

PROPOSED RESIDENTIAL PROJECT “VEENA VATIKA” AT DARBHANGA NEAR DELHI MORE AT MAUZA-SONHAN, VASUDEOPUR, KHATA NO- 117,716/1564 TAUZI NO - 1596,1656 KHESHRA NO - 776(OLD), 1178(OLD)/1539 (NEW), THANA NO - 449, DIST-DARBHANGA.

FORM IA

CHECK LIST OF ENVIRONMENTAL IMPACTS

(Project proponents are required to provide full information and wherever necessary attach explanatory notes with the Form and submit along with proposed environmental management plan & monitoring program)

SECTION 1- LAND ENVIRONMENT

1.1 Will the existing land use get significantly altered from the project that is consistent with the surroundings? (Proposed land use must conform to the approved Master Plan/Development Plan of the area. Change of land use, if any and the statutory approval from the competent authority are submitted). Attach Maps of (i) site location, (ii) surrounding features of the proposed site (within 500 meters) and (iii) the site (indicating levels & contours) to appropriate scales. If not available attach only conceptual plans.

➤ **No**

Project Site Location and Land Use

M/s KKT Constructions Private Limited has planned to develop a Residential Project “Veena Vatika” located at Darbhanga Near Delhi More At Mauza-Sonhan, Vasudeopur, Khata No- 117,716/1564, Tauzi No - 1596,1656, Khasra No - 776(Old), 1178(Old)/1539 (New), Thana No - 449, Dist-Darbhangha, State-Bihar. Darbhanga Municipal Corporation has permitted the construction of proposed Residential project at the project site.

The Project proposal involves development of 6 no. s of Residential buildings- Block A, Block B(Type 01), Block B(Type 02), Block C, Block D and Block E with the allied facilities like waste management system, storm water management system, water supply system, sewerage system, Fire Fighting Management, adequate parking facility and green area. Total plot area of the project is 16148.7 sq.m. Built-up area of project after development will be approx. 53693.45 sq m.

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Site Surroundings, Connectivity and environmental sensitivity

Project lies in Mauza-Sonhan. Geographical coordinates of the project site are given in **Table 1**. Site is flat land with average elevation of approx. 51 m AMSL. Project site is well connected with road adjacent. This road connects site to NH-27 at distance of 0.12 km S direction and NH-105 at distance of 0.5km E direction. Shisho Railway Station is 1.98 km away in NW direction. Kavi Kokil Vidhyapati Airport is at about 1.75 km in NE direction.

Table 1: Geographical coordinates of Project site

S. No.	Latitude	Longitude
1.	26°11'21.30"N	85°53'47.20"E
2.	26°11'21.30"N	85°53'48.10"E
3.	26°11'19.00"N	85°53'48.30"E
4.	26°11'17.30"N	85°53'48.40"E
5.	26°11'16.70"N	85°53'44.80"E
6.	26°11'19.60"N	85°53'44.00"E
7.	26°11'17.10"N	85°53'44.10"E
8.	26°11'20.50"N	85°53'47.00"E
9.	26°11'20.65"N	85°53'44.02"E

Table 2: Surroundings and Connectivity of the Project Site

Near-by Residential Areas	- Basdeopur (1.7 Km E) - Bella Dullah (1.6 km SW)
Nearest City/Town	Darbhangha (approx. 3 km S)
District Headquarters	Darbhangha
Nearest Schools & Colleges	- Darbhangha Public School (approx. 200m, W) - Darbhangha Central School (approx. 400m W) - Ramballabh Jalan College (approx. 1.2km S) - Lalit Narayan Mithila University (approx. 3km S)
Nearest Hospitals	- Mediworld Multispeciality Hospital, (approx. 500 m, E) - KIMS Hospital (approx. 1.02 km, W)
Nearest Water Bodies	- Chhoti Bagmati River (0.47 Km W) - Vidya River (approx 7km NW) - Manth Pond (300 m S) - Harahi Lake (approx. 3km W) - Dighhi Lake (approx. 4km W)
Nearest Highway & Road	- NH-27 (0.12 km, S) - NH-105 (0.56 km, E) - Road adjacent to project site
Nearest Railway Station	Shisho Railway Station (1.98 Km NW)

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	Darbhanga Junction Railway Station (3.9 km SE)
Nearest Airport	Darbhanga Airport (0.8 km NE)

10 KM BUFFER MAP OF THE STUDY AREA

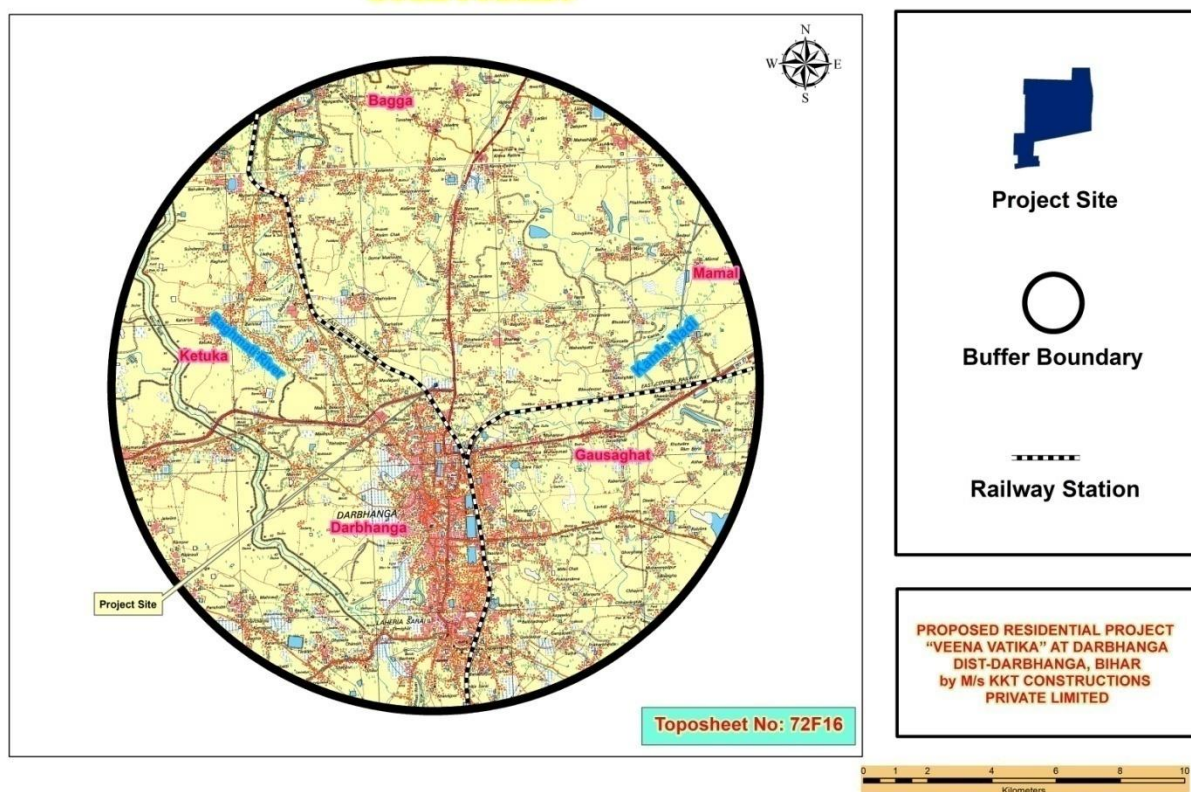


Figure 1: 10 km buffer Map

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500 METERS BUFFER MAP OF THE STUDY AREA

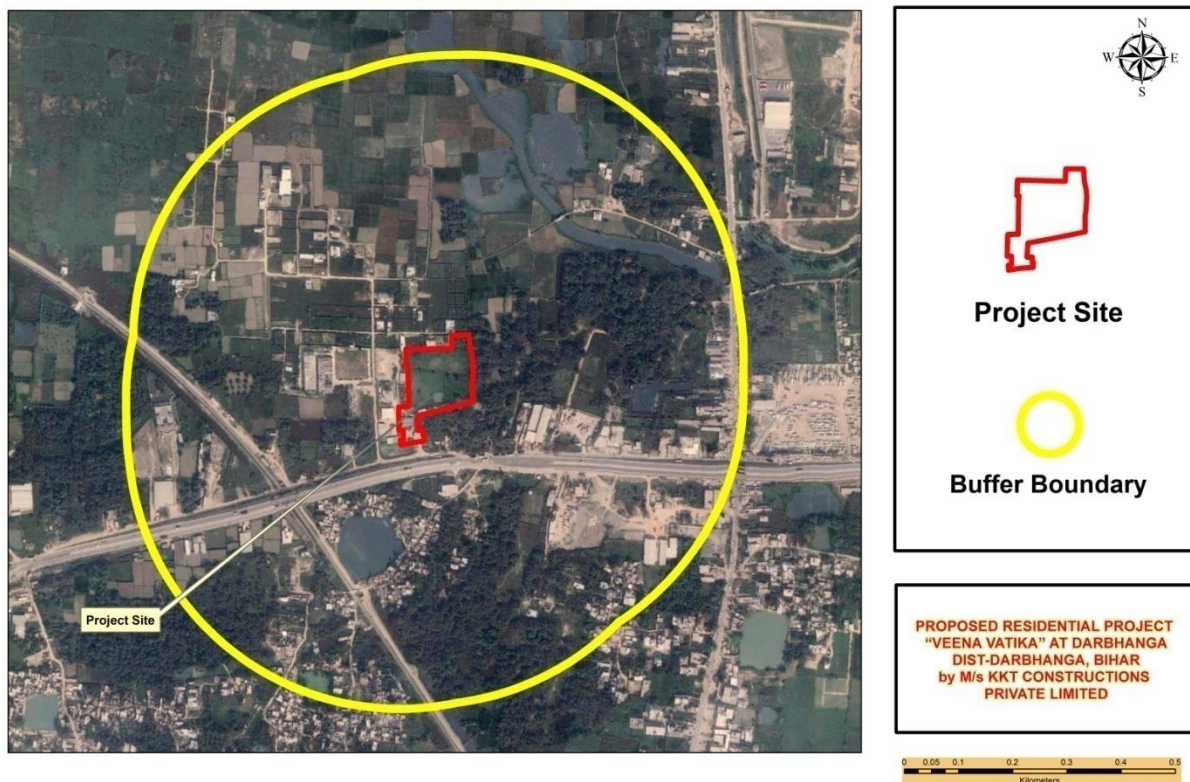


Figure 2: 500 m buffer Map

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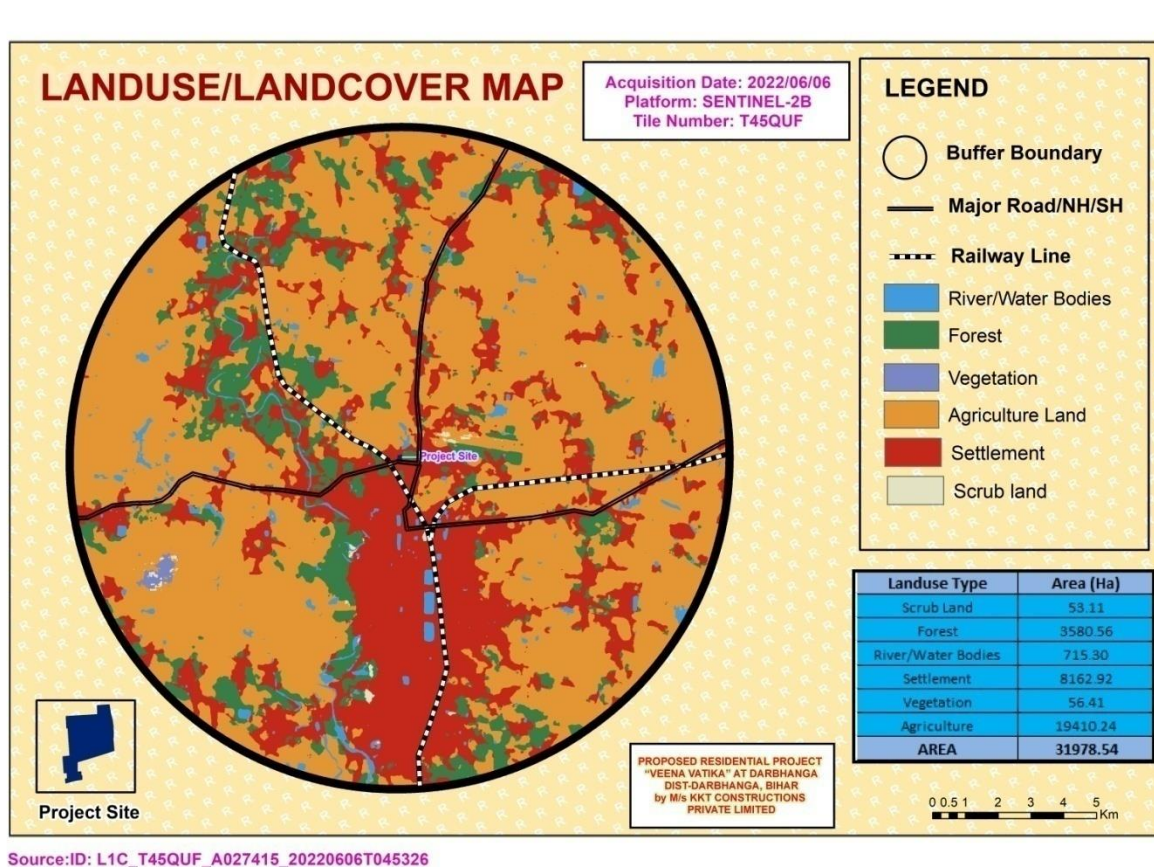


Figure 3: Land use Map

1.2 List out all the major project requirements in terms of the land area, built up area, water consumption, power requirement, connectivity, community facilities, parking needs etc.

