

APPENDIX 1
(See Paragraph - 6)
FORM 1

(I) Basic Information

Sr. No.	Item	Details
1	Name of the project/s	Kent Hail Garden
2	Sr.No. in the schedule	8(a), Category B2-Building and Construction project
3	Proposed capacity/area/length/tonnage to be handled/command area/lease area/number of wells to be drilled	Plot area: 5853.74 Sqm With Built-up Area: 29,687.51 Sqm
4	New/ Expansion/Modernization	New building and construction project of residential units.
5	Existing Capacity/ Area etc.	Plot Area: 5853.74 Sqm
6	Category of Project i.e. 'A' or 'B'	B2
7	Does it attract the general condition? If yes, Please specify.	No- Category B2-Building and Construction project for 20,000 Sqm ≤ BUA ≤ 1, 50,000 Sqm.
8	Does it attract the specific condition? If yes, Please specify.	No
9	Location	in Survey Nos. 135/2, 138, 226/1 in Elamkulam Village, Kanayannur Taluk, Ernakulam District <u>Geological Coordinates</u> Latitude : 9°59'26.23"N Longitude : 76°18'4.36"E
	Plot/Survey/ Khatha No.	At Survey Nos. 135/2, 138 & 226/1
	Village	Elamkulam Village
	Tehsil	Kanayannur Taluk
	District	Ernakulam
	State	Kerala
10	Nearest Railway station / airport along with distance in Kms.	1. Ernakulam North Railway Station is located at a distance of 3.6 Km from the project site. 2. Cochin International Airport is located at a distance of 20 km (aerial)

Construction of Residential Building Project of M/s Kent construction Pvt. Ltd., at Sy. Nos. 226/1,135/2 & 138 of Elamkulam Village, Kanayannur Taluk, Ernakulam District, Kerala.

11	Nearest town, city, District headquarters along with distance in Kms.	Located within Municipal Corporation Limits of Ernakulam
12	Name of the applicant	M/s. Kent Constructions Pvt. Ltd.
13	Registered Address	Kent Hail Garden, Stadium Link road, Kaloor, Pin -682025
14	Address for correspondence :	Door No: 63/3441-A166 Kent Hail Garden, First Floor Stadium Link Road, Near Jawaharlal Nehru Intl. Stadium Palarivattom, Cochin - 682025, Kerala, India
	Name	K.C. Raju
	Designation (Owner/Partner/CEO)	Director and Authorized signatory
	Address	Door No: 63/3441-A166 Kent Hail Garden, First Floor Stadium Link Road, Near Jawaharlal Nehru Intl. Stadium Palarivattom, Cochin - 682 025, Kerala, India
	Pin Code	682025
	E-mail	ajith@kenthomes.in
	Telephone No.	0484 - 4211111
	Fax No.	
15	Details of Alternative Sites examined, if any. Location of these sites should be shown on a Topo sheet.	No alternative sites were examined.
16	Interlinked Projects	Nil
17	Whether separate application of interlinked project has been submitted	Nil
18	If yes, date of submission	NA
19	If no, reason	Proposed site is suitable in all the aspects for independent Project.
20	Whether the proposal involves approval/ clearance under: (a) The Forest (Conservation) Act, 1980 (b) The Wildlife (Protection) Act, 1972 (c) The C.R.Z Notification, 1991	This proposal does not require approval /clearance under Forest Act, Wild life Act, & C R Z Notification.
21	Whether there is any Government order / policy relevant /relating to the site	Nil

Construction of Residential Building Project of M/s Kent construction Pvt. Ltd., at Sy. Nos. 226/1,135/2 & 138 of Elamkulam Village, Kanayannur Taluk, Ernakulam District, Kerala.

22	Forest land involved (hectares)	No forest land is involved.
23	Whether there is any litigation pending against the project and/or land in which the project is propose to be set up (a) Name of the Court (b) Case No. (c) Orders/directions of the Court, if any and its relevance with the proposed project.	No
24	Expected cost of the project	Total Project Cost: Rs 34.22 Crores Land Cost : Rs. 1.54 Crores Construction Cost : Rs 32.68 Crores

(II) Activity

1. Construction, operation or decommissioning of the Project involving actions, which will cause physical changes in the locality (topography, land use, changes in water bodies, etc.)

Sr.No.	Information/Checklist confirmation	Yes /No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
1.1	Permanent or temporary change in land use, land cover or topography including increase in intensity of land use (with respect to local land use plan)	Yes	The project is being developed on a plot of land measuring about 5853.74 Sqm; presently the land is barren devoid of any vegetation. The proponent wants to use the land to develop office buildings. Land ownership and conversion documents are attached.
1.2	Clearance of existing land, vegetation and buildings?	Yes	The plot measures about 5853.74 Sqm; presently the land is barren devoid of any vegetation. The proponent is proposing to use the land to develop Office building. Site location plan have been enclosed as Annexure along with EMP report.
1.3	Creation of new land uses?	Yes	The proposal is in conformity with the land use of the area as per the City Development Plan, Kochi.
1.4	Pre-construction investigations e.g. bore houses, soil testing?	No	Not Applicable
1.5	Construction works?	Yes	As per conceptual plan only.
1.6	Demolition works?	No	Not Applicable
1.7	Temporary sites used for construction works or Housing of construction workers?	No	
1.8	Above ground buildings, structures or Earthworks including linear structures, cut and fill or excavations	Yes	Excavation work will be undertaken for the foundation of the building. The excavated earth will be used for filling low lying areas, pavements, etc and surplus amount will be utilized for back filling of construction site.
1.9	Underground works including mining or tunneling?	No	Not applicable
1.10	Reclamation works?	No	Not applicable
1.11	Dredging?	No	Not applicable
1.12	Offshore structures?	No	Not applicable

1.13	Production and manufacturing processes?	No	Not applicable
1.15	Facilities for treatment or disposal of solid waste or liquid effluents?	Yes	<p>During operation phase, the solid waste will be collected separately as biodegradable (Organic) and non biodegradable (inorganic/recyclable) in the respective bins provided.</p> <ul style="list-style-type: none"> ✓ Organic waste will be processed in organic waste converter. ✓ Recyclable waste will be handed over to the authorized vendors for further processing. ✓ STP sludge will be used as manure for gardening. ✓ E-Wastes generated will be handed over to authorized E-Waste processors. <p>The domestic sewage will be treated in STP</p> <p>Refer STP feasibility reports attached as Annexure1.</p>
1.16	Facilities for long term housing of operational workers?	No	As local people will be hired for the routine maintenance, no permanent facilities are proposed.
1.17	New road, rail or sea traffic during construction or operation?	No	The existing road facility will be made use of.
1.18	New road, rail, air, waterborne or other transport infrastructure including new or altered routes & stations, ports, airports etc?	No	Not Applicable as this is a construction project.
1.19	Closure or diversion of existing transport routes or infrastructure leading to changes in traffic movements?	No	<p>There is no change in the existing route or the traffic movement.</p> <p>Traffic pattern in the approach road during construction and operation phase is expected to increase. A detailed Traffic density study has been carried out to assess the increase in the existing traffic scenario. The traffic study report is enclosed as Annexure 2.</p>

Construction of Residential Building Project of M/s Kent construction Pvt. Ltd., at Sy. Nos. 226/1,135/2 & 138 of Elamkulam Village, Kanayannur Taluk, Ernakulam District, Kerala.

1.20	New or diverted transmission lines or pipelines?	No	Electric power is supplied by KSEB from the existing transmission line. Water for the operation phase will be sourced from the bore wells and KWA.
1.21	Impoundment, damming, culverting, realignment or other changes to the hydrology of watercourses or aquifers?	No	NA
1.22	Stream crossings?	No	No
1.23	Abstraction or transfers of water from ground or surface waters?	No	Tertiary treated water will be used for curing and dust suppression during construction phase. Concreting and Domestic water requirements during construction shall be met by external authorized supplier. Operation phase water requirements will be met by the KWA & treated water from STP.
1.24	Changes in water bodies or the land surface affecting drainage or run-off?	No	Project site doesn't receive/intercept storm water from the surroundings. Runoff from the project site is utilized for ground water recharge through recharge pits within the site.
1.25	Transport of personnel or materials for construction, operation or decommissioning?	Yes	Raw materials for construction were transported by trucks and the trips were scheduled only during night and the transportation trucks were covered with tarpaulin sheets to avoid dust emissions.
1.26	Long-term dismantling or decommissioning or restoration works?	No	Nil
1.27	Ongoing activity during decommissioning which could have an impact on the environment?	No	Nil
1.28	Influx of people to an area in either temporarily or permanently?	Yes	Construction Phase: There was a temporary and minor influx of construction laborers due to employment opportunities generated during construction phase. Operation Phase: There is an influx of people including the staff, securities and visitors commuting on the project site.

1.29	Introduction of alien species?	No	NA
1.30	Loss of native species or genetic diversity?	No	NA
1.31	Any other actions?	Yes	Rainwater harvesting & storm water management plan has been proposed

2. Use of Natural resources for construction or operation of the Project (such as land, water, materials or energy, especially any resources which are non-renewable or in short supply):

Sr. No.	Information/checklist confirmation	Yes /No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data
2.1	Land especially undeveloped or agricultural land (ha)	Yes	Construction of the project is on a plot of land measuring about 5853.74 Sqm which is a converted empty land.
2.2	Water (expected source & competing users) unit: KLD	Yes	Construction phase: Approx. 10 KLD Source: Tanker/ Treated Municipal water. Operation phase: Approx. 125 KLD Source: KWA, Borewell Requirement: Fresh water 85 KLD+ Recycled water 40 KLD
2.3	Minerals (MT)	No	--
2.4	Construction material - stone, aggregates, sand/ soil (expected source - MT)	Yes	Construction materials for built-up area of 29,687.51 Sqm from nearby sources. As per estimation: Steel: 1000 MT Cement: 3500 MT
2.5	Forests and timber (source - MT)	Yes	Minimal use of timber poles and shuttering for civil construction. Timber for door frames, shutters, etc., wherever wood may be used.
2.6	Energy including electricity and fuels (source, competing users) Unit: fuel (MT), energy (MW)	Yes	The power requirement during operational phase is met from Kerala State Electricity Board
2.7	Any other natural resources (use appropriate standard units)	No	--

3. Use, storage, transport, handling or production of substances or materials, which could be harmful to human health or the environment or raise concerns about actual or perceived risks to human health.

Sr.No.	Information/Checklist confirmation	Yes /No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
3.1	Use of substances or materials, which are hazardous (as per MSIHC rules) to human health or the environment (flora, fauna, and Water supplies)	No	Diesel & lube oil to be used for DG sets during power failure is stored in leak proof containers on impervious floors in the designated places within the site and is disposed off through KSPCB authorised re processors/recyclers
3.2	Changes in occurrence of disease or affect disease vectors (e.g. insect or water borne diseases)	No	Nil
3.3	Affect the welfare of people e.g. by changing living conditions?	Yes	Socioeconomic status will improve.
3.4	Vulnerable groups of people who could be affected by the project e.g. hospital patients, children, the elderly etc.,	No	Nil
3.5	Any other causes	No	--

4. Production of solid wastes during construction or operation or decommissioning (MT/month)

Sr. No.	Information/Checklist confirmation	Yes /No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
4.1	Spoil, overburden or mine wastes	No	--
4.2	Municipal waste (domestic and or commercial wastes)	Yes	<p>Construction Phase Project proponents are not going to provide any labour colony, so there will be less quantity of domestic solid waste generation during construction phase, which will be handed over to local body.</p> <p>Operation Phase Solid waste generation during operation phase:</p> <ul style="list-style-type: none"> • Total solid waste: 410 Kg/day • Organic waste: 175 Kg/day • Inorganic waste : 235 Kg/day

4.3	Hazardous wastes (as per Hazardous Waste Management Rules)	Yes	Waste oil from DG sets will be given to KSPCB, designated waste oil recyclers & the generated E-Waste (during operation phase) is handed over to the approved and authorized KSPCB E-Waste recyclers.
4.4	Other industrial process wastes	No	--
4.5	Surplus product	No	--
4.6	Sewage sludge or other sludge from effluent treatment	Yes	Total sewage sludge generated from the proposed activity will be used as manure / organic fertilizer for horticulture in the Project Site.
4.7	Construction or demolition wastes	No	Construction waste generated was used within the project site for leveling. Non-recyclable such as concrete waste, etc. was used for road construction and all the recyclable wastes such as steel, other metal scrap, etc. were sold to recyclers/scrap dealers.
4.8	Redundant machinery or equipment	No	--
4.9	Contaminated soils or other materials	No	--
4.10	Agricultural wastes	Yes	Horticulture waste will be used as manure.
4.11	Other solid wastes	Yes	Domestic solid waste will be fed into the organic waste converter and treated.

5. Release of pollutants or any hazardous, toxic or noxious substances to air (Kg/hr)

Sr. No.	Information/Checklist confirmation	Yes /No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
5.1	Emissions from combustion of fossil fuels from stationary or mobile sources	Yes	Minor vehicular pollution is accounted for during construction phase and operation phase. Negligible emissions from DG set in case of power failure
5.2	Emissions from production processes	No	Not applicable.
5.3	Emissions from materials handling including storage or transport	No	Negligible emissions from vehicular transportation & DG set in case of power failure

5.4	Emissions from construction activities including plant and equipment	Yes	Fugitive emissions during unloading of construction material, concrete mixers are negligible. Other source of emission was from DG sets, graders, levelers etc. only
5.5	Dust or odors from handling of materials including construction materials, sewage & waste	Yes	There was dust emission during construction operation which was controlled by water sprinkling and by erecting barricades around the site. Sewage treatment plant was well maintained to ensure aerobic conditions. Solid wastes were handled using closed containers to avoid odour nuisance.
5.6	Emissions from incineration of waste	No	--
5.7	Emissions from burning of waste in open air (e.g. slash materials, construction debris)	No	--
5.8	Emissions from any other sources	No	--

6. Generation of Noise and Vibration, and Emissions of Light and Heat:

Sr. No.	Information/Checklist confirmation	Yes /No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
6.1	From operation of equipment e.g. engines, ventilation plant, crushers	Yes	Construction phase: Noise was generated from following sources during construction phase: 1. Construction machinery 2. On-going construction activity Operation phase: Potential noise generating sources during operation phase is vehicular traffic & from DG sets only.
6.2	From industrial or similar processes	No	Not applicable.
6.3	From construction or demolition	Yes	Noise from construction activities where plant and machinery was used. No demolition works were involved. localized noise is expected during construction phase.
6.4	From blasting or piling	No	--

6.5	From construction or operational traffic	Yes	Construction phase: Noise was generated due to trucks carrying the construction material. Operation phase: During operation phase, noise is generated due to traffic.
6.6	From lighting or cooling systems	No	--
6.7	From any other sources	No	--

7. Risks of contamination of land or water from releases of pollutants into the ground or into sewers, surface waters, groundwater, coastal waters or the sea:

Sr. No.	Information/Checklist confirmation	Yes /No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
7.1	From handling, storage, use or spillage of hazardous materials	No	Nil, as the project is development of residential apartments.
7.2	From discharge of sewage or other effluents to water or the land (expected mode and place of discharge)	No	STP is used to treat waste water to acceptable standards for utilization for use as makeup water for flushing, HVAC & horticulture.
7.3	By deposition of pollutants emitted to air into the land or into water	No	--
7.4	From any other sources	No	--
7.5	Is there a risk of long term build up of pollutants in the environment from these sources?	No	Nil

8. Risk of accidents during construction or operation of the Project, which could affect human health or the environment

Sr.No.	Information/Checklist confirmation	Yes /No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
8.1	From explosions, spillages, fires etc from storage, handling, use or production of hazardous substances	Yes	Storage of HSD, fresh and used lube oil are prone to dangers. Care is taken that these are stored in closed tanks/containers, away from any possible sources of ignition.
8.2	From any other causes	No	--

8.3	Could the project be affected by natural disasters causing environmental damage (e.g. floods, earthquakes, landslides, cloudburst etc)?	No	The design of the building is as per the IS 1893: Part (1) 2002 (Criteria for earthquake resistance design of structures - Part 1 General Provisions and Buildings). 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.
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9. Factors which should be considered (such as consequential development) which could lead to environmental effects or the potential for cumulative impacts with other existing or planned activities in the locality

Sr. No.	Information/Checklist confirmation	Yes/ No	Details thereof (with approximate quantities/rates, wherever possible) with source of information data
9.1	Lead to development of supporting facilities, ancillary development or development stimulated by the project which could have impact on the environment e.g.: <ul style="list-style-type: none"> Supporting infrastructure (roads, power supply, waste or waste water treatment, etc.) housing development extractive industries supply industries other 	Yes -- --	Infrastructure that accompanies proposed development include: <ul style="list-style-type: none"> STP for treatment and recycling of waste water generated on the project site. Rainwater harvesting. Adequate parking space. Proportionate development of infrastructure, creation of associated tertiary service sector and employments. Expected increase in traffic due to the project, which can be easily handled by the existing infrastructure to the project. A detailed survey of Traffic density has been conducted and the report is enclosed.
9.2	Lead to after-use of the site, which could have an impact on the environment	No	Not applicable.
9.3	Set a precedent for later developments	No	Not applicable
9.4	Have cumulative effects due to proximity to other existing or planned projects with similar effects	Yes	This project, along with many such developments in the surrounding area is likely to exert more loads on the resources such as water and electricity.

(III) Environmental Sensitivity

Sr. No.	Areas	Name/ Identity	Aerial distance (within 15 km.) Proposed project location boundary
1	Areas protected under international conventions, national or local legislation for their ecological, landscape, cultural or other related value	No	Not applicable.
2	Areas which are important or sensitive for ecological reasons - Wetlands, watercourses or other water bodies, coastal zone, biospheres, mountains, forests	No	Not applicable.
3	Areas used by protected, important or sensitive species of flora or fauna for breeding, nesting, foraging, resting, over wintering, migration	No	Not applicable.
4	Inland, coastal, marine or underground waters	No	Not applicable.
5	State, National boundaries	No	Not applicable.
6	Routes or facilities used by the public for access to recreation or other tourist, pilgrim areas	No	Not applicable.
7	Defense installations	No	Not applicable
8	Densely populated or built-up area	Yes	The proposed project falls within Cochin Corporation limits.
9	Areas occupied by sensitive man-made land uses (hospitals, schools, places of worship, community facilities)	Yes	Project is within municipal limits where in all community facilities are available.
10	Areas containing important, high quality or scarce resources (Ground water resources, surface resources, forestry, agriculture, fisheries, tourism, minerals)	No	Not applicable.
11	Areas already subjected to pollution or environmental damage. (those where existing legal environmental standards are exceeded)	No	Not applicable.

12	Areas susceptible to natural hazard which could cause the project to present environmental problems (Earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions)	--	The design of the building is as per the IS 1893: Part (1) 2002 (Criteria for earth quake resistance design of structures - Part 1 General Provisions and Buildings).
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(IV) Proposed Terms of Reference (TOR) for EIA Studies.

Not Applicable

I hereby give undertaking that the data and information given in the application and enclosures are true to the best of my knowledge and belief and I am aware that if any part of the data and information submitted is found to be false or misleading at any stage, the project will be rejected and clearance given, if any to the project will be revoked at our risk and cost.

Date: 29/07/2017

Place: Cochin

Signature of the Applicant

for Kent Constructions Pvt. Ltd.



