

Proposed Commercial Project “Satvika Elegance”, at Mouza- Digha, Thana- Digha, Thana No.-1 Khata No.-843, 861,864,880,1081,1083,1072 & 1091 Plot No.-1542,1543,1544, 1545, 1578, 1579,1580,1581 & 1582 ,Dist.- Patna Bihar-

1.0 INTRODUCTION

M/s Satvika Infra India Pvt. Ltd is proposed to develop a commercial building project “Satvika Elegance” at Mouza-Digha, Thana-Digha, Thana No.-1 Khata No.-843, 861,864,880,1081,1083,1072 & 1091 Plot No.-1542,1543,1544, 1545,1578, 1579,1580, 1581 & 1582 ,Dist.- Patna, Bihar. Project involves development of one number of commercial tower along with green area and other ancillary facilities. Project site is spread over area of 15963.77 sq m. Total buildup area is **63496.88** square meter.

1.1 APPLICABLE LEGAL FRAMEWORK

As per EIA Notification, 2006, projects listed in schedule of the said notification requires prior environmental clearance. Project involves development of commercial project as defined above. Built-up area of the project is **63496.88** sqm. Project having built-up area more between 20,000 sq m and 1,50,000 sq m falls under activity 8 (a) and Category B of the schedule of said notification and thus, prior environmental clearance is required for the proposed project from SEIAA, Bihar. The acts and rules applicable to the project includes following:

- Environment protection Act, 1986
- EIA Notification, 2006 as amended
- MSW Rules, 2016
- Construction & Demolition Waste Management Rules, 2016
- Plastic waste Management Rules, 2016
- Hazardous & Other waste Management Rules, 2016
- E-Waste Rules, 2016
- Air Act, 1981
- Water Act, 1974
- Local By Laws
- Forest Act 1927 & 1980

1.2 CONNECTIVITY AND SURROUNDINGS OF PROJECT SITE

Project site lies at Mouza- Digha, Thana- Digha , Thana No.-1 Khata No.-843, 861,864, 880, 1081,1083,1072 & 1091 Plot No.-1542,1543,1544, 1545,1578, 1579,1580, 1581 & 1582 ,Dist.- Patna .Bihar. Geographical coordinates of the project site are 25°38 42.67N 85° 05 02.31E, Details of coordinates of project site and project boundary is represented in Table 1 and Figure 1 below. Location Map of project site is given in Figure 2 below. Project site is connected through Danapur Bankipur Marg (about 20 meter N Direction). Digha Bridge Halt Railway Station is at approx. 400 m from the site in West direction. Jay Prakash Narayan Int. Airport Patna approx. 5.68 km, North direction of project site Surroundings of project site is given in Table 2 below.

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Table 1: Geographical Coordinates of Project Site

Point in Image	Latitude	Longitude
1	25° 38 42.67N	85° 05 02.31E
2	25° 38 48.98N	85° 05 03.35E
3	25° 38 42.37N	85° 05 03.97E
4	25° 38 43.67N	85° 05 04.28E
5	25° 38 43.62N	85° 05 04.82E
6	25° 38 44.41N	85° 05 05.01E
7	25° 38 44.37N	85° 05 05.59E
8	25° 38 48.74N	85° 05 06.19E



