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 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 to 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 Residential cum Commercial Complex.
Land Area =7729.37 sqm.
Total Built-up area = 30456.925 sqm
Land related document is enclosed in **Annexure – 1.**

Attachment Maps **:** Conceptual plan as Master Plan is given in **Annexure – 3**.

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.

Proposed Project Area	7729.37 sqm
Total Built Up Area	30456.925 sqm
Ground Coverage	3463.26 sqm (44.81%)
Total Green Area	1888.41 sqm (24.43%)
Exclusive Tree Plantation Area	1678.76 sqm (21.72%)
Total Paved Area	1518.36 sqm (19.64%)
No. of Block & Storey	Block A to Block E –B+G+10
No. of Dwelling units	214 nos.
Source of Water	Bidhannagar Municipal Corporation supply.
Total Quantum of Water required	216 KLD
Quantity of Wastewater Generation	154 KLD
Quantity of treated wastewater recycled	83 KLD

<table>
<tr><td>Quantity of treated wastewater Discharge</td><td>71 KLD</td></tr>
<tr><td>Quantum of Fresh Water required</td><td>133 KLD</td></tr>
<tr><td>Quantity of Solid Waste Generation</td><td>755 kg/day</td></tr>
<tr><td>Constructional Phase Water Demand</td><td>21 KLD (Construction work – 3 KLD, Workers – 18 KLD)</td></tr>
<tr><td>Total Population During Construction</td><td>250 persons</td></tr>
<tr><td>Total Population During Operation</td><td>1689 persons (permanent - 1280, temporary - 409)
<table>
<tr><th></th><th>total no. of flats</th><th>Total Popu.</th></tr>
<tr><td>Residential (Fixed)</td><td>214</td><td>1248</td></tr>
<tr><td>Commercial Area (Fixed)</td><td></td><td>32</td></tr>
<tr><td>Total Fixed persons</td><td></td><td>1280</td></tr>
<tr><td>Floating population</td><td></td><td>408</td></tr>
<tr><td>Residential</td><td></td><td>125</td></tr>
<tr><td>Commercial Area</td><td></td><td>283</td></tr>
<tr><td>Service Persons</td><td></td><td>1</td></tr>
<tr><td></td><td></td><td>1689</td></tr>
</table></td></tr>
<tr><td>Electricity Load</td><td>1660 KVA (1327KW)</td></tr>
<tr><td>Electricity Supplied By</td><td>WBSEDCL</td></tr>
<tr><td>D.G.Sets</td><td>3 nos 500 KVA DG Set & 1 no 150 KVA DG Set.</td></tr>
<tr><td>Fuel (diesel) Required for D.G.Sets</td><td>264 litre/hr.</td></tr>
<tr><td>Stack Height for D.G.Sets</td><td>4.5 m stack for each 500 KVA DG set, 2.4 m stack for 150 KVA DG set opening above roof level.</td></tr>
<tr><td>Car Parking provided</td><td>226 nos. (Covered -200 nos, Open -26 nos.)</td></tr>
<tr><td>No. of trees provided</td><td>110 Nos.</td></tr>
</table>

Connectivity : Bidhannagar Railway Station– 8.88 km. NSCB Airport – 2.56 km (aerial distance)

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

Area statement including car parking details is given in **Annexure –4.**

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 existingland use, disturbance to the local ecology).

The surrounding area is predominantly Residential cum Commercial Complex. The proposed project area is 7729.37 sqm.By applying rational formula the peak rate of storm runoff considering 12 mm/hr rainfall is given below.

The proposed project area =7729.37 sqm = 0.772937 ha. By applying rational method, the peak rate of run-off = 10 x 0.60 x 12 x 0.772937 cum/hr. = 55.651 cum/hr. = 0.01545 cum/sec. Velocity through pipe is 1.0 m/sec (non-scouring and non-silting). The required diameter of pipe is 150 mm.

The storm drains of the complex will collect and convey the rainwater into the adjacent Corporation drain. The internal drainage system will be designed considering the invert level of the 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 is anticipated. The site is 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.

During constructional activities water sprinkling arrangement have been made in regular manner for dust suppression. Wastewater originating from labour hut is being discharged to the Corporation drain through temporary septic tank followed by soak pit during construction phase.

