

**Proposed Khudiram Bose Medical College and hospital at Village - Bagaras Tehsil - Bakhari, Bihar
by M/s Khagaria Shiksha Seva Nyas**

1.0 INTRODUCTION

M/s Khagaria Shiksha Seva Nyas has proposed to Construct **Khudiram Bose Medical College and hospital at** Village – Bagaras, Khata No. - 100, 100, 100, 100, 100, 100, 100, 100, 106, 74, 87(क), 13, 11,54,04,10,44 04, 100, 100, 100, 01, 100, 01, 01, 01 Khasra No.- 217, 217, 217, 217, 217, 217, 220, 217/977, 12, 13, 14, 15, 16, 20, 21, 22, 23, 01,01, 218, 219, 217,219,219,219, Tehsil - Bakhari, District – Begusarai, Bihar.

The Total Plot area measures about **264766.392** square meters including pond area and the estimated Total built-up area is **202749.41 Square meter**.

Project offers the following Entities:

- Hospital Block
- Nursing Residential building
- Medical College
- Hostel
- Dr. Quarter
- Admin Block
- Connecting Bridge along the pond
- School
- Physical Education, etc.

1.1 APPLICABLE LEGAL FRAMEWORK

The project involves the development of a medical college and Hospital project at Village - Bagaras Tehsil - Bakhari, Bihar. **Total Built-up area of the project is approx. 202749.41 Sqm.**

The pond area will be left around the project site, and the hospital and college will be constructed in the center. There are provisions for 5 bridges to access the hospital & college across the pond and also 5 main gate entrances. The pond also provision & features deck and boats.

As per EIA Notification, 2006, the projects listed in Schedule I of the notification attract the applicability of EIA Notification, 2006 and are required to obtain prior environmental clearance. Building and construction projects having built-up area more than 1,50,000 sq m. fall under the category B1 and activity 8 (b). Thus, it is required to obtain prior environmental clearance for the proposed project from SEIAA, Bihar. The acts and rules applicable to the project include the following:

- Environment Protection Act, 1986
- EIA Notification, 2006 as amended
- MSW Rules, 2016
- Construction & Demolition Waste Management Rules, 2016

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- Plastic Waste Management Rules, 2016
- Hazardous & Other Waste Management Rules, 2016
- E-Waste Rules, 2016
- Air Act, 1981
- Water Act, 1974
- Local Bylaws
- Forest Act 1927 & 1980

1.2 CONNECTIVITY AND SURROUNDINGS OF PROJECT SITE

Details of surroundings and connectivity of the site are given in

Table - 1

S. No.	Features	Description
1.	Nearest Railway station	● Salona station (04 km) ● Khagariya (19 km approx) ● Begusarai junction railway station (20 km approx)
2.	Nearest Airport	● Jay Prakash Narayan International Airport (118 Km, W)

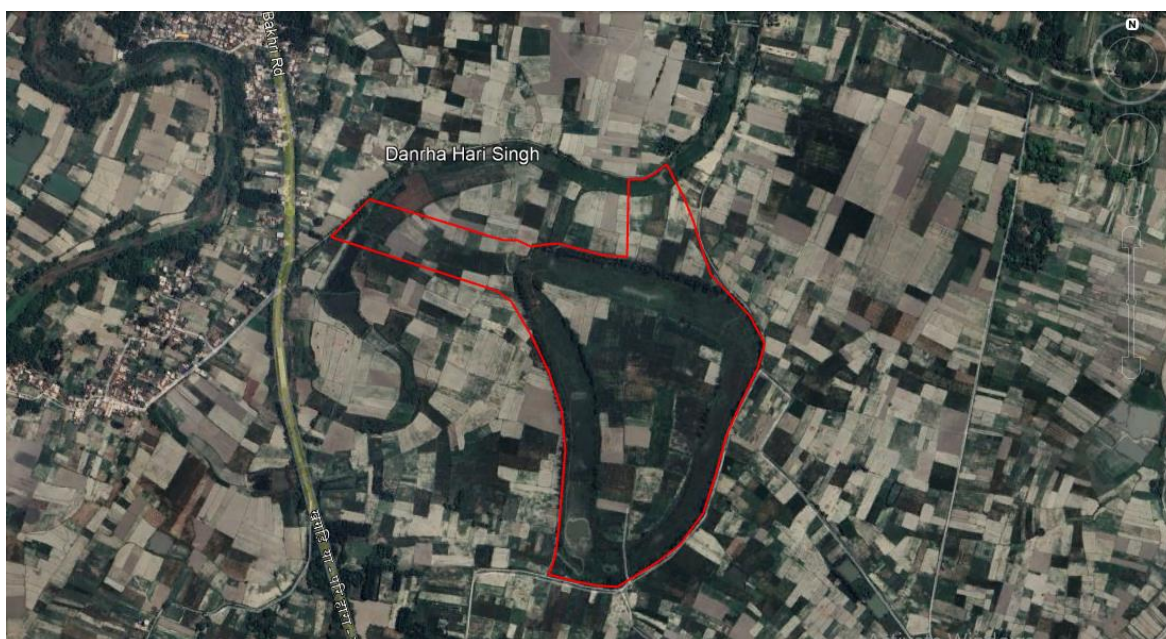


Figure 1: Google Map

Conceptual Plan

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1.3 PROJECT COST

The total cost of the project is INR 250 Crores.