Figure 1: Project Boundary Map

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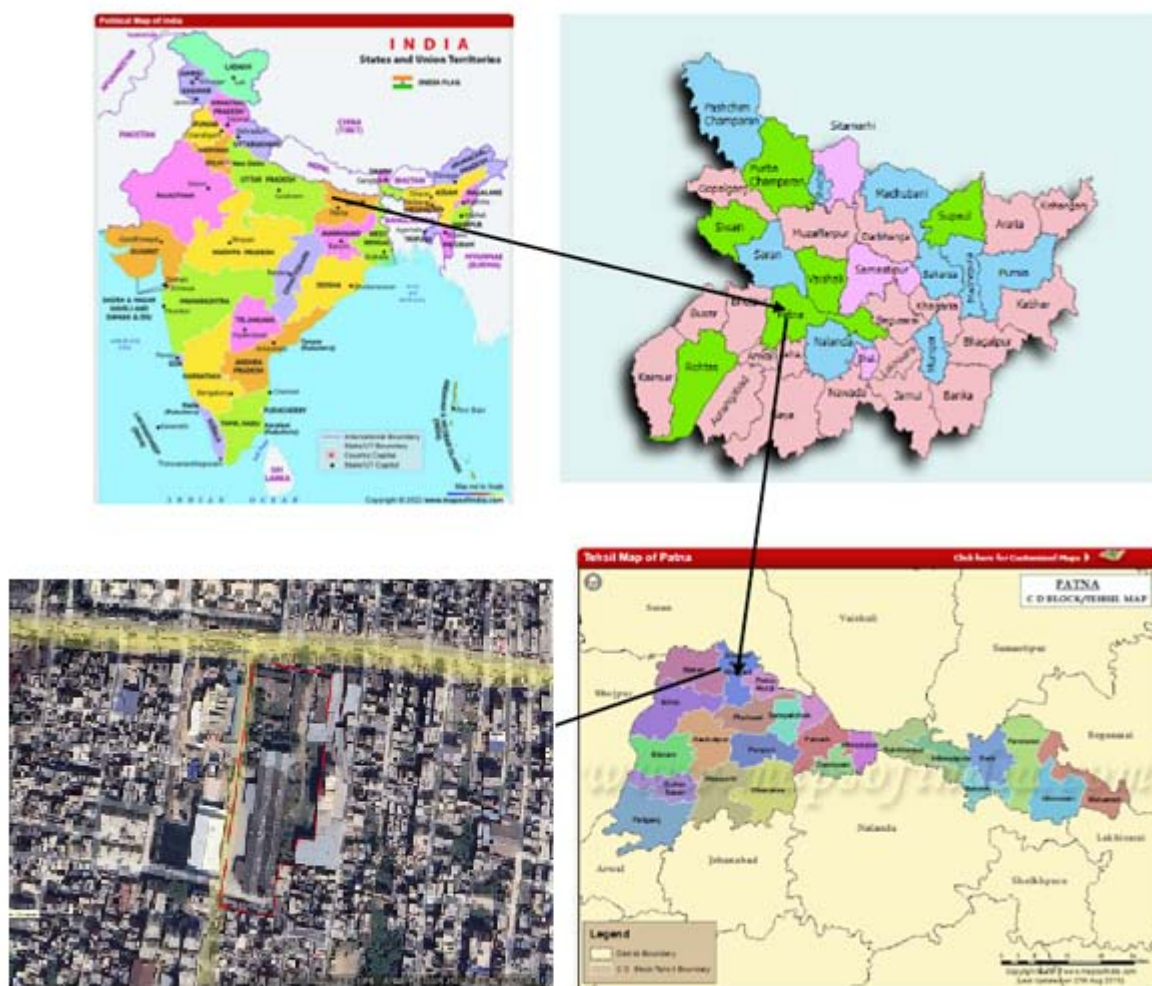


Figure 2: Location Map

Table 2: Surroundings of Project Site

S. No.	Features	Description
1.	Nearest Habitation	- Yadav colony (0.50 km, South) - Mali Tola (0.32 km, NNE) - Mithla Colony (1.25 km, SW) - Digha (1.1 km, East) - Nasriganj (1.92 km, West) - Danapur Cantonment (4.50 km, West)
2.	Nearest City	Patna (Project site lies in Patna City)

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3.	Nearest School/College	• St. Paul's High School (1.12 km, ESE) • Danapur Public School (3.33 km, WSW) • Army Public School, Danapur (4.50 km, WSW)
4.	Nearest Hospital	• Ziom Multispeciality Hospital (0.83 km East) • Military Hospital Danapur (3.50 km, W) • Paras HMRI Hospital Patna (4.45 km, South)

1.3 PROJECT COST

Total cost of the project is approx . INR 95.0 Crores

1.4 LAND REQUIREMENT AND AREA SUMMARY

The total plot area of the project site is 15963.77 sq m. Project involves development of one tower of commercial building. Total buildup area is **63496.88** square meter.

