

Environment Clearance Application Conceptual Plan

**For
Proposed Gramin Vikas Bhawan**

**At
Curzon Road/ Kasturba Gandhi Marg, New Delhi**

**Developed by
M/s Central Public Works Department [CPWD]**

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Introduction

General

- As per EIA Notification, 2006 & its amendments, all building construction and area development projects comes under schedule 8 and are required to obtain prior environmental clearance from State Environmental Impact Assessment Authority (SEIAA)/MoEF&CC. For the category 8(a), application seeking prior environmental clearance shall be made in the prescribed Form 1 annexed herewith and supplementary Form 1A and Conceptual Plan in SEIAA/MoEF&CC. The project shall be screened and scrutinized by respective SEAC/EAC. Following the appraisal of the project to the satisfaction of the SEAC/ SEIAA/MoEF&CC, Environmental Clearance shall be granted.
- Since, the built up area of the project is **58,258.4 m²**, it is categorized as 8(a) project, under the EIA Notification, 2006 and requires environmental clearance from the EAC.

Brief about Project

- Grameen Vikas bhawan shall be developed by central public works department, Delhi. Proposed building shall have nine floors and will bring under one roof all the departments of important Ministries — Rural Development, and GNCTD. Proposed Project shall be comprises of green building features also. The building will have green features such as zero waste discharge, solar power generation to meet energy demands, real time response to climatic day light and functional variation, an automated controls for efficiency through use of sensors, grey water recycling, gain water harvesting, low energy consumption, use of automated shades to reduce day light energy, use of water efficient fixtures etc. Other salient features of the site are as follow:

Table 1- Salient features of the project

<i>S. No.</i>	<i>Description</i>	<i>Proposed</i>
1.	Plot Area	14,607.8 m ²
2.	Proposed Built Up Area	58,258.4 m ²
3.	Maximum Height	40.2 mtrs
4.	Maximum No. of Floors	2B+G+9
5.	Cost of Project	361.6 Crores
6.	Expected Population	4,228
7.	Total Water Requirement	315 KLD
8.	STP Capacity and Technology	200 KLD (FAB)
9.	No. of RWH pits	4

10.	Parking Proposed	628 ECS
11.	Solid Waste Generation	957.62 kg/day
12.	Total Power Requirement	2,077 kVA

Project Location and Connectivity

Proposed site is situated at Curzon road/Kasturba Gandhi Marg, New Delhi. The proposed site is well connected to Delhi, Noida, and other NCR regions. It is surrounded by places such as Andhra house, Hyderabad house, Lok sabha, Vigyan bhawan, Curzon hostel, Cannaught place, India gate etc. within 5km of the area of the site.

Site co-ordinates of the project site are as follow.

Table 2-Geographical co-ordinates of the site

S.No.	Description	Details
1.	Corner-A	28°37'17.48"N and 77°13'28.99"E
2.	Corner-B	28°37'12.21"N and 77°13'32.18"E
3.	Corner-C	28°37'10.57"N and 77°13'28.60"E
4.	Corner-D	28°37'9.73"N and 77°13'28.17"E
5.	Corner-E	28°37'10.10"N and 77°13'27.41"E
6.	Corner-F	28°37'11.46"N and 77°13'27.51"E
7.	Corner-G	28°37'12.53"N and 77°13'27.27"E
8.	Corner-H	28°37'15.87"N and 77°13'28.33"E

Site is well connected to transport facilities. Proposed site is adjacent to Shrimat Madhav rao scindia marg in south and having pandit ravi shanagr Shukla marg in its north. To its west runs the ashoka road at few meters distance and KG marg to its East. Site surroundings and sensitivity areas within 15 km are stated below.

Table 3-Site surroundings

S.No.	Particulars	Name	Distance 'n' Direction (approx.)
1.	Nearest Railway Station	New Delhi Railway station Pragati Maidan Halt Hazrat Nizamuddin Railway Station Janpath Metro Station	2.36 km in N 2.27 km in E 4.48 km in SE 0.72 km in NW
2	Nearest Airport	Indira Gandhi International Airport Safdarjung Airport	14.14 km in SW 4.32 km in SSW
3	Nearest Populated Area	Janpath Mandi House Bara Khamba Connaught Place	0.75 km in NW 0.91 km in NE 1.45 km in N 1.44 km in NW
4	State Boundary	Delhi - UP state border Delhi- Haryana state border	8.11 km in ESE 14.25 km in SE
5	Nearest Roads	NH-24 NH-8	5.40 km in ESE 6.54 km in SW

		NH-2 KG Marg Firozeshah Road	7.61 km in SE Adjacent to the site, E Adjacent to the site, N
6	Nearest School	Lady Irwin Sr. Sec. School Navyug School Usha & Lakshmi Mittal Institute ICFAI University	0.13 km in WSW 0.23 km in SW 0.33 km in E 0.95 km in N
7	River	Yamuna River	2.77 km in E

(Source: Google Earth Pro)

Google map and topographical map showing site and surroundings within 500 mtrs, 10 km and 15 km are attached.

[Annexure 1- Google map showing site and surroundings within 500 mtrs](#)

[Annexure 2-Toposheet map showing site and surroundings within 10 and 15 km](#)

Land Environment

- The land is allotted by state government to develop the public and semipublic facilities. Total plot area is 14,607.8 m² (1.46 Hectare or 3.60 Acre)

[Annexure 3: Land Ownership Documents](#)

Topography

- Physically the natural capital territory of Delhi can be divided into 3 segments - the Yamuna flood plain, the Ridge and the Plain. The entire area of the national capital territory of Delhi is categorized as Bangar or the plain. The land of the plain is mostly fertile.
- The entire area of the site is monotonously flat. The project area possesses plain terrain. Highest elevation levels is 218 meters & the lowest levels is 216 meters above mean sea level. The project site is located in New Delhi district which comprises of three subdivisions namely: Delhi Cantonment, Chankyapuri, and Vasant Vihar.

