

# *Honey Heights*

## **M/s VIJAYA LAKSHMI HOUSING**

**R.S. NOS. 10/ 3B, 10/ 4B & 10/ 5B, KESARAPALLI,  
GANNAVARAM, KRISHNA DISTRICT,  
ANDHRA PRADESH**

**1. FORM I**

**2. FORM I A**

**Submitted By**

**M/s Vijaya Lakshmi Housing  
#54-16-15A, Flot No.101,  
J.M.D Twins,  
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**SUBMITTED TO  
STATE LEVEL ENVIRONMENT IMPACT ASSESSMENT AUTHORITY,  
ANDHRA PRADESH  
GOVERNMENT OF INDIA**

## APPENDIX I

(See paragraph – 6) FORM 1

S.No	Item	Details
1	Name of the Project/s	<b>Honey Heights by M/s Vijaya Lakshmi Housing</b>
2	S.No. in the Schedule	B category ( <i>Expected cost of the project 35 crores</i> )
3	Proposed capacity/area/length/tonnage to be handled/command area/lease area/number of wells to be drilled	<b>Annexure I</b>
4	New/Expansion/Modernization	New
5	Existing Capacity/Area etc.	NA
6	Category of Project i.e 'A' or 'B'	B category
7	Does it attract the general condition? If yes, please specify	No
8	Does it attract the Specific condition? If yes, please specify.	No
9	Location	
	Plot/Survey/Khasra No.	R.S. NOS. 10/ 3B, 10/ 4B & 10/ 5B
	Village	Kesarapalli,
	Tehsil	Gannavaram
	District	Krishna
	State	Andhra Pradesh
10	Nearest railway station/airport along with distance in kms.	Gannavaram Railway Station – 2.6 km.
11	Nearest Town, City, District Headquarters along with distance in kms.	Vijayawada and Guntur
12	Village Panchayats, Zilla Parishad, Municipal Corporation, Local body (complete postal address with telephone nos. to be given)	Vijayawada Municipality
13	Name of the Applicant	<b>Sri. Kotapati Lakshmi Reddy</b>
14	Registered Address	<b>M/s Vijaya Lakshmi Housing #54-16-15A, Flot No.101, J.M.D Twins, Opp. Loyola College Auditoriam, Vijayawada - 520 008.</b>
15	Address for Correspondence:	<b>M/s Vijaya Lakshmi Housing #54-16-15A, Flot No.101, J.M.D Twins, Opp. Loyola College Auditoriam, Vijayawada - 520 008.</b>
	Name	<b>Sri. Kotapati Lakshmi Reddy</b>

S.No	Item	Details
	Designation(Owner/Partner/CEO)	<b>Managing Partner</b>
	Address	<b>M/s Vijaya Lakshmi Housing #54-16-15A, Flot No.101, J.M.D Twins, Opp. Loyola College Auditoriam, Vijayawada - 520 008.</b>
	Pin Code	<b>520008</b>
	E-mail	<b>krkreddyconstructions@yahoo.com</b>
	Telephone Number	0866 2455488; 9505096789
	Fax No.	
16	Details of alternative Sites examined, if any. Location of these sites should be shown on a topo sheet.	Village-District-State NA
17	Interlinked Projects	No
18	Whether separate application of interlinked project has been submitted?	
19	If yes, date of submission	
20	If no, reason	
21	Whether the proposal involves approval/clearance under: if yes, details of the same and their status to be given. (a) The Forest (Conservation) Act, 1980? (b) The Wildlife (Protection) Act, 1972 ? (c) The C.R.Z Notification, 1991 ?	No
22	Whether there is any Government Order/Policy relevant/relating to the site?	Yes
23	Forest land involved (hectares)	No
24	Whether there is any location pending against the project and /or land in which the project is propose to be set up? (a) Name of the Court (b) Case No (c) Orders/directions of the Court, if any and its relevance with the proposed project.	No

## (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.)

S.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)	Yes	The site area is located in VGTUDA. The present land use is Residential and Commercial construction project. Presently the land barren, and is not used for any productive purpose. The proposed project shall enhance the land cover.
1.2	Clearance of existing land, vegetation and buildings?	No	The land is barren containing mainly shrubs and bushes. The same shall be cleared.
1.3	Creation of new land uses?	No	The present land use is Residential and Commercial.
1.4	Pre-construction investigations e.g. bore houses, soil testing?	No	
1.5	Construction works?	Yes	The project is a construction project of Residential and Commercial.
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	Built up Area: <b>Annexure I</b> Cut and Fill quantity: <b>Annexure II</b>
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	Residential and Commercial construction project.
1.14	Facilities for storage of goods or materials?	Yes	Construction materials like cement, steel, sand, paints, aggregate etc shall be stored on site. The cement and paints are stored indoor, while the

S.No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
			remaining is stored out doors.
1.15	Facilities for treatment or disposal of solid waste or liquid effluents?	Yes	The wastewater shall be treated and reused for flushing the toilets, on land irrigation and HVAC make up water requirement. Hence all the recycled water is utilized completely and is considered as a zero discharge. The water balance, water recycling quantities and the design details of sewage treatment plant are presented in <b>Annexure –III</b> . The garbage shall be collected and the collected garbage shall be sent segregation point located within the site and then sent to Municipal solid waste management facility. The garbage management plan is enclosed I <b>Annexure – IV</b> .
1.16	Facilities for long term housing of operational workers?	No	
1.17	New road, rail or sea traffic during construction or operation?	No	
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	The local hydrology shall be considered while designing the storm water drains.
1.22	Stream crossings?	No	

<b>S.No.</b>	<b>Information/Checklist confirmation</b>	<b>Yes/No</b>	<b>Details thereof (with approximate quantities /rates, wherever possible) with source of information data</b>
1.23	Abstraction or transfers of water form ground or surface waters?	Yes	The domestic water requirement during occupation/construction Vijayawada Municipality
1.24	Changes in water bodies or the land surface affecting drainage or run-off?	No	The proposed storm water drains shall consider increased run off due to the project and shall be provided with sufficient number of collection sumps and rainwater harvesting structures.
1.25	Transport of personnel or materials for construction, operation or decommissioning?	Yes	Trucks shall be used for transporting the materials.
1.26	Long-term dismantling or decommissioning or restoration works?	No	
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?	No	The local area is developing at a faster pace due to the commercial area development in the surrounding areas.
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):**

S.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)	Yes	Undeveloped land belonging to the industry spread over an area of <b>1.0086 hectares.</b>
2.2	Water (expected source & competing users) unit: KLD	Yes	Vijayawada Municipality. Water requirement during occupation is 148.5 KLD. During construction the water requirement is 50 KLD.
2.3	Minerals (MT)	No	
2.4	Construction material – stone, aggregates, sand / soil (expected source – MT)	Yes	<b>Annexure – V:</b> Lead distances of construction materials. <b>Annexure – VI:</b> Quantity of construction material requirement.
2.5	Forests and timber (source – MT)	Yes	Local authorized Suppliers
2.6	Energy including electricity and fuels (source, competing users) Unit: fuel (MT), energy (MW)	Yes	DG sets and construction equipment shall be used during construction, which shall use mainly HSD as fuel. The energy requirement during occupation is presented in <b>Annexure – VII.</b> DG set (250 kVA x 2 Nos, 1500 KVA X 1 Nos) shall be used during occupation in the event of power shut down by APTRANSCO to provide power for lifts, street lighting, common lighting and sewage treatment plant.
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.**

<b>S.No.</b>	<b>Information/Checklist confirmation</b>	<b>Yes/No</b>	<b>Details thereof (with approximate quantities/rates, wherever possible) with source of information data</b>
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	Hazardous materials used are: HSD, Paints etc.
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?	Yes	
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)**

S.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	698 kg/day during operation.
4.3	Hazardous wastes (as per Hazardous Waste Management Rules)	Yes	Used oil: 110 l/year Used Batteries: 9 nos. /year
4.4	Other industrial process wastes	No	
4.5	Surplus product	No	
4.6	Sewage sludge or other sludge from effluent treatment	Yes	7.5 kg/day sludge from STP shall be reused as manure.
4.7	Construction or demolition wastes	Yes	
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)

S.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	Emissions from DG sets, operated only during load shut down by APTRANSCO. Emissions quantities are presented in <b>Annexure – VIII</b> .
5.2	Emissions from production processes	No	Cooking and vehicular transport are the other sources of emission.
5.3	Emissions from materials handling including storage or transport	No	
5.4	Emissions from construction activities including plant and equipment	Yes	Construction equipment and DG sets which mainly use HSD, as fuel shall generate emissions.
5.5	Dust or odours from handling of materials including construction materials, sewage and waste	No	
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:**

<b>S.No.</b>	<b>Information/Checklist confirmation</b>	<b>Yes/No</b>	<b>Details thereof (with approximate quantities/rates, wherever possible) with source of information data with source of information data</b>
6.1	From operation of equipment e.g. engines, ventilation plant, crushers	Yes	Construction activity and the construction equipment are the main sources of noise and vibration during construction. While there are no major sources of noise during occupation phase.
6.2	From industrial or similar processes	No	
6.3	From construction or demolition	Yes	
6.4	From blasting or piling	No	No blasting activity envisaged.
6.5	From construction or operational traffic	Yes	There will be an increase in the traffic density, which shall increase the noise levels of the area mainly during construction.
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:**

S.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	Used batteries and waste oil shall be stored separately and shall not lead to contamination of land during normal operation.
7.2	From discharge of sewage or other effluents to water or the land (expected mode and place of discharge)	No	The sewage shall be treated to achieve the standards prescribed by MoE&F during operation phase. While the discharges from temporary toilets during construction shall be sent to septic tank followed by sewer lines.
7.3	By deposition of pollutants emitted to air into the land or into water	No	The project shall not emit substantial quantities of pollutants to have an impact on the air quality.
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	

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

S.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	NA	
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)?	No	The site is located at a higher elevation and the seismic zone for the project area is Zone III, which is considered safe.

**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**

S. No.	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
9.1	<p>Lead to development of supporting facilities, ancillary development or development Stimulated by the project which could have impact on the environment e.g.:</p> <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>	<p>No</p> <p>Yes</p> <p>Yes</p> <p>No</p> <p>No</p> <p>No</p>	<p>The project envisages development of residential area in place of the existing residential facilities provided to employees of the industrial unit.</p>
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	Yes	The surrounding areas shall develop as residential/commercial areas.
9.4	Have cumulative effects due to proximity to other existing or planned projects with similar effects	No	

### (III) Environmental Sensitivity

S.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	Mangalagiri RF at a distance of 4 km from project site
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	Yes	Nearest densely populated area is Vijayawada Town
9	Areas occupied by sensitive man-made land uses ( <i>hospitals, schools, places of worship, community facilities</i> )	Yes	Hospitals, Schools, Places of worship and community facilities are located in the project impact area.
10	Areas containing important, high quality or scarce resources ( <i>Ground water resources, surface resources, forestry, agriculture, fisheries, tourism, minerals</i> )	No	
11	Areas already subjected to pollution or environmental damage. ( <i>Those where existing legal environmental standards are exceeded</i> )	No	
12	Areas susceptible to natural hazard which could cause the project to present environmental problems ( <i>Earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions</i> )	No	

#### **(IV).Proposed Terms of Reference for EIS studies**

##### **Scope of Work of EIS**

“...The EIS shall cover the following:

###### **Description of the proposed project:**

The first task:” Description of the proposed project” forms a vital component of the Environmental Impact Statement (EIS) as it provides the basis for evaluating the likely causes of Environmental Impacts. It is essential that the key components of the project shall be clearly determined as far as possible at this stage.

