

9.11 If you are using glass as wall material provides details and specifications including emissivity and thermal characteristics.

The proposed project is a Residential Building Complex and no glass will be used as wall materials within the proposed building premises.

9.12 What is the rate of air infiltration into the building? Provide details of how you are mitigating the effects of infiltration.

In the proposed Residential Building Project premises prime importance is given to the natural wind circulation and illumination aspect. Keeping that in mind open terraces, cutouts, larger open able windows and the inter-block spaces have been proposed so that air infiltration through all the spaces is maximum. However, due to close proximity to River Ganga favorable wind will be received all around the year.

9.13 To what extent the non-conventional energy technologies are utilized in the overall energy consumption? Provide details of the renewable energy technologies used.

In order to conserve electrical energy, it is proposed to utilize solar energy for staircase lightings. The landing and mid-landing of all the staircases shall be provided with 12 hours back-up solar power lighting. All light fittings shall be provided with electronic ballast. Solar Power will be utilized for ;

- Street lights
- Solar power packs/inverters
- Green Belt & landscape lighting

10.0 ENVIRONMENT MANAGEMENT PLAN :-

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.

10.1 Introduction ;

The Environment Management Plan (EMP) is a site-specific plan developed to ensure that the project is implemented in an environmentally sustainable manner where all contractors and subcontractors, including all stake holders, understand the potential environmental risks arising from the project and take appropriate actions to properly manage that risk. EMP also ensures that the project implementation is carried out in accordance with the design by taking appropriate mitigation actions to reduce adverse environmental impacts during its life cycle. The plan outlines existing and potential problems that may adversely impact the environment and recommends corrective measures where required.

Proposed “Residential Building Project” by M/s. Bhuswami Buildcon Pvt. Ltd. at Mauza- Hario, Chandauti, Dist.- Gaya, State- Bihar, will adopt all measures for better environmental management. Proper Green belt & landscaping will be developed for better air environment,

because man needs inhalation every moment, so also is Flora and Fauna dependent on it. All waste water generated from proposed project will be treated in STP inside the project premises.

10.2 **OBJECTIVE**

Present Environmental Management Plan (EMP) is designed to minimize the potential adverse environmental impacts, if any, due to proposed residential Building Project. The EMP reflects the commitment, of the Developers, to safeguards for environment as well as the surrounding population. The potential impacts on the environment from the proposed Building Project are identified based on the nature of the various activities associated with the location, and operation of the proposed project and also on the current status of the environmental quality around the project area.

10.3 **WATER POLLUTION MANAGEMENT** ;

10.3.1 *Construction Phase* ;

Water requirement during construction phase is expected to be about 10 m³/day, which will be primarily sourced through Water Tankers. The following control measures will be adopted in order to minimize the construction impacts on water quality of the area :

- Monsoon season would be avoided for construction activity.
- Appropriate sanitation facilities will be provided for the labours to reduce impact on water quality.
- No construction wastewater will be discharged directly on land or into the river. A couple of Sediment traps with retention period of half an hour will be constructed during the construction stage, where all construction wastewater will be collected. After the sedimentation of the construction wastewater, the comparatively cleaner water will be reused for wetting of building materials & structures.

10.3.2 *Operation Phase* ;

The total water requirement for the proposed “Residential Building Project Thakur Singh Suncity Complex” of M/s Bhuswami Buildcon Pvt. Ltd. will be 298 KLD (139 KLD Fresh Water through Municipal water supply /Borewells, 159 KLD STP treated water.) Total Fresh Water requirement during 01st run will be 208 m³/day and thereafter 139 KLD fresh Municipal water/ground water required for domestic use. Toilet flushing, Car/Street Washing, Green belt & landscape irrigation and Fire fighting water requirement will be met by Treated Water from STP. The fresh water will be sourced through Borewells.

Approx. 186 KLD waste water will be generated from the proposed Residential Building project. The proposed project will adopt recycling of treated waste water. All waste water generated will be treated in STP and reused for toilet flushing, street/car washing, landscape irrigation & Fire

water storage tanks. Balance treated water from above will be discharged to govt. drains outside project area. Characteristics of effluent from proposed building project will be as under;

Parameters	Expected Concⁿ of Generated Effluent from proposed Project
pH	6.5 - 7.5
Suspended Solids mg/l.,	100 – 200 mg/l.
BOD (3 days at 27 ⁰ C), mg/l.	50-150 mg/l.
COD, mg/l.	150-500 mg/l.
Oil & Grease, mg/l.	5-10 mg/l.