1.4 LAND REQUIREMENT AND AREA SUMMARY

The total Plot area measures about **264766.392** square meters including pond area and the estimated Total built-up area is **202749.41** Sqm.

The detailed area statement is provided below in **Table - 2:**

Table 2: Detailed area statement

S. NO.	DESCRIPTION	Detail
1.	Plot Area	264766.392 square meters including pond area
2.	Ground coverage without Pond area (30.2%)	36739.25 sq.m
3.	Total Built up Area	202749.41 Sq.m
4.	Green Area (20 %)	25000 Sq.m
5.	Total parking area	25679 Sq.m
6.	Number of Beds	1200
7.	No. of Students Seats per year in Medical College	250
8.	Number of OPD	2000
9.	FAR	1.1
10.	STP	1000 KLD
11.	ETP	75 KLD
12.	Total Municipal waste	2183 kg/day
13.	Total Biomedical Waste	1200 kg/day
14.	Building Height	40 meter
15.	Power Requirement	5000 KVA
16.	Power Backup	4000 KVA
17.	Total Water Requirement	Approx 968 KLD
18.	Waste Water Generated	Approx 748 KLD
19.	EMP Budget	158 Lakh

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Table 3 : Block Detail

S.No	Type	Detail	Construction Status
1	Connecting Bridge	5 Across the Pond	Fresh Building
2	Hospital	G+5	Fresh Building
3	Academic Block	G+7	Fresh Building
4	Ayurvedic College & Nursing College	G+4	Fresh Building
5	Physical Education	G+4	Fresh Building
6	Paramedical & Dental College	G+4	Fresh Building
7	Veterinary College	G+5	Fresh Building
8	School	G+4	Fresh Building
9	Hostel (Total Number of Hostel -10)	G+6	Fresh Building
10	Residential Zone (Total -7)	G+6	Fresh Building
11	Utilities	G+1	Fresh Building

Table 4: Built-up Area Breakup Details: (Square Meter)

Academic Zone				
S. No.	Block	Coverage	No. of FLR	Total B/Up Area
1.	Hospital	6572.27	G+ 5	39433.62
2.	Academic Block	3034.84	G+ 7	24278.72
3.	Ayurvedic & Nursing College	2000.18 MT	G+ 4	10000.9
4.	Physical Education	1000.64	G+ 4	5003.2
5.	Paramedical & Dental College	2094.91	G+ 4	10474.55
6.	Veterinary College	2489.81	G+ 5	14938.86
7.	School	1064.64	G+ 4	5323.2
Hostel Zone				
8.	UG Girls	1286.47	G+6	9005.29

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9.	PG Girls	1286.47	G+6	9005.29
10.	Dental Girls	680.83	G+6	3032.54
11.	Ayurvedic Girls	680.83	G+6	3032.54
12.	Girls Intern	433.22	G+6	3032.54
13.	Boys Intern	1286.47	G+6	9005.29
14.	UG Boys	1286.47	G+6	9005.29
15.	PG Boys	1286.47	G+6	9005.29
16.	Nurses Q-1	433.22	G+6	3032.54
17.	Nurses Q-2	433.22	G+6	3032.54
Residential Zone				
18.	Dean Resi.	242.78	G+1	485.56
19.	Med. Sup.	242.78	G+1	485.56
20.	Asst. Prof Q1	701.65	G+6	4911.55
21.	Asst. Prof Q2	701.65	G+6	4911.55
22.	Resident Doctor Girls	433.22	G+6	3032.54
23.	Resident Doctor Q1	433.22	G+6	3032.54
24.	Resident Doctor Q2	433.22	G+6	3032.54
Amenities				
25.	Girls Mess	856.55	G + 1	1731.1
26.	Boys Mess	856.55	G + 1	1731.1
27.	PRA Building & Canteen	2167.95	G + 1	4335.9
28.	Cafe-1	185.39	G + 1	370.78
29.	Cafe-2	79.37	G + 1	158.74
Utilities				
30.	Badminton Court	85.4	4	158.74
31.	Basket-Ball Court	450	2	900
32.	Center For Indoor Games	1500	1	1500

Site Plan is attached as **Annexure**.

1.5 POPULATION DENSITY

The total population of the hospital will be approximately 6415 persons, which includes outdoor patients, indoor patients, attendants, OPD, Doctors, Resident Doctors, Nurses, technicians, and staff. The population break-up is given below in Table 6.

Table 5: Population Density

**Proposed Khudiram Bose Medical College and hospital at Village - Bagaras Tehsil - Bakhari, Bihar
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Category	No of Beds/DUs	Person/Unit	Population
Resident population			
No. of Beds	1200 beds	1/bed	1200
Attendant	1200 beds	1/bed	1200
Staff Residents (Doctors & Administration Staff)	1200 beds	5/unit	240
Student Seats	250 per year	(5.5 Year)	1375
Total Residential			4015
Floating			
OPD	2000	--	2000
Staff (Doctors+ Nurse+ Admin Staff+ Security+ Housekeeping)	400	--	400
Total Floating			2400
Total Population			6415

Note:- Details population count will be given at the time of EIA/EMP

1.6 WATER REQUIREMENT

The total domestic water requirement for the project will be approximately 968 **KLD**. The water source will be a private water tanker supply or groundwater (if required). However, permission from the CGWB will be obtained prior to extracting groundwater during the operational phase. The freshwater requirement will be approximately 677 KLD. The daily water requirement calculation is given below in Tables 6 to 7.

