

APPENDIX II

(See paragraph 6)

FORM-1 A

(Only for construction projects listed under item 8 of the Schedule)

(Environment Clearance for Proposed Shopping Mall Project to be developed
by M/s HILITE MALL (THRISSUR) LLP)

at

(Re-survey Nos. 188/24, 188/24 p of Ollur Village, Thrissur Corporation,
Thrissur Taluk & District, Kerala)

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)

1.0 LAND ENVIRONMENT

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

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.

Ans. The proposed project site is located at Ollur village which is in the Corporation limits of Thrissur, Thrissur District, Kerala.

The vicinity map and the satellite map showing the location of the project site & it's surroundings is attached. The photographs of the site from all four sides is attached. The survey map showing the topographical levels of the site is attached. The layout plan & building plan is enclosed. The conceptual plan showing the location of STP, Solid waste processing area, landscape area, parking area, rain water storage tanks, location of wells, building blocks, entry & exit to the site, internal traffic circulation within the site and surrounding etc. is attached.

The project site is in Corporation limits of Thrissur which covers the external infrastructural services available / proposed viz. water supply, electricity supply, storm water drainage & sewage facility, road connectivity, common solid waste disposal facility, fire fighting and health & educational institutions.

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.

Ans. The major project requirements for this construction projects are mentioned below:-

Objective of the project = Shopping Mall project

Facilities in the project = Shopping Mall with Retail shops, Multiplex, Restaurant with supporting infrastructure facilities etc.

Total Cost of the Project = Rs. 200 Crores

Total plot area	1.58517 ha. (15,851.75 sq. m.)	
	Permissible	Proposed
Ground Coverage	10,303.63 sq.m. (65%)	10,032.96 sq.m. (63.30%)
Total open area	5,548.12 sq.m. (35%)	5,818.80 sq.m. (36.70%)

FAR proposed = 38,189.92 sq.m. (@2.40)

Total Built-up area = 68,553.39 sq.m.

Max. no. of floors = Basement + Lower Ground + Ground + 6 floors

Max. height of the building = 30 m.

Total Domestic Water Req. = 201 KL/day

Sewage Generation = 181 KL/day

Sewage Disposal Facility = Sewage Treatment Plant & Recycling

Treated Water Available from STP = 163 KL/day

**Source of Water = Roof Rain water (Non-flushing req.) (Rainy days-Concurrent use),
Stored rain water / well water / KWA supply (Non flushing req.) (non-rainy days) &Treated waste water from STP (Flushing Req.) (Entire Year)**

The details of the daily water requirement balance chart (rainy days & non – rainy days) is provided. Also attached is the activity wise population & daily water consumption details are attached.

Total Power Demand load = 3,382 kVA

Source of Power = Kerala State Electricity Board & D.G. Sets (standby)

Capacity of D.G. Sets = 1,500 kVA x 2 nos. + 1,010 x 1 no.

Parking Proposed = about 629 Cars + about 445 Two wheelers

Connectivity :-

The access road to the project site is from 16 m. wide Thrissur-Mannamangalam Road which is well connected to entire city.

The nearest railway station is Thrissur Railway Station which is at about 7 km. and Cochin Int. Airport, (Nedumbassery) is at about 46 Km. away from the project site.

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

Ans. The proposed project site is located at Ollur village which is in the Corporation limits of Thrissur, Thrissur District, Kerala. There would be no negative impacts on the existing facilities adjacent to the proposed site.

The proposed project has provision for (i) Treatment of sewage and it's fully recycling thereby there is no discharge outside the project premises during rainy days and during non rainy days (ii) The project has made provision for rain water storage tank which will be used as concurrent source of water during rainy days and for non-rainy days. (iii) By the bio-gas generation plant to be installed within the project site, the bio-degradable solid waste disposal will be managed within the site thereby no disposal outside the site.(v) There are various native species of trees, shrubs, herbs etc existing at site as part of floral ecology. Some of the trees will be retained and the remaining will be cut for development of the proposed site. As part of the eco restoration, large number of saplings of native species would be planted. Due to the eco restoration, the impact to floral and faunal ecology will be short term.

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).

Ans. There will be no significant land disturbance occur due to the proposed construction project. The project site falls within Zone-III as per the seismological classification map of India. There is no history of subsidence of the project site or it's surroundings in the past. There is a level difference of about 3 m. and the slope is towards north to south side of the project site.

The ground water table is higher levels. The bore hole soil profile data of the site is provided.

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)

Ans. There is a level difference of about 3 m. and the slope is towards north to south side of the project site. The contour map showing the natural drainage of the proposed project site is provided. The proposed development does not affect the drainage pattern of the site and surroundings. There is a storm water drain available abutting the access road (Thrissur-Mannamangalam) to the project 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.)

Ans. Excavation of earthwork for foundation of structures will be carried out. The top soil which is fertile will be kept at site for landscaping work. The excavated soil will be used for back filling work and for internal road construction purposes the excess excavated earth of will be disposed as per guidelines.