Physiography

Geology and Seismicity

New Delhi forms a small part of the Delhi metropolitan area. Since the city is located on the Indo-Gangetic Plain, there is little difference in elevation across the city. New Delhi and surrounding areas were once a part of the Aravali Range; all that is left of those mountains is the Delhi Ridge, While New Delhi lies on the floodplains of the Yamuna River, it is essentially a landlocked city. East of the river is the urban area of Shahdara New Delhi falls under the seismic zone-IV,

Figures below show the Seismic Zone map for India Indicating project location and First Level Seismic Hazard Micro-zonation Map of NCT, Delhi

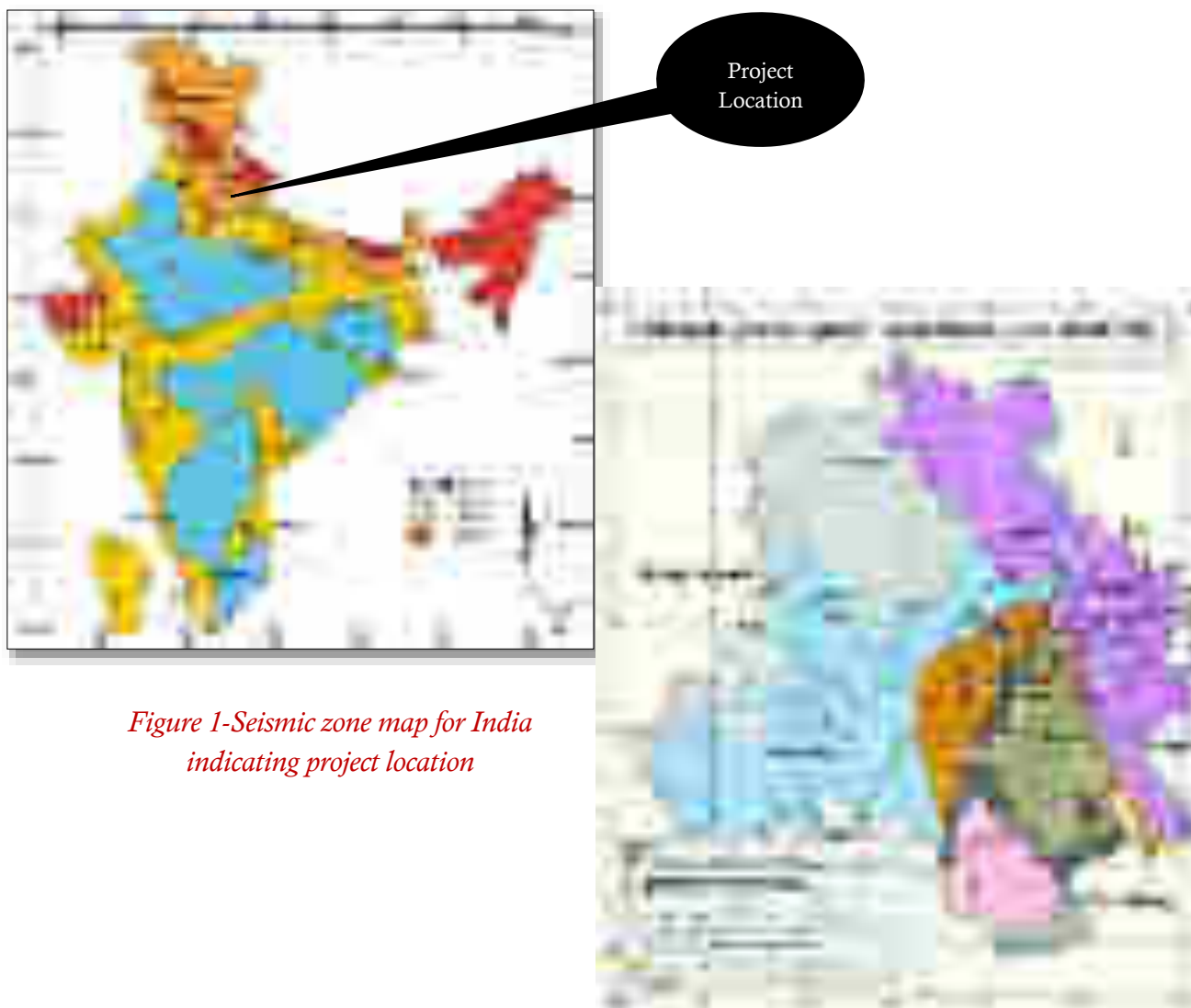


Figure 1-Seismic zone map for India indicating project location

Area Details

Total site area under project site is 14,607.8 m² (1.46 Hectare or 3.60 Acre). Total built up area of the site is 58,258.4 m². Detailed area statement is as follow

Table 4- Area Details

S.No.	Particulars	Total Area (m ²)
1.	Total Area of Plot (A)	14,607.8
2.	Permissible Ground Coverage (@30% of PA)	4,382.34
3.	Proposed Ground coverage (@ 28.95% of PA)	4,229
4.	Permissible FAR (@2 of PA)	29,215.6
5.	Proposed FAR (@ 1.95 of PA)	28,474.7
6.	Proposed Green area (@30 % of PA)	4,382.34

7.	Open Area	5,996.46
8.	Basement area (2 levels)	21,454
	Basement 1	10,727
	Basement 2	10,727
9.	BUILT UP AREA	58,258.4
10.	Non FAR Area	8,329.7
11.	Height of the building (2B+G+9)	40.2 mtrs

FAR Details

Floor wise details of the proposed building is given below.

Table 5-Floor wise details of proposed building

S. No.	Floor Description	Area (m ²)
1.	Ground Floor (<i>Retails & Amenities</i>)	1,017.26
2.	1 st Floor (<i>Office space</i>)	3,074.16
3.	2 nd Floor (<i>Office space</i>)	3,074.16
4.	3 rd Floor (<i>Office space</i>)	3,074.16
5.	4 th Floor (<i>Office space</i>)	3,074.16
6.	5 th Floor (<i>Office space</i>)	3,074.16
7.	6 th Floor (<i>Office space</i>)	3,074.16
8.	7 th Floor (<i>Office space</i>)	2,864.16
9.	8 th Floor (<i>Office space</i>)	3,074.16
10.	9 th Floor (<i>Auditorium</i>)	3,074.16
	Total FAR Area	28,474.7

Population Density

During the Construction Phase

The total manpower required for construction activities of the expansion area of institutional project will be an approximate 80-120 person which includes workmen, labourers, supervisors, engineers, architect and Manager.

During Operational Phase

The total population of the project will be 4,228 persons that include staff as well as visitor population. On each floor dedicated areas are allocated for different activities. Space allocation on various floors is given below.

Table 6-Floor wise description and space allocation of proposed project

S.No.	Floor Description	wise Details
1.	Ground Floor	<ul style="list-style-type: none"> ● Public Facilities <ul style="list-style-type: none"> ▪ Public Canteen, CGHS, Bank, Post Office, Telephone Exchange, Creche) ● GNCTD <ul style="list-style-type: none"> ▪ Pension Cell (350 m²)
2.	First Floor	<ul style="list-style-type: none"> ● Conference Hall (@180 seats) ● Cafeteria

		<ul style="list-style-type: none"> Offices GNCTD Office space (2,220 m²)
3.	Second Floor	<ul style="list-style-type: none"> Other offices GNCTD Office space (430 m²)
4.	Third & Fourth floor	<ul style="list-style-type: none"> Offices of MoRD
5.	Fifth Floor	<ul style="list-style-type: none"> Offices for Director with PPS/PS, JS, US, and staff
6.	Sixth Floor	<ul style="list-style-type: none"> Secretarial offices and meeting rooms
7.	Seventh Floor	<ul style="list-style-type: none"> Offices of MRD and refuge area
8.	Eighth Floor	<ul style="list-style-type: none"> Ministerial offices (5 nos.) conference rooms (2)
9.	Ninth Floor	<ul style="list-style-type: none"> Auditorium, Galleries & cafeteria

The detailed population breakup including staff members as well as visitors is given in the tables below.

