BRIGADE RESIDENTIAL DEVELOPMENT

Form 1A for Prior Environment Clearance

Project Address: Survey No. 398/1A2, Devanahalli Village, Kasaba Hobli, Devanahalli Taluk, Bengaluru Rural District

BRIGADE

PROJECT PROPONENT: **M/s. BCV Developers Private Limited, subsidiary of M/s. Brigade Enterprises Limited**

ADDRESS: 29th Floor, World Trade Center, Brigade Gateway Campus, 26/1, Dr. Rajkumar Road, Malleswaram - Rajajinagar, Bengaluru - 560 055. Ph. 080-41379200, anandkumar@brigadegroup.com; www.brigadegroup.com

FORM-1 A

1. LAND ENVIRONMENT

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

1.1. Will the existing land-use get significantly altered from the project that is not consistent with the surroundings? (Proposed land-use must conform to the approved Master Plan / Development Plan of the area. Change of land-use if any and the statutory approval from the competent authority be submitted). Attach Maps of (i) site location, (ii) surrounding features of the proposed site (within 500 meters) and (iii) the site (indicating levels & contours) to appropriate scales. If not available attach only conceptual plans.

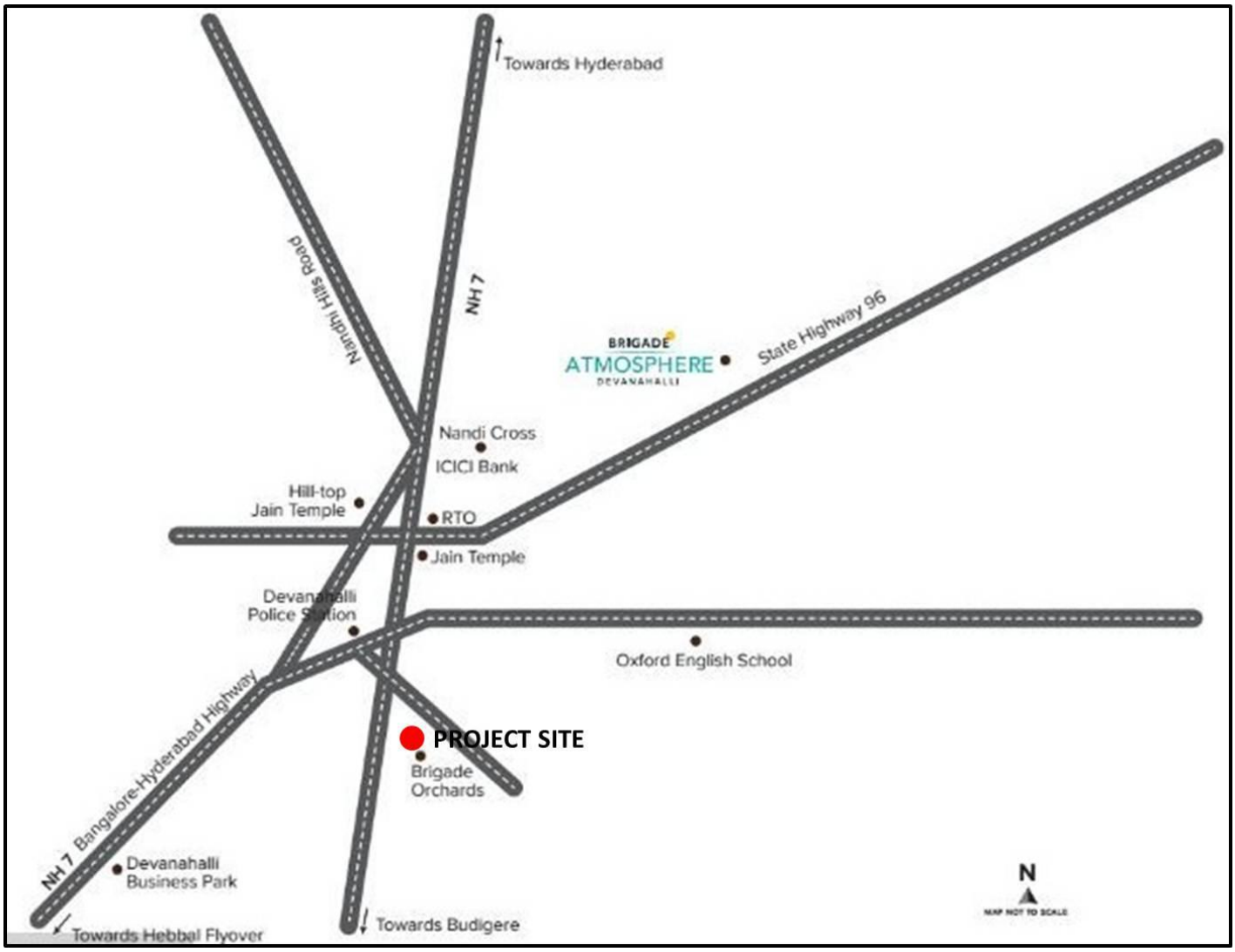

Fig: Location Map

Schedule of the Proposed Property

East	:	Property bearing Survey No.397 and Road;
West	:	Property bearing Survey No.398/1A1;
North	:	Property bearing Survey Nos. 397;
South	:	Village Boundary of Rayasandra

The proposed project site is situated in Devanahalli (part of Bangalore International Airport Area Planning Authority (BIAAPA)), Devanahalli Taluk, Bengaluru district of Karnataka. The project site is abutting Devanahalli-Bagalur Road which connects to Devanahalli via NH-7 and Bagalur via SH-104. It is around 4km from Junction of NH-7 with Devanahalli-Bagalur Road & around 3.5km from Junction of SH-104 with Devanahalli-Bagalur Road. It is approximately 40 km from Bangalore City and about 14 km from the Kempegowda International Airport.

The Project Site is generally a plain land barring tree species viz., Coconut, Silver Wood, Date Fruit, Mango & and other local trees which exist at the proposed project site..

