

PROJECT
MONK MONASTERY
PROPOSED AT, KHASRA NO.:1144M,
1146M VVIP ADDRESSES ALONG VILLAGE -
NOORNAGAR, GHAZIABAD (U.P)

SUBJECT
MEP SERVICES

ENVIRONMENT IMPACT ASSESSMENT REPORT

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INTRODUCTION

The proposed project is a residential project, located at VVIP Addresses along village Noornagar, Ghaziabad, U.P. The building consists of Residential flats, club house and parking in basement with all modern amenities to be developed on land of approx. 4547.35 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. 43 KL, out of which domestic water requirement is 40 KL. Fresh water requirement is approx. 28 KL which is 70% of the domestic water demand. Daily water requirement calculation is given below in Table 1:

Table 1: Calculations for Daily Water Demand

S. No.	Description	Occupancy	Units/Area	Total Population	Total water Req.	
					L/Head	LPD
A.	RESIDENTIAL DEVELOPMENT					
1	4 BHK UNITS	40 units	7 person/unit	280	86	24080
	STAFF	15% of population		42	86	3612
	Visitors	15% of population		42	15	630
2	COMMUNITY HALL					
	GROUND FLOOR	154 sqm	1.4 sqm/person	110	45	4950
	FIRST FLOOR	154 sqm	1.4 sqm/person	110	45	4950
Total Water Requirement						38222
SAY						40 KL
B.	HORTICULTURE AND LANDSCAPE DEVELOPMENT					
1	GREEN AREA	454.73 sqm			6 lt/sqm	2728.38
SAY						3 KL

Table-2 : Waste water calculations

Domestic Water Requirement	38.22 KL
• Fresh(70% of domestic)	26.75 KL
• Flushing (30% of domestic)	11.47 KL
Waste Water Generated (80% fresh + 100% flushing)	32.87 KL
SAY	35 KL

The water balance diagram is shown below in figure 1 & 2:

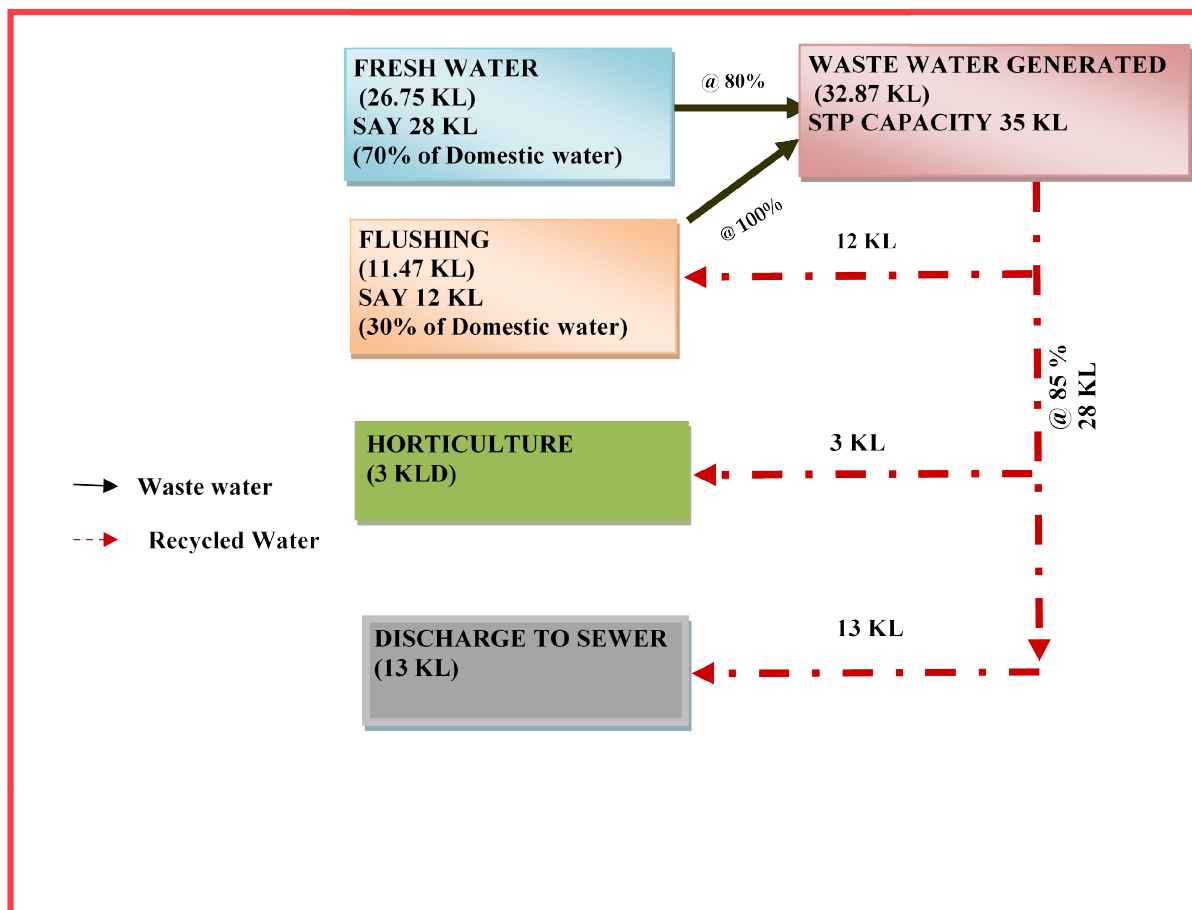


Figure 1: Water Balance Diagram for non-rainy season

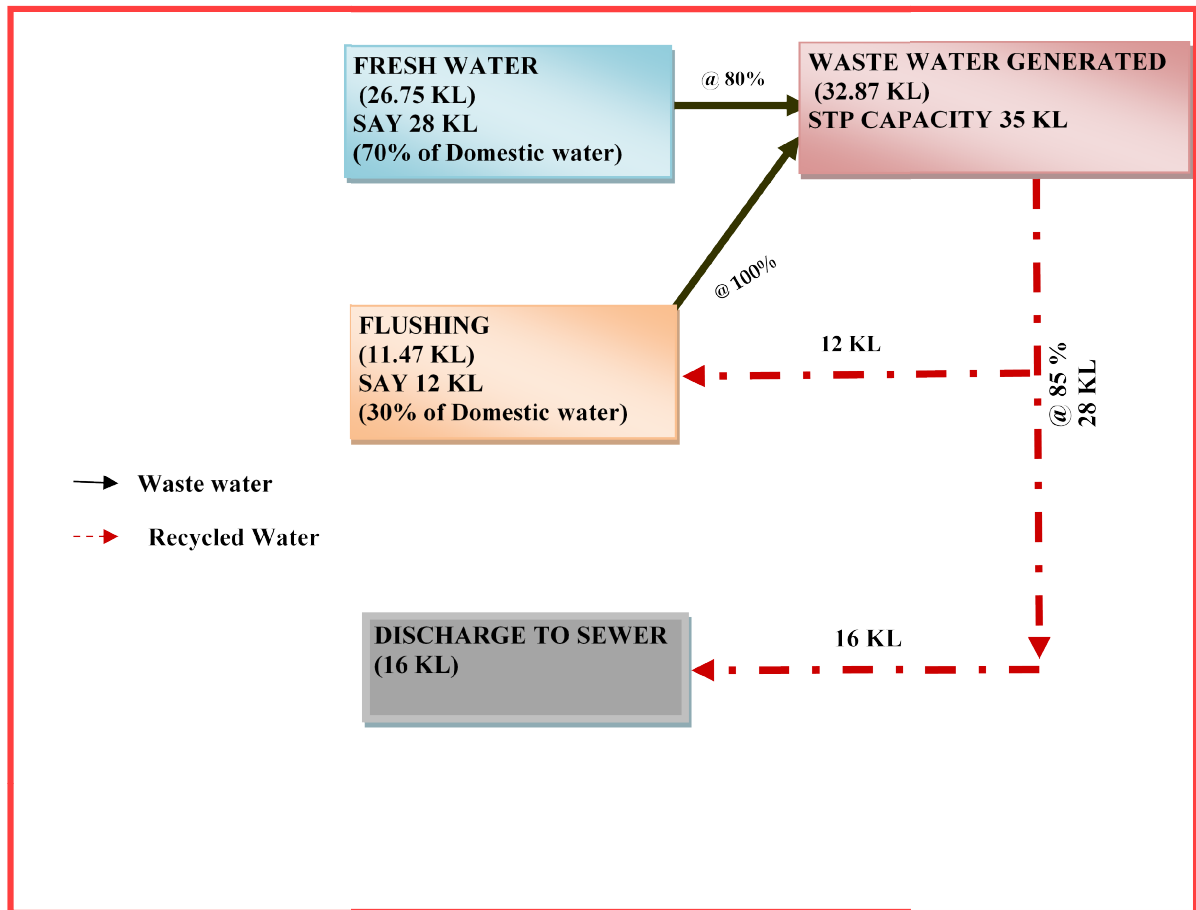


Figure 2: Water Balance Diagram for rainy season

Wastewater Generation & Treatment

It is expected that 35 KLD of wastewater shall be generated from project site during operation phase. Wastewater will be treated in the STP provided within the complex generating 28 KLD of recoverable water from STP which will be recycled within the project but 13 KLD during non- rainy season and 16 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 35 KL/DAY capacity. Treatment will be done to achieve treated effluent to permissible limit to reuse for various non-domestic applications.

SEWAGE TREATMENT SYSTEM

The membrane bioreactor (MBR) has emerged as an efficient compact technology for municipal and industrial wastewater treatment. The major drawback impeding wider application of MBRs is membrane fouling, which significantly reduces membrane performance and lifespan, resulting in a significant increase in maintenance and operating costs. Finding sustainable membrane fouling mitigation strategies in MBRs has been one of the main concerns over the last two decades. This paper provides an overview of membrane fouling and studies conducted to identify mitigating strategies for fouling in MBRs. Classes of foulants, including biofoulants, organic foulants and inorganic foulants, as well as factors influencing membrane fouling are outlined. Recent research attempts on fouling control, including addition of coagulants and adsorbents, combination of aerobic granulation with MBRs, introduction of granular materials with air scouring in the MBR tank, and quorum quenching are presented. The addition of coagulants and adsorbents shows a significant membrane fouling reduction, but further research is needed to establish optimum dosages of the various coagulants/adsorbents. Similarly, the integration of aerobic granulation with MBRs, which targets biofoulants and organic foulants, shows outstanding filtration performance and a significant reduction in fouling rate, as well as excellent nutrients removal. However, further research is needed on the enhancement of long-term granule integrity. Quorum quenching also offers a strong potential for fouling control, but pilot-scale testing is required to explore the feasibility of full-scale application.