K.C. Raju
Director



NOTE:

1. The projects involving clearance under Coastal Regulation Zone Notification, 1991 shall submit with the application a C.R.Z. map duly demarcated by one of the authorized agencies, showing the project activities, wrt. C.R.Z. (at the stage of TOR) and the recommendations of the State Coastal Zone Management Authority (at the stage of EC). Simultaneous action shall also be taken to obtain the requisite clearance under the provisions of the C.R.Z Notification, 1991 for the activities to be located in the CRZ.
2. The projects to be located within 10 km of the National Parks, Sanctuaries, Biosphere Reserves, Migratory Corridors of Wild Animals, the Authorized Signatory shall submit the map duly authenticated by Chief Wildlife Warden showing these features vis-à-vis the project location and the recommendations or comments of the Chief Wildlife Warden thereon (at the stage of EC)".
3. All correspondence with the Ministry of Environment & Forests including submission of application for TOR /Environmental Clearance, subsequent clarifications, as may be required from time to time, participation in the EAC Meeting on behalf of the Authorized Signatory shall be made by the authorized signatory only. The authorized signatory should also submit a document in support of his claim of being an authorized signatory for the specific project".

FORM - 1A

APPENDIX II

(See paragraph 6)

SECTION 1- LAND ENVIRONMENT

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

Panoramic view of the proposed project site is enclosed as **Drawings**.

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 are submitted). Attach Maps of (i) site location (ii) surrounding features of the proposed site (within 500 meters) and (iii) the site (indicating levels & contours) to appropriate scales. If not available attach only conceptual Plans.

No, the existing land use will not get significantly altered due to the proposed project. Location Map and Google map of the project site are enclosed along with EMP report.

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.

Yes. The Details are given in below table.

Sl No.	Particulars	Details
1	Total Land Area	5853.74 Sqm
2	Height of the Building	58 meters
3	Total Built up area	29,687.51 Sqm
4	FAR area	24126.91 Sqm
5	Ground coverage area	4264.2495 Sqm
6	Total Water Consumption	Construction Phase: 10 KLD Operational Phase: 125 KLD
7	Power Requirement	Construction Phase: 250 KVA Operational Phase: 750 KVA+ 160KVA
8	Accessibility	Stadium link road
9	Parking Requirement	Total Car parking provided = 162

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 facility, details of the existing land use, disturbance to the local ecology).

Due to good architectural views and well designed landscape, the project is expected to enhance the aesthetics of the surroundings. Project site is situated in the neighbourhood of other residential apartment and commercial developments, hence does not alter the local ecosystem.

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

No. It is proposed to develop professionally designed landscaping to avoid the erosion of the texturally disturbed soil.

Soil type: Sandy

Vulnerability to subsidence: The soil is not vulnerable to subsidence.

Seismicity: The project site is located in the Seismic Zone – III, which is classified as the moderate damage risk zone.

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

The proposed project activity does not involve any alteration of natural drainage system. Site Plan is enclosed as **Drawing**.

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.)

During the construction phase, excavation was carried out in order to provide foundations and basement construction. The excavated top soil was stored and reused the same for back filling, road construction and landscaping purposes.

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

Water requirement and domestic water needs for the labourers during construction phase are met by the external authorized tanker water suppliers. The water used for construction gets consumed into chemical reactions with cement and also partly gets evaporated. Hence, there will be no wastewater generation from this. However, domestic wastewater will be collected in collection tank and will be lifted to Municipal Corporation sewage treatment plant for further treatment. Proponents are not going to provide any labour colony; therefore there won't be any domestic solid waste generation.

The non bio-degradable waste, the empty cement bags, other packaging materials etc. would be disposed to the authorized vendors.

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 areas or wetlands around the proposed project site. The excavated Earth during construction will be used for filling the low lying areas within the site and also for levelling of the roads etc., but no alteration will be done outside the project site.

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).

The wastes generated during the construction phase were mainly earthy and rocky matter, which do not have any adverse effect on human health. The construction waste such as left over concrete, rejection due to wrong workmanship was used for back-filling and road pavement. The metallic waste of construction was sold to scrap dealers and recyclers.

SECTION 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.

The total quantity of water required for proposed project is 125 KLD and the same will be met through KWA. Detailed Water Balance Chart is enclosed in EMP report.

Water requirement:

1. Construction Phase: 10 KLD

2. Operation Phase: 125 KLD

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

Fresh water is proposed to be sourced from KWA

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).

Potable water as per IS: 10500 is used for hand wash, human contact etc. Tertiary treated water is used for non-potable use such as Green belt, Flushing & HVAC.

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)

During operation stage tertiary treated water from the STP to the tune of about 90 KLD is generated. Out of this, 36.9 KLD shall be used for flushing of toilets, about 46.8 KLD shall be used for gardening and 6.3 KLD for miscellaneous purposes.

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)

Requirement of water is met through borewells, KWA and treated water from STP inside the project. No such impact is anticipated on other existing users.

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 domestic sewage will be treated in STP of capacity 100 KLD.

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

Details given in Storm water drain/Rain Water Harvesting plan- attached as drawings.

2.8 What would be impact of the land use change 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?

There will be no impact on the runoff characteristics from the proposed project. The terrace rain water is collected in the roof rain water collection tank of suitable capacity and the same is used after prior treatment. Internal storm water drain is provided within the site in order to carry out the storm water from landscape and hardscapes into the recharge pits, to recharge the ground water which is provided with perforated pre-cast cover all along the site boundary as well as in walk way & pavements. Excess will be routed to existing external storm water drain in the project site. Hence it won't cause any flooding or water logging problems.

2.9 What are the impacts of the proposal on the ground water? (Will there be tapping of ground Water gives the details of ground water table, recharging capacity, and approvals obtained from competent authority, if any)

Groundwater will be tapped through borewell.

2.10 What are the precaution/measure 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)

No significant runoff was observed due to construction activities. Also no lake is

existing in the vicinity of the proposed project. The concrete was sourced from ready mix plants, and hence there wasn't any runoff due to concrete making. Care was taken during mortar preparation and curing to avoid runoff. However, if found necessary, during construction, separate catch pits were constructed to collect runoff. This was allowed to settle and clear water was reused for construction purposes.

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

Storm water drain / Rainwater harvesting plan is attached as **Plate 1**

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)

During constructional phase, average 300 labourers were employed at the site. The total water requirement for 300 workers for drinking & other purpose was around 10 KLD. Sufficient drinking water was provided for labourers.

Facilities created for workers during the construction phase include the following:

- Open defecation was not allowed. Portable sanitation system was provided based on the requirement
- First Aid facilities were provided at the site.
- Health check up was carried out.
- Arrangement with local hospital for any emergency was made for all the laborers working at site.
- Safety measures like PPE (Personal Protective Equipments) – Helmets, Safety shoes, Nose Mask, Hand gloves, Goggles and Safety Belts, etc were provided for the construction, depending on the nature of their work.

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)

Sewage and sullage generated is treated in full fledged STP of capacity 100 KLD. The treated water is utilized for secondary purposes like gardening, flushing etc. The sewage is treated to the stipulated KSPCB standards. The STP feasibility reports will be enclosed as **Annexure-4**.

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

Treated water will be used for gardening and flushing purposes.

SECTION 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 threat, since no unique biodiversity features in the project area.

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

The proposed project site is an empty land with no vegetation existing.

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)?

As a responsible corporate citizen of our country, it is our moral duty to protect and sustain the environment. To comply to our commitment, extensive green belt development, in and around the site premises would be carried out with a survival rate of > 85%. Native multi-culture species would be selected for their sustainability.. The plantation will be undertaken only with local species.

SECTION 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 is no unique faunal community within the core and buffer zone of the proposed project area, except most common ones like toad, frog, crow, sparrow, maina, etc.

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

The proposed project will not have any direct or indirect impacts on the avifauna of the area.

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

Not Applicable.

SECTION 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 result of the proposed constructions).

Concentration of SO₂ in the ambient air is expected to increase when DG sets are operational for standby power. There will be no significant impact on SPM, NO_x due to the project norms. They will also be provided with chimneys with sufficient height as per the norms for the proper dispersion of pollutants. It is expected that there will be a marginal increase in the pollutant levels due to vehicular emissions from operational traffic. However, the occupants shall be encouraged to use mass transit system and optimal use of vehicles. The impacts from the proposed project is marginal, hence doesn't cause heat island effect.

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

The only source for generation of dust was construction activity, which was a temporary phenomena for which barricades were put up around the site and water was sprinkled at regular intervals. Since it is a residential development, there will be no generation of smoke, odorous fumes or hazardous gases.

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

Sufficient parking space is provided within the campus for the number of vehicles anticipated. Transport infrastructure is adequate. Detailed Traffic Density Survey will be carried out to know the impact.

Car Parking Provided: 162

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

Major roads are provided with provisions for footpath, pedestrian pathways for hassle-free movement of all users of the project, as shown in the Site Plan/ Conceptual plan enclosed as **Plate 2**.

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

All precautionary measures were ensured for the safety of construction laborers while working at the site. There will be some incremental noise due to additional traffic. It is mitigated by enforcing silence zones, limiting speed by rumble strips etc. Vibrations are not expected since not much of heavy vehicular traffic is envisaged.

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

DG sets are installed in acoustically treated enclosures with anti-vibration mountings, which will mitigate noise significantly. Fuel used is Low Sulphur HSD, which will have sulphur content less than 0.05%. Stacks are provided as per prevailing pollution control norms, which ensure minimal impact on ambient air quality. No other equipment, which would impact noise and ambient air quality, is envisaged in the project.

SECTION 6 - AESTHETIC

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

There are no scenic amenities or landscapes in the surroundings of the project, hence doesn't cause any adverse impacts. And due to good architectural view, the artistic beauty of the surrounding area is going to increase.

6.2 Will there be any adverse impacts from new construction on the existing structures what are the considerations taken into account.

No adverse impacts are noticed from new construction on the existing structures.

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

There will not be any local considerations of urban form and urban design influencing the design criteria.

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.

There is no anthropological or archeological site or artifacts surrounding the Project site.

SECTION 7 - SOCIO ECONOMIC ASPECTS

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

Yes. From the proposed project, the surrounding demography will experience some changes. It is expected that there will be an increase in literate population by assuming 80% of the inhabitants belong to working class, so the working class of people in the vicinity of the project site is expected to rise. Apart from this, there will also be increased job opportunities from the project in terms of commercial establishments to serve the basic needs of the residents and the maintenance labour requirements of the project after completion. Therefore, the overall socio-economic conditions will improve due to the proposed project.

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

The project site is surrounded by commercial and residential establishments like IMA house, Jawaharlal Nehru Stadium, Skyline Imperial Gardens, Indira Gandhi National Open University, petrol bunks etc. The proposed project will benefit the local infrastructure positively on completion.

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

The proposed project doesn't result in any adverse effects on local communities, disturbance to sacred sites or the other cultural values. Environment Pollution control and Safety are the proposed project's top priority.

SECTION 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).

Construction materials are specified based on life-cycle assessment and use of materials that are extracted or recovered in the region emphasizes. Whenever possible, materials such as carpets, paints, wall coverings and adhesives have been used that carry the Green Seal Label, reducing emission of potentially harmful organic compounds or gases.

Yes, General energy efficient processes were adopted in production of construction materials. Some of the embodied energy materials used in proposed project is aluminum, stainless steel, copper, steel, glass, cement, plaster board, lime, gypsum plaster, concrete Insitu, concrete blocks, sand, aggregates & precast lintels.

- Maximum use of local resources and skills for the production of construction materials.
- Recycling of solid wastes into the building construction and for building products.
- Reduced transportation.
- Used renewable energy resources.
- Used energy efficient process.

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

There was vehicular movement due to transport of construction materials, tools and tackles, required for construction. However that was only a temporary phenomenon that existed only during the construction phase of the project. Optimal routes were planned for the transportation of construction materials. The traffic was scheduled to

operate during night hours.

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

Construction debris & waste during construction was minimized & handled in an eco-friendly manner. All left over concrete, rejection due to change in design or wrong workmanship was used for leveling ground area and road pavement. Other wastes were segregated and were handed over to KSPCB authorized recyclers for recycling the waste materials.

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

Solid wastes is collected separately as biodegradable (organic) and non biodegradable (recyclable waste) in separate bins from each floor, door to door collection is done from each unit to collect the solid wastes. The collected and segregated organic waste is handed over to the Cochin municipal corporation, and recyclable waste is handed over to the authorized vendors for further processing. E-Wastes is collectively handed over to the authorized E-Waste recyclers for component recovery. Around 410 Kg/day (Inorganic & Organic) is generated during the operation phase.

SECTION 9- ENERGY CONSERVATION

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

The total power requirement for the project during construction phase was about 250 KVA and during operational phase is about 750KVA +160 KVA. The electricity will be sourced by KSEB. 1 DG set of 200 KVA capacity has been installed for backup power supply. Adequate measures have been taken in the design of the structure to utilize the natural light to the maximum extent possible.

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

One DG set of capacity 200 KVA are provided for residential units to meet the demand. However, all essential service like external lighting, ventilation, water supply and others are fully linked with the DG sets.

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

The project is provided with heat reflected glass wherever required-having properties, which will make it energy saving element in the building and will provide safety and transparency of the desired level.

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

The project provide enough daylight factors in the building to permit maximum daylight to interior to minimize overall energy consumption. These features will also minimize the impact on weather both in summer & in winter and as a result, the use of electricity will likely be reduced. Also, usage of solar equipments is proposed for water heaters, landscape and external lighting.

9.5 Does the layout 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 building complex? Substantiate with details.

The layout of the plot has been designed in such a fashion that maximum daylight could be utilized.

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 & the West & the roof? How much energy saving has been effected?

The overall design of the project layout has adequately taken care of shading factor into consideration as per ECBC 2006 and will result in significant saving in energy consumption.

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

Yes, energy-efficient & environment-friendly space conditioning, lighting & mechanical system are installed and the building structures are constructed using materials which minimize energy consumption.

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

The building block design has been made in such a way that it causes minimal hindrance to the wind movement according to the prevailing wind direction and also sufficient set back is provided in accordance with the height of the building.

9.9 What are the thermal characteristics of the building envelope? (a) Roof (b) external walls and (c) fenestration? Give details of the materials used and the U -

values or the R values of the individual components.

Thermal insulation for the building.

Data for Brick Walls External: - According to DS: 3792-1966.

Thermal conductivity (k) for different building materials & insulation materials are
K cal cm/m²h deg c.

K₁ = k₃ = 81.8 (cement mortar)

K₂ = 69.7 (Brick work common) &

L₁, L₂, L₃ are the thickness of the plastering with cement mortar & Brick wall thickness.

L₁ = L₃ = 1.2 cm

L₂ = 20 cm

R₁ = (L₁/K₁) = 1.2/81.8 = 0.0146

R₂ = (L₂/K₂) = 20.0/69.7 = 0.2869

R₃ = (L₃/K₃) = 1.2/ 81.8 = 0.0146

FOR WALLS

1/f_i = 0.125 & 1/F_o = 0.0151

Total Thermal resistance.

$$\begin{aligned} R_T &= 1/f_i + 1/f_o + R_1 + R_2 + R_3 \\ &= (0.125 + 0.0515 + 0.0146 + 0.2869 + 0.0146) \\ &= 0.4926 \end{aligned}$$

Thermal Conductivity (U) is the reciprocal of thermal resistance.

$$U = 1/R_T = 1/0.4926 = 2.03$$

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

The residential apartment project is a development of residential building & the height of the building is 60 meters.

The project has been designed based on all the relevant fire safety as per NBC norms.

. Fire extinguishers systems are deployed throughout the building.

- . Fire hydrants are provided around the building.
- . Fire hose cabinets provided at every floor.
- . Identified Assembly points will be provided for fire accidents.

Precautions & safety measures proposed are:

- . Fire extinguishers for common areas and signage.
- . Wet risers through the dedicated shafts till terrace with valves as required.
- . Electrical fire alarm system for entire building.
- . Public address system.
- . Sprinkler system for entire building including upper and lower basement which will be used for parking of two and four wheelers.
- . Landing hydrants on all floors near each staircase with necessary accessories.

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

The project proponent has minimized the use of glass as a wall material, as a measure towards energy saving element in the building.

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.

Use of solar energy for water heating and street lighting is proposed for the project.

Date: 29/07/2016

Place: Cochin

Signature of the Applicant
For Kent Construction Pvt Ltd.



K. C. Raju
Director



Table of Contents

Sl. No	Description	Page No.
Chapter - 1 : Introduction		
1.1	Introduction	1
1.2	About the Project	1
1.3	Description of Standards Applicable	3
Chapter - 2 : Site Location		
2.1	Location of Project Site	4
2.2	Site & Its Surroundings	5
2.3	Climatic Conditions	6
2.4	Seismicity	7
Chapter-3 : Project Requirements		
3.1	Over view of the Project	8
3.2	Water requirements	8
3.3	Power Requirements	9
3.3.1	Back Up power Supply System	9
3.4	Sewerage Collection and Conveyance	9
3.4.1	Quantum of Sewage	10
3.4.2	Water balance chart	11
Chapter – 4 : Prediction of Impacts & Environmental management plan		
4.1	General	14

Cont...

Sl. No	Description	Page No.
4.2	During Construction Phase	14
4.2.1	Site Preparation	15
4.2.2	Air Quality	16
4.2.3	Noise Levels	17
4.2.4	Water Quality	17
4.2.5	Solid & Hazardous Waste Disposal	18
4.2.6	Traffic Density	18
4.2.7	Occupational health & Safety	18
4.3	During Operation Phase	18
4.3.1	Air Quality	19
4.3.2	Noise Quality	19
4.3.3	Water Quality	19
4.3.4	Solid Waste Management	20
4.3.5	Traffic Density	20
4.3.6	Green Belt Development	21
4.3.7	Rain Water Harvesting	21
4.3.8	Energy Saving Measures	22
4.3.9	Fire Safety & protection	23
Chapter - 5 : Disaster Management Plan		
5.1	Introduction	24
5.2	On-Site Management Plan	24

Cont...

Sl. No	Description	Page No.
5.2.1	Objectives, scope and contents of On-site Emergency Plan	24
5.2.2	Scope of Onsite Emergency Plan	25
5.3	Emergency	26
5.3.1	Methodology	26
5.3.2	Structure of Emergency Management	27
5.3.3	Identification and Assessment of Hazards	27
5.3.4	Infrastructure at Emergency Control Center	27
5.3.5	Emergency Medical Facilities	28
5.3.6	Health and Safety Measures For the workers	29
5.3.7	Emergency Action Plan for Cylinder Fire	29
5.3.8	Emergency Action Plan for Electric Fire	30
5.3.9	Emergency Action Plan for Office Fire	30
5.3.10	Emergency Action Plan for Oil Fire	30
5.3.11	Emergency Action Plan for Medical Aid	30
5.4	Natural Hazards:	32
5.4.1	Emergency Action Plan for Tornado/High Winds	32
5.4.2	Emergency Action Plan for earthquakes	32
5.4.3	Emergency Action Plan for Bomb Threat	32
6.0	Conclusions	35

LIST OF ANNEXURES

Sl. No.	Annexures
1	Land documents
2	Traffic density report
3	Air quality analysis report
4	Noise analysis report
5	Water quality analysis report
5	STP report

LIST OF PLATES

Sl. No.	Plates
1	Completion drawing 1
2	Completion drawing 2

1 INTRODUCTION

1.1 Introduction

Kent Constructions (P) Ltd. is a name that absolutely resounds with the definition of a Builder. The triumphant 23 years that has passed since its commencement, simultaneously resulted in carving a niche in the real estate sector of Kerala. Over these years, the company has lived up to the reputation as a proponent of innovative designs by coming up with a range of projects. Kent surpasses its competitors in bringing a revolutionary change in the flat culture, that is, innovating traditionally designed villas along with ultra modern apartments which has equally been appreciated by every aesthete of Kerala.

