

**Proposed Magadh Medical College and Hospital at Mauza – Pranpura (Panpura), Punpun,
District – Patna, Bihar.**

1.0 INTRODUCTION

Ramashray Singh Memorial Educational & Welfare Trust has proposed the development of Magadh Medical College and Hospital at Mauza – Pranpura (Panpura), Punpun, District – Patna, Bihar. The proposed project comprises Hospital Building, Medical College Building, Boys Hostel, Girls Hostel, Staff quarters, Faculty Block, parking areas, internal roads, utility infrastructure, landscaped green areas, sewage treatment plant, rainwater harvesting structures, and associated institutional facilities.

The project has been planned to cater to the increasing demand for healthcare and medical education infrastructure in the region with a proposed hospital capacity of 650 beds, OPD capacity of approximately 1043 persons/day, and student intake capacity of 250 students.

The project is proposed over Khata Nos. - 21, 25, 21, 21, 25, 25, 18, 21, 05, 05, 22, 24, 22, 18, 18, 87, 82, 03, 53, 96, 82, 96, 96, 82, 82, 3, 53, 96, 110, 3, 53, 96, 96, 82, 110, 3, 53, 96, 96, 53, 3 Khasra Nos.- 239, 251, 252, 239, 241, 249, 252, 239, 249, 249, 240, 242, 248, 252, 252, 821, 165, 167, 168, 169, 165, 169, 164, 165, 165, 167, 168, 169, 164, 167, 168, 169, 169, 165, 164, 167, 168, 169, 169, 168, 167 at Mauza – Panpura, Punpun, Thana – Dhanarua, District – Patna, Bihar. The total plot area of the project, as per the land documents, is approximately **30,260 sq.m.**

The proposed Hospital Block includes OPD facilities, ICU, operation theatres, emergency section, wards, deluxe rooms, MRI, CT-Scan, blood bank, dialysis unit, laboratories, nurse stations, cafeteria, and diagnostic facilities, while the Medical College Block includes lecture halls, laboratories, demonstration rooms, library, faculty chambers, and associated academic infrastructure.

The total built-up area of the Hospital Block is approximately 23,818.27 Sq.m, the Medical College Block is approximately 16,335.21 Sq.m, the Faculty Blocks comprise approximately 2018.64 Sq.m, the Staff quarters comprise approximately 2018.64 Sq.m, the hostel buildings comprise approximately 12277.44 Sq.m, Basement Parking: 931.83 Sq.m and the Canteen building comprise approximately 482.52 Sq.m. The project also includes dining & sports facilities, basement parking, open parking, internal roads, STP, rainwater harvesting systems, and associated utility infrastructure within the proposed campus development.

The project has been planned with sustainable infrastructure provisions including STP, rainwater harvesting, wastewater recycling, solid waste management, green landscaping, parking facilities, and internal circulation roads for environmentally responsible development.

1.1 APPLICABLE LEGAL FRAMEWORK

As per the provisions of the EIA Notification, 2006 (as amended), projects listed under the Schedule require prior Environmental Clearance (EC) from the competent authority before commencement of construction activities.

The present proposal pertains to the development of Magadh Medical College and Hospital, which falls under Item 8(a): Building and Construction Projects of the EIA Notification, 2006.

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The proposed project comprises Hospital Building, Medical College Building, Faculty Block, Hostel Facilities, parking areas, internal roads, utility infrastructure, landscaped green areas, sewage treatment plant, rainwater harvesting structures, and associated institutional facilities.

As per the architectural drawings and planning documents, the Total built-up area of the proposed project is approximately **57882.55 Sq.m.** within a plot area. The project comprises Hospital Block, Medical College Block, Faculty Blocks, Boys & Girls Hostels, dining & sports facilities, Canteen, parking areas, and associated utility infrastructure. The proposed hospital capacity is 650 beds along with medical education infrastructure having an intake capacity of 250 students.

Accordingly, the project attracts the provisions of the EIA Notification, 2006 (as amended), and requires prior Environmental Clearance from the State Level Environment Impact Assessment Authority (SEIAA), Bihar before commencement of construction and development activities.

The project shall be developed in compliance with applicable environmental laws, rules, guidelines, and regulations issued by MoEF&CC, CPCB, BSPCB, and other concerned statutory authorities.

- Environment (Protection) Act, 1986
- EIA Notification, 2006 (as amended)
- Solid Waste Management Rules, 2026
- Construction and Demolition Waste Management Rules, 2016
- Plastic Waste Management Rules, 2016
- Hazardous and Other Wastes Management Rules, 2016
- E-Waste Management Rules, 2022
- Air (Prevention and Control of Pollution) Act, 1981
- Water (Prevention and Control of Pollution) Act, 1974
- Applicable Local By-Laws and statutory provisions
- Forest Act 1927 & 1980

1.2 CONNECTIVITY AND SURROUNDINGS OF PROJECT SITE

The proposed project site of Magadh Medical College and Hospital is located at Mauza – Panpura, Punpun Plot Nos. 21, 5, 21, 25, 18, 21, 18, 18, 5, 22, 24, 82, 3, 96, 82, 3, 96, 53, 3, 87, 82, 82, 25, 21 Khasra Nos.- 239, 249, 239, 241, 249, 252, 239, 252, 252, 249, 240, 248, 242, 165, 167, 169, 165, 167, 168, 169, 169, 168, 167, 821, 165, 165, 165, 251, 252 Thana – Dhanarua, Thana No. – 81, Punpun, District – Patna, Bihar.

The geographical coordinates of the proposed Magadh Medical College and Hospital project site lie approximately between latitude 25°25'11.07"N to 25°25'16.85"N and longitude 85°07'28.85"E to 85°07'33.34"E.

The project site is well connected through the regional road network and is approachable through an 18.30 m wide road. The nearest railway stations are Pothahi Railway Station located at an approximate distance of 4.83 km in WNW direction and Neema Halt Railway

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Station located at approximately 5.43 km in WSW direction from the project site. The nearest airport is Gaya International Airport situated at an approximate distance of 76.26 km in SSW direction.