###### **Assessment of Environmental Impacts:**

Based upon the results from the review of existing information, field visits, site data collection and consultation, for each component of environment (physical, biological and socio economic) the positive, negative, direct and indirect, temporary and permanent impacts will be evaluated along with an indication of the degree of impact, i.e., whether the impact is significant, moderate, minor or negligible.

###### **Environment Management Plan and Mitigation Plan:**

For each significant negative impact identified, specialist shall work closely with the engineering team to suggest practicable measures to avoid or mitigate the impact. Suggestions for compensation shall be given where there is no other alternative course of action.

The mitigation of environmental impacts will be by three mechanisms.

=>Introduction of mitigation features through the engineering design.

=>Implementation of environmental controls during construction and operation

=>Legislative control involving compliance with Indian environmental laws.

The Environmental management plan shall include an estimate of capital and recurring costs of mitigation measures and will identify the parties and institutional framework for implementation.

###### **Monitoring Plan:**

Having identified the significant environmental impacts that are likely to arise as a result of construction of Residential and Commercial blocks project, the project team shall specify what monitoring is required during the various phases of project cycle.

The monitoring plan will identify parameters and frequency of monitoring and responsible organization.

I hereby give the undertaking that data and information given in the application and enclosures are true to the best of my knowledge and belief and I am aware that if any part of the data and information submitted is found to be false or misleading at any stage, the project will be rejected and clearance give, if any to the project will be revoked at our risk and cost.

Date: 3<sup>rd</sup> August 2016

Place: Vijayawada

**For VIJAYA LAKSHMI HOUSING**



**Managing Partner**  
Signature of the applicant

Sri. Kotapati Lakshmi Reddy  
Managing Partner  
M/s Vijaya Lakshmi Housing  
#54-16-15A, Flot No.101,  
J.M.D Twins,  
Opp. Loyola College Auditoriam,  
Vijayawada - 520 008.

## ANNEXURE-I

### Built Up Areas

Land Use	No of Floors	Total No of Units	Total Site Area in m <sup>2</sup>	Total Built up area (m <sup>2</sup> )
Commercial	C+G+4		396.4	1982.1
Block A & B	S+G+4	195	4630.7	23153.7
Amenities	C+G+4		142.1	710.5
Green Area			922.2	
Road Area			2319.8	
Open Area			801.5	
Road Widening Area			873.4	
<b>Parking</b>				
Stilt				5208.65
Cellar				804.06
<b>Total</b>		<b>195</b>	<b>10086.1</b>	<b>31858.9</b>

## ANNEXURE-II

### Earth Work Quantities

S.No	Area	Qty. of fill (m <sup>3</sup> )	Qty. of cut (m <sup>3</sup> )	Surplus fill (m <sup>3</sup> )	Surplus cut (m <sup>3</sup> )
1	Site area	9683	12103	-----	2421

## ANNEXURE-III

### Water Requirement of the Project

Land Use	No. of Units	No. of Persons/ unit	Water requirement per person in l *	Total Water Requirement in KLD
Block A & B	195	5	135	131.6
Amenities	1	60	45	2.7
Visitors		2	15	5.9
Commercial		125	45	5.6
Retail		380	7	2.7
<b>TOTAL</b>				<b>148.5</b>
*Water requirement as per NBC				

### Water Savings Proposed

Land Use	No. of Units	No. of Persons/ unit	Water Requirement/ KLD	Treated water reuse/day Klpcd	Effective Water Requirement in KLD
Block A & B	195	5	131.6	39.0	92.6
Amenities	1	60	2.7	1.2	1.5
Visitors		2	5.9	2.9	2.9
Commercial		125	5.6	2.5	3.1
Retail		380	2.7	1.3	1.3
<b>TOTAL</b>			<b>148.5</b>	<b>47.0</b>	<b>101.5</b>

**Note:** Treated water reuse assumed @ 45 l/head for Housing, and @ 20 l/head in amenities.

Approximately 47.0 Kl/day water will be saved by adopting recycling of treated water in the toilet flush. The effective water consumption is reduced by 47.0 Kl/day and the requirement will be in the order of 101.5 Kl/day.

### Water Balance during occupation stage

Input	KLD	Output	KLD
Domestic water from Vijayawada Municipality	101.5	HVAC Chillers	69.3
Recycled water	47.0	Recycled water	47.0
		Water requirement for green belt during non monsoon	2.5
		Losses approx 20%	29.7
<b>Total</b>	<b>148.5</b>	<b>Total</b>	<b>148.5</b>

The water used in the order of 148.5 KL/day would generate 118.8 KL/day of wastewater, which has to be treated for reuse and or disposal.

## **Sewage treatment plant based on Fluidized Aerobic Bio Reactor (FAB) technology**

### **PROCESS DESCRIPTION:**

The raw sewage will be collected in a collection sump and pumped to mechanical bar screen chamber for removal of large floating matter followed by grit removal in Grit Chamber. The raw sewage will then be collected in an equalization tank for homogenization of hydraulic load. The tank contents will be kept in suspension by means of coarse bubble aeration through pipe grid. The equalization tank, with air flow indicator for continuous monitoring of air supply to the tank in order to avoid septic conditions, will be covered from top (RCC or FRP) to avoid nuisance. The equalized effluent will then be pumped to two Fluidized Aerobic Bio Reactors (FAB) in series where BOD/COD reduction can be achieved by virtue of aerobic microbial activities. The oxygen required will be supplied through coarse air bubble diffusers. The bio-solids formed in the biological process will be separated in the down stream Tube Settler. The clear supernatant will gravitate to the chlorine contact tank where sodium hypochlorite will be dosed for disinfection of treated water prior to disposal.

The biological sludge generated in the FAB and settled in the tube settlers will be collected in a sludge sump and then pumped to sludge drying bed for de watering. The dried sludge will then be disposed off suitably as manure. The schematics of the process are shown. The two main components of the treatment system viz. The FAB reactor and tube settler are described in the following sections.

### **Fluidized Aerobic Bio Reactor (FAB)**

Conventional effluent treatment plants are large sized, power intensive and require a lot of monitoring. Scarcity of open space and rising land a power costs have forced the industries to look out for space saving, compact and efficient treatment options. This has led to the development attached growth processes where the bio mass is retained within the aeration tank obviating the need for recycle. These plants are not only compact but also user friendly. The endeavor to have a continuously operating, no-clogging biofilm reactor with no need for back washing, low head-loss and high specific biofilm surface area culminated in the most advanced technology of aerobic biological fluidized bed treatment where the biofilm (biomass) grows on small carrier elements that move along with the water in the reactor. The movement is normally caused by aeration in the aerobic version of the reactor.

The reactor combines all the advantages and best features of Trickling filters, Rotating biological contractors, activated sludge process and submerged fixed film reactors while eliminating the drawbacks of these systems. The plants are more compact and more energy efficient.

The Fluidized Aerobic Bio Reactor (FAB) consists of a tank in any shape filled up with small carrier elements. The elements are made up of special grade PVC or polypropylene of controlled density (shown in plate). For media of specific gravity 0.92-0.96 the overall density could be expected to increase up to 9.5% when full of biomass such that they can fluidize using an aeration device. A biofilm develops on the elements, which move along the effluent in the reactor. The movement within the reactor is generated by providing aeration with the help of diffusers placed at the

bottom of the reactor. Then thin biofilm on the elements enables the bacteria to act upon the biodegradable matter in the effluent and reduce the BOD/COD content in the presence of oxygen available from the air that is used for fluidization.

#### Characteristics of Waste water

Parameter	Quantity in mg/l
PH	6 – 7
Total Suspended Solids	400 – 600
BOD	200 – 300
COD	450 – 500

#### *Design of the unit*

##### **Basic data**

Flow	:	118	KLD
Capacity	:	150	m <sup>3</sup>
Peak factor	:	3.5	
Peak flow Q peak	:	525	m <sup>3</sup> /day
Influent BOD	:	200	mg/lit
Influent Suspended Solids	:	200	mg/lit
Influent COD	:	350	mg/lit
Effluent BOD	:	30	mg/lit
Effluent COD	:	200	mg/lit
Effluent Suspended Solids	:	100	mg/lit

##### **1. Bar Screen Chamber**

Average flow	:	0.0017	m <sup>3</sup> /sec
Peak factor	:	3.5	
Peak flow	:	0.006	m <sup>3</sup> /sec
Velocity at peak flow	:	0.75	m/Sec

##### *Effective area of screen Required*

At average flow	:	0.005	m <sup>2</sup>
At Peak flow	:	0.0075	m <sup>2</sup>
<i>Provide Effective area of screen</i>	:	0.0075	m <sup>2</sup>

Considering the bar of dia. 10 mm(w) and clear spacing of 20 mm (b)

Overall area required	:	0.012	m <sup>2</sup>
Considering screen depth as	:	0.024	m Consider 0.5 m
Number of clear spacing	:	0.3	
Number of bars	:	1	Consider 3 Nos.

Hence Provide 5 bars

Provide a screen of 0.5 m X 0.5 m at an inclination of sin 60°. In a screen channel of one meter (1 m) length.

##### **2. Grit Chamber :**

The flow from the bar screen chamber is let into the Grit Chamber of minimum 2 hours capacity. This tank is provided to even out the flow variation, and to provide a continuous feed into the secondary biological treatment units.

Peak flow Q	:	0.006	m <sup>3</sup> /sec
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Providing a flow through velocity of 0.30 m/sec  
 Cross sectional area of Channel (0.006/0.3) : 0.02 m<sup>2</sup>  
 Surface area of channel (0.006/0.013) : 0.46 m<sup>2</sup>  
 Assuming depth d : 0.2 m  
 Width of channel (0.02/0.2) : 0.1 m (say 0.2m)  
 Length of channel (0.46/0.1) : 4.6 m (say 4.5 m)  
 Provide two channels each of 0.2 m wide and 4.6 m long with depth of waste water 0.2 m.

### 3. Equalization tank:

The flow from the bar screen chamber is let into the equalization tank of minimum 2hours capacity. This tank is provided to even out the flow variation, and to provide a continuous feed into the secondary biological treatment units.

Average flow : 6.25 m<sup>3</sup>/hr  
 Peak factor : 3.5  
 Peak flow : 21.87 m<sup>3</sup>/hr  
 Hydraulic retention tank = 2 hrs at Peak flow  
 Hence required volume of the tank : 43.75 m<sup>3</sup>  
 Provide tank of : 43.75 m<sup>3</sup> Capacity  
 Assuming depth : 3 m  
 Area : 14.58 m<sup>2</sup>  
 Assuming length to width ratio (1:1) ; l=b  
 length of the tank : 3.8 m  
 width of the tank : 3.8 m  
 Air required for agitation : 0.01 m<sup>3</sup>/m<sup>2</sup> min  
 Total air required : 26.25 m<sup>3</sup>/hr  
 Air blower required : 40 m<sup>3</sup>/hr @ 3.8 mwc  
 Effluent transfer pump : 6.25 m<sup>3</sup>/hr @ 8 mwc

### 4. Fluidized Aerobic Bio Reactor (FAB):

The polypropylene media have been provided with a specific surface area of 350 – 520 m<sup>2</sup>/m<sup>3</sup>. This allows micro-organisms to get attached and biomass concentration can be increased to four folds as compared to Activated Sludge Process. This enables to consider higher Organic loading rates.