Keywords: aerobic granulation, extracellular polymeric substances (EPS), membrane bioreactor (MBR), membrane fouling, quorum quenching, soluble microbial products (SMPs), wastewater treatment.

GENERAL INFORMATION

Treated Sewage Quality

The treatment plant shall be guaranteed to produce Sewage with following characteristics as per the requirement of the Pollution Control Board.

1. Wastewater Details

- | | | | |
|-----|-------------------------|---|----------|
| (a) | Daily load | : | 35 KLD |
| (b) | Duration of flow to STP | : | 24 hours |

(c)	Temperature	:	Maximum 32°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

2. Final discharge characteristics

(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

Treated sewage quality shall be checked for composite samples with at least 95% compliance in a month.

TREATMENT CONCEPT

Domestic sewage effluent from the units will flow through Bar Screen, Oil Skimmer and collected in equalization tank.

The homogenized and mixed wastewater in the equalization tank shall be pumped through fine screening before entering the MBR.

An internally-fed screen with punched-hole openings less than or equal to 2-3 mm in diameter with no possibility of bypass or carryover is absolutely required to maintain both membrane warranty, and optimal MBR operation.

Effluent from the Equalization tank and Return Activated Sludge (RAS) being pumped from the membrane tank must be mixed and fed into the bioreactor tank.

Biological trains shall be equally divided into single/multiple trains on hydraulic loading and shall be operated in parallel. Each train shall comprise of an aerobic tank. For Nitrogen removal, bioreactor shall additionally consist of Anoxic zone of suitable size

Influent wastewater and re-circulated sludge shall be divided between all the biological trains as it enters each aerobic tank.

