personnel working in or close to fire, must be protected continuously by water sprays. Fire fighter should advance towards the fire downwind if possible.
- In case of only valves that can be used to stop the leakage is surrounded by fire, it may be possible to close it manually. The person attempting the closure should be continuously protected by water sprays, fire entry suit, water jet blanket etc. The person must be equipped with a safety belt and a manned lifeline.

**Leakage from a LPG cylinder without fire**

- ◆ Cordon off the area around 30 meters radius so that no vehicle or source of ignition approached the area. Attempt to close the control/manual valve.
- ◆ Open all windows to increase ventilation and hence prevent build up of vapour cloud.
- ◆ Avoid getting entrapped in the cloud vapour.
- ◆ Water sprays should be used to disperse the vapour cloud.
- ◆ Warn the surrounding areas to put off all naked flames.

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**Post Emergency Follow up**

- All cases of fire occurrence, no matter how small, must be reported immediately to Coordinator for follow up.
- Used fire extinguishers must be laid horizontally to indicate that they have been expanded.
- Under no circumstances should fire-extinguishing equipment once used be returned to its fixed location before it is recharged/ certified fit by the Fire Chief / Safety Manager.

**13.4 FIRST AID CENTER**

The medical management for the possible emergencies essentially consists of treatment for burns and may be some asphyxiation cases. Help from the nearby city hospitals shall be obtained.

# ENVIRONMENTAL IMPACT MATRIX

Nature and/or Points of impacts activity	Plant water use	Sewage discharge	Aerial emissions	Hazardous material handling	Solid waste disposal	Noise	Transport	Socio-economic development
Land use		1			1			
Traffic							1	
Agricultural Migration	0			0			0	0
Soil					0			
Surface water	0	0		0				
Ground water		0						
Water availability		0		0				
Air quality			1				1	0
Terrestrial flora		0						
Terrestrial fauna					0			
Aquatic ecology	0	0						
Noise level					0	1	1	
Local economy	0							
Building / monuments			0					
Safety			0					
Villagers displaced by process								
Cumulative effects								

Environmental impact matrix	0	no impact	Impact Ranking
	1	negligible impacts	Unacceptable impacts, remedial measures required to reduce impacts.
	2	Slight impacts	Review of existing control measure, probable need for further measures.
	3	Moderate impacts	Review monitoring programme results after commissioning assess the need for action.
	4	serious impacts	Review monitoring survey results to confirm .N. action required.

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# CONCLUSION

The sewage treatment plant is designed based on the proven activated sludge process with extended aeration technology. The STP would be able to treat the sewage to the standards prescribed by the KSPCB with treated BOD<sub>5</sub> levels less than 20 Mg/lit. The treated water can be used for the tertiary uses like gardening, floor washing, toilet flushing, etc. The treated water is safe to come in contact as the chlorination is done to kill the bacteria.

The rainwater harvesting proposed would not waste any rainwater and it will be used back to the maximum and the excess water will be used for the recharging of under ground water.

The water and wastewater management adopted by the developers would be one of the best in the interest of protecting the environment and in saving the natural resources.

Overall, the project has no major impacts on the environment, thus this project should be awarded necessary Environmental Clearances.

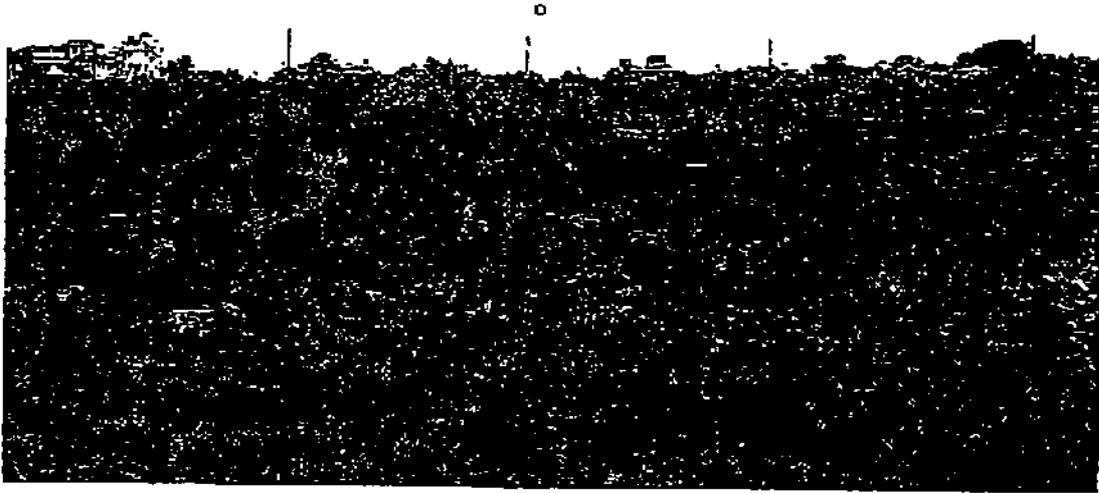
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# ANNEXURE

1. Site Photographs
2. Ambient Air Quality Results within 10 km Radius from the Project Site
3. Schematic Diagram of STP No.1 having capacity 650 KLD
4. Schematic Diagram of STP No.2 having capacity 300 KLD

ANNEXURE: 1 SITE PHOTOGRAPHS

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**Back side of the Project about 0.5 km**

**381**



**Dona Paula Traffic circle Near Project site (about 0.5 km)**



**ANNEXURE: 2 AMBIENT AIR QUALITY RESULTS WITHIN 10 KM RADIUS FROM PROJECT SITE**

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**A1: AT PROJECT SITE**

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Date	SPM (µg/m³)	RSPM (µg/m³)	SO <sub>2</sub> (µg/m³)	NO <sub>x</sub> (µg/m³)	CO (µg/m³)
01-03-06	86	53	6.1	8	112
04-03-06	96	58	6.3	10	118
08-03-06	82	60	6.3	14	112
11-03-06	110	52	6	7	123
15-03-06	100	56	6.2	12	128
18-03-06	116	54	6.1	11	135
22-03-06	102	61	6.2	10	110
25-03-06	89	53	6.1	13	129
29-03-06	111	58	BDL	8	127
02-04-06	88	55	6.1	9	130
06-04-06	96	57	6	11	120
09-04-06	91	60	6.3	14	125
13-04-06	113	59	6.2	8	127
16-04-06	114	52	6.1	9	119
20-04-06	90	54	6.3	12	131
23-04-06	97	56	6.2	13	121
27-04-06	93	53	6.3	7	124
01-05-06	85	61	6.1	14	110
04-05-06	116	52	6	12	129
08-05-06	82	58	6.1	13	123
11-05-06	112	57	BDL	10	133
15-05-06	106	53	6.1	8	132
18-05-06	108	59	6	12	115
22-05-06	94	56	6.3	9	117
25-05-06	87	60	6.2	14	132
29-05-06	102	58	6.1	13	118
31-05-06	109	61	6.2	11	111
<b>Maximum</b>	116	61	6.3	14	135
<b>Minimum</b>	82	52	BDL	7	110
<b>Average</b>	95	58	6.1	9	121
<b>Standard Deviation</b>	11.12	3.07	0.10	2.30	7.73
<b>98 Percentile</b>	116	61	6.3	14	133.96

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A2: AT PANAJI

Date	SPM (µg/m <sup>3</sup> )	RSPM (µg/m <sup>3</sup> )	SO <sub>2</sub> (µg/m <sup>3</sup> )	NOx (µg/m <sup>3</sup> )	CO (µg/m <sup>3</sup> )
01-03-06	86	48	6.5	10	119
04-03-06	89	63	6.3	15	123
08-03-06	96	64	6	10	147
11-03-06	114	48	6.8	12	132
15-03-06	128	55	6.3	14	138
18-03-06	116	57	6.4	15	137
22-03-06	125	53	6.5	8	123
25-03-06	97	50	BDL	9	125
29-03-06	100	63	6.1	11	127
02-04-06	110	62	6.3	12	132
06-04-06	102	47	6.8	15	130
09-04-06	108	48	6.8	14	120
13-04-06	113	63	6.7	8	117
16-04-06	88	61	6.4	13	119
20-04-06	90	60	6	14	137
23-04-06	91	54	BDL	12	147
27-04-06	119	58	6.2	8	127
01-05-06	117	57	6.7	11	120
04-05-06	121	51	6.5	9	124
08-05-06	120	59	6.2	15	139
11-05-06	88	64	6.1	14	141
15-05-06	88	49	6.3	13	140
18-05-06	86	47	6	11	149
22-05-06	119	58	6	10	133
25-05-06	110	49	6.2	8	145
29-05-06	117	56	6.4	10	142
31-05-06	89	55	6.3	8	141
<b>Maximum</b>	128	64	6.8	15	149
<b>Minimum</b>	86	47	BDL	8	117
<b>Average</b>	110	57	6	12	129
<b>Standard Deviation</b>	14.02	5.86	0.26	2.50	9.89
<b>98 Percentile</b>	126.44	64	6.8	15	147.96