Kent Constructions (P) Ltd. is one of the Kerala's most reputed property development firms over 23 years of experience in land acquisition, clearances and sale. A two men team comprising Mr. T. P. Vinayan, Chairman and Mr. K. C. Raju, Managing Director led Kent Constructions in its future endeavors. Kent as a quality builder that focuses on creating projects such as Kent III am, Kent Kovilakam, Glass house, Hail garden etc.

Achievements:

- ✓ Business Excellence Award 2011, Junior Chamber International India , Harven fest -2011, Zone Conference, Zone XX
- ✓ Kerala State Business Excellence Award 2012 being adjudged as the No:1 Builder in Kerala

Kent constructions Pvt. Ltd., was granted building permit for construction of residential apartments comprising of 2 towers Sy. Nos. 138, 135/2 and 226/1 of Elamkulam Village, Kanayannur Taluk, Ernakulam district by the Cochin Corporation. The project proponent unaware of the EIA Notification 2006, started the construction of this project after obtaining following statutory approvals. Land documents and all approvals are attached as **Annexure 1**.

1. Building Permit from Cochin Corporation dated 22/08/2006.
2. Consent to Establish from Kerala State Pollution Control Board
3. NOC from Fire and rescue services, Govt. of Kerala
4. Height clearance approval from Southern naval Command.

MoEF & CC, GoI issued a recent Notification vide S.O. 804 (E), dated 14.03.2017, for one time opportunity for Violation cases. Therefore, we are hereby submitting our application for getting Environmental Clearance of the project as per MoEF & CC Notification dated on 14.03.2017.

The construction work is completed at the project site and occupancy certificate is issued by the Cochin Corporation, and apartments are occupied by the purchasers.

1.2 About the Project

Kent Constructions (P) Ltd. has developed residential building Project at Survey. Nos. 135/2, 226/1, and 138, Elamkulam Village, Kanayannur Taluk, Ernakulam district. This project has been developed on a plot of land measuring i.e. 5853.74 Sqm.

The constructed building project is a residential building consisting of 2 blocks naming A and B. Each of the two blocks have basement, ground floor and 16 upper floors. The maximum height of the building is 58 m. The road width in front of the project is 22 m.

Hail Garden placed advantageously, adjacent to the Jawaharlal Nehru International Stadium between Kaloore and Kadavanthra, is well- connected to all the city's pulse points. Hail Garden is right next to one of Cochin's broadest city roads. The development will offer its occupants, tenants, owners and visitors state of the art infrastructure, professional facility management, high and ready connectivity, uninterrupted power supply and advanced telecommunications along with a host of value added services. Some of the salient features of the project are given in the **Table 1.1.**

Table 1.1: Salient Features of the Project

Name of the project	Kent Hail Garden
Location	Elamkulam Village, Kanayannur Taluk, Ernakulam district, Kerala.
Total site area	5853.74 Sqm
Total Built-up Area	29,687.51 Sqm
FAR Area	24126.91 Sqm
Ground coverage area	4264.2495 Sqm
Car Parking	162
Expected occupancy	875 Nos
Max No. of Levels	Blocks A & B - 1 Basement + Ground floor+ 16 Upper floors
Height of the Building	58 m
Road Width	22 m
Source of Power	Kerala State Electricity Board & DG set (standby)
Power requirement	750kVA +160 kVA
Back up DG sets	1 x 200 KVA
Source of Water	KWA supply
Water requirement	125 KLD
Sewage Treatment Plant	1 Full fledged STP of capacity 100 KLD
Use of STP treated water	Utilization for urban reuse Viz. Flushing, Gardening
Project Cost	34.22Crores

1.3 Description of Standards Applicable.

As per Rule (IV) Environmental Protection Act 2006, this project falls under 8(a), Category- B2 of Building and Construction Project covering the Built up area >20,000 Sqm and < 1,50,000 Sqm. The proposed residential project has been constructed in a plot area of 5853.74 Sqm and with a built up area of 29,687.51 Sqm.

2 SITE LOCATION

2.1 Location of the Project Site

The project site is located in Elamkulam Village, Kanayannur Taluk, Ernakulam district. The land of the project is owned by the company. The site area is near to the Ernakulam North Railway Station is located at a distance of 3.6 Km from the project site and Cochin International Airport located at a distance less than 20 km (aerial). The co-ordinates of the project site are latitude $9^{\circ}59'25.61''$ N to $9^{\circ}59'27.08''$ N and longitude $76^{\circ}18'02.16''$ E to $76^{\circ}18'05.90''$ E with 9m AMSL (Above Mean Sea Level).

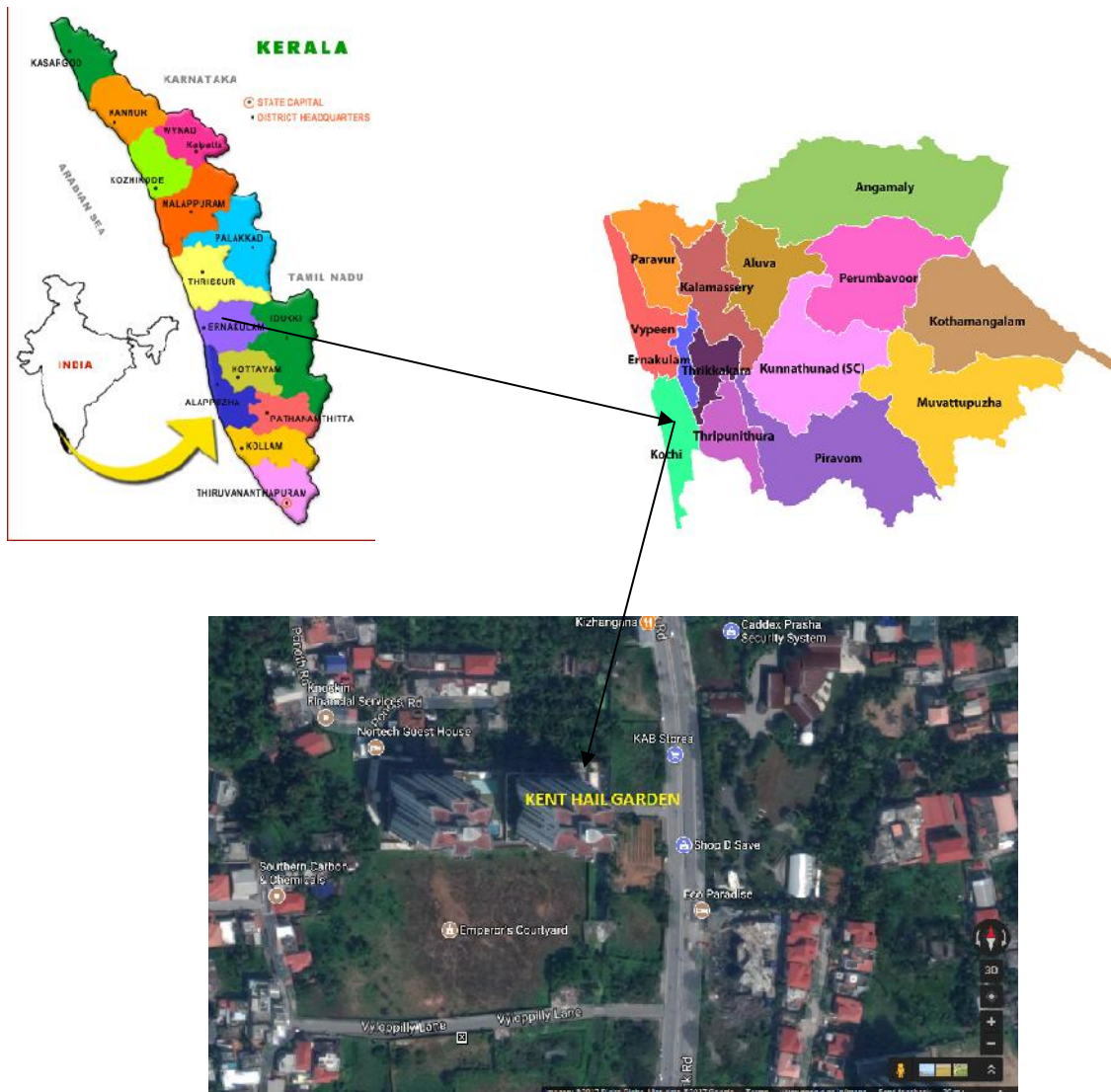


Fig: 2.1 Location map of project site

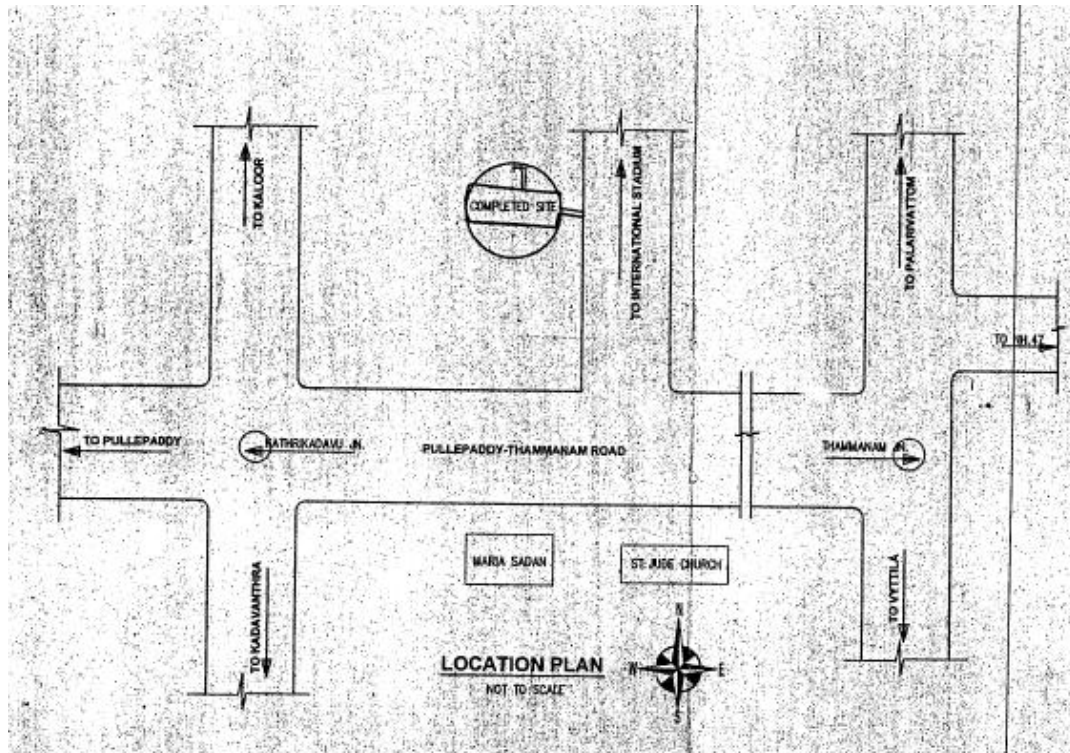


Fig 2.2 Location map of the project.

2.2 Site & Its Surroundings

Elamkulam is a region in the city of Kochi, in the state of Kerala, India. The buildings and offices in Kadavanthra expanded to the spaces of this place which is next bus stop after Kadavanthra towards Vyttila direction. Elamkulam can boast of many churches small and large, the biggest of which is the Little Flower Church by the Sahodaran Ayyapan Road (S.A Road). The road to the north from the Elamkulam bus stop leads to Sewage Treatment Plant. The road is hence named S.T.P road and it is also known as the Fatima Church road. The road towards south is the Chilavanoor road.

The S.T.P road leads to Chettichira junction in Subhash Chandra Bose road. It was the old way to get to Kadavanthra before the Kaloorkadavanthra Road came to existence and its full functionality. The Elamkulam junction also houses the Navy quarters and leads to the backwaters of Chilavanoor where many flats are on the rise

due to aesthetics of the place. Elamkulam comes under the Kadavanthra P.O. The Elamkulam Village office is located opposite to the Rajiv Gandhi Indoor Stadium known previously as Regional Sports Centre, Kochi at Kadavanthra. The Elamkulam village office were the land taxes and residential issues and taxes are collected is one of the three Village offices in the Cochin Corporation. Elamkulam region expands from the bridge over the erstwhile Thripunithura lagoon, which is at present just a canal, to the Elamkulam junction.



Fig.2.3 Photographs showing the Completed Project

2.3 Climatic Conditions

Since the region lies in the south western coastal state of Kerala, the climate is tropical, with only minor differences in temperatures between day and night, as well as over the year. Summer lasts from March to May, and is followed by the South-west monsoon from June to September. October and November form the post

monsoon or retreating monsoon season. Winter from December through February is slightly cooler, and windy, due to winds from the Western Ghats.

The City is drained in the monsoonal season by heavy showers. The average annual rainfall is 3000 mm. The South-west monsoon generally sets in during the last week of May. After July the rainfall decreases. On an average, there are 124 rainy days in a year. The maximum average temperature of the city in the summer season is 33 degree Celsius while the minimum temperature recorded is 25 degrees Celsius. The winter season records a maximum average of 29 degree Celsius and a minimum average of 20 degree Celsius.

2.4 Seismicity:

The seismic hazard map of India was updated in 2000 (11) by the Bureau of Indian Standards (BIS). There are no major changes in the map with respect to Kerala. All districts in the state lie in Zone III. The maximum intensity expected in these areas would be around MSK VII. It must be noted that BIS estimates the hazard, based in part, on previous known earthquakes. Similarly all of the Lakshadweep Island also lies in Zone III.

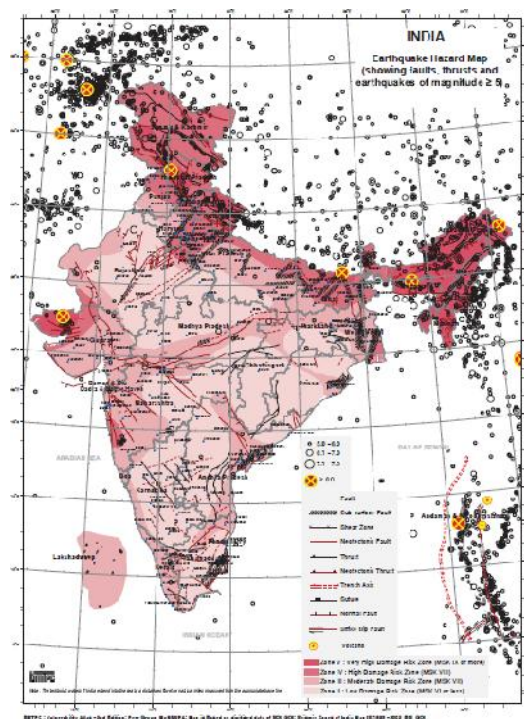


Fig. 2.4 Seismic map of India Showing Hazard Zones

3 PROJECT REQUIREMENTS

3.1 Overview of the Project

The residential building project consist of 2 blocks named A and B. Each of the two blocks have 1 basement, ground floor and 16 upper floors and the maximum height of the building is 58 m. The road width in front of the project is 22 m.

The design of the architecture of the buildings were conceptualised to achieve KENT HAIL GARDEN corporate philosophy of developing facilities that aim to be environmentally sustainable and responsive to global aspects. There by aiming towards being a truly sustainable development by incorporating aspects of environmental, economic and social sustainability.

There is a rich mix of facilities and special spaces for:

- Amenities like swimming pool with baby pool, sauna and Jacuzzi, clubhouse, mini convention centre, barbeque counter, billiards room, table tennis and card room.
- The landscape architecture will encompass the environmental aims of the architecture and urban design and the beautifully landscaped areas,

3.2 Water Requirements

Principal source of water supply for the proposed developments are from KWA and borewells. The total domestic water requirement of the project is **125 KLD**. The total wastewater generation is **100 KLD**.

Source of Water:

- KWA and borewell water.
- Recycled water from sewage treatment plant of constructed capacity of **100 KLD** is the source for flushing, irrigation water supply system & external drain.

Table 3.1 Water Requirement During Operation Phase

Sl No.	Tower	No. of Flats	No. of Person Per Flat	Total Population	Domestic Requirement (Lpcd)	Flushing (Lpcd)	Overall Requirement (L/d)
1	A	78	5	390	105	45	58500
2	B	84	5	420	105	45	63000
3	Staff strength at office	--		65		45	2925
	TOTAL			875			124425
				Total water Requirement			~125 KLD

3.3 Power Requirements

The total power demand for the finished project is 750 kVA and 160 kVA and also project proponent has made provision of DG sets (200 KVA X 1 No.) The power requirement in the operation phase is met from Kerala State Electricity Board.

3.3.1 Backup Power Supply System

In order to meet emergency power requirements during the grid failure, one DG set of capacity 200 KVA has been installed, which acts as 100% back up for EB power.

3.4 Sewage Collection & Conveyance

Drainage system for soil and wastewater is based on most efficient, functional and economical design, minimum maintenance after installation and with available site conditions, minimum excavation of soil for lying of pipes.

Waste and soil vertical pipes running in toilet are connected to vertical pipe in shaft and finally dropped down to ground level through the ducts. Waste pipes are connected to inspection chambers through gully traps. Soil pipes are connected directly to inspection chambers. Further, this sewer line is carried through a battery of inspection chambers and manholes and is finally discharged / connected into sewage treatment plant (STP). The treated water from STP is stored in underground sump. The treated water is used for flushing, landscape, and fire fighting systems.

3.4.1 Quantum of Sewage:

The total water requirement of the project is **125 KLD**.

Considering 80% of water requirement as wastewater generation,

Sewage generation = **100 KLD**

Hence Sewage Treatment Plant of capacity 100 KLD is designed.