The surrounding area of the project site comprises institutional, residential, agricultural, and open land areas. Important nearby facilities include Primary School Dhanarua located at approximately 0.19 km in SW direction, Primary Health Centre Dhanarua located at approximately 6.53 km in southern direction, and Primary Health Centre Masaudhi located at approximately 12.16 km in SW direction.

The project site is situated in a developing area with availability of basic infrastructure facilities, road connectivity, educational institutions, and healthcare facilities, making it suitable for the proposed medical college and hospital development.



Figure 1: Location of the Medical College and Hospital Block



Figure 2: Location of the Hostel Block

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Table 1: Surroundings of Project Site

S. No.	Feature	Name / Description	Distance	Direction
1	Nearest River	Punpun River	Approx. 6.5 km	East
2	Nearest Highway	NH-22	Approx. 7.0 km	North-West
3	Nearest City / Town	Patna City	Approx. 28 km	North
4	Nearest Hospital	Primary Health Centre, Dhanarua	Approx. 6.53 km	South
5	Nearest School	Primary School, Dhanarua	Approx. 0.19 km	SW
6	Nearest Railway Station	Pothahi Railway Station	Approx. 4.83 km	WNW
7	Nearest Airport	Gaya International Airport	Approx. 76.26 km	SSW
8	Ecologically Sensitive Area	No Ecologically Sensitive Area within 10 km radius	—	—

1.3 LAND REQUIREMENT AND AREA SUMMARY & PROJECT COST

The proposed project site of Magadh Medical College and Hospital is located at Mauza – Panpura, Punpun Plot Nos. 21, 5, 21, 25, 18, 21, 18, 18, 5, 22, 24, 82, 3, 96, 82, 3, 96, 53, 3, 87, 82, 82 82, 25, 21 Khasra Nos.- 239, 249, 239, 241, 249, 252, 239, 252, 252, 249, 240, 248, 242, 165, 167, 169, 165, 167, 168, 169, 169, 168, 167, 821, 165, 165, 165, 251, 252 Thana – Dhanarua, Thana No. – 81, Punpun, District – Patna, Bihar.

The Total plot area of the proposed project as per land Document is approximately 30,260 Sq.m. The campus comprises Hospital Building (B+G+6), Medical College Building (G+6), Faculty Blocks, Boys Hostels, Girls Hostel & Staff Nurse Block, Canteen, dining & sports facilities, parking areas, internal roads, landscaped green areas, utility infrastructure, STP, and rainwater harvesting structures.

The total built-up area of the project is approximately 57882.55 Sq.m. including:

Hospital Block : 23,818.27 Sq.m.

Medical College Block : 16,335.21 Sq.m.

Faculty Blocks : 2018.64 Sq.m.

Staff Quarter: 2018.64 Sq.m

Hostel Buildings: 12277.44 Sq.m.

Canteen: 482.52 Sq.m.

Basement Parking Built-up Area & Ground Floor Parking Area: 931.83 Sq.m.

The project includes healthcare facilities such as OPD, ICU, operation theatres, emergency section, wards, MRI, CT-Scan, blood bank, dialysis unit, laboratories, and academic facilities including lecture halls, laboratories, demonstration rooms, library, and faculty chambers.

The detailed area statement of the project is provided in the respective tables.

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The total estimated project cost is approximately **₹95 Crores.**

Table 2: Area Statement

S. No.	Description	Details
1.	Total Plot Area (As per Land Document)	30,260 Sq.m.
2.	Total Plot Area (As per Site Plan)	25,163.93
3.	Total Built-up Area	57882.55 Sq.m.
4.	Hospital Block Built-up Area	23,818.27 Sq.m
5.	Medical College Block Built-up Area	16,335.21 Sq.m
6.	Hostel & Faculty Residential Block Built-up Area	16314.72 Sq.m.
7.	Canteen Block Built-up Area	482.52 Sq.m.
8.	Basement Floor Parking Built-up Area +Ground Floor Covered Parking Area	348.95+ 582.88 = 931.83 Sq.m.
9.	Hospital Capacity	650 Beds
10.	OPD Capacity	Approx. 1043 Persons/Day
11.	Student Intake Capacity per year	250 Students
12.	Internal Roads	5.00 m & 6.10 m Wide Driveways
13.	Green Area Main Medical College & Hospital Campus	2529.19 Approx.
14.	Green Area Hostel / Residential Campus	1457.66 Sq.m
15.	Total Green Area	Approx. 3986.85 Sq.m
16.	STP	500 KLD
17.	ETP	40 KLD
18.	Rain Water Harvesting	4 Nos
19.	Project Cost	Approx. ₹95 Crores
20.	Maximum No. of floors	Basement + Ground + 6 Floors
21.	Basement Parking Area (Hostel / Residential Campus)	582.88 Sq.m.
22.	Basement Parking Area (Main Hospital Campus)	348.95 Sq.m.
23.	Height of Building	45 m

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Table 3: Block-wise & Floor-wise Built-up Area Details in Sqm.

	College Block	Hospital Block	Staff Quarters	Faculty Block	Boys Hostel, Dining & Sports Block	Girls Hostel, Dining & Sports Block-01	Girls Hostel, Dining & Sports Block-02	Canteen Block
Basement Floor	---	83.47	---	---				
Ground Floor	2763.83	3759.74	40	40	584.64	584.64	584.64	241.26
First Floor	1689.80	3175.26	331.44	331.44	584.64	584.64	584.64	241.26
Second	2729.18	3359.96	331.44	331.44	584.64	584.64	584.64	
Third Floor	1847.02	3359.96	331.44	331.44	584.64	584.64	584.64	
Fourth Floor	2729.18	3359.96	331.44	331.44	584.64	584.64	584.64	
Fifth Floor	1847.02	3359.96	331.44	331.44	584.64	584.64	584.64	
Sixth Floor	2729.18	3359.96	331.44	331.44	584.64	584.64	584.64	
Total B/U Area	16335.21	23818.27	2018.64	2018.64	4092.48	4092.48	4092.48	482.52
Basement Parking	348.95		582.88					
Total B/U Area including Basement Parking	57882.55 Sqm.							