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A3: AT DONA PAULA

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Date	SPM (µg/m³)	RSPM (µg/m³)	SO <sub>2</sub> (µg/m³)	NOx (µg/m³)	CO (µg/m³)
01-03-06	84	52	6	14	128
04-03-06	110	57	6.3	8	136
08-03-06	115	60	6.5	9	135
11-03-06	113	65	BDL	12	130
15-03-06	111	49	6.1	13	121
18-03-06	98	50	6.2	7	123
22-03-06	96	52	6.5	14	128
25-03-06	103	51	6	12	129
29-03-06	108	58	6	13	130
02-04-06	110	53	6.2	10	133
06-04-06	120	65	6.1	8	125
09-04-06	122	52	6.4	12	121
13-04-06	86	57	6.5	9	127
16-04-06	89	51	6.4	14	128
20-04-06	84	50	6.3	13	136
23-04-06	122	49	6.2	11	135
27-04-06	112	53	BDL	10	132
01-05-06	115	59	6	14	122
04-05-06	104	57	6	7	121
08-05-06	101	52	6.2	12	123
11-05-06	103	51	6.1	11	135
15-05-06	85	49	6.3	10	125
18-05-06	87	65	6.5	13	136
22-05-06	90	61	6.4	8	134
25-05-06	114	63	6	9	131
29-05-06	107	62	6.1	11	122
31-05-06	87	60	6.3	11	127
Maximum	122	65	6.5	14	136
Minimum	84	49	BDL	7	121
Average	96	55	6	11	130
Standard Deviation	12.38	5.46	0.18	2.23	5.23
98 Percentile	122	65	6.5	14	136

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A4: AT CHICALIM

Date	SPM (µg/m³)	RSPM (µg/m³)	SO <sub>2</sub> (µg/m³)	NO <sub>x</sub> (µg/m³)	CO (µg/m³)
01-03-06	117	63	6.3	12	128
04-03-06	132	52	6.9	18	140
08-03-06	130	54	7.2	15	136
11-03-06	125	58	7	14	135
15-03-06	128	59	6.3	16	138
18-03-06	129	60	6.4	12	128
22-03-06	119	64	6.8	14	127
25-03-06	117	51	6.7	15	135
29-03-06	132	53	7	18	126
02-04-06	130	60	7.2	17	138
06-04-06	131	57	6.4	15	135
09-04-06	125	58	6.6	16	136
13-04-06	127	63	6.2	12	140
16-04-06	129	62	6	15	136
20-04-06	122	59	6.7	15	128
23-04-06	121	52	6.9	14	127
27-04-06	120	57	7.1	12	135
01-05-06	116	56	6.8	13	134
04-05-06	131	58	6.6	18	127
08-05-06	124	55	6	17	128
11-05-06	126	62	6.8	16	133
15-05-06	122	60	7.2	16	135
18-05-06	125	53	7	15	129
22-05-06	129	64	6.8	12	137
25-05-06	130	52	6.1	18	130
29-05-06	131	58	6.2	13	140
31-05-06	121	57	BDL	16	137
Maximum	132	64	7.2	18	140
Minimum	116	51	BDL	12	126
Average	128	57	6	15	132
Standard Deviation	5.03	3.94	0.38	2.01	4.63
98 Percentile	132	64	7.2	18	140

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Project Name:

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16.6

## A5: NEAR GMC

Date	SPM ( $\mu\text{g}/\text{m}^3$ )	RSPM ( $\mu\text{g}/\text{m}^3$ )	SO <sub>2</sub> ( $\mu\text{g}/\text{m}^3$ )	NOx ( $\mu\text{g}/\text{m}^3$ )	CO ( $\mu\text{g}/\text{m}^3$ )
01-03-06	95	56	6.3	7	135
04-03-06	96	60	6.2	8	126
08-03-06	112	63	6	13	138
11-03-06	129	59	6.7	14	135
15-03-06	127	56	6.6	12	136
18-03-06	114	58	6.5	8	140
22-03-06	104	57	6.4	11	136
25-03-06	125	59	6.3	9	128
29-03-06	118	60	BDL	15	127
02-04-06	96	61	6.4	14	135
06-04-06	94	63	6.3	13	134
09-04-06	112	63	6.5	11	142
13-04-06	113	58	6.7	10	128
16-04-06	129	59	6.3	8	133
20-04-06	110	57	6	10	135
23-04-06	102	55	6.2	8	121
27-04-06	107	56	6.3	9	127
01-05-06	109	53	6.4	15	120
04-05-06	120	65	6.2	14	136
08-05-06	123	64	6	13	135
11-05-06	128	63	6.2	11	132
15-05-06	108	62	BDL	10	122
18-05-06	101	60	6.6	8	121
22-05-06	100	65	6.4	10	123
25-05-06	96	58	6.5	8	135
29-05-06	94	57	6.2	7	125
31-05-06	99	65	6.3	11	138
Maximum	129	65	6.7	15	142
Minimum	94	53	BDL	7	120
Average	111	59	6.1	10	132
Standard Deviation	11.87	3.36	0.19	2.52	6.39
98 Percentile	129	65	6.7	15	140.96

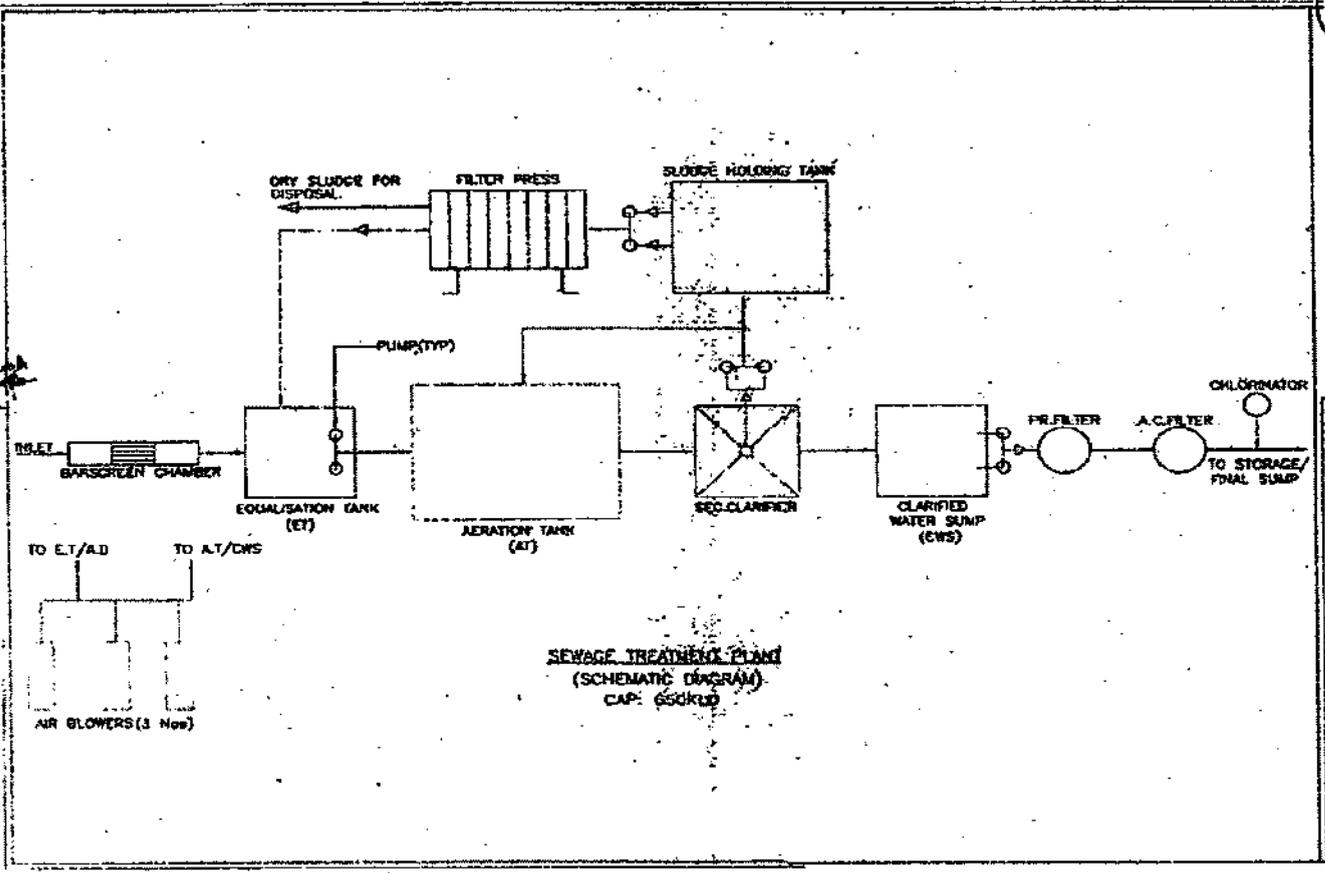
Project Proponent:  
Project Name:

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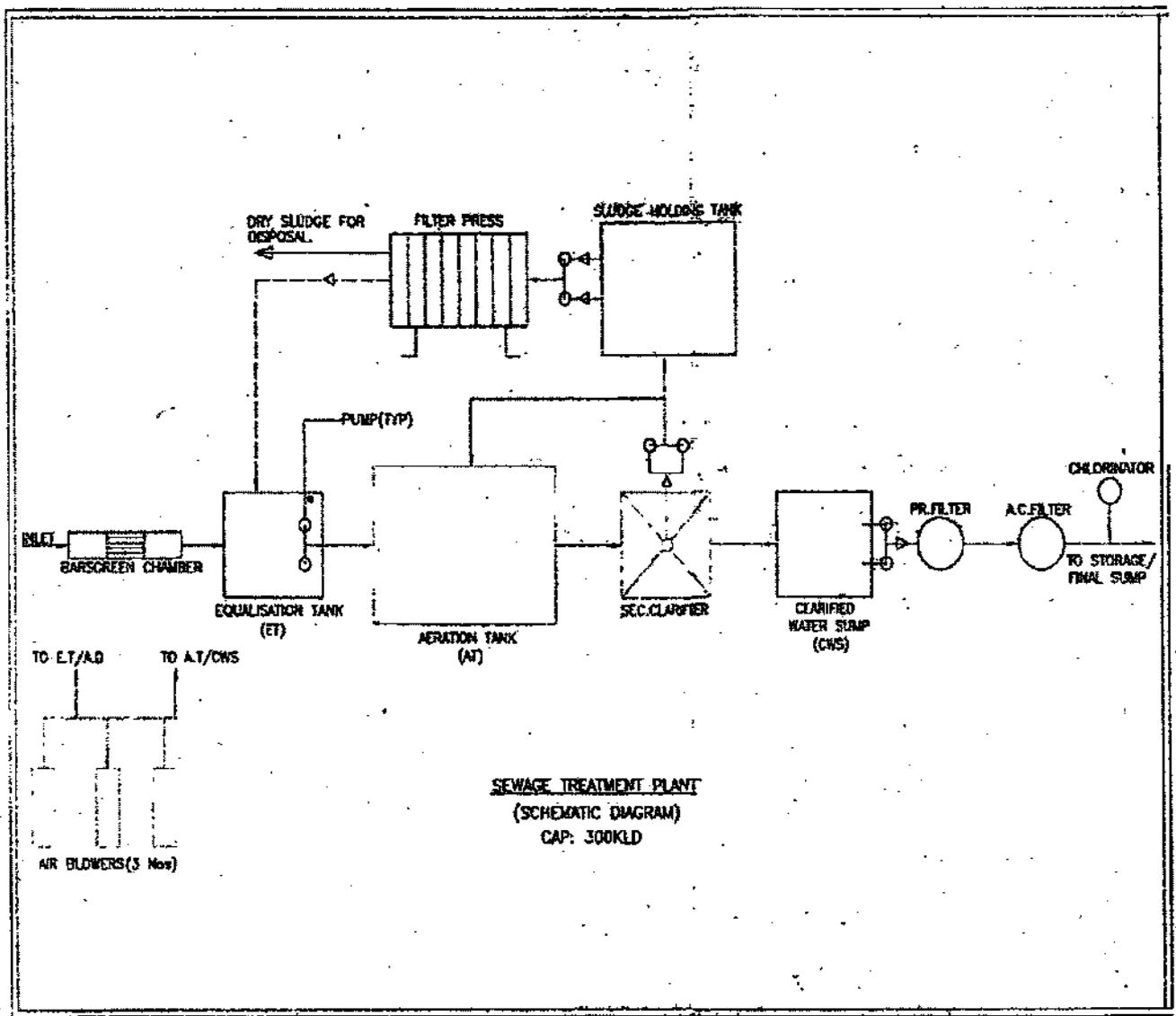
Annexure: 3 Schematic Diagram of STP No. 1 having Capacity 650 KLD



Annexure: 4 Schematic Diagram of STP No. 2 having Capacity 300 KLD

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Project Name:

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# LAYOUTS

1. Section Drawing
2. Countour Plan
3. STP, RWH system and sewage management system.
4. Sewage Treatment Plan (No.1)
5. Sewage Treatment Plan (No.2)
6. Sewage Treatment Plant Schematic Diagram (STP-1)
7. Sewage Treatment Plant Schematic Diagram (STP-2)
8. Site Plan (stilt Floor)

Project Proponent:  
Project Name:

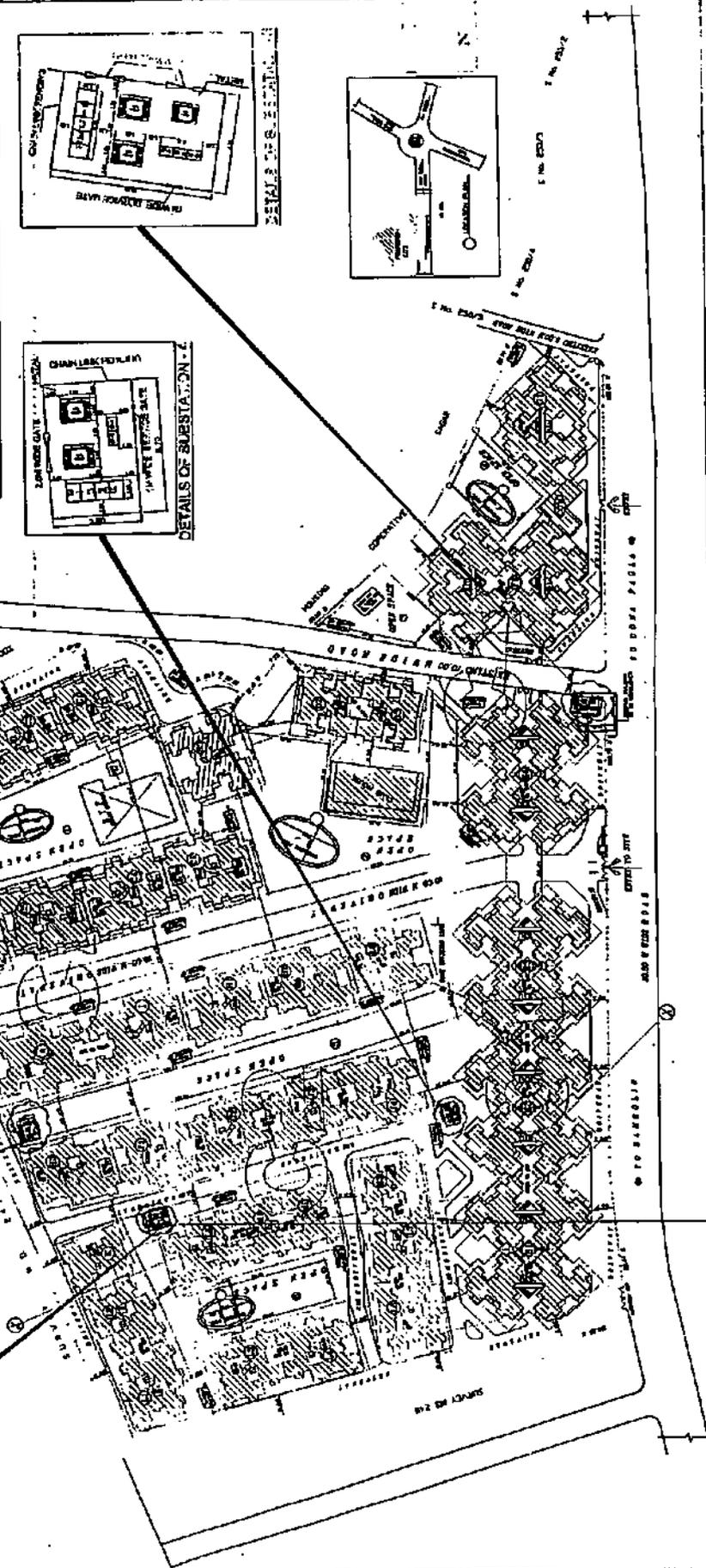
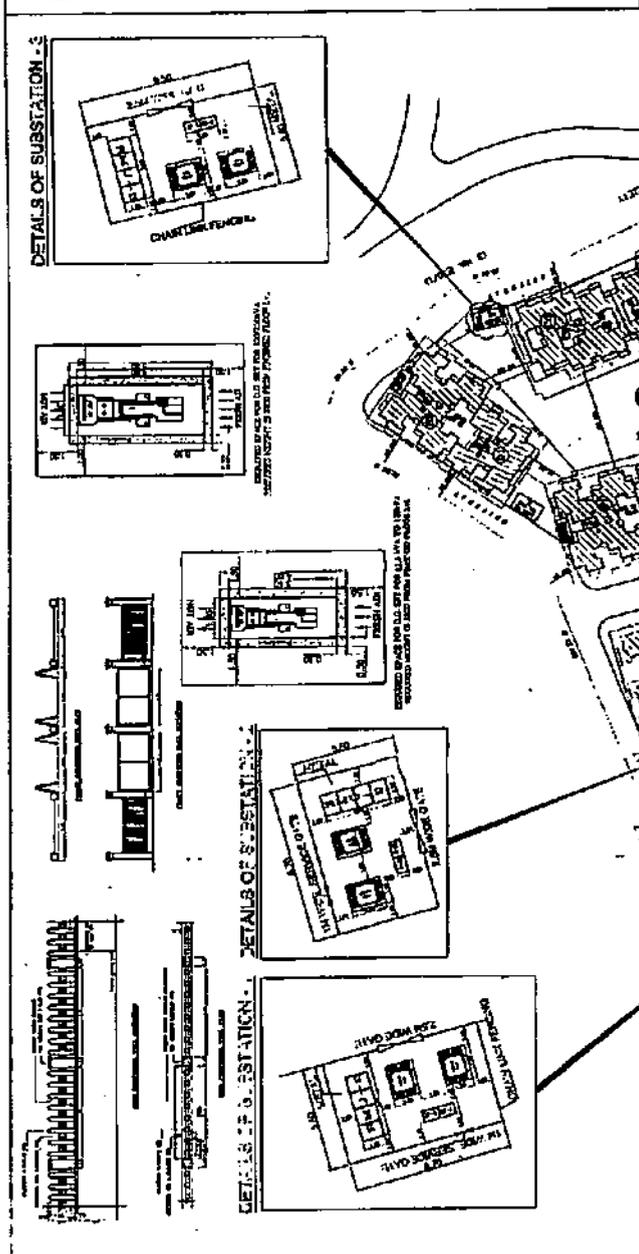
Mathias Construction (P) Ltd.  
Mathias Ocean Park

PROJECT NO.	
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BY	
CHECKED BY	
APPROVED BY	
REVISIONS	
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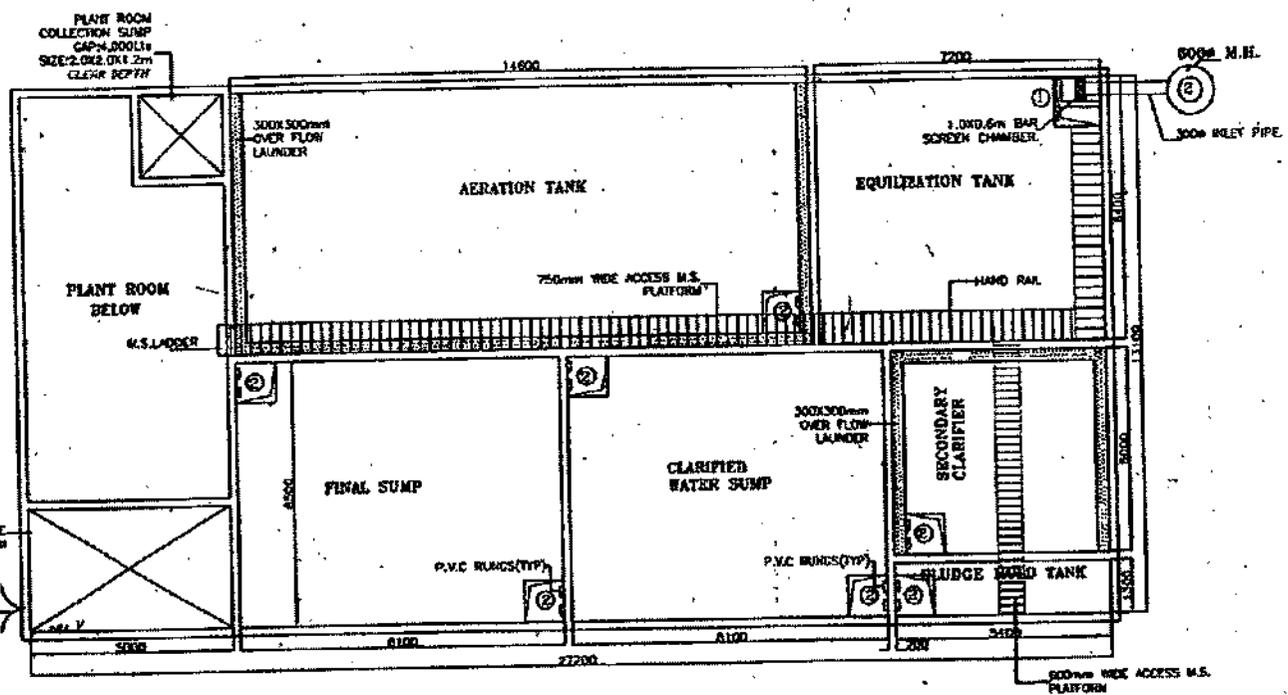
GENERAL NOTES: 1. ALL DIMENSIONS ARE IN FEET AND INCHES. 2. ALL MATERIALS TO BE USED SHALL BE OF THE BEST QUALITY AVAILABLE. 3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS. 4. THE CONTRACTOR SHALL MAINTAIN ACCESS TO ALL ADJACENT PROPERTIES AT ALL TIMES. 5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING UTILITIES AND STRUCTURES. 6. THE CONTRACTOR SHALL MAINTAIN A SAFE WORKING ENVIRONMENT AT ALL TIMES. 7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL ADJACENT PROPERTIES AND UTILITIES. 8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING UTILITIES AND STRUCTURES. 9. THE CONTRACTOR SHALL MAINTAIN A SAFE WORKING ENVIRONMENT AT ALL TIMES. 10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL ADJACENT PROPERTIES AND UTILITIES.

