

CONCEPTUAL PLAN

1. INTRODUCTION

M/s Aarohi Homes Pvt. Ltd. has proposed for Expansion of Residential Building “Aarohi city” on the total land area measuring **12300.14 Sqm.** and Net Plot Area **12186.18 Sqm.** (Area of the Plot used for the road of Master Plan = 113.96 Sqm.) Sikandarpur, Patna, Bihar. The proposed build up area is **55647.79 Sqm.** (Built-up Area as per existing EC: 34288.41 Sqm. + Proposed Built-up Area: 21359.38 Sqm.).

The Project built up area is greater than 20,000 Sqm. and less than 1,50,000 Sqm. therefore designated under Category “B” and falls under Item 8 (a) (Building & Construction Project) of the Environmental Impact Assessment (EIA) Notification of September 14, 2006 and its subsequent amendments.

2. SITE SURROUNDING & CONNECTIVITY

The proposed Expansion project is well connected to different villages and towns. It is surrounded by villages such as Luv Kush Nagar, Gandhi Nagar and Ruknapur habitation & the project is also close proximity to the Patna town within 10 km of the area of proposed project. Site surroundings and Connectivity details of the proposed project are given in **Table-1**.

Table-1: Site Surroundings and Connectivity Details

Connectivity & Site Surroundings			
S. No.	Description		Distance and Direction
1.	Nearest Junction Nearest Railway Station	Patliputra Junction Patna Junction Railway Station Danapur Railway Station	Approx.0.25 Km towards South. Approx. 7.30 Km towards ESE. Approx. 5.10 Km towards SSW.
2.	Nearest Airport	Jayprakash Narayan Airport Patna	Approx. 3.87 km towards SE.
3.	Nearest Village	Luv Kush Nagar Gandhi Nagar Ruknapur Vijay nagar Chanakya puri	Approx. 0.65 Km towards SW. Approx. 0.45 Km towards East. Approx. 1.0 Km towards SE. Approx. 0.90 Km towards South. Approx 1.30Km towards west.
4.	Nearest Highway/Roads	Digha Bridge Link Rd Bailey Rd	Attached to Site. Approx. 1.65 km. towards SSW.

Connectivity & Site Surroundings			
S. No.	Description		Distance and Direction
		Ashiana - Digha Rd	Approx. 1.42 km. towards East.
5.	Nearest School & College	Magadh Institute of Pharmacy M.S Memorial Academy St. Karen’s High school Kendriya Vidyalaya Danapur Cant Amity University	Approx. 0.38 Km towards SSW Approx. 0.60 Km towards SSE. Approx. 0.97 Km towards WSW. Approx. 2.60 Km towards WNW. Approx. 1.90 Km towards SW.
6.	Nearest Hospital	Sarv Chikitsa Hospital Raj Trauma Hospital Shyamal hospital Royal hospital State Government Hospital.	Approx. 1.50 Km towards South. Approx. 1.20 Km towards West. Approx. 1.40 Km towards SSE. Approx. 1.92 Km towards SSE. Approx. 5.45 Km towards SSW.
7.	Places of worship	Shri Mahaveer Mandir Shiv mandir Manokamna mandir Hanuman Mandir Jagata Hanumanji mandir	Approx. 0.25 Km towards WSW. Approx. 0.55 Km towards ENE. Approx. 1.10 Km towards SSE. Approx. 1.72 Km towards North. Approx. 1.70 Km towards SSW.
8.	Water Bodies	Ganga River Gandak River Ganga Marsona Channel	Approx. 2.50 Km towards North. Approx. 14 Km towards ENE. Approx. 2.50 Km towards WNW.
9.	Nearest Town	Patna	Approx. 7.50 Km towards ESE.
10.	Sanctuary	Bird Sanctuary Pond.	Approx. 2.60 Km towards SSE.
11.	Reserve Forest/ Zoo	Sanjay Gandhi Biological Park Zoo.	Approx. 4.0 Km towards SE.
12.	Defense installations	Danapur Cantonment	Approx. 2.80 Km towards WNW.

Source: Google Earth & Site visit

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

A Google Map showing the site corner coordinates of the proposed project is shown in **Figure-2**.

Topographical map (*Survey of India Top sheet no. G4N2, G45M14*) of 10 km radius is shown in **Figure 3**.

Proposed Expansion of Residential Building “Aarohi City” at Sikandarpur, Patna, Bihar