Table 7-Population details for proposed area

S. No.	Description	Floor Area (m ²)/DU	Occupant Load, Floor Area in m ² /Person	Total Population
A.	Office Building			
	Ground Floor			
	<ul style="list-style-type: none"> Retail & amenities Pension Cell 	667.26 350	3 m ² /person 10 m ² /person	222 35
	First Floor (conference Hall)	180 seats	No. of seats × 1.2	216
	Office area (include GNCTD)	2,724	10 m ² /person	272
	Second Floor	3,074.16	10 m ² /person	307
	Third & Fourth Floor	6148.32	10 m ² /person	615
	Fifth Floor	3,074.16	10 m ² /person	307
	Sixth Floor	3,074.16	10 m ² /person	307
	Seventh Floor	2,864.16	10 m ² /person	286
	Eighth Floor			
	Ministerial office	2,793.16	10 m ² /person	279
	Conference Rooms (2)	168 Seats	No. of seats × 1.2	202
	Ninth Floor (auditorium)	489 Seats	No. of seats × 1.2	587
B.	Others			
	Cafeteria			336
	Maintenance & Security Staff			257
	Total Population (A-B)			4,228

Water demand per capita and wastewater generation

Freshwater demand and source

Construction Phase

During the construction phase of expansion area water requirement (approx. 210 ML) will be met from Private water or treated wastewater from CSTP. No ground water will be extracted. Hence, there will be no impacts on ground water environment during construction phase.

Operational Phase

Total water demand for the project will be 315 KLD. Main source of supply shall be DJB. The domestic Water demand for the building shall be approx. 177 KLD .The source of water supply during operational phase is mainly municipal supply. For any shortage, the water shall be augmented from the tube well/ tanker water for the proposed buildings after obtaining proper permission from the concerned department, if required.

Storage structures in form of underground tanks will be developed within the project site for storage of water. Storage shall be provided for one day requirement on the below basis

Table 8-Water demand for the operational phase

S.No.	Description	Total Population/area (m ²)	Unit Water Consumption (lpcd)	Total Water Requirement (KLD)
1.	Main Uses			
	Staff	3,165	45	142.43
	Visitors	727	15	10.91
	Cafeteria	336	70	23.52
	Domestic Water Demand (A)			176.86 say 177 KLD
2	Other Uses			
	Landscape area	4,382.34	3 ltr/sq.mtr	13.14
	DG cooling	2,020 kVA	0.9lt/kVA/hr (6hrs)	9.69
	HVAC	1,150 TR	10 lt/TR/hr (10 hrs)	115
	TOTAL WATER DEMAND			314.69 say 315 KLD

Table 9- Wastewater Calculation with respect to STP

S.No.	Description	Quantity (KLD)
01	Fresh water Requirement (30% of domestic water)	53.1 KLD
02	Flushing water requirement (70% of domestic Water)	123.9 KLD
03	Wastewater Generation @ (80% Fresh water + 100% of Flushing)	166.38 say 166 KLD
	Wastewater generation	166 KLD
04	STP Capacity	200 KLD

Table 10- Summary of Water available for Reuse and Recycle

S.No.	Description	Quantity (KLD)
A)	Recycled Water Available @80% of Waste Generated	133 KLD
B)	Recycled Water Required	262 KLD
01	For Flushing Purposes	124 KLD
02	For Landscape	13 KLD
03	Cooling Towers (HVAC +DG Sets)	125 KLD
	Make up water required (B-A)	129 KLD

