

10. ENVIRONMENT MANAGEMENT PLAN

Vaishnavi Mata memorial Trust has proposed to established Blue Diamond Medical College and Hospital Project. The site selected is almost level in topography and covers 33235 Sq. meters (m²) land area. The site is located at Mauza Garha Block Bochaha District Muzaffarpur, Bihar. The proposed project consist of 605 bedded Hospital and Site infrastructure development work which include road, sewer line, Drainage work, parking Area, Landscaping, electrification, water supply, waste disposal system etc. as per standard

The Environment Management Plan would consist of all mitigation measures for each item wise activity to be undertaken during the construction, operation and the entire life cycle to minimize adverse environmental impacts as a result of the activities of the project. It would also delineate the environmental monitoring plan for compliance of various environmental regulations. It will state the steps to be taken in case of emergency such as accidents at the site including fire.

The mitigation measures suggested for the impacts identified on the various environmental components due to the project activities are given in this section. A detailed environmental management plan is presented in table on next page to mitigate all the identified environmental impacts that are found to be significant.

10.1 Environmental Management Plan – Construction Phase and Operational phase

Construction phase

	Issue	Management / Mitigative measures
1.	Safety during construction	All manpower will be provided with personal protective equipment. Working hours and working conditions, as per ILO norms, will be strictly adhered to. Adequate preventive measures to be implemented. Workers to be properly trained in on-site emergency response management.
2.	Construction water usage	Fresh groundwater shall not be used for meeting construction water requirement. Instead, treated wastewater (arranged from various sources) shall only be used for the purpose.
3.	Equipment and machinery	All equipment and machinery will conform to the relevant BIS norms, various other statutory provisions (in terms of performance, emissions, noise, etc.). A record of PUC will be maintained for all plant and machinery.
4.	Construction material	The material to be procured from existing approved sources conforming to the applicable environmental provisions and should have valid consents/permissions/ authorizations.
5.	Construction operations	Construction material will be regularly sprinkled with water to keep the exposed surface wet and preventing it from getting air borne.
6.	Material transportation and handling	The vehicles should conform to Motor Vehicles Act, 1988. Covered transportation will be preferred. Due care to be taken during unloading.
7.	Parking and machinery bays	The area for parking of construction vehicles, fuel/lubricant storage area, equipment and machinery area, will be lined. All operations will be carried out in a way to prevent the contamination of ground from spillage of fuels/lubricants. Arrangement will be provided to arrest the run-off from the area and send it to septic tank.

8.	Environmental conditions	Periodic monitoring of air, water, noise, and soil quality, through an approved monitoring agency will be periodically undertaken to ensure safe environmental conditions.
9.	Labour camp	The camp will provide necessary facilities in functional and hygienic manner. The sanitation and sewage system are designed, built, and operated, such that no health hazards occur and no pollution to air, ground water, etc., takes place. Adequate toilets and sanitation facilities would be provided for labour use (with specific provision for females) and operated so that there is no health hazard.

Operation phase

	Issue	Management / Mitigative measures
1.	Wastewater treatment and disposal	Elaborate wastewater treatment facility will be developed to ensure, to the maximum capacity, the reuse of treated wastewater (The treated wastewater reuse potential is ~60% of wastewater generation). The excess treated wastewater will be disposed onto land for irrigation of plantation area.
2.	Solid waste management/Biomedical waste	Solid wastes will be appropriately segregated (at source) into recyclable, and non-compostable components. For Biodegradable waste Organic waste Converter (OWC) will be installed. The recyclable fraction will be sent directly to recyclers.
3.	Equipment and machinery	All equipment and machinery will conform to the relevant BIS norms, various other statutory provisions (in terms of performance, emissions, noise, etc.).
4.	Ground water usage	To minimize the additional stress to meet the project's water requirement, appropriate ground water recharge using rain water harvesting will be implemented. The annual recharge potential is 32218.88 m ³ . Compliance with the requirements of Central Ground Water Authority is to be ensured.
5.	Drainage	Adequate storm water management will be developed.
6.	Green belt development	More than 8452.40 m ² of horticulture and green area (as dedicated parks and also along inner periphery of the complex boundary and along pavements) will be provided within the complex.
7.	Accidents	Adequate preventive measures to be implemented for fire, electrical hazards, earthquakes, etc.