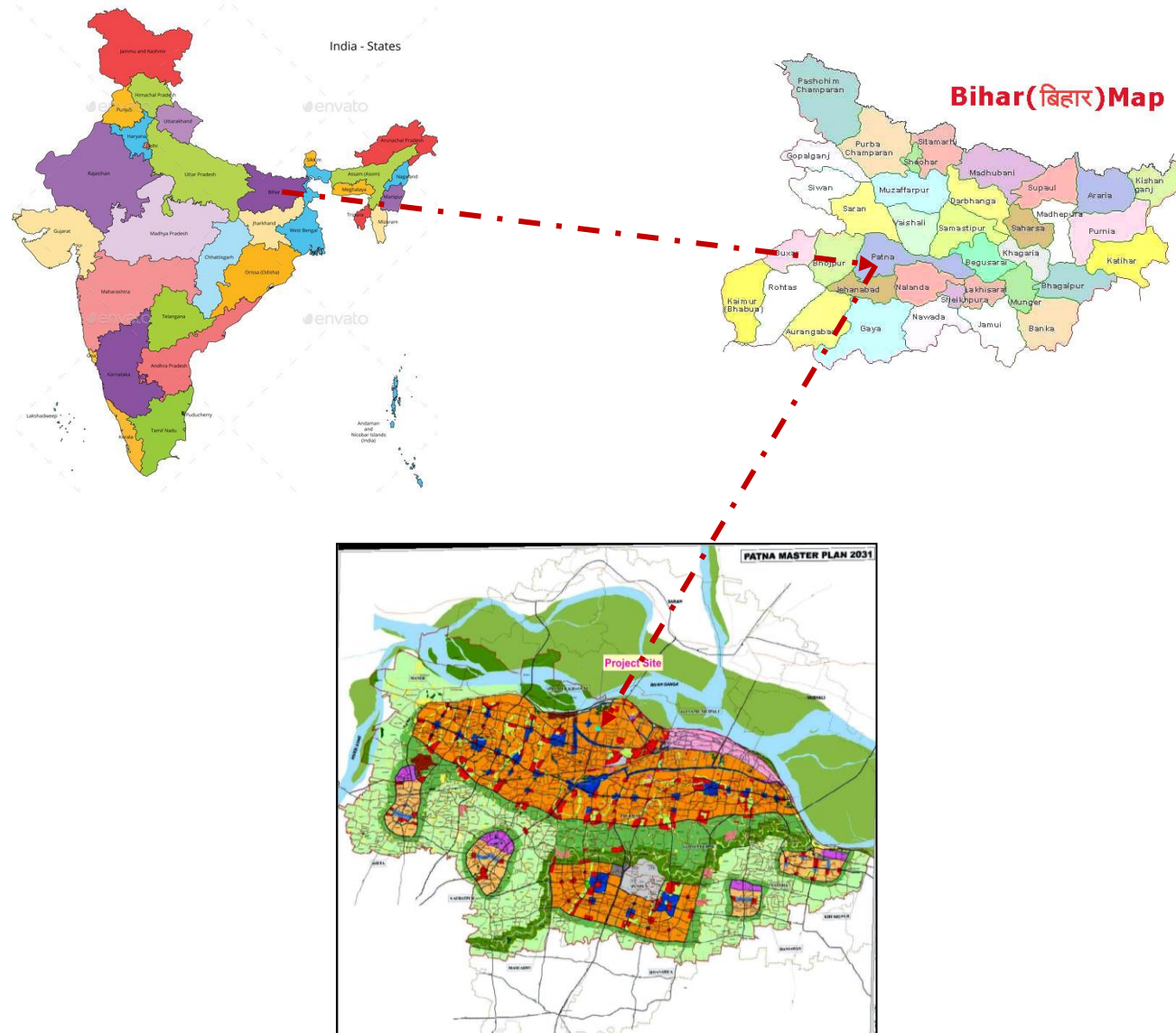
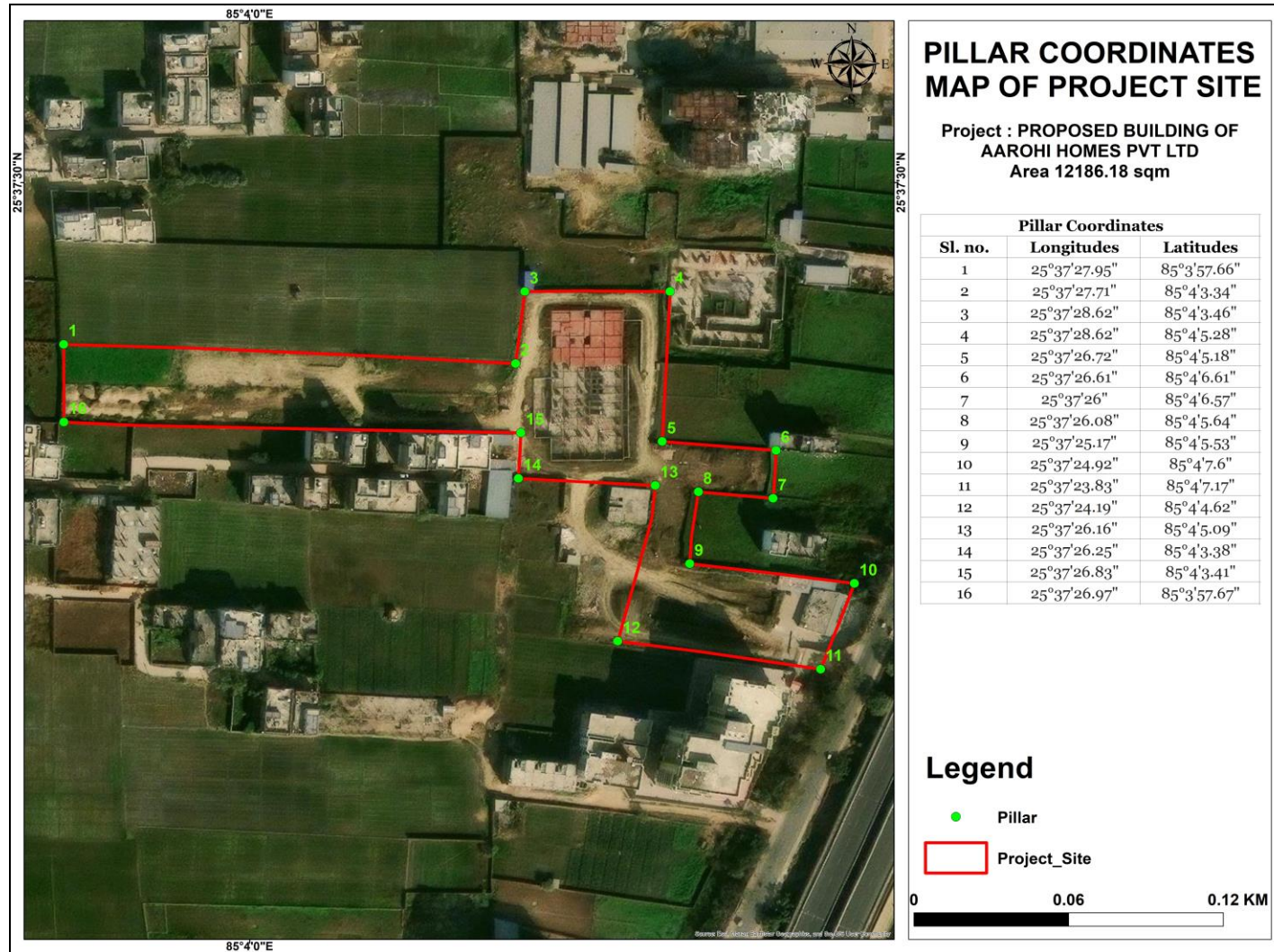


