

CONCEPTUAL PLAN

1. INTRODUCTION

The proposed Expansion project of IIT Patna is located at Bihta, Bihar. The Existing and Expansion project having total Plot area 20,23,436.50 and total Building Built-up area 268503.2 Sqm. (Existing Building Phase I BUA- 137954.2 Sqm.+ Proposed Phase II Building BUA- 130549 Sqm.). The details of land as per PMAA is attached as **Annexure-I**. Environment Clearance (EC) vide Ref. No. 97 dated 26/10/2012 enclosed as **Annexure-II**. Site Plan is enclosed as **Annexure-III**.

The construction of the expansion project IIT Patna (Phase-II) at Amhara and Dilawarpur Blocks, Bihta, Patna has already started and ~98% work of the total construction has been completed, hence the proposed expansion project falls under violation category for as per MoEF&CC, Notification S.O.804 (E), date 14th March, 2017 and O.M. No.-22-10/2019-IA.III dated 9th September 2019.

The Project built up area is greater than 1,50,000 sqm therefore designated under Category “B” and falls under Item 8(b) (Township and area development project) of the Environmental Impact Assessment (EIA) Notification of September 14, 2006 and its subsequent amendments.

2. SITE SURROUNDING & CONNECTIVITY

The IIT Patna campus is well connected to different villages and towns. It is surrounded by villages such as Bihta, Amahar and Kharagpur habitation. Site surroundings and Connectivity details of the project are given in **Table-1**.

Table-1: Site Surroundings and Connectivity Details

Sr. No.		Description	Distance & Direction
1.	Nearest Railway Station	Bihta Railway Station	Approx. 3.85 km, NNE
2.	Airport	Patna Airport	Approx. 31.60 km, ENE
3.	Nearest Highway/Roads	NH-118 SH-5	Approx. 0.27 km, SSE Approx. 0.60 km, SW
4.	Water Bodies	Ganga River Sone River	Approx. 15 Km towards N Approx. 5.86 km towards NW
5.	Nearest Habitation	Bihta – lai road Bihta – Kanpa Road SH-78	Approx. 0.25 m, East Adjacent to Site in North Approx. 3.0 Km, North.
6.	Nearest School, Hospital & Temple	List of Schools: St. Teresa International School - DAV Public School Amhara High School	Approx. 3.21 km, NNE Approx. 0.78 km, ENE Approx. 0.84 km, SSE

		List of Hospitals: Aastha Hospital List of Temples: Sai Mandir	Approx. 3.56 km NE Approx. 0.55 Km, NE
7.	Nearest Densely	Bihta Amahar Kharagpur	Approx. 3.63 km ,NNE Approx. 1.99 km ,SE Approx. 2.68 km , ESE
8.	Defense Area	Bihta Airbase Station	Approx. 5.39 km NE

Source: Google Earth & Site visit

The Site Location map is shown in **Figure-1**.

Surrounding features of the proposed site (within 500 meters) is shown in **Figure 2**. Topographical map of 10 km radius is shown in **Figure 3**