Considering 90% of sewage water as treated water,

Quantity of treated water = **90 KLD**

The capacity of Sewage Treatment Plant is 100 KLD

3.4.2 Water Balance Chart:

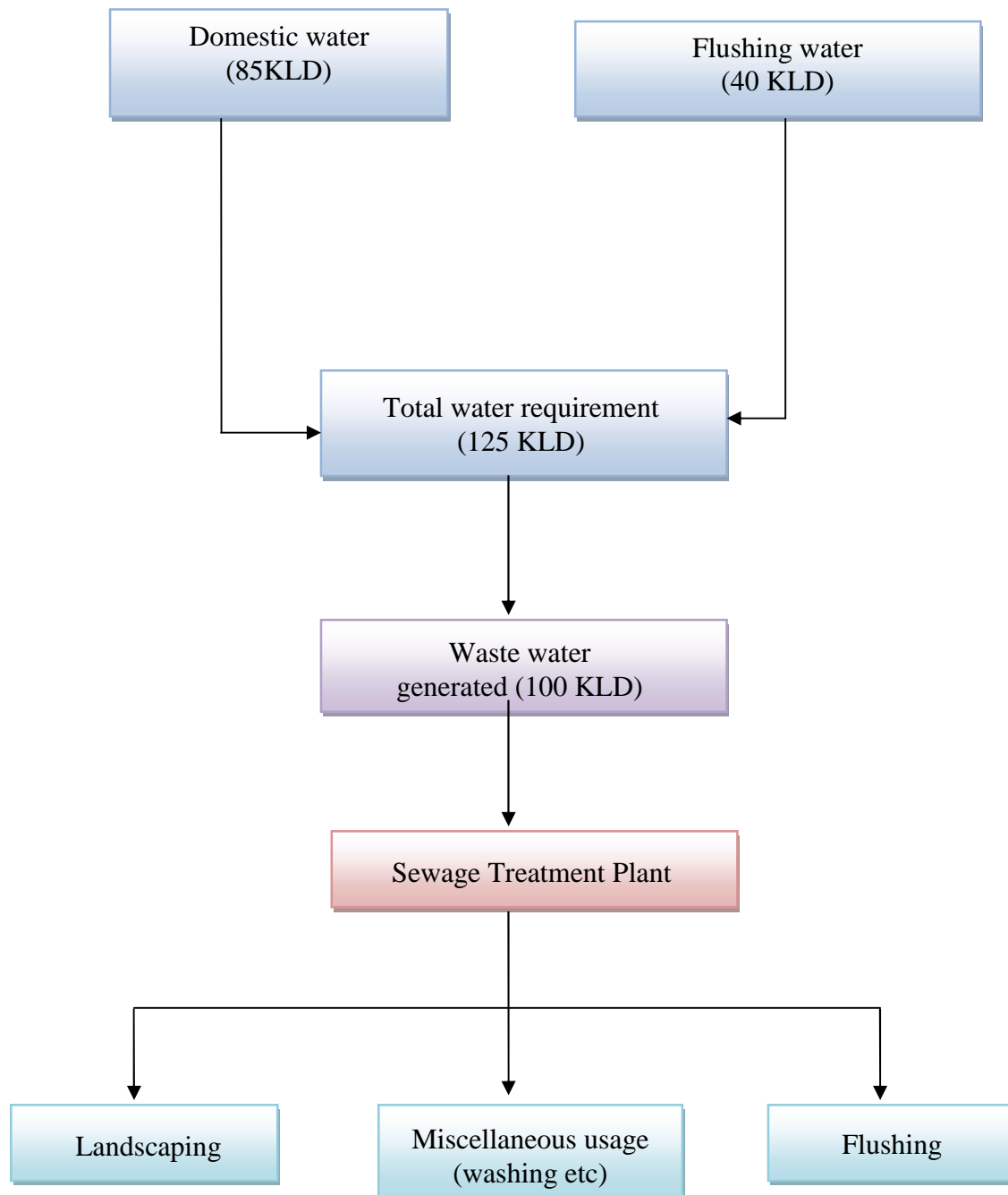


Fig.3.1 Showing Detailed Water Balance Chart

3.4.3 Utilization of treated water

The treated water from STP is utilized efficiently & effectively for the requirements within the project site and the details are given in **Table 3.2**.

Table 3.2 Utilization of Treated water

Sl. No.	Description	Quantity (KLD)
1	Flushing	36.9
2	Gardening/Horticulture	46.8
3	Miscellaneous Usage (like car wash etc.)	6.3
Total		90

Note: According to General Standards for discharge of Environmental pollutants, Schedule-VI of EP Rules, loading rate of treated effluent on land for irrigation is given below in **Table 3.3**.

Table 3.3 Showing Soil Texture and loading rate of treated water for irrigation

Sl. No	Soil Texture	Loading Rate in m ³ / Hec /Day
1	Sandy	225 to 280
2	Sandy Loam	170 to 225
3	Loam	110 to 170
4	Clay Loam	55 to 110
5	Clayey	35 to 055

In the constructed residential project site, soil texture is Sandy, according to the above rules, we can discharge up to 225 to 280 m³/Hec/Day of treated water on land for irrigation. .

3.5 Project Cost

The total estimated cost of the project is **Rs 34.22 Crores**. The details are as given in Table 3.3 below.

Table 3.4 Details of Project Cost

Sl. No.	Description	Cost (Rs. In Crores)
1	Land Cost	1.54
2	Construction Cost with Plant & Machinery	32.68
Total		34.22

4 PREDICTION OF IMPACTS & ENVIRONMENTAL MANAGEMENT PLAN

4.1 General

Prediction of impacts is a significant component of the Environmental Impact Assessment of any project. Several scientific methods are available to predict impacts of development projects on air, water, ecological & socio-economic environments. Such predictions are superimposed over baseline environment status to derive post project scenario of environmental conditions. The prediction of impacts helps to minimize adverse impacts on environmental quality during & after project execution by suitably designed environment management plans.

Environmental Management Plan (EMP) would consist of all mitigation measures for each item wise activity that has been undertaken during the construction. The same measures will also be undertaken during operation and the entire life cycle to minimize adverse environmental impacts as a result of the activities of the project.

This section outlines the key Environmental Management and safeguards that will be initiated by the project proponent to manage the project's key Environmental concerns. EMP is the tool for mitigating or offsetting the potential adverse environmental impacts resulting from various activities of the project.

The potential environmental impacts and proposed management associated with each stage of the project development are described here. The primary objective of this proposed environmental management plan is to control environmental impacts to levels within acceptable limits and to minimize possible impact on the community and the workforce of foreseeable risks during the construction and subsequent operation phases of the project.

The Environmental Management Plan (EMP) mainly consists of integrating potential impacts, environmental mitigation measures, implementation schedule and monitoring plans.

4.2 During Construction Phase

The impacts during the construction phase of the project on the environment were basically of transient in nature and have reduced gradually on completion of the construction activities. The environmental impacts during the construction phase and the measures that were taken for the mitigation are listed below:

Table 4.1 EMP for Construction Phase Impacts- Site Preparation

Environmental Impacts	Mitigation Measures
Noise generation	<ul style="list-style-type: none">• Selection of equipment with less noise generation was used• The earth moving equipment was periodically checked and maintained for noise levels. Since the site is more or less even use of these earth-moving equipments were not necessary.• The workers were provided with adequate PPE such as ear plugs to reduce impact of high noise levels
Dust generation	<ul style="list-style-type: none">• The site cleared was periodically watered to reduce emission of dust particles• The workers were provided with PPE such as nose masks and goggles to reduce impact on health• Barricades were provided all along the boundary of the project site.

Table 4.2 EMP for Construction Phase Impacts -Transportation of Construction Materials

Environmental Impacts	Mitigation measures
Noise generation	<ul style="list-style-type: none">• Periodic maintenance of vehicles were done
Dust generation	<ul style="list-style-type: none">• Construction materials were covered with tarpaulin sheets to prevent the material from being air borne• The workers transporting materials were provided with PPE

	such as nose masks to reduce impact of air borne dust on their health
Vehicular emissions	<ul style="list-style-type: none"> • Periodic emission check for vehicles were done • Clean fuel was used for vehicles

Table 4.3 EMP for Construction Phase Impacts "Construction Activities"

Environmental Impacts	Mitigation measures
Noise generation	<ul style="list-style-type: none"> • Personnel Protective Equipment (PPE) such as ear plugs and helmets were provided for construction workers. • The working hours were imposed on construction workers.
Dust generation	<ul style="list-style-type: none"> • PPE in the form of nose masks were provided for construction workers. • Water sprays to prevent the dust contact from being air borne were used
Air Emissions from construction machinery	<ul style="list-style-type: none"> • Periodic check and regular maintenance of construction machinery for emissions. • Clean fuel was used in equipments. • Barricades were provided all along the boundary of the project site.

4.2.1 Air Quality

During construction period, generation of dust emissions was high. This could be attributed by vehicular movements and other construction activities. Also there was emission of fugitive dust from the construction activities. The following measures were taken to reduce the impact on air quality.

- Transport vehicles were properly maintained.
- Periodic water spraying
- Any vehicle not meeting the vehicle pollution standards were not allowed within the construction activity.
- Vehicles were covered using tarpaulins to avoid spills and dust emissions.

4.2.2 Noise Level

The noise levels during the construction phase were well within the acceptable limits. Noise was produced due to movement of vehicles and allied construction activities. The following measures were taken to reduce the noise impact.

- Construction equipment generating minimum noise and vibration were chosen.
- Adequate care had been taken while procuring noise generating equipment & machinery to ensure that vendors have incorporated adequate measures to minimize noise & vibrations.
- All equipments were operated as per the manufacturer manual to generate minimum noise level and not to exceed the limits.
- High noise generation equipment, when used was operated during the day time only and completely restricted during night hours and this eliminated any possible discomfort to the nearby residents.
- Ear muffs were provided to workers.

4.2.3 Water Quality

There were no labour quarters/colony on site. Suitable toilet facilities were arranged at site for the convenience of the laborers. There is no likely hood of ground water contamination, as no waste was discharged to ground water. The following measures were taken to reduce the impact on water quality.

- A temporary septic tank-soak pit was constructed for treatment and disposal of wastewater.
- The construction waste was disposed off on land in a proper manner.
- Cutting and filling of earthwork was avoided during monsoon season.
- Construction equipment requiring minimum water for cooling and operation for optimum effectiveness was chosen.

4.2.4 Solid / Hazardous Waste Disposal

Solid wastes generated during construction phase include domestic waste and construction waste. The hazardous waste materials used during construction phase was spent oil from DG sets. The following measures were taken for proper disposal.

- Solid wastes were disposed off through Municipal Authorities in construction phase.
- Hazardous wastes like spent oil and paints were stored in separate enclosures and given to authorized recyclers.

4.2.5 Traffic Density

Traffic density had increased during construction phase due to transportation of construction materials. The following measures were taken to reduce the traffic congestion.

- Heavy vehicular movement was restricted to day time only
- Adequate parking facility was provided.
- Widened entry and exit points were provided for the easy movement of vehicles.

A detailed traffic density survey has been done and the report has been enclosed as **Annexure 2**.

4.2.6 Occupational Health & Safety

Safety training was provided to all construction laborers entering the site: the onus of such training lie with the contractor who was entrusted with the work: only reputed, safety conscious contractors were deployed for this prestigious project. On site emergency First aid facility was made available at all times. Ambulance on call facility was tied up with neighboring hospitals for more serious emergencies.

4.3 During Operation Phase

The project does not generate water or noise pollution to any significant degree to impact the environment and cause any adverse effect. There is no highly significant

air, solid waste or hazardous waste emission from the project, which will cause damage to the environment. The details are given below.

4.3.1 Air Quality

Major pollutants envisaged from the project are from DG sets and vehicle movement. The major pollutants are oxides of nitrogen, particulates and sulphur dioxide. The following measures will be taken to reduce the impact on air quality.

- Sufficient stack height will be provided for DG sets as per KSPCB norms.
- Green belt development will be done with tall growing trees.
- Periodic Ambient Air Quality Monitoring

The analysis reports of the air environment are attached as **Annexure 3**

4.3.2 Noise Quality

The major source of noise is DG sets. Adequate care has been taken while procuring noise generating equipment & machinery to ensure that vendors have incorporated adequate measures to minimize noise & vibrations. The following measures are taken to reduce the impact of noise.

- All noise generating source will be equipped with appropriate noise control measures.
- DG sets are provided with integral acoustic enclosure as per CPCB norms.
- Noise attenuating green belt shall be developed for effective reduction in noise.
- Ambient noise levels will be periodically monitored to determine compliance with the norms.

The analysis reports of noise environment are attached as **Annexure 4**.

4.3.3 Water Quality

The water requirement for the project is met from KWA and bore well. The domestic wastewater generated from the proposed project is treated in STP of capacity 100 KLD. The treated water is used for flushing, and will be reused for green belt development requirement; thus making it a zero discharge project. The details of water demand calculation and STP are provided in **Annexure 6**. The following measures are taken to minimize the usage of water.

- Rainwater harvesting for optimum utilization of rainwater and also to recharge the ground water is adopted.
- Use of low flow fixtures and appliances for reduced water consumption.
- Recycle and reuse of treated water from STPs.

The analysis reports for water quality at project site is attached as **Annexure 5**.

4.3.4 Solid Waste Management

About **410 Kg/day** of solid waste (Organic + Inorganic) will be generated from the proposed project. The solid waste consists of paper, cardboard, plastics, kitchen wastes and other general refuse by routine activities. Presently, the generated solid waste is provided to Cochin Municipal Corporation for further treatment and disposal. Organic waste converter shall be implemented in the site at the earliest. The details of solid waste generation and its disposal methods are given in **Table 4.4** below:

Table 4.4 Solid Waste Management

Description of waste	Quantity (Kg/day)	Method of collection	Mode of disposal
Domestic/Organic Waste	175	Separate bins will be provided for collection of Organic & inorganic waste.	Organic waste & Inorganic waste will be given to KSPCB approved recyclers.
Inorganic Waste	235		

The only hazardous waste generated is spent oil from DG set. Spent oil is stored in leak proof sealed containers and given to authorized re-processors.

4.3.5 Traffic Density

The project contributes to an additional vehicular movement on the main Road. However, the project is nearby to stadium link road towards eastern side and this road is quite capable of handling the incremental traffic. Thus additional traffic due to the project is absorbed by the main roads. The details of traffic survey are given in **Annexure 2**. However, the following measures will be adopted to reduce traffic congestion at the site.

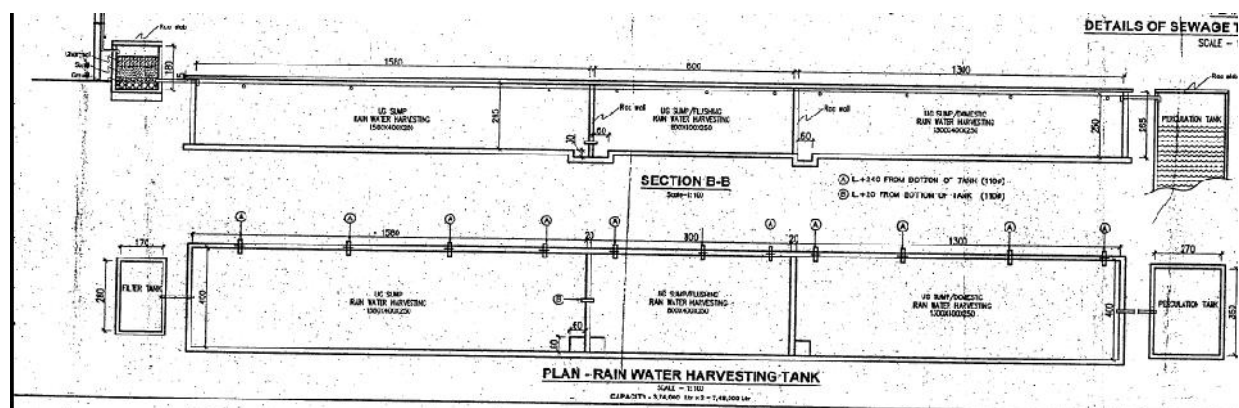
- Wide gate is provided to the apartment for entry and exit
- Adequate parking facilities are provided
- The long driveway leading to the parking bays and areas are designed such that the vehicles do not get piled up.
- Proper signages are provided at suitable places.

4.3.6 Green Belt Development

The project will be provided with the total green area of 34% of the plot area. The implementation of green belt is of immense importance, as it not only acts as pollution sink but also enhances the visual appearance of the developed site. The species to be grown on the site will be fast growing native species having broad leaf base so that permanent green belt is created in a short period. The effective plantation will also stabilize the soil and reduce soil erosion. Besides this, the visual aesthetics of the proposed site will be enhanced by developing parks / lawn with local ornamental plants in the open spaces.

4.3.7 Rainwater Harvesting

The rainwater from terrace area of 380 m² from each tower and other open spaces is collected through rain water down take pipes and connected to catch basins. The rain water from hardscapes and landscapes are collected by catch basins through drains with gratings and connected to the storm water channels. The water in the basements are drained into sumps located in the basement from where water is pumped out to the external storm water drain. Drawing showing the rain water harvesting tank is given below.



4.3.8 Energy Conservation Plan

The energy consumption analysis and data sheets are as per the Energy Conservation Building Codes 2007 / Bureau of Energy Efficiency.

Various energy conservation measures adopted in the project are described below:

4.3.8.1 Solar Architectural features:

The project is provided with enough daylight factors in the building to permit maximum daylight to interior to minimize overall energy consumption. These features also minimize the impact of climate both in summer and in winter and as a result, the use of electricity is reduced.

4.3.8.2 Energy saving measures

- Energy efficient appliances are installed in the building.
- Constant monitoring of energy consumption and defining targets for energy conservation is employed.
- Sunscreen films on windows to reduce heating inside the buildings are used.
- All lifts work on VFD drives which results in 30% saving in consumption.
- Most of the common area lighting work on high energy efficient lamps (LED) as specified in bureau of energy efficiency, which again results in saving in general consumption.
- 30% of the external lighting shall be proposed on solar. These are set of lighting which are placed at critical junctions and which would be lit round the night.
- All internal common area lighting system is proposed to have either high efficiency lamps/ LED.

4.3.8.3 Savings In Electrical Power Consumption

The project has been provided with enough daylight factors in the building to permit maximum daylight to interior to minimize overall energy consumption. These features will also minimize the impact of climate both in summer and in winter and as a result, the use of electricity will likely to be reduced.

- Low loss copper winding transformers
- Suitably sized power cables to limit the voltage drops to less than 5% to minimize power losses.
- Low loss electric ballast in place of electromagnetic ballast for common area lights
- LED lamps for common area lighting such as lifts, lobbies/corridors.
- Automatic capacitor connection feature to improve the power factor of the pumps.
- Energy efficient motors for pumps lifts etc...
- Timer based controls for common area lights to switch off when not needed.

4.3.9 Fire safety and Protection

Precaution & Safety measure against fire hazard:

- The Proposed development is designed and installed as per NBC, part IV of Fire & Life Safety 2005 and to suit local authority requirements.
- Proposed development is categorized under Group A, Residential building, Sub division A4 apartment houses.
- Fire detection & alarm system, public address system, portable fire extinguishers will be set up
- Fire Extinguishers will be provided for common areas and signage.
- Over head tank with down comer hydrant point at each floor with valves as required.
- Fire alarm system will be provided for common area
- Sprinkler system will be provided in the parking of two and four wheelers.
- Landing hydrants will be provided on all floors near each staircase with necessary accessories.

5.0 DISASTER MANAGEMENT PLAN

5.1. Introduction

Rapid development of the city has posed wide-ranging hazards threatening safety and health of people. Accidents may adversely affect the environment and the people living in the vicinity. These accidents can be minimized to a great extent by proper procedures, handling and training. But it may be difficult to reach zero risk or absolute safety level. Whenever such incidents do occur in order to prevent loss of lives and damage to property, it becomes necessary to take immediate steps to control the situation. This can be achieved through a planned advance preparation to face such a situation with respect to both on site and off site emergencies.

5.2. On-Site Management Plan

The On-Site plan is circulated to all concerned members of emergency teams. It is essential that all concerned familiarize themselves with the overall on-site emergency plan and their respective roles and responsibilities during and emergency. They should also participate regularly in the mock drills that will be conducted so as to keep themselves and the emergency organization in a state of perpetual preparedness at all times to meet any emergency.

5.2.1 Objectives, scope and contents of On-site Emergency Plan

Objectives of Emergency Planning are to maximize the resource utilization and combined efforts towards emergency operations and would broadly cover the following.

1. To localize the emergency and if possible eliminate it.
2. To minimize the effects of accidents on people and property.
3. To take remedial measures in the quickest possible time to contain the incident and control it with minimum damage.
4. To mobilize the internal resources and utilize them in the most effective way.
5. To get help from the local community and government officials to supplement internal manpower and resources.
6. To minimize the damage in other sections.