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

Ans. Construction phase – It is expected to have about 150 workers (average) during construction phase. The water requirement during construction period is from the well water. The domestic water requirement is expected to be 11 KL per day and for construction purposes would be about 30 KL per day. Further, by using of ready mix concrete (RMC) & curing agents, the water will be reduced substantially. The major part of the construction water requirement will be fully consumed. The sewage generation from labourers during construction period would be about 9 KL/day and this quantity of domestic waste would be disposed through a STP to be installed at the labour colony. The treated sewage will be used for meeting the landscape requirement. The non bio-degradable waste, the empty

cement bags, other packaging materials etc. would be disposed to the vendors. The bio-degradable solid waste from the labour colony will be disposed in a bio-bin system for microbial composting from the labour colony.

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)

Ans. Not applicable.

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)

Ans. The construction waste consists of earth, debris concrete, lumber, masonry and cardboards which are about 35%, 15%, 12% and 10% respectively. Construction waste would be disposed for backfilling purposes. The bio-degradable food waste from the construction labourers will be disposed in a bio-bin system for microbial composting from the labour colony. The non-biodegradable waste will be stored and sold to the vendors. The packaging material like cement bags etc. would also be sold to the vendors.

2.0 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.

Ans. The details are provided below :-

The water requirement during construction phase are for construction purposes and for the domestic water requirements of the construction workers. The construction water requirement is expected to be 30 KL/day and for domestic purposes is estimated to be 11 KL/day. The water requirement during the construction phase will be met from the wells & rain water storage tanks.

The total daily water requirement, water balance chart and source of water during the operation phase of the project calculated on the basis of full occupancy are mentioned below: -

**Total Domestic Water Req. = 201 KL / day
(which includes 102 KLD of fresh water req.)**

Sewage Generation = 181 KL / day

Sewage Disposal Facility = Sewage Treatment Plant & Recycling

Treated Water Available = 163 KL / day

Source of Water = Roof Rain water (Non-flushing req.) (Rainy days-Concurrent use), Stored Rain Water / Wells / KWA water supply (Non flushing req.) (non-rainy days) & Treated waste water from STP (Flushing Req.) (Entire Year)

The project has made provision for rain water storage tank will be used for the concurrent use of water and hence as source of water during rainy days & non-rainy days. The source of water for this well water & stored rain water through tanks and hence the availability of water is ensured.

The Water Balance Chart (rainy days & non-rainy days) is attached. The activity wise population & daily water consumption details are attached.

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

Ans. During construction phase, the source is from the wells / KWA water supply & recycled water from STP & rain water storage tank. With the estimated construction phase water requirement of about 41 KL/day (11 KDL + 30 KLD) extending for a period of about 36 months, this source is dependable. The source of water for the proposed project during operation phase will be water from the proposed Rain water collection tank within the site of for meeting the water requirement for non-flushing (during rainy days). Also, it proposed to construct STP for the treatment of domestic sewage. During non-rainy days, the source of water is from stored rain water & for well water for meeting the non-flushing water requirement. The treated waster from STP would meet the water requirement for flushing, horticulture & cooling requirements. Therefore by these sources and by an integrated water management approach, a dependable source of water is ensured. Further details are provided in water balance chart which is provided.

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)

Ans. The source of water for the proposed project will be from stored rain water during rainy days & non-rainy days for non-flushing purposes & treated sewage for meeting the flushing water requirement. Also for the drinking purposes KWA water supply will also be another source of water to the project. It is proposed to have Sewage Treatment Plant (STP) for treatment of domestic sewage. Also, it is proposed to have WTP for filtration & disinfection of rain water before its use. The water quality of the well at site is collected and analyzed through a NABL accredited laboratory. It is observed that the analyzed values physical, chemical parameters of the well water analyzed is fit for potable purposes to meet the drinking water standards as per IS 10500 except iron contents. Thereby, appropriate treatment would be done before its consumption. Also attached is the well water quality report.

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)

Ans. The proposed project has provision for treatment of sewage. The quantity of treated water from STP which is fit for recycling to meet the flushing requirement (121 KLD), horticulture (4 KLD) & excess to the cooling requirement. The details of recycling and it's usage are provided in 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)

Ans. Since there is minimal dependency on public supply (only for drinking), there is no diversion of water from other users. The water supply for the proposed project is from stored rain water, well water and recycled water and hence there will be minimum impact to the surrounding.

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)

Ans. There would be no incremental pollution load from wastewater generated from the proposed activity because the whole waste water of this project would be treated through proposed S.T.P. within the project area and the treated water from S.T.P will be fully re-used during non rainy days and no

discharge outside the project site during rainy days. Therefore, no impact outside the site.

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

Ans. One of the source of water for the proposed project will be water from stored rain water in tanks to be constructed within the site for meeting the water requirement for non-flushing activities. The capacity of the rain water storage tank requirement is = ground coverage of the building x 25 ltr. as per KMBR. The statutory requirement works out. However, provision is made more than the statutory requirements.

