Central Park®

To,

Date: 21-06-2017

The Member Secretary,
Infrastructure & Miscellaneous Projects & CRZ Committee (Infra-2),
Ministry of Environment, Forests and Climate Change, Govt. of India,
Indira Paryavaran Bhavan,
Jor Bagh Road,New Delhi-110003

File No: 21-148/2017-IA-III

Reference: Minutes of 15th EAC meeting (Infra-2) held on 27.05.2017

Subject: Submission of Reply for project Expansion of "Group Housing Colony" at Sector-48, Sohna Road, Gurgaon, Haryana being developed by M/s Sweta Estates Pvt. Ltd.

Dear Sir,

We are developing a Group Housing colony at Sector-48, Sohna Road, Gurgaon, Haryana. Appraisal for grant of Environmental Clearance was done on 18th EAC meeting held on 27.05.2017. Few queries were raised in the meeting. Thus, we are hereby submitting the reply of queries raised for Grant of Environmental clearance.

S.No.	Queries raised	Reply
1	Latest certified compliance report issued by the MoEF&CC Regional Office, Chandigarh on environmental conditions stipulated in the existing environmental clearance	The certified compliance was issued on 30.11.2015. However, the request letter for issuance of latest Certified compliance report has been submitted to MoEF&CC Regional Office, Chandigarh. The copy of certified compliance 30.11.2015& issuance letter of the same is attached as **Annexure A**
2	Latest compliance status with regards to the certified compliance report of 30.11.2015 especially where the project proponents have given assurances for compliance not complied or partially complied.	Latest compliance status with regards to the certified compliance report of 30.11.2015 is attached as **Annexure B.**
3	The present status of operation of 350 KLD and 100 KLD STP's and fourth 2 STP of 300 KLD also	STP of Capacity 350 KLD, 300 KLD, 300 KLD & 100 KLD are operational. STP of 325 KLD is proposed.

SWETA ESTATES PRIVATE LIMITED

Corporate Office: 3rd Floor, Tower D, Global Business Park, Mehrauli Gurgaon Road, Gurgaon-122002 (Haryana) INDIA
Tel : 91-124-4107050 Fax : 91-124-4107064 & 4107065.
Registered Office : Asset 5B, Hospitality District, Delhi Aero City, IGI Airport, New Delhi- 110037
Website : 'www.centralpark.in
Corporate Identity Number :U74899DL1991PTC044871

4	The current status of storm water disposal	The storm water of existing phase is being channelized to 39 no of rainwater harvesting pits. For proposed expansion, 6 no rainwater harvesting pits shall be constructed and storm water shall be channelized to the same.
5	Give a conformity status to conditions stipulated in Annexure XIV of the amended EIA Notification vide S.O. 3999 (E) dated 09.12.2016	Conditions stipulated in Annexure XIV of the amended EIA Notification vide S.O. 3999 (E) dated 09.12.2016 is applicable for built-up area from 5000 sqm. to 150000 sqm. As the built-up area for our project after expansion will be 562141.739 sqm. Therefore, above conditions are not applicable for our project. Hence, we have applied for environmental Clearance for expansion of the project. However, we will be complying the conditions stipulated in Annexure XIV of the amended EIA Notification vide S.O. 3999 (E) dated 09.12.2016.
6	Submit an assessment of the cumulative impact of all redevelopment and increased inhabitation being carried out or proposed to be carried out by the project or other agencies in the core area, shall be made for traffic densities and parking capabilities in a 05 kms radius from the site. A detailed traffic management and a traffic decongestion plan draw up through an organisation of repute and specialising in transport planning shall be implemented to the satisfaction of the State Urban Development and Transport Department that the incremental traffic from the operation of the project will be within the carrying capacity of feeder roads.	A detailed traffic management and a traffic decongestion plan is attached as **Annexure C.**
7	Compliance report of ECBC.	The ECBC Compliance along with LEED certification for existing phase is enclosed as **Annexure D.** The same will be followed for proposed 2 towers after expansion.

Hope this will fulfil the Requirement and Environmental Clearance will be granted at the earliest.

Thanking you,

Yours faithfully,

For Sweta Estates Pvt. Ltd.

(Authorized Signatory)

Encl: As above

Annexure A

Copy of Certified Compliance Report 30.11.2015 & Copy of issuance letter for latest certified compliance

Central Park®

To,
Additional Director,
Ministry of Environment & Forest,
Northern Regional Office,
Bays No. 24 -25, Sector 31-A,
Dakshin Marg, Chandigarh-160030.

Date: 23/05/2017

Reference: TOR letter no. HR/SEAC/194/606 dated 10.02.2016; Grant of Environmental Clearance for Expansion of "Group Housing Colony" at Sector-48. Sohna Road, Gurgaon, Haryana by M/s Sweta Estates Pvt, Ltd.

Sub: Request for Site Visit and thereby Issuance of Certified Compliance Report / Certificate for the project – Expansion of "Group Housing Colony" at Sector 48, Sohna Road, Gurgaon, Haryana developed by M/s Sweta Estates Pvt. Ltd.

Dear Sir,

We wish to inform you that we had already been granted the Environmental Clearance Letter No. 21-563/2006-IA III dated 10.04.2007 from SEIAA, Haryana, for the development of the"Group Housing Colony" at Sector-48, Sohna Road, Gurgaon, Haryana for plot area 192334.638 Sqm& built up area of 331520 Sqm excluding (Basement and Non-FAR) for 28 towers and EWS Tower. Out of which 26 towers and EWS Tower were constructed. The construction for the remaining two towers is to be done. Hence, the built-up area will increase.

We hadgot certified compliance report in year 2015 (copy enclosed). We have already submitted the compliance report for December 2016. However, we here by confirm that currently there is no construction work at the site.

We hereby earnestly request you to kindly arrange / conduct the Site visit of our Project and thereby issue us the Certified Satisfactory Compliance Report.

Thanking You,

Yours Faithfully,

For, M/s Sweta Estates Pvt. Ltd.

(Authorized Signatory)

23/5/17

Enclosures:

1. **Copy of the Environmental Clearance**
2. **Copy of the MoEF Circular dated 30.05.2012 vide Circular no: J-11011/618/2010-IA-II (I)**
3. **Copy of certified compliance report 2015**

Northern Regional Office
Ministry of Environment & Forests
Bays No. 24-25, Dakshin Marg
Sector 31-A, Chandigarh

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

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उत्तर क्षेत्रीय कार्यालय
बेज नं० 24 – 25, सेक्टर - 31 ए,
दक्षिण मार्ग, चंडीगढ - 160030

Northern Regional Office,
Bays No. 24 – 25, Sector 31-A,
Dakshin Marg, Chandigarh - 160030

No. 4-263/2007-RO(NZ) 1160 Dated: 30.11.2015

To

The Member Secretary
State Environment Impact Assessment Authority(SEIAA)
Haryana, Bays No. 55-58, Paryatan Bhawan
Sector-02, Panchkula

Sub: **Construction of Housing Complex at Sector-48, Gurgaon, Sohna Road, Haryana by M/s Sweta Estates Private Ltd.-submission of compliance report to SEIAA, Haryana regarding**

Ref. **MoEF's letter No.21-563/2006-IA.III dated 10th April, 2007.**

Sir,

It is to inform you that the above cited project was accorded environmental clearance by the Ministry of Environment & Forests, Govt. of India, New Delhi on **10.04.2007 vide letter cited above**. The project has been last monitored by this office on **06.11.2015** and the detailed monitoring report has been submitted to the Ministry(**Annexure-1**). **The project proponent will be submitting an application to you for seeking approval for extension of the validity period of the environment clearance.** In pursuance of the **MoEF, New Delhi's circular No.J-11011//618/2010-IA.II(I) dated 30th May, 2012**, this office has been approached to inform you the latest status of compliance. Accordingly, following observations are brought to your kind notice for further consideration:-

1.	The project has been monitored by this office **on 06.11.2015** and the detailed monitoring report is submitted to the Ministry. A copy of the monitoring report is enclosed vide **Annexure-1. It may be noted that most of the conditions are either being complied or assured to be complied by the project proponent which is evident from the enclosed report.**
2.	The project proponent **has been submitting six monthly progress reports to this office** and the same are being reviewed in this office.
3.	The project proponent is getting different environment parameters monitored from the authorized agency/lab namely **Vardan Envirolab, Gurgaon.** The latest monitored results for the monitoring carried out in April, 2015 in respect of **ambient air quality, stack emission, ambient noise levels, drinking water, STP treated water at outlet and soil samples** are submitted by the project proponent which are enclosed herewith vide **Annexure--2.** All the results are within the permissible limits of HSPCB.
4.	**About 6 no. of DG sets of 1010 kva each have been established for power back up during the construction phase.** These DG sets are being utilized during operation phase also All the DG sets have been provided with acoustic enclosures and stacks of adequate height.
5.	The development of green belt has already been started. **More than 1000 trees and 5000 shrubs have been planted.**

6.	It is observed that **one STP of 350 KLD capacity is operational**. UV system has been provided. Two more STP's of 300 kld and 100 kld are ready but they are yet to be made operational. Fourth STP of 300 kld capacity will be ready within 3 months. It is further confirmed that the treated water will be used in toilet flushing through dual plumbing line. The balance water will be used green belt and cooling. Layout of the STP along with scheme approved is attached vide **Annexure-3.**
7.	The Project authorities will take necessary measures to control storm water and its reuse along with rainwater harvesting measures.
8.	The **First Aid Facilities** are provided at the project site for the workers.
9.	**Adequate drinking water** and sanitary facilities are provided to the workers.
10.	**The treated water from the STP will be used for toilet flushing by dual plumbing line.**
11.	In total 37 rainwater harvesting pits along with desilting chambers have been completed. Rain water harvesting pit details are submitted vide **Annexure-4.**
12.	**NOC/ 'Consent to Establish'** under Air & Water Acts was accorded by the HSPCB on 18.04.2007 vide **Annexure-5.**
13.	**NOC has been obtained from Airports Authority of India(AAI)** for the height of the building vide **Annexure-6.**
14.	Approval for fire fighting scheme has been obtained for the project from Municipal Council, Gurgaon vide **Annexure-7.**
15.	The project authorities have submitted **the details of Energy Conservation measures** being taken in the housing complex vide **Annexure-8.**

Thus it is concluded that the project proponent has been complying **most of the environmental safeguards** in the existing project in construction phase and few conditions have been assured to be complied. **Hence, the compliance report of the project is forwarded herewith for considering the extension of validity period of the environment clearance as per proposal to be submitted by the project proponent,** on merits. The project will be monitored by this office from time to time in construction phase as well as in operational phase.

This is submitted for your information and necessary consideration.

Yours faithfully,

30/11/15

(Surendra Kumar)
Director(S)
Tel. No. (0172)-2638994
E Mail:sk581@yahoo.com

Encl. as above:

Copy to:- **The Director, M/s Sweta Estates Pvt. Ltd., 3rd Floor, Tower D, Global Business Park, Mehrauli Gurgaon Road,Gurgaon-122002** for necessary reply.

Annex – 1

भारत सरकार
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
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दक्षिण मार्ग, चंडीगढ़ - 160030

Northern Regional Office,
Bays No 24 – 25, Sector 31-A,
Dakshin Marg, Chandigarh - 160030

F.No.4-263/2007-RO(NZ) Dated: 16.11.2015

सेवा में

The Director(S), **Monitoring Cell**,
Ministry of Environment, Forests
and Climate Change, Indira Paryavaran Bhawan,
Jor Bagh, Aliganj, **New Delhi—110003**

Sub: **Construction of Housing Complex at Sector-48, Gurgaon, Sohna Road, Haryana by M/s Sweta Estates Private Ltd.-site inspection regarding.**
Ref. **MoEF's letter No.21-563/2006-IA.III dated 10th April, 2007.**

महोदया,

उपर्युक्त विषय में उल्लेखित परियोजना का निरीक्षण दिनांक 6th November, 2015 को किया गया। स्थल निरीक्षण के दौरान सभी प्रेक्षणों तथा परियोजना अधिकारियों से चर्चा के बाद अधोहस्ताक्षरी द्वारा तैयार की गई आख्या तथा विस्तृत अग्रेषण पत्र संलग्न किए जाते हैं। आपसे अनुरोध है कि आवश्यक कार्रवाई करके इस कार्यालय को भी मंत्रालय द्वारा की गई कार्रवाई से अवगत कराने की कृपा करें।

भवदीय,

(सुरिन्द्र कुमार)
निदेशक(एस)
Tel. No. (0172)-2638994
E Mail:sk581@yahoo.com

संलग्नक:

Ministry of Environment, Forest & Climate Change
Northern Regional Office
Chandigarh

DATA SHEET

1.	Project Type:	Construction Project (Housing Scheme)
2.	Name of the Project:	Housing Scheme at Sector-48,Gurgaon Sohna Road.
3.	Clearance letter (s)/ O.M No. & dates:	No. 21-563/2006-IA.III dated 10.4.2007
4.	Location: a) District (s) b) State (s) c) Latitudes/longitudes	 Gurgaon Haryana 28^0 27' N, 77^0 4' E
5.	Address for correspondence: a) Address of Concerned Project Chief Engineer (with Pin Code/ Tel No./Telex/Fax No./ E-Mail address)	Shri S K Kapoor, Director Sweta Estates Private Limited 21- Commercial Complex Malcha Marg, Diplomatic Enclave New Delhi-110021 Shri S K Kapoor---9958790350 Shri D K Singh— 9560235552 Shri D S Dabas-- 8744058194
6.	Salient features: a) of the project	It is proposed to develop Housing Complex at Sector-48, Gurgaon Sohna Road,Gurgaon, Haryana. The project involves construction of 1750 dwelling units including 218 service apartments and 260 units for EWS to accommodate 8215 people. The housing scheme will have service apartments, schools, shops and community center etc. The plot area is 1,90,108 sq. meters. The total built up area is 3,31,520 sq. meters. Total water requirement will be 2481 cu. m/day. Total waste water generation from the complex will be 1745 cu.m/day which will be treated in 2.0 MLD capacity STP. The total solid waste generated will be 6000 kg/day.

	b) of the environmental management plans	a) First aid facilities, drinking water and sanitary facilities for the workers. b) Muck excavation and restoration. c) Acoustic enclosures with DG sets. d) Establishment of STP. e) Rain water harvesting. f) Green belt development. g) Energy conservation measures in the building. h) Solid waste disposal. i) Monitoring.
7.	**Break up of the project area:**	Total plot area– 11,90,108 sq. meters Total built up area-- 3,31,520 sq. meters
8.	**Break up of project affected population**	Not applicable. Land is allotted by HUDA to develop Residential Complex.
9.	**Financial details:** a) Project cost as originally planned and subsequent revised estimates and the year of price reference. b) Allocations made for environmental management plans with item wise and year wise break up. 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 b) above. e) Actual expenditure incurred on the project so far. f) Actual expenditure incurred on the environmental management plans so far:	1. Original project cost: Rs. 750.66 crore Rs. 136.00 crore Not submitted Approx. Rs. 130 crores Recurring expenditure— Rs. 88.00 lacs Non-recurring expenditure- Rs. 200.00 lacs
10.	**Forest land requirement :**	N.A.
11.	**The status of clear felling in non-forest areas**	N.A.

12.	**Status of construction :** a) Date of commencement (actual and/or planned) b) Date of completion (actual and/or planned)	April, 2007 --- Phase-I August, 2007--- Phase-II December, 2017
13	**Reasons for the delay if the project is yet to start:**	N.A.
14.	**Dates of site visits** **a. Date of previous site visit:** **b. Date of present site visit:**	17th April, 2008 6th November, 2015 Participants (A) From M/s Sweta Estates Pvt. Ltd. 1. Shri S K Kapoor 2. Shri D K Singh 3. Shri D S Dabas (B) From NRO, MoEF, Chandigarh 3. Shri Surendra Kumar, Director(S)

PART-II
STATUS OF COMPLIANCE
&
PART-III
DETAILED MONITORING REPORT

It is proposed to develop Housing Complex at Sector-48, Gurgaon Sohna Road,Gurgaon, Haryana. The project involves construction of 1750 dwelling units including 218 service apartments and 260 units for EWS to accommodate 8215 people. The housing scheme will have service apartments, schools, shops and community center etc. The plot area is 1,90,108 sq. meters. The total built up area is 3,31,520 sq. meters. Total water requirement will be 2481 cu. m/day. Total waste water generation from the complex will be 1745 cu.m/day which will be treated in 2.0 MLD capacity STP. The total solid waste generated will be 6000 kg/day. The construction work was started in August, 2007. Component wise progress of construction is given below:-

- Out of total 29 towers, 27 towers are completed.
- 2 Towers are yet to be started
- Internal roads are completed
- Overhead water tank is complete
- About 600 units are occupied
- About 2000 people are living

The project is expected to be completed in December, 2017. **At present no major works are going on at the site.** The compliance of different conditions is given below:-

(A) Specific Conditions:

1. Construction Phase

(i)	Necessary approval of the State Forest Department shall be obtained commencing construction of the project.	Being complied

The Project authorities have informed that there is no involvement of forest land for the passage to their project. The PA has obtained NOC from the State Forest Deptt. to the effect that no forest land is involved in the project.

(ii)	All required sanitary and hygienic measures should be in place before starting construction activities and to be maintained throughout the construction phase.	Being complied

No major construction work is going on at the present. About 150 workers are engaged at work who are deployed for watch and ward and maintenance work basically. It is gathered that the contractor has been made responsible to provide all sanitary and hygienic conditions to the workers during construction phase. Following measures have been taken by the contractor for implementation of the condition:-

- To provide adequate number of toilets (at least one for every 25 labourers) with proper septic tank.
- To ensure proper disposal of sewage so that sanitary conditions are maintained.
- To ensure regular cleaning of toilet and soak pits.
- To ensure construction of pucca roads in the areas with regular movement of vehicles so that the dust may be controlled during transportation of construction material inside the construction site.
- To ensure proper water sprinkler system on the construction sites to suppress dust during handling of excavated soil.

(iii)	Soil and ground water samples 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 samples have been tested by **an approved lab namely Vardan Envirolab, Gurgaon from time to time. Last monitoring was done in April, 2015 indicating all the results within permissible limits.** The copies of the results are placed in the file.

(iv)	A First Aid Room will be provided in the project both during construction and operation of the project.	Being complied

It is observed that the First Aid facilities have been provided at the construction site during construction phase to take care of minor medical treatments. The PA has been asked to intimate the expenditure done on providing medicines to the workers.

(v)	Adequate drinking water and sanitary facilities should be provided for construction workers at the site. The safe disposal of waste water and solid wastes generated during the construction phase should be ensured.	Being complied

Around 150 workers have been employed by the contractor during construction phase. It is confirmed that all the construction sites have adequate drinking and sanitary facilities for the workers. Moreover, the contractor has made foolproof arrangement for disposal of waste water and solid waste generated during the construction phase.

(vi)	Disposal of muck including excavated material during construction phase should not create any adverse effects on the neighboring communities and disposed off taking the necessary precautions for general safety and health aspects.	Being complied

It is confirmed that all the practical possible precautions are being followed in the whole construction work to ensure that there is no nuisance to neighboring communities during the disposal of muck including excavation materials. About 5 lac cubic meter of muck was excavated from different basements. The muck has been utilized in landscaping and filling of low lying areas. There is no complaint from any neighbor about any air pollution by the project activities.

(vii)	Use of diesel generator sets during construction phase should be enclosed type and should conform to E(P)A Rules prescribed for air and noise emission standards.	Being complied

It is gathered that about 6 no. of DG sets of 1010 kva each have been established for power back up during the construction phase. These DG sets are being utilized during operation phase also. It is promised that all the DG sets have been provided with acoustic enclosures and stacks of adequate height. The DG sets do conform the standards prescribed in E(P) A Rules for air and noise emission. **Stack emission of DG sets has been monitored by an approved lab namely Vardan Envirolab, Gurgaon in April, 2015 indicating all the results within permissible limits.**

(viii)	Ambient noise levels should conform to residential standards both during day and night.	Being complied

The contractor has been instructed to keep all the construction activities in controlled manner to keep the ambient noise levels within residential standards during day and night time. **Noise levels near DG sets have been monitored by an approved lab namely Vardan Envirolab, Gurgaon in April, 2015 indicating all the results within permissible limits.**

(ix)	Vehicles hired for bringing construction material at site should be in good condition and should have valid "Pollution under Check" certificate and to conform to applicable air and noise emission standards.	Being complied

The PA has been checking the PUC's of all the vehicles being used for bringing the construction material. Copies of few PUC's have been submitted to this office.

(x)	Construction spoils including bituminous material and other hazardous materials must not be allowed to contaminate watercourses and the dump sites for such material must be secured so that they should not leach into the ground water.	Being complied

The project authorities have taken all possible precaution to prevent water contamination during the handling of hazardous material including bituminous material. Following steps are worth mentioning:-

- To ensure entire construction planning in such a way that there is minimum generation of construction waste like concrete, mortars and cement gouts.
- To ensure reuse of construction material as far as possible.
- To ensure the removal of construction solids from the site as frequent as possible.
- To establish litter disposal and collection points around all construction sites.
- To ensure proper measures to check any runoff from spoil piles.
- To ensure transportation of construction spoils to officially designated dump sites after obtaining necessary permission from relevant authorities.

(xi)	Any hazardous waste generated during construction phase should be disposed of as per applicable Rules & norms with necessary approvals of the HSPCB.	Assured to comply

The waste oil/used oil to be generated from DG sets will be treated as hazardous waste and will be disposed off by the PA as per rules. The PA is being instructed in this regard accordingly.

(xii)	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 surroundings.	Being complied

The project authorities have complied this condition satisfactorily to avoid any disturbance to the surroundings. It is informed that site incharge is trained for supervision of day to day environment related problems.

(xiii)	Under the provisions of Environment(Protection) Act, 1986, legal action shall be initiated against the project proponent if it was found that construction of the project had started without obtaining environmental clearance.	No violation has been observed

The construction work was started only after getting environment clearance. Thus no violation of this condition was noticed and no action is recommended against the project authorities.

(2) Operational Phase:

(i)	Necessary permission of competent authority shall be taken to store the diesel in the premises for operation of DG sets.	Being complied

The PA has been storing 15 kl of diesel in underground tanks. They have obtained the permission from Chief Controller of Explosive for storing the diesel.

(ii)	Diesel generator sets proposed as back up power for lifts and common area should be of enclosed type and conform to E(P)A Rules prescribed for air and noise emission standards as per CPCB quidelines. Exhaust should be raised to 4 meters above the roof top.	Being complied

It is gathered that about 6 no. of DG sets of 1010 kva each have been established for power back up during the construction phase. These DG sets are being utilized during operation phase also. It is promised that all the DG sets have been provided with acoustic enclosures and stacks of adequate height. The DG sets do conform the standards prescribed in E(P) A Rules for air and noise emission. **Stack emission of DG sets has been monitored by an approved lab namely Vardan Envirolab, Gurgaon in April, 2015 indicating all the results within permissible limits.** Ambient air quality and noise levels have also been monitored by an approved lab namely Vardan Envirolab, Gurgaon in April, 2015 indicating all the results within permissible limits.

(iii)	During night time the noise levels measured at the boundary of the building shall be restricted to the permissible levels to comply with prevalent regulations.	Being complied

Ambient air quality and noise levels have also been monitored by an approved lab namely Vardan Envirolab, Gurgaon in April, 2015 indicating all the results within permissible limits.

(iv)	Noise barriers should be provided at appropriate locations so as to ensure that the noise levels do not exceed the prescribed standards.	Under compliance

The green belt is being developed all around the colony and along the internal roads to work as noise barriers.

(v)	Weep holes in the compound walls shall be provided to ensure natural drainage of rainwater in the catchment area.	Being complied

The PA have confirmed that the weep holes in the compound walls of the project to ensure natural drainage of rainwater in the catchment area have been provided.

(vi)	A sewage treatment plant (STP) of adequate capacity shall be installed. The installation of STP should be certified by an Independent expert and a report in this regard should be submitted to the Ministry before the project is commissioned for operation.	Under compliance

It is observed that one STP of 350 KLD capacity is operational. UV system has been provided. Two more STP's of 300 kld and 100 kld are ready but they are yet to be made operational. Fourth STP of 300 kld capacity will be ready within 3 months. It is further confirmed that the treated water will be used in toilet flushing through dual plumbing line. The balance water will be used green belt and cooling.

(vii)	Oil and grease trap shall be provided to remove oil and grease from the surface run off and suspended matter shall be removed in a settling tank before its utilization for rainwater harvesting.	Being complied

In total 37 rainwater harvesting pits along with desilting chambers have been completed. The PA has been asked to submit cleaning schedule for the rainwater harvesting pits.

