ENVIRO ANALYSTS & ENGINEERS PVT. LTD.

NABET Accredited & MoEF (Govt. of India) approved

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27/06/2017

To,
Member Secretary
(Infrastructure and Miscellaneous Projects + CRZ/
New Construction projects and Industrial estates)
Ministry of Environment, Forests and Climate Change.
Indira Paryavaran Bhawan,
JorBagh Road,
New Delhi - 110 003

Sub: Submission of compliance of 18th EAC meeting for Expansion of "Paradise City" - Proposed Residential and commercial building at S. No. 942 Pt, at Village Mahim, Tal Palghar, Dist - Thane by M/s A Y Associates (M/s HDIL and others).

Ref: Item No. 18.3.13. Of 18th EAC meeting dated 25.05.2017

Respected Sir,

Sr. No.	Requirement	Compliance met
1	Certified compliance report issued by the MoEF&CC Regional Office, Nagpur on environmental conditions stipulated in the existing environmental clearance.	We have received the a letter from RO-Moef Nagpur, vide no EC-299/RON/20 16-NGP/ dated 23/05/2017 The same is replied with the compliance action taken. Copy of the letters are attached as **Annexure I**
2	Give a conformity status to conditions stipulated in Annexure XIV of the amended EIA Notification vide S.O. 3999 (E) dated 09.12.2016.	The construction area of proposed project is 9, 03,039.68 sq.mtrs. EIA Notification vide S.O. 3999 (E) dated 09.12.2016 has incorporated the requirement conformity status to conditions stipulated in Annexure XIV are for the project having construction area below 1, 50,000 sq. mtr. However comparison with conditions stipulated for project having construction area below 1, 50,000 sq. mtr has been done. Attached as **Annexure II**
3	Notarized affidavit of undertaking by Board of Director(s) stating, no construction activity has commenced at the site and Project Proponent undertakes that the construction works will be	The project has received earlier EC dated 23rd December 2013 for total construction area of 3, 42,382.22 sq.m out of which **3,01,721.27** sq.m construction is completed. The work done uptill

		now is as per EC granted. The notarized affidavit stating that the work carried out as per EC and there is no violation of the EIA notification enclosed as **Annexure- III**.
4	It shall be ensured that water supply is only sourced from agencies possessing a CGWA clearance for ground water abstraction.	There is no ground water extraction is proposed for the project for any purpose. As far as drinking water is concerned, it will be made from the source of water i.e dam situated in the nearby area We have received water Noc form Mahim Gram Panchayat dated 22.11.2016 that the water supply will be made available from the irrigation department.
5	Detail plan for solid waste management.	Complete Solid waste management plan for collection, storage, segregation, treatment & disposal as per SWM-2016 indicating location of storage bins, processing area etc is attached as an **Annexure–1V.**
6	Submit an assessment of the cumulative impact of expansion and increased inhabitation being carried out or proposed to be carried out by the project for traffic densities and parking capabilities in a 5 kms. Radius from the site. A detailed traffic management and a traffic decongestion plan drawn up through an organization of repute and specializing in Transport Planning shall also be submitted.	The detailed traffic management in the project site area is already submitted. The study report of detailed traffic management and a traffic decongestion plan as sought is attached as **Annexure -V**
7	Compliance report of ECBC norms	Detailed report for Building Envelope study is attached as an **Annexure-VI**

Thanking you

Yours faithfully

Enviro Analysts and Engineers Private Limited.

Authorized signatory

ANNEXURE I

भारत सरकार
GOVERNMENT OF INDIA
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
MINISTRY OF ENVIRONMENT, FORESTS
& CLIMATE CHANGE

Regional Office (WCZ)
Ground Floor, East Wing
New Secretariat Building
Civil Lines, Nagpur - 440001
Tel: 0712-2531319 (O)
0712-2531318 (F)
E-mail: apccfcentral-ngp-mef@gov.in

F.No:EC-299/RON/2016-NGP/ Date: 23/05/2017

To,

Scientist 'D'
Member Secretary
IA Division (Infra-2)
Ministry of Environment, Forest & Climate Change
Indira Paryavaran Bhawan,
Aliganj, Jorbagh Road,
New Delhi-110003

Sub: Environmental clearance for "Paradise City" at S.No. 942 Pt. at village Mahim, Tal Palghar, Thane District by M/s. Housing Development Infrastructure Limited (Formerly M/s. A& Y Associates)

Ref:

1. SEIAA, Maharashtra letter no SEAC-2011/CR.731/TC.2 dated 02.03.2012

Sir,

I am directed to invite your kind attention on the above subject and letter under reference. Monitoring report of compliance to conditions stipulated in Environment Clearance accorded for "Paradise City" at S.No. 942 Pt. at village Mahim, Tal Palghar, Thane District by M/s. Housing Development Infrastructure Limited (Formerly M/s. A& Y Associates) is enclosed herewith. Following observations were made during the site inspection:

Construction of the project is in progress. As per the area statement provided by PA, construction of built up area of 301721.27 sq.m. has been completed. Area statement is enclosed as **Annexure-1**.

Following conditions were not complied:

Condition no. Ii:

No details provided regarding submission of copy of EC to concerned Municipal Corporation and local NGO. Copy of EC was not uploaded to the company website.

Condition no. Iii:

PA did not upload the copy of the six monthly compliance report to their website. Criteria pollutant levels are not being displayed at the main gate of the project.

Following conditions were partially complied:

Condition no. iv:

MPCB granted consent to establish for the project vide letter no. BO/RO(HQ)/CE/CAC-32 dated 19.11.2011. Validity of consent to establish expired in November 2016.

Construction work is in progress. No details have been provided regarding the revalidation of consent to establish.

Condition no. xxii & xxxviii:

Noise levels are not being monitored at night time.

Condition no. xxviii:

Ground water level is not being monitored.

Condition no. xliv, l, liii:

As per the details provided, only 3 six monthly compliance reports were submitted since the grant of EC.

Condition no. xlix:

Advertisement has been made, however the clause of seven days was not followed.

Condition no. liv:

PA submitted the environment statement to MPCB, however copy of the same was not uploaded to their website.

This issues with the approval of APCCF (Central), Regional Office, Nagpur.

A. Suresh Kumar 23/05/17

Suresh Kumar Adapa
Scientist 'D'

Encl: as above

Copy to:

1. Director RO HQ, Ministry of Environment, Forest & Climate Change, Government of India, 1st Floor Agni Wing, Indira Paryavaran Bhawan, Jorbagh Road, New Delhi-110 003
2. Director (Monitoring Cell), Ministry of Environment, Forest & Climate Change, Indira Paryavaran Bhawan, Aliganj, Jorbagh Road, New Delhi-110003
3. M/s Housing Development and Infrastructure Limited (HDIL), 9-01, HDIL Towers, Anant Kanekar Marg, Bandra (E), Mumbai- 400051
4. Guard File

A. Suresh Kumar 23/05/17

Suresh Kumar Adapa
Scientist 'D'

MONITORING THE IMPLEMENTATION OF ENVIRONMENTAL SAFEGUARDS

Ministry of Environmental and Forests

Regional Office, West Central Zone, Nagpur.

Monitoring Report

PART – I

DATA SHEET

1.	Project type: river - valley/ mining/ Industry / thermal / nuclear/ Other (specify)	**Township Project**
2.	Name of the project	**"Paradise City"**
3.	Clearance letter (s) / OM/ no and date:	**File No.: SEAC-2011/CR.731/TC.2** **Dtd. 2nd March, 2012.**
4.	Location	**S. No. 942 Pt.; at Village Mahim, Tal. Palghar, Dist – Thane.**
a.	District (s)	-
b.	State (s)	**Maharashtra**
c.	Latitude / Longitude	---
5.	Address for correspondence	
a.	Address of concerned project Chief Engineer (with pin code & telephone / telex / fax number)	**Mr. Avinash Madne** **M/s. A. Y. Associates** **1/E, Rajanikunj, Opp. Dena Bank,** **MG Road,** **Kandivali (W), Mumbai-400067.**
b.	Address of Executive Project Engineer /Manager (with pin code / fax number)	

6.	Salient features	
a.	of the project	Total Plot Area = 6,83,910.00 sq.m. Phase I: Plot Area : 3,04,709,19 sq.m **Phase I:** **FSI Area: 2,67,281.55 sq.m.** **Non FSI: 40,990.67 sq.m.** **Total Construction Area: 3,42,382.22 sq.m.** **No. of building:** **115 No. (Residential, Amenities, Commercial): G + 4**
b.	of the environmental management plans	**1. *Sewage Treatment Plant:*** **5 No. of Sewage Treatment Plant with total capacity 2500 m^2 will be provided for treating the wastewater.** **2. *Water Management:*** **Rain Water Harvesting shall be provided to recharge the ground water table.** **3. *Solid Waste Management:*** • **Construction debris will be reused on site premises. The substratum removed will be used for back filling, leveling and road construction.** • **Top soil proposed for the green cover area will be preserved and reused.** • **Waste oil which is generated due to usage of DG sets shall be stored and subsequently given to the authorized hazardous waste management agencies recognized by MPCB.** • **Dry garbage will be segregated & disposed off to recyclers.** • **Wet garbage will be composted by using the organic manure for landscaping** • **Sewage sludge will be composted and then used as manure.** • **E-waste will be stored separately and disposed though authorized recycler.** • **Biomedical waste will be segregated and handed over to MPCB approved vendor as per the Bio-Medical Waste (Management and Handling) Rules, 1998 and its amendment 2003.**
d.		

7.	Break Up Of the project Area	
a.	Submerge area : forest & :non-forest	**Non Forest**
b.	Others	**Total Plot Area = 6,83,910.00 sq.m.** **Phase I: Plot Area : 3,04,709,19 sq.m** **Phase I:** **FSI Area: 2,67,281.55 sq.m.** **Non FSI: 40,990.67 sq.m.** **Total Construction Area: 3,42,382.22 sq.m.**
8.	Break up of the project affected: Population with enumeration of those losing houses / dwelling units, only agriculture land only, both dwelling units and agriculture land and landless labourers / artisan.	**Not Applicable.**
a.	SC, ST / Adivasis:	---
b.	Others	---
	(Please indicate whether these figures are based on any scientific and systematic survey carried out or only provisional figures, if a survey is carried out give details and years of survey).	
9.	Financial details	
a.	Project cost as originally planned and subsequent revised estimates and the year of price reference	**Total cost : 405 Cr**
b.	Allocation made for environmental management plans with item wise and year wise break-up	**Construction Phase:** Capital EMP Cost: 70.5 Lakhs Cost for EMP O & M: 8.75 Lakhs **Operation Phase:** Capital EMP Cost: 810 Lakhs Cost for EMP O & M: 46 Lakhs
c.	Benefit cost ratio/ Internal rate of return and the year of assessment	---
d.	Whether (c) includes the cost of environmental management as shown in the above	---

e.	Actual expenditure incurred on the project so far	**Rs. 150 Cr**
f.	Actual expenditure incurred on the environmental management plans so far	**Rs. 107 Lacs**
10.	Forest land required	
a.	The status of approval for diversion of forest land for non-forestry use	**The land is of non-forest type hence not applicable.**
b.	The status of clearing and felling	**R.G. Area Provided: 68,220.00 Sq. m.** **A combination of native evergreen trees and ornamental flowering trees, shrubs and palms are planned in the complex. There will be tree plantation of about 3500 Nos. Different species will be selected as per CPCB green belt guidelines and common species available in the proposed area.**
c.	The status of compensatory afforestation, if any	------
d.	Comments on the viability & sustainability of compensatory afforestation program in the light of actual field experience so far	**N.A.**
11.	The status of clear felling in non-forest areas (such as submergence area of reservoir, approach roads), if any with quantitative information.	**N.A.**
12.	Status of construction	
a.	Date of commencement (Actual and/or planned)	**July 2012**
b.	Date of completion (Actual and/ of planned)	**December, 2020.**
13.	Reasons for the delay if the project is yet to start	------
14.	Dates of site visits	
a.	The date on which the project was monitored by the regional office on previous occasions, if any	-----

b.	Date of site visit for this monitoring report	
15.	Details of correspondence with project authorities for obtaining action plans/ information on status on compliance to safeguards other than the routine letters for logistic support for site visits	**M/s. A.Y. Associates** **1/E, Rajanikunj, Opp. Dena Bank,** **MG Road,** **Kandivali (W), Mumbai-400067** **File No. : SEAC-2011/CR.731/TC-2** **Dtd. 2nd March, 2012.**

Compliance status of conditions stipulated in environmental clearance granted for the "Paradise City"at S.No. 942 Pt. at village Mahim, Tal Palghar, Thane District by SEIAA, Govt. of Maharashtra vide letter no. SEAC-2011/CR.731/TC.2 dated 02.03.2012

S. No	Condition	Status
i.	This environmental clearance is subject to the condition that project proponent take all possible measures for the protection of the Nala, including not taking up the management of solid waste near it.	**PA agreed to comply with.**
ii.	This environmental clearance is issued subject to land use verification. Local authority/planning authority should ensure this with respect to Rules, Regulations, Notifications, Government Resolutions, Circulars, etc. issued if any. This environmental clearance issued with respect to the environmental consideration and it does not mean that State Level Impact Assessment Authority (SEIAA) approved the proposed land use.	**PA agreed to comply with.**
iii.	The height, built up area of proposed construction shall be in accordance with the existing FSI /FAR norms of the urban local body & it should ensure the same before approving layout plan & before according commencement certificate to the proposed work. ULB should also ensure the zoning permissibility for the proposed project as per the approved development plan of the area.	**PA agreed to comply with.** PA submitted that construction is being carried out as per the approval of town planning authority. Town planning authority approved the building plan vide approval dated 05.02.2011. Revised approval has been obtained on 14.10.2016. Non Agriculture permission has been obtained vide letter dated 06.06.2011. NA permission has been revised vide letter dated 20.01.2017.
iv.	"Consent for establishment" shall be obtained from Maharashtra Pollution Control Board under air Water Act and a copy shall be submitted to the Environment Department before start of any construction work at the site.	**Partly complied.** MPCB granted consent to establish for the project vide letter no. BO/RO(HQ)/CE/CAC-32 dated 19.11.2011. Validity of consent to establish expired in November 2016. Construction work is in progress. No details have been provided regarding the revalidation of consent to establish.
v.	All required sanitary and hygienic measures should be in place before starting construction activities and to be maintained throughout the construction phase.	**Complied.** Drinking water, toilets have been provided for the construction workers.
vi.	Project proponent shall ensure completion of STP, MSW disposal	**Compliance is in progress.** Sewage treatment plant based on Soil Bio

S. No	Condition	Status
	facility prior to occupation of the buildings. No physical occupation or allotment will be given unless all above said environmental infrastructure is installed and made functional including water requirement	Technology (SBT) has been provided. OWC has been procured. Green belt has been developed over an area of 5500 sq.m. with the plantation of 300 no.s of trees of species. PA submitted that an application has been submitted to MPCB for the grant of consent to operate.
vii.	Provision shall be made for the housing of construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, crèche etc.	PA during site inspection submitted that, construction labour is not residing at the site. Most of the labour is from nearby villages. Toilets, drinking water have been provided at the construction site.
viii.	Adequate drinking water and sanitary facilities should be provided for construction workers at the site. Provision should be made for mobile toilets. The safe disposal of wastewater and solid wastes generated during the construction phase should be ensured.	Drinking water, toilets have been provided at the site. Solid waste generated is being disposed off to Municipality. Toilets were provided with septic tank and soak pit.
ix.	The solid waste generated should be properly collected & segregated. Dry/inert solid waste should be disposed off to the approved sites for land filling after recovering recyclable material.	**PA agreed to comply with.** Organic waste convertor has been provided for the treatment of wet garbage.
x.	Wet Garbage should be treated by Organic Waste Converter and treated waste (manure) should be utilized in the existing premises for gardening. And, no wet garbage will be disposed outside the premises. Local authority should ensure this.	**PA agreed to comply with.** Organic waste convertor has been provided for the treatment of wet garbage.
xi.	Arrangement shall be made that waste water and storm water do not get mixed.	**PA agreed to comply with.**
xii.	All the topsoil excavated during construction activities should be stored for use in horticulture / landscape development within the project site.	**Being complied.** Top soil generated at the site is being used for green belt development.
xiii.	Additional soil for leveling of the proposed site shall be generated within the sites (to the extent possible) so that natural drainage system of the area is protected and improved.	**PA agreed to comply with.** PA submitted that leveling has been carried out with the excavated material.
xiv.	Green Belt Development shall be carried out considering CPCB	**Compliance is in progress.** As per the details provided, green belt has

S. No	Condition	Status
	guidelines including selection of plant species and in consultation with the local DFO/ Agriculture Dept.	been developed over an area of 5500 sq.m. with the plantation of 300 no.s of trees of species. PA submitted that green belt will be developed over an area of 68,264.65 sq.m.
xv.	Disposal of muck during construction phase should not create any adverse effect on neighboring communities and be disposed taking the necessary precautions for general safety and health aspects of people, only in approved sites with the approval of competent authority.	PA submitted that muck generated during construction used for leveling of the site.
xvi.	Soil and ground water sample will be tested to ascertain that there is no threat to ground water quality by leaching of heavy metals and other toxic contaminants.	**Being complied.** Soil and ground water quality is being monitored. As per the monitoring data, the heavy metal concentration in the ground water found to be within prescribed limits.
xvii.	Construction soils, including bituminous material and other hazardous material must not be allowed to contaminate watercourses and the dumpsites for such material must be secured so that they should not leach into the ground water.	As per the consent to establish and operate granted by MPCB, PA shall not generate any hazardous waste.
xviii.	Any hazardous waste generated during construction phase should be disposed off as per applicable rules and norms with necessary approvals of the Maharashtra Pollution Control Board.	As per the consent to establish and operate granted by MPCB, PA shall not generate any hazardous waste.
xix.	The diesel generator sets to be used during construction phase should be low sulphur diesel type and should conform to Environment (Protection) Rules prescribed for air and noise emission standards.	PA submitted that no DG set is being used during construction phase.
xx.	The diesel required for operating DG sets shall be stored in underground tanks and if required, clearance from concern authority shall be taken.	PA submitted that no DG set is being used during construction phase.
xxi.	Vehicles hired for bringing construction material to the sites should be in good condition and should have pollution check certificate and should conform to applicable air and noise emission standards and should be operated only during non-peak hours.	**Being complied**. PA submitted vehicles used for transportation of construction material are regularly checked for PUC. Vehicles operate only during non-peak hours. Ambient air quality and noise monitoring is being carried out regularly. As per the

S. No	Condition	Status
		monitoring data, the air quality and noise levels found to be within prescribed limits.
xxii.	Ambient noise levels should confirm to residential standards both during day and night. Incremental pollution loads on the ambient air and noise quality should be closely monitored during construction phase. Adequate measures should be made to reduce ambient air and noise level during construction phase, so as to conform to the stipulated standards by CPCB/MPCB.	**Partly complied**. As per the monitoring data, the day time noise levels found to be within standards prescribed for residential areas. Noise levels are not being monitored at night time. As per the monitoring reports provided, air quality levels found to be within prescribed standards.
xxiii.	Fly ash should be used as building material in the construction as per the provision of Fly Ash Notification of September 1999 and amended as on 27th August, 2003.(The above condition is applicable only if the project site located within the 100 km of Thermal Power Station).	**Being complied**. As per the details provided, fly ash is being used in ready-mixed concrete.
xxiv.	Ready mixed concrete must be used in building construction.	**Being complied**. Ready mixed concrete is being used.
xxv.	The approval of competent authority shall be obtained for structural safety of the building any possible earthquake, adequacy of firefighting equipment etc. as per National Building Code including measures from lighting.	**PA agreed to comply with**. Structural engineer, M/s. Shah Gattani Consultants certified that the buildings are designed for Ground + 4 storeys. Fire NOC: Directorate of Maharashtra Fire Service, Govt. of Maharashtra vide letter no. MFS//0014/2016/661 dated 21.12.2016.
xxvi.	Strom water control and its re-use as per CGWB and BSI Standards for various applications.	**Being complied**. Ground water recharge pits have been provided for the harvesting of rain water from terrace and other open areas.
xxvii.	Water demand during construction should be reduce by use of pre-mixed concrete, curing agents and other best practices referred.	**Being complied**. Pre-mixed concrete is being used.
xxviii.	The ground water level and its quality should be monitored regularly in consultation with Ground water Authority.	**Partly complied**. Ground water level is not being monitored. Ground water quality is being monitored. As per the monitoring data, ground water quality found to be within prescribed limits.

S. No	Condition	Status
xxix.	The installation of the Sewage Treatment Plant (STP) should be certified by an independent expert and a report in this regard should be submitted to the Environment Department before the project is commissioned for operation. Treated effluent emanating from STP shall be recycled/ refused to the maximum extent possible. Treatment of 100% gray water by decentralized treatment should be done. Discharge of unused treated effluent shall conform to the norms and standards of the Maharashtra Pollution Control Board. Necessary measures should be made to mitigate the odor problem from STP.	**PA agreed to comply with.** STP of capacity 415 KLD has been provided. PA submitted that treated effluent will be reused for gardening and flushing.
xxx.	Local body should ensure that no occupation certification is issued prior to operation of STP/ MSW site etc. with due permission of MPCB.	STP and OWC are provided.
xxxi.	Permission to draw ground water shall be obtained from the competent Authority prior to construction / operation of the project.	As per the details provided, tanker water is being used for construction. PA submitted that Maharashtra Jeevan Pradhikaran will supply water to the buildings after occupation.
xxxii.	Separation of gray and black water should be done by the use of dual plumbing line for separation of gray and black water.	**Complied.** Dual plumbing system has been provided for the usage of treated sewage for flushing and gardening.
xxxiii.	Fixtures for showers, toilet flushing and drinking should be of low flow either by use of aerators or pressure during devices or sensor based control.	**PA agreed to comply with.** As per the details submitted, low flow type fixtures will be used for water conservation.
xxxiv.	Use of glass may be reduced up to 40% to reduced electricity consumption and load on air conditioning. If necessary, use high quality double glass with special reflective coating in windows.	**PA agreed to comply with.** Project is a residential building. PA submitted that glass usage will be restricted to 25% of façade area.
xxxv.	Roof should meet prescriptive requirement as per Energy Conservation Building Code by using appropriate thermal insulation material to fulfill requirement.	**Being complied.** Roof is being provided with 50mm extruded polystyrene insulation.

S. No	Condition	Status
xxxvi.	Energy conservation measures like installation of CFLs /TFLS for the lighting areas outside the building should be integral part of project design and should be in place before project commissioning. Use CFLs and TFLs should be properly collected and disposed off/ sent for recycling as per the prevailing guidelines/ rules of regulatory authority to avoid mercury contamination. Use of solar panels may be done to the extent possible like installing solar street lights. Project proponents should install, after checking feasibility, solar plus hybrid non conventional energy sources as sources of energy.	**PA agreed to comply with.** As per the details submitted following energy conservation measures will be provided: • Light fixtures with LED lights & T5 fluorescent tube with electronic chocks • Solar energy for street lights • Small capacity transformers • Selection of energy efficient equipments
xxxvii.	Diesel power generating sets proposed as sources of backup power for elevators and common area illumination during operation phase should be of enclosed type and conform to rules made under the Environment (Protection) Act, 1986. The height of stack of DG sets should be equal to the height needed for the combined capacity of all proposed DG sets. Use low sulphur diesels. The location of the DG sets may be decided with in consultation with Maharashtra Pollution Control Board.	**PA agreed to comply with.**
xxxviii.	Noise should be controlled to ensure that it does not exceed the prescribed standards. During night time the noise levels measured at the boundary of the building shall be restricted to the permissible level to comply with the prevalent regulation.	**Partly complied.** As per the monitoring data, the day time noise levels found to be within prescribed standards. Noise levels are not being monitored during night time.
xxxix.	Traffic congestion near the entry and exit points from the roads adjoining the proposed project site must be avoided. Parking should be fully internalized and no public space should be utilized.	**PA agreed to comply with.** PA submitted that parking will be provided for 145 four wheelers and 6550 two wheelers. Also internal roads of width 9 m. will be provided.
xl.	Opaque wall should meet prescriptive requirement as per Energy Conservation Building Code, which is proposed to be mandatory for all air-conditioned spaces while it is	Project is a residential township.

S. No	Condition	Status
	aspirational for non-air –conditioned spaces by use of appropriate thermal insulation material to fulfill requirement	
xli.	The building should have adequate distance between them to allow movement of fresh air and passage of natural light, air and ventilation.	**PA agreed to comply with.** As per the details provided a minimum of 6.0 meters distance will be provided between two buildings.
xlii.	Regular supervision of the above and other measures for monitoring should be in place all through the construction phase, so as to avoid disturbance to the surrounding.	**PA agreed to comply with.** PA submitted that regular supervision of the above measures is being carried out by Site incharge.
xliii.	Under the provision of Environment (Protection) Act, 1986, legal action shall be initiated against the project proponent if it was found that construction of the project has been started without obtaining environment clearance.	**Complied.** As per the details provided, construction of the project started after obtaining environmental clearance and consent to establish.
xliv.	Six monthly monitoring reports should be submitted to the Department and MPCB.	**Partly complied.** As per the details provided, only 3 six monthly compliance reports were submitted since the grant of EC.
xlv.	A complete set of all documents submitted to the department should be forwarded to the MPCB.	No details provided regarding submission of documents to MPCB.
xlvi.	In the case of any change(s) in the scope of the project, the project would require a fresh appraisal by this Department.	**PA agreed to comply with.**
xlvii.	A separate environment management cell with qualified staff shall be set up for implementation of the stipulated environmental safeguards.	**Complied.** As per the details provided, environmental management cell has been established at the corporate level. At the project, site in-charge is supervising the implementation of environmental protection measures. Monitoring is being carried out by MoEF approved laboratories.
xlviii.	Separate funds shall be allocated for implementation of environmental protection measures/EMP along with item-wise breaks-up. These cost shall be included as part of the project cost. The funds earmarked for the environment protection measures shall not be diverted for other purposes and year-wise expenditure should reported	**Being complied.** As per the details provided, an amount of Rs. 111 lakhs has been spent towards environmental protection measures till date.

S. No	Condition	Status
	to the MPCB & this department.	
xlix.	The project management shall advertise at least in two local newspapers widely circulated in the region around the project, one of which shall be in the Marathi language of the local concerned within seven days of issue of this letter, informing that the project has been accorded environmental clearance and copies of clearance letter are available with the Maharashtra Pollution Control Board and may also be seen at Website at http://envis.maharashtra.gov.in.	**Partly complied**. Advertisement has been made, however the clause of seven days was not followed.
l.	Project management should submit half yearly compliance reports in respect of the stipulated prior environment clearance terms and conditions in hard & soft copies to the MPCB & this department, on 1St June & 1st December of each calendar year.	**Partly complied**. As per the details provided, only 3 six monthly compliance reports were submitted since the grant of EC.
li.	A copy of clearance letter shall be sent by proponent to the concerned Municipal Corporation and the local NGO, if any, from whom suggestion/ representation/ representations, if any, were received while processing the proposal. The clearance letter shall also be put on the website of the company by the proponent.	**Not complied**. No details provided regarding submission of copy of EC to concerned Municipal Corporation and local NGO. Copy of EC was not uploaded to the company website.
lii.	The proponent shall upload the Status of compliance of the stipulated EC conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously he sent to the Regional Office of MoEF, the respective Zonal Office of CPCB and the SPCB. The criteria pollutant levels namely; SPM, RSPM. SO, NOx (ambient levels as well as stack emissions) or critical sectoral parameters, indicated for the project shall be monitored and displayed at a Convenient location near the main gate of the company in the public domain.	**Not complied**. PA did not upload the copy of the six monthly compliance report to their website. Criteria pollutant levels are not being displayed at the main gate of the project.
liii.	The project proponent shall also submit six monthly reports on the status of	**Partly complied**. As per the details provided, only 3 six monthly

S. No	Condition	Status
	compliance of the stipulated EC conditions including results of monitored data (both in hard copies as well as by e-mail) to the respective Regional Office of MoEF the respective Zonal Office of CPCB and the SPCB.	compliance reports were submitted since the grant of EC.
liv.	The environmental statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board a prescribed under the Environment (Protection) Rules. 1986, as amended subsequently shall also be put on the website of the company along with the status of compliance of EC conditions and shall also be sent to the respective Regional Offices of MoEF by e-mail.	**Partly complied**. PA submitted the environment statement to MPCB, however copy of the same was not uploaded to their website.
4.	The environmental clearance is being issued without prejudice to the action initiated under EP Act or any court case pending in the court of law and it does not mean that project proponent has not violated any environmental laws in the past and whatever decision under EP Act or of the Hon'ble court will be binding on the project proponent. Hence the clearance does not give immunity to the project proponent in case filed against him if any or action initiated under EP Act.	**PA agreed to comply with**.
5.	In case of submission of false document and non compliance of stipulated conditions. Authority/ Environment Department will revoke or suspend the Environmental Clearance without any intimation and initiate appropriate legal action under Environmental Protection Act. 1986,	**PA agreed to comply with**.
6.	The Environment department reserves the right to add any stringent condition or to revoke the clearance if conditions stipulated are not implemented to the satisfaction of the department or for that matter, for any ether administrative reason.	**PA agreed to comply with**.

S. No	Condition	Status
7.	**Validity of Environment Clearance:** The environmental clearance accorded shall be valid for a period of 5 years.	**PA agreed to comply with.** As per MoEF&CC notification dated 29.04.2015, validity of EC is 7 years.
8.	In case any deviation or alteration in the proposed from those submitted to this department for clearance, fresh reference should be made to the department to assess the adequacy of the condition(s) imposed and to incorporate additional environmental protection measures required, if any.	**PA agreed to comply with.**
9.	The above stipulation would be enforced among others under the water(prevention and control of pollution)act 1974,the air(prevention and control of pollution)act,A1981,the environment (protection) act,1986 and rules their under, hazardous waste(management and handling) rules,1989 and its amendment, the public liability insurance act,1991 and its amendment	**PA agreed to comply with.**
10.	Any appeal against this environmental clearance shall lie with the National Green Tribunal, Van Vigyan Bhawan, Sec-5, R.K. Puram, New Dehli- 110 022, if preferred, within 30 days as prescribed under Section 16 of the National Green Tribunal Act, 2010.	**PA agreed to comply with.**

A. Suresh 23/05/17

सुरेश कुमार अडापा, 'वैज्ञानिक 'डी'
SURESH KUMAR ADAPA
वैज्ञानिक 'डी'
SCIENTIST 'D'
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
Ministry of Environment, Forest & Climate Change
क्षेत्रीय कार्यालय (पश्चिम मध्य क्षेत्र)
Regional Office (WCZ)
नागपुर/Nagpur-440001

Summary Note

1. **Implementation of Conditions:**

Site inspection has been carried out on 20.05.2017. Construction of the project is in progress. As per the area statement provided by PA, construction of built up area of 301721.27 sq.m. has been completed. Area statement is enclosed as **Annexure-1**.

Following conditions were not complied:

Condition no. li:

No details provided regarding submission of copy of EC to concerned Municipal Corporation and local NGO. Copy of EC was not uploaded to the company website.

Condition no. lii:

PA did not upload the copy of the six monthly compliance report to their website. Criteria pollutant levels are not being displayed at the main gate of the project.

Following conditions were partially complied:

Condition no. iv:

MPCB granted consent to establish for the project vide letter no. BO/RO (HQ)/CE/CAC-32 dated 19.11.2011. Validity of consent to establish expired in November 2016.

Construction work is in progress. No details have been provided regarding the revalidation of consent to establish.

Condition no. xxii & xxxviii:

Noise levels are not being monitored at night time.

Condition no. xxviii:

Ground water level is not being monitored.

Condition no. xliv, l, liii:

As per the details provided, only 3 six monthly compliance reports were submitted since the grant of EC.

Condition no. xlix:

Advertisement has been made, however the clause of seven days was not followed.

Condition no. liv:

PA submitted the environment statement to MPCB, however copy of the same was not uploaded to their website.

2. **Review w.r.t to MOEFs letter dated 30.5.2012:**

This report has been prepared after carrying out site inspection on 20.05.2017 for expansion of the project "Paradise City" at S.No. 942 Pt. at village Mahim, Taluka Palghar, Thane District.

3. Court Cases and show cause/closure notices:

PA submitted undertakings that

a. There are no court cases pending against the project
b. No show cause notices issued by MPCB are pending against the project.

MPCB granted consent to establish for the project vide letter no. BO/RO (HQ)/CE/CAC-32 dated 19.11.2011. Validity of consent to establish expired in November 2016. Construction work is in progress. No details have been provided regarding the revalidation of consent to establish.

A. Suresh Kumar 23/08/17

Scientist 'D'

सुरेश कुमार अडापा
SURESH KUMAR ADAPA
वैज्ञानिक 'डी'
SCIENTIST 'D'
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
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नागपुर/Nagpur-440001

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www.hdil.in
CIN No. L70100MH1996PLC101379

To,
Mr. Suresh Kumar Adapa (Scientist D)
Regional office (WCZ)
Ministry of Environment, Forest and Climate Change,
Nagpur.

Date: 20.05.2017

Subject: Status of construction activities at site for our proposed residential township project "Paradise City" at S. No. 942 Pt.; Village Mahim, Tal & Dist Palghar.

Ref: Environmental clearance wide No. SEAC-2011/CR-731/TC -2 dated 02.03.2012

Respected sir,
With reference to the above subject, we would like to inform you that the construction activities are going on as per environmental clearance granted at site. Now, we are submitting constructed area details as follows:

SECTOR NO	CONSTRUCTION AREA IN SQ.MTR	REMARK
SECTOR 1	43837.72	Ready For Possession
SECTOR 2	63190.67	Constructed area
SECTOR 3	45392.71	
SECTOR 4	75938.03	
SECTOR 5	14176.25	
SECTOR 6	53745.61	
SECTOR 11	5440.28	
TOTAL	**301721.27**	

Thanking You
M/s. Housing Development and Infrastructure Limited
(Formerly M/s. A Y Associates)

(Authorised Signatory)

20/24

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CIN No. L70100MH1996PLC101379

Date: 20.05.2017

To,
Mr. Suresh Kumar Adapa (Scientist D)
Regional office (WCZ)
Ministry of Environment, Forest and Climate Change,
Nagpur.

Subject: Requirement for certification of report for status of compliance conditions stipulated in the environmental clearance of our proposed residential project "Paradise City" at S. No. 942 Pt.; Village Mahim, Tal & Dist Palghar.

Ref: Environmental clearance wide No. SEAC-2011/CR-731/TC -2 dated 02.03.2012

Respected sir,
With reference to the above subject, we would like to submit the detail as per the requirement:

1. Expenditure made on environmental protection measures?
   Reply: Expenditure made on environmental protection measures as on date as follows:

Sr.No.	Method Adopted	Cost(Rs. in lakhs)
1.	Water Sprinkling for dust suppression	5.0
2.	Site sanitation	5.0
3.	Environmental monitoring	3.0
4.	Disinfection	3.0
5.	Health checkup	3.5
6.	Sewage Treatment plant	57.0
7.	Storm water & Rain water Harvesting	15.0
8.	Landscaping	10.0
9.	Solid waste management	5.5
10.	Energy conservation measures	4.0
	Total	111

2. Details of Green belt development?
   Reply: We are proposing total RG area at site about 68,284.65 sq.m. Further we will undertake that we will develop the sector wise. In this regard, we have developed around 5500 sq.m R.G area and planted about 300 trees on site as on date.

3. Details of Energy conservations?
   Reply: we have proposed following energy conservation measures
   - Light fixtures are proposed with energy saving LED lights & T5 fluorescent tube with electronic chocks.
   - Solar energy will Use of for street lightings.
   - Small capacity transformers having low no load and load losses.
   - Selection of Energy efficient equipments (BEE STAR RATED).

Thanking You
M/s. Housing Development and Infrastructure Limited
(Formerly M/s. A Y Associates)

B. N. Wadhwa
(Authorised Signatory)

21/24

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CIN No. L70100MH1996PLC101379

Date: 27/02/2017

TO WHOM SO EVER IT MAY CONCERN

This is to inform you that we have received environmental clearance for our Proposed Residential Township at S. No. 942 Pt.; at Village Mahim, Tal Palghar, Dist- Palghar on 02/03/2012 vide letter dated SEAC-2011/CR.731/TC.2 and there are no court cases pending against the said project.

Yours faithfully

For, M/s Housing Development & infrastructure Ltd.
(Formerly A. Y Associates)

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CIN No. L70100MH1995PLC101379

Date: 27/02/2017

TOWHOMSOEVER IT MAY CONCERN

This is to inform you that we have received environmental clearance for our Proposed Residential Township at S. No. 942 Pt.; at Village Mahim, Tal Palghar, Dist- Palghar on 02/03/2012 vide letter dated SEAC-2011/CR.731/TC.2 and there are no show cause notices issued by MPCB or pending against said project.

Yours faithfully

For, M/s Housing Development & infrastructure Ltd.
(Formerly A. Y Associates)

23/24

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CIN No. L70100MH1996PLC101379

Date: 27/02/2017

TOWHOMSOEVER IT MAY CONCERN

This is to inform you that we have received environmental clearance for our Proposed Residential Township at S. No. 942 Pt.; at Village Mahim, Tal Palghar, Dist- Palghar on 02/03/2012 vide letter dated SEAC-2011/CR.731/TC.2 On behalf of said project undersigned agreed to comply with the condition No. ii, xlvi, 4, 5, 6, 7, 8, 9 & 10 of environmental clearance granted for the project by SEIAA, Maharashtra.

Yours faithfully

For, M/s Housing Development & infrastructure Ltd.
(Formerly A. Y Associates)

24/24

6/c

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CIN No. L70100MH1996PLC101379

To,
Regional Office (WCZ)
Ground Floor, East Wing
New Secretariat Building
Civil Lines
Nagpur - 440001

24-05-2017

Sub. : Certification of compliance report of Environmental Clearance for "Paradise City" – at village Mahim, Tal Palghar, Dist – Palghar.