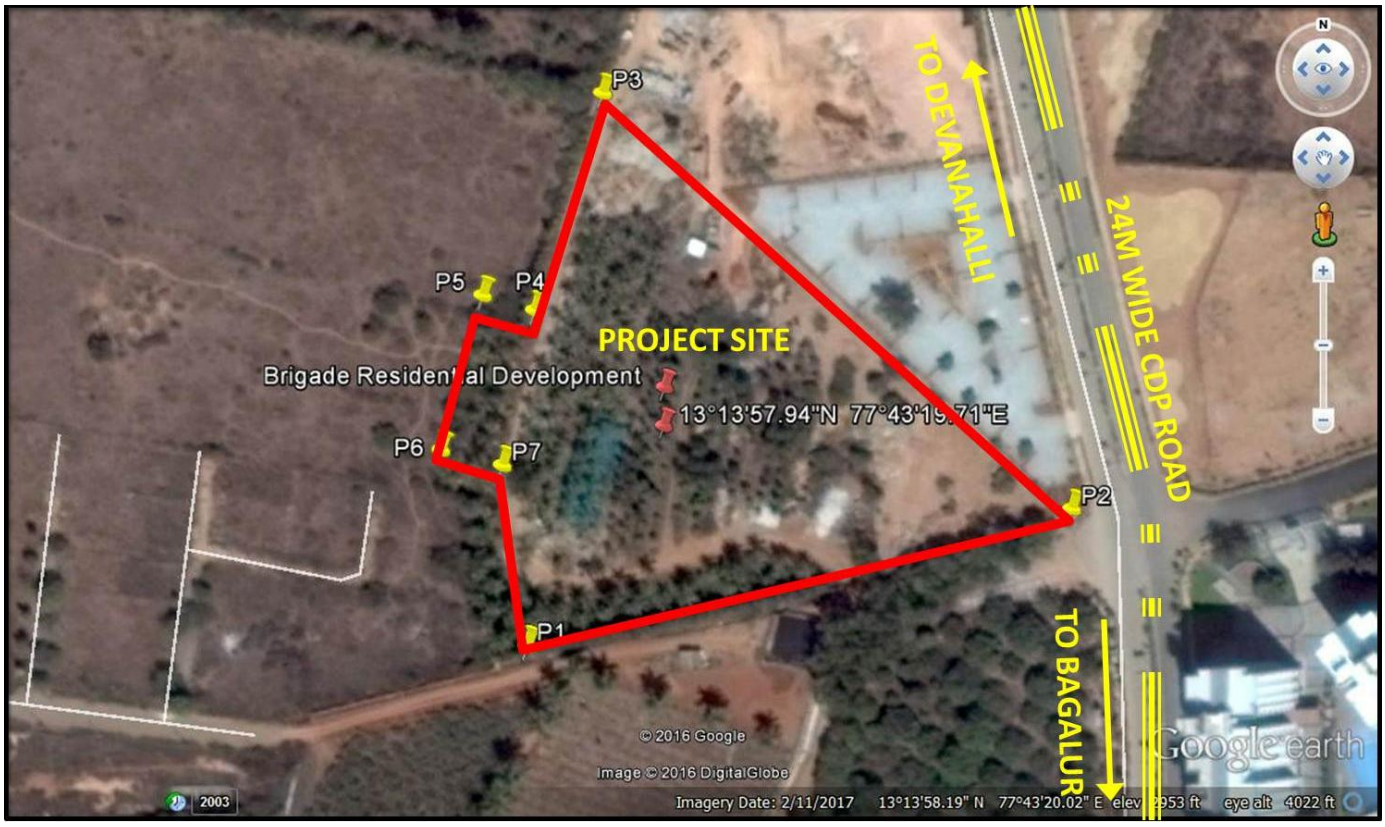

Fig: Google Image of the Project Site

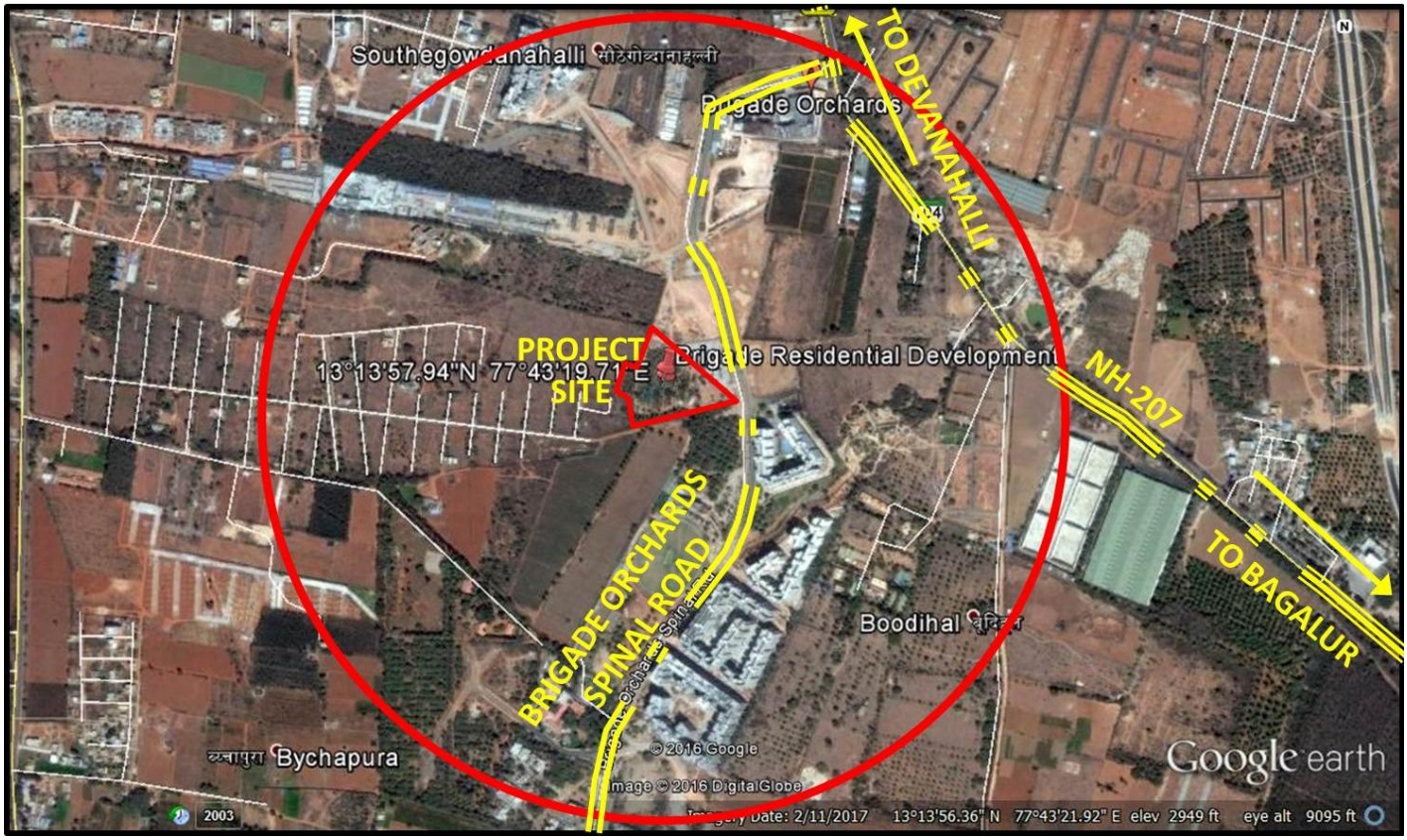

Fig: 500m Radius Google Image

Brief Description of Devanahalli:

Devanahalli is no longer the quiet and far flung area it was 10 to 15 years ago. The Town Municipal Council (TMC) Devanahalli has come a long way to witness some of the city's biggest infrastructural and developmental changes. For being only 34 km away from Bengaluru, the public transport in the area is both rounded and resourceful.

It is situated on the Bangalore-Hyderabad National Highway 7. Plus, the second-biggest airport in all of India, Kempegowda International Airport, is strategically located here.

The presence of the airport 12 km south of Devanahalli Town has increased tourist traffic all along the highway, leading to rapid infrastructure development. Since the opening of the airport in 2008, Devanahalli has witnessed road enhancement and improved connectivity, with projects such as Outer Ring Road (ORR) and the planned six-lane carriageway that forms a ring between ORR and the Satellite Town ring road.

Attracted by the potential this locality had to offer, it didn't take very long for IT companies to set up base here. The Bangalore BIAL ITIR is a 12,000-acre IT Investment Region that is under development, 15 km north of the airport. It is supposedly the largest infrastructural project in Karnataka's history. Other IT projects such as KIADB Hardware Park and Aerospace Park, are sure to give a boost to Devanahalli's residential and commercial market.

Well-established schools, colleges, hospitals, malls, and supermarkets strengthen the locality's worth. Supermarkets such as Food World and Heritage Fresh, schools such as Akash International and Nandini Niketan, and multi-specialty hospitals in the region have helped in the development of the area and rise in property prices.

The locality's value is excitable yet increasing. Devanahalli is, thus, a promising locality worthy of future scope for infrastructure and advancement that further accelerates not only well-paced growth, but also overall development.

Connectivity and Transit Points

After the International airfield operations began here, Devanahalli has had a lot to offer in terms of public transportation facilities. Localities such as Bommanahalli, Krishnarajapura, Yelahanka, Kengeri, Hoskote, Dasarahalli, Dodballapur, Magadi, and Nelamangala are the nearby towns having great road connectivity to Devanahalli.

The Devanahalli Railway Station is situated in the area, although the more preferred Bangalore City Railway station is only 41 km away. This station is more convenient, as it is a major stop for most trains traveling through the Bangalore route.

