PROJECT

PROPOSED SHIVOY COMMERCIAL LOCATED AT KHASRA NO 1069, VILLAGE NOORNAGAR GHAZIABAD (U.P)

SUBJECT

MEP SERVICES

PROJECT REPORT

MEP CONSULTANTS:

WeDESIGN ASSOCIATES.
C-68, LOWER GROUND FLOOR, SEC-63,
NOIDA, U.P.
E-MAIL: wedesignconsultancy@gmail.com

ARCHITECTS:

SINGLA ARCHITECTS & ASSOCIATES
EROS MARKET PLACE, PLOT NO-02
SHOP-87, FIRST FLOOR, INDIRAPURAM
E-MAIL: gsingla32@gmail.com

INTRODUCTION

The proposed project is a commercial and hotel building, located at Khasra N0 1069, Village Noornagar, Ghaziabad, U.P. The building consists of Commercial shops, Dining/Restaurants, Hotel rooms and parking with all modern amenities to be developed on land of approx. 4102 Square Meters.

This report intends to basically highlight the technical proposals/points/ parameters, which are proposed to be adopted in the planning and designing of internal & external sanitary engineering for the upcoming master plan.

WATER REQUIREMENT

During construction phase water will be supplied by private water tankers, whereas during operation phase water supply will be provided through the Municipal water supply/tube wells. Total water requirement is approx. 141.5 KLD, out of which Domestic water requirement is 100 KLD. Flushing water requirement is approx. 41.5 KLD. Daily water requirement calculation is given below in Table 1,2&3:

Table 1: Calculations for Daily Fresh Water Demand

DOMESTIC WATER REQUIREMENT						
S. No.	**Description**	**Occupancy**	**Units/Area**	**Total Population**	**Total water Req.**	
					L/Head	**LPD**
COMMERCIAL COMPLEX						
1	Studio/Guest rooms	120 units	2 person/unit	240	260	62400
	Staff	10% of hotel population		24	25	600
2	Commercial Area					
	1st Basement + Ground floor	2792 sqm	3 sqm/person	931		
	First floor	1398 sqm	6 sqm/person	233		
	Visitors	90% of total population of commercial area	-	1048	5	5240
	Staff	10% of total population of commercial area	-	117	25	2925
3	Multipurpose hall					
	Second floor	1046 sqm	1.8 sqm/person	582	25	14550
4	KITCHEN				L.S.	10000
Total Water Requirement						**95715**
SAY						**100KL**

Table 2: Calculations for Daily Flushing Water Demand

FLUSHING WATER REQUIREMENT						
S. No.	Description	Occupancy	Units/Area	Total Population	Total water Req.	
					L/Head	LPD
COMMERCIAL COMPLEX						
1	Studio/Guest rooms	120 units	2 person/unit	240	60	14400
	Staff	10% of hotel population		24	20	480
2	Commercial Area					
	1st Basement + Ground floor	2792 sqm	3 sqm/person	931		
	First floor	1398 sqm	6 sqm/person	233		
	Visitors	90% of total population of commercial area	-	1048	10	10480
	Staff	10% of total population of commercial area	-	117	20	2340
3	Multipurpose hall					
	Second floor	1046 sqm	1.8 sqm/person	582	20	11640
Total Water Requirement						**39340**
SAY						**40KL**

Table-3 : Water Calculations

Total Water Requirement	
• Domestic Water Requirement	100 KLD
• Horticulture and Irrigation @ 6 L/Sqm	1.5 KLD
• Flushing Water Requirement	40 KLD
TOTAL	**141.5 KLD**

Table-4 : STP CAPACITY

Waste Water Generated	116 KLD

• 80% of Domestic Water • 100% of Flushing Water Total	76.5 KLD 39.5 KLD
STP Proposed	**120 KLD**