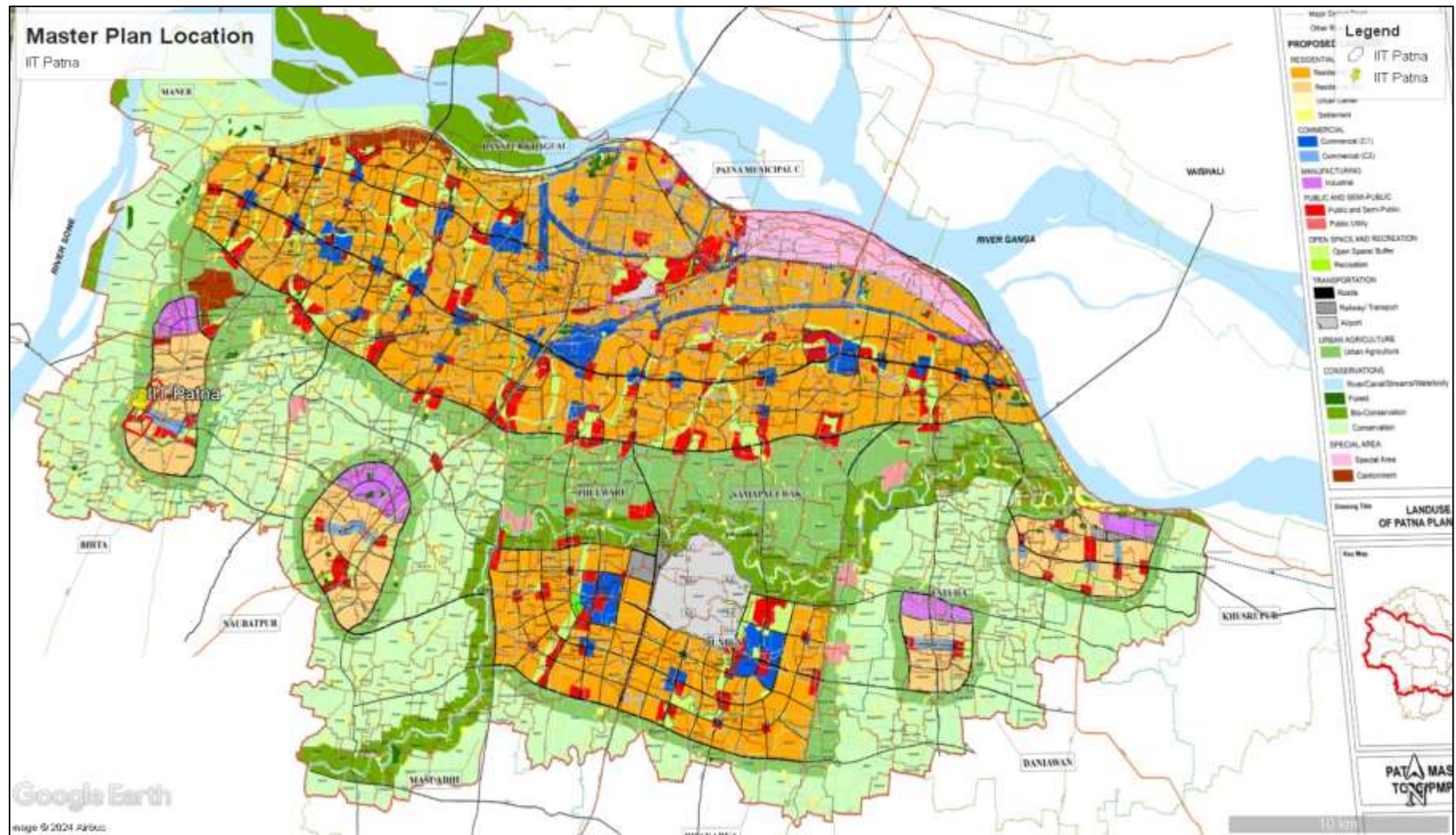


Figure-1: Site Location Map

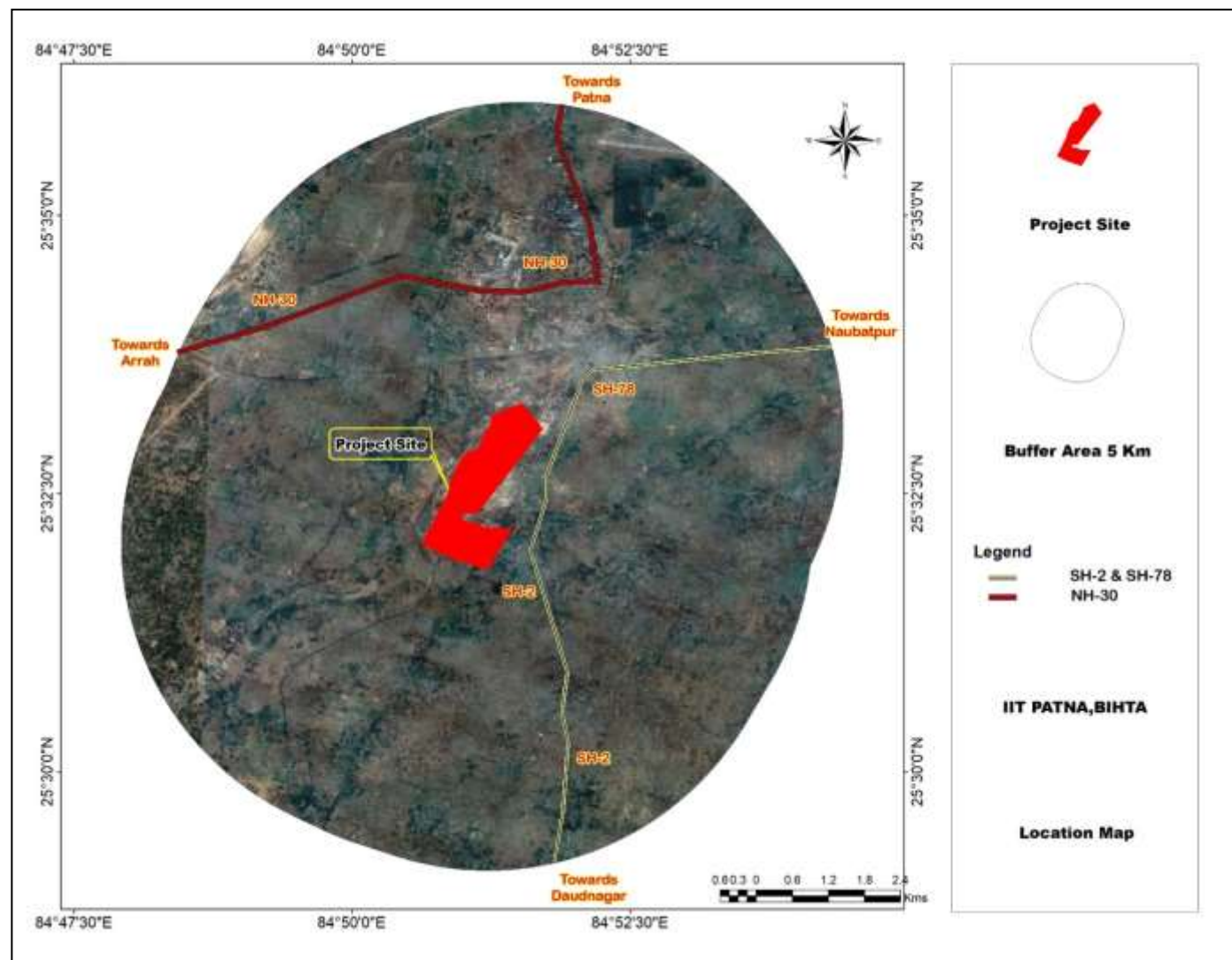


Figure-2: Surrounding features of the proposed site (within 500 meter)