1.7 WASTE WATER GENERATION

Wastewater generation from the site is expected to be 748 KLD, which will be treated in 1 No. of ETP of capacity 75 KLD and 1 No. of STP of capacity 1000 KLD, respectively. Treated water from the STP will be used for flushing, Fire Fighting, DG cooling, and horticulture. The STP will be provided with MBBR Technology.

Table 6: Calculations for Total Daily Water Demand

Category	Capacity	Standard (LPCD)	Water Requirement	Fresh Water Requirement	Recycled Water Requirement
No. of Beds	1200	450	540	378	162
Attendant	1200	135	162	113	49
Other residence (Staff & Student)	1615	135	218	152	66

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Floating Staff	400	45	18	13	5
OPD	2000	15	30	21	9
Domestic Water Requirement			968	677	291
Landscaping	25000	1 l/sq m	250	0	250
Fire Fighting			5	0	5
HVAC			20	0	20
DG Cooling	3000	1 KLD/1KVA	30	0	30
OT Laundry		45 Litre/bed	54	0	54
			1327	677	650

Table 7: Waste Water Calculations-ETP

Category	Total Quantity (KLD)
Effluent generation (OT, Laundry)	54
Capacity of ETP (1 No. of 50 KLD)	75
Recovered water from ETP (90% of Waste Water)	49

Table 9: Wastewater Calculations-STP

Category	Total Quantity (KLD)
Fresh water Req.	677
Flushing water Req.	291
Total Domestic water requirement	868
Sewage generation (@80% of the Fresh + 100% flushing water requirement)	832
Capacity of STP	1000
Recovered water from STP (90% of Waste Water)	748
Total Recycled Waste Water Generated STP	748
1. Flushing	291
2. Landscaping (1 ltr/sqm)	250
3. Fire Fighting	5
4. HVAC	20
5. DG cooling	30
6. Sewer	152

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Note:- Detail water calculation and water balance diagram will be given at the time of EIA/EMP report.

1.8 SEWAGE MANAGEMENT

INTRODUCTION:

Moving Bed Bio Reactor System provides a highly effective treatment solution using **Biofilm** to provide organic carbon removal and nitrification / de-nitrification where necessary. The process forms a highly reliable and robust solution for wastewater treatment. In this process Biofilm act as carriers in the treatment tanks on which the Biomass grows.

DESCRIPTION OF PROCESS:

The treatment process shall comprise the following stages:

Physical treatment : Fine bar-screening / Oil & Grease Chamber

Equalization / Collection tank : Flow equalization with air mixing

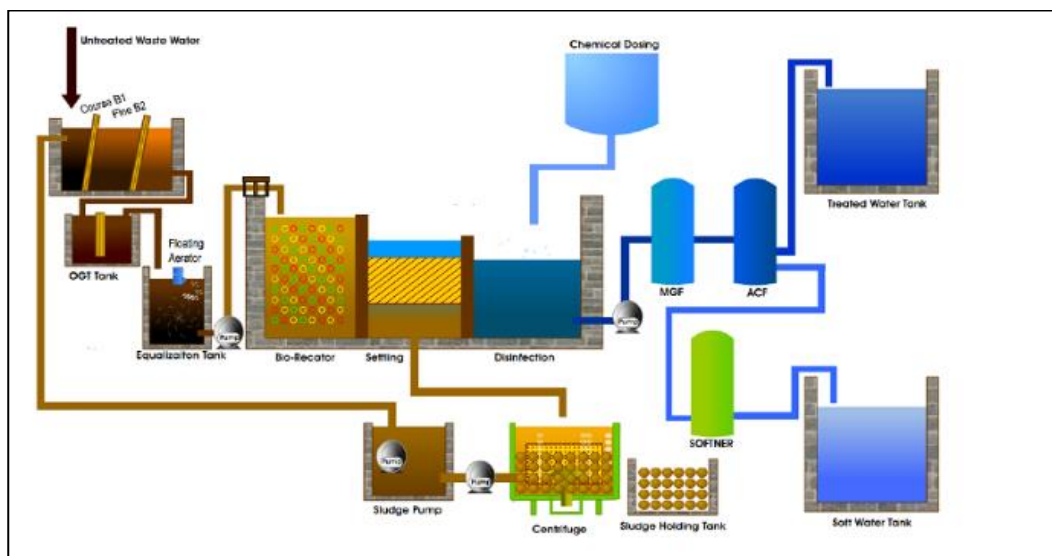
Biological treatment : FMBR-based

Final sedimentation : Settler tank

Water reclamation : Tertiary filtration

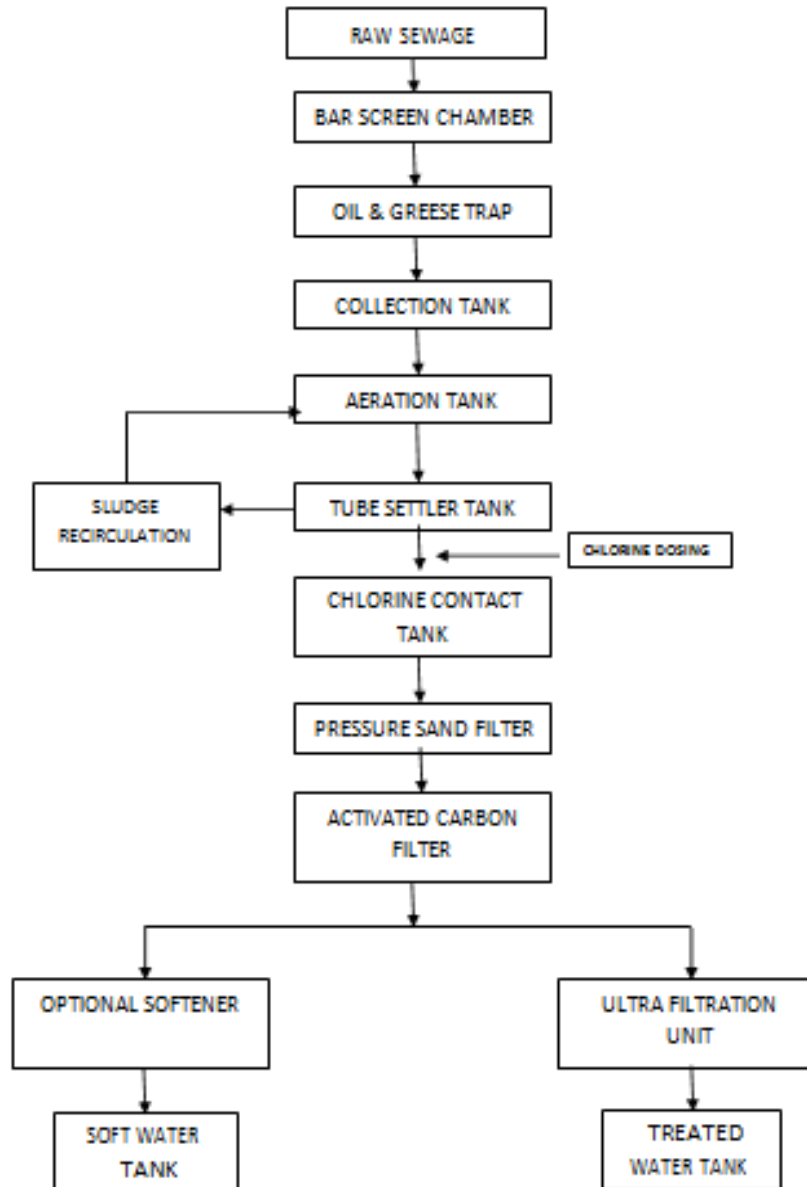
(For irrigation Sposes, flushing or cooling tower make-up)

Sludge disposal : In cake form through Filter Press or (Transfer through a type of pump to a municipal tanker)



MBBR TECHNOLOGY PROCESS DIAGRAM

GENERAL PROCESS DESCRIPTION FOR SEWAGE TREATMENT PLANT (SCHEME):



1. Inlet Screen Chamber / Oil & Grease Chamber

- a. Raw sewage shall flow into the inlet screen chamber by gravity. A fine screen shall intercept large solid particles. Then, there shall be an Oil and grease Tank. Sewerage will then flow into an Equalization / Collection Tank. The incoming sewage shall be mixed in the EQT, and fine bubble aeration shall be maintained.

2. Equalization / Collection Tank

- a. The equalization tank shall be designed to provide a minimum storage of 6 hours at peak flow while pumping. Submersible pumps as per schedule shall be provided with level switch control and automatic cut-in of the standby unit.
- b. An aeration system shall be provided for mixing and aeration of the sewage.

3. FMBR Tank

- a. Sewage shall be retained in the FAB tank for a minimum of 7-8 hours and subjected to biochemical oxidation by fine bubbles aeration. The FMBR media shall be installed in the form of rectangular blocks & shall be float in the form of layers. The media shall be corrugated type & shall facilitate cross flow for better air distribution. The media shall be duly glued as per manufacturer's recommendations.

4. Tube Settler Tank

- a. The sewage after bio-oxidation shall enter the hopper bottom sedimentation tank, where the sludge effectively settles to the tank bottom.
- b. The activated sludge collected in the sludge tank shall be returned to the FMBR tank for further oxidation of the incoming organic matter. Excessive sludge shall be wasted in the sludge holding tank.
- c. PVC tube deck media is to be installed in the Tube Settler Tank. The media shall be installed at 60° angle with the horizontal, and the total vertical height when installed should be 750 mm. The media shall be duly glued using recommended material and shall be installed as per the drawing to be given by the vendor as per manufacturer's recommendation.

5. Chlorine Contact Tank

- a. The effluent shall be retained in the baffle-walled cleared water tank for half an hour to three hours for effective disinfection prior to discharge.

6. Sludge Holding Tank

- a. Excessive sludge shall be stored in the sludge holding tank for final dewatering and disposal.

7. Treated Water Tank

- a. To hold and store finally STP-treated water for process use.

STANDARD EQUIPMENT DETAILS:

The following gives the minimum requirements of the different components of the system.

All equipment and components of the system shall be of top-quality construction and shall be corrosion resistant.

1. Fine Screening Equipment

The bar screen shall be of MS/SS construction. Drip trays shall be provided for holding and draining the screenings. A manual bypass screen with a 5 to 10 mm opening with a drip tray shall be provided.

2. Air blowers

Air blowers shall be provided with a standby arrangement. Blowers shall be either positive displacement or centrifugal, with a motor, base plate, inlet filter, non-return valve, V-belt system, or direct drive coupling. The casing rotor shall be of cast iron construction. Bearings and gears shall be grease lubricated. Motor speed shall be 1500 rpm.