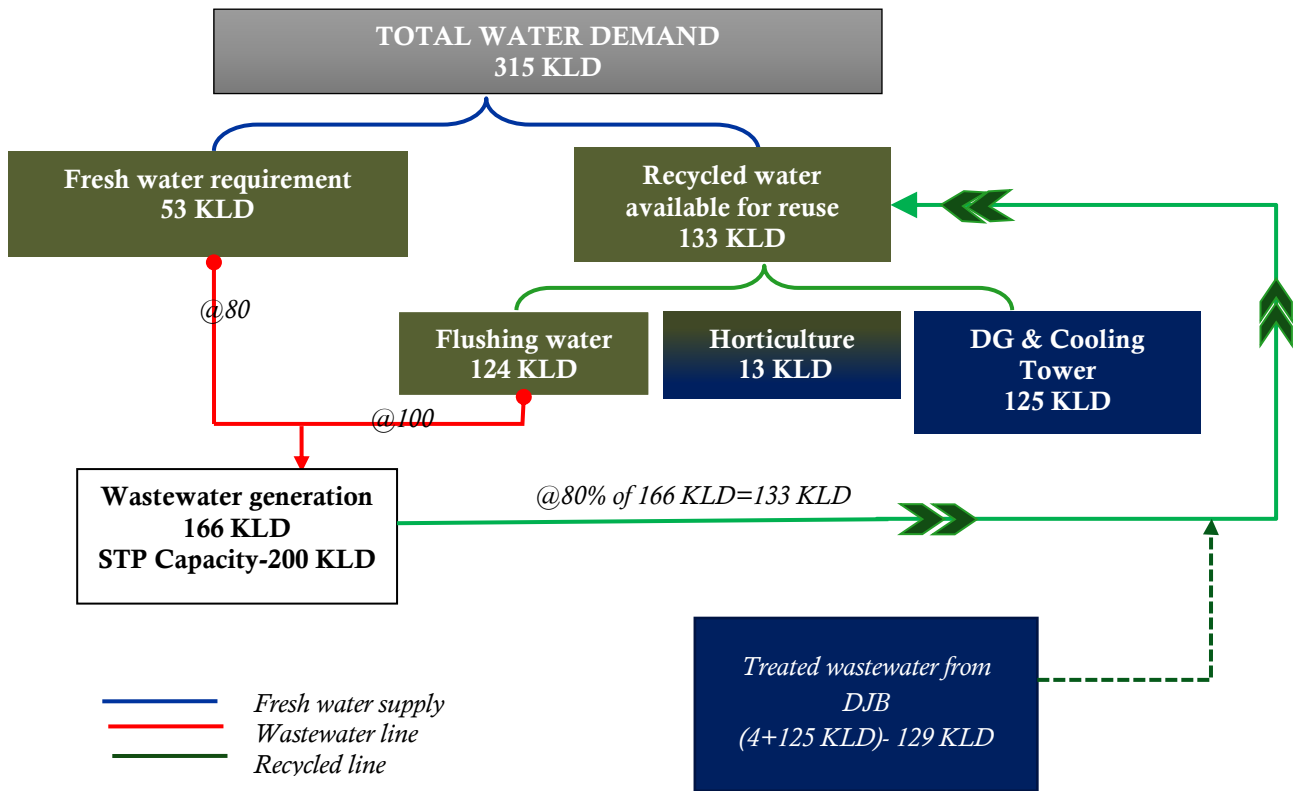


Figure 3-Water balance diagram during non-rainy season

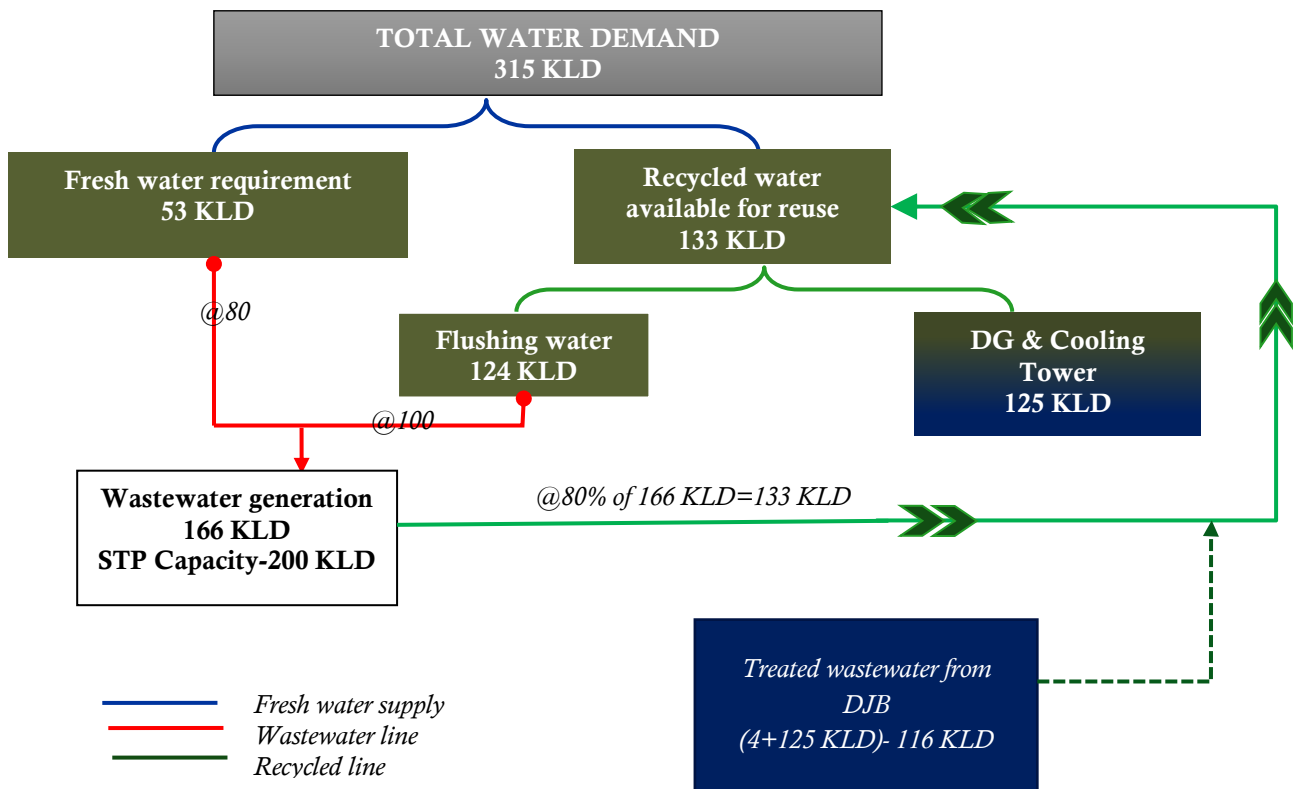


Figure 4-Water balance diagram during rainy season

Wastewater generation and treatment

During Construction Phase

The quantity of sewage generation during the construction phase will be approx. 4.68 KLD. Thus, the sewage will be treated by providing small septic tanks, soak trenches and Sulabh Shauchalaya type mobile toilets.

During Operational Phase

Quantity of sewage generated during operational phase shall be 166 KLD .The sewage will be treated through sewage treatment plant of capacity 200 KLD. The treated sewage will be re used for flushing (124 KLD) greenbelt development (9 KLD), surplus treated water requirement during non-season i.e.-129 KLD and during rainy season i.e. 116 KLD shall be met via treated water supply by DJB.

Sewage Treatment Technology

The design of sewage network shall be done in accordance with the CPHEEO guideline, NBC guidelines and reverent Indian Standards. Sewage generation is assumed to be 100% of flushing water and 80% of domestic water.

The following parameters/ site conditions shall be kept in mind when designing the sewage, Sludge and storm water drainage system.

- Natural slope of the area.
- Layout of different facility in the complex;
- Possibility of using complete or part of the existing sewage network;
- Sub-soil water table;
- Provision of Sewage lifting station; (if required)
- Provision of venting arrangement for manholes;
- Construction of manholes & laying of pipes considering ground condition;
- Termination of vent cowl at terrace level;
- Provision of adequate slope for horizontal header in the under slung pipes especially for public toilets
- Sewage flow starts with fractional capacity and builds up to full capacity in due course. An operational plan to meet this demand from a low flow to full flow will be part of the design.

An external 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 recoverable 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.

Wastewater details are given in below

Table 11-Wastewater Details

Particulars	Quantity	
Daily load	166 KLD	
Duration of flow to STP	24 Hours	
Temperature	32° C	
	Inlet	Outlet (Treated Wastewater)
pH	6.0 – 8.5	6.0-8.5
S.S. (mg/l)	200-450	Less than 20 mg/1
BOD5 27° C (mg/l)	250-400	Less than 10 mg/1
COD (mg/l)	600-800	Less than 30 mg/1
Oil & grease ABS (mg/l)	Up to 20 mg/1	Less than 05 mg/1
E. coli	>10 ⁶ MPN	< 10 ³ MPN

Technology

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 fluidized aerobic bed reactor (FAB) process combines the biological processes of attached & suspended growth. It combines submerged fixed film with extended aeration for treatment of the waste water.