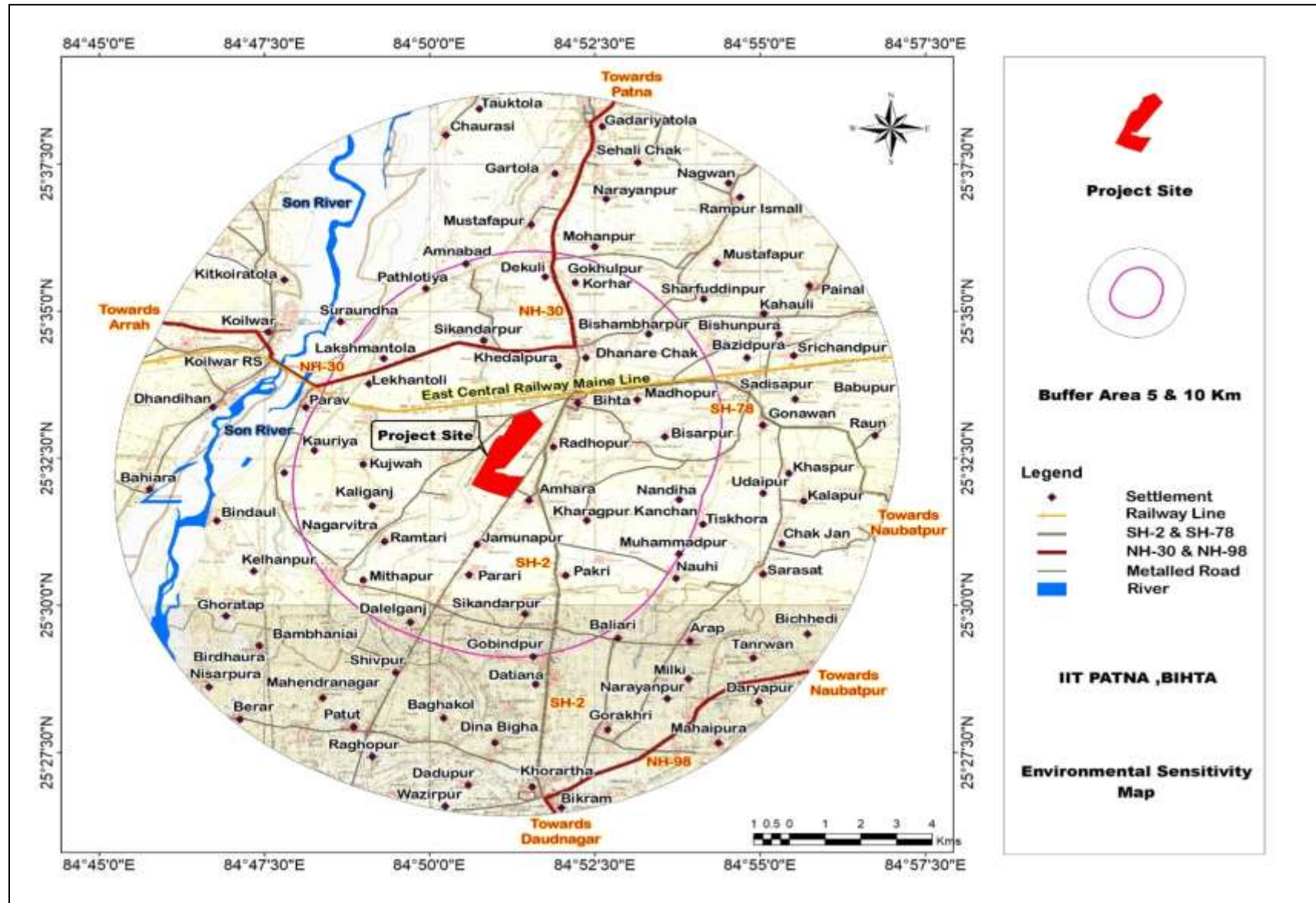


Figure-3: Topographical Map of 10 km radius

3. PROJECT LOCATION AND DESCRIPTION

The coordinates of the project boundary along with the center of the project site is given below in the Table-2.

Table-2: Coordinates of the Project Boundary

S. No.	Latitude	Longitude
1	25°32'15.365"N	84°50'36.990"E
2	25°32'43.935"N	84°50'51.473"E
3	25°33'5.759"N	84°51'02.187"E
4	25°33'16.274"N	84°51'11.115"E
5	25°33'31.599"N	84°51'14.885"E
6	25°33'31.750"N	84°51'30.955"E
7	25°33'17.663"N	84°51'42.264"E
8	25°32'32.031"N	84°51'7.147"E
9	25°32'23.698"N	84°51'10.917"E
10	25°32'23.698"N	84°51'25.400"E
11	25°32'00.881"N	84°51'11.909"E

4. DETAIL OF BUILDING BLOCK

Details of Building Blocks are given in Table 3.

Table 4: Details of Building Blocks (Existing)

Sl. No.	Building	No. of Building	No. of Floors	Ground Coverage	Built-up area
1	Academic Block 3	1	G+5	1680	9660.5
2	Academic Block 6	1	G+5	1680	9660.5
3	Academic Block 4	1	G+3	1680	6440.3
4	Academic Block 9	1	G+5	2337	11319
5	Administrative Building	1	G+3	3778.81	10,655.12
6	SAC 1/3	1	G	1541.78	1541.78
7	Workshop	1	G	2476.28	2476.28
8	Boy's Hostel 1	1	G+7	4921	27393
9	Boy's Hostel 2	1	G+7	1371.54	11130.8
10	Girl's Hostel	1	G+5	1042	5004

Sl. No.	Building	No. of Building	No. of Floors	Ground Coverage	Built-up area
11	Gymkhana	1	G+2	1548.24	3239
12	Director's Bungalow	1	G+1	476	674
13	Primary School	1	G	1746.08	1746.08
14	Hospital	1	G+1	1379.17	2310.93
15	Housing Type-D	4	G+3	1231.2	4531.2
16	Housing Type-C	2	G+6	1356.57	6496
17	Housing Type-B	4	G+8	2685.6	22220.04
18	ESS	3	G	234	702
19	MRSS	1	G	598.6	598.6
20	Gate Complex	1	G	155.07	155.07
		29		33918.94	137954.2