8.	Environmental conditions	Regular monitoring of air, water, noise, and soil quality, through an approved monitoring agency will be periodically undertaken.
9.	Energy conservation	Efforts will be incorporated, through expert planning, to minimize the electrical power consumption of the complex with due care to use of natural lighting, solar power, etc.
10.	Management and staffing	Dedicated environmental, health and safety department with qualified and trained team to be provided, supported by adequate budgetary allocations and training to all the staff.

10.2 Environmental Monitoring Plan

It is proposed to monitor essential parameters for ambient air quality, ambient noise quality, ground water quality, and waste water quality both during the construction and operation phases of the project. However, the monitoring schedule for the compliance report is given in **Table-3**.

Table-3: Environmental Monitoring Schedule for Compliance

Area of Monitoring	Frequency of sampling	Parameters to be Analyzed
Ambient Air Quality	Quarterly	PM ₁₀ , PM _{2.5} , SO ₂ , NO ₂ & O ₃
DG Set Stack Emission	Quarterly	PM, SO ₂ & NO ₂
Ground Water Quality	Monthly	As per IS 10500:2012
Effluent sample before & after STP & ETP	Monthly	In accordance with EPA, 1986 and requirement of Central Pollution Control Board (CPCB)
Noise	Quarterly i.e. once in three months	Ambient Equivalent continuous Sound Pressure Levels (Leq) at Day and Night Time

10.3 Environmental Monitoring:

Various environmental protection and mitigation measures have been suggested in the previous Chapter/section for ensuring compliance with the stipulated environmental regulations and applicable standards. Also, there are specified environmental monitoring and record keeping requirements for operating facilities that the proposed Project will have to comply with. Though record keeping would be largely an in-house activity, environmental monitoring within and outside of the proposed Project would be carried out through recognized environmental laboratories as per the requirements of MoEFCC.

The purpose of environmental monitoring is to evaluate the effectiveness of implementation of EMP by periodically monitoring the important environmental parameters within the impact area, so that any potential adverse impacts are detected and timely action can be taken. In order to ensure compliance with the applicable regulatory requirements, the Project plans to conduct the following environmental monitoring activities.

10.4 Wastewater Quality Monitoring and Record Keeping

The wastewater discharges from the proposed Project will mainly comprise of domestic sewage and other wastewater discharges from drinking water points, toilets, washbasins, food court and kitchen, backwashing of filters (used in water treatment) etc.

Therefore, as per the requirements of the Water (Prevention and Control of Pollution) Act 1974, the Project proponent will apply to State Pollution Control Board for the Consent to Establish. Before starting the operation, the Project proponent will apply to State Pollution Control Board for the Consent to Operate for Wastewater Discharges and thereafter periodically renew its Consent to Operate. Subsequently, whenever there is a change in the operations, the Project will get the requisite amendments in its Consent.

The Project would maintain an inventory of all sources of wastewater and maintain records of waste water quality and quantity for the wastewater streams, as required. The Project will

ensure that wastewater analysis is conducted for all regulated parameters as per State Pollution Control Board's specification or as per conditions of Consent to Operate and to ensure compliance with any other specifically applicable standards. The frequency of wastewater quality monitoring would be decided in consultation with the State Pollution Control Board officials. Care will be taken to ensure that wastewater analysis is conducted at such a frequency that potential variations due to various operational factors are recorded.

10.4 Noise Level Monitoring and Record keeping

The Project would maintain an inventory of all point and non-point sources of noise emissions and identify regulated sources, specified in the State Pollution Control Board's Consent to Operate for Air Emissions. Main source of noise would be DG sets during the construction phase, but as DG sets with acoustic enclosure has been proposed, there would be minimal chance of noise pollution. However, the Project management would conduct noise level monitoring at the specified locations within, on the fence line/boundary, and outside the Project's premises to ensure compliance with the specific standards and conditions of the Consent to Operate. The locations of the noise monitoring station and frequency of noise level monitoring would be decided in consultation with the State Pollution Control Board officials. The noise level monitoring would be conducted at such a frequency that potential variations due to various operational factors are recorded.

10.5 Awareness and Training

Training and human resource development is an important link for achieving sustainable operation of the facility and environmental management. For successful functioning of the project, relevant EMPs will be communicated to the Staffs & Doctors of the project. Everyone will be made aware of importance of their various environmental responsibilities including waste segregation and storage, water and energy conservation, etc. This awareness will be provided through documents and periodic meetings. They will be informed of their responsibilities for successful operation of various environmental management schemes inside the Project premises. Relevant personnel at site will be trained for the following:

- Applicable EH&S regulations and compliance requirements for the same.
- Collection, Segregation, Storage and Disposal of solid and hazardous wastes.
- Operation and maintenance of Sewage Treatment Plant and recycling system
- Techniques for waste minimization, water conservation and energy conservation, etc.
- Functioning of the Project's Environmental Management System (EMS) including environmental monitoring, reporting and documentation needs.
- Requirements and responsibilities in case of an emergency as per emergency response plan.