Approx. 186 KLD domestic effluent will be generated from the proposed Residential Building premises of “M/s Bhuswami Buildcon Pvt. Ltd.”. All these effluents will be sent to 190 KLD capacity STP inside premises for treatment. The process of treatment is as under;

A 200 KLD Sewage Treatment Plant (STP) based on MBBR (Moving Bed Bio Reactor) Technology will be installed. Operation details of proposed MBBR technology STP are as under;

Preliminary Treatment: The treatment will include the following unit / equipment;

- Screen Chamber
- Oil & Grease Trap
- Raw Sewage Collection Tank
- Raw Sewage Transfer pumps

Biological Treatment (Secondary Treatment): This will include the following;

- MBBR Bioreactor
- Secondary Clarifier
- Sludge Dewatering System- (Filter press)

Tertiary Treatment: The treatment will include the following unit / equipment;

- Filter feed pumps
- Pressure Sand Filter (PSF)
- Activated Carbon Filter (ACF)
- UV system

The clear supernatant from the Secondary clarifier will be collected in a Filter feed tank this tank will be provided with level switch for unmanned operations. The treated sewage will be pumped to MGF followed by ACF. After ACF treated sewage will be passed through UV filtration for disinfection. After UV filtration treated sewage will be collected in Treated Water Tank.

The treated effluent will be of suitable quality for use as flushing, car washing landscape irrigation & fire water tanks. Treated water Characteristics will be as under;

Expected characteristics of Treated water is as under;

Parameters	General Standards as per Schedule VI of E(P) Rules for Irrigation of Land	Expected Conc ⁿ (mg/l.)
pH	5.5 – 9.0	6.5 – 7.5
Suspended Solids mg/l.,	200.0 mg/l.	< 20.0
BOD (3 days at 27 ⁰ C), mg/l.	100.0 mg/l.	< 10.0
COD, mg/l.	Not Specified	< 30.0
Oil & Grease, mg/l.	10.0 mg/l.	< 2.0

10.3.3 Rainwater Harvesting ;

Rain water harvesting with filtration system & recharge wells will be provided for the purpose of recharging ground water.

It is proposed to collect all the Rain Water falling on the Roof surface will be channelize into the Rain Water Catch Basins with in-built recharge pits around the periphery of the proposed Residential Building Project.

RAIN WATER HARVESTING POTENTIAL:-

RAIN WATER HARVESTING POTENTIAL OF PROPOSED BUILDING PROJECT :-

Type of Area	Area is M ²	Run-Off Coefficient	Annual Avg. Rainfall in m.	RWH Potential (m ³)
Roof Area	5686.2	0.80	1.05	4776.40
TOTAL				4776.40 M ³
Annual Rainwater Harvesting Potential				

4 Nos. of Recharge Pits (Size :3.0 Ø X 10.0 m deep) will be provided within this building project to recharge ground water aquifer.

10.4 AIR QUALITY MANAGEMENT;

10.4.1 Construction Phase ;

During construction period major sources of dust & smoke are DG Sets, Vehicular movement & construction activities. To mitigate these effects regular water sprinkling will be done all around the construction area and building materials will be stored in covered area by way of covering them with tarpaulin or keeping them in temporary makeshift sheds.

10.4.2 Operational Phase ;

The sources of air emissions from the proposed project are the stacks attached to DG set Exhaust. The DG sets will run only in case of power failure and hence air emissions from the DG sets are restricted to only such occasions.

The impact of Air Emissions can be minimized in following ways ;

- Stack height, of 3.5 m. above the roof of the building where DG Sets will be installed, as per regulatory norms will be provided for the DG sets to ensure satisfactory dispersion of the gaseous pollutants.
- It will be ensured that the stack emissions from DG sets meet prescribed standards for diesel engines as per GSR 489 (E), July 11, 2002.
- The DG Sets will be maintained regularly as per preventive maintenance schedules and engine tuning of DG Sets carried out as per recommendations by the manufacturers to ensure stack emission quality within desired limits.
- The secondary source of air emissions is from vehicles movement of the residents & outside guests. It shall be ensured that all such vehicles are maintained on regular basis and meet PUC norms.
- Moreover, 1888.47 Sq. M. area on ground will be developed and maintained for green belt within the project premises. Regular Water Spraying will be done all around the project premises to minimize dust emissions.