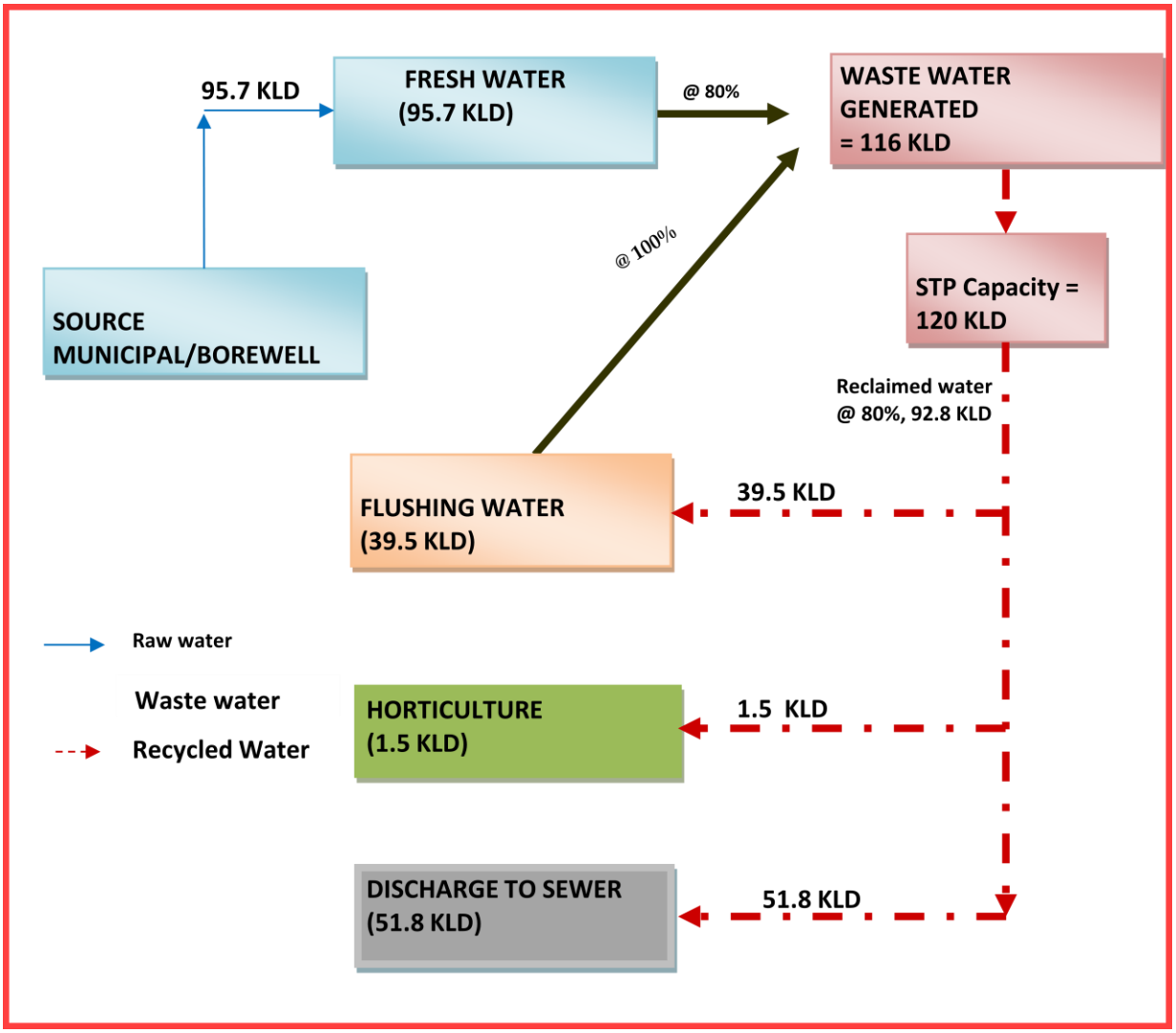


Figure 1: Water Balance Diagram for non-rainy season

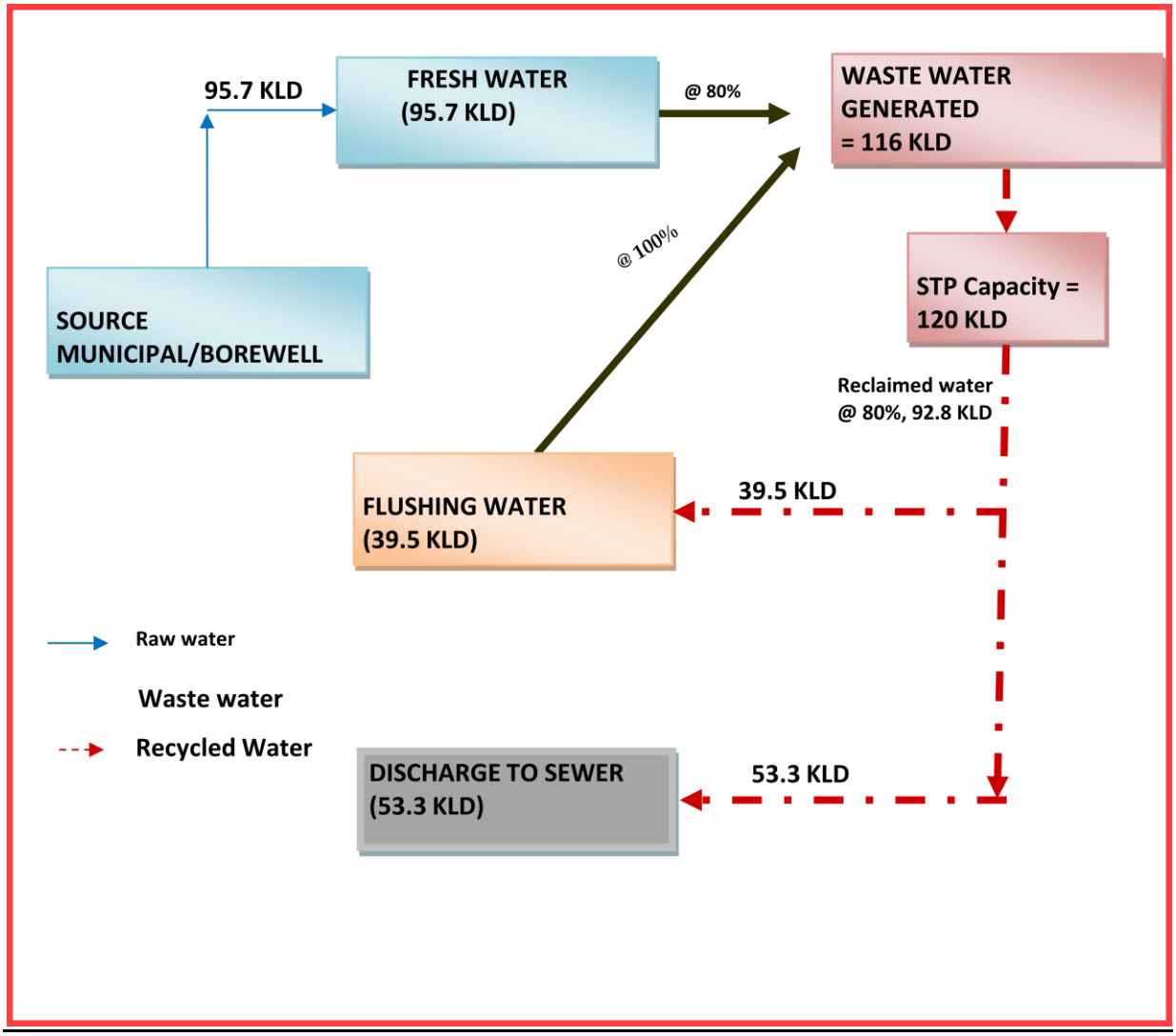


Figure 2: Water Balance Diagram for rainy season

Wastewater Generation & Treatment

It is expected that 116 KLD of wastewater shall be generated from project site during operation phase. Wastewater will be treated in the STP provided within the complex generating 92.8 KLD of recoverable water from STP which will be recycled within the project but 41 KLD during non- rainy season and 39.5 KLD during rainy season will become surplus and will be discharged to sewer line.

SEWAGE TREATMENT TECHNOLOGY

Sewage generated from the project will be treated in centralized sewage treatment plant of 120 KL/DAY capacity. Treatment will be done to achieve treated effluent to permissible limit to reuse for various non-domestic applications.

SEWAGE TREATMENT SYSTEM

MBBR TECHNOLOGY

Sewerage System

An sewage network shall collect the sewage from all units, and flow by gravity to the proposed sewage treatment plant.

Following are the benefits of providing the Sewage Treatment Plant in the present circumstances:

- Reduced net daily water requirements, source for Horticultural purposes by utilization of the treated waste water.