Biological process blowers and fine bubble diffusers in the aerobic tanks shall provide the oxygen required for the biological process as well as the mixing energy required to keep the mixed liquor in suspension. Dissolved oxygen shall be monitored in each aerobic tank to achieve a desired set point of 2 mg/L.

The mixed liquor shall overflow by gravity from the biological tanks to the membrane tanks where the solid/liquid separation takes place by means of the vacuum created by the process pumps. The permeate shall be stored in the permeate storage tank.

The mixed liquor from the end of the bioreactor aerobic zone shall proceed by gravity to the membrane filtration basins. At the outlet of each aerobic tank and inlet of each filtration basin there shall be an isolation valve. Flow shall proceed by gravity through the valve. The sluice gate valve/isolation valve can be used to either isolate of the membrane tank (i.e. during cleans). Plant demand shall be controlled by the feed flow into the system and can be trimmed by the level in the bioreactor/membrane tank. One permeate pump per membrane train shall be employed to draw water through the membranes. Treated water shall flow from the permeate pump to the final disposal point.

Under normal operation and average day flow conditions, permeation is stopped for a specific period of time at regular intervals. This membrane relaxation period, combined with air scouring, effectively removes solids that have accumulated on the membrane surface or within the fibers and reduces electrical costs.

Same permeate pump with valving arrangement shall be provided for back pulsing the membranes.

From membrane tanks, Permeate pump shall draw treated effluent through the pores of the membrane fibers and into the back pulse tank. Once full, the treated effluent is automatically diverted away from the back pulse tank to a final disposal point. Clean water (permeate) is suctioned through hollow fiber membranes by centrifugal permeate pumps.

The membranes shall be air scoured with required capacity of membrane aeration blowers fitted with Mechanical Variable speed drive or with pulley arrangement.

Waste activated sludge (WAS), shall be removed to the sludge handling facilities via a side stream on the discharge from the membrane tank by pumping in a controlled manner.

7.4.2 Major Process Components for MBR system

The plant shall comprise of the following major components (not limited to) :

- Coarse and fine Bar screens, Oil Removal system
- Equalization tank , Mixing system

During recovery clean, no permeate water shall be generated from the membrane train so bidder has to is assuming an equalization tank of suitable capacity to take care of the variable flow rates.

- Bioreactor feed pump
- Mechanical Fine Screen 2-3 mm (Punched Hole configuration)

Screen raw wastewater with ≤ 3 mm punch hole internally fed rotary drum screen or center flow travelling band screen or fine brush screen.

Design notes:

- 1 All screen openings are punch hole (dimensions in two directions). Bar or wedge wire fine screens are not acceptable.

2 Alternative screens and/or pre-treatment methods must be approved by Consultant.

- Bioreactor tank
 - Anoxic Mixer in anoxic zone (Only if Nitrogen removal required)
 - Fine bubble diffusers for aerobic tanks
 - Instruments such as DO meter
 - Biological process blowers
 - Biological process chemical feed system
 - Membrane tank with accessories for installing UF membrane

A “membrane train” is a treatment unit consisting of multiple “cassettes” that are manifolded together, installed in a concrete (i.e. membrane tank) and connected to a common permeate pump.

Within each membrane tank, the cassettes are connected to permeate header and air supply header(s). The permeate header conveys permeate from the cassettes to the permeate pump suction and also delivers cleaning solutions to the membranes. The air headers deliver air to cassette aerators for air scouring to prevent solids accumulation on the membrane surface