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?

Ans. As per the soil investigation report, the ground water is at about 0.9 m. below the existing round level. The soil is Lateritic clay with gravel in nature. Due to this factors, the percolation to the ground before the site development is very poor. Further, it is proposed to have a rain water storage tanks. Due to these measures, there would not be any incremental load and will not cause any flooding or water logging. The excess runoff from the site before discharge outside will be pass through a de-siltation cum oil removal unit. The excess storm water will be chanalized to the drain available at 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)

Ans. Pre-construction Soil Investigation has been carried out for the site. As per the soil investigation report, the ground water is at about 0.9 m. below the existing round level. The soil is Lateritic clay with gravel in nature. The source of water for the proposed project will be water from Rain water storage tanks for meeting the water requirement during rainy days-concurrent use and stored for non-rainy days and well water at site for meeting the water requirement for non-flushing activities and water supply from Kerala Water Authority and hence the availability of water is ensured and due to the reasons mentioned above, the dependency on ground water will be minimal.

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)

Ans. The run-off during construction phase will be partially channelized to the rain water storage tank. The excess runoff will be channelized from the site after de-silting and oil removal and therefore, the run-off will not contaminate the land and aquifer.

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)

Ans. The roof run-off from the site will be appropriately channelised to the storm water collection tank to be constructed within the site and surface run-off will be connected to the external storm water drain available at site. The contour map showing the natural drainage network within the site is provided with the application. The surface runoff will be properly channelized.

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)

Ans. The proposed project has provision of labor colony and the domestic sewage will be channelised to the STP for treatment of sewage during the construction period to handle the sewage. Also, it is proposed to have the food waste disposal from labor colony through the microbial bio-bin facility. Also, it is proposed to have a dedicated staff for good house keeping of the construction site premises and the labor colony premises. These measures will ensure a good hygienic conditions around the labor colony.

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)

Ans. The project has provision of mobile STP for the treatment of sewage during construction phase and STP of 218 KL capacity within the project premises to treat the sewage during operation phase. The treatment theory is based on MBBR technology. The total quantity of sewage generation will be 181 KL/day. The treated water will be fully recycled for meeting the flushing, horticulture & cooling water requirement. There will be no sewage discharge from the proposed project premises after development of the proposed project.

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

Ans. The treated waste water from the proposed Sewage Treatment Plant during the operation phase of the project will be used for flushing, horticulture & cooling purposes and for which dual plumbing system is proposed.

3.0 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)

**Ans. There are some coconut & other trees (all native species) and different varieties of shrubs, herbs, climbers existing at site. For the development of the proposed project, there will be clearance some of the existing trees & different varieties of shrubs, herbs, grass & climbers.
A complete ecological study of the existing site will be carried out.**

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

**Ans. There are some coconut & other trees (all native species) and different varieties of shrubs, herbs, climbers existing at site. For the development of the proposed project, there will be clearance of the existing trees & different varieties of shrubs, herbs & climbers.
As per the "Kerala Promotion of Tree Growth in Non-Forest Areas (Amendment) Act, 2007", no permission is required for cutting of these trees. A complete ecological study of the existing site will be carried out.**

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)

Ans. It is proposed to have large numbers (mostly flowering, medicinal & shady trees) of tree plantation (native species) within the project area and the landscape plan proposed is attached.

4.0 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.

Ans. There will be no displacement of fauna due to the construction of the proposed project.

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

Ans. There is no direct or indirect impact on the avifauna of the area due to this project. The proposed project after the proposed eco restoration with lot of flowering trees and fruit bearing trees will enhance the presence of avifauna.

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

Ans. Not applicable.

5.0 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)

Ans. The proposed project is shopping mall project and it will not increase atmospheric concentration of gases, the project has provision of D.G. Sets for standby arrangement of electricity and will run only during power failure. The stack attached to the proposed D.G. Sets will follow all the rules and regulations of State Pollution Control Board and Central Pollution Control Board.

The ambient air quality of the site carried out through a NABL accredited laboratory and the ambient air quality report is attached.

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.

Ans. During construction phase, there will be generation of dust & smoke due to this project. The dust generation during construction phase will be controlled by enclosures at appropriate locations and also by sprinkling of water for suppression of dust. The gas/smoke generation expected is from D.G. sets only and the gases will be vented out through stack of appropriate height.

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.

Ans. The proposed project would provide vehicle parking facilities within the project premises. The parking plan for this project would follows KMBR guidelines. The total number of parking proposed is about 629 Cars + about 445 two wheelers. The conceptual plan clearly shows the internal traffic management with entry and exit to the proposed project site. Also attached is the parking plans. The proposed site development will provide minimum drive way as per KMBR at all around the building block for easy & smooth vehicular movement.

The access road to the project site is from 16 m. wide Thrissur-Mannamangalam Road which is well connected to entire city.

The nearest railway station is Thrissur Railway Station which is at about 7 km. and Cochin Int. Airport, (Nedumbassery) is at about 46 Km. away from the project site.