- Reduced dependence on the public utilities for water supply and sewerage systems.
- Sludge generated from the Sewage Treatment Plant shall be rich in organic content and an excellent fertilizer for horticultural purposes.

a. <u>Wastewater Details</u>

(a)	Daily load	:	120 KLD
(b)	Duration of flow to STP	:	24 hours
(c)	Temperature	:	Maximum 32^{o}C
(d)	pH	:	7 to 9.5
(e)	Colour	:	Mild

(f)	T.S.S. (mg/l)	:		100-400 mg/l
(g)	BOD (mg/l)	:		200-300 mg/l
(h)	COD (mg/l)	:		500-700 mg/l

b. <u>Final discharge characteristics</u>

(a)	pH	:		6.5 to 7.5
(b)	Oil & Grease	:		<10 mg/l
(c)	B.O.D.	:		<20 mg/l
(d)	C.O.D.	:		<100 mg/l
(e)	Total Suspended Solids		:	<10 mg/l

c. <u>Treatment Technology</u>

The technology is based on attached growth aerobic treatment followed by clarification by a tube settler. Lime will be dosed in for suppression of foaming tendencies. The clarified water will be filtered in a pressure sand filter after dosing of coagulant (alum) for removal of unsettled suspended impurities. This water will be passed through an activated carbon filter for removal of organics. The filtered water from ACF is then chlorinated & stored in the flushing tank.

