

Commercial Complex at Premises No. - 25, Netaji Subhash Road, Kolkata - 700001,
KMC Ward No. - 45, Borough - V, P.S. - Hare Street

FORM 1A

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

1.1. Will the existing land use get significantly altered from the project that is not 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 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 area is dedicated for Commercial Complex Area.

Total land area = 11197.52 sqm. Land deed is enclosed in **Annexure – 1**.

Attachment Maps: Conceptual plan as Master Plan is given in **Annexure – 2**.

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.

Total Land Area	11197.52 sqm
Proposed Ground Coverage	3891.09 sqm (34.75%)
Exclusive Tree Plantation Area	2383.89 sqm (21.29%)
Total Green Area	3692.12 sqm (32.97%)
Total Paved Area	2787.18 sqm (24.89%)
Total Built Up Area	81505.78 sqm
No. of Storey	One building of commercial complex with Two Towers, South Tower of G+31 storied with helipad and North Tower of G+23 storied (maximum height – 123.6 meter).
Source of Water	Kolkata Municipal Corporation (KMC)
Total Quantum of Water required	362 KLD
Quantity of Wastewater Generation	200 KLD
Quantity of Treated Wastewater Discharge	Zero Discharge
Treated Wastewater Recycled	200 KLD
Quantum of Fresh Water required	162 KLD
Quantity of Solid Waste Generation	1670 kg/day
Constructional Phase Water Demand	56 KLD (Construction Labours – 47KLD; Construction Work – 9 KLD)

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Total Population During Construction	660 nos.
Total Population During Operation	5387 persons
Electricity Load	5000 KVA (4000 KW)
Electricity Supplied By	CESC
D.G.Sets	2 x 2500 KVA
Fuel (diesel) Required for D.G.Sets	800 lt/hr
Stack Height for D.G.Sets	10.0 m for 2500 KVA DG set each
Car Parking Required	504 Nos.
Car Parking Provided	Total -641 Nos.[Covered: (Ground Floor-10 Nos., 2nd Floor-60 Nos., 3rd Floor-98 Nos., 4th Floor-102., 5th Floor-102 Nos., 6th Floor-102., 7th Floor-102 Nos.), Open: Ground Floor-65 Nos.]
Total nos. of trees provided	160 Nos.

Connectivity : The proposed project is located about 2.53 km away from Sealdah railway station. It is about 15 km away from Netaji Subhash Chandra Bose International Airport.

Community Facilities : There are existing community facilities in the vicinity of the project.

Area statement including car parking calculation is given in **Annexure – 3**.

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).

This is a plain developed land with no undulation. The surrounding area is predominantly commercial Complex area. The total land area of the proposed project is 11197.52 sqm. By applying rational formula the peak rate of storm runoff considering 12 mm/hr rainfall is given. Total land area = 11197.52 sqm = 1.11 ha. By applying rational method the peak rate of run-off = $10 \times 0.60 \times 12 \times 1.11$ cum. /hr. = 79.92 cum./hr. = 0.022 cum/sec. Velocity through pipe is 1.1 m/sec (non scouring and non silting). The required diameter of pipe is 200 mm.

The storm drains of the complex will collect and convey the rainwater into the adjacent Kolkata Municipal Corporation drain. The internal drainage system will be designed considering the invert level of the Kolkata Municipal Corporation drain (outfall) in-front of the project site to avoid any flooding or water logging in the site.

During construction phase pollution due to air borne dust, wastewater, noise and vibration will be anticipated. The site will be enclosed to a reasonable height (about 15-20 feet) to prevent transportation of air borne dust and to create barrier for the noise. No significant additional load is anticipated to existing noise and air quality status.

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During construction activities water sprinkling arrangement will be made in regular manner for dust suppression. Wastewater originating from labour hut will be discharged to the Kolkata Municipal Corporation (KMC) drain through temporary septic tank during construction phase.

Both during construction and operational phase vehicle movement will be increased but the level of increment will be accommodated easily with the prevailing traffic load. Traffic movement will be controlled by the security inside the premises.

The ecological scenario around the existing site is mainly composed of residential and commercial building with trees and vegetation. The pollutants anticipated in this site have already been mentioned with the mitigation measures to be adopted. The site will be landscaped with garden and evergreen trees, which would act as pollutant absorber. And therefore, the activities both during construction and operational phase would not cause any adverse impact on the local ecology.