Table 3 a: Area Summary

S. No.	Description	Area (sq m)
1.	Plot Area	15963.77
2.	Ground Coverage @39.03	6230.76
3.	FAR	2.499
4.	Total Built-up area	63496.88
5.	Green Area (@19.51 % of plot area)	3115.38
6.	Nos. of Tower	1
7.	Height (m)	45

Table 3 b: Details of Commercial Tower

Tower	Floors	Remarks
1	B+B1+G+9	Commercial Building

Table 3 C: Built up Area calculation (Floor Wise)

For Commercial	
Basement	12451.51 Sq. Meter
Basement 1	12513.14 Sq. Meter
Ground Floor	7130.76 Sq. Meter
First Floor	6235.42 Sq. Meter
Second Floor	7140.75 Sq. Meter
Third Floor	4378.71 Sq. Meter
Fourth Floor	6728.30 Sq. Meter
Fifth Floor	4534.87 Sq. Meter

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Sixth Floor	595.83 Sq. Meter
Seventh Floor	595.83 Sq. Meter
Eight Floor	595.83 Sq. Meter
Ninth Floor	595.83 Sq. Meter
Total	63496.78 Sq. Meter

1.5 ESTIMATED POPULATION

Population estimated at the site is 3894 which includes Staff and floating population. Detailed calculation is given in **Table 4**.

Table 4: Estimated Population

S. No.	Category	No of DU/Area (sq m)	Standard	Population
Commercial				
1.	Total Population	38942.03	1 person/10 sq m	3894
2.	Staff	-	@20%	779
3.	Visitors	--	@80%	3115
Total Commercial Population				3894

1.6 WATER REQUIREMENT

Water requirement during construction phase is approx. 30-50 KLD. Source of water during construction phase will be private water tankers supplemented with ground water. Source of water during operation phase will be Municipal supply supplemented with ground water. Total water requirement, estimated during operation phase is 103 KLD out of which fresh water requirement is 58 KLD. Water calculation detail is given in **Table 5&6**. Water balance diagrams are provided in **Figure 3 & 4**.

1.7 SEWAGE GENERATION

Sewage generation from the site is expected to be 70 KLD which will be treated in STP of capacity 100 KLD. Dual plumbing system is provided at site to re-use the treated water for flushing, gardening and other purpose. STP is provided with MBBR Technology.

Table 5: Calculations for Total Daily Water Demand

Category	Population/Area (sq m)/Capacity	Standard (LPCD)	Water Requirement- KLD	Fresh Water Requirement- KLD	Recycled Water requirement- KLD
Domestic					
Staff	779	45	35	25	10
Visitors	3115	15	47	33	14
Total Domestic Water Demand			82	58	24
Landscape	3115.38 sq m	5 liter/square meter	16	0	16

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Fire Fighting	--	--	5	0	5
Total	--	-	103	58	45

Table 6: Wastewater Calculations

Category	Total Quantity (KLD)
Fresh water Req.	58
Flushing water Req.	24
Sewage generation (@80% of the fresh water consumption + 100% flushing water)	70
Capacity of STP	100
Recovered water from STP (80% of Waste water)	56
1. Flushing	24
2. Landscaping	16
3. Fire Fighting	5
4. Discharge to Sewer	11