The size and performance of the air blower shall be so selected that it provides a suitable airflow rate and maintain a minimum of 2.0mg/ dissolved oxygen in the aeration tanks in operation.

3. Air Diffusers

Air diffusers shall be made of an elastomeric rubber membrane to provide a uniform distribution of fine bubble air release performance in the system.

4. Pumps

Working and standby pumps for raw sewage/sludge re-circulation and filter feed pumps shall be provided.

Pumps may be submersible / surface in CI / SS with a complete set of accessories.

5. Settling Tank

Settling tanks shall include baffles to prevent short-circuiting along with tube media.

6. Tertiary Treatment

This tertiary treatment shall be provided for the effluent used for the irrigation and flushing of the tower make-up water tank/flushing system.

The tertiary treatment plant shall comprise pressure sand filters and activated carbon filters. It shall be sized to accommodate 100% of the effluent discharge flow rate and shall achieve the performance as outlined and described in the Design Criteria.

After passing water through filters (Sand Filter and Activated Carbon Filter), it is passed through the UF Module for membrane filtration in the Sewage Treatment Plant.

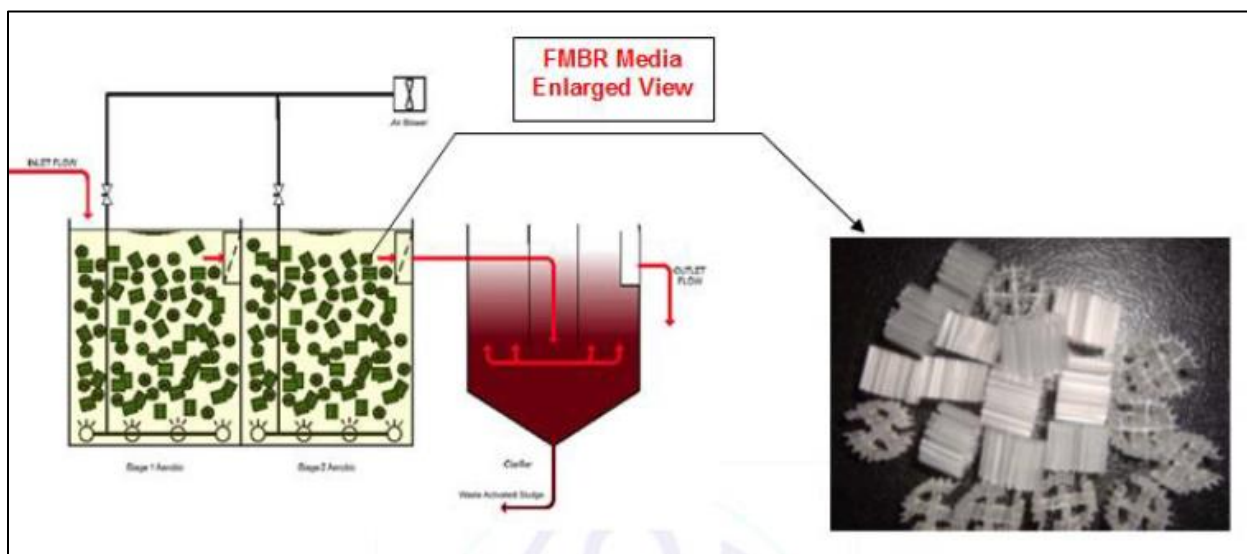
7. Electrical Control

A completely assembled and pre-wired control panel consisting of a weatherproof cabinet shall be furnished. The control panel shall contain all metering and status indicators, motor starters, program timers, on-off-auto change-over switches and duty selectors for equipment.

8. Other Miscellaneous Items

This covers a broad scope of interconnecting piping and fitting work, as well as various valves, cables, supports, and necessary instrumentation.

SPECIAL NOTE ON MBBR MEDIA USED IN AERATION TANK:



Bio-media are Inert Plastic materials that support the attached growth of microbes that effectively degrade/oxidise organic solids in wastewater. In the system, where polymeric inert media are used, Biofilm gets deposited on the surface of the media. This film is formed as microorganisms stick to the surface and coagulate to form high-concentration colonies of biomass. The thickness of this film is affected by several factors, viz, the turbulence within, the food availability to sustain the bacteria, and the ability of the innermost layer of bacteria to draw all life-sustaining inputs.

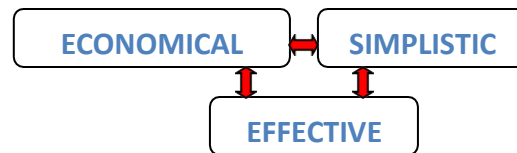
In practice, the tank capacity and media volume will vary depending on wastewater BOD as well as other factors, which can affect the thickness and activity of biomass biofilm. These factors need to be given due consideration when designing to ensure safe and effective plant design.

Features of Bio Media: -

- ✓ Better life cycle and more resistance to breakage and chipping. This prevents triggered clogging of pipelines.
- ✓ Higher void age with more surface area & greater biomass reactive zones.

WHY MBBR???

- Very Good Effluent Quality.
- Low Capital Cost.
- Simple, Robust Design.
- Energy Efficient.
- Ease of Installation and Operation.
- The capacity of existing works can be quickly and easily increased.
- Low Operating Cost.
- Small Footprint for New Works.
- Upgrade of Existing Works—Simultaneously Increase Capacity and Improve Effluent Quality.