Table 4: Details of Building Blocks (Proposed)

Sl. No.	Building	No. of Building	No. of Floors	Ground Coverage	Built-up area
1	Boy's Hostel 3	1	G+7	4920	27680.35
2	Girl's Hostel 2	1	G+5	1042	5004
3	Married Accommodation	1	G+5	410	2384.31
4	Auditorium	1	G	5520	5012.52
5	Central Library	1	G+5	2899	10474.36
6	Lecture Hall	1	G+1	2080	3900.62
7	Academic Block 1	1	G+5	1680	9698.75
8	Academic Block 2	1	G+5	1680	9698.75
9	Academic Block 5	1	G+5	1680	10271
10	CEER	1	G+1	2900	2900
11	SAC (2,3)/3	1	G	3339	3332.72
12	Workshop	1	G	3100	3153.77
13	Incubation Centre	1	G+1	2080	2972
14	ESS-4	1	G	474.82	474.82
15	Type-A Quarters	1	G+8	621	5722.01
16	Type-B Quarters	1	G+8	621	5811.81
17	Type-C Quarters	2	G+6	928	6498.18
18	Type-D Quarters	3	G+3	864	3630.95
19	Guest House	1	G+2	1993	5278.37
20	Higher Secondary School	1	G+2	2814	5163
21	CELS	1	G+1	1486	1486
		24		43131.82	130549

5. POPULATION DETAIL

Total population of the project will be **9017** which includes the population of Students, Faculty, Staffs and visitors.

6. ROAD & PARKING DETAILS

Internal Road – Project has driveway of 6 m. inside the premises. The details of the Parking requirement are provided in the **Table-6**

Table-6: Parking Details

Sl. No.	Items	Area proposed for parking	Area required (sqm) per ECS	ECS Proposed
1.	Open parking space	76,114	25	3,045

7. GREENBELT DEVELOPMENT

Increasing vegetation in the form of greenbelt is one of the preferred methods to mitigate air pollution. Plants serve as a sink for pollutants, reduce the flow of dust and reduce noise pollution. The site for the buildings is vacant so, no tree cutting is required. Calculation of green area for the project is given in **Table-7**.

Table-7: Calculation of Green Area

Total Plot Area	2023436.50 Sqm.
Landscape area provided	445156.03 Sqm.
Total No. of Trees required to be Planted @ 1 tree per 80Sq.m. of Plot area	25293 Nos.

8. WATER REQUIREMENT, SUPPLY AND DISTRIBUTION

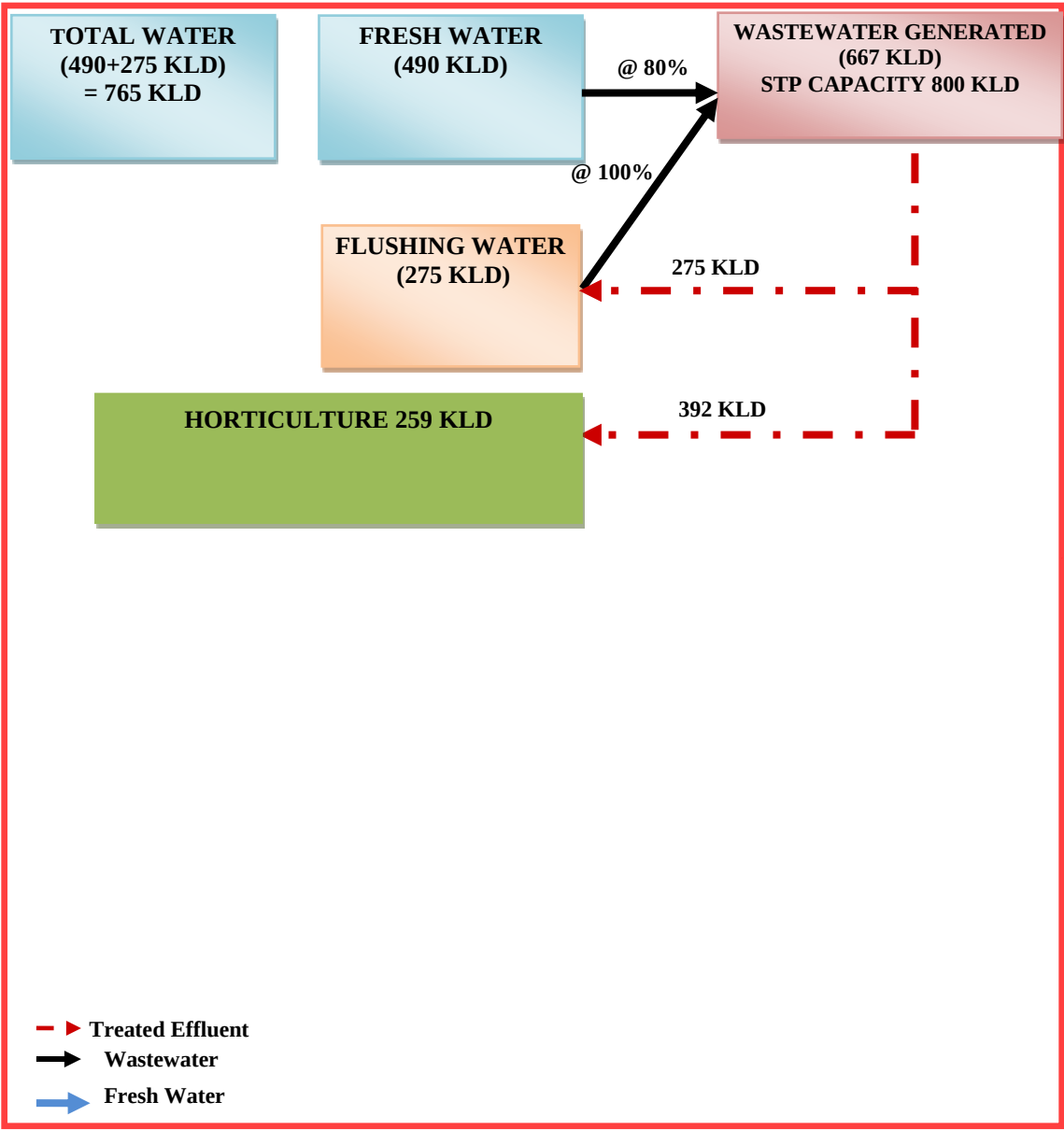
Water Requirement for the proposed project is mentioned below.