➤ **LAND AREA & BUILT-UP AREA**

The total plot area of the project site is 16148.7 sq.m. Project involves development of 6 no.s of Residential plotted buildings with the allied facilities like waste management system, storm water management system, water supply system, sewerage system, Fire Fighting Management, adequate parking facility and green area. Built-up area of project after development will be approx. 53,693.45 sq.m.

Table3: Area Summary

S. NO.	DESCRIPTION	AREA (SQ M)
A.	Plot Area	16148.7
B.	Proposed Ground Coverage (@46.59%) of plot area)	7523.67

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C.	FAR area(@2.71)	43736.88
D.	Non-FAR area	9956.57
E.	Built-up Area (C+D)	53,693.45
F.	Green Area on ground (@ 25.64 % of plot area)	4140.83
G.	Open Parking area (@1.54 % of plot area)	250
H.	Proposed Stilt parking	10,758.50
I.	Road Area/ Paved Area and open Areas (@26 % of plot area)	4234.2
J.	Height	23.6 m
K.	No. of Dwelling Units	528

➤ ESTIMATED POPULATION

Population estimated at the site is 3036 which includes residential and floating population.

Blocks	No. of Floors	Dwelling Units	Standard	Population
Block A (3 BHK)	B+G+6	48	6 person/unit	288
Block B(Type 1) (3 BHK)	B+G+6	72	6 person/unit	432
Block B(Type 2) (3 BHK)	G+6	72	6 person/unit	432
Block C (3 BHK)	G+6	144	6 person/unit	864
Block D (2 BHK)	G+6	144	5 person/unit	720
Block E (2 BHK)	G+6	48	5 person/unit	240
Total		528		2976

Table 4: Estimated Population

S. No.	Category	No of DU/Area	Standard	Population
1.	Residents	528	5.5 person/unit	2976
4.	Staff	--	@5%	149
5.	Visitors	--	@10%	298
	Total Residential Population			3423

➤ WATER REQUIREMENT

Water requirement during construction phase is approx. 20-30 KLD. Source of water during construction phase will be from Private tanker. Source of water during operation phase will be from Municipal supply supplemented with Ground water if required. Total water requirement during operation phase is 466 KLD out of which Domestic water requirement is 413 KLD. Fresh water requirement is 286 KLD.

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➤ **POWER REQUIREMENT AND BACK-UP**

Maximum power demand for the project during construction and operation phase is estimated to be 50 kVA and 5930.88 kVA respectively. Source of power will be Bihar State Electricity board. 2 no. of DG set of Total 3706 kVA will be provided as power back-up during power failure.

➤ **PARKING FACILITIES**

Adequate parking of 612 ECU (Four Wheeler Car Parking for Resident and Visitors- 555, Fire Fighting Vehicle – 01, Ambulance – 01, Two Wheeler Parking- 55 nos.) will be provided to accommodate the expected vehicles during operation phase of the project in line with the requirement of Local Building by Laws. Proposed parking is given as:

Particulars	Area (sqm)
Open Parking	250
Stilt Parking	10758.50
Basement Parking (Block A & B)	2535.5
Total	13544

1.3 What are the likely impacts of the proposed activity on the existing facilities adjacent to the proposed site? (Such as open spaces, community facilities, details of the existing land use and disturbance to the local ecology).

Project site lies in the Village-Sonhan, Vasudeopur and its surroundings are urban in nature. Project is well planned activity. Project involves development of world class housing infrastructure and green area which will add to aesthetics of the area. Total green area provided at the site is Green Area on ground 4140.83sq.m (@ 25.64% of plot area). The project will not have any impact on the land use and surrounding communities.

1.4 Will there be any significant land disturbance resulting in erosion, subsidence & instability? (Detail of soil type slope analysis, vulnerability to subsidence, seismicity etc may be given).

Project site is a flat land with average elevation of 51 m amsl and is surrounded by majorly residential and commercial developments. No significant threat of erosion, subsidence or instability is anticipated. The site falls under the zone V as per the seismic zone map of India and indicating

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high damage risk zone. Structure of the building will be developed as per seismic requirement of NBC, 2016.

1.5 Will the proposal involve alteration of natural drainage system? (Give details on a contour map showing the natural drainage near the project site).

The project does not intersect any natural drainage route. No perennial or non-perennial drainage system is found to exist in the project area or being obstructed by the project. The surroundings comprise an urbanized stretch. Well planned storm water drainage has been designed at site to take care of internal storm water drainage. No impact on the natural drainage system is anticipated.

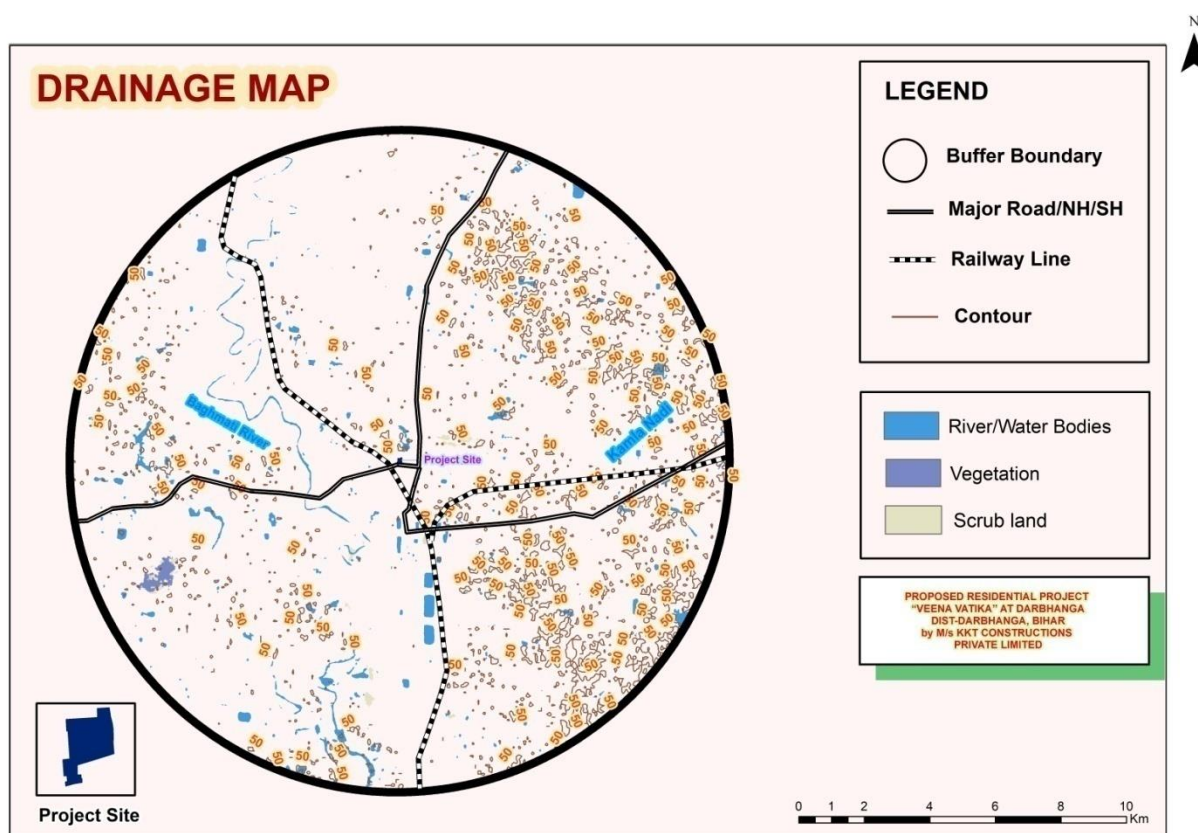


Figure 4: Drainage Map

1.6 What are the quantities of earthwork involved in the construction activity-cutting, filling, reclamation etc. (Give details of the quantities of earthwork involved, transport of fill materials from outside the site etc?)

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Excavated top soil is stored separately and will be used for landscaping, filling, leveling and road construction within the site.

1.7 Give details regarding water supply, waste handling etc. during the construction period.

Water requirement during construction phase is app. 20-30 KLD. Source of water during construction is private tanker. Sewage generated during the construction phase is disposed off through septic tanks. Solid waste is generated both during construction as well as during operation phase. Solid waste generated during construction phase is majorly excavated materials, cement bags, bricks, concrete, MS rods, tiles, wood etc. **Table 5** details the solid waste management plan during construction phase.

Table 5: Solid Waste Management during 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 is and will be segregated into recyclable/reusable and discarded material. Recyclable material is and will be sold to authorize dealers. Re-usable material is stored under covered conditions at site and reject are and will be disposed off at the designated locations by local authority. Waste will be transported in covered vehicles only.
2.	Excavated Soil	Top soil is 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 labour at the site is and will be disposed off through local agencies in the area on daily basis.

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1.8 Will the low lying areas & wetlands get altered? (Provide details of how low lying and wetlands are getting modified from the proposed activity).

No. There are no water body or wetland at the project site. Project site lies in urban settings. No low lying area is disturbed due to project development.

1.9 Whether construction debris & waste during construction cause health hazard? (Give quantities of various types of wastes generated during construction including the construction labor and the means of disposal).

No health hazard is expected to be caused by construction debris & waste is managed properly. Solid waste generated during construction phase is majorly excavated materials, cement bags, bricks, concrete, MS rods, tiles, wood etc. **Table 5** above details the solid waste management plan during construction phase. Additionally, health & safety of construction worker are and will be taken and are given below to minimize the impact.

- Provided personal protective equipment like ear plugs, face masks, helmets, safety jackets & gloves.
- Appointment of safety officers at site
- Regular inspection & maintenance of the construction machinery
- Construction activities restricted to day time
- Provision of adequate lightning during night time
- Cautionary notices to be displayed at required places
- Regular clearing off site to remove the debris
- Availability of medical officer & first-aid facility at construction site
- Tie-up with near-by hospital to attend emergency case, if any

SECTION 2- WATER ENVIRONMENT

2.1 Give the total quantity of water requirement for the project with the breakup of requirements for various uses. How will the water requirement be met? State the sources & quantities and furnish a water balance statement.

Water requirement during construction phase is approx. 20-30 KLD. Source of water during construction phase is private water tankers. Source of water during operation phase will be Municipal supply supplemented with ground water. Permission will be obtained from concerned

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authority prior extraction of ground water. Total water requirement during operation phase is 466 KLD out of which Domestic water requirement is 413 KLD. Fresh water requirement is 286 KLD. Water calculation detail is given in **Table 6 & 7**. Water balance diagram are given in **Figure 5 & 6**.