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DRAWING NO. 2' DUSTIN & BOBIE \* DR. ORDER NO. 3004 \* DR. KRISHNARAO

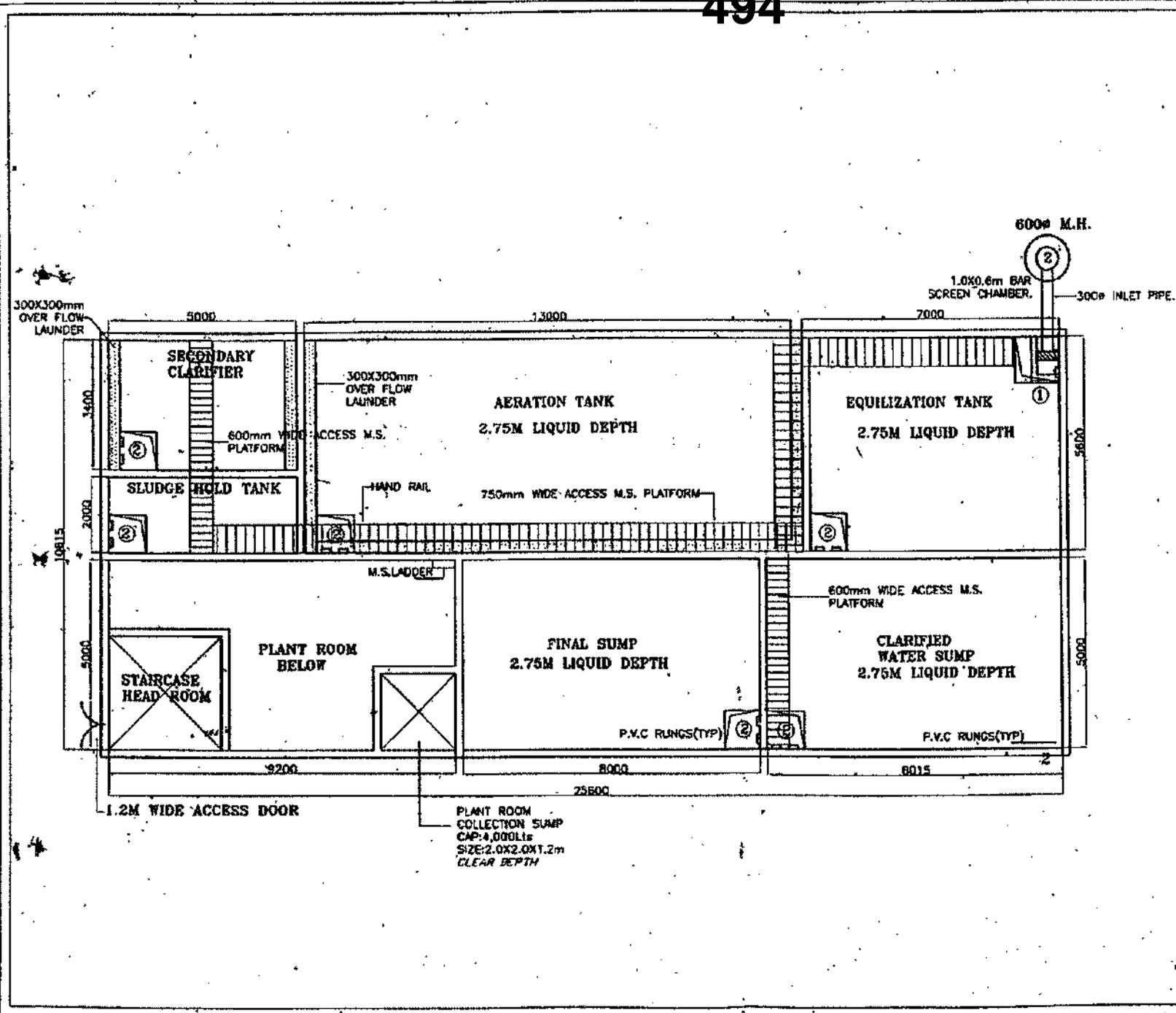


**LEGEND:**

①	1.0X1.0m MANHOLE.
②	1.2X1.2m MANHOLE.
850KLD	

OWNER'S SIGNATURE	
ARCHITECT'S SIGNATURE	
D. SCOLATA 7277-91	
CONSULTANT'S SIGNATURE	
<i>S. K. Associates</i> S. K. ASSOCIATES	
PURPOSE	ORIENTATION
POLLUTION CONTROL BOARD SANCTION DRAWING	<input checked="" type="checkbox"/> N <input type="checkbox"/> S <input type="checkbox"/> E <input type="checkbox"/> W
TITLE: SEWAGE TREATMENT PLANT (S-1)	
SCALE: 1/4" = 1'-0"	DATE: 20/01/00
DESIGNED BY: S. K. ASSOCIATES	CHECKED BY: S. K. ASSOCIATES
PROJECT: PROPOSED MATHEAS OCEAN PARK AT DONA-PAULA, GOA FOR M&A FOR MATHEAS CONSUMER No. 2497-A OF VILLAGE TALEKHA, GOA.	
ARCHITECTS: TEAM - 2	
S. K. ASSOCIATES	
<b>S. K. ASSOCIATES</b> 850/2, 2nd Floor, SHRIYU COMPLEX 2ND FLOOR, L.P. JUNCTION 2nd Phase BANGALORE-560 078. PH NO. : 080-26484578 TELEFAX : 080-26484578 EMAIL : skumar_s@rediffmail.com	

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**LEGEND:**

①	1.2X1.2m MANHOLE.
②	1.0X1.0m MANHOLE.

300KLD

**OWNER'S SIGNATURE:**

**ARCHITECT'S SIGNATURE:**  
B.C.C./E.I./S.S./A.-T/R/VI-98

**CONSULTANT'S SIGNATURE:**  
S.K. ASSOCIATES

**PURPOSE:** POLLUTION CONTROL BOARD SANCTION DRAWING

**ORIENTATION:**

**TITLE:** SEWAGE TREATMENT PLANT (00-2)

**REVISION/NO** | **REV. NO :** 00-01-02

<b>DESIGN</b>	<b>DEVELOP</b>	<b>CHECKED</b>
PIRAN	EFFTA	SHAFIQ KHALIL

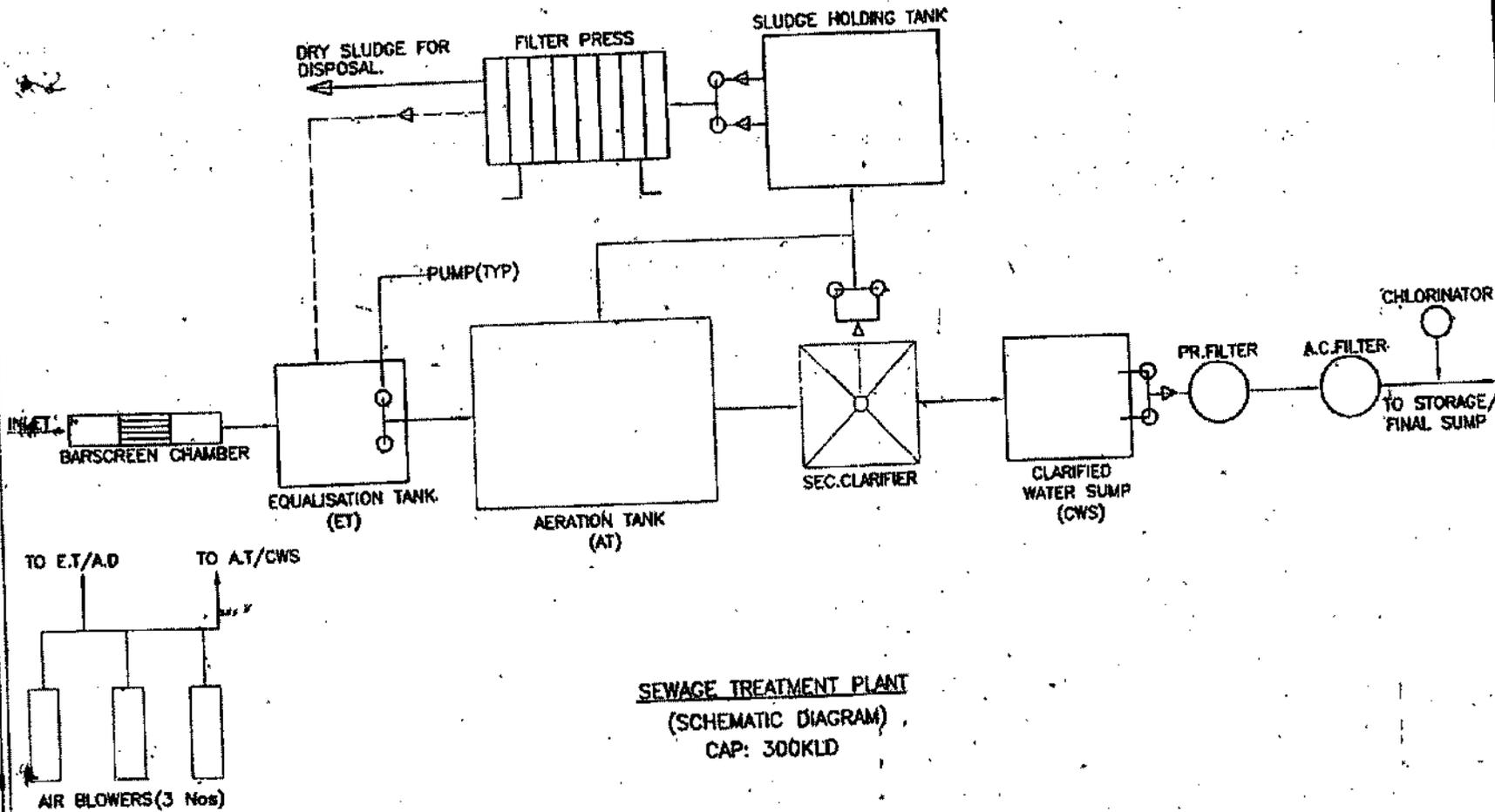
**DATE DRAWN** | **SCALE :** 1:100

**PROJECT:** PROPOSED "MATHIAS OCEAN PARK" AT DONA-PAULA, GOA, FOR M/s JOE MATHIAS ON SURVEY No.249/1-A OF VILLAGE TALEDAD, GOA.

