

FORM-1 A (only for construction projects listed under item 8 of the Schedule)

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 programme)

1. LAND ENVIRONMENT

(Attach panoramic view of the project site and the vicinity)

1.1. Will the existing landuse get significantly altered from the project that is not consistent with the surroundings? (Proposed landuse must conform to the approved Master Plan /Development Plan of the area. Change of landuse if any and the statutory approval from the competent authority be 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.

The Project proposal is to construct a Residential apartment project consisting of 1 Basement + Ground floor + 4 Upper floors and Terrace Floor with total 171 flats and other civic amenities. The total built up area of the project is 29,290.70 Sqm.

Following maps are attached herewith:

- (i) Site location Map– **Annex 1***
- (ii) Surrounding features of the proposed Project site (Aerial view within 500 meters) – **Annex 2***
- (iii) CDP map – **Annex 3***
- (iv) Site plan – **Annex 5***

*The Kammasandra lake is situated approx.120 m towards the south of the proposed project site The proposal is in conformity with the land use of Bangalore Metropolitan Region Development Authority (BMRDA).The Land has been converted from agricultural to non-agricultural/residential use. The land ownership and conversion documents are attached as **Annex 6**.*

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.

S. No.	Project Siting	Description	%
1	Total Built-up area	29,290.70 Sqm	
2	Area statement		
	Total Site area	9,108.74 Sqm	100
	Plinth area	4,967.84 Sqm	54.54
	Paved area	2,157.10 Sqm	23.68
	Landscape area on natural earth Landscape on Podium	1,196.06 Sqm 787.74 Sqm	21.78
3	Water		

	Water requirement	Construction phase: Source: Tankers. Requirement: Approx. 30 – 40 kld depending upon the construction activity. Operation phase: Source: Hebbagodi Grama Panchayat Requirement: 79 kld of Freshwater + 54 kld of Recycled water.
4	Power	
	Power Requirement	Construction Phase: Approx. 100 kVA from Bangalore Electricity Supply Company (BESCOM) and 1 no of DG of 25 kVA backup with fuel (HSD) consumption of 12 l/hr. Operation Phase: 900 kVA from BESCOM and 1 Nos of 250 kVA DG sets as backup with fuel (Diesel) 40 l/hr.
	Power Source	Bangalore Electricity Supply Company Limited (BESCOM)
5	Connectivity	
	Access roads	The Project site is accessible through a service road adjacent to Hosur Main Road
	Nearest railway station	Heelalige railway station – 2.8 Km* towards South - East. *aerial distance
	Nearest airport	HAL Airport ≈ 13.8 kms* towards north *aerial distance
6	Community facilities	General community facilities such as markets, cinema halls, hospitals, schools, colleges, bus station are available in Hebbagodi and Electronic city
7	Parking needs	182 Car parks will be provided. Refer Annex. 9 for the Car parking drawing.

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 landuse, disturbance to the local ecology).

The Project site is within the limits of BMRDA. Refer **Annex 2** for nearby villages/human habitations and other features within 500 m radius of the Project site.

No adverse impact is likely on the local ecology due to the development of the Project as considerable development has already taken place near the project site.

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

The existing topography of the site will not be changed due to the proposed project. Therefore, no soil erosion or instability of land is envisaged.

The site area falls under Seismic Zone II as per the Seismic Zoning Map of India. Necessary seismic factors as suggested in the NBC 2005 and IS Codes shall be incorporated suitably while designing the Structures to safeguard against earthquake risks.

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

*No, there will not be any alteration in natural drainage system. The existing site contour levels is enclosed as **Annex 10**.*

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.)

The proposed structure will have a basement; hence will involve excavation of approx. 10,000 cum of soil. Earthwork will include foundation and excavation for construction of basement and backfilling at Project site.

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

During Construction Phase, approx. 30 – 40 kld of water will be required for construction – concrete mixing and curing purpose.

The water demand will be met through the tankers.