The micro-organisms attached to media are kept in a fluid state thereby maintaining the CSTR (continuous Stirrer tank reactor) regime as well as two tanks is provided in series making the plug – flow system. This will enhance the efficiencies and have the merits of both CSTR and plug-flow regimes.

Organic loading rate : 3.2 kg BOD/ m<sup>3</sup> d  
 Organic load : 26 kg/day  
 Volume of the tank : 9.37 m<sup>3</sup>  
 Assume the depth : 3 m  
 No. of tanks in series : 1  
 Size of the tank : 1.8 m dia. x 3.0 SWD  
 Specific gravity of media : 0.92 to 0.96  
 Specific surface area of media : 350 – 520 m<sup>2</sup>/m<sup>3</sup>  
 Media filling : 30 – 50 % of tank volume

Oxygen required	:	2	kg / kg BOD
Oxygen in air	:	23%	
Specific gravity of air @ 30 deg.	:	1.65	
Aeration	:	Coarse bubble	
Oxygen transfer efficiency	:	12%	
Air required	:	77.7	m <sup>3</sup> /hr
Air blower required	:	80	m <sup>3</sup> /hr @ 6.5 m wc

#### 5. Tube settler

Surface loading rate	:	48	m <sup>2</sup> /m <sup>3</sup> d
Surface area required	:	3.125	m <sup>2</sup>
Tank size	:	3.0 m x 6.0 m x 2.7 m SWD With 55 deg. hopper bottom	
Tube Modules	:	3.0m x 6.0 m x 0.6 m ht.	
Tube inclination	:	60	deg.
Settling area for 60 deg slope	:	11	m <sup>2</sup> /m <sup>3</sup>
Cross sectional area of tubes	:	120 mm x 44 mm Hexagonal	
Hydraulic radius	:	1/61 cm (1.5 cm)	
Shape factor	:	0.6 – 0.7 for media settleable solids	

#### 6. Pre Filtration tank

The flow from the each individual settling tank i.e., the supernatant liquid is let into the respective Pre-Filtration Tank, which has a minimum 1.5 hours holding capacity. This tank is provided to hold the treated effluent and give an even flow to the pressure sand filter.

Average flow	:	6.25	m <sup>3</sup> /hr
Peak factor	:	2	m <sup>3</sup> /hr
Peak flow	:	12.5	m <sup>3</sup> /hr
Provide min 1.5 hours holding capacity.			
Hence required volume of the tank	:	18.75	m <sup>3</sup>

#### 7. Pressure Sand Filter:

Vertical down flow type with graded/sand bed under drain plate with polysterene strains.

Flow	:	150	m <sup>3</sup> /day
Rate of filtration assumed as	:	10	m <sup>3</sup> /m <sup>2</sup> /hr
Requirement of treated water for usage in 20 hrs	:	7.5	m <sup>3</sup> /hr
Dia. of filter of 1 nos.	:	980	mm

Provide pressure sand filter of 980 mm dia. and 1200 mm HOS with sand as media layer, under drain pipe, laterals face piping etc for each stream.

#### 8. Activated Carbon Filter:

Vertical down flow type with graded/sand bed under drain plate with polysterene strains.

Flow	:	150	m <sup>3</sup> /day
Rate of filtration assumed as	:	10	m <sup>3</sup> /m <sup>2</sup> /hr
Requirement of treated water for usage in 20 hrs	:	7.5	m <sup>3</sup> /hr
Dia of filter of 1 nos.	:	980	mm

Provide Activated Carbon filter of 980 mm dia with granular Activated carbon as media and 1200 mm HOS with sand as media layer, under drain pipe, laterals face piping etc for

each stream.

### 9. Final Treated Water Holding Tank

It is always preferred to provide one final holding tank of minimum one day holding capacity, so that the treated effluents can be stored and used back for gardening or other tertiary purposes.

Capacity: 150 m<sup>3</sup>

### 10. Sludge Filter Press:

The biomass in the aeration tank stabilizes BOD in wastewater by consuming the organic matter in the wastewater. The metabolic activity results in growth of the biomass population in the Fluidized Aerobic Bio Reactor (FAB). Sludge holding tank has been provided with filter press for dewatering sludge. The filtrate drains off through the media, which is again let into equalization tank.

The dewatered sludge is collected in trays, which can be used as manure in the garden.

No. of plates	: 24
Size of plates	: 600 mm X 600 mm
Plate moc (material of construction)	: PP (poly propline)
Type of operation	: Hydraulic
Power pack capacity	: 2 HP

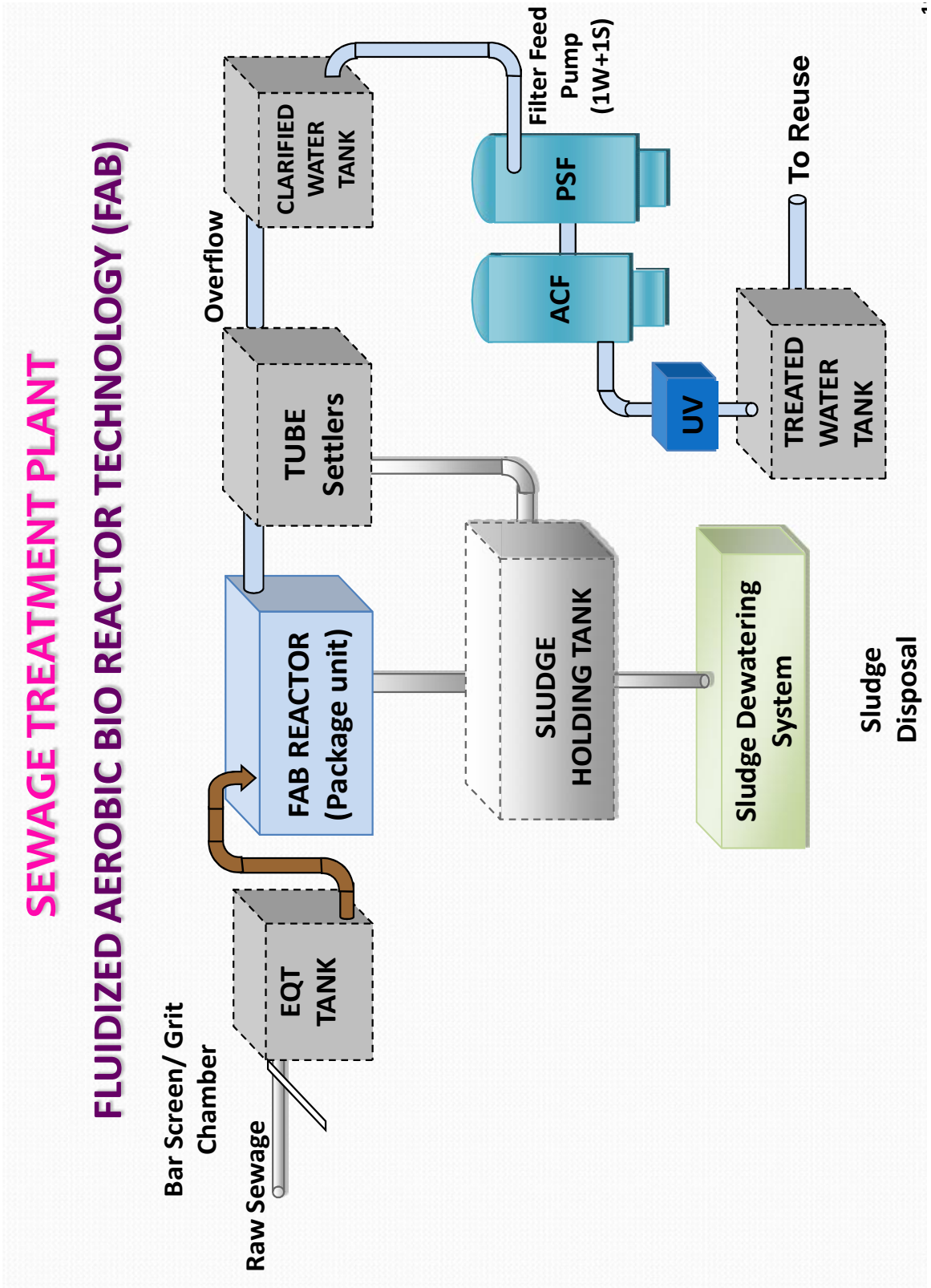
The biomass in the aeration tank stabilizes BOD in wastewater by consuming the organic matter in the wastewater. The metabolic activity results in growth of the biomass population in the Fluidized Aerobic Bio Reactor (FAB). Sludge holding tank has been provided with filter press for dewatering sludge. The filtrate drains off through the media, which is again let into equalization tank. The dewatered sludge is collected in trays, which can be used as manure in the garden.

### Characteristics of Treated Waste water

Parameter	Quantity in mg/l
PH	7 – 8
Total Suspended Solids	100
BOD	30
COD	100

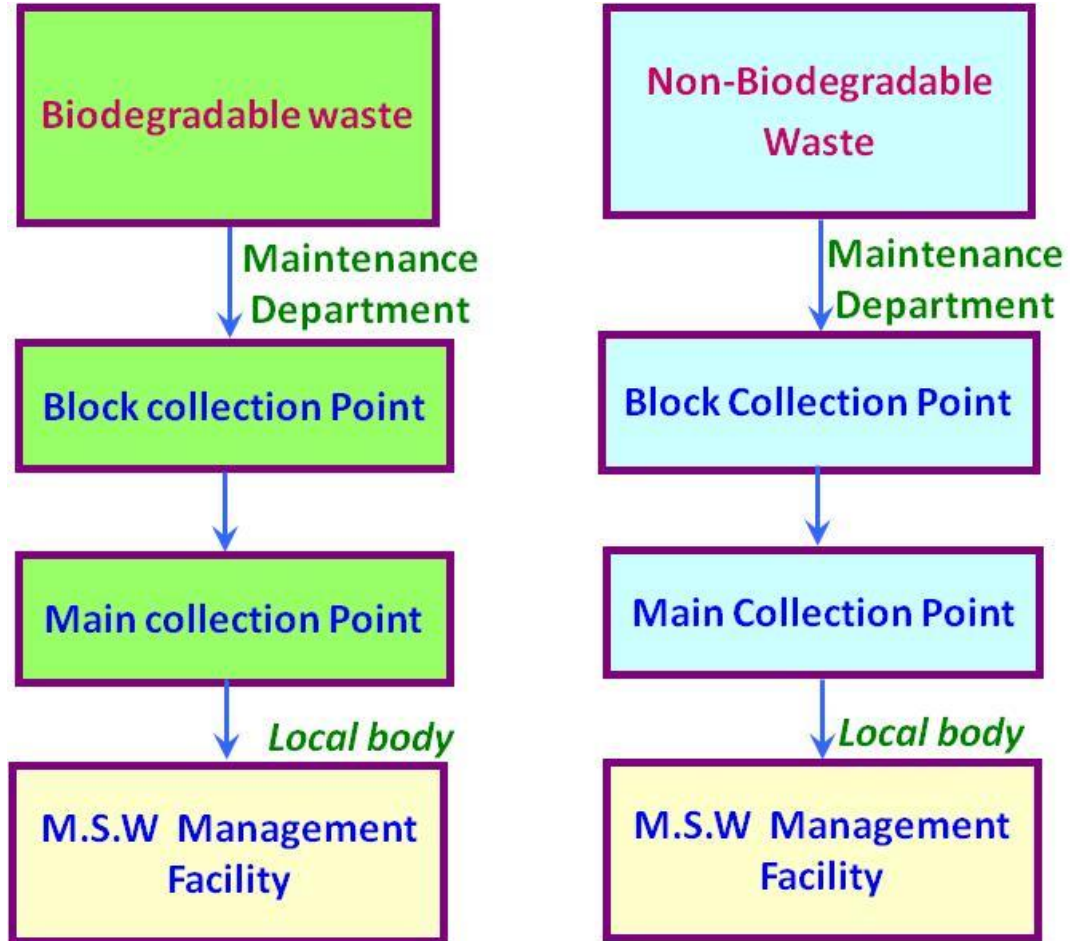
**Disposal of Treated Waste Water:** The wastewater shall be treated and reused for flushing the toilets, on land irrigation and HVAC make up water requirement. Hence all the recycled water is utilized completely and is considered as a zero discharge.