Major Landmarks

- Devanahalli Fort
- Kempegowda International Airport (KIA)
- M S Ramaiah Institute Of Management Studies
- Bangalore Baptist Hospital
- Aerospace Park
- Airport Residency

Factors for Growth in the Future:

The locality of Devanahalli is fast developing with good reason - the number of projects proposed.

ITIR (Information Technology Investment Region) is said to be costing 22 billion dollars. This project has proposed to directly provide employment to 1.2 million people and indirect employment to 2.8 million. This is a centre-state partnership where basic infrastructure such as road, rail, and telecommunication links will be provided by the Centre, and physical infrastructure and utilities, including power, water, sewerage, and effluent treatment facilities will be provided by the state. IT companies such as Infosys, Wipro, TCS, and Cognizant have shown signs of interest, and have already signed MoU's with this project. All three phases are expected to be complete in about 5-10 years from now.

Located adjacent to Bengaluru International Airport is the Aerospace Park, which is being developed as a world-class aerospace hub. This is a 985-acre facility that can be accessed by key national highways such as NH-7, NH-4, and NH-207. It also contains a 252-acre Special Economic Zone (SEZ) within its boundaries. Hindustan Aeronautics Limited, Jupiter Aviation, and Dynamic Technologies are some of the noteworthy investors who have shown interest in this project. The park has already acquired 1000 acres, but requires an additional 2000 acres.

Devanahalli Business Park is said to come up in 309 acres of land. This project also promises employment and the development of the area. Two IT sectors, retail sector, goods assembly, and three hospitals will be a part of this project. Expected investment here is around Rs 9,500 crores.

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.

The major items are listed as below:

Sl. No.	Particulates	Details
1	Plot Area	3 Acres 18 Guntas (13,961.66Sq.m)
2.	Built-up Area	49,318.94 Sq.m
3.	Water Demand	246KLD (163KLD-Domestic, 83KLD-Flushing)

4.	Power Demand	3000KVA
5.	Connectivity	Devanahalli Railway Station – 4.5km, NH 7 -4km, CBD – 40km, Kempegowda International Airport – 14km
6.	Community Facility	Club House, Gym, Round the clock Security, Energy Efficient Building, Uninterrupted Power Supply, Water, etc.,
7.	Parking Required	314 Car Parks
8.	Parking Proposed	314 Car Parks

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

The proposed project site is surrounded by Property bearing Survey No.397 and Road towards the east, Property bearing Survey No.398/1A1 towards the west, Property bearing Survey No.397 towards the north & Village Boundary of Rayasandra towards the south. Many projects from reputed builders such as Sobha Group, Ozone Builders, Hiranandani among others are under construction stage/advanced stage in and around the surroundings of the proposed project site.

The proposed site is generally plain barren land with few trees & wild shrubs spread across the project site. About 148 Coconut trees and 2 Date Fruit exist at the proposed project site. Trees shall be Cut, Transplanted and Retained depending on their economic value, age, size, girth, etc. Trees on the setbacks of the buildings and parks shall be retained. The building footprint shall be carefully designed to retain maximum trees and many shall be transplanted.

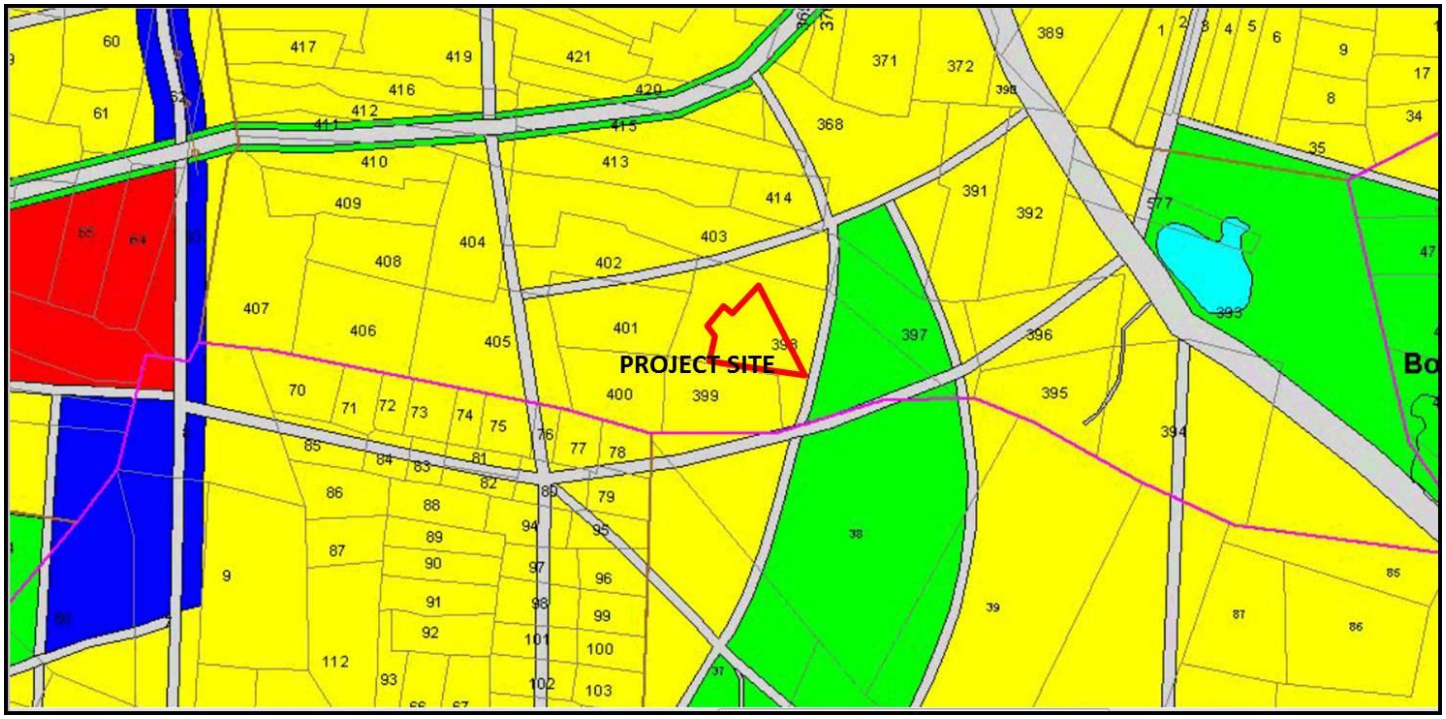

Fig: Extract from BIAAPA Master Plan 2021 Showing Proposed Project Site

Figure shows the project site overlapped on the BIAAPA Master Plan 2021. The land-use of proposed project site is earmarked as Residential where Residential Development is permitted as per BIAAPA byelaws.

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

Storm water management is scientifically designed during and after construction. Scientifically designed landscaping will further improve water holding capacity & minimize soil erosion.

The topography of the proposed Residential development site is generally plain barring few trees, shrubs and remaining open spaces. Care shall be taken to prevent soil erosion, caving of soil & soil instability during excavation works.

The contour map is enclosed for the proposed project site. Slope of about 2.5m exist in North-West to South-East direction over a distance of about 180m.

The project area falls in Zone - II of Seismic Zoning map of India. The seismic factors have been appropriately incorporated in the civil designs for the proposed project.