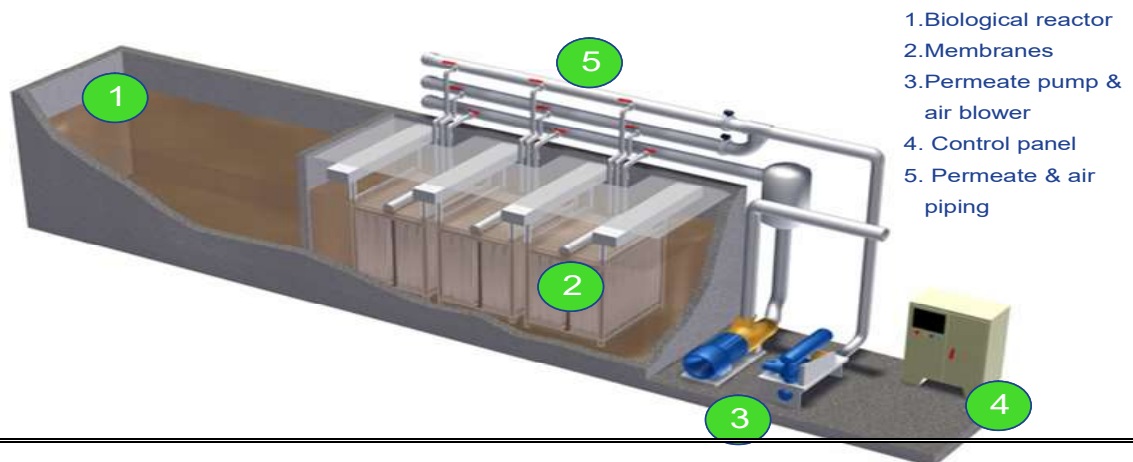
Design notes:

1. Puddle pipes inside membrane tank to be MS hot dip galvanized.
2. Membrane tank accessories required to install membranes like beams, brackets, hangers, hold pins to be minimum SS304L grade.
3. Permeate header should be SS304L (minimum) inside membrane tank and FRP, PVC, HDPE on permeate /back pulse pumps suction and discharge.

- MBR membrane

The membrane cassettes are immersed directly in the mixed liquor in the membrane tanks.

The 3D drawing above (example) shows the main components of an MBR system



- Permeate pumps/back pulse pumps (process pumps) with VFD

The membrane cassettes in each tank shall be connected to a permeate header, which in turn shall be connected to the suction of a Permeate/Back pulse Pump. This set of cassettes, the piping, and the pump is referred to as a membrane train. The vacuum generated by the Permeate Pump draws permeates from the outside in through the membrane fibers. All Permeate/Back pulse pumps discharge into a common permeate collection header.

All the trains in the plant are operated with a repeating filtration cycle. It consists of two phases: permeation (drawing) of water through the membranes followed by a short period of reverse flow (back pulsing) or relaxation (no flow). For the proposed membrane filtration system the same pump will be used for permeate and backpulse with necessary valving arrangement

Pump parts and MOC:

Casing : CI
Impeller : CI/Br/SS

- Permeate pump priming system -Ejector system

After extended standby periods or when a train is first placed into automatic control, an automated valve which connects the top of the membrane train permeate header to an ejector (shown below) and an automated valve which connects the ejector to the Air Compressor opens. The compressed air drives the ejector to create a vacuum that draws air out of the train, pulling water through the membranes until water in the header hits a level switch. This indicates that both valves can be closed to ensure the system is primed and can be placed in operation. To simplify system control the ejector configuration consists of one unit per train and is controlled by PLC.

- Air Scour Blowers for Membrane Aeration

Whenever a membrane train is in production, membrane aeration blowers will produce the air scour required to remove solids from the membrane surface and maintain membrane permeability. A specially designed and highly efficient aeration system to be used to scour the outside surface of the membrane and move mixed liquor solids away from the membrane fibers. This shall be accomplished by a aeration system that uses a aeration grid, which is integrated into the base of each cassette. The integration of diffusers within the cassette simplifies the installation of diffusers and enhances the operation of the membrane unit.

The blowers discharge into the membrane aeration manifolds. This manifold delivers air to the membrane distribution air headers installed above each membrane tank (train).

Conventional Cyclic aeration :For optimal balance between the energy requirements of the membrane aeration blowers and the amount of air scouring provided at the membranes, the system can be designed to cycle air within each membrane cassette (10:10 mode or 10:30 mode). Each cassette is equipped with two air connections; one air connection from each cassette is connected to one of two air headers at each membrane tank, using a flexible hose. Airflow is cycled from one train header to the other (using pneumatic valves) so that half of each cassette is aerated at a time

- Recirculation Pump (RAS pumps)
- Membrane tank Drain pump

The membrane tanks need to be drained for recovery chemical cleaning or other maintenance procedures. This can be achieved by using the above mentioned mixed liquor recirculation pumps (RAS Pumps) or separate drain pumps may be used.