(viii)	The solid waste generated should be properly collected and segregated. Wet garbage should be composted and dry/inert solid waste should be disposed of for land filling.	Being complied

It is informed that the practice of segregating bio-degradable and non biodegradable waste is adopted and then the waste is disposed off by the project authorities by giving to HUDA's approved /designated places as this complex is located in Sector-48 of Gurgaon which is developed sector by HUDA and to maintain the external infrastructural facilities. Ten organic waste converter units of 10 kg per day capacity each have been commissioned to convert the organic waste into bio-compost. Few more units will be commissioned in due course of time.

(ix)	Any hazardous waste including bio-medical waste should be disposed of as per applicable Rules & norms with necessary approvals of the Haryana Pollution Control Board.	Assured to comply

As the proposed project is an Housing Complex and Township, it is assumed that no hazardous waste will be generated other than waste oil/used oil from the DG sets. Few DG sets **have been established for power back up and the waste oil/lubricant is generated during their maintenance, the PA has been asked** to comply following measures in respect of disposal of waste oil/used oil which is categorized as hazardous waste:-

- The lubricant/waste oil from DG sets should be collected in separate containers with marking of "Hazardous waste" and the same may be disposed off by selling to registered recyclers only.
- A register will be maintained by respective companies to keep a record of quantity of lubricant/waste oil generated by DG sets.

- The project authorities will submit return in Form-4 and Form-13 to the Haryana State Pollution Control Board every year with the copies to this office.

(x)	The green belt design along the periphery of the plot shall achieve attenuation factor conforming to the day and night noise standards prescribed for residential land use. The open spaces inside the plot should be suitably landscaped and covered with vegetation of indigenous variety.	Under compliance

The green belt development is in progress. More than 1000 trees and 5000 shrubs have been planted. The PA has been asked to submit the details of plants planted till date in the following proforma:-

S.No	Year	Area covered	No. of plants planted	Species of plants planted	Exp. incurred (in Rs.)

(xi)	Incremental pollution loads on the ambient air quality, noise and water quality should be periodically monitored after commissioning of the project.	Being complied

The ambient air quality, noise level quality, stack emission, STP treated water and ground water quality is being monitored by the approved lab namely Vardan Envirolab, Gurgaon and the reports are submitted to this office. Last monitoring was done in April, 2015 indicating all the results within the permissible limits. The project authorities have been asked to get the monitoring done from time to time.

(xii)	The ground water levels and its quality should be monitored regularly in consultation with Central Ground Water Authority.	Being complied

The ground water quality is being monitored by the approved lab namely Vardan Envirolab, Gurgaon and the reports are submitted to this office. Last monitoring was done in April, 2015 indicating all the results within the permissible limits.

(xiii)	A Report on the energy conservation measures conforming to energy conservation norms finalized by Bureau of Energy Efficiency should be prepared incorporating details about building materials & technology, R & U Factors etc. and submit to the Ministry in 3 months time.	Being complied

Details about Energy conservation measures conforming to energy conservation norms incorporating details about building materials & technology and R & U factors etc. has been submitted by PA. Following measures are being taken by the project authorities:-

- Stable incoming power supply from State Electricity grid.
- Transformer with on load tap charger/off load tap charger provided for superior voltage regulation.

- Green CFL based lighting will be done in the common areas, landscape areas, signages, entry gates and boundary walls etc.
- Use of solar water heater systems have been proposed.
- Building envelope has glazing of low E insulating glass and low U factor.
- DG sets are in auto cut and auto start controlled mechanism.

(xiv)	**The values of R & U for the building envelope should meet the requirements of the hot & humid climatic location. Details of the building envelope should be worked out and furnished in 3 months time.**	Assured , to comply

The values of R & U for the building envelope will be meeting the requirements of the hot & humid climatic location and details will be checked up regularly.

(xv)	**Application of solar energy should be incorporated for illumination of common areas, lighting for gardens and street lighting in addition to provision for solar water heating.**	Under compliance

It is observed that the solar energy has been utilized as per HAREDA guidelines. The solar energy has been utilized for water heating.

(xvi)	**Excess treated sewage, if any, shall be utilized for building construction activities in consultation with HUDA.**	Being complied

The project authorities have obtained the approval of the HUDA for use of treated water in construction activities.

(B) General Conditions :

(i)	**The environmental safeguards contained in the EIA Report should be implemented in letter and spirit.**	Being complied

The PA has been trying its best to comply most of the environmental safeguards laid down in environment clearance letter and EIA report.

(ii)	**Provision should be made for the supply of kerosene or cooking gas / pressure cooker to the laborers during construction phase.**	Being complied

It is gathered that about 150 workers have been engaged for the project who reside in their camps in nearby villages. The mess facilities are provided by the contractor. The medical facilities are also provided by the contractor and First Aid facilities are provided by the project authorities.

(iii)	**All the laborers to be engaged for construction works should be screened for health and adequately treated before the issue of work permits.**	Being complied

It is informed that the contractors do provide necessary medical facilities to the workers and First Aid Boxes have been provided at the construction sites.

(iv)	**Regular submission of six monthly progress report.**	Being complied

The project has been monitored on **06.11.2015** and regular submission of six monthly progress report is being ensured. The PA has been asked to submit six monthly progress report in 1st week of December and 1st week of June every year in soft and hard copies both as the report will be displayed on Web site of the Ministry of Environment & Forests in pursuance of the provisions of new EIA Notification no. 1533(E) dated 14th September, 2006.

(v)	**Copy of environmental clearance should be advertised in two local newspapers.**	Partially complied

The copies of the advertisement of environmental clearance letter in Hindi and English newspapers are yet to be submitted by PA.

(vi)	**Approvals from Chief Controller of Explosives, Fire Department, Civil Aviation Department, Forest (Conservation) Act, 1980 & Wildlife (Protection) Act, 1972 etc. should be obtained.**	Under compliance

It is informed that the NOC from State Pollution Control Board, clearances/NOC's from Civil Aviation Deptt. and Fire Department have been obtained. Consent to Operate under Air & Water Acts has been applied for. Completion certificate has been obtained. There are two borewells in the project premises for which the permission from CGWA has been obtained.

(vii)	**The project authority will enter into MOU with all the buyers, if any, of the property , flats/shops etc. to ensure operation and maintenance of the assets handed over to the society formed by the residents/owners of the building.**	Assured to comply

It is planned that the general maintenance and other basic infrastructure facilities will be maintained by M/s Sweta Estates Pvt. Ltd. itself and property will not be handed over to any other party/Association. Hence, this condition is not applicable at this project. However, PA has been asked to enter into MOU with all the buyers if the general maintenance of the Housing Complex is handed over to any Association or private parties.

(viii)	**Under the provisions of Environment(Protection) Act, 1986, legal action shall be initiated against the project proponent, if, it was found that construction of the project had started without obtaining environmental clearance.**	No violation was noticed.

Thus it is confirmed that major construction work was done at the project site only after ensuring environmental clearance letter from the Ministry of Environment & Forests. Thus no violation of this condition was noticed and no action is recommended against the project authorities.

16/11/15

(Surendra Kumar)
Director(S)

Encl. as above:

Annex-2

Vardan Envirolab

Regd. Address: D-142, Sushant Lok-III, Golf Course Extension Road, Sector-57, Gurgaon (Haryana)
Lab Address: Samaspur, Opposite Amity School, Sector-51, Gurgaon (Haryana)
(ISO 9001|ISO 14001|OHSAS 18001|NABL Accredited|RSPCB Approved Laboratory)

Test Certificate

Sample Number	VEL/SEPL/A/01	Report No.:	VEL/A/1504/051
Name & Address of Party:	M/s Sweta Estate Pvt. Ltd, Proposed Housing Scheme, Sector-48, Gurgaon-Sohna Road, Gurgaon (Haryana).	Format No.:	5.1F-01
		Party Reference No.:	NIL
		Reporting Date:	26/04/2015
		Receipt Date:	20/04/2015
Sample Description :	AMBIENT AIR QUALITY MONITORING		

General Information:-

Client Representative	:	Mr. Devendra
Sample collected by (Name & Designation)	:	Mr. Deepak Sharma (Field Analyst)
Sampling Location	:	Near Main Gate
Latitude	:	28°25'26.3"
Longitude	:	77°02'15.6"
Instrument Used	:	RDS with PM 2.5 attachment
Instrument Code	:	VEL/RDS/01 & VEL/FPS/01
Instrument Calibration Status	:	Calibrated
Meteorological condition during monitoring	:	Clear Sky
Date of Monitoring	:	19/04/2015 to 20/04/2015
Time of Monitoring	:	24 hours
Ambient Temperature (°C)	:	Min. 22.1, Max. 39.0
Surrounding Activity	:	Human & Vehicular Activities
Scope of Monitoring	:	Regulatory Requirement
Control measure if Any	:	No
Sampling & Analysis Protocol	:	IS-5182
Parameter Required	:	$PM_{2.5}$, PM_{10}, NO_x, SO_2, CO

TEST RESULTS

S. No.	Parameter	Protocol	Result	Unit	NAAQS*
1.	Particulate Matter	$PM_{2.5}$ sampler (Gravimetric)	50.72	$\mu g/m^3$	60
2.	Particulate Matter (PM_{10})	IS: 5182 (P-23), 2006	78.50	$\mu g/m^3$	100
3.	Nitrogen Dioxide (NO_x)	IS: 5182 (P-6), 1975 Reffirmed 1998	30.80	$\mu g/m^3$	80
4	Sulphur Dioxide (SO_2)	IS: 5182 (P-2), 2001	13.60	$\mu g/m^3$	80
5.	Carbon Monoxide (CO)	IS: 5182 (P-10), 1999	0.86	mg/m^3	4

*NAAQS - National Ambient Air Quality Standards, Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 16.11.2009

NOTE: 1. The results listed refer only to the tested samples & applicable parameters
2. Total liabilities of our lab will be restricted to the invoice amount only
3. The sample will be destroyed after retention time unless otherwise specified
4. This report is not to be reproduced wholly or in part and cannot be used as evidence in the court of law

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Lab Address: Samaspur, Opposite Amity School, Sector-51, Gurgaon (Haryana)
(ISO 9001|ISO 14001|OHSAS 18001|NABL Accredited|RSPCB Approved Laboratory)

Test Certificate

Sample Number:	VEL/ SEPL/A/02	Report No.:	VEL/A/1504/052
Name & Address of Party:	M/s Sweta Estate Pvt. Ltd, Proposed Housing Scheme, Sector-48, Gurgaon-Sohna Road, Gurgaon (Haryana).	Format No.:	5.1F-01
		Party Reference No:	NIL
		Reporting Date:	26/04/2015
		Receipt Date:	20/04/2015
Sample Description:	AMBIENT AIR QUALITY MONITORING		

General Information:-

Client Representative	:	Mr. Devendra
Sample collected by (Name & Designation)	:	Mr. Sandeep (Field Analyst)
Sampling Location	:	Near Center of the Project
Latitude	:	28°25'27.4"
Longitude	:	77°02'10.7"
Instrument Used	:	RDS with PM 2.5 attachment
Instrument Code	:	VEL/RDS/02 & VEL/FPS/02
Instrument Calibration Status	:	Calibrated
Meteorological condition during monitoring	:	Clear Sky
Date of Monitoring	:	19/04/2015 to 20/04/2015
Time of Monitoring	:	24 hours
Ambient Temperature (°C)	:	Min. 22.1, Max. 39.0
Surrounding Activity	:	Human & Vehicular Activities
Scope of Monitoring	:	Regulatory Requirement
Control measure if Any	:	No
Sampling & Analysis Protocol	:	IS-5182
Parameter Required	:	$PM_{2.5}$, PM_{10}, NO_x, SO_2 CO

TEST RESULTS

S. No.	Parameter	Protocol	Result	Unit	NAAQS*
1.	Particulate Matter	$PM_{2.5}$ sampler (Gravimetric)	47.83	µg/m³	60
2.	Particulate Matter (PM_{10})	IS: 5182 (P-23), 2006	81.50	µg/m³	100
3.	Nitrogen Dioxide (NO_x)	IS: 5182 (P-6), 1975 Reffirmed-1998	27.40	µg/m³	80
4.	Sulphur Dioxide (SO_2)	IS: 5182 (P-2), 2001	13.70	µg/m³	80
5.	Carbon Monoxide (CO)	IS: 5182 (P-10), 1999	0.73	mg/m³	4

*NAAQS – National Ambient Air Quality Standards: Schedule-VII [Rule 3 (3B)], [Part-II-sec -3(i)] 16.11.2009

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Vardan EnviroLab

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Test Certificate

Sample Number:	VEL/ SEPL/A/03	Report No.:	VEL/A/1504/053
Name & Address of Party:	M/s Sweta Estate Pvt. Ltd, Proposed Housing Scheme, Sector-48, Gurgaon-Sohna Road, Gurgaon (Haryana).	Format No.:	S.TF-01
		Party Reference No.:	NIL
		Reporting Date:	26/04/2015
		Receipt Date:	20/04/2015
Sample Description :	AMBIENT AIR QUALITY MONITORING		

General Information:-

Client Representative	:	Mr Devendra
Sample collected by (Name & Designation)	:	Mr. Naveen (Field Analyst)
Sampling Location	:	Backside of the Project
Latitude	:	28°25'21.3"
Longitude	:	77°02'03.5"
Instrument Used	:	RDS with PM 2.5 attachment
Instrument Code	:	VEL/RDS/02 & VEL/FPS/02
Instrument Calibration Status	:	Calibrated
Meteorological condition during monitoring	:	Clear Sky
Date of Monitoring	:	19/04/2015 to 20/04/2015
Time of Monitoring	:	24 hours
Ambient Temperature (°C)	:	Min. 22.1, Max. 39.0
Surrounding Activity	:	Human & Vehicular Activities
Scope of Monitoring	:	Regulatory Requirement
Control measure if Any	:	No
Sampling & Analysis Protocol	:	IS-5182
Parameter Required	:	$PM_{2.5}$, PM_{10}, NO_x, SO_2, CO

TEST RESULTS

S. No.	Parameter	Protocol	Result	Unit	NAAQS*
1.	Particulate Matter	$PM_{2.5}$ sampler (Gravimetric)	42.16	µg/m³	60
2.	Particulate Matter (PM_{10})	IS: 5182 (P-23), 2006	81.86	µg/m³	100
3.	Nitrogen Dioxide (NO_x)	IS: 5182 (P-6), 1975 Reffirmed-1998	24.80	µg/m³	80
4.	Sulphur Dioxide (SO_2)	IS: 5182 (P-2), 2001	16.60	µg/m³	80
5.	Carbon Monoxide (CO)	IS: 5182 (P-10), 1999	0.77	mg/m³	4

*NAAQS – National Ambient Air Quality Standards, Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 16.11.2009

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Lab Address: Samaspur, Opposite Amity School, Sector-51, Gurgaon (Haryana)
(ISO 9001|ISO 14001|OHSAS 18001|NABL Accredited|RSPCB Approved Laboratory)

Test Certificate

Sample Number:	VEL/ SEPL/ST/01	Report No.:	VEL/ST/1504/050
Name & Address of Party:	M/s Sweta Estate Pvt. Ltd, Proposed Housing Scheme, Sector-48, Gurgaon-Sohna Road, Gurgaon (Haryana).	Format No.:	5.1 F-01
		Party Reference No.:	NIL
		Reporting Date:	26/04/2015
Sample Description :	Stack Emission Monitoring	Receipt Date:	20/04/2015

Client Representative	:	Mr. Devendra
Sample Collected (Name & Designation)	:	Mr. Deepak Sharma (Field Analyst)
Date of Sampling	:	20/04/2015
Sampling Location	:	D. G Set Area
Sampling duration (Minutes)	:	34.0
Stack attached to	:	D.G. Set No. 1 (1010 KVA)
Make of stack	:	Iron
Diameter of stack	:	450 mm
Height of stack	:	50 mtr.
Meteorological Condition	:	Clear Sky
Instrument calibration status	:	OK
Ambient Temperature - Ta (^{0}C)	:	36 0
Temperature of Stack Gases - Ts (^{0}C)	:	129.0
Velocity of Stack Gases (m/sec.)	:	9.25
Flow rate of PM (LPM)	:	26.00
Flow rate of Gas (LPM)	:	2.00
Sampling condition	:	Isokinetic
Protocol used	:	IS :11255

RESULTS

S. No.	Parameters	Results	Units	Test Methods	Limits (As Per CPCB)
1.	Particulate Matter (PM)	71.90	mg/Nm^3	Gravimetric method	75
2.	Oxides of Nitrogen (NO2)	60.67	mg/Nm^3	PDA Method	710
3.	Sulphur Dioxide (SO_2)	45.22	mg/Nm^3	Titrimetric method	--
4.	Carbon Monoxide	5.78	mg/Nm^3	By G. C. Method	150

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(ISO 9001|ISO 14001|OHSAS 18001|NABL Accredited|RSPCB Approved Laboratory)

Test Certificate

Sample Number:	VEL/ SEPL/ST/02	Report No.:	VEL/ST/1504/051
Name & Address of Party:	M/s Sweta Estate Pvt. Ltd, Proposed Housing Scheme, Sector-48, Gurgaon-Sohna Road, Gurgaon (Haryana).	Format No..	5.1 F-01
		Party Reference No.:	NIL
		Reporting Date:	26/04/2015
Sample Description :	Stack Emission Monitoring	Receipt Date:	20/04/2015

Client Representative	:	Mr. Devendra
Sample Collected (Name & Designation)	:	Mr. Sandeep (Field Analyst)
Date of Sampling	:	20/04/2015
Sampling Location	:	D. G. Set Area
Sampling duration (Minutes)	:	36.0
Stack attached to	:	D.G. Set No. 2 (1010 KVA)
Make of stack	:	Iron
Diameter of stack	:	450 mm
Height of stack	:	50 mtr.
Meteorological Condition	:	Clear Sky
Instrument calibration status	:	OK
Ambient Temperature – Ta (°C)	:	37.0
Temperature of Stack Gases - Ts (°C)	:	130.0
Velocity of Stack Gases (m/sec.)	:	10.06
Flow rate of PM (LPM)	:	26.00
Flow rate of Gas (LPM)	:	2.00
Sampling condition	:	Isokinetic
Protocol used	:	IS :11255

RESULTS

S. No.	Parameters	Results	Units	Test Methods	Limits (As Per CPCB)
1.	Particulate Matter (PM)	58.10	mg/Nm³	Gravimetric method	75
2.	Oxides of Nitrogen (NO2)	60.53	mg/Nm³	PDA Method	710
3.	Sulphur Dioxide (SO_2)	49.10	mg/Nm³	Titrimetric method	--
4.	Carbon Monoxide	4.40	mg/Nm³	By G. C. Method	150

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(ISO 9001|ISO 14001|OHSAS 18001|NABL Accredited|RSPCB Approved Laboratory)

Test Certificate

Sample Number	VEL/ SEPL/ST/03	Report No.:	VEL/ST/1504/052
Name & Address of Party:	M/s Sweta Estate Pvt. Ltd, Proposed Housing Scheme, Sector-48, Gurgaon-Sohna Road, Gurgaon (Haryana).	Format No.:	5.1 F-01
		Party Reference No.:	NIL
		Reporting Date:	26/04/2015
Sample Description :	Stack Emission Monitoring	Receipt Date:	20/04/2015

Client Representative	:	Mr. Devendra
Sample Collected (Name & Designation)	:	Mr. Naveen (Field Analyst)
Date of Sampling	:	20/04/2015
Sampling Location	:	D. G. Set Area
Sampling duration (Minutes)	:	37.0
Stack attached to	:	D.G. Set No. 3 (500 KVA)
Make of stack	:	Iron
Diameter of stack	:	450 mm
Height of stack	:	50 mtr.
Meteorological Condition	:	Clear Sky
Instrument calibration status	:	OK
Ambient Temperature - Ta (°C)	:	36.0
Temperature of Stack Gases - Ts (°C)	:	130.0
Velocity of Stack Gases (m/sec.)	:	8.70
Flow rate of PM (LPM)	:	27.00
Flow rate of Gas (LPM)	:	2.00
Sampling condition	:	Isokinetic
Protocol used	:	IS :11255

RESULTS

S. No.	Parameters	Results	Units	Test Methods	Limits (As Per CPCB)
1.	Particulate Matter (PM)	67.52	mg/Nm³	Gravimetric method	75
2.	Oxides of Nitrogen (NO2)	44.72	mg/Nm³	PDA Method	710
3.	Sulphur Dioxide (SO_2)	5.77	mg/Nm³	Titrimetric method	--
4.	Carbon Monoxide	3.83	mg/Nm³	By G. C Method	150

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Test Certificate

Sample Number:	VEL/SEPL/AN/01	Report No.:	VEL/AN/1504/051
Name & Address of Party:	M/s Sweta Estate Pvt.Ltd, Proposed Housing Scheme, Sector-48, Gurgaon Sohna Road,Gurgaon (Haryana)	Format No.:	5.10F-01
		Party Reference No.:	NIL
		Reporting Date:	26/04/2015
		Receipt Date:	20/04/2015
Sample Description :	AMBIENT NOISE LEVEL MONITORING		

General Information:-

Client Representative	:	Mr. Devendra
Sample collected by (Name & Designation)	:	Mr. Deepak Sharma (Field Analyst)
Sampling Location	:	Near Main Gate
Latitude	:	28°25'26.3"
Longitude	:	77°02'15.6"
Instrument Used	:	Sound Level Meter
Instrument Code	:	VEL/SLM/01
Instrument Calibration Status	:	Calibrated
Meteorological condition during monitoring	:	Clear Sky
Date of Monitoring	:	19/04/2015 to 20/04/2015
Time of Monitoring	:	06:00 AM to 06.00AM
Ambient Temperature (°C)	:	Min., Max., Leq.
Surrounding Activity	:	Human & Vehicular Activities
Scope of Monitoring	:	Regulatory Requirement
Control measure if Any	:	No any
Sampling & Analysis Protocol	:	CPCB Guidelines & IS-9989
Sampling Duration	:	24 Hours
Parameter Required	:	As per Work Order

TEST RESULTS

S. No.	Parameters	Protocol	Test Result dB (A)		Unit
			Day Time (6:00 am to 10:00 pm)	Night Time (10:00 pm to 06:00 am)	
1.	L_{max}	CPCB Guidelines/ IS 9989	62.60	56.80	dB(A)
2.	L_{min}	CPCB Guidelines/ IS 9989	49.90	39.70	dB(A)
3.	L_{eq}	CPCB Guidelines/ IS 9989	53.30	42.50	dB(A)
4.	CPCB Limits in dB(A) Leq (Residential Area)	-	55.00	45.00	dB(A)

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Lab Address: Samaspur, Opposite Amity School, Sector-51, Gurgaon (Haryana)
(ISO 9001|ISO 14001|OHSAS 18001|NABL Accredited|RSPCB Approved Laboratory)

Test Certificate

Sample Number:	VEL/ SEPL/AN/02	Report No.:	VEL/AN/1504/052
Name & Address of Party:	M/s Sweta Estate Pvt.Ltd, Proposed Housing SchemeSector-48, Gurgaon Sohna Road,Gurgaon (Haryana)	Format No.:	S.10F-01
		Party Reference No.:	NIL
		Reporting Date:	26/04/2015
		Receipt Date:	20/04/2015
Sample Description :	AMBIENT NOISE LEVEL MONITORING		

General Information:-

Client Representative	:	Mr. Devendra
Sample collected by (Name & Designation)	:	Mr. Naveen (Field Analyst)
Sampling Location	:	Near Center of the Project
Latitude	:	28°25'27.4"
Longitude	:	77°02'10.7"
Instrument Used	:	Sound Level Meter
Instrument Code	:	VEL/SLM/02
Instrument Calibration Status	:	Calibrated
Meteorological condition during monitoring	:	Clear Sky
Date of Monitoring	:	19/04/2015 to 20/04/2015
Time of Monitoring	:	06:00 AM to 06:00AM
Ambient Temperature (°C)	:	Min., Max., Leq.
Surrounding Activity	:	Human & Vehicular Activities
Scope of Monitoring	:	Regulatory Requirement
Control measure if Any	:	No any
Sampling & Analysis Protocol	:	CPCB Guidelines & IS-9989
Sampling Duration	:	24 Hours
Parameter Required	:	As per Work Order

TEST RESULT

S. No.	Parameters	Protocol	Test Result dB (A)		Unit
			Day Time (6:00 am to 10:00 pm)	Night Time (10:00 pm to 06:00 am)	
1.	L_{max}	CPCB Guidelines/ IS 9989	64.90	57.50	dB(A)
2.	L_{min}	CPCB Guidelines/ IS 9989	47.70	41.20	dB(A)
3.	L_{eq}	CPCB Guidelines/ IS 9989	52.80	43.10	dB(A)
4.	CPCB Limits in dB(A) Leq (Residential Area)		55.00	45.00	dB(A)