Table 6: Calculations for Total Daily Water Demand

Category	Population/ Area (sq m)/Capacit y	Standard (LPCD)	Water Requireme nt (KLD)	Fresh Water Requirement (KLD)	Recycled Water requirement (KLD)
Domestic					
Residents	2976	135	402	281	121
Staff	149	45	7	2	5
Visitors	298	15	4	3	1
Total Domestic Water Demand			413	286	127
Landscape	4140.83	6ltr/sq.m	25	-	25
Fire Fighting	-	-	1	-	1
DG cooling	3706 KVA	0.9l/KVA/hr	27	-	27
Total			466	286	180

Table 7: Wastewater Calculations

Category	Total Quantity (KLD)
Domestic water Req. (Fresh)	286
Flushing water Req.	127
Sewage generation (@80% of the fresh + 100% flushing water requirement)	356
Capacity of STP	400
Recovered water from STP (90% of Waste water)	320
1. Flushing	127
2. Landscaping	25
3. Fire Fighting	1
4. DG Cooling	27
5. Road washing/Sewer	140

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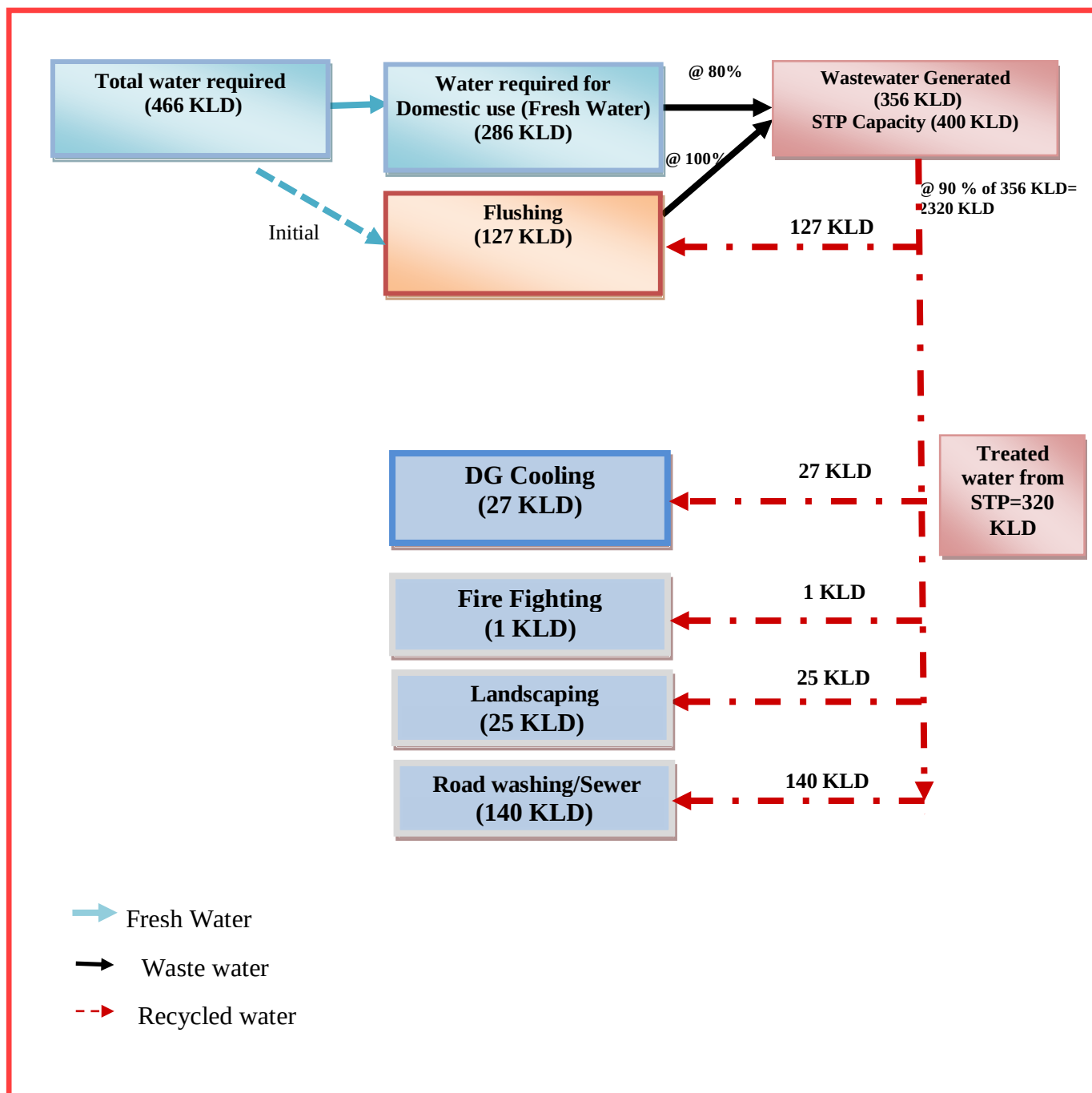


Figure 5: Water Balance Diagram-Non-Monsoon Season

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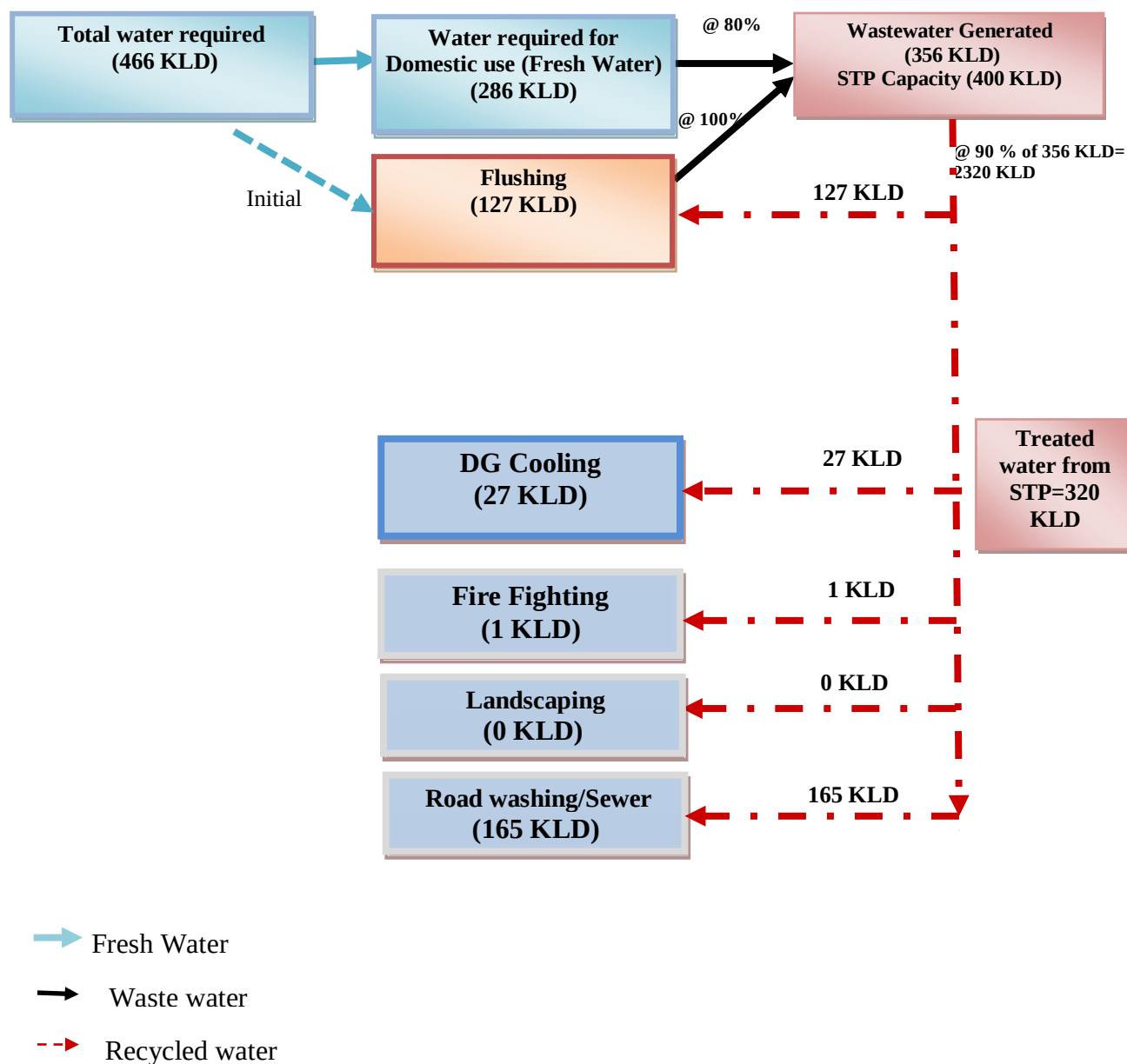


Figure 6: Water Balance Diagram-Non-Monsoon Season

2.2 What is the quality of water required, in case, the supply is not from a municipal source? (Provide physical, chemical, Biological characteristics with class of water quality).

Source of water during construction is private tanker. Source of water during operation phase will be municipal supply supplemented with ground water as required. Permission will be taken from concerned authority prior extracting ground water

2.3 How much of water requirement can be met from the recycling of treated sullage? (Give the details of quantities, sources and usage)

320 KLD of STP treated water will be recycled within the project. 127 KLD will be used for flushing and 25 KLD for landscaping purpose.

2.4 Will there be diversion of water from other users? (Please assess the impacts of the project on other existing uses and quantities of consumption).

No. There is no diversion of water from other users. Source of water during construction is private tanker. Source of water during operation phase is municipal supply. Ground water will be used, if required only after obtaining permission from concerned authority.

2.5 What is the incremental pollution load from sullage generated from the proposed activity? (Give details of the quantities and composition of sullage generated from the proposed activity)

Sewage generation from the site is expected to be 356 KLD which will be treated in STP of capacity 400 KLD proposed to be constructed at the site. Treated water from the STP will be used for flushing and horticulture purpose. STP will be provided with MBBR Technology. Detail of sewage generation and STP capacity is mentioned in **Table 7**. Characteristics of the sewage are given in **Table 8**.

Table 8: Characteristics of Sewage

a) Raw Sewage / Influent	
pH	6.5 – 8.5
BODS	300 – 400 mg/l
S. Solids	200 – 450 mg/l
COD	600 – 800 mg/l
Oil and Grease	50 – 30 mg/l

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b) Treated Effluent before Ultra filtration Treatment	
pH	7.0 – 8.5
BODS	Less than 20 mg/l
S. Solids	Less than 10 mg/l
COD	Less than 100 mg/l
Oil and Grease	Less than 5 mg/l

2.6 Give details of the water requirements met from water harvesting? Furnish details of the facilities created.

Storm water will be collected and recharged to the ground through 2 nos. RWH pits. Storm water will not be used to meet the water requirement. However, it will help replenishing the ground water aquifer.

2.7 What would be the impact of the land use changes occurring due to the project on the runoff characteristics (quantitative as well as qualitative) of the area in the post construction phase on a long term basis? Would it aggravate the problems of flooding or water logging in any way?

Project site was open land prior development of the project. Due to project development app. 10% of site area is converted into paved surfaces due to which run-off generation is increased. There is no substantial increase as the extent of project site is smaller to have any significant impact. However, to address the issue, a storm water drainage system is designed at the site due to which storm water is channelized the storm water drains and is recharged into the ground through pits. Due to which there is no flooding at the site during rains due to project development. 2 nos. of RWH pits are proposed to recharge the storm water into the ground.

2.8 What are the impacts of the proposal on the ground water? (will there be tapping of ground water; give the details of ground water table, recharging capacity and approvals obtained from competent authority, if any)

Area has the municipal supply connection as is planned to take the same for fulfillment of water demand. Ground water will be used for the water requirement(if required). Total fresh water requirement is 286 KLD at the site. The impact anticipated on ground water due to project is moderately significant. However, 2 nos of RWH pits are provided at site which will help in recharging the surface run-off of annually.