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

Ans. The conceptual plan clearly shows the internal traffic management with entry and exit to the proposed project site, all internal roads with width, pedestrian path ways etc. The total area earmarked for internal roads. Further provision of ramps are proposed for the easy access to the building for physically challenged persons.

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.

Ans. The proposed project is a shopping mall project and there would be some increase in noise and vibration due to the vehicular movement within the project site. The project has provision of large area for the parking for the vehicles and the parking arrangement which is planned, that there would be easy movement of vehicles within the project area and smooth movement is provided for the vehicles to reduce the traffic congestion.

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.

Ans. The D.G. sets which would be used for the project will be with sound proof acoustic enclosures and hence there will be no impact to the surroundings. The D.G. sets would be attached with proper anti vibration pads to reduce any vibration impact to the site surrounding.

The flue gases from the D.G. sets will be vented out through stack of appropriate height as per C.P.C.B. norms to reduce the impacts on air quality around the project site.

The ambient noise level of the site is carried out through a NABL accredited laboratory and the ambient noise level report is attached.

6.0 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?

Ans. There is no natural feature of aesthetics located in the immediate vicinity of the project site.

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

Ans. The project site surrounded with commercial, residential, institutions and in the south east side the project site is access road the project site i.e. 16 m. wide Thrissur-Mannamangalam Road. There will be no any adverse impacts due to the development of the proposed project.

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

Ans. The proposed project would be constructed in conformity with the Kerala Municipal Building Rules (KMBR).

The project site is in Corporation limits of Thrissur which covers the external infrastructural services available / proposed viz. water supply, electricity supply, storm water drainage & sewage facility, road connectivity, common solid waste disposal facility, fire fighting and health & educational institutions.

As per seismic classification, the project site falls in Zone-III. No reported cloudburst in the area. Also, there is no hilly area around the project site, there is no chance of landslide. Structural design aspects as per the seismic codes – IS 1893 (2002), IS 13920 (1993) and IS 456 (2000) as applicable would be incorporated in our 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.

Ans. There is no report of existence of any anthropological or archaeological site nearby the project area. The proposed project is located in Kochi Corporation Limits. The vicinity map showing the site & surrounding area is provided.

7.0 SOCIO-ECONOMIC ASPECTS

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

Ans. The proposed project is a shopping mall project. During operation phase, on full occupancy of the project, the maximum population expected is 9,528 persons (floating) and hence there will be influx of people (fixed) to the project area and surrounding.

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

Ans. There are several schools, colleges, religious places commercial and residential buildings, Govt. and private offices, hospitals, which are located around the proposed project. The vicinity map showing the surrounding details of the proposed project is provided.

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

Ans. The project would not cause any adverse effects on local communities, disturbance to sacred sites or other cultural values. The proposed project is a shopping mall project and thereby the living index of the people around the project site will definitely improve. Also there will be various ancillary activities like convenient shops, transport facilities etc. attached to the project which will benefit the local people and change their living condition.

8.0 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)

Ans. The proposed shopping mall project and the building is a centrally air conditioned building, the selection of building materials plays a major role in the energy consumption. The proposed project will make all attempts to use to avoid building materials with high embodied energy. Cement blocks & hollow blocks will be replaced with country made red bricks. Further, the river sand will be replaced by manufactured sand from stone crushers. The glass used will be low emissivity and having U value as per ECBC norms.

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

Ans. All vehicles which bring construction material to the site would possess Pollution Under Control Certificates (PUC). All vehicles would be of close body to avoid spread of dust from the loose materials, and vehicles which bring sand, stone dust, etc. would ensure that the above mentioned material are properly wetted during transportation to avoid dust generation. Pucca Road to be made in the construction site for the vehicle movement so that the dust generation due to the vehicular movement within the project site can be minimized. Stacking of construction material shall be confined to the project site only. All the D.G. Sets would have attached with Acoustic Enclosure for the sound pollution control and all sound generating construction activity to be minimized. Further barricading of the site with GI sheets of 20 ft height in the side abutting the public road during construction phase.

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

Ans. The plastic (non-biodegradable solid waste) will be used along with coal tar during the construction of internal roads. This will increase the life of roads.

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

Ans. The details are given below :-

SOLID WASTE

- ✓ The proposed project will generate about 1,054 Kg/day from the proposed project.
- ✓ The solid waste from the proposed project will be segregated into two categories at source itself as per Municipal Solid Waste Rules, 2000 by providing appropriate colored bins i.e., Bio-degradable (green bins) & non-biodegradable (blue bins).
- ✓ The non-biodegradable and recyclable waste would be sold to the vendors.
- ✓ The biodegradable waste along with sludge from STP would be sent to the bio-gas plant to be developed within the premises.
- ✓ The bio-gas generated would be consumed in the within the site.
- ✓ The manure produced from the bio-gas generation facility would be used for green area development within the premises.

e-Waste :-

- ✓ Discarded computer parts, monitor, key boards etc. constitutes e-waste and this waste will be stored in an earmarked area.
- ✓ E-waste will be generated after 4-5 years latency period
- ✓ Separate earmarked space will be provided for e-waste storage.
- ✓ E-waste will be disposed as per E Waste (Management & Handling) Rules, 2012.