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Test Certificate

Sample Number:	VEL/ SEPL/AN/03	Report No :	VEL/AN/1504/053
Name & Address of Party:	M/s Sweta Estate Pvt.Ltd, Proposed Housing SchemeSector-48, Gurgaon Sohna Road,Gurgaon (Haryana)	Format No.:	5.10F-01
		Party Reference No.:	NIL
		Reporting Date:	26/04/2015
		Receipt Date:	20/04/2015
Sample Description :	AMBIENT NOISE LEVEL MONITORING		

General Information:-

Client Representative	:	Mr. Devendra
Sample collected by (Name & Designation)	:	Mr. Sandeep (Field Analyst)
Sampling Location	:	Backside of the Project
Latitude	:	28°25'21.3"
Longitude	:	77°02'03.5"
Instrument Used	:	Sound Level Meter
Instrument Code	:	VEL/SLM/03
Instrument Calibration Status	:	Calibrated
Meteorological condition during monitoring	:	Clear Sky
Date of Monitoring	:	19/04/2015 to 20/04/2015
Time of Monitoring	:	06:00 AM to 06:00AM
Ambient Temperature (°C)	:	Min., Max., Leq.
Surrounding Activity	:	Human & Vehicular Activities
Scope of Monitoring	:	Regulatory Requirement
Control measure if Any	:	No any
Sampling & Analysis Protocol	:	CPCB Guidelines & IS-9989
Sampling Duration	:	24 Hours
Parameter Required	:	As per Work Order

TEST RESULTS

S. No.	Parameters	Protocol	Test Result dB (A)		Unit
			Day Time (6:00 am to 10:00 pm)	Night Time (10:00 pm to 06:00 am)	
1.	L_{max}	CPCB Guidelines/ IS 9989	65.20	54.90	dB(A)
2.	L_{min}	CPCB Guidelines/ IS 9989	45.40	38.80	dB(A)
3.	L_{eq}	CPCB Guidelines/ IS 9989	50.30	42.60	dB(A)
4.	CPCB Limits in dB(A) Leq (Residential Area)	-	55.00	45.00	dB(A)

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Vardan EnviroLab

Regd. Address: D-142, Sushant Lok-III, Golf Course Extension Road, Sector-57, Gurgaon (Haryana)
Lab Address: Samaspur, Opposite Amity School, Sector-51, Gurgaon (Haryana)
(ISO 9001|ISO 14001|OHSAS 18001|NABL Accredited|RSPCB Approved Laboratory)

Test Certificate

Sample Number:	VEL/SW/W/01	Report No.:	VEL/W/1504/050
Name & Address of Party:	M/s Sweta Estate Pvt. Ltd, Proposed Housing Scheme, Sector-48, Gurgaon-Sohna Road, Gurgaon (Haryana)	Format No :	5.10F-01
		Party Reference No.:	NIL
		Reporting Date:	26/04/2015
Sample Description.	Drinking water sample	Receipt Date:	19/04/2015
Sampling Location:	Near Project Site	Sampling Date:	19/04/2015
Client Representative	Mr. Devendra	Sampling Type:	Composite
Sample Collected by (Name & Designation):	Mr. Sudhir Singh (Feild Analyst)	Preservation:	Refrigerated
Latitude:	28°25'27.3"	Sampling Quantity:	2.0 Ltr
Longitude.	77°02'10.7"	Parameter Required:	As per Work Order
Sampling & Analysis Protocol	IS-10500-2012,APHA 22nd Edition 2012		

TEST RESULTS

S. No.	Parameter	Test-Method	Result	Unit	Limits of IS:10500 -2012	
					Desirable limit (Max.)	Permissible limit in the Absence of Alternate Source (Max.)
1.	pH (at 25 °C)	APHA 22nd Edition, 4500-H+ B	6.98	--	6.5 to 8.5	No Relaxation
2.	Colour	APHA 22nd Edition, 2120 B	<5.0	Hazen	5	15
3.	Turbidity	APHA 22nd Edition, 2130 B	<1.0	NTU	1	5
4.	Odour	APHA 22nd Edition, 2150 B	Agreeable	--	Agreeable	Agreeable
5.	Taste	APHA 22nd Edition, 2160 B	Agreeable	--	Agreeable	Agreeable
6.	Total Hardness as $CaCO_3$	APHA 22nd Edition, 2340 C	70.50	mg/l	200	600
7.	Calcium as Ca	APHA 22nd Edition, 3500 Ca B	18.31	mg/l	75	200
8.	Alkalinity as $CaCO_3$	APHA 22nd Edition, 2320 B	49.87	mg/l	200	600
9.	Chloride as Cl	APHA 22nd Edition, 4500-Cl- B	32.45	mg/l	250	1000
10.	Residual free Chlorine	APHA 22nd Edition, 4500 Cl- B	<0.05	mg/l	0.2	1
11.	Cyanide as CN	APHA 22nd Edition, 4500 CN- D	<0.02	mg/l	0.05	No Relaxation
12.	Magnesium as Mg	APHA 22nd Edition, 2340 B	6.03	mg/l	30	100
13.	Total Dissolved Solids	APHA 22nd Edition, 2540 C	185.00	mg/l	500	2000
14.	Sulphate as SO_4	APHA 22nd Edition, 4500 E	3.64	mg/l	200	400
15.	Fluoride as F	APHA 22nd Edition, 4500-F D	0.46	mg/l	1.0	1.5
16.	Nitrate as NO_3	IS 3025 (P-34) 1988	1.84	mg/l	45	No Relaxation
17.	Iron as Fe	APHA 22nd Edition, 3500-Fe B	0.58	mg/l	0.3	No relaxation
18.	Aluminium as Al	APHA 22nd Edition, 3111 B	<0.02	mg/l	0.03	0.2
19.	Boron	APHA 22nd Edition, 4500B C	<0.5	mg/l	0.5	1

Cont...

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Lab Address: Samaspur, Opposite Amity School, Sector-51, Gurgaon (Haryana)
(ISO 9001|ISO 14001|OHSAS 18001|NABL Accredited|RSPCB Approved Laboratory)

Test Certificate

S. No.	Parameter	Test-Method	Result	Unit	Limits of IS:10500 -2012	
					Desirable limit (Max.)	Permissible limit in the Absence of Alternate Source (Max.)
20	Phenolic Compounds	APHA 22nd Edition, 5530 C	<0.001	mg/l	0.001	0.002
21.	Anionic Detergents as MBAS	APHA 22nd Edition, 5540 C	<0.02	mg/l	0.2	1.0
22.	Chromium as Cr	APHA 22nd Edition, 3111 B	<0.01	mg/l	0.05	No Relaxation
23.	Zinc as Zn	APHA 22nd Edition, 3111 B	<0.02	mg/l	5	15
24	Copper as Cu	APHA 22nd Edition, 3111 B	<0.02	mg/l	0.05	1.5
25.	Manganese as Mn	APHA 22nd Edition, 3111 B	<0.02	mg/l	0.1	0.3
26.	Cadmium as Cd	APHA 22nd Edition, 3111 B	<0.003	mg/l	0.003	No Relaxation
27.	Lead as Pb	APHA 22nd Edition, 3111 B	<0.01	mg/l	0.01	No Relaxation
28.	Selenium as Se	APHA 22nd Edition, 3111 B	<0.01	mg/l	0.01	No Relaxation
29.	Arsenic as As	APHA 22nd Edition, 3111 B	<0.01	mg/l	0.01	No Relaxation
30.	Mercury as Hg	APHA 22nd Edition, 3111 B	<0.001	mg/l	0.001	No Relaxation
31.	Total Coliform	IS 1622,1981(Reaffirmed 2003)	<2/100ml	(CFU/100ml)	-	10.00
32.	E. Coli	IS 1622,1981(Reaffirmed 2003)	Absent	(CFU/100ml)	Absent	Absent

VARDAN ENVIRO LAB SAMASPUR SECTOR-51 GURGAON

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Lab Address: Samaspur, Opposite Amity School, Sector-51, Gurgaon (Haryana)
(ISO 9001|ISO 14001|OHSAS 18001|NABL Accredited|RSPCB Approved Laboratory)

Test Certificate

Sample Number:	VEL/SW/WW/01	Report No.:	VEL/WW/1504/050
Name & Address of Party:	M/s Sweta Estate Pvt. Ltd, Proposed Housing Scheme, Sector-48, Gurgaon-Sohna Road, Gurgaon (Haryana)	Format No.:	5.1 F-01
		Party Reference No.:	NIL
		Reporting Date:	26/04/2015
Sample Description:	Sewage Water (STP Inlet)	Receipt Date.	19/04/2015
Sampling Location:	STP Plant	Sampling Date:	19/04/2015
Client Representative	Mr. Devendra		
Sample Collected by (Name & Designation):	Mr. Sandeep (Field Analyst)	Preservation:	Refrigerated
Latitude:	28°25'22.5"	Sampling Quantity:	2.0 Ltr
Longitude:	77°02'05.4"	Parameter Required:	As per IS 10500-2012
Sampling & Analysis Protocol	IS 3025, APHA 22nd Edition		

S. No.	Parameter	Protocol	Result	Units
1.	pH (at 25 °C)	APHA 22nd Edition, 4500-H+ B	8.11	-
2.	COD	APHA 22nd Edition, 5220 B	340.10	mg/l
3.	BOD (3 Days at 27 °c)	IS 3025,P-44,1999(Reaffirmed 2003)	102.10	mg/l
4.	Total Suspended Solids	APHA 22nd Edition, 2540 D	212.00	mg/l
5.	Oil and Grease	APHA 22nd Edition, 5520 B	2.74	mg/l

VARDAN ENVIRO LAB SAMASPUR SECTOR-51 GURGAON

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(ISO 9001|ISO 14001|OHSAS 18001|NABL Accredited|RSPCB Approved Laboratory)

Test Certificate

Sample Number:	VEL/SW/WW/02	Report No.:	VEL/WW/1504/051
Name & Address of Party	M/s Sweta Estate Pvt. Ltd, Proposed Housing Scheme, Sector-48, Gurgaon-Sohna Road, Gurgaon (Haryana)	Format No.:	5.1 F-01
		Party Reference No.:	NIL
		Reporting Date:	26/04/2015
Sample Description:	Sewage Water (STP Outlet)	Receipt Date:	19/04/2015
Sampling Location:	STP Plant	Sampling Date:	19/04/2015
Client Representative	Mr. Devendra		
Sample Collected by (Name & Designation):	Mr. Sandeep (Field Analyst)	Preservation:	Refrigerated
Latitude:	28°25'37.8"	Sampling Quantity:	2.0 Ltr
Longitude:	77°02'0.2"	Parameter Required:	As per IS 10500-2012
Sampling & Analysis Protocol	IS 3025, APHA 22nd Edition		

S. No.	Parameter	Protocol	Result	Units	Limits as per CPCB
1.	pH (at 25 °C)	APHA 22nd Edition, 4500-H+ B	7.25	-	6.5 - 8.5
2.	COD	APHA 22nd Edition, 5220 B	38.10	mg/l	250
3.	BOD (3 Days at 27 °c)	IS 3025,P-44,1999(Reaffirmed 2003)	11.20	mg/l	30
4.	Total Suspended Solids	APHA 22nd Edition, 2540 D	12.80	mg/l	100
5.	Oil and Grease	APHA 22nd Edition, 5520 B	0.20	mg/l	10

VARDAN ENVIRO LAB

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Lab Address: Samaspur, Opposite Amity School, Sector-51, Gurgaon (Haryana)
(ISO 9001|ISO 14001|OHSAS 18001|NABL Accredited|RSPCB Approved Laboratory)

Test Certificate

Sample Number:	VEL/SEPL/S/01	Report No.:	VEL/S/1504/050
Name & Address of Party:	M/s Sweta Estate Pvt.Ltd, Proposed Housing Scheme, Sector-48, Gurgaon-Sohna Road, Gurgaon (Haryana).	Format No.:	5.10F-01
		Party Reference No.:	NIL
		Reporting Date:	26/04/2015
Sample Description:	SOIL	Receipt Date:	20/04/2015
Sampling Location.	Near Project Site	Sampling Date:	20/04/2015
Client Representative (Name & Designation):	Mr. Devendra (Manager)	Type of Sampling:	Composite
Sample Collected by (Name & Designation):	Mr. Deepak Sharma (Sr.Analyst)	Sampling Quantity:	2.0 Kg
Latitude:	28°25'27.3"	Depth of Sampling:	30 Cm
Longitude:	77°02'10.6"	Packing Status:	Temp Sealed
Sampling & Analysis Protocol	IS 2720 & USDA		

S. No.	Parameter	Protocol	Result	Unit
1.	pH (at 25 °C)	IS : 2720 (P-26,1987)	7.79	--
2.	Conductivity	IS:14767 2000 Reaffirmed 2006	0.248	mS/cm
3.	Soil Texture	USDA Method, 1968	Silty Loam	--
4.	Color	USDA Method, 1968	Yellowish	--
5.	Water holding capacity	USDA Method, 1968	30.58	%
6.	Bulk density	USDA Method, 1968	1.45	gm/cc
7.	Chloride as Cl	USDA Method, 1968	71.80	mg/kg
8.	Calcium as Ca	USDA Method, 1968	65.43	mg/kg
9.	Sodium as Na	USDA Method, 1968	12.52	mg/kg
10.	Potassium as K	USDA Method, 1968	147.62	kg./hec.
11.	Organic Matter	IS:2720 (P-22, 1972)	0.54	%
12.	Magnesium as Mg	USDA Method, 1968	16.36	mg/kg
13.	Available Nitrogen as N	IS:14684, 1999	172.56	kg./hec.
14.	Available Phosphorus	USDA, APHA-4500PC	15.28	kg./hec.
15.	Zinc as Zn	APHA-3030D, APHA-3111B	2.65	mg/kg
16.	Manganese as Mn	APHA-3030D, APHA-3111B	5.86	mg/kg
17.	Chromium as Cr	APHA-3030D, APHA-3111B	1.96	mg/kg
18	Lead as Pb	APHA-3030D, APHA-3111B	1.44	mg/kg
19.	Cadmium as Cd	APHA-3030D, APHA-3111B	2.70	mg/kg
20.	Copper as Cu	APHA-3030D, APHA-3111B	3.10	mg/kg

Authorised Signatory

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Annex-3

FIGURE 7.1: SEWAGE TREATMENT PLANT SCHEMATIC FLOW DIAGRAM (TREATMENT FOR DISPOSAL)

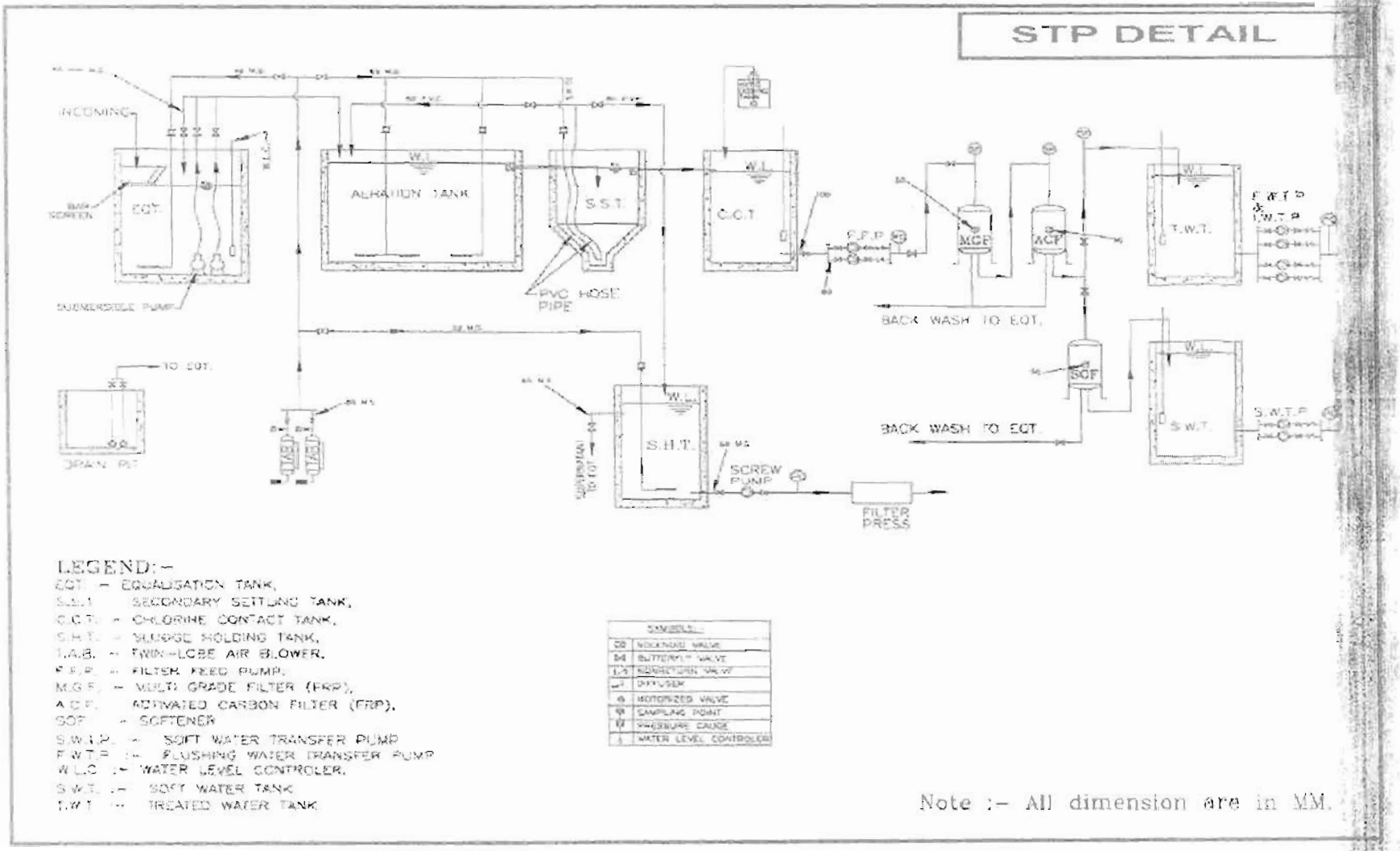
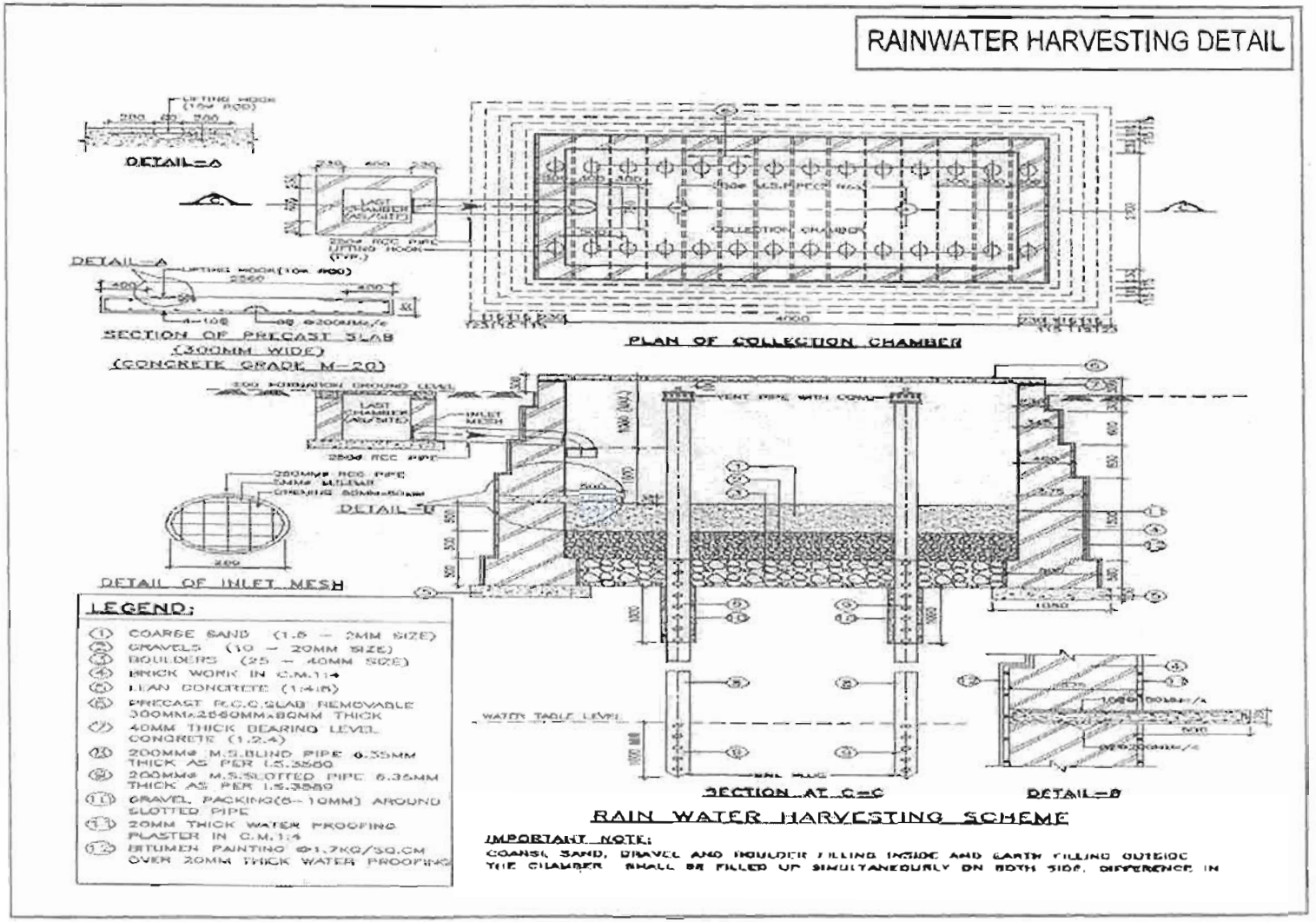


FIGURE 7.2: RAIN WATER HARVESTING DETAILS



Rain water Harvesting &
STP Details.

WATER BALANCE INCLUDING PROVISIONS FOR RECYCLING AND RAIN WATER HARVESTING

Table Water Balance

S. No.	Particular	Quantity (Cum per day)
A	Project Water Demand	
i.	Water for flushing	640
ii.	Water drawn for domestic consumption	1540
iii.	Water requirement for on site landscaping etc. & other commercial activities	300
B	Water harvested	550 (Avg.)
C	Waste water being used on site (for flushing & landscaping)	940
	Water balance (A)-(B+C)	990

The water would be made available from the public water mains of local authority and supplemented from the rain water harvesting system etc.

RAIN WATER HARVESTING - STROM WATER MANAGEMENT

It is programmed to do total rain water harvesting in this housing development. The average precipitation is 610 mm.

Total plot area 47.527 Acres or 192334.64 sq m.
Average rain full 610 mm/Year.
Total Annual Catchments Precipitation = 116,323 K L.
Expected Recovery @ 60% = 69,773.80 K L.

All roof water shall be collected in underground lines through rain water down take pipes and discharged in underground aquifer by the use of detention tanks and discharge wells for rain water harvesting.

All water in the pavements and lawns shall be collected in local swathes and detention of 1-2 hours shall be provided for local recharge.

The basement floor construction shall be such to prevent direct ingress of rain water. However rain water carried by the ramps to the basement shall be collected including the runoffs into sumps. The sumps shall be provided with minimum 2 pumps (1 working, 1 standby) for drainage of basement areas, below

Haryana State Pollution Control Board,
C-11, Sector 6, Panchkula.

Amex-5

936

Regd.A.D.

No. HSPCB/NOC/TAC-I/2007/422 Dated: 18/4/07

To

M/S Shweta Estates Pvt. Ltd.,
21 Commercial Complex, Malcha Marg,
Diplomatic Enclave, New Delhi-110-021

Sub: **Issue of "No Objection Certificate" from pollution angle.**

Please refer to your NOC application received in this office on dated 29.8.2006, on the subject cited above.