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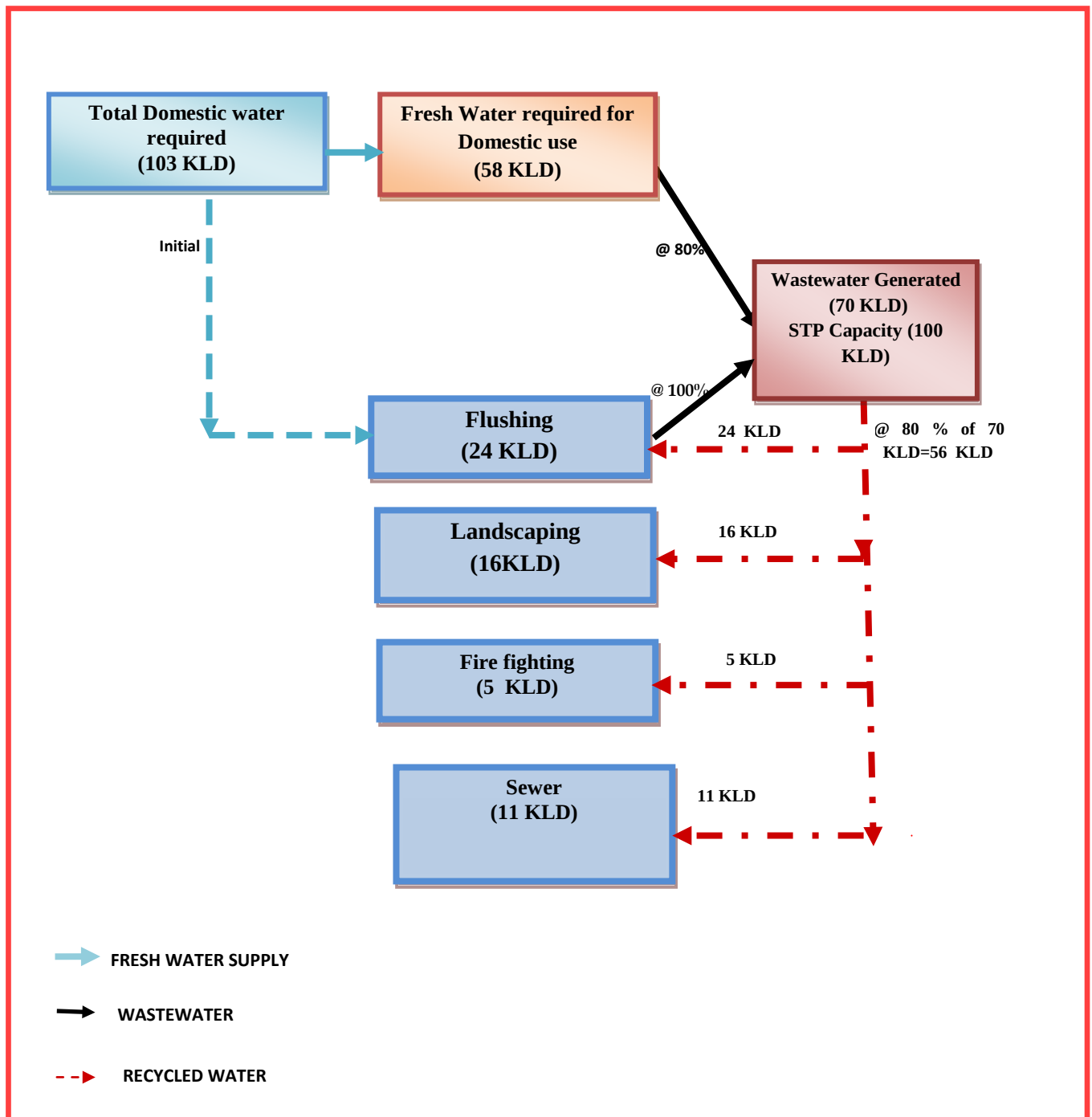