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Table 3.1: Summary of Plot Area & Built-up Area

Particular	Area (Sq.m)
Plot Area of Main Medical College & Hospital Campus as per Site Plan	15663.75
Plot Area of Hostel / Residential Campus as per Layout	9,500.08
Total Plot Area as per Site Plan	25,163.93
Total Plot Area as per land Document	30,260
Hospital Block Built-up Area	23,818.27
Medical College Block Built-up Area	16,335.21
Hostel & Faculty Residential Block Built-up Area	16314.72
Canteen Built-up Area	482.52
Basement Floor Parking Built-up Area +Ground Floor Covered Parking Area	348.95+ 582.88 = 931.83 Sq.m.
Total Built-up Area	57882.55

1.4 ESTIMATED POPULATION

The total population of the hospital will be approximately **3248**, which includes outdoor patients, indoor patients, attendants, OPD, Doctors, Resident Doctors, Nurses, technicians, and staff. The population break-up is given below in **Table 4**.

Table 4: Estimated Population

S. No.	Category	Population
A	Hospital Facilities	
1	OPD Patients (Per Day)	Approx. 1043
2	IPD Patients / Bed Capacity	650
3	Attendants & Visitors	650
4	Hospital Staff & Supporting Staff	150
	Subtotal (Hospital)	2493
B	Medical College	
5	Students Intake Capacity	250
6	Teaching Faculty	80
7	Administrative & Supporting Staff	50
	Subtotal (Medical College)	380
C	Hostel & Residential Facilities	
8	Hostel Students & Residents	300
9	Residential/Service Staff	75
	Subtotal (Residential)	375
	Grand Total Estimated Population	Approx. 3248 Persons

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1.5 WATER REQUIREMENT

Water requirement during the construction phase is expected to be about **30–50 KLD**, which will be sourced through government water supply or private water tankers.

The total water requirement for the proposed Magadh Medical College and Hospital project will be approximately 417 KLD. Out of this, the fresh water requirement will be approximately 292 KLD, while approximately 193 KLD shall be met through recycled/treated water from the proposed STP for flushing, landscaping, HVAC, DG cooling, and utility purposes.

Water demand for **landscaping, fire fighting, , DG cooling, and other non-potable uses** will be fulfilled through treated wastewater. The fresh water will be sourced through bore wells at the project site.

Detailed water requirement calculations are presented in **Table 5 and Table 6**, and the water balance diagram is provided in **Figure 3 and Figure 4**.

1.6 SEWAGE GENERATION

Approximately 358 KLD domestic effluent will be generated from the proposed Medical College & Hospital campus premises. All these effluents will be sent to a 500 KLD capacity STP inside the premises for treatment.

Table 5: Calculations for Total Daily Water Demand

S. No.	Category	Capacity	Standard (LPCD)	Water Requirement (KLD)	Fresh Water Requirement (KLD)	Recycled Water Requirement (KLD)
1	Inpatients / Bed Capacity	650 Beds	450	292.50	204.75	87.75
2	Students, Staff & Residential Population	755 Persons	135	101.93	71.35	30.58
3	Floating Staff	150 Persons	45	6.75	4.73	2.02
4	OPD Patients & Visitors	1043 Persons	15	15.65	10.95	4.70
	Domestic Water Requirement			417 KLD	292KLD	125 KLD
5	Landscaping	Approx. 3986.85 Sq.m	5 L/sq.m	19.93	0	19.93
6	Fire Fighting	—	—	5.00	0	5.00
7	HVAC Requirement	—	—	10.00	0	10.00
8	DG Cooling	DG	—	5.00	0	5.00

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		Backup System				
9	OT & Laundry Requirement	650 Beds	45 L/Bed	29.25	0	29.25
	Total Water Requirement			485 KLD	292 KLD	193 KLD

Table 6: Wastewater Calculations - ETP

Category	Total Quantity (KLD)
Effluent generation (OT Laundry)	29.25
Capacity of ETP	(1 No. of 40 KLD)
Recovered water from ETP (90% of Waste Water)	26

Table 7: Wastewater Calculations - STP

Category	Total Quantity (KLD)
Fresh Water Requirement	292
Flushing Water Requirement	125
Total Domestic Water Requirement	417
Sewage Generation (80% of domestic + 100% flushing)	358
Capacity of STP	500
Recovered Water from STP (≈90% of wastewater)	322
Flushing	125
Landscaping (5 L/sq.m)	19.93
Fire Fighting	5.00
HVAC	10.00
DG Cooling	5.00
Laundry	29.25
Sewer / Excess	157.07