2.9 What precautions/ measures have been proposed to check the surface run-off, as well as uncontrolled flow of water into any water body?

To check the surface run-off from site or uncontrolled flow of water into any water body is controlled by provision of storm water drainage system and recharge pits at the site. Detail of storm water drainage system and the measures taken to prevent the contamination of the ground water due to storm water recharging are listed below.

- Provision of storm water drainage network
- Provision of filter packed 2 nos. RWH pits
- Provision of de-silting chambers and oil & grease trap
- Disinfection of the water prior recharge
- Cleaning of the RWH pits and other units on regular basis and especially prior onset of monsoon. Regular supervision of the condition of rain water harvesting system
- Provision of first flushing system to flush off the first rain water
- Avoid application of pesticides and herbicides before wet season.
- Avoid application of chemical pesticides and fertilizers

2.10 How is the storm water from within the site managed? (State the provisions made to avoid flooding of the area, details of the drainage facilities provided along with a site layout indication contour levels).

Site is flat land with elevation varying from 51 m amsl. To manage the storm water at site and prevent the flooding storm water harvesting system is provided at the site. This will not only prevent the flooding but also augments the ground water level of aquifers.

Storm water drainage system will be provided at the site for channelizing storm water and prevents local flooding. Covered storm water drains will be provided at the site. Run-off from the site will be collected and recharged into ground through 2 nos. of RWH pits. Recharge of the rainfall run-off to ground not only prevents the local flooding during rain but also helps in augmenting the ground water level of the aquifers. Ground water level in project area is approx. 3.7 to 30.59 mbgl during pre-monsoon season and 2.2 – 12.2 mbgl during post-monsoon season. 101.50 mm and depth will be approx. 10-15m or upto rock formation zone. This run-off increases due to generation of paved surfaces. Run-off available from the site annually after

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project development is calculated and is presented in the **Table 9**. Calculations for rainwater harvesting pits are given below in **Table 10**. Excess run-off will be discharged into the external storm water drains.

Table 9: Available Run-off from Site

S. No.	Catchment	Area (sq m)	Run-off Coefficient	Average Annual Rainfall (m)	Available Annual Run-off (cum)
1.	Roof top	7523.67	0.9	1.14	7720
2.	Green	4140.83	0.1	1.14	472
3.	Paved Areas	1614.87	0.7	1.14	1289
Total Run-off					9481

Table 10: Calculation for RWH Pits

S. No.	Catchment	Area (sq m)	Run-off Coefficient	Peak Hourly Rainfall (m)	Available Annual Run-off (cum)
1.	Roof top	7523.67	0.9	0.06	406
2.	Green	4140.83	0.1	0.06	24
3.	Paved Areas	1614.87	0.7	0.06	68
Total Run-off					498
Retention Time					15 min
Available Run-off in 15 min					124
Volume of RWH System (10 x 3 x 3)					42
Nos. of Pits Provided					2

2.11 Will the deployment of construction laborers particularly in the peak period lead to unsanitary conditions around the project site (Justify with proper explanation).

Local labours are hired for construction of the project. However, to maintain the sanitary conditions at the site, mobile toilets and septic tanks are and will be provided at the site for preventing open defecation and managing the sewage. Also proper waste management system is and will be implemented during operation phase. These measures prevented generation of unsanitary conditions at the site. To prevent impact on health of workers, clean drinking water and safe environment is provided to the workers.

2.12 What on-site facilities are provided for the collection, treatment & safe disposal of sewage? (Give details of the quantities of sullage generation, treatment capacities with technology & facilities for recycling and disposal).

STP of 400 KLD will be constructed for treatment of the sewage. Dual plumbing system will be installed so as the treated water from STP is re-used for non-potable uses like flushing & horticulture. Details are given in **Table 7** above.

2.13 Give details of dual plumbing system if treated waste used for flushing of toilets or any other use.

Dual plumbing system that utilizes separate piping systems for freshwater and recycled water is adopted for the project. Sewage is treated in the STP provided within the project site. Treated water will be used for flushing (127 KLD), horticulture (25 KLD), DG Cooling (27 KLD), Fire Fighting (1 KLD). Total 180 KLD of treated water will be used at the site to meet the water requirement. Remaining treated water (140 KLD) will be discharged to sewer.

3. VEGETATION

3.1 Is there any threat of the project to the biodiversity? (Give a description of the local ecosystem with its unique features, if any).

No ecologically sensitive area falls within the project site and 10 km of project site. Hence, no threat is anticipated to ecological environment. Total green area provided at the site is Green Area on ground – 4140.83 sq.m (@ 25.64% of plot area). Site did not support any vegetation prior construction and development of project has improved the ecology. Species to be planted at the site will include Ashoka, Neem, Kachnar, Amaltas, and Gulmohar etc.

3.2 Will the construction involve extensive clearing or modification of vegetation? (Provide a detailed account of the trees & vegetation affected by the project)

The project site did not support any significant vegetation. No clearing of vegetation or modification was involved with project development

3.3 What are the measures proposed to be taken to minimize the likely impacts on important site – features (Give details of proposal for tree plantation, landscaping creation of water bodies etc along with a layout plan to an appropriate scale?)

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The project site did not support any significant vegetation. No clearing of vegetation or modification was involved with project development thus no impacts are anticipated on biodiversity. Total green area provided at the site is Green Area on ground - 4140 sq.m (@ 25.64% of plot area). Site did not support any vegetation prior construction and development of project has improved the ecology. Species to be planted at the site will include Ashoka, Neem, Kachnar, Amaltas, Gulmohar etc.

4. FAUNA

4.1 Is there likely to be any displacement of fauna both terrestrial and aquatic or creation of barriers for their movement? Provide the details.

No. The existing land use around the site is urban (involves human activities) and does not provide a habitat for wild species thus no impact on fauna is anticipated due to development of the project

4.2 Any direct or indirect impacts on the avifauna of the area? Provide details.

Project has no any direct or indirect impacts on the avifauna of the area.

4.3 Prescribe measures such as corridors, fish ladders etc. to mitigate adverse impacts on fauna.

Not applicable

5. AIR ENVIRONMENT

5.1 Will the project increase atmospheric concentration of gases & result in heat islands? (Give details of background air quality levels with predicted values based on dispersion models taking into account the increased traffic generation as a result of the proposed construction).

Project site is located in the urban area of Village- Sonhan, Vasudeopur. Surroundings of the project site is residential and commercial areas majorly. Air quality of Mauza- Sonhan, Vasudeopur is good and within the permissible NAAQS as per the real time data available with Bihar Pollution Control Board. It is a residential project, thus there is no extensive air pollution generating activity involved. Air pollution is anticipated during the construction phase due to the construction activities, vehicular movement, DG operation and material transportation and storage. Anticipated traffic during construction phase is 8-10 trucks per week which is not

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significant pollution source. Dust generation in the area may increase during the construction activities and material loading & unloading activities. However, if mitigation measures are taken, dust generation can be reduced substantially. During operation phase, source of air pollution is movement of vehicle and occasional operation of DG sets during the power failure only.

Incremental Increase

For the purpose of the impact assessment, the more relevant determination for anticipated pollutants is the incremental increase in the background concentration rather than the determination of maximum GLC values. In the present study, an attempt has been made to determine the increase in the concentration of PM, SO₂, NO_x for project site location where ambient air quality stations were established.