Figure 3: Water Balance Diagram-Dry Season

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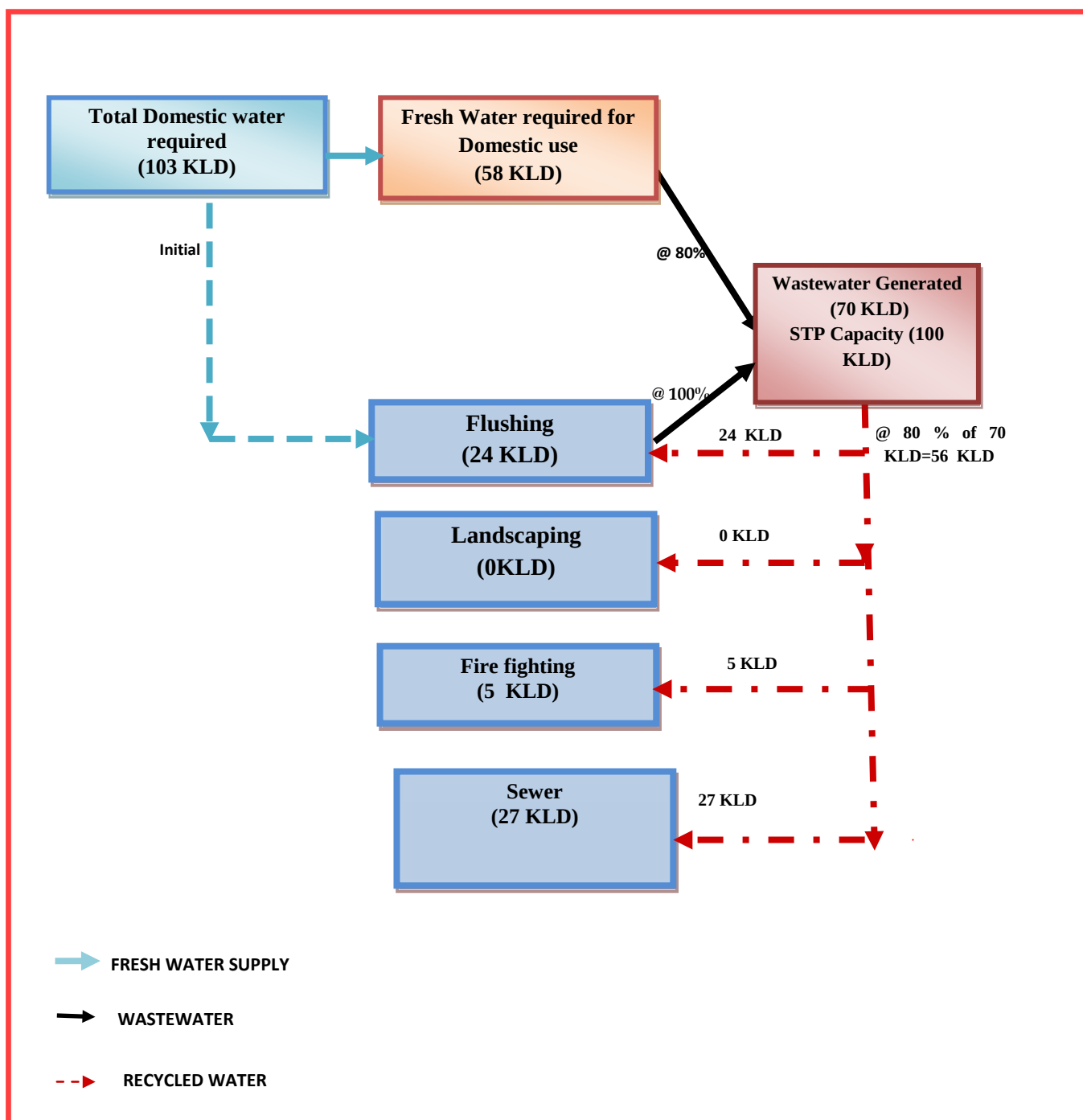


Figure 4: Water Balance Diagram-Monsoon Season

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1.8 SEWAGE MANAGEMENT

STP of 100 KLD with MBBR technology is provided at the site. Detail of the treatment technology and sewerage system are given below

Sewerage System

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 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. Wastewater Details

(a)	Daily load	:	70 KLD
(b)	Duration of flow to STP	:	24 hours
(c)	Temperature	:	Maximum 32°C
(d)	pH	:	6.5 to 8.5
(e)	Colour	:	Mild
(f)	T.S.S. (mg/l)	:	200-450 mg/l
(g)	BOD (mg/l)	:	300-400 mg/l
(h)	COD (mg/l)	:	600-800 mg/l
(i)	Oil & Grease	:	30-50 mg/l

b. Final discharge characteristics

(a)	pH	:	6.5 to 8.5
(b)	Oil & Grease	:	<5 mg/l
(c)	B.O.D.	:	<20 mg/l
(d)	C.O.D.	:	<100 mg/l
(e)	Total Suspended Solids :	:	<10 mg/l

c. Treatment 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 Moving bed bio reactor (MBBR) process combines the biological processes of attached & suspended growth. It combines submerged fixed film with extended aeration for treatment of the waste water.