- Foam Pump
- Compressor
- Sludge dewatering system
- Common membrane chemical cleaning system
- Control equipment (PLC)
- Instrumentation - Pressure Transmitters, Temperature Transmitters, Level
- Transmitters, Turbidity meter and Magnetic flow Meter
- TREATED WATER

The Sewage discharged from the MBR system will have low biological solids. The quantity of biological solids in the Sewage will depend substantially on the quantity of suspended solids and the concentration of soluble BOD entering the system. It is therefore necessary to provide means of separating the biological mass from the Sewage. The treated water after MBR shall be collected in treated water tank for onward usage in gardening and flushing

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 rainwater 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 45 mm/hr. The length & breadth of Recharge pit to be 3.5 m and 2.5 m respectively, and effective Depth = 2.2 m 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

$$\text{Roof-top area} = \text{Ground Coverage} = 1376.38 \text{ m}^2$$

$$\text{Green Area} = 454.73 \text{ m}^2$$

$$\begin{aligned}\text{Paved Area} &= \text{Total Plot Area} - (\text{Roof-top Area} + \text{Green Area}) \\ &= 4547.35 - (1376.38 + 454.73) \\ &= 2716.24 \text{ m}^2\end{aligned}$$

Runoff Load

$$\begin{aligned}\text{Roof-top Area} &= 1376.38 \times 0.045 \times 0.9 \\ &= 55.74 \text{ m}^3/\text{hr}\end{aligned}$$

$$\begin{aligned}\text{Green Area} &= 454.73 \times 0.045 \times 0.15 \\ &= 3.06 \text{ m}^3/\text{hr}\end{aligned}$$

$$\begin{aligned}\text{Paved Area} &= 2716.24 \times 0.045 \times 0.8 \\ &= 97.78 \text{ m}^3/\text{hr}\end{aligned}$$

$$\begin{aligned}\text{Total Runoff Load} &= (55.74 + 3.06 + 97.78) \text{ m}^3/\text{hr} \\ &= 156.58 \text{ m}^3/\text{hr}\end{aligned}$$

$$\begin{aligned}\text{Taking 15 minutes Retention Time, Total volume of storm water} &= 156.58/4 \\ &= 39.14 \text{ m}^3\end{aligned}$$

Taking the length & breadth of Recharge pit to be 3.5 m and 2.5 m respectively, and effective Depth = 2.2 m.