# Sewage Treatment Flow Diagram



# ANNEXURE-IV

## Garbage Management Plan



## ANNEXURE-V

### Lead Distance for Construction Materials

S.No	Material	Source	Lead Distance (Km)
1	Sand	ROBOSAND and or Krishna river bed areas permitted by Govt. of Andhra Pradesh	30 – 45
2	Aggregate	From quarries	20-30
3	Cement	Manufacturing units	50 –100
4	Reinforcement Steel	SAIL/TATA godowns	5
5	Bricks	Local Suppliers	10 -20
6	Plumbing Material	Local suppliers	2 – 7
7	Electrical Material	Local Suppliers	2 – 7
8	Sanitary Material	Local suppliers	2 – 7
9	Flooring and Pavement Tiles	Manufacturers	50 – 150
10	Paints	Local Manufacturers	50 - 250
11	Ready Mix Concrete	Local Batching Plants	5 – 10

## ANNEXURE-VI

### Material Consumption for Total Units

Units	BUA per unit in (m <sup>2</sup> )	Total Ready Mix Concrete (m <sup>3</sup> )	Total Cement (bags)	Total Sand (m <sup>3</sup> )	Total Aggregate (m <sup>3</sup> )	Total Water (m <sup>3</sup> )	Total Bricks (Nos) x 1000	Total Reinforcement Steel (MT)
Total BUA	31859	13062	29629	12425	1370	7710	3696	733
<b>Total</b>	<b>31859</b>	<b>13062</b>	<b>29629</b>	<b>12425</b>	<b>1370</b>	<b>7710</b>	<b>3696</b>	<b>733</b>

## ANNEXURE-VII

### Electricity Consumption Statement

S.No	Description	No. of Units	Load in KW	Total Connected Load (KW)	Total Connected Load (kVA)	Total Max Demand (KVA)
1	Block A & B	195	4	780.0	975.0	975.0
2	Commercial		400	400.0	500.0	500.0
3	Street Lights	45	0.04	1.8	2.3	1.8
4	Amenities			296.8	371.1	296.8
5	STP	1	90	90.0	112.5	112.5
6	Lifts	6	15	90.0	112.5	112.5
	<b>TOTAL</b>			<b>1658.6</b>	<b>2073.3</b>	<b>1998.6</b>
Maximum demand in kw at 0.6 diversity factor				<b>995.2</b>		
Consumption of power for 8 hours per day				<b>7961.5</b>		
Maximum demand in kw at 0.2 diversity factor				<b>331.7</b>		
Consumption of power for 16 hours per day				<b>5307.7</b>		
Total consumption of power per day				<b>13269.1</b>	<b>KW</b>	
Total consumption of power per year				<b>48.4</b>	<b>Lakh Units</b>	

### Energy Saving by using Solar Water Heater

S.No	Description	No. of Units	Power allocated in watts / unit	Total power required in (KW)	
1	Block A & B	78	3000	234	
	<b>TOTAL</b>			<b>234</b>	
Maximum demand in kw at 1 diversity factor				<b>234</b>	
Consumption of power for 2 hours per day				<b>468</b>	
Maximum demand in kw at 0.4 diversity factor				<b>94</b>	
Consumption of power for 2 hours per day				<b>187</b>	
Total consumption of power per day				<b>655.2</b>	<b>KW</b>
Total consumption of power per year				<b>2.39</b>	<b>Lakh Units</b>

### Energy saving by using Solar Street Lights

S.No	Description	No. of Units	Power allocated in watts / unit	Total power required in (KW)	
1	Street lights	15	40	0.6	
	<b>TOTAL</b>			<b>0.6</b>	
Maximum demand in kw at 0.6 diversity factor				<b>0.4</b>	
Consumption of power for 8 hours per day				<b>3</b>	
Maximum demand in kw at full load				<b>1</b>	
Consumption of power for 4 hours per day				<b>2</b>	
Total consumption of power per day				<b>5.3</b>	<b>KW</b>
Total consumption of power per year				<b>0.02</b>	<b>Lakh Units</b>
saving with Solar Heater and Street Lighting				<b>2.41</b>	<b>Lakh Units</b>

### Electrical Power savings using CFL for lighting

S.No	Description	Area in m <sup>2</sup>	Power allocated in watts / unit	Total power required in (KW)	
1	Residential	23154	10	232	
2	Common & Utilities	8705	2.5	22	
	<b>TOTAL</b>			<b>253</b>	
Maximum demand in kw at 0.9 diversity factor				<b>228</b>	
Consumption of power for 12 hours per day				<b>2736</b>	
Total consumption of power per day				<b>2735.6</b>	<b>KW</b>
Total consumption of power per year				<b>9.99</b>	<b>Lakh Units</b>
<b>Savings in power using CFL/LED</b>				<b>3.00</b>	<b>Lakh Units</b>

### Savings in Electrical Power Consumption - SUMMARY

S.No	Description	With CFL	With Solar Heater and Street Lighting	Total Consumption Lakh units	Total Saving
1	Savings in lakh kwh units	3.00	2.41	48.43	5.41
2	Savings in percentage (%)	6.18	4.98		11.2

## ANNEXURE-VIII

### Details of DG Set emissions

Stack connected to DG set capacity	Height m	Dia m	Temp. of Exhaust Gases (°C)	Velocity m/sec	Pollutant Emission Rate (g/Sec)		
					PM	SO <sub>2</sub>	NO <sub>x</sub>
250 kVA DG set of 2 nos.	3.5	0.1	112.5	8.5	0.001	0.02	0.03
1500 kVA DG set of 1 nos.	8.0	0.6	975	12.5	0.005	0.12	0.15

## APPENDIX II

(See paragraph 6)

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): Location Plan enclosed.

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 are submitted). Attach Maps of (i) site location, (ii) surrounding features of the proposed site (within 500 meters).

The site area is located in Vijayawada Guntur Tenali Urban development Authority (VGTUDA)/ Vijayawada Municipality. The present land use as Residential and commercial construction project. The location plan is enclosed.

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.

#### COMMUNITY FACILITIES:

##### Amenities Proposed

Amenity	Nos. or description
Greening Area	922.2 m <sup>2</sup>
DG Sets	250 kVA X 2 nos. + 1500 kVA X 1 nos.
Sewage Treatment Plant	1
Garbage segregation point	1

#### PARKING NEEDS:

##### Parking Space Provision of the Project

Floor	4 - Wheeler	2 - Wheeler
Stilt & cellar	208	255
<b>Total</b>	<b>208</b>	<b>255</b>

<u>Parking Details:</u>	Commercial		Residential	
Required Parking as per Go 168,GoAP	740.4	27.5%	5093.8	22.0%
Parking Provided	804.1	29.9%	5208.7	22.5%
Required Parking nos. as per MoEF & NBC	20		98	
Parking Provided	208			

**LAND ALLOCATION:****Built Up Area Statement**

Land Use	No of Floors	Total No of Units	Total Site Area in m <sup>2</sup>	Total Built up area (m <sup>2</sup> )
Commercial	C+G+4		396.4	1982.1
Block A & B	S+G+4	195	4630.7	23153.7
Amenities	C+G+4		142.1	710.5
Green Area			922.2	
Road Area			2319.8	
Open Area			801.5	
Road Widening Area			873.4	
<b>Parking</b>				
Stilt				5208.65
Cellar				804.06
<b>Total</b>		<b>195</b>	<b>10086.1</b>	<b>31858.9</b>

**POWER REQUIREMENT:****Electricity Consumption Statement**

S.No	Description	No. of Units	Load in KW	Total Connected Load (KW)	Total Connected Load (kVA)	Total Max Demand (KVA)
1	Block A & B	195	4	780.0	975.0	975.0
2	Commercial		400	400.0	500.0	500.0
3	Street Lights	45	0.04	1.8	2.3	1.8
4	Amenities			296.8	371.1	296.8
5	STP	1	90	90.0	112.5	112.5
6	Lifts	6	15	90.0	112.5	112.5
	<b>TOTAL</b>			<b>1658.6</b>	<b>2073.3</b>	<b>1998.6</b>
	Maximum demand in kw at 0.6 diversity factor			<b>995.2</b>		
	Consumption of power for 8 hours per day			<b>7961.5</b>		
	Maximum demand in kw at 0.2 diversity factor			<b>331.7</b>		
	Consumption of power for 16 hours per day			<b>5307.7</b>		
	Total consumption of power per day			<b>13269.1</b>	<b>KW</b>	
	Total consumption of power per year			<b>48.4</b>	<b>Lakh Units</b>	

### Energy Saving by using Solar Water Heater

S.No	Description	No. of Units	Power allocated in watts / unit	Total power required in (KW)	
1	Block A & B	78	3000	234	
	<b>TOTAL</b>			<b>234</b>	
Maximum demand in kw at 1 diversity factor				<b>234</b>	
Consumption of power for 2 hours per day				<b>468</b>	
Maximum demand in kw at 0.4 diversity factor				<b>94</b>	
Consumption of power for 2 hours per day				<b>187</b>	
Total consumption of power per day				<b>655.2</b>	<b>KW</b>
Total consumption of power per year				<b>2.39</b>	<b>Lakh Units</b>

### Energy saving by using Solar Street Lights

S.No	Description	No. of Units	Power allocated in watts / unit	Total power required in (KW)	
1	Street lights	15	40	0.6	
	<b>TOTAL</b>			<b>0.6</b>	
Maximum demand in kw at 0.6 diversity factor				<b>0.4</b>	
Consumption of power for 8 hours per day				<b>3</b>	
Maximum demand in kw at full load				<b>1</b>	
Consumption of power for 4 hours per day				<b>2</b>	
Total consumption of power per day				<b>5.3</b>	<b>KW</b>
Total consumption of power per year				<b>0.02</b>	<b>Lakh Units</b>
saving with Solar Heater and Street Lighting				<b>2.41</b>	<b>Lakh Units</b>

### Electrical Power savings using CFL for lighting

S.No	Description	Area in m <sup>2</sup>	Power allocated in watts / unit	Total power required in (KW)	
1	Residential	23154	10	232	
2	Common & Utilities	8705	2.5	22	
	<b>TOTAL</b>			<b>253</b>	
Maximum demand in kw at 0.9 diversity factor				<b>228</b>	
Consumption of power for 12 hours per day				<b>2736</b>	
Total consumption of power per day				<b>2735.6</b>	<b>KW</b>
Total consumption of power per year				<b>9.99</b>	<b>Lakh Units</b>
<b>Savings in power using CFL/LED</b>				<b>3.00</b>	<b>Lakh Units</b>

**Savings in Electrical Power Consumption - SUMMARY**

S.No	Description	With CFL	With Solar Heater and Street Lighting	Total Consumption Lakh units	Total Saving
1	Savings in lakh kwh units	3.00	2.41	48.43	5.41
2	Savings in percentage (%)	6.18	4.98		<b>11.2</b>

**WATER CONSUMPTION:**

**Water Requirement of the Project**

Land Use	No. of Units	No. of Persons/unit	Water requirement per person in l *	Total Water Requirement in KLD
Block A & B	195	5	135	131.6
Amenities	1	60	45	2.7
Visitors		2	15	5.9
Commercial		125	45	5.6
Retail		380	7	2.7
<b>TOTAL</b>				<b>148.5</b>
*Water requirement as per NBC				

**Water Savings Proposed**

Land Use	No. of Units	No. of Persons/unit	Water Requirement/ KLD	Treated water reuse/day Klpcd	Effective Water Requirement in KLD
Block A & B	195	5	131.6	39.0	92.6
Amenities	1	60	2.7	1.2	1.5
Visitors		2	5.9	2.9	2.9
Commercial		125	5.6	2.5	3.1
Retail		380	2.7	1.3	1.3
<b>TOTAL</b>			<b>148.5</b>	<b>47.0</b>	<b>101.5</b>

**Note:** Treated water reuse assumed @ 45 l/head for Housing, and @ 20 l/head in amenities.

Approximately 47.0 KI/day water will be saved by adopting recycling of treated water in the toilet flush. The effective water consumption is reduced by 47.0 KI/day and the requirement will be in the order of 101.5 KI/day.