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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 fixed film 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

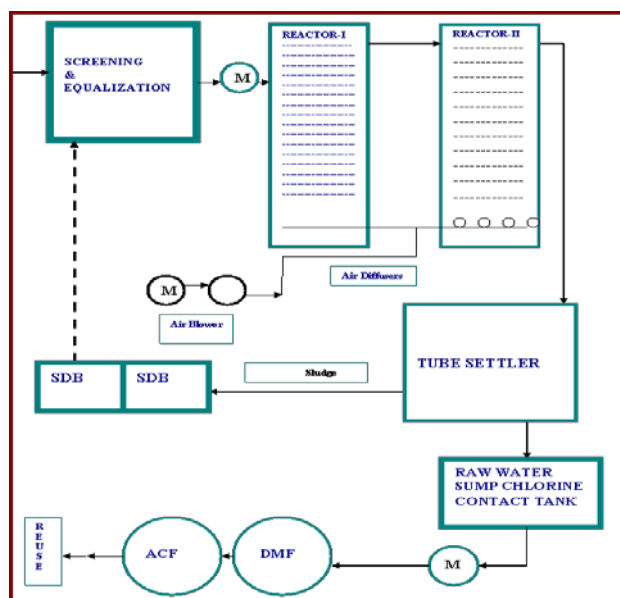


Figure 5: Schematic Diagram of STP

Storm water drainage system is provided at the site for channelizing storm water and prevents local flooding. Covered storm water drains are provided at the site. Run-off from the site is collected and recharged into ground through 10 nos. of RWH pits. Recharge of the rainfall run-off to ground not only prevents the local flooding during rain but also helps in augmenting the ground water level of the aquifers. Ground water level in project area is approx. 3-5 m bgl as per soil investigation study. Diameter of the recharge bore will be approx 300 mm and depth will be approx. 5 m below water level. Run-off generation from site without development is approx. 11202.37 cum. This run-off increases due to generation of paved surfaces. Run-off available from the site annually after project development is calculated and is presented in the **Table 7**. Calculations for rainwater harvesting pits are given below in **Table 8**.

S. No.	Catchment	Area (sq m)	Run-off Coefficient	Average Annual Rainfall (m)	Available Annual Run-off (cum)
1.	Roof top	6230.76	0.9	1.16	6504.91

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2.	Green	3115.38	0.1	1.16	361.38
3.	Paved Areas	5340.00	0.7	1.16	4336.08
Total Run-off					11202.37

Table 8: Calculation for RWH Pits

S. No.	Catchment	Area (sq m)	Run-off Coefficient	Peak Hourly Rainfall (m)	Available Annual Run-off (cum)
1.	Roof top	6230.76	0.9	1.16	6504.91
2.	Green	3115.38	0.1	1.16	361.38
3.	Paved Areas	5340.00	0.7	1.16	4336.08
Total Run-off					11202.37
Retention Time					15 min
Available Run-off in 15 min					746.82
Volume of RWH System -cum					75
Nos. of Pits Provided					9.95 or 10

1.10 VEHICLE PARKING FACILITIES

Adequate road network and parking facility is proposed to be provided at the site. Total parking area provided will be 24964.65 square meter.

1.11 POWER REQUIREMENT

Maximum power demand for the project during construction and operation phase is estimated to be 100 kVA and 500 KVA respectively. Source of power will be Bihar State Electricity Board. DG set of 500 kVA will be provided as power back-up during power failure.