7. To keep the required emergency equipment in stock at right places and ensure that they are in working condition.
8. To keep the concerned personnel fully trained in the use of emergency equipment.
9. To give immediate warning to the surrounding localities in case of an emergency situation arising.
10. To mobilize transport and medical treatment of the injured.
11. To educate the public in the surrounding places regarding hazards.
12. To arrange for rescue and treatment of casualties.
13. To safe guard the people.
14. To identify the causalities and communicate to relatives, to render necessary help to concerned.
15. To rehabilitate area affected.
16. To provide information to media & government agencies

5.2.2. Scope of Onsite Emergency Plan

The plan covers information regarding the properties of the residential apartments, type of disasters and disaster/accident-prone zones, the actual disaster control plans with authority delegation, controlling and other details. General details like location, project layout, neighboring entities and the assistance they can render etc., are also provided.

The important elements considered in this plan are

- Statutory requirements
- Emergency organization
- Roles and Responsibilities
- Communications during emergency
- Emergency shutdown & control of situation
- Rescue & Rehabilitation
- Emergency facilities
- Important Information

The primary purpose of the on-site emergency plan of DMP is to control and contain the incident and so to prevent it from spreading. It is not possible to cover every eventuality in the plan and the successful handling of the emergency will depend on appropriate action and decisions being taken on the spot. Other important aspects needing to be considered include the following:

5.3. Emergency

A major emergency in any situation is one, which has the potential to cause serious injury or loss of life, which may cause extensive damage to the structures in the vicinity and environment and could result in serious disruption to normal operation both inside and outside the layout premises. Depending on the magnitude of the emergency, services of the outside agencies may also be required for supplementing the internal effort to effectively handle the emergency and to contain the damage.

The Management has to take effective steps to assess, minimize and wherever feasible eliminate the risks to a large extent. Accidents may still occur and it is necessary to be fully prepared to tackle all such emergencies if and when they occur. It is likely that the consequences of such emergencies will be confined to the units concerned or may affect outside. If the consequences are confined within the plant boundary, it is then termed as On Site Emergency and will be controlled by Chief Emergency Controller. In order to generate the plans it is necessary to first determine the kinds of accidents leading to an emergency that can occur in the layout. The most widely used technique in practice is based on experience accumulated over many years and safety audits.

5.3.1. Methodology

The considerations in an emergency planning include the following: -

1. Identification and assessment of hazards and risks
2. Hazard, consequence analysis
3. Alarm and communication procedures
4. Identifying, appointment of personnel & assignment of responsibilities

5. Identification and equipping Emergency control centre, Identifying Assembly, Rescue points, Medical facilities.
6. Emergency preparedness plan, procedures, steps to be taken before, during and after emergency.
7. Formulation of plan and emergency sources.
8. Training rehearsal, evaluation and updating the plan

5.3.2 Structure of Emergency Management

- a. Noticing the accidents
- b. Informing declarer of emergency
- c. Declaration of emergency
- d. Functions of declarer
- e. Interaction with outside agencies

5.3.3. Identification and Assessment of Hazards

This stage is crucial to both on-site and off-site emergency planning and requires systematic identification of all possible emergencies that could arise in the plants. These should range from small events, which can be dealt by plant personnel without any help from external agencies to the largest event that would require outside help. To tackle such emergencies effectively, it is essential to have clear-cut action plan. Experience has shown that for every occasion that the full potential of an accident is realized, there are many occasions when some lesser event occurs or when developing incident is made safe before reaching full potential.

5.3.4. Infrastructure at Emergency Control Center

Emergency control centers should therefore contain the following

- An adequate number of external telephones; if possible, one should accept only outgoing calls, in order to bypass jammed switchboards during an emergency.
- An adequate number of internal telephones
- Radio equipment
- A plan of the works, to show:

- Areas where there are large inventories of hazardous materials.
- Sources of safety and first aid equipment.
- The fire-fighting system and additional sources of water.
- Site entrance and roadways, including up-to-date information on road Traffic.
- Assembly points.
- Vehicle parking and rail sidings.
- Additional work and layout plans detailing alternate routes and affected areas, during an emergency.
- Note pads, pens and pencils.
- A nominal role of employees.
- A list of key personnel, with addresses, telephone numbers, etc.

The emergency control center should be sited in an area of minimum risk. Suitable location from where clear view of the plant is possible or the control room can be designated as Emergency Control Center. All the Site Controller/ Incident Controller Officers, Senior Personnel would be located here or have access to the ECC.

5.3.5. Emergency Medical Facilities

Stretchers, gas masks and general first aid materials for dealing with chemical burns, fire burns, etc., would be maintained in the medical center as well as in the Emergency Control Room. A range of medicines should be maintained in the ECC/ Medical Center. Breathing apparatus and other emergency medical equipment should be provided and maintained.

The Medical Center should display poster for treating burns and first aid. Some medicines and facilities to be kept in the medical center are suggested. The list is indicative and the qualified doctors of the medical center should use their professional judgment for medical treatment.

5.3.6. Health and Safety Measures For the workers

a. Buildings and structures: No walls, chimneys, galleries, stairways, floor, platform, staging or structure whether of a permanent or temporary character shall be constructed in such manner as to cause risk or bodily injury.

b. Provision of crawling boards etc: No person shall be required to stand or to pass over or work on or near by any roof or ceiling cover with fragile material through which he is liable to fall, in case it breaks or gives away. The distance for more than 3 meters without use of sufficient number of suitable ladders, duck ladders or crawling boards which are securely supported is not allowed.

c. Service platforms: Whenever practicable and demanded service platforms and gangways will be provided for overhead shafting, and where required by him these will be securely fenced with guard rails and toe boards.

d. Belts: All belts will be regularly examined to insure that the joints are safe and the belts are in proper tension.

e. Helmets: Helmets will be provided to the workers for safe guarding themselves against any head injuries.

f. Machinery: No machineries or equipments will be situated, operated or maintained in such a manner as to cause risk of body injury.

g. Methods of work: No process of work will be carried out in such a manner as to cause risk of body injury.

h. Electricity: No electricity installation shall be provided during construction so as to be void of dangers to human life or safety.

5.3.7 Emergency action Plans

5.3.7.1 Emergency Action Plan for Cylinder Fire:

1. When filled container containing LPG is involved in fire, internal pressure if not relieved, shall build up above 70 kg/sqcm and ultimately rupture the container. Rupture weak by direct flame impingement. Ruptured containers can be propelled at distance by jet action.

2. If container's pressure is not raised upto 70 kg/sqcm leakage from screwed valve joint can occur due to different expansion of steel and brass.
3. Ignition of the escaping gas would aggravate the fire but release of fire reduces the possibility of rupture.
4. No attempt should be made to extinguish the burning gas but the container under fire and other containers in vicinity should be kept cool by water spray.
5. If the gas leakage does not ignite, the container should be approached from up and removed to the place of safety away from the source of ignition.

5.3.7.2 Emergency Action Plan for Electric Fire:

1. Disconnect the affected areas electric supply.
2. Attempt to extinguish fire with the help of CO₂, DCP
3. If fire is not extinguished, extinguish by spraying water with fog nozzle after ensuring complete isolation of electric circuit.

5.3.7.3 Emergency Action Plan for Office Fire:

1. Disconnect electric supply of the affected area.
2. Attempt to extinguish the fire with the help of CO₂, DCP and sand.
3. If large fire, use hydrant system.
4. Attempt to save the record.
5. Attempt fire extinguisher.

5.3.7.4 Emergency Action Plan for Oil Fire:

1. Attempt to extinguish small fire with the help of DCP
2. If the fire is not controlled, use water foam to blanket the fire and further action is to be taken

5.3.7.5 Emergency Action Plan for Medical Aid:

i. Emergency Action Plan for Electric Shock Casualties:

Electric shock results in:

Irreversible damage to brain cell begins followed by deterioration of the organs.

Rescue and first aid:

- ❖ Do first aid quickly and without fuss and panic
- ❖ Switch off the supply if this can be done at once.

- ❖ If not possible use a dry stick, dry cloth or other non-conductor to separate the victim from electrical contact.
- ❖ The rescuer must avoid receiving shock himself by wearing gloves or using a jacket to pull the victim.
- ❖ Always keep in mind that delay in rescue and resuscitation may be fatal. Every sound counts.

ii. Artificial Respiration:

Give artificial respiration if breathing has stopped. There are several methods of artificial respiration, if the victim is not injured over the face, try mouth to mouth.

a) Mouth to mouth Method:

- ❖ If there is obstruction to breathing, remove it with your fingers if it is in mouth. Several sharp blows in between shoulder blade may help to dislodge an obstruction.
- ❖ Lie casually on his back, put something under his shoulder to raise them & allow his head to fall backwards. The head should be, if possible be a little lower than the trunk. Remember that speed is essential.
- ❖ Kneel at the casualty's head and grasp his arms at the wrists then cross them firmly over the lower chest. This movement should force air out of his lungs. Press with the hands crossed on the lower part of the chest and maintain pressure for two seconds.
- ❖ Release this pressure and pull out his arms with a sweeping movement upwards and outwards above his head and backwards as far as possible.
- ❖ This movement should cause air to be drawn in to his lungs. Retain the arm in this position for three seconds.
- ❖ Repeat these movements rhythmically about twelve times a minute checking the mouth frequently for obstructions.
- ❖ With the casualty on his back there is danger of aspiration of vomit, mucus or blood reentering the system. This risk can be reduced by keeping his head extended and a little lower than the trunk.
- ❖ If an assistant is available, he can press the casualty's lower jaw so that the chin is jutting out.

- ❖ The assistant should also ensure that the mouth is kept open as far as possible and head is tilted to one side.
- ❖ When natural breathing begins, your movement should be adapted to correspond to it.
- ❖ If burns are present, cover them with a dry sterile dressing
- ❖ Handle the casualty gentle
- ❖ Do not allow people to crowd around and block fresh airflow
- ❖ Arrange to remove the injured to the care of a doctor as early as possible.

5.4. Natural Hazards

5.4.1 Emergency Action Plan for Tornado/High Winds:

a. Weather reports shall be monitored from broadcast warnings regarding threatening conditions.

- If the tornado has been sighted or effect is felt, following steps should be taken by plant personnel.
 - ❖ Persons shall be notified over public address system or through siren.
 - ❖ Emergency services shall be alerted for assistance.
 - ❖ Plant personnel should be advised to assemble in the administration building basement, staff room, recreation room and rest rooms.
 - ❖ All safety systems should be kept on alert and all nonessential utilities should be put off.
 - ❖ After the status is restored, personal should inspect all the facilities for resource, first aid and damage control activities, damage assessment and clean up, restoration and recovery.

5.4.2. Emergency Action Plan for earthquakes

a. When first tremors are sensed during an earthquake, all personnel should evacuate buildings and assemble at safe place away from structures, walls and falling objects. Emergency shutdown should be declared.

b. Emergency services should be contacted for assistance.

c. After the status is restored, personnel should inspect all the facilities for rescue, first aid and damage control activities, damage assessment, cleanup, restoration and recovery.

5.4.3. Emergency Action Plan for Bomb Threat

When bomb threat call is received the following measures are to be taken.

- ❖ Inform the message to the highest local police authority and seek their assistance for patrolling and security need.
- ❖ Inform Controller of Explosives the details and nature of the anonymous message and read operations.
- ❖ Request the Local Fire Brigade to position at least one fire tender at the Location immediately.
- ❖ Keep the Concerned Dept. at the Regional Level informed with the developments at regular intervals.
- ❖ Alert the Local Govt /Pvt. Hospitals and seek their help for providing Ambulances if necessary

In The Location Premises:

- ❖ Keep the Fire Hydrant System/all Fire Fighting and Personnel protective Equipment in readiness.
- ❖ Every one entering the location must be frisked at the gate/check all hand bags, parcels etc., for suspected explosive/dangerous objects.
- ❖ Have thorough inspection of the location for any suspected dangerous object.
- ❖ Materials and other Boxes to be brought in to the location must be deposited at gate for minimum curing period of 48 Hrs.
- ❖ Organize employees vigilance cell for round the clock observation of the premises.

If the Suspected object is found:

- ❖ In case of finding of suspected article, do not disturb its position, but the area around it should be cordoned off to a distance of 100 meters and more depending upon the gravity of situation.
- ❖ Adequate staff or police squad posted to prevent any unauthorized entry into the enforced cordon.

- ❖ Contact controller of explosives immediately, who on reaching the site will decide suitable action for defusing and disposal of the suspected object.
- ❖ Evolution of thick billowing smoke is an indication of impending explosion and in such a case, with draw or evacuates all personnel from the spot, which has been identified.

As a general measure regulate the movement of the outsiders inside our Premises and restrict their entry with permits.

6.0 Conclusion

From Overall assessment of the impacts in terms of positive and negative effects on various environmental components, the developed project activity has not envisaged any major impacts on the surrounding environment. The project is only of residential apartment buildings consisting mainly of residential units, club house and garden space along with other amenities. The project has adopted 3 R's principle (Reduce, Reuse and Recycle) to minimize the impacts on environment with regard to pollution and other detrimental aspects of environmental condition with Novel green building concepts. The building designed and executed by adopting eco friendly concept by implementing rainwater harvesting techniques and effective utilization of treated water within the project. The management is committed to contribute towards improving socio economic aspects through Corporate Social Responsibility (CSR).

Regular monitoring of various environmental parameters concerned with the project activity will be used as a tool for the effective management of various environmental parameters and to help the management to take midcourse correction by implementing required mitigative measures.

Considering all the mentioned factors, indicating the overwhelming positive impact of the project on the community within the vicinity by providing eco friendly developments, we hereby request that the Environmental Clearance may be recommended for the residential apartment building.

For

Kent Constructions (P) Ltd.



K.C. Raju
Director



For

METAMORPHOSISSM
Projects Consultants Pvt. Ltd.



Mrs. Sreelekha K
EIA Co-ordinator



No: 9241/08.

Village Office, Elamkulam
Date: 29-11-06POSSESSION CERTIFICATE

Certified that an extent of 146.857
 cents of land in Sy. No. 138/Pant of Elamkulam Village in Kanayannur Taluk
 is in possession and enjoyment of Sri/Smt. M/s. Kent Constructions (P) Ltd, Palanivattam
 as per Document No. 5907/06 & 5908/06 of Sub Registry Office, Emakulam.

Recd: 15/11/06 dt 16/11-2006.

1 This Certificate issued for Bank Loan purpose only



29/11/06

 VILLAGE OFFICER
 VILLAGE OFFICER
 ELAMKULAM, KOCHI-20

46

Hail Garden

APPENDIX C
[See Rule II (3)]

BUILDING PERMIT

Cochin Corporation / Municipal Council/Town Panchayat
No. MOP5-40/2006 Date 22.8.2006

Ref:- Application dated 19.6.2006 from Sri / Smt. K. Varkay Abraham

Permission is granted for the erection/re-erection / addition / alteration / demolition of building / hut / digging of well / New construction (specify the construction) in building

No. 36 or near the building No in Survey

No. 226/1, 138 Village Panikulam, Karayannur

District Canakkulam for Residential (specify

the occupancy) purpose, subject to the conditions stated below:

1. The final outcome of the Pending writ Petition (C) No. 25478/2006 before the Honourable High Court.
2. Permit fee of Rs. 61,56,500/- (Rs. Sixty one lakh fifty six thousand and five hundred only) submitted as per RT- No. 45/20081 dt. 22-11-06.

Plinth area of the building is as follows:-

1. Permit is valid for 3 yrs from 22-11-06.
2. Basement
3. Sufficient RWH Tank must be provide at the time of completion
4. Ground Floor
5. Sewage treatment plant shall be constructed.
6. First Floor
7. Solid waste disposal arrangement shall provide.
8. Aviation NOC will submit before commencement of work.

Area shown in site plan for road shall left before commencement of work

Place: Structural design is to be submitted before commencement of work

Date: 10. The builder shall take care to limit the construction to FAR allowable as per KMBR.

11. Drainage system should be provided as per plan

12. Non-discharging water facility should be provided

Cochin 22-2007

Assistant Executive Engineer,
Corporation of Cochin

Note:- (1) The development permit or building permit, unless otherwise provided in these rules, shall be valid for three years from the date of issue and may be renewed twice each for three years.

(2) The application for renewal shall be submitted to the Secretary in white paper, typed or written in ink, affixed with necessary court fee stamp and accompanied by copy of permit and approved plan.

Plinth Area

C.A.F	-	3514.14 m ²
F.F. (2 blocks)	-	1523.78 m ²
3 rd floor (")	-	1674.64 m ²
4 th floor (")	-	1674.64 m ²
5 th floor (")	-	1674.64 m ²
6 th floor (")	-	1674.64 m ²
7 th floor (")	-	1674.64 m ²
8 th floor (")	-	1674.64 m ²
9 th floor (")	-	1674.64 m ²
10 th floor (")	-	1674.64 m ²
11 th floor (")	-	1390.82 m ²
12 th floor (")	-	1394.46 m ²
13 th floor (")	-	1390.82 m ²
14 th floor (")	-	1394.46 m ²
15 th floor (")	-	1390.82 m ²
16 th floor (")	-	1394.46 m ²
Lift machine room	-	171.16 m ²
Pump room	-	37.50 m ²
Electrical room	-	37.50 m ²
Service room	-	36.00 m ²

Cochin

2-2-2007

TOWN PLANNING OFFICE

Assistant Executive Engineer
Corporation of Cochin

Kochi-11

Fire & Rescue Services Dept.,
Housing Board Function,
Thiruvananthapuram-1.
Dated: 26-12-2016

No 41-11-1011.

NO OBJECTION CERTIFICATE
(FORM)

The report headed by the Districtal Officer, Fire & Rescue Services, Ernakulam has reported on 17 November 2016 G-16 Floor, 15th floor south Residential building in Sector No.16, 15th in Poonthura Village in Ernakulam District under Cochin Corporation owned by The Director, Cochin Constructions, Jay's Tower, Opposite Telephone Exchange Paluvattom, Ernakulam - 26 and recommended to issue No Objection Certificate for the occupation of the said building as per report No. 41-11-1011 dated 15.11.2016 of the Districtal Officer, Fire & Rescue Services, Ernakulam.

1) This was viewed by the Scrutiny Committee, Fire & Rescue Services Headquarters headed by the Director (Technical) on 14.12.2016 and found that the building is suitable for occupancy.

2) In the circumstances, No Objection Certificate is issued for the occupation of the above building under my seal and authority. No further construction will be allowed in the vacant spaces provided in the approved plan.

3) This Certificate is issued on the condition that the fire fighting systems installed will be kept always functional and the owner of the building should take special care to maintain the systems installed in proper working condition. A declaration to this effect should be submitted to the Station Officer of the concerned Fire & Rescue Station on or before 15th of January, every year without fail. Non submission of the declaration within the time limits will be viewed seriously and appropriate legal action will be initiated against the concerned. All officers of and above the rank of Station Officers of the Fire & Rescue Services Department will have the right to inspect the building at any time to ensure that the installed systems are in good working condition.

4) One copy of the plan showing the fire fighting arrangements and water sources will be provided to the Station Officer, Fire & Rescue Station, Gandhinagar.

Sd/-

DR. SIBY MATHEWS, IPS,
COMMISSARIANT GENERAL,
FIRE & RESCUE SERVICES.