Under the Authority of the Haryana State Pollution Control Board vide its agenda Item No. 47.8 dated 28.4.83 sanction to the issue of " No Objection Certificate" with respect to pollution control of Water and Air is hereby accorded for setting up the project of **M/s Shweta Estates Pvt. Ltd., Central Park II, Sector 48, Gurgaon** for the **Housing Project,** with the following terms and conditions:-

1. The Construction Project has declared that the quantity of effluent shall be **1754 m³/Day** i.e **1754 m³/Day** for domestic effluent & **nil Kl/Day** for trade effluent and the same should not exceed mentioned herein.
2. The above "No Objection Certificate" is valid for two years from the date of its issue to be extended for another one year at the discretion of the Board or till the time the unit starts its trial production whichever is earlier. The unit will have to set up the plant and obtain consent during this period.
3. The officer/official of the Board shall have the right to access and inspection of the project in connection with the various processes and the treatment facilities being provided simultaneously with the construction of building/machinery.
4. That necessary arrangement shall be made by the project proponent for the control of Air Pollution before commissioning. The emitted pollutants will meet the emission and other standards as laid/will be prescribed by the Board from time to time
5. The UHBVN/DHBVN will give only temporary connection and permanent connection to the unit will be given by the UHBVN/DHBVN after verifying the consent granted by the Board both under Water Act and Air Act.
6. The project proponent unit will raise the stack height of DG Set as per CPCB norms.
7. Unit will maintain proper log book of Water meter/sub meter before/after commissioning.
8. That in the case of a project is located in an area is sited in a residential or institutional or commercial or agricultural area, the necessary permission for siting such project in an residential or institutional or commercial or agricultural area or controlled area under Town and Country Planning laws or Municipal laws has to be obtained from the competent Authority in law permitting this deviation and will be submitted in original with the request for consent to operate.
9. That there is no discharge directly or indirectly to the surface water body or the process into any interstate river or Yamuna River or River Ghaggar or any other river or either through a direct flow or indirectly without any treatment
10. The unit will use only non-ozone depleting substances in Air Conditioning unit of the project.
11. That the project or the unit concerned is not sited within any prohibited distances according to the Environmental Laws and Rules, Notification, Orders and Policies of Central Pollution Control Board and Haryana State Pollution Control Board.
12. That the project shall use the treated effluent for horticulture/Green belt and undertaking to recycle the treated effluent and remaining with treatment, if any can be discharged into public sewer and obtain permission of the authority concerned.
13. That all the financial dues required under the rules and policies of the Board have been deposited in full by the unit for this No Objection Certificate (NOC)(Consent to Establish). Unit will attach proofs of such deposits with consent to operate.
14. That the unit will comply with all the Hazardous & Solid Waste Management Rules as applicable relating to Handling, Storage and Disposal as required by Central Pollution Control Board and Haryana State Pollution Control Board and MOEF, GOI.
15. Project Proponent should adopt water conservation measures to ensure minimum recycling consumption of water in their Process. Ground water based proposals of new projects should get clearance from Central Ground Water Authority for conservation of precious resource.
16. This NOC would be invalid if it is established in the non-conforming area or any area where such activities are prohibited.
17. That the unit will take all other clearances from concerned agencies whenever required.
18. The above NOC is further subject to the conditions that the unit comply with all the laws/ rules/ decisions and competent directions of Govt. of India/State Government/ HSPCB in all respects before commissioning of the project and during its actual working strictly.
19. That the unit will provide rain water harvesting facility.
20. The unit will recycle 25% of domestic effluent for horticulture purpose.
21. The unit if commencing will provide 3 Ambient air Quality stations within premises at an angle 120° for monitoring of ambient Air Quality.

22 The project Proponent will provide fire-fighting system including storage of water in reservoirs, water hydrants, sprinklers, fire alarm, smoke detector etc. in accordance with National Building Code, which should be fool proof.

23 The Project Proponent shall provide the stack height of DG set stacks which shall be higher than the proposed building as per CPCB norms based on CPCB formule for proper dispersion of gaseous emissions. The unit will install acoustic Chamber/acoustically treated room for controlling noise.

24 The fuel used in DG set should of low sulphur i.e. 0.25% or lower sulphur content

25 The Project Proponent will take adequate measure for controlling NOX emission such as low NOX burner, NCCR System so as to achieve/keep Npx within permissible limits. The Standard of less than less 75 PPM Nox in DG Sets stack as CPCB Norms shall be followed.

26 The Project proponent will obtain permission from Central Ground Water Authority for tubewells installed or proposed to be installed.

27 The project proponent will submit water balance/energy balance and statement there of.

Other specific conditions:

- That the unit will obtain consent /Authorization from the Board after completion of construction work.
- That the unit will submit the copy of EIA clearance to this office as and when obtained from the MOEF, if required.
- That the unit will provide air pollution control NOX and SO2 emissions from DG set.
- That the unit will ensure zero discharge and will provide rainwater harvesting facility.
- That the unit will arrange its own facility for the disposal of Municipal solid waste.
- That the unit will provide Acoustic treatment for controlling Noise form DG set.
- Project proponent will sprinkler water for controlling dust emission during construction.
- The project proponent will not create nuisance during construction and manage traffic properly.
- The project proponent comply with all the orders / rules / notifications of other Govt. Departments or Govt. undertakings as applicable.
- The project proponent will not disrupt the natural drainage boundaries of storm water.
- The project proponent will obtain permission from forest department for cutting the trees.
- The project proponent will obtain all other clearances from all other departments.
- The HSPCB reserves the right to add any conditions, if required, in future.
- The project proponent will use solar & other renewable source of energy.
- The project Proponent will submit approval of building from local authority.
- The project proponent will use 30% of the area under green cover and tree plantation.
- The project proponent will submit scheme to control liquid effluents for installation of ETP/STP.
- The project proponent will submit construction schedule for example (CPM/PERT Chart).
- The project proponent will submit vehicle parking management plan and ensure that there is no parking disorder/mismanagement due to the project.
- **The unit will submit affidavit to comply with all the general as well as specific conditions of the NOC along with a copy of contract given to person/ authority for the management and disposal of Municipal Solid Waste within 30 days failing which NOC will be revoked.**

Env. Engineer-II (HQ)
For Chairman

Endst.No.HSPCB/2007/TAC/ **Dated:**

A copy of the above is forwarded to the following for information and necessary action:

1 The Regional Officer, **Gurgaon.**
2 Executive Engineer,(OP) Division, DHBVN, **Gurgaon.**
3 Director, Environment Department, Haryana, Sec-17, Chandigarh
4 Secretary, MOEF, CGO Complex, Lodhi Road, New Delhi

Env. Engineer-II (HQ)
For Chairman

NOC - AAI

Amex-6

सहित सेवा

AAI/NOC/2006/87/ 576 -78

Dated.-16-05-2006

M/s Sweta Estates Pvt.Ltd.,
21/48 Malcha Marg,
Diplomatic Enclave,
New Delhi-110021.

SUBJECT:- **NO OBJECTION CERTIFICATE - (FOR HEIGHT CLEARANCE ONLY)**

Sir,

Please refer to your letter no. -- dated **13-04-06** on the subject mentioned above.

This office has no objection to the construction of the proposed **Group Housing** by **M/s Sweta Estates Pvt. Ltd.** herein after referred to as the applicant(s) at location **Village Tikri, Sector-48, Gurgaon** to a height of **75 Mts.** (in figure) **Seventy five meters** (in words) above ground level so that the top of the proposed structure when constructed shall not exceed **225.50 Mts.** (site elevation) plus(+) **75 Mts.** (height of structure)= **300.50 Mts.** above mean sea level .

This no objection certificate is being issued on the express understanding that the site elevation (height above mean sea level) viz **225.50 Mts.** relative location of the proposed building/structure & its distances and bearings from ARP/ Runway ends, as tendered by the applicant(s) are correct. If, however, at any stage it is established that the said data as tendered & which could adversely effect aircraft operations, the structure or part(s) thereof in respect of which this 'No Objection Certificate' is being issued will have to be demolished at his own cost as may be directed by the Airports Authority of India. The Applicant(s) are therefore advised in his /their own interest to verify the elevation and other data furnished for the site, before embarking on the proposed construction.

The issue of this 'NOC' is further subject to the provisions of Section 9-A of the Indian Aircraft Act, 1934 and those of any notifications issued there under from time to time and under which also the applicant may be called upon by the Airports Authority of India(National Airports Division) to demolish in whole or in part the structure now being authorized vide this 'No Objection Certificate'.

No Radio/TV Antenna, lighting arresters, staircases, mumtee, overhead water tank and attachments and fixtures of any kind project above the height indicated in para 2 of above.

The use of electric fire or oil fired furnace is obligatory.

This certificate is valid for a period of **three years** from the date of issue. if the building /structure /chimney is not constructed & completed within the above mentioned period of **three years**, you will be required to obtain a fresh 'No Objection Certificate' from the Airports Authority of India(National Airports Division) and/or the General Manager, Aerodromes, Northern Region. The date of completion of the building/ structure/chimney should be intimated to the Airports Authority of India and/or the General Manager, Aerodromes, Northern Region.

No light or a combination of lights which by reason of its intensity, configuration or colour may cause confusion with the aeronautical ground lights of the Airport shall be installed at the site at any time during or after the construction of the building

Day & Night markings with secondary power supply may be provided as per ICAO standard .

16/5/06

(R.K.BHANDARI)
ASSTT.GEN.MANAGER (NOC)
FOR GENERAL MANAGER (AERO)
NORTHERN REGION

Copy to:-

1. The Chairman, Airports Authority of India, Rajiv Gandhi Bhawan, Safdarjung Airport, New Delhi.
2. The Town Planner, DTP Office, Gurgaon.

FOR GENERAL MANAGER (AERO)
NORTHERN REGION

Amex-7

From

The Executive Officer,
Municipal Council,
Gurgaon

To

M/s Sweta Estate Pvt. Ltd.,
22, Commercial Complex, Malcha Marg,
Diplomatic Enclave, Chankya Puri, New Delhi

No. FS/2007/ 260 Dated 12/2/07.

Sub: - Approval of Fire Fighting Scheme from Fire Safety Point of view of the Group Housing measuring 47.527 Acre at Sector- 48 developed by M/s Sweta Estate Pvt. Ltd. Vill. Tikri, Gurgaon

Reference on the subject cited above

Approval of Fire Fighting Scheme of above building from Fire Safety Point of view is forwarded to you for necessary compliance and further necessary action as per letter no- FS/2007/203 Dated 9/2/07 of the Fire Station Officers Gurgaon with duly counter signed by Fire Officer (HQ) of Urban Local Bodies, Haryana Chandigarh. (Copy enclosed).

Executive Officer
Municipal Council,
Gurgaon

.Notes for Point-14 of your letter.

Annex 8

9. ENERGY CONSERVATION

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

- Power would be drawn from Dakshin Haryana Bijli Vitaran Nigam (DHBVN) The total power requirement will be approximately 22000 kVA.
  Backup Source - D.G sets using HSD or natural gas fuel will be used
  Energy consumption – 3.60 VA per square foot of built-up area

Effective measures have been incorporated to minimize the energy consumption in the following manner:

- The building will be designed in such a way that the public areas can be cooled by natural ventilation.
- Energy efficient appliances such as CFL lighting will be used for street lighting. & energy efficient pumps, plant & machinery shall be used.

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

- Back-up power units will be provided by 12 D.G sets of 2000 KVA each providing 100% power backup to the entire Housing Development. The electrical changeover system shall be capable of restoring power supply within 15 seconds of interruption (black out or brown out) of main power supply critical one.

Diesel Generator Set Fuel Combustion – Point Source
To serve as a back-up power supply, 24,000 KVA of power is to be supplied through 12 diesel
generators, having a total of 12 stacks, of height 30m each, with estimated operation duration of
2 hours per day. As a worst-case scenario, emissions were predicted assuming an operation
time of 24 hours.

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

- Glazing is double insulated hermetically sealed glass with low E inside and toughened for outside

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

- Passive solar design refers to the use of the sun's energy for the heating and cooling of living spaces.
- Indirect sunlight to the habitable area by providing 1800mm deep balconies acting as shading devices.

The following passive solar architectural features will be used in the building:

- The orientation of the buildings will be done in such a way that maximum daylight is available.
- Living areas will be placed so that North South to the maximum extent so that light is available.
- The water bodies and green areas will be spaced so that a significant reduction in the temperature can take place.
- Thick walls will be constructed on the West side so that heat influx is reduced.
- Maximum service areas will be placed on the western side.
- Lesser openings will be provided on the West facing walls
- Maximum openings will be provided on the South side.
- Use of cavity wall construction with insulation infill.

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

- Solar energy will be harnessed only for the purpose of domestic use i.e. heating water

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

- Deep overhangings & low E external glazing, The roof of terrace is provided with thermal insulation to reduce the heat gains.

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

- The localised AC (split units) System is designed with R-1410 A Run compressor which is CFC & HCFC free and is ozone friendly. For calculating the heat load, accordingly, minimum heat dissipation from electrical appliances, lighting and glazing have been accounted for. All drive motors are of VVVF type of Energy Efficient having efficiency more than 94%. Similarly distribution transformers (ONAN) are designed for 99% efficiency. Complete lighting/ illumination has been provided using low-power CFL source.

  *VVVF: Variable voltage variable frequency CFL: Compact Fluorescent Lamp ONAN: Oil Natural & Air Natural IKW: Input Kilowatt CFC: Chloro Fluoro carbon HCFC: Hydro Chloro Fluoro Carbon

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

- Heat emission from the proposed construction can be from the following sources: Heat absorbed from the paved and concrete structures, heat generated from equipments / appliances, and due to increased population in the proposed complex. However the heat generated will not be significant and will be dissipated in the lush greens and open areas provided within the complex. Hence it can be concluded that the heat island effect shall not be a concern for the concerned project.

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

- Thermally insulated roof, deep overhanging, Low E glazing. U value are as follows: 230 brick masonry: *0.32*, Low E glazing U value 1.99 Summer ,1.76 Winter Thermal Insulated roof *0.14*

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

- Complete fire fighting system for multi storey appartments including the basement parking is provided confirming to B.I.S. including emergency measures.
- The details of the fire fighting system are enclosed as **Annexure XIV.**

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

- Low E glass for external glazing . U value 1.99 Summer ,1.76 Winter

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

- Being provide with localised A.C.(split system)and not with central HVAC system,air infiltration into the building is not considered.

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

- Solar panels at the terrace level for domestic water heating.

10. Environment Management Plan

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

- The detailed EMP for the proposed complex is enclosed as **Annexure XV.**

Copy of issuance letter for latest certified compliance

Central Park®

To,
Additional Director,
Ministry of Environment & Forest,
Northern Regional Office,
Bays No. 24 -25, Sector 31-A,
Dakshin Marg, Chandigarh-160030.

Date: 23/05/2017

Reference: TOR letter no. HR/SEAC/194/606 dated 10.02.2016; Grant of Environmental Clearance for Expansion of "Group Housing Colony" at Sector-48. Sohna Road, Gurgaon, Haryana by M/s Sweta Estates Pvt, Ltd.

Sub: Request for Site Visit and thereby Issuance of Certified Compliance Report / Certificate for the project – Expansion of "Group Housing Colony" at Sector 48, Sohna Road, Gurgaon, Haryana developed by M/s Sweta Estates Pvt. Ltd.

Dear Sir,

We wish to inform you that we had already been granted the Environmental Clearance Letter No. 21-563/2006-IA III dated 10.04.2007 from SEIAA, Haryana, for the development of the"Group Housing Colony" at Sector-48, Sohna Road, Gurgaon, Haryana for plot area 192334.638 Sqm& built up area of 331520 Sqm excluding (Basement and Non-FAR) for 28 towers and EWS Tower. Out of which 26 towers and EWS Tower were constructed. The construction for the remaining two towers is to be done. Hence, the built-up area will increase.

We hadgot certified compliance report in year 2015 (copy enclosed). We have already submitted the compliance report for December 2016. However, we here by confirm that currently there is no construction work at the site.

We hereby earnestly request you to kindly arrange / conduct the Site visit of our Project and thereby issue us the Certified Satisfactory Compliance Report.

Thanking You,

Yours Faithfully,

For, M/s Sweta Estates Pvt. Ltd.

(Authorized Signatory)

23/5/17

Enclosures:

1. **Copy of the Environmental Clearance**
2. **Copy of the MoEF Circular dated 30.05.2012 vide Circular no: J-11011/618/2010-IA-II (I)**
3. **Copy of certified compliance report 2015**

Northern Regional Office
Ministry of Environment & Forests
Bays No. 24-25, Dakshin Marg
Sector 31-A, Chandigarh

SWETA ESTATES PRIVATE LIMITED

Corporate Office: 3rd Floor, Tower D, Global Business Park, Mehrauli Gurgaon Road, Gurgaon-122002 (Haryana) INDIA
Tel : 91-124-4107050 Fax : 91-124-4107064 & 4107065.
Registered Office : Asset 5B, Hospitality District, Delhi Aero City, IGI Airport, New Delhi- 110037
Website : www.centralpark.in
Corporate Identity Number :U74899DL1991PTC044871

Annexure B

Latest Compliance Report

Central Park®

Date:19th June, 2017

The Director,
Ministry of Environment, Forests & Climate Change,
Northern Regional Office,
Bays No. 24-25, Sector 31-A,
Dakshin Marg, Chandigarh-160030.

Sub: **Submission of Six monthly compliance report for the period October-2016 to March-2017 submission due in June-17 of the Environmental Conditions issued for the construction of "Group Housing Colony" at Sector – 48, Sohna Road, Gurgaon, Haryana, developed by M/s Sweta Estates Pvt. Ltd.**

Reference: Environmental Clearance vide Letter No 21-563/2006-IA,III Dated 10/04/2007.

Dear Sir,
This is in reference to the submission of six monthly compliance report due in June-2017 of the stipulated Environmental Clearance Conditions/Safeguards obtained vide Environmental Clearance Letter 21-563/2006-IA,III Dated 10/04/2007 for the establishment of project "Group Housing Colony" at Sector – 48, Sohna Road, Gurgaon, Haryana, developed by M/s Sweta Estates Pvt. Ltd.
In this regard, we wish to inform you that part construction has been completed at the site. The completed part is in operation. Further, construction activity at our above-mentioned project site has been stopped since April, 2014. We have already applied for expansion in Environmental Clearance of the project. We shall start the construction work once, expansion in Environmental Clearance is granted to us.
However, we are submitting the point-wise compliance of Environmental Clearance. We hope that this will fulfill all the requirements.

Thanking You,

Yours Faithfully,
For, M/s Sweta Estates Pvt. Ltd.

(Authorized Signatory)
Name:Rakesh Malhotra
Contact no. 9958006559
E-mail I.D.:rakesh.malhotra@centralpark.in

Copy to:

1) ***Member Secretary, Haryana State Pollution Control Board, C-11, Sector-6, Panchkula, Haryana.***

2) ***State Environment Impact Assessment Authority, Bays No. 55-58, Prayatan Bhawan. Sector-2, Panchkula. Haryana***

COMPLIANCE REPORT

FOR

EXPANSION OF "GROUP HOUSING COLONY"

AT

SECTOR-48, SOHNA ROAD, GURGAON, HARYANA

Being Developed by:
M/s Sweta Estates Pvt. Ltd.
3rd Floor Tower-D Global Business Park, Mehrauli,
Gurgaon Road, Gurgaon- 122002, Haryana, India
Contact person: Rakesh Malhotra
Phone No.: 9958006559
Email-id: *rakesh.malhotra@centralpark.in*

Prepared by
M/s Perfact Services
(NABET Reg. ISO9001:2015& ISO14001:2015 Certified)
503, 5th Floor, NN Mall,
Mangalam Palace, Sector 3 Rohini, New Delhi
Ph No. 011- 49281372

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Chapter -1	**Purpose of the Report**	
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	Annexure -I	**Permission for Diesel Storage**
	Annexure -II	***Copy of Test Reports***
	Annexure -II	***ECBC Report***

1. INTRODUCTION

The proposed project is **Expansion of Group Housing Colony** which is located at Sector-48, Sohna Road, Gurgaon, Haryana being developed by **M/s Sweta Estates Pvt. Ltd**. The project is having licensed area for construction of Group Housing Colony i.e.191893.533 sqm (47.418 Acres).

The project has already been granted Environmental Clearance vide letter No. 21-563/2006-IA, III Dated 10 April 2007 for the plot area **192334.639 sqm** and built up area **331520 sq m** (excluding Non-FAR & Basement area) for 28 towers excluding EWS under category 8 (b) EIA Notification,2006.

Out of 28 towers 26 towers were constructed having FAR 272932.438 sqm. Now, only two towers have to be constructed. Hence, built up area (excluding basement and Non-FAR) will increase from **331520.0 Sqm** to **335813.683 Sqm** (excluding basement and Non-FAR) and built up area **562141.739 Sqm** (including basement and Non-FAR). As the built-up area is more than 3,00,000 sq m. The environmental Clearance for the expansion part (2 towers) has been applied to MOEF and is in process at MOEF. Hence, as per EIA Notification,2006 the project falls under the activity 8 (b), Category 'A'. After expansion, plot area will remain same i.e. **191893.533 sqm (47.418 acres**) and built up area will be **562141.739 sqm.**

2. Construction Status:

The project has already been granted Environmental Clearance vide letter No. 21-563/2006-IA, III Dated 10 April 2007 for the plot area 192334.639 sqm and built up area 331520 sq m (excluding Non-FAR & Basement area) for 28 towers under category 8 (b) EIA Notification,2006.

28 no of towers was proposed at the time of Environmental clearance, out of which 26 towers are operational. Construction of 2 towers has not yet started. We have reapplied for the environmental clearance as validity of our Environmental Clearance has been expired.

Site Photographs showing status of completed towers:

Site Photos Showing construction to be done:

3. Current Status of point wise compliance report as per EC conditions

I. Operation Phase		
i	Necessary permission of competent authority shall be taken to store diesel in the premises for operation of DG set.	**Necessary Permission has been Obtained. Permission enclosed as annexure 1**
ii.	Diesel power generating sets proposed as source of black up power for lifts and common area illumination should be of "enclosed type" and conform to rules made under environment (protection) Act 1986, prescribed for air and noise any mission standards as per CPCB guidelines. Exhausts should be discharged by stack, raised to 4 meters above the rooftop.	**Acoustically enclosed D.G sets have been installed at the project site & kept in Acoustically enclosed room which conform to the rules made under E (P) A 1986 prescribed for air & noise emissions standards.** **Stack Height of 115 m has already been provided.**
iii.	During night time the noise levels measured at the boundary of the building shall be restricted to the permissible level to complete with the prevalent regulations.	**Ambient noise level is being maintained as per the standards.** **Test reports are enclosed as Annexure - II**
iv.	Noise barriers should be provided at appropriate location so as to ensure that the	**Appropriate measures have been taken to reduce noise emissions to standard levels.**

	noise level do not exceed the prescribed standards.	
v	Weep holes in compound walls shall be provided to ensure natural drainage of rain water in the catchment area.	**Weep holes in compound walls has been provided to ensure natural drainage.**
vi	The sewage treatment plant should be certified by an independent expert of efficiency as well as adequacy and should submit a report in this regards to the Ministry before the project is commissioned for operation. The waste water should be treated to tertiary level and after treatment reused for flushing of toilets and gardening. Discharge of treated sewage, if any, conform to the norms and standards prescribed by HSPCB	**The Sewage Treatment Plant (STP) of Capacity (2 x 300 KLD, 100 KLD & 350 KLD) has been installed for the treatment of the Sewage in 26 towers. For proposed two towers STP of 325 KLD Capacity shall be installed.** **Discharge of treated sewage is confirm to the norms and standards of HSPCB, Panchkula.** **Test reports are enclosed as Annexure –II.**
vii	Oil and Grease trap shall be provided to remove oil and grease from the surface run off and suspended matter shall be removed in a setting tank before its utilization for rain water harvesting.	**Rain water harvesting for run-off and surface run-off, is being implemented as per plan submitted.** **Before recharging the surface run off, pre-treatment through sedimentation tanks is being provided to remove suspended matter, oil and grease.**

viii	The solid waste generated should be properly collected and segregated. Wet garbage should composted and dry/inert solid waste should be disposed of for land filling.	**The generated biodegradable waste is treated in Organic Waste Converter installed within the project site. The remaining non- biodegradable waste is being collected and sold to approved recycler.**
Ix	Any hazardous waste including biomedical waste should be disposed of as per applicable rules and norms with necessary approvals of the Haryana state pollution control board.	**Only hazardous waste generated during operation phase is used oil from DG sets, and it is being given to approve recycler of CPCB. The copy of agreement is enclosed as**
X	The green belt design along the periphery of the plot shall achieve attenuation factor conforming to the day and night noise standards prescribed for residential land use. The open spaces inside the plot should be suitably landscaped and covered with vegetation of indigenous variety.	**Green Area as per plan submitted has been developed.**
Xi	Incremental pollution loads on the ambient air quality, noise and water quality should be periodically monitored after commissioning of the project.	**Incremental pollution loads on the ambient air quality has been monitored six monthly.**
Xii	The ground water levels and its quality should be monitored regularly in consultation with Central Ground water authority.	**The ground water level & its quality is being monitored.**

Xiii	A report of the energy conservation measures should be prepared incorporating details about building materials and technology, R & U Factors etc and submitted to the ministry in three months' time.	**Necessary provision has been made.** **The project has achieved overall 84 Points with GOLD rating in IGBC Green Homes Precertification.**
xiv	The values of R & U for building envelope should meet the requirement of the hot and humid climatic location. Details of the building envelope should be worked out and furnished in three-month time.	**The details of building envelope are mentioned in the ECBC Report.**
xv	Solar energy shall be utilized for common area lighting and water heating.	**Necessary provision has been made.**
xvi	Excess treated sewage if any shall be utilized for building construction activities in consultation with HUDA.	**The treated Waste water is being re-used in the complex.**

ANNEXURE-I
PERMISSION OF DIESEL STORAGE

भारत सरकार
Government of India
वाणिज्य और उद्योग मंत्रालय
Ministry of Commerce & Industry
पेट्रोलियम तथा विस्फोटक सुरक्षा संगठन (पैसो)
Petroleum & Explosives Safety Organisation (PESO)
हाल संख्या 502 एवं 507, लेवल-5, ब्लाक II, पुराना सी.जी.ओ. काम्प्लेक्स, एन.एच.4
फरीदाबाद- 121001
Hall No. 502 & 507, Level 5, Block B, Old CGO Complex, NH-4,
Faridabad - 121001

E-mail : jtccefaridabad@explosives.gov.in
Phone/Fax No : 0129 - 2410734, 2410732

संख्या /No. P/NC/HN/15/1831 (P375172)

दिनांक /Dated 18/05/2017

18 MAY 2017

सेवा में /To,

M/s. Sweta Estates Pvt Ltd.,
Global Business Park 3rd Floor, Tower D M.G. Road,
Gurgaon,
Taluka: Gurgaon,
District: GURGAON,
State: Haryana
PIN: 999999

विषय /Sub Khasra No, Sector - 48, Setor 48, Sector 48 Village TIKRI, Taluka: Gurgaon, District: GURGAON, State: Haryana, PIN: 999999 में पेट्रोलियम वर्ग B का अधिष्ठापन -अनुज्ञप्ति जारी करने के बारे में ।

Petroleum Class B Installation at Khasra No, Sector - 48, Setor 48, Sector 48 Village TIKRI, Taluka: Gurgaon, District: GURGAON, State: Haryana, PIN: 999999 Grant of License regarding.