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 FAB reactor for biological processing. The water enters the bottom of the reactor & flows up through the fixed film media which

grossly enhances the hydraulic retention time & provides a large surface area for growth of biological micro – organisms. The FAB 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 FAB 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.

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

The treated and disinfected water from the Chlorine Contact Tank will be passed through a Multigrade Filter, an Activated Carbon Filter and a Softener and then stored in a Treated Sewage Water Tank. Water from this tank will be used for the Cooling of DG system and for horticulture and other recreational activity within the site.

Preventive measures to Avoid Leaching

Treated sewage from Sewage Treatment Plant will be conveyed to Treated Sewage Tank through pipelines. All the joints from piping system will be checked periodically and carrying treated wastewater pipes will be laid in conduits wherever road crossings are expected. Thus no leaching of treated sewage into nearby water courses shall take place. Supervisors will be employed for overall operation & maintenance of water supply, waste water treatment and other utility services.



Figure 5-STP technology

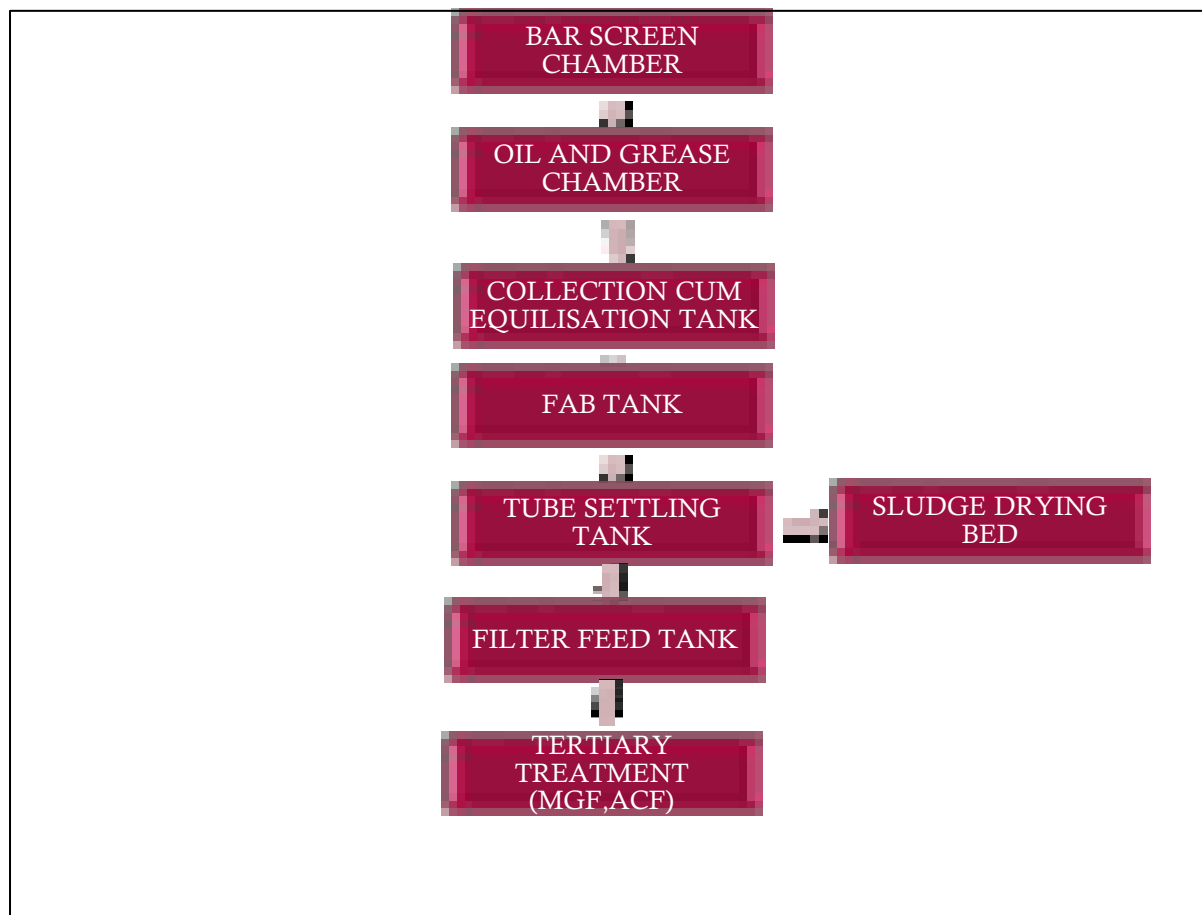


Figure 6-Process and Instrumentation of STP technology

Parking Details

Adequate provision shall provide for vehicle parking at the project site not to disturb the traffic and allow smooth movement at the site.

Proposed project will consist of open parking. The parking space criteria and area requirement provided are summarized in the below tables. Parking details are as per Delhi Building Bye Laws.

Table 12-Parking Required

(As per the EIA guidance Manual from MoEF & CC)	
Parking required (for Office building)	1 ECS @ 50 m ² of proposed FAR = 1 × 28,474.7/50 = 569 ECS
Parking Required as per MoEF & CC	= 569 ECS
As per the Delhi Building Bye Laws	
Parking required (for Office building)	1 ECS @ 50 m ² of proposed FAR = 1 × 28,474.7/50 = 569 ECS
Parking required as per Delhi Building bye Laws	= 569 ECS

Table 13-Parking Proposed

For Office building	
Proposed area in Basement-I	10,727.36 m ²
Parking Proposed (32 m ² /ECS)	10,727.36 /32 = 335 ECS
Parking Proposed (Basement-I)	7,201.522 m ²
Parking proposed in Tier-I (32 m ² /ECS)	5,024 m ² /32 m ² – 157 ECS
Parking proposed in Tier-II (16 m ² /ECS)	2,177 m ² /16 m ² – 136 ECS
Total ECS Proposed	628 ECS

Rainwater Harvesting and Storm Water Drain

A rainwater harvesting system comprises components of various stages -transporting rainwater through pipes or drains, filtration, and recharging the ground water through tanks. Percolation structures will be constructed for ground water recharge.

Runoff from the first spell of rain carries a relatively large amount of pollutants from the air and catchments surface so the system will be provided with a filtration pit consisting of layers of sand, gravel and pebbles of relevant sizes to remove impurities from the collected rainwater.

Need for Rainwater Harvesting

Surface water is inadequate to meet the daily demand and we have to depend on ground water.

- Due to rapid urbanization, infiltration of rain water into the sub-soil has decreased drastically and recharging of ground water has diminished.
- Rainwater harvesting prevents the flooding of low-lying areas in the site.

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 areas/shall be connected to adjacent drain by a pipe through catch basins. Therefore, it has been calculated to provide 4 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.

- Storm water system consists of pipe drain, catch basins and seepage pits at regular intervals for rain water harvesting and ground water recharging.