**Water Balance during occupation stage**

<b>Input</b>	<b>KLD</b>	<b>Output</b>	<b>KLD</b>
Domestic water from Vijayawada Municipality	101.5	HVAC Chillers	69.3
Recycled water	47.0	Recycled water	47.0
		Water requirement for green belt during non monsoon	2.5
		Losses approx 20%	29.7
<b>Total</b>	<b>148.5</b>	<b>Total</b>	<b>148.5</b>

The water used in the order of 148.5 KL/day would generate 118.8 KL/day of wastewater, which has to be treated for reuse and or disposal.

**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 and disturbance to the local ecology).**

The local area is developed as commercial and residential plots. No major impact on the local ecology is anticipated.

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

**a. Soil type:** Sandy loam

**b. Slope analysis:** 15 meter slope towards the South direction.

**c. Vulnerability to Subsidence:** No subsidence is anticipated in plain terrain areas.

**d. Seismicity:** The site area is classified as Zone III as per the IMD.

**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)**

No, the site area is **1.0086 hectares** only, and forms part of Krishna river 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.)**

**Earth Work Quantities**

<b>S No</b>	<b>Area</b>	<b>Qty of fill (m<sup>3</sup>)</b>	<b>Qty of cut (m<sup>3</sup>)</b>	<b>Surplus Fill(m<sup>3</sup>)</b>	<b>Surplus Cut(m<sup>3</sup>)</b>
1	Site	9683	12103	-----	2421

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

The water requirement during construction will be provided by the Guntur Municipality. The water requirement of the project during occupation stage is in the order of 148.5 KLD.

Construction debris like cement, sand, RCC, Aggregate, steel etc. are the waste generation during construction and these waste materials are used for road development.

**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)**

-NO-

**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).**

**Construction Debris**

The construction debris consists of various types of materials. The construction debris will be in both hazardous and non-hazardous categories. The hazardous debris consists empty containers of adhesives, thinners, paints, and petroleum products. These empty containers will be sold to authorize recycling agencies. The non hazardous wastes contain recyclable debris like iron and other metal, glass, plastics, cartons of paper, wood etc. These wastes will be sent for reuse/recycle. The waste percentage will be in the order of 2%. Construction debris containing bricks, demolished RCC will be used for land filling in the place of sub grade.

**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.**

**Water Requirement of the Project**

Land Use	No. of Units	No. of Persons/ unit	Water requirement per person in l *	Total Water Requirement in KLD
Block A & B	195	5	135	131.6
Amenities	1	60	45	2.7
Visitors		2	15	5.9
Commercial		125	45	5.6
Retail		380	7	2.7
<b>TOTAL</b>				<b>148.5</b>
*Water requirement as per NBC				

### Water Savings Proposed

Land Use	No. of Units	No. of Persons/unit	Water Requirement/ KLD	Treated water reuse/day Klpcd	Effective Water Requirement in KLD
Block A & B	195	5	131.6	39.0	92.6
Amenities	1	60	2.7	1.2	1.5
Visitors		2	5.9	2.9	2.9
Commercial		125	5.6	2.5	3.1
Retail		380	2.7	1.3	1.3
<b>TOTAL</b>			<b>148.5</b>	<b>47.0</b>	<b>101.5</b>

**Note:** Treated water reuse assumed @ 45 l/head for Housing, and @ 20 l/head in amenities.

Approximately 47 Kl/day water will be saved by adopting recycling of treated water in the toilet flush. The effective water consumption is reduced by 47 Kl/day and the requirement will be in the order of 101.5 Kl/day.

### Water Balance during occupation stage

Input	KLD	Output	KLD
Domestic water from Vijayawada Municipality	101.5	HVAC Chillers	69.3
Recycled water	47.0	Recycled water	47.0
		Water requirement for green belt during non monsoon	2.5
		Losses approx 20%	29.7
<b>Total</b>	<b>148.5</b>	<b>Total</b>	<b>148.5</b>

The water used in the order of 148.5 KL/day would generate 118.8 KL/day of wastewater, which has to be treated for reuse.

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

-NA-

#### 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)

Water shall be drawn from the Vijayawada Municipality.

**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)**

**Water Savings of the Project**

Land Use	No. of Units	No. of Persons/unit	Water Requirement/ KLD	Treated water reuse/day Klpcd	Effective Water Requirement in KLD
Block A & B	195	5	131.6	39.0	92.6
Amenities	1	60	2.7	1.2	1.5
Visitors		2	5.9	2.9	2.9
Commercial		125	5.6	2.5	3.1
Retail		380	2.7	1.3	1.3
<b>TOTAL</b>			<b>148.5</b>	<b>47.0</b>	<b>101.5</b>

**Note:** Treated water reuse assumed @ 45 l/head for Housing, and @ 20 l/head in amenities.

Approximately 47.0 Kl/day water will be saved by adopting recycling of treated water in the toilet flush. The effective water consumption is reduced by 47.0 Kl/day and the requirement will be in the order of 101.5 Kl/day.

**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)**

NO, the required water shall be drawn from Vijayawada Municipality.

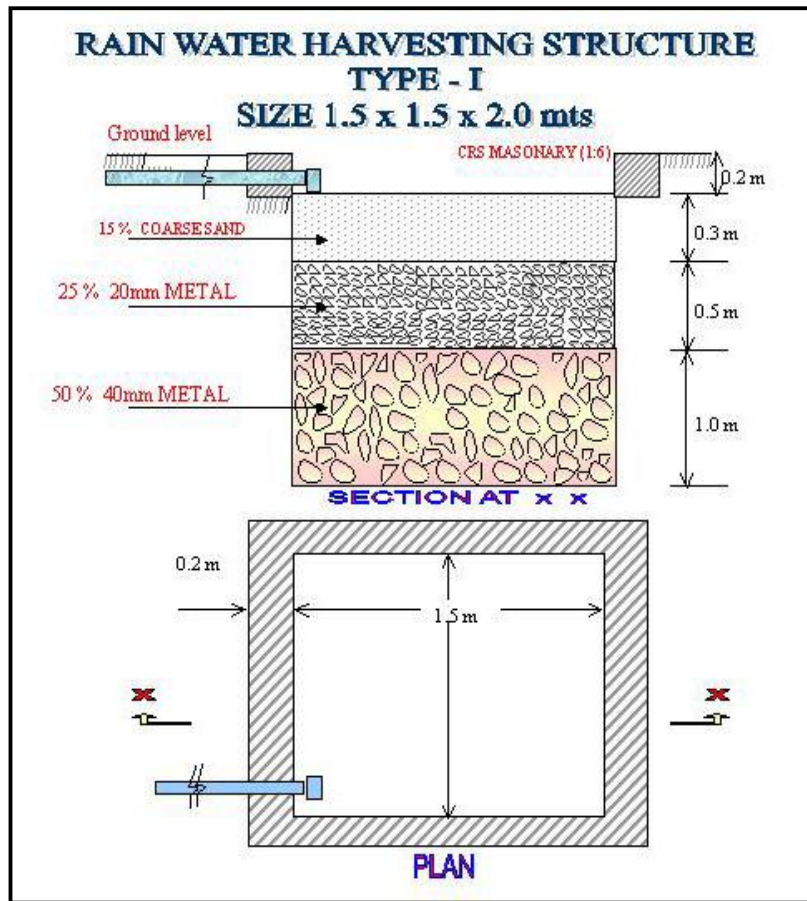
**2.6 What is the incremental pollution load from wastewater generated from the proposed activity? (Give details of the quantities and composition of wastewater generated from the proposed activity)**

**Characteristics of Waste water**

Parameter	Quantity in mg/l
PH	6 – 7
Total Suspended Solids	400 – 600
BOD	200 – 300
COD	450 – 500

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

Storm water management involves harvesting through rain water harvesting structures and storage in storm water storage ponds. The water from these sumps will be reused after primary treatment i.e., filtration for domestic and gardening respectively. The excess water is diverted to the storm water drains. The rainwater harvesting structure is presented below.



**Rainwater Harvesting Structures**

**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?**

The impact of project on physiography is a function of the terrain of the area. It is most drastically altered in case of hilly terrain or where extensive cut-and-fill operations are involved. The project area has plain terrain and the design stage deliberations have ensured that the major contours are not disturbed. However the physiography impact will be significant and non-reversible, as the contours of the area will be disturbed. The cut and fill operations may cause air pollution, clogging of drains and solid waste for disposal. The design stage has optimized the cut and fills operations and the excess cut material is minimum and the same shall be reused for the construction purposes.

The project will have a positive impact on the soils and soil quality as housing project will have landscaping and the soils will be protected due to conservation.

During the occupation stage, compaction will not occur, and the compaction if any will be restricted to road ROW. And the road ROW compaction cannot be said to be an

impact of the operation stage as the pavement itself is a function of compacted base and sub base.

During the occupation stage, soil pollution due to garbage dumping at unauthorized locations may have temporary negative impact leading contamination of soil. The accidental spills or leaks are also a low probability incident.

The other major impact will be due to the increased run off and may have negative impact on the receiving body if the same is not properly managed. Impacts due to surface runoff include increased soil erosion and local flooding or water logging. Hence the project will be designed with adequate storm water drains and cross drainage structures

**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)**

NA

**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)**

Construction activity is taken up only during non-monsoon season. There are no major drains in the site. All material dumps shall be located away from the natural drains. Storm water drains shall be constructed before the construction of the buildings.

**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)**

Storm water drains will be provided all over the site to meet the expected increase in the runoff during rainy seasons due to the impervious nature of the paved areas. The site is plain sloping towards east and it is proposed to maintain the levels as much as possible.

Based on the catchment area, potential inflows and rainfall intensity determine the drain size so as to minimize damage resulting from high intensity storms. Energy dissipaters such as drop structures will be provided along the channel where runoff velocities may become excessive.

**Storm water drains:**

Conservation of water resource is most important aspect of the project during construction and occupation phases. Storm water drainage planning, domestic water planning and sewerage transfer and sewage treatment planning are critical aspects of construction and occupation stages of housing projects.

Storm water drains will be provided all over the site to meet the expected increase in the runoff during rainy seasons due to the impervious nature of the paved areas. The site is uneven and it is proposed to maintain the levels as much as possible, hence

storm water outlets from the site are anticipated. The expected runoff is calculated for the design of the storm water drains and presented in following table.