HAZARDOUS WASTE

- ✓ As per Hazardous Waste (Management & Handling Rules), 2003, the hazardous waste i.e., the used oil from D.G. sets, discarded oil filters and discarded batteries and stored separately and will be disposed to CPCB / SPCB authorized vendors only.
- ✓ M/s Pefect Alloys, Chengampur, M/s Peejay Enterprises, Thiruvalla, M/s Excel Petrochemicals, Kochi and M/s Cee Jee Lubricants, Aluva are the approved recyclers for discarded batteries & used oil located in Kerala.

9.0 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?

Ans. The total power requirement is estimated to be 3,382 kVA and will be from by Kerala State Electricity Board. The project will make provision of D.G. Sets (1,500 kVA x 2 nos. + 1,010 x 1 no.) as standby arrangement of electricity. The proposed project will have provision of power saving and maximum natural light will be provided to minimize energy consumption. Other measures are:

- All lifts are proposed on VFD drives which results in 30% saving in consumption.
- Most of the common area lighting are proposed to work on high energy efficient lamps (LED) as specified in bureau of energy efficiency which again results in saving in general consumption. The LPD is working less than 1 W/m².
- External lighting is assumed to be 40 kW. 30% of the external lighting is proposed on solar. These are set of lighting which are placed at critical junctions and which would be lit around the night. Otherwise the other 70% lighting is on time circuite to achieve the max. savings. Total lighting in the basement is proposed to have day light sensors & presence detectors.
- Terrace area is placed with the solar panel for generation of electricity. Total 150 kW capacity solar grid is installed.
- All internal common area lighting system is proposed to have either high efficiency lamps (T5/T8) LED. These gives us a LPD less than 10W/m² but still achieving the required 200 LUX for ambient lighting.
- Power factor corrections with APFCR & Capacitor banks are proposed for increasing the power factor.

Other measures :-

- Water cooled chillers in place of air cooled chillers which are energy intensive & the treated water available from STP would be used as make-up water attached to the water cooled chillers.
- Savings in energy by the use of LED lamps.
- Building Management System (BMS) through sensors for maximizing the energy conservation.
- Solar water heating system for the hot water requirement.
- Electrical fixtures & HVAC unit would be of 5 star series as per Bureau of Energy Efficiency (BEE) to achieve reduction in energy consumption.
- Building materials selection would be in compliance to Energy Conservation Building Code (ECBC)
- Total energy saving is expected to be of about 24%.

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

Ans. The project proponent has made provision of D.G. Sets (1,500 kVA x 2 nos. + 1,010 x 1 no.) as standby arrangement of electricity.

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?

Ans. The glass used will be low emissivity and the other specifications of the glass will comply with the norms as per ECBC. The further details are :-

Sr. No.	Description of Material with Specification for Commercial Building (Air-conditional building)	U-Value of the overall assembly
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1.	EXTERNAL WALL External finish + 200 mm thick Cement Blocks + Thermal insulation + Stone cladding wall plastered on both side with 5 mm thick aluminium composite panel	0.39 W / m ² K)
2.	ROOF 150 mm thick expanded polystyrene insulation + Water Proofing Compound + 40 mm thick Roof Tiles Grouted with 1:4 Cement Mortar	0.367 W / m ² K)
3.	GLASS Glazing shall be of double glass with air gap (6 mm + 12 mm air gap + 6 mm)	3.30 W / m ² K)

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

Ans. All the relevant features are incorporated like the orientation of the building, shading effect etc.

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.

Ans. Due consideration has been taken for maximum use of the solar energy while preparation of layout plan. The project proponent shall made provision for solar panel system (hot water purpose) in building block area and solar energy devices will be used for street lighting, emergency lighting in the proposed project.

Further, provision would be made to set-up a Solar Power Plant based on Photo-Voltaic (PV) technology, on the roof top of the building. The size of the proposed solar power plant for the buildings was calculated to be 20 kWp. The solar power plant is proposed to be connected at LT level (0.433 kV) in parallel with the electrical grid of the institute. The solar power plant would be able to generate more than 30,000 units annually and cater to partial electrical requirement of the building. The entire generation from the solar power plant would be self-consumed by the commercial building and hence batteries are not required for storage purposes. Additional requirement of power during the day would be met by the supply from electrical grid or D.G. sets. It is envisaged that the proposed solar power plant would result in substantial saving of electricity from the grid or diesel consumption in D.G. sets. Also, it is proposed to have solar power operated street lights, solar water heating system etc for energy conservation.

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?

Ans. All the relevant features are incorporated like the orientation of the building, shading effect etc.

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.