Ref.: letter No-F.No.:299/RON/2016-NGP i.e Report after site inspection on 20.05.2017 by Scientist D, Suresh Kumar Adappa

Respected Sir,
We are in receipt of the site visit report regarding certification of compliance of Environmental Clearance obtained dtd 02.03.2012.
Following are the non-compliances and partial compliances noted in the report. We are submitting compliance for the same.

Sr.No.	Non-Compliance/Partial compliance raised	Compliance
1	**Condition No ii**: No details provided regarding submission of copy of EC to concerned Municipal Corporation and local NGO. Copy of EC was not uploaded to the company website	The copy of EC was submitted to local body dated 15-06-2015 attached as **Annexure I**. Copy of EC shall be uploaded on company website.
2	**Condition iii**: PA did not upload the copy of six monthly compliance report to their website. Criteria pollutant levels are not being displayed at the main gate of the project.	The copy of six monthly compliance report shall be uploaded on company website. The monitoring data shall be displayed on main gate of the project site.
3	**Condition no iv**: MPCB granted consent to establish for the project vide letter no. 80/RO(HQ)/CE/CAC-32 dated 19.11.2011. Validity of consent to establish expired in November 2016. Construction work is in progress. No details have been provided regarding the revalidation of consent to establish.	The revalidation of CTE shall be done as per the prevailing laws *i.e.* as per the CPCB circular dated 22-2-2017

पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
Ministry of Environment, Forest & Climate Change
क्षेत्रीय कार्यालय (पश्चिम मध्य क्षेत्र)
Regional Office (Western Central Zone)
भू-तल, पूर्व खंड / Ground Floor, East Wing
नया सचिवालय भवन / New Secretariat Building
सिविल लाईन्स / Civil Lines
नागपुर / Nagpur-440 001
24/5/17

ANNEXURE II

Compliance to conditions of EIA Notification 2016 (Area >50,000 sqm)

MEDIUM.	S.N.	ENVIRONMENTAL CONDITIONS AS PER MoEF NOTIFICATION	REMARKS
Topography and Natural Drainage,	1	The natural drain system should be maintained for ensuring unrestricted flow of water. No construction shall be allowed to obstruct the natural drainage through the site. No construction is allowed on wetland and water bodies. Check dams, bio-swales, landscape, and other sustainable urban drainage systems (SUDS) are allowed for maintaining the drainage pattern and to harvest rain water.	Storm water drainage network for the project is proposed as per the existing contours. There shall be no alternation in the existing drainage pattern of the area. Same shall be remodel. Rain water harvesting tanks are proposed for harvesting rain water. Adequacy of drain is examined
		Buildings shall be designed to follow the natural topography as much as possible. Minimum cutting and filling should be done.	Complied. Due care will be taken to maintain the natural topography of the site. The site is almost flat.
Water Conservation, Rain Water Harvesting, and Ground Water Recharge	2	A complete plan for rain water harvesting, water efficiency and conservation should be prepared.	RWH tank of 6705 Cum (considering 2 days storage capacity) is proposed. Use of water efficient appliances like, Tap, flushing tank are included. water efficiency and conservation water balance is enclosed.
		The local bye-law provisions on rain water harvesting should be followed. If local bye-law provisions are not available, adequate provision for storage and recharge should be followed as per the Ministry of Urban Development Model Building Bye-laws, 2016.	Water efficient appliances like low flow fixtures, low capacity flushing tanks etc will be proposed for water conservation measures. RWH tank of 6705 Cum (considering 2 days storage capacity) is proposed.
		A rain water harvesting plan needs to be designed where the recharge bores of minimum one recharge bore per 5,000 square meters of built up area and storage capacity of minimum one day of total fresh water requirement shall be provided. In areas where ground water recharge is not feasible, the rain water should be harvested and stored for reuse. The ground water shall not be withdrawn without approval from the Competent Authority.	The hydro geological investigation report revealed that, the ground water table is at 4.00 meter below ground level. Hence recharge bores are not recommended. RWH tank of 6705 Cu.m capacities is proposed as per DCR norms. Rain water harvesting tanks considering 2 days storage of rain water is proposed which will be utilized for the domestic purpose of the project .No ground water withdrawal for the project is proposed.
		All recharge should be limited to shallow aquifer.	Ground water recharge is proposed for the project.
	2(a)	At least 20% of the open spaces as required by the local building bye-laws shall be pervious. Use of Grass pavers, paver blocks with at least 50% opening, landscape etc. would be considered as pervious surface.	RG area of 68284.65 sqm is proposed as per local norms in addition to this greenbelt area of 23236 sqm is proposed for the project

Compliance to conditions of EIA Notification 2016

	2 (b)	Use of water efficient appliances should be promoted. Low flow fixtures or sensors be used to promote water conservation.	Water efficient appliances like low flow fixtures, low capacit flushing tanks etc will be proposed for water conservatio measures.
	2 (c)	Separation of grey and black water should be done by the use of dual plumbing system. In case of single stack system separate recirculation lines for flushing by giving dual plumbing system be done.	Dual Pluming system for domestic and treated water i proposed
Solid Waste Management	3	Solid waste: Separate wet and dry bins must be provided in each unit and at the ground level for facilitating segregation of waste.	3 bin system as per SWM rules 2016 is proposed. Dedicated area at ground level for the storage treatment and disposal of segregated waste from the project is proposed. Details are enclosed.
		The provisions of the Solid Waste (Management) Rules 2016 and the e-waste (Management) Rules 2016, and the Plastics Waste (Management) Rules 2016 shall be followed.	
	3 (a)	All non-biodegradable waste shall be handed over to authorized recyclers for which a written tie up must be done with the authorized recyclers.	Non-biodegradable waste shall be handed over to local recyclers.
	3(b)	Organic waste composter/Vermiculture pit with a minimum capacity of 0.3 kg	Calculation are on the basis of total waste of 0.3 kg/person/day and biodegradable waste of 0.18 kg /person/day adequate OWC are proposed for increase quantity of waste CPHEEO norms are enclosed for reference
		/person/day must be installed.	
Sewage Treatment Plant	4	Onsite sewage treatment of capacity of treating 100% waste water to be installed. Treated waste water shall be reused on site for landscape, flushing, cooling tower, and other end-uses. Excess treated water shall be discharged as per CPCB norms. Natural treatment systems shall be promoted.	Onsite sewage treatment of 10.7 MLD capacity for treating 100% waste water is proposed. Treated waste water shall be reused on site for landscape, flushing, and municipal park reservation. Excess treated water shall be discharged as per CPCB norms.
		Sludge from the onsite sewage treatment, including septic tanks, shall be collected, conveyed and disposed as per the Ministry of Urban Development, Central Public Health and Environmental Engineering Organisation (CPHEEO) Manual on Sewerage and Sewage Treatment Systems, 2013.	Yes, It will be used as fertilizer for gardening

Compliance to conditions of EIA Notification 2016

Energy	5	Compliance with the Energy Conservation Building Code (ECBC) of Bureau of Energy Efficiency shall be ensured. Buildings in the States which have notified their own ECBC, shall comply with the State ECBC.	The proposal complies with the ECBC norms of BEE.
		Concept of passive solar design that minimize energy consumption in buildings by using design elements, such as building orientation, landscaping, efficient building envelope, appropriate fenestration, increased day lighting design and thermal mass etc. shall be incorporated in the building design.	100 % Common area and outdoor passage lighting is proposed on solar. Parking area lighting shall be LED and partly on solar. The use of better performance glazing, AAC blocks, as well as the provision of overhangs and canopies which shall reduce the direct heat gains through the building envelope is proposed. This shall considerably reduce solar heat gains in the building through building orientation
		Wall, window, and roof u-values shall be as per ECBC specifications.	Separate report is attached
	5 (a)	Solar, wind or other Renewable Energy shall be installed to meet electricity generation equivalent to 1% of the demand load or as per the state level/ local building bye-laws requirement, whichever is higher.	Solar energy for 2 lights and 1 fan in each unit is being proposed for the phase II
	5 (b)	Solar water heating shall be provided to meet 20% of the hot water demand of the commercial and institutional building or as per the requirement of the local building bye-laws, whichever is higher. Residential buildings are also recommended to meet its hot water demand from solar water heaters, as far as possible.	Energy conservation is done by providing LED/CFL lamps as per previous EC. The terrace area available will be used for providing solar PV panels.20% hot water system is included in proposed expansion.
	5 (c)	Use of environment friendly materials in bricks, blocks and other construction materials, shall be required for at least 20% of the construction material quantity. These include fly-ash bricks, hollow bricks, AACs, Fly Ash Lime Gypsum blocks, Compressed earth blocks, and other environment friendly materials.	Fly ash bricks, AAC blocks shall be used along with other environment friendly materials during construction phase.
		Fly ash should be used as building material in the construction as per the provisions of the Fly Ash Notification of September, 1999 as amended from time to time.	Fly ash bricks shall be used for construction.

Compliance to conditions of EIA Notification 2016

Air Quality and Noise	6	Dust, smoke & other air pollution prevention measures shall be provided for the building as well as the site. These measures shall include screens for the building under construction, continuous dust/ wind breaking walls all around the site (at least 3 meter height). Plastic/tarpaulin sheet covers shall be provided for vehicles bringing in sand, cement, murram and other construction materials prone to causing dust pollution at the site as well as taking out debris from the site. Wheel washing for the vehicles used be done.	Site specific Environmental management plan shall be followed for control of environmental pollution during construction phase. Following air pollution prevention measures shall be followed at site during construction phase • Dust suppression and barricading the site (6 m height) for containing dust within the site only. It is also recommended to monitor loading and unloading activities. • Water sprinkling at regular interval for dust suppression shall be carried out at site. • Transport of construction material will be schedule during non peak hours only to avoid inconvenience /accident probability for the nearby resident and traffic congestion. • Transport of material outside the project will be carried out in covered trucks. • Regular environmental monitoring will be carried out to keep a check on the compliance of the proposed mitigation and prevailing regulatory standards. • Only PUC certified vehicles will be allowed within the project site. Washing of the trucks tires before leaving the site.
		Sand, murram, loose soil, cement, stored on site shall be covered adequately so as to prevent dust pollution.	Transport of material outside the project will be carried out in covered trucks.
		Wet jet shall be provided for grinding and stone cutting. Unpaved surfaces and loose soil shall be adequately sprinkled with water to suppress dust.	Dust suppression measure is included in debris management plan sheet. Water sprinkling at regular interval for dust supresión shall be carried out at site.

Compliance to conditions of EIA Notification 2016

		All construction and demolition debris shall be stored at the site (and not dumped on the roads or open spaces outside) before they are properly disposed. All demolition and construction waste shall be managed as per the provisions of the Construction and Demolition Waste Rules 2016.	Construction debris shall be stored at dedicated place within the project site and will be regularly wate sprinkled and will be kept covered. Transport of debris shall be done in covered trucks for disposal as pe Construction and Demolition Waste Rules 2016.
		All workers working at the construction site and involved in loading, unloading, carriage of construction material and construction debris or working in any area with dust pollution shall be provided with dust mask.	Good construction practice will be followed at site. Worker working at construction site shall be provide with all necessary PPE like helmets, dusk mask, ear plugs etc.
		For indoor air quality the ventilation provisions as per National Building Code of India.	Building proposed is designed considering adequate indoor light and ventilation as per NBC of India.
	6 (a)	The location of the DG set and exhaust pipe height shall be as per the provisions of the CPCB norms.	DG set stack height will be provided as per CPCB norms.
reen Cover	7	A minimum of 1 tree for every 80 sq.mt. of land should be planted and maintained. The existing trees will be counted for this purpose. Preference should be given to planting native species.	Total 1850 Nos. of native tree species are proposed for plantation
	7 (a)	Where the trees need to be cut, compensatory plantation in the ratio of 1:3 (i.e. planting of 3 trees for every 1 tree that is cut) shall be done and maintained.	Tree plantation is as per prevailing norms of Local body is included. There will be no cutting of tre involved. NOC for the tree cutting from MCGM has been obtained.

Compliance to conditions of EIA Notification 2016

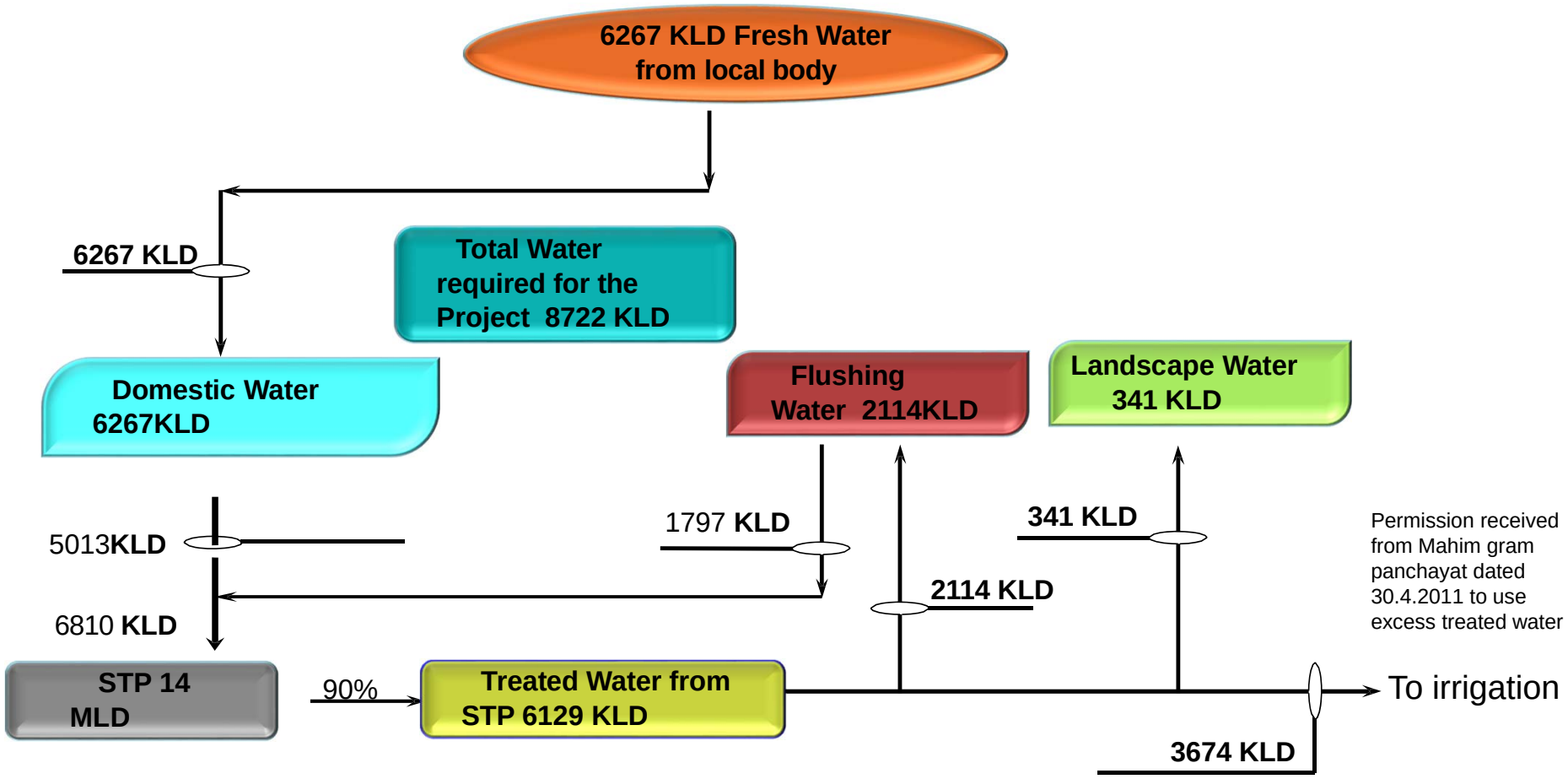
Top Soil Preservation and Reuse	8	Topsoil should be stripped to a depth of 20 cm from the areas proposed for buildings, roads, paved areas, and external services. It should be stockpiled appropriately in designated areas and reapplied during plantation of the proposed vegetation on site.	Topsoil of will be generated from the project. Topsoil shall be stored in covered area and will be reused in landscaping.
Transport	9	A comprehensive mobility plan, as per MoUD best practices guidelines (URDPFI), shall be prepared to include motorized, non-motorized, public, and private networks.	Traffic management plan for the proposed project and provision according to it will be made so as to minimize the impact of the proposed project on the surrounding road network.
		Road should be designed with due consideration for environment, and safety of users. The road system can be designed with these basic criteria.	Separate pedestrian walkway along with separate min. 6 m internal driveway is proposed for smooth vehicular movement. 1017 nos. of car parks and 26189 nos. of 2 wheeler parking are proposed
		1. Hierarchy of roads with proper segregation of vehicular and pedestrian traffic.	
		2. Traffic calming measures.	
		3. Proper design of entry and exit points.	
		4. Parking norms as per local regulation.	
Environment Management Plan	10	An environmental management plan (EMP) shall be prepared and implemented to ensure compliance with the environmental conditions specified in item number 1 to 9 above. A dedicated Environment Monitoring Cell with defined functions and responsibility shall be put in place to implement the EMP. The environmental cell shall ensure that the environment infrastructure like Sewage Treatment Plant, Landscaping, Rain Water Harvesting, Energy efficiency and conservation, water efficiency and conservation, solid waste management, renewable energy etc. are kept operational and meet the required standards. The environmental cell shall also keep the record of environment monitoring and those related to the environment infrastructure.	EMP is prepared and will be implemented to ensure the EC condition compliance. Separate budgetary allocation for the same shall be made for the project. Regular environmental monitoring as per schedule will be carried out.

WATER REGIME

1. Domestic Water					
Particulars	**Population**	**Per capita water requirement s per standards**	**Water Consumption as per standards**	**Proposed Reduction in requirement by efficient fixtures**	**Reduced requirement for project**
		LPCD	**KLD**	**LPCD**	**KLD**
Residential	93395	90	8406	65	6071
Shops	5445	20	109	14	76
CFC	6470	20	129	14	91
Hospital (beds)	120	300	36	216	26
Hospital (floating population)	180	20	4	14	3
Total domestic			8684		6267
2. Flushing Water					
		LPCD	**KLD**	**LPCD**	**KLD**
Residential	93395	45	4203	21	1961
Shops	5445	25	136	12	65
CFC	6470	25	162	12	78
Hospital	120	150	18	70	8
Hospital (floating population)	180	25	5	12	2
Total Flushing			4524		2114
Landscape water Requirement			**341**		**341**
Sewage generation			**10792**		**6810**
STP capacity				**14 MLD**	
Total water requirement of project			**13549**		**8722**

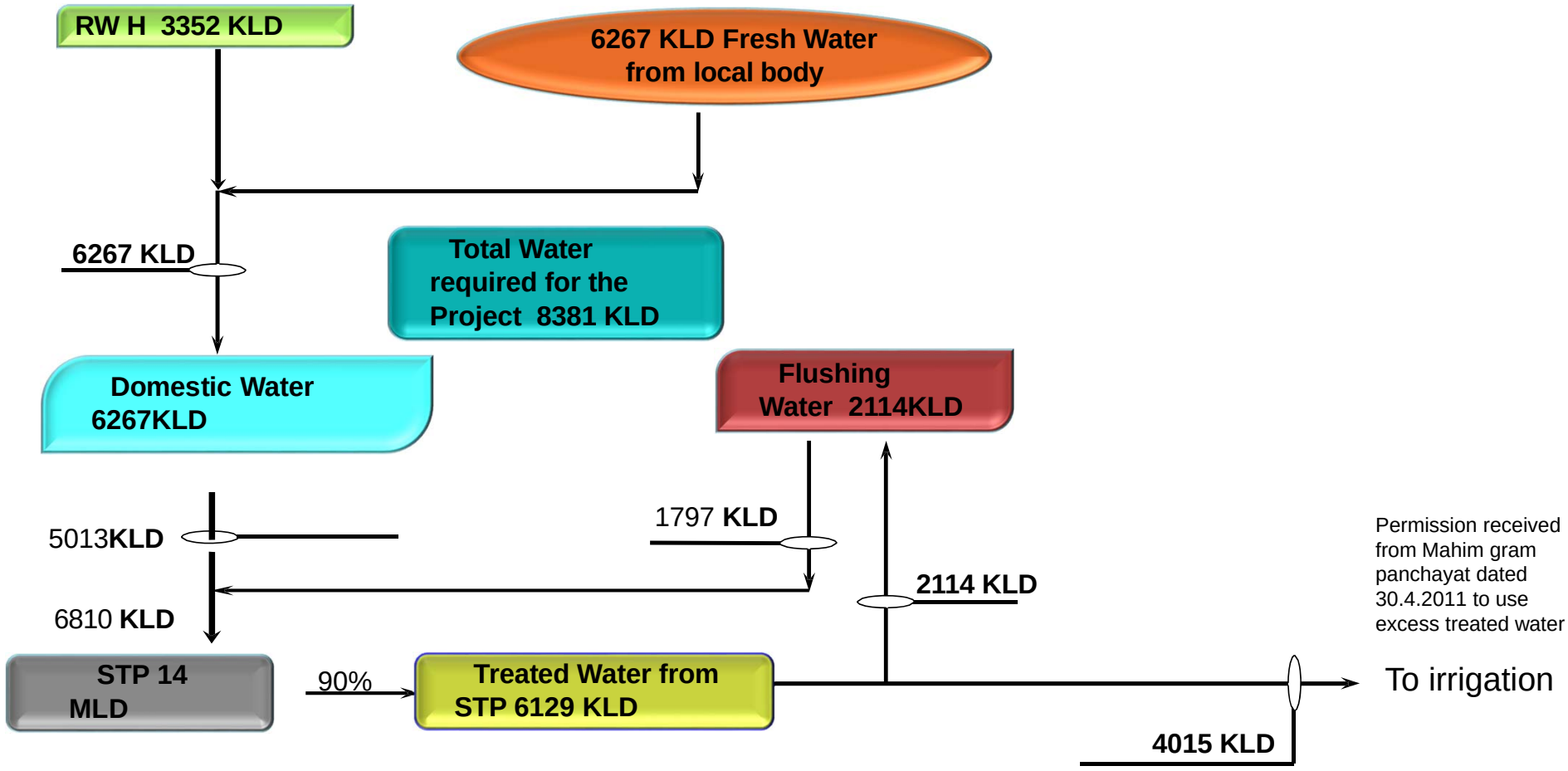
***Notes* : 1. Water consumption is reduced from 135 LPCD to 86 LPCD by use of efficient fixtures and use of low flow devices.**
2. The water balance chart and tank capacities are designed to handle the water and waste water as per standards.

Water Balance for Project with water efficient fixtures– Non Monsoon



17

Water Balance for Project with water efficient fixtures–Monsoon



18

ANNEXURE III

भारतीय गैर न्यायिक

एक सौ रुपये

Rs. 100

रु. 100

ONE HUNDRED RUPEES

सत्यमेव जयते

भारत INDIA

INDIA NON JUDICIAL

महाराष्ट्र MAHARASHTRA ◑ 2017 ◑ RS 535591

Sub Treasury Office Vasai

Sub Treasury Office Vasai. 20 MAY 2017 19 MAY 2017 Sub Treasury Officer Vasai. 20/5/17

NOTARY ANIL KUMAR DUBEY MAHARASHTRA REGD. NO. 15527 Expiry Date 05/11/2018 GOVT. OF INDIA

AFFIDAVIT

From:
Housing Development & Infrastructure Ltd.
(Formerly A. Y. Associates) & Others
9th floor, HDIL Towers,
Aanat Kanekar Marg, Bandra (E), Mumbai - 51
("the Developer")

To,
Expert Appraisal Committee (INFRA-2)
Ministry of Environment, Forest & Climate Change
Indira Paryavaran Bhavan,
Jorbagh Road, New Delhi - 110 003

We, having been own the plot lying, situated and being at S. No. 942 Pt, at Village Mahim, Tal Palghar, Dist – Palghar (Herein after referred as 'the said plot')

BINOD KUMAR
M.A.,LL.B.
ADVOCATE HIGH COURT
Legal Chamber,
Bhasker Building, Bandra Court,
Bandra (East), Mumbai - 400 051.

जोडपत्र-2/ Annexture-II

दस्ताचा प्रकार / दस्तऐवज क्रमांक	
दस्ताचा नोंदणी करण्यात आला का?	
नोंदणी [illegible]	

16403

M-R

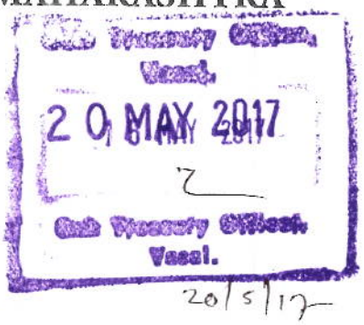
तुमचे

ज्या कारणा-करिता स्वतंत्र मुद्रांक शुल्क आकारणी आवश्यक आहे त्यासाठी मुद्रांक खरेदी
कल्याणपासून ६ महिन्यात वापरणे बंधनकारक आहे

22 MAY 2017

GOVT. OF

महाराष्ट्र MAHARASHTRA ◑ 2017 ◑ RS 535592



Towards the said plot we have proposed a Residential and Commercial Buildings project named as "Paradise City" and have accordingly received the Environmental Clearance from the Department of Environment, Government of Maharashtra vide letter no. SEAC-2011/CR.731/TC.2 dated 02.03.2012 (copy of the EC letter is annexed hereto and marked as Annexure I) for phase-I plot area 3,04,709.19 sqm (out of total plot area of 6,83,910 sqm).

We have accordingly started construction of the Phase I buildings admeasuring the BUA of 3,42,382.22 sq. m. on the basis of statutory approval accorded by the Collector, Palghar (formerly Collector, Thane) dated 06.06.2011 and Consent to Establish from Maharashtra Pollution Control Board, dated 30.11.2011 as per the EC accorded.

We hereby irrevocably undertake as follows,

We hereby agree, undertake and confirm that the work carried out in the Paradise City on site is as per the statutory approvals accorded and we have not violated any condition of Environmental Clearance received for the said project and also the built up area constructed on the site is well within the permissible Built Up Area sanctioned by the statutory body.

BINOD KUMAR
M.A.,LL.B.
ADVO[illegible]GH COURT
[illegible]mber,
Bhaske[illegible]andra Court,
Bandra (East), Mumbai - 400 051.

जोडपत्र-2/ Annexture-II

दस्ताचा प्रकार / अनुक्रमांक	
दस्ताचा नोंदणी करावा अधिकार?	
नोंदणी	

16404

M.R.-DOC

[illegible] मुद्रांक शुल्क कायद्यासाठी मुद्रांक शुल्क
कल्याणासुन ६ महिन्यात वापरणे बंधनकारक आहे

22 MAY 2017

We are aware, acknowledge and fully agree and accept that a breach or default by us of the aforesaid warranties, representations, declarations agreements and undertakings, and/or a breach or default by us of any of the terms and provisions of the said Environmental Clearance and Consent, shall entitle you to initiate such legal proceedings against us permissible in law and you shall be fully entitled and at liberty to exercise all the rights and remedies available to you under the said Agreement, these presents and in law.

We hereby agree and confirm that this affidavit shall be binding upon us, all our partners, successors and their respective heirs.

Mumbai, Dated This 23rd of June, 2017

Yours Faithfully,

(Director)

Binod Kumar
B.Sc. Math (Hons.)
P.G.D.E.M., M.A.,
LL.B.
ADVOCATE HIGH COURT, MUMBAI
Bhaskar Bldg., 2nd Floor, Bandra Court,
Bandra (E), Mumbai - 400 051

BEFORE ME

A. K. DUBEY
B.A. LL B
NOTARY
Maharashtra
Govt. of India

23 JUN 2017

ग्रामपंचायत कार्यालय, माहीम

फोनः २२०१२३

मु.पो.माहीम, ता.पालघर, जि.ठाणे

जा.नं.ः ८७२ /२०११ दिनांक ः ०५/४/२०११

प्रति,
श्री. आर.को वाधवन व भागीदार
मे.ए.वाय.असोसिएट
रा. कांदिवली - मुंबई

विषय ः- केळवा - माहीम नळ पाणी पुरवठा योजने बाबत.

महोदय,

माहीम गावास मागील २० ते २५ वर्षापासून केळवा-माहीम या प्रादेशिक ग्रामिण नळ पाणी पुरवठा चालु आहे. परंतू दिवसेंदिवस वाढ होत चाललेल्या लोकसंख्येस सध्याचा होणारा पाणी पुरवठा अपुरा होत आहे. या करीता मा.ना.श्री.सुनिलजी तटकरे साहेब मंत्री जलसंपदा यांच्या अध्यक्षतेखाली दि.१९/०१/२०११ रोजी मंत्रालय मुंबई येथे मा.मंत्री उच्चाधिकार समितीची बैठक घेण्यात आली.या बैठकीत पालघर तालुक्यातील माहीम-केळवा या लघु पाटबंधारे योजनेतून ०.७३ द.ल.घ.मी/ प्रति वर्ष पाण्याच्या आरक्षणाच्या प्रस्तावास मान्यता मिळाली आहे. या बावतचे कार्य वृत्त क्रमांक ः बैठक २०११(१/२०११)/सिव्य(धोरण) जलसंपदा विभाग मंत्रालय मुवंई ४०००३२ दि.०२/०२/२०११ अन्वये मंजूर आहे.

तसेच या बावत पुढील कार्यवाही होणेसाठी मा.ना.श्री.लक्ष्मण रावजी ढोवळे साहेब, मंत्री पाणी पुरवठा व स्वच्छता यांच्या अध्यक्षतेखाली त्यांच्या दालनात मुख्य अभियंता(को.वि) म.जी.प्रा.ठाणे,अधिक्षक अभियंता म.जी.प्रा.मॅ.ठाणे कार्यकारी अभियंता म.जी.प्रा.बांधकाम विभाग ठाणे यांच्या समवेत दि.२३/०२/११ रोजी बैठक घेण्यात आली.या बैठकीत मा.मंत्री महोदयांनी योजनेसाठी ग्रा.पं.ने १०% लोकवर्गणी जमा करावी असा निर्णय दिला.या बावतचे इतिवृत्त क्र.बैठक - ११११/प्र.क्र.२४/पा.पु - ०६,पाणी पुरवठा व स्वच्छता विभाग मंत्रालय मुवंई - ३२ दि.४मार्च २०११ मंजूर आहे.

आपल्या खाजगी संस्थेमार्फत आमच्या ग्रामपंचायतीच्या क्षेत्रात निवासी वसाहत बांधणेसाठी ग्रामपंचायती कडून देण्यात आलेल्या नाहरकत दाखल्यानुसार आपल्या निवासी वसाहती करीता पाणी पुरवठा प्रस्तावित योजनेतून योजना पुर्ण झालेनंतर करणेत येईल.

ग्रामपंचायतीकरीता नव्याने तयार करण्यात येत असलेल्या पाणी पुरवठा योजने करीता आवश्यक लागणा-या १०% लेकवर्गणीची रक्कम आपल्याकडुन मिळावी ही आपणास विनंती.

सरपंच
ग्रामपंचायत माहीम

ANNEXURE IV

SOLID WASTE MANAGEMENT- construction Phase

Waste	Qty	Management
Excavation material	4200 cum	Shall be used within the layout for filling and leveling purposes.
Cement Bags	1000 Bags	Empty bags to be handed over to recycler.
Paint container (@20L)	4800 cans	To be handed over to recycler.
Scrap metal generated	50 tons	100 % to be sold for recycling
Broken Tiles	2500 sqm	Waste tiles to be used for skirting. Broken pieces to be used for china mosaic waterproofing of terraces.

SOLID WASTE MANAGEMENT- Operation Phase

Sr.No	Building	Occupancy	CRITERIA (per person per day)		SOLID WASTE GENERATION		TOTAL
			Biodegradable	Non-Biodegradable	Biodegradable	Non-Biodegradable	
1	Flats	93395	0.18	0.12	16811	11207	28019
2	Shops	5445	0.045	0.105	245	572	817
3	CFC 2 – Community hall	770	0.045	0.105	35	81	116
4	CFC 3,8 -Schools	4453	0.045	0.105	200	468	668
5	CFC 4,6-Open Market	295	0.045	0.105	13	31	44
6	CFC 5 -Club	21	0.045	0.105	1	2	3
7	CFC 7 – Shopping Centre	130	0.045	0.105	6	14	20
8	CFC 9 – Shopping Centre	801	0.045	0.105	36	84	120
	TOTAL	105610			18063	11743	29807
Note :	All units for waste generation in Kg/day						

OWC LOCATION

Sr no.	Description	Management
1	Biodegradable waste	To be processed in the OWC.
2	Non-Biodegradable waste	To be handed over to Local Recyclers
3	E- waste	will be handed over to MPCB authorized recyclers
4	Bio-medical waste	Will be segregated as per Biomedical Waste Management and Handling Rule 1998 (amended in 2016) and handed over to Common Bio-medical Waste Treatment Facilities.

BIOMEDICAL WASTE

Sr. No	Description	Occupancy	CRITERIA (per person per day)		SOLID WASTE GENERATION		
			Biodegradable	Non-Biodegradable	Biodegradable	Non-Biodegradable	
9	CFC 1 –Hospital (180 floating population)	180	0.045	0.105	8	19	46
	Bio – Medical Waste CFC 1 –Hospital (120 beds)	120	0.60	0.90	72	108	180

No of beds	Estimated generation of total waste for hospital building
120	180

Biomedical waste

1. Non infectious waste:144 kg/day-(80% of biomedical waste)
2. Infectious but not toxic:27 kg/day- (15% of biomedical waste)
3. Toxic:9 kg/day (5% of biomedical waste)

Management of Biomedical waste: Will be segregated as per Biomedical Waste Management and Handling Rule 1998 (amended in 2016) and handed over to Common Bio-medical Waste Treatment Facilities.