To

The Secretary, Cochin Corporation.

Vide reference No. MopS-40/2005 dated 14.07.2013.

The Party The Station Officer, Fire & Rescue Station, Gandhinagar.

Approved for issue.


22/12/16
K. SIVANANDAN,
DIRECTOR (TECHNICAL).

Tele 2872050

Reply should be addressed to the
Flag Officer Commanding-in-Chief

Headquarters
Southern Naval Command
Kochi - 682 004

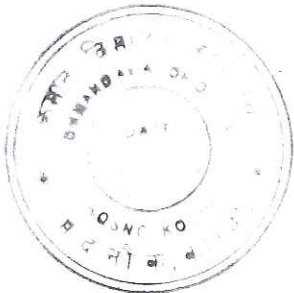
Quoting: AO/357/HC

03 Aug 10

✓ M/S Kent Constructions Pvt. Ltd.
2nd Floor, Lilly's Tower
Opp. BSNL Telephone Exchange
Palarivattom, Kochi - 25

EXTENSION OF NOC FOR CONSTRUCTION OF NEW BUILDING
(KENT HAIL GARDEN)

1. Refer to your letter dated 24 Jul 10 and this Headquarters letter AO/7160/1(viii) dated 03 Jul 07.
2. It is intimated that the validity of NOC issued vide this Headquarters letter quoted ibid is hereby extended for a period of nine month i.e. from 03 Jul 10 to 03 Apr 11.
3. It is requested that completion report be forwarded before expiry of NOC, else the NOC will be cancelled and no further extension will be granted.



(V Satish Babu)
Commander
Command Aviation Officer III
for Flag Officer Commanding-in-Chief

B Venkatesh
POA (AM)
12448212
Inspected on Completion of project
① cords & height as per NOC issued
② AC light fitted outside

**Proceedings of the
Deputy Chief Electrical Inspector, Ernakulam
(Present:- Bhojan.M.K)**

Subject:- Installation of 1No. 750 KVA USS, 1No.160 KVA USS, 1No. 200 KVA DG, 1 No. 125 KVA DG sets and connected electrics at the premises of M/s. Kent Constructions Pvt.Ltd, Hail Gardens, Kaloor, Ernakulam - Sanction for energisation - order issued

Read:-

1. Scheme approval No. B3-16820/08/CEI/CEI dated 16/10/08
2. Completion report No. ME/87/2010 dated 03/08/11 of M/s.Manoj Electricals, 62/2, Lissie Hospital road, Near Pulleppady Rly. Gate, Kochi - 682 018
3. Inspection conducted on 09/08/11
4. Defect report served under even number dated 09/08/11
5. Compliance report furnished under cover of letter No.ME/38/2011 received on 13/09/11 of M/s.Manoj Electricals, 62/2, Lissie Hospital road, Near Pulleppady Rly. Gate, Kochi - 682 018

Order No. T1-9833/11/EIE dated 15/09/11

Sanction under section 54 of The Electricity Act, 2003 and Regulation 32, 36, 43 of the CEA (Measures relating to Safety and Electric Supply) Regulations, 2010 is hereby accorded for energisation of the electrical installation covered under the completion report read as 2nd above and installed at the premises of M/s. Kent Constructions Pvt.Ltd, Hail Gardens, Kaloor, Ernakulam subject to the following conditions with the specifications mentioned there under.

Conditions:-

1. Any addition or alteration to the existing installation shall be carried out only after getting prior written approval from this office.
2. The owner should rectify any defects that may be pointed out during subsequent inspection of the installation by the Deputy Chief Electrical Inspector.
3. Date of energisation should be intimated to this office.
4. The maintenance of all major equipments should be carried out periodically as prescribed by the manufacturer and as per Indian Standard Specifications and a register shall be maintained for recording maintenance activity and periodic checking. The register shall be kept upto date and submitted for perusal during periodical inspection.
5. All the pre-commissioning tests shall be recorded for ready reference.
6. Only authorised person shall be in charge of the operation and maintenance of the installation.
7. Power allocation for additional loads, if necessary, should be obtained from KSEB/Licensee.

Specifications:-

HT Equipments

Transformer

Rating	Voltage Ratio	Make	Sl. No.	Type
160kVA	11kV/433V	Unipower	UTPL/1977	Indoor
750kVA	11kV/433V	Unipower	UTPL/1976	Indoor

HT Switch Gears

HTSFU

630A 3Nos.
Make: ESWARI
SI No: B100702, B100705, B100709

Bus Trunking

Rating	Length
1200A	9M

MV Generators

Rating(kVA)	Voltage(V)	Make	Sl. No.	GCP Breaker(A)
200	415	KIRLOSKAR	FS3 M110C100210	315
Engine: Make:KIRLOSKAR Sl.No: F6.3614/1000155				
Energy Meter : Make:- Larsen & Toubro Sl.No: 01388327				
125	415	KIRLOSKAR	ES3H010L117324	250

Engine: Make-KIRLOSKAR Sl.No:6H3545/1000735
Energy meter: Make-Larsen& Toubro Sl.No:10084325

Common

53.05kW

Capacitor 17kVAR

Fire Pump:52.5KW

Earth Electrodes 12Nos.**Lightning Protection** 2Nos.**LT Consumers** 168Nos.**MV Switch Gears**

a. MSB	1200A - 1No.	400A - 6Nos.	
b. CFP	250A - 2Nos.	100A - 5Nos.	63A - 2Nos.
c. GSB	315A - 1No.	250A - 1No.	160A - 1No. 63A - 8Nos.
d. SSB1	400A - 1No.	125A - 5Nos.	
e. SSB2	400A - 1No.	125A - 5Nos.	
f. SSB3	400A - 1No.	200A - 1No.	125A - 4Nos.
g. SSB4	400A - 1No.	125A - 5Nos.	
h. SSB5	400A - 1No.	125A - 3Nos.	
i. SSB6	400A - 1No.	125A - 3Nos.	
j. Pump panel	100A - 1No.	63A - 4Nos.	
k. STP CP	63A - 1No.	32A - 6Nos.	
l. SSB-3B	160A - 1No.	63A - 8Nos.	
m. BB	200A - 1No.	160A - 2Nos.	
n. Lift Panel(2No's)	125A - 2Nos.	63A - 8Nos.	
o. Fire Pump Panel	200A - 1No.	160A - 1No.	32A - 1No.

To

M/s.Kent Constructions Pvt. Ltd,
Hail Gardens, Kaloor, Ernakulam

Copy to:

1. M/s.Manoj Electricals, 62/2, Lissie Hospital road, Near Pulleppady Rly. Gate, Kochi - 682 018 [Lic. No.:- CA156]
2. The Assistant Engineer, KSEB, Electrical Section:- Kaloor (through:- The Deputy Chief Engineer, KSEB, Electrical Circle:- Ernakulam)
3. Stock File/Computer Data
4. Office Copy

IIR Case No.7880 New Case

e.solutions-6.7

Deputy Chief Electrical Inspector



KERALA STATE POLLUTION CONTROL BOARD

CONSENT TO ESTABLISH

UNDER

Water (Prevention & Control of Pollution) Act, 1974

Air (Prevention & Control of Pollution) Act, 1981

&

Environment (Protection) Act, 1986

TO

Sri. K.C.Raju
Director
Kent Construction Pvt. Ltd.
Pavareth Building 1st floor
Near Manorama Junction
Cochin – 682 036

For
Kent Hail Garden. Kaloor

1. GENERAL

1	VALIDITY	12.06.2012	
2	Name and Address of establishment	Kent Hail Garden Kaloor	
3	Communication	Telephone : 0484-3268787 0484-3298787 Email : kentcoindia@hotmail.com	
4	Occupier details	Sri. K.C. Raju Director, Kent Construction Pvt. Ltd.	
5	Survey Number	226/1, 135/2, 138	
6	Village	Poonithura	
7	Taluk	Kanayannoor	
8	District	Ernakulam	
9	Local body	Kochi Corporation	
10	Category	ORANGE	
11	Annual Fee	Rs.80,000/-	
12	Fee remitted	Rs.4,40,000/-	
13	Capital investment	Rs.34.22 crores	
14	Water consumption	Purpose	Quantity in m ³ /day
		Domestic (including sanitation and canteen and laundry)	162
		Total	162
15	Activities	Construction of multistoried building, flats in G+16 floors with 136 apartments Total built up area : 29,687.51m ² DG set (1 No.) – 200 KVA	



2. GENERAL CONDITIONS

- 2.1. This consent is granted subject to the power of the Board to review and make variation in or revoke the conditions as the Board deems fit as per the relevant Acts/Rules.
- 2.2. This consent, unless withdrawn earlier and subject to condition No. 2.1, shall be valid up to 12/06/2012. At the end of the validity period if the construction is not completed, the same shall be got renewed.
- 2.3. The applicant shall comply with the instructions that the Board may issue from time to time regarding prevention and control of air, water, land and sound pollution.
- 2.4. The date of commissioning shall be intimated at least one month in advance, to the Regional Office of the Board at Ernakulam.
- 2.5. Consent to Operate/Authorisation shall be obtained before commissioning the building under the Water (Prevention and Control of Pollution) Act, the Air (Prevention and Control of Pollution) Act and the relevant Rules under Environment (Protection) Act for a period of 3 years. Operation & Maintenance Contract with Performance Guarantee shall be entered into between the consentee and the consultant/authorisee of the consultant to operate the pollution control systems for a period of 3 years. The application for 'consent to operate' shall be accompanied by the following.
 - (i) Undertaking of the builder on Rs.50 stamp paper that all facilities to comply with the conditions of the 'consent to establish' have been duly provided.
 - (ii) Certifications by the consultant to that effect.
 - (iii) Operation & Maintenance contract (copy).
 - (iv) Performance guarantees (copy).
 - (v) Copy of Consent to establish
 - (vi) Outlet location drawing.
- 2.6. Water meter shall be fixed to record consumption of water.
- 2.7. A minimum set back as per Kerala Municipality Building Rules shall be



provided between the boundary and the building and the set back can be utilised for the development of green belt. Sewage treatment plant (STP) shall be set up beyond 21m from the nearest residence/education institution/public office/hospital/place of worship/community hall/similar establishments (excluding industries). The 200 KVA D.G.set shall be placed at a minimum distance of 10m from nearest residence.

3 CONDITIONS AS PER WATER (PREVENTION AND CONTROL OF POLLUTION) ACT

3.1. Effluent Treatment Plant consisting of treatment units listed below shall be maintained properly:

a) Sewage

1	Primary anaerobic reactor	2	Collection cum equalisation tank
3	Aeration Tank	4	Secondary settling tank
5	Filter feed tank	6	Pressure sand filter
7	Disinfection tank	8	Activated carbon filter
9	Treated effluent collection tank	10	Soak pit

b) Sullage

1	Bar screen chamber	2	Grease trap cum grit chamber
3	Chemical Treatment tank	4	Primary Settling tank

c) The following modifications shall be made in the proposal of effluent treatment plant:

- i) Sewage and sullage shall be treated separately.
- ii) Sullage shall be treated in facilities as stated in 3.1 (b) above and shall join the equalisation tank in the sewage line.
- iii) Screenings from screen and scum from oil and grease trap shall



be removed daily and shall be disposed along with excess ETP sludge and bio degradable garbage to an anaerobic digester. Grit from grit chamber shall be disposed safely.

iv) Anaerobic filter shall have a minimum depth of 3m.

v) A disinfection tank shall be introduced between pressure sand filter and activated carbon filter. It shall provide a minimum contact time of one hour.

vi) Inbuilt facilities shall be provided for reuse of treated effluent for flushing, gardening, cooling water make up etc. Water meter shall be provided for measuring the quantity of treated water recycled.

3.2 Balance treated effluent, if any, shall be discharged only into soak pit with the following specifications:

- Soak pit shall have concreted bottom, honeycomb brick work or perforated ring side wall and 1m thick 2mm sand envelope around it.

3.3 No effluent shall be discharged outside the premises. Storm water alone shall be let out into road side drain.

3.4 The characteristics of effluent after treatment shall conform to the following tolerance limits before reused or discharged into soak pit.

Sl.No.	Characteristics	Unit	Tolerance limits	
			for reuse	for soak pit discharge
1	pH	-	5.5-9	5.5-9
2	Suspended solids	mg/l	20	100
3	BOD, 3 days at 27 ⁰ C	mg /l	3	30
4	Oil & Grease	mg/l	1	10

3.5 There shall be easy access to each and every sewage treatment unit and the recycling facility for inspection. Manhole shall be provided prior to soak pit to facilitate effluent sampling. Lighting arrangements shall be provided in the effluent treatment area, recycling area and backyard.

3.6 Energy meter shall be installed exclusively for the effluent treatment



and reuse system and shall be maintained properly.

- 3.7 Arrangements shall be provided for rain water harvesting and for utilization of harvested rain water. The rain water harvest system shall be at least 15 m away from the soak pit.
- 3.8 If operations are planned to be done with backup power, the generator shall have adequate capacity to run all the associated pollution control devices.
- 3.9 Natural drainage pattern of the area shall be protected.

4. CONDITIONS AS PER AIR (PREVENTION AND CONTROL OF POLLUTION) ACT

- 4.1. Air pollution control devices listed below shall be made operational at the time of commissioning for the D.G.set

Sl. No.	Stack No.	Source of emission	Height of chimney above roof level	Control measure
1	1	D.G.set (1 No.) - 200 KVA	3m	Acoustic enclosure

- 4.2 Water sprinklers shall be provided to suppress spreading of dust outside the premises in the construction phase. Suspended particulate matter at the boundary of the premises shall not exceed 200 microgram per cubic metre
- 4.3 The sound level measured 1m outside the boundary of the premises shall not exceed the ambient sound level standard applicable for the adjoining area.
- 4.4 All operation likely to produce dust or noise shall be carried out within closed premises.
- 4.5 Arrangements for segregated collection, treatment and disposal of biodegradable and non degradable/recyclable garbage shall be provided.
- 4.6 Suitable species of trees and curtain plants shall be planted and maintained within and along the periphery of the premises, forming a green belt to improve the environment.




5. OTHER CONDITIONS

- 5.1 Excavation and piling operation shall be done without causing damage to the nearby buildings and without causing nuisance to the neighbours.
- 5.2 The construction debris and mud discharge etc from the construction site shall be disposed safely and the details of disposal of the same shall be intimated to the Board's office in advance.
- 5.3 Proper precautionary measures shall be provided during construction phase to minimize disturbance due to excavation, piling, transportation of materials etc.
- 5.4 Sanitary facilities shall be provided for the construction workers and effluent shall be disposed of safely.
- 5.5 The location of structures shall be as shown drawing attached. Subject to the conditions stated in this document. No change or alteration to the above shall be made without prior clearance from this office.
- 5.6 Environmental clearance from the Ministry of Environment and Forest shall be obtained.

DATE: 29.03.2011



OFFICE SEAL

SIGNATURE & SEAL OF
ISSUING AUTHORITY
M. S. Mythili
Chief Environmental Engineer

Annexure 2

Traffic Studies and Analysis

1.1 Introduction

Kent Constructions (P) Ltd. has developed residential building Project at Survey. Nos. 226/1, 135/2 and 138, Elamkulam Village, Kanayannur Taluk, Ernakulam district. This project has been developed on a plot of land measuring 6042.61 Sqm. Hail Garden Placed advantageously, adjacent to the Jawaharlal Nehru International Stadium between Kaloore and Kadavanthra, is well- connected to all the city's pulse points. Hail Garden is right next to one of Cochin's broadest city roads. The traffic density study was conducted in the Stadium Link road.

Car parking provided for the project is 165 Nos.

The project is provided with adequate facilities for not causing any obstruction to the smooth flow of traffic with consideration to the following points:

- The residential building should be functional in the present scenario of the traffic system as well as the future possibility of improvements to the abutting roads.
- The residential building should be integrated with its surroundings especially to the road adjacent to it.
- The residential building should have a smooth traffic circulation system along with maximum amount of car parking space.
- The entry/exit to the property site shall be conflict free and the traffic dispersal shall be smooth.
- The junction at the entry/exit point to the site shall be improved geometrically with appropriate traffic control systems, street furniture's and pedestrian facilities.

1.2 Traffic Surveys

Kent Constructions (P) Ltd. has developed residential building Project at Survey. Nos. 226/1, 135/2 and 138, Elamkulam Village, Kanayannur Taluk, Ernakulam district. The residential project is adjacent to the Stadium link road, which is capable of accommodating the traffic inflow to the region. The traffic study is conducted for the same road (Stadium link road) as shown in **figure.1**.

1.2.1 Methodology for Traffic Surveys

Manual traffic counts for 24 hours were conducted to cover all the vehicular movements on the road. The Vehicles are classified as follows.

- Cycle
- Two Wheeler
- Three Wheeler
- Car/Jeep
- LCV (Light Commercial Vehicle)

The collected traffic volume data is computed using the commonly used spreadsheet package. The traffic volume data collected has been processed direction wise.

The peak hourly directional vehicular movement data was used to plan and design the improvement scheme for the existing road.

1.2.2 Data Analysis

The data and pertinent information collected from the traffic surveys have been analysed to obtain the required information concerning traffic characteristics on the said road.

The data was analysed to study hourly variation of traffic, peak hourly flows, traffic composition etc. The counts were classified by category of vehicles and by direction of movement. The various vehicle types having different sizes and characteristics were converted into equivalent passenger car units. The passenger car unit (PCU) factors recommended by Indian Road Congress in 'Guidelines for capacity of Urban roads in Plain Areas' (IRC 106-1990) were used and same is given in table below.

Table 1 Recommended PCU factors for various types of vehicles in urban roads:

Sl. No.	Vehicle Type	Equivalent PCU Factors	
		% composition of vehicle type	
		Up to 10%	10% and above
A.	Fast Vehicles		
1.	Two wheeler	0.5	0.75
2.	Passenger car, Pickup van	1.0	1.0
3.	Auto Rickshaw	1.2	2.0
4.	Light Commercial Vehicle	1.4	2.0
5.	Truck or Bus	2.2	3.7
6.	Agricultural Tractor, Trailer	4.0	5.0
B.	Slow Vehicles		
1.	Cycle	0.4	0.5
2.	Cycle Rickshaw	1.5	2.0
3.	Tonga (Horse drawn Vehicle)	1.5	2.0
4.	Hand cart	2.0	3.0

1.2.3 Hourly Variation of Traffic

The hourly variation of traffic along with the hourly variation of PCU is given in Figure 2 & 3. The hourly variation observed in Direction-1(Towards International Stadium) adjacent to the site varied in the range of 4- 151 VPH (Vehicles per Hour) and in Direction-2 (Towards Thammanam) varied in the range of 2-150 VPH. In terms of PCU in Direction-1 it varied from 6- 153 PCPH (Passenger Car Unit per Hour) and in Direction-2 it varied from 2- 157 PCPH (Passenger Car Unit per Hour). The traffic flow in the study area will be high during the morning and evening hours. The Peak traffic flows observed was during 08.00am-10.00am during morning hours and 05.00pm to 07.00pm during evening hours for both the Directions 1&2.

1.2.4 Traffic Composition

Composition of traffic as observed in the Stadium link road, which is the main connecting road to the project site is very adjacent to site. It is seen that the share of

2- wheelers and Car/Jeep is the highest being 29 % & 41 % in direction-1 and 38% and 32 % in direction-2, respectively.