Waste handling: *The details are as follows:*

- 1. Various types of construction debris such as bricks, blocks, steel, formwork, finishing materials, etc. will be generated.*
- 2. Bricks, metal chips, cut tiles will be used for internal paving.*
- 3. The damaged/ cut pieces of steel, glass etc. will be sold to scrap dealer.*
- 4. Substratum removed during foundation will be used as far as possible as filling material.*
- 5. Balance construction wastes, if any, will be disposed to authorized MSW site.*

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)

There are two wetlands towards the South within 500m radius from the project site. The natural slope is towards the South. After construction, the run off will increase and the designing of the storm water network will be done considering the same.

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

Construction waste arising from the project shall be disposed in appropriate manner as indicated below:

a. Concrete wastage and wasted mortar

Total amount of broken concrete structures, brick wastage and wasted mortar generated from plastering operation will be about 2-3 % by mass of the total building material used in the Project. This material will be collected from the Project site of generation and stored in a designated place. The material will be crushed, aggregated and mixed with other road sub-base construction material.

b. Waste/damaged construction material

Sieved sand, broken brick bats and chipped plaster will be another type of debris generated from the project construction. This material will also be used in the construction of roads and for backfill and consolidation of surfaces under podia, under margins/pitching of storms water drains, periphery curbing roads, etc.

c. Waste vitrified material

Broken tiles, wasted sanitary ware, broken glass and other glazed/vitrified material will be generated mostly during sanitary fitting and plumbing phases of the buildings. This material will be collected, broken again into suitable size and used for mosaic work on the terraces, exposed structures of the buildings and on the floors of parking/parking approaches for aesthetics and solar reflection purposes.

d. Metal scraps

Scrap scaffoldings, fasteners, waste clamps, scrap wire ropes, TOR steel scrap, waste shuttering material and metal drums, etc. will be sold to local scrap dealers for onward recycling. The material will be cleaned at site to remove possibility of contamination of any kind before handing over to the scrap dealer.

e. Waste packaging material and wooden waste

Used plastic bags of cement and other construction material will be sold back to the supplier for reuse. Wooden and plywood packaging, which comes with utility equipment will be carefully de-nailed and used in the labour camps for making partitions/storage racks, etc. Wooden chips, shredded wood and wastages from removed shuttering, etc. will be mixed with the municipal waste and put to composting.

f. Plastic and paper waste

Plastic and paper waste mainly from packaging of construction materials (tiles, plumbing, electrical fixtures, glasses, aluminum claddings, etc. will be sold to registered recyclers.

No hazardous construction material such as asbestos, PCB filled electrical equipment, harmful solvents/thinners such as CTC, etc. restricted pesticides, and etc. shall be stored, handled or used on the Project site.

2. WATER ENVIRONMENT

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

Construction Phase:

Source: Tankers.

Requirement: Approx. 30 – 40 kld will be used depending upon the construction activities and limited domestic use.

Operation Phase:

Source: Hebbagodi Gram Panchayat.

Total Requirement: Approx. 79 kld of Freshwater + Approx. 54 kld of Recycled water from STP.

Freshwater shall be used for all domestic purposes other than flushing. Tertiary treated water from STP shall be used for horticulture, Misc. washing and flushing. The total water quantity estimated for the apartments based on various activities comes to approx. 135 kld. The details are given in the Water Balance is attached as **Annex.6**.

2.2. What is the capacity (dependable flow or yield) of the proposed source of water?

The primary source of water is Hebbagodi Grama Panchayat.

Water requirement will be augmented by making use of treated sewage from proposed Sewage Treatment Plant (110 kld) for flushing, Misc. washing and horticulture.