Figure-1: Site Location Map

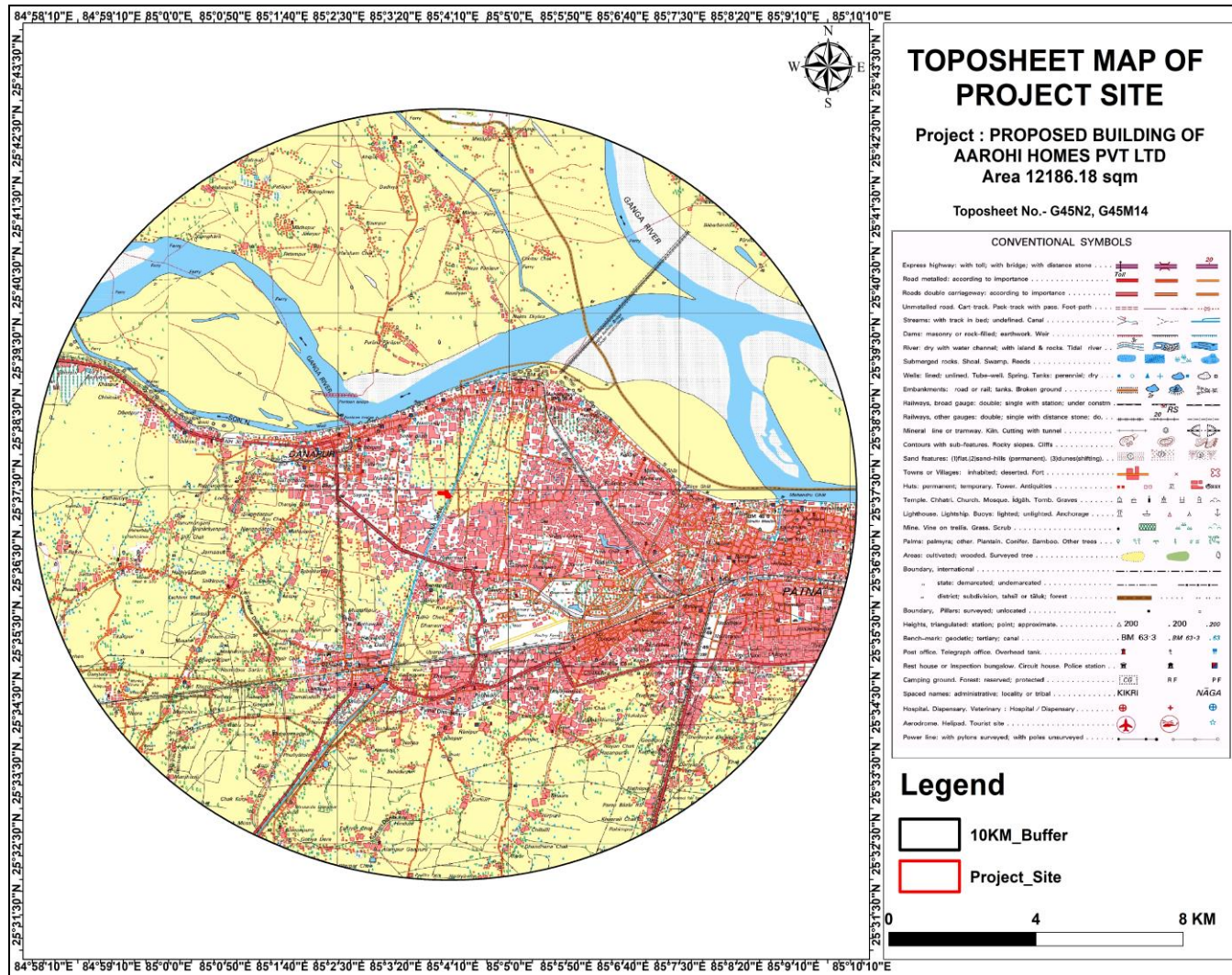
Proposed Expansion of Residential Building “Aarohi City” at Sikandarpur, Patna, Bihar



Source: Google Map

Figure-2: Pillar Coordinate Map

Proposed Expansion of Residential Building “Aarohi City” at Sikandarpur, Patna, Bihar



Source: Survey of India

Figure 3: Topographical Map of 10 km radius

3. PROJECT LOCATION AND DESCRIPTION

The Proposed Expansion of Residential Building “Aarohi city” at Sikandarpur, Patna, Bihar. 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

Sl. no.	Longitudes	Latitudes
1	25°37'27.95"	85°3'57.66"
2	25°37'27.71"	85°4'3.34"
3	25°37'28.62"	85°4'3.46"
4	25°37'28.62"	85°4'5.28"
5	25°37'26.72"	85°4'5.18"
6	25°37'26.61"	85°4'6.61"
7	25°0307'26"	85°4'6.57"
8	25°37'26.08"	85°4'5.64"
9	25°37'25.17"	85°4'5.53"
10	25°37'24.92"	85°4'7.6"
11	25°37'23.83"	85°4'7.17"
12	25°37'24.19"	85°4'4.62"
13	25°37'26.16"	85°4'5.09"
14	25°37'26.25"	85°4'3.38"
15	25°37'26.83"	85°4'3.41"
16	25°37'26.97"	85°3'57.67"

The detailed area statement is given below in **Table-3**.

Table-3: Detailed Area Statement

S. No.	Details	Area	
1	Total Plot area as per Deed / at site	12300.14	Sqm.
2	Effected Land for Master Plan	113.96	Sqm.
3	Net Plot area	12186.18	Sqm.
4	FAR area after Expansion (Excluding EWS)	39592.7	Sqm.
5	Total FAR Achieved	3.24	--
6	EWS Built-up Area required	5938.9	Sqm.
7	EWS Built up area provided	5951.55	Sqm.
8	Residential Parking area Required @ 30% of BUA (Excluding 15% of Service Area)	9094.21	Sqm.
9	Total Parking area Provided	10103.54	Sqm.
10	Built-up area as per Existing EC	34288.41	Sqm.
11	Proposed Built-up area	21359.38	Sqm.
12	Total Built-up area	55647.79	Sqm.
13	Greenbelt area Provided	2509.25	Sqm.
14	Total Ground Coverage	3934.49	Sqm.
15	Road, Paved and visitor's Parking area	5742.44	Sqm.
16	Commercial Built-up area included in total Built-up area	1203.28	Sqm.

4. DETAIL OF BUILDING BLOCK

The Project envisages construction of single block; the proposed group housing building of 3 Blocks. Details of Building Blocks are given in **Table 4(a) & 4(b)**.