8.1 Water requirement during Construction phase

During the construction phase the water requirement (approx. 90 KLD) will be met from treated waste water from existing STP and domestic water from ground water as NOC from CGWA has been obtained for ground water withdrawal of 1500 KLD ground water vide letter no. 21-4 (129)/CGWA/MER/2012-4839 dated 07/11/2012.

8.2 Water requirement during operation phase

Water requirement during the operational phase after expansion of the project will be met through Ground water. The total water requirement has been estimated 765 KLD. This includes domestic water requirement and flushing water requirement. The total fresh water requirement is 490 KLD which includes Domestic water requirement. The water requirement for Flushing i.e. 275 KLD will be met through treated water from STP. Water balance diagram for given in **Figure-4**.



8.3 Wastewater Generation

The total estimated quantity of wastewater to be generated from proposed project is ~**667 KLD**.

Calculation of wastewater generation is shown below in **Table-8**.

Table-8: Calculation of Wastewater Generation

Details	Water (KLD)
Water requirement for domestic purpose	490
Wastewater to be generated from domestic use (@ 80% of domestic water requirement)	392
Water requirement for Flushing Purpose	275
Wastewater to be generated from Flushing & (@ 100% of flushing requirement)	275
Total Wastewater generated	667
STP capacity 20% higher than total waste water	800

Reuse of Treated Water:

The waste water generation will be about 667 KLD. After treatment in STP, approx. 534 KLD will be available for reuse, out of which ~275 KLD water will be used for flushing & 259 KLD will be used in horticulture.

During the non-monsoon season, treated water will be used in Flushing & landscaping management and during the monsoon season, as there will be no requirement of water for landscaping, and the excess treated water depending upon requirement either will be used in nearby construction site or discharged into the sewer line.

Wastewater Treatment Scheme

It is proposed to use activated sludge process working on the principle of extended aeration based on a Fine Bubble Diffused Aeration System. Raw Sewage will flow through a bar screen chamber to an Equalization Tank. The bar screen shall be so designed that it can be cleaned manually from outside the Tank. Two submersible solid handling pumps shall be provided in the Equalization Tank to pump the collected Raw Sewage to the Aeration Tank. An automatic level controller shall be provided in the Equalization Tank to turn the pump off at the low water level in the Tank and to start the pump automatically when water level is high.

Air will be introduced in the Equalization Tank through submerged air diffusers, to prevent the sewage from becoming septic during long retention or low load conditions. The Raw Sewage that comes into the Aeration Tank shall be aerated by using Fine Bubble Diffusers mounted in a grid at the bottom of the tank. Facility will be made to pull up the diffusers for cleaning if necessary. Air will be supplied to the diffusers by twin lobe rotary air blowers located in the plant room. The aeration system shall be designed in a way so as to achieve complete mixing of the sludge organisms with raw sewage in order to achieve a MLSS of between 3000 – 4000 in the Aeration Tank. From the aeration tank this mixed liquor passes into a Clarifier. The liquid in the clarifier tank is maintained in quiescent condition allowing the solids to settle to the bottom of the Clarifier for collection.

The accumulated solids (Activated Sludge) shall be constantly pumped back into the aeration tank by sludge recycle pumps. This return sludge undergoes further digestion in the aeration tank and also provides the active organism needed to digest the incoming raw sewage.

The Clarifier shall be provided with an overflow weir to collect the treated effluent and a scum baffle

shall keep any floating matter from passing out in the final treated water. Treated water from clarifier shall overflow into a Chlorine Contact Tank where hypo chlorite solution shall be added to disinfect the treated water.

Excess sludge from the bottom of the Clarifier shall be wasted 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.