Ans. Suitable energy optimization will be adopted during the calculation of energy load of the proposed project. The space heating load will be minimized using passive solar structure and suitable buildings envelop material. Uses of incandescent lamp and halogen lamps have been avoided and energy efficient LED lamps will be used for all common area. The diesel generator sets shall be automatically controlled to optimize their usage based on the actual load requirements at any time. Variable

frequency drive systems would be adopted for the lifts, etc to maximize the energy saving.

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?

Ans. More open spaces are proposed within the site to creation of any heat islands. The roads and parking spaces would be with concrete slabs intermittent with grass on surrounding.

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.

Ans. The building construction material namely bricks, concrete and steel are being used in the construction. U-factor, also known as Thermal Transmittance, is heat transmission in unit time through unit area of a material or construction and the boundary air films, induced by unit temperature difference between the environments on each side. The glass used will be low with low emissivity and the other specifications of the glass will comply with the norms as per ECBC.

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

Ans. List of equipments proposed for Fire Fighting Measures:-

A. The major equipments proposed for Fire Fighting Measures are Main Hydrant Pump, Sprinkler Pump, Diesel Engine Pump, Jockey Pump.

B. Capacity of Fire Water Storage Tanks & Number:-

It is proposed to have Fire Water Storage Tank appropriate capacity of overhead tank for fire fighting provided at the tower.

C. Fire Detecting Equipments: -

The Fire Detecting Equipments would be as per BIS and NBC norms.

D. Other Fire Fighting Measures: -

The other Fire Fighting Measures proposed includes, an Emergency Control Room, Separate Fire exit during emergency, all rooms with Fire Detector / Smoke Detector, Fire Extinguishers at each entry and exit point on each floor, (5 Kg, 10 Kg and 9 Ltr. capacity), Public address system etc. The Fire Fighting Measures are backed by Electrical supply from D.G. sets in case of emergency.

The nearest fire station is at Thrissur fire station which is about 6.5 km. away from the project site. The fire fighting plan is provided.

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

Ans. The glass will be used Low-e glass. Opaque assemblies shall be modeled as having the same heat capacity as the proposed design but with minimum U-factor.

The glass used will be low with low emissivity and the other specifications of the glass will comply with the norms as per ECBC.

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

Ans. Infiltration is the uncontrolled inward air leakage through cracks and crevices in any building element and around windows and doors of a building caused by pressure differences across these elements due to factors such as wind, inside and outside temperature differences, and imbalance between supply and exhaust air systems.

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

Ans. The use of non-conventional source of energy in the proposed construction project are as follows: -

a. **Solar Water Heater: -**

The proposed project would install solar panels for hot water requirements in the building block and hence the dependency on electricity for hot water generation can be minimized. This would conserve lot of coal which produces the electricity through public supply and also load on D.G. sets also would be reduced and there by conserve diesel.

b. **Solar Street Light: -**

It is also suggested to use solar cell powered street lights within the proposed project site for conservation of electricity.

c. **Use of LED Lamps: -**

The project proponent would use LED Lamp which conserve less electricity.

d. **20kwh solar power plant is proposed for the building in the project.**

10.0 Environment Management Plan

The Environment Management Plan would consist of all mitigation measures for each item wise activity to be undertaken during the construction, operation and the entire life cycle to minimize adverse environmental impacts as a result of the activities of the project. It would also delineate the environmental monitoring plan for compliance of various environmental regulations. It will state the steps to be taken in case of emergency such as accidents at the site including fire.

Environmental Management Plan

Sr. No.	Potential Impact	Action	Parameters for Monitoring
I. Construction Phase			
1.	Air Emissions	All equipments are operated within specified design parameters	Random checks of equipment logs/manuals
		Vehicle trips to be minimized to the extent possible	Vehicle logs
		Any dry, dusty materials stored in sealed containers or prevented from blowing.	Absence of stockpiles or open containers of dusty materials.
		Compaction of soil during various construction activities	Construction logs
		Ambient air quality within the premises of the proposed unit to be monitored.	The ambient air quality will conform to the standards for PM ₁₀ & PM _{2.5} , SO ₂ and NO _x ,
2.	Noise	List of all noise generating machinery onsite along with age to be prepared. Equipment to be maintained in good working order.	Equipment logs, noise reading
		Night working is to be minimized.	Working hour records