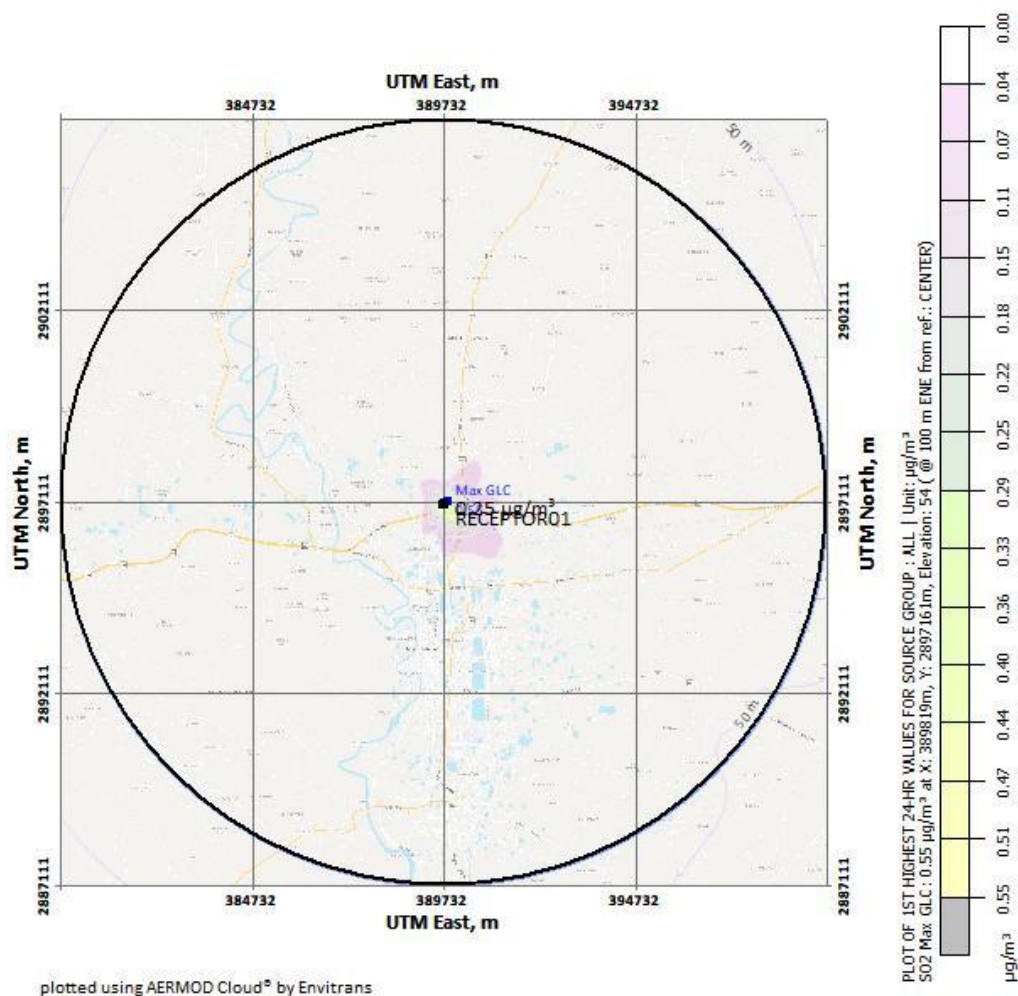


Figure 6(a): Isoleths of SO₂

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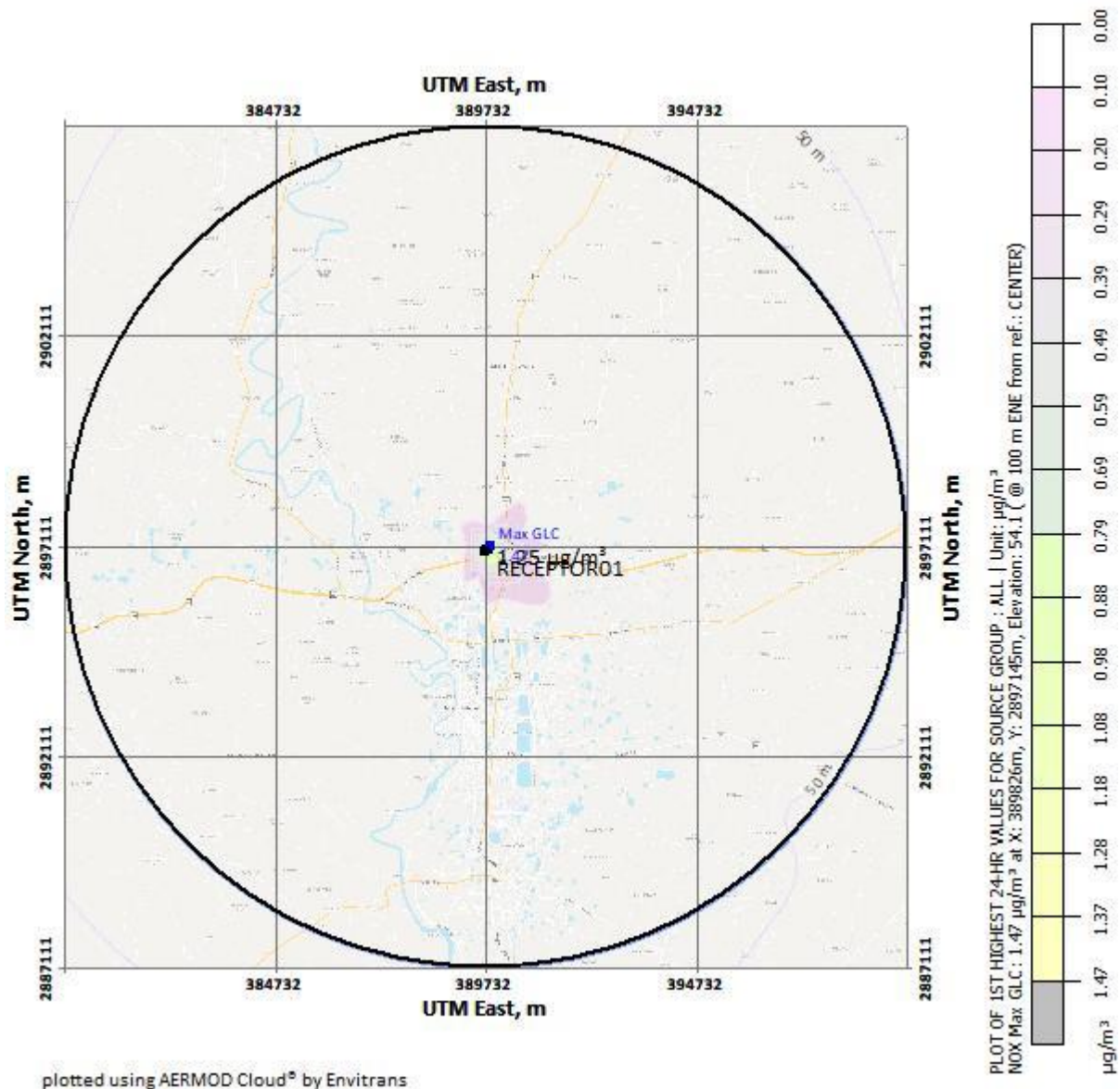


Figure 6(b): Isopleths of NOx

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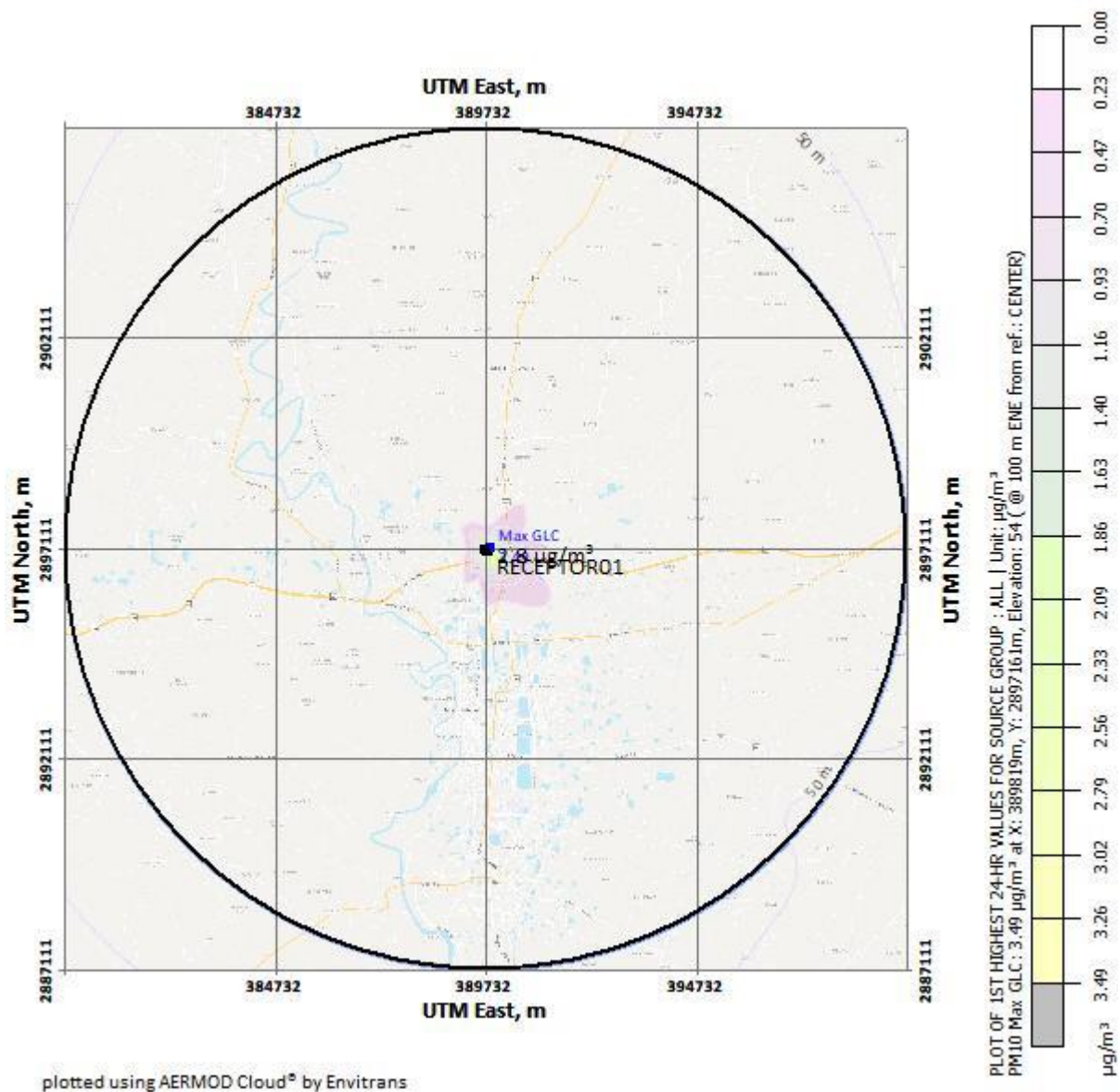


Figure 6(c): Isopleths of PM 10

When predicted 24 hourly ground level concentrations of PM, SO₂ & NO_x emissions from the source is added to background maximum monitored values, resultant values remain well below the prescribed National Ambient Air Quality Standards. Hence, there is negligible on the ambient air quality of the area due to the proposed building construction project. Maximum ground level concentration of PM 10, SO₂ & NO_x are 2.8 $\mu\text{g}/\text{m}^3$, 0.25 and 1.25 $\mu\text{g}/\text{m}^3$ respectively found at project site.

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However due to generation of paved surfaces, heating effect in the area can increase but sufficient green will be developed which will compensate the heating effect. Some of the measures which are being taken and will be taken to prevent the air pollution during construction and operation phase are given below:

Construction Phase:

- Transportation of material in covered vehicles only
- Barricading the project site
- Water sprinkling at site and haulage road
- Storage of material in covered conditions
- Covering the scaffolding of buildings with green nets
- Provision of stacks with DG sets as per CPCB norms and usage of low sulphur fuel in DG sets
- Initiation of the green area development in construction stage itself
- Carrying out ambient air quality monitoring at the site every six monthly to record the ambient air quality at the site.

Operation Phase:

- Maintenance of green belt and green areas.
- Provision of stacks with DG sets as per CPCB norms and usage of the low sulphur diesel.
- Carrying out ambient air quality monitoring at the site every six monthly to record the ambient air quality at the site.

5.2 What are the impacts on generation of dust, smoke, odorous fumes or other hazardous gases? Give details in relation to all the meteorological parameters.

There is no generation of any smoke, odorous fumes & hazardous gases during operation phase. Dust generation is anticipated to occur during construction phase while loading & unloading of construction material, debris & construction activities and vehicular movement during construction phase. During operation phase dust generation is and will be from vehicular movement. Dust generation is and will be controlled by taking following measures.

- Transportation of material in covered vehicles only

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- Barricading the construction site
- Water sprinkling at construction site and haulage road
- Storage of material in covered conditions
- Covering the scaffolding of buildings with green nets
- Provision of stacks with DG sets as per CPCB norms and usage if low sulphur fuel in DG sets
- Initiation of the green belt development in construction stage itself
- Carrying out ambient air quality monitoring at the site every six monthly to record the ambient air quality at the site

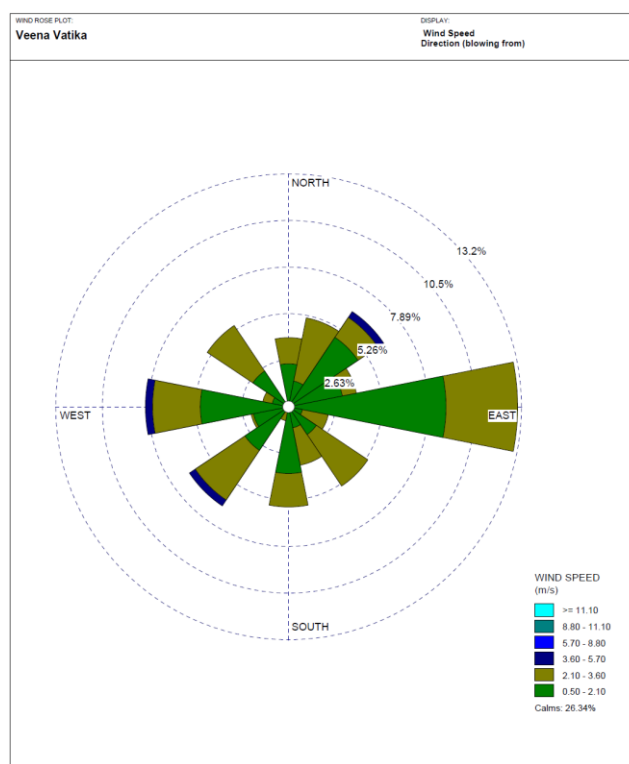


Figure 6(): Wind Rose Diagram (Secondary data IMD, Darbhanga, Climatological Normals)

5.3 Will the proposal create shortage of parking space for vehicles? Furnish details of the present level of transport infrastructure and measures proposed for improvement including the traffic management at the entry and exit to the project site.

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Adequate parking of 612 ECU will be provided to accommodate the expected vehicles during operation phase of the project in line with the requirement of Local Building by Laws.

Traffic Management detail

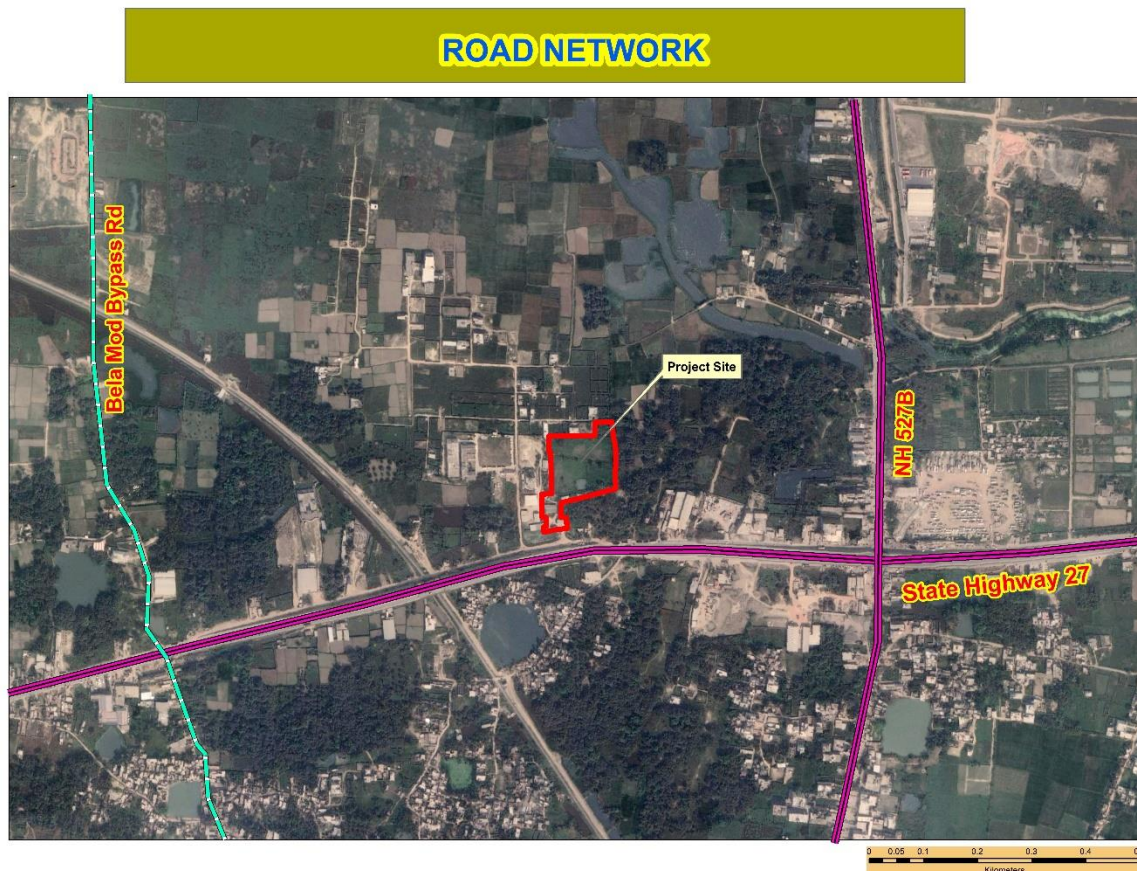


Figure 6(): Road Network Map

5.4 Provide details of the movement patterns with internal roads, bicycle tracks, pedestrian pathways, footpaths etc, with areas under each category.