From the **figures 4 & 5** it is seen that Heavy Commercial Vehicle (HCV) constitute 1%, Car/Jeep constitute 41%, 2 wheeler constitutes 29%, Light Commercial Vehicle constitute (LCV) 12% and 3 wheeler constitute 10% in direction-1 and Heavy Commercial Vehicle (HCV) constitute 2%, Car/Jeep constitute 32%, 2wheeler constitutes 38%, Light Commercial Vehicle constitute (LCV) 8%, and 3 wheeler constitute 6% in direction-2.

1.4 Present Traffic Scenario & LoS after the commencement of operation of the project:

Table 2 Present Traffic Scenario & LoS

For the Road	V	C	Existing V/C Ratio	LOS	Performance
Direction-1	153	2900	0.05	"A"	Excellent
Direction-2	157	2900	0.05	"A"	Excellent

Note: The highest peak observed is 285 PCU's during 09.00 am to 10.00am towards direction-1 and 308 PCU's during 09.00 am to 10.00 am.

1.5 Conclusion

The residential project does not affect the traffic density in the adjacent Stadium Link road. The Stadium link road gives an excellent performance for handling the present traffic. It comes under LoS category A, where individual users are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to manoeuvre within the traffic stream is high. The general level of comfort and convenience provided to the users is excellent.



Fig.1: Image showing details of directions in the Stadium Link Road.

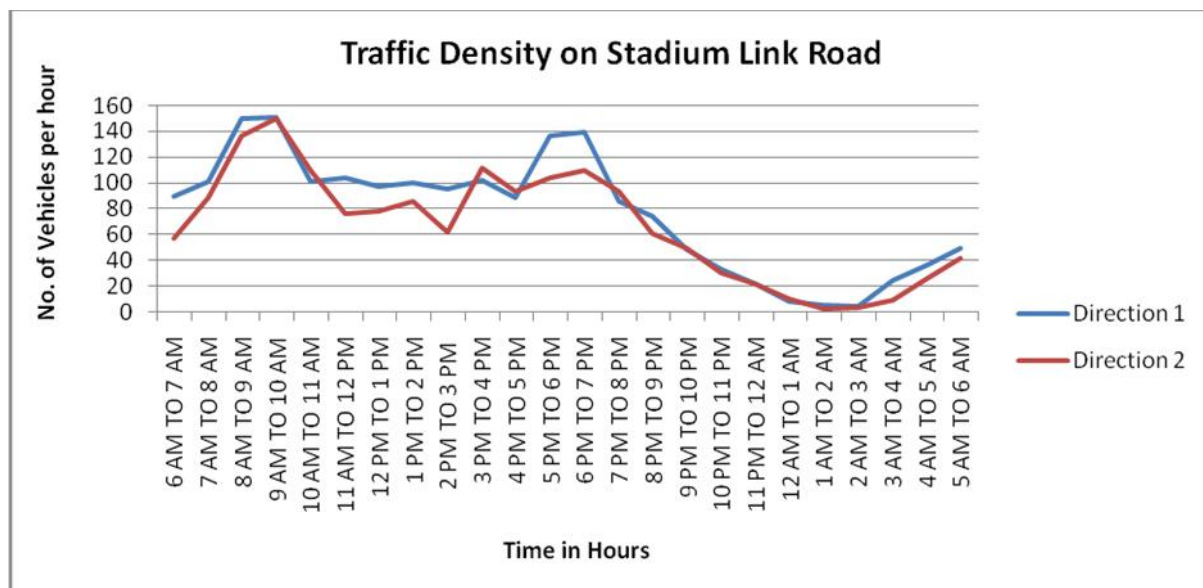


Fig.2: Hourly Variation of Traffic in direction 1 & 2

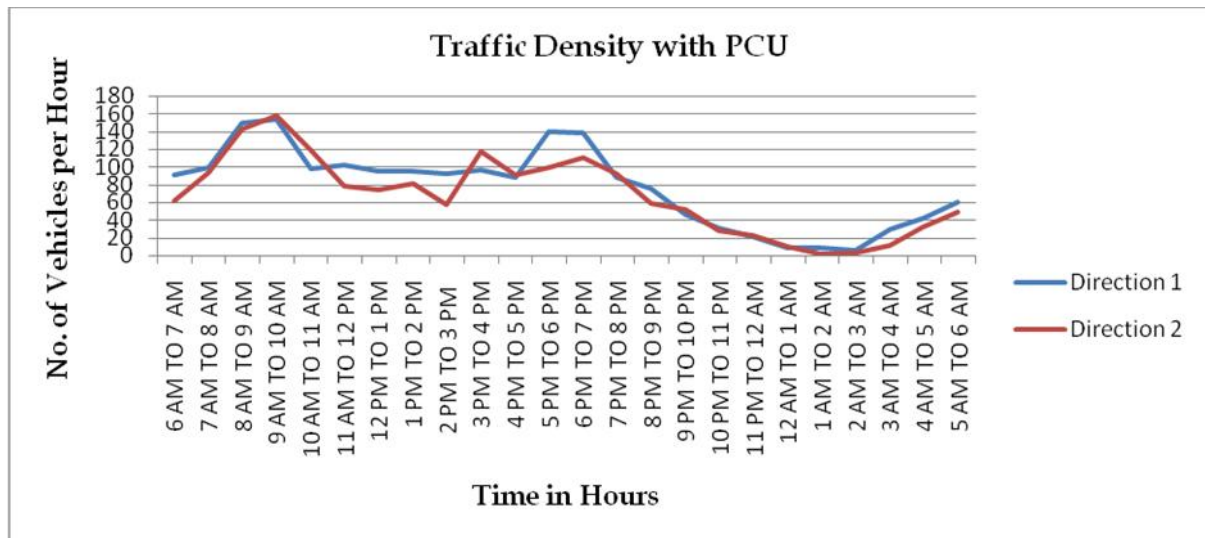


Fig.3: Hourly Variation of Traffic with direction 1 & 2 with PCU

From the above graph it is observed that the peak traffic flow in the stadium link road is usually during the 8 am to 10 am morning hours and 5 pm to 7pm during evening hours in both the directions.

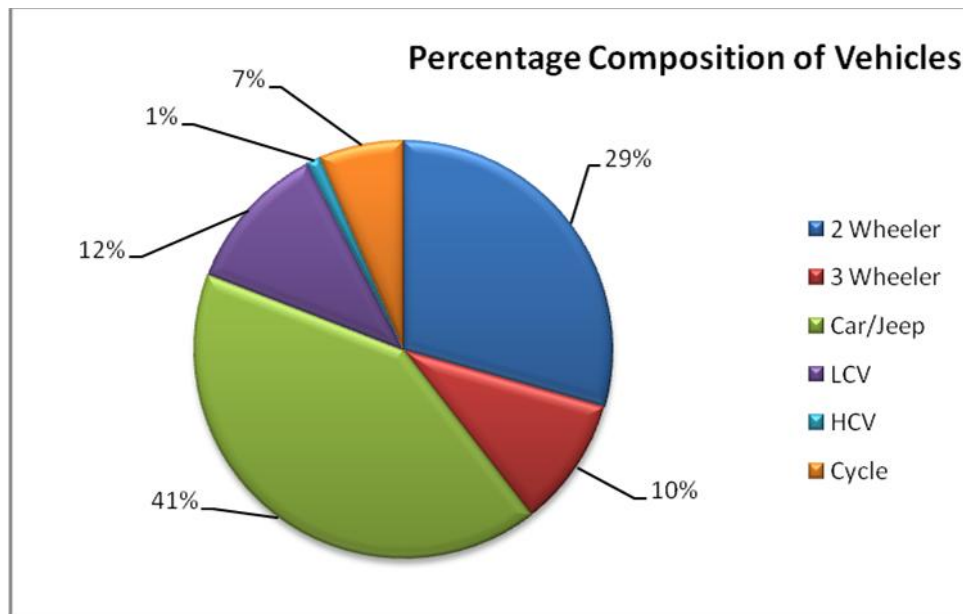


Fig.4: Composition of Vehicles towards International Stadium (Direction-1)

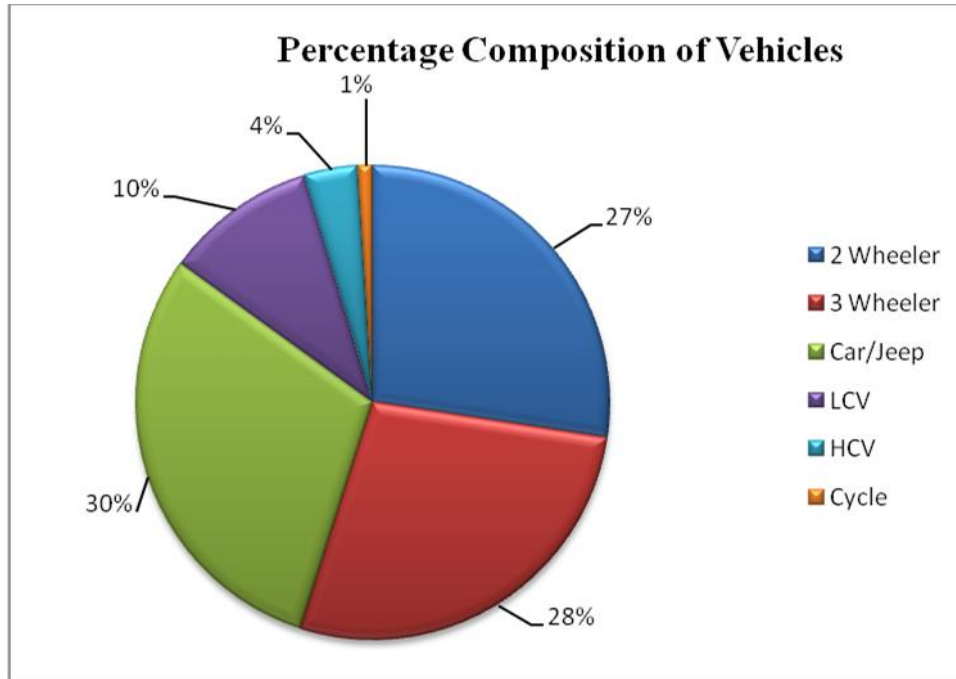


Fig.5: Composition of Vehicles towards Thammanam (Direction-2)

Table: 3 Vehicular Composition towards International Stadium

Traffic Density study of M/s. Kent Constructions Pvt Ltd							
DIRECTION 1: Towards International Stadium							
Time	2 Wheeler	3 Wheeler	Car/Jeep	LCV	HCV	Cycle	TOTAL
6 AM TO 7 AM	25	8	33	15	0	5	89
7 AM TO 8 AM	28	9	34	16	0	10	101
8 AM TO 9 AM	40	15	60	17	0	12	150
9 AM TO 10 AM	41	16	62	18	0	8	151
10 AM TO 11 AM	35	12	30	10	0	10	101
11 AM TO 12 PM	34	11	35	11	0	9	104
12 PM TO 1 PM	33	10	36	8	0	6	97
1 PM TO 2 PM	30	9	42	7	0	8	100
2 PM TO 3 PM	29	7	43	8	0	5	96
3 PM TO 4 PM	35	8	40	6	1	8	102
4 PM TO 5 PM	32	9	38	6	0	0	88
5 PM TO 6 PM	45	17	55	11	0	3	136
6 PM TO 7 PM	48	15	52	12	0	6	139
7 PM TO 8 PM	16	11	45	5	0	5	85
8 PM TO 9 PM	10	6	46	6	0	3	74
9 PM TO 10 PM	9	4	20	7	0	6	48
10 PM TO 11 PM	5	2	14	5	0	5	33

EMP report for Residential Building Project of M/s Kent Construction Pvt. Ltd., at Sy. Nos. 138, 135/2 and 226/1 of Elamkulam Village, Kanayannur Taluk, Ernakulam District, Kerala.

11 PM TO 12 AM	2	1	9	2	2	4	21
12 AM TO 1 AM	1	0	5	1	1	0	8
1 AM TO 2 AM	0	0	2	0	3	0	5
2 AM TO 3 AM	0	0	2	0	2	0	4
3 AM TO 4 AM	4	1	6	9	3	0	24
4 AM TO 5 AM	8	2	10	10	4	0	35
5 AM TO 6 AM	10	6	13	14	4	0	49
TOTAL	520	179	732	204	20	114	1840

Table: 4: Vehicular Composition towards Thammanam

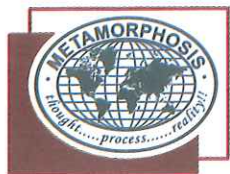
Traffic Density study of M/s. Kent Constructions Pvt Ltd							
DIRECTION 2: Towards Thammanam							
Time	2 Wheeler	3 Wheeler	Car/Jeep	LCV	HCV	Cycle	TOTAL
6 AM TO 7 AM	22	8	15	6	2	2	57
7 AM TO 8 AM	37	16	18	7	2	5	88
8 AM TO 9 AM	55	19	33	15	3	6	136
9 AM TO 10 AM	59	29	31	12	1	12	150
10 AM TO 11 AM	35	23	28	8	1	10	109
11 AM TO 12 PM	26	10	24	6	2	5	76
12 PM TO 1 PM	30	8	23	5	1	8	78
1 PM TO 2 PM	35	7	25	9	0	6	85
2 PM TO 3 PM	28	6	16	5	0	4	61
3 PM TO 4 PM	39	20	41	4	0	3	111
4 PM TO 5 PM	40	13	29	3	0	4	93
5 PM TO 6 PM	41	12	33	6	0	8	104
6 PM TO 7 PM	42	15	36	7	0	5	109
7 PM TO 8 PM	30	11	38	5	0	6	94
8 PM TO 9 PM	19	5	25	4	1	4	60
9 PM TO 10 PM	15	5	21	3	2	1	49
10 PM TO 11 PM	10	2	15	1	0	1	30
11 PM TO 12 AM	8	1	8	0	3	0	21
12 AM TO 1 AM	2	0	5	0	2	0	9
1 AM TO 2 AM	0	0	2	0	0	0	2
2 AM TO 3 AM	1	0	2	0	0	0	3
3 AM TO 4 AM	3	0	0	2	3	0	8
4 AM TO 5 AM	5	5	7	5	2	0	25
5 AM TO 6 AM	10	8	11	7	2	2	42
TOTAL	592	223	486	120	27	92	1602

Table: 5: Vehicular composition towards International Stadium (with PCU)

Traffic Density study of M/s. Kent Constructions Pvt Ltd							
DIRECTION 1: Towards International Stadium							
Time	2 Wheeler	3 Wheeler	Car/Jeep	LCV	HCV	Cycle	TOTAL
6 AM TO 7 AM	19	16	33	21	0	2	91
7 AM TO 8 AM	21	18	34	22	0	4	99
8 AM TO 9 AM	30	30	60	24	0	5	149
9 AM TO 10 AM	31	32	62	25	0	3	153
10 AM TO 11 AM	26	24	30	14	0	4	98
11 AM TO 12 PM	26	22	35	15	0	4	102
12 PM TO 1 PM	25	20	36	11	0	2	94
1 PM TO 2 PM	23	18	42	10	0	3	96
2 PM TO 3 PM	22	14	43	11	0	2	92
3 PM TO 4 PM	26	16	40	8	2	3	96
4 PM TO 5 PM	24	18	38	8	0	0	88
5 PM TO 6 PM	34	34	55	15	0	1	139
6 PM TO 7 PM	36	30	52	17	0	3	137
7 PM TO 8 PM	12	22	45	7	0	2	88
8 PM TO 9 PM	8	12	46	8	0	1	75
9 PM TO 10 PM	7	8	20	10	0	2	47
10 PM TO 11 PM	4	4	14	7	0	2	31
11 PM TO 12 AM	2	2	9	3	4	2	21
12 AM TO 1 AM	1	0	5	1	2	0	9
1 AM TO 2 AM	0	0	2	0	7	0	9
2 AM TO 3 AM	0	0	2	0	4	0	6
3 AM TO 4 AM	3	2	6	13	7	0	30
4 AM TO 5 AM	6	4	10	14	9	0	43
5 AM TO 6 AM	8	12	13	20	9	0	61
TOTAL	390	358	732	286	44	46	1855

Table 6: Vehicular composition towards Thammanam (with PCU)

Traffic Density study of M/s. Kent Constructions Pvt Ltd							
DIRECTION 2: Towards Thammanam							
Time	2 Wheeler	3 Wheeler	Car/Jeep	LCV	HCV	Cycle	TOTAL
6 AM TO 7 AM	17	16	15	8	4	1	61
7 AM TO 8 AM	28	32	18	10	4	2	94
8 AM TO 9 AM	41	38	33	21	7	2	142
9 AM TO 10 AM	44	58	31	17	2	5	157
10 AM TO 11 AM	26	46	28	11	2	4	118
11 AM TO 12 PM	20	20	24	8	4	2	78
12 PM TO 1 PM	23	16	23	7	2	3	74
1 PM TO 2 PM	26	14	25	13	0	2	80
2 PM TO 3 PM	21	12	16	7	0	2	58
3 PM TO 4 PM	29	40	41	6	0	1	117
4 PM TO 5 PM	30	26	29	4	0	2	91
5 PM TO 6 PM	31	24	33	8	0	3	99
6 PM TO 7 PM	32	30	36	10	0	2	109
7 PM TO 8 PM	23	22	38	7	0	2	92
8 PM TO 9 PM	14	10	25	6	2	2	59
9 PM TO 10 PM	11	10	21	4	4	0	51
10 PM TO 11 PM	8	4	15	1	0	0	28
11 PM TO 12 AM	6	2	8	0	7	0	23
12 AM TO 1 AM	2	0	5	0	4	0	11
1 AM TO 2 AM	0	0	2	0	0	0	2
2 AM TO 3 AM	1	0	2	0	0	0	3
3 AM TO 4 AM	2	0	0	3	7	0	12
4 AM TO 5 AM	4	10	7	7	4	0	32
5 AM TO 6 AM	8	16	11	10	4	1	50
	444	446	486	168	59	37	1640



ANNEXURE NO 3
METAMORPHOSISSM
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TEST REPORT

MLPL/A/17/07/170

AMBIENT AIR QUALITY DATA


1. Name of the Project : Kent Hail Garden.
2. Name of the Project Proponent : M/s. Kent Constructions Pvt Ltd. Elamkulam Village,
Kanayannur Taluk, Ernakulam District, Kerala
3. Month : July 2017 Duration : 8 Hours Location Code : KC/CZ/A1

Location Name	Date of Sampling	SO ₂ µg / Nm ³	NO ₂ µg / Nm ³	PM ₁₀ µg / Nm ³	PM _{2.5} µg / Nm ³	Ammonia µg / Nm ³
Project Site 1	07.07.2017	17.53	23.7	19.9	10.9	--
Project Site 2	07.07.2017	15.50	20.45	16.9	12.6	
Protocol / Method		IS:5182 (Part 2) – Improved West and Gaeke method	IS:5182 (Part 6) – Jacob and Hochheiser method	IS:5182 (Part 23) – Gravimetric method	MLPL/SOP/44 - Gravimetric method	MLPL/SOP/41 – Indophenol blue method
NAAQ Standards		80	80	100	60	400


INFERENCE	As per CPCB Standards Report Status: All values are within the standard.
Sample Collected By	M/s. METAMORPHOSIS Laboratory Private Limited, Bengaluru