The attached growth moving bed bio reactor (MBBR) process combines the biological processes of attached & suspended growth.

The waste water after screening is collected in an equalization tank. The equalization tank is required for preventing surges in flow & facilitating equalization of characteristics over the entire quantity of effluent in a given time. A provision for pre-aeration is made in the equalization tank in order to ensure mixing & to prevent the sewage from going septic.

The equalized sewage is then pumped into the MBBR reactor for biological processing. The water enters the bottom of the reactor & flows up through the media which grossly enhances the hydraulic retention time & provides a large surface area for growth of biological micro – organisms. The MBBR reactor is aerated by fine pore sub – surface diffusers which provide the oxygen for organic removal. The synthetic media floats on the water & the air agitation ensures good water to micro-organism contact.

The MBBR treatment is an attached growth type biological treatment process where in, the majority of biological activity takes place on the surface of the PVC media. Continuous

aeration ensures aerobic activity on the surface of the media. Micro – organisms attach themselves on the media & grow into dense films of a viscous jelly like nature. Waste water passes over this film with dissolved organics passing into the bio-film due to concentration gradients within the film. Suspended particles & colloid may get retained on this sticky surface where they are decomposed into soluble products. Oxygen from the aeration process in the waste water provides oxygen for the aerobic reactions at the bio-film surface. Waste products from the metabolic processes diffuse outward & get carried away by the waste water or air currents through the voids of the media.

The aerated effluent passes into a tube deck settler for clarification. The theory of gravity tube settler system is that the carrier fluid maintains laminar flow in the settling media at specified maximum viscosity. These two parameters of a carrier fluid, flowing through a hydraulic configuration, will determine the velocity gradients of the flow, the height of boundary layer at the inclined surface and the residence time within the media.

The carrier fluid must be viscous Newtonian, exhibiting a Reynolds number of less than 1000 and preferably, a number under 400. The laminar flow, through the inclined tubes, will produce velocity gradients sufficiently large to form an adequate boundary layer, where the velocity of fluid approaches zero. Boundary layers are necessary in functioning tube settlers, to allow suspended solids to separate from the viscous carrier fluid. Under gravitational forces, they will settle to the hydraulic surface of the tube and subsequently from the clarifier media.

Since the tubes are inclined at 60 degrees, solids settled on the tubes are continually discharged down. This downward rolling action increases particle contact and hence further agglomeration, which increases the sludge settle ability. Studies show that these agglomerated sludge particles can have a settling rate in excess of ten times the settling rate of the individual floc particles in the influent. These heavy agglomerated masses quickly slide down the 60 degree inclined tube and settle at the bottom of the tank.

At the bottom of the Tube deck, where the sludge leaves the Tube surface, the larger agglomerated captures smaller particles in the upcoming stream. This solid contact phenomenon greatly enhances the capture efficiency.

Stages of Treatment: The treatment process consists of the following stages:

- Equalization
- Bio- Degradation
- Clarification & Settling
- Filtration

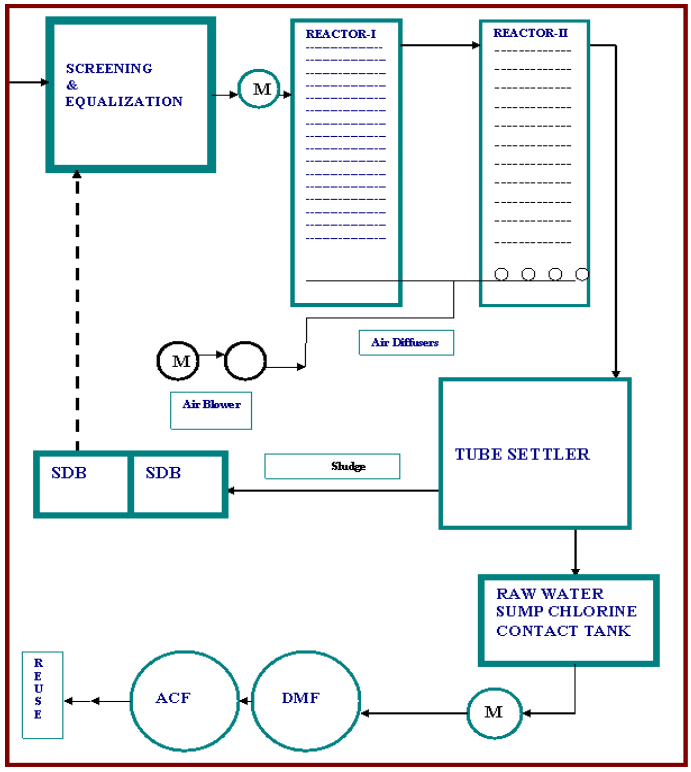


Figure 3: Schematic Diagram of STP

RAIN WATER HARVESTING

The storm water disposal system for the premises shall be self-sufficient to avoid any collection/stagnation and flooding of water. The amount of storm water run-off depends upon many factors such as intensity and duration of precipitation, characteristics of the tributary area and the time required for such flow to reach the drains. The drains shall be located near the carriage way along either side of the roads. Taking the advantage of road camber, the rainfall run off from roads shall flow towards the drains. Storm water from various blocks shall be connected to adjacent drain by a pipe through catch basins. The water table becomes more than 25 m in future, rainwater harvesting can be carried out. Therefore, it has been calculated to provide 1 rain water harvesting pits at selected locations, which will catch the maximum run-off from the area.

1) Since the existing topography is congenial to surface disposal, a network of storm water pipe drains is planned adjacent to roads. All building roof water will be brought down through rain water pipes.
2) Proposed storm water system consists of pipe drain, catch basins and seepage pits at regular intervals for rain water harvesting and ground water recharging.
3) For basement parking, the rainwater from ramps will be collected in the basement storm water storage tank. This water will be pumped out to the nearest external storm water drain.
4) Annual rainfall of 731mm/yr shall be considered for designing the storm water drainage system.

Peak hourly rainfall has been considered as 90 mm/hr. The length & breadth of Recharge pit to be 4.5 m and 3 m respectively, and effective Depth = 2.5 m is constructed for recharging the water. Inside the recharge pit, a recharge bore is constructed having 300 mm diameter and 30 m depth. The bottom of the recharge structure will be kept 4 m above this level. At the bottom of the recharge well, a filter media is provided to avoid choking of the recharge bore. Design specifications of the rain water harvesting plan are as follows:

- Catchments/roofs would be accessible for regular cleaning.
- The roof will have smooth, hard and dense surface which is less likely to be damaged allowing release of material into the water. Roof painting has been avoided since most paints contain toxic substances and may peel off.
- All gutter ends will be fitted with a wire mesh screen and a first flush device would be installed. Most of the debris carried by the water from the rooftop like leaves, plastic bags and paper pieces will get arrested by the mesh at the terrace outlet and to prevent contamination by ensuring that the runoff from the first 10-20 minutes of rainfall is flushed off.
- No sewage or wastewater would be admitted into the system.
- No wastewater from areas likely to have oil, grease, or other pollutants has been connected to the system.