The community facilities such as hospitals, nursing homes, schools, post office etc. present in the neighboring area will not be affected as adequate preventive measures will be taken as discussed above.

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).

This zone is not susceptible to subsidence and seismicity. As per the seismic zoning map of India, the country has been divided into four seismic zones, namely, Zone-II to V. Zone-V is considered to be the most seismically active region, while zone-II is the least. The project site falls in seismic zone III. Seismic load has been considered in structural design. During construction phase removal of top soil may cause soil erosion at the construction site. The construction site run off with eroded soil will be routed through catch pit / sedimentation basin prior to final disposal to Kolkata Municipal Corporation (KMC) drain.

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)

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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.)

This is a developed land. Total quantity of excavated soil is 3895 cum. Part of the excavated soil will be utilized in the filling of foundation and rest will be disposed off outside the project area. As the land is already developed, so, there is no requirement of fill materials.

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

Water demand during construction phase is: 56 KLD during peak construction period (average water demand in the construction work – 9 KLD and average water demand – potable water – 47 KLD).

Water supply: KMC from its own treated surface water source.

No construction material or wastes e.g. excavated soil, debris etc., will be dumped outside the project area.

Construction waste originating from construction activities will be 711 MT. Construction waste will be used in the site and road preparation work.

Garbage will be segregated at source for biodegradable, recyclables and inert material. Waste generated during construction period will be 132 kg/day and finally disposed of by Kolkata Municipal Corporation (KMC) as per MSW (M&H) Rules 2016.

During construction phase wastewater originating from labour hut will be discharged to Kolkata Municipal Corporation (KMC) drain through septic tank by temporary sewer connection from Kolkata Municipal Corporation (KMC).

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. The construction site is neither lowland nor a wetland.

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 does not contain any remarkable harmful substances that can cause health hazards. The hazardous waste is mainly of centering oil, grease, water proofing compounds, paints, wood dust from treated wood, discarded lube oil etc. Special care will be taken to prevent mixing of these harmful substances with non hazardous construction waste. Discarded lube oil will be stored in HDPE container and finally sold to the authorized vendor of MoEF. Therefore, possibility of any health hazard will be negligible.

Waste originating from construction activities will be 711 MT. Demolition and Construction waste will be used in the site and road preparation work.

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Proper sanitary and health care facilities will be developed for the construction workers and the persons associated with the project within the project site. Temporary residential arrangements with adequate number of decentralized latrines and urinals for construction workers will be provided during the construction period.

The wastewater originating from labour hut will be discharged to Kolkata Municipal Corporation (KMC) drain (temporary sewer connection) through septic tank.

Garbage will be segregated at source for biodegradable, recyclables and inert material. Waste produced during the construction period will be 132 kg/day and will be disposed of by Kolkata Municipal Corporation (KMC) as per MSW (M&H) Rules 2016.

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.

Daily water demand of the proposed project during operation phase will be 362 KLD, out of the total water demand 162 KLD will be the fresh water demand and rest 200 KLD (landscaping – 21 KLD, HVAC: 85 KLD, Dual Flushing – 94 KLD) will be recycled from treated wastewater. The fresh water will be supplied by Kolkata Municipal Corporation.

	Total popu.	Lpcd	Total litre/day	KLD
Shop	566	45	25470	26
Restaurant	598	70	41860	42
Food court, Spa, Banquet, Cafeteria etc	538	35	18830	19
Hotel	82	180	14760	15
Office	3068	45	138060	139
Service Persons	49	15	735	1
Floating population	486	15	7290	8
Sub Total 1				250
Landscaping				21
Losses				3
HVAC				88
Sub Total 2				112
TOTAL WATER REQUIREMENT				362
Total Wastewater Generation				200
Total Wastewater discharge				0

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Total Recycling	200
Landscaping	21
HVAC	85
Flushing	94
Fresh Water Requirement	162
OCCUPANCY RATE AS PER NBC 2016, PART 9, PAGE 11, CLAUSE 4.1 ,SECTION 1	