2.3. 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)

*The source of water for domestic use is Hebbagodi Grama Panchayat. The water NOC is enclosed as **Annex.7***

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

*Approx. 54 kld of treated water will be recovered and used for flushing, Misc. wash and horticulture. Treated water conforming to KSPCB's standard for ground disposal will be used in greenbelt irrigation and toilet flushing. Usage of recycled water will reduce requirement of fresh water, thus conserving ground water. Refer **Annex.6** for the Water balance chart.*

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

The freshwater requirement is approx. 79 kld from Hebbagodi Gram Panchayat. As considerable amount of water requirement 54 kld, approx.40% of total water requirement of 135 kld will be met from recycled water, to reduce the necessity of freshwater.

2.6. What is the incremental pollution load from wastewater generated from the proposed activity?
(Give details of the quantities and composition of wastewater generated from the proposed activity)

Total wastewater generation will be around 104 kld. This will be treated in an STP of 110 kld proposed at site. The treated water shall confirm the land disposal criteria of KSPCB. 54 kld of treated wastewater will be used for flushing, miscellaneous washing and horticulture. The excess treated water will be let into the UGD line. The basis of calculation is as follows.

Water requirement and waste water generation	Qty (kld)
Residential	
No. of Dwelling Units (nos.)	171.0
Estimated peak occupancy (nos.) persons/unit *	855.0
Fresh Water requirement @ 90 lpcd	76.95
Sewage @ 80% of the freshwater required	61.56
Recycled Water requirement @ 45 lpcd	38.475
Sewage generation @ 100% of Recycled water	38.475
Club House	
Daily peak Club occupancy estimated (nos.) @ 10% of total occupants	86
Fresh water requirement @ 10 lpcd	0.86
Sewage @ 80% of the freshwater usage	0.69
Recycled water requirement for 1 out of 3 visitors @ 35 lpcd	1.015
Sewage generation @ 100% of Recycled water	1.015
Swimming pool	
Freshwater Requirement for Swimming pool	1.0
Volume of the Swimming pool (m ³)	200
Car Wash	
Recycled water requirement for Car washing @ 20 lit/day	3.42
Waste Water generation @ 50% of the water used	1.71
Evaporative loss	1.71
Horticulture	
Green area on Natural earth (m ²)	1196.06
Water requirement @ 6 l/sqm	7.17
Green Area on Podium (in m ²)	787.74
Water requirement @ 4 l/sqm	3.15
Total Water required	
Total Fresh Water requirement	78.7
Recycled Water requirement	53.77
Total Waste Water to STP	103.9
1% of total Waste Water is Atmospheric losses	1.039
Sludge - 2% of total waste water lost with wet sludge	2.079
97% of total waste water	100.86

Excess recycled water to UGD	47.09
STP Capacity	110

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

Water harvesting through Roof Top Harvesting system will be done. The filtered rain water collected from the roof tops will be collected in underground sump. The overflow of this sump will be drained to the Recharge pits and then to the storm water network. The run off from the garden and other paved areas also will be directed to the recharge pits.

2.8. What would be the impact of the land use changes occurring due to the proposed 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?

The land in the Project site was converted from agricultural use to non-agricultural/residential use. It is an open land at present and therefore the runoff from the Project site is less. After the building construction, the runoff will increase. The increased runoff will be directed to the proposed rainwater harvesting system consist of storm water pits. Thus the effective water percolation area will not register any change.

No flooding is envisaged at the site and in the surrounding area due the storm water management to be implemented at the project site as explained in section 2.7.

2.9. 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)

Water requirement for construction will be met from the Tankers.

Hebbagodi Grama panchayath water supply will be the prime source of water during operation phase of the project. During rainy season, the fresh water demand will decrease due to the rain water harvesting system.

2.10. What precautions/measures are taken to prevent the run-off from construction activities polluting land & aquifers? (Give details of quantities and the measures taken to avoid the adverse impacts)

It is estimated that all the major construction and suite grading involving earth work will be carried out during non-monsoon period.

All minor trenching for gutter lines and shallow plumbing/cabing after final site grading will be done under brick wall containment.