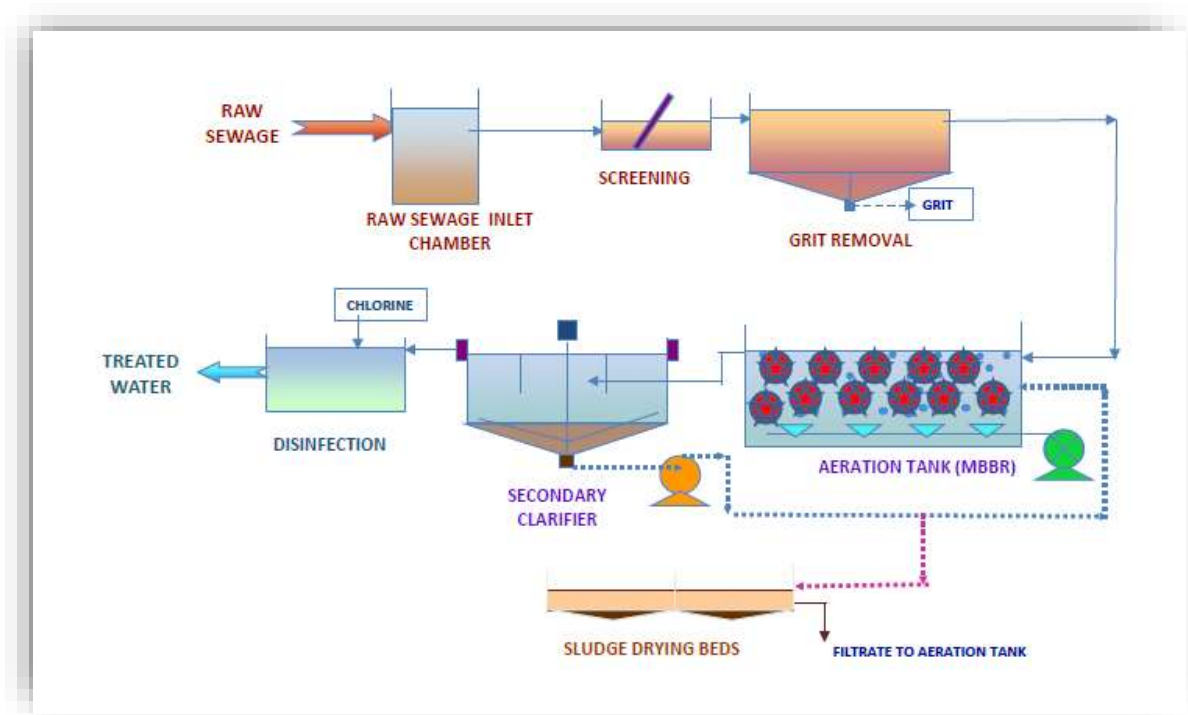


Figure-6: Schematic Diagram of MBR STP

9. STORM WATER MANAGEMENT

The storm water disposal system for the premises shall be self-sufficient to avoid any collection/stagnation and flooding of water. Maximum harvesting will be done within the site. Therefore, it has been decided to provide sufficient rainwater harvesting at selected locations, which are liable to catch the maximum run-off from the area. Following are some measures for Storm water disposal:

- 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) The annual rainfall intensity of 40 mm/hr shall be considered for designing the storm water drainage system.

The entire site is provided with extensive planned drainage system to low lying areas. The arrangement provides appropriate protection to the site against flooding.

9. POWER REQUIREMENT

The total electrical load demand has been estimated to be 7 MVA. The source of power will be supplied by SBPDCL Supply.

In case of power failure, 9 DG sets (7x500 KVA + 2x1000 KVA) of total capacity of 5500 KVA will be provided as power back-up. The DG sets are located in the basement and will be of air cooled.

The DG sets will be provided with acoustic enclosure. Adequate stack heights of D.G. Sets will be provided as per the stipulated guidelines of Central Pollution Control Board (CPCB) to facilitate natural dispersion of exhaust gases as the calculation for the stack height is given below considering height of the building.

10. SOLID WASTE GENERATION AND MANAGEMENT

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 Solid Waste Management Rules, 2016.

The domestic solid waste will be generated by the students, residents, faculties, visitors and staff; pertains to the two categories, Bio-degradable and non-biodegradable. These solid wastes will be collected separately by putting three types of separate bins at the source of generation. For the biodegradable waste green bins will be provided, for the recyclable waste blue bins and for the non-recyclable waste dark grey bins will be provided. It is estimated that maximum solid waste generation would be about **2282 kg/day**, and **300 kg** of sludge (wet basis). Following solid waste generation rate has been considered as given in **Table-9**.

Table-9: Solid Waste Generation Details

Sl. No.	IIT Patna	Population	Kg per capita waste generation	Total waste generation (kg/day)	Bio-degradable waste	Non-bio degradable waste
1	Faculty and students stays in quarters and Hostels	4602	0.35	1611	644.4	966.6
2	Visitors includes staff and students	4415	0.15	662	264.8	397.2
3	Landscape waste	1,86,283 sqm or 46 acres	0.2/acre/day	9	3.6	5.4
	Total			2282	912.8 Say 913	1369.2 Say 1369

Source: Manual on Municipal Solid Waste Management, published by Central Public Health and Environmental Engineering Organization (CPHEEO), Ministry of Urban Development, Government of India