1.9 STORM WATER MANAGEMENT

A storm water drainage system will be provided at the site to channelize storm water and prevent local flooding. Covered storm water drains will be provided at the site. Run-off from the site will be collected and recharged into the ground through 25 RWH pits. Recharge of the rainfall run-off to the ground not only prevents local flooding during rain but also helps augment the groundwater level of the aquifers. The groundwater level in the project area is approximately. 15-18 mbgl during pre-monsoon season and 12-15 mbgl during post-monsoon season. This runoff increases due to the generation of paved surfaces. Detail RWH Pit calculation will be given at the time of EIA/EMP report.

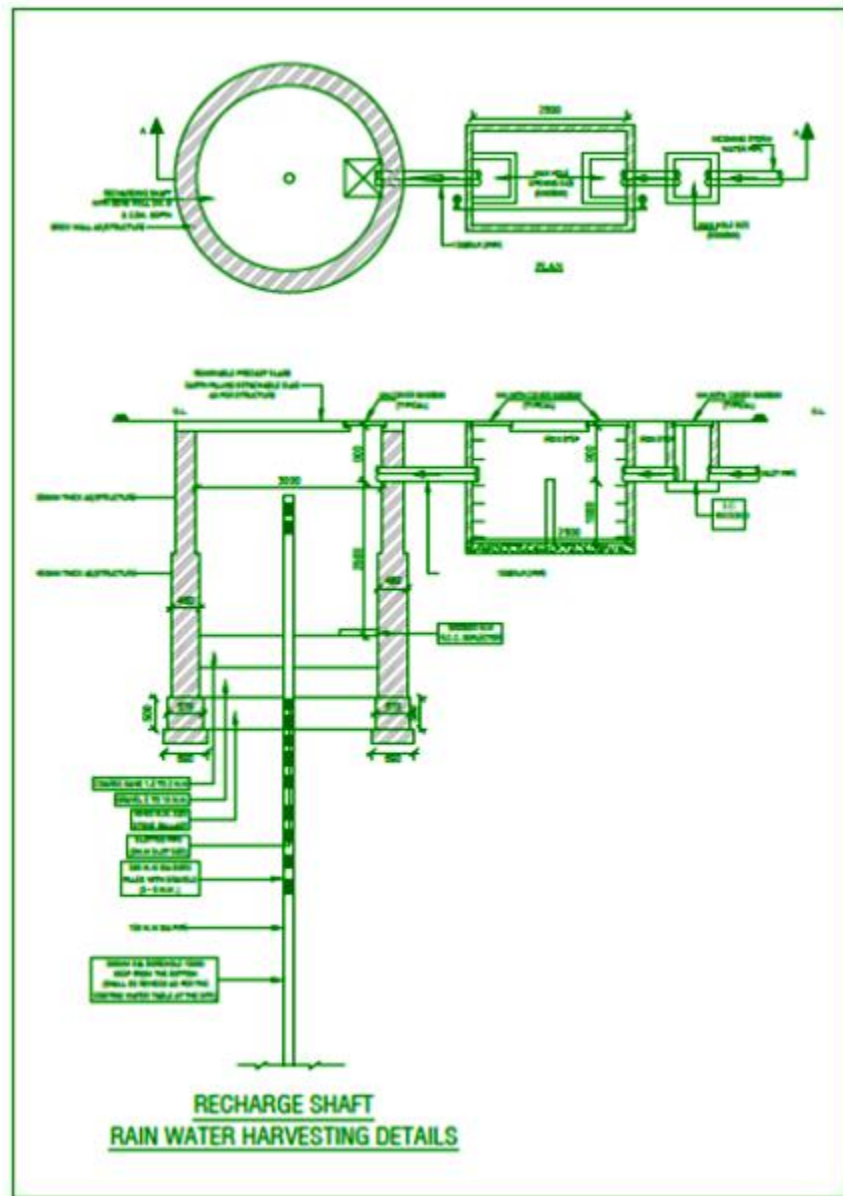


Figure 5: Schematic Diagram of RWH Pit

1.10 VEHICLE PARKING FACILITIES

Adequate parking of a total of 25679 sq. meters will be provided in open area to accommodate the expected vehicles during the operation phase of the project in line with the requirements of the Local Building by Laws.

1.11 POWER REQUIREMENT

The maximum power demand for the project during the operation phase is estimated to be 5000 kVA. The power source will be the State Electricity Board.

20 No. of DG sets of capacity 250 KVA will be provided as power back-up during power failure.

1.12 SOLID WASTE GENERATION AND MANAGEMENT

Construction Phase

Solid waste would be generated both during the construction and operation phases. The solid waste expected to be generated during the construction phase will comprise excavated materials, used bags, bricks, concrete, MS rods, tiles, wood, etc. The following steps are proposed to be followed for the management of solid waste:

- Construction yards are proposed for the storage of construction materials.
- The remaining soil shall be utilized for refilling, road work, raising the site level at locations, selling to an outside agency for road construction, etc.

Table 8: Solid waste management during the 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 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 MC. Waste will be transported in covered vehicles only.
2.	Excavated Soil	Top soil will be stripped off and stored in covered condition. Top soil will be used for landscaping within the project site. Remaining excavated soil will be used within the site for filling and leveling and construction of roads. Excess muck will be disposed off through authorized vendors.
3.	Domestic Waste	Domestic waste generated by labor at the site will be disposed off through local agencies in the area on daily basis.