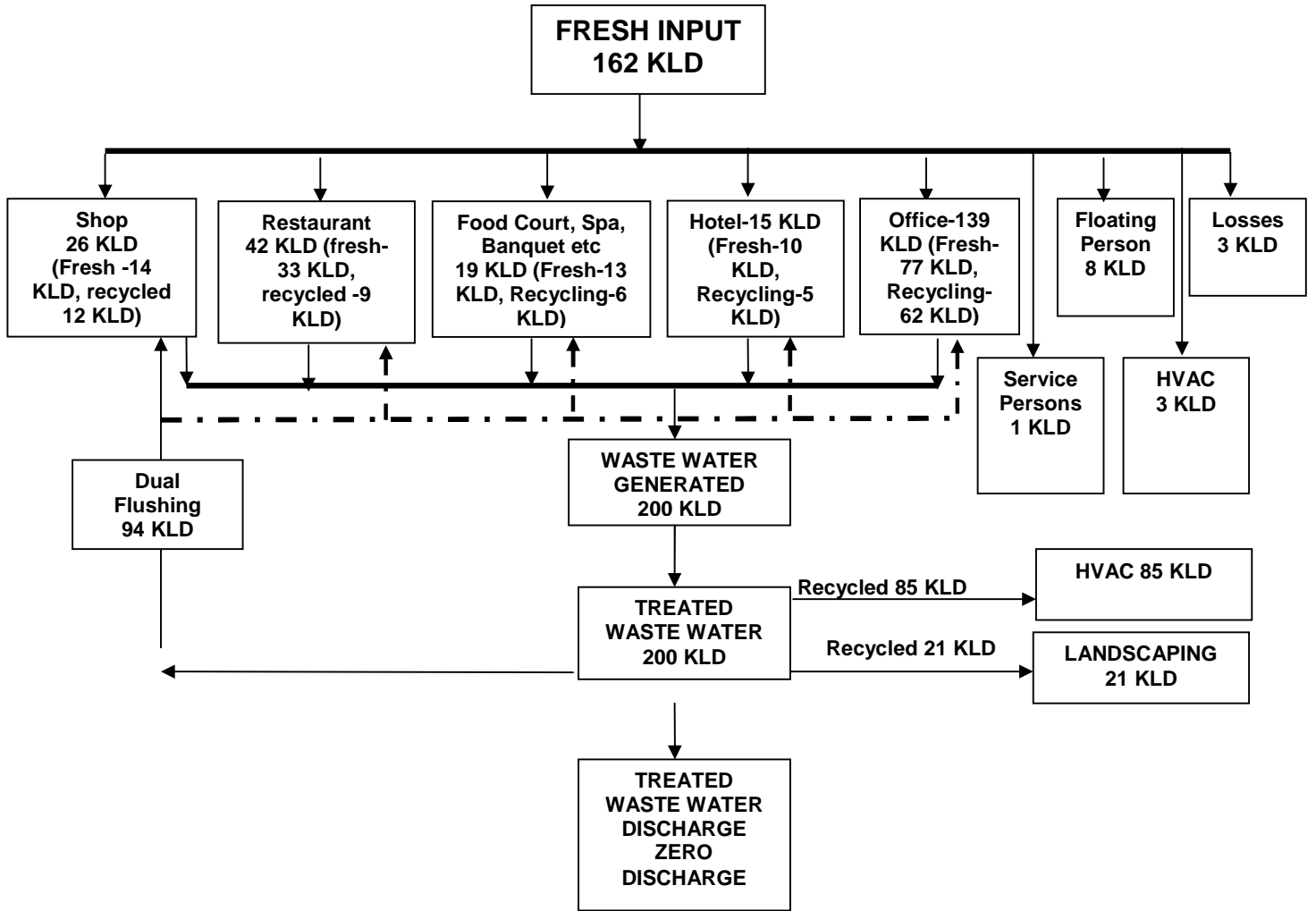
The wastewater will be collected through a well designed sewer network leading to STP. The proposed STP will be based on FAB technology.

Total Recycling : 200 KLD
Landscaping : 21 KLD
HVAC : 85 KLD
Dual Flushing : 94 KLD

Treated Waste Water Discharge to Drain: Zero Discharge

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WATER BALANCE DIAGRAM



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

Water will be supplied by KMC from its own treated surface water source.

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)

KMC will supply water.

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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)

Total Recycling: 200 KLD (Landscaping: 21 KLD + HVAC: 85 KLD + Dual Flushing: 94 KLD)

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)

Water will be supplied by KMC.