Both during constructional and operational phase vehicle movement will increase 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 cum Commercial complex 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 provide shadow for creating microclimatic condition. And therefore, the activities both during construction and operation 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 practically 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 is being routed through catch pit / sedimentation basin prior to final disposal to Corporation 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)

This is a plain developed land with no undulation. The surrounding area is predominantly Residential cum Commercial Complex area. The proposed project area is 7729.37 sqm.By applying rational formula the peak rate of storm runoff considering 12 mm/hr rainfall is given below.

The proposed project area = 7729.37 sqm = 0.772937 ha. By applying rational method, the peak rate of run-off = 10 x 0.60 x 12 x 0.772937 cum/hr. = 55.651 cum/hr. = 0.01545 cum/sec. Velocity through pipe is 1.0 m/sec (non-scouring and non-silting). The required diameter of pipe is 150 mm.
The internal drainage system will be designed considering the invert level of the Corporation drain (outfall) in-front of the project site to avoid any flooding or water logging in the site

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 11450 cum. The excavated soil has been stored for construction of road and landscape development. 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: About 21 KLD during peak construction period (average water demand in the construction work – 3 KLD and average water demand – potable water –21 KLD).

Water supply: Water during construction phase is being met from **Bidhannagar Municipal Corporation** supply.

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

Construction waste originating from construction activities will be 355 MT. Construction waste will be used in the site and road preparation work.

Garbage will be segregated at source into biodegradable, recyclables and in-organic material. Waste generated during construction period will be 50 Kg/day and finally disposed off by **Bidhannagar Municipal Corporation (Formerly Rajarhat Gopalpur Municipality)** as per MSW (M&H) Rules, 2016.

During construction phase wastewater originating from labour hut is being discharged to Corporation drain through septic tank by temporary sewer connection from Corporation. Concurrence letter for water supply, discharge of sewer and Corporation solid waste management is given in **Annexure – 2.**

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 no low lying area or wetland within the project area.

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 is taken to prevent mixing of these harmful substances with non hazardous construction waste. Discarded lube oil is being stored in HDPE container and finally sold to the authorized vendor of MoEF. Therefore, possibility of any health hazard will be negligible.

Solid waste originating from construction activities will be 355 MT. Construction waste will be used in the site and road preparation work.

Proper sanitary and health care facilities have been 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 have been provided during the construction period.

The wastewater originating from labour hut is being discharged to Corporation drain (temporary sewer connection) through septic tank followed by septic tank.

Garbage will be segregated at source into biodegradable, recyclables and in-organic material. Waste produced during the construction period will be 50 Kg/day and is being disposed off by **Bidhannagar Municipal Corporation (Formerly Rajarhat Gopalpur Municipality)** as per MSW (M&H) Rules, 2016. Concurrence letter in this context is given in **Annexure – 2**.

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 216 KLD Out of the total water demand 133 KLD will be the fresh water demand and rest 83 KLD (Landscaping – 15 KLD; Car Washing –10 KLD, Flushing – 58 KLD) will be recycled from treated wastewater.

The total wastewater generated from this project during operational phase is around 154 KLD. The wastewater will be collected through a well designed sewer network leading to STP. The STP will be based on **MBBR** technology followed by tertiary treatment (PSF – Pressure Sand Filter, ACF- Activated Carbon Filter and Disinfection by UV Radiation). Process flow sheet of STP is given in **Annexure -6**

Treated wastewater discharge to Corporation drain – 71 KLD The fresh water will be obtained from **Bidhannagar Municipal Corporation** supply.

	Flat No.	Occu. Rate	Total popu.	Lpcd	Total litre/day	kLD
Flats	214		1248	135	168480	169
Commercial Area			32	45	1440	2
Floating Population			408	15	6120	7
Service persons			1	45	45	1
Sub Total 1						**179**
Landscaping						15
Car washing						10
Losses						2
Swimming pool						10
Sub Total 2						**37**
TOTAL WATER REQUIREMENT						**216**
Total Wastewater Generation						**154**
Total Wastewater discharge						**71**
Total Recycling						**83**
Landscaping						15
Flushing						58
Car washing						10
Fresh Water Requirement						**133**
OCCUPANCY RATE AS PER NBC 2016, PART 9, PAGE 11, CLAUSE 4.1 ,SECTION 1						

Source: **Bidhannagar Municipal Corporation** supply.