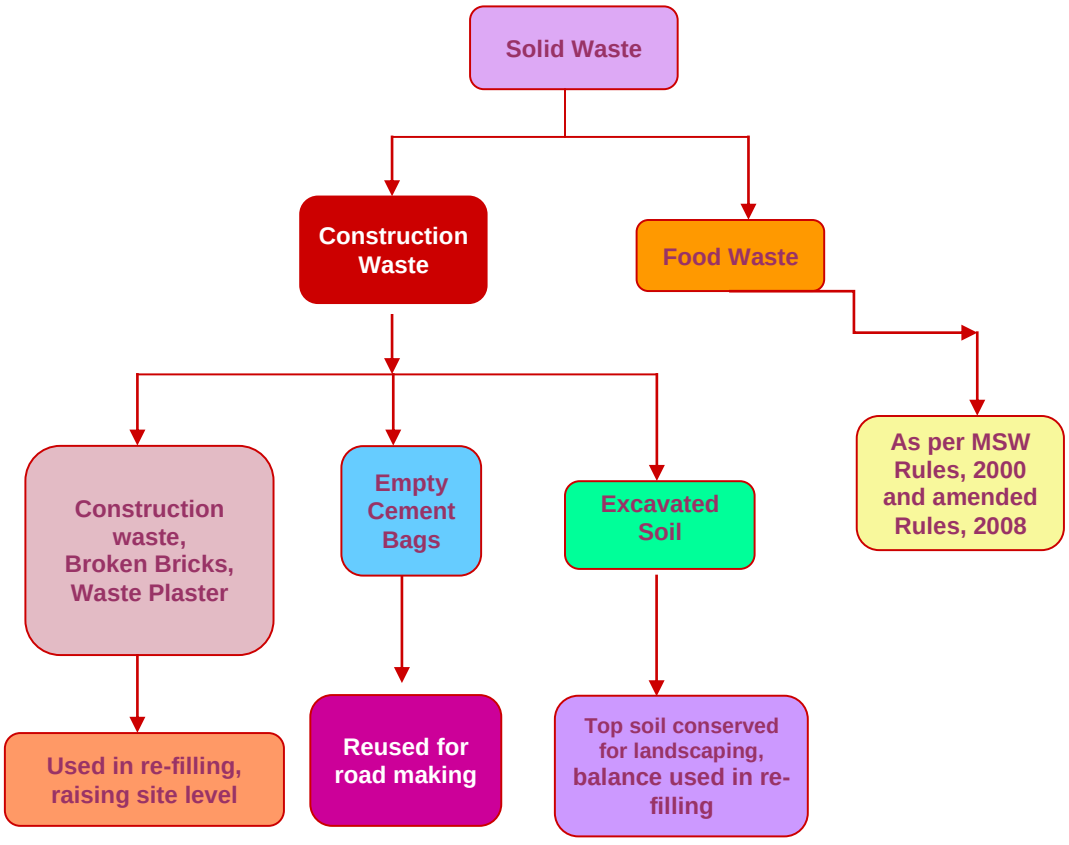
Calculations for storm water load

COMPUTATION FOR RAIN WATER HARVESTING PIT		
Total coverage area	1651.43	sq mt (approx).
Average Run off coefficient for roof top	90%	percent
Peak Intensity of Runoff (assumed for provisioning Harvesting pit)	90	mm/hr
Run off from site	134	cum/hr
15 min retention (as per CPWD norms)	33	cum/hr
Size of each Harvesting Pit provided		
(can be varied to suit the landscape)		
Length	4.5	m approx.
Width	3	m approx.
Depth (effective depth)	2.5	m approx.
Volumetric capacity of Harvesting Pit	33.75	cum
Volumetric capacity of De-silting Chamber	2	cum
Volumetric capacity of Harvesting Pit + De-silting Chamber	36	cum
Harvesting pit Required	**0.9**	**Nos.**
Harvesting pit Provided Say	**1.0**	**Nos.**

SOLID WASTE GENERATION

Solid waste would be generated both during the construction as well as during the operation phase. The solid waste expected to be generated during the construction phase will comprise of excavated materials, used bags, bricks, concrete, MS rods, tiles, wood etc. The following steps are proposed to be followed for the management of solid waste:

- Construction yards are proposed for storage of construction materials.
- The excavated material such as topsoil and stones will be stacked for reuse during later stages of construction.
- Excavated top soil will be stored in temporary constructed soil bank and will be reused for landscaping of the residential group housing project**.**
- Remaining soil shall be utilized for refilling / road work / rising of site level at locations/ selling to outside agency for construction of roads etc.



Figure

Solid Waste Management Scheme (Operation Phase)

During the operation phase, waste will comprise domestic as well as agricultural waste. The solid waste generated from the project shall be mainly domestic waste and estimated quantity of the waste shall be approx. @ 0.5 kg per capita per day for residents, @ 0.15 kg per capita per day for the commercial, 0.25 kg per capita per day for the staff members and landscape wastes @ 15 kg/acre/day). Following arrangements will be made at the site in accordance to Municipal Solid Wastes (Management and Handling) Rules, 2000 and amended Rules, 2008.

Table 4: Calculation of Solid Waste Generation

S. No.	Category	kg per capita per day	Waste generated (kg/day)
1.	Staff	141 @ 0.25 kg/day	35.25
2.	Guest Room	240 @ 0.5 kg/day	120
3.	Commercial	1630 @ 0.15 kg/day	244.5
3.	Landscape waste	0.052 acre @ 15 kg/acre/day	0.8
	TOTAL SOLID WASTE GENERATED		**400.55 kg/day**

(Source: For Waste Collection, Chapter 3, Table 3.6, Page no. 49, Central Public Health & Environment Engineering Organization, Ministry of Urban Development, (Government of India, May 2000))

❖ Collection and Segregation of waste

1. A door to door collection system will be provided for collection of domestic waste in colored bins from household units.
2. The local vendors will be hired to provide separate colored bins for dry recyclables and Bio-Degradable waste.
3. Litter bin will also be provided in open areas like parks etc.

❖ Treatment of waste

- Bio-Degradable wastes

1. Bio-degradable waste will be subjected to organic waste convertor and the compost will be used as manure.
2. STP sludge is proposed to be used for horticultural purposes as manure.