4

COLOUR CODE AND TYPE OF CONTAINER (as per BMW rules 2016)

Option	Waste Category	**Treatment & Disposal**
Category No. I	Human Anatomical Waste(human tissues, organs, body parts)	Incineration
Category No. 2	**Animal Waste**(animal tissues, organs, body parts carcasses, bleeding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals colleges, discharge from hospitals, animal) houses)	Incineration
Category No 3	**Microbiology & Biotechnology Waste**(wastes from laboratory cultures, stocks or specimens of micro-organisms live or attenuated vaccines, human and animal cell culture used in research and infectious agents from research and industrial laboratories, wastes from production of biologicals, toxins, dishes and devices used for transfer of cultures)	local autoclaving / micro-waving / incineration
Category No 4	**Waste sharps**(needles, syringes, scalpels, blades, glass, etc. that may cause puncture and cuts. This includes both used and unused sharps)	Disinfection (chemical treatment /autoclaving / micro- waving and mutilation/ shredding
Category No 5	**Discarded Medicines and Cytotoxic drugs** (wastes comprising of outdated, contaminated and discarded medicines)	Incineration/destruction and drugs disposal in secured landfills drugs disposal in secured

Category No 6	**Solid Waste** (Items contaminated with blood, and body fluids including cotton dressings, soiled plaster casts, lines, beddings, other material contaminated with blood)	Incineration/autoclaving / micro-waving
Category No. 7	**Infectious Solid Waste**(wastes generated from disposable items other than the waste shaprs such as tubings, catheters, intravenous sets etc).	Disinfection by chemical treatment autoclaving/micro-waving and mutilation/shredding
Category No. 8	Chemical Waste (chemicals used in production of biologicals, chemicals used in disinfection, as insecticides, etc.)	Chemical treatment and discharge into drains for liquids and secured landfill for solids

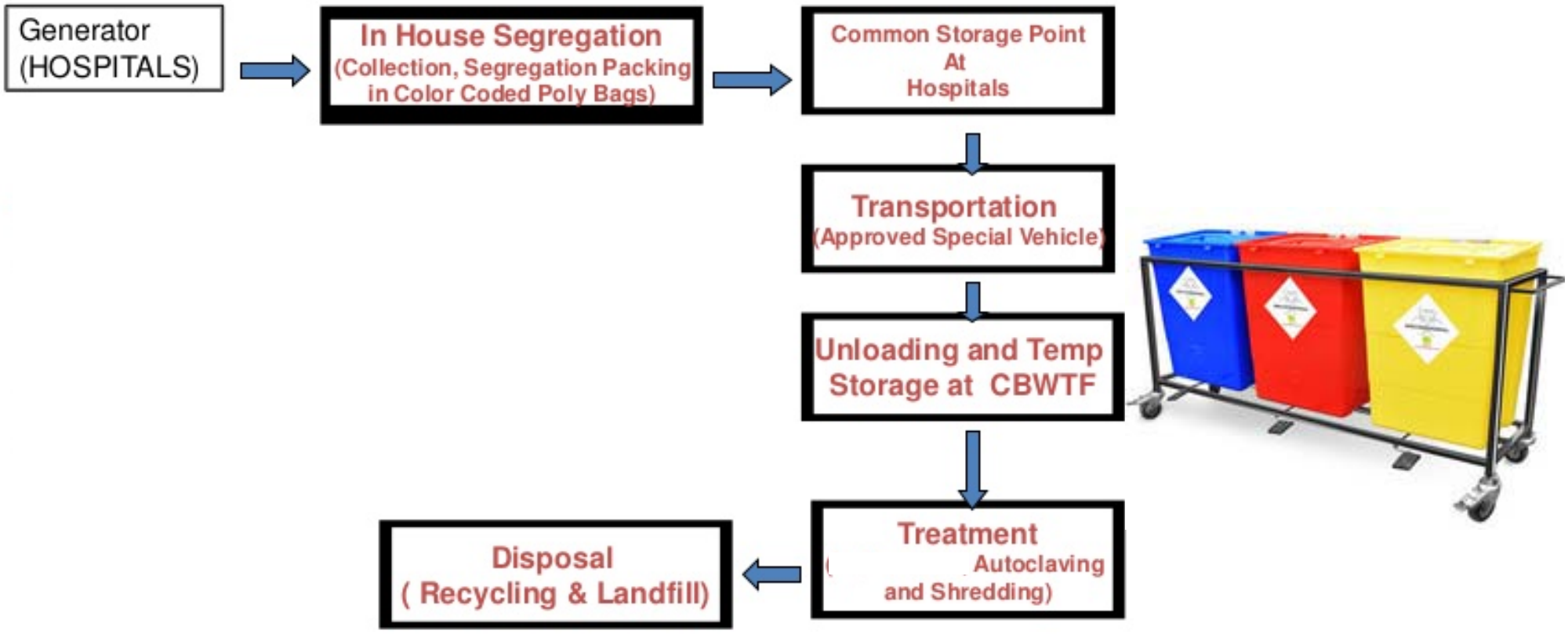
Colour Coding	Type of Container	Waste Category	Treatment options as per Schedule I
Yellow	Plastic bag	Cat.1,Cat.2, Cat.5 and Cat.6	Incineration
Red	Disinfected container/ plastic bag	Cat.3, Cat.4, and Cat.7	Autoclaving/Micro waving/ Chemical Treatment
Blue	Plastic Bag/ puncture proof container	Cat.8	Autoclaving/Micro waving/ Chemical Treatment & destruction/ shredding
Black	Plastic bag	Municipal waste	Disposal in secured landfill

6

SOLID WASTE MANAGEMENT

Sr no.	Description	Units
1	Quantity of Total waste in kg	29807
	Quantity of bio degradable waste in kg	18063
2	Machine recommended	OWC 500
3	No. of machines proposed	18 nos
4	Capacity per batch in kg per batch	200
5	No. of batches for each machine	6
6	Area of machines (18 nos)	60 sqm
7	Maneuvering operating space	250 sqm
8	No of tiers in shelves	3
9	Maneuvering space (Curing + storage)	1900 sqm
10	Total space for processing	2210 sqm
11	Space for providing wet waste bins (200 locations)	500 sqm
12	Space for providing dry waste bins (200 locations)	500 sqm
13	Space for providing domestic hazardous waste bins (100locations)	250 sqm
14	Space for segregation of non bio degradable waste (18 locations)	1200 sqm
15	**Total area for solid waste management**	**4660 sqm**
17	Man power required	54 persons

BIOMEDICAL WASTE FLOW CHART



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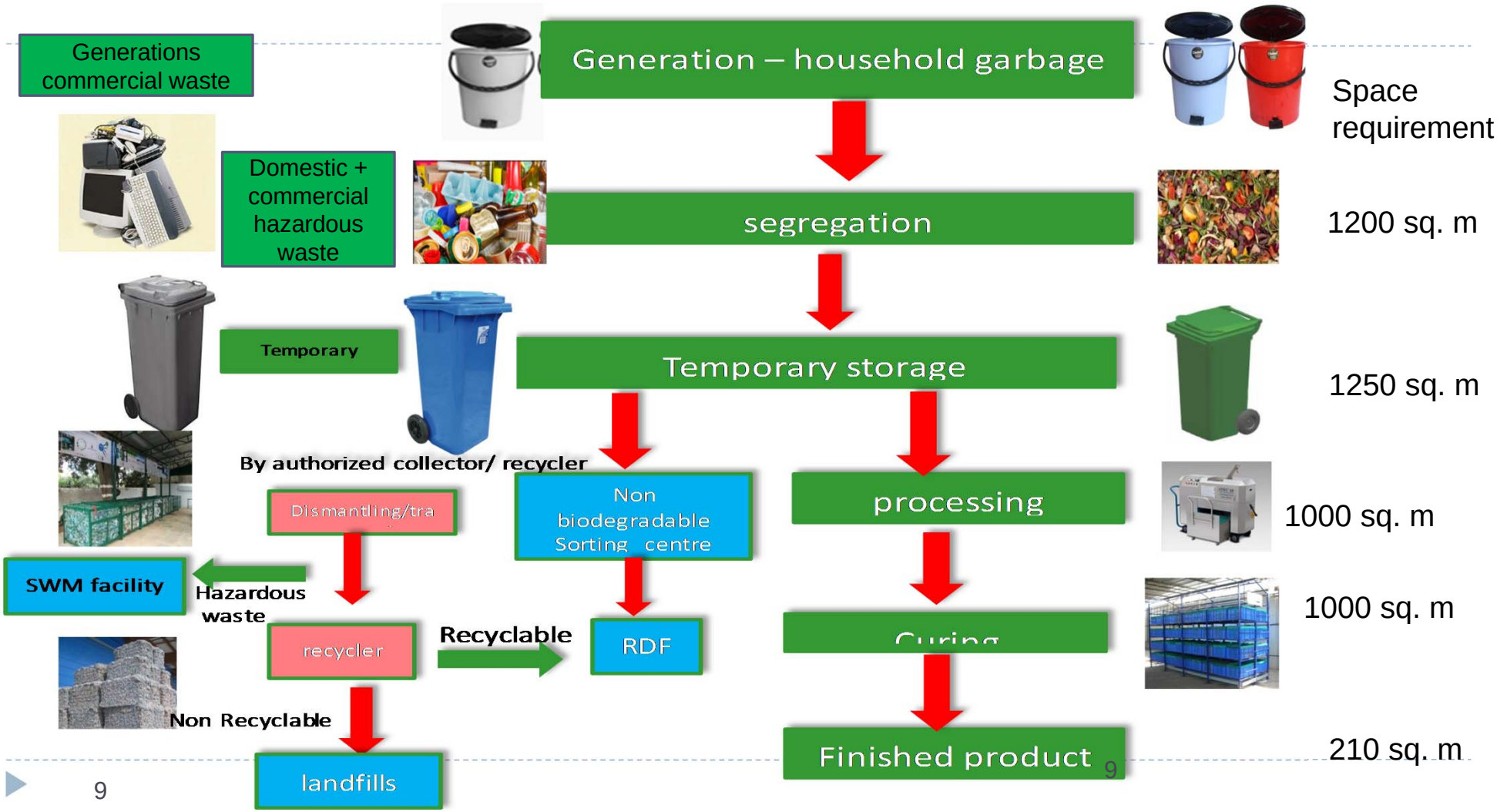
SOLID WASTE MANAGEMENT FLOW CHART



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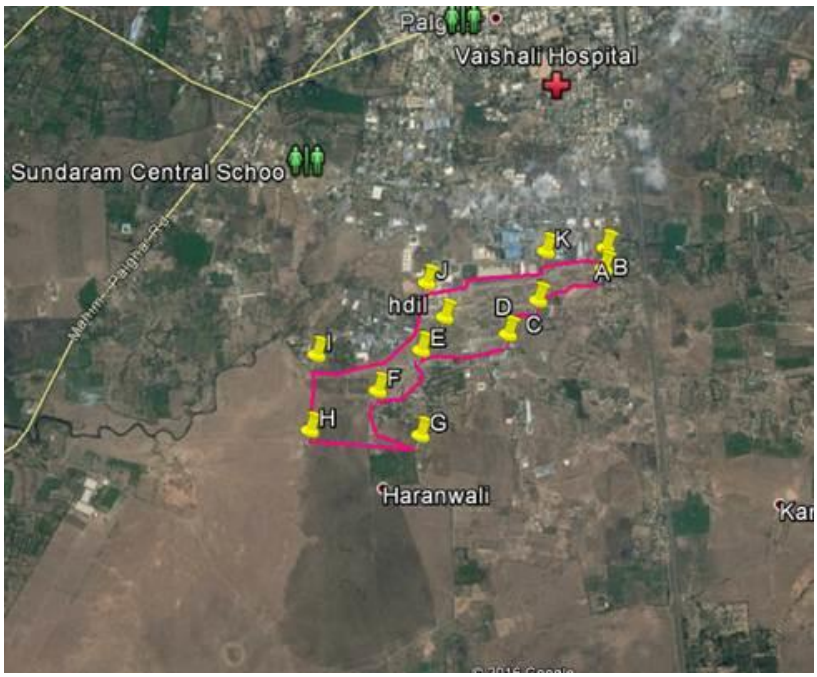
ANNEXURE V

TRAFFIC IMPACT ASSESSMENT STUDY
of

Paradise City
Revised Existing and Proposed Group Housing Scheme for Residential And Commercial On Land Bering G. No. 942 T Village-Mahim, Taluka- Palghar, District-Palghar.

By
M/s. A Y Associates (M/s. HDIL)



Prepared by

Let's go to the sustainable age

Sustainable Approach for Green Environment

Sage

SAGE (Sustainable Approach for Green Environment) LLP

205, Second Floor, Bhavani Industrial Estate,
Hare Krishna Road, Opp. Main Gate of IIT Bombay
Powai, Mumbai - 400076

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Chapter 1

Introduction

1.1 Study Background

Revised Existing and Proposed Group Housing Scheme for Residential and Commercial On Land Bering G. No. 942 at Village-Mahim, Taluka- Palghar, District-Palghar, has been proposed by M/s. A Y Associates (M/s.HDIL). Conducting a TIA (Traffic Impact Assessment) is a part of the basic requirements to get any new establishment approved by the Ministry of Environment and Forestry (MoEF). The Ministry weighs the potential benefits of the establishment on the surrounding transportation and environmental systems against the negative impact and decides to approve or reject the construction of the proposed establishment.

(SAGE) Sustainable Approach for Green Environment LLP has been commissioned by the project proponent, M/s. A Y Associates (M/s.HDIL) to provide a Traffic Impact Study for this project.

1.2 Scope of the Study

The entire study can broadly be broken into the following tasks:

- Visit the site and understand the existing traffic pattern, traffic facilities and field constraints.
- Collect relevant traffic survey data through primary and secondary surveys fortraffic impact assessment.
- Quantify the traffic volume and density for road network around the project with and without extra demand for the coming project
- Project the traffic density for next 25 years for road network
- Study the traffic impact of the development on the surrounding road network with the consideration of future changes in the traffic and infrastructure.

- Study the internal traffic within the site layout to demonstrate the vehicular speed and space requirement.
- Calculate the time requirement to exit the vehicles for disaster management plan during peak hours.
- Identify the adequacy of the transport infrastructure and the remedial measures to improve the traffic plan.
- Preparation of final report, submission and presentation to the committee.

1.3 Report Structure

The report has been organized in the following order:

- **Chapter 1**: A brief introduction of the project
- **Chapter 2**: Background of the project and the road network to be studied is provided
- **Chapter 3**: The primary traffic surveys conducted to obtain the network traffic data
- **Chapter 4**: The performance of the road network in terms of LoS for the current and the projected future traffic and assess the impact of the proposed complex on the LoS.
- **Chapter 5**: Study of Parking space.
- **Chapter 6**: Traffic Management Plan during the development as well as after completion of proposed project for external and internal traffic.
- **Chapter 7**: Summary and Conclusion.

1.4 Design Parameters

The basic design parameters considered for the study has been illustrated below:

1. The social status as well as economic well-being of the residents plays an important role in determining the parking demand for any residential project.

2. The visitors will expect a safe and efficient circulation with good levels of service i.e. minimum waiting time at security check, proper traffic control at entry/exits, minimum congestion delays and pleasing aesthetics.

3. A design vehicle is a vehicle whose dimensions and operational characteristics are used to establish layout geometry. Toyota Innova (Big Car) and Maruti Swift (Small Car) and Volvo 400 (Fire Tender) were chosen as the design vehicles.

4. The maximum number of traffic a road can carry is referred to as its Capacity or design service volume. The service volumes considered for the project is given below:

Type of Roadway	Road Capacity*	Category
4-Lane (Two Way)	3600	Arterial

*Indian Road Congress 106:1990 Urban Road Capacity

5. Level of Service (LoS) can be defined as a letter designation that describes a range of operating characteristics on a given facility. Six Levels of Services are defined for capacity analysis. They are given letter designations from A to F, with LoS 'A' representing best level of operational standards and LoS 'F' the worst.

Table 1.1 Description of LoS Based on V/C Ratio

Level of Service (LoS)	Volume / Capacity Ratio (V/C)	Level of Comfort	Nature of flow
A	<0.30	**Highest**	Free flow
B	0.30 – 0.50		Reasonably free flow
C	0.50 – 0.70		Stable flow
D	0.70 – 0.90	**Threshold**	Approaching unstable flow
E	0.90 – 0.99		Unstable flow
F	≥1	**Lowest**	Forced Flow

1.5 Entry/Exit Lane Capacity

Entry / Exit Lane Capacity for Car Parks		
Sr. No.	**Type of Entry**	**Capacity (Veh/hour/lane)**
1	Free flow access into internal distributor road/structure (no parking spaces immediately after access i.e. Car Hoist distributing to several levels of car park)	800
2	Free flow access	580
3	Lifting-arm barrier without ticket issue	550
4	Lifting-arm barrier with automatic ticket issue (push button)	360
5	Lifting-arm barrier with access card (slot-based)	235
6	Lifting-arm barrier with transponder (no slot – RFID etc.)	380

Sr. No.	**Type of Exit**	**Capacity (Veh/hour/lane)**
1	Ticket on entry and payment at a manned exit	240
2	Lifting-arm barrier without ticket issue	550
3	Ticket on entry and variable payment to a machine linked to the exit barrier	270
4	Ticket on entry and operation of the exit barrier by a prepaid ticket or token	400
5	Free flow exit	Analysis based on specific road layout (i.e. yield etc.)

*Rates based on:Design recommendations for multistory and underground car parks, Institute of Structural Engineers, 3rd Edition, June 2002 and HBS 2001, FGSV Vertag, January 2002

As per international practices it is preferred to restrict the queue length to around 18m i.e. 3 vehicles. This is also linked with space availability at site for queuing.

Chapter 2

Project Background

The plot HDIL Paradise City at G. No. 942 at Village-Mahim, Taluka- Palghar, District-Palghar, is surrounded by different commercial buildings and hotels. The location of the plot is suitable for residential and commercial development.

The figure below shows the location of proposed site by M/s. A Y Associates (M/s.HDIL).

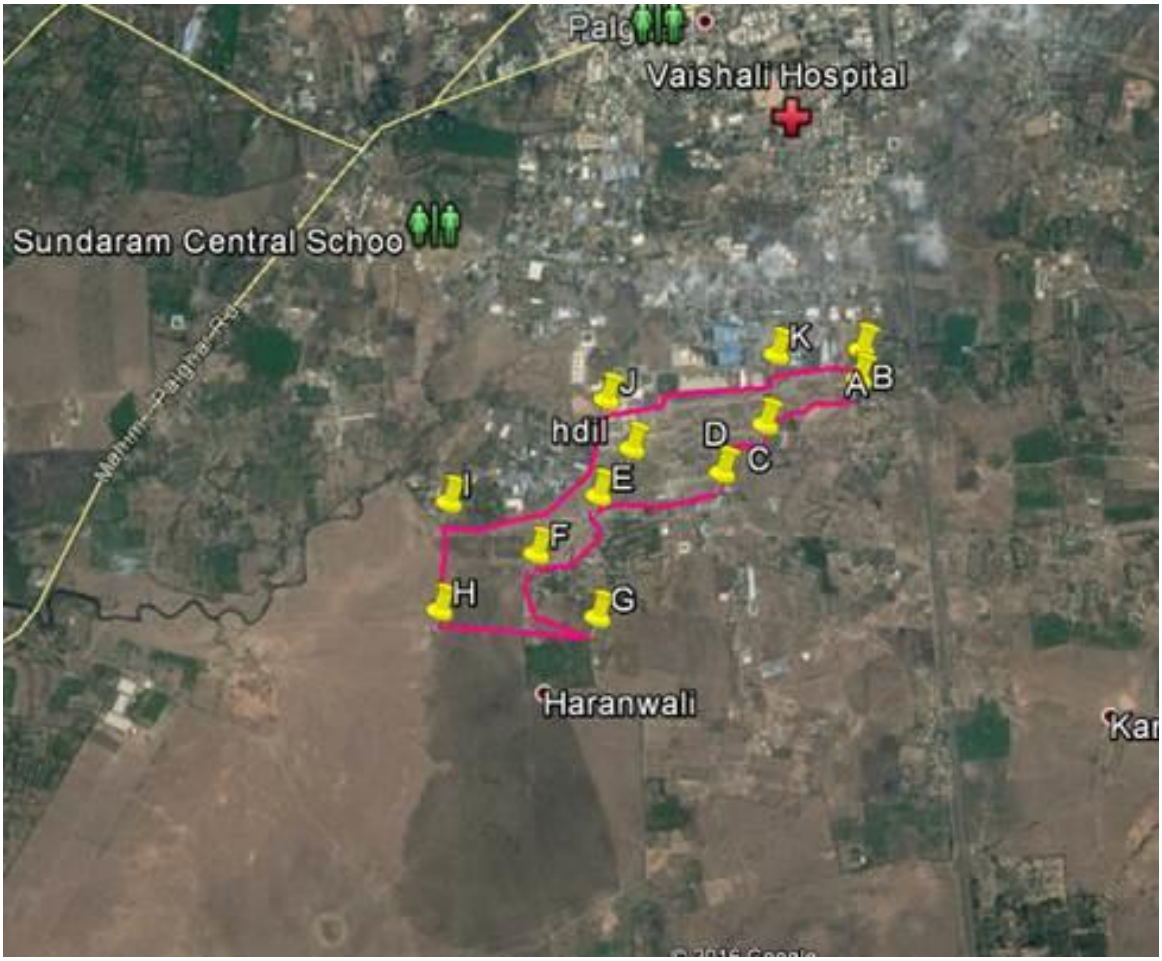


Figure 2.1 Location of Proposed Plot M/s. A Y Associates (M/s.HDIL).

Table 2.1 Building Configuration

Building	Configuration
Sector l - Vll C & Sector Xl	G(P) + ST(P) + 4
Sector Vlll – X & Sector Xll	G(P) + ST(P) + 8

Table 2.2 Details of Parking Area

Vehicles	Parking
Cars	809
Two Wheelers	25362

Chapter 3

Site Appreciation, Existing Transport Network and Base Traffic

Extensive surveys were conducted on the road network around proposed project for getting the primary data related to the road network. The extensive surveys include - Road Inventory Surveys for network geometry.

3.1 Survey Location

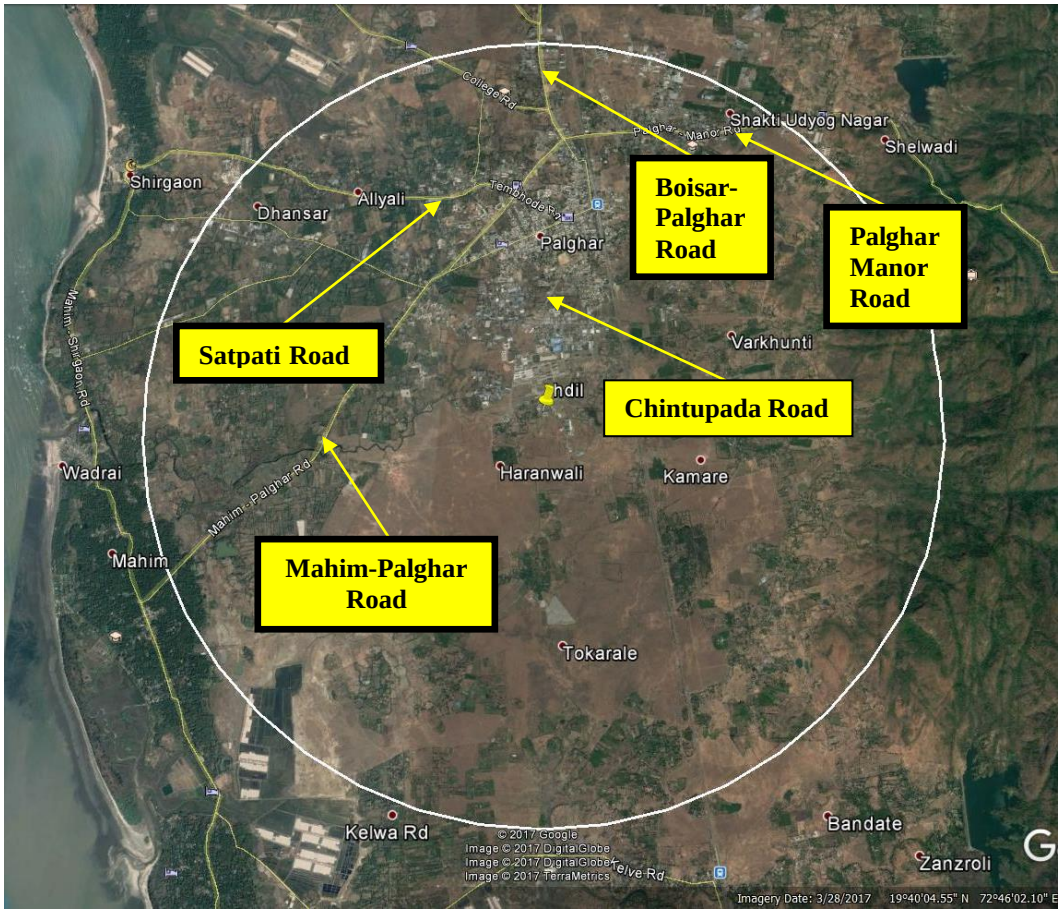


Figure 3.1 Location of Data collection

3.2 Schedule of Surveys for Data Collection

Table 3.1 Schedule of Survey

Sr. No.	Location	Date
1	Mahim-Palghar Road	17/04/2017
2	Satpati Road	17/04/2017
3	Boisar- Palghar Road	17/04/2017
4	Chintupada Road	17/04/2017

3.3 Road Inventory Survey

Traffic survey was conducted for 12 hours to understand the hourly traffic variation for the roads. The hourly traffic distribution for different vehicles for all the mentioned locations has been illustrated in the below figures:

3.3.1 Mahim- Plaghar Road

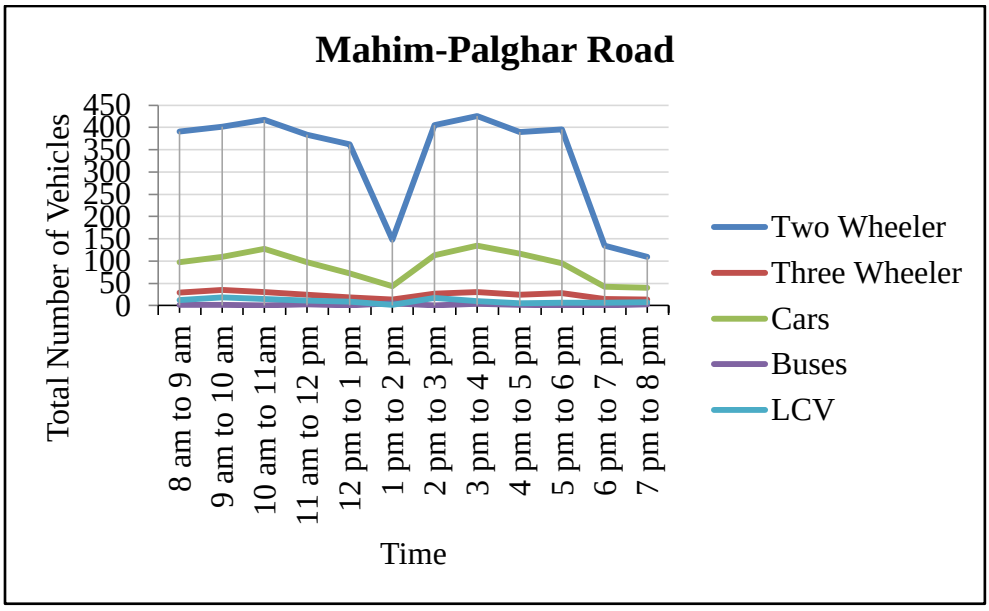


Figure 3.2 Categories Wise Hourly Traffic Distribution for Mahim-Palghar Road

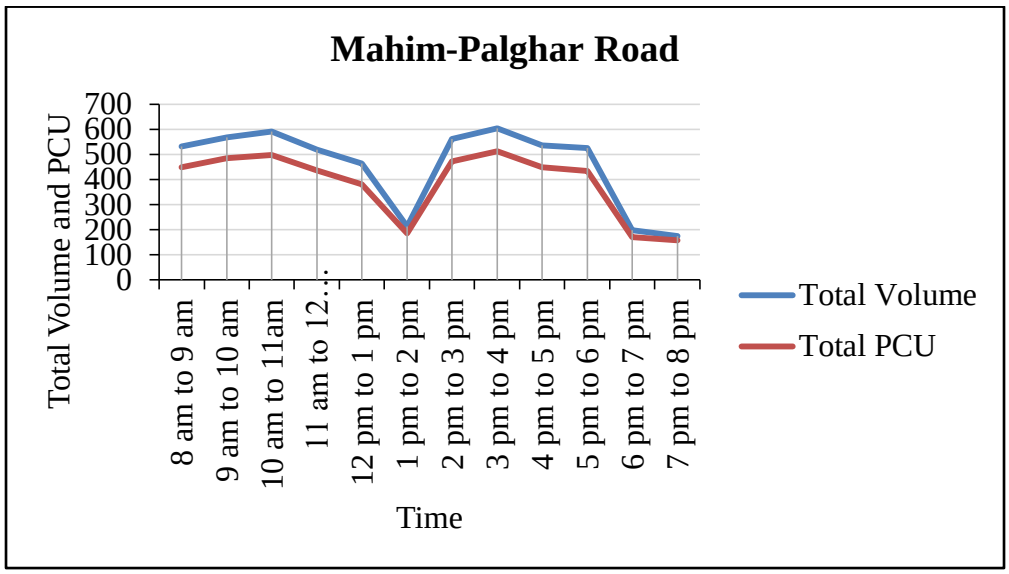


Figure 3.3 Hourly Total PCU and Volume Distribution for Mahim-Palghar Road

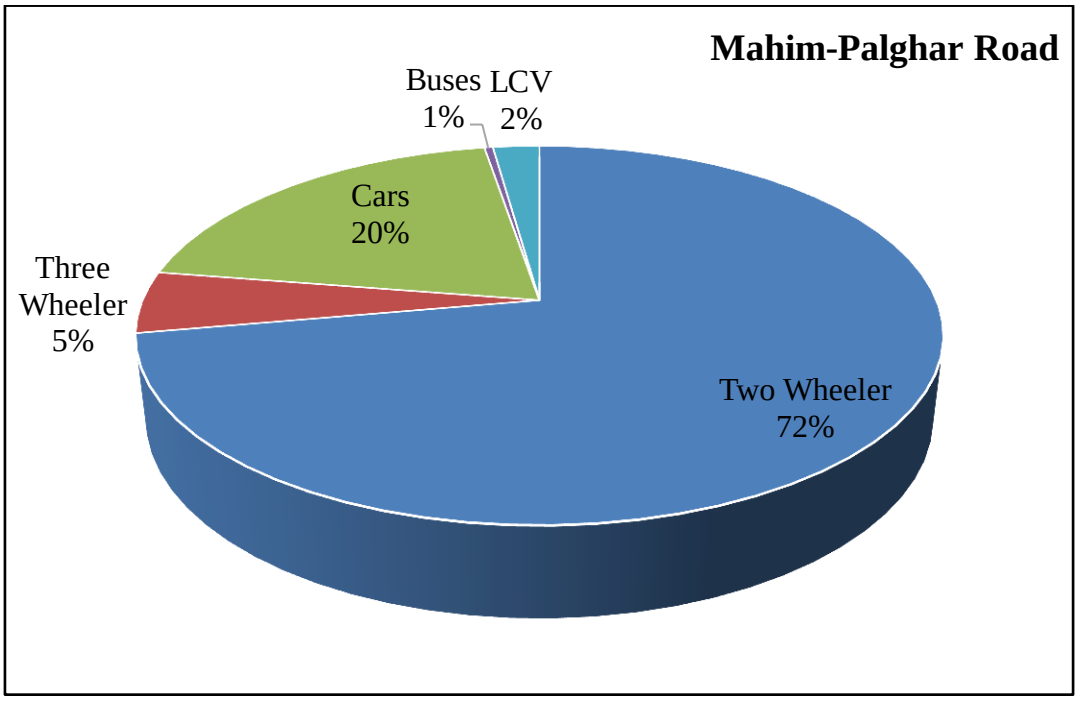


Figure 3.4 Modal Split (vehicles) for Mahim-Palghar Road

3.3.2 Satpati Road

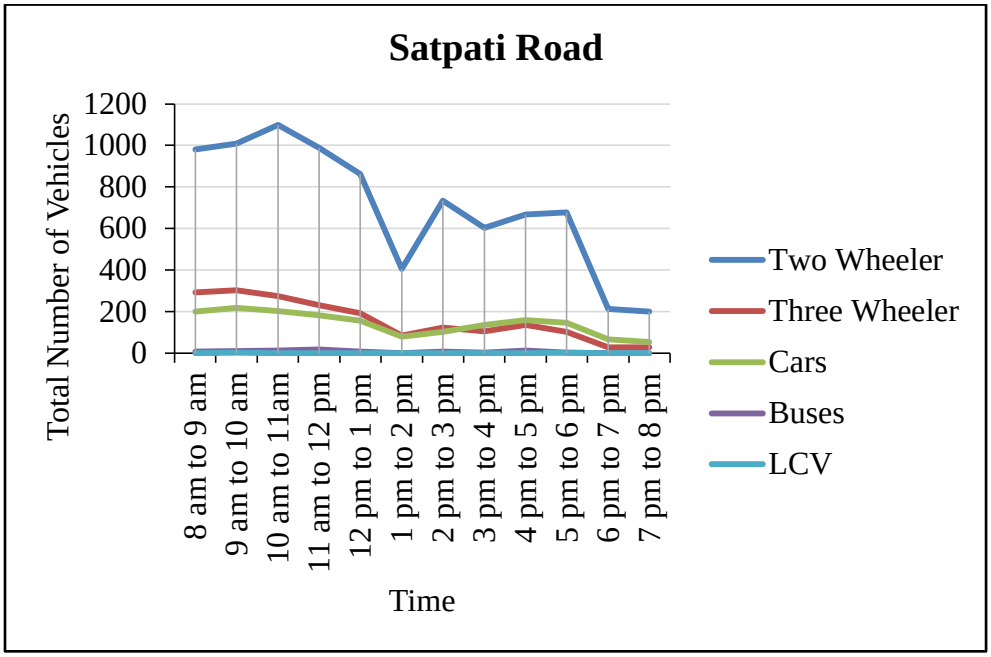


Figure 3.5 Categories Wise Hourly Traffic Distribution for Satpati Road

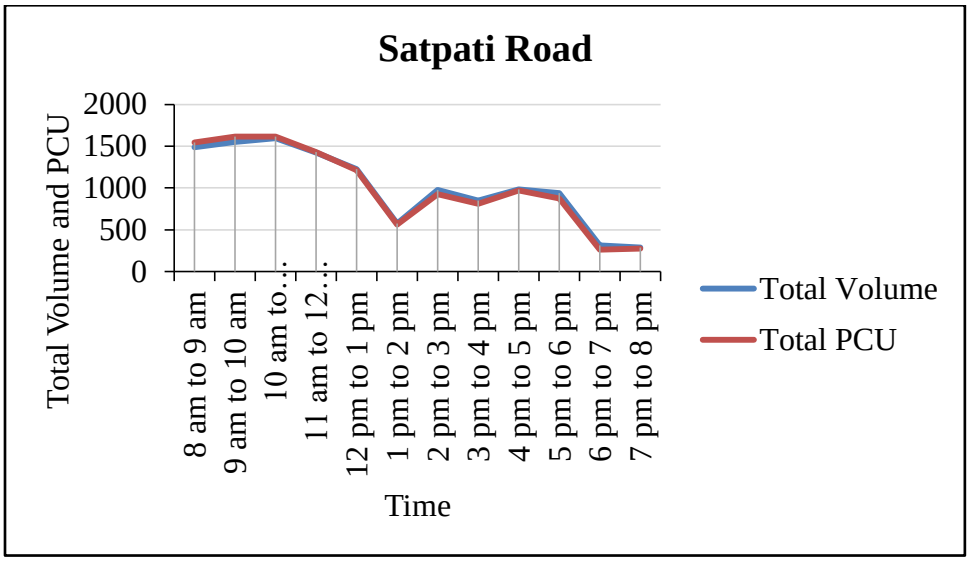


Figure 3.6 Hourly Total PCU and Volume Distribution for Satpati Road

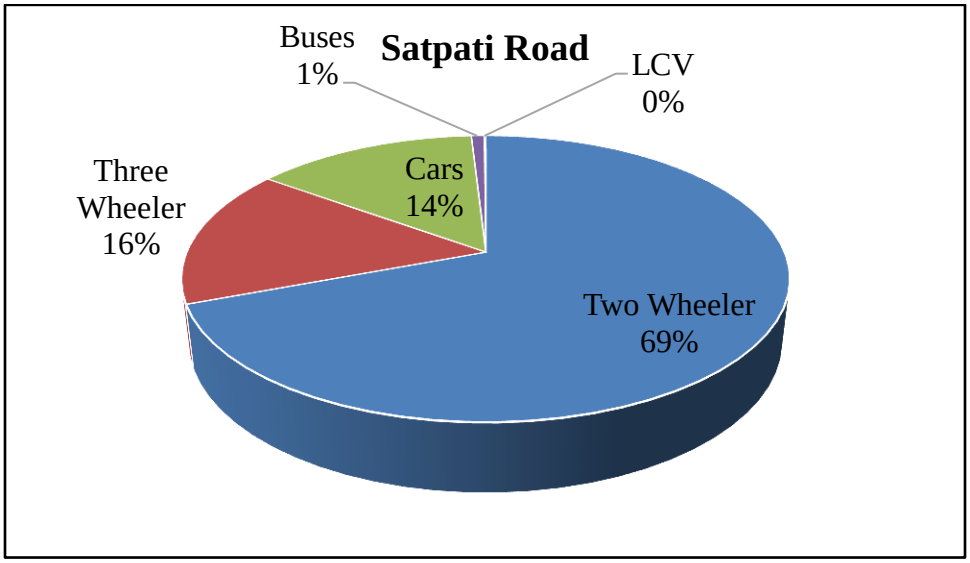


Figure 3.7 Modal Split (vehicles) for Satpati Road

3.3.3 Boisar-Palghar Road

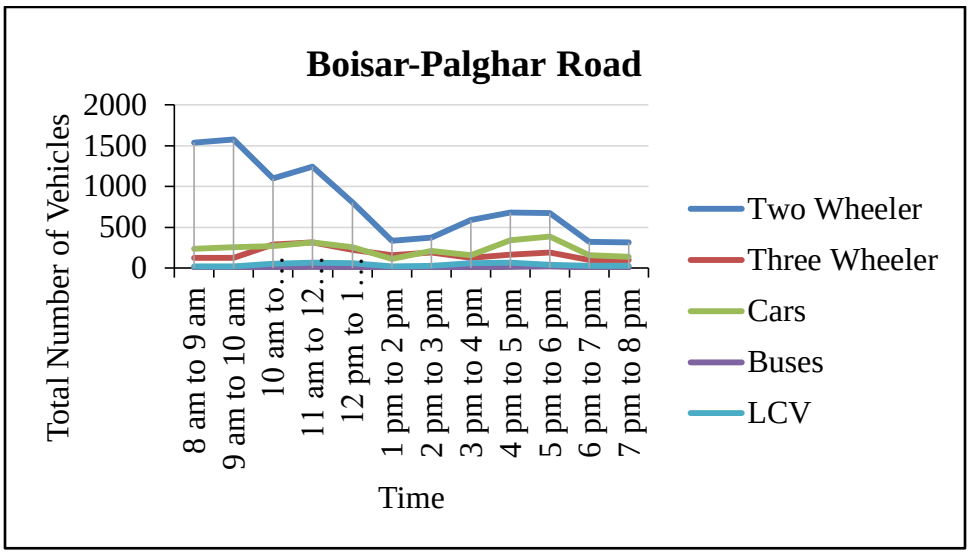


Figure 3.8 Categories Wise Hourly Traffic Distribution for Boisar-Palghar Road

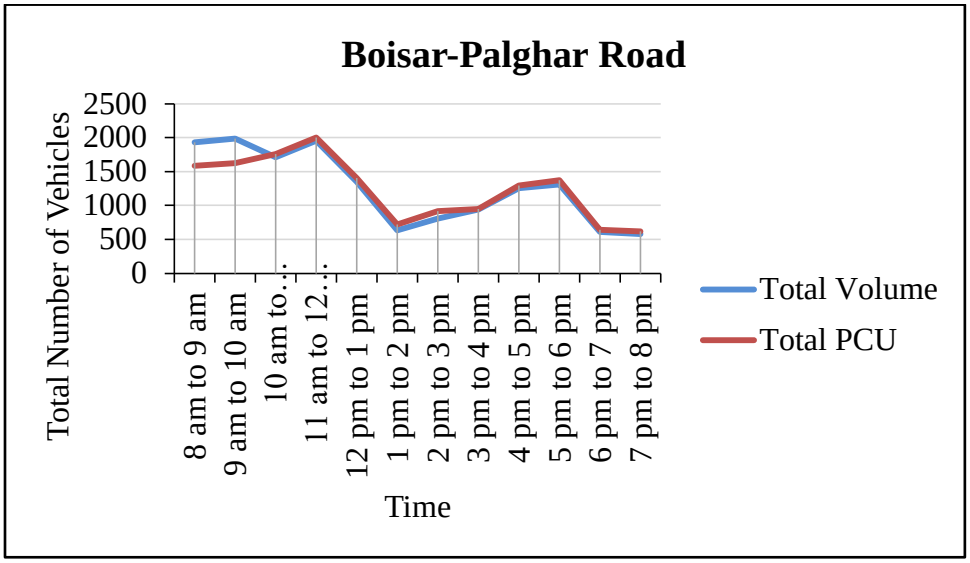


Figure 3.9 Hourly Total PCU and Volume Distribution for Boisar-Palghar Road

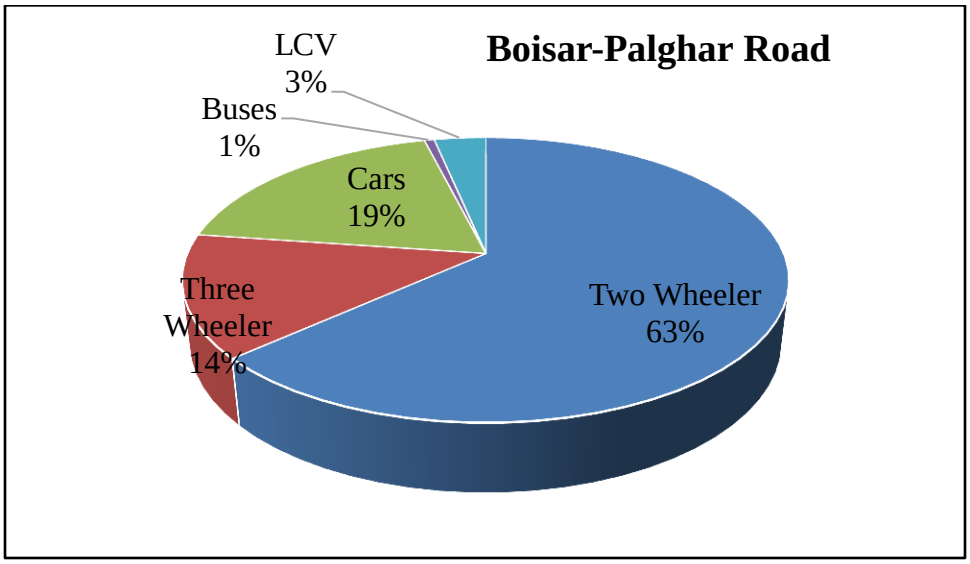


Figure 3.10 Modal Split (vehicles) for Boisar-Palghar Road

3.3.4 Chintupada Road

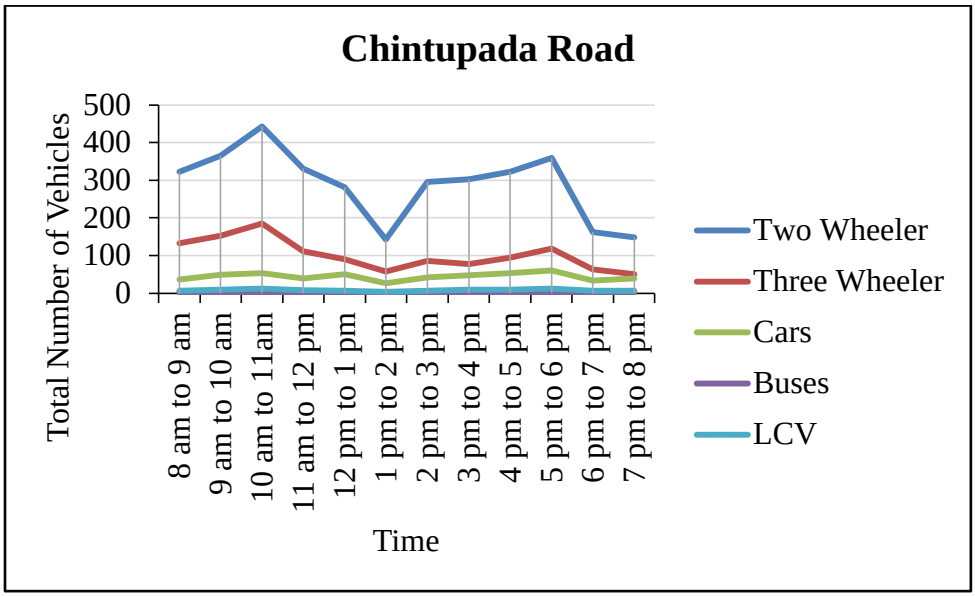


Figure 3.11 Categories Wise Hourly Traffic Distribution for Chintupada Road

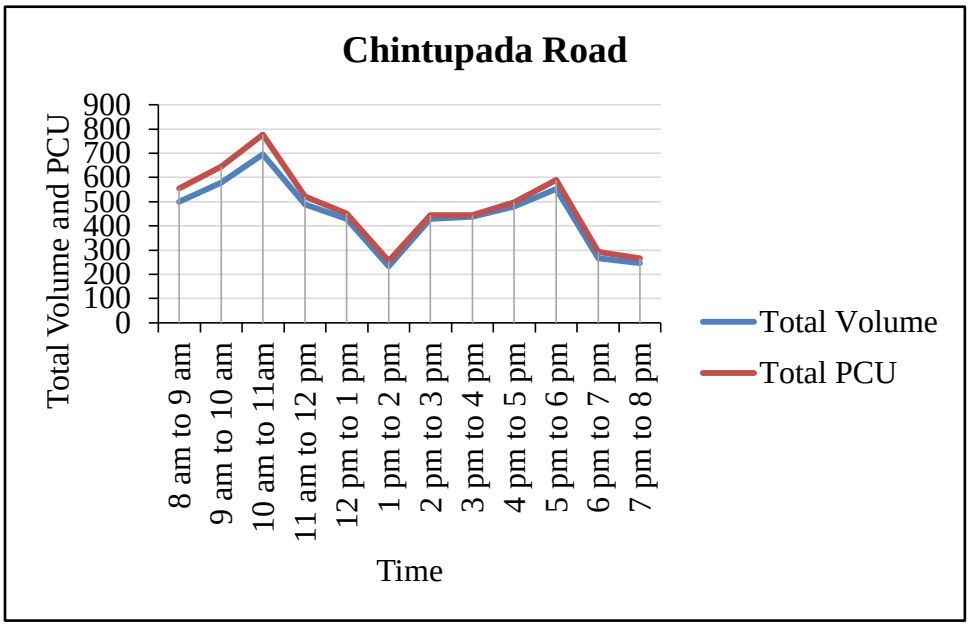


Figure 3.12 Hourly Total PCU and Volume Distribution for Chintupada Road

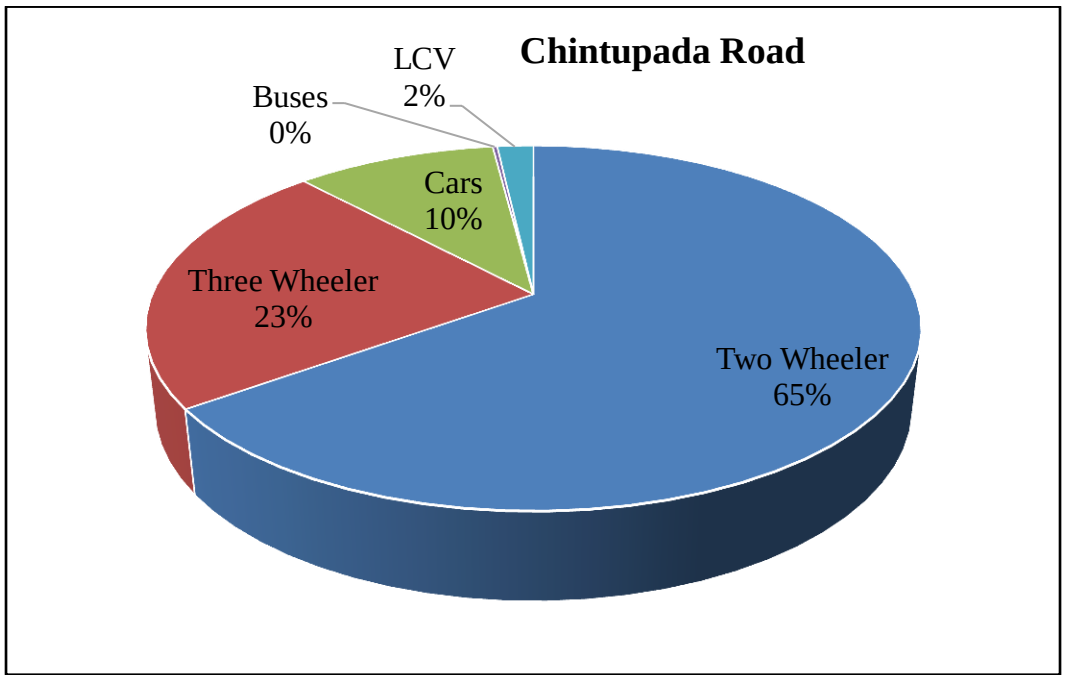


Figure 3.13 Modal Split (vehicles) for Chintupada Road

Chapter 4

Traffic Data Analysis

4.1 Traffic Analysis

The road network around proposed site was analysed to determine its performance in order to observe the current traffic and the projected traffic for the coming 25 years. To measure the network performance, volume by capacity ratio (V/C) and Level of Services (LoS) were calculated as per IRC recommendations.

4.2 Methodology Adopted for the Traffic Analysis

1. The first step was to calculate the traffic of this road network for coming twenty five years with the growth rate of 5% per year.

2. Volume of the traffic is converted to PCU (Passenger Car Unit) based on the number of vehicles and by using the appropriate conversion factor for each type of vehicle.

3. The relevant Design Service Volume (DSV) of each road has been taken as the capacity as per IRC 106 – 1990.

4. Level of Services (LoS) is identified for each road for each study year on the basis of Volume by Capacity ratio for the particular road.

5. The LoS has been calculated with and without the new development to identify the impact of proposed complex on present as well as future traffic on the road network.

4.3 Estimation of Capacity and LoS (for current scenario – 2017)

Following analysis is done by considering theoretical capacity of roads. In this analysis the vehicles parked at the road side has not been considered.

Table 4.1 Estimation of LoS Value for Maximum Peak (current scenario 2017)

Road	Type of Carriageway	Road Category	Total PCU (Without Project)	Total PCU (With Project)	V/C (Without Project)	V/C (With Project)	LoS (Without Project)	LoS (With Project)
Mahim-Palghar Road	Divided Lane (Two Way)	Arterial	513	1077	0.10	0.21	A	A
Satpati Road	Divided Lane (Two Way)	Arterial	1617	3394	0.31	0.66	B	C
Boisar-Palghar Road	Divided Lane (Two Way)	Arterial	2003	4204	0.39	0.82	B	D
Chintupada Road	Divided Lane (Two Way)	Arterial	777	1631	0.15	0.32	A	B

Table 4.2 Estimation of LoS Value for Current Year 2017 (Morning 8 am – 11 am)

Road	Type of Carriageway	Road Category	Total PCU (Without Project)	Total PCU (With Project)	V/C (Without Project)	V/C (With Project)	LoS (Without Project)	LoS (With Project)
Mahim-Palghar Road	Divided Lane (Two Way)	Arterial	477	1041	0.09	0.20	A	A
Satpati Road	Divided Lane (Two Way)	Arterial	1592	3369	0.31	0.66	B	C
Boisar-Palghar Road	Divided Lane (Two Way)	Arterial	1656	3857	0.32	0.75	C	D
Chintupada Road	Divided Lane (Two Way)	Arterial	659	1513	0.13	0.29	A	A

Table 4.3 Estimation of LoS Value for Current Year 2017 (Evening 5 pm – 8 pm)

Road	Type of Carriageway	Road Category	Total PCU (Without Project)	Total PCU (With Project)	V/C (Without Project)	V/C (With Project)	LoS (Without Project)	LoS (With Project)
Mahim-Palghar Road	Divided Lane (Two Way)	Arterial	254	818	0.05	0.16	A	A
Satpati Road	Divided Lane (Two Way)	Arterial	470	2247	0.09	0.44	A	B
Boisar-Palghar Road	Divided Lane (Two Way)	Arterial	877	3078	0.17	0.60	A	C
Chintupada Road	Divided Lane (Two Way)	Arterial	383	1237	0.07	0.24	A	A

Table 4.4 Estimation of LoS value for current scenario 2022 (Maximum LoS)

Road	Type of Carriageway	Road Category	Total PCU (Without Project)	Total PCU (With Project)	V/C (Without Project)	V/C (With Project)	LoS (Without Project)	LoS (With Project)
Mahim-Palghar Road	Divided Lane (Two Way)	Arterial	655	1219	0.13	0.24	A	A
Satpati Road	Divided Lane (Two Way)	Arterial	2064	3841	0.40	0.83	B	D
Boisar-Palghar Road	Divided Lane (Two Way)	Arterial	2557	4758	0.50	0.93	B	E
Chintupada Road	Divided Lane (Two Way)	Arterial	991	1845	0.19	0.36	A	B

Table 4.5 Estimation of LoS value for Morning peak hours for current year 2022

Road	Type of Carriageway	Road Category	Total PCU (Without Project)	Total PCU (With Project)	V/C (Without Project)	V/C (With Project)	LoS (Without Project)	LoS (With Project)
Mahim-Palghar Road	Divided Lane (Two Way)	Arterial	609	1173	0.12	0.23	A	A
Satpati Road	Divided Lane (Two Way)	Arterial	2032	3809	0.40	0.74	B	D
Boisar-Palghar Road	Divided Lane (Two Way)	Arterial	2113	4314	0.41	0.84	B	D
Chintupada Road	Divided Lane (Two Way)	Arterial	991	1845	0.19	0.36	A	B

Table 4.6 Estimation of LoS value for Evening peak hours for current year 2022

Road	Type of Carriageway	Road Category	Total PCU (Without Project)	Total PCU (With Project)	V/C (Without Project)	V/C (With Project)	LoS (Without Project)	LoS (With Project)
Mahim-Palghar Road	Divided Lane (Two Way)	Arterial	324	888	0.06	0.17	A	A
Satpati Road	Divided Lane (Two Way)	Arterial	600	2377	0.12	0.46	A	B
Boisar-Palghar Road	Divided Lane (Two Way)	Arterial	1119	3320	0.22	0.65	A	C
Chintupada Road	Divided Lane (Two Way)	Arterial	488	1342	0.09	0.26	A	A

4.4 Estimation of Capacity and LoS (after 15 years scenario-2032)

Table 4.7 Estimation of LoS Value for Maximum Peak (Year 2032)

Road	Type of Carriageway	Road Category	Total PCU (Without Project)	Total PCU (With Project)	V/C (Without Project)	V/C (With Project)	LoS (Without Project)	LoS (With Project)
Mahim-Palghar Road	Divided Lane (Two Way)	Arterial	1067	1631	0.21	0.32	A	B
Satpati Road	Divided Lane (Two Way)	Arterial	3362	5139	0.65	1.00	C	E
Boisar-Palghar Road	Divided Lane (Two Way)	Arterial	4165	6366	0.81	1.24	D	F
Chintupada Road	Divided Lane (Two Way)	Arterial	1615	2469	0.31	0.48	B	B

Table 4.8 Estimation of LoS Value for Year 2032 (Morning 8am – 11am)

Road	Type of Carriageway	Road Category	Total PCU (Without Project)	Total PCU (With Project)	V/C (Without Project)	V/C (With Project)	LoS (Without Project)	LoS (With Project)
Mahim-Palghar Road	Divided Lane (Two Way)	Arterial	992	1556	0.19	0.30	A	A
Satpati Road	Divided Lane (Two Way)	Arterial	3310	5087	0.64	0.99	C	E
Boisar-Palghar Road	Divided Lane (Two Way)	Arterial	3442	5643	0.67	1.10	C	F
Chintupada Road	Divided Lane (Two Way)	Arterial	1370	2224	0.27	0.43	A	B

Table 4.9 Estimation of LoS value for Evening peak hours for current year 2032

Road	Type of Carriageway	Road Category	Total PCU (Without Project)	Total PCU (With Project)	V/C (Without Project)	V/C (With Project)	LoS (Without Project)	LoS (With Project)
Mahim-Palghar Road	Divided Lane (Two Way)	Arterial	527	1091	0.10	0.21	A	A
Satpati Road	Divided Lane (Two Way)	Arterial	978	2755	0.19	0.54	A	C
Boisar-Palghar Road	Divided Lane (Two Way)	Arterial	1823	4024	0.35	0.78	B	D
Chintupada Road	Divided Lane (Two Way)	Arterial	795	1649	0.15	0.32	A	B

4.5 Estimation of Capacity and LoS (after 25 years scenario-2042)

Table 4.10 Estimation of LoS value for current scenario 2042 (Maximum LoS)

Road	Type of Carriageway	Road Category	Total PCU (Without Project)	Total PCU (With Project)	V/C (Without Project)	V/C (With Project)	LoS (Without Project)	LoS (With Project)
Mahim-Palghar Road	Divided Lane (Two Way)	Arterial	1738	2302	0.34	0.45	B	B
Satpati Road	Divided Lane (Two Way)	Arterial	5476	7253	1.06	1.41	F	F
Boisar-Palghar Road	Divided Lane (Two Way)	Arterial	6784	8985	1.32	1.75	F	F
Chintupada Road	Divided Lane (Two Way)	Arterial	2630	3484	0.51	0.68	C	C

Table 4.11 Estimation of LoS value for Morning peak hours for current year 2042

Road	Type of Carriageway	Road Category	Total PCU (Without Project)	Total PCU (With Project)	V/C (Without Project)	V/C (With Project)	LoS (Without Project)	LoS (With Project)
Mahim-Palghar Road	Divided Lane (Two Way)	Arterial	1617	2181	0.31	0.42	B	B
Satpati Road	Divided Lane (Two Way)	Arterial	5391	7168	1.05	1.39	F	F
Boisar-Palghar Road	Divided Lane (Two Way)	Arterial	5606	7807	1.09	1.52	F	F
Chintupada Road	Divided Lane (Two Way)	Arterial	2232	3086	0.43	0.60	B	C

Table 4.12 Estimation of LoS value for Evening peak hours for current year 2042

Road	Type of Carriageway	Road Category	Total PCU (Without Project)	Total PCU (With Project)	V/C (Without Project)	V/C (With Project)	LoS (Without Project)	LoS (With Project)
Mahim-Palghar Road	Divided Lane (Two Way)	Arterial	859	1423	0.17	0.28	A	A
Satpati Road	Divided Lane (Two Way)	Arterial	1593	3370	0.31	0.66	B	C
Boisar-Palghar Road	Divided Lane (Two Way)	Arterial	2970	5171	0.58	1.01	C	F
Chintupada Road	Divided Lane (Two Way)	Arterial	1296	2150	0.25	0.42	A	B

4.6 Comparison for Traffic Impact Due To Proposed Development with Current Facility

- **Effect of V/C new development on Mahim-Palgahar Road**

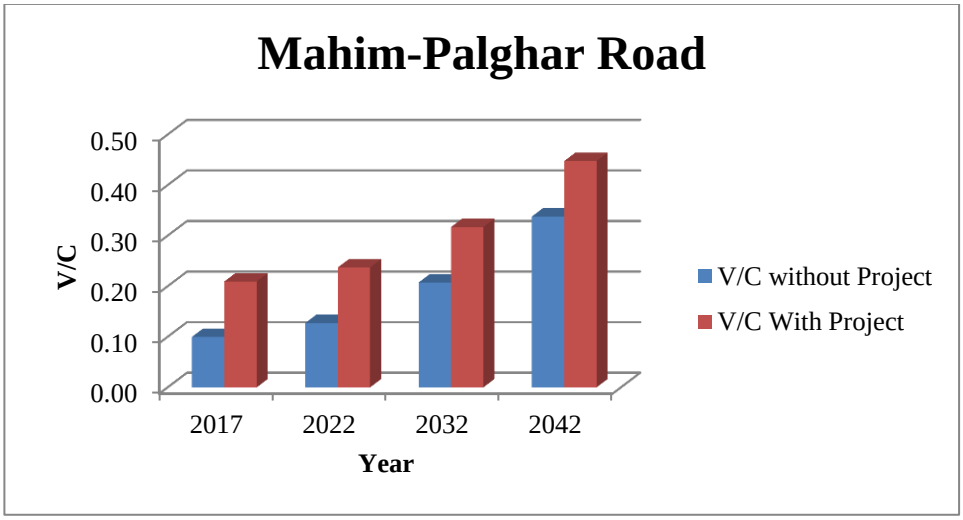


Figure 4.1 Effect by New Development on Mahim-Palghar Road

- **Effect of V/C new development on Satpati Road**

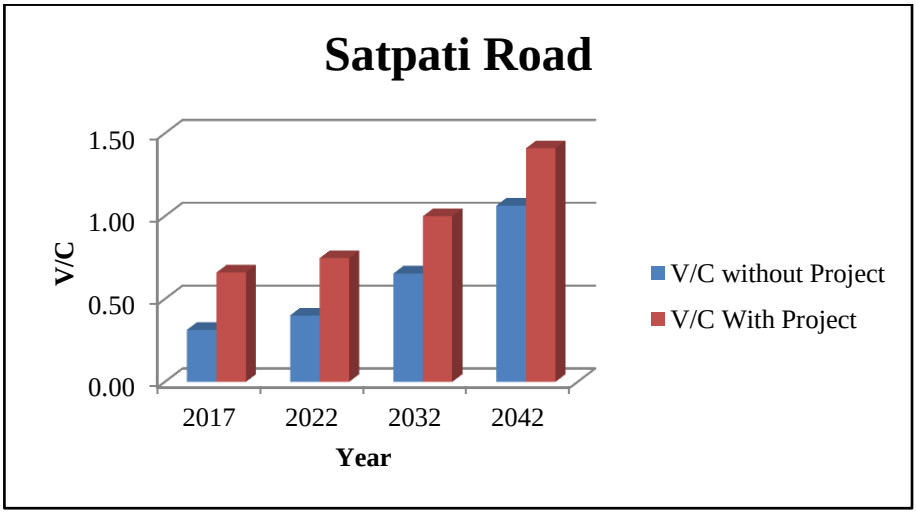


Figure 4.2 Effect of V/C by New Developmenton Satpati Road

➢ **Effect of V/C new development on Boisar-Palghar Road**

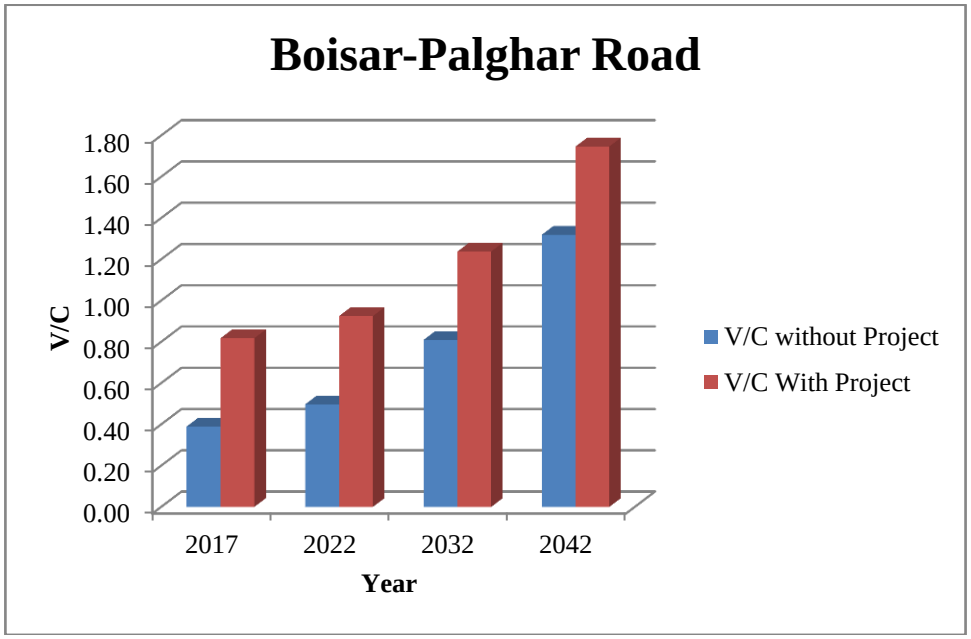


Figure 4.3 Effect of V/C by New Development on Boisar-Palghar Road

➢ **Effect of V/C new development on Chintupada Road**

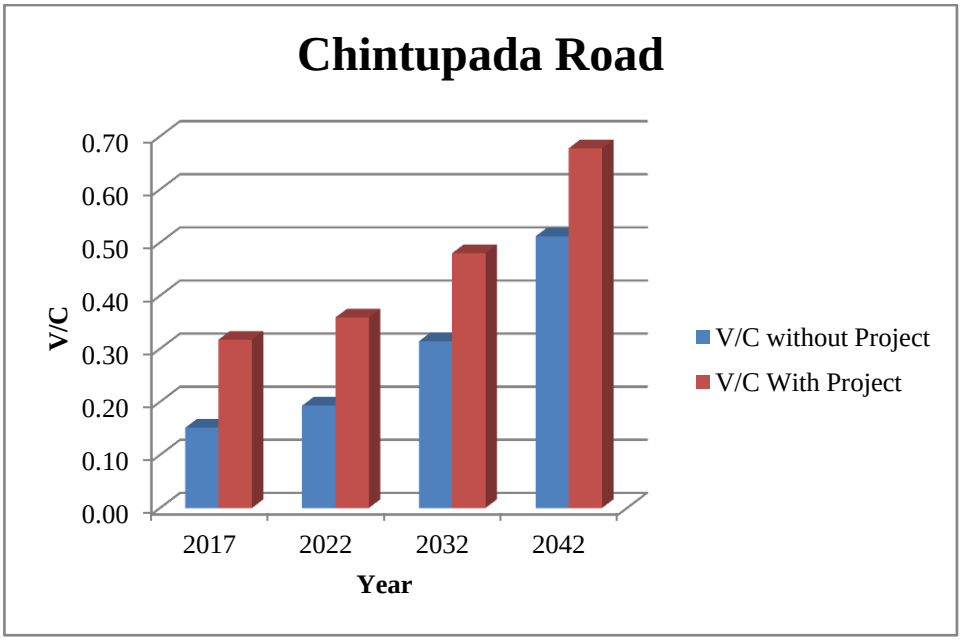


Figure 4.4 Effect of V/C by New Development on Chintupada Road

4.7 Mitigation Measures

- The Mumbai Metropolitan Region Development Authority (MMRDA) plans to extend the proposed Thane-Bhiwandi-Kalyan monorail corridor up to Badlapur to connect Bhiwandi, Ambernath and Badlapur to Thane.

- Mumbai Urban Infrastructure Project (MUIP), Multi Modal Corridor connecting Virar and Alibaug, to be extended to Kalyan Ring Road, Shirgaon-Padgha-Titwala-Badlapur Link, Neral-Dasturi Naka-Matheran Road, Khopoli Bypass Road.These upcoming public transport alternatives are expected to reduce the PCU load by 15% and improve the LOS from F to D.

- The Shirgaon-Padgha-Titwala-Badlapur Link Road may divert the traffic from Satpati-Palghar Road, Boisar-Palghar Road and Mahim- Palghar Road.

- Widening of the roads of this road network is a future proposed plan.

Chapter 5

Parking Study Report

5.1 General Development Layout

5.1.1 Background

Poonam Lifestyle has planned a residential development at Palghar (East). This site is well accessed by Public Transport i.e. Railway station, Bus stand.

5.2 Development Layout

The details of the Proposed Residential Development are given below:

- The total parking facility proposed for this development is some 809 car and 25362 scooters parking bays.

The parking statement of vehicles is presented in **Table 2.2**

The internal traffic circulation and the parking facility at Ground level are presented in following figures.

- **Figures 5.1** represents the Ground Floor Plan.

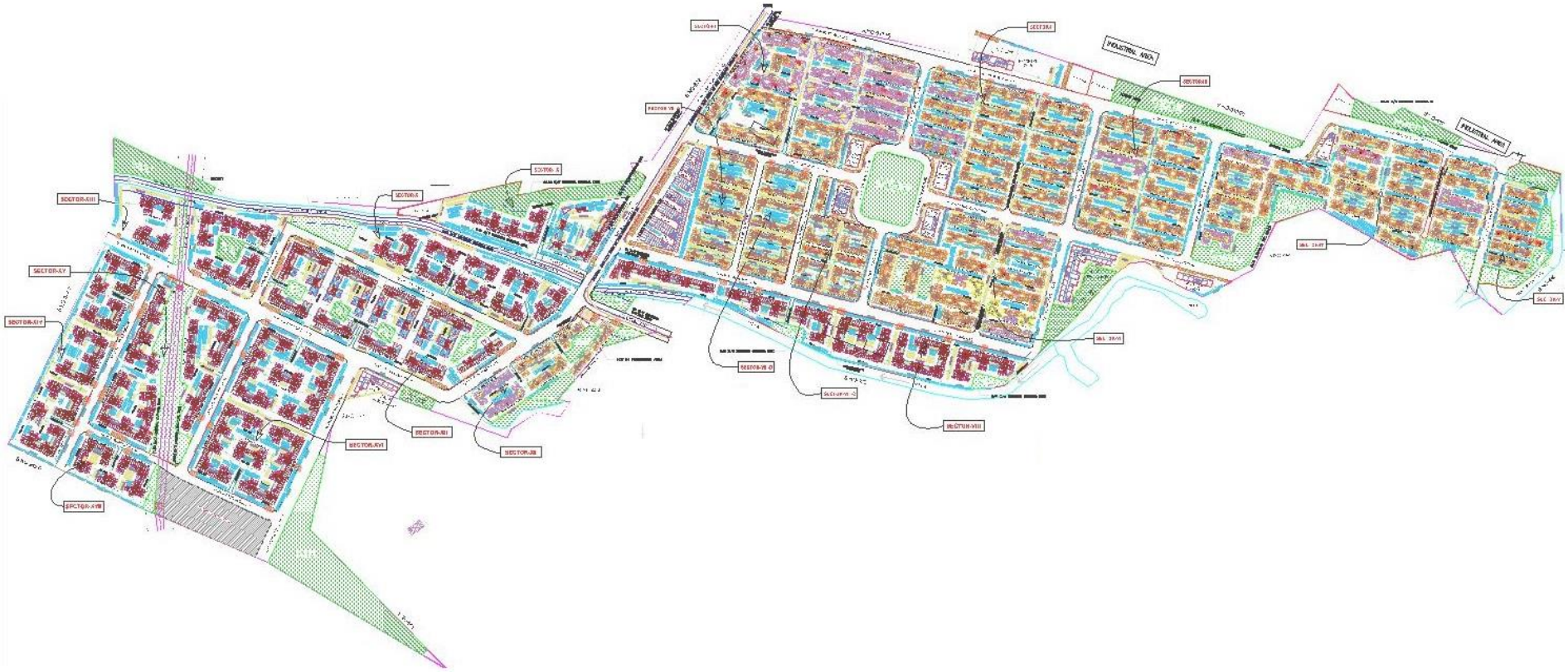


Figure 0.1 Ground Floor Plan for all the buildings

Chapter 6

Traffic Management Plan

6.1 Introduction

The proposed project, HDIL Paradise City safely manages the vehicular traffic and acknowledges the safety of road users. This chapter contains the guidelines, general requirements and procedures to be used when activities or areas of work have a potential to impact on the highway and local traffic. The proposed project site is about 3.5 km away from Palghar Station via Chintupada Road and hence would majorly impact the local traffic.

6.2 Purpose of Traffic Management Plans (TMP)

The primary purpose of the Traffic Management Plans is to provide for the reasonably safe and efficient movement of road users through or around the proposed project while reasonably protecting the workers and equipment. When the normal function of the roadway is affected with the presence of workers and equipment, the TMP provides for continuity of the movement for motor vehicle, bicycle and pedestrian traffic, transit operations and access to properties and utilities.

6.3 Traffic Control Measures

Generally, the internal roads are undivided to maintain flexibility of traffic lanes. Minimum 6m wide roadway width has been provided for the movement of vehicles. Recommended design speed on the internal road is 15kmph and on the turns is 10kmph. Speed tables will be provided near the entrance/exit point to control traffic and regulate speed of vehicles. An illustrative picture is also shown in Figure 5.1. Additionally, the following shall be required to maintain traffic flow at required level of service.

- Road Markings and Signages: Proper road markings (edge, median, arrows, turning, Kerb) and Signages (direction, turning, speed, and pedestrian crossings) will be installed and maintained on all roads in the vicinity of project premises.

- On-street parking will be prohibited on all external and internal streets.
- Pick and drop at designated places only.
- Preferably no U-Turn on roadway
- Traffic calming measures – speed tables, signage Apart from internal signage – it will be requested to provide necessary signage and traffic control measures, on neighbouring roads, – such as Speed limit, Left hand curve, pedestrian crossing etc.

6.4 Traffic control measure for site

1. Speed Bumps will be provided at entry/exits as well as on longer distances.
2. Safety Mirrors at curve ends will be installed as safety measure and to give a proper view of the approaching vehicles.
3. Signage to specify speed limit on curves and straight road, no parking zones, disabled parking etc. will be displayed at respective locations.
4. Fire Extinguisher will be installed at multiple points in case of emergency.
5. Floor Markings will be provided to denote the parking space, reserve parking, visitors parking, etc.
6. Sufficient Lights at proper distances will be installed to prevent collision and accidents during night time.
7. Pedestrian Crossing will be installed for safe road crossing.
8. Temple Area will be marked with Silence Area signage

Sr. No	Description	Signage
1	Speed Limit	
2	Silence Zone	
3	Pedestrian Crossing	
4	Left Hand Curve	

Figure 6.1 Traffic Control Measures

Chapter 7

Summary and Conclusion

Traffic impact analysis shows that, generated traffic from the proposed new development may have considerable impact with available road width according to the current situation. Also, LoS of each road of this road network has no major impact in the terms of congestion except Boisar-Palghar Road as presented in Table 4.1. Boisar-Palghar road connects Palghar and Tarapur Industrial region. The traffic from this project may have minor diversion to this road. For Dahanu destination, there is alternative way via NH 48 to reduce traffic impact on Boisar-Palghar road. It is also considered that the development will carry the widening of these roads to provide acceptable level of service.

All other analysed roads i.e. Mahim-Palghar Road, Satpati Road, and Chintupada Road have Level of Service between A to D for future scenario 2042 without project. These roads represent fair operating conditions and the general level of comfort and convenience provided to the road users is satisfactory. These roads have low LoS (high congestion) in future scenario (2042) with project. The mitigation measures have been proposed as road widening plan for future time. The road widening plans and proposed connectivity plans may reduce the traffic congestion levels as well as the impact on the future traffic scenario.

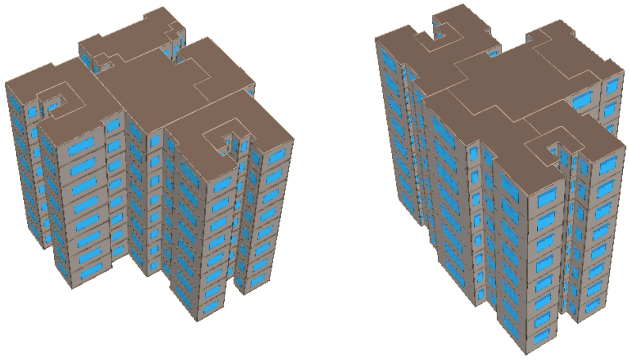
ANNEXURE VI

ECBC GUIDELINES

Compliance with Energy Conservation Building Code 2007			
Sr. No.	**Section No.**	**Requirement**	**Compliance Met By**
Electrical Units saving parameters (Calculation-based)			
1	7.2.1.4	Exterior lighting to be within specified limits	1) 60% lighting including for Road,Landscape & garden shall be kept on solar system. 2) Also other Lights provided on Energy saving luminaries like LED intsead of metal halide lamps. 3)Provided with Time switch to be kept operational only during night mode
2	7.3.1	Interior lighting power to be with in specified limits	1)For Parking/staircases the lighting power Density shall be 0.2 W/sqft by using T5 lights instead of T8. 2) For Lobby, use of LED would ensure power density of less than 1.3w/sqft 3)60% of Lobby & Staircase Lights shall be put on Solar PV Panels.
3		Lifts with Regenerative system	Using Regenerative Type Lift system that would result in 30% energy saving compared to conventional lifts.
Infrastructure based energy conservation measures			
4	8.2.1.2	Transformer Monitoring	Voltmeters/Ammeters for monitoring transformer performance & losses
5	8.2.2	Energy efficient motors	All motors used in pumps of services shall be of class 1 category that would give better efficiency (60%+)& less losses as per IS2615.
6	8.2.3	Power Factor correction	Designing capacitor Banks to improve Power Factor from 0.95 to 1
7	8.2.4	Energy Metering	Energy Meters for External Lighting, All water Pumps for Monitoring
8	8.2.5.1	Cable sizing to min. losses	Electrical cables of derated capacity to avoid heating during working thereby saving the current losses.

BUILDING PERFORMANCE ANALYSIS REPORT

Expansion of "Paradise City" - Proposed Residential and commercial building At S. No. 942 Pt, at Village Mahim, Tal Palghar, Dist - Thane



DESIGN ANALYSIS REPORT : 24th May 2017

M/s A Y Associates

(M/s HDIL Creating Value and others)

KAIZEN DESIGN SOLUTIONS

EXECUTIVE SUMMARY

This report has been prepared for Expansion of "Paradise City" -Proposed Residential and commercial building At S. No. 942 Pt, at Village Mahim, Tal Palghar, Dist - Thane. This report is part of a process towards obtaining Environmental Clearance from MOEF. The specific objective of this report is to evaluate annual energy usage and apply various energy efficiency measures for ECBC Compliance for maximum Energy Efficiency. The building was analysed using hourly energy simulation to evaluate the performance in terms of energy consumption and thermal comfort of the occupants.

The purpose of this report is to present the performance of the design building in comparison to a baseline budget building based on ECBC 2007.

It is observed via various analysis tools that the buildings are properly Shaded, Naturally ventilated & has sufficient Daylight. It is determined via simulation that the project saves 3.70% in Energy over ECBC 2007 base case. In addition to this, if we consider Solar PV generation, the final saving will rise to 6.03% over the ECBC 2007 mandated baseline. Similarly it is determined via simulation that the project saves 22.97% in Energy over Conventional base case. In addition to this, if we consider Solar PV generation, the final saving will rise to 24.84% over the Conventional baseline.

The report is structured as follows.