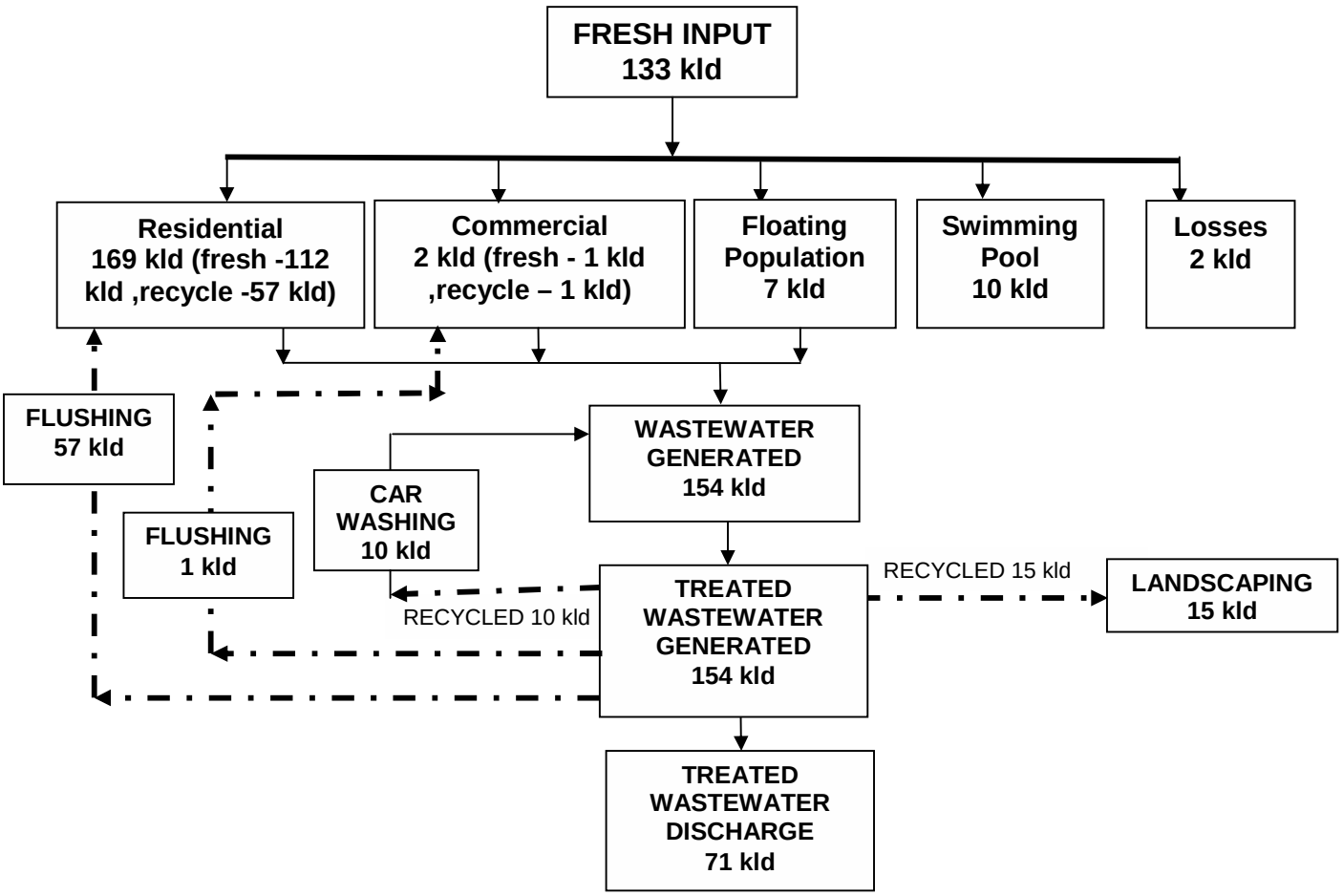
The wastewater will be collected through a well designed sewer network leading to STP. The STP will be based on **MBBR** Technology followed by tertiary treatment (pressure sand filter - PSF, activated carbon filter - ACF & disinfection - UV-radiation) and reused as much as possible**.** Process flow sheet of STP is given in **Annexure -6**

RECYCLED: 83 KLD (Landscaping : 15 KLD + Car Washing : 10 KLD + Flushing : 58 KLD)

Treated Wastewater Discharge to Corporation drain: 71KLD

The treated wastewater will be discharged into the Corporation drain in front of the project site.