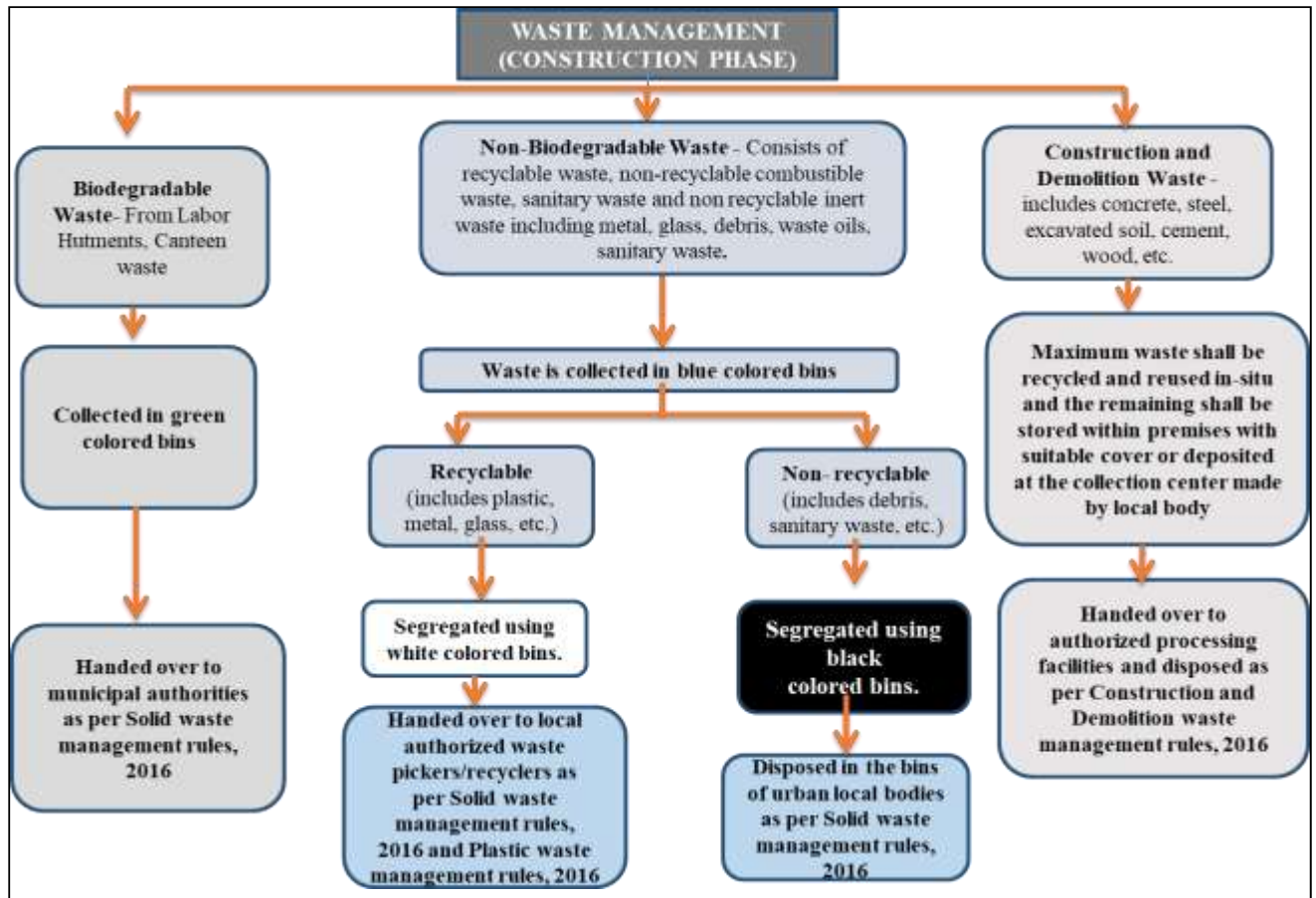


Figure-7: Solid Waste Management during Construction Phase

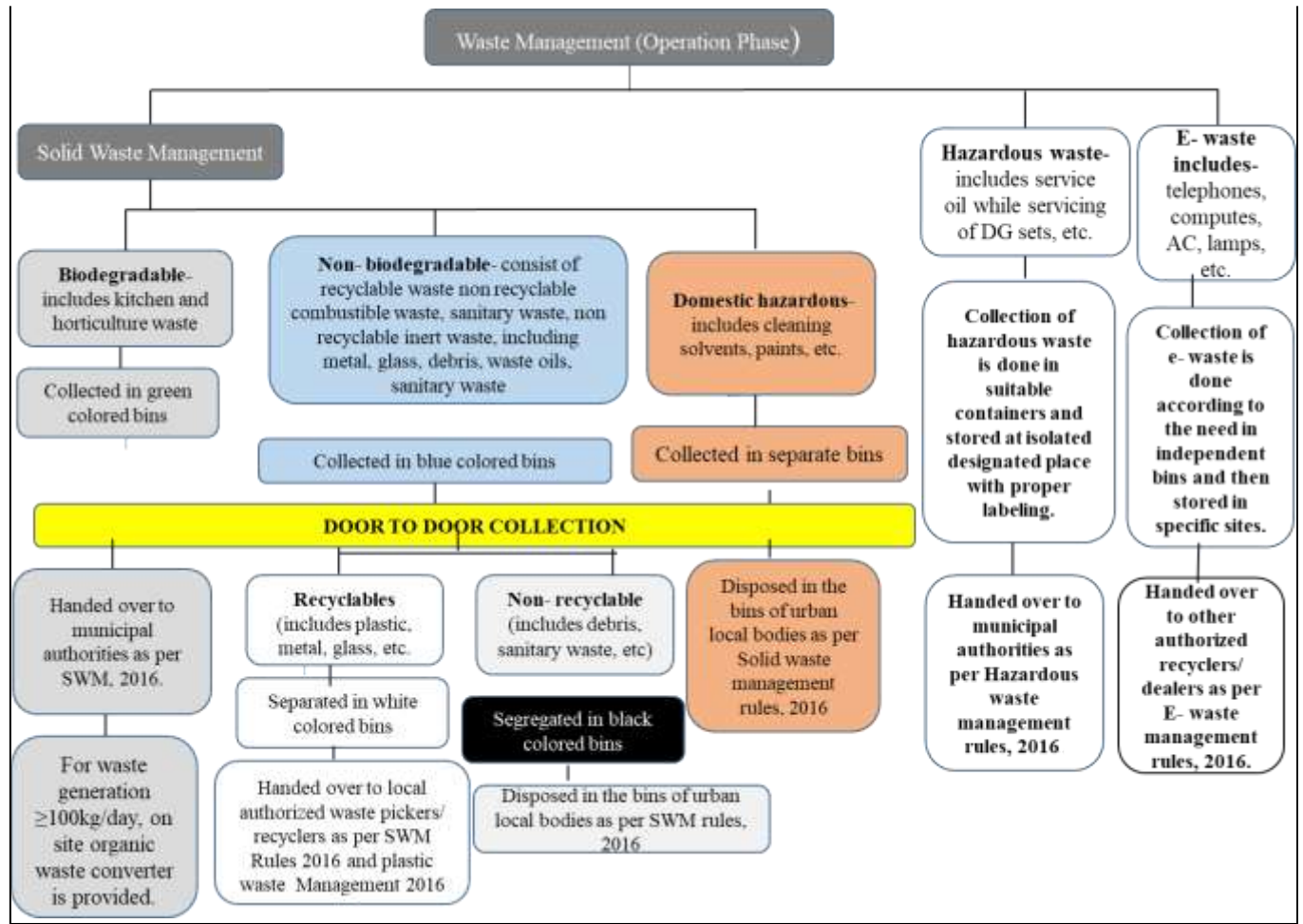


Figure-8: Solid Waste Management during Operation Phase

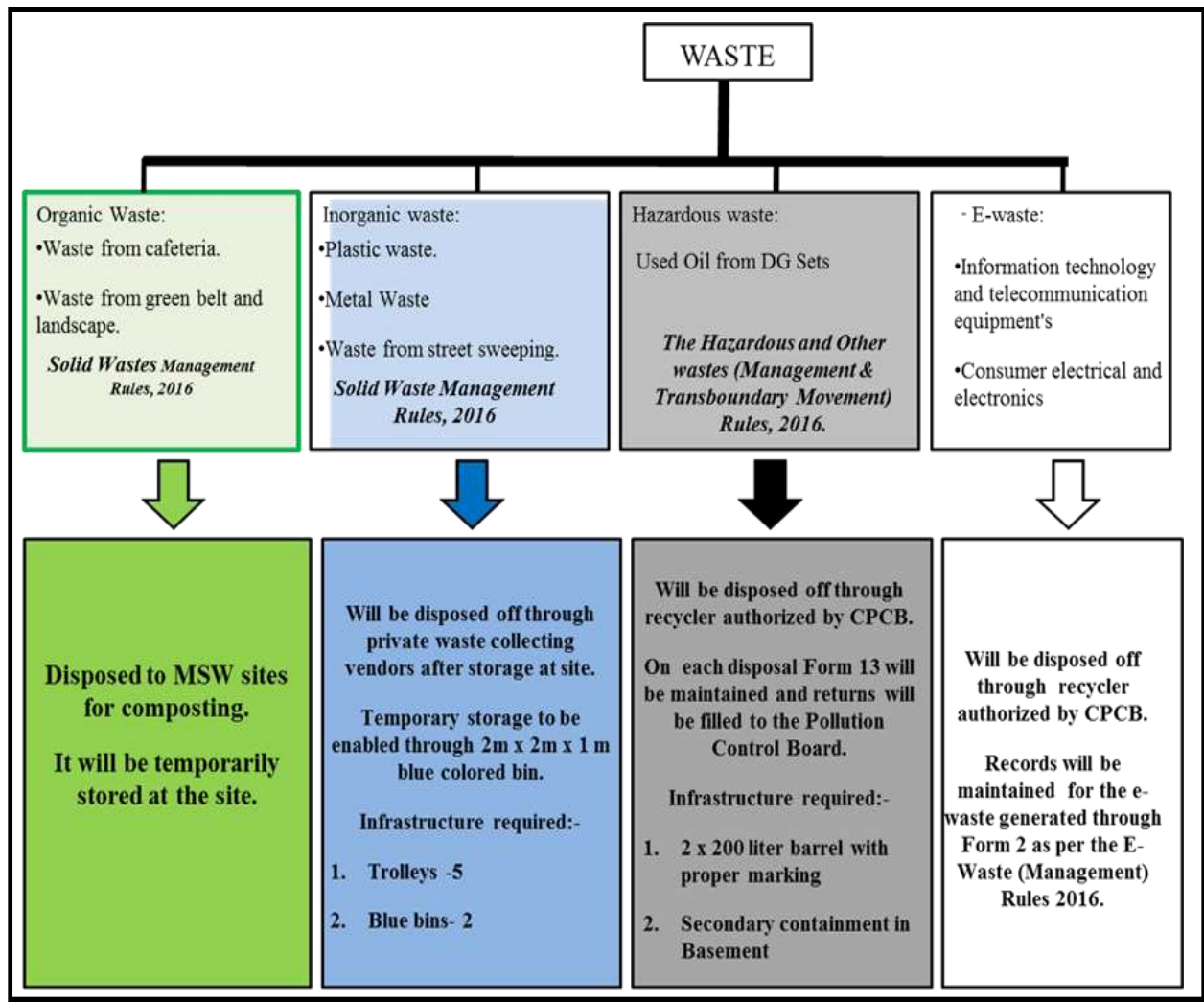


Figure-9: Hazardous Waste Management Plan

11. FIRE FIGHTING SYSTEM

The Fire Fighting will be designed as per the recommendations of the National Building Code of India: Part 4 Fire and Life safety: 1997. The building has been classified under Group-C:Institutional Building, Sub Division (C-1) in the National Building Code 2005.

The fire- fighting system has been designed considering the following codes, manual and guidelines;

- National Building Code of India (NBC);
- As per requirement of fire officer/local fire approving authorities; and
- As per Indian Standard Code for Fire Protection (IS Codes)

12. DETAIL OF CONSTRUCTION MATERIAL

Locally available building materials are majorly used for project development. Low embodied energy material like fly ash mixed cement is also used for construction of the project.