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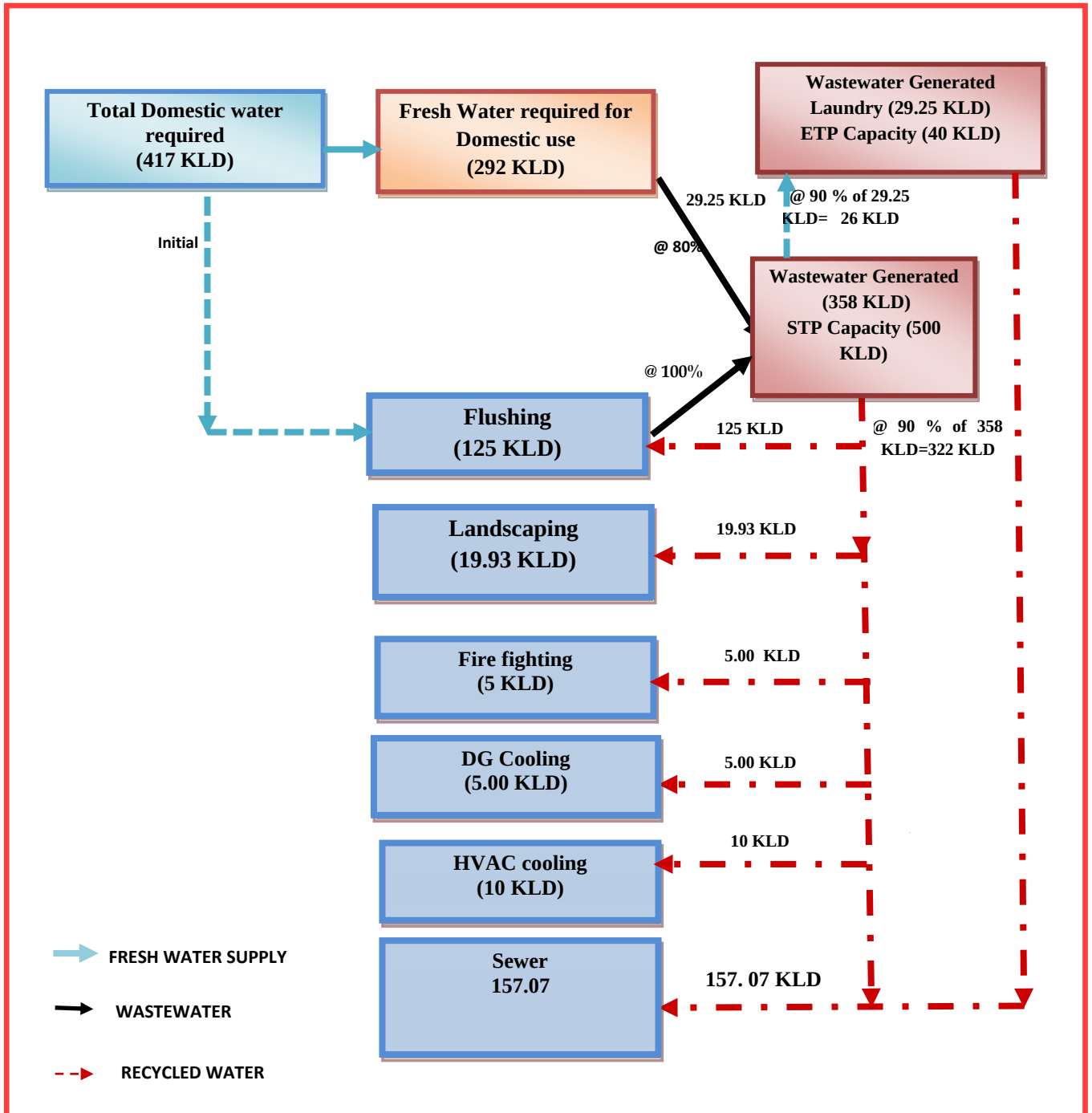


Figure3: Water Balance Diagram-Dry Season

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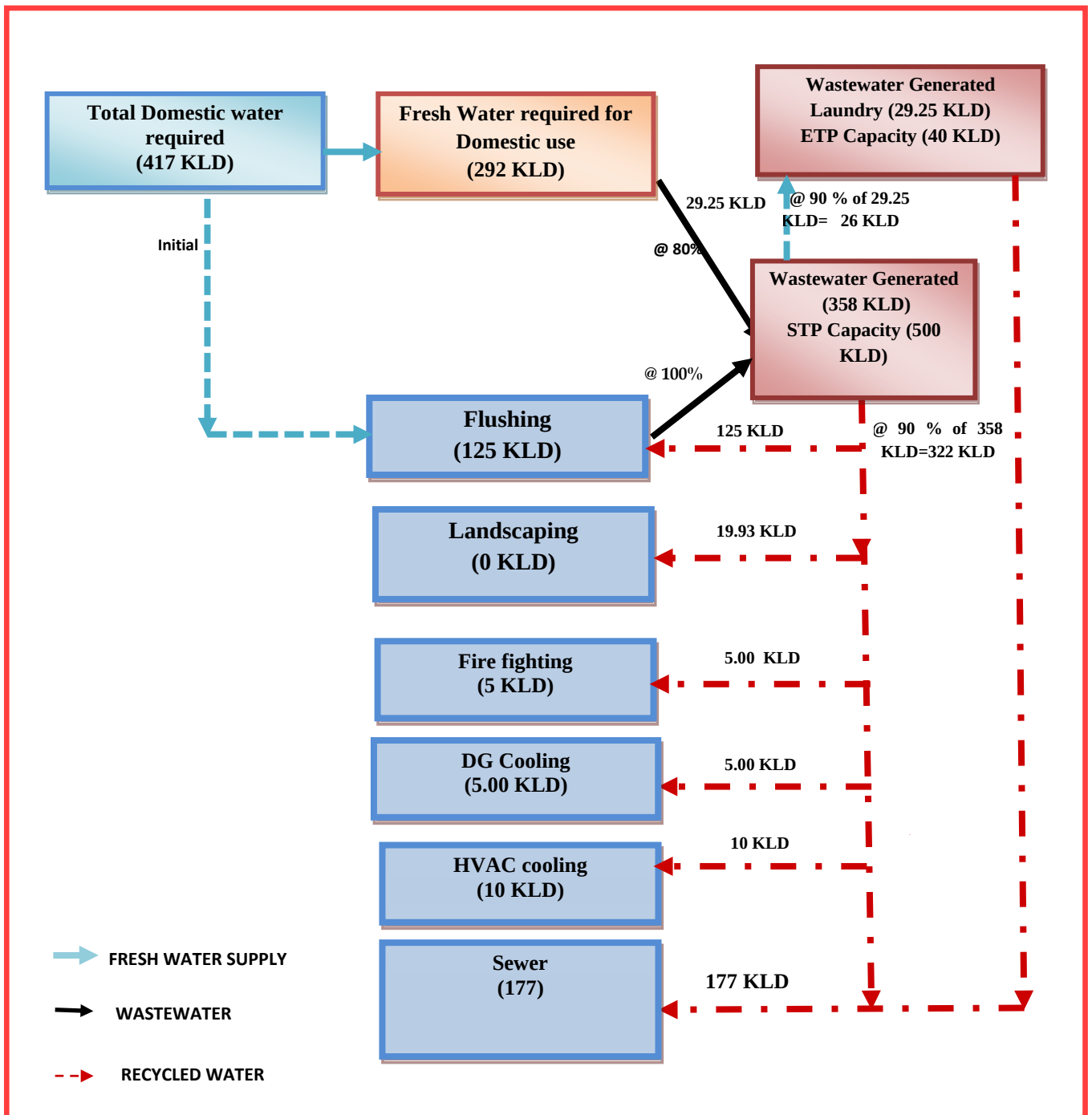


Figure 4: Water Balance Diagram-Monsoon Season

1.7 SEWAGE MANAGEMENT

STP of 500 KLD with MBBR technology will be provided at the site. Detail of the treatment technology and sewerage system is given below:

Sewerage System

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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	:	500 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	:	6.0 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.