Rain water harvesting has been catered to and designed as per the guideline of CGWA.. The recharge pit of 4 m dia and 3 depth is constructed for recharging the water. Inside the recharge pit, a recharge bore is constructed having adequate diameter with PVC slotted pipe up to a layer where sandy aquifers/ deeper aquifer permeable layers exist. The bottom of the recharge structure will be kept 5 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.

Further water conservation measures are suggested to be taken to reduce the water requirement are given table below. Plans showing storm water drainage network is attached.

Table 14-Calculation for Storm water load

S. No.	Type of Surface	Catchment's Area		Run off Coff. [C]	Rainfall Int.(mm/hr)	Discharge (Run Off) [Q=10CIA] m ³ /hr	Total (m ³ /hr) [Q]
		sq. m	Ha.				
1	Building						
	G.C. Area	4,229	0.42	0.60	80	10×0.60×80×0.42	20.16
	Green Area	4,382.34	0.43	0.20	80	10×0.20×80×0.43	68.8
	Paved Area	8,187.63	0.81	0.75	80	10 ×0.75×80×0.81	486
Total storm water volume calculated -574.96 m ³ /hr							
2	Considering 15 mins (0.25) retention period						143.74
3	Volume of Rain water harvesting pit					3.14× (2 ²)×3	37.68 m ³

4	Total No. of Rain water harvesting pits required	3.8
5	Total No. of Rain water harvesting pits proposed	4

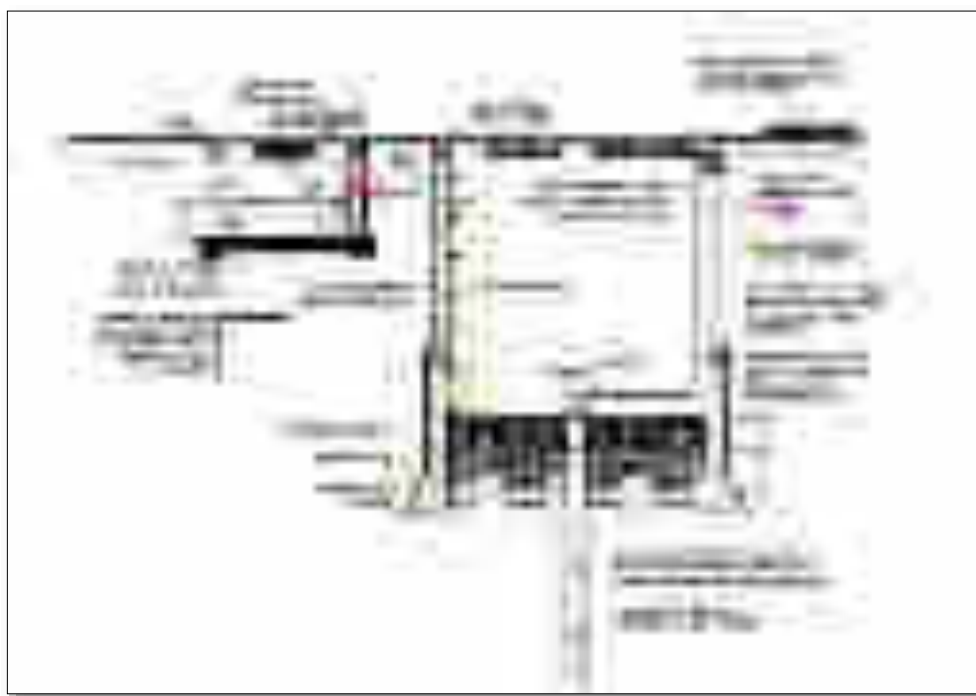


Figure 7-Typical rainwater harvesting pit design

Table 15- Water conservation measures

Measures	Type
Water Conservation Fixtures	Dual plumbing cisterns, Dual flushing system, low flow taps, low flow urinals, sensor-based taps in commercial areas and facility areas, low faucet taps, low flow showers, tap aerators, auto control valves and pressure reducing devices
Monetary Measures	Metering (flow water) and pricing of water
Leakage Prevention	Timely detection of leakages in pipeline & tanks
Wastage Prevention	Alarms for filling of tank
Storm water harvesting	Storm water collection and recharging system. Recharge pits to be provided for recharging collected rain water to ground.

Power Requirement

Table 16-Electrical Load Details

Power Requirement	Details
Transformer Selection	<ul style="list-style-type: none"> • Demand load estimated for the building is approx. 2,077 kVA • Which shall be supplied by transformers: Transformers (11 kV/433V): 3 transformers of 1,250 kVA each (2W+1S)
Source of Power Supply	To meet the load, the HT supply will be received at 11 kV from the NDMC
DG proposed	DG sets of total 3,030 kVA [3× 1,010 kVA each] [2W+1S]
Location of DG Sets	DG sets shall be placed in basement

Stack Height

As per CPCB norms and Local Authority

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 will be followed for the management 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.
- Remaining soil shall be utilized for refilling / road work / rising of site level at locations/ selling to outside agency for construction of roads etc.