Table 4(a): Details of Building Blocks (Existing & Proposed)

S. No.	Details	Block A (Existing) (Sqm.)	Block E (Existing) (Sqm.)	Block D (Proposed) (Sqm.)	Block F (Existing & Proposed) (EWS)
1	Basement-01 Floor B/U Area	36.31	52.22	61.43	..
2	Basement-02 Floor B/U Area	21.45	29.9	47.22	..
3	Ground Floor B/U Area	617.64	56.84	62.84	238.15
4	First Floor B/U Area	585.64	1110.25	1276.31	408.1
5	Second Floor B/U Area	652.85	1110.25	1276.31	408.1

Proposed Expansion of Residential Building “Aarohi City” at Sikandarpur, Patna, Bihar

6	Third Floor B/U Area	652.85	1110.25	1276.31	408.1
7	Fourth Floor B/U Area	652.85	1110.25	1276.31	408.1
8	Fifth Floor B/U Area	652.85	1110.25	1276.31	408.1
9	Sixth Floor B/U Area	652.85	1110.25	1276.31	408.1
10	Seventh Floor B/U Area	652.85	1110.25	1276.31	408.1
11	Eight Floor B/U Area	652.85	1110.25	1276.31	408.1
12	Ninth Floor B/U Area	652.85	1110.25	1276.31	408.1
13	Tenth Floor B/U Area	652.85	1110.25	1276.31	408.1
14	Eleventh Floor B/U Area	652.85	1110.25	1276.31	408.1
15	Twelfth Floor B/U Area	652.85	1110.25	604.1	408.1
16	Thirteenth Floor B/U Area	652.85	1110.25		408.1
17	Fourteenth Floor B/U Area		1110.25		408.1
	Sub Total	9095.24	15682.46	14815.00	5951.55
	Total FAR Proposed after Expansion	45544.25			
	Lower Basement Parking area	714.41	1446.1	1534.09	
	Upper Basement Parking area	714.41	1446.1	1534.09	
	Ground Floor Parking area		1442.1	1272.24	
	Sub Total	1428.82	4334.3	4340.42	
	Total Non-FAR	10103.54			
	Total Built-up area	55647.79			

Table 4 (b): Details of Building Blocks

Residential Block	3 BHK	2 BHK	1 BHK	Total No. of units	Population	No. of Floors	Height of the Building
Block A	60	..	..	60	360	LB+UB+G+13	Max. 42 meter
Block E	112	28	..	140	812	LB+UB+G+14	Max. 45 meter
Block D	114	23	..	137	799	LB+UB+G+12	Max. 39 meter
Block F (EWS)	..	..	101	101	404	G+14	Max. 45 meter
Total				438	2375		

5. POPULATION DETAIL

Total population of the proposed project will be **2804** which include the population of dwelling units, and visitors. Breakup of the population is given in **Table-5**.

Table-5: Calculation of Population

Residential Block	Flat	No. of Units	Population
Residential Building	438	6\5\4	2375
Commercial	601/6		101
Visitors	10% of Residential Population		237
Visitor (Commercial Population)	90% of the commercial Staff		91
Total			2804

6. PARKING DETAIL

The details of parking required and provided is mentioned in following **Table 6**.

Table 6: Parking Details

Parking Required for Existing Blocks	Area
Commercial Built-up area after deduction of 15% service area	1022.78 Sqm.
Parking area required @30% of Net Built-up area	306.83 Sqm.
Block A & E Built up area after deduction of 15% service area	20038.25 Sqm.
Parking area required @30% of Net Built-up area	5009.56 Sqm.
Total Parking area required for Existing Blocks	5316.39 Sqm.
Total parking area provided for Existing Blocks	
Block A	
Lower Basement Parking area	714.41 Sqm.
Upper Basement Parking area	714.41 Sqm.
Block E	
Lower Basement Parking area	1446.1 Sqm.
Upper Basement Parking area	1446.1 Sqm.
Ground Floor Parking area	1442.1 Sqm.
Total Parking area	5763.12 Sqm.
Parking Details for Proposed Blocks	

Block D Built up area after deduction of 15% service area	12592.75 Sqm.
Parking area required @30% of Net Built-up area	3777.82
Parking area provided for D	
Lower Basement Parking area	1534.09 Sqm.
Upper Basement Parking area	1534.09 Sqm.
Ground Floor Parking area	1272.24 Sqm.
Total parking area provided	4340.42 Sqm.

7. LANDSCAPE 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 proposed buildings is vacant so, no tree cutting is required. Calculation of green area for proposed project is given in **Table-7**. **Table-8** indicates various planned species to be used in greenbelt development. The Landscape plan is shown in Site layout attached as **Annexure VI**.

Table-7: Calculation of Green Area

Total Plot Area	12186.18 Sqm.
Landscape area provided @ 20.59 %	2509.25 Sqm.
Total No. of Trees will be Planted @ 1 tree per 80 Sqm. of Plot Area	152 Nos.

Table-8: Suggested List of Species for Greenbelt Development

S.N.	Scientific Name	English Name	Common/Hindi Name	Family	Endemism	Nature
1	<i>Albizia procera</i>	White siris	Safed Siris	Mimosaceae	Native	Perennial
2	<i>Annona squamosa</i>	Custard apple	Sharifa / Sitaphal	Annonaceae	Introduced	Perennial
3	<i>Artocarpus heterophyllus</i>	Jackfruit	Kathal	Moraceae	Native	Evergreen
4	<i>Azadirachta indica</i>	Neem	Neem	Meliaceae	Native	Evergreen
5	<i>Dalbergia latifolia</i>	Indian Rosewood,	Kala-shisham	Fabaceae	Native	Deciduous
6	<i>Dalbergia sissoo</i>	Indian Rosewood	Sissoo	Fabaceae	Native	Deciduous
7	<i>Delonix regia</i>	Flame Tree	Gulmohar	Caesalpinaceae	Naturalized	Evergreen
8	<i>Ficus benghalensis</i>	Indian Banyan	Bad/Bargad	Moraceae	Native	Evergreen
9	<i>Ficus benjamina</i>	Golden Fig	Pakar	Moraceae	Native	Evergreen
10	<i>Ficus racemosa</i>	Cluster Fig	Gular	Moraceae	Native	Evergreen
11	<i>Ficus religiosa</i>	Sacred Fig Tree	Peepal	Moraceae	Native	Deciduous
12	<i>Mangifera indica</i>	Mango	Aam	Anacardiaceae	Native	Evergreen
13	<i>Madhuca neriifolia</i>	Madhuca malabarica	Mahua	Sapotaceae	Native	Deciduous
14	<i>Neolamarckia cadamba</i>	Kadamb	Kadamb	Rubiaceae	Native	Evergreen
15	<i>Phyllanthus emblica</i>	Indian Gooseberry	Amla	Phyllanthaceae	Native	Deciduous
16	<i>Pongamia pinnata</i>	Indian Beech Tree	Karanj	Fabaceae	Native	Deciduous
17	<i>Syzygium cumini</i>	Indian Blackberry	Jamun	Myrtaceae	Native	Evergreen
18	<i>Tectona grandis</i>	Teak	Sagwan	Verbenaceae	Native	Deciduous
19	<i>Terminalia arjuna</i>	Deep, spreading roots	Arjun Tree	Combretaceae	Native	Evergreen
20	<i>Terminalia bellirica</i>	Belliric Myrobalan	Baheda	Combretaceae	Native	Deciduous
21	<i>Terminalia chebula</i>	Chebolic Myrobalan	Harra/Harad/Kadka	Combretaceae	Native	Deciduous

8. WATER REQUIREMENT, SUPPLY AND DISTRIBUTION

Water Requirement for the proposed project is discussed below.