CLIMATIC ANALYSIS

SHADING ANALYSIS

DAYLIGHT ANALYSIS

VENTILATION CALCULATIONS

HEAT ISLAND EFFECT

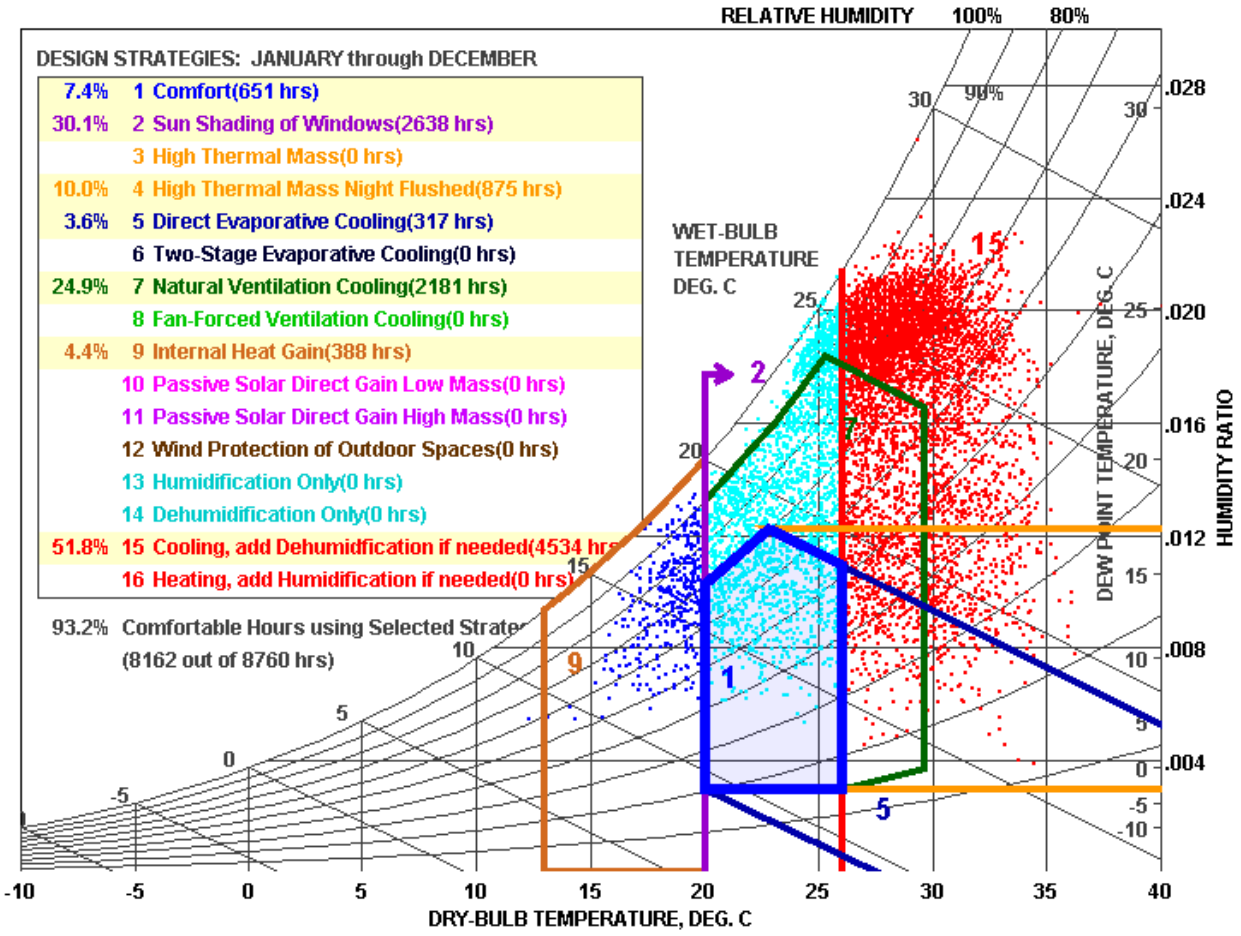
SHADING & RADIATION

RENEWABLE ENERGY

ENERGY SIMULATION

HEAT GAIN CALCULATION

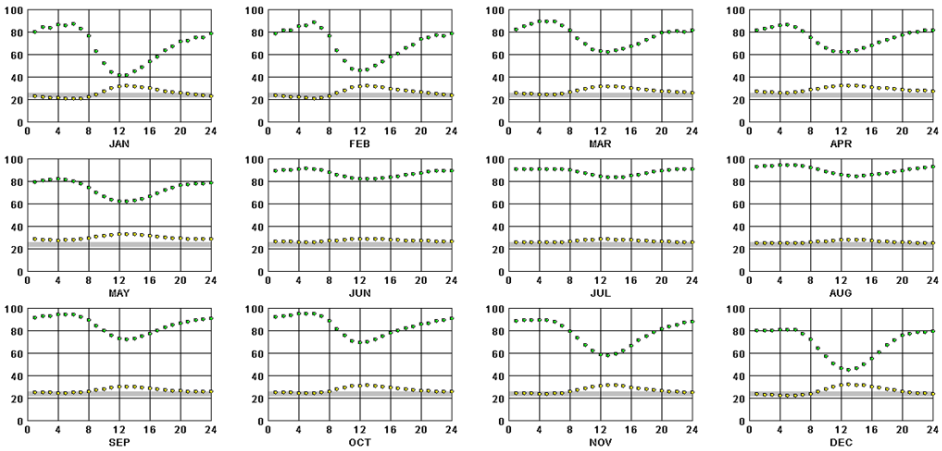
CLIMATIC ANALYSIS:



The Psychrometric Chart above explains that, no other strategy is effective for passive comfort except Shading & Ventilation. Around 20% of total comfort hours can be achieved by Sun Shading & Natural Ventilation. 10% can be achieved by ceiling fan forced ventilation & for the rest 70% of the time air conditioning may be required. For this analysis, the Comfort Criterion was set at 22 to 26 degree C for dry bulb temperature & relative humidity to 70%.

The graph plot on next page clearly shows the degree difference between the Dry Bulb Temperature & Relative Humidity. That's why strategies like Evaporative cooling, Thermal mass, Night purging etc. will not be effective at all. The Pshychrometric Chart above confirms that the only two effective strategies are Shading & Ventilation. As per the legend, at least 30% of the total hours are in comfort range with an effective wind speed of 3 to 5 m/s. Fan forced ventilation is certainly an effective strategy & comparatively cheaper than AC.

Next is he annual wind pattern of Mumbai city. The purpose is to understand this Wind Pattern. If you observe the legend carefully, you will understand that, 10% of the total annual wind is flowing from West direction, which has a temperature C, with a humidity around 70% & maximum wind speed is 8 m/s at one point of time. The predominant wind direction in Monsoon Period is West – South-West.

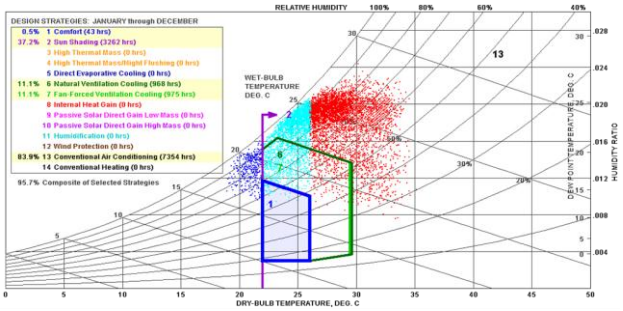


DRY BULB X RELATIVE HUMIDITY

Dry Bulb

Humidity

Comfort Zone



DRY-BULB TEMP (degrees C)

0%	< 0
4%	0 - 22
34%	22 - 26
61%	26 - 38
0%	> 38

WIND SPEED (m/s)

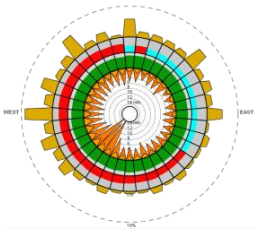
23%	< 2
34%	2 - 3
35%	3 - 5
6%	5 - 9
0%	> 9

TEMPERATURE (Deg. C)

- < 0
- 0 - 22
- 22 - 26
- 26 - 38
- > 38

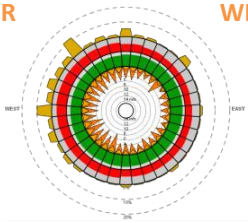
RELATIVE HUMIDITY (%)

- <30
- 30-70
- >70

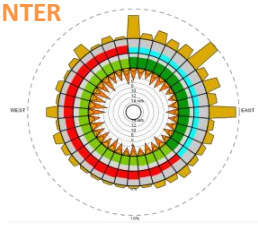


ANNUAL WIND PATTERNS

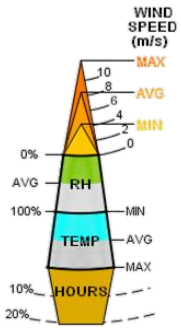
SUMMER



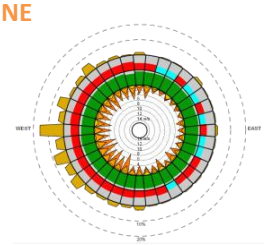
WINTER



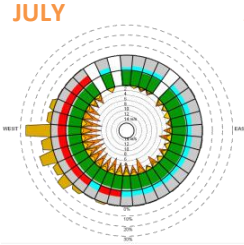
SEASONAL WIND PATTERNS



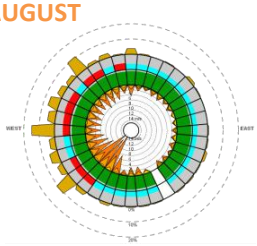
JUNE



JULY



AUGUST



MONTH WISE DETAILS

SHADING ANALYSIS:

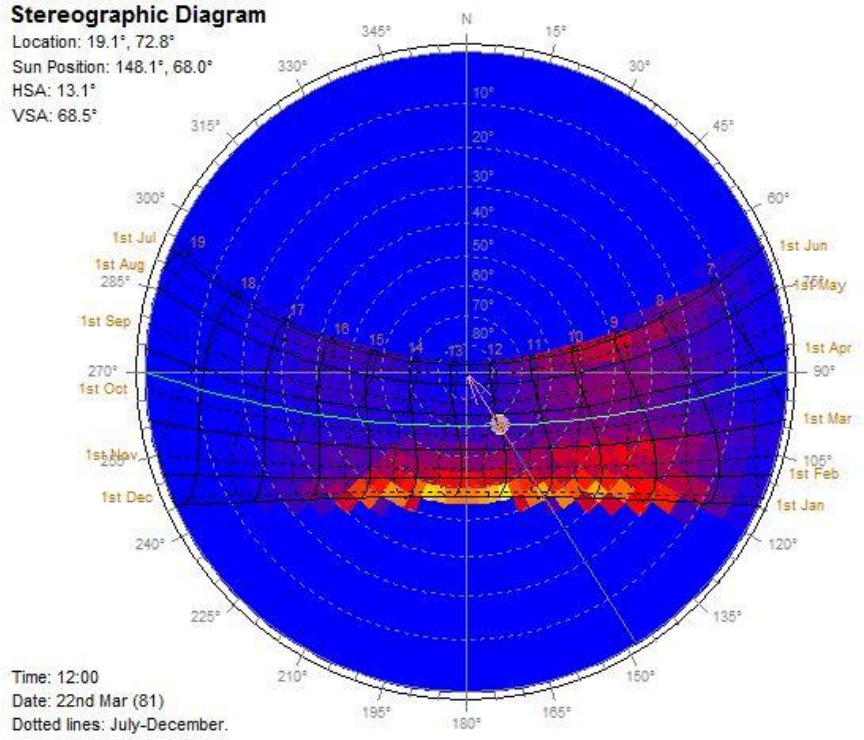
Mutual shading plays an important role in heat gain through envelope. Though envelope insulation has more contribution towards heat gain reduction, at the same time Mutual & Window Shading is also effective. The project team has consciously designed the shading devices reducing insolation on walls & windows. The analysis confirms that proposed shading devices help to reduce incident radiation on envelope resulting in lesser heat load.

METHODOLOGY -

Virtual analysis tool – Ecotect has been used with the above information as a basis for the commentary provided in this report. To determine impacts of the proposed project structures, the 3D virtual model of the proposed building and surrounding structures were created in the software. Actual weather file of Mumbai were used for the simulation.

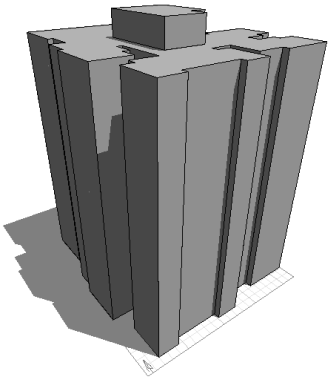
OBJECTIVE -

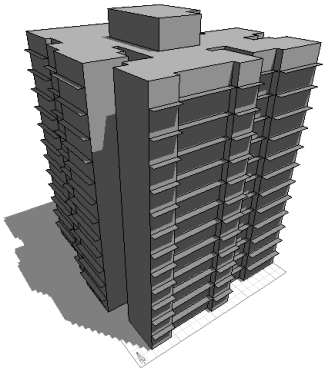
The aim of the study is to assess the potential impact of proposed shades on the building envelope. The effects of shading by one building upon another can be either positive or negative depending upon the site-specific circumstances of the properties involved. A potential benefit of shading for adjacent structures may be a cooling effect gained during warm weather. Negative consequences of shading include the loss of natural light for passive or active solar energy applications or the loss of warming influences during cool weather. Factors influencing the relative impact of shadow effects are site-specific and include differences in terrain elevation between involved properties, the height and bulk of structures, the time of year, the duration of shading in a day, and the sensitivity of adjacent land uses to loss of sunlight.



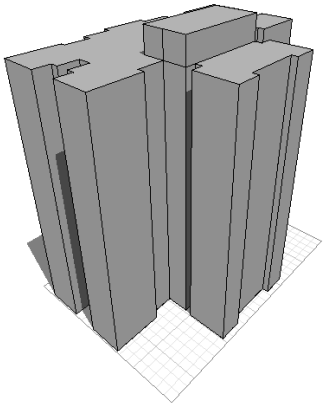
HOURLY SHADOW PATTERNS –

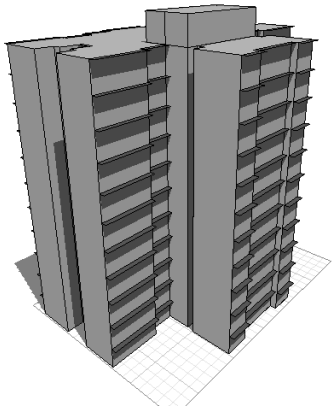
SECTOR 13 – TYPE B 07

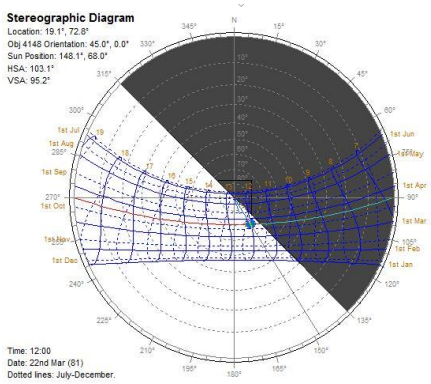


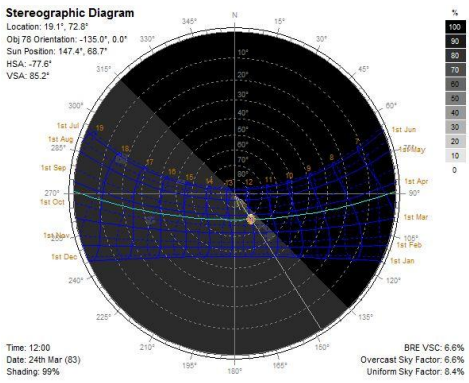


SECTOR 14 – TYPE A1









CONCLUSION -

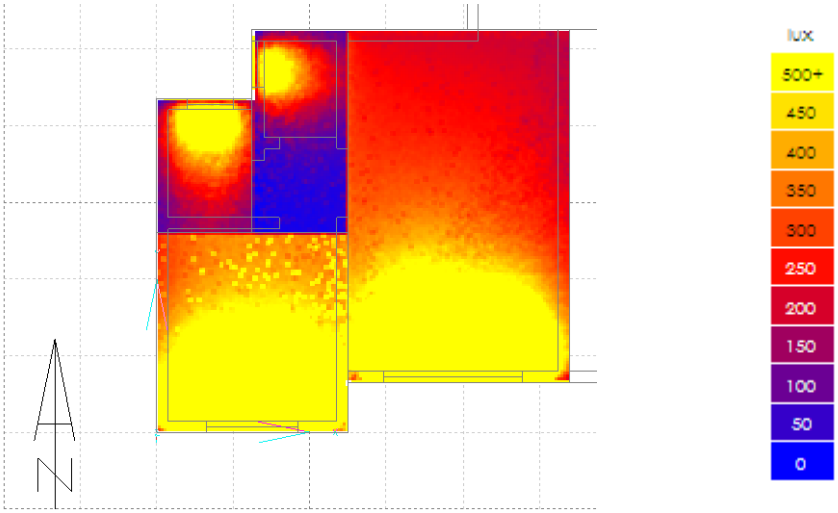
Shading analysis confirms that more than 41% (for SECTOR 13 – TYPE B 07) and more than 27% (for SECTOR 14 – TYPE A1) of the walls & windows are shaded due to mutual and shading devices designed in the project.

DAYLIGHT ANALYSIS:

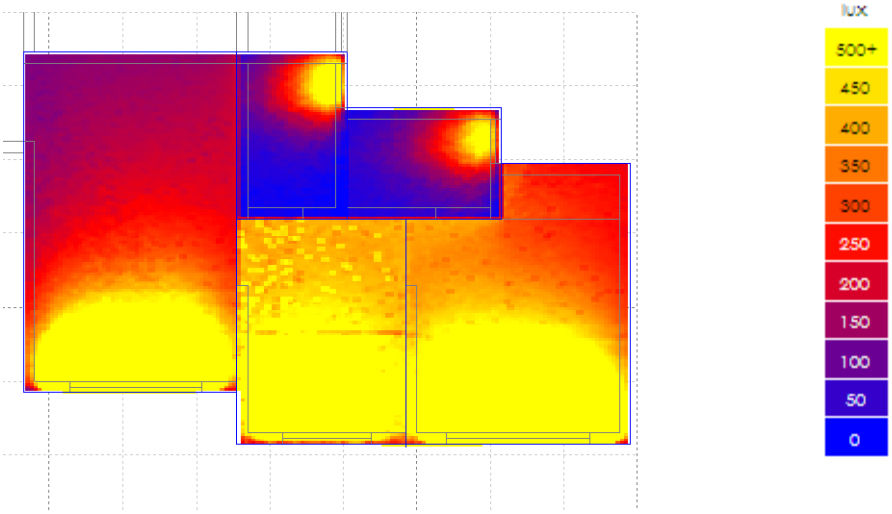
Simulation Method - Clear sky condition on 21st September at 12 noon, at working plane, 750 mm.

Glass VLT – 50%, Reflectances – Ceiling 70%, Wall 50% & Flooring 20%.

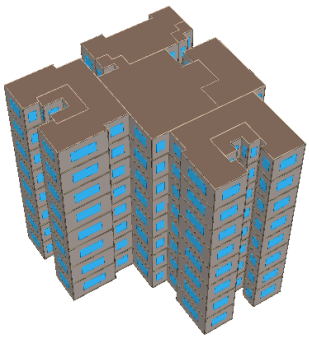
Typical Flat 1 – 1 RK

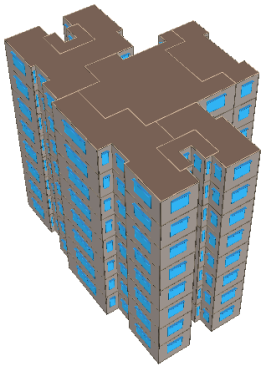


Typical Flat 2 – 1 BHK



VENTILATION ANALYSIS:





Simulation Method – IES VE MacroFlow

Geometry Inputs

⇩

Opening Properties

⇩

Operable Area	66%
Operating Time	As per occupancy schedule
Degree of Opening	33°C

Climate Data

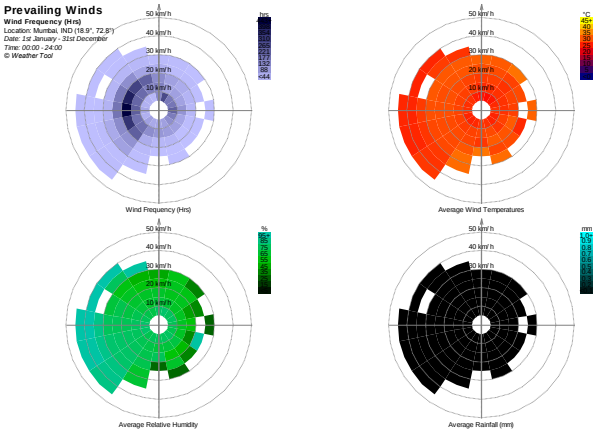
⇩

Weather File	Mumbai ISHRAE
Wind Speed	As per climate file

Obstruction Analysis

⇩

Ventilation Analysis



SECTOR 13 – TYPE B07 Typical **1 BHK Flat**

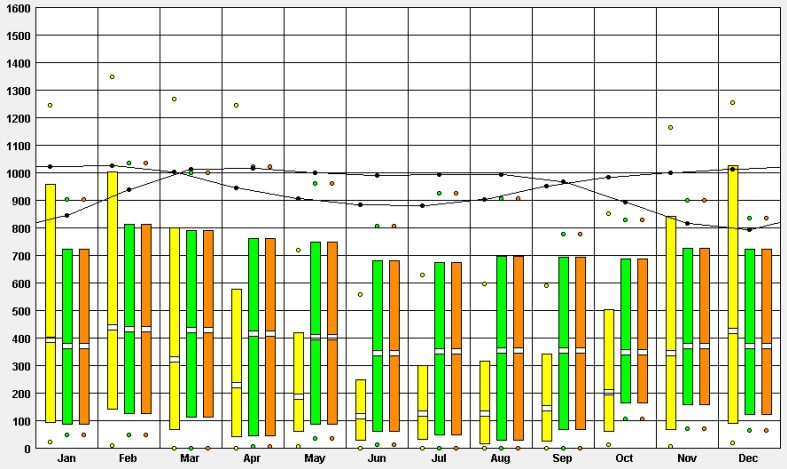
Space	Ventilation Rate	Required Ventilation as per NBC 2005	Compliance
Living Room	4.05	3 - 6	Yes
Kitchen	3.25	3 - 6	Yes
Bedroom 1	3.35	2 - 4	Yes

HEAT ISLAND EFFECT:

Urban development has serious effects on the global environmental quality, including the quality of air, increase in temperature and traffic congestion. Construction of building itself is related to global changes in terms of increase of urban temperatures, the rate of energy consumption, the increased use of raw materials, pollution and the production of waste, conversion of agricultural land to developed land, loss of biodiversity and water scarcity. An urban heat island is a climatic phenomenon in which urban areas have higher air temperature than their rural surroundings as a result of anthropogenic modifications of land surfaces, significant energy use and its consequent generation of waste heat. Thus, this might prove to be an unsustainable factor that leads to excessive energy use for cooling and putting the urban population at great risk for morbidity and mortality. According to the above perspective and considering that rapid and huge population growth is expected in the near future, it becomes increasingly important to apply heat island mitigation strategies in order to reduce energy consumption and improve the quality of life.

Effects of Urban Heat Island

- Increased in cooling demand;
- Increased in energy usage;
- Increased air pollution;
- Increased CO2 emissions;
- Climate change;
- Increase health problems;
- Heat related illness & death;
- Impaired water quality



Absorption of solar radiation

During the day in rural areas, the solar energy absorbed near the ground evaporates water from the vegetation and soil. Thus, while there is a net solar energy gain, this is compensated to some degree by evaporative cooling. In urban development, where there is less vegetation, the buildings, streets and sidewalks absorb the majority of solar energy input.

CONCLUSION -

From the results on the next page, it can be clearly seen that because of measures like Solar Panels on roof, Light Coloured or Open Grid Pavers, Shaded Streets, Maximum Green Area etc. there is a considerable decrease of 73% in the Surface Absorbed Radiation resulting is reduction of Cooling Loads.

Case 1: The case has been assumed with all the proposed buildings with convectional finish on top, asphalt road and dark colored paving on site without any green space.

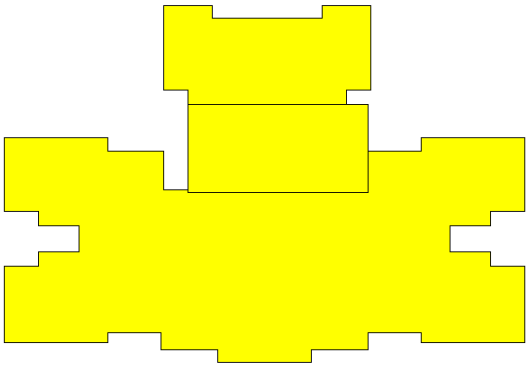
Case 2: The case has been proposed with light coloured road surface and paver blocks with green space in open area areas which is help to reduce urban air temperature in surroundings.

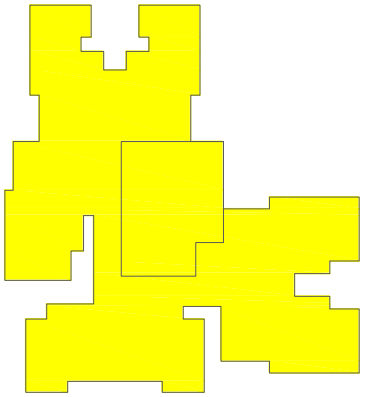
High SRI Paints

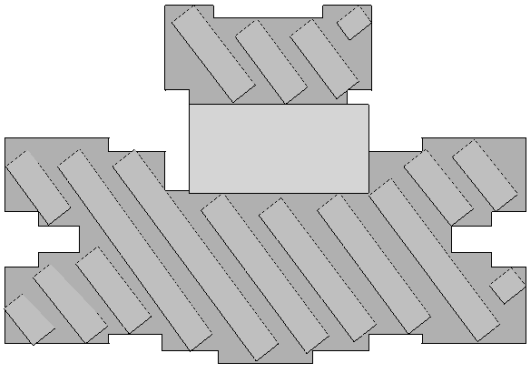
Light Colored Paver Block

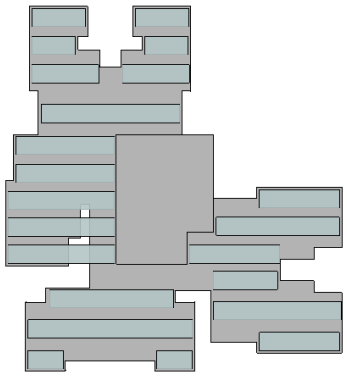
Light Coloured & Shaded Roads

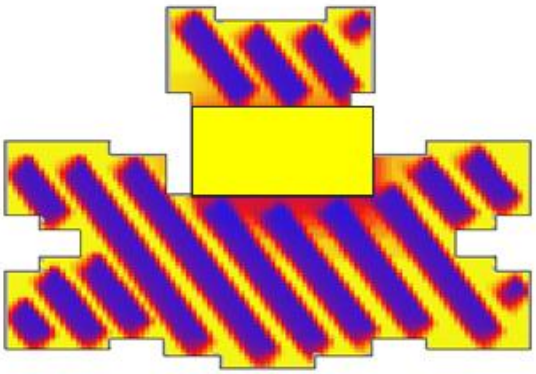
Green Open Area

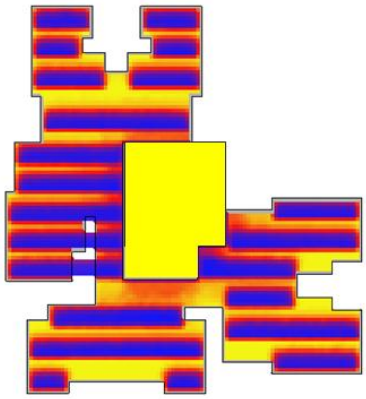








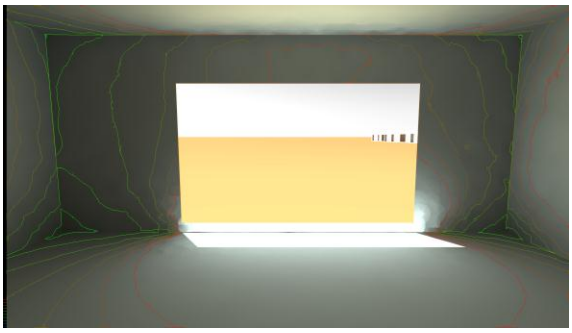




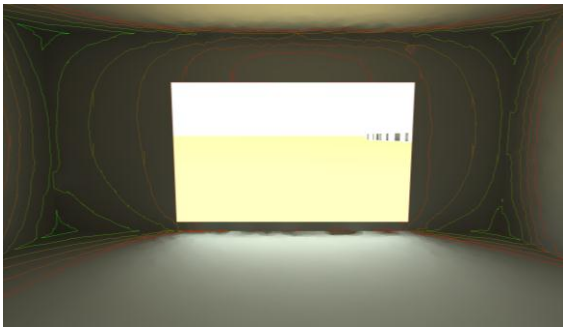
SHADING & RADIATION:

Analysis of Window Shades on South Façade -

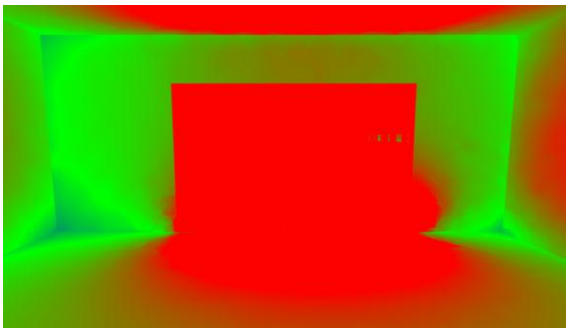
Human Sensitivity Effect
Without Shades

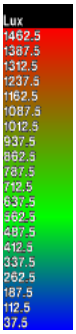


Human Sensitivity Effect
with Shades

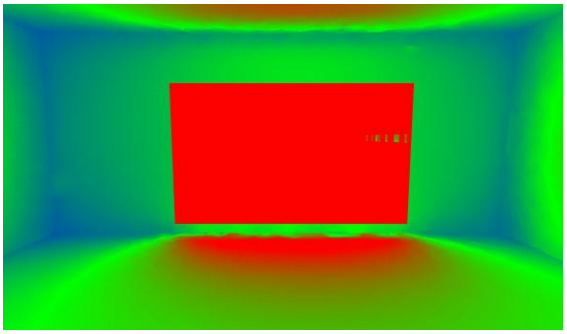


False Colour Rendering
Without Shades

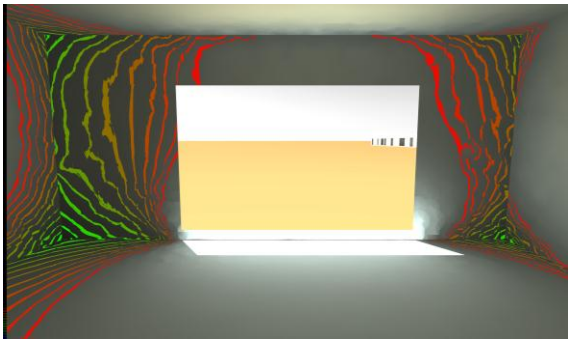




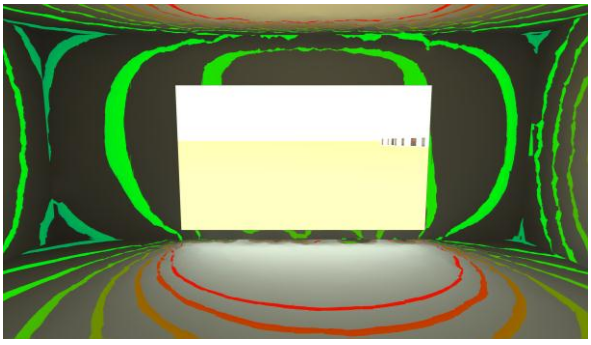
False Colour Rendering
with Shades



Lux Counter Diagram
Without Shades



Lux Counter Diagram
with Shades

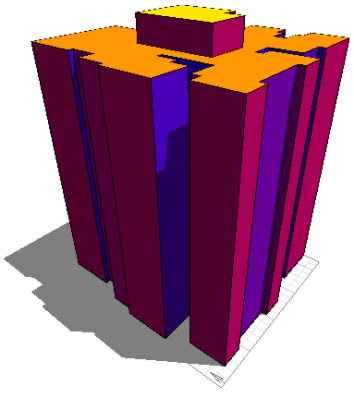


All windows have been provided Shades of 750 mm depth. Above images explain the effectiveness of Shades. First image shows that penetration of Direct Radiation is completely nullified. Second image confirms that Glare is reduced & Visual Comfort is increased. Third image clarifies that daylight is Evenly Distributed in the space.

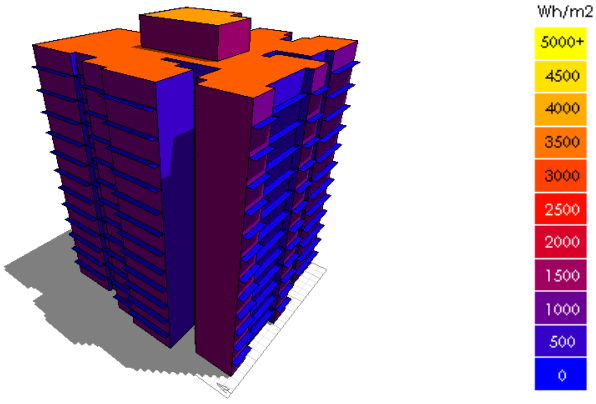
Analysis of Incident Radiation on East & South Façade -

SECTOR 13 – TYPE B 07

Incident Radiation on East Facade
Without Shades

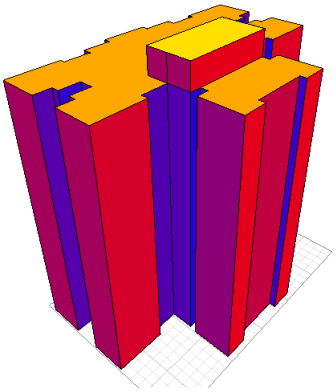


Incident Radiation on East Facade
with Shades

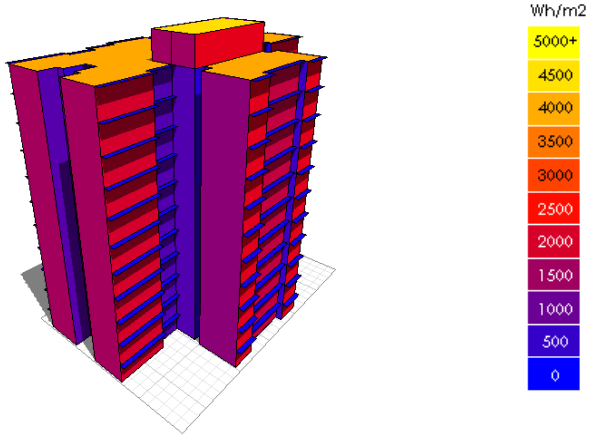


SECTOR 14 – TYPE A1

Incident Radiation on South Facade
Without Shades



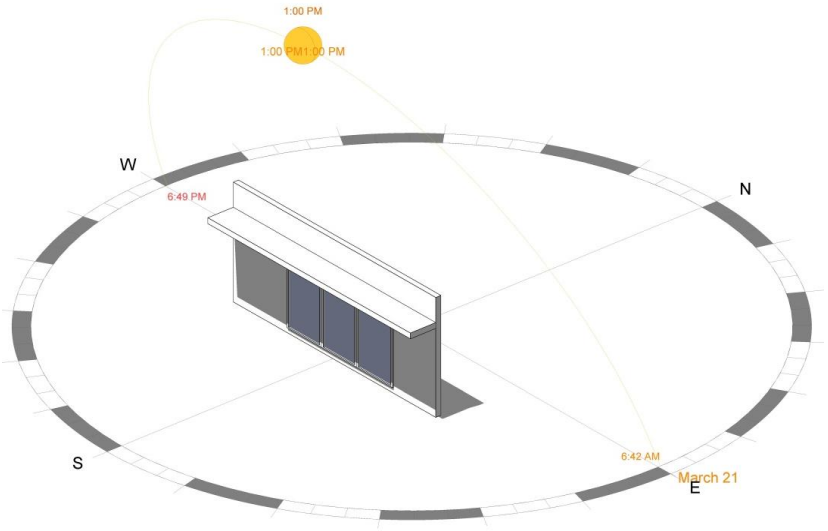
Incident Radiation on South Facade
with Shades



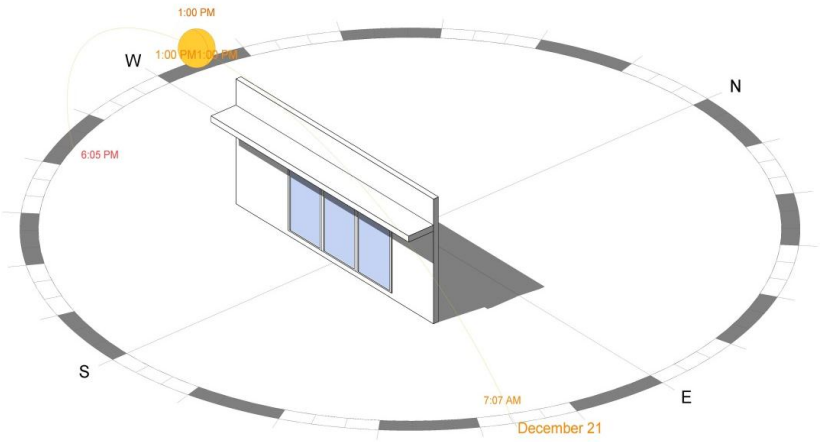
CONCLUSION -

The incident solar ingression has been analyzed for East Facade (SECTOR 13 – TYPE B 07) and South façade (SECTOR 14 – TYPE A1), considering both the surfaces are most critical during summer period. In case 1, analysis was carried out on both the facades without shades. The same orientation is analyzed with overhangs of 750mm in Case 2. For (SECTOR 13 – TYPE B 07) the East façade is getting reduced incident radiation by 37%. Similarly for (SECTOR 14 – TYPE A1) the South façade are getting reduced incident radiation by 21%.

Following images also show that the windows are completely shaded in summer season blocking summer heat & welcoming winter sun when it is required.