10.6 Green Belt Development

An area of 8452.40 Sqm. area (25.43% of total land area) on ground will be developed and maintained for green belt within the project premises.

As per the requirement of EIA Notification 2006 amendment 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. 415 nos. of trees will be planted within and all around the proposed project 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 hedgerows 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.

Following species will be planted within the premises of proposed Project :

S. No.	Scientific Name	Family	Common Name	Hindi Name
1	<i>Azadirachta indica</i>	Meliaceae	Indian Lilac	Neem
2	<i>Alstonia scholaris</i>	Apocynaceae	Blackboard Tree	Chitvan
3	<i>Cocos nucifera</i>	Arecaceae	Coconut Palm	Nariyal
4	<i>Cassia fistula</i>	Fabaceae	Golden Shower Tree	Amaltas
5	<i>Delonix regia</i>	Fabaceae	Royal Poinciana	Gulmohar
6	<i>Ficus benghalensis</i>	Moraceae	Banyan Fig	Bargad
7	<i>Ficus virens</i>	Moraceae	White Fig	Pakhad
8	<i>Ficus racemosa</i>	Moraceae	Cluster Fig	Gular
9	<i>Mangifera indica</i>	Anacardiaceae	Mango Tree	Aam
10	<i>Monoon longifolium</i>	Annonaceae	False Ashoka	Ashoka
11	<i>Psidium guajava</i>	Myrtaceae	Guava Tree	Amrud
12	<i>Saraca asoca</i>	Fabaceae	Ashoka Tree (Sacred)	Ashok
13	<i>Syzygium cumini</i>	Myrtaceae	Java Plum	Jamun
14	<i>Dalbergia sissoo</i>	Fabaceae	Indian Rosewood	Shisham
15	<i>Butea monosperma</i>	Fabaceae	Flame of the Forest	Palash
16	<i>Terminalia arjuna</i>	Combretaceae	Arjun Tree	Arjun
17	<i>Tectona grandis</i>	Lamiaceae	Teak	Sagwan

10.7 ENVIRONMENT CONSERVATION CONSIDERATIONS ;

Following initiatives may be considered (if feasible within economic constraints) for energy conservation & preserving the environment ;

- Switching to low-flow toilets or installing toilet tank fill diverters.
- Installation of low-flow showerheads and sink aerators.
- Switching to compact fluorescent light bulbs in lobbies and common areas and use of sensors and/or timers for areas that are infrequently used.
- Awareness program for residential owner of the proposed Residential Housing Project to close drapes and turn off lights and turn off heating / air conditioning when rooms are unoccupied.
- Installation of window film to lower heating and cooling loads
- Provision of recycler baskets for newspaper, white paper glass, aluminum, cardboard and plastic.
- Provision of recycling bins to make recycling as easy as possible.
- Use of least toxic cleaners, sanitizers, paints, pesticides etc. throughout and ensuring all chemicals are stored safely in a well-ventilated area.
- Monitoring and tracking rates of energy and water use. Making repairs or replace equipment when rate changes indicate problems.
- Creating an incentive program to encourage management staff to participate in and improve upon environmentally friendly practices.

10.8 Environmental Monitoring Program during Construction period

Based on the above, the following environmental monitoring program during construction activities is proposed for the Project. The monitoring program would be discussed and approved by State Pollution Control Board are given in table below ;

Table-5: Proposed Monitoring Program for Construction Phase of the Project

S. No.	Type	Locations	Parameters	Period and Frequency
1.	Ambient Air Quality Monitoring	As per NAAQS requirement	SO ₂ , NO ₂ , PM ₁₀ , PM _{2.5} and CO	As per State Pollution Control Board's requirements
2.	Ambient Noise Monitoring	As per requirement	Noise level Leq both during daytime and nighttime	As per State Pollution Control Board's requirements
3.	Water Quality Testing (Portability testing)	(i) Any operational bore well (ii) One of the Drinking Water Point	Drinking water parameters as per IS 10500:2005.	As per State Pollution Control Board's requirements