8.1 Water requirement during Construction phase

Approx. 21 KLD water will be required for domestic as well as for construction purpose. Source of fresh water will be packaged drinking water. Source of construction water is treated water & tanker water supply.

No use of ground water or surface water will be used during the construction activity

- Cement mixing – 05 KLD
- Curing - 02 KLD
- Sprinkling - 05 KLD
- Domestic purposes – 9 KLD

8.2 Water requirement during operation phase

Water requirement during the operational phase will be met through ground water. The total water requirement for the proposed project has been estimated **~255 KLD**. This includes domestic water requirement, flushing and landscaping. The total fresh water requirement is **~172 KLD** which includes domestic water requirement. The water requirement for flushing and landscaping will be met through treated water from STP.

Details of break-up of water requirement are given in **Table-9**.

Proposed Expansion of Residential Building “Aarohi City” at Sikandarpur, Patna, Bihar

Table-9: Details of Water Requirement

S. No.	Description	No. of units /	Unit Population	Population	Unit water consumption (lpcd)	Total water required (kld)	Fresh water required (kld)	Flushing (kld)	Total Wastewater (kld) (80% of domestic +100% Total flushing)
1	Main Dwelling Units (Residential)	438	3 BHK: 6 Person 2 BHK: 5 Person 1 BHK: 4 Person	2375	100* (70+30)	238	166.25	71.25	204.25
2	Visitors (10% of the residential population)	...	...	237	15 (10+5)	3.6	2.37	1.185	3.081
3	Commercial		...	101	45 (25+20)	4.5	2.525	2.02	4.04
4	Visitors (90% of the Commercial population)	...		91	15 (10+5)	1.4	0.91	0.455	1.183
	Subtotal I					247	172	75	213
	Reuse of treated water								
1	Horticulture	2509	3 liter/sqm of Landscape area	...		8			0
	Subtotal II					8.00			0
	Grand Total I+II					255			130

8.3 Wastewater Generation

The total estimated quantity of wastewater to be generated from proposed project is ~213 KLD. Calculation of wastewater generation is shown below in **Table-10**.

Table-10: Calculation of Wastewater Generation

Details	Water (KLD)
Water requirement for domestic purpose	172
Wastewater to be generated from domestic use (@ 80% of domestic water requirement)	138
Water requirement for Flushing Purpose	75
Wastewater to be generated from Flushing (@ 100% of flushing requirement)	75
Total Wastewater generated	213
STP capacity 20% higher than total waste water	~255

Water balance diagram for given in **Figure-4**.

Proposed Expansion of Residential Building “Aarohi City” at Sikandarpur, Patna, Bihar

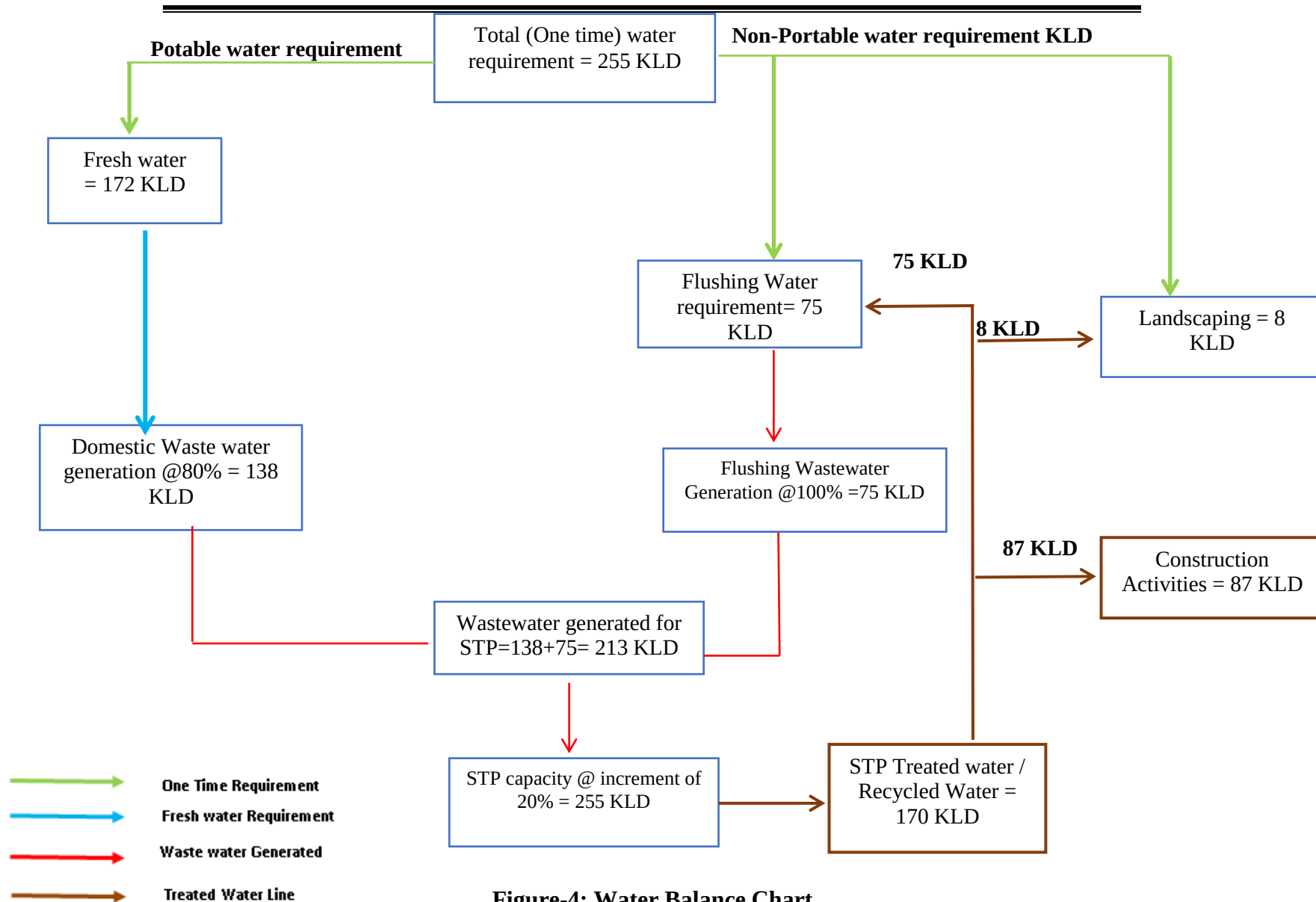


Figure-4: Water Balance Chart

Reuse of Treated Water:

Waste water generated is 213 KLD, which will be treated in the onsite STP of capacity 20% more than the waste water generated i.e. 255 KLD. The treated water available is 170 KLD (@ of 80%) and it will be recycled and re-used for flushing and landscaping purpose.