21ST MARCH 1PM



21ST DECEMBER 1PM

RENEWABLE ENERGY:

RET Screen Calculation		
Solar tracking mode		Fixed
Slope		20
Azimuth		0
Solar Data		
Photovoltaic		
Type		poly - Si
Power Capacity	**kW**	**1240**
Manufacturer		DelSolar
Model		Poly - Si - D6P - 230W - B3 A
Number of Units		5387
Efficiency	%	14%
Nominal operating cell temperature	° C	45
Temperature coefficient	% / ° C	0.4
Solar collector area	m ²	8787
Miscellaneous losses	%	5%
Inverter		
Efficiency	%	85%
Capacity	kW	619.5
Miscellaneous losses	%	5%
Summary		
Capacity Factor	%	16.90%
Electricity export rate	Electricity explored to Grid - annual	
Electricity exported to grid	**MWh**	**1446**

Considering the Sun Path of Mumbai city, it is recommended to install PV cells on south side at an angle of 20 Degree facing South for maximum average efficiency round the year. The efficiency of the PV cell is considered as 14% & inverter is 85%.

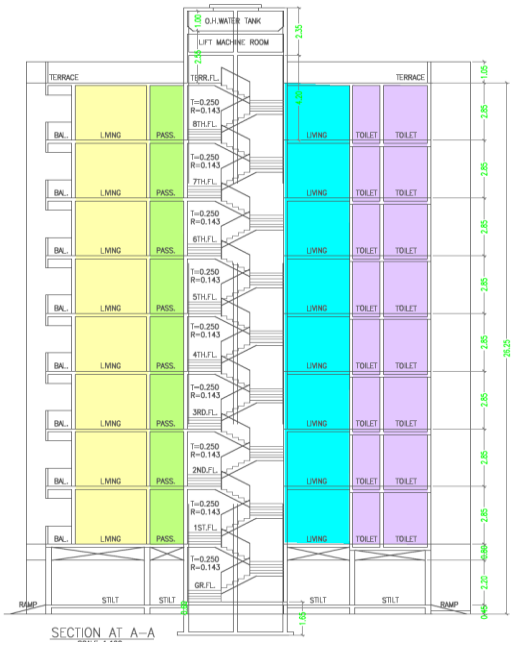
Considering all these factors & climate of Mumbai city (As per ISHRAE Weather File), it is calculated that, solar panels of 1240 KWp capacity will generate 1446 MWh electricity annually which means 3962 kWh / day which concludes that solar panels of 1 KWp capacity will generate 3.19 kWh / day.

For the proposed project the installation cost calculated of Solar Panel to generate 1446 Mwh annually is around 12.4 Crore in addition to this 50,000 Rs. are considered for annual maintains and operations.

ENERGY ANALYSIS:

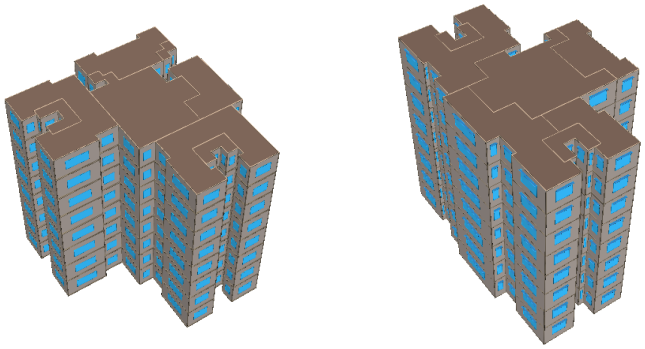
Expansion of "Paradise City" -Proposed Residential and commercial building At S. No. 942 Pt, at Village Mahim, Tal Palghar, Dist – Thane. which lies in western India. The total built-up area of residential buildings is about 5, 60,657m2 distributed over a large area along with club house facility & other amenities. The overall Window to Wall Ratio is approximately 25%.

A zoning plan was developed for each floor & entered into the simulation model. Each zone was assigned a set of properties including lighting power density, equipment power density, occupancy rate, outside air requirement etc. Each zone was also assigned physical properties of floor-to-floor height, material conductivity & fenestration area etc.



A baseline building as per the properties stated in ECBC 2007 was modelled. The Building was simulated with actual orientation and again after rotating the entire Building by 90, 180 & 270 Degrees and then the annual energy consumption results were averaged out to get the ECBC 2007 Baseline Building Energy consumption in kilowatt hours. As per ECBC 2007, the average base case energy consumption does not consider the effect of building shades & overhangs.

A wide range of actual as-designed parameters such as Envelope (roofs, walls), Windows (type of window glass), Lighting (lighting power density), reduced Exterior Lighting, efficient system design were added to the Baseline case to simulate the performance of the designed building.



The project has been modelled with the e-QUEST energy analysis software that uses the DOE 2.2 Building energy simulation engine. The e-QUEST energy modelling software allows for a graphical display of all the 3-dimensional geometry entered in the application to describe the building. As per the view shown, the Building has been modelled in detail to improve the accuracy of analysis work. The project objective is to evaluate energy use and the energy efficiency performance of the Building.

BASELINE MODEL – As per Conventional Case

The ECBC 2007 Minimally Compliant Baseline model is used to benchmark the design case. This model geometry is based upon the design case, but the performance parameters listed below are defined to reflect the minimum efficiency levels that ECBC 2007 defines for various building components.

These parameters are listed below.

Building Envelope

- Exterior wall construction:

  U-value – 1.87 W/Sq.m.K

- Roof Construction:

  U-value – U-value – 2.27 W/Sq.m.K

- Window wall ratio: 24%.

- Fenestration type:

  U-Value : 5.7 W/Sq.m.K

  SC (All) : 0.80

- Shading Devices: None.

Lighting Equipment

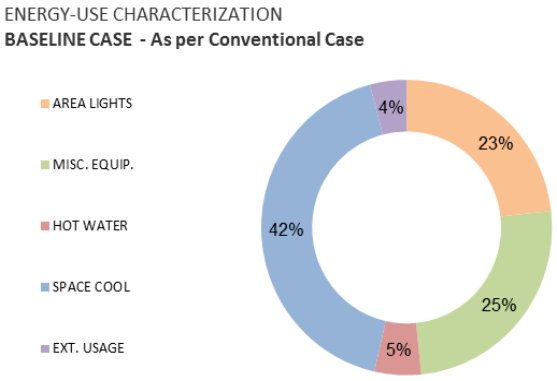
- Lighting Power Density is considered according
- to building area method,

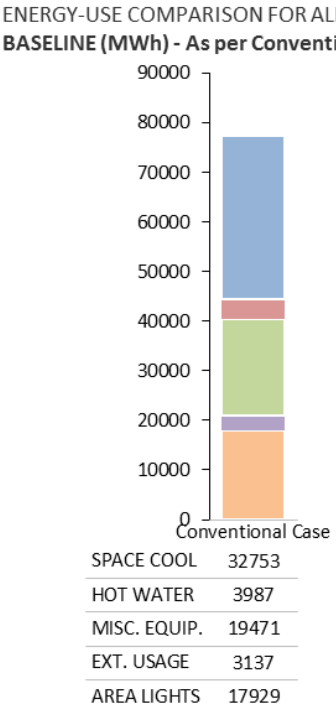
  LPD : 1.0 W/sq.ft.

Air Side HVAC System

- As per ANNEXURE-I all bedrooms and living rooms are modelled as conditioned spaces with unitary air conditioners assigned to each zone with COP 3.0. Kitchen areas are modelled with unit ventilators.

The annual energy consumption for baseline case, broken down by end-use shows that Lighting (23%) and Equipment (25%) are the largest components after HVAC (42%).





SPACE COOL	32753
HOT WATER	3987
MISC. EQUIP.	19471
EXT. USAGE	3137
AREA LIGHTS	17929

Based on above parameters, The average base-case consumption is 77,277.

BASELINE MODEL – As per ECBC 2007

The ECBC 2007 Minimally Compliant Baseline model is used to benchmark the design case. This model geometry is based upon the design case, but the performance parameters listed below are defined to reflect the minimum efficiency levels that ECBC 2007 defines for various building components.

These parameters are listed below.

Building Envelope

- Exterior wall construction:

  U-value – 0.44 W/Sq.m.K

- oof Construction:

  U-value – 0.409 W/Sq.m.K

- Window wall ratio: 24%.

- Fenestration type:

  U-Value : 3.3 W/Sq.m.K

  SC (All) : 0.29

- Shading Devices: None.

Lighting Equipment

- Lighting Power Density is considered according

- to building area method,

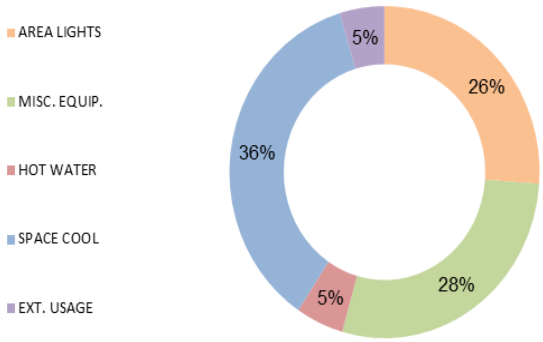
  LPD : 0.70 W/sq.ft.

Air Side HVAC System

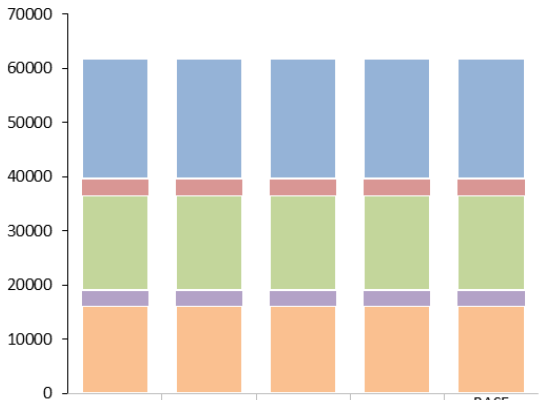
- As per ANNEXURE-I all bedrooms and living rooms are modelled as conditioned spaces with unitary air conditioners assigned to each zone with COP 3.0. Kitchen areas are modelled with unit ventilators.

The annual energy consumption for baseline case, broken down by end-use shows that Lighting (26%) and Equipment (28%) are the largest components after HVAC (36%).

ENERGY-USE CHARACTERIZATION
BASELINE CASE - As per ECBC 2007



ENERGY-USE COMPARISON FOR ALL END-USES
BASELINE (MWh) - As per ECBC 2007



	0°	90°	180°	270°	BASE LINE
SPACE COOL	22,253	22,188	22,286	22,155	22,221
HOT WATER	3,077	3,077	3,077	3,077	3,077
MISC. EQUIP.	17,485	17,485	17,485	17,485	17,485
EXT. USAGE	2,886	2,886	2,886	2,886	2,886
AREA LIGHTS	16,144	16,144	16,144	16,144	16,144

Based on above parameters, The average base-case consumption is 61,813 MWh.

PROPOSED CASE

Proposed case assumptions are based on project drawings and operating parameters assumptions based on experience and standards.

Building Envelope

- Exterior wall construction : 8" AAC Block wall

  U-Value : 0.56 W/Sq.m.K

- Roof Construction : 6"RCC + 2" XPS Insulation

  U-Value : 0.404 W/Sq.m.K

- Window to wall ratio: 24%

- Fenestration type:

  Saint Gobain ST 150 Clear (SGU)

  U-Value : 5.7 W/Sq.m.K
  SC : 0.62
  VLT : 51%

- Shading Devices: As per Design.

Lighting Equipment

- Lighting Power Density is considered according to building area method,
  - LPD : 0.50 W/sq.ft.

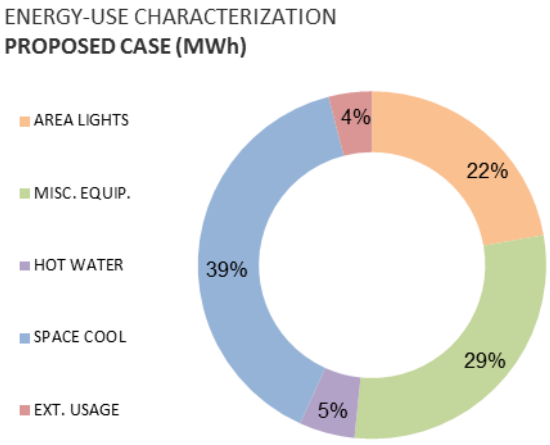
Air Side HVAC System

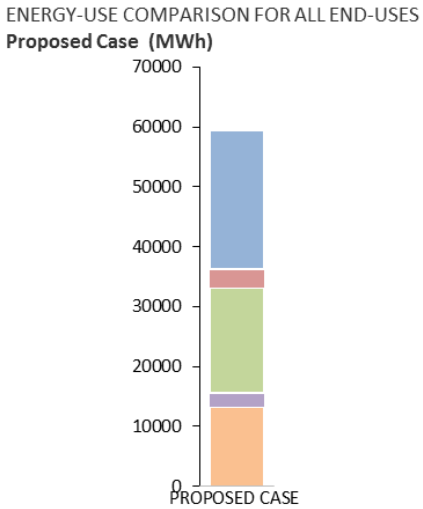
- As per ECBC 2007, all bedrooms and living rooms are modelled as conditioned spaces with unitary air conditioners assigned to each zone with COP 3.0. Kitchen areas are modelled with unit ventilators.

Utility Rates -

- Energy charge : 5/kWh

The annual energy consumption for proposed case, broken down by end-use shows that Interior Lighting (22%) and Miscellaneous Equipment (29%) are the largest after HVAC (39%).





SPACE COOL	23332
HOT WATER	3077
MISC. EQUIP.	17485
EXT. USAGE	2395
AREA LIGHTS	13238

Based on above parameters, The base-case consumption is 59,527 MWh.

SUMMARY

The Proposed case model shows significant savings in internal lighting as well as space cooling energy consumption as compared with the ECBC 2007 stipulated baseline model. These energy reductions can primarily be attributed to improved lighting power density and reduction in cooling loads due to improved envelope and glazing specifications.

For the purposes of determining energy savings in rupees, the energy costs for the proposed case model are compared to the energy costs for the ECBC 2007 minimally-compliant model.

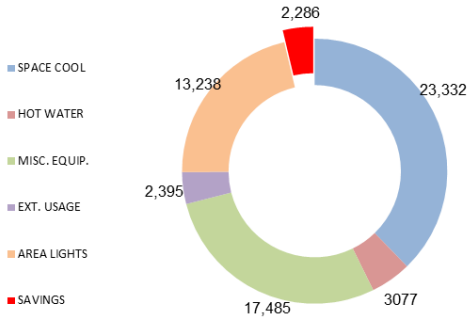
Based on the final design considerations for building envelope and equipment, it is noted from the results of energy simulation that by using efficient envelope and lighting, the total annual energy required for Expansion of "Paradise City" -Proposed Residential and commercial building At S. No. 942 Pt, at Village Mahim, Tal Palghar, Dist – Thane., is 59,527 MWh. The energy required for the baseline model as per conventional case is simulated to be 77,277 MWh. whereas energy required for the baseline model as per ECBC 2007 Base case is simulated to be 61,813 MWh. The total energy saving is 22.97% over conventional Base case and 3.70% over ECBC 2007 Base Case.

With current proposed case, the project is saving upto 3.70% in energy over ECBC 2007 base case & will be able to save 2286 MWh annually.

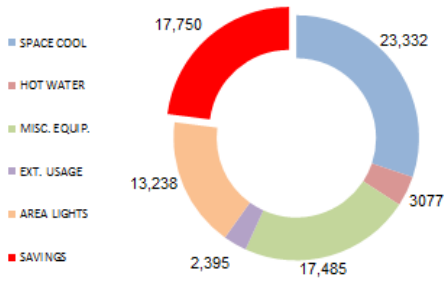
Similarly, with current proposed case, the project is saving upto 22.97% in energy over Conventional base case & will be able to save 17,750 MWh annually.

In addition to this, if we consider Solar PV generation from 1240 kW, which is 1446 MWh, the final saving will rise to 6.03% over ECBC 2007 Base case and 24.84% over Conventional Case.

ENERGY (MWh) FOR END-USES PROPOSED CASE SHOWING SAVINGS OVER BASELINE - ECBC 2007

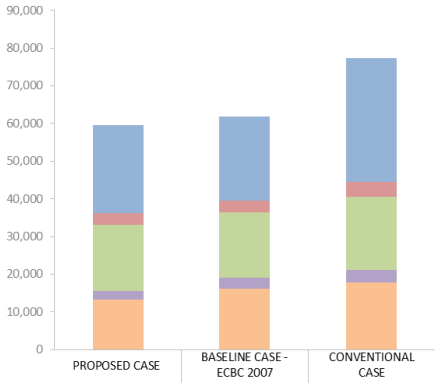


ENERGY (MWh) FOR END-USES PROPOSED CASE SHOWING SAVINGS OVER BASELINE - CONVENTIONAL CASE



ENERGY-USE COMPARISON FOR ALL END-USES

Proposed Case vs Baseline - As per ECBC 2007 VS Baseline - As per Conventionacase (MWh)

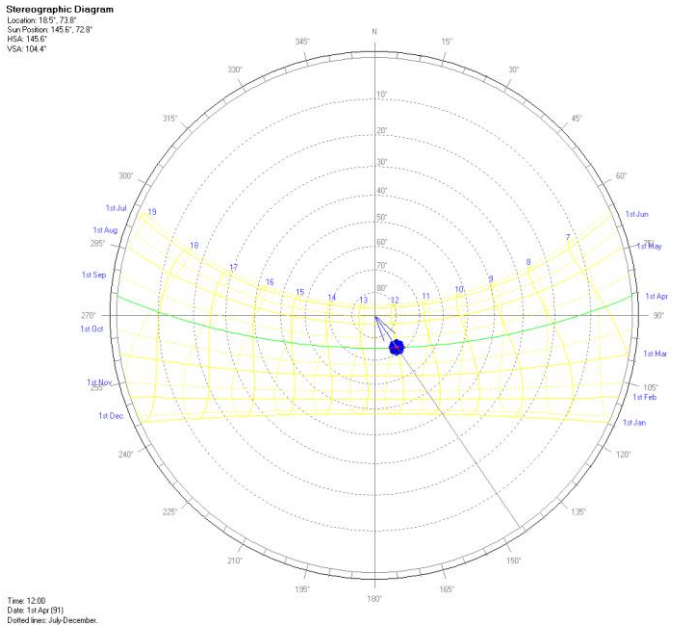


	PROPOSED CASE	BASELINE CASE - ECBC 2007	CONVENTIONAL CASE
SPACE COOL	23332	22221	32753
HOT WATER	3077	3077	3987
MISC. EQUIP.	17485	17485	19471
EXT. USAGE	2395	2886	3137
AREA LIGHTS	13238	16144	17929
Total	59,527	61,813	77,277

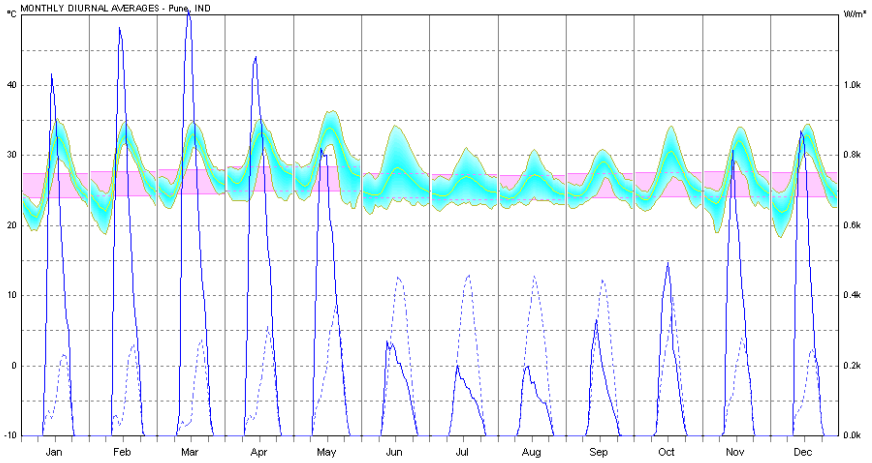
APPENDIX I

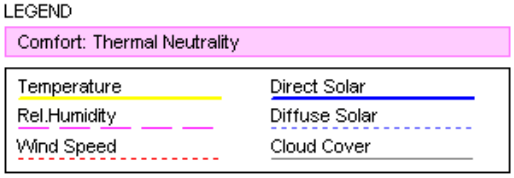
WEATHER DATA:

Sun Path, Avg. Monthly Temperature & Solar Radiation -



Sun Path Diagram for Mumbai





Design Temperature for Mumbai

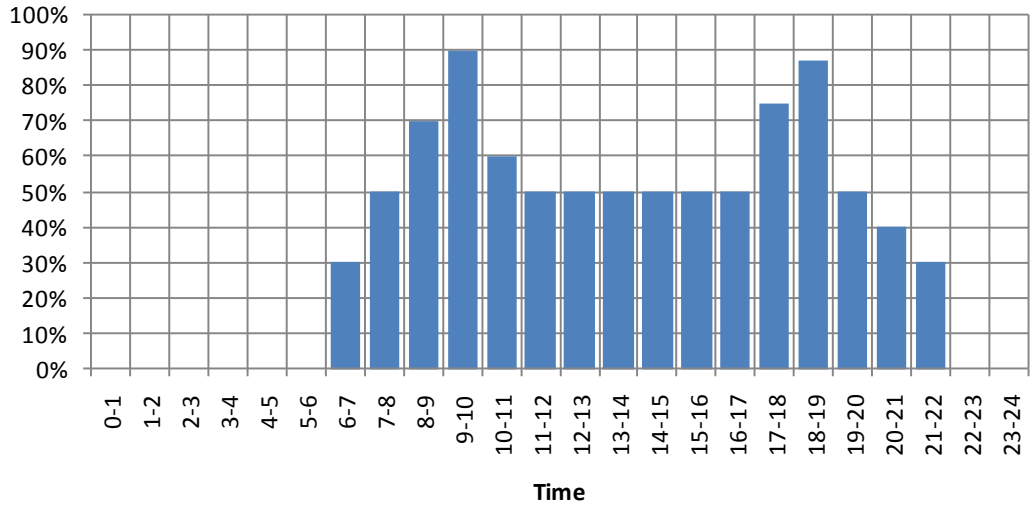
APPENDIX II

Detailed comparison between Base case & Proposed case:

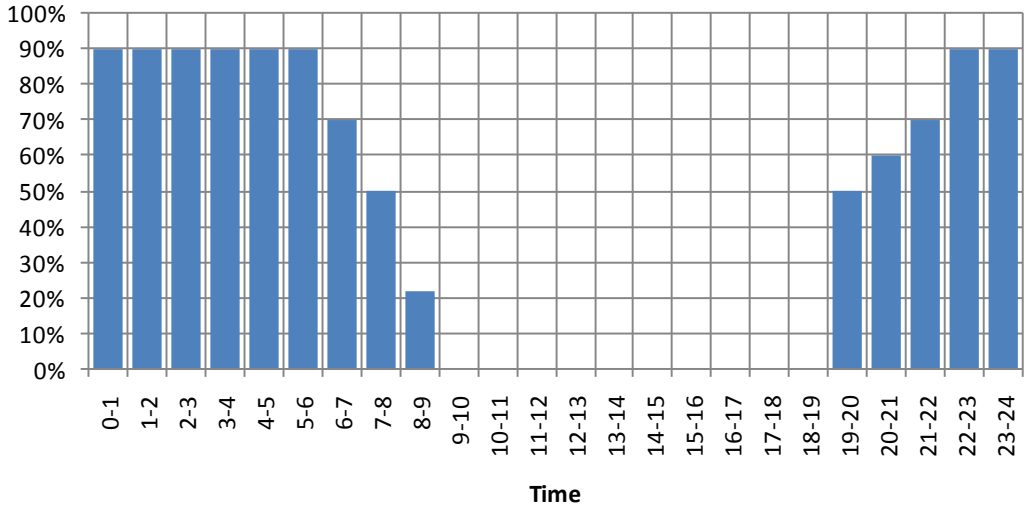
S.NO.	Model Input Parameter	Conventional Case	Baseline Case (As per ECBC 2007)	Proposed Case
1.	Exterior Wall Construction	U-factor = 1.87 W/Sq.m.K	U-factor = 0.44 W/Sq.m.K	8" AAC wall construction U-factor = 0.56 W/Sq.m.K
2.	Roof Construction	U-factor = 2.279 W/Sq.m.K	U-factor = 0. 409 W/Sq.m.K Insulation entirely above deck.	6" RCC slab with 2"XPS Insulation U-factor = 0. 404 W/Sq.m.K
3.	Glazing	U Value: 5.7 W/Sq.m.K SC (All) : 0.80 For Fenestration Assembly	U Value: 3.3 W/Sq.m.K SC (All) : 0.29 For Fenestration Assembly	Saint Gobain ST 150 Clear Single Glazed Unit U Value : 5.7 W/Sq.m.K SC : 0.62 VLT : 51%
4.	WWR	24%	24%	24%
5.	Shading	No shades	No shades	Shading as per Design
6.	Equipment Power Density	1.5 W/ft^2	1.5 W/ft^2	1.5 W/ft^2
7.	Pumps & Motors	Standard – 60%	Standard – 70%	Standard – 85%
8.	Lighting Power Density	1.0 W/ft^2	0.70 W/ft^2	0.50 W/ft^2
9.	External Lighting Load	734 kW	490 kW	343kW
10.	Domestic Hot Water Generation	Electric	20% on Solar	20% on Solar
11.	HVAC System Type	Packaged Single Zone (Split Unit)	Packaged Single Zone (Split Unit)	Packaged Single Zone (Split Unit)
12.	Coefficient of Performance	3.0	3.0	3.0
13.	Ventilation Requirement (ACPH As per NBC)	Living 4, Kitchen 5, Bedroom 3.	Living 4, Kitchen 5, Bedroom 3.	Living 4, Kitchen 5, Bedroom 3.
14.	Domestic Hot Water Consumption	15 ltrs/person/day	15 ltrs/person/day	15 ltrs/person/day
15.	Process Loads	13445 kW	13445 kW	13445 kW

APPENDIX III

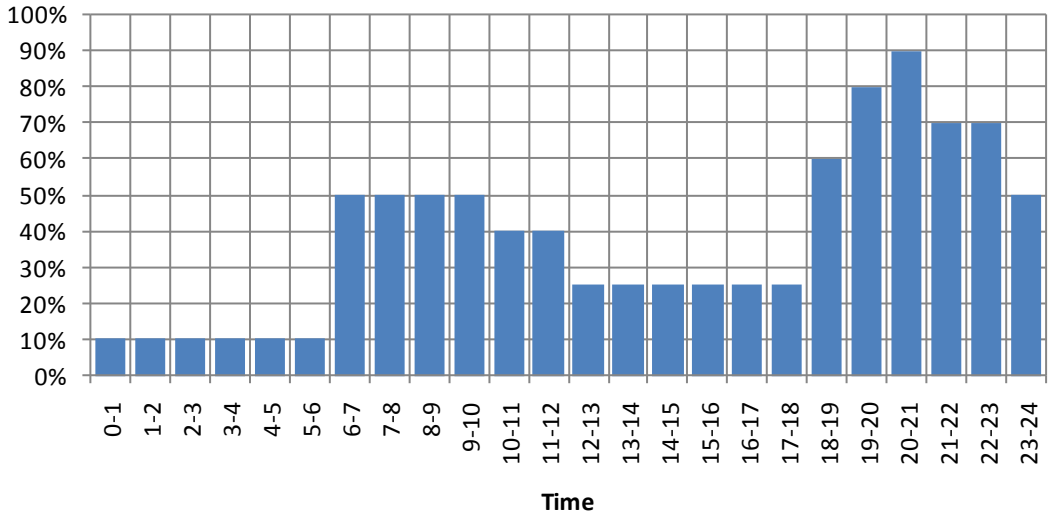
Schedules Used for calculations –



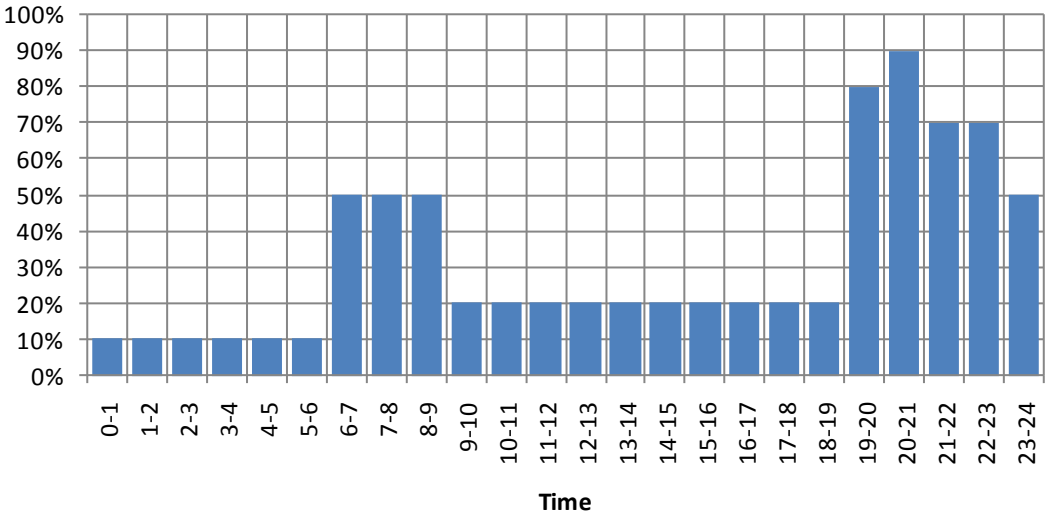
Typical Occupancy Schedule for Living room, Dining room & Kitchen



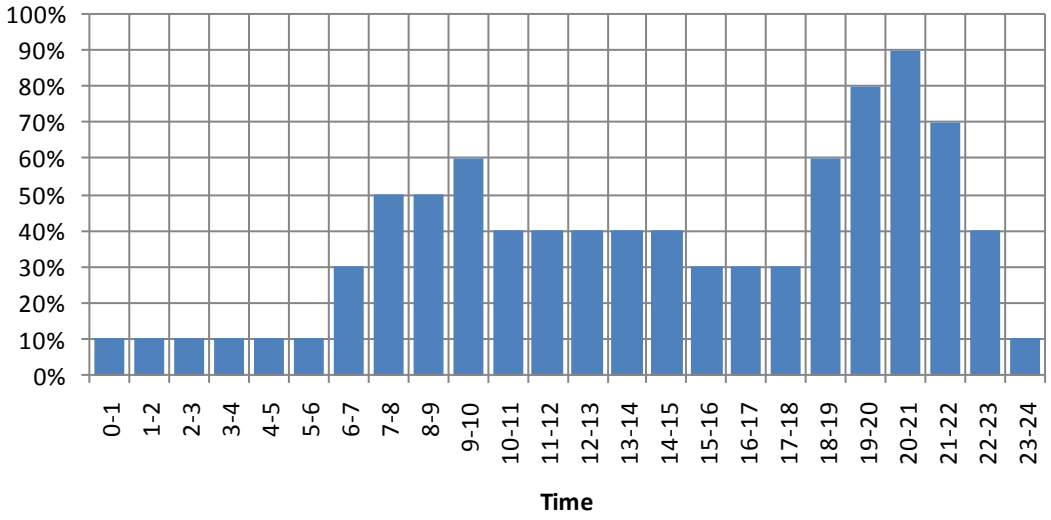
Typical Occupancy Schedule for Bedrooms



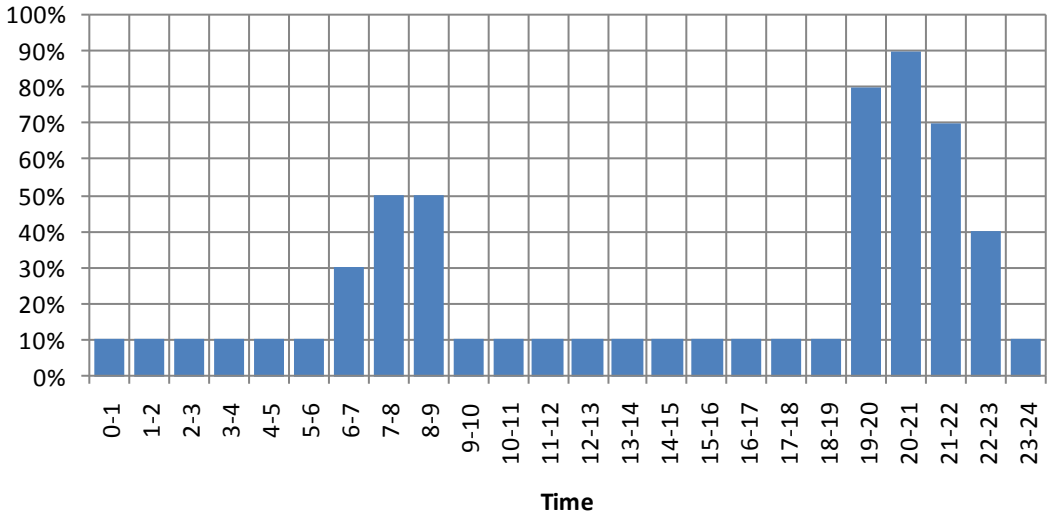
Typical Lighting Schedule for Living room, Dining room & Kitchen



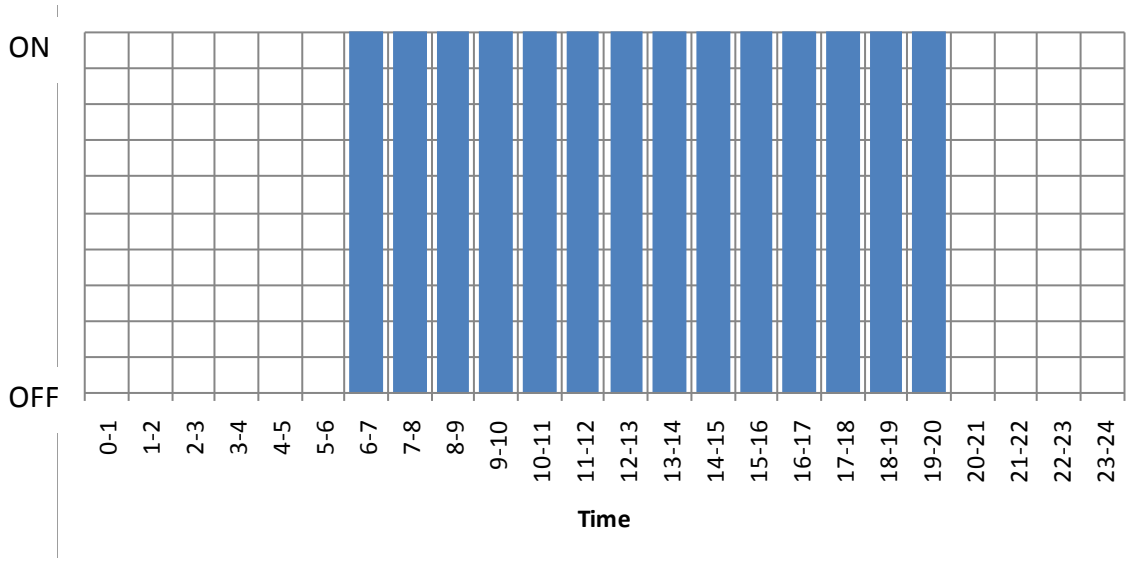
Typical Lighting Schedule for Bedrooms



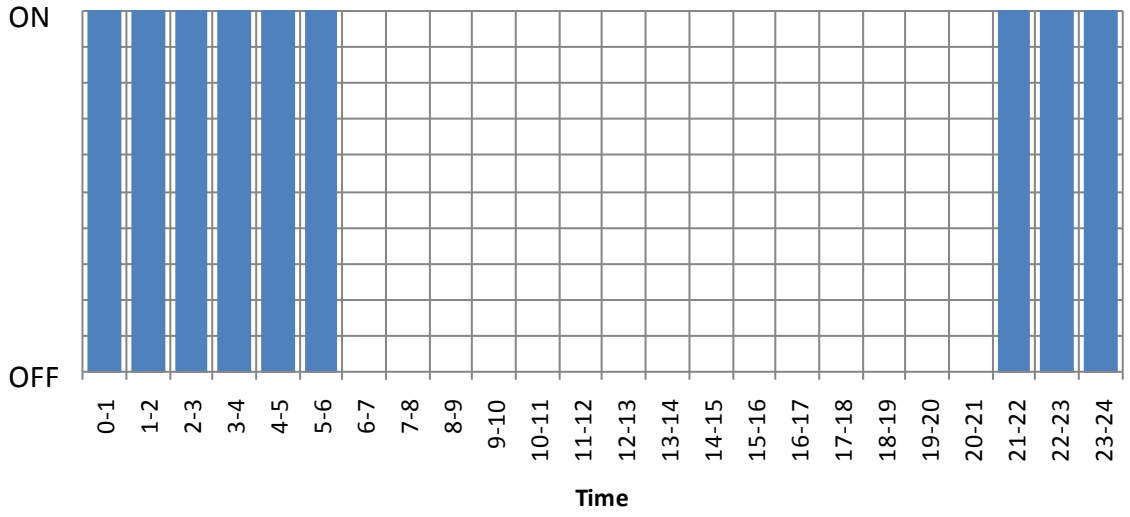
Typical Equipment Schedule for Living room, Dining room & Kitchen



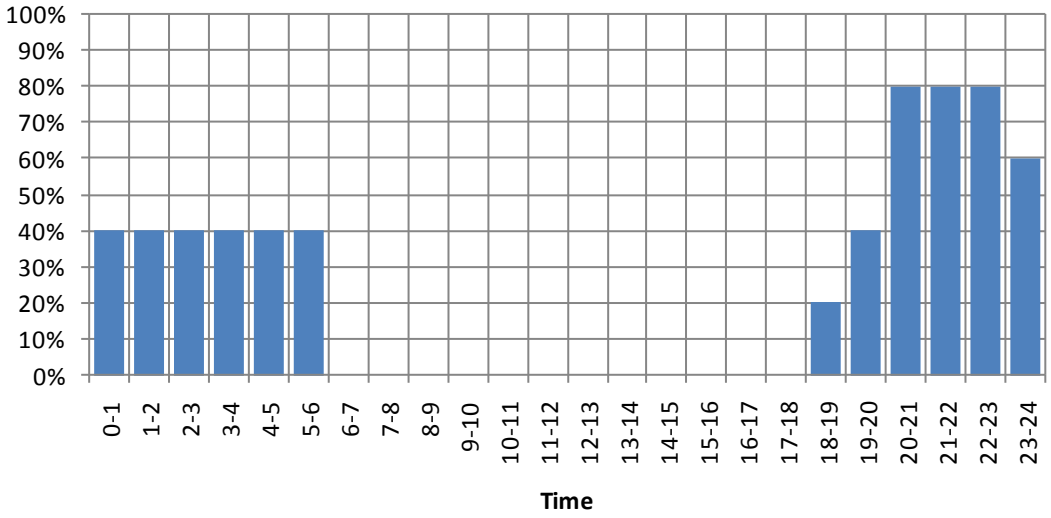
Typical Equipment Schedule for Bedroom



Typical Cooling Schedule for Living room & Dining room



Typical Cooling Schedule for Bedroom



Typical Exterior Lighting Schedule

APPENDIX IV

Solar PV Cutsheet –

DelSolar

D6P_B3A-WS
230 W - 250 W
Multi-Crystalline Photovoltaic Module

- Positive power tolerance
  0~+4.99 watt
- Withstand strong wind/snow load up to 5400 Pa
  Pass ASTM E330
  Maximum wind speed: 197 km/h (safety factor 3)
- Excellent low light performance
  4% relative eff. reduction at low-irradiance (200W/m²)
- PID resistant
  Enhanced module reliability
- 100% EL inline inspection
  Better module reliability
- Prolonged aging test
  2000 hours damp heat test; 400 thermal cycles
- Certified ammonia resistance
  According to IEC 62716 Ed. 1
- Compliance with cadmium content test
  According to IEC 62321

APPENDIX V

Building Envelope –

Calculation Of 'U' Value For A Wall Section -

Material Specification		'R' Value
1) Outside Air Film	–	0.17
2) 1" Cement Plaster	–	0.20
3) 8" AAC Wall	–	8.40
4) ½" Cement Plaster	_	0.10
5) Inside Wall Air Film	–	0.68
		9.55 h ft^2 f/btu

Therefore,

'R' Value of Vertical surface (Wall)	-	9.55 h ft^2 f/btu.
'U' Value - 1 / R - 1 / 9.55	-	0.10 btu/h ft^2 f. -
Value in W/Sq.m.K	-	0.56 W/Sq.m.K

Calculation of 'U' Value for a Roof Section -

Material Specification		'R' Value
1) Outside Air Film	–	0.17
2) Floor Finish	–	0.15
3) 1" Screed	–	0.20
4) 2" XPS Insulation	–	12.0
5) 1" Screed	–	0.20
6) 6" Concrete Slab	–	0.60
7) ½" Cement Plaster	_	0.10
8) Inside Ceiling Air Film	–	0.61
		14.03 h ft^2 f/btu

Therefore,

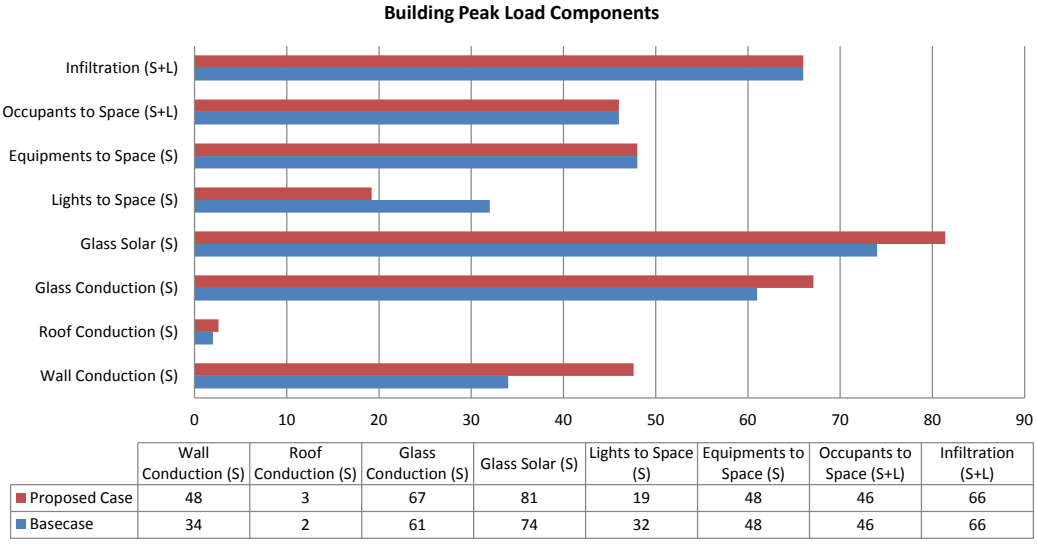
'R' Value of horizontal surface (Roof)	-	14.03 h ft^2 f/btu.
'U' Value - 1 / R - 1 / 14.03	-	0.071 btu/h ft^2 f.
Value in W/Sq.m.K	-	0.404 W/Sq.m.K

APPENDIX VI

Heat Gain Calculation –

Building Peak Load Components - LS-C Report, has been analysed here. The building heat gain comparison between base case & proposed case is as follows. It is clearly observed from the table below that, for a naturally ventilated residential building, Envelope Shading is also an effective strategy along with insulation. Though the Base case (With Insulation – Without Shading) still has a lesser heat gain as compared to Proposed case (Without Insulation – With Shading), but the difference is marginal & can be easily compensated by reducing lighting & Equipment consumptions. This is possible mainly because Reduced Sol Air Temp & Shaded Walls, Windows & Roof.