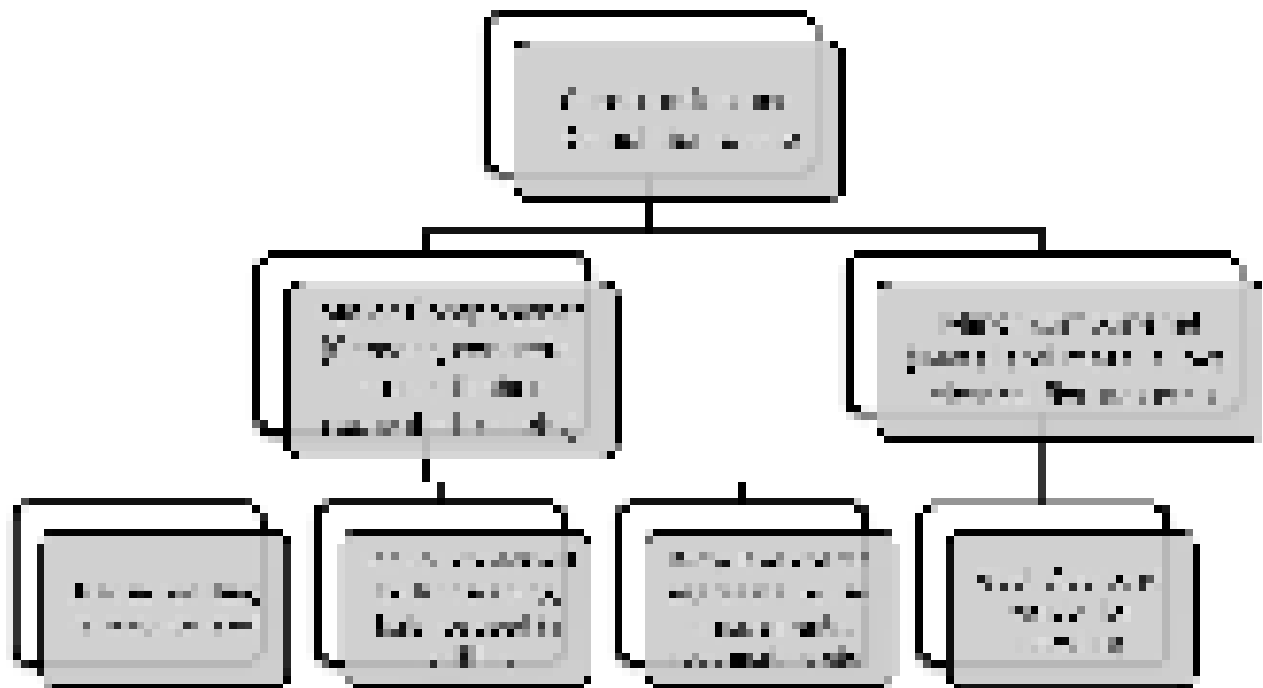


Figure 8-Waste Management-Construction Phase

During Operational Phase

The project will adopt a systematic approach for solid waste collection and disposal. Solid waste generated from the project will be collected properly and will be managed as per MSW Rules, 2016.

- Municipal waste shall be mainly categories in two classes. 1. Bio degradable Waste
2 Non- biodegradable Waste. The biodegradable portion dominates the bulk of MSW. This is mainly due to food and paper waste.
- These solid wastes will be collected separately by putting three types of separate bins at the source of generation.
- It is estimated that maximum solid waste generation would be about 957.62 kg/day; Following are the solid waste generation rate has been considered as is given table.

Table 17: Calculation of Solid Waste Generation

Category	Counts (heads)	Waste Generated (kg/day)
Waste Generation from residential and academic bulding		
Office block		
• Staff	3,165@0.25kg/day	791.25
• Visitors	727 @0.15kg/day	109.05
Cafeteria		
• Staff	67 @0.25kg/day	16.75
• Visitors	269 @0.15kg/day	40.35
Landscape Waste (1.08 Acre)	@ 0.2 kg/acre/day	0.22
Total Waste Generated		957.62 kg/day
Total Solid Waste generation		957.62 kg/day
Biodegradable waste		approx. 459.67 kg/day
Non-Bio degradable waste		approx. 402.20 kg/day
Inert waste		approx. 95.76 kg/day

Collection and Segregation of waste

For Domestic Waste

- A door to door collection system will be provided for collection of domestic waste in colored bins from every unit.
- The local vendors will be hired to provide separate colored bins for dry recyclables and Bio-Degradable waste.
- For waste collection, adequate number of colored bins (Green and Blue & dark grey bins– separate for Bio-degradable and Non- Bio-degradable) are proposed to be provided at the strategic locations of the area.
- Litter bin will also be provided in open areas like parks etc.

Treatment of Waste

Domestic Waste

Bio degradable Waste

- Bio-degradable waste will be subjected to the compost/resultant will be used as manure.
- STP sludge is proposed to be used for horticultural purposes as manure.
- Horticultural Waste is proposed to be composted and will be used for gardening purposes.

Recyclable Waste

- 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.

Organic Waste Converter

The garbage will be collected and stored in garbage collection room and segregated as Biodegradable waste, Non-Biodegradable waste and Recyclable waste using different color coded bins

- Bio degradable waste will be treated by OWC and used as a manure for gardening area
- Recyclable wastes are inert waste which will be disposed through authorized recyclers.
- The total excavated earth material will be used for refilling in the low-lying area.

Technique for disposal of biodegradable waste

Organic Waste Converter

The Mechanical Composter involves a biomechanical process which decomposes bacteria and produces odorless pre-organic compost in 15 minutes. The machine occupies small area and provides a cleaner and better environment.

Working Principle

Mechanical Composter converts the organic waste into odorless, pre-compost manure in 15-20 minutes. The organic waste, free from foreign particles is fed into MC. The shredder reduces the organic waste into the optimum particle size for composting. Then it is mixed with moisture absorbing materials and Useful microorganisms. This mixture is then blended for a homogeneous mixture and is converted into pre-compost manure in 20

minutes. The pre-compost manure is then fed into aerated compost blocks or 12 - 15 days. The compost blocks or piles are specially designed for the pre-compost manure to have proper aeration and suitable environment to mature. The final manure will be rich in nutrients and used for the development of green belt.

Salient Features of Organic Waste Converter (OWC)

- Quick, easy to operate, less space requirement and odor free manure compared to other waste conversion process
- Immediate and hygienic disposal of food waste
- Waste minimization strategy followed by 3R Technique (Reduce, Reuse, Recycle)
- Savings on Purchase of Manure for landscape
- Savings on Waste Disposal Expenses
- Elimination on the usage of chemical fertilizers
- Carbon credit revenue in the future

Optimum Conditions for Composting

During Composting process, optimum conditions shall be maintained to achieve better compost value. The parameters mentioned below shall be maintained accordingly during operation.

Table 18-Optimum condition for composting

S.No.	Parameters	Values
1.	C/N ratio	30: 1
2.	Particle Size	1/8 to 2 inches
3.	Oxygen	15 % - 20 %
4.	Temperature	55 - 65.5 ° C
5.	Moisture	40 % - 60 %
6.	pH	6.5 - 7.5

Table 19-Characteristic of Final Compost

S.No.	Parameters	Concentration (% except pH)
1.	Total Nitrogen	1.3
2.	Total Phosphorus	0.2-0.5
3.	Total Potassium	0.5
4.	Organic phosphorus	0.054
5.	pH	8.6
6.	Moisture	45-50
7.	Organic Matter	30-70



Figure 9-Organic Waste Converter

Benefits of organic waste converter:

- Large quantity of solid waste is converted to fertilizer in a very short period
- This fertilizer can be sold as compost to farmers, or used for gardening
- Machine requires less space and the efficiency is high
- Manpower and maintenance are very less
- This is one of the latest techniques of managing solid waste.

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, 2016. Solid waste management Scheme is depicted in the following figure.