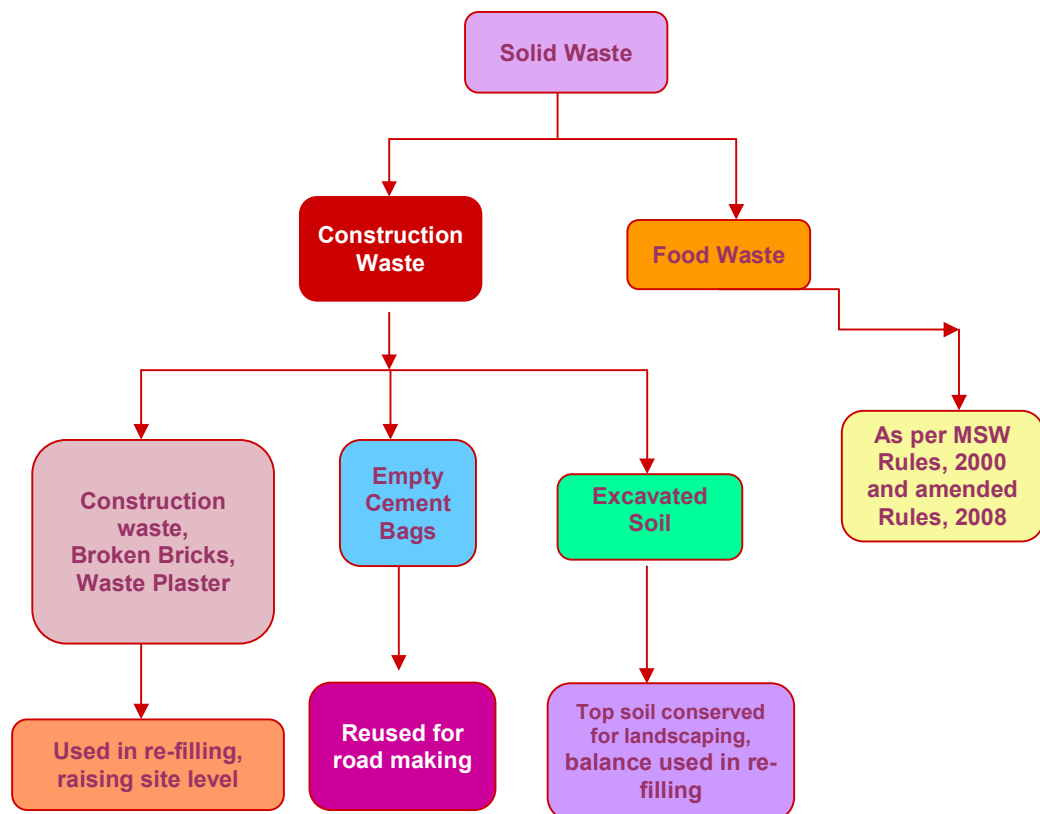
$$\text{Volume of a single Recharge pit} = L \times B \times H = 3.5 \times 2.5 \times 2.2 = 19.25 \text{ m}^3$$

Hence No. of pits required = $39.14/19.25 = 2.03$ or say 2 **Pits**.

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 (Construction 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. 168.55 kg per day (@ 0.5 kg per capita per day for residents, @ 0.15 kg per capita per day for the visitor, 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.	Residents	280 @ 0.5 kg/day	140
2.	Staff	42 @ 0.25 kg/day	10.5
3.	Visitors	42 @ 0.15 kg/day	6.3
4.	Landscape waste	0.78 acre @ 15 kg/acre/day	11.75
	TOTAL SOLID WASTE GENERATED		168.55 kg/day