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 up on requirement either will be used in nearby construction site or discharged into the sewer line.

Design basis of Sewage Treatment plant: MBR Technology

Technical Description of MBR Process:

Membrane Bioreactor (MBR) is a process that combines a membrane ultra / micro filtration process and activated sludge process. The MBR process is used in place of the secondary sedimentation tank and sand filter used for tertiary treatment in the conventional activated sludge process. The Brief Description of MBR STP is mentioned below:

Pre-treatment:

To reduce the chances of membrane damage, wastewater should undergo a high level of debris removal using screens prior to the MBR. Primary treatment is often provided in larger installations. In addition, all MBR systems require 1 to 3 mm-cutoff fine screens immediately before the membranes, depending on the MBR manufacturer. These screens require frequent cleaning.

Membrane Configuration:

MBR manufacturers employ membranes in two basic configurations: hollow fiber bundles and plate membranes. A number of **bundles** are connected by manifolds into units that can be readily changed for maintenance or replacement.

The other configuration, employ **membranes** in a flatplate configuration, again with manifolds to allow a number of membranes to be connected in readily changed units.

System Operation:

All MBR systems require some degree of pumping to force the water flowing through the membrane. While other membrane systems use a pressurized system to push the water through the membranes, the major systems used in MBRs draw a vacuum through the membranes so that the water outside is at ambient pressure. The advantage of the vacuum is that it is gentler to the membranes; the advantage of the pressure is that throughput can be controlled. All systems also include techniques for continually cleaning the system to maintain membrane life and keep the system operational for as long as possible. All the principal membrane systems used in MBRs use an air scour technique to reduce buildup of material on the membranes. This is done by blowing air around the membranes out of the manifolds.

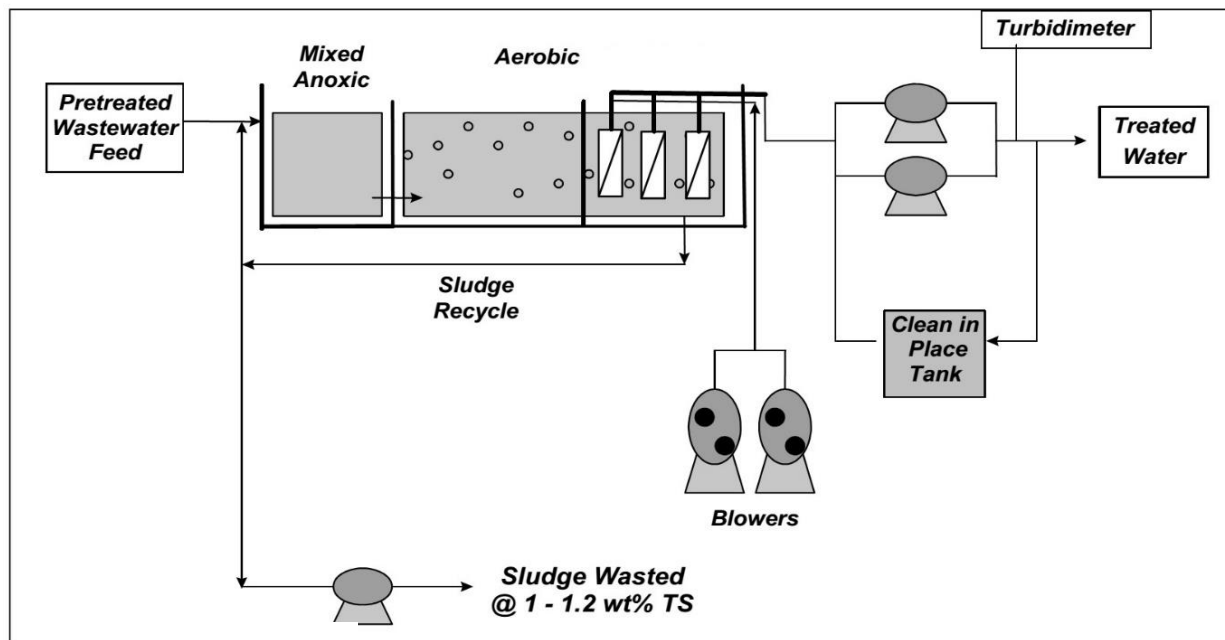


Figure-5: Schematic Diagram of MBR STP

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 rain water 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.

10. RAINWATER HARVESTING

Rainwater harvesting is the activity of direct collection of rainwater. Collected Rainwater will be stored for direct use or for recharging the groundwater. Rain Water Harvesting is the technique through which rain water is captured from the roof and paved surfaces and stored in sub-surface ground water reservoir by adopting artificial recharge techniques.

Advantages:

- ✓ To meet the ever increasing demand for water.
- ✓ To avoid flooding of roads.
- ✓ To augment the ground water storage and control the decline of water table levels.
- ✓ To reduce ground water pollution.
- ✓ To improve the quality of ground water.
- ✓ To reduce the soil erosion.
- ✓ To supplement domestic water requirement during summer, drought etc.
- ✓ Improves the quality of ground water through dilution when recharged to ground water.

As stated above, due to high ground water table, it is not feasible to provide the rain water recharge pits for aquifer recharging but there will be provision of the water sump for the collection of roof top rain water and it will be further used for miscellaneous purposes. The rainwater runoff from the roofs shall be transported through underground pipes to water sumps structures & surface rainwater shall naturally percolate in the underground aquifer through natural filtration.