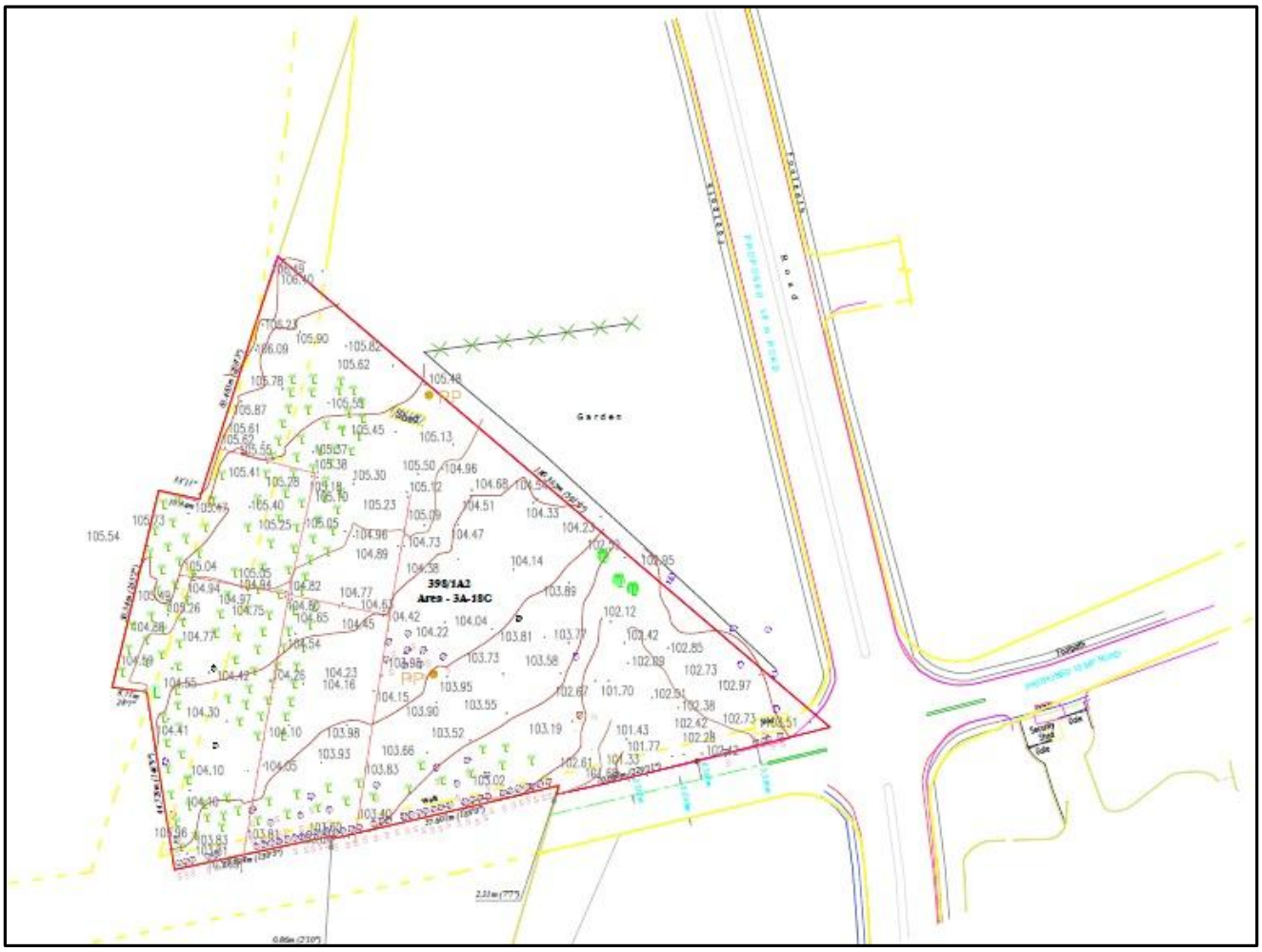

Fig: Contour Map

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

The contour map is enclosed for the proposed project site. Slope of about 2.5m exist in North-West to South-East direction over a distance of about 180m. The natural gradient at the project site shall be respected and same will be maintained unaltered after completion of construction of the Project.

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.)

Excavation will be for providing basements, footings, sump tanks etc. and excavated earth will be used for backfilling, leveling of earth, internal roads, etc.

The built-up area of the proposed 2 Basement floors is 14,050Sq.m. Considering Floor to Floor height of Basement as 3m and the level difference at site (2.5m), the total excavated earth is 49,175cum.Top earth of about 5,590cum shall be stored and used for landscaping, 19,730cum shall be used for leveling, 18,183cum shall be used for backfilling & balance 5,672cum of earth shall be used for construction of internal roads.

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

300 laborers will be employed for carrying out construction related work. The maximum amount of waste generated during construction will be around 20KLD. Wastewater generated from the temporary bathrooms and toilets will be treated in temporarily provided septic tanks. The water will be drawn from local agencies at the time of construction. During construction stage, proper storm water flow arrangement is proposed. The septic tank will be cleaned periodically to maintain the temporary sanitation facility.

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)

The low lying areas and wetlands will not be affected or altered due to the proposed construction of the project. Scientifically designed Storm Water drain shall be proposed to ensure that the surface run-off during heavy rainfall shall be properly harvested within the development & excess run-off is diverted into the external storm water drain.

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

Generation of construction debris and waste will slightly increase noise levels and dust concentration inside the site. However, the project authorities have proposed to provide face masks, ear plugs, gloves and other personal protective equipment's to prevent accidents or incidents during construction activities. Spraying of water will be done on temporary driveways to control dust emissions generated due to vehicular movement.

50kg/Sq.m of debris is expected to be generated from the construction of the project (ref: Construction and Demolition Waste Management Guidelines, BBMP, dated: 18-03-2016). Total construction debris is calculated to 1,000 Tonnes. Waste during construction activity relates to excessive cement mix or concrete left after work is over, rejection caused due to change in design or wrong workmanship etc., concrete appears in two forms in the waste. Structural elements of building have reinforced concrete, while foundations have mass non-reinforced concrete. These materials are normally reused as filler material at the same site after completion of excavation work and for construction of basement raft and internal road etc. Other miscellaneous material during construction that arise as waste includes, glass, plastic material, general refuse, scrap metal, cardboard, plastics etc. will be segregated and disposed to authorized recyclers.

During the construction phase, approx. 100 skilled and 200 unskilled laborers will be working during peak time of construction.

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.

Table: Water Demand Calculation

Sl. No.	Description of Module	No. of Units	Type of Unit	Average Occupancy per Flat	No. of Persons	Domestic Water Demand LPCD	Flushing Water demand LPCD	Domestic Water Requirement KLD	Flushing Water Requirement KLD	Total Demand In KLD
1	Residential	262	1 BHK	4	1048	90	45	94	47	**141**
		144	2 BHK	5	720			65	32	**97**
2	Club House	10% of Total Occupants			177	20	25	3.5	4	**7.5**
Total								**162.5 Say 163**	**83**	**245.5 Say 246KLD**

The fresh total water demand of 163 KLD will be sourced from Borewell & Rooftop Rain Water. The wastewater generated is estimated to be about 221 KLD. 199 KLD of treated water will be available for reuse and recycling.

1. Domestic Water (Fresh Water) Demand - 163KLD
2. Flushing Water Demand - 83KLD
3. Total Water Demand - 246KLD - (1 + 2)
4. Waste Water Generation @ 90% of Total Water Demand - 221KLD
5. Proposed Sewage Treatment Plant Capacity - 225KLD (1 No.)
6. Treated water available for recycling - 199KLD (90% of Waste water generation)
7. Water Demand for Landscaping - 96KLD