2.11. 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)

The entire rain water down take and open gutter system is based on 50mm rainfall per hour, for the entire open to sky areas on building and hardscape. The storm water drain is designed based on the same.

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

Labour colony is proposed with high environment and safety standards. Adequate temporary sanitation facilities will be provided for the construction workers. Also clean drinking water will be provided. It will also be ensured that no accumulation of water will take place.

Peak civil construction activity in the Project site is estimated to employ 100 labourers.

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

During construction phase, temporary toilets will be provided at the Project site and treated in mobile STP.

During operation phase an STP of 110 kld will be constructed at the Project site. Waste water will be conveyed to a sewage treatment plant (STP) by a well designed system of down-take pipes & drainages. The tertiary treated water will be reused for flushing, miscellaneous washing/usage and horticulture purpose.

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

Municipal water will be used for domestic purpose (i.e. for drinking, washing, bathing purpose).

*Dual plumbing system shall be used to utilize grey water coming out of the STP. The system will be separately color coded for easy identification. The line shall not be placed along with raw/potable water line to prevent any accidental cross mixing. Grey water shall be stored on elevated reservoirs near the point of use and shall not be supplied under pressure, except for filling up the reservoir. General convention for grey water plumbing shall be followed as in the National Building Code of India, 2005. All repairs to the grey water network shall be done after complete de-pressurization, flushing with raw water and usage of proper PPEs. Refer **Annex 11** for dual piping diagram.*

There will be separate lines & tanks for treated waste water to be used for flushing, car washing, and horticulture.

3. VEGETATION

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

The Project is not likely to pose any threat to the local biodiversity as there is no vegetation at the site.

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

At present, the project site is a bare land with little/no ground vegetation. The ground vegetation, if any, will be cleared and the top soil shall be stored separately before excavation for foundation is commenced on the site.

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)

*There is no distinct topographical, landscape or ecological site features associated with the Project site. Refer **Annex 12** for Landscaping of the project site.*

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 significant fauna at site as the project site does not have any vegetation.

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

No impact on the avifauna is envisaged due to development of the Project.

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

The project is too small in size to impact the avifaunal diversity in a significant manner.

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 constructions)

There will be temporary increase in air pollution (particularly dust levels) due to transport of materials, excavation and land development during the construction phase.

Atmospheric emission accountable on the project will comprise automobile emissions from usage of cars and intermittent DG emissions to be operated during rare occasions of power failure during operation phase.

During operation phase, the project will have stand-by 1 No. 250 kVA DG set running on HSD as standby.

The DG will be CPCB type approved set compliant by design for air and noise pollution norms under the Environment (Protection) Act, 1986.

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.

Handling of loose & powdery construction material like soil, sand and cement may lead to dusty instances during high wind conditions. However, as the site is covered up to breast height from the nearby properties, such instances will be low and localised.

Transportation of raw material shall be done under covered condition. Spray of water shall be done regularly on the unpaved surfaces of the project to subside dust.

No fumes or hazardous gases will be used at the Project site during construction or operation phase of the project.

During operation phase, vehicular exhausts will be the only source of air pollution and 1 No of 250 kVA DG sets will be the only fixed point source of pollution, which will be run only during power shortages. The DG will be acoustically enclosed type with noise level <75 dB at 1 m distance as per CPCB norms notified under the EP Act, 1986.

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 & exit to the project site.

The development will create need for parking for the occupants. Parking facility will be provided for 182 cars, calculated as per the local requirement as given in the following table:-

S. No.	Location of Car Park	No. of Car Parks
1.	Basement	171
3.	Surface	11
	Total	182

*The traffic of the Project shall merge with the service road and reducing congestion on the entry gate complex of the Project site. Refer **Annex.9** for car parking drawing*

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

The Project provides 6 m wide road and will be manned by trained security round the clock. Thus no congestion due to traffic is anticipated. The parking will be allotted to the occupants eliminating problems of miss-parking and parkings outside the lots. Curbed pathways have been provided along the roads for pedestrian traffic.