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.

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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

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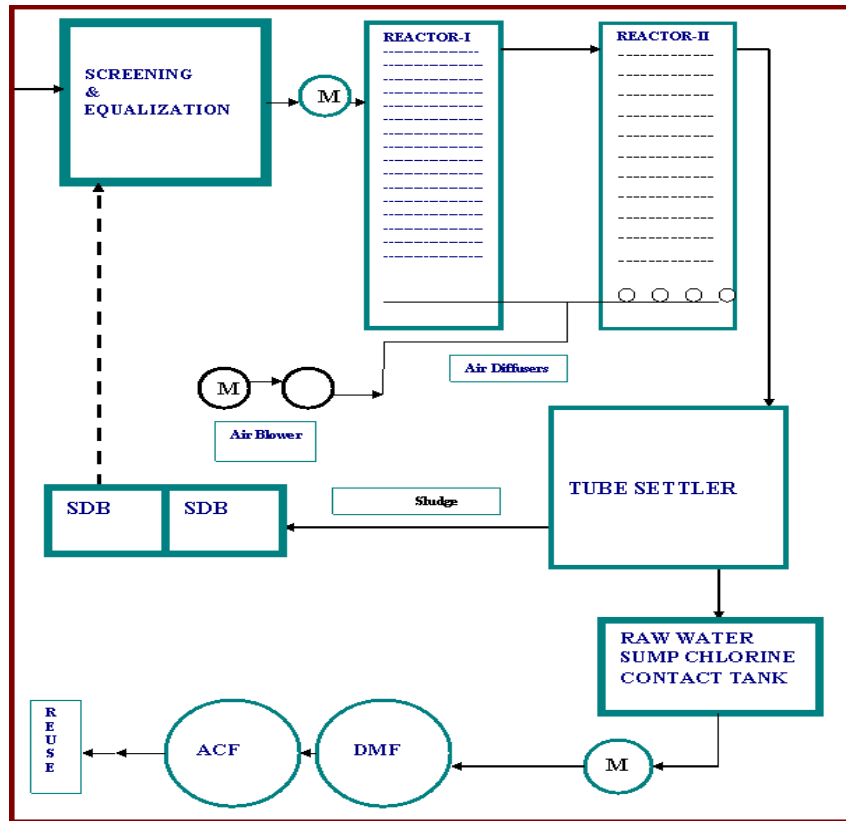


Figure 5: Schematic Diagram of STP

1.8 STORM WATER MANAGEMENT

The annual rainwater harvesting potential of the proposed Magadh Medical College and Hospital project will be approximately 15,923.24 Cu.m/year based on the proposed rooftop, paved, and landscaped catchment areas. All of this water is expected to percolate down to the groundwater table thus acting as a recharge system. The natural purification process (filtration and adsorption phenomena while percolation through soil) is expected to further enhance the water quality by the time the water reaches the groundwater table.

Each building have garland drain along with plinth protection. Discharge of Rain Water from terrace will be in garland drains through rain water pipes. The garland drain will be connected to storm water drain.

Run-off available from the site annually after project development is calculated and is presented in the **Table 8**. Calculations for rainwater harvesting pits are given below in **Table 9**.

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Table 8: Available Run-off from Site

S. No.	Catchment	Area (sq m)	Run-off Coefficient	Average Annual Rainfall (m)	Runoff Annually	Peak Hourly Rainfall (m3)	Runoff (m3/hr)
1.	Roof top	10,443.37	0.9	0.97	9,116.46	0.01	94.00
2.	Green	Approx. 3986.85 Sq.m	0.1	0.97	386.72	0.01	3.99
3.	Paved Areas	9,456.64	0.7	0.97	6,420.06	0.01	66.20
Total Run-off					15,923.24 Cu.m		164.19 m³/hr

Table 9: Calculation for RWH Pits

Total Run-off (m ³ /hr)	160.16
Length and breadth and depth of the RWH pit m ³	4*3*4
Nos. of Pits Required	3.34 or 4 Nos.

1.9 VEHICLE PARKING FACILITIES

Adequate parking facilities including basement parking, ground/open parking areas, and internal circulation roads will be provided within the proposed project premises for visitors, staff, students, residents, and ambulance movement. As per the site plans, the proposed basement parking area is approximately 931.83 sq.m. comprising 348.95 sq.m. in the Medical College & Hospital campus and 582.88 sq.m. in the Hostel campus. In addition, open parking spaces and dedicated emergency vehicle circulation roads/driveways have been proposed throughout the campus for smooth vehicular movement and emergency access.

1.10 POWER REQUIREMENT

The estimated power and Backup power for the proposed Project is about 2500 KW of Built-up Area for the project, considering the specified power distribution and load factors. Although the power supply to the project would be from state electricity board. but in case of any power failure, the power back-up system is also being proposed. This power Back up would be provided by 4 DG sets of 500 kVA capacity. The height of all sources of emissions will be provided as per the prevailing specifications of the MoEF, Govt. of India. Waste oil, if any, will be stored as per the specifications and sold to authorize agencies only as per requirement of Hazardous and Other Wastes (Management and Transboundary Movement) Rules '2016.