**CALCULATION FOR STORM WATER DRAIN:**

**(a) With out project:**

Area of Catchment, 'A'	:	1.0086	Ha
Run off Coefficient, 'C'	:	0.6	
Maximum intensity of rainfall, 'I'	:	40	mm/hr
Therefore Q	:	0.067	m <sup>3</sup> /sec

**(b) With project:**

Area for catchment for roof and road	:	0.836	Ha
Area of Catchment, 'A'	:	0.836	Ha
Run off Coefficient, 'C'	:	0.9	
Maximum intensity of rainfall, 'I'	:	40	mm/hr
Therefore Q =	:	0.084	m <sup>3</sup> /sec

Area for catchment for open areas	:	0.172	Ha
Run off Coefficient, 'C'	:	0.6	
Maximum intensity of rainfall, 'I'	:	40	mm/hr
Therefore Q =	:	0.011	m <sup>3</sup> /sec

**Total Discharge** : **0.095** m<sup>3</sup>/sec

But, Discharge, Q = A/V :

Where, :

A= Area of the Drain, :

V= Max. Permissible Velocity : 6 m/sec for concrete drain

Area of drain, 'A' = Q/V : 0.016 m<sup>2</sup>

**Taking depth of drain as 0.6 m at the starting point** : **0.6**

Width of drain = Area/depth = **0.026 m**      **26 mm**

*Width of the drain is to taken 30 mm and depth varies according to the slope of ground.*

**Storm water Management**

Land Use	Area in Hectares	Vol./hr (KL) after development C=0.8	Vol./hr (KL) before development C=0.6	Difference in Discharges	Remarks
Roof Area	0.52	165.4	124.1	41.4	Harvested in 2 nos. of Storm water storage sumps of capacity 20 m <sup>3</sup> each.
Road Area	0.32	102.2	76.6	25.5	13 nos. of RWH pits are provided of size 1.5m x 1.5m x 2.0 m
Open Area	0.17	20.7*	41.4	-20.7	
<b>TOTAL</b>	<b>1.01</b>			<b>46.2</b>	

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

No, Temporary toilet facilities shall be provided and the same shall be connected to septic tank followed by sewer lines.

**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)**

**Sewage treatment plant based on Fluidized Aerobic Bio Reactor (FAB) technology**

**PROCESS DESCRIPTION:**

The raw sewage will be collected in a collection sump and pumped to mechanical bar screen chamber for removal of large floating matter followed by grit removal in Grit Chamber. The raw sewage will then be collected in an equalization tank for homogenization of hydraulic load. The tank contents will be kept in suspension by means of coarse bubble serration through pipe grid. The equalization tank, with air flow indicator for continuous monitoring of air supply to the tank in order to avoid septic conditions, will be covered from top (RCC or FRP) to avoid nuisance. The equalized effluent will then be pumped to two Fluidized Aerobic Bio Reactors (FAB) in series where BOD/COD reduction can be achieved by virtue of aerobic microbial activities. The oxygen required will be supplied through coarse air bubble diffusers. The bio-solids formed in the biological process will be separated in the down stream Tube Settler. The clear supernatant will gravitate to the chlorine contact tank where sodium hypochlorite will be dosed for disinfection of treated water prior to disposal.

The biological sludge generated in the FAB and settled in the tube settlers will be collected in a sludge sump and then pumped to sludge drying bed for de watering. The dried sludge will then be disposed off suitably as manure. The schematics of the process are shown. The two main components of the treatment system viz. The FAB reactor and tube settler are described in the following sections.

### Fluidized Aerobic Bio Reactor (FAB)

Conventional effluent treatment plants are large sized, power intensive and require a lot of monitoring. Scarcity of open space and rising land a power costs have forced the industries to look out for space saving, compact and efficient treatment options. This has led to the development attached growth processes where the bio mass is retained within the aeration tank obviating the need for recycle. These plants are not only compact but also user friendly. The endeavor to have a continuously operating, no-clogging biofilm reactor with no need for back washing, low head-loss and high specific biofilm surface area culminated in the most advanced technology of aerobic biological fluidized bed treatment where the biofilm (biomass) grows on small carrier elements that move along with the water in the reactor. The movement is normally caused by aeration in the aerobic version of the reactor. The reactor combines all the advantages and best features of Trickling filters, Rotating biological contractors, activated sludge process and submerged fixed film reactors while eliminating the drawbacks of these systems. The plants are more compact and more energy efficient.

The Fluidized Aerobic Bio Reactor (FAB) consists of a tank in any shape filled up with small carrier elements. The elements are made up of special grade PVC or polypropylene of controlled density (shown in plate). For media of specific gravity 0.92-0.96 the overall density could be expected to increase up to 9.5% when full of biomass such that they can fluidize using an aeration device. A biofilm develops on the elements, which move along the effluent in the reactor. The movement within the reactor is generated by providing aeration with the help of diffusers placed at the bottom of the reactor. Then thin biofilm on the elements enables the bacteria to act upon the biodegradable matter in the effluent and reduce the BOD/COD content in the presence of oxygen available from the air that is used for fluidization.

**Characteristics of Waste water**

Parameter	Quantity in mg/l
PH	6 – 7
Total Suspended Solids	400 – 600
BOD	200 – 300
COD	450 – 500

### *Design of the unit*

#### **Basic data**

Flow	:	118	KLD
Capacity	:	150	m <sup>3</sup>
Peak factor	:	3.5	
Peak flow Q peak	:	525	m <sup>3</sup> /day
Influent BOD	:	200	mg/lit
Influent Suspended Solids	:	200	mg/lit
Influent COD	:	350	mg/lit
Effluent BOD	:	30	mg/lit

Effluent COD	:	200	mg/lit
Effluent Suspended Solids	:	100	mg/lit

### 1. Bar Screen Chamber

Average flow	:	0.0017	m <sup>3</sup> /sec
Peak factor	:	3.5	
Peak flow	:	0.006	m <sup>3</sup> /sec
Velocity at peak flow	:	0.75	m/Sec

#### *Effective area of screen Required*

At average flow	:	0.005	m <sup>2</sup>
At Peak flow	:	0.0075	m <sup>2</sup>
<i>Provide Effective area of screen</i>	:	0.0075	m <sup>2</sup>

Considering the bar of dia. 10 mm(w) and clear spacing of 20 mm (b)

Overall area required	:	0.012	m <sup>2</sup>
Considering screen depth as	:	0.024	m Consider 0.5 m
Number of clear spacing	:	0.3	
Number of bars	:	1	Consider 3 Nos.

Hence Provide 5 bars

Provide a screen of 0.5 m X 0.5 m at an inclination of sin 60°. In a screen channel of one meter (1 m) length.

### 2. Grit Chamber :

The flow from the bar screen chamber is let into the Grit Chamber of minimum 2 hours capacity. This tank is provided to even out the flow variation, and to provide a continuous feed into the secondary biological treatment units.

Peak flow Q	:	0.006	m <sup>3</sup> /sec
Providing a flow through velocity of 0.30 m/sec			
Cross sectional area of Channel (0.006/0.3)	:	0.02	m <sup>2</sup>
Surface area of channel (0.006/0.013)	:	0.46	m <sup>2</sup>
Assuming depth d	:	0.2	m
Width of channel (0.02/0.2)	:	0.1	m (say 0.2m)
Length of channel (0.46/0.1)	:	4.6	m (say 4.5 m)

Provide two channels each of 0.2 m wide and 4.6 m long with depth of waste water 0.2 m.

### 3. Equalization tank:

The flow from the bar screen chamber is let into the equalization tank of minimum 2 hours capacity. This tank is provided to even out the flow variation, and to provide a continuous feed into the secondary biological treatment units.

Average flow	:	6.25	m <sup>3</sup> /hr
Peak factor	:	3.5	
Peak flow	:	21.87	m <sup>3</sup> /hr
Hydraulic retention tank = 2 hrs at Peak flow			
Hence required volume of the tank	:	43.75	m <sup>3</sup>
Provide tank of	:	43.75	m <sup>3</sup> Capacity
Assuming depth	:	3	m
Area	:	14.58	m <sup>2</sup>
Assuming length to width ratio (1:1) ; l=b			
length of the tank	:	3.8	m

width of the tank	:	3.8	m
Air required for agitation	:	0.01	m <sup>3</sup> / m <sup>2</sup> min
Total air required	:	26.25	m <sup>3</sup> /hr
Air blower required	:	40	m <sup>3</sup> /hr @ 3.8 mwc
Effluent transfer pump	:	6.25	m <sup>3</sup> /hr @ 8 mwc

#### 4. Fluidized Aerobic Bio Reactor (FAB):

The polypropylene media have been provided with a specific surface area of 350 – 520 m<sup>2</sup>/m<sup>3</sup>. This allows micro-organisms to get attached and biomass concentration can be increased to four folds as compared to Activated Sludge Process. This enables to consider higher Organic loading rates.

The micro-organisms attached to media are kept in a fluid state thereby maintaining the CSTR (continuous Stirrer tank reactor) regime as well as two tanks is provided in series making the plug – flow system. This will enhance the efficiencies and have the merits of both CSTR and plug-flow regimes.

Organic loading rate	:	3.2	kg BOD/ m <sup>3</sup> d
Organic load	:	26	kg/day
Volume of the tank	:	9.37	m <sup>3</sup>
Assume the depth	:	3	m
No. of tanks in series	:	1	
Size of the tank	:	1.8 m dia. x 3.0 SWD	
Specific gravity of media	:	0.92 to 0.96	
Specific surface area of media	:	350 – 520 m <sup>2</sup> /m <sup>3</sup>	
Media filling	:	30 – 50 % of tank volume	
Oxygen required	:	2	kg / kg BOD
Oxygen in air	:	23%	
Specific gravity of air @ 30 deg.	:	1.65	
Aeration	:	Coarse bubble	
Oxygen transfer efficiency	:	12%	
Air required	:	77.7	m <sup>3</sup> /hr
Air blower required	:	80	m <sup>3</sup> /hr @ 6.5 m wc

#### 5. Tube settler

Surface loading rate	:	48	m <sup>2</sup> /m <sup>3</sup> d
Surface area required	:	3.125	m <sup>2</sup>
Tank size	:	3.0 m x 6.0 m x 2.7 m SWD With 55 deg. hopper bottom	
Tube Modules	:	3.0m x 6.0 m x 0.6 m ht.	
Tube inclination	:	60	deg.
Settling area for 60 deg slope	:	11	m <sup>2</sup> /m <sup>3</sup>
Cross sectional area of tubes	:	120 mm x 44 mm Hexagonal	
Hydraulic radius	:	1/61 cm (1.5 cm)	
Shape factor	:	0.6 – 0.7 for media settleable solids	

#### 6. Pre Filtration tank

The flow from the each individual settling tank i.e., the supernatant liquid is let into the respective Pre-Filtration Tank, which has a minimum 1.5 hours holding capacity. This tank

is provided to hold the treated effluent and give an even flow to the pressure sand filter.

Average flow	:	6.25	m <sup>3</sup> /hr
Peak factor	:	2	m <sup>3</sup> /hr
Peak flow	:	12.5	m <sup>3</sup> /hr
Provide min 1.5 hours holding capacity.			
Hence required volume of the tank	:	18.75	m <sup>3</sup>

#### **7. Pressure Sand Filter:**

Vertical down flow type with graded/sand bed under drain plate with polysterene strains.