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)

The total wastewater generated from this project during operational phase is around 200 KLD. As such, no impact is anticipated on the local surface water quality. The composition of raw wastewater is given below.

pH	: 6.5 - 8.5
TSS	: 150 – 250 mg/L
BOD	: 175 – 200 mg/L
COD	: 350 – 400 mg/L
OIL & GREASE	: 10 - 20 mg/L

Treated wastewater quality would conform to the CPCB standards for discharging into surface water bodies.

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

The rain water harvesting detail is given in **Annexure – 4**.

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?

This is a plain developed land with no undulation. The surrounding area is predominantly Commercial Complex area. The total land area of the proposed project is 11197.52 sqm. By applying rational formula the peak rate of storm runoff considering 12 mm/hr rainfall is given. Total land area = 11197.52 sqm = 1.11 ha. By applying rational method the peak rate of run-off = $10 \times 0.60 \times 12 \times 1.11$ cum. /hr. = 79.92 cum./hr. = 0.022 cum/sec. Velocity through pipe is 1.1 m/sec (non scouring and non silting). The required diameter of pipe is 200 mm.

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level of the Kolkata Municipal Corporation drain (outfall) in-front of the project site to avoid any flooding or water logging in the site.

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)

The required amount of water will be supplied by KMC from its own treated surface water source. To overcome the negative impacts, the reservoir will be recharged with rain water.

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)

Very negligible quantity of construction materials are expected to be deposited on the construction site, which may be carried through surface run off. As a preventive measures surface run off will be routed through catch pit /sedimentation basin prior to final / ultimate disposal to Kolkata Municipal Corporation (KMC) drain. Special care will be taken while using some hazardous substances such as oil, paint, wood dust from treated wood, etc. to prevent mixing with the surface run off. Therefore no possibility is expected to pollute land and aquifers due to the construction activities.

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 land is a developed land. The storm water coming from roof top will be connected with the rainwater harvesting tank (partially) and partially recharging into the deep aquifer as proposed earlier and the overflow will be diverted to the well designed storm water drain inside the building. The inside storm water drain will be designed considering the invert level of the KMC combined sewer drain so that the excess storm water and surface run off can easily go to the KMC drain. Rainwater harvesting details is given in **Annexure – 4**.

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).

Mostly the construction workers shall come to the site from the adjoining areas. They will be provided with clean drinking water from Kolkata Municipal Corporation (KMC). The labour huts will be temporarily constructed with adequate number of decentralized latrines and urinals. The wastewater will be finally connected to Kolkata Municipal Corporation (KMC) drain by temporary connection through septic tank. As such, development of unsanitary condition due to deployment of construction workers is not expected.

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)

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The total quantity of wastewater generation will be about 200 KLD. The wastewater will be treated in STP based on FAB technology and reused as much as possible within the project site for landscaping, car washing and flushing. Process flow sheet of STP is given in **Annexure – 5**.

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

Dual plumbing system is proposed in the said project. 200 KLD of treated wastewater will be recycled by dual flushing system.

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)

No, there is no threat to the Biodiversity. This is no existing trees with in project area. The operation stage of the proposed project will not pose any significant impact to the biodiversity of the area. Moreover plantation program will give shelter to the avifauna.

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

There will no extensive clearing or modification of vegetation. The detail of trees to be planted with names is given in **Annexure - 6**.

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).

The proposed building will have landscape garden and plantation along the boundary, roadside and inside the hard surface area. This plantation programme will create a better landscape quality as well as a barrier for dust and noise. The detail of trees to be planted is given in **Annexure - 6**.

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.

There will be no significant impact on the faunal resource of the area due to the construction and operation of the proposed building.

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

The activities including plantation program to be carried out have no way link to any direct or indirect negative impact on the avifauna. On the contrary additional trees will make shelter for avifauna.

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

Plantation programme that will be undertaken is likely to have some positive impact on the faunal resource of the area.

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)

The data obtained from WBPCB were compiled to have an idea about the background air quality around the project area.

**Background Air Quality Around Project Area
(Yearly average during January 2018 To March 2018)**

Name	NO ₂ (µg/cum)	SO ₂ (µg/cum)	PM ₁₀ (µg/cum)
Moulali	56.99	239.11	9.78
Shyambazar	53.52	220.53	8.42

(Source : WBPCB website)

Increase of vehicular traffic may cause increment of atmospheric concentration of gases in construction phase. However, it will be ensured that vehicles with valid auto emission control certificates will be used during the construction. As a result, no adverse impact on the ambient air quality of the area due to the increased traffic movement during the project construction activities is expected.