WATER BALANCE DIAGRAM



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

Water will be supplied by **Bidhannagar Municipal Corporation** . Concurrence letter is given in **Annexure – 2.**

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 water required during operation phase will be supplied by **Bidhannagar Municipal Corporation**.

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)

RECYCLED : 83 KLD (Landscaping : 15 KLD + Car Washing : 10 KLD + Flushing : 58 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)

No, since the fresh water will be supplied by **Bidhannagar Municipal Corporation**.

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 wastewater generated from this project will be 154 KLD. As such, no impact is anticipated on the local surface water quality because there will be STP for treating the sewage and finally reused for car washing, landscaping and flushing within the project and rest will be discharged into the Corporation drain. The composition of raw wastewater is given below.

pH	: 6.5 - 8.5
TSS	: 200 – 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/SPCB 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 rainwater harvesting details is given in **Annexure –**5**.**

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 surrounding area is predominantly Residential cum Commercial Complex Area. The proposed project area is 7729.37 sqm. By applying rational formula the peak rate of storm runoff considering 12 mm/hr rainfall is given below.

The proposed project area =7729.37 sqm = 0.772937 ha. By applying rational method, the peak rate of run-off = 10 x 0.60 x 12 x 0.772937 cum/hr. = 55.651 cum/hr. = 0.01545 cum/sec. Velocity through pipe is 1.0 m/sec (non-scouring and non-silting). The required diameter of pipe is 150 mm.

The storm drains of the complex will collect and convey the rainwater into the adjacent Corporation drain. The internal drainage system will be designed considering the invert level of the 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 met from **Bidhannagar Municipal Corporation** supply. Rainwater will be recharged into deep aquifers. Rainwater harvesting details is given in **Annexure – 5.**

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 being deposited on the construction site, which may be carried through surface run off. As a preventive measures surface run off is being routed through catch pit /sedimentation basin prior to final / ultimate disposal to Corporation drain. Special care is 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 rainwater harvesting details is given in **Annexure – 5**. The inside storm water drain will be designed considering the invert level of the Corporation drain so that the excess storm water and surface run off can easily go to the Corporation drain.

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 are coming to the site from the adjoining areas. They are being provided with clean drinking water supplied by **Bidhannagar Municipal Corporation** supply. The labour huts have been temporarily constructed with adequate number of decentralized latrines and urinals. The wastewater has been finally connected to the Corporation 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)

The total quantity of wastewater generation will be about 154 kld. The wastewater will be treated in STP based on **MBBR** technology and reused as much possible within the project site for landscaping, car washing and flushing. Process flow sheet of STP is given in **Annexure -6.**

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

Treated wastewater is being used for Dual flushing purpose.

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, there is no threat to the Biodiversity. The operation stage of the proposed project will not pose any significant impact to the biodiversity of the area. Moreover extensive 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- 7**.

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 Residential cum Commercial Complex 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 with names is given in **Annexure- 7**.

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 Residential cum Commercial Complex.

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

The activities including plantation program to be carried out will have no 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
(Daily average Report between January 2017 to March 2017)

Stations	PM_{10}	NO_2	SO_2
Rajarhat	140.86	37.59	3.38
Salt Lake	147.62	44.25	4.34

Increase of vehicular traffic may cause increment of atmospheric concentration of gases in construction phase. However, it has been ensured that vehicles with valid auto emission control certificates are 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 constructional activities is expected.

Planting trees, bushes and properly planned landscape will reduce the heat island effect by reducing ambient temperature through evapo-transpiration. Trees will be planted around the building, which intercept solar radiation and shade the walls and windows of the building (with S, SW and SE exposure) to prevent heat gain to a certain height. Broken china mosaic, light colored tiles as roof finish will be used, which reflects the heat off the surface because of high solar reflectivity, and infrared emittance, preventing 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, PM_{10} 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 around Corporation exhibits 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 has been 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 site.