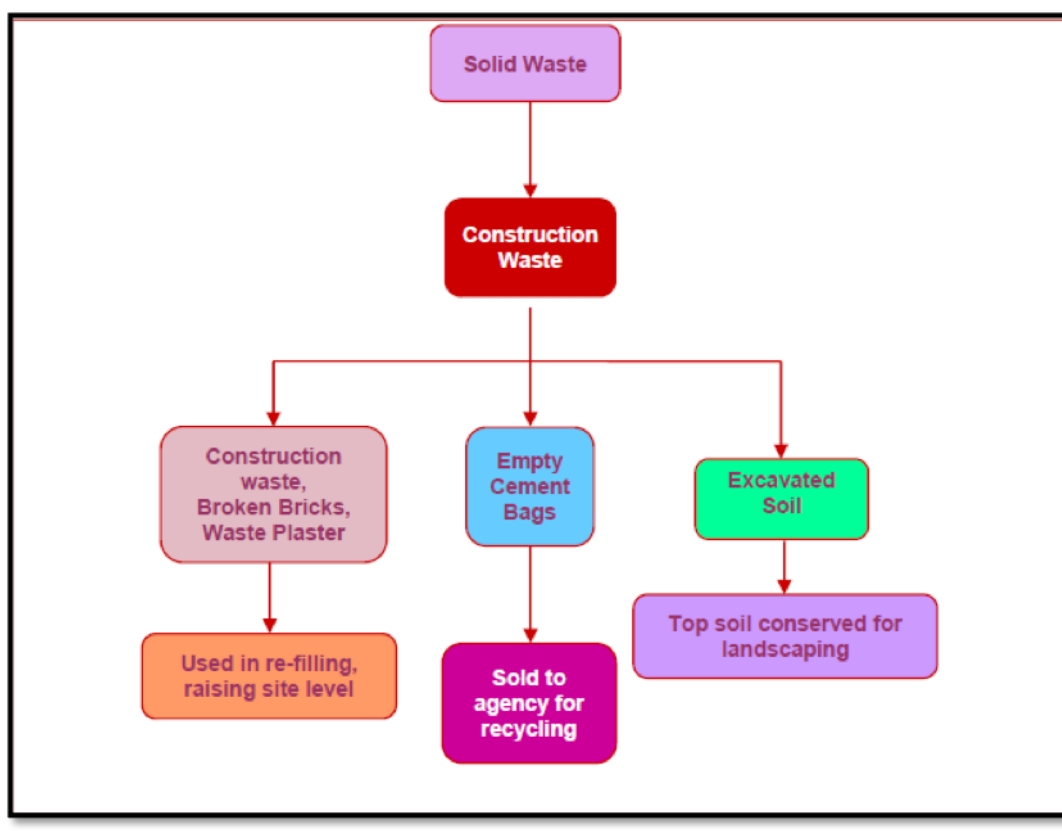


Figure-6: Solid Waste Management Scheme (Construction Phase)

Operation phase

The total solid waste generated during the operation phase of the project shall be approximately. **2183 kg/day** (@0.5 kg/bed for IPD patients, @ 0.5 kg per capita per day for staff (doctors + nurses) and IPD patient attendants, @ 0.15 kg/day for the outpatients, Nursing College staff with student & Para Medical Student with Staff @ 0.5 kg per capita per day, Non Residential Staff (Doctors, Nurses, etc.) @ 0.25 kg per capita per day and ETP + STP sludge). Total biomedical waste from the hospital will be approximately. **1200 kg/day**. The following arrangements will be made at the site in accordance with Municipal Solid Waste (Management and Handling) Rules, 2016 and Bio-Medical Waste (Management and Handling) Rules, 2016 in Tables **13 to 14**. The waste management plan is given below:

Table 9: Calculation of Solid Waste Generation

S. No	Description	Occupancy/Area	kg/capita/day	Total Solid Waste Generation (kg/day)
1.	Outdoor patients	2000	@ 0.15 kg/day	300

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2.	Indoor patients	1200	@ 0.5 kg/day	600
3.	Attendants with IPD patients	1200	@ 0.25 kg/day	300
4.	Residential Staff	240	@ 0.5 kg/day	120
5	Student	1375	@ 0.5 kg/day	687
6.	Non-Residential Staff	400	@ 0.25 kg/day	100
7.	Landscape Waste	-	-	2108
	Total Municipal Waste			2108 kg/day
8.	Bio-Medical waste		@ 1 kg per bed day	1200

(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))

Table 10: Calculation of Solid Waste Generation-Total

S.No	Description	Total Solid Waste Generation
1	Total Municipal Waste	2108 kg/day
2	STP Sludge	70 kg/day
3	ETP Sludge	5 kg/day
Total Solid Waste		2183 kg/day
Bio-Medical waste		1200 kg/day

Note:- Detail solid waste generation and its management will be given at the time of EIA/EMP report.