Internal roads of adequate width, footpaths/pedestrian pathways are developed in the project site.

5.5 Will there be significant increase in traffic noise & vibrations? Give details of the sources and the measures proposed for mitigation of the above.

Adequate parking of 612 ECU will be provided to accommodate the expected vehicles during operation phase of the project in line with the requirement of Local Building by Laws proposed parking is given as:

To manage the noise level following measures are proposed

- Prohibition of honking at the site

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- Restricting of vehicular speed in site at 15 kmph only
- Provision of multiple entry and exit to prevent congestion at entry/exit points and minimizing honking
- Maintenance of the green belt developed at the site
- Provision of DG sets, pumps, motors etc in acoustic enclosures

5.6 What was the impact of D.G. sets and other equipment on noise levels and vibration in ambient air quality around the project site? Provide details.

DG sets will be operational both during construction phase and operation phase during power failures only. DG sets will be provided with integrated acoustic enclosures thus the noise generation is not anticipated. Also stacks will be provided as per CPCB norms with DG sets to discharge the emissions. Low Sulphur fuel will be used in DG sets to reduce the emission of sulphur dioxide. Thus no significant impact is anticipated due to DG set operation on air and noise quality of the area

6. AESTHETICS

6.1 Will the proposed construction in any way result in the obstruction of a view, scenic amenity or landscapes? Are these considerations taken into account by the proponents?

The site lies in urban area, thus no obstruction of view or scenic beauty or landscape is anticipated.

6.2 Will there be any adverse impacts from new constructions on the existing structures? What are the considerations taken into account?

No impacts anticipated.

6.3. Whether there are any local considerations of urban form & urban design influencing the design criteria? They may be explicitly spelt out.

The project strictly followed the Local Building by Laws and NBC, 2005 norms. All norms on Ground Coverage, FAR, Height, Setbacks, Fire Safety Requirements, Structural Design and other parameters are strictly adhered to.

6.4 Are there any anthropological or archaeological sites or artifacts nearby? State if any other significant features in the vicinity of the site have been considered?

No anthropological or archaeological sites or artifacts are found within 300 m radius area of project site.

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7. SOCIO-ECONOMIC ASPECTS

7.1 Will the proposal result in any changes to the demographic structure of local population? Provide the details.

No such changes anticipated.

Construction phase: Generation of employment for construction phase

Operation phase: The project will mainly lead to spatial redistribution of local population and hence no considerable influx of population is envisaged owing to the project

7.2 Give details of the existing social infrastructure around the project.

The area around the project is surrounded by urban area. Areas occupied by sensitive man-made land uses like hospitals, schools, places of worship, community facilities etc. and details are given in **Table 11** below.

Table 11: Social Infrastructure in Surroundings of Project Site

Nearest School & College	• Darbhanga Public School (approx. 200m, W) • Darbhanga Central School (approx. 400m W) • Ramballabh Jalan College (approx. 1.2km S) • Lalit Narayan Mithila University (approx. 3km S)
Nearest Hospital	• Mediworld Multispeciality Hospital, (approx. 500 m, E) • KIMS Hospital (approx. 1.02 km, W)
Nearest Water Body	• Chhoti Bagmati River (0.47 Km W) • Vidya River (approx 7km NW) • Manth Pond (300 m S) • Harahi Lake (approx. 3km W) • Dighhi Lake (approx. 4km W)

7.3 Will the project cause adverse effects on local communities, disturbance to sacred sites or other cultural values? What are the safeguards proposed?

No adverse impacts are anticipated due to project development on local community or sacred sites. Project site is surrounded by already developed area. Site is surrounded by residential areas followed by agricultural land. Further no place of cultural and archaeological importance lies within 300 m radius of the project site. Measures are taken to control air, water, soil & noise pollution to minimize negative impact of project development on the environment & society. Environment management plan has been drafted detailing safeguards proposed for environmental

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management and is given in Section 10 of this report. Project is for the betterment of society as it provides the quality living facility at affordable price.

8. BUILDING MATERIALS

8.1 May involve the use of building materials with high embodied energy. Are the construction materials produced with energy efficient processes? (Give details of energy conservation measures in the selection of building materials and their energy efficiency)

Most of the building material is and will be purchased for local areas. Low embodied energy material like fly ash mixed cement is and will be used for construction of the project.

8.2 Transport and handling of materials during construction may results in pollution, noise and public nuisance. What measures are taken to minimize the impacts?

Mitigation Measures for Air Pollution during Construction Stage:

- Construction materials suitably covered with tarpaulin cover during transportation and storage.
- Water sprinkling on haul roads where dust generation is anticipated.
- Raw material storage and handling yard enclosed from all sides.
- To minimize the occupational health hazard, proper personal protective gears i.e. mask are and will be provided to the workers working in the dust prone areas.

Mitigation Measures for Noise Pollution during Construction Stage:

- Barricading the site from all sides
- Provision of noise shields around heavy machinery
- DG sets provided with acoustic enclosures
- Regular servicing and maintenance of the construction vehicle and equipment
- No noise generation activity taken up during night time

8.3 Are recycled materials used in roads and structures? State the extent of savings achieved?

Fly-ash cement is and will be used for construction purpose.

8.4 Give detail of the methods of collection, segregation & disposal of the garbage generated during the operation phases of the project.

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During operation phase, waste comprise of municipal waste. It is estimated that approx. 1607 kg per day (0.5 kg per capita per day for the residents, 0.15 kg per capita per day for the visitor. 0.25 kg per capita per day for the staff members, whereas 0.2 kg/acre/day is considered for landscape waste) to be generated from project site. Estimations for solid waste generation during operation phase are given in Table 12. Waste management plan is given below.

Table 12: Calculation of Solid Waste Generation

S. No	Description	Occupancy/Area	kg/capita/day	Total Solid Waste Generation (kg/day)	Recyclable (kg/day)	Non-Recyclable (kg/day)
1.	Residents	2976	0.5	1488	1190	298
2.	Staff	149	0.25	37	30	7
3.	Visitors	298	0.15	45	36	9
4.	Landscape waste	1.02 Acres	0.2 kg/acres	1	0.8	0.2
	Total Domestic waste			1571	1257	314
5.	STP sludge	356 KLD	--	36	29	7
Total Waste Generated				1607	1286	321

❖ **Collection and Segregation of waste**

- Door to door collection system is provided for collection of domestic waste
- Local vendors will be hired for waste collection, management and disposal
- Separate colored bins for dry recyclables and rejected waste will be provided to residents as well as in common and open areas

❖ **Disposal**

- Rejected fraction of the waste will be collected and disposed by local agencies on daily basis and will be disposed at the locations designated by Nagar Parisad. Recyclable waste and E-waste will be sold to authorized vendor.
- Used oil from DG sets will be sold to authorized vendors.

9. ENERGY CONSERVATION

9.1 Give details of the power requirements, source and supply, backup source etc. What is the energy consumption assumed per square foot of built-up area? How have you tried to minimize energy consumption?

Maximum power demand for the project during construction and operation phase is estimated to be 50 kVA and 5930.88 kVA respectively. Source of power will be Bihar State Electricity

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board. 2 no. of DG set of Total 3706.81 kVA each will be provided as power back-up during power failure. Effective measures have been incorporated to minimize the energy consumption in following manners:

- Energy efficient lifts will be installed at the site
- All motors and pumps to be installed are energy efficient
- All the electrical fittings and internal & external lighting will be BEE star rated
- CFL/LED lights will be used for internal lighting
- Solar street lights will be provided in ratio of 1:3
- Usage of fly ash mixed cement for construction (PPC

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- Green belt and greenery developed around the project periphery covering approx. 23.8% of the balance plot area
- Painting wall and roof with white/light color heat reflecting paint
- No fenestration provided on the west facing side of the building. West facing will be blocked
- All windows of all rooms open to outside so as the day light enters in all the flats
- Shafts and windows provided for adequate ventilation
- Bus bars in all distribution panels are specified as copper bus bars to reduce losses and improve reliability.
- Total energy conservation from Solar power & LED is approx. 5.18 %.

Details of Energy Conservation

Solar Based LED Lighting will be done in the common areas, signages, entry gates and boundary walls etc.								
S. No.	Description	Consumption with conventional light (Watt/sqm.)	Consumption with solar light (Watt/sqm.)	Common area = Total Plot area - ground coverage (sqm)	Total consumption with conventional light (Watt)	Total consumption with solar light (Watt)	Saving (Watts)	Saving (kVA)
1	Solar Light	2	0	8625	17250	0	17250	57.5

LED Based Lighting will be done in the dwelling units								
S. No.	Description	Consumption with conventional light (Watt/sqm.)	Consumption with LED light (Watt/sqm.)	FAR (sqm)	Total consumption with conventional light (Watt)	Total consumption with LED light (Watt)	Saving (Watts)	Saving (kVA)

Form 1A

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1	LED Light	1	0.2	43736.88	43736.88	8747.38	34989.504	69.98
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Usage of energy efficient Lift (VVVF gearless lifts)								
S. No.	Description	Consumption with conventional lift (KW)	Consumption with VVVF gearless lifts (KW)	No. of Lift	Total consumption with conventional lift (KW)	Total consumption with VVVF gearless lifts (KW)	Saving (KW)	Saving (kVA)
1	Lifts	21	12	12	252	144	108	180

Net Energy Saved (Weighted Average Calculations)		
S. No.	Description	Saving
1	Solar Based Lighting will be done in the common areas, signages, entry gates and boundary walls etc.	57.5
2	LED Based Lighting will be done in the dwelling units	69.98
3	Usage of energy efficient Lift (VVVF non gear lifts)	180
	Total Energy Saved (KVA)	307.18
	Total Energy Consumption(KVA)	5930.88
	Total Energy Saving	5.18 %

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9.2 What type and capacity of power backup do you plan to provide?

As power backup DG sets are installed at site and these are acoustic in nature. 2 no. of DG set of Total 3706.81 kVA each is provided at the site. DG set will only be used during power failure.

9.3 What are the characteristics of the glass you plan to use? Provide specifications of its characteristics related to both short wave and long wave radiation?

Glass is not used as wall material. 6 mm clear toughened glass is used in buildings with U value 5.7 W/sq m K, L.T value: 88% &S.F: 0.82.

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9.4 What passive solar architectural features are being used in the building? Illustrate the applications made in the project.

Blocking of west facing side of the building, sunken window, provision of window in each room opening to outside are features some of the passive features considered in building design which will maximize the day light without direct heat exposure

9.5 Does the layout of street & building maximize the potential for solar energy devices? Have you considered the use of street lighting, emergency lighting and solar hot water systems for use in the building complex? Substantiate with details.