महोदय /Sir(s),

कृपया आपके पत्र क्रमांक nil दिनांक 21/04/2017 का अवलोकन करें ।
Please refer to your letter No. nil dated 21/04/2017

विषयान्तर्गत अधिष्ठापन में निम्नलिखित पेट्रोलियम पदार्थों के वर्ग तथा मात्रा के भंडारण के लिए पेट्रोलियम नियम, 2002 के अधीन प्ररूप - XV में स्वीकृत, दिनांक 31/12/2019 तक वैध अनुज्ञप्ति संख्या P/NC/HN/15/1831 (P375172) दिनांक 18/05/2017 भेजी जा रही है ।

Licence No. P/NC/HN/15/1831 (P375172) dated 18/05/2017 granted in Form XV under the Petroleum Rules, 2002 and valid till 31/12/2019 for the storage of the following kinds and quantities of Petroleum at the subject installation is forwarded herewith.

पेट्रोलियम का विवरण /Description of Petroleum	किलोलीटरों में अनुज्ञप्त क्षमता /Quantity licenced in KL
वर्ग क प्रपुंज पेट्रोलियम /Petroleum Class A in bulk	NIL
वर्ग क प्रपुंज पेट्रोलियम से भिन्न /Petroleum Class A, otherwise than in bulk	NIL
वर्ग ख प्रपुंज पेट्रोलियम /Petroleum Class B in bulk	5.00 KL
वर्ग ख प्रपुंज पेट्रोलियम से भिन्न /Petroleum Class B, otherwise than in bulk	NIL
वर्ग ग प्रपुंज पेट्रोलियम /Petroleum Class C in bulk	NIL
वर्ग ग प्रपुंज पेट्रोलियम से भिन्न /Petroleum Class C,otherwise than in bulk	NIL
कुल क्षमता /Total Capacity	5.00 KL

कृपया पेट्रोलियम नियम 2002 के अधीन बनाए गए नियम 148 में दी गई प्रक्रिया का कड़ाई से पालन करें और अनुज्ञप्ति के नवीकरण हेतु

भारत सरकार
Government of India
वाणिज्य और उद्योग मंत्रालय
Ministry of Commerce & Industry
पेट्रोलियम तथा विस्फोटक सुरक्षा संगठन (पैसो)
Petroleum & Explosives Safety Organisation (PESO)
हाल संख्या 502 एवं 507, लेवल-5, ब्लाक II, पुराना सी.जी.ओ. काम्प्लेक्स, एन.एच.4
फरीदाबाद- 121001
Hall No. 502 & 507, Level 5, Block B, Old CGO Complex, NH-4,
Faridabad - 121001

E-mail : jtccefaridabad@explosives.gov.in
Phone/Fax No : 0129 - 2410734, 2410732

संख्या /No : P/NC/HN/15/1823 (P353801)

दिनांक /Dated : 20/04/2017

सेवा में /To,

M/s. SWETA ESTATE PVT LTD,
GLOVAL BUSINESS PARK, 3rd FLOOR, TOWER D , M.G. ROAD,
Gurgaon,
Taluka: Gurgaon,
District: GURGAON,
State: Haryana
PIN: 122002

विषय /Sub . Khasra No, Khasra No. 15/1 & 11, Balgravia - II Project Central Park - KK, Village TIKRI SECTOR 48, Taluka: Gurgaon, District: GURGAON, State: Haryana, PIN: 999999 में पेट्रोलियम वर्ग B का अधिष्ठापन -अनुज्ञप्ति जारी करने के बारे में ।

Petroleum Class B Installation at Khasra No, Khasra No. 15/1 & 11, Balgravia - II Project Central Park - KK, Village TIKRI SECTOR 48, Taluka: Gurgaon, District: GURGAON, State: Haryana, PIN: 999999 Grant of License regarding.

महोदय /Sir (s),

कृपया आपके पत्र क्रमांक nil दिनांक 17/04/2017 का अवलोकन करें ।

Please refer to your letter No. nil dated 17/04/2017

विषयान्तर्गत अधिष्ठापन में निम्नलिखित पेट्रोलियम पदार्थों के वर्ग तथा मात्रा के भंडारण के लिए पेट्रोलियम नियम, 2002 के अधीन प्ररूप - XV में स्वीकृत, दिनांक 31/12/2019 तक वैध अनुज्ञप्ति संख्या P/NC/HN/15/1823 (P353801) दिनांक 20/04/2017 भेजी जा रही है ।

Licence No. P/NC/HN/15/1823 (P353801) dated 20/04/2017 granted in Form XV under the Petroleum Rules, 2002 and valid till 31/12/2019 for the storage of the following kinds and quantities of Petroleum at the subject installation is forwarded herewith.

पेट्रोलियम का विवरण /Description of Petroleum	किलोलीटरों में अनुज्ञप्त क्षमता /Quantity licenced in KL
वर्ग क प्रपुंज पेट्रोलियम /Petroleum Class A in bulk	NIL
वर्ग क प्रपुंज पेट्रोलियम से भिन्न /Petroleum Class A, otherwise than in bulk	NIL
वर्ग ख प्रपुंज पेट्रोलियम /Petroleum Class B in bulk	15.00 KL
वर्ग ख प्रपुंज पेट्रोलियम से भिन्न /Petroleum Class B, otherwise than in bulk	NIL
वर्ग ग प्रपुंज पेट्रोलियम /Petroleum Class C in bulk	NIL
वर्ग ग प्रपुंज पेट्रोलियम से भिन्ना /Petroleum Class C,otherwise than in bulk	NIL
कुल क्षमता /Total Capacity	15.00 KL

कृपया पेट्रोलियम नियम 2002 के अधीन बनाए गए नियम 148 में दी गई प्रक्रिया का कड़ाई से पालन करें और अनुज्ञप्ति के नवीकरण हेतु समस्त दस्तावेजों को अनुज्ञप्ति की वैधता समाप्ती की तारीख या उससे पूर्व इस कार्यालय को प्रेषित करें ।

Please follow the procedure strictly as laid down in rule 148 of the Petroleum Rules, 2002 and submit complete documents for further renewal of the licence to this office, so as to reach on or before the date on which licence expires.

यह अनुमोदन/ अनुमति अन्य प्राधिकारियों से आवश्यक अनुमति/क्लीयरन्स प्राप्त करने से या यथा लागू अन्य विधियों से छूट नहीं देती है ।

This approval/permission, however, does not absolve from obtaining necessary permission/clearance from other authorities or under other statutes as applicable.

भवदीय /Yours faithfully,

((के.एल.सिलावट)
(K. L. Silawat))
संयुक्त मुख्य विस्फोटक नियंत्रक
Jt. Chief Controller of Explosives
फरीदाबाद

संयुक्त मुख्य विस्फोटक नियंत्रक
उत्तरी अंचल फरीदाबाद

ANNEXURE-II
COPY OF TEST REPORTS

TEST REPORT
Ambient Air Analysis

Report No. : PRPL/AS/020617-002 **Issue Date** : 07/06/2017

Name of the Customer	:	Sweta Estates Pvt. Ltd.
Name & Address of the project		"Expansion of Group Housing Colony" at Sec 48, Sohna Road Gurgaon Haryana
Location of Sampling & GPS detail	:	Onsite
Sampling Plan & Procedure	:	PRPL/WP/AS/001-012
Date of Monitoring/ Date of collection	:	01/06/2017 To 02/06/2017
Date of Receipt of Sample at lab	:	02/06/2017
Sample Description	:	Ambient Air
Sample Quantity	:	PM10 -48.50 m3, PM2.5-23.50 m3 & Gasses-252 lit
Sample Collected by	:	Mr. Dharmendra & Mr. Virendra
Manufacture Model & Serial no.	:	Model AAS 271 ,12-B-101,by Ecotech
Ambient Temperature	:	22°C
Humidity	:	41%
Wind Speed & Direction	:	5.6 Km/hr, SSW
Tests started on	:	03/06/2017
Tests Completed on	:	06/06/2017

RESULTS

S.No.	PARAMETER	Units	Test Method	Results	Standard Limit as per NAAQS
1	Particulate Matter 2.5 (PM2.5)	µg/m3	USEPA Quality Assurance Hand Book (Vol. II)Part II,Quality Assurance GuidelineDocument,2.12	83.6	60
2	Particulate Matter 10 (PM10)	µg/m3	IS:5182 Part 23 :2006	165.8	100
3	Oxides of Nitrogen (NOX)	µg/m3	IS:5182 Part VI 2006	57.9	80
4	Sulphur dioxide (SO2)	µg/m3	IS:5182 Part II (1999-2001)Reaffirmed 2006	8.6	80

Remarks:

1. The results mentioned above relate only to the Sample received and Tested by us.
2. The test report shall not be reproduced either in full or part without the written approval of the Laboratory.
3. Samples received shall be disposed off after one month from the date of issue of Test Report unless specified otherwise.

End of Report

Analyst

Authorized Signatory

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Phone : 011-49281360

TEST REPORT

Drinking Water Analysis

Report No. : PRPL/WS/020617-002 **Issue Date** : 07/06/2017

Name of the Customer : Sweta Estates Pvt. Ltd.

Name & Address of the project : "Expansion of Group Housing Colony" at Sec 48, Sohna Road Gurgaon Haryana

Location of Sampling & GPS detail : Onsite

Sampling Plan & Procedure : PRPL/WP/WS/058

Date of Monitoring/ Date of collection : 02/06/2017

Date of Receipt of Sample at lab : 02/06/2017

Sample Description : Drinking Water

Sample Quantity : 1 Lt.

Sample Collected by : Mr. Virendra

Tests started on : 03/06/2017

Tests Completed on : 06/06/2017

RESULTS

S.No.	Parameter	Unit	Test Method	Results	IS 10500 : 2012 (Drinking Water Standard)	Minimum Detection Limit
1	Colour	Hazen	APHA 2120 B 22nd edition 2012	<1	5	1
2	Odour	---	APHA 2150 B 22nd edition 2012	Agreeable	Agreeable	-
3	Turbidity	NTU	APHA 2130 B 22nd edition 2012	<1	5	0.5
4	pH Value	---	IS 3025 (P-11) 1983 Reaffirmed 2006	7.5	6.5-8.5	0.1
5	Temperature	°C	IS 3025 (P-9) 1984 Reaffirmed 2006	24.9	-	-
6	Conductivity	µmho/cm	APHA 2510 B 22nd edition 2012	247	-	0.01
7	Total Dissolved Solids	mg/L	APHA 2540 C 22nd edition 2012	124.9	500	0.01
8	Chlorides	mg/L	APHA 4500 Cl B 22nd edition 2012	16	250	1
9	Fluoride	mg/L	APHA 4500-F D 22nd edition 2012	0.2	1	0.01
10	Total Hardness as CaCO3	mg/L	APHA 2340 C 22nd edition 2012	84	200	1
11	Boron	mg/L	APHA 4500-B C 22nd edition 2012	<0.5	0.5	0.5
12	Calcium	mg/L	APHA 3500-Ca B 22nd edition 2012	25.6	75	1
13	Aluminium	mg/L	APHA 3500-Al B 22nd edition 2012	<0.003	0.03	0.003
14	Phosphates	mg/L	APHA 4500-P D 22nd edition 2012	<0.02	-	0.02
15	Magnesium	mg/L	APHA 3500-Mg B 22nd edition 2012	4.9	30	1
16	Iron	mg/L	APHA 3111 B 22nd edition 2012	<0.04	0.3	0.04
17	Sulphate	mg/L	APHA 4500-SO4 E 22nd edition 2012	10.1	200	0.3
18	Nitrate Nitrogen	mg/L	APHA 4500- NO3 B 22nd edition 2012	1.9	45	0.1
19	Total Chromium	mg/L	APHA 3500-Cr B 22nd edition 2012	<0.01	0.05	0.01

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Report No. : PRPL/WS/020617-002 **Issue Date** : 07/06/2017

S.No.	Parameter	Unit	Test Method	Results	IS 10500 : 2012 (Drinking Water Standard)	Minimum Detection Limit
20	Alkalinity as CaCO3	mg/L	APHA 2320 B 22nd edition 2012	64	200	3
21	Nickel	mg/L	APHA 3111 B 22nd edition 2012	<0.02	0.02	0.02
22	Manganese	mg/L	APHA 3111 B 22nd edition 2012	<0.01	0.1	0.01
23	Sodium	mg/L	APHA 3111 B 22nd edition 2012	14.5	-	0.003
24	Copper	mg/L	APHA 3111 B 22nd edition 2012	<0.02	0.05	0.02
25	Potassium	mg/L	APHA 3111 B 22nd edition 2012	0.3	-	0.005
26	Cadmium	mg/L	APHA 3111 B 22nd edition 2012	<0.007	0.003	0.007
27	Lead	mg/L	APHA 3111 B 22nd edition 2012	<0.01	0.01	0.01
28	Lithium	mg/L	APHA 3500-Li B 22nd edition 2012	<0.05	-	0.05
29	Zinc	mg/L	APHA 3111 B 22nd edition 2012	<0.006	5	0.006

Remarks:

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2. The test report shall not be reproduced either in full or part without the written approval of the Laboratory.
3. Samples received shall be disposed off after one month from the date of issue of Test Report unless specified otherwise.
4. Samples for BOD and DO, Colour shall be disposed off after 7 days from the date of issue of test report.

End of Report

Analyst

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TEST REPORT

Waste Water Inlet Analysis

Report No. : PRPL/WS/020617-005 **Issue Date** : 07/06/2017

Name of the Customer	:	Sweta Estates Pvt. Ltd.
Name & Address of the project		"Expansion of Group Housing Colony" at Sec 48, Sohna Road Gurgaon Haryana
Location of Sampling & GPS detail	:	Onsite
Sampling Plan & Procedure	:	PRPL/WP/WS/058
Date of Monitoring/ Date of collection	:	02/06/2017
Date of Receipt of Sample at lab	:	02/06/2017
Sample Description	:	Waste Water Inlet
Sample Quantity	:	2 lt.
Sample Collected by	:	Mr. Virendra
Tests started on	:	02/06/2017
Tests Completed on	:	06/06/2017

RESULTS

S.No.	PARAMETER	Units	Test Method	Results
1	pH	--	APHA 4500-H B 22 nd Edition 2012	6.4
2	Total Suspended Solids	mg/L	APHA 2540 D 22nd Edition 2012	57.2
3	Oil and Grease	mg/L	APHA 5520 B 22nd edition 2012	114
4	Biochemical Oxygen Demand (5 days at 20°C)	mg/L	APHA 5210 B 22nd Edition 2012	208
5	Chemical Oxygen Demand	mg/L	APHA 5220 B 22nd Edition 2012	420

Remarks:

1. The results mentioned above relate only to the Sample received and Tested by us.
2. The test report shall not be reproduced either in full or part without the written approval of the Laboratory.
3. Samples received shall be disposed off after one month from the date of issue of Test Report unless specified otherwise.
4. Samples for BOD and DO, Colour shall be disposed off after 7 days from the date of issue of test report.

End of Report

Analyst

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DELHI

TEST REPORT

Waste Water Outlet Analysis

Report No. : PRPL/WS/020617-007 **Issue Date** : 07/06/2017

Name of the Customer	:	Sweta Estates Pvt. Ltd.
Name & Address of the project		"Expansion of Group Housing Colony" at Sec 48, Sohna Road Gurgaon Haryana
Location of Sampling & GPS detail	:	Onsite
Sampling Plan & Procedure	:	PRPL/WP/WS/058
Date of Monitoring/ Date of collection	:	02/06/2017
Date of Receipt of Sample at lab	:	02/06/2017
Sample Description	:	Waste Water Outlet
Sample Quantity	:	2 lt.
Sample Collected by	:	Mr. Virendra
Tests started on	:	02/06/2017
Tests Completed on	:	06/06/2017

RESULTS

S.No.	PARAMETER	Units	Test Method	Results	Standard limits
1	pH	-	APHA 4500-H B 22nd Edition	7.4	5.5-9.0
2	Total Suspended Solids	mg/l	APHA 2540 C 22nd Edition	38.4	<100
3	Oil & Grease	mg/l	APHA 5520 B 22nd Edition	42	<10
4	Biochemical Oxygen Demand (5 days at 20°C)	mg/l	APHA 5210 B 22nd Edition	19	<30
5	Chemical Oxygen Demand	mg/l	APHA 5220-B, 22 nd Edition 2012	60	<250

Remarks:

1. The results mentioned above relate only to the Sample received and Tested by us.
2. The test report shall not be reproduced either in full or part without the written approval of the Laboratory.
3. Samples received shall be disposed off after one month from the date of issue of Test Report unless specified otherwise.

End of Report

Analyst

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TEST REPORT
Soil Analysis

Report No. : PRPL/SS/020617-002 **Issue Date** : 07/06/2017

Name of the Customer	:	Sweta Estates Pvt. Ltd
Name & Address of the project		"Expansion of Group Housing Colony" at Sec 48, Sohna Road Gurgaon Haryana
Location of Sampling & GPS detail	:	Onsite
Sampling Plan & Procedure	:	PRPL/WP/SS/030
Date of Monitoring/ Date of collection	:	02/06/2017
Date of Receipt of Sample at lab	:	02/06/2017
Sample Description	:	Composite Sample
Sample Quantity	:	1 Kg
Sample Collected by	:	Mr. Virendra
Tests started on	:	03/06/2017
Tests Completed on	:	06/06/2017

RESULTS

S.No.	PARAMETER	Unit	Test Method	Results	Range Of Detection
1	pH	–	ISO-10390 2005	7.5	1 - 14
2	Colour	–	Munsell Chart	6/3 (Dull Reddish Brown)	–
3	Moisture Content	%	(USDA (M-26)1954,Edition by L.A. Richards	1.2	0.1-80
4	Organic Matter	%	USDA (M-24)	0.39	0.01-80
5	Electrical Conductivity	µS/cm	ISO-11265: 1994-10-01	306.2	1-1000
6	Available Nitrogen	mg/kg	ISO-14256: 2003-03-15	81.2	5-1000
7	Calcium (as Ca)	mg/kg	(USDA M-7)1954, Edition by L.A. Richards	88.0	5-3000
8	Magnesium (as Mg)	mg/kg	(USDA M-7)1954 Edition by L.A. Richards	40.0	10-2500
9	Potassium (as K)	mg/kg	(USDA M-58) 1954 Edition by L.A. Richards	39.0	5-20000
10	Nitrate Nitrogen	mg/kg	ISO-14256: 2003-03-15	43.9	5-5000
11	Available Phosphorus (as P)	mg/kg	(USDA M-61)1954 Edition by L.A. Richards	16.4	5-5000
12	Chloride (as Cl)	mg/kg	(USDA M-13)1954 Edition by L.A. Richards	96.3	5-3000
13	Cation Exchange Capacity	meq/100 mg	ISO-11260: 1994 (E)	63.5	5-300
14	Available Sulphur	mg/kg	(USDA M-60)1954 Edition by L.A. Richards	8.0	10-200
15	Exchangeable Sodium	mg/kg	(USDA M-57) 1954 Edition by L.A. Richards	87.0	5-20000
16	Orthophosphate	mg/kg	IS-10158,1982 Reaffirmed-2009	2.2	1-5000
17	Bicarbonate	mg/kg	(USDA M-12) 1954, Edition by L.A.Richards(Reissued in 1969)	85.4	2-2000
18	Texture	–	(USDA M-41) 1954, Edition by L.A.	Silt Loam	–

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Phone : 011-49281360

Report No. : PRPL/SS/020617-002 **Issue Date** : 07/06/2017

S.No.	PARAMETER	Unit	Test Method	Results	Range Of Detection
18			Richards (Reissued in 1969)		
	a. Sand	%	--	14.8	0-100
	b. Silt	%	--	70.8	0-100
	c. Clay	%	--	14.1	0-100
19	Bulk Density	gm/cc	USDA M 38	1.31	0.1 - 8
20	Porosity	%	USDA M 40	34.5	0- 100%

Remarks:

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End of Report

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TEST REPORT

Ambient Noise Analysis

Report No. : PRPL/NS/020617-002 **Issue Date** : 04/06/2017

Name of the Customer : Sweta Estates Pvt Ltd.

Name & Address of the project : "Expansion of Group Housing Colony" at Sec 48, Sohna Road Gurgaon Haryana

Location of Sampling & GPS detail	:	Onsite
Sampling Plan & Procedure	:	PRPL/WP/NS/001-002
Date of Monitoring/ Date of collection	:	01/06/2017 To 02/06/2017
Date of Receipt of Sample at lab	:	02/06/2017
Sample Description	:	Ambient Noise
Sample Collected by	:	Mr.Dharmendra & Mr. Virendra
Sampling Period	:	24 Hrs (With 15 min interval)
Tests started on	:	03/06/2017
Tests Completed on	:	03/06/2017

RESULTS

S.No.	Time	Unit	Test Method	Leq Values	Standard Limit
1	Day Time (06:00-22:00)	Leq dB(A)	IS: 9989-1981 Reaffirmed 2008	56.9	55.0
2	Night Time (22:00 - 06:00)	Leq dB(A)	IS: 9989-1981 Reaffirmed 2008	46	45.0

Remarks:

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End of Report

Analyst

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Perfact Researchers Pvt. Ltd. DELHI

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ANNEXURE-III
ECBC REPORT

LSquare Solutions
Experience Solutions

Recommending
the Right Solution

Energy -Analysis, Sun Path & Daylight Report

Central Park The Room Project

2013

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ENERGY ANALYSIS METHODOLOGY

The Proposed Building has been evaluated on the basis of the methodology outlined in ECBC Standard-**Whole Building Performance Method.**

Whole building energy simulation analysis is used to predict the annual energy performance of a building design. The analysis is carried out by first developing a detailed building energy simulation model. The simulation programme is then used to test the thermal response & to calculate the energy use of the building model using a weather data file to capture the climatic impact on the building. This type of analysis is referred as Whole Building Performance (WBP) Method. Whole building energy simulation is the most sophisticated way of analyzing the impact of energy efficiency measures in an integrated manner.

IES <VE> 2012 simulation tool has been used for modelling the baseline and the proposed building.

As specified by the WBP Method, the Proposed and Budget Buildings are identical in terms of:

- Design Model
- Simulation software
- Thermal Blocks
- Weather data (Gurgaon, Delhi, India)
- Occupancies

STANDARADS AND SOFTWARE TOOLS USED FOR ANALYSIS

Standard used for the Analysis

Standard used for the analysis is ECBC (Energy Conservation Building Code). The purpose of ECBC is to provide minimum requirements for energy efficient design & construction of buildings & their systems. Estimates based on computer simulation models indicate that ECBC complaint buildings can use 40-60 % less energy than conventional buildings. It is estimated that a nationwide mandatory enforcement of the ECBC will yield a annual savings of approximately 1.7 billion kWh.