		Generation of vehicular noise	Maintenance records of vehicles
		Implement good working practices (equipment selection and sitting) to minimize noise and also reduce its impacts on human health (ear muffs, safe distances, and enclosures).	Site working practices records, noise reading
		No machinery running when not required.	
		Acoustic mufflers / enclosures to be provided in large engines	Mufflers / enclosures in place
Sr. No.	Potential Impact	Action	Parameters for Monitoring
		Noise to be monitored in ambient air within the plant premises.	Noise reading
		The noise level will not exceed the permissible limit both during day and night times.	
		All equipments operated within specified design parameters.	Random checks of equipment logs / manuals
		Vehicle trips to be minimized to the extent possible	Vehicle logs
3.	Waste water Discharge	No untreated discharge to be made to surface water, ground water or soil	No discharge hoses in vicinity of watercourses.
		The discharge point should be selected properly and sampling and analysis should be undertaken prior to discharge	Discharge norms for effluents as given in consent to operate by PCB.
		Take care in disposal of wastewater generated such that soil and groundwater resources are protected	
4.	Soil Erosion	Minimize area extent of site clearance, by staying within the defined boundaries	Site boundaries not extended / breached as per plan document
		Protect topsoil stockpile where possible at edge of site	Effective cover in place
5.	Drainage and effluent Management	Ensure drainage system and specific design measures are working effectively. The design to incorporate existing drainage pattern and avoid disturbing the same.	Visual inspection of drainage and records thereof
6.	Waste Management	Implement waste management plan that identifies and characterizes every waste arising associating with proposed activities and which identifies the procedures for collection handling & disposal of each waste arising.	Comprehensive waste management plan in place and available for inspection on site. Compliance with MSW Rules, 1998 and Hazardous Waste (Management and Handling Rules), 2003

7.	Non-routine events and cool dental releases	Plan to be drawn up Considering likely emergencies and steps required to prevent / limit consequences	Mock drills and records of the same
8.	Environmental Management Cell/Unit	The Environmental Management Cell / Unit is to be set up to ensure implementation and monitoring of environmental safeguards.	A formal letter from the management indicating formation of Environment Management Cell
II. Operational Phase			
9.	Air Emissions	Stack emissions from DG set to be optimized and monitored	The ambient air quality will conform to the standard for PM ₁₀ & PM _{2.5} , SO ₂ , and NO _x , CO as given by PCC.
		Ambient air quality within the premises of the proposed unit to be monitored. Exhaust from vehicles to be minimized by use of fuel efficient vehicles and well maintained vehicles having PUC certificate.	The ambient air quality will conform to the standards for PM ₁₀ & PM _{2.5} as given by PCC Vehicles logs to be maintained
		Vehicle trips to be minimized to the extent possible	Vehicle logs
10.	Noise	Noise generated from operation of DG set to be optimized and monitored DG sets to generate less than 75 dB(A) Leg at 1.0 m from the source DG sets are to be provided at service building with a acoustic enclosures with height of chimney above roof level or as specified by SPCB	Maintain records of vehicles
		Generation of vehicular noise	Maintain records of vehicles
11.	Wastewater Discharge	No untreated discharge to be made to surface water, groundwater or soil,	No discharge hoses in vicinity of watercourses
		Take care in disposal of wastewater generated such that Soil and groundwater resources are protected	Discharge norms for effluent
12.	Drainage and effluent Management	Ensure drainage system and specific design measures are working effectively. Design to incorporate existing drainage pattern and avoid disturbing the same.	Visual inspection of drainage and records thereof
13.	Indoor air contamination	Contaminants such as CO, CO ₂ and VOCs to be reduced by providing adequate ventilation.	Monitoring of indoor air contaminants such as CO, CO ₂ and VOCs

14.	Energy Usage	Energy usage for air-conditioning and other activities to be minimized Conduct annual energy audit for the buildings	Findings of energy audit report
15.	Emergency preparedness, such as fire fighting	Fire protection and safety measures to take care to fire and explosion hazards to be assessed and steps taken for their prevention.	Mock drill records, on site emergency plan, evacuation plan
16.	Environment Management Cell/Unit	The Environment Management Cell/Unit to be set up to ensure implementation and monitoring of Environmental safeguards	A formal letter from the management indicating formation of Environment Management Cell

(B) ENVIRONMENTAL MONITORING PLAN

The environmental monitoring programmed is a vital process in the management Plan for any construction project. This helps in signaling the potential problems that would result from the proposed project and will allow for prompt implementation of effective corrective measures. The environmental monitoring will be required during construction and operational phases.

Water Quality and Public Health

Since water contamination leads to various water related diseases, the project authorities shall establish a procedure for water quality surveillance and ensure safe water for the consumers. A detailed epidemiological study related to water borne diseases shall be carried out and the data shall be compiled for every year in the project area. This data would help the authority in finding out the trends for incidence of water related diseases prevalent in the area, which would help them to take suitable remedial measures for reducing or eradicating the occurrence of these diseases in future.

Water quality parameters shall be monitored before and after the completion of the project. Monitoring shall be carried out on quarterly basis to cover seasonal variations. Water quality shall be analyzed by applying the standard techniques. The parameters recommended for monitoring are as follows :

<ul style="list-style-type: none"> • pH • Dissolved Oxygen • Biochemical Oxygen Demand • Chemical Oxygen Demand • Total Dissolved Solids • Total Suspended Solids • Total Alkalinity • Temperature • Total Hardness • Calcium • Temperature 	<ul style="list-style-type: none"> • Calcium • Magnesium • Iron • Chloride • Sulphate • Nitrate • Fluoride • Total Nitrogen • Total Phosphate • Total Coliforms
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Air and Noise Quality Monitoring

The attributes to be monitored as a part of the mitigation measures are Air Quality, Noise Levels; the monitoring programme for the construction and operation stage is presented in Table given below :-