1.12 SOLID WASTE GENERATION AND MANAGEMENT

Construction Phase

Solid waste will be generated both during construction as well as during operation phase. Solid waste generated during construction phase was majorly excavated materials, cement bags, bricks, concrete, MS rods, tiles, wood etc. Construction waste was segregated into re-usable, recyclable and reject fraction. Re-usable waste was stored at site, recyclable material was sold to authorized vendor and rejected material was disposed-off at the designated areas by local body. Solid waste management plan followed is given in **Table 9**.

Table 9: Solid waste management during construction phase

S. No.	Solid waste	Solid waste management
1.	Waste materials like MS Rods, bricks, concrete, broken tiles, wood pieces, cement bags etc.	Construction waste was segregated into recyclable/reusable and discarded material. Recyclable material was sold to authorize dealers. Re-usable material was stored under covered conditions at site and reject was disposed off at the

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		designated locations by local body. Waste was transported in covered vehicles only.
2.	Excavated Soil	Top soil was stripped off and stored in covered condition. Excavated soil cum will be reused at site for levelling, filling and landscaping works
3.	Domestic Waste	Domestic waste generated by labour at the site was disposed off through local agencies in the area on daily basis.

Operation phase

During operation phase, waste comprise of municipal waste. It is estimated that approx. 669 kg per day (0.5 kg per capita per day for the residents& guests, 0.15 kg per capita per day for the visitor. 0.25 kg per capita per day for the staff members, whereas 0.2 kg/acre/day is considered for landscape waste) to be generated from project site. Estimations for solid waste generation during operation phase are given in **Table 10**. Waste management plan is given below.

Table 10: Calculation of Solid Waste Generation

S. No	Description	Occupancy/Area	kg/capita/day	Total Solid Waste Generation (kg/day)	Non-Recyclable (Kg/day)	Recyclable (kg/day)
1.	Staff	779	0.25	195	117	78
2.	Visitors	3115	0.15	467	280	187
3.	Landscape waste	0.76 acres	0.2 kg/acre	0.2	0	0.2
4.	STP sludge	100 KLD Sewage	--	7	0	7
Total Waste Generated				669	397	272

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

❖ Collection, Segregation and treatment of waste

- Door to door collection system is provided for collection of domestic waste
- Local vendors carry out waste collection, management and disposal
- Separate colored bins for compostable (wet waste), recyclables and rejected waste are provided to residents as well as in common and open areas

❖ Disposal

- Rejected fraction of the waste is collected and disposed by local agencies on daily basis at the locations designated by municipal authority. Recyclable waste is sold to authorized vendors by plot owners
- Used oil from DG sets is sold to authorized vendors

1.13 GREEN AREA

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Total green area provided at the site is 3115.38 sq m (19.51 % of plot area). Evergreen native species and ornamental tree species will be planted at the site. About 39 trees will be planted. i.e 1tree/80 sqm

1.14 CONSTRUCTION MATERIAL

Detail of different type of construction material used in the site with their U values is given in **Table 11**. List of machinery which will be used for construction is given below.

Table 11: List of Construction materials

Type of Construction	U values (in W/m ² °C)
Walls	
<i>Brick:</i>	
Plastered both sides	3.24
Solid unplastered	2.67
Plastered both sides	2.24
<i>Concrete, ordinary, Dense:</i>	
-152 mm	3.58
-203 mm	3.18
<i>Concrete block:</i>	
CLC Fly ash block	1.19
<i>Hollow Concrete block, 220 mm, single skin, outside rendered, inside plastered</i>	
CLC Fly ash block	1.70
Roofs Flat:	
Reinforced concrete slab, 100mm, scered 63-12 mm, 3 layers bituminous felt	3.35
Floors:	
Concrete on ground or hardcore fill	1.13
+ Grano, Terrazze or tile finish	1.13
+ Wood block finish	0.85
Exposure South Sheltered:	
Single glazing	3.97
Double glazing 6 mm space	2.67

1.15 LIST OF MACHINERY USED DURING CONSTRUCTION

- Dumper
- Concrete mixer with hopper
- Excavator
- Concrete Batching Plant
- Cranes
- Road roller
- Bulldozer
- Tower Cranes
- Hoist

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- Labor Lifts
- Concrete pressure pumps
- Mobile transit mixer