8. Treated Water for Water Features - 15KLD
9. Treated Water for Car Wash - 5KLD

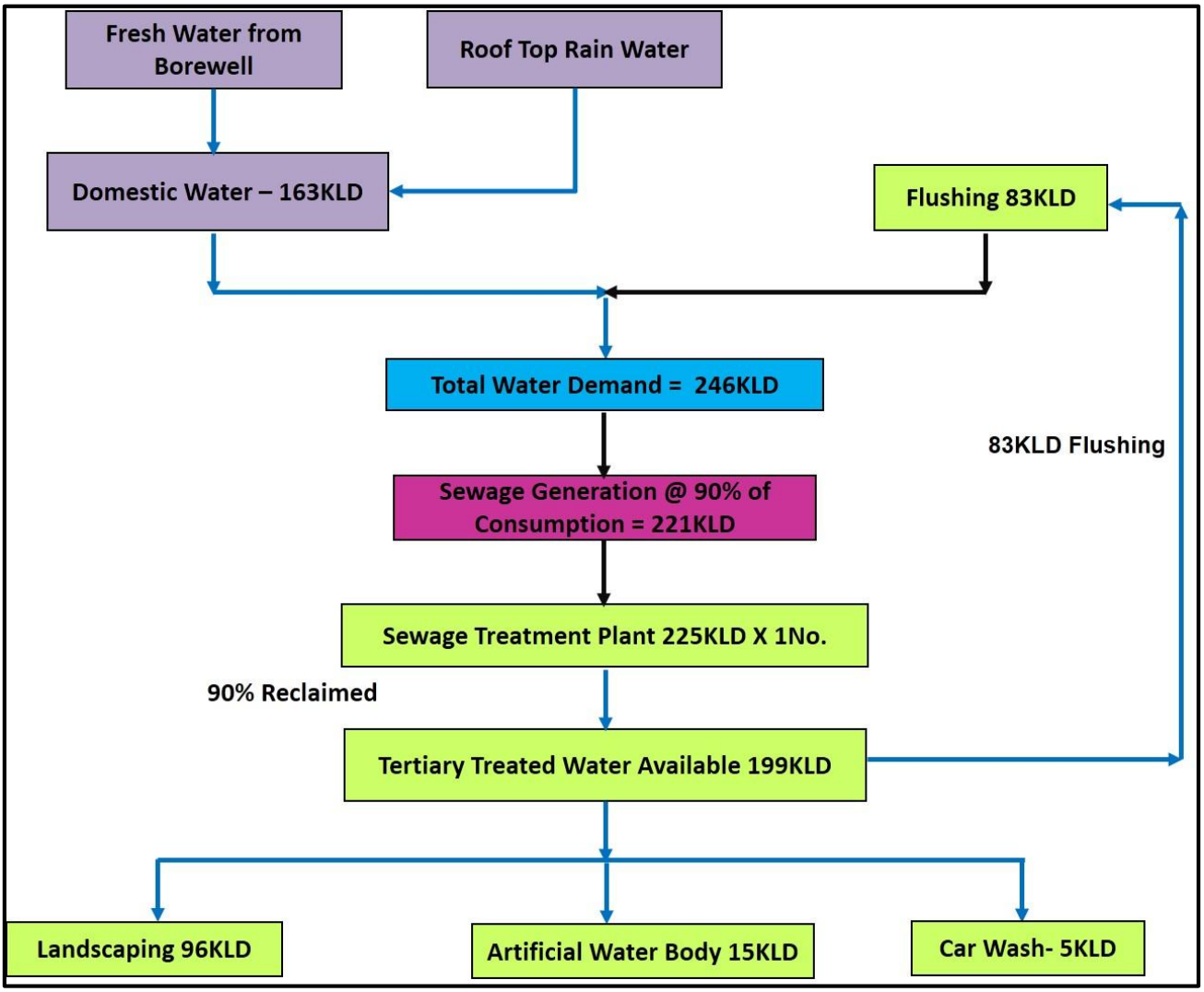

Fig: Water Balance Chart

Estimate of water demand for landscaping

- Landscape Area : 4,607.26 Sq.m
- Total Water Demand : 96 KLD

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

Micro level Hydrogeological Study report of the project area is enclosed - Water Source is Bore well & Rooftop Rainwater.

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)

Micro level Hydrogeological Study report of the project area is enclosed.

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)

199 KLD of treated wastewater will be available for recycling.

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)

Not Applicable

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)

Proposed quality of raw and treated wastewater is as below

General Characteristics (Inlet)

PH	6.5-7.5
BOD	350 mg/l
COD	450 mg/l
TSS	150 mg/l
E-Coli	>2000MPN

General Characteristics (Outlet)

pH	6.5 – 9.0
BOD_3 at 27 Degree Celsius	≤ 20mg/l
COD	≤ 50mg/l
Total Suspended Solids	≤ 50mg/l

Ammonical – Nitrogen	≤ 5mg/l
Total Nitrogen	≤ 10mg/l
Fecal Coliform	< 1000 MPN/100ml

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

Rainwater Harvesting System

As per CGWA / BWSSB Guidelines

- Rooftop Rainwater to be harvested per Sq.m of Roof area - 20litres
- Storm water harvesting per Sq.m of non-roof area (open area) - 10litres

Rooftop area	-	2,158.4Sq.m
Non-roof area	-	11,803.26Sq.m

Rooftop Harvesting:	-	2,158.4Sq.m x 20litres = 43cum
Storm Water Harvesting	-	11,803.26Sq.m x 10litres = 118cum

Proposed Rooftop rainwater harvesting tank capacity of - 45cum

Propose 1 Number of 45 Cum capacity Rainwater Harvesting tank.

Recharge Shaft details - For Storm Water Harvesting

Diameter of bore well (2r)	d	150mm
Depth of bore well	H	20m
Area which the groundwater is flowing through (2 PI r (h + r))	A	9.5Sqm
Hydraulic gradient - Unit less (dh/dl)=i	i	0.85000
Hydraulic conductivity of the aquifer in m/s	K	0.00100m/Sec
Rate of infiltration = K * I * A	Q	0.008075Cum/Sec

Consider peak rainfall period as 15min

Quantity of storm water to be recharged per recharge shaft = 7.26cum

No. of recharge shaft required = 118/7.26 = 16.25

Propose 16Nos. Recharge shaft to harvest 106cum of storm water.

Maintenance

Presence of considerable quantity of silt and suspended materials in the harvested rainwater from different surfaces pose problem in the filter bed with its clogging effect. Mud would be accumulated over the sand bed resulting complete blockage of filtration process. Following measures are to be taken from time to time.

- Scraping the top surface
- Removing the mud
- Changing the filter material, particularly the sand layer before each monsoon for effective results

2.8. What would be the impact of the land use changes occurring due to the proposed project on the runoff characteristics (quantitative as well as qualitative) of the area in the post construction phase on a long term basis? Would it aggravate the problems of flooding or water logging in any way?

The proposed Residential project will have no impact on the quality of runoff. Effective rainwater harvesting plan will minimize the water requirement & also improves the ground water table. The natural drainage pattern in the site will be maintained. No significant change in drainage pattern or risk of flooding is anticipated due to the project.

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

Fresh water of 163 KLD will be drawn from Borewell & Rooftop Rain Water.

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

The boundary wall will be constructed to prevent exit of direct runoff from the site. An efficient hydraulically designed drainage facility will be provided for the storm water outflow from the proposed project site. Bar screens, Silt traps, sedimentation basin etc., will be provided at the outlet of storm water drain to prevent movement of any kind of construction debris during construction phase.

Temporary sedimentation ponds are proposed during the construction phase for collection of rainwater/run-off from the site and provision will be made for the overflow to the external storm water drain.

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

Care is taken not to increase the runoff quantity. Below calculation explains the same.

Existing Scenario:

Co-efficient of Runoff Considered for partly developed project area	-	0.5 (C)
Intensity of rainfall	-	60mm (I)
Site Area	-	13961.66 Sq.m (A)
Quantity of Runoff Q = C x I x A	-	0.419cusec
Consider Peak Rainfall period as	-	15min
Peak Quantity of Runoff in 15mins	-	377cum

Changed Scenario

Co-efficient of Runoff Considered for developed project area	-	0.7 (C)
Intensity of rainfall	-	60mm (I)
Site Area	-	13961.66Sq.m (A)
Quantity of Runoff Q = C x I x A	-	0.586cusec
Consider Peak Rainfall period as	-	15min
Peak Quantity of Runoff in 15mins	-	527cum

Proposed Rainwater Harvesting Systems = Rooftop Rainwater Harvesting Sump + Recharge Shaft

Total Quantity of rainwater harvested = 43cum + 118cum = 161Cum

Therefore, Quantity of runoff post development is less than prior to development i.e. 366cum < 377cum

- Storm Water drains will be scientifically designed with Sixteen (16) numbers of recharge shafts for groundwater recharge.
- Rooftop rainwater will be collected through down take pipes to 1 number of Rainwater Harvesting Sump of 45cum capacity each is proposed.
- Sedimentation chamber and screens are proposed at the overflow of runoff to external storm water drain.