ECBC was developed as a first step towards promoting energy efficiency in the building sector. The ECBC user Guide (also referred to as “The Guide” in this document) has been developed to provide detailed guidance to building owners, designers, engineers, builders, energy consultants, and others on how to comply with the code. It provides expanded interpretation, examples, supplementary information to assist in applying ECBC during the design and construction of new buildings as well as additions and alterations to existing buildings

This Guide can also be used as a document by “authorities having jurisdiction” in the enforcement of code once it is made mandatory. The guide follows the nomenclature of the code. It is written both as a reference and as a instruction guide, and can be help- full to anyone who is directly or in- directly involved in the construction and design and construction of ECBC-compliant buildings.

The code is applicable to the buildings or building complexes that have a connected load of 500 kW or greater or a contract demand of 600 kVA or greater. This code would become mandatory as and when it is notified by the Central and the State government in the official Gazette (P) of S14 or clause (a) of S 15 of the energy conservation act 2001 (52 of 2001)

This code is applicable to the following Building System-

- Building envelopes expect for unconditioned storage spaces or warehouse
- Mechanical System and equipment, including heating, ventilation and air conditioning, (HVAC)
- Service hot water heating
- Interior and exterior lighting
- Electrical power and motors

This code is not- applicable to the following Building System-

- Buildings that do not use either electricity or fossil- fuel
- Equipment and portions of building system that use energy primarily for manufacturing process

Software used for Analysis

Energy Modelling & Simulation is a holistic approach to achieve energy savings in a building. The process of energy modelling is being done in the following phases:

- 3 Dimensional Modelling
- Base Building Energy Consumption Results
- Development of Energy Efficiency Measures
- Design Building Energy Consumption Results

Software used for the Project is IES. IES <VE>

Integrated Environmental Solutions (IES) is a world leading provider of integrated performance analysis software and consulting services for sustainable building design. Comparative analysis at the early stage, using ballpark figures, is useful to check feasibility, quantify and inform design team decision making. It can help with those all important master planning, orientation, massing and form decisions; justifying choices and differentiating project proposals.

Detailed analysis provides more accurate figures and results for system sizing, fine tuning, compliance, costing and documentation. Results and analysis can be presented to clients and building control, justifying design decisions and offering you competitive advantage.

IES provides a wide range of different analysis options and capabilities designed to give feedback quickly and efficiently at the relevant level. All are powered by the sophisticated <Virtual Environment> performance modelling engine that undertakes detailed simulations at hourly or smaller increments as necessary.

Energy Simulation Software Salient Features

- Undertake energy performance snapshots to assess impact of design decisions
- Develop building loads and impact of conservation strategies
- Develop carbon footprint reduction strategies
- Assess passive/hybrid/renewable strategies
- Assess the impact of daylight and solar
- Incorporate bulk airflow, ventilation and indoor air quality into the equation
- Assess compliance with a range of worldwide regulations and voluntary codes

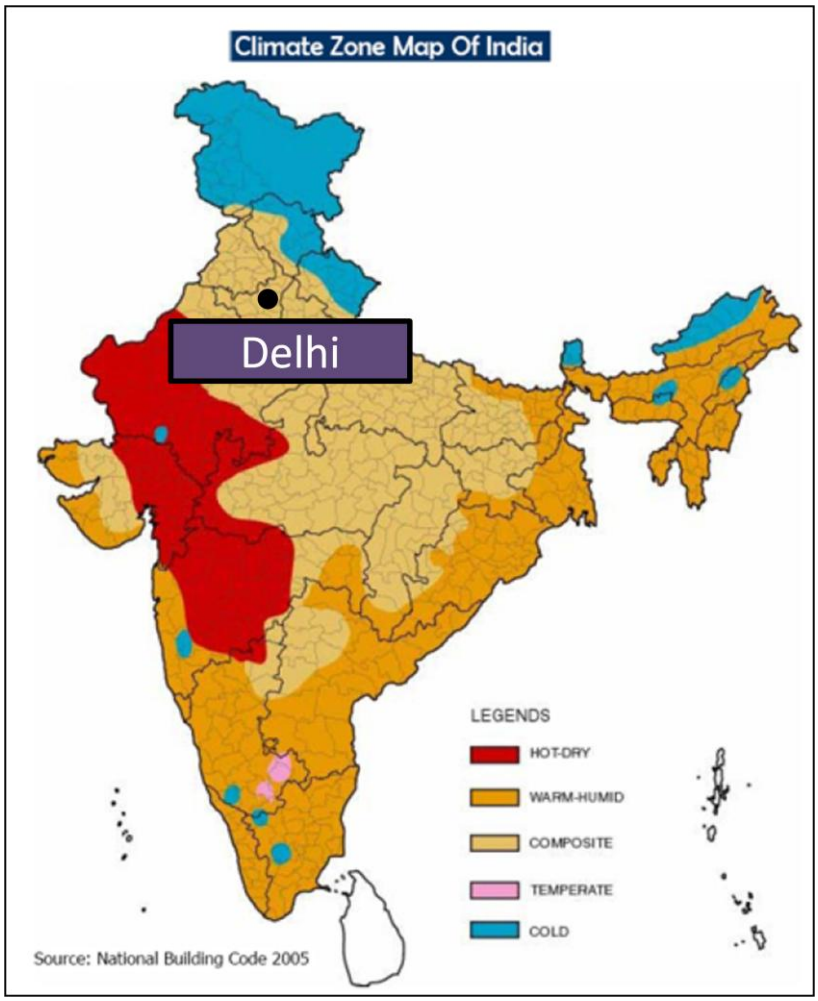
We have used the following modules of IES for completion of this report:

- Model IT – 3D building modeller
- Sun Cast – Solar shading analysis
- FlucsDL– Day Light analysis
- ApacheSim – Thermal analysis

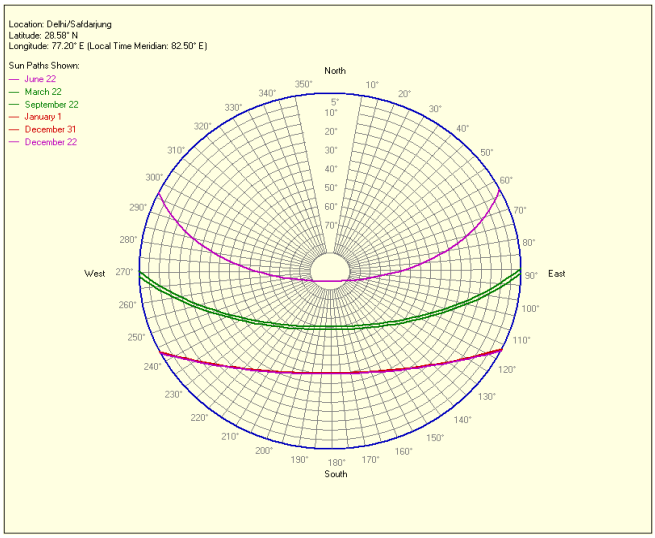
PROJECT TECHNICAL DESIGN SUMMARY

Climatology

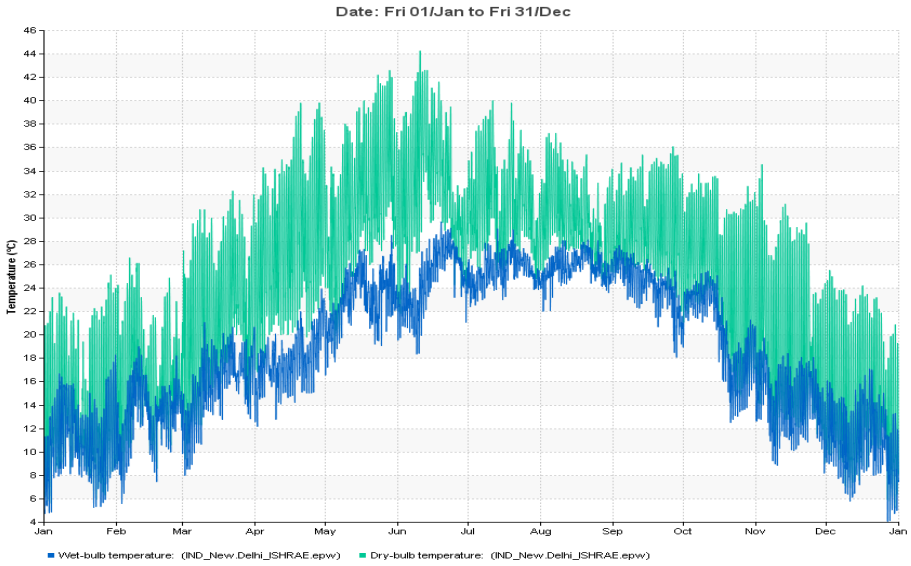
India possesses large variety of climates, which broadly categorizes into five regions. Project is located in Gurgaon, Delhi. According to ECBC User Guide, Table 13.2, Climatic Zones of Major Indian Cities, Project follows Composite climate as shown in the adjoining image



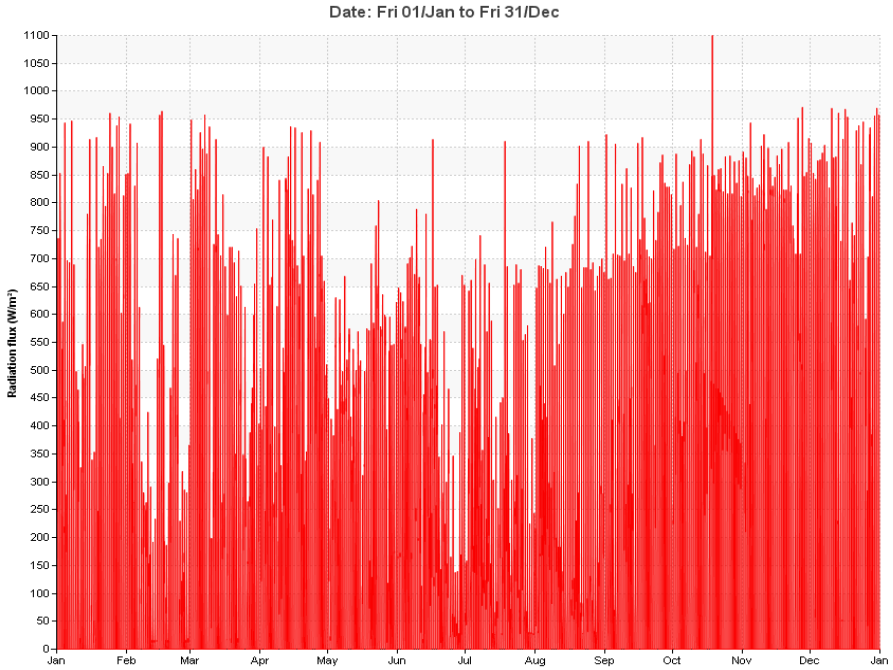
Sun Path Diagram



Minimum and Maximum Temperatures at Gurgaon



Dry Bulb & Wet bulb Variation



Radiation Graph

Energy Input Parameters

Following is the summary of input parameters of Base case as per ECBC & Proposed case as per design of the Project:

Base & Proposed Case Parameters

BASE & PROPOSED CASE PARAMETERS		
Model Input Parameter	**Proposed Design Input**	**ECBC Design Input**
Exterior Wall Construction	RCC walls, With Insulated paint. U value: 1.988 W/ m^2 K	U Value of overall assembly 0.440 W/ m^2 K. Minimum R value of insulation alone 2.10 m2 K/W
Roof Construction	Standard Roof with SRI paint U value 0.738 W/m2 K	U Value of overall assembly 0.409 W/ m^2 K. Minimum R value of insulation alone 2.1 m2 K/W
Fenestration U Value	DGU U value-1.8W/ m^2K	3.30 W/ m^2 K
Fenestration SHGC	0.38	0.20
Fenestration VLT	62%	Minimum VLT 27 %
LPD (W/m2)	Space by Space Method for Lighting Power density calculation considered	
EPD (W/m2)	Space wise Equipment Power density calculated and provided in section ….	

Envelope Analysis

Exterior Wall Parameters

Exterior Wall (outer to Inner)	Thickness (m)	k-Value (w/m ^{0}K)	Density, kg/m^3	U-value w/m^{20}k (k/Thickness)	R-value (1/U)
Plaster	0.03	0.5	1300	16.67	0.06
Face brick HF-A7	0.34	1.331	2003	3.91	0.26
Gypsum plaster board	0.03	0.16	950	5.33	0.19
Overall exterior wall value	**0.4**			**1.99**	**0.50**
Expected U-value = 1.988					

Roof Assembly Parameters

Roof Assembly	Thickness (m)	k-Value (w/m ^{0}K)	Density, kg/m^3	U-value w/m^{20}k (k/Thickness)	R-value (1/U)
Thermalite-high strength	0.065	0.16	950	2.46	0.41
Plaster (dense)	0.015	0.025	30	1.67	0.60
Cast concrete(light weight)	0.34	1.331	2083	3.91	0.26
Plaster (dense)	0.015	0.16	950	10.67	0.09
Overall exterior wall value	**0.435**			**0.74**	**1.36**
Expected U-value= 0.40					

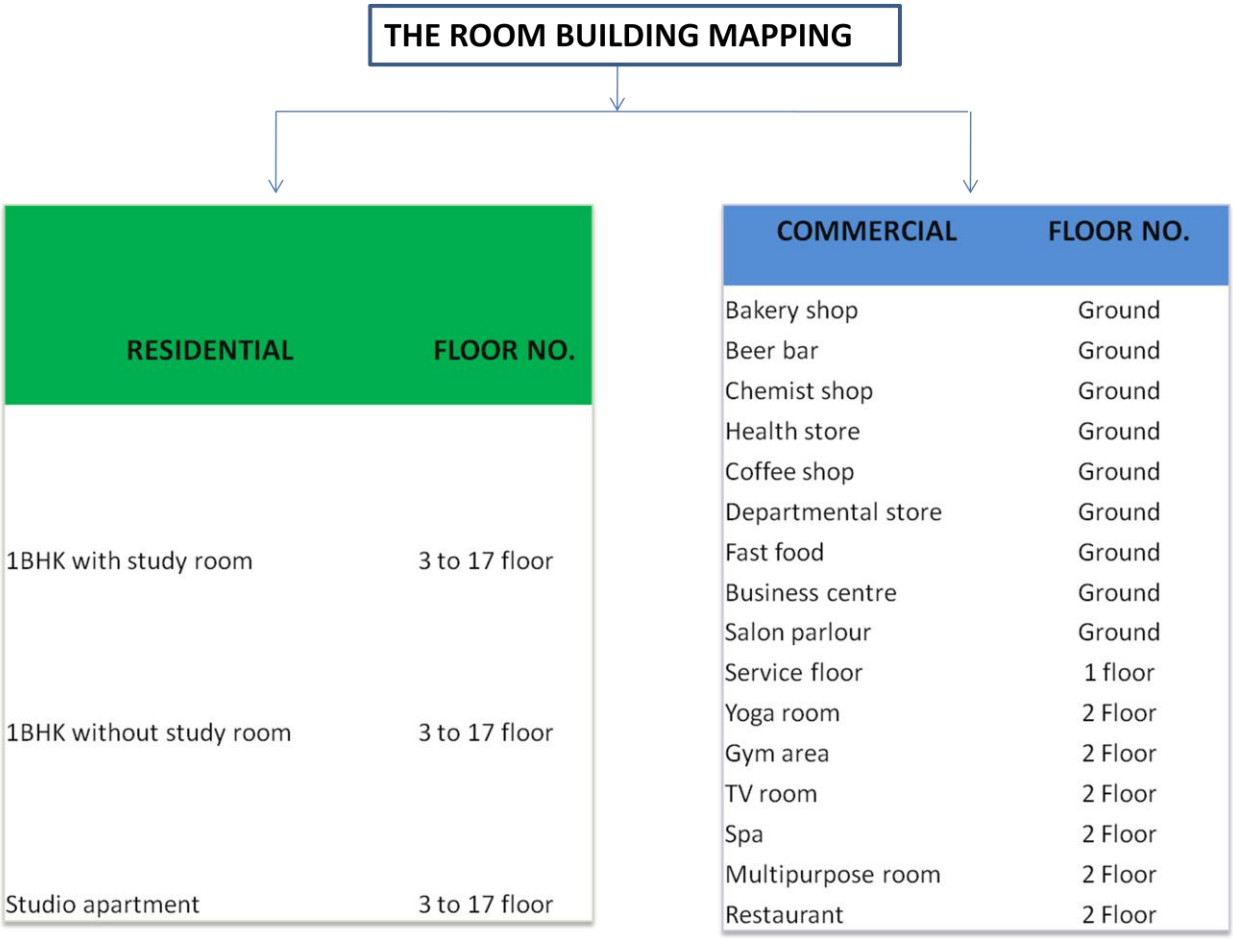
Lighting Analysis

LPD Calculation for Exterior & Interior

Lighting	Applicable Areas	ECBC Lighting Power Density (LPD)	Design Lighting Power Density (LPD) 30% Reduction	Design Lighting Power Density (LPD) 20% Reduction
Interior Lighting **(for residential units)**	Individual dwelling unit, Apartments, Villas, Gated communities	5.00 W/m2	3.5 W/m2	4 W/m2
Exterior Lighting, excluding Parking Area (for residential & nonresidential units)	Landscaping, Façade, Street lighting, Pathways, Signage's, etc.,	2.5 W/m2	1.75 W/m2	2 W/m2
Common Area Lighting, excluding Parking Area (for residential & nonresidential units)	Corridors, Lobbies, Staircases, Terrace, etc.,	4.0 W/m2	2.8 W/m2	3.2 W/m2
Parking Area	Surface parking (covered & uncovered), Basement parking,	2.5 W/m2	1.75 W/m2	2 W/m2

- **The project must ensure that the interior, exterior, common and parking area lighting Power densities are reduced by at least 20% from the baseline values through 'building area method'**
- **For Lighting Power Density (LPD) Design case, 30% reduction is considered for analysis.**

BUILDING MAPPING



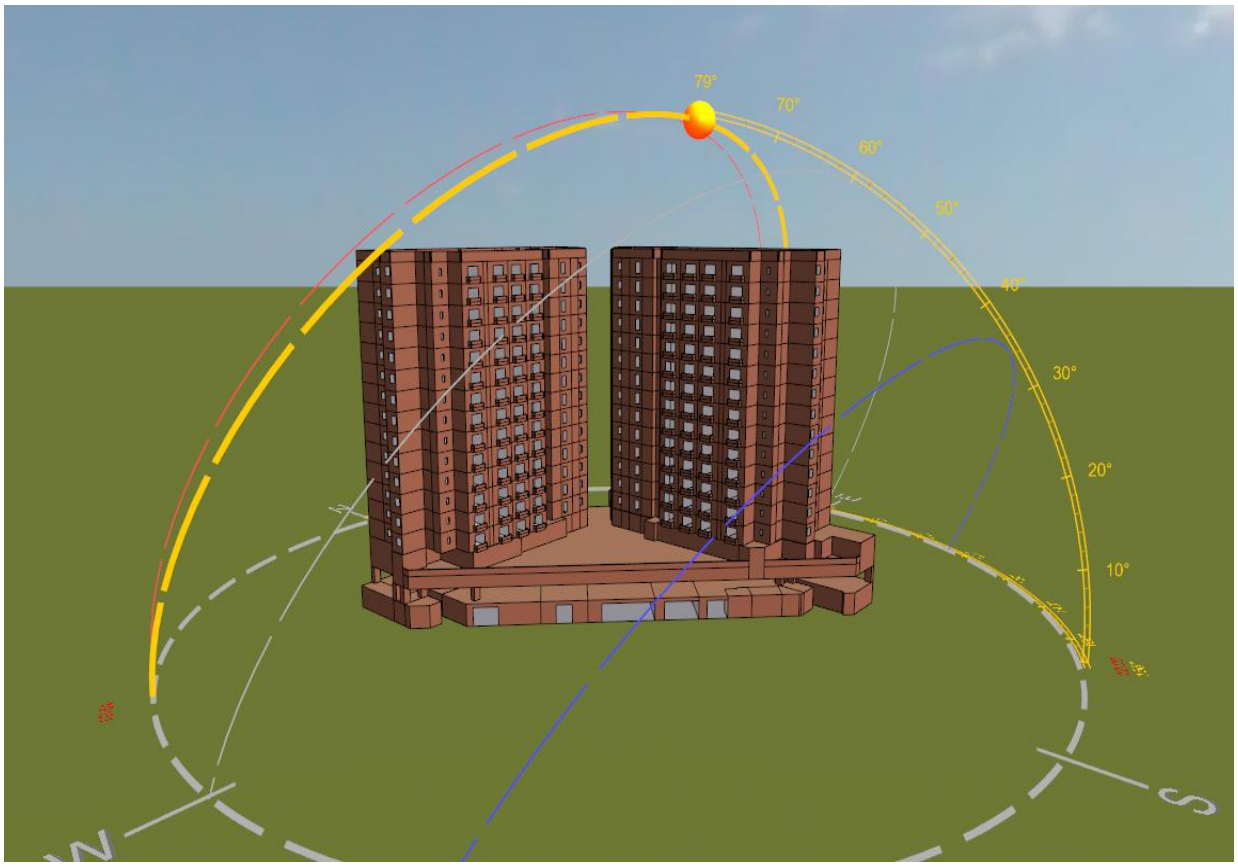
RESIDENTIAL	FLOOR NO.
1BHK with study room	3 to 17 floor
1BHK without study room	3 to 17 floor
Studio apartment	3 to 17 floor

COMMERCIAL	FLOOR NO.
Bakery shop	Ground
Beer bar	Ground
Chemist shop	Ground
Health store	Ground
Coffee shop	Ground
Departmental store	Ground
Fast food	Ground
Business centre	Ground
Salon parlour	Ground
Service floor	1 floor
Yoga room	2 Floor
Gym area	2 Floor
TV room	2 Floor
Spa	2 Floor
Multipurpose room	2 Floor
Restaurant	2 Floor

The table shown above is the summary of the Central park-The Room project and we are considering residential areas for our analysis. We have considered the typical floors from third to seventeenth floor.