4.	Treated Wastewater Quality	Inlet and outlet of the STP	Parameters for assessing compliance with standards for recycling and horticulture use	As per State Pollution Control Board's requirements
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10.9 Post-Project Environmental Monitoring Program

Based on the above, the following post-project environmental monitoring program is proposed for the Project. The monitoring program would be discussed and approved by State Pollution Control Board are given in table below ;

Table-4: Proposed Monitoring Program for Operational Phase of the Project

S. No.	Type	Locations	Parameters	Frequency
1.	Ambient Air Quality Monitoring	As per requirement	SO ₂ , NO ₂ , PM ₁₀ , PM _{2.5} and CO	Quarterly
2.	Ambient Noise Monitoring	As per requirement	Noise level Leq both during daytime and night time	Quarterly
3.	Water Quality Testing (Portability testing)	Any operational borewell, One of the Drinking Water Point	Drinking water parameters as per IS 10500:2012.	Quarterly
4.	Treated Wastewater Quality	Inlet and outlet of the STP & ETP	Parameters for assessing compliance with standards for recycling and Horticulture use	Monthly

10.10 Environmental Documentation and Env. Budget

Documentation and reporting of environmental performance is an important management tool for ensuring sustainable operation of the Project. Documents/Records shall be maintained for regulatory, monitoring and operational issues. Typical documentation requirements for the "Project" are summarized in Table-5. Environmental Management Cost during construction and operation is presented in Table 6 and Table 7.

Table-5: Environmental Documentation for Operational Phase of the Project

PARAMETER	PARTICULARS
Air Emissions (incl. Noise)	• Consent to Establish from State Pollution Control Committee. • Consent to Operate for Air Emissions from State Pollution Control Committee. • Ambient Air Quality Monitoring records • Ambient Noise Monitoring Records

Water Supply	• Water Quality Monitoring records • Water Cess Returns
Wastewater Discharges	• <i>Consent to Establish</i> from State Pollution Control Committee. • <i>Consent to Operate for Wastewater Discharges</i> from State Pollution Control Committee. • Details of quantity of wastewater discharged from various sources and discharged from the outlet of the STP for recycling/into the sewer • Operational details of STP including number of hours of operation, chemical usage, in-process wastewater quality, etc. • Wastewater Quality and Quantity Monitoring records
Waste Management	• Permission for disposal of solid wastes from concerned municipality/authority • Wastes Management Inventory including details of quantity of wastes generated on-site and mode of their disposal • Inventory of wastes stored on-site • Records of hazardous wastes stored on-site (as per rules) (if generated) • Annual Returns for hazardous wastes to State Pollution Control Board • Documentation related to off-site transportation and disposal of hazardous wastes as per rules
Environmental Statement	• Submission of Environmental Statement to State Pollution Control Board before 30th September every year
Petroleum Storage	• License from PESO for storage of HSD and other petroleum substances (based on their quantities) • Inventory of petroleum substances stored on-site both at storage and usage locations • Regular integrity testing/inspection reports for the storage tanks

Table-6: Environmental Management Cost during Construction

Sr. No.	Component	Particulars	Capital Investment (Lakhs)	Recurring Expenditure per Annum (Lakhs)
1.	Air	Anti-smog Gun	10.0	2.0
2.	Water	Sedimentation Tank	5.0	2.0
3.	Solid and C&D Waste and its Management	Storage yard and its management	10.0	3.0

4.	Environment Monitoring & Management	Environment Monitoring as per monitoring plan ➤ Construction of wind breaking wall Green Curtains on under construction building	5.0	2.0
5.	Green Belt	Development and maintenance of green belt	5.0	3.0
Total (Rs.)			35	12

Table-7: Environmental Management Cost during Operation

Sr. No.	Component	Particulars	Capital Investment (Lakhs)	Recurring Expenditure per Annum (Lakhs)
1.	Air	Exhaust System	15.0	3.0
2.	Water	Sewage Treatment Plant (STP) & ETP	150.0	10.0
3.	Rain Water Harvesting	Installation of RWH System	25.0	2.5
4.	Solid waste Area and its Management	Purchase of Containers for Storage of Waste & OWC of 500 kg/day @ 2 Nos.	10.0	2.5
5.	Environment Monitoring & Management	Environment Monitoring as per monitoring plan	0.00	5.0
6.	Green Belt	Development and maintenance of green belt	25.0	5.0
Total (Rs.)			225.0	28.0

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