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

The Project authorities are committed to provide proper sanitation facility for the laborers. The project may employ around 300 skilled and unskilled laborers. A labor camp will be setup very close to the proposed project site. The camp will include about 20 toilets and 10 bathrooms. The Project authorities are committed to provide proper sanitation facility for the laborers.

Drinking water will be supplied to the labor camp through water tankers for drinking purpose. Toilets are proposed even at the proposed project site during construction phase. The wastewater from these temporary sanitary facilities will be treated in temporary septic tank of size 2m X 2m X 3m.

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

The sewage effluent generated is estimated to 221KLD. Sequencing Batch Reactor technology Sewage Treatment Plant of 225 KLD capacity is proposed to be installed to treat the waste water

generated from the Residential Development. The treated water will be used for Gardening, Toilet flushing etc.

Basic Treatment Process in Sequencing Batch Reactor Technology:

a) Fill

The fill process is where the reactor is filled with wastewater between a low water level & a high water level. Fill could occur under mixed, unmixed, aerated or un-aerated conditions. The time of fill depends on the capacity of each reactor, the number of parallel reactors in operation, & the variations in the wastewater flow rate

b) React

The react phase begins once fill is complete. It includes mixing & aeration (dissolved oxygen (DO)>2 mg/l). In this phase, no influent flow into SBR aeration & sludge could be wasted Aeration process serves to nitrify ammonia, oxidize organic carbon, & promote uptake of phosphorus in the sludge, while un-aerated conditions support de-nitrification of nitrite & nitrate.

c) Settle

In this phase, neither influent flows to SBR nor waste of sludge is permitted. Clear supernatant appears in the upper part of the reactor. The duration of settle can be adjusted for sludge settle ability.

d) Decant

In this phase, no influent flows to SBR as well as no aeration is conducted. The supernatant is decanted from the upper part of the reactor via automatic valves.

e) Idle

The period between draw phase & the fill phase is termed as idle. The idle time could be employed effectively to waste settled sludge. It is optional phase & no influent is fed to the reactor in addition to the absence of aeration.

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

Dual plumbing system with color coded pipes as per NBC 2016 is proposed. Purple color pipes shall be used for recycled water for toilet flushing.

3. VEGETATION

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

No, there will be no threat of the project to the unique / rare biodiversity.

Local ecosystem in Devanahalli includes Birds such as House crows, Black Kites, Myna, barbets & crows; Mammals such as Squirrels, Field Mouse, Common Mongoose & Bandicoot; Reptiles such as Garden lizard, Chameleon & rat snakes. During construction, there will be slight disturbance in the ecosystem balance, which shall be effectively compensated by planting of local & fast growing tree & flowering species, once the project has been completed. After project completion, the local ecosystem will be restored to its original.

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 site is generally devoid of rare vegetation of any description. There will no clearance of rare vegetation of any kind. About 148 Coconut trees and 2 Date Fruit exist at the proposed project site. Trees shall be Cut, Transplanted and Retained depending on their economic value, age, size, girth, etc. Trees on the road widening area, setbacks of the buildings and parks shall be retained. The building footprint shall be carefully designed to retain maximum trees and many shall be transplanted.

3.3. What are the measures proposed to be taken to minimize the likely impacts on important site features (Give details of proposal for tree plantation, landscaping, creation of water bodies etc along with a layout plan to an appropriate scale)

The implementation for development of greenbelt 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 a permanent greenbelt is created in a short period. The effective plantation will also stabilize the soil and reduce any nuisance during windstorm if any in future. These together in a long term will improve the local ecology of the site. Besides this, the visual aesthetic of the proposed site will be enhanced by developing lawn with local ornamental plants in the open spaces. 4,607.26 Sq.m of the project site area is reserved for landscaping.

Fig: Landscape Plan

4. FAUNA

4.1. Is there likely to be any displacement of fauna - both terrestrial and aquatic or creation of barriers for their movement? Provide the details.

No. There will not be any displacement.

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

No. No direct or indirect impact is anticipated on the avifauna of the area due to project.

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

Not Applicable. No such impact is anticipated due to the proposed project.

5. AIR ENVIRONMENT

5.1. Will the project increase atmospheric concentration of gases & result in heat islands? (Give details of background air quality levels with predicted values based on dispersion models taking into account the increased traffic generation as a result of the proposed constructions)

The impacts on ambient air quality due to emissions from the operation of DG sets (500 KVA x 3 Nos.) during power cuts by the BESCOM in the Residential project will be very minimal as the DG sets will be operated with dual fuel ie., both low sulphur High Speed Diesel (HSD) with Sulphur content less than 50ppm & Compressed Natural Gas (CNG). Also movement of vehicles from this project will be under the surveillance of the security group that will be deployed to manage internal traffic. This impact of operations of DG sets is negligent and restricted to limited period (during power cuts), thus background air quality levels and dispersion models are not considered for prediction of impacts. As per experimental judgment, it can be concluded that the use of DG Sets during power cuts and movement of vehicular traffic will not increase atmospheric concentration of gases and shall not result in any heat island.

Standard air pollution mitigation measures shall be provided

- Stack height will be at-least 5m above Roof Level of the proposed building for dispersion and dilution of emissions
- Ultra-low High Speed Diesel (HSD) with Sulphur content less than 50ppm will be used
- Compressed Natural Gas (CNG) shall be used as an alternative means of fuel for DG Sets.
- Only DG Sets with in-built Acoustic enclosures will be provided to mitigate noise pollution

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

The main source of emission during the construction period are the movement of equipment, vehicles at site and dust emitted during leveling, earthworks, foundation works and other construction related activities. The dust emitted during the above mentioned activities depends upon the type of soil being excavated and the ambient humidity levels. The impact is likely to be for short duration and confined locally to the construction site itself. The composition of dust in this kind of

operation is however mostly coarse particles, inorganic and non-toxic in nature. These are not expected to travel long distance before settling.

Exhaust emission from vehicles and equipment deployed during the construction phase also result in a marginal increase in the levels of SO_2, NO_x, PM and un-burnt hydrocarbons. Construction activities may cause changes in the PM levels locally, the impact will, however be reversible, marginal and temporary in nature.

The impact of such activities would be temporary and restricted to the construction phase. The impacts will be confined within the project boundary and is expected to be negligible outside the project boundaries. Proper upkeep and maintenance of vehicles, sprinkling of water on temporary accessible roads at construction site, providing sufficient vegetation on the periphery etc., are some of the proposed measures that would greatly reduce the impact on the air quality during the construction phase of the project.

The impacts on ambient air quality due to vehicular emissions will be very less and will only be during the peak hours. The Entry and Exits will be manned by trained and experienced traffic wardens. Stopping or parking near the Entrance and Exit portals will be prohibited: The long driveway leading to the Parking bays and areas will ensure that vehicles do not get piled up. Visitor's cars with valid emission certificate will be allowed within the Residential Building.

Since the predominant wind direction in Bangalore is West to East, there will be a minimal impact on the Eastern side of the project and is reversible.

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

It is proposed to provide ample car parking space within the project site. 314 car park spaces shall be provided in 2 Basements, Ground Floor & Surface. Additional car parking space for visitors is also considered in the project design and is located within the project. The project will have separate Entry & Exit onto the 18m wide abutting road towards the southern side.