The vehicles being used for transportation of materials are having valid Pollution under Control (PUC) certificates. 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 on 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 neighborhood. DG sets – 3 nos. 500 KVA & 1 no 150 KVA DG Set will be installed for back up power. The emission from DG sets will be discharged through a 4.5 m stack for 500 KVA DG & 2.4 m stack for 150 KVA above the roof of the building. Fuel required for DG sets will be about 264 litre/hr. As such, these activities will have insignificant impact on noise level and vibration in the neighborhood

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 Rajarhat Gopalpur area according to census 2001 is given in the following Table:

DETAILS	TOTAL	MALE	FEMALE
Total households	61898		
Total population (including institutional and houseless population)	271811	140218	131593
Population in the age group 0-6	28888	14750	14138
Scheduled caste population	50634	25904	24730
Scheduled tribe population	1178	578	600
Literates	204815	111821	92994
Total workers	94001	78455	15546
Main workers	88459	75261	13198
Cultivators	505	338	167

Agricultural labourers	271	204	67
Household industry workers	1171	773	398
Other workers	86512	73946	12566
Marginal workers	5542	3194	2348
Cultivators	55	32	23
Agricultural labourers	55	36	19
Household industry workers	412	116	296
Other workers	5020	3010	2010
Non - workers	177810	61763	116047

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 has been 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, tiles and reinforcement (steel). A little amount of high-embodied energy content material such as aluminium and glass will be used as required for Residential cum Commercial Complex.

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 are not being dumped in public roads around the project site.
- Loading and unloading of construction materials is not being done at night at the store yard considering the huge noise likely to be generated from this activity.
- Attempts have been taken to keep the debris under cover during storage at site and while transporting.
- Applying water and maintaining 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 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 755 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 **Bidhannagar Municipal Corporation (Formerly Rajarhat Gopalpur Municipality)** 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 WBSEDCL. The electrical load will be about 1660 KVA (1327 KW) . DG sets – 3 nos. 500 KVA & 1 no 150 KVA are proposed. The emission from DG sets will be discharged through 4.5 m stack for each 500 KVA DG set & 2.4m stack for 150 KVA above the roof of the building. In the common area solar energy will be used in some places for lighting to minimize the energy consumption.

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

For backup power 3 nos. of 500 KVA & 1 no 150 KVA 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?

In the residential part, no glass will be used in wall material and for other requirement minimum glass will be used.

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

- Masonry construction on the external façade, wherever applicable, would be made of Rat-trap bond of thickness 250 mm, providing better thermal insulation due to the intermediate air gaps in the masonry construction. It is a cavity wall construction with added advantage of thermal comfort and reduction in the quantity of bricks by 25% and the quantity of cement by upto 40%, thus also reducing the consumption of building materials of high embodied energy (5-8 GJ/Tonne for Cement and 2-7 GJ/ Tonne for clay brick). By adopting rat-trap bond method aesthetically pleasing wall surface can be created and plastering thickness can be reduced.
- In order to reduce the U-value of the Roof assembly to 0.35 W/m^2K, roof tiles with surki backing shall be laid on roof to minimize heat transfer from the roof.
- External vertical surfaces will be of light coloured and smooth building finish to promote reflectivity and reduce absorption of solar radiation.
- Sunshades in the form of projection or recessed openings in each floor will be provided to reduce solar radiant heat gain to the indoor environment.
- External plastering of masonry wall, wherever applicable, has been proposed by use of dilutable water repellent emulsion, in order to reduce penetration of ambient moisture to the building material, which in turn will maintain the moisture level at a minimum in indoor spaces of the buildings located in warm-humid climate.
- Recessed wall surfaces, providing mutual shading particularly on the west not only receives lesser solar radiation but also the external surface conductance (fo) becomes much smaller (about 8 to 13 W/m2K) for sheltered exposure, compared to the value of 18.20 W/m2K assumed for the calculation of U-value for external wall.

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 color 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/m^2C, roof tiles with surki backing shall be laid on roof to minimize heat transfer from the roof. Passive solar cooling will 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 in the individual building 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 evapo transpiration. 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 mosaic, light coloured 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.

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.

Roof Assembly:

R= 0.214 m^2 K/W
U=2.750 W/m^2K

External Wall assembly

R= 0.403 m^2 K/W
U= 1.720 W/m^2K

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

- Fire fighting system has been designed in accordance with the WBFES norms.
- Fire Consultant have been 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.

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

Glass will be used in the commercial part. In the residential part, no glass will be used in wall material and for other requirement minimum glass will be used.

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

None

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 - 8.**