**ARCHITECTS:** TEAM - 2  
SHAFIQ KHALIL  
SUNIL KHALIL WAD  
SUNIL KHALIL - 000 000

**THE CONSULTANT:** **S.K. ASSOCIATES**  
156/3, 2nd floor, SHARDA COMPLEX  
21th MAIN, J.P. NAGAR 2nd Phase  
BANGALORE - 560 078.  
PH NO. : 080-25484879  
TELEFAX : 080-25494878  
EMAIL : sharma\_ja@rediff.com

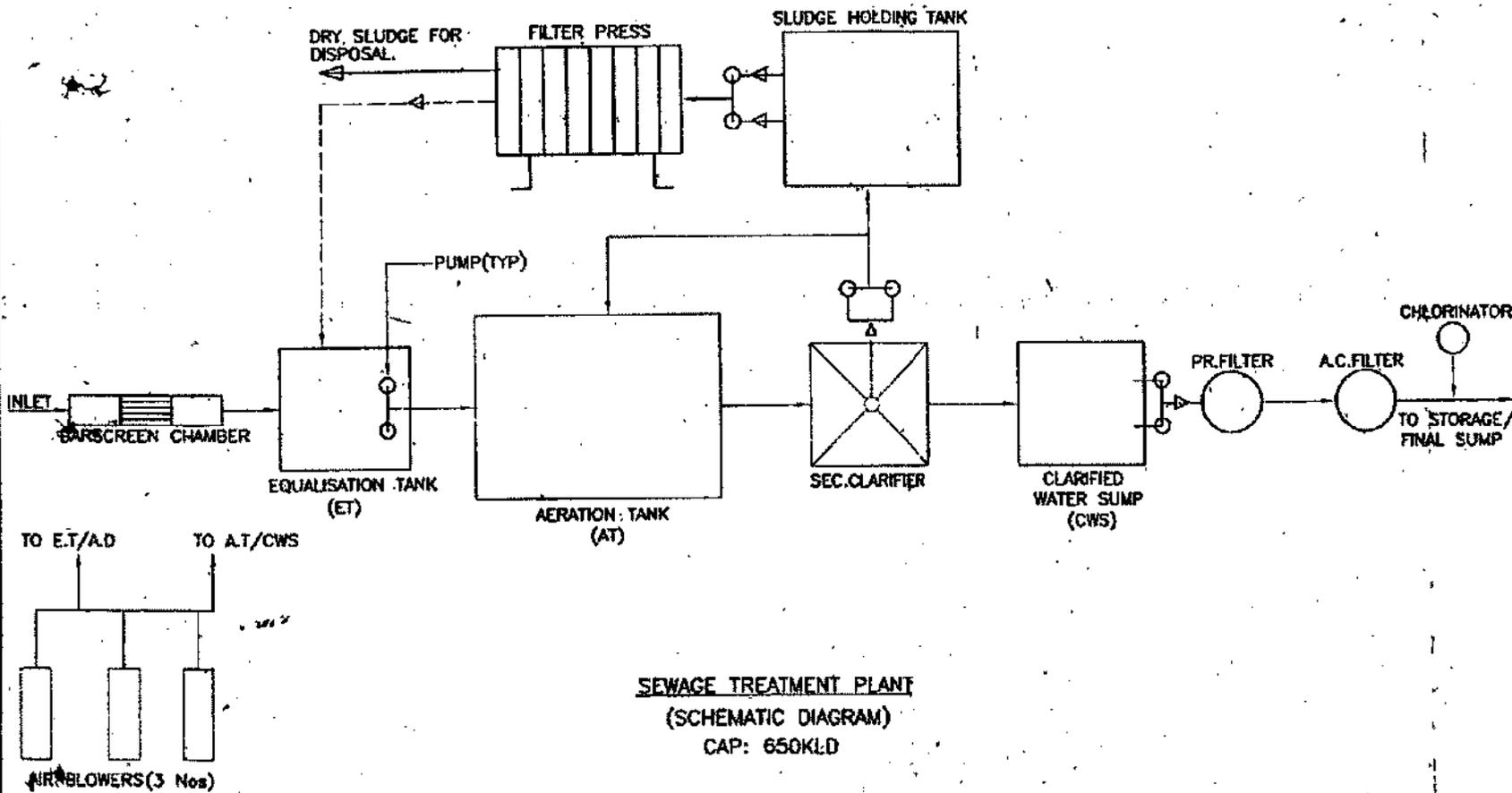
392



SEWAGE TREATMENT PLANT  
(SCHEMATIC DIAGRAM)  
CAP: 300KLD

OWNER'S SIGNATURE	
ARCHITECT'S SIGNATURE	
CONSULTANT'S SIGNATURE	
PROJECT	
TITLE	
SCALE	
PROJECT	
ARCHITECTS	
DATE	
S.K. ASSOCIATES	

394



**SEWAGE TREATMENT PLANT**  
(SCHEMATIC DIAGRAM)  
CAP: 650KLD

OWNER'S SIGNATURE	
ARCHITECT'S SIGNATURE	
CONSULTANT'S SIGNATURE	
PURPOSE	
PROJECT	
TITLE	
REVISIONS	
DATE	
PROJECT	
ARCHITECT	
S.I. ASSOCIATES	

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390

## SCOPE OF SERVICES

24/2022/IA III  
ENVIRONMENTAL HEALTH & SAFETY DIVISION

### A. ENVIRONMENTAL ENGINEERING SERVICES

- Stack & Ambient Air Quality Monitoring
- Water Potable & effluent analysis
- Environmental Impact Assessment: Rapid & Comprehensive EIA/ Environmental Management Plan
- Public Hearing & MoEF Clearance
- Personal Monitoring /Workplace Monitoring
- Environmental Audit /Statement
- Health & Socioeconomic Survey
- ETP & STP Designing & Turnkey Projects
- ETP & STP -Operation & Maintenance
- Feasibility & Treatability Study
- Waste Water Management Study & Storm Water Distribution System -designing & construction
- Water Management Audit & Water Harvesting
- Hydrological & Limnological Study
- Water Supply & Drainage system Designing
- Hazardous Waste management System/ Land filling
- Energy Audit & Illumination or Lighting Audit
- Environmental Accounting
- Responsible Care System & ISO 14001 (EMS)

### B. SAFETY ENGINEERING SERVICES

- Safety Survey, Safety Audits & Fire Audits
- Hazard & Operability Study (HAZOP) & Hazard Analysis (HAZAN)
- Safety Report (Under EPA 1986 (Rule No.10), Hazardous Chemicals)
- On-site & Off-site Emergency Plans/Disaster Management Plan
- Risk Assessment /Analysis & Management: Environmental, Social & Financial
- Mock Drills & Preparation of Booklets under Factory Act 1948 / State Factory Rules
- Behavioral Safety Audit, PPE'S Audit & Ergonomic Audit
- Dispersion Modeling /Mathematical Modeling /Fire Pool & Ball modeling
- Occupational Health, Hygiene & Work Environments survey/audits
- Food Hygiene & HACCP survey, training & audits
- Reliability Study & Safety Management System (SMS)
- HSE Policy & Safety Management System (SMS)
- Illumination or Lighting Audit
- Process Safety & Plant Safety Manual
- Plant O & M Manual / Corporate Protocols
- Process Safety Analysis/Safety Diagnosis
- Accident Investigations
- Electrical Safety Audit
- Loss Prevention Programs
- Mock Drill for emergency preparedness
- In-plant HSE Training & OHSAS 18000