Parking			
Car parking required	314		
Car parking provided	314	Lower basement	102
		Upper basement	88
		Ground floor	48
		Surface parking	76
		Total	314

The Entry and Exits will be manned by trained and experienced traffic wardens. Stopping or parking near the Entrance and Exit portals will be prohibited. The driveway leading to the Parking bays and areas will ensure that vehicles do not get piled up. It is proposed to provide bell mouth entry and exit for smooth flow of vehicles in or out of the project.

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

Internal road for vehicular movements is proposed with no. of signage at equal intervals / at required locations. The road width of 6m ROW (uni-directional) is maintained all round the building footprint for thorough movement of vehicles. There is a separate Entry and Exit point located adjacent to each other on the 18m abutting road (South Side) to ease the load of traffic generated by the Project while exiting onto the main road. The entry and exit to the project will be scientifically designed to ensure that there is no bottle neck situation onto the abutting road.

The internal road with the movement pattern is shown in the site plan. Trained security will be deployed to ensure smooth flow of traffic into and out of the Residential Apartment.

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

There will be slight increase in traffic and noise during the peak hours, but that will be maintained by providing wide roads and proper signage internally and security group will be hired to direct the flow

of traffic towards outside the project site. DG sets with Acoustic Enclosures are provided to prevent Noise Generation due to vibrations.

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

Impacts: Not significant (Temporary)

- Stack height will be provided as per norms
- DG Sets with Acoustic enclosures are provided to prevent Noise levels from exceeding the levels as per CPCB norms
- HSD used for DG sets will be with sulphur content <50ppm(Low Sulphur High Speed Diesel)

The noise produced during construction phase will have temporary impacts on the existing ambient noise levels at project site but restricted to within the project site and only during daytime. Therefore, the impact of noise levels on surrounding area will be insignificant during the construction phase. Emissions from the DG set may cause localized impact on ambient air quality for short duration. It may be noted that the DG set will be operated only in case of power failure from BESCOM. However, acoustic enclosures will be fitted with the DG sets to control the noise levels. Adequate height of stacks will be provided to the DG sets as per guidelines issued by CPCB.

6. AESTHETICS

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

No. The proposed Residential Development is high rise developments (Ground + 13 Upper Floors) and will not obstruct the surrounding views or landscapes. We have designed the developments in such a manner, for the occupants to have views on at least two sides. Overall, it will improve the infrastructure of the area which is essential to enable, sustain, or enhance societal living conditions.

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

No. New construction on the proposed site will not have any impact on the existing structures in the vicinity. There is a vast distance between the proposed site & the adjoining developments. Adequate Safety aspects have been considered in the structural design, to negate any impacts, if any, arising during the construction.

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

All norms on ground coverage, FAR, height, setbacks, structural design, and other parameters as per will be strictly followed.

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.

Yes. Devanahalli Fort is located about 4km North of the project. Also, Tipu Sultan’s Birth Place is located about 3.5km North of project location.

7. SOCIO-ECONOMIC ASPECTS

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

Standard of living including the socio-economic conditions of the surrounding population will improve upon project completion. Job opportunities will arise due to the requirement of personnel's in the facilities team in charge of maintenance of services such as Utilities, House Keeping, Landscaping etc., during project operation.

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

Social infrastructure around the proposed project can be termed above average with schools, colleges, place of worships, hotels, restaurants, etc., in the close vicinity. The existing social infrastructure is expected to improve further due to various similar developments around the project site.

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

The proposed project will not cause any adverse effects on local communities' disturbance to sacred sites or other cultural values. Environment pollution control and safety are the proposed project's top priority.

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)

Following energy conservation measures are considered in selection of building materials and their energy efficiency

- Locally sourced building materials will be used to reduce embodied energy and air pollution produced by vehicles during its transportation to the project site.
- Cement with Ground granulated blast-furnace slag (GGBS) content shall be used. This will reduce the overall embodied energy of the building.
- Steel with recycled content of at least 15% will be used.
- Recycled wood (MDF - Medium Density Fiber Board) will be used for doors and windows

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

Generation of Air & Noise Pollution envisaged during transport and handling of materials during construction will be minimized. Below mitigation measures will be adopted to reduce public nuisance.

Noise control Measures

To mitigate the impact of noise generated from usage of construction equipment, the following measures are suggested:

- Noise prone activities could be restricted to day time only.
- Workers employed in high noise areas would be rotated. Earplugs/muffs, or other hearing protective devices could be provided to those working very close to the noise generating machinery.
- Barricading of site boundary using Galvanized Iron (GI) sheets to minimize dissipation of noise to adjacent places around the site.

Fugitive Dust Control Measurers

Source	Control Measures
Disturbed surface areas	- Apply dust suppression measures frequently to maintain a stabilized surface; - Areas, which cannot be stabilized, as evidenced by wind driven dust, will have an application of water at least twice per day (early morning & late evening).
Inactive disturbed surface areas	- Apply dust suppressants in sufficient quantity and frequency to maintain a stabilized surface.
Unpaved roads	- Water all roads used for any movement at least twice a day of active operations; - Water all roads used for any vehicular traffic once daily and restrict vehicle speed to 20 kmph, which will reduce dust emission.
Open storage piles	- Apply water to at least 80 percent of the surface areas of all open storage piles on a daily basis when there is evidence of wind driven fugitive dust; - Install an enclosure all along the storage piles to prevent dust movement.
Track-out control	- Downwash of construction vehicles (especially tyres) prior to departure from site.

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

Yes. 3% of the construction material will be saved through recycle and reuse. Construction debris which is recyclable like waste concrete generated due to demolition, waste plastering etc., will be used in the construction of roads, leveling and pavements. Other materials viz., steel, wood, glass, etc. will be sold to authorized reprocessing vendors. About 6-9% of the construction cost will be saved by recycling materials.

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

The solid waste generated from the project amounts to about 796 kg/day of domestic solid waste, paper, cardboards, garbage, etc. The organic solid waste of 442 kg/day will be segregated from other wastes and will be composted within the development. The inorganic solid waste of 354 kg/day will

be segregated and will be disposed off to the local authorized agencies for further treatment and disposal. The project proponent will take necessary measures to avoid the usage of plastics.

General Composition of Municipal Solid Waste:

The most abundant solid waste component is paper, which is in the range of 30% - 50%, yard waste and cardboard appears next in abundance, ranging from 9% to 40%. Glass ranks third in abundance after yard waste and cardboard.

The general composition of municipal solid waste (MSW) is as shown in table:

Components	Typical %	Moisture Content %
Organic	50.0	45-85
Yard Wastes	5	45-85
Wood	0.1	15-40
Food Waste	10	45-85
Paper	25	3-8
Cardboard	8	3-8
Textiles	0.2	5-15
Rubber	0.2	2-4
Leather	0.5	8-10
Miscellaneous organics	1	10-60
Inorganic	50.0	1-5
Plastics	25	1-3
Glass	0.5	0.5-1
Tin Cans	20	0.5-1
Non-ferrous	1	0.5-1
Ferrous Metals	0.5	0.5-1
Dirt Ashes etc.	2.5	6-12
E-Waste	0.5	0.5-1

The solid waste that is generated will be segregated at source as per Solid Waste Management Rules, 2016. The segregated solid waste shall be collected by door to door collection system in service elevators into the Garbage storage and processing room. Here the organic solid waste will be composted and recyclable solid waste viz. Plastic, Metal, Glass etc will be sold to authorized agencies / disposed to local government agencies.

The E-waste generated will be about 200 kg/annum while Hazardous waste generated will be around 500kg/annum. Both E-waste & hazardous waste will be stored separately and shall be handed over to approved / authorized disposal agencies.

9. ENERGY CONSERVATION

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

The project proposes to have 3,000KVA sanctioned power from BESCOM. Acoustically enclosed DG sets (500KVA x 3 Nos.) will be provided as backup power during power break down. 50% back-up is proposed for residential units and 100% back-up for common area services, STPs, WTP, etc.