3. Horticultural Waste is proposed to be composted and will be used for gardening purposes.

- Recyclable wastes

i. *Grass Recycling* – The cropped grass will be spread on the green area. It will act as manure after decomposition.

ii. Recyclable wastes like paper, plastic, metals etc. will be sold off to recyclables.

❖ **Disposal**

Recyclable and non-recyclable wastes will be disposed through Govt. approved agency. Hence, the Municipal Solid Waste Management will be conducted as per the guidelines of Municipal Solid Wastes (Management and Handling) Rules, 2000 and amended Rules, 2008. A Solid waste management Scheme is depicted in the following figure for the residential project.

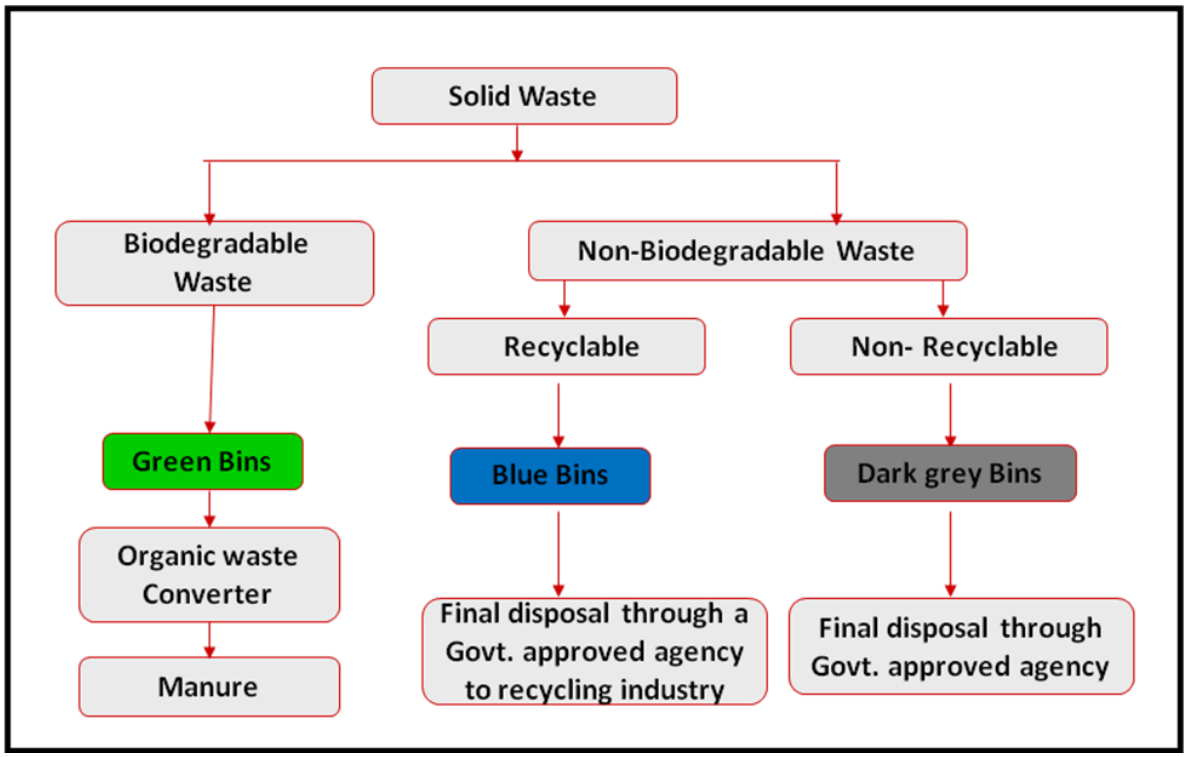


Figure 5: Solid Waste Management Scheme (Operation Phase)

ELECTRICAL

4.1 SOURCE OF POWER:

As per UPPCL norms power shall be supplied at 433 Volts if total load of the complex is less than 50 KW. If load is more than 50 KW and less than 4 MVA power shall be supplied at 11 KV. If load is more than 4 MVA and less than 20 MVA power shall be supplied at 33 KV. As the total demand load required is **1602 KVA**, hence single point connection at 11 KV shall be taken from UPPCL. The power shall be terminated in 11KV metering room comprising 11 KV meter and 11 KV VCB for isolation for each.

4.2 ELECTRICITY TARRIFF SYSTEM:-

Owner shall pay to UPPCL electricity charges on the basis of readings in 11 KV meter in addition to the fixed charges as per the norms as it will be a bulk supply connection. Owner shall in turn collect electricity charges from the tenants with the help of Energy Management Software which will be used for generating electricity bill for each tenant based on the energy consumption for Lighting, Power, A/C, adjustment of Common Area charges. The software shall have the capability to take in to account the dual tariff (Grid Supply & DG Supply). The software shall have the capability to take the 11 KV meter readings, subtract from these readings the individual readings of all the energy meters and adjust this energy difference amount on to the bills of tenants based on their areas.