Flow	:	150	m <sup>3</sup> /day
Rate of filtration assumed as	:	10	m <sup>3</sup> /m <sup>2</sup> /hr
Requirement of treated water for usage in 20 hrs	:	7.5	m <sup>3</sup> /hr
Dia. of filter of 1 nos.	:	980	mm

Provide pressure sand filter of 980 mm dia. and 1200 mm HOS with sand as media layer, under drain pipe, laterals face piping etc for each stream.

#### **8. Activated Carbon Filter:**

Vertical down flow type with graded/sand bed under drain plate with polysterene strains.

Flow	:	150	m <sup>3</sup> /day
Rate of filtration assumed as	:	10	m <sup>3</sup> /m <sup>2</sup> /hr
Requirement of treated water for usage in 20 hrs	:	7.5	m <sup>3</sup> /hr
Dia of filter of 1 nos.	:	980	mm

Provide Activated Carbon filter of 980 mm dia with granular Activated carbon as media and 1200 mm HOS with sand as media layer, under drain pipe, laterals face piping etc for each stream.

#### **9. Final Treated Water Holding Tank**

It is always preferred to provide one final holding tank of minimum one day holding capacity, so that the treated effluents can be stored and used back for gardening or other tertiary purposes.

Capacity: 150 m<sup>3</sup>

#### **10. Sludge Filter Press:**

The biomass in the aeration tank stabilizes BOD in wastewater by consuming the organic matter in the wastewater. The metabolic activity results in growth of the biomass population in the Fluidized Aerobic Bio Reactor (FAB). Sludge holding tank has been provided with filter press for dewatering sludge. The filtrate drains off through the media, which is again let into equalization tank.

The dewatered sludge is collected in trays, which can be used as manure in the garden.

No. of plates	:	24
Size of plates	:	600 mm X 600 mm
Plate moc (material of construction)	:	PP (poly propline)
Type of operation	:	Hydraulic
Power pack capacity	:	2 HP

The biomass in the aeration tank stabilizes BOD in wastewater by consuming the organic matter in the wastewater. The metabolic activity results in growth of the biomass population in the Fluidized Aerobic Bio Reactor (FAB). Sludge holding tank has been provided with filter press for dewatering sludge. The filtrate drains off through the media,

which is again let into equalization tank. The dewatered sludge is collected in trays, which can be used as manure in the garden.

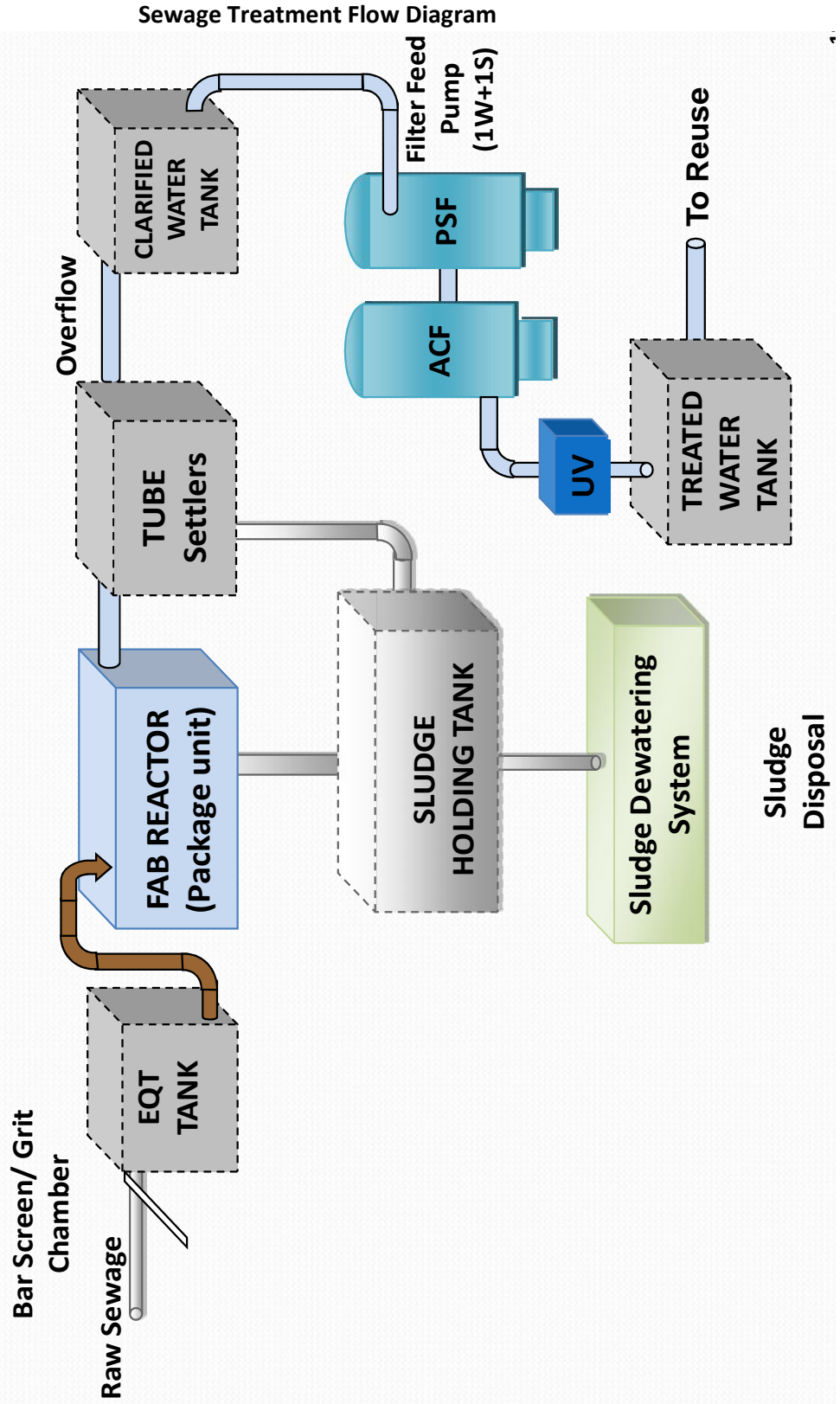
**Characteristics of Treated Waste water**

<b>Parameter</b>	<b>Quantity in mg/l</b>
PH	7 – 8
Total Suspended Solids	100
BOD	30
COD	100

**Disposal of Treated Wastewater:** The wastewater shall be treated and reused for flushing the toilets, on land irrigation and HVAC make up water requirement. Hence all the recycled water is utilized completely and is considered as a zero discharge.

# SEWAGE TREATMENT PLANT

## FLUIDIZED AEROBIC BIO REACTOR TECHNOLOGY (FAB)



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

Dual plumbing system is used for toilet flushing. Separate tank is provided to store the treated water; the tank shall be 1 foot below the over head tank. Separate pipe system is provided to pump the treated water for flushing. All the treated water pipelines shall be colored blue.

**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)**

No, the local biodiversity will improve as development of green area is part of the proposal.

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

No, the site area has no major trees and is covered mainly with shrubs.

**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).**

The landscape area is 922.2 m<sup>2</sup>. The plantation list is presented in the following table

S. No	Names of trees
1	Filicum Decipiens
2	Mimusops Elengi
3	Filicum Decipiens
4	Cassia Fistula
5	Delonix Regia
6	Alstonia Scholaris
7	Ficus Benjamina
8	Kigelia Pinnata
9	Tabebuia Rosea
10	Anthocephalus Chinensis
11	Ficus panda
12	Tabernaemontana coronaria

**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.**

-NO-

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

-No major impact envisaged. However the proposed plantaion shall help in providing nesting space for the avifauna.

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

-NA-

## 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)

**Maximum Predicted Ground Level Concentrations**

S.No.	Pollutant	Direction	Distance (m)	Maximum Concentration (~g/m <sup>3</sup> )
1	PM	SW	345	0.36
2	SO <sub>2</sub>	SW	345	1.41
3	NOx	SW	345	1.78

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.

**Sources of dust during Construction Activity**

Vehicle and Equipment Use	Exposed Areas	Contractor Activities
Vehicle and equipment entering and leaving the project site	Areas of exposed soil that have been cleared and grubbed	Land clearing and grubbing
Vehicle and equipment movement and use within the project site	Areas of exposed soil that have been excavated, filled, compacted, or graded	Earthwork including soil compaction, rough grading and final grading.
Sediment tracking off-site	Construction staging areas	Drilling
Temporary parking lots and staging areas	Vehicle and equipment storage and service areas	Materials handling, including material stockpiling, transfer, and processing
Onsite Construction traffic	Material processing areas and transfer points	Batch dropping, dumping
	Construction roads	Conveyor transfer and stacking
	Bare ground areas of construction site	Material transferring
	Spilled materials	Milling and screening operations
	Construction stockpiles	Demolition and debris disposal
	Soil and debris piles	Tilling

## OCCUPATION STAGE

No dust generation is envisaged during the occupation stage as the area will have greenery and all roads shall be paved and all slopes & embankments shall be turfed as per best engineering practices.

**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.**

### Parking Space Provision of the Project

Floor	4 - Wheeler	2 - Wheeler
Stilt & cellar	208	255
<b>Total</b>	<b>208</b>	<b>255</b>

<u>Parking Details:</u>	Commercial		Residential	
Required Parking as per Go 168,GoAP	740.4	27.5%	5093.8	22.0%
Parking Provided	804.1	29.9%	5208.7	22.5%
Required Parking nos. as per MoEF & NBC	20		98	
Parking Provided	208			

### Circulation Plan:

- ❖ Ground Floor Driveway : 5.0 m
- ❖ No. of Cellars: 1 nos.
- ❖ No. of Ramps : 2 – 1 way
- ❖ Width of Ramp : 4.5 m
- ❖ Slope of Ramp : 1 in 8
- ❖ Cellar Driveway : 4.5 m
- ❖ No. of Lifts : 6
- ❖ Capacity of each Lift: 10 pax.
- ❖ Connecting Road : 30 m ROW

The connecting road to the site is 30 m. The width of connecting roads is 30 m with a capability of 3600 PCU. The present level of service is 0.429. The proposed project shall increase the number of trips by 63. The level of service of connecting road shall reduce from 0.429 to 0.446 and the LOS remains class C (Good).

### Volume/Capacity Ratio

Road	Existing volume, PCU/hr	Maximum capacity, PCU/hr	Volume/ Capacity	Los, performance
NH - 5	1378	3600	0.383	"B" Very Good

**Modified Los & Performance**

Road	Existing volume, PCU/hr	Existing volume/ Capacity	Additional volume	Modified Volume	Modified Volume/ Capacity	Modified Los & performance
NH - 5	1378	0.383	46	1424	0.396	"B" Very Good
<i>*Traffic Volumes as PCU during Peak hour</i>						

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

-NA-

**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.**

There shall be marginal increase in the traffic density, however the proposed subways and the location of school adjacent to the site will benefit the employees in terms of accident risk.

**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.**

DG sets shall be provided with acoustic enclosures. The emissions from the DG sets are released at 8.0 m & 3.5 m for 250 kVA, 1500 KVA height above the roof level.

**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?**

-NO-, the proposal includes a noise berm along the highway adjacent to the site which shall be planted with trees to act as an aesthetic amenity in addition to mitigation of noise levels.

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

-No adverse impacts are anticipated-

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

The layout plan is on the basis of Development rules prescribed VGTUDA

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

-NO-

## 7. SOCIO-ECONOMIC ASPECTS

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

-NO-

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

**School:** 0.5 Km from site

**Community Centers:** with in 1 km from site

**Bus Stops:** 1.0 km from site

**Railway station:** 2.6 Km from site

**Temples/church/mosque:** a number of them within 1.5 km radius of the 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?