Following are the methods proposed for the project to minimize energy consumption

- External lighting is assumed to be 100 kW. 50% of the external lighting is proposed on solar. These are set of lighting which are placed at critical junctions and which would be lit round the night. Otherwise the other 50% lighting is on timer circuits to achieve the maximum savings.
- Energy efficient lamps with daylight sensors are proposed
- All internal common area lighting system is proposed as efficiency lamps (T5/T8)/ CFL / LED.
  - Interior LPD : 7.5 W/ m^2
  - Exterior LPD : 1.3 W/ ft^2(Building Entrance)
  - : 60 W/m (of Door Width)
- The top two floor apartments are provided with provisions for Solar water heating which results in substantial energy savings.
- Proper selection of glass and the designed orientation of the building shall result in Energy Savings, by reducing the use of lights during the day time.

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

- Fuel used: HSD
- Fuel Quantity: Dual Fuel mode of High Speed Diesel (HSD) with Sulphur content less than 50ppm & Compressed Natural Gas (CNG) and capacity is 5.5L/KVA/Peak load
- DG Set Capacities: 500KVA X 3 Nos.
- Acoustic Enclosures
- Stack height as per norms (i.e. 5.0m Above Roof Level)

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

Window (Glass) to wall ratio will be restricted to <40%. Glass characteristics proposed are as below:

U-Value	:	0.9 Btu/hr.ft^2.ºF
SHGC	:	0.24
VLT	:	0.40

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

Cross ventilation through apartment blocks and dwellings units is proposed as passive solar architectural features. The ventilation systems shall be provided with high performance glass to allow sufficient light into the dwelling unit, but at the same time blocks the heat gain.

The windows shall have chajjas to avoid direct entry of sunlight and heat in the dwelling unit. Day-lighting and allowance for openable windows for use in comfortable months for ventilation will optimize energy usage. Given the fact that the typical flat floor plates are not deep (typically not exceeding 5-10 meters depth,) light penetration will be good and need for continuous artificial lighting is reduced.

9.5. Does the layout of streets & buildings maximize the potential for solar energy devices? Have you considered the use of street lighting, emergency lighting and solar hot water systems for use in the building complex? Substantiate with details.

- 50% of the external lighting is proposed on solar. Solar Photovoltaic (PV) modules are used for lighting which are placed at feasible junctions and which would be lit round the night.
- The top two floor apartments are provided with provisions for Solar water heating which is feasible & results in substantial energy savings

9.6. Is shading effectively used to reduce cooling/heating loads? What principles have been used to maximize the shading of Walls on the East and the West and the Roof? How much energy saving has been effected?

Energy efficient high performance glazing is proposed to reduce cooling/heating loads. Measures such as shades provided by the effect of recesses in the external envelope of the building, Transient shading provided by the orientation of the building on one or more of its external walls, Shading of roofs by rolling reflective canvass, earthen pots, vegetation etc. Operable louvers / blinds are proposed as additional shading device towards the East, West and South sides of the building facade. Paints with high Solar Reflective Index (SRI > 70%) will be used to paint the terrace / roof to reduce any heat loss / gain.

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

- High efficiency transformers are proposed - total losses will be <1.14 % of the rating of the transformers. The total capacities of transformers will be 4000KVA.
- Use of high efficiency pumps and motors - ISI & BEE certified star rated motors are proposed.
- The buildings are not designed for centralized air conditioning. However, awareness to the occupants on use of CFC free Air Conditioning systems will be done.

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 effects of the building on Micro-climates will be minimized by implementing the following measures

- Decreased exposed surface area - Minimum ground coverage
- Increase thermal resistance - Roof insulation and east and west wall insulation
- Increase shading - East and west walls, glass surfaces protected by overhangs, fins and trees
- Increase surface reflectivity - Roof with Pale colour paints (SRI Paints), glazed china mosaic tiles, etc.
- Providing covered car parking on the surface to the maximum extent possible.

9.9. What are the thermal characteristics of the building envelope? (a) roof; (b) external walls; and (c) fenestration? Give details of the material used and the U-values or the R values of the individual components.

The U-values of the roof and external wall of the building will meet the requirements as specified in the Energy Conservation Building Code (ECBC).

R Value of Roof : 2.5 (R-15) w/m²ºk extruded polystyrene insulation.

U Value of Wall : 0.39 w/m²ºk

Fenestration : Window (Glass) to wall ratio will be restricted to <40%. Glass characteristics proposed are as below

U-Value	:	0.9 Btu/hr.ft2.ºF
SHGC	:	0.24
VLT	:	0.40

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

The Fire Fighting requirements depend on occupancy classification and height of the proposed building. The proposed development comprises Three Towers (1 Building) comprising of 2 Basement + Ground Floor + 13 Upper Floors. It is suggested that the individual buildings have their own independent firefighting systems as per statutory norms.

Since the proposed buildings are of high rise development (maximum 40m height), each building shall be protected by basic firefighting measures such as Fire Extinguishers, Hose Reel at feasible locations on each floor, Sprinkler system, Fire Pump and Fire water Overhead Tanks of 20,000 Litre capacity as applicable. Below table outlines the firefighting requirements for the project as per Part IV: Fire & Life Safety of National Building Code of India, 2005.

Life safety systems engineering

- Fire Extinguisher
- Hose Reel
- Automatic Sprinkler System
- 2,00,000 Litre Rain Water tank below Ground Level

- 20,000 Litre Water tank at Terrace
- Two Electric & One Diesel pump of capacity 2850 lit/min and one electric pump of capacity 180 lit/min
- Security Access control system
- Closed Circuit Television (CCTV) Surveillance system

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

Glass is not used as wall material. Glass is used for windows and ventilators only.

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

Air infiltration is the exchange of air through cracks and gaps in the outside shell of a building. Infiltration increases heating and cooling costs and reduces the comfort level of occupants. Loose fitting windows and doors, cracks between the house and the foundation, and gaps around plumbing and electrical penetrations are typical sources of leaks.

Although reducing air infiltration is recommended, it is not advisable to seal a building too tightly. This could result in a lack of adequate ventilation or, in extreme cases, sick building syndrome.

The effect of Air infiltration into a building without centrally air conditioned is negligible.

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.

The project considers solar lights to maximize utilization of solar energy thereby reducing dependence on Conventional energy to the maximum extent possible. The project proposes to adopt latest energy conservation / efficient and environment - friendly technologies & practices in building structures, which would result in significant energy conservation.

Energy saving measures that will be incorporated in the project includes:

1. Use of high efficiency drives for the lifts
2. Use of Copper wound transformer
3. Use of HF ballast for lighting
4. Use of LED light fittings
5. Use of Solar lighting in the open area of the development
6. Use of Solar heating systems for all dwelling units on the top two floors

SAVINGS IN ELECTRICAL POWER CONSUMPTION										
SUMMARY										
Sl. No.	**Description**	**Total power consumption per year in lakh kWH**	**Total power Saving using copper wound transformer in lakh kWH**	**Total power saving using solar Geyser per year in lakh kWH**	**Total power saving using VFD for lifts &pumps per year in Lakh kWH**	**Total power saving Using Solar for External lighting per year in Lakh kWH**	**Total power saving Using LED fixture for External lighting per year in Lakh kWH**	**Power saving using LED light fixtures & energy saving techniques for common areas per year in Lakh kWH**	**Power saving using LED light fixtures & energy saving technique for Club House per year in Lakh kWH**	**Total power saving per year in Lakh kWH**
1	**Residential Building**	20.10	0.11	1.51	1.63	0.21	0.15	1.29	0.13	**5.04**
	(percentage savings)		0.54%	7.52%	8.10%	1.04%	0.77%	6.44%	0.65%	**25.06%**

"I hereby give an 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 give, if any to the project will be revoked at our risk and cost."

Date: 03-11-2017
Place: Bengaluru

AMAR MYSORE
VICE PRESIDENT
BCV DEVELOPERS PRIVATE LIMITED