10.5 AMBIENT NOISE MANAGEMENT ;

10.5.1 *Construction Phase* ;

- Equipment generating minimum noise and vibration will be selected for construction phase.
- Vehicles and construction equipment with internal combustion engines will be provided with proper silencers and mufflers in order to reduce noise levels.
- Requisite compliance requirements from contractors for their equipment will be communicated to them before commencing construction.
- To prevent the hearing damage to construction workers, they will be provided with ear plugs and muffs and job rotation will also be practiced.
- Emphasis on carrying out the construction work during day time only.

10.5.2 *Operational Phase* ;

- During the operational phase, noise will be generated from the DG sets, compressors, pump rooms & vehicles movement.
- The DG set room, compressors and pump room will be isolated from the outside environment and proper acoustic arrangements will be made to control the noise generated.
- The noise levels outside these rooms will be maintained within the stipulated norms both during the day and night time.

- It shall be ensured that the new DG sets to be installed for the proposed hotel shall comply with all applicable environmental regulations for noise. The DG set shall have an acoustic enclosure and an exhaust muffler that will ensure minimum of 25 dB(A) insertion loss.
- Plantation and landscaping will be designed to ensure that there is a green belt all around the project area so that further noise attenuation is achieved.
- Overall design of facilities, equipment, layout and landscaping is done with a view to maintain pre-project noise level in the post project stage also.
- All efforts will be made to maintain the noise level within the proposed premises around 55 dB(A) in day time & 45 dB(A) during night time.
- Moreover, 1888.47 Sq. M area on ground level will be developed and maintained for green belt within the project premises. Regular Water Spraying will be done all around the project premises to minimize dust emissions.
- Alongside boundary of the proposed building premises trees will be planted which will also act as barrier for outside noise.

10.6 **SOLID & HAZARDOUS WASTE MANAGEMENT** ;

10.6.1 **Construction Phase** ;

No flammable / hazardous materials will be handled, stored or used beyond the Threshold Limit of MSIHC Rules at Construction site of proposed Project.

- Wherever possible, hazardous raw materials will be substituted by non-hazardous materials e.g. cleaning solvents can be replaced with biodegradable cleaners, usage of non-chlorinated strippers instead of strippers containing methylene chloride and substitution of water based paints for oil based ones.
- On-site composting of bio-degradable wastes and off-site recycling of paint, thinner, solvent wastes and waste oil will be carried out. Segregation and storage of waste paints and thinners, contaminated rags and brushes will be carried out to facilitate recycling and reuse.
- Vehicle maintenance area shall be designed to prevent contamination of ground water by accidental spillage of oil.
- Appropriate inventory control of all hazardous materials will be maintained.
- It will be ensured that concerned contractors follow prescribed directions regarding the above.

10.6.2 *Operational Phase* ;

The collection, transportation and disposal of the solid waste generated during the operation phase of the proposed Building project will be done as per the Municipal Solid Wastes (Management & Handling) Rules, 2016 (MSW Rules).

During operational phase approx. 773 Kg/day solid waste will be generated from proposed Residential building project in the form of domestic waste. (@ 0.25 to 0.45 Kg per capita).

SOLID WASTE CALCULATION

Sr. No.	Category	Capacity (Nos.)/Area	Waste Generation (Kg/day/capita)	Waste generated (kg/day)	Bio-Degradable Waste (Kg/day/capita)	Bio-Degradable Waste (Kg/day)	Non-Bio-Degradable Waste (Kg/day)
1	Residential Occupancy	1510 Nos.	0.45 kg/person	679.5	0.36 kg/person	543.6	135.9
2	Visitors	230 Nos	0.36 kg/person	82.8	0.25 kg/person	57.5	25.3
3	Security Staff and maintenance staff	10 Nos	0.45 kg/person	4.5	0.36 kg/person	3.6	0.9
4	Green Area, Landscaping & Others	1888.47 SQ.M.	5 kg/acres	6.15	5 kg/acres	6.15	0.0
Total Municipal waste generation				772.95 say 773 Kg/day		610.85 Say 611 Kg/day	162.1 Say 162 Kg/day

All biodegradable and non-biodegradable waste will be handled as per Municipal Solid Waste (Management and Handling) Rule, 2016. Waste from biodegradable bins will be reutilized in bio-composting to prepare organic manure. Non bio-degradable waste will be disposed off through govt. waste collection system.

3 Nos. bio composting pits of 300 Kg. capacity each (Dimension: L- 2 m. x W – 1 m., D – 1 m.) will be provided within premises for composting of biodegradable waste.

Three-bin system will be adopted. Storage facilities will be created and established by taking into account quantities of waste generation in a given area and the population densities. Different colored bins for different categories of wastes will be provided.