Planting trees, bushes and properly planned landscape will reduced the heat islands effect by reducing ambient temperature through evapotranspiration. Trees will be planted around the building, which intercept solar radiation and shade the walls and windows of building (with S, SW and SE exposure) to prevent heat gain to a certain height. Broken china mosaic, light colored tiles as roof finish, which reflects the heat off the surface because of high solar reflectivity, and infrared emittance, which prevents heat gain. In the parking areas hollow concrete pavers will be used.

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.

Dust particle will be liberated due to different constructional activities, like unloading, storage and handling of different constructional materials, handling of construction site debris, rubbish etc. and vehicular movement for transportation of these materials. As a result, SPM and RPM concentration in the ambient air will increase to some extent. Dust pollution, though temporary in nature, may affect health of the workers. But the overall ambient air quality in and around KMC exhibit the concentration below permissible limit except in winter due to meteorological condition.

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.

Adequate provisions for parking will be kept within the project site. Adequate security personnel will be posted at the entry and exit points of the complex to supervise traffic management in and around the complex.

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

Internal wide road will be constructed by the project authority.

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.

There may be some increase in movement of light vehicles, private cars, and two wheelers in the area due to the proposed project. The movement of such vehicles in the area and blowing of their horns may contribute to the noise level. Blowing of the horns will be restricted inside the project. The vehicle to be used for transportation of materials must have a valid Pollution under Control (PUC) certificate and it will be checked in every 6 months period. Adequate security personnel will be posted at the entry and exit points of the complex to supervise traffic management and avoid traffic congestion. However, the magnitude of such negative impact would be insignificant.

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.

Running of pumps, D.G. Sets etc. may create an occasional noise problem of low order and for short duration in the neighbourhood. Electricity will be supplied by CESC. Connected load will be about 5000KVA (4000 KW). DG sets (2 nos. 2500 KVA each) will be installed for backup power. The emission from DG sets will be discharged through a 10.0 m stack for 2500 KVA DG set above the roof of the DG building. Fuel (diesel) required for DG sets will be about 800 litre/hr. As such, these activities will have insignificant impact on noise level and vibration in the neighbourhood.

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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?

There will not be any obstruction of view, scenic amenity or landscapes since such factors had been taken into consideration while formulating the project concept.

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

Not expected.

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

Nothing mention worthy.

6.4. Are there any anthropological or archaeological sites or artifacts 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.

Population data of Kolkata Municipal Corporation according to **Census 2001** is given in the following Table:

DETAILS	MALE	FEMALE	TOTAL
Total households			34,952
Total population (including institutional and houseless population)	79,728	75,723	155,451
Population in the age group 0-6	8,275	7,892	16,167
Scheduled caste population	8,651	8,503	17,154
Scheduled tribe population	929	886	1,815
Literates	63,542	53,283	116,825
Total workers	44201	8,878	53,079

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Main workers	41,865	6,950	48,815
Cultivators	388	28	416
Agricultural labourers	399	21	420
Household industry workers	553	340	893
Other workers	40,525	6,561	47,086
Marginal workers	2,336	1,928	4,264
Cultivators	9	13	22
Agricultural labourers	60	5	65
Household industry workers	72	299	371
Other workers	2,195	1,611	3,806
Non - workers	35,527	66,845	102,372

Some local people will get job during the construction phase of the project. Some manpower will be required for regular operation and maintenance of the complex building. The project will generate job opportunities in both direct and indirect sector.

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

There are schools, post office, hospitals in the neighboring areas of the site.

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

NA

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)

The project will be conceived mostly using RCC and brick wall. The building materials to be used are of low to moderate-embodied energy as major percentage of construction materials will be covered by cement mixed with fly ash, sand, bricks mixed with fly ash, tiles and reinforcement (steel). A little amount of high-embodied energy content material such as aluminium and glass will be used as required for Business Building.

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

- ✓ The construction materials will not be dumped in public roads around the project site.
- ✓ Loading and unloading of construction materials must not be done at night at the store yard considering the huge noise like to be generated from this activity.