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1.11 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 will mainly comprise of excavated earth, concrete debris, steel scrap, tiles, wood and packaging materials such as cement bags etc. Construction waste will be segregated into re-usable, recyclable and non-recyclable fractions. Re-usable material will be utilized within the project site for filling and leveling, recyclable material will be sold to authorized recyclers, and non-recyclable waste will be disposed of at designated sites as per local authority norms.

During the operation phase, municipal solid waste will be generated from residents, staff and visitors. The waste will be segregated at source into biodegradable and non-biodegradable components. Biodegradable waste will be treated through composting/organic waste management system within the site, while recyclable waste will be handed over to authorized recyclers. The solid waste management plan to be adopted for the project is given in **Table 10**.

Table 10: Solid waste management during construction phase

S. No.	Solid waste	Solid waste management
1.	Waste materials like MS Rods, concrete, broken tiles, wood pieces, cement bags etc.	Construction waste will be segregated into recyclable/reusable and discarded material. Recyclable material will be sold to authorize dealers. Re-usable material will be stored under covered conditions at site and reject will be disposed off at the designated locations by local body. Waste will be transported in covered vehicles only.
2.	Excavated Soil	Top soil will be stripped off and stored in covered condition. Excavated soil will be reused at site for levelling, filling and landscaping works
3.	Domestic Waste	Domestic waste generated by labour at the site will be disposed off through local agencies in the area on daily basis.

Operation phase

The collection, transportation, and disposal of solid waste generated during the operational phase of the proposed Medical College & Hospital project shall be carried out in accordance with the **Solid Waste Management Rules, 2026**.

During the operational phase, approximately 988.95 kg/day (~0.99 TPD) of municipal solid waste will be generated from the proposed Magadh Medical College and Hospital project comprising biodegradable waste, recyclable waste, kitchen waste, domestic waste, landscaping waste, and institutional waste generated from hospital operations, medical college activities, hostel facilities, staff, students, patients, and visitors.

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All generated solid waste shall be collected, segregated, and disposed of through the **local Panchayat / authorized waste collection agency**. Recyclable materials such as paper, plastic, glass, metal scrap, and other reusable items will be segregated at source and handed over to authorized recyclers/vendors.

The waste shall be segregated into biodegradable and non-biodegradable fractions at source, and proper storage facilities will be provided within the premises as per SWM Rules, 2016. A **three-bin system** will be adopted, comprising:

- **Green bins** for biodegradable waste (kitchen and garden waste)
- **Blue bins** for recyclable waste (paper, plastic, glass, etc.)
- **Black/Grey bins** for non-recyclable waste

Adequate numbers of color-coded bins will be provided at appropriate locations, and waste will be collected daily.

For treatment of biodegradable waste, **bio-composting facilities** shall be developed within the project site. The compost generated will be utilized for landscaping and greenbelt development.

Sludge generated from the Sewage Treatment Plant (STP) will be dried, packed in HDPE bags, and used as manure for horticulture purposes within the premises.

Hazardous waste such as **used oil from DG sets and machinery** will be stored in HDPE containers in a designated covered area and disposed of through **CPCB/BSPCB authorized recyclers** in accordance with the **Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016**.

Bio-medical waste generated from the hospital (approximately **1050 kg/day**) will be managed as per **Bio-Medical Waste Management Rules, 2016** and handed over to authorized Common Bio-Medical Waste Treatment Facilities (CBWTF).

BIO-MEDICAL WASTE MANAGEMENT;

Approximately 650 kg/day (@ 1 kg/bed/day for 650 beds) of bio-medical waste will be generated from the proposed Magadh Medical College and Hospital project, which shall be managed in accordance with the provisions of the Bio-Medical Waste Management Rules, 2016.

The generated bio-medical waste shall be collected, segregated, stored, transported, and disposed of through an authorized Common Bio-Medical Waste Treatment Facility (CBWTF).

During the operational phase, approximately 988.95 kg/day (~0.99 TPD) of municipal solid waste shall be generated from hospital, medical college, hostel, residential, dining, and landscaping activities within the proposed project campus. Out of the total municipal solid waste generated, approximately 595.37 kg/day shall comprise recyclable/biodegradable waste. In addition, approximately 35 kg/day of STP sludge and 3 kg/day of ETP sludge shall also be generated from the proposed utility systems.

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The detailed estimation of solid waste generation during the operational phase is presented in **Table 11**. The proposed solid waste management plan for handling, segregation, storage, and disposal of waste is described in the table below.

Table 11: Calculation of Solid Waste Generation

S. No.	Description	Occupancy / Area	Waste Generation Rate	Total Solid Waste Generation (kg/day)	Recyclable / Biodegradable Waste (60%) (kg/day)	Non-Recyclable Waste (40%) (kg/day)
1	OPD Patients	Approx. 1043 Persons/Day	0.15 kg/capita/day	156.45	93.87	62.58
2	Indoor Patients (IPD)	650 Beds	0.50 kg/bed/day	325.00	195.00	130.00
3	Attendants with IPD Patients	650 Persons	0.25 kg/capita/day	162.50	97.50	65.00
4	Residential Population (Students & Hostel Residents)	300 Persons	0.50 kg/capita/day	150.00	90.00	60.00
5	Teaching, Administrative & Supporting Staff	280 Persons	0.25 kg/capita/day	70.00	42.00	28.00
6	Hospital Staff / Mess Area	150 Persons	0.50 kg/capita/day	75.00	45.00	30.00
7	Landscape Waste	Approx. 4,947.96 Sq.m	—	50.00 (Approx.)	30.00	20.00
	Total Municipal Solid Waste			988.95 kg/day	593.37 kg/day	395.58 kg/day
8	Bio-Medical Waste	650 Beds	1.0 kg/bed/day	650 kg/day	—	

(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))

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Table 12: Calculation of Solid Waste Generation-Total

S.No	Description	Total Solid Waste Generation (kg/day)
1	Total Municipal Waste	988.95
2	STP Sludge	35
3	ETP Sludge	3
Total Solid Waste		1026.95Kg/day
Bio-Medical waste		650