4.3 SELECTION OF SIZE OF TRANSFORMER:-

The 11 KV power received shall be stepped down to 433 Volts which is the operating voltage, by installing 11 KV/433 Volt Transformer. As per the calculations enclosed in the report the total transformer capacity required is 1764 KVA, for which there will be one Substation comprising 11 KV VCB Panel, **Two nos. 1000 KVA** oil filled type Transformer.
The Transformer shall be ONAN type as it is proposed to being installed in open.

4.4 STAND BY POWER GENERATION: -

As per load calculations enclosed in the report in total DG capacity required is 1567 KVA for which it is recommended to provide 2 nos. 750 KVA DG Set considering almost 100% power backup for entire complex.

It is proposed to provide DG Sets with Power Command Centre (PCC) for AMF & Auto synchronizing function. Separately PLC based Auto Load Management system shall be provided which will function in coordination with Power Command Centre provided in each DG Set.

DG sets shall be provided outside in Acoustic Enclosure and exhaust pipes as per CPCB norms and shall be radiator cooled.

ELECTRICAL LOAD SHEET						
A	**DESCRIPTION OF FLOORS**	**PARKING SQ.MTR**	**WATT/ SQ.MTR**	**LOAD IN KW**	**DIVERSITY %**	**TOTAL LOAD IN KW**
1	BASEMENT FLOOR	2536.44	15	38.05	80%	30.44
	TOTAL (A)			**38.05**		**30.44**
B	**DESCRIPTION OF FLOORS**	**COMMERCIAL SQ.MTR**	**WATT/ SQ.MTR**	**LOAD IN KW**	**DIVERSITY %**	**TOTAL LOAD IN KW**
1	LOWER GROUND FLOOR	1651.43	150	247.71	75%	185.79
2	UPPER GROUND FLOOR	1651.43	150	247.71	75%	185.79
3	FIRST FLOOR	1651.43	150	247.71	75%	185.79
4	SECOND FLOOR	1585.72	150	237.86	75%	178.39
	TOTAL (B)			**981.00**		**735.75**
C	**DESCRIPTION OF FLOORS**	**HOTEL/ APARTMENT SQ.MTR**	**WATT/ SQ.MTR**	**LOAD IN KW**	**DIVERSITY %**	**TOTAL LOAD IN KW**
1	FOURTH FLOOR	1115.6	150	167.34	75%	125.51
2	FIFTH FLOOR	1115.6	150	167.34	75%	125.51
3	SIXTH FLOOR	1115.6	150	167.34	75%	125.51
4	SEVENTH FLOOR	1115.6	150	167.34	75%	125.51
5	EIGHTH FLOOR	951.07	150	142.66	75%	107.00
	TOTAL (C)			**669.36**		**609.02**
D	**DESCRIPTION OF FLOORS**	**SERVICE SQ.MTR**	**WATT/ SQ.MTR**	**LOAD IN KW**	**DIVERSITY %**	**TOTAL LOAD IN KW**
1	3RD/SERVICE FLOOR	1585.72	5	7.93	75%	5.95
2	MACHINE ROOM/MUMTY	393.63	5	1.97	75%	1.48
	TOTAL (D)			**9.90**		**7.42**
E	**COMMON SERVICES**					
1	LIFT (6NOS) @12KW EACH			72	80%	57.60
2	ESCALATOR (1 NO.) @12KW EACH			12	80%	9.60
3	FIRE FIGHTING			125	10%	12.50
4	PLUMBING			25	80%	20.00
5	STP			25	80%	20.00
6	EXTERNAL LIGHTING			15	80%	12.00

7	COMMON AREA LIGHTING			10	80%	8.00
	TOTAL (E)			**284.00**		**139.70**

GRAND TOTAL 1522.KW

TRANSFORMER SELECTION

Transformer Capacity Considering 0.95 Power Factor **1602.KVA**

Transformer Capacity Considering 80% Loading **2003.KVA**

Transformer Capacity 2 No. 1000KVA 11KV/.433 KV Oil filled type Transformer

GRAND TOTAL 1522.KW

D.G. SET SELECTION

OVERALL DIVERSITY 70% 1066.KW

D.G. SET Capacity Considering 0.8 Power Factor **1332.KVA**

D.G. SET Capacity Considering 85% Loading **1567.KVA**

D.G. SET Capacity 2 No. 750KVA