Table-11: Rainwater Harvesting Calculation

Input Data			Reference	
Catchment Area		Value		
1	Rooftop Area of Building/shed	3934.49	Sqm.	
2	Green Belt Area	2509.25	Sqm.	
3	Open & Paved Area	5,742.44	Sqm.	
	Total	12186.18		
Run off Coefficient, c				
	Rooftop Area of Building/shed	0.85		RWH in India, MoEF&CC, e-book 2016
	Green Belt Area	0.15		
	Paved Area	0.75		
	Open Area	0.15		
				CGWB Patna
Rainfall				
	Average Annual Rainfall	1076	mm/year	
	Hourly Peak Rainfall Intensity, I	45	mm/hour	
	Peak Time taken	15	minutes	$Q = A * c * I$
Total Volume of Water to be Captured on Annual Basis				
	Rooftop Area of Building/shed	3598.48	cu-m/year	
	Green Belt Area	404.99	cu-m/year	
	Paved Area	4634.15	cu-m/year	
Runoff Calculation for the Peak Rainfall, Q				
	Rooftop Area of Building/shed	37.62	cu-mtr/hour	RWH in India, MoEF&CC, e-book 2016
	Green Belt Area	4.23	cu-mtr/hour	
	Paved Area	48.45	cu-mtr/hour	
	Total	90.31	cu-mtr/hour	
Annual Recharge Potential IMD				
	Recharge Potential	8637.63	cu-m/year	
	Rainy Season	June-Sep		
Design of Recharge Structure for Peak Flow				
Calculation for One Pit				
	Diameter of Pit	3	mtr	
	Depth of the Pit	3	mtr	
	Volume of the Pit	21.21	cu-mtr	
	Number of Pits Required to store the	4.3		

peak discharge			
Rain water harvesting Pits provided	4		

Number of RWH Pits Proposed = ~4

11. POWER REQUIREMENT

The total electrical load demand has been estimated to be 2500 KW. The source of power will be supplied by State Electricity Board.

In case of power failure, 3 DG sets of total capacity of 250 KVA will be provided as power back-up. The DG sets are located in the basement and will be of water 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

Calculation of DG Stack Height:

$$H = h + 0.2 \sqrt{(\text{capacity of DG in KVA.})}$$

Where:

H = Total height of stack in meter.

h = Height of the building in meters where the generator set is installed.

KVA = Total generator capacity in the set of KVA.

For DG set of 500 KVA

$$H = h + 0.2 \sqrt{250}$$

$$H = h + 0.2 \times 15.81$$

$$H = h + 3.16$$

We suggest 3 meter above the max. Height of the building

12. 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 occupants of the Residential Apartments, commercial population and visitors; 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 **1124 kg/day** and 150 kg of sludge (wet basis). Following solid waste generation rate has been considered as given in **Table-12**.

Table-12: Solid waste Generation details

S. No.	Category of Solid Waste	Waste Generation Rate	Formula	Total Population	Waste Generated	Bio-degradable	Non-biodegradable
1	Residential Refuse	0.3 to 0.6 kg/cap/day	Total Population* 0.45	2375	1069	641	428
2	Visitor (10% of the residential Population)	0.1 to 0.3 kg/cap/day	Total Population* 0.15	237.0	35.55	21	14
3	Commercial	0.05 to 0.2 kg/cap/day	Total Population* 0.1	101	10.1	6	4
4	Visitor (90% of the commercial Staff)	0.1 to 0.3 kg/cap/day	Total Population* 0.1	91	9.1	5	4
	Total			2804	1124	674	450