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- ✓ Attempts will be taken to keep the debris under cover during storage at site and while transporting.
- ✓ Apply water and maintains soils in a visible damp condition for temporary stabilization.
- ✓ Limit vehicle speeds (10-15 km/hr) to such a limit that it could not generate dust.
- ✓ Clean overhaul truck before leaving the site

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

Yes, discarded demolition and construction waste and debris will be used in the roads and site preparation work.

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

The garbage (solid waste) within the project site will be biodegradable, recyclables and inert material in nature. The total quantity of solid waste generated during operational phase will be 1670 kg/day. The solid waste will be segregated at source and collected in separate bins. The solid waste will be collected through containerized system and finally it will be transported, treated and disposed off by KMC as per MSW (M&H) Rules, 2016.

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?

Electricity will be supplied by CESC. The connected load will be about 5000 KVA (4000 KW). DG sets (2 nos. 2500 KVA each) will be installed for backup power. The emission from DG sets will be discharged through a 10.0 meter stack for each 2500 KVA DG set above the roof of the DG building. Fuel (diesel) required for DG sets will be about 800 litre/hr. In the common area solar energy will be used in some places for lighting to minimize the energy consumption. Use of CFL lamps instead of GLS lamps & use of T5 light fixtures in basements.

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

For backup power 2 nos. 2500 KVA each D.G. sets will be installed.

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?

As the project is a Commercial Complex area glass will be used in different places and it will be restricted with in 30% of the total wall area.

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

Orientation of building façade is an important parameter of solar passive building design. Orientation also plays an important role with respect to wind direction. The amount of solar radiation falling on surfaces of different orientation varies considerably depending on the view or exposure to the sun. Northward orientation has a very brief period of exposure to solar radiation: early morning and late afternoons on clear summer days. Considering all these features the building is designed northward orientation to reduce heat gain.

9.5. Does the layout of streets & buildings 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.

Energy efficient lighting system e.g. High Pressure Sodium Vapour (HPSV) lamps, LED etc will be used. Emergency lighting will be provided by DG sets. Solar energy will be used in street 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?

Considering the fact that northward orientation has a very brief period of exposure to solar radiation: early morning and late afternoons on clear summer days, the building is designed northward orientation to reduce heat gain. Apart from that light colour and smooth building finish is preferred to promote reflectivity and reduce absorption of solar radiation. In order to reduce the U-value of the Roof assembly to 0.4 W/m²C, roof tiles with surki backing shall be laid on roof to minimize heat transfer from the roof. Passive solar cooling to be incorporated in building design.

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.

Uses of Air conditioner will be CFC and HCFC free.

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?

Planting trees, bushes and properly planned landscape will reduce the heat island effect by reducing ambient temperature through evapotranspiration. Trees will be planted around the building, which intercept solar radiation and shade the walls and windows of building (with S, SW and SE exposure) to prevent heat gain to a certain height. Apart from that northward orientation has a very brief period of exposure to solar radiation: early morning and late afternoons on clear summer days, the building is designed northward orientation to reduce heat gain. Broken china

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mosaic, light colored tiles as roof finish, which reflects the heat off the surface because of high solar reflectivity, and infrared emittance, which prevents heat gain, shall be used. In the parking areas hollow concrete pavers will be used.

Microclimate Study Report is given in **Annexure - 11**.

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.

Wall : Wall with 2" Insulation on North & South Facade
U-Value : 0.409 W/sqm°K

Roof : OverdeckPU form based 3" Insulation
U-Value : 0.29 W/sqm°K

Glazing : Saint GobainSKN 054
U-Value : 1.4 W/sqm°K
SHGC: 0.28
VLT: 0.53

Shading: Horizontal & Vertical shades of 600mm

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

- Fire fighting system will be designed in accordance with the WBFS norms.
- Fire Consultant will be appointed for drawing up an appropriate plan for control / management of any fire in the complex.
- Fire alarm system will be provided at appropriate locations.
- Security Manager will be stationed to inform Fire Brigade / Police Station / Hospitals / Local Administrations in case of an emergency / disaster.

Emergency Management Plan is given in **Annexure – 10**.

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

As the project is a business building, glass will be used in different places and it will be restricted with in 30% of the total wall area.

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

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Always positive pressure will be maintained.

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 will be used in street lighting to minimize the energy consumption.

10. Environment Management Plan (EMP).

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. EMP is given in **Annexure - 7.**