For more information, Please contact/writemail your inquiries to:



**EHS DIVISION  
GREEN CIRCLE, INC.,**

Environmental, Safety & Industrial, Engineers & Consultant  
(In Collaboration with S & G Australia & Emergy, USA)

Pradheep: 9824272844  
Narendra: 9898387949  
Anushree: 9898246340

REGD. OFF. TOGETHER CO. OF SOC. LTD. Road, PANDURANGWADI, GOREGAON(E), MUMBAI-400063 (INDIA)  
TEL: (022) 28755146, FAX: (022) 28748861.  
CO: 1049/10, GROUND FLOOR, GOVIND KRUPA, SADASHIV PETH, PUNE-411030  
TEL: (020) 2291228, FAX: (020) 4174025.  
R&D: 204, 2<sup>nd</sup> FLOOR, "Chaukya", Opp. Vinobhaub Complex, High tension Road Char Rasta, BARODA-390023 (GUJARAT)  
TEL: (0265) 2291228 FAX: (0265) 2280189, E-mail: info@greencircleinc.com Web: www.greencircleinc.com

**IN PLANT EHS MANAGEMENT TRAINING PROGRAMES**

We offer proven EHS & FIRE Management Training Programs that can improve EHS & Fire Management Rating high, in turn it would lead to better & effective management of Environment, Health & Safety, further it would increase competitiveness, boost business performance and build a positive reputation. The training programs are so designed to help the management to reduce losses, improve production, save time & money.

**ENVIRONMENTAL MANAGEMENT TRAINING PROGRAMES**

1. Environmental Management- 2 days
2. Effluent Treatment Plant/Sewage Treatment Plant: Operation & Maintenance -2 days each
3. Environmental Monitoring & Analysis: Air /Water /Noise (Laboratory & Field Exercise )-3 days
4. Water Management- 2 days
5. EMS: ISO 14001 Awareness Programs & Training - 1 day
6. EMS: ISO 14001 Internal Auditors Training Program - 2 days

**SAFETY & HEALTH MANAGEMENT TRAINING PROGRAMES**

- |   |   |
|---|---|
| 1. Safety Management                                    | 29. Permit System                           |
| 2. Use of Personal Protection Equipment (PPE's)         | 30. Observing Unsafe Acts & Reporting       |
| 3. Housekeeping   | 31. Risk Management                         |
| 4. Chemicals Management                                 | 32. Emergency Preparedness                  |
| 5. Machine Guarding                                     | 33. MSDS                                    |
| 6. Safe Maintenance                                     | 34. Evacuation                              |
| 7. Accident Report Writing & Investigation              | 35. Hazard Communication                    |
| 8. Job Safety Analysis (JSA)                            | 36. Mock Drill- 2 days                      |
| 9. Fire Safety Management/Fire Prevention & Control     | 37. Legal /Statutory Requirements           |
| 10. First Aid   | 38. EHS Policy Training                     |
| 11. Accident Prevention & Control                       | 39. Static Electricity                      |
| 12. Loss Prevention & Control                           | 40. Rescue Methods                          |
| 13. Safety In Construction /Projects                    | 41. Material Handling /Fork Lift            |
| 14. Office Safety                                       | 42. Safety Committee                        |
| 15. Occupational Health & Hygiene                       | 43. Contractors Safety                      |
| 16. Safety in Computer Operations                       | 44. Electrical Safety                       |
| 17. Transportation Safety                               | 45. Drivers Training                        |
| 18. Hazard & Operability Study (HAZOP)-2 Days           | 46. Safety in Welding /cutting              |
| 19. Safety Audit  | 47. Safety in Engineering Industries        |
| 20. Safety Consideration in Designing of Chemical Plant | 48. Dock /Port Safety                       |
| 21. Stores & Warehouse Safety                           | 49. Safety of tank farms /bullets / Spheres |
| 22. Public Liabilities Act (PLA)                        | 50. Working at Heights                      |
| 23. Safety & Productivity                               | 51. Working in Hazardous Area               |
| 24. Handling, Storing & Use of LPG / NG                 | 52. Handling, Storing & Use of Chlorine     |
| 25. Working with Compressed Gas Cylinders               | 53. Safety Discipline                       |
| 26. Vessel Entry /Working in Vessel/Confined Space      | 54. Operational Safety of Pressure Vessels  |
| 27. Noise & Vibration                                   | 55. Non Destructive Tests (NDT's)           |
| 28. Human Factors in Process Control                    | 56. Stress Management                       |

The Training Programs & Literature are offered in Hindi /Local Languages (Indian) & English. At a time 2 topics from above list (Safety) could be selected for one day program, for a batch of 20 persons. However for comprehensive programs the modules would be customized to the plant needs.

*For more information, Please contact/ write/email your inquiries to:*

**TRAINING DIVISION****GREEN CIRCLE, INC.**

Environmental, Safety & Industrial, Engineers & Consultants  
(In Collaboration with S & G Australia & Emery, USA)

Pradheep: 9824272844

Narendra: 9302127010

Anushree: 9898246340

H.O.: 205-B, YOGESH CO. OP. SOC. 3<sup>RD</sup> Road, PANDURANOWADI, GOREGAON(E), MUMBAI-400663 (INDIA)  
 TEL: (022) 28755198, FAX: (022) 28745861.  
 C.O.: 1049/50, GROUND FLOOR, GOVIND KRUPA, SADASHIV PETH, PUNE-411030  
 TEL: (020) 4015630/4490104, FAX: (020) 4474025.  
 R&D: 204.2<sup>ND</sup> FLOOR, "Chanakya", Opp. Vimalnath Complex, High tension Road Char Rasta, BARODA-390023 (GUJARAT)  
 TEL: (0265) 2291228 FAX: (0265) 2280189 E-mail: info@greencircleinc.com Web: www.greencircleinc.com

**Go E. Mathias**

499. 21-16 | 2007-IAIII

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To,

Date-29/12/2006

The Additional Director-IA-III  
Ministry of Environment & Forest,  
5<sup>th</sup> Floor, Paryavaran Bhavan,  
CGO Complex, Lodi Road  
New Delhi-110014

**Sub: Submission of EIA/EMP report along with the following documents for Mathias construction Pvt. Ltd.**

Dear Sir,

Please enclosed the following documents for your kind perusal

1. EIA/EMP Report
2. Executive Summary
3. Form IA
4. Site plan
5. Landscape Plan
6. Contour Map

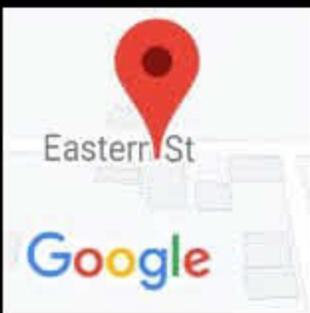
We kindly request you to enlist the project for presentation to get Environmental Clearance.

Thanking you,

For:- Mathias construction Pvt. Ltd. (A)

(AUTHORISED SIGNATORY)

ANNEXURE - C



ssagar society, Plot.no37, Dona Paula Rd, Durgavado, Goa 403004, Goa 403004 India

28 May 2024 04:00 PM

32.0 °C

ANNEXURE - D



501, 5C Gran Canaria  
Mathias Ocean Park  
Residency, Dona paula,  
28 May 2024 01:22 PM



501, 5C Gran Canaria  
Mathias Ocean Park  
Residency, Dona paula,  
28 May 2024 01:22 PM



501, 5C Gran Canaria  
Mathias Ocean Park  
Residency, Dona paula,  
28 May 2024 01:22 PM



scattered  
clouds  
33.0 °C



501, 5C Gran Canaria  
Mathias Ocean Park  
Residency, Dona paula,  
28 May 2024 01:22 PM