Reference: NBC 2016

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

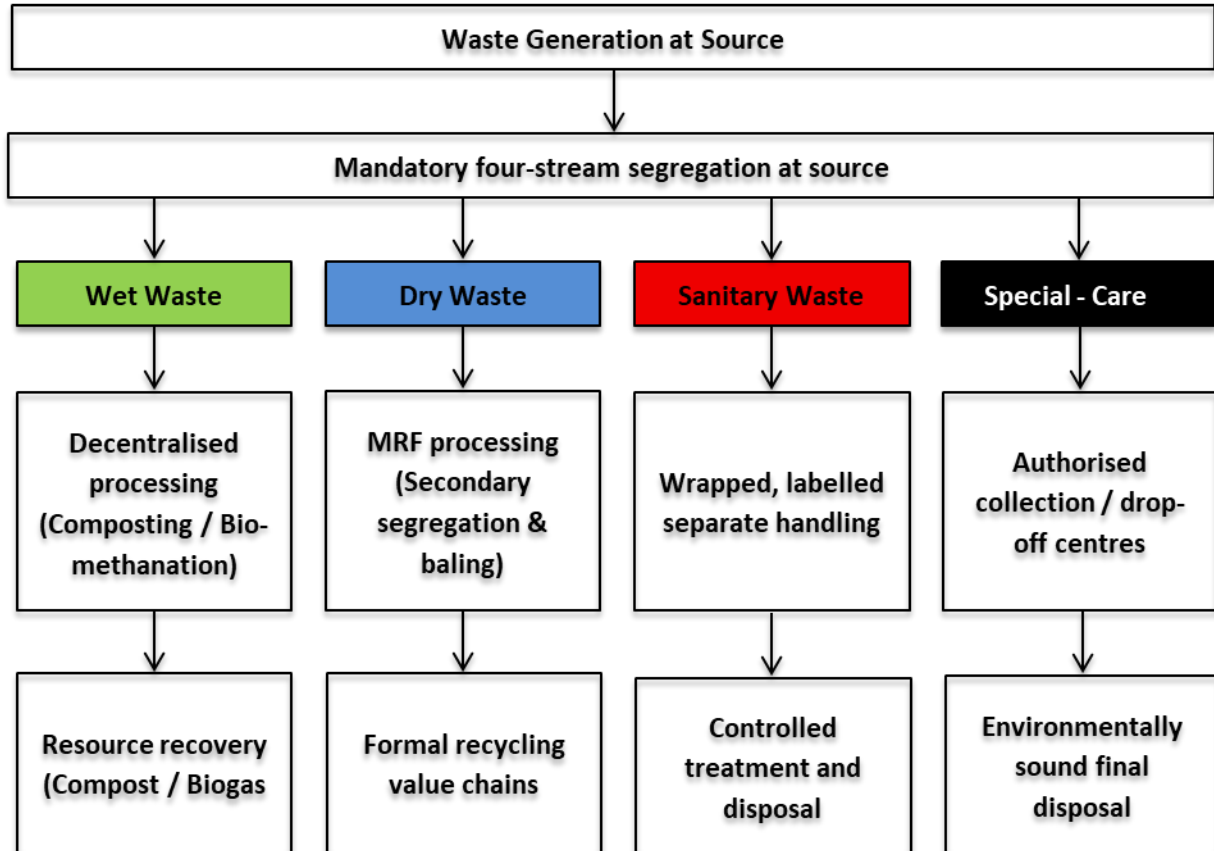


Figure-7: Solid Waste Management during Operation Phase

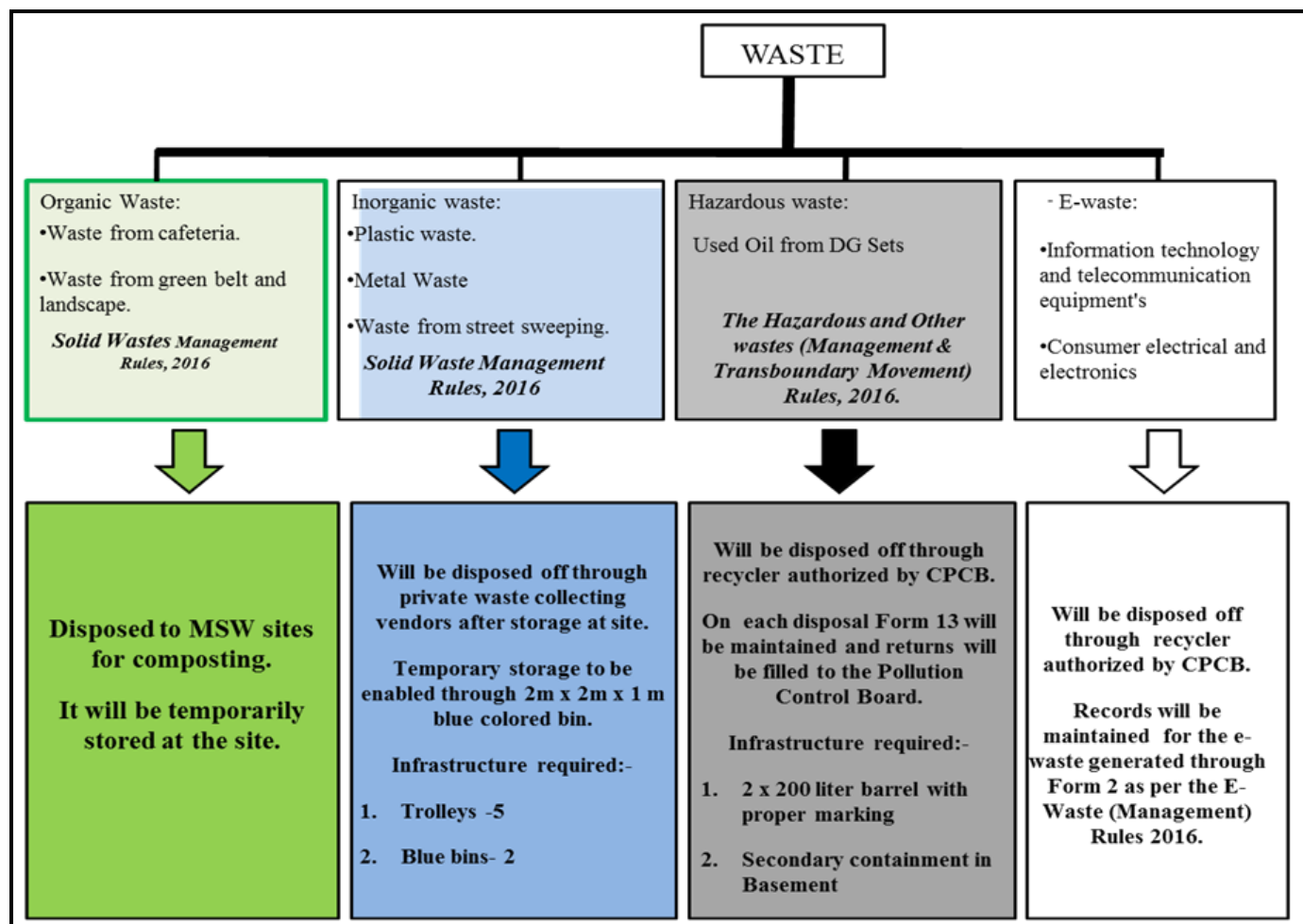


Figure-8: Hazardous Waste Management Plan

13. 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 2016.

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)

14. DETAIL OF CONSTRUCTION MATERIAL

List of building materials will be used at site:

- Coarse sand – 105730.801 CFT
- Stone aggregate (10 MM)- 24,206.78 CFT
- Stone aggregate (20 MM)- 5,063.94 CFT
- Cement (50 Kg/BAG)- 22259.116 BAGs
- Bricks- 473006.215 No.
- Steel- 208.67 Tons
- Plywood- 7234.213 SFT

Finishing materials like tiles, sanitary fixtures, etc. shall be stored in closed rooms.

16. Occupational Health and Safety (during construction)

The Management of the project has committed for the health and safety of workers as under;

- The management declares its intention and commitment with all relevant statutory requirements in regard to environment, health and safety of workers.
- The management has assigned the responsibility at different levels as:

Project Manager : For all the workers/employees.

Supervisor : For casual and daily/unskilled workers.

The management will ensure the occupational health and safety, at the site during construction, by adopting following practices;

- a) Every responsible efforts will be made to provide and maintain safe and healthy working conditions, environment, and system of work for all employees.
- b) It will also endeavor of the project proponent to ensure that surrounding environment is not adversely effected by the work activity.
- c) The working environment would be healthy and co-operative.
- d) The prevention of accidents or accident hazards leading to personal injury or damage of equipment/property is recognized as essential as an integral part of efficient operations.
- e) Every employee will follow safety rules/regulations, operating procedures/safe work method design to protect people and equipment from risk of injury of damage to property.

- f)** The project will endeavor to adequately train all employees suitably equip them to perform their duties in a safe and effective way.
- g)** Every employee will discharge his personal responsibility, and shall co-operate and actively participate in maintaining and improving safety standards.
- h)** A primary health care centre will be provided within the campus. Besides, there is a multi-specialty private hospital (on panel of the institute) just opposite to the institute entrance.
- i)** A doctor will be appointed for health checkup of workers at regular intervals and related records shall be maintained. A doctor and a hospital will be empanelled for attending off site health problems of the workers.
- j)** First Aid kits will be kept ready and available to the workers, in case of emergencies; company will provide fastest possible medical aid. Staff will be adequately trained for this.
- k)** Adequate supply of clean drinking water, neat and clean toilets and washing facilities will be provided at the site.
- l)** Proper ventilation, wherever required, shall be provided in the work areas.
- m)** Proper safety and protections, steps and guards shall be provided at all required places.
- n)** Suitable safety instructions will be displayed in writing (including that in vernacular language) for all critical areas and working conditions.
- o)** A vehicle/ambulance will be specifically positioned at the site for emergency evacuation of workers in case of any health problem/accident.