** End of Report **

Analysed By

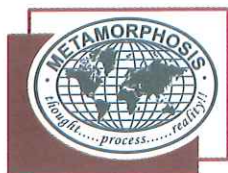

15/07/2017
Govt. Analyst
Mr. Ramesh. S

Authorised Signatory


Laboratory Head
Dr. Shanth A. Thimmaiah



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Behind Central Silk Board, BTM Layout II Stage, Bengaluru-560 068
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mail@metamorphosis-india.com www.metamorphosis-group.com

**TEST REPORT**

MLPL/N/17/07/173

AMBIENT NOISE MEASUREMENT

1. Name of the Project : Kent Hail Garden.
2. Name of the Project Proponent : M/s. Kent Constructions Pvt Ltd, Elamkulam Village, Kanayannur Taluk, Ernakulam District, Kerala.
3. Date of Measurement : 07.07.2017

Name of the Location	Location Code	Protocol	Result (dB (A))					
			Day			Night		
			L _{Min}	L _{Max}	Leq	L _{Min}	L _{Max}	Leq
Project Site 1	KC/CZ/N1	IS:9989-1981	47.2	56.6	52.9	-	-	-
Project Site 1	KC/CZ/N1		48.5	51.02	49.9			

Limits in dB (A) Leq			
Area Code	Category of Area / Zone	Day (6 a.m. to 10 p.m.)	Night (10 p.m. to 6 a.m.)
(A)	Industrial Area	75	70
(B)	Commercial Area	65	55
(C)	Residential Area	55	45
(D)	Salience zone	50	40

INFERENCE	As per KSPCB standards Report Status: All the values are within the standards
Sample Collected By	M/s. METAMORPHOSIS Laboratory Private Limited, Bengaluru

** End of Report **

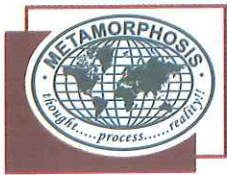
Analysed By

Govt. Analyst
Mr. Ramesh. S 15/7/2017

Authorised Signatory

Laboratory Head
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ANNEXURE NO 5

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TEST REPORT

MLPL/W/17/07/171

ANALYSIS REPORT OF WATER QUALITY


1. Name of the Project : Kent Hail Garden.
2. Location Name : Water Collected at Project site
3. Name of Project Proponent : M/s. Kent Constructions Pvt Ltd. Elamkulam Village, Kanayannur Taluk, Ernakulam District, Kerala.
4. Date of Sampling : 07.07.2017
5. Particulars of Sample Collected : Ground Water
6. Sample Number : KC/CZ/GW1
7. Date of Sample Receipt : 07.07.2017
8. Analysis Started On : 08.07.2017
9. Date of Reporting : 15.07.2017

Sr. No.	Parameters	Protocol	Unit	Result	Standard IS 10500: 2012 (2 nd Revision)	
					Acceptable Limit	Permissible Limit
A.	PHYSICAL PARAMETERS					
1.	Colour	IS:3025 (Part 4)	Hazen	1	5	25
2.	pH	IS:3025 (Part 11)	--	7.02	6.5 to 8.5	
B.	CHEMICAL PARAMETERS					
3.	Chlorides, as Cl	IS:3025 (Part 32)	mg/L	19.4	250	1000
4.	Total Hardness as CaCO ₃	IS: 3025 (Part 21)	mg/L	39.7	300	600
5.	Calcium as Ca	IS 3025 (Part 40)	mg/L	7.9	75	200
6.	Magnesium as Mg	IS 3025 (Part 46)	mg/L	4.8	30	100
7.	Total Suspended Solids	IS 3025 (Part 17)	mg/L	--	--	100
8.	Total Dissolved solids,	IS:3025 (Part-16)	mg/L	41.6	500	2000
9.	Fluorides as F	IS 3025 (Part 60)	mg/L	BDL	1	1.5
10.	Sulphate, as SO ₄	IS 3025 (Part 24)	mg/L	0.39	150	200
11.	Nitrate as NO ₃	IS 3025 (Part 60)	mg/L	4.0	45	--
12.	Iron as Fe	IS 3025 (Part 53)	mg/L	0.13	0.3	1
13.	Alkalinity as CaCO ₃	IS:3025 (Part 23)	mg/L	189	200	600
14.	Conductance	IS:3025 (Part 14)	µS/cm	73.4	2000	
C.	MICROBIOLOGICAL PARAMETERS					
15.	Coliform organism/100ml	IS:1622-1981	MPN	Absent	≤ 10	Absent
16.	E.Coli Bacteria/100ml	IS:1622-1981	--	Absent	Absent	Absent

INFERENCE	As per IS Standards Report Status: All values are within the standard.
Sample Collected by	M/s. METAMORPHOSIS Laboratory Private Limited, Bengaluru

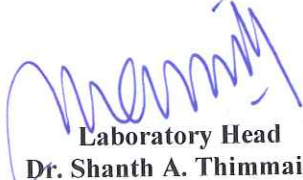
** End of Report **

Analysed By


Govt. Analyst
Mr. Ramesh. S

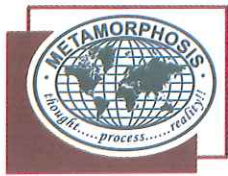
Authorised Signatory




Laboratory Head
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TEST REPORT

MLPL/W/17/07/172

ANALYSIS REPORT OF WATER QUALITY

1. Name of the Project : Kent Hail Garden.
2. Location Name : Water Collected at Project site
3. Name of Project Proponent : M/s. Kent Constructions Pvt Ltd. Elamkulam Village, Kanayannur Taluk, Ernakulam District, Kerala.
4. Date of Sampling : 07.07.2017
5. Particulars of Sample Collected : Ground Water
6. Sample Number : KC/BZ/GW2
7. Date of Sample Receipt : 07.07.2017
8. Analysis Started On : 08.07.2017
9. Date of Reporting : 15.07.2017

Sr. No.	Parameters	Protocol	Unit	Result	Standard IS 10500: 2012 (2 nd Revision)	
					Acceptable Limit	Permissible Limit
A.	PHYSICAL PARAMETERS					
1.	Colour	IS:3025 (Part 4)	Hazen	1	5	25
2.	pH	IS:3025 (Part 11)	--	7.39	6.5 to 8.5	
B.	CHEMICAL PARAMETERS					
3.	Chlorides, as Cl	IS:3025 (Part 32)	mg/L	24.3	250	1000
4.	Total Hardness as CaCO ₃	IS: 3025 (Part 21)	mg/L	108.2	300	600
5.	Calcium as Ca	IS 3025 (Part 40)	mg/L	81.1	75	200
6.	Magnesium as Mg	IS 3025 (Part 46)	mg/L	10.0	30	100
7.	Total Suspended Solids,	IS 3025 (Part 17)	mg/L	--	--	100
8.	Total Dissolved solids,	IS:3025 (Part-16)	mg/L	88.0	500	2000
9.	Fluorides as F	IS 3025 (Part 60)	mg/L	0.19	1	1.5
10.	Sulphate, as SO ₄	IS 3025 (Part 24)	mg/L	2.06	150	200
11.	Nitrate as NO ₃	IS 3025 (Part 60)	mg/L	0.33	45	--
12.	Iron as Fe	IS 3025 (Part 53)	mg/L	0.16	0.3	1
13.	Alkalinity as CaCO ₃	IS:3025 (Part 23)	mg/L	126.0	200	600
14.	Conductance	IS:3025 (Part 14)	µS/cm	243.0	2000	
C.	MICROBIOLOGICAL PARAMETERS					
15.	Coliform organism/100ml	IS:1622-1981	MPN	Absent	≤ 10	Absent
16.	E. Coli Bacteria/100ml	IS:1622-1981	--	Absent	Absent	Absent

INFERENCE	As per IS Standards Report Status: All values are within the standard.
Sample Collected by	M/s. METAMORPHOSIS Laboratory Private Limited, Bengaluru

** End of Report **

Analysed By

Govt. Analyst
Mr. Ramesh. S

Authorised Signatory

Laboratory Head
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Annexure-6

DETAILED FEASIBILITY REPORT

On

**SEWAGE TREATMENT PLANT (STP) OF CAPACITY
100 KLD**

For

“Residential Building Project- Kent Hail Garden”

Of

**M/s Kent construction Pvt. Ltd., at Sy. Nos. 135/2, 138 and 226/1 of
Elamkulam Village, Kanayannur Taluk, Ernakulam District, Kerala**

INTRODUCTION

Kent Constructions (P) Ltd. has developed residential building Project at Survey. Nos. 135/2, 226/1, and 138, Elamkulam Village, Kanayannur Taluk, Ernakulam district.

With a view to conserve fresh water resources and adopt re-cycle and re-use measures, a water pollution control and re-use system for the wastewater generated from entire campus is developed. The main sources of waste water are due to domestic usage in toilets, kitchens and wash basins and washrooms etc. This report details the following from the proposed facility: Collection, Treatment and Disposal of Domestic sewage from the residential complex.

PROPOSED WATER SUPPLY SYSTEM

The total water requirement to meet the Domestic & other consumption from the residential complex is about 125 KLD. Principal source of water supply for the developments is available from Kerala Water Authority and existing bore wells.

TABLE 1: Water Demand Calculation

Sl No.	Tower	No. of Flats	No. of Person Per Flat	Total Population	Domestic Requirement (Lpcd)	Flushing (Lpcd)	Overall Requirement (L/d)
1	A	78	5	390	105	45	58500
2	B	84	5	420	105	45	63000
3	Staff strength at office	--		65		45	2925
	TOTAL			875			124425
				Total water Requirement			~125 KLD

QUANTITY AND QUALITY OF WASTEWATER GENERATED

The STP is of **100 KLD** capacity, the detailed description of quantity of waste water generated is as given below.

Total water requirement would be **125 KLD**, the wastewater quantity from domestic sources is considered at maximum of 80% of water consumed/required.

Quantity of wastewater generated/discharged would be = **100 KLD**

Hence Sewage Treatment Plant of capacity **100 KLD** is designed.

Considering 90% of sewage water would be available as treated water,

Quantity of treated water = **90 KLD**

Proposed quality of raw and treated sewage is as below:

Characterization

The general characteristic of sewage and sullage is as shown below:

SEWAGE: -

B.O.D.	-	300 - 350 mg/l
C.O.D.	-	600 - 700 mg/l
Total Suspended Solids	-	400 - 500 mg/l
Oil & Grease	-	<20 mg/l
pH	-	5.3 - 6.3

SULLAGE: -

B.O.D.	-	150 - 200 mg/l
C.O.D.	-	600 - 800 mg/l
Total Suspended Solids	-	400 - 500 mg/l
Oil & Grease	-	<50 mg/l
pH	-	6.3 - 7.5

The treated water quality at the outlet of the plant shall be as follows: -

B.O.D.	-	< 30 mg/l
C.O.D.	-	< 100 mg/l
Total Suspended Solids	-	< 30mg/l
Oil & Grease	-	< 2 mg/l
pH	-	6.5 - 7.5

The treated water available from STP is utilized completely within the project requirement; the details are given in below Table:

Table 2 Utilization of treated water

Sl. No.	Description	Quantity (KLD)
1	Flushing	36.9
2	Gardening/Horticulture	46.8
3	Miscellaneous Usage (like car wash etc.)	6.3
Total		90

IMPLEMENTED TREATMENT SCHEME/METHOD

The treatment plant uses anaerobic technology for the primary treatment of sewage. The secondary treatment of both sewage and sullage is together carried out using the MBBR technology. The other modes of treatment considered before arriving at the selected treatment process were FAB (Fluidized Aerobic Bio Reactor), ASP (Activated Sludge Process) etc. The advantages and disadvantages of the each scheme, initial investment and maintenance cost etc were compared and finally arrived at providing a STP using MBBR – Moving Bed Biofilm Reactor.

Table 3 The Sewage Treatment Plant units

SL. No.	Name of the Unit	Purpose
1	Bar Screen Chamber	For removing unwanted floating materials.
2	Oil & Grease trap	For removing the oil and grease present in the effluent
3	Equalization Tank	To even out the flow variations and continuous uniform mixing operations with coarse bubble.
4	Anaerobic Reactor	For the treatment of sewage
5	MBBR	The MBBR system consists of an aeration tank (similar to a activated sludge tank) with special plastic carriers that provide a surface where a biofilm can grow. The carriers will be mixed in the tank by the aeration

		system and thus will have good contact between the substrate in the influent wastewater and the biomass on the carriers.
6	Secondary settling tank	The secondary sedimentation tanks or settling basins or clarifiers allow the microorganisms and other solids to settle biological treatment.
7	Sludge Holding tank	Store sludge generated from the biological treatment
8	Disinfection tank	Tank in which disinfection of the clarified effluent is done
9	Pressure Sand Filter	To filter out suspended solids if any in the treated water.
10	Activated Carbon Filter	To remove color and Odor if any in the filtered water.

Table 4 The Civil Units And Its Sizes As Designed

Sl. No	Name of the Unit	Size in m.	Quantity
1	Bar Screen Chamber	0.5x 0.75x 0.75 m	2 Nos.
2	Oil & Grease Trap	1.75x 0.5x 0.9m	1 No.
3	Equalization Tank	3.1x 3.2x 1.8m + 0.25m freeboard	1 No.
4	Primary Settling tank	3.15 x1.53x 1.75+ 0.3 m freeboard	1 No.
5	Secondary Settling Tank	2x 3.2x 1.75 + 0.3m freeboard	1 Nos.
6	Disinfection tank	3.35x 3.2x 1.75+ 0.3 m freeboard	1 No
7	Sludge holding tank	1x 3.2x 1.75 + 0.3m freeboard	1 No.

Mechanical Equipments provided:

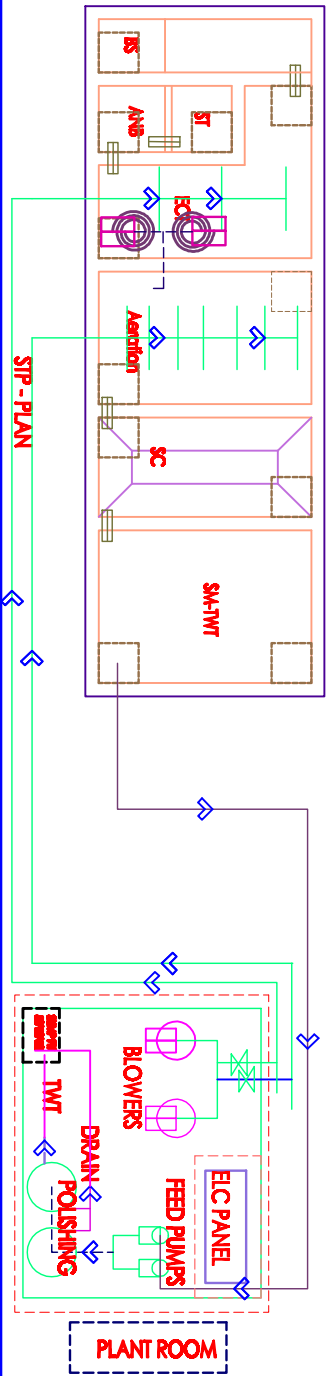
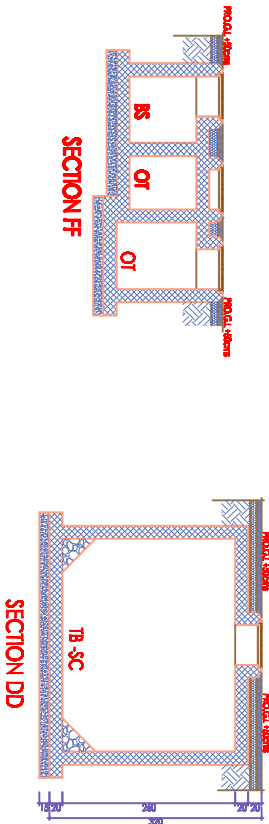
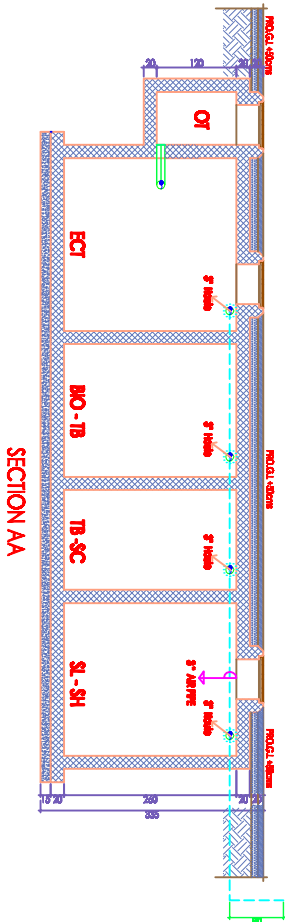
Sl. No	Item	Specification	Qty
1	Effluent transfer pump	5000LPH, 2 hp, self priming sewage pump	2 Nos.

2	Filter feed pump	6000LPH, 2 hp, centrifugal, mono-block	2 No.
3	Air blower	90m ³ /hr 0.3 kg/cm ² , twin lobe type	2 No.
4	Pressure sand filter	6-8 m ³ /hr, FRP, with side mounted valve	1 No.
5	Activated Carbon filter	6-8 m ³ /hr, FRP, with side mounted valve	1 No.
6	Coarse bubble diffuser	2.5 m ³ /hr Snap cap type with EPDM membrane	8 Nos.
7	Fine bubble diffuser	10m ³ /hr, tube type with EPDM membrane	8 Nos.
8	MBBR media	400m ² /m ³ , PP	5m ³
9	Chemical holding tanks	25L capacity	3 Nos
10	Pipe, hose, valves and fittings	4kg/cm ² , 6kg/cm ² , 10kg/cm ²	1 No

CONCLUSIONS:

The STP treats the sewage to the standards prescribed by the KSPCB with treated BOD levels less than 10 mg/lit. The treated water is safe to come in contact, as chlorination is done to kill the bacteria (disinfection). The treated water is utilized for gardening and flushing.

S.T.P TREATMENT FLOW CHART



- GENERAL NOTES:**
1. All dimensions are in millimeters (mm).
 2. All materials shall be as per the specification of the relevant code.
 3. All materials shall be as per the specification of the relevant code.
 4. All materials shall be as per the specification of the relevant code.
 5. All materials shall be as per the specification of the relevant code.



NO.	REV.	DATE	DESCRIPTION	BY	CHECKED	DATE
01	01	01/01/2021	ISSUED FOR TENDER	01/01/2021	01/01/2021	01/01/2021
02	01	01/01/2021	ISSUED FOR TENDER	01/01/2021	01/01/2021	01/01/2021
03	01	01/01/2021	ISSUED FOR TENDER	01/01/2021	01/01/2021	01/01/2021
04	01	01/01/2021	ISSUED FOR TENDER	01/01/2021	01/01/2021	01/01/2021
05	01	01/01/2021	ISSUED FOR TENDER	01/01/2021	01/01/2021	01/01/2021
06	01	01/01/2021	ISSUED FOR TENDER	01/01/2021	01/01/2021	01/01/2021
07	01	01/01/2021	ISSUED FOR TENDER	01/01/2021	01/01/2021	01/01/2021
08	01	01/01/2021	ISSUED FOR TENDER	01/01/2021	01/01/2021	01/01/2021
09	01	01/01/2021	ISSUED FOR TENDER	01/01/2021	01/01/2021	01/01/2021
10	01	01/01/2021	ISSUED FOR TENDER	01/01/2021	01/01/2021	01/01/2021



DETAIL OF SEWAGE TREATMENT PLANT

CONSTRUCTION



ARCHITECT