Solar lights will be provided in all common area.

9.6 Is the shading effectively used to reduce cooling/heating loads? What principles have been used to maximize the shading of walls on the East and the West and the Roof? How much energy saving has been effected?

Blocking of west facing side of the building, sunken window, provision of window in each room opening to outside are features some of the passive features considered in building design which will maximize the day light without direct heat exposure

9.7 Do the structures use energy-efficient space conditioning, lightening and mechanical systems? Provide technical details. Provide details of the transformers and motor efficiencies, lightening intensity and air conditioning load assumption? Are you using CFC and HCFC free chillers? Provide specifications.

HVAC/chillers are not provided as it is residential project. CFL/LED lighting are provided within the project to save the energy. Natural ventilation in building will be through windows and shafts. Ventilation in the buildings proposed is mechanical through fans & exhaust fans.

9.8 What are the likely effects of the building activity in altering the micro-climates? Provide a self-assessment on likely impacts of the proposed construction on creation of heat island & inversion effects?

Paved surfaces have more absorbance capacity of heat than the vegetation and soil. Thus there is increase in heat radiation due to project development but provision of greens in surroundings compensate the heat absorption and bring cooling effect

9.9 What are the thermal characteristics of the building envelope? (a) Roof (b) external walls and (c) fenestration? Give details of the material used and the U value or the R values of the individual components.

The U-values of the roof, external wall and fenestration of the building meet the requirements as specified in the Energy Conservation Building Code (ECBC) and are given below in **Table 13**.

Table 13: U Values of Building Envelope

S.No.	Component	Material Used	Permissible U-Value as per ECBC (W/m ² -°C)
1	Roof	Concrete	3.35
2	External wall	Brick	0.44
3	Fenestration	Glass Facade	3.3

9.10 What precautions & safety measures are proposed against fire hazards? Furnish details of emergency plans.

Management & Prevention of Fire hazard

Fire-fighting system is provided at the site as per requirement of NBC norms and local fire office norms. Fire-fighting facilities provided at the site includes water sprinklers, UG and OH fire tanks, automatic fire alarms, manual call points, fire hooters, fire staircase, fire lifts, signage, smoke detectors, refuge area, DG sets compartmentalization and fire proof electrical installations.

Management & Prevention of Earthquake hazard

During Construction Phase

To ensure safety of the building from Seismic Load the Design of the building is done in accordance to Section 1, Part 6 of NBC 2005. Measures taken to minimize earthquake hazard are listed below:

- In concrete floors, spans are reduced with secondary beams so as to reduce the thickness of slab and thus reduces the dead weight.
- Ductility provisions are made in structural detailing.
- Bolting, Brace or anchor for high & heavy objects are used.
- Strong latches or bolts on cabinets are installed.

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During Operation Phase

- Charts detailing Do's & Don't during earthquake are displayed at site
- Potable fire-extinguishers are provided to deal with fires induced due to earthquake

9.11 If you are using glass as wall materials, provide details and specifications including emissivity and thermal characteristics.

Glass is not used as wall material.

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

HVAC are not used thus there are no issues of infiltration.

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.

Solar lights are used in common areas for lighting purpose.

10. ENVIRONMENT MANAGEMENT PLAN

EMP consist of all mitigation measures for each component of the environment due to the activities increased during the construction, operation and the entire life cycle to minimize adverse environmental impacts resulting from 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 sites including fire. The detailed EMP for the project is given below.

10.1 Introduction

The Environment Management Plan (EMP) is a site specific plan developed to ensure that the project is implemented in an environmental sustainable manner where all client, contractors and subcontractors, including consultants, 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. Also, the plan outlines roles and responsibility

of the key personnel and contractors who will be in-charge of the responsibilities to manage the project site.

Objectives of EMP

- It is prepared in accordance with acts, rules and requirements of the MoEF&CC and CPCB/SPCB
- To ensure that the component of facility are operated in accordance with the design
- A process that confirms proper operation through supervision and monitoring
- A system that addresses public complaints during construction and operation of the facilities and
- A plan that ensures remedial measures is implemented immediately.

The key benefits of the EMP are that it offers means of managing its environmental performance thereby allowing it to contribute to improved environmental quality. The other benefits include cost control and improved relations with the stakeholders.

M/s KKT Constructions Private Limited is responsible for implementation of EMP both during construction and operation phase M/s KKT Constructions Private Limited will contract agencies for taking care of operation and management of the STP, RWH systems, drinking water supply, maintenance of firefighting system, solid waste management, landscaping etc. Residents are made aware about the systems in place at the time of purchase of the flats and also they are updated with the changes in system, if any time to time. EMP plan is given in **Table 14** below.

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NO - 776(OLD), 1178(OLD)/1539 (NEW), THANA NO - 449, DIST-DARBHANGA

Table 14: Summary of Potential Impacts and Remedial Measures

S. No.	Environmental components	Potential Impacts	Potential Source of Impact	Controls Through EMP & Design	Impact Evaluation	Remedial Measures
1.	Ground Water Quality	Ground Water Contamination	<u>Construction Phase</u> Waste water generated from temporary labor tents.	Waste water will be managed to achieve zero discharge and to maintain hygienic condition at site	No significant impact as majority of labors are and will be locally deployed	Waste water arising from the project was disposed off conforming to standards of CPCB by septic tanks/soak pits
			<u>Operation Phase</u> Discharge from the project site	No untreated water is discharged in sewer	No negative impact on ground water quality envisaged.	Waste water generated is treated in STP within the site. Treated water is re-used at the site for flushing & landscaping.
2.	Ground Water Quantity	Ground Water Depletion	<u>Construction Phase</u> No impact as ground water is and will not be used for construction. Water from private water tanker is and will be sourced for	No water ponding will be allowed at site	No impact	Water from Private Tankers is and will be used for carrying out construction.

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			construction phase			
			<u>Operation Phase</u> Source of water will be municipal supply and ground water	Water should be conserved and wastage should be prevented	Depletion of water level in aquifers	- Using water efficiently - Re-usage of treated water from STP to minimize fresh water requirement for flushing & landscaping purpose - Use of Water Efficient fixtures like flow regulators & dual flushing cisterns 2 nos. of RWH pits are provided to recharge the storm water at the site
3.	Surface Water Quality	Surface water contamination	<u>Construction Phase</u> Surface runoff from site during construction activity & open defecation of construction labour	Water & Sewage management carried out at the site to control water pollution	Measures are taken to restrict the run-off from site.	- Silt traps and diversion ditches are constructed to control surface run-off during site construction and is and will be constructed in construction site area - Curing is and will be done by spraying water to reduce run-off

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						Toilets are provided at site to control open defecation and sewage is disposed through septic tank and soak pits
			<u>Operation Phase</u> Discharge from Project Site	No untreated water is discharged outside project site	No negative impact on surface water quality envisaged.	Treated water from STP is used for flushing, horticulture within the site
4.	Air Quality	Dust Emissions (PM)	<u>Construction Phase</u> - Construction activities - Vehicular movement	Suitable control measures are adopted for reducing the PM level in the air as per air pollution control plan.	Dust generation is temporary and settles fast due to dust suppression techniques. Impacts are restricted to small area.	- Water sprinklers are provided - Regular cleaning of construction site - Construction material & debris carrying vehicles are covered. - Construction material stored in covered area
		SO ₂ , NO ₂ and CO	<u>Construction Phase</u> - Vehicular exhaust - Running D.G. set (back up)	Rapid on-site construction	Impact will be for short duration	- Regular monitoring of emissions and control measures are taken to reduce the emission levels. - Ambient air quality monitoring at site carried out every six monthly

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						• Use of low sulfur diesel in DG sets as fuel • Provision of stack with DG sets to manage the emission • Regular maintenance and servicing of vehicles.
		Emissions of PM, SO ₂ , NO _x and CO	<u>Operation Phase</u> • Vehicular movement • Vehicular exhaust • Running D.G. set (back up)	• Suitable control measures will be adopted for reducing emissions	Not significant. Regular monitoring of air quality will be carried out to maintain air quality	• Stack height of DG provided as per CPCB standards and • Regular ambient air and DG stack monitoring carried out • Use of low sulfur diesel • Traffic management • Providing Footpath • Developing Green belt • All vehicles will carry PUC
5.	Noise Environment		<u>Construction phase</u> • Construction Activities • Operation of Machinery • Operation of DG sets	• Noise Management by adopting suitable measures.	Impact is temporary and restricted to small area.	• Provision of Noise shields • DG sets are provided with acoustic enclosures • Construction activities involving high level noise generation is restricted to day time

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						• Provision of ear muffs to workers • Traffic Management at site to prevent honking • Use of machinery of modern make, meeting the noise standards • Vehicle randomly may be checked for PUC certificate
			<u>Operation Phase</u> • Noise from vehicular movement • Noise from DG set operation	• Noise Management by adopting suitable measures	Not Significant.	• Development of green belt at site • DG sets provided with acoustic enclosure • Proper traffic management & circulation at site. Speed limits restricted to 15 kmph for speed regulation. Honking is prohibited in the premise

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6.	Land Environment	Soil contamination	<u>Construction Phase</u> • Disposal of construction debris • Spillage of oil or paints • Excavation of soil	• By controlling soil erosion and maintaining soil quality by periodic soil quality monitoring	No significant impact. Impact restricted to project site	• Construction debris are being and will be re-used at site and remaining sent for disposal to designated location. • Proper work management to avoid spillage • Excavated soil will be re-used for landscaping in project area. • Silt traps and dykes provided to arrest silt as required.
			<u>Operation Phase</u> • Municipal solid waste • Used oil from D.G. set	• Solid waste management as per MSW Rules, 2016.	Since solid waste is handled by the authorized agency, open waste dumping is not practiced thus impact is not significant. Negligible impact.	• MSW Management Rules, 2016 are followed. • E-waste managed as per E-waste Rules, 2016. • Used oil generated is sold to authorized vendors on regular basis. It is stored in HDPE drums at isolated location on paved surface.

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						Disposed off as per Hazardous & Other Waste Rules, 2016
7.	Biological Environment	Displacement of Flora and Fauna on site	<u>Construction Phase</u> Site Development during construction	Important species of trees, if any, will be identified and marked and will be merged with landscape plan	No significant vegetation exists at project site so no tree felling involved.	No clearing of trees was carried out as site was open land and did not support any vegetation
			<u>Operation Phase</u> Day to day activities	Development of Green Belt	Positive Impact	- Development of green belt at site. Green areas provide habitat to avifauna, insects and small tree dwellers like squirrels - Proper after care & maintenance will be done
8.	Socio-Economic Environment	Population displacement	<u>Construction Phase</u> Construction activities may lead to temporary relocation	Generation of employment for local people especially labor	Positive Impact	- Generation of employment for skilled, unskilled and semiskilled people - Development of an area due to improved infrastructure - Employment preferably

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						is and will be given to local people
			<u>Operation Phase</u> Site operation	Creation of safe and comfortable working space	Positive impact	Generation of employment for skilled, unskilled and semiskilled people
9.	Traffic Pattern	Increase in traffic	<u>Construction Phase</u> Transportation of construction material & debris	Proper Traffic Management & circulation	Impact is short time and restricted to construction phase	- Provision of adequate parking space at site to prevent parking of vehicle on road - Proper traffic circulation system at site - Proper signage system - Restrict hours of material transport to avoid peak hours - Routes designated for material transportation so as to avoid already busy routes
			<u>Operation Phase</u> Vehicles of residents, staff &	Proper Traffic Management & circulation	Not Significant as project site is well connected via	- Provision of adequate parking space within site - Proper traffic circulation

Form 1A

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			visitors		network roads	of	system at site • Informatory & directive Sign boards are provided • Provision of pedestrian path to encourage walking
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M/s KKT CONSTRUCTIONS PRIVATE LIMITED

10.2 ENVIRONMENT MANAGEMENT PLAN

An Environmental Management Plan (EMP) is being and will be implemented at the site is given below.