The roads within the Project site will be provided with street illumination. Additional pedestrian pathways also will be provided with children play area, etc.

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.

About 5 - 10 trucks per day during construction will come to the site for supply of construction material. However, this traffic will gradually taper down after major concrete structural activity of the project is over. Tailpipe emissions and engine noise from the construction traffic may cause temporary nuisance to the nearby locations. However, this will be localised & short term. All such traffic will be confined to day time. This is however expected to be significantly ameliorated by the landscape proposed along the road side. The Project site being predominately residential, no sensitive receptors are present in the vicinity which could be adversely affected by the un-avoidable noise generated due to any activities.

5.6. What will be the impact of DG sets & other equipment on noise levels & vibration in & ambient air quality around the project site? Provide details.

Based on the power load demands, 1 DG set of 250 kVA will be provided. The DG will be acoustically enclosed type with noise level < 75 db (A) at 1m distance as per CPCB norms. The DG will run on low sulphur HSD. A naturally aspirated, insulated stack will be provided to a height of 5 m higher than the building height to facilitate dispersion of flue gases. The DG will be tuned by the vendor to meet with the NOx and SO₂ emission norms prescribed under EP Act 1986.

The air quality at the Project site is pristine at present. Noise shall be created due to traffic movement inside the Project Site. This is however expected to be significantly ameliorated by the landscape proposed in the Project site. The Project site being predominately residential, no sensitive receptors are present in the vicinity which could be adversely affected by the un-avoidable noise generated due to any activities.

6. AESTHETICS

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

The Project will result in creation of aesthetic architectural construction in the area. No scenic view will be obstructed.

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

No.

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

There are no local traditional patterns or facades which have made any significant impact on the design of the project.

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

No.

7. SOCIO-ECONOMIC ASPECTS

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

The Project will create direct employment opportunity for ≈ 100 people in its peak development phase which will be temporary in nature.

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

The area is well developed in terms of infrastructure. The city is cosmopolitan in nature and project size is too small to create any significant change in the social infrastructure.

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

There are no sacred sites or distinct cultural values ascribable to the site which may be affected by the proposed project.

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)

Locally available building material will be used in the Project construction. No particular building has process related requirements of steel shell structural, aluminum panels or glass façade, therefore only there will be normal usage of high embodied energy construction material.

Extensive usage of locally available stone for tiling, flooring and building shell purpose, in addition to maximum usage of fly ash cement products will make the construction environmentally less impacting.

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

About 5 - 10 trucks will come to the construction site for transport of excavated earth initially. However, this traffic will gradually tail down after major concrete structural activity of the project is over. Tailpipe emissions and engine noise from the construction traffic may cause temporary nuisance to the nearby locations. However, this will be localised & short term. All such traffic will be confined to day time.

Handling of loose & powdery construction material like soil, sand and cement may lead to dusty instances

during high wind conditions. However, as the site is covered up from the nearby properties.

Transportation of raw material shall be done under covered condition. Spray of water shall be done regularly on the unpaved surfaces of the project to subside dust.

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

Waste construction material from the project will be re-used in road construction.

a. Broken concrete waste

Total amount of broken concrete structures, brick wastage and wasted mortar generated from plastering operation may be about 2-3 % by mass of the total building material used in the project. This material will be collected from the site and stored in a designated place. The material will be crushed, aggregated and mixed with other road sub-base construction material.

b. Waste/damaged construction material

Sieved sand, broken brick bats and chipped plaster will be another type of debris generated from the project construction. This material will also be used in the construction of roads and for backfill and consolidation of surfaces under podia, under margins/pitching of storm water drains, periphery curbing of roads, etc.

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

Solid waste generated from the project will be segregated.

Biodegradable solid waste shall be composted on-site using organic waste convertor, and used as manure for initial landscaping. The garbage will be cleared in quick successions to minimize fly and rodents infestation. Non bio degradable waste will be disposed off in the nearest sanitary landfill site.