CENTRAL PARK-THE ROOM ANALYSIS

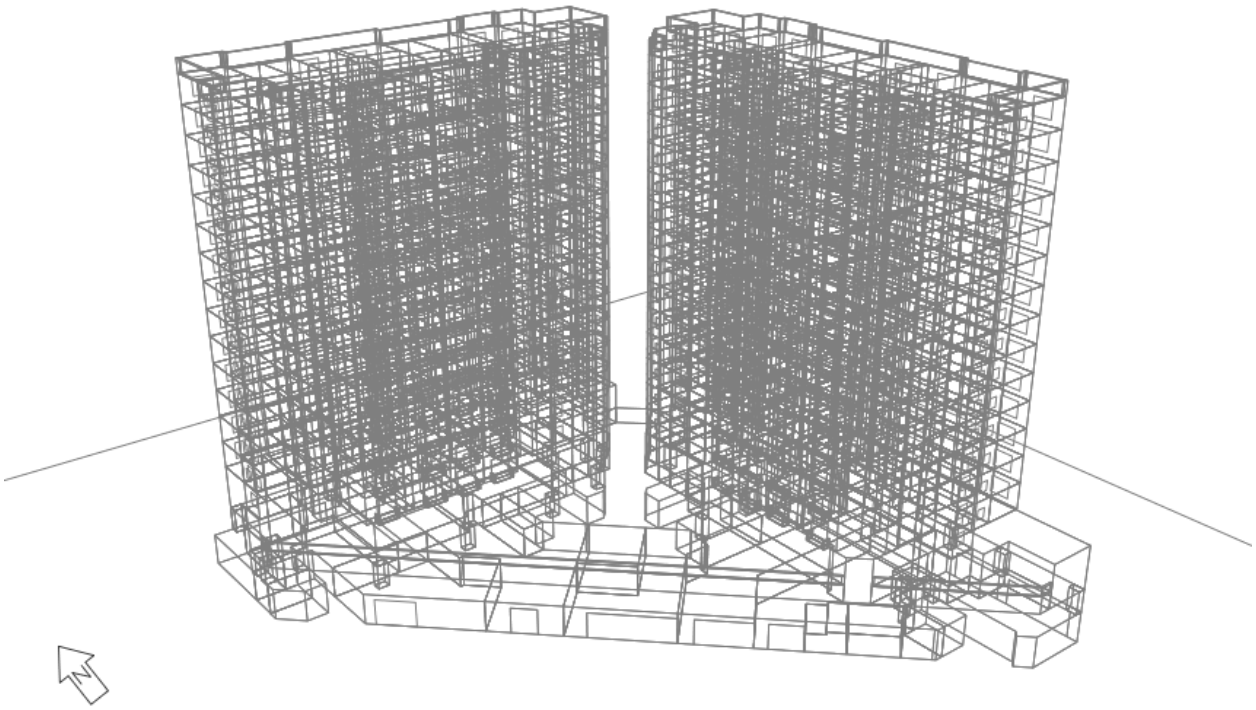
Energy & Day Light Analysis Of The Room building



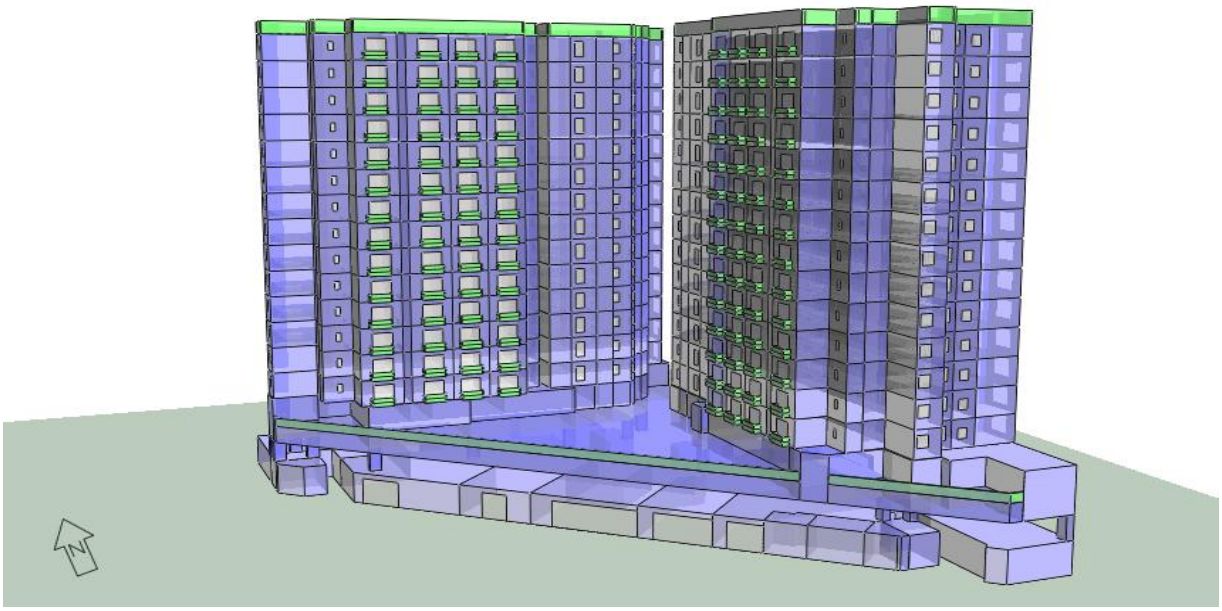
Sun Path Analysis: Energy & Daylighting

Energy Models

Envelope Design Model of The Room Building



Energy Model Image of The Room Building



Energy Performance Benchmarking

Design Case Energy Consumption

Month	Total lights energy (MWh)	Total equip energy (MWh)
Date		
Jan 01-31	2.5491	4.1787
Feb 01-28	2.3024	3.7743
Mar 01-31	2.5491	4.1787
Apr 01-30	2.4669	4.0439
May 01-31	2.5491	4.1787
Jun 01-30	2.4669	4.0439
Jul 01-31	2.5491	4.1787
Aug 01-31	2.5491	4.1787
Sep 01-30	2.4669	4.0439
Oct 01-31	2.5491	4.1787
Nov 01-30	2.4669	4.0439
Dec 01-31	2.5491	4.1787
Summed total	30.014	49.2011

ECBC Case Energy Consumption

Month	Total lights energy (MWh)	Total equip energy (MWh)
Date		
Jan 01-31	3.6406	5.971
Feb 01-28	3.2883	5.3931
Mar 01-31	3.6406	5.971
Apr 01-30	3.5232	5.7784
May 01-31	3.6406	5.971
Jun 01-30	3.5232	5.7784
Jul 01-31	3.6406	5.971
Aug 01-31	3.6406	5.971
Sep 01-30	3.5232	5.7784
Oct 01-31	3.6406	5.971
Nov 01-30	3.5232	5.7784
Dec 01-31	3.6406	5.971
Summed total	42.8654	70.3033

Comparison between Design & ECBC Case

Alternative	Total lights energy	Total equipments
	(MWH)	**(MWH)**
ECGC case	42.8654	70.3033
Design case	30.014	49.2011
Energy Cost Savings over ECBC average base case	**30%**	**30%**

Result Summary

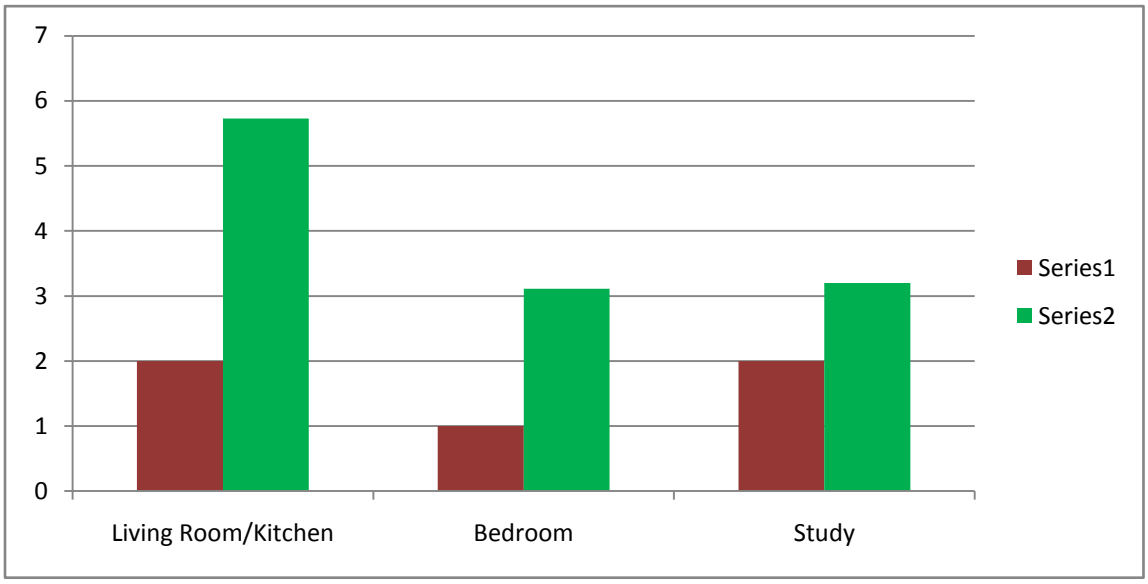
- To compare, an appropriate occupancy per typical dwelling unit is considered with conventional residential energy operational schedule.
- In Compared results of Design and ECBC case, **30%** saving are noticed (base on the 30% reduction in Lighting Power Densities; Refer Table on Pg No. 12
- For additional efficiencies, Sensors are recommended for the non-regularly occupied spaces.

Daylight Analysis

Comparison between Design & LEED Requirement

Type 1 with study room

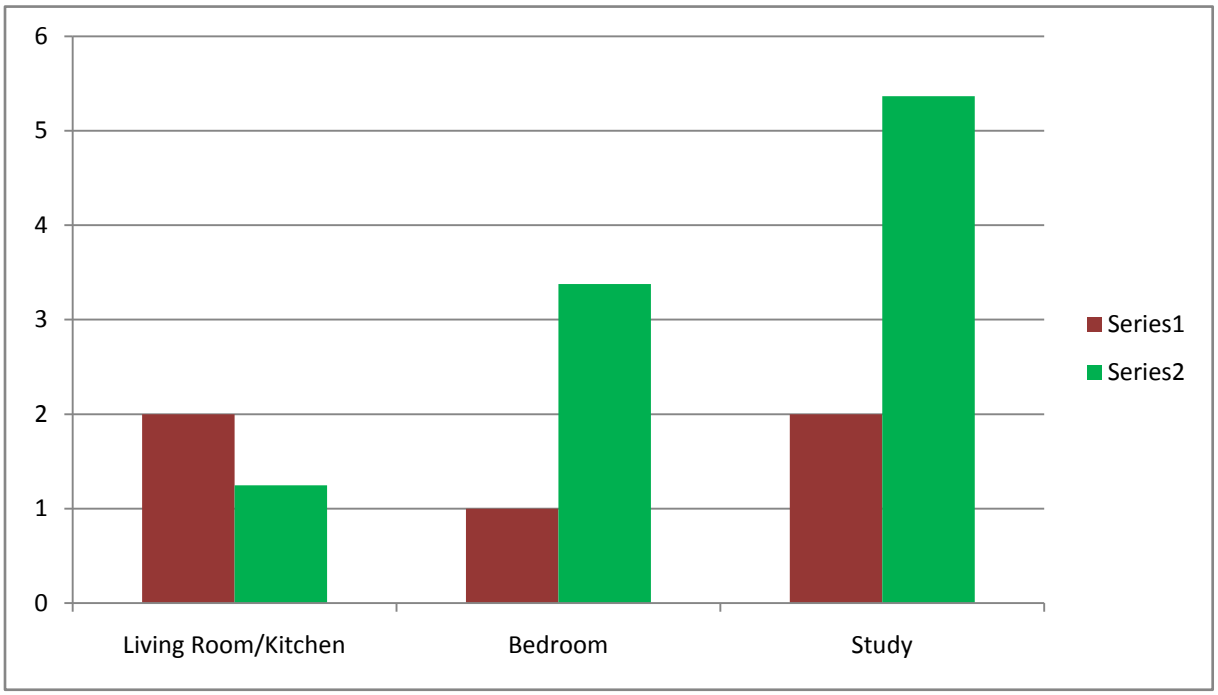
Sr. no	Typical floor flat	Actual Requirement	Daylight Factor	Window nomenclature
1	Living Room/Kitchen	2	5.73	SG1
2	Bedroom	1	3.11	W1
3	Study	2	3.20	W4A



As per the analysis, with the given building specification the building is achieving fairly high day light in all regularly occupied spaces. Thereby, the project intends to ensure the connectivity between the interior and the exterior environment by providing the adequate daylighting.

Type 2 with study room

Sr. no	Typical floor flat	Actual Requirement	Daylight Factor	Window nomenclature
1	Living Room/Kitchen	2	1.25	W3
2	Bedroom	1	3.38	W1
3	Study	2	5.37	W2A



As per the analysis, with the given building specification, the building is achieving fairly high day light in Bedroom and study and less daylight is achieved in living/ kitchen. Thereby, the project intends to ensure the connectivity between the interior and the exterior environment by providing the adequate daylighting.

Type 3 without study room

Sr. no	Typical floor flat	Actual Requirement	Daylight Factor	Window nomenclature
1	Living Room/Kitchen	2	2.50	DW1
2	Bedroom	1	1.62	W4

As per the analysis, with the given building specification, the living/kitchen and bedroom are achieving fairly high day light in all rooms. Thereby, the project intends to ensure the connectivity between the interior and the exterior environment by providing the adequate daylighting.

Type 4

Sr. no	Typical floor flat	Actual Requirement	Daylight Factor	Window nomenclature
1	Studio/kitchen	2	5.62	SG1

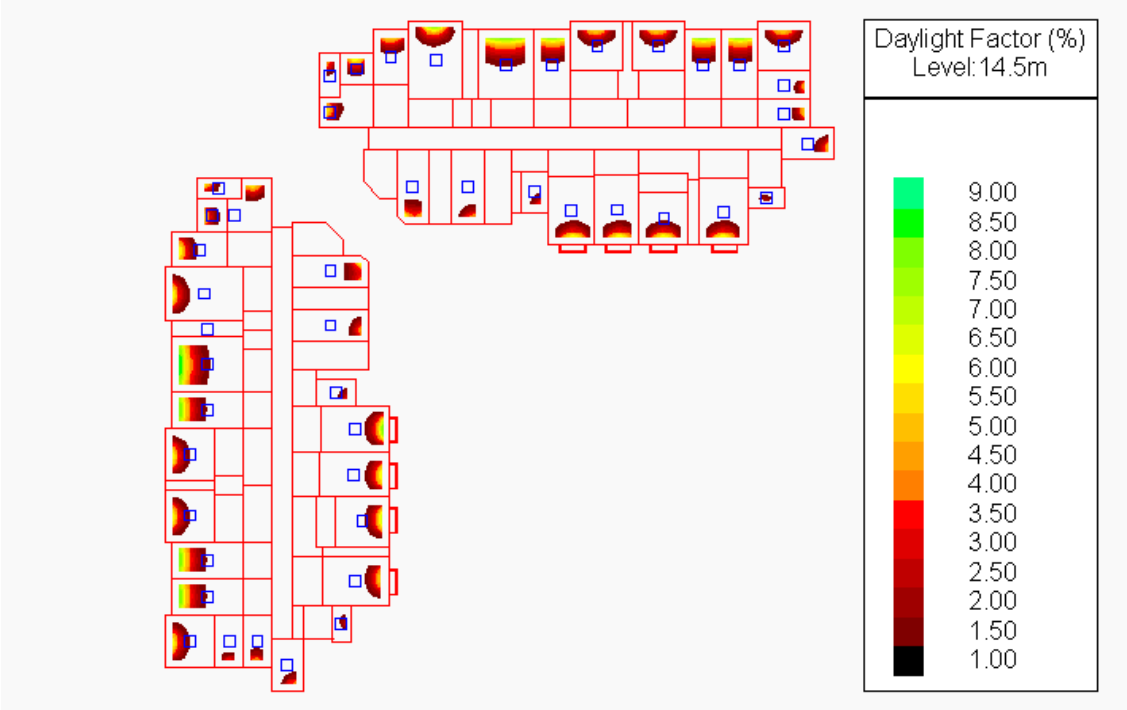
As per the analysis, with the given building specification, the rooms is achieving fairly high day light in Studio and kitchen. Thereby, the project intends to ensure the connectivity between the interior and the exterior environment by providing the adequate daylighting.

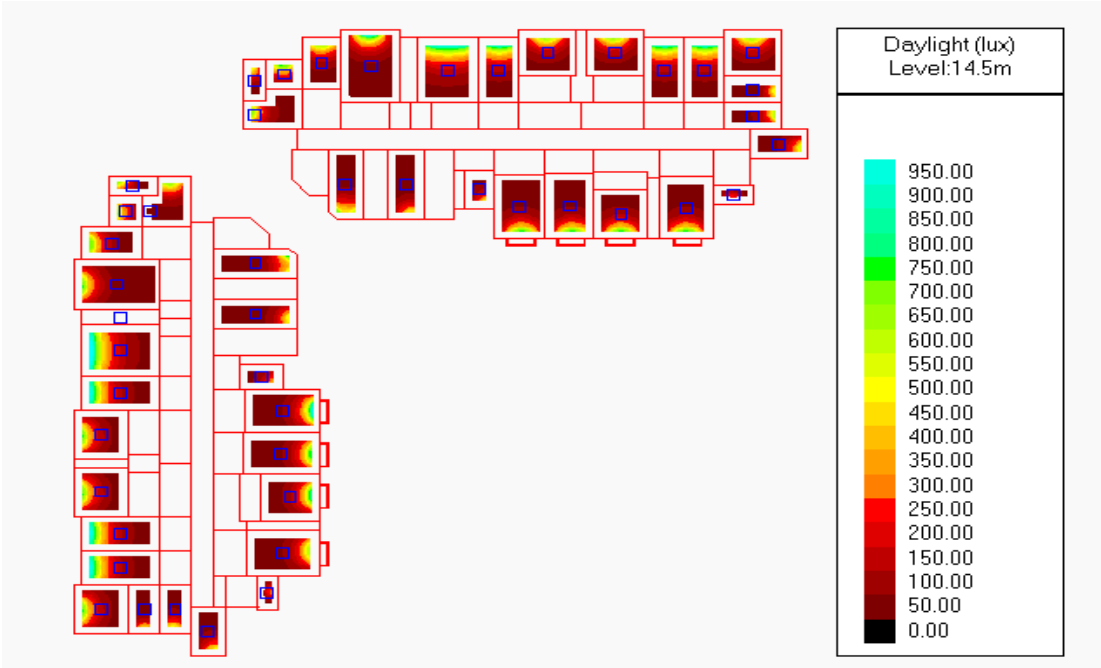
Type 5

Sr. no	Typical floor flat	Actual Requirement	Daylight Factor	Window nomenclature
1	Studio/kitchen	2	1.44	DW1

As per the analysis, with the given building specification, the Studio and kitchen is not achieving fairly high day light. Thereby, the project intends to ensure the connectivity between the interior and the exterior environment by providing the adequate daylighting.

Daylight Graphical Analysis with VLT 62%





This is the graphical analysis showing the lux levels and daylight factor.

LSquare Solutions
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the Right Solution

Energy -Analysis, Sun Path & Daylight Report

Central Park Belgravia-II Project

2013

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ENERGY ANALYSIS METHODOLOGY

The Proposed Building has been evaluated on the basis of the methodology outlined in ECBC Standard-**Whole Building Performance Method.**

Whole building energy simulation analysis is used to predict the annual energy performance of a building design. The analysis is carried out by first developing a detailed building energy simulation model. The simulation programme is then used to test the thermal response & to calculate the energy use of the building model using a weather data file to capture the climatic impact on the building. This type of analysis is referred as Whole Building Performance (WBP) Method. Whole building energy simulation is the most sophisticated way of analyzing the impact of energy efficiency measures in an integrated manner.

IES <VE> 2012 simulation tool has been used for modelling the baseline and the proposed building.

As specified by the WBP Method, the Proposed and Budget Buildings are identical in terms of:

- Design Model
- Simulation software
- Thermal Blocks
- Weather data (Gurgaon, Delhi, India)
- Occupancies

STANDARADS AND SOFTWARE TOOLS USED FOR ANALYSIS

Standard used for the Analysis

Standard used for the analysis is ECBC (Energy Conservation Building Code). The purpose of ECBC is to provide minimum requirements for energy efficient design & construction of buildings & their systems. Estimates based on computer simulation models indicate that ECBC complaint buildings can use 40-60 % less energy than conventional buildings. It is estimated that a nationwide mandatory enforcement of the ECBC will yield a annual savings of approximately 1.7 billion kWh.

ECBC was developed as a first step towards promoting energy efficiency in the building sector. The ECBC user Guide (also referred to as “The Guide” in this document) has been developed to provide detailed guidance to building owners, designers, engineers, builders, energy consultants, and others on how to comply with the code. It provides expanded interpretation, examples, supplementary information to assist in applying ECBC during the design and construction of new buildings as well as additions and alterations to existing buildings.

This Guide can also be used as a document by “authorities having jurisdiction” in the enforcement of code once it is made mandatory. The guide follows the nomenclature of the code. It is written both as a reference and as a instruction guide, and can be help- full to anyone who is directly or in- directly involved in the construction and design and construction of ECBC-compliant buildings.

The code is applicable to the buildings or building complexes that have a connected load of 500 kW or greater or a contract demand of 600 kVA or greater. This code would become mandatory as and when it is notified by the Central and the State government in the official Gazette (P) of S14 or clause (a) of S 15 of the energy conservation act 2001 (52 of 2001)

This code is applicable to the following Building System-

- Building envelopes expect for unconditioned storage spaces or warehouse
- Mechanical System and equipment, including heating, ventilation and air conditioning, (HVAC)
- Service hot water heating
- Interior and exterior lighting
- Electrical power and motors

This code is not- applicable to the following Building System-

- Buildings that do not use either electricity or fossil- fuel
- Equipment and portions of building system that use energy primarily for manufacturing process

Software used for Analysis

Energy Modelling & Simulation is a holistic approach to achieve energy savings in a building. The process of energy modelling is being done in the following phases:

- 3 Dimensional Modelling
- Base Building Energy Consumption Results
- Development of Energy Efficiency Measures
- Design Building Energy Consumption Results

Software used for the Project is IES. IES <VE>

Integrated Environmental Solutions (IES) is a world leading provider of integrated performance analysis software and consulting services for sustainable building design. Comparative analysis at the early stage, using ballpark figures, is useful to check feasibility, quantify and inform design team decision making. It can help with those all important master planning, orientation, massing and form decisions; justifying choices and differentiating project proposals.

Detailed analysis provides more accurate figures and results for system sizing, fine tuning, compliance, costing and documentation. Results and analysis can be presented to clients and building control, justifying design decisions and offering you competitive advantage.

IES provides a wide range of different analysis options and capabilities designed to give feedback quickly and efficiently at the relevant level. All are powered by the sophisticated <Virtual Environment> performance modelling engine that undertakes detailed simulations at hourly or smaller increments as necessary.

Energy Simulation Software Salient Features

- Undertake energy performance snapshots to assess impact of design decisions
- Develop building loads and impact of conservation strategies
- Develop carbon footprint reduction strategies
- Assess passive/hybrid/renewable strategies
- Assess the impact of daylight and solar
- Incorporate bulk airflow, ventilation and indoor air quality into the equation
- Assess compliance with a range of worldwide regulations and voluntary codes

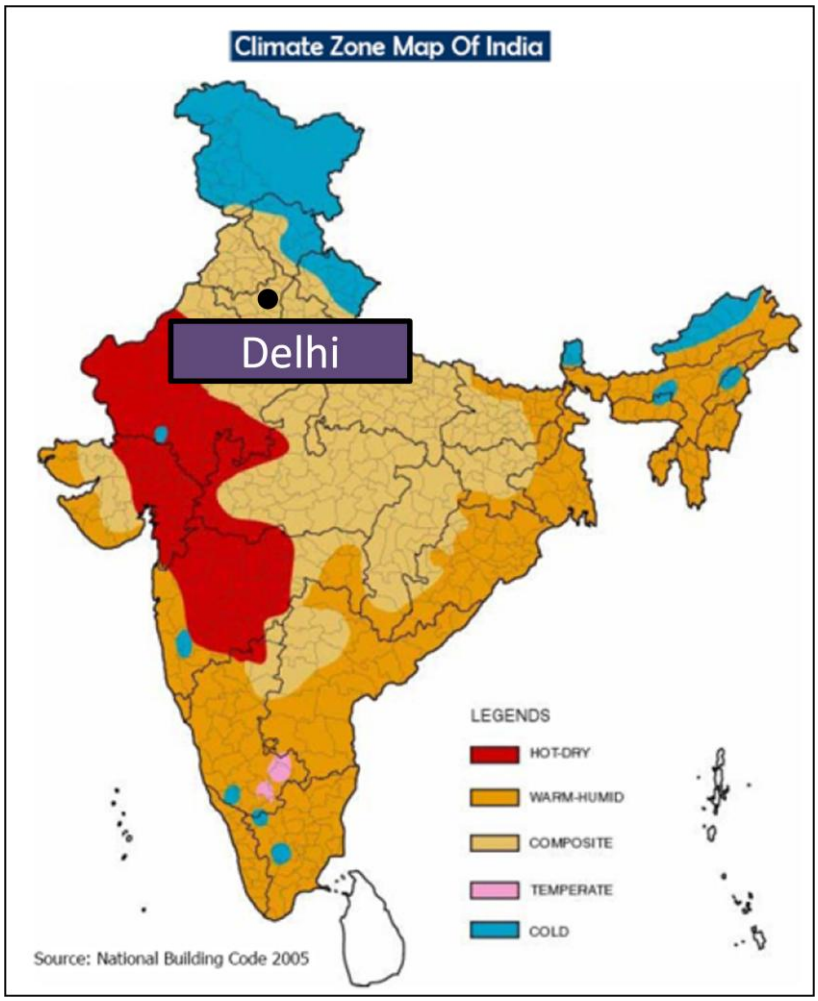
We have used the following modules of IES for completion of this report:

- Model IT – 3D building modeller
- Sun Cast – Solar shading analysis
- FlucsDL– Day Light analysis
- ApacheSim – Thermal analysis