ENVIRONMENT MANAGEMENT PLAN

CONSTRUCTION PHASE				
Sr. No.	Particulars	Approx. Recurring Cost/Annum	Approx. Capital Cost	Basis for Cost Estimate
		(Rs. In Lakhs)		
1.	Medical cum First Aid facility	2.0	1.0	A First Aid medical facility with a trained person with first aid kit.
2.	Portable Toilets type mobile sanitation system & STP	0.5	2.0	Portable Toilets like "Sulabh Sauchalaya" & STP
3.	Supply of drinking water for the labourers	3.0	2.0	Rain water from tank with filtration & disinfection, well water
4.	Barricading and Wind breakers	0.75	2.0	Barricading around the project site Wind breakers at the marble cutting area
5.	Sprinklers for suppression of dust	1.0	3.0	Sprinklers, pipeline network, online micro filters and pressure pumps
6.	Solid waste from labour camp & construction site	1.0	2.0	Segregation & microbial bio-bin composting facility
	TOTAL	8.25	12.0	

OPERATION PHASE				
Sr. No.	Particulars	Approx. Recurring Cost/Annum	Approx. Capital Cost	Basis for Cost Estimation
		(Rs. In Lacs)		
1.	Sewage Treatment Plant	5.0	25.0	Capital Cost of STP & recurring cost would include operational cost (energy & manpower)
2.	Water Treatment plant	2.0	6.0	Capital Cost of WTP & recurring cost would include operational cost (energy & manpower)
3.	Solid Waste Management Plan	6.0	15.0	Capital cost of Coloured bins at appropriate locations & bio-gas plant & its recurring cost.
5.	Noise Control for D.G. Sets through acoustic enclosures	2.0	6.0	D.G. Sets will be new and will be fitted with acoustic enclosures & hence no separate capital cost & the recurring cost would include minor repair works
6.	Chimney for D.G. Sets Emission	1.0	3.0	The capital cost would include cost of providing adequate height of stack, ladder and platform and recurring cost would include cost of painting
7.	Green Area	2.0	8.0	Green Area Development Plan

	development including Grass Coverage			
8.	Rain Water Storage tanks	6.0	25.0	Capital cost on construction of rain water collection tanks
9.	Solar energy operated lights	4.0	20.0	Capital cost on procurement & installation of solar street lights
	TOTAL	28.0	108.0	

ENVIRONMENT MONITORING PLAN

CONSTRUCTION PHASE				
Sr. No.	Particulars	Parameters	Frequency	Approx. Recurring cost / Annum (Rs. In Lakhs)
1.	Ambient Air	PM 10 & PM 2.5 , SO ₂ , NO _x , CO	Every three months	1.0
2.	Noise Level	24 hrs. Noise Level	Once in a month	1.0
3.	Rain water / KWA water	As per IS:14543 standards for construction water	Once in a fortnight	1.0
	TOTAL			3.0

OPERATION PHASE				
Sr. No.	Particulars	Parameters	Frequency	Approx. Recurring Cost / Annum (Rs. In Lakhs)
1.	Ambient Air	PM 10 & PM 2.5 , SO ₂ , NO _x , CO	Once in a season	1.0
2.	Stack Emission	SPM, SO ₂ , NO _x	Every six months	0.25
3.	Treated Water from STP	pH, BOD, COD, Oil & Grease, TSS, bacteriological parameters	Once in a month	1.0
4.	Noise Level	24 Hrs. Noise Level	Once in a month	1.0
5.	Rain water / supply water	As per IS:10500	Once in a month	0.6
	TOTAL			3.85

ENVIRONMENTAL MANAGEMENT PLAN

The Environmental Management System constitutes provision of an Environmental Division, which should be staffed by an Environmental Engineer / Office, and Environmental Assistant and other assistant (miscellaneous works). The task assigned should include supervision and co-ordination of studies, monitoring and Implementation of environmental mitigation measures.

ENVIRONMENT MANAGEMENT / MONITORING CELL
FREQUENCY OF MEETING – ONCE IN THREE MONTHS
(Construction Phase & one year of operation phase)

Sr. No.	Members	Role
1.	Director	Chairman
2.	Project Manager	Member
3.	Health & Safety Officer	Member
4.	Representative of NABL accredited laboratory	Member
5.	Representative of NABET accredited Environmental Consultant	Member
6.	Representative of STP & Bio-gas unit supplier	Member
7.	Project Engineer	Member & Convener

ENVIRONMENT MANAGEMENT / MONITORING CELL
FREQUENCY OF MEETING – ONCE IN THREE MONTHS
(Operation phase – After handing over to RWA)

Sr. No.	Members	Role
1.	Secretary, RWA	Chairman
2.	Maintenance Engineer	Member
3.	Representative of NABL accredited laboratory	Member
4.	Representative of NABET accredited Environmental Consultant	Member
5.	Representative of STP & Bio-gas unit supplier	Member
6.	Project Engineer	Member & Convener