❖ 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

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

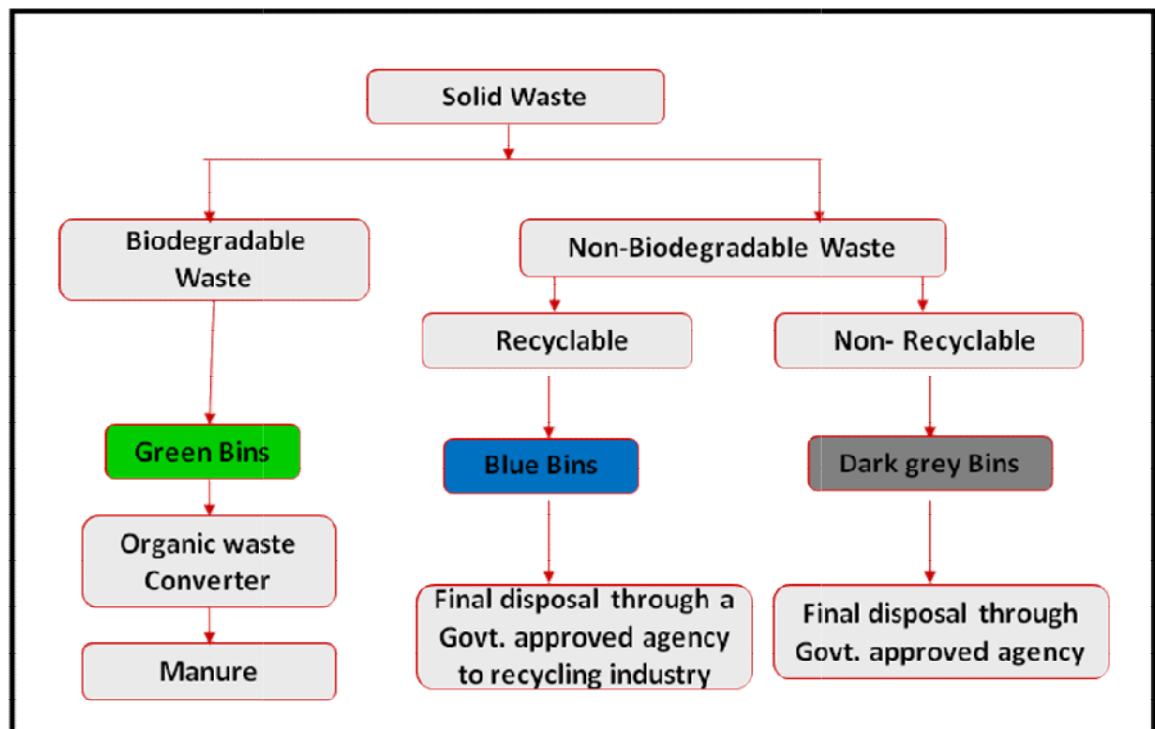


Figure 5: Solid Waste Management Scheme (Operation Phase)

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. As the total demand load required is 363.63 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 415 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 400 KVA, for which there will be one Substation comprising 11 KV VCB Panel, 400 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 296 KVA for which it is recommended to provide 1 nos. 320KVA 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							
SR. NO.	PLOT DESCRIPTION	AREA (IN SQM)	TOTAL SQMTR.	Load Per sqm (watt)	Total Connected Load (in KW)	D.F.	Total Demand Load (in KW)
1	BLOCK A	1565.09	1565.09	50	78.25	0.5	39.13
2	BLOCK B	1565.09	1565.09	50	78.25	0.5	39.13
3	BLOCK C	1565.09	1565.09	50	78.25	0.5	39.13
4	BLOCK D	1565.09	1565.09	50	78.25	0.5	39.13
	TOTAL	6260	6260		313kW		157kW
	COMMON AREA SERVICES						
	LIFT LOAD 4NOS @ 7.5KW EACH				30.00	1	30.00
	EXTERNAL LIGHT				10.00	0.5	5.00
	COMMON LIGHTING				6.00	0.8	4.80
	BASEMENT AREA	2175.629	2175.629	10	21.76	0.5	10.88
	CLUB HOUSE	307.81	307.81	150	46.17	0.75	34.63
	STP Load				15.00	0.8	12.00
	Water Pumps + WTP				10.00	0.8	8.00
	TOTAL				138.93kW		105.31kW
	GRAND TOTAL OF RESIDENTIAL & COMMON SERVICES						261.82kW
	Transformer Capacity Considering 0.9 Power Factor						290.91KVA
	Transformer Capacity Considering 80% Loading						363.63KVA
	Transformer Capacity 1 Nos. 400KVA 11/.415 KV Oil Filled Transformer						

D.G. LOAD SHEET						
SR. NO.	PLOT DESCRIPTION	NO OF UNITS/AREA	LOAD PER UNIT/ PER SQM (watt)	Total Connected Load (in KW)	D.F.	Total Demand Load (in KW)
1	BLOCK A	10	3 KW	30.00	0.8	24.00
2	BLOCK B	10	3 KW	30.00	0.8	24.00
3	BLOCK C	10	3 KW	30.00	0.8	24.00
4	BLOCK D	10	3 KW	30.00	0.8	24.00
	TOTAL			120kW		96kW
	COMMON AREA SERVICES					
	LIFT LOAD 4NOS @ 7.5KW EACH			30.00	1	30.00
	EXTERNAL LIGHT			10.00	0.5	5.00
	COMMON LIGHTING			6.00	0.8	4.80
	BASEMENT AREA	2175.629	10	21.76	0.5	10.88
	CLUB HOUSE	307.81	150	46.17	0.75	34.63
	STP LOAD			15.00	0.8	12.00
	WATER PUMPS + WTP			10.00	0.8	8.00
	TOTAL			138.93kW		105.31kW
	GRAND TOTAL OF RESIDENTIAL & COMMON SERVICES					201.31kW
	D.G Capacity Considering 0.8 Power Factor					251.63KVA
	D.G Capacity Considering 85% Loading					296.04KVA
	D.G Capacity 1 Nos. 320KVA					