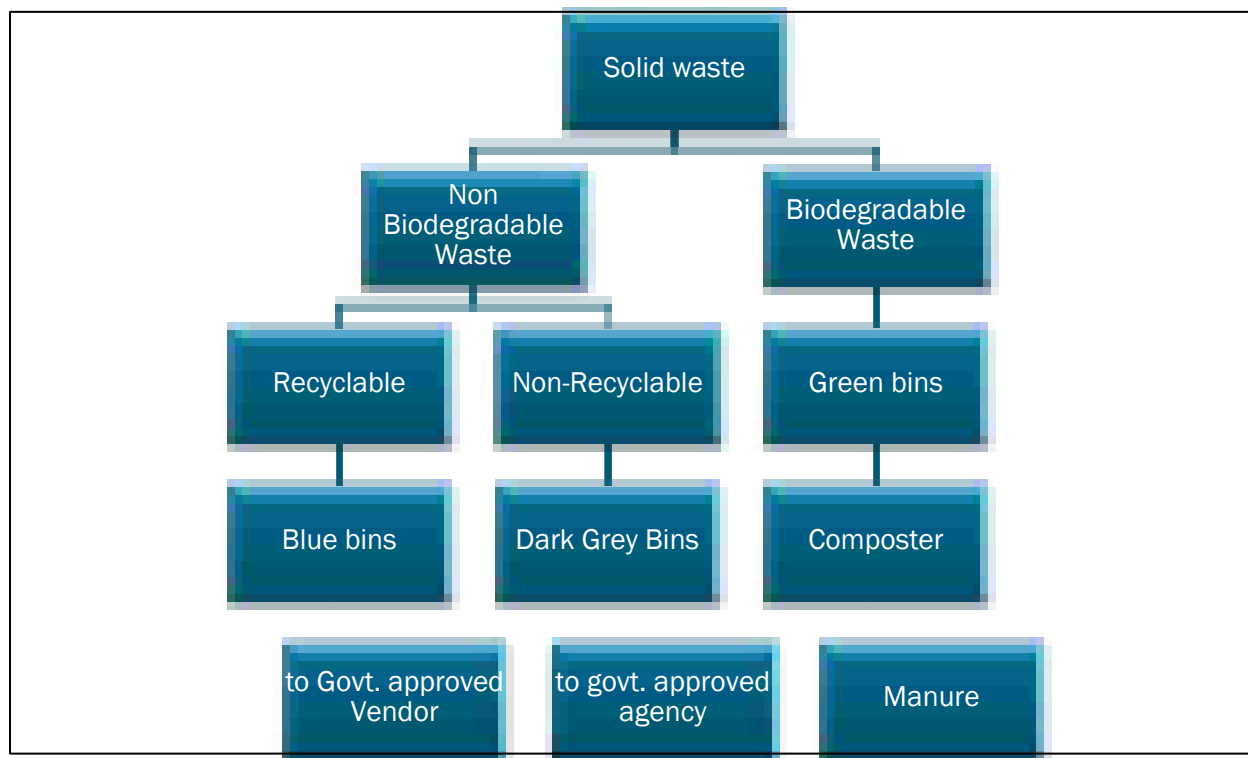


Figure 10: Solid Waste Management Scheme -Domestic Waste

Landscape Details

Total green area proposed for project is 4,382.34 m² (30 % of plot area). A combination of evergreen and ornamental, palms, shrubs and ground covers planted along the sides of the road and in open space and set back area within the complex layout. Landscaping is an important element in altering the microclimate of the place. Proper landscaping reduces direct sun from striking the buildings and heating up building surfaces, prevents reflected light carrying heat into a building from the ground or surfaces, creates different air flow patterns and can be used to direct or divert the wind advantageously by causing a pressure difference. Shade created by trees & the effects of grass & shrubs reduce air temperature adjoining the building and provide evaporative cooling.

Table 20-Landscape area details

Plot area	14,607.8m²
Landscape area Proposed	4,382.34 m ² (30 % plot area)
As Per MoEF Guidelines	One tree per 80 m ² of total area out of which minimum 50 % to be in the category of evergreen trees.
Trees Required	55 trees
Nos. of trees at site to be cut	25
Compensatory plantation proposed	250 trees
No of saplings proposed at site	30
Compensatory plantation planted	220 trees (Jaunpur forest)
Shelter belt (@ 70% of green area)	3,067.638 m ²

Shrubs, herbs, lawns, parks & climber plants, avenue plantation (@ 30% of green area)	1,314.702 m ²
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Table 21-List of Trees Proposed

S.No.	Botanical name	Local name
1.	<i>Azadirachta indica</i>	Neem
2.	<i>Cassia fistula</i>	Amaltas
3.	<i>Delonix regia</i>	Gulmohar
4.	<i>Bauhinia purpurea</i>	Kachnar
5.	<i>B. Variegata</i>	Kachnar
6.	<i>Lagerstroemia flosreginae</i>	Pride of India
7.	<i>Grevillea robusta</i>	Silk oak
8.	<i>Callistemon lanceolatum</i>	Bottle Brush
9.	<i>Anthocephalus cadamba</i>	Kadam
10.	<i>Polyalthia longifolia</i>	Ashok
11.	<i>Putranjiva roxburghii</i>	Putrajiv
12.	<i>Sterculea alata</i>	Coconut Buddha
13.	<i>Bassia Latifolia</i>	Mahua
14.	<i>Alstonia scholaris</i>	Devil Tree
15.	<i>Michelia champaca</i>	Champak
16.	<i>Terminalia arjuna</i>	Arjun
17.	<i>Ficus retusa</i>	Ficus
18.	<i>Saraca indica</i>	Ashoka
19.	<i>Dalbergia sissoo</i>	Shisham
20.	<i>Maduca latifolia</i>	Madhu
21.	<i>Ficus infectoria</i>	Pilkhan
22.	<i>Cassia nodosa</i>	Roheda
23.	<u>ORNAMENTAL SHRUBS</u>	
24.	<i>Delonix pulcherima</i>	Chhota gulmohar
25.	<i>Plumeria alba</i>	Champa
26.	<i>Lagerstroemia indica</i>	Dhayti
27.	<i>Ervatamia divaricata</i>	Chandni
28.	<i>Nyctanthes arbor-tristis</i>	Harsinghar
29.	<i>Yellow Duranta</i>	Skyflower
30.	<i>Hibiscus hirsta</i>	Costa Flores
31.	<i>Cassia biflora</i>	Twin-flowered cassia
32.	<i>Nerium indicum</i>	Kaner
33.	<i>Cassia aungustifolia</i>	Senna
34.	<i>Cassia glauca</i>	Kalamona

(Source: *Guidelines for developing Green Belts by CPCB, 2000*)

List of building materials being used at site

1. Coarse sand
2. Fine sand
3. Stone aggregate
4. Stone for masonry work
5. Cement

- Concrete mixer with hopper
- Excavator
- Concrete Batching Plant
- Cranes
- Road roller
- Bulldozer
- RMC Plant
- Tower Cranes
- Hoist
- Labor Lifts
- Pile Boring Machines
- Concrete pressure pumps
- Mobile transit mixer