Peak Condition - 1 May 2 pm			
Sr. No.	Description	Heat Gain in kW Base Case Sensible + Latent	Heat Gain in kW Proposed Case Sensible + Latent
1	Wall Conduction (S)	34	48
2	Roof Conduction (S)	2	3
3	Glass Conduction (S)	61	67
4	Glass Solar (S)	74	81
5	Lights to Space (S)	32	19
6	Equipments to Space (S)	48	48
7	Occupants to Space (S+L)	46	46
8	Infiltration (S+L)	66	66
9	**Total Load**	**363**	**378**
10	**% Increase**	**3.94**	



	Wall Conduction (S)	Roof Conduction (S)	Glass Conduction (S)	Glass Solar (S)	Lights to Space (S)	Equipments to Space (S)	Occupants to Space (S+L)	Infiltration (S+L)
Proposed Case	48	3	67	81	19	48	46	66
Basecase	34	2	61	74	32	48	46	66

APPENDIX VII

Air Conditioning – LG Product Cut sheet -

Specification	Description	Model	LSA3ES5Z	LSA5ES5Z	LSA3EW3Z	LSA3EW5Z	LSA5EW3Z	LSA5EW5Z	LSA6EW3Z
	Star Rating		5	5	3	5	3	5	3
	Cooling	Watts	3516	5200	3516	3516	5200	5200	6200
Elec. Rating	Compressor	Type	Rotary - R22	Rotary - R22	Rotary - R22	Rotary - R22	Rotary - R22	Rotary - R22	Rotary - R22
	Power Supply	Volt/Phase/Hz.	230 / Single / 50	230 / Single / 50	230 / Single / 50	230 / Single / 50	230 / Single / 50	230 / Single / 50	230 / Single / 50
Performance	Power Input	Watts	1050	1530	1150	1050	1735	1530	2050
	Running Current	Amps	4,8	7,0	5,3	4,8	7,9	7,0	9,4
	EER / COP	W / W	3.35	3.40	3.06	3.35	3.00	3.40	3.02
	Air Circulation (In/Out)	CFM	390/1485	530/1550	390/1485	390/1485	530/1550	530/1550	530/1600
Features	Noise Level (Indoor)	dB	24	30	24	24	30	30	32
	IDU Size (Net)	(WxHxD) mm	889x280x205	1030x322x250	889x280x205	889x280x205	1030x322x250	1030x322x250	1030x322x250
	ODU Size (Net)	(WxHxD) mm	810x568x270	810x568x270	770x530x244	810x568x270	810x568x270	810x568x270	870x655x322
	IDU Weight (Net)	Kg	10	16	10	10	16	16	16
	ODU Weight (Net)	Kg	35	37	34	35	38	37	46
	Auto Air Swing		4-way	4-way	4-way	4-way	4-way	4-way	4-way
	Speed Setting	Cooling/Fan	4/3	6/5	4/3	4/3	6/5	6/5	6/5
	Display Type		Digital	Digital	Digital	Digital	Digital	Digital	Digital
	Auto Restart		✓	✓	✓	✓	✓	✓	✓
	Sleep Mode		✓	✓	✓	✓	✓	✓	✓
	On Timer		✓	✓	✓	✓	✓	✓	✓
	Off Timer		✓	✓	✓	✓	✓	✓	✓
	Dehumidification		✓	✓	✓	✓	✓	✓	✓
	Chaos Logic		✓	✓	✓	✓	✓	✓	✓
	Fuzzy Logic		✓	✓	✓	✓	✓	✓	✓
	Jet Cool		✓	✓	✓	✓	✓	✓	✓
	Night Glow Buttons - Remote		✓	✓	✓	✓	✓	✓	✓
	Sweet Dreamz Mode		✓	✓	✓	✓	✓	✓	✓
	e-Saver		✓	✓	✓	✓	✓	✓	✓
	Quiet Mode		✓	*	✓	✓	*	*	*
	Selectable Swing		✓	✓	✓	✓	✓	✓	✓
	Plasmaster Auto Clean		✓	✓	✓	✓	✓	✓	✓
	Easy Installation		✓	✓	✓	✓	✓	✓	✓
	Evaporator Type		3 Bend Eva	3 Bend Eva	3 Bend Eva	3 Bend Eva	3 Bend Eva	3 Bend Eva	3 Bend Eva
	Evaporator Fin Type		Blue	Blue	Blue	Blue	Blue	Blue	Blue
	Condenser Fin Type		Multiflow	Multi Flow	Gold	Multiflow	Multi Flow	Multi Flow	Multi Flow
Filters	Anti-Bacteria Filter		✓	✓	✓	✓	✓	✓	✓
	Triple Filter		✓	✓	✓	✓	✓	✓	✓
	Neo Plasma Filtation		*	*	*	*	*	*	*
	Plasmaster Ionizer		✓	✓	✓	✓	✓	✓	✓
	Virus and Allergy Safe Filter		✓	✓	✓	✓	✓	✓	✓

APPENDIX VIII Solar PV Breakup Calculations:–

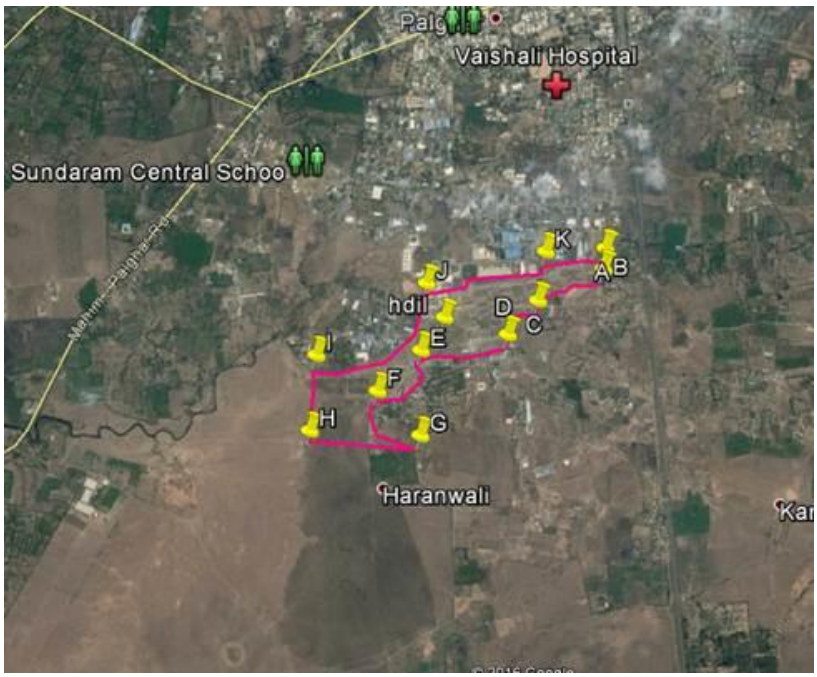
As per the calculations, 2 tube lights and 1 ceiling fan are proposed to run on Solar power (renewable energy) generation for each flat of Proposed Project.

Appliance	Energy Consumption Per Appliances (Watts)	No. Of Appliances	Total Energy Consumption (Watts)
LED Tube light	20	2	40
Celling Fan	60	1	60
Total Energy Consumption / Apartment			100
Total Number of apartments in proposed Project			12392 NO.
Required Renewable energy for proposed project			1239.2 kW
Renewable energy proposed for the Project			1240 kW

TRAFFIC IMPACT ASSESSMENT STUDY
of

Paradise City
Revised Existing and Proposed Group Housing Scheme for Residential And Commercial On Land Bering G. No. 942 T Village-Mahim, Taluka- Palghar, District-Palghar.

By
M/s. A Y Associates (M/s. HDIL)



Prepared by

Let's go to the sustainable age

Sustainable Approach for Green Environment

Sage

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Chapter 1

Introduction

1.1 Study Background

Revised Existing and Proposed Group Housing Scheme for Residential and Commercial On Land Bering G. No. 942 at Village-Mahim, Taluka- Palghar, District-Palghar, has been proposed by M/s. A Y Associates (M/s.HDIL). Conducting a TIA (Traffic Impact Assessment) is a part of the basic requirements to get any new establishment approved by the Ministry of Environment and Forestry (MoEF). The Ministry weighs the potential benefits of the establishment on the surrounding transportation and environmental systems against the negative impact and decides to approve or reject the construction of the proposed establishment.

(SAGE) Sustainable Approach for Green Environment LLP has been commissioned by the project proponent, M/s. A Y Associates (M/s.HDIL) to provide a Traffic Impact Study for this project.

1.2 Scope of the Study

The entire study can broadly be broken into the following tasks:

- Visit the site and understand the existing traffic pattern, traffic facilities and field constraints.
- Collect relevant traffic survey data through primary and secondary surveys fortraffic impact assessment.
- Quantify the traffic volume and density for road network around the project with and without extra demand for the coming project
- Project the traffic density for next 25 years for road network
- Study the traffic impact of the development on the surrounding road network with the consideration of future changes in the traffic and infrastructure.

- Study the internal traffic within the site layout to demonstrate the vehicular speed and space requirement.
- Calculate the time requirement to exit the vehicles for disaster management plan during peak hours.
- Identify the adequacy of the transport infrastructure and the remedial measures to improve the traffic plan.
- Preparation of final report, submission and presentation to the committee.

1.3 Report Structure

The report has been organized in the following order:

- **Chapter 1**: A brief introduction of the project
- **Chapter 2**: Background of the project and the road network to be studied is provided
- **Chapter 3**: The primary traffic surveys conducted to obtain the network traffic data
- **Chapter 4**: The performance of the road network in terms of LoS for the current and the projected future traffic and assess the impact of the proposed complex on the LoS.
- **Chapter 5**: Study of Parking space.
- **Chapter 6**: Traffic Management Plan during the development as well as after completion of proposed project for external and internal traffic.
- **Chapter 7**: Summary and Conclusion.

1.4 Design Parameters

The basic design parameters considered for the study has been illustrated below:

1. The social status as well as economic well-being of the residents plays an important role in determining the parking demand for any residential project.

2. The visitors will expect a safe and efficient circulation with good levels of service i.e. minimum waiting time at security check, proper traffic control at entry/exits, minimum congestion delays and pleasing aesthetics.

3. A design vehicle is a vehicle whose dimensions and operational characteristics are used to establish layout geometry. Toyota Innova (Big Car) and Maruti Swift (Small Car) and Volvo 400 (Fire Tender) were chosen as the design vehicles.

4. The maximum number of traffic a road can carry is referred to as its Capacity or design service volume. The service volumes considered for the project is given below:

Type of Roadway	Road Capacity*	Category
4-Lane (Two Way)	3600	Arterial

*Indian Road Congress 106:1990 Urban Road Capacity

5. Level of Service (LoS) can be defined as a letter designation that describes a range of operating characteristics on a given facility. Six Levels of Services are defined for capacity analysis. They are given letter designations from A to F, with LoS 'A' representing best level of operational standards and LoS 'F' the worst.

Table 1.1 Description of LoS Based on V/C Ratio

Level of Service (LoS)	Volume / Capacity Ratio (V/C)	Level of Comfort	Nature of flow
A	<0.30	**Highest**	Free flow
B	0.30 – 0.50		Reasonably free flow
C	0.50 – 0.70		Stable flow
D	0.70 – 0.90	**Threshold**	Approaching unstable flow
E	0.90 – 0.99		Unstable flow
F	≥1	**Lowest**	Forced Flow

1.5 Entry/Exit Lane Capacity

Entry / Exit Lane Capacity for Car Parks		
Sr. No.	**Type of Entry**	**Capacity (Veh/hour/lane)**
1	Free flow access into internal distributor road/structure (no parking spaces immediately after access i.e. Car Hoist distributing to several levels of car park)	800
2	Free flow access	580
3	Lifting-arm barrier without ticket issue	550
4	Lifting-arm barrier with automatic ticket issue (push button)	360
5	Lifting-arm barrier with access card (slot-based)	235
6	Lifting-arm barrier with transponder (no slot – RFID etc.)	380

Sr. No.	**Type of Exit**	**Capacity (Veh/hour/lane)**
1	Ticket on entry and payment at a manned exit	240
2	Lifting-arm barrier without ticket issue	550
3	Ticket on entry and variable payment to a machine linked to the exit barrier	270
4	Ticket on entry and operation of the exit barrier by a prepaid ticket or token	400
5	Free flow exit	Analysis based on specific road layout (i.e. yield etc.)

*Rates based on:Design recommendations for multistory and underground car parks, Institute of Structural Engineers, 3rd Edition, June 2002 and HBS 2001, FGSV Vertag, January 2002

As per international practices it is preferred to restrict the queue length to around 18m i.e. 3 vehicles. This is also linked with space availability at site for queuing.

Chapter 2

Project Background

The plot HDIL Paradise City at G. No. 942 at Village-Mahim, Taluka- Palghar, District-Palghar, is surrounded by different commercial buildings and hotels. The location of the plot is suitable for residential and commercial development.

The figure below shows the location of proposed site by M/s. A Y Associates (M/s.HDIL).

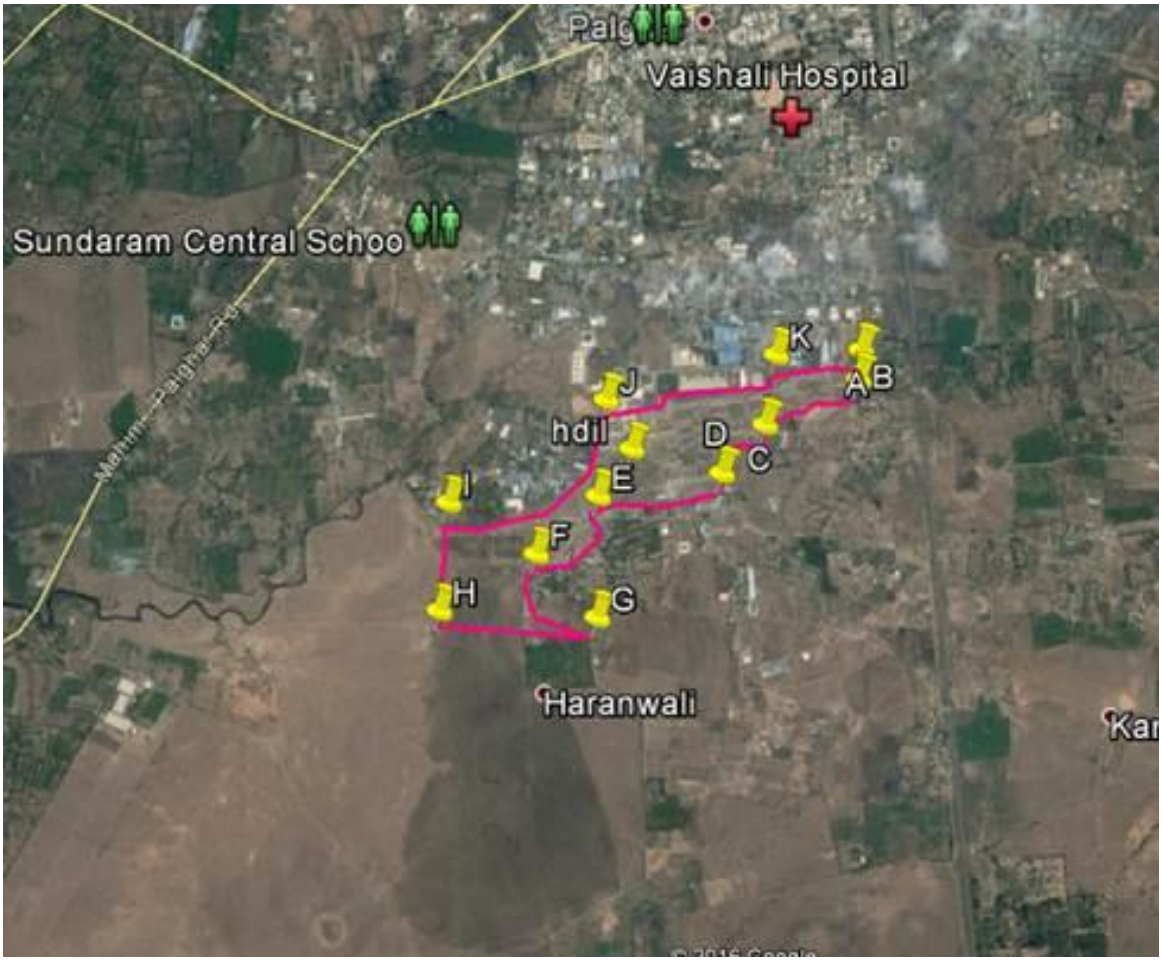

Figure 2.1 Location of Proposed Plot M/s. A Y Associates (M/s.HDIL).

Table 2.1 Building Configuration

Building	Configuration
Sector l - Vll C & Sector Xl	G(P) + ST(P) + 4
Sector Vlll – X & Sector Xll	G(P) + ST(P) + 8

Table 2.2 Details of Parking Area

Vehicles	Parking
Cars	809
Two Wheelers	25362

Chapter 3

Site Appreciation, Existing Transport Network and Base Traffic

Extensive surveys were conducted on the road network around proposed project for getting the primary data related to the road network. The extensive surveys include - Road Inventory Surveys for network geometry.

3.1 Survey Location

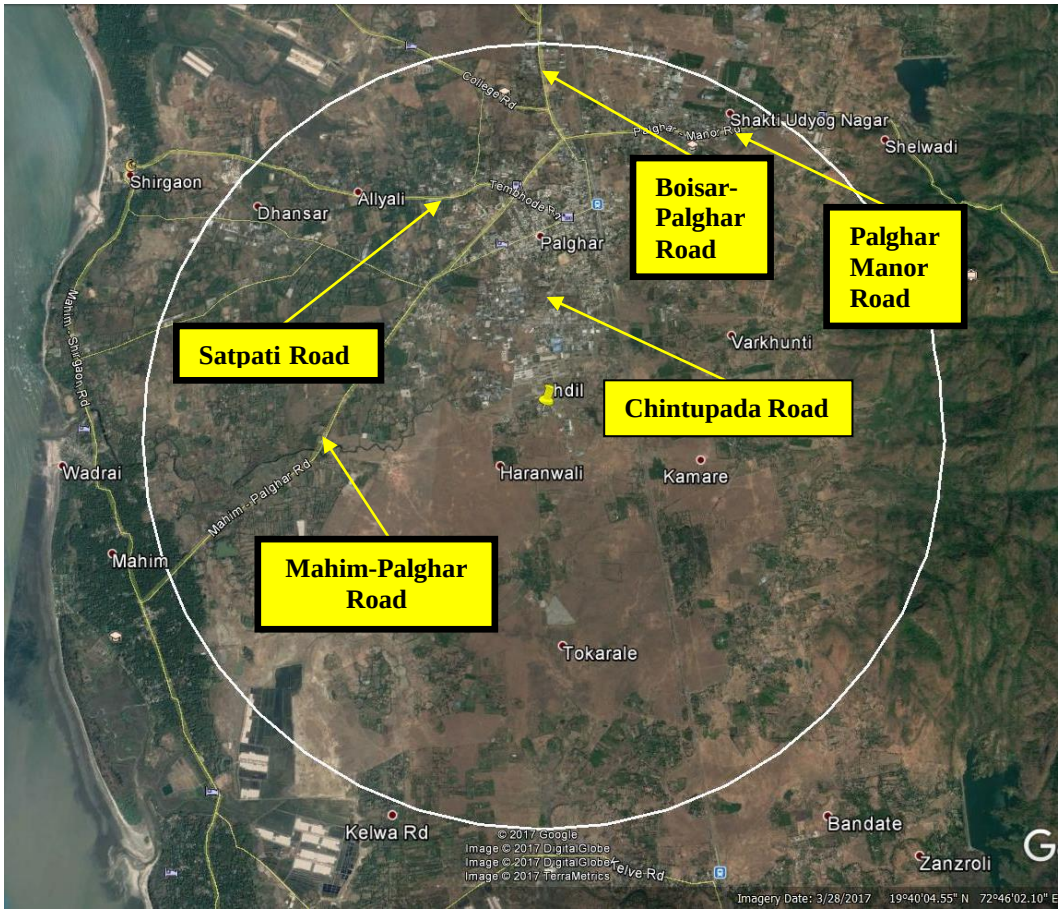

Figure 3.1 Location of Data collection

3.2 Schedule of Surveys for Data Collection

Table 3.1 Schedule of Survey

Sr. No.	Location	Date
1	Mahim-Palghar Road	17/04/2017
2	Satpati Road	17/04/2017
3	Boisar- Palghar Road	17/04/2017
4	Chintupada Road	17/04/2017

3.3 Road Inventory Survey

Traffic survey was conducted for 12 hours to understand the hourly traffic variation for the roads. The hourly traffic distribution for different vehicles for all the mentioned locations has been illustrated in the below figures:

3.3.1 Mahim- Plaghar Road

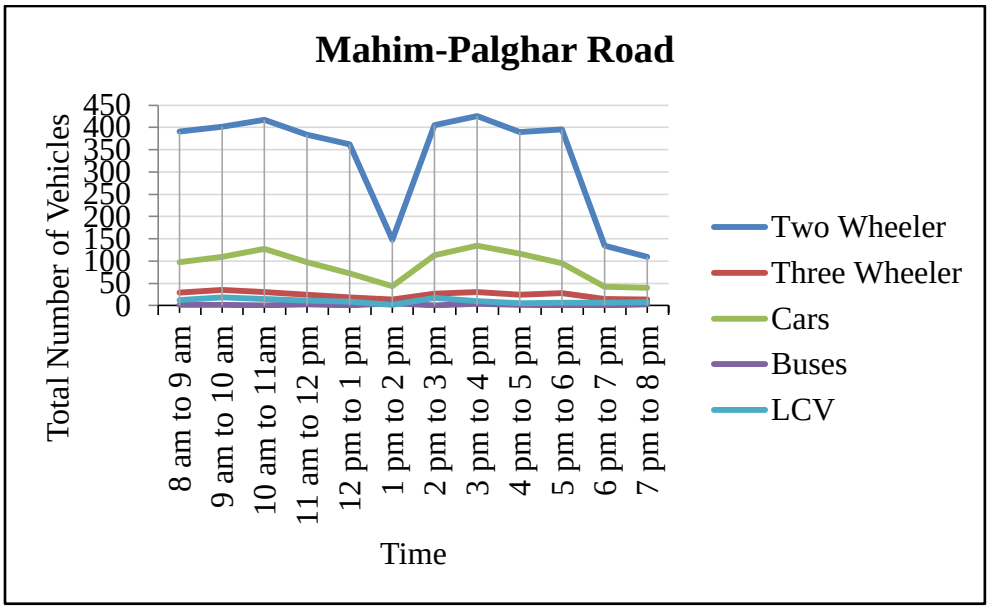

Figure 3.2 Categories Wise Hourly Traffic Distribution for Mahim-Palghar Road

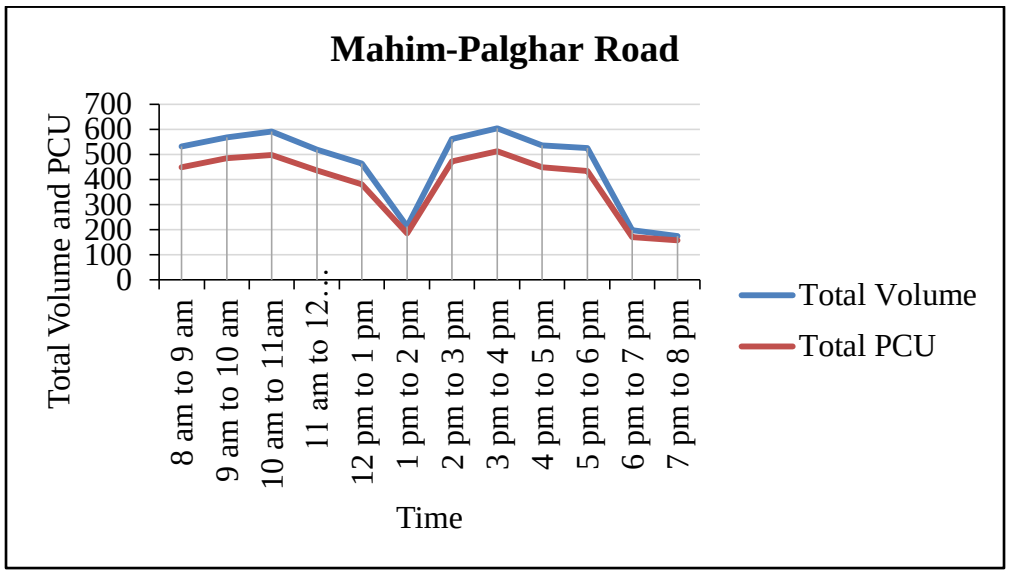

Figure 3.3 Hourly Total PCU and Volume Distribution for Mahim-Palghar Road

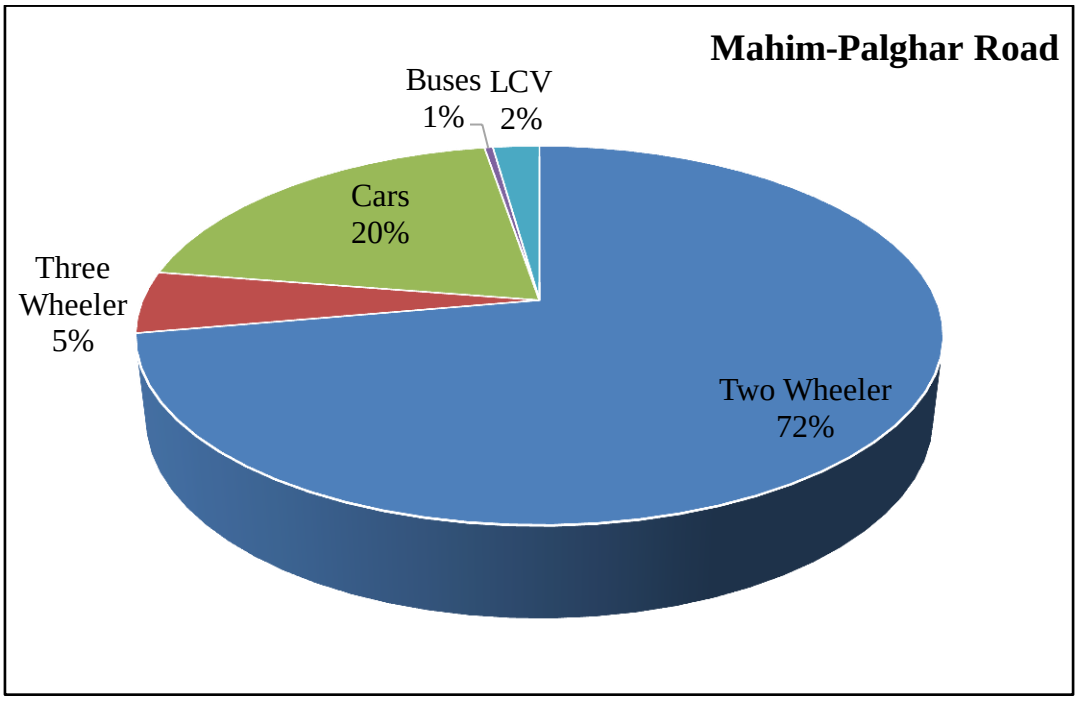

Figure 3.4 Modal Split (vehicles) for Mahim-Palghar Road

3.3.2 Satpati Road

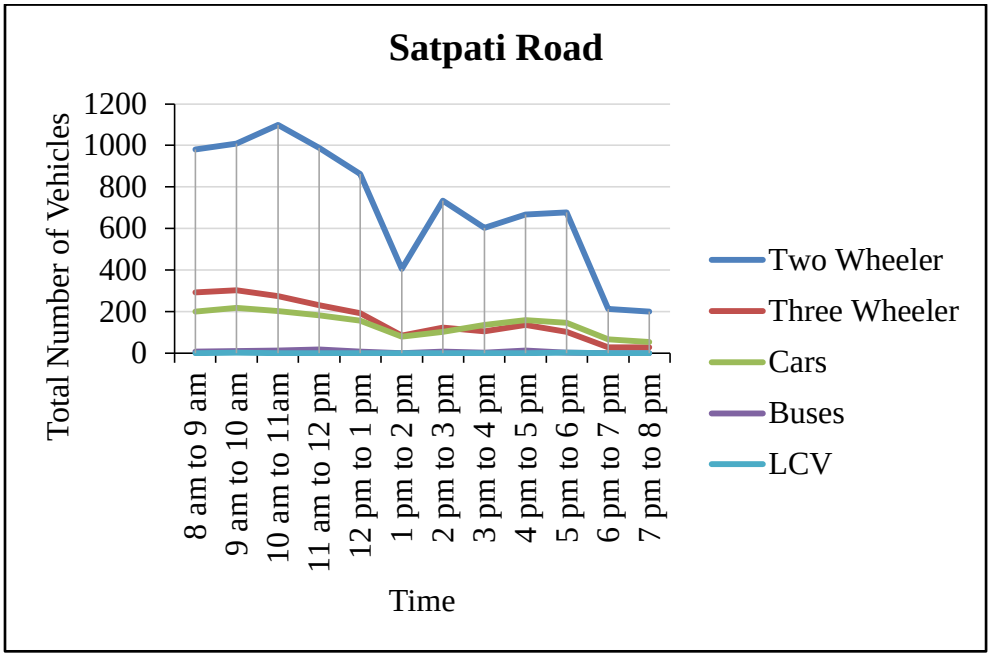

Figure 3.5 Categories Wise Hourly Traffic Distribution for Satpati Road

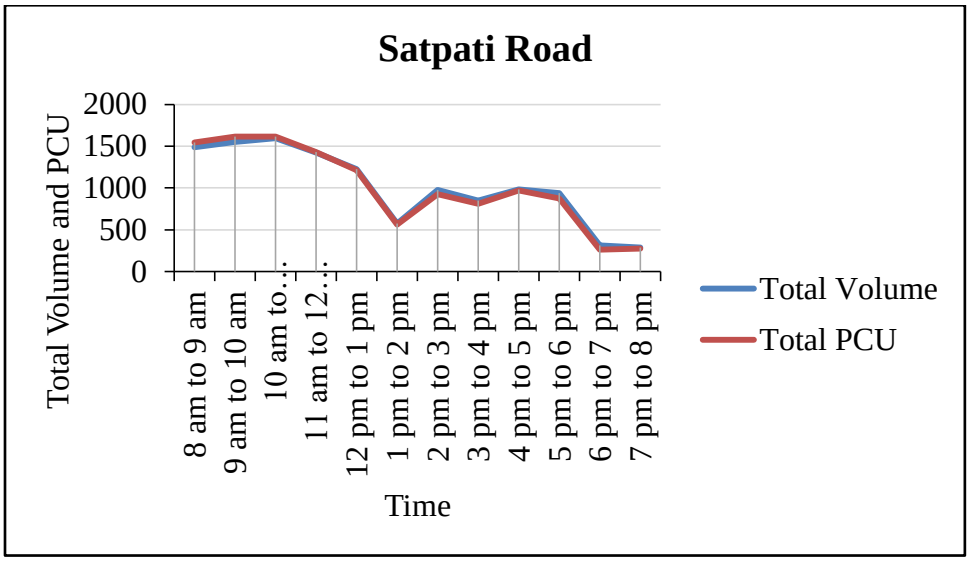

Figure 3.6 Hourly Total PCU and Volume Distribution for Satpati Road

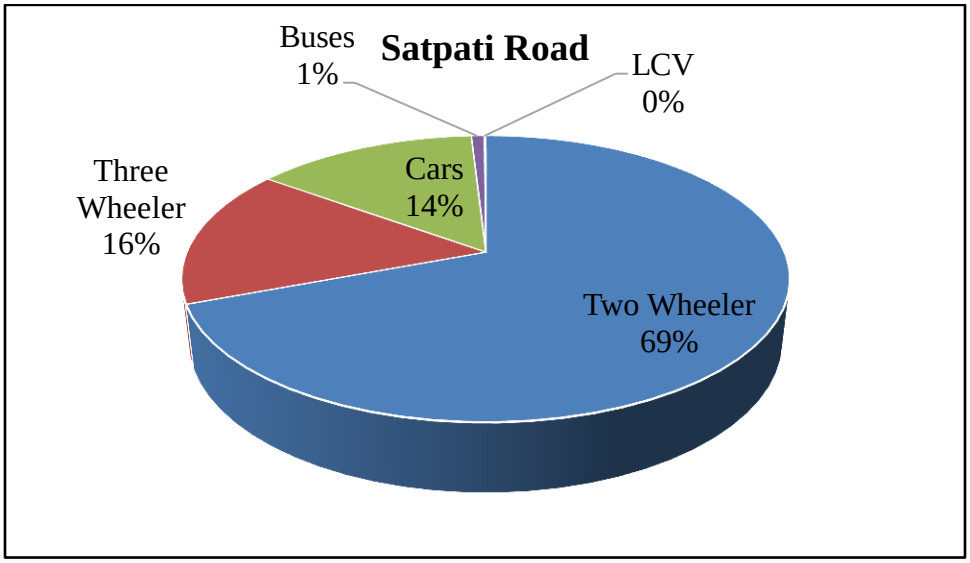

Figure 3.7 Modal Split (vehicles) for Satpati Road

3.3.3 Boisar-Palghar Road

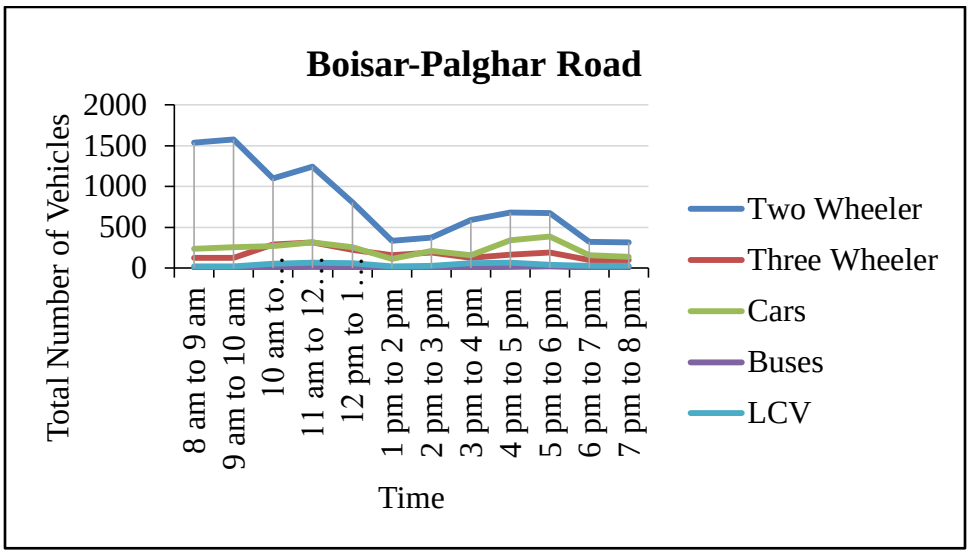

Figure 3.8 Categories Wise Hourly Traffic Distribution for Boisar-Palghar Road

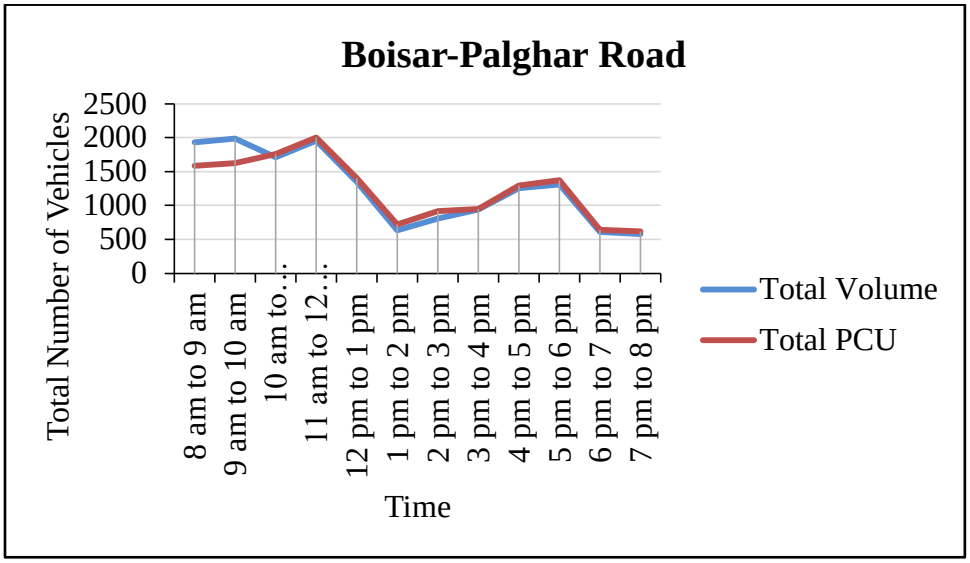

Figure 3.9 Hourly Total PCU and Volume Distribution for Boisar-Palghar Road

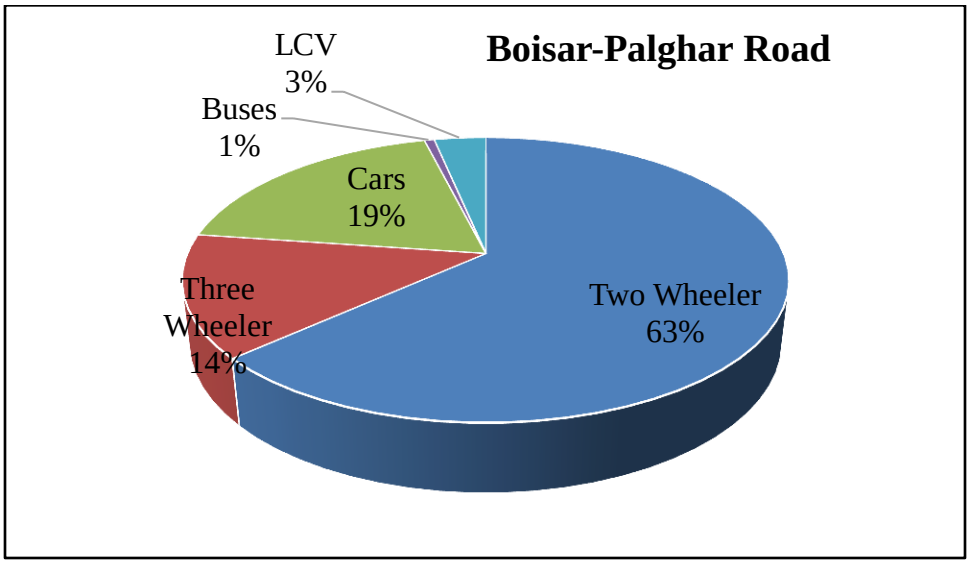

Figure 3.10 Modal Split (vehicles) for Boisar-Palghar Road

3.3.4 Chintupada Road

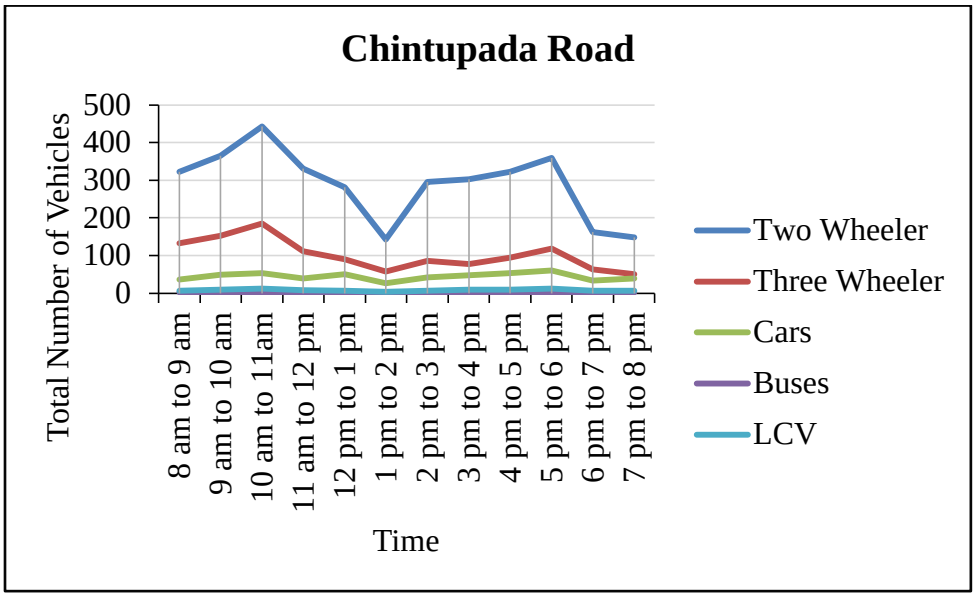

Figure 3.11 Categories Wise Hourly Traffic Distribution for Chintupada Road

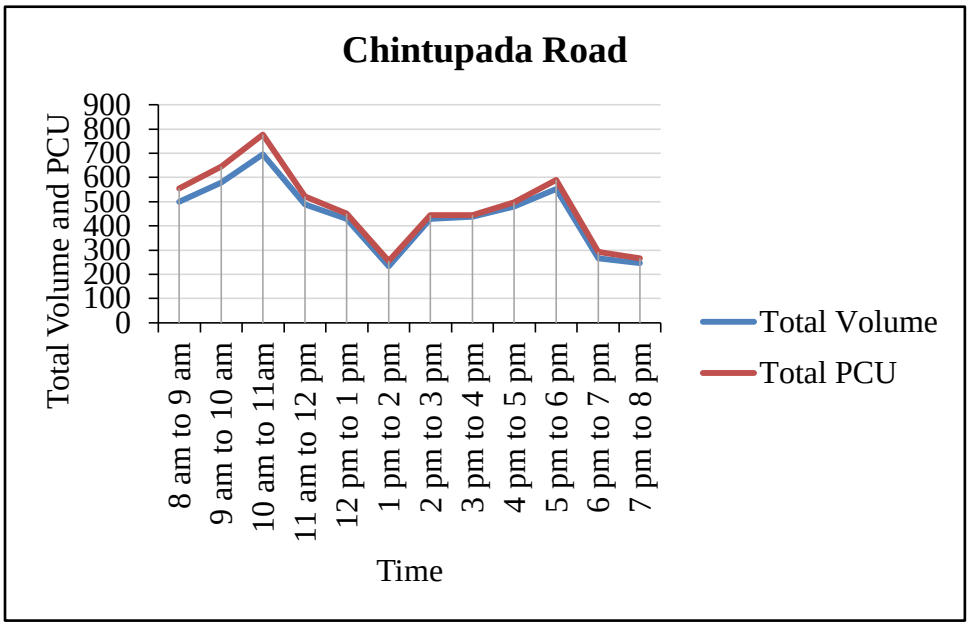

Figure 3.12 Hourly Total PCU and Volume Distribution for Chintupada Road

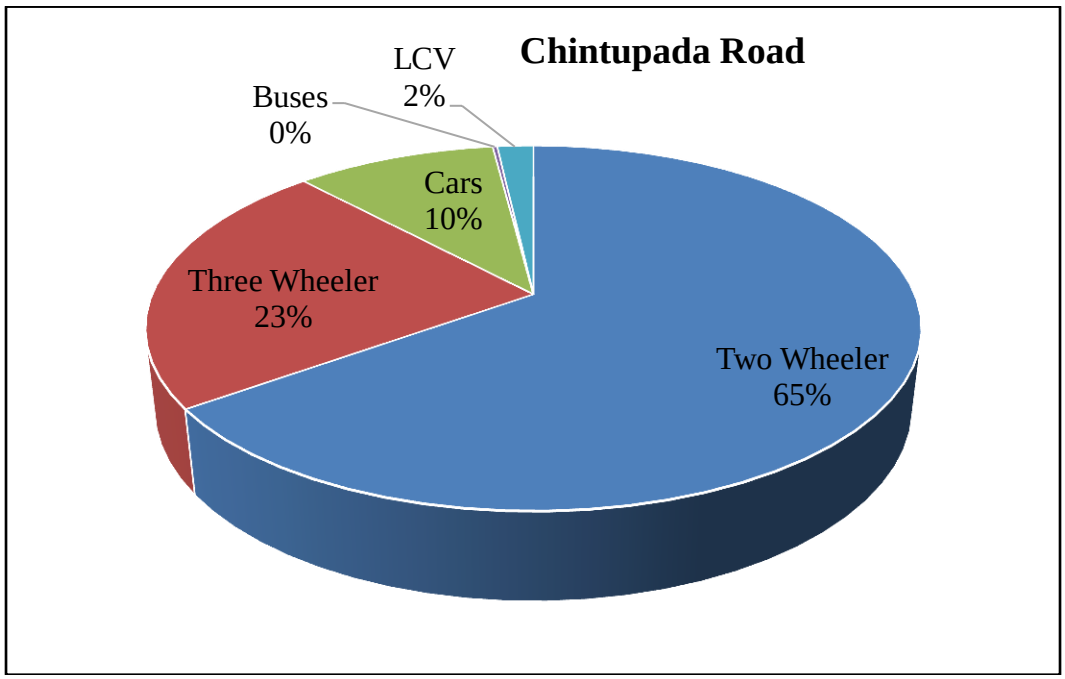

Figure 3.13 Modal Split (vehicles) for Chintupada Road

Chapter 4

Traffic Data Analysis

4.1 Traffic Analysis

The road network around proposed site was analysed to determine its performance in order to observe the current traffic and the projected traffic for the coming 25 years. To measure the network performance, volume by capacity ratio (V/C) and Level of Services (LoS) were calculated as per IRC recommendations.

4.2 Methodology Adopted for the Traffic Analysis

1. The first step was to calculate the traffic of this road network for coming twenty five years with the growth rate of 5% per year.

2. Volume of the traffic is converted to PCU (Passenger Car Unit) based on the number of vehicles and by using the appropriate conversion factor for each type of vehicle.

3. The relevant Design Service Volume (DSV) of each road has been taken as the capacity as per IRC 106 – 1990.

4. Level of Services (LoS) is identified for each road for each study year on the basis of Volume by Capacity ratio for the particular road.

5. The LoS has been calculated with and without the new development to identify the impact of proposed complex on present as well as future traffic on the road network.

4.3 Estimation of Capacity and LoS (for current scenario – 2017)

Following analysis is done by considering theoretical capacity of roads. In this analysis the vehicles parked at the road side has not been considered.

Table 4.1 Estimation of LoS Value for Maximum Peak (current scenario 2017)

Road	Type of Carriageway	Road Category	Total PCU (Without Project)	Total PCU (With Project)	V/C (Without Project)	V/C (With Project)	LoS (Without Project)	LoS (With Project)
Mahim-Palghar Road	Divided Lane (Two Way)	Arterial	513	1077	0.10	0.21	A	A
Satpati Road	Divided Lane (Two Way)	Arterial	1617	3394	0.31	0.66	B	C
Boisar-Palghar Road	Divided Lane (Two Way)	Arterial	2003	4204	0.39	0.82	B	D
Chintupada Road	Divided Lane (Two Way)	Arterial	777	1631	0.15	0.32	A	B

Table 4.2 Estimation of LoS Value for Current Year 2017 (Morning 8 am – 11 am)

Road	Type of Carriageway	Road Category	Total PCU (Without Project)	Total PCU (With Project)	V/C (Without Project)	V/C (With Project)	LoS (Without Project)	LoS (With Project)
Mahim-Palghar Road	Divided Lane (Two Way)	Arterial	477	1041	0.09	0.20	A	A
Satpati Road	Divided Lane (Two Way)	Arterial	1592	3369	0.31	0.66	B	C
Boisar-Palghar Road	Divided Lane (Two Way)	Arterial	1656	3857	0.32	0.75	C	D
Chintupada Road	Divided Lane (Two Way)	Arterial	659	1513	0.13	0.29	A	A

Table 4.3 Estimation of LoS Value for Current Year 2017 (Evening 5 pm – 8 pm)

Road	Type of Carriageway	Road Category	Total PCU (Without Project)	Total PCU (With Project)	V/C (Without Project)	V/C (With Project)	LoS (Without Project)	LoS (With Project)
Mahim-Palghar Road	Divided Lane (Two Way)	Arterial	254	818	0.05	0.16	A	A
Satpati Road	Divided Lane (Two Way)	Arterial	470	2247	0.09	0.44	A	B
Boisar-Palghar Road	Divided Lane (Two Way)	Arterial	877	3078	0.17	0.60	A	C
Chintupada Road	Divided Lane (Two Way)	Arterial	383	1237	0.07	0.24	A	A

Table 4.4 Estimation of LoS value for current scenario 2022 (Maximum LoS)

Road	Type of Carriageway	Road Category	Total PCU (Without Project)	Total PCU (With Project)	V/C (Without Project)	V/C (With Project)	LoS (Without Project)	LoS (With Project)
Mahim-Palghar Road	Divided Lane (Two Way)	Arterial	655	1219	0.13	0.24	A	A
Satpati Road	Divided Lane (Two Way)	Arterial	2064	3841	0.40	0.83	B	D
Boisar-Palghar Road	Divided Lane (Two Way)	Arterial	2557	4758	0.50	0.93	B	E
Chintupada Road	Divided Lane (Two Way)	Arterial	991	1845	0.19	0.36	A	B

Table 4.5 Estimation of LoS value for Morning peak hours for current year 2022

Road	Type of Carriageway	Road Category	Total PCU (Without Project)	Total PCU (With Project)	V/C (Without Project)	V/C (With Project)	LoS (Without Project)	LoS (With Project)
Mahim-Palghar Road	Divided Lane (Two Way)	Arterial	609	1173	0.12	0.23	A	A
Satpati Road	Divided Lane (Two Way)	Arterial	2032	3809	0.40	0.74	B	D
Boisar-Palghar Road	Divided Lane (Two Way)	Arterial	2113	4314	0.41	0.84	B	D
Chintupada Road	Divided Lane (Two Way)	Arterial	991	1845	0.19	0.36	A	B

Table 4.6 Estimation of LoS value for Evening peak hours for current year 2022

Road	Type of Carriageway	Road Category	Total PCU (Without Project)	Total PCU (With Project)	V/C (Without Project)	V/C (With Project)	LoS (Without Project)	LoS (With Project)
Mahim-Palghar Road	Divided Lane (Two Way)	Arterial	324	888	0.06	0.17	A	A
Satpati Road	Divided Lane (Two Way)	Arterial	600	2377	0.12	0.46	A	B
Boisar-Palghar Road	Divided Lane (Two Way)	Arterial	1119	3320	0.22	0.65	A	C
Chintupada Road	Divided Lane (Two Way)	Arterial	488	1342	0.09	0.26	A	A

4.4 Estimation of Capacity and LoS (after 15 years scenario-2032)

Table 4.7 Estimation of LoS Value for Maximum Peak (Year 2032)

Road	Type of Carriageway	Road Category	Total PCU (Without Project)	Total PCU (With Project)	V/C (Without Project)	V/C (With Project)	LoS (Without Project)	LoS (With Project)
Mahim-Palghar Road	Divided Lane (Two Way)	Arterial	1067	1631	0.21	0.32	A	B
Satpati Road	Divided Lane (Two Way)	Arterial	3362	5139	0.65	1.00	C	E
Boisar-Palghar Road	Divided Lane (Two Way)	Arterial	4165	6366	0.81	1.24	D	F
Chintupada Road	Divided Lane (Two Way)	Arterial	1615	2469	0.31	0.48	B	B

Table 4.8 Estimation of LoS Value for Year 2032 (Morning 8am – 11am)

Road	Type of Carriageway	Road Category	Total PCU (Without Project)	Total PCU (With Project)	V/C (Without Project)	V/C (With Project)	LoS (Without Project)	LoS (With Project)
Mahim-Palghar Road	Divided Lane (Two Way)	Arterial	992	1556	0.19	0.30	A	A
Satpati Road	Divided Lane (Two Way)	Arterial	3310	5087	0.64	0.99	C	E
Boisar-Palghar Road	Divided Lane (Two Way)	Arterial	3442	5643	0.67	1.10	C	F
Chintupada Road	Divided Lane (Two Way)	Arterial	1370	2224	0.27	0.43	A	B

Table 4.9 Estimation of LoS value for Evening peak hours for current year 2032

Road	Type of Carriageway	Road Category	Total PCU (Without Project)	Total PCU (With Project)	V/C (Without Project)	V/C (With Project)	LoS (Without Project)	LoS (With Project)
Mahim-Palghar Road	Divided Lane (Two Way)	Arterial	527	1091	0.10	0.21	A	A
Satpati Road	Divided Lane (Two Way)	Arterial	978	2755	0.19	0.54	A	C
Boisar-Palghar Road	Divided Lane (Two Way)	Arterial	1823	4024	0.35	0.78	B	D
Chintupada Road	Divided Lane (Two Way)	Arterial	795	1649	0.15	0.32	A	B

4.5 Estimation of Capacity and LoS (after 25 years scenario-2042)

Table 4.10 Estimation of LoS value for current scenario 2042 (Maximum LoS)

Road	Type of Carriageway	Road Category	Total PCU (Without Project)	Total PCU (With Project)	V/C (Without Project)	V/C (With Project)	LoS (Without Project)	LoS (With Project)
Mahim-Palghar Road	Divided Lane (Two Way)	Arterial	1738	2302	0.34	0.45	B	B
Satpati Road	Divided Lane (Two Way)	Arterial	5476	7253	1.06	1.41	F	F
Boisar-Palghar Road	Divided Lane (Two Way)	Arterial	6784	8985	1.32	1.75	F	F
Chintupada Road	Divided Lane (Two Way)	Arterial	2630	3484	0.51	0.68	C	C

Table 4.11 Estimation of LoS value for Morning peak hours for current year 2042

Road	Type of Carriageway	Road Category	Total PCU (Without Project)	Total PCU (With Project)	V/C (Without Project)	V/C (With Project)	LoS (Without Project)	LoS (With Project)
Mahim-Palghar Road	Divided Lane (Two Way)	Arterial	1617	2181	0.31	0.42	B	B
Satpati Road	Divided Lane (Two Way)	Arterial	5391	7168	1.05	1.39	F	F
Boisar-Palghar Road	Divided Lane (Two Way)	Arterial	5606	7807	1.09	1.52	F	F
Chintupada Road	Divided Lane (Two Way)	Arterial	2232	3086	0.43	0.60	B	C

Table 4.12 Estimation of LoS value for Evening peak hours for current year 2042

Road	Type of Carriageway	Road Category	Total PCU (Without Project)	Total PCU (With Project)	V/C (Without Project)	V/C (With Project)	LoS (Without Project)	LoS (With Project)
Mahim-Palghar Road	Divided Lane (Two Way)	Arterial	859	1423	0.17	0.28	A	A
Satpati Road	Divided Lane (Two Way)	Arterial	1593	3370	0.31	0.66	B	C
Boisar-Palghar Road	Divided Lane (Two Way)	Arterial	2970	5171	0.58	1.01	C	F
Chintupada Road	Divided Lane (Two Way)	Arterial	1296	2150	0.25	0.42	A	B

4.6 Comparison for Traffic Impact Due To Proposed Development with Current Facility

- **Effect of V/C new development on Mahim-Palgahar Road**

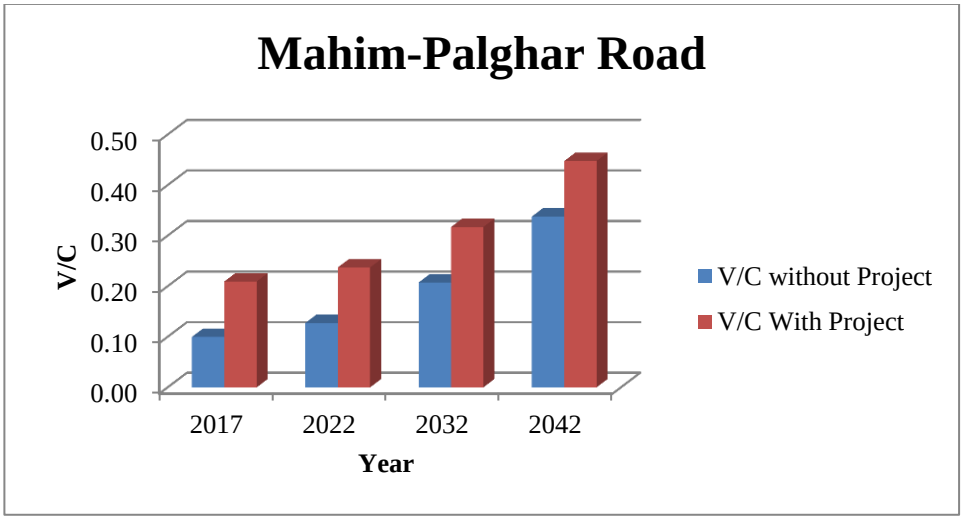

Figure 4.1 Effect by New Development on Mahim-Palghar Road

- **Effect of V/C new development on Satpati Road**

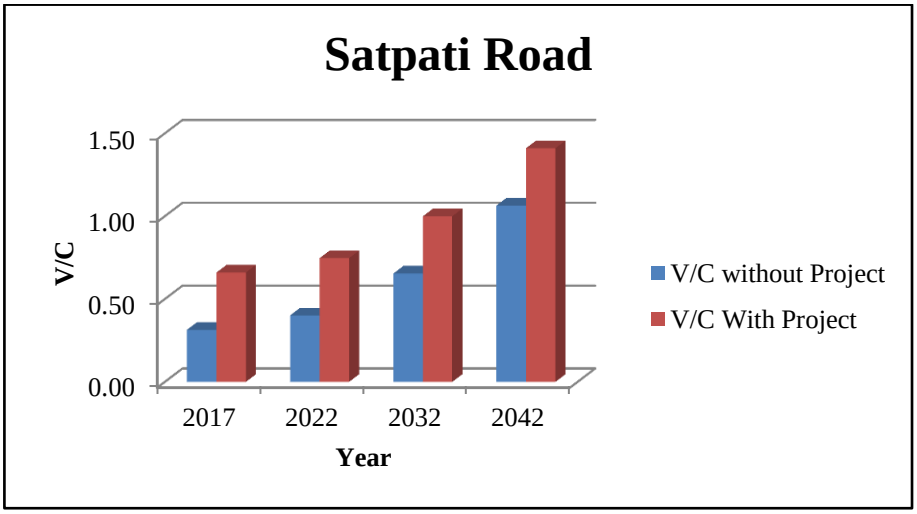

Figure 4.2 Effect of V/C by New Developmenton Satpati Road

➢ **Effect of V/C new development on Boisar-Palghar Road**

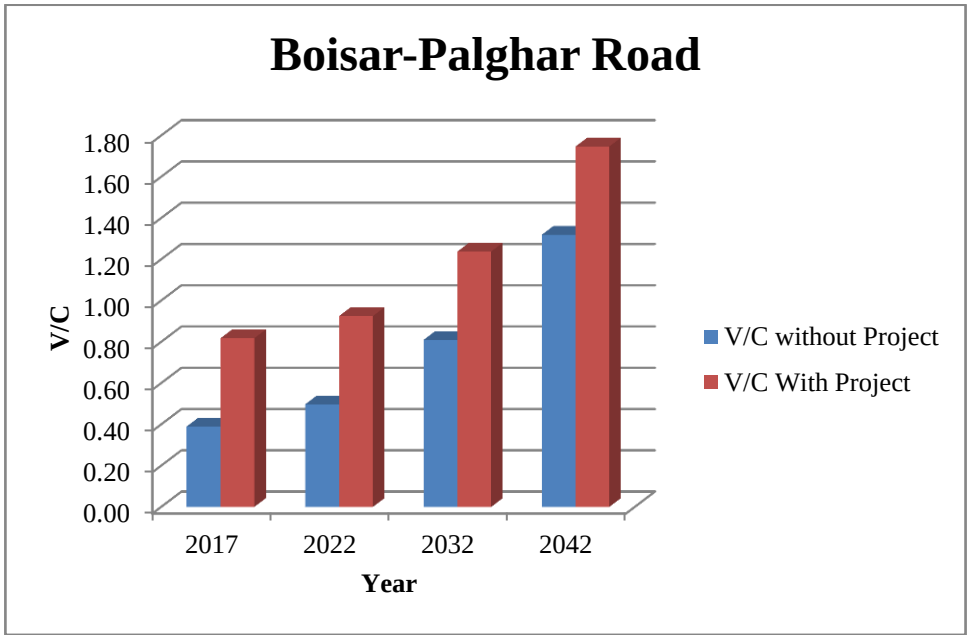

Figure 4.3 Effect of V/C by New Development on Boisar-Palghar Road

➢ **Effect of V/C new development on Chintupada Road**

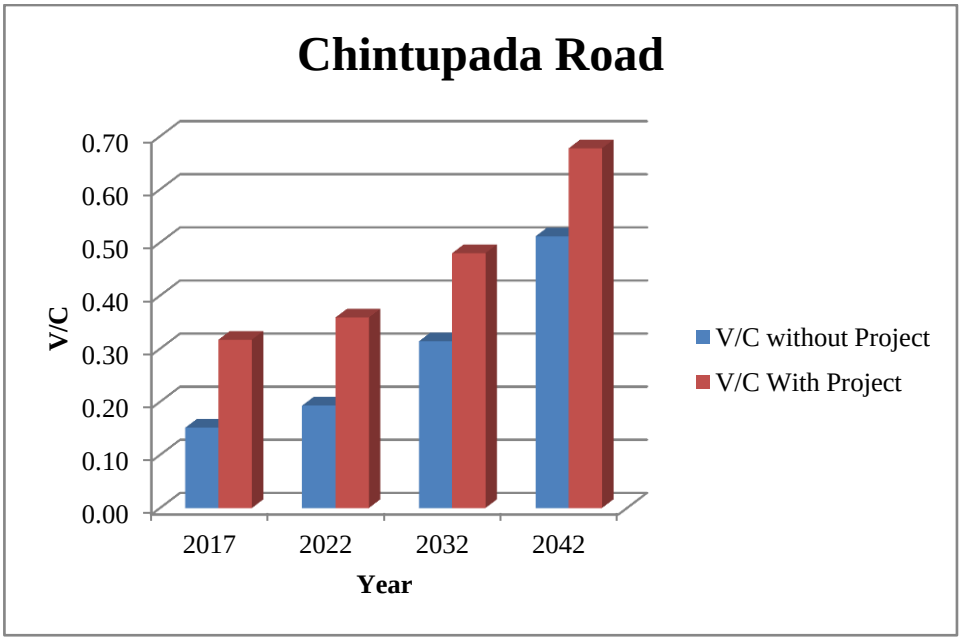

Figure 4.4 Effect of V/C by New Development on Chintupada Road

4.7 Mitigation Measures

- The Mumbai Metropolitan Region Development Authority (MMRDA) plans to extend the proposed Thane-Bhiwandi-Kalyan monorail corridor up to Badlapur to connect Bhiwandi, Ambernath and Badlapur to Thane.

- Mumbai Urban Infrastructure Project (MUIP), Multi Modal Corridor connecting Virar and Alibaug, to be extended to Kalyan Ring Road, Shirgaon-Padgha-Titwala-Badlapur Link, Neral-Dasturi Naka-Matheran Road, Khopoli Bypass Road.These upcoming public transport alternatives are expected to reduce the PCU load by 15% and improve the LOS from F to D.

- The Shirgaon-Padgha-Titwala-Badlapur Link Road may divert the traffic from Satpati-Palghar Road, Boisar-Palghar Road and Mahim- Palghar Road.

- Widening of the roads of this road network is a future proposed plan.

Chapter 5

Parking Study Report

5.1 General Development Layout

5.1.1 Background

Poonam Lifestyle has planned a residential development at Palghar (East). This site is well accessed by Public Transport i.e. Railway station, Bus stand.

5.2 Development Layout

The details of the Proposed Residential Development are given below:

- The total parking facility proposed for this development is some 809 car and 25362 scooters parking bays.

The parking statement of vehicles is presented in **Table 2.2**

The internal traffic circulation and the parking facility at Ground level are presented in following figures.

- **Figures 5.1** represents the Ground Floor Plan.

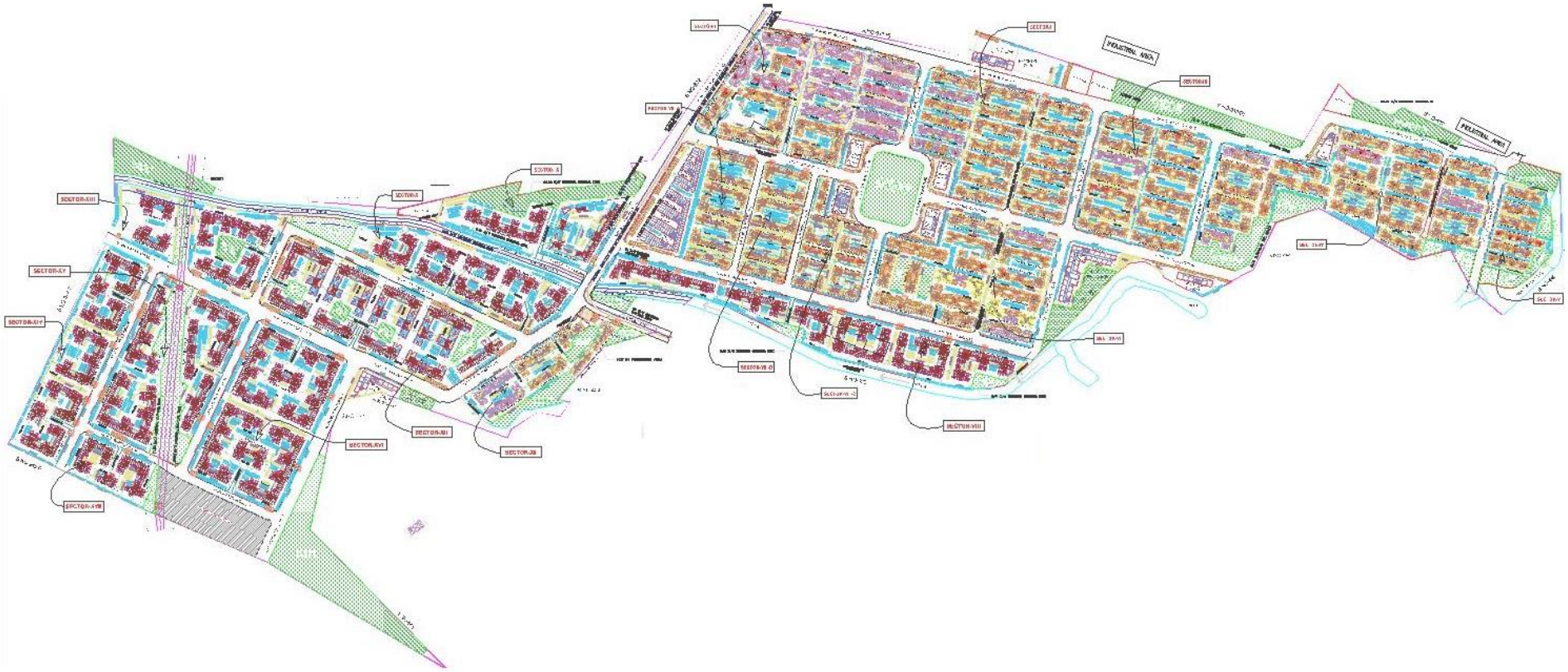

Figure 0.1 Ground Floor Plan for all the buildings

Chapter 6

Traffic Management Plan

6.1 Introduction

The proposed project, HDIL Paradise City safely manages the vehicular traffic and acknowledges the safety of road users. This chapter contains the guidelines, general requirements and procedures to be used when activities or areas of work have a potential to impact on the highway and local traffic. The proposed project site is about 3.5 km away from Palghar Station via Chintupada Road and hence would majorly impact the local traffic.

6.2 Purpose of Traffic Management Plans (TMP)

The primary purpose of the Traffic Management Plans is to provide for the reasonably safe and efficient movement of road users through or around the proposed project while reasonably protecting the workers and equipment. When the normal function of the roadway is affected with the presence of workers and equipment, the TMP provides for continuity of the movement for motor vehicle, bicycle and pedestrian traffic, transit operations and access to properties and utilities.

6.3 Traffic Control Measures

Generally, the internal roads are undivided to maintain flexibility of traffic lanes. Minimum 6m wide roadway width has been provided for the movement of vehicles. Recommended design speed on the internal road is 15kmph and on the turns is 10kmph. Speed tables will be provided near the entrance/exit point to control traffic and regulate speed of vehicles. An illustrative picture is also shown in Figure 5.1. Additionally, the following shall be required to maintain traffic flow at required level of service.

- Road Markings and Signages: Proper road markings (edge, median, arrows, turning, Kerb) and Signages (direction, turning, speed, and pedestrian crossings) will be installed and maintained on all roads in the vicinity of project premises.

- On-street parking will be prohibited on all external and internal streets.
- Pick and drop at designated places only.
- Preferably no U-Turn on roadway
- Traffic calming measures – speed tables, signage Apart from internal signage – it will be requested to provide necessary signage and traffic control measures, on neighbouring roads, – such as Speed limit, Left hand curve, pedestrian crossing etc.

6.4 Traffic control measure for site

1. Speed Bumps will be provided at entry/exits as well as on longer distances.
2. Safety Mirrors at curve ends will be installed as safety measure and to give a proper view of the approaching vehicles.
3. Signage to specify speed limit on curves and straight road, no parking zones, disabled parking etc. will be displayed at respective locations.
4. Fire Extinguisher will be installed at multiple points in case of emergency.
5. Floor Markings will be provided to denote the parking space, reserve parking, visitors parking, etc.
6. Sufficient Lights at proper distances will be installed to prevent collision and accidents during night time.
7. Pedestrian Crossing will be installed for safe road crossing.
8. Temple Area will be marked with Silence Area signage

Sr. No	Description	Signage
1	Speed Limit	
2	Silence Zone	
3	Pedestrian Crossing	
4	Left Hand Curve	

Figure 6.1 Traffic Control Measures

Chapter 7

Summary and Conclusion

Traffic impact analysis shows that, generated traffic from the proposed new development may have considerable impact with available road width according to the current situation. Also, LoS of each road of this road network has no major impact in the terms of congestion except Boisar-Palghar Road as presented in Table 4.1. Boisar-Palghar road connects Palghar and Tarapur Industrial region. The traffic from this project may have minor diversion to this road. For Dahanu destination, there is alternative way via NH 48 to reduce traffic impact on Boisar-Palghar road. It is also considered that the development will carry the widening of these roads to provide acceptable level of service.

All other analysed roads i.e. Mahim-Palghar Road, Satpati Road, and Chintupada Road have Level of Service between A to D for future scenario 2042 without project. These roads represent fair operating conditions and the general level of comfort and convenience provided to the road users is satisfactory. These roads have low LoS (high congestion) in future scenario (2042) with project. The mitigation measures have been proposed as road widening plan for future time. The road widening plans and proposed connectivity plans may reduce the traffic congestion levels as well as the impact on the future traffic scenario.