10.2.1 EMP for Air Environment

Construction Phase

To mitigate the impacts of dust during the construction phase of the project, the following measures are and will be followed for dust generation minimization:

- A dust control plan
- Procedural changes to construction activities

Dust Control Plan

The most cost-effective dust suppressant is water because water is easily available on construction site. Water can be applied using water trucks, handled sprayers and automatic sprinkler systems. Furthermore, incoming loads could be covered to avoid loss of material in transport, especially if material is transported off-site.

Procedural Changes to Construction Activities

Idle time reduction: Construction equipment are commonly left idle while the operators are on break or waiting for the completion of another task. Emission from idle equipment tends to be high, since catalytic converters cool down, thus reducing the efficiency of hydrocarbon and carbon monoxide oxidation. Existing idle control technologies comprises of power saving mode, which automatically off the engine at preset time and reduces emissions, without intervention from the operators.

Improved Maintenance: Significant emission reductions are achieved through regular equipment maintenance. Contractor is being asked to provide maintenance records for their fleet as part of the contract bid, and at regular intervals throughout the life of the contract. Incentive provisions is established to encourage contractors to comply with regular maintenance requirements.

Reduction of On-Site Construction Time: Rapid on-site construction reduces the duration of traffic interference and therefore, reduced emissions from traffic delay.

Operation Phase

To mitigate the impacts of pollutants from DG set and vehicular traffic during the operational phase of the Project, following measures will be implemented:

- DG set emission control measures
- Vehicular emission controls and alternatives
- Greenbelt development

Diesel Generator Set Emission Control Measures

Adequate stack height maintained to disperse the air pollutants generated from the operation of DG set at appropriate height as per CPCB norms to minimize the GLC of pollutants.

Vehicle Emission Controls and Alternatives

During construction, vehicles are properly maintained to reduce emission.

Footpaths and Pedestrian ways: Adequate footpaths and pedestrian ways are provided at the site to encourage walking.

Greenbelt Development

Increased vegetation in the form of greenbelt is one of the preferred methods to mitigate air and noise pollution. Plants serve as a sink for pollutants, act as a barrier to break the wind speed as well as allow the dust and other particulates to settle on the leaves. It also helps to reduce the noise level at large extent. Tree belt is developed at the site already.

10.2.2 EMP FOR NOISE ENVIRONMENT

Construction Phase

To mitigate the impacts of noise from construction equipment during the construction phase on the site, the following measures are and will be implemented.

Time of Operation: Noisy construction equipment not allowed at night time.

Job Rotation and Hearing Protection: Workers employed in high noise areas are and will be employed on shift basis. Hearing protection such as earplugs/muffs are and will be provided to those working very close to the noise generating machinery.

Operation Phase

To mitigate the impacts of noise from diesel generator set during operation phase, the following measures will be implemented

- Adoption of Noise emission control technologies
- Greenbelt development

Noise Emission Control Technologies

DG sets are provided with integrated acoustic enclosures as per E (P) Act, GSR 371 (E) and its amendments.

10.2.3 EMP FOR WATER ENVIRONMENT

Construction Phase

To prevent degradation and to maintain the quality of the water source, adequate control measures are and will be implemented. To check the surface run-off as well as uncontrolled flow of water into any water body, following management measures are and will be:

- Avoid excavation during monsoon season
- Care taken to avoid soil erosion
- Toilets are and will be constructed on site during construction phase and the sewage is and will be channelized to the septic tanks in order to prevent waste water to enter into the water bodies
- Any area with loose debris within the site will be seeded with grass
- To prevent surface and ground water contamination by oil and grease, leak-proof containers are used for storage and transportation of oil and grease. The floors of oil and grease handling area kept effectively impervious. Any wash off from the oil and grease handling area or workshop is disposed off after passing it through oil & grease traps.
- Storm run-off is and will be channelized through temporary drains and was collected in sedimentation tanks. This water is and will be used for various purposes at site like wheel washing, curing, cleaning etc.
- All stacking and loading areas are provided with proper garland drains, equipped with baffles, to prevent run off from the site, to enter into any water body.

Operation Phase

In the operation phase of the project, water conservation and development measures are taken, including all possible potential for rain water harvesting. Following measures are adopted:

- Water source development.

- Minimizing water consumption.
- Promoting reuse of water after treatment and development of closed loop systems for different water streams.

Water Source Development

Water source development shall be practiced by installation of scientifically designed Rain Water Harvesting system. Rainwater harvesting promotes self-sufficiency and fosters an appreciation for water as a resource. 2 Nos. of RWH pits will be developed at site to put the storm water in ground for recharging the ground water aquifers. Thus proper management of this resource is a must to ensure that it is free from contamination.

A detailed storm water management plan is developed which consider the possible impacts from above sources. The plan incorporates best management practices which include the following:

- Regular inspection and cleaning of storm drains.
- Installation of clarifiers or Oil/Water separators/traps system of adequate capacity around parking areas and garages as per requirement.
- Avoid application of pesticides and herbicides before wet season.
- Conducting routine inspections to ensure cleanliness.
- Preparation of spill response plans, particularly for fuel and oil storage areas.
- Provision of silt traps in storm water drains.
- Good housekeeping in the above areas.

Minimizing Water Consumption

Consumption of fresh water is minimized by combination of water saving fixtures and other domestic water conservation measures. The following section discusses the specific measures, which shall be implemented:

Domestic Usage

- Use of water efficient plumbing fixtures (dual flushing cisterns, low flow showers, pressure taps and faucets etc). Water efficient plumbing fixtures uses less water with no marked reduction in quality and service
- Leak detection and repair techniques.
- Meter water usage: Implies measurement and verification methods.

- Monitoring of water uses is a precursor for management.

Horticulture

- Usage of STP treated water for horticulture

Promoting Reuse of Water after Treatment and Development of Closed Loop Systems

Sewage generation from the project site is approx. 356 KLD which will be treated in STP of capacity 400 KLD. Treated water from the STP (320 KLD) will be used for flushing & landscaping. STP has been constructed at the site for treatment of sewage generated. Water will be treated up to tertiary level in the STP to make water fit for re-use.

10.2.4 EMP FOR LAND ENVIRONMENT

Construction Phase

Solid waste is generated both during construction as well as during operation phase. Solid waste generated during construction phase is majorly excavated materials, cement bags, bricks, concrete, MS rods, tiles, wood etc. Construction waste is segregated into re-usable, recyclable and reject fraction. Re-usable waste is stored at site, recyclable material was sold to authorized vendor and rejected material was disposed off at the designated areas of MC. Same will be followed for remaining construction phase.

Operational Phase

During operation phase, waste comprise of municipal waste. It is estimated that approx. 1607 kg per day (0.5 kg per capita per day for the residents, 0.15 kg per capita per day for the visitor. 0.25 kg per capita per day for the staff members, whereas 0.2 kg/acre/day is considered for landscape waste) to be generated from project site.

SOLID WASTE MANAGEMENT PLAN

❖ Collection and Segregation of waste

- a. Door to door collection system is provided for collection of domestic waste
- b. Local vendors are hired for waste collection, management and disposal
- c. Separate colored bins for dry recyclables and rejected waste are provided to residents as well as in common and open areas.

❖ Disposal

- a. Rejected fraction of the waste is collected and disposed by local agencies on daily basis and will be disposed at the locations designated by local authority. Recyclable waste and E-waste is sold to authorized vendors.
- b. Used oil from DG sets is sold to authorized vendors.

10.2.5 EMP FOR ECOLOGICAL ENVIRONMENT

Site did not support any vegetation thus no impact on ecology is there due to project development. During operation phase a green belt will be developed at the project site. Total green area provided at the site is Green Area on ground - 4140.83 sq.m (@ 25.64 % of plot area).

10.2.6 EMP for Socio-Economic Environment

During construction stage only local labour is and will be hired for construction purpose which provided employment to local people. Environment management plan is and will be implemented at the site which prevented the environmental pollution in the area and problems to the people in the project site surroundings.

During operation phase, environment management plan will be implemented to manage sewage, storm water, emissions and waste from the site. Thus there are no impacts due to the project on socio-economy. Being residential project, project provides quality living facility along with all modern day needs and requirement.

10.2.7 EMP FOR ENERGY CONSERVATION

Energy saving measures will be taken during construction and operation phase of the project. Energy saving measures proposed are described in section 9 of this document. Some of the measures are detailed below:

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- Energy efficient lifts are installed at the site
- All motors and pumps installed are energy efficient
- All the electrical fittings and internal & external lighting are BEE star rated
- CFL/LED lights are used for internal lighting
- Solar street lights will be installed in ratio of 1:3 in common areas
- Usage of fly ash mixed cement for construction (PPC)
- Green belt and greenery developed around the project periphery.
- Painting wall and roof with white/light color heat reflecting paint
- No fenestration provided on the west facing side of the building. West facing is blocked
- All windows of all rooms open to outside so as the day light enters in all the flats
- Shafts and windows provided for adequate ventilation
- Bus bars in all distribution panels are specified as copper bus bars to reduce losses and improve reliability.
- 5.18% of energy conservation is done by solar panel & LED.

10.3 ENVIRONMENTAL MANAGEMENT CELL

M/s KKT Constructions Private Limited is responsible for implementation of environment management plan at the site. M/s KKT Constructions Private Limited has designated an environment and safety expert at the site who ensure implementation of environment management plan and to abide by the environmental legislations. Contract will be given to external agency for STP maintenance and operation, green belt development and waste collection at the project site. M/s KKT Constructions Private Limited ensures that all environmental management measures are taken up at site by them and contracted agencies.

Environmental Management Budget

Implementation cost for environmental management plan during operation & construction phase of the project is given below in **Tables 12 & 13** below.

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Table 12: EMP budget for Construction Phase

S. No.	Activity	Capital Cost (Lacs)	Annual Recurring Cost (Lacs)
1.	Health & safety of Workers (PPE, safety officers etc)	4.0	1.0
2.	Environmental Monitoring	-	2.0
5.	Covered sheds for storage of material	3.0	0.5
Total		7	3.5

Table 13: EMP budget for Operational Phase

S. No.	Activity	Capacity/ Area/Nos./parameters	Capital Cost (Lacs)	Annual Recurring Cost (Lacs)
1.	STP	350 KLD	70	8
2.	Landscaping & planting trees	4140.83 (25.64%) sq m	5.5	2
3.	Solid waste Management	Municipal waste-1237 kg/day	9	4
4.	RWH Pit Installation	2 pits	1.5	1
5.	Energy Saving	5.18%	7	3
Total			93	18

10.3.3 Environmental Monitoring

The purpose of environmental monitoring is to evaluate the effectiveness of implementation of Environmental Management Plan (EMP) by periodic monitoring. The important environmental parameters within the impact area are selected so that any adverse effects are detected and time action can be taken. The project proponent will monitor ambient air Quality, Ground Water Quality and Quantity, and Soil Quality in accordance with an approved monitoring schedule.

Table 15: Suggested Monitoring Program for Project

S. No.	Type	Locations	Parameters	Period and Frequency
1.	Ambient Air Quality	Project Site	Criteria Pollutants: SO ₂ , NO ₂ , PM _{2.5} & PM ₁₀	Half yearly (24 hr average samples) during construction phase and annual during operation phase.
2.	Groundwater (Portability)	Project site	Drinking water parameters as per	Half Yearly

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	testing)		IS 10500.	
3.	Ambient Noise	Project site	dB (A) levels	Half Yearly (Hourly day and night time L_{eq} levels) during construction phase and every year during operation phase.
4.	Potable water quality	Drinking water supply	As per IS 10500 potable water standards	Half Yearly
5.	Soil quality	Project site	Organic matter, C.H., N, Alkalinity, Acidity, heavy metals and trace metal, Alkalinity, Acidity.	Half Yearly
6.	Waste Characterization	Municipal and Biomedical	Physical and Chemical composition	Daily
7.	Treated water	Outlet of STP/ETP	BOD, MPN, coliform count, etc.	Monthly

10.3.4 Awareness and Training

Training and human resource development is an important link to achieve sustainable operation of the facility and environment management. For successful functioning of the project, relevant EMP will be communicated to residents. Residents will be made aware of the importance of waste segregation and disposal, water and energy conservation through the signages provided in the project site.