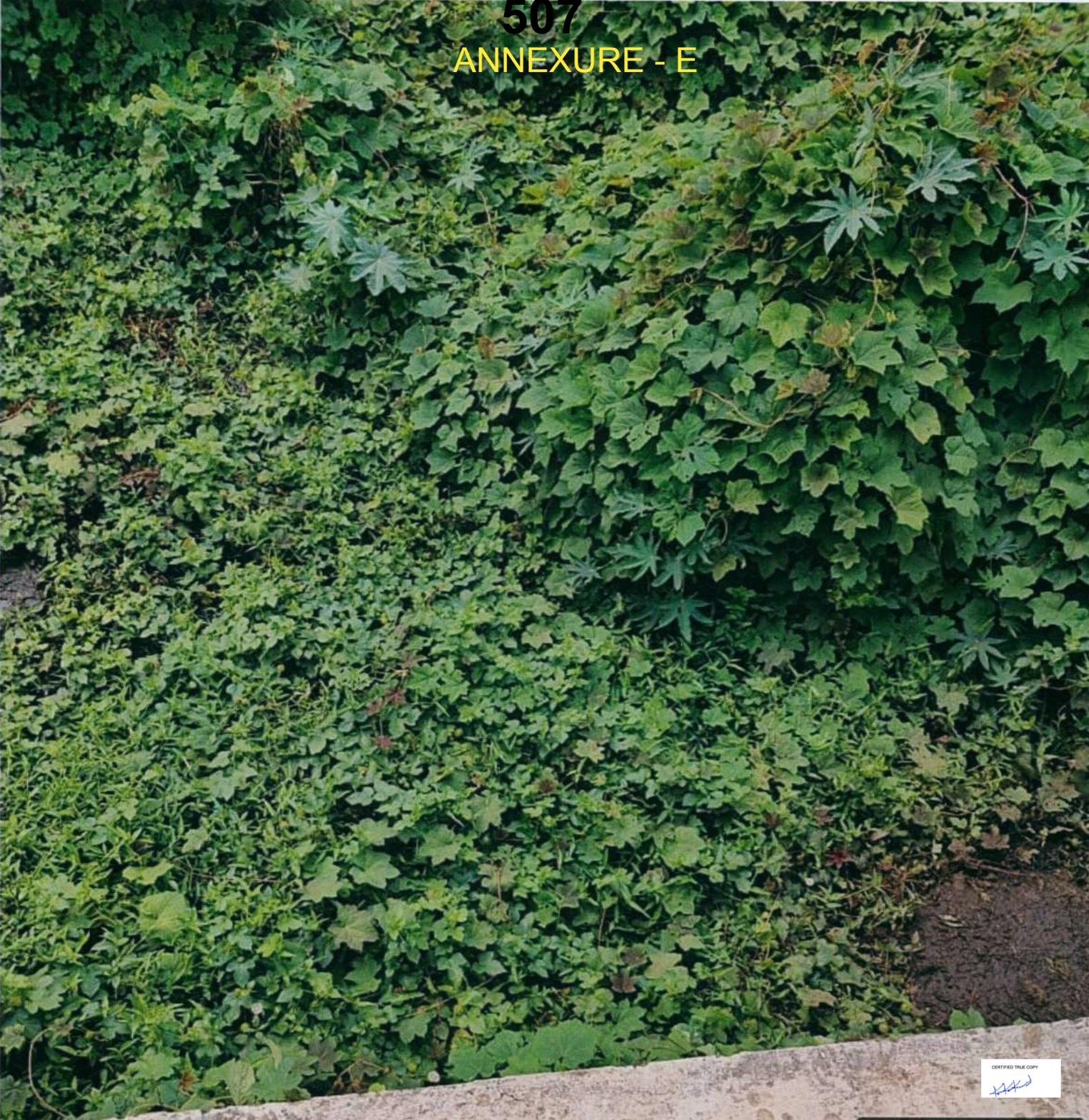


501, 5C Gran Canaria  
Mathias Ocean Park  
Residency, Dona paula,  
28 May 2024 01:22 PM



501, 5C Gran Canaria  
Mathias Ocean Park  
Residency, Dona paula,  
28 May 2024 01:22 PM

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ANNEXURE - E



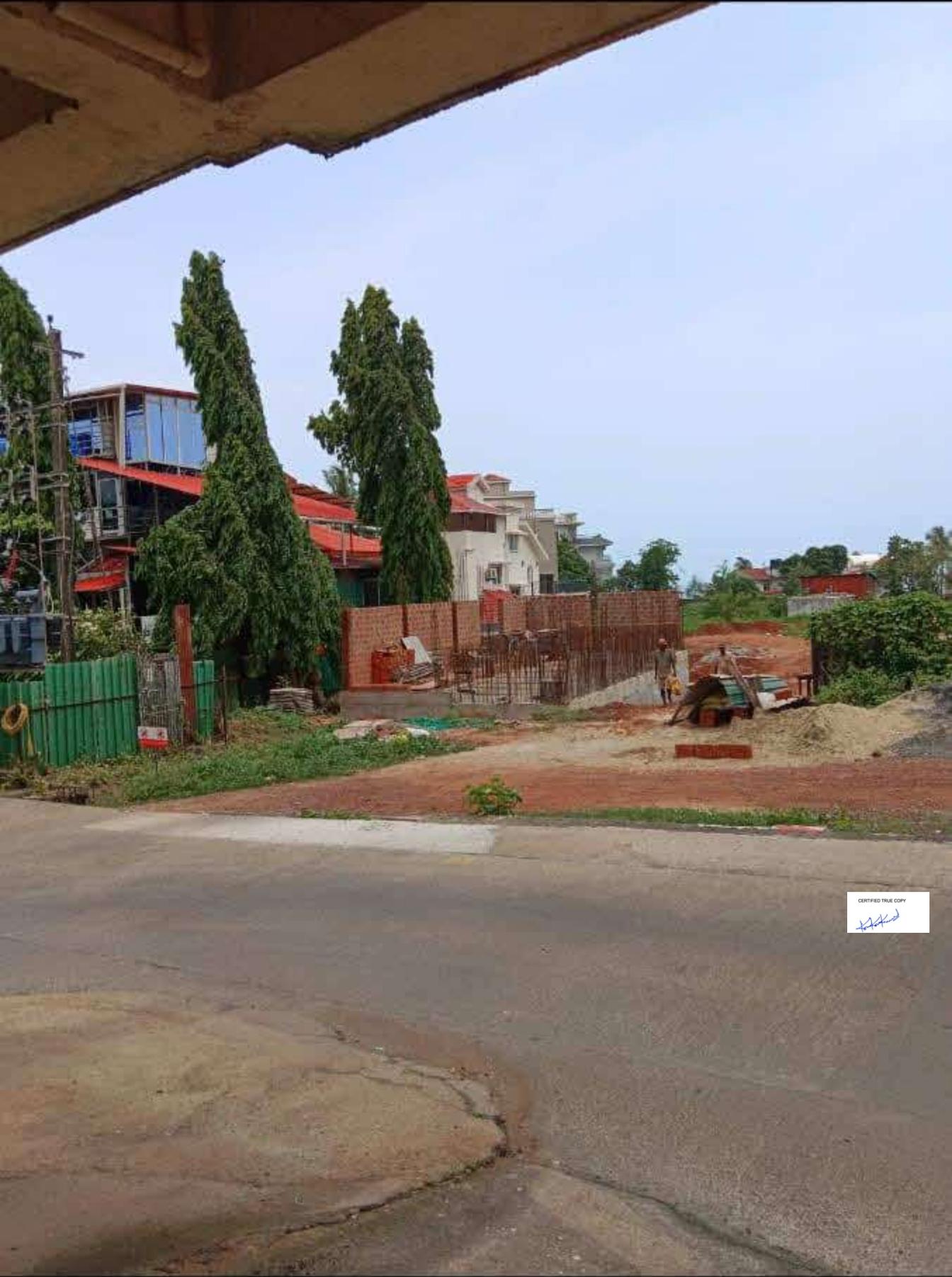
CERTIFIED TRUE COPY  
*[Handwritten signature]*

 GPS Map Camera



**Panaji, Goa, India**  
B-13 Bella Vista Ocean Park, Dona Paula, near  
Cidade Goa Hotel, Panaji, Goa 403004, India  
Lat 15.456297°  
Long 73.80848°  
07/04/22 10:21 AM

# ANNEXURE - F



501, 5C Gran Canaria  
Mathias Ocean Park  
Residency, Dona paula,  
28 May 2024 01:22 PM



La Palma building (Unit  
No. 8 Mathias Ocean Park,  
Dr E Borges Rd, opposite

28 May 2024 01:29 PM



scattered  
clouds

33.0 °C