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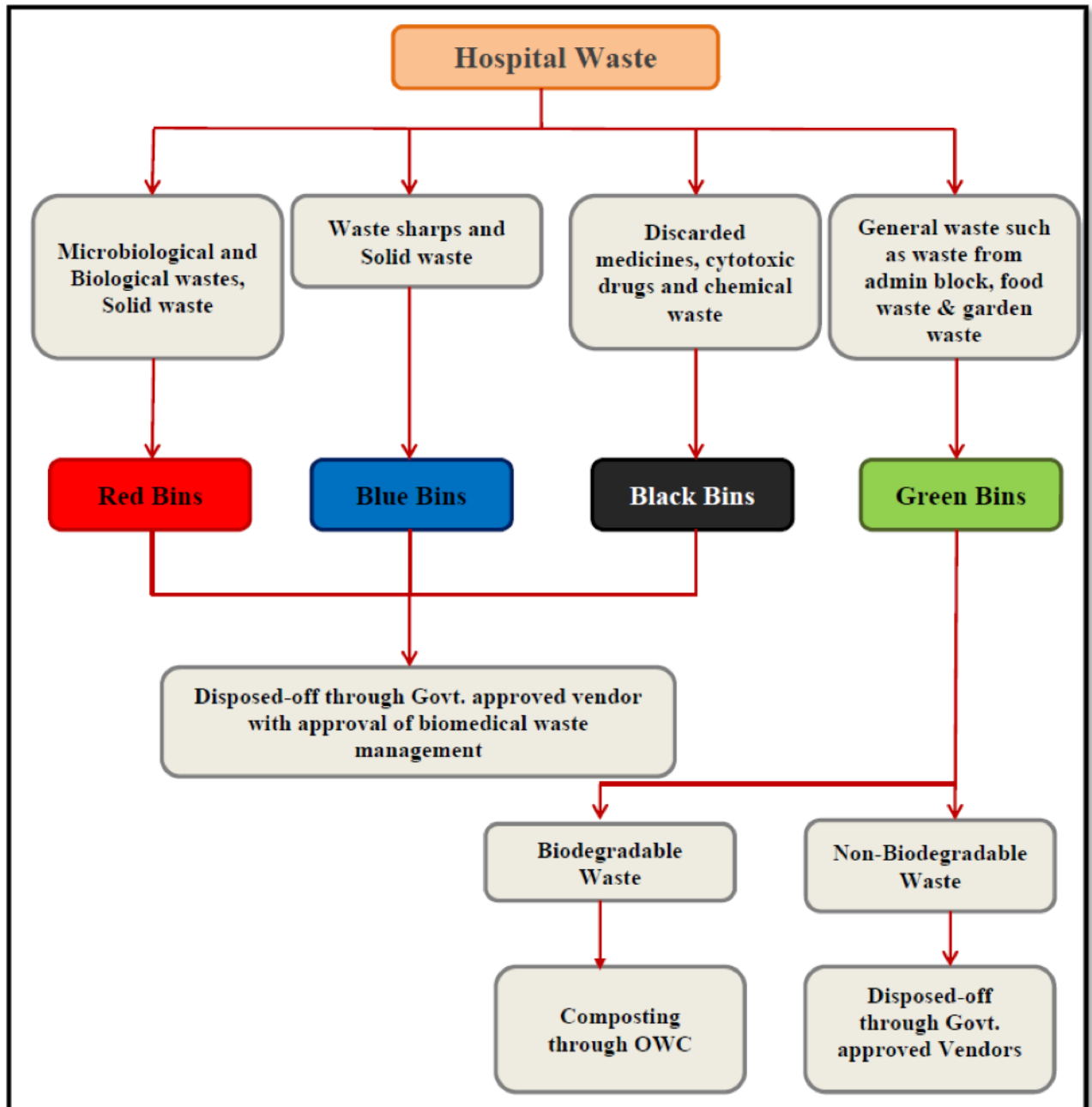


Figure-6: Solid Waste Management Scheme (Operation Phase)

Collection and Segregation of Waste

- ❖ For Hospital waste collection, adequate numbers of colored bins (Red, Yellow, Black, Blue and dark blue bins) are proposed to be provided at the strategic locations of the Hospital area.
- ❖ Red bins: These are for disposing of IV tubings, plastic bottles, syringes without needles, drainage tubes, catheters, and locally autoclaved microbiological waste.
- ❖ Yellow bins: For the disposal of anatomical parts, amputated body parts, and placenta, as well as items contaminated with blood and body fluids, including cotton, dressings, soiled plaster casts, lines, bedding, and other material contaminated with blood.
- ❖ Black bins: For the discard of paper, wrappers, tissue and other general items.
- ❖ Blue bins: These are for disposing of glass bottles, ampoules, broken glass, vials, and other glass items.

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- ❖ Dark Blue bins: For the disposal of sharps. Does not contain disinfectant. Includes needles, stylet, lancets and blades.
- ❖ Treatment of waste
 - Bio-Degradable waste:
 1. Bio-degradable Waste will be disposed of through the Govt. approved vendor for decomposition.
 2. STP sludge is proposed to be used for horticultural purposes as manure.
 3. ETP sludge is proposed to be sold out through Govt. vendors.
 4. Horticultural waste is proposed to be composted and used for gardening purposes.
 - Recyclable waste:
 1. Grass Recycling—The cropped grass will be spread on the green area. After decomposition, it will act as manure.
 2. Recyclable waste like paper, plastic, metals, etc., will be sold off to local recyclers.
 - ❖ Recyclable and non-recyclable waste will be disposed of through a local, approved agency as per the Municipal Solid Waste (Management and Handling) Rules, 2016. Biomedical waste will be disposed of through a government-approved vendor.