9. ENERGY CONSERVATION

9.1. Give details of the power requirements, source of 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?

The power requirement of the proposed project is approx. 900 kVA. Power demands will be higher than the yearly average during summers as air conditioners are the only effective means of ambient cooling in the high RH climate of Bangalore.

Energy conservation at the building level has been attempted by the following two approaches:

(a) Better solar orientation, shade and natural illumination design and better horizontal and vertical aspiration of the building units, thus minimising the need for day time illumination, energy consumption for building & unit level ventilation, and maximising ambient heat radiation by the building skin.

(b) Utilization of energy efficient electronic ballast for BEE 3star & CFL lamps. All the common area illumination shall be done by solar power. Usage solar water heater and regenerative type elevators available

in the market shall be installed. All large volume illuminations such as gate complex, etc. shall be done with energy efficient HPSV lamps.

9.2. What type of, and capacity of, power back-up to you plan to provide?

1 No 250 kVA DG set with acoustic enclosure is proposed. 100% DG back up will cater to emergency illumination demands of the parking and common area, elevators of the buildings, staircase and corridors, etc. external lightings and lightings of the amenities. In addition it will cater to all fire fighting pump demands (main, jockey, flushing), main water lift pumps of the buildings and the STP.

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?

The entire vision window will be provided with double layered insulated glass with external shading. Glass with lower U-value (heat transmission co-efficient) and Solar Heat Gain Co-efficient (SHGC) will be used. The special reflective glasses supplied by some float glass vendors are effective in reflecting visible and IR wavelengths at both the ends of the visible spectrum.

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

The building orientation has been designed to minimise solar heat gain through the skin of the building and to maximise the light penetration to reduce day time illumination of the common areas such as staircases, corridors, parkings, etc. Shade constructed surfaces on the site with landscape features and utilization of high-reflectance materials for hardscape are proposed to minimise solar heat gain in the buildings. High albedo materials for hardscapes (i.e. roof, roads, sidewalks, etc.) with vegetated surfaces such as vegetated roofs are also proposed as passive solar architecture measures in the project.

9.5. Does the layout of streets & buildings maximise 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.

*1. Use of solar water heaters
2. Purchase of energy efficient appliances
3. Use of compact fluorescent lamps and low voltage lighting
4. In order to minimize energy consumption, energy efficient T5 tubes and PL lamps will be used for interior lighting.*

9.6. Is 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?

Building shape and orientation has been designed to pose least direct solar exposure to reduce heat gain by the building envelope. Shading and louvers and building external ventilation shafts will be provided for

shading to achieve lower cooling expenses.

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

Building orientation, shell and fenestration design will be done to maximize natural lighting, ventilation and minimize load on AC.

All the drives used in the utilities, ACs and other electrical appliances will be minimum three star rating from the Bureau of Energy Efficiency.

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

The buildings as standalone development are not likely to alter the wind pattern, solar insolation, albedo and ground shading to significantly alter the micro climate of the area.

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-values or the R values of the individual components.

Not applicable

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

Adequate protection measures are envisaged as part of prevention and control of fires in the Project as prescribed in Part IV of the National Building Code.

Adherence to Building Codes and local Building By-laws generally takes care of the fire hazard prevention. Threats of widespread fires in a residential facility are generally very low.

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

Not applicable.

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

- 1. Mechanical ventilation and exhaust will be provided for the following spaces: Mechanical plant rooms, DG room, basement and electrical substation & panel rooms.*
- 2. Air will be exhausted from toilets and enclosed parking areas.*

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 energy is the non-conventional energy that will be partially utilized in the overall energy consumption of the proposed project.

10. 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.

*A comprehensive Environment Management Plan for the project addressing mitigation measures for activity to be undertaken during the construction and operation through out the life cycle of the project has been prepared. The EMP also delineates the environmental monitoring plan for compliance of various environmental regulations. Please refer **Annex 13** for EMP.*