-NO-

## 8. BUILDING MATERIALS

8.1. 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)

**Material Consumption for Total Units**

Units	BUA per unit in (m <sup>2</sup> )	Total Ready Mix Concrete (m <sup>3</sup> )	Total Cement (bags)	Total Sand (m <sup>3</sup> )	Total Aggregate (m <sup>3</sup> )	Total Water (m <sup>3</sup> )	Total Bricks (Nos) x 1000	Total Reinforcement Steel (MT)
Total BUA	31859	13062	29629	12425	1370	7710	3696	733
<b>Total</b>	<b>31859</b>	<b>13062</b>	<b>29629</b>	<b>12425</b>	<b>1370</b>	<b>7710</b>	<b>3696</b>	<b>733</b>

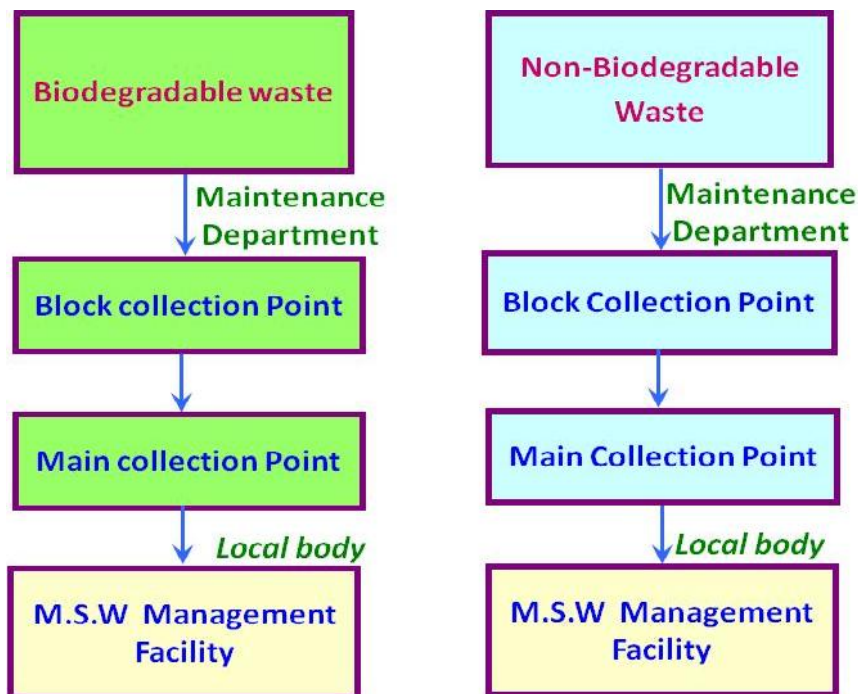
8.2. Transport and handling of materials during construction may result in pollution, noise & public nuisance. What measures are taken to minimize the impacts?

All materials shall be transported during non peak hours. Sand and aggregate are covered during transportation. Noise generating construction activity shall not be taken up during night times, adjacent to the residential area.

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

Excess cut material shall be reused for road construction.

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



### 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?

Electricity Consumption Statement

S.No	Description	No. of Units	Load in KW	Total Connected Load (KW)	Total Connected Load (kVA)	Total Max Demand (KVA)
1	Block A & B	195	4	780.0	975.0	975.0
2	Commercial		400	400.0	500.0	500.0
3	Street Lights	45	0.04	1.8	2.3	1.8
4	Amenities			296.8	371.1	296.8
5	STP	1	90	90.0	112.5	112.5
6	Lifts	6	15	90.0	112.5	112.5
	<b>TOTAL</b>			<b>1658.6</b>	<b>2073.3</b>	<b>1998.6</b>
	Maximum demand in kw at 0.6 diversity factor			<b>995.2</b>		
	Consumption of power for 8 hours per day			<b>7961.5</b>		
	Maximum demand in kw at 0.2 diversity factor			<b>331.7</b>		
	Consumption of power for 16 hours per day			<b>5307.7</b>		
	Total consumption of power per day			<b>13269.1</b>	<b>KW</b>	
	Total consumption of power per year			<b>48.4</b>	<b>Lakh Units</b>	

### Energy Saving by using Solar Water Heater

S.No	Description	No. of Units	Power allocated in watts / unit	Total power required in (KW)	
1	Block A & B	78	3000	234	
	<b>TOTAL</b>			<b>234</b>	
Maximum demand in kw at 1 diversity factor				<b>234</b>	
Consumption of power for 2 hours per day				<b>468</b>	
Maximum demand in kw at 0.4 diversity factor				<b>94</b>	
Consumption of power for 2 hours per day				<b>187</b>	
Total consumption of power per day				<b>655.2</b>	<b>KW</b>
Total consumption of power per year				<b>2.39</b>	<b>Lakh Units</b>

### Energy saving by using Solar Street Lights

S.No	Description	No. of Units	Power allocated in watts / unit	Total power required in (KW)	
1	Street lights	15	40	0.6	
	<b>TOTAL</b>			<b>0.6</b>	
Maximum demand in kw at 0.6 diversity factor				<b>0.4</b>	
Consumption of power for 8 hours per day				<b>3</b>	
Maximum demand in kw at full load				<b>1</b>	
Consumption of power for 4 hours per day				<b>2</b>	
Total consumption of power per day				<b>5.3</b>	<b>KW</b>
Total consumption of power per year				<b>0.02</b>	<b>Lakh Units</b>
saving with Solar Heater and Street Lighting				<b>2.41</b>	<b>Lakh Units</b>

### Electrical Power savings using CFL for lighting

S.No	Description	Area in m <sup>2</sup>	Power allocated in watts / unit	Total power required in (KW)	
1	Residential	23154	10	232	
2	Common & Utilities	8705	2.5	22	
	<b>TOTAL</b>			<b>253</b>	
Maximum demand in kw at 0.9 diversity factor				<b>228</b>	
Consumption of power for 12 hours per day				<b>2736</b>	
Total consumption of power per day				<b>2735.6</b>	<b>KW</b>
Total consumption of power per year				<b>9.99</b>	<b>Lakh Units</b>
<b>Savings in power using CFL/LED</b>				<b>3.00</b>	<b>Lakh Units</b>

**Savings in Electrical Power Consumption - SUMMARY**

S.No	Description	With CFL	With Solar Heater and Street Lighting	Total Consumption Lakh units	Total Saving
1	Savings in lakh kwh units	3.00	2.41	48.43	5.41
2	Savings in percentage (%)	6.18	4.98		<b>11.2</b>

250 kVA x 2 Nos & 1500 kVA x 1 Nos . capacity DG sets shall be used for back up power for street lighting, lifts and sewage treatment plant.

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

**Details of DG Set emissions**

Stack connected to DG set capacity	Height m	Dia m	Temp. of Exhaust Gases (°C)	Velocity m/sec	Pollutant Emission Rate (g/Sec)		
					SPM	SO <sub>2</sub>	NO <sub>x</sub>
250 kVA DG set of 2 nos.	3.5	0.1	112.5	8.5	0.001	0.02	0.03
1500 kVA DG set of 1 nos.	8.0	0.6	975	12.5	0.005	0.12	0.15

**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?**

The façade is not made of glass, and the glass requirement is only for windows. The glass characteristics are presented as follows;

**Characteristics of Glass utilized.**

		Normal					Anti-firing type	
		See through(SE)			Non-see-through (NS)		SE	NS
Nominal thickness		6	8	10	6	10	9.8	9.8
Structure	Out glass	FL3	FL4	FL5	G3	G5	PWN 6.8	GWN 6.8
	vacuum	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	In glass	Low-E 3	Low-E 4	Low-E 5	Low-E 3	Low-E 3	Low-E 3	Low-E 3
Visible	TL(%)	75.5	74.6	73.8	75.5	73.8	72.4	72.4
	RL(%)	15.9	15.8	15.6	15.9	15.6	16.8	16.8
Solar	TS(%)	62.6	60.1	57.8	62.6	57.8	56.9	56.9
	RS(%)	14.1	13.6	13.2	14.1	13.2	14.2	14.2
	AS(%)	23.3	26.3	29.0	23.3	29.0	28.9	28.9
Solar heat gain		0.76	0.74	0.72	0.69	0.66	0.69	0.63
Thermal insulation	(W/m <sup>2</sup> K)	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	(kcal/m <sup>2</sup> hrC)	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Sound reduction (JIS grade)		30	30	30	30	30	35	35
Maximum size(mm)		2,400 x 1,350			1,800 x1,200		L	M
Minimum size(mm)		350 x 200			350 x 200		350 x 200	

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

- The width to height ratio between the apartment blocks is around 1:1.5 which is achieved as per the development control rules.
- All window openings is provided with chajjas depth as specified by the design standards (around 300mm)
- The full height openings have been designed for better lighting in the apartments units. For climatic considerations, all these openings are placed next to a balcony/sit out space which acts as a buffer by eliminating the direct lighting and thereby avoiding heat ingress.
- Use of Large fenestration in buildings reduces the use of mechanical light energy during daytime thereby reducing the energy 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.**

Solar power shall be used for the street lights and fencing.

**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?**

Yes.

**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.**

#### **Building Materials**

- The building materials chosen for the landed and apartment units are as per the recommendations of the climatic standards.
- To achieve the maximum energy value, a balance between the availability of building materials locally and skilled labourers is achieved.
- Burnt brickwork with fly ash for the walling and plastering reduces the thermal penetration by 20-30%.
- The RCC roof is covered with Brickbat concrete and terracotta weather tiles, which reduces the heat penetration by 18%.

#### **Colour of Facades**

- The colour choice for the buildings uses a maximum of white surface (nearly 84%). This increases the solar reflectivity factor.
- Emittance factor for white surfaces is around 90% compared to coloured surface (20-60%)
- 16% of wall area uses earthen colours and this space has longer thermal storage in the walls. This creates a comfortable temperature at nights due to the thicker walls designed.
- Heat Absorbance of the brick used for building is around 50%.
- The roof of the units (if not covered with terrace garden) is painted white to have a maximum reflectivity.
- The R-factor (resistance factor) for the roof with brickbats and white painted is nearly 40% more as compared to the recommended standards.

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

#### **Green Roofs**

Green roofs are an attractive roofing option that can reduce urban heat islands by providing shade and through evapotranspiration, the release of water from plants to the surrounding air. The benefits of green roofs include:

- Reduce sewage system loads by assimilating large amounts of rainwater.
- Absorb air pollution, collect airborne particulates, and store carbon.
- Protect underlying roof material by eliminating exposure to the sun's ultraviolet (UV) radiation and extreme daily temperature fluctuations.
- Serve as living environments that provide habitats for birds and other small animals.
- Offer an attractive alternative to traditional roofs, addressing growing concerns about urban quality of life.
- Reduce noise transfer from the outdoors.
- Insulate a building from extreme temperatures, mainly by keeping the building interior cool in the summer.

**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.**

Building envelop thermal properties		
	Max U factor ( w/Sq.m-DegC)	Min R factor Sq.m_DegC/W)
Roof	0.261	R 3.5
Opaque Wall	0.44	R 2.1
Vertical Fenestration	Max U factor ( w/Sq.m-DegC)	Max SHGC for WWR less than or equal to 40%
	3.3	0.25
Min VLT 0.2 for WWR upto 40%		

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

-NA-

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

-No-

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

4 A changes = 4.

**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.**

-Nil-

## **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.

Furnished in EIS/EMP report.

# *Honey Heights*

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