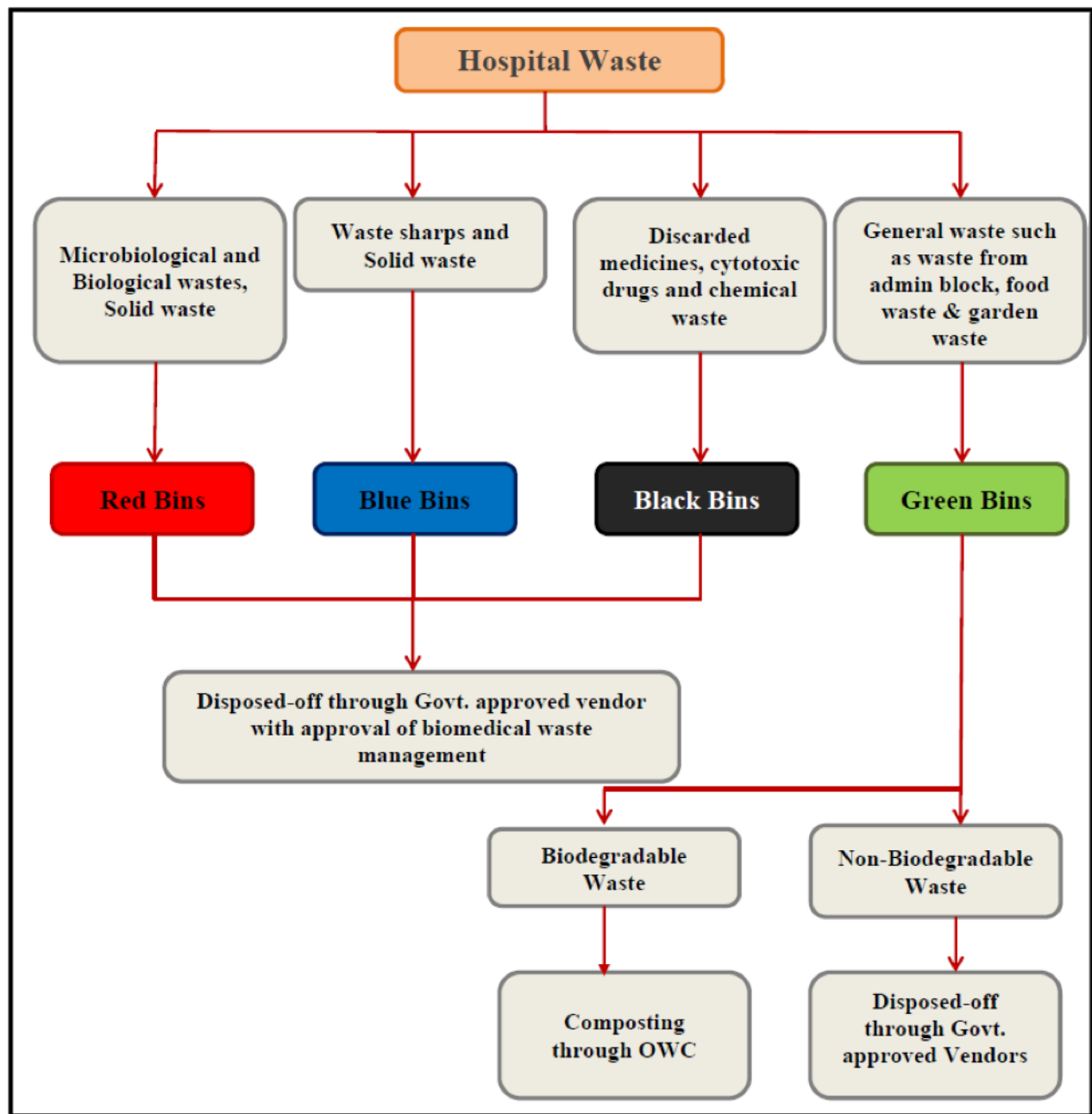


Figure-7: Solid Waste Management Scheme (Operation Phase)

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.
- ❖ 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.

1.14 GREEN AREA

The total green area provided at the site measures 11578.81 m², which will include a green belt/area under tree plantation and lawn within the project site. The following is the list of species proposed to be planted.

Number of trees as per MoEF&CC norms (1 tree per 80 sqm of plot area).

Evergreen native and ornamental tree species will be planted at the site. **Table 15** indicates various suggested species for greenbelt development.

Table 11: List of plants to be proposed for planting

S.NO	Scientific Name	Local Name
1.	<i>Mimusops elengi</i>	Moulshri
2.	<i>Caryota</i>	Fishtail Palm
3.	<i>Verbena officinal is</i>	Verbena
4.	<i>Verbena officinal is</i>	Verbena Mix
5.	<i>Lagerstroemia speciosa</i>	Pride of India

6.	<i>Cassia fistula</i>	Amaltas
6.	<i>Delonix regia</i>	Gulmohar
7.	<i>Rubiaceae</i>	Kadam
8.	<i>Hamelia patens</i>	Hamela
9.	<i>Cassia javanica</i>	Cassia javanica
10.	<i>Jacarandaeae</i>	Jacaranda
11.	<i>Bougainvillea</i>	Bougainvillea
12.	<i>Plumeria rubra</i>	Pink Plumeria
13.	<i>Salix Babylonia</i>	Weeping willow
14.	<i>Ficus retusa</i>	Ficus panda
15.	<i>Duranta dombeyana</i>	Golden Duranta
16.	<i>Ficus benjamina</i>	Weeping fig

1.15 CONSTRUCTION MATERIAL

Detail of different types of construction material used in the site is given in **Table 12**, and with their U values are given in **Table 13**. List of machinery which will be used for construction is given below.

Table 12: Construction materials List

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 13: 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

1.16 LIST OF MACHINERY USED DURING CONSTRUCTION

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