Three colour of wheeled bins in each building: - Dark grey for non-recyclable waste, Green for kitchen food/ compostable garden waste and Blue for paper.

In addition, boxes will be provided for the collection of other recyclable materials; a green box is used for paper and a black box is used for cans and plastic collections.

Following measures will be adopted for safe disposal and management of solid wastes from the proposed project ;

- Waste from biodegradable bins will be reutilized in bio-composting to prepare organic manure.
- The dried STP Sludge will be used as manure for gardening

- c. Waste oil generated from DG Set / Other machinery overhauling and waste transformer oil will be sold off to CPCB / BSPCB authorized vendors for waste oil.
- d. Old newspapers & other paper waste and used empty bottles will be sold off to authorized scrap dealers.
- e. All the non bio-degradable waste disposal will be done through Gaya Nagar Nigam waste collection system or other authorized vendors.

The used Spent Oil from DG sets would be carefully stored in HDPE drums in isolated covered facility and disposed off through CPCB/BSPCB authorized recyclers as per guidelines of Hazardous and Other Wastes (Management and Transboundary Movement) Rules '2016.

Following measures will be adopted for safe disposal and management of solid wastes from the proposed project ;

- a. Waste oil generated from DG Set / Other machinery overhauling and waste transformer oil will be sold off to CPCB / BSPCB authorized vendors for waste oil.
- b. Old newspapers & other paper waste and used empty bottles will be sold off to a scrap dealer.

The used Spent Oil from DG sets would be carefully stored in HDPE drums in isolated covered facility and disposed off through CPCB/BSPCB authorized recyclers as per guidelines of Hazardous and Other Wastes (Management and Transboundary Movement) Rules '2016.

10.7 **GREEN BELT DEVELOPMENT AND LANDSCAPING** :-

An area of 1888.47 Sq. M (11.16%) area on ground will be developed and maintained for green belt within the project premises.

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

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. 215 nos. of trees will be planted within and all around the proposed 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 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 Residential “Building Project” by M/s Bhuswami Buildcon Pvt. Ltd.

• 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 or West Indian Jasmine

10.8 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 Building 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.

10.9 ENVIRONMENTAL MONITORING PROGRAM ;

Monitoring / Sampling stations will be fixed as per recommendation of Environmental Clearance to assess the ambient levels in relevant areas of environment after the commissioning of the project. An environmental monitoring programme is important as it provides useful information on the following aspect:

- i) It helps to verify the predictions on environmental impacts presented in this study.
- ii) It helps to indicate warnings of the development of any alarming environmental situations, and thus, provides opportunities for adopting appropriate control measures.

The monitoring programme in different areas of environment are outlined below;

POST PROJECT ENVIRONMENTAL MONITORING PROGRAM

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	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

10.10 ENVIRONMENTAL BUDGET FOR STATUTORY COMPLIANCES;

Sr. No.	EHS Component	One Time Installation Cost	Recurring Cost / Annum
1.	Installation of STP & Water Treatment Plant	Rs. 20 Lakhs	Rs 5 Lakhs
2.	Installation of SPV and Solar Lighting System	Rs. 20 lakhs	Rs. 5 Lakhs
3.	Installation of Fire Fighting & Management System	Rs. 30 Lakhs	Rs. 2 Lakhs
4.	Environmental Monitoring as per requirement of EC	---	Rs. 10 Lakhs
5.	Green Belt Development & Maintenance	Rs. 15 Lakhs	Rs. 5 Lakhs
6.	Rain Water Recharging (4 Nos.)	Rs. 6 Lakhs	Rs. 0.25 Lakhs
7.	Municipal Solid waste (Bio composting pits – 3 Nos. 300 kg/day)	Rs. 3 Lakhs	Rs. 0.25 Lakhs
TOTAL AMOUNT		Rs. 94 Lakhs	Rs. 27.5 Lakhs ~ 28 Lakhs

After the completion of Construction work of proposed residential project of M/s Bhuswami Buildcon Pvt. Ltd., Residential Building flats will be handed over to respective buyers. Owner Society of the proposed building project will carry out environmental monitoring & management work as per conditions imposed in Environmental Clearance issued by State Expert Appraisal Committee, Bihar. A fixed amount as per above budget will be allocated for Environmental Monitoring & Management work of proposed Residential Building Project. All these work will be accomplish under the supervision of Secretary or his authorized representative of the Owner Society of the proposed building project of “M/s Bhuswami Buildcon Pvt. Ltd.”.

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