1.13 Radioactive Waste Management Plan

Disposal of Solid Radioactive Waste — An AERB-certified, trained, and authorised person may dispose of solid radioactive waste by burial into pits prepared in an exclusive burial ground, provided:

- (a) The burial ground is located in an isolated site owned by the said person.
- (b) The site is duly fenced off to prevent unauthorized entry.
- (c) The site is duly approved by the competent authority for burial of radioactive waste, the approval being governed by factors such as the nature of environment including topographical and geological characteristics of the burial site, usage of ground and surface waters in the general area around the site, with a view to minimize the assessed anticipated risk of accidental dispersal of the waste to potentially affected locations or back to the environment;
- (d) The depth of the burial pit is so chosen that the wastes have a top layer of compact earth of a minimum 120 cm thickness when the pit head is closed;
- (e) Successive burial pits are separated by a distance of at least 180 cm.
- (f) Not more than 12 burials are made in any one year.
- (g) The burial area is treated as a restricted area and subjected to periodic environmental surveillance by the Radiological Safety Officer to ensure that the appropriate disposal limits and operational limits are not exceeded.
- (h) A logbook is maintained.
- (i) Incineration of Radioactive Waste — An AERB-certified, trained, and authorized person may undertake incineration of radioactive wastes, including incineration of radioactive animal carcasses, provided
 1. The design of the incinerator is suitable for the intended operations, providing for the retention of solid and liquid combustion/scrubbing by-products and the controlled discharge of liquid and gaseous effluents.
 2. The incineration operations will not result in airborne radioactive contamination in excess of the operational limits prescribed under the Radiation Protection Rules, 1971, for unrestricted areas.
 3. The solid and liquid radioactive wastes arising from incineration operations will be duly collected and disposed of in accordance with these rules.
 4. Adequate environmental surveillance, including air monitoring where necessary, will be provided to ensure that the operational limits are not exceeded.
 5. The incineration operations are undertaken under the direct supervision of the radiological safety officer.

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1.12 GREEN AREA

An area of approximately 3986.85 sq.m has been allocated within the proposed Magadh Medical College & Hospital project for green belt and landscape development, which constitutes approximately 15.84% of the total project area of 25,163.93 sq.m (Medical College & Hospital Campus + Hostel Campus). The proposed green area comprises avenue plantation, lawn development, ornamental plants, tree plantation, green buffer zones, playground peripheral plantation, and open landscaped spaces for environmental enhancement and aesthetic improvement within the campus..

The proposed green area comprises avenue plantation, lawn development, ornamental plants, tree plantation, green buffer zones, and open landscaped spaces for environmental enhancement and aesthetic improvement within the campus.

After construction of the proposed buildings, trees will be grown to the maximum extent all around the premises boundary.

As per the requirement of EIA Notification 2006 amendments vide Gazette Notification No. S.O. 3999(E) dt: 09.12.2016 , one tree / 80 sq. M. should be planted in case of building & construction projects, approx. 700 nos. of trees will be planted within and all around the proposed medical college and hospital building premises.

While carrying out plantation within premises or outside the following considerations will be given for choice of types of trees

- Species of trees and plants suitable for the local agro-climatic and soil conditions will be selected.
- Natural hedge rows will be preferred over fencing wherever possible.
- Trees with large canopies will be chosen which will serve as natural air filters, noise attenuators and umbrellas.
- Automatic irrigation systems will be installed. Irrigation will preferably be carried out at night so that less water is lost in evaporation and most of the water naturally percolates to groundwater through the soil.
- Location of trees and shrubs will be chosen such that they provide a natural shield to the buildings from natural ailments like excessive sunlight and rain.
- Organic manure made from garden waste (dry leaves etc.) & STP sludge will be used so that dependence on chemical fertilizer can be reduced.

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Table 13: List of plants to be proposed for planting

S. No.	Botanical Name	Common Name
1	<i>Butea monosperma</i>	Flame of the Forest / Palash
2	<i>Ficus benjamina</i>	Weeping Fig
3	<i>Ficus benghalensis</i>	Banyan
4	<i>Madhuca indica</i>	Mahua (<i>Not Jatropha – corrected</i>)
5	<i>Pongamia glabra</i>	Karanj
6	<i>Terminalia arjuna</i>	Arjun
7	<i>Albizia lebbek</i>	Siris
8	<i>Bombax ceiba</i>	Silk Cotton Tree / Semal
9	<i>Tectona grandis</i>	Teak / Sagwan
10	<i>Liriodendron tulipifera</i>	Tulip Tree (<i>not typical Poplar – corrected</i>)
11	<i>Azadirachta indica</i>	Neem
12	<i>Mangifera indica</i>	Mango
13	<i>Juniperus chinensis</i>	Chinese Juniper
14	<i>Kigelia pinnata</i>	Balam Kheera
15	<i>Polyalthia longifolia</i>	Ashoka
16	<i>Delonix regia</i>	Gulmohar
17	<i>Dalbergia sissoo</i>	Sheesham
18	<i>Emblica officinalis</i>	Amla

Proposed Magadh Medical College and Hospital at Mauza – Panpura, Punpun, District – Patna, Bihar.

Following ornamental species will be planted within the premises of proposed Building Project;

• Crotons
• Coleus
• Colocasia
• English Laurel
• Song of India
• Roses
• Jasmine
• Chrysanthemum
• Gerbera
• Marigold
• Geranium
• Dahlia
• Daffodils
• Tulips
• Bird's Nest Fern
• Bougainvillea
• Arabian Jasmine
• Orchid Tree
• Bottle Brush
• Jungle Flame / West Indian Jasmine

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1.13 CONSTRUCTION MATERIAL

Detail of different type of construction material to be used at project site with their U values are provided in respective Tables.

Table 14: List of Construction materials

S.No	Description
1.	Cement
2.	Sand
3.	Metal 20 mm
4.	Stock Bricks
5.	MS/RTS Rods
6.	Ceramic Tiles
7.	Country wood scantlings up to 4m length
8.	UPVC Windows
9.	Solid Core Flush Doors
10.	PVC Door Shutters

Table 15: U values 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, screed 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

Proposed Magadh Medical College and Hospital at Mauza – Panpura, Punpun, District – Patna, Bihar.**1.14 LIST OF MACHINERY USED DURING CONSTRUCTION**

List of machinery which will be used for construction is given below:

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