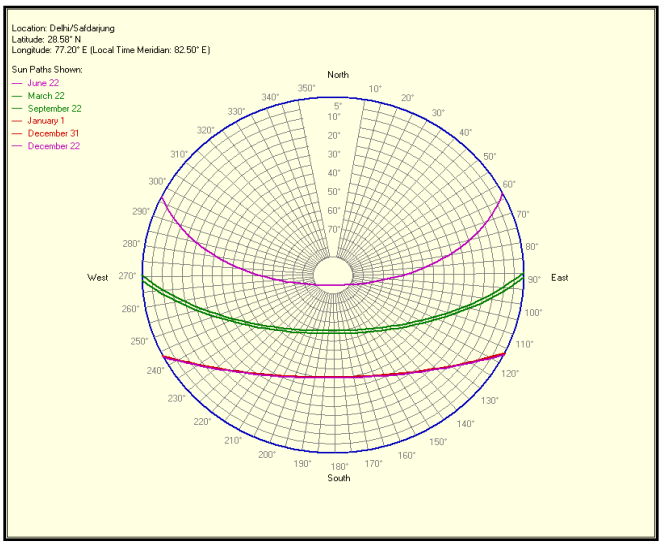
PROJECT TECHNICAL DESIGN SUMMARY

Climatology

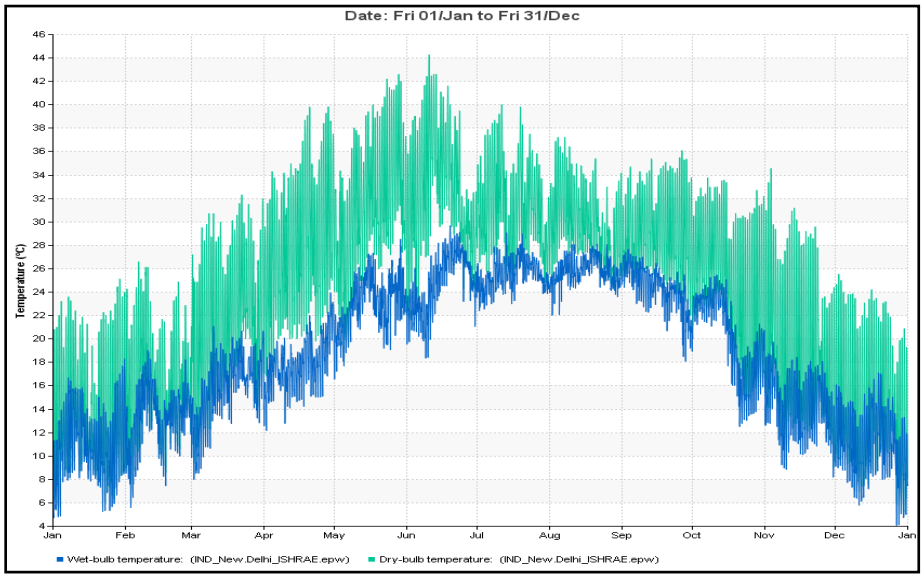
India possesses large variety of climates, which broadly categorizes into five regions. Project is located in Gurgaon, Delhi. According to ECBC User Guide, Table 13.2, Climatic Zones of Major Indian Cities, Project follows Composite climate as shown in the adjoining image



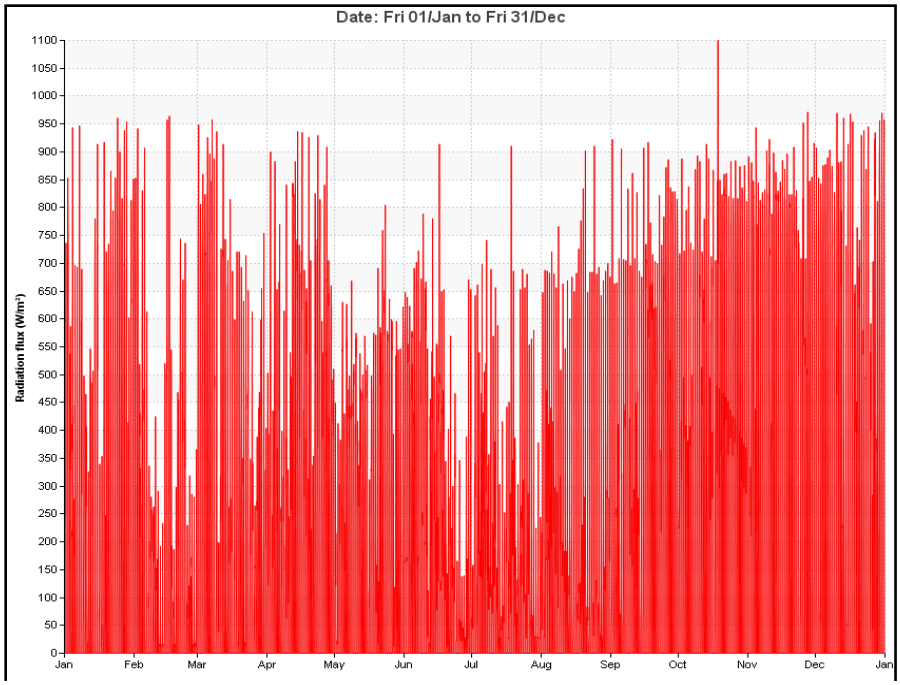
Sun Path Diagram



Minimum and Maximum Temperatures at Gurgaon



Dry Bulb & Wet bulb Variation



Radiation Graph

Energy Input Parameters

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Fenestration U Value	DGU U value-1.77 W/ m^2K	3.30 W/ m^2 K
Fenestration SHGC	0.36	0.20
Fenestration VLT	62%	Minimum VLT 27 %
LPD (W/m2)	Space by Space Method for Lighting Power density calculation considered	
EPD (W/m2)	Space wise Equipment Power density calculated and provided in section ….	

Envelope Analysis

Exterior Wall Parameters

Exterior Wall (outer to Inner)	Thickness (m)	k-Value (w/m ^{0}K)	Density, kg/m^3	U-value w/m^{20}k (k/Thickness)	R-value (1/U)
POP inner side	0.009	0.16	801	17.77778	0.05625
Cement Plaster	0.012	0.5	1300	41.66667	0.024
Common Brick	0.23	0.84	1700	3.652174	0.27381
Cement Plaster outer side	0.018	0.5	1300	27.77778	0.036
Overall exterior wall value	**0.4**			**1.785**	**0.097515**

Roof Assembly Parameters

Roof Assembly	Thickness (m)	k-Value (w/m ^{0}K)	Density, kg/m^3	U-value w/m^{20}k (k/Thickness)	R-value (1/U)
Brick bat coba	0.125	0.19	600	1.52	0.658
Cement concrete slab	0.125	0.16	500	1.28	0.781
Cement plaster	0.006	0.5	1300	83.33333	0.012
POP	0.009	0.16	801	17.77778	0.056
Overall exterior wall value	**0.435**			**0.607**	**0.377**

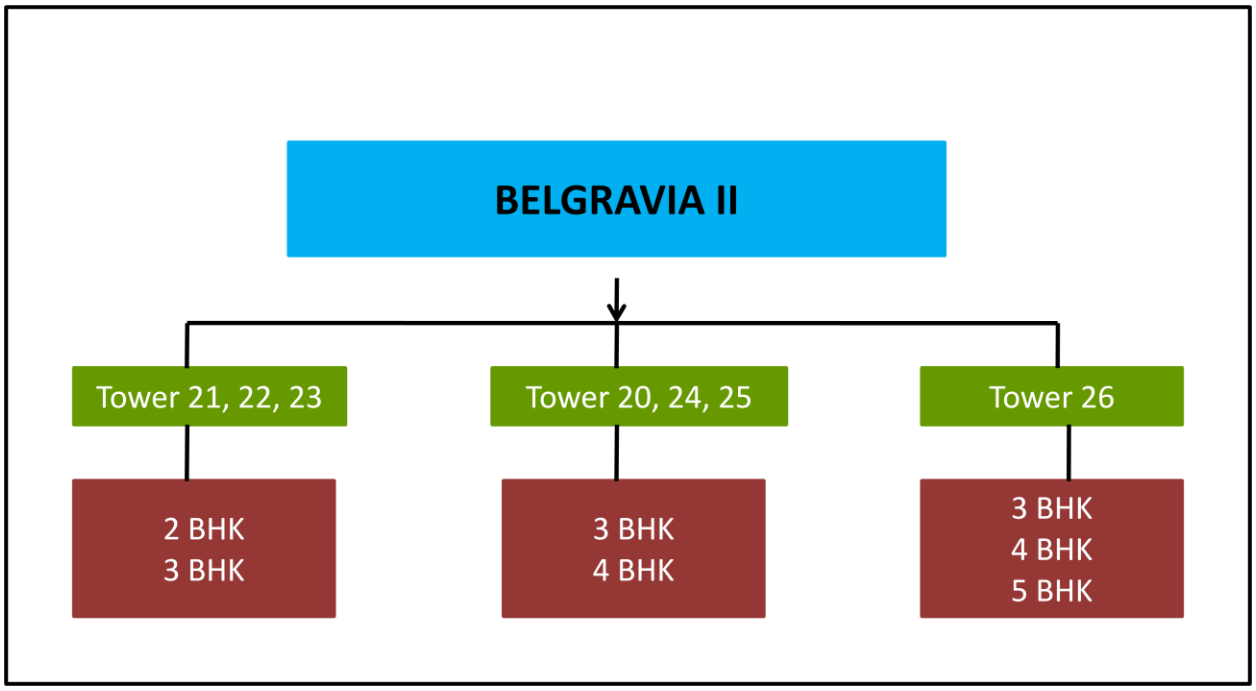
Lighting Analysis

LPD Calculation for Exterior & Interior

Lighting	Applicable Areas	Base case Lighting Power Density (LPD)	Design Lighting Power Density (LPD) 30% Reduction	Design Lighting Power Density (LPD) 20% Reduction
Interior Lighting **(for residential units)**	Individual dwelling unit, Apartments, Villas, Gated communities	5.00 W/m2	3.5 W/m2	4 W/m2
Exterior Lighting, excluding Parking Area (for residential & nonresidential units)	Landscaping, Façade, Street lighting, Pathways, Signage's, etc.,	2.5 W/m2	1.75 W/m2	2 W/m2
Common Area Lighting, excluding Parking Area (for residential & nonresidential units)	Corridors, Lobbies, Staircases, Terrace, etc.,	4.0 W/m2	2.8 W/m2	3.2 W/m2
Parking Area	Surface parking (covered & uncovered), Basement parking,	2.5 W/m2	1.75 W/m2	2 W/m2

- **The project must ensure that the interior, exterior, common and parking area lighting Power densities are reduced by at least 20% from the baseline values through 'building area method'**
- **For Lighting Power Density (LPD) Design case, 30% reduction is considered for analysis.**

BUILDING MAPPING

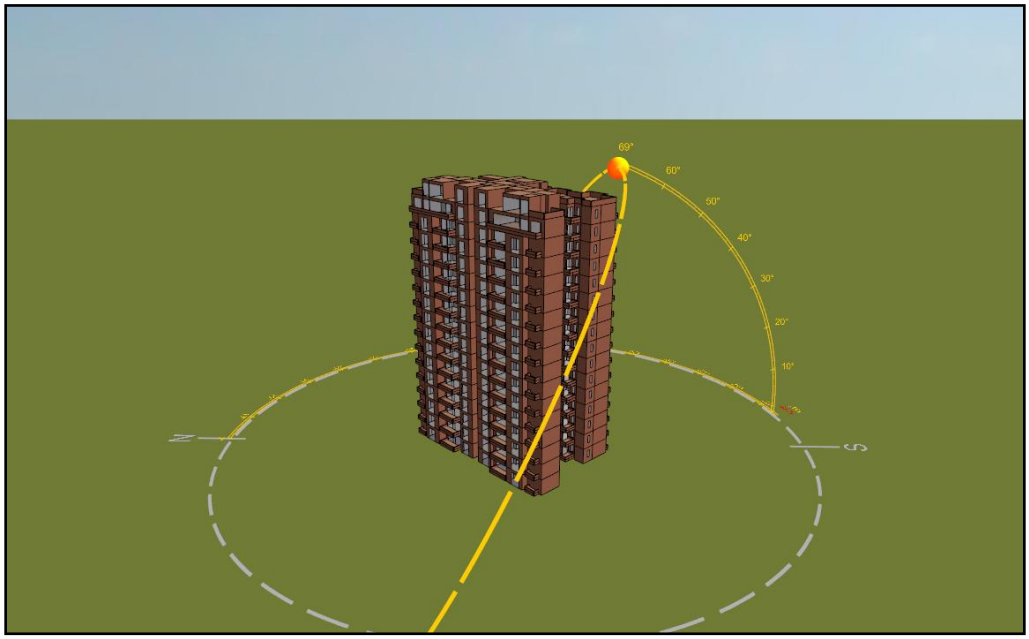


The table shown above is the summary of the Central park-Belgravia II project and we are considering residential areas for our analysis. We have considered the typical floors of Tower 20 to 26 for analysis.

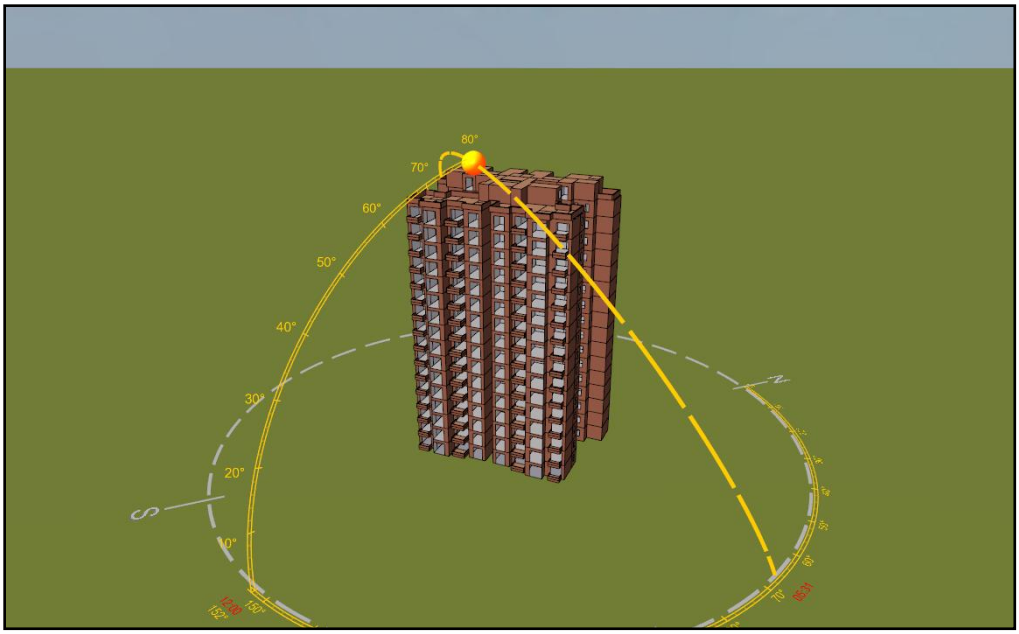
CENTRAL PARK-BELGRAVIA-II ANALYSIS

Energy & Day Light Analysis of Belgravia-II building

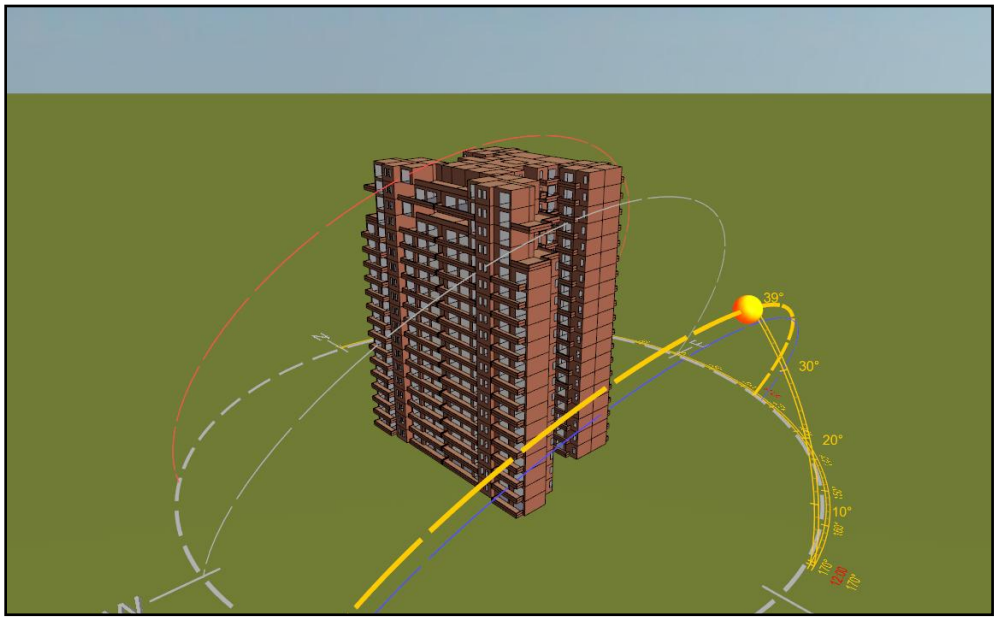
Tower 21, 22, 23



Tower 20, 24, 25



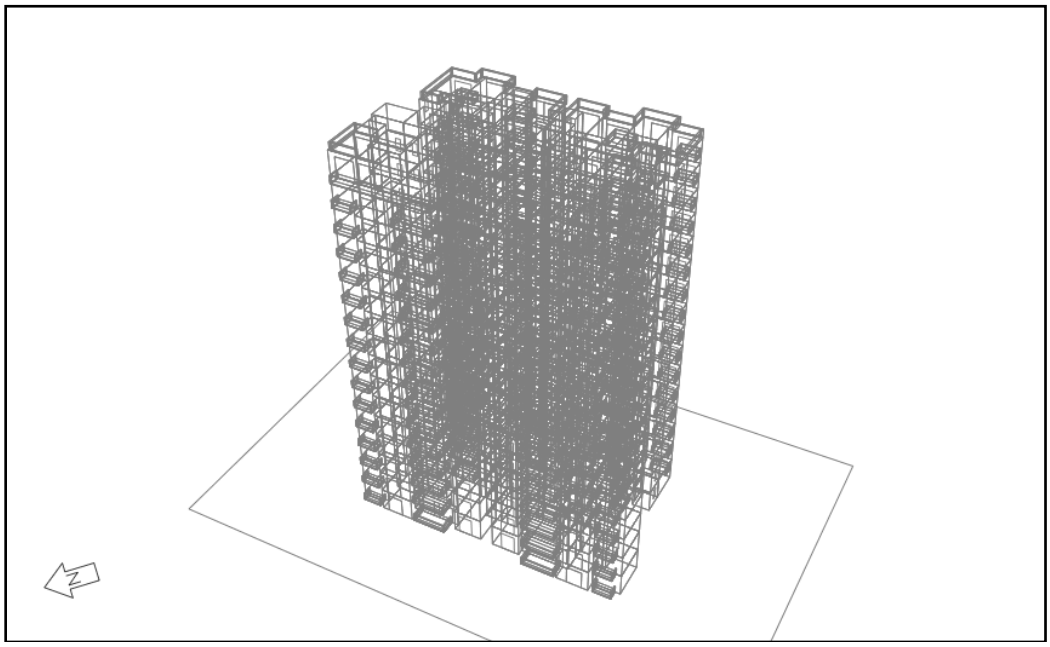
Tower 26



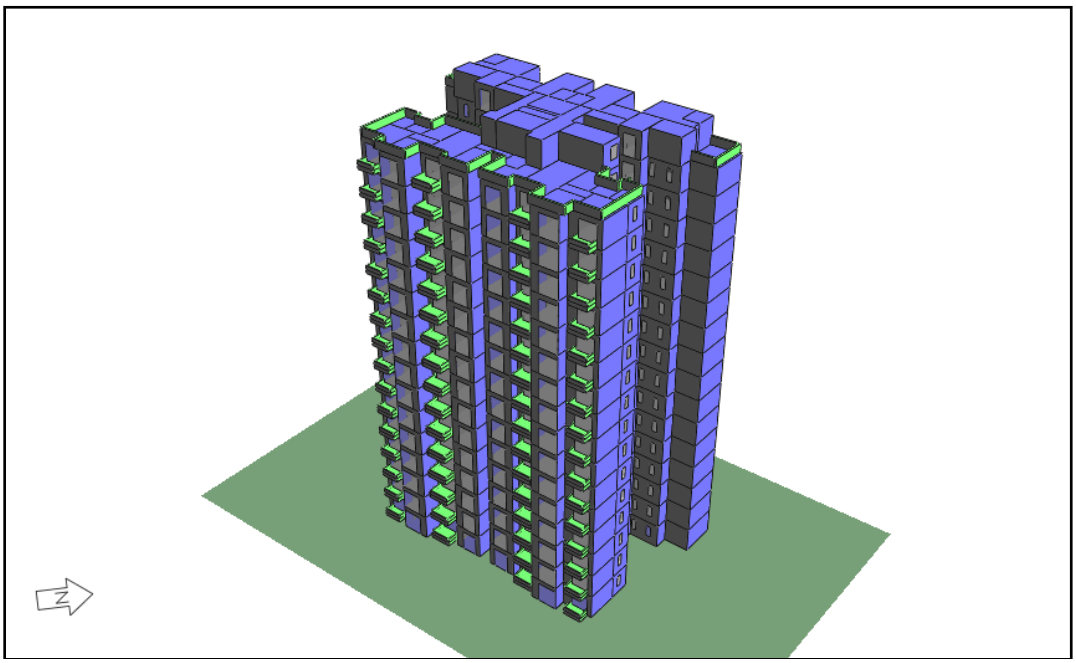
Sun Path Analysis: Energy & Daylighting

Energy Models

Envelope Design Model of The Tower 21, 22, 23

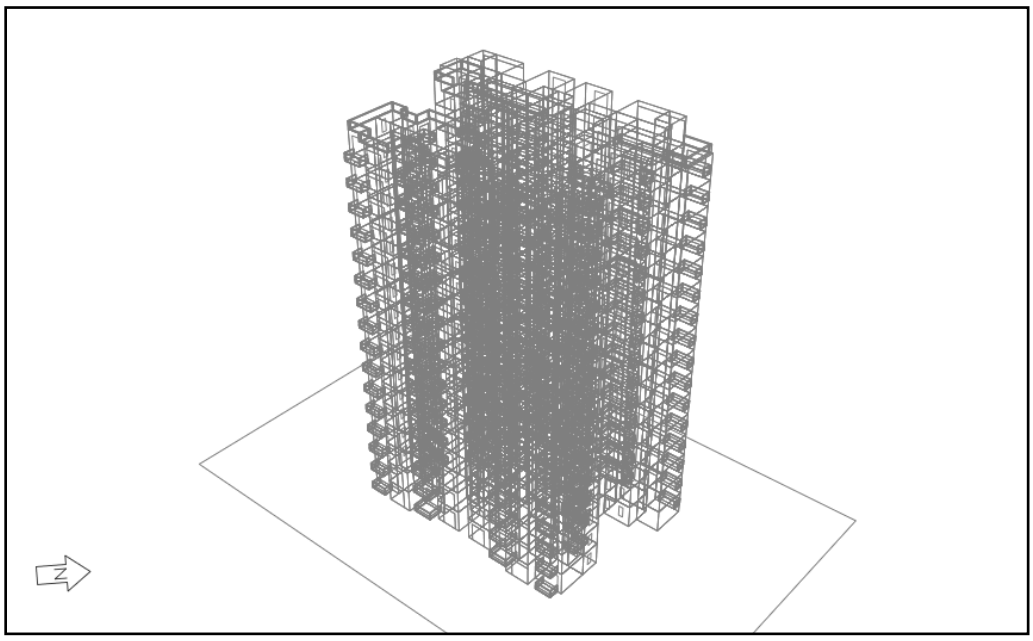


Energy Model Image of the Tower 21, 22, 23

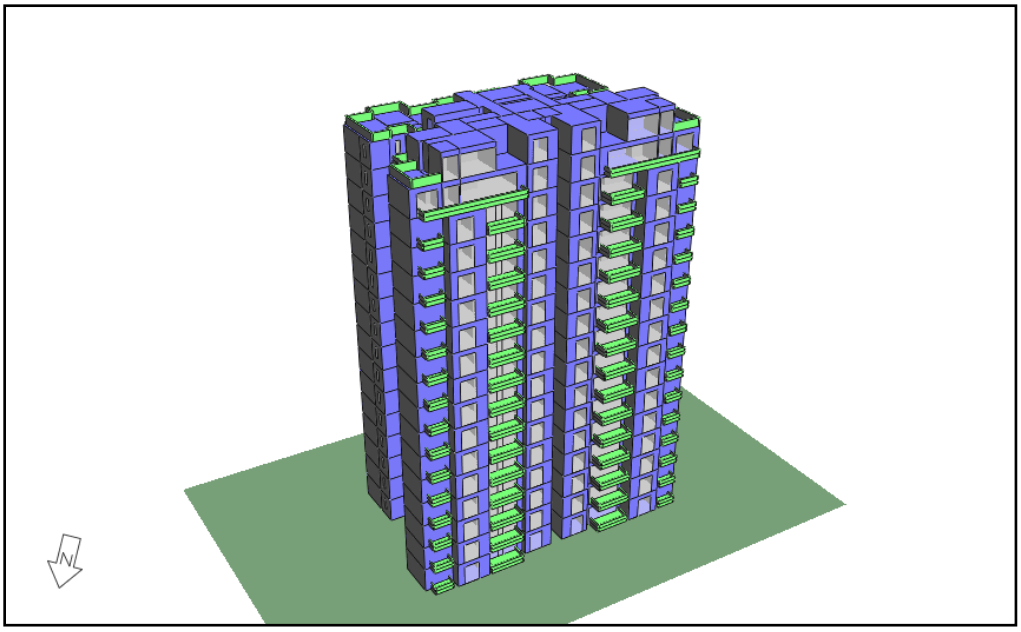


Energy Models

Envelope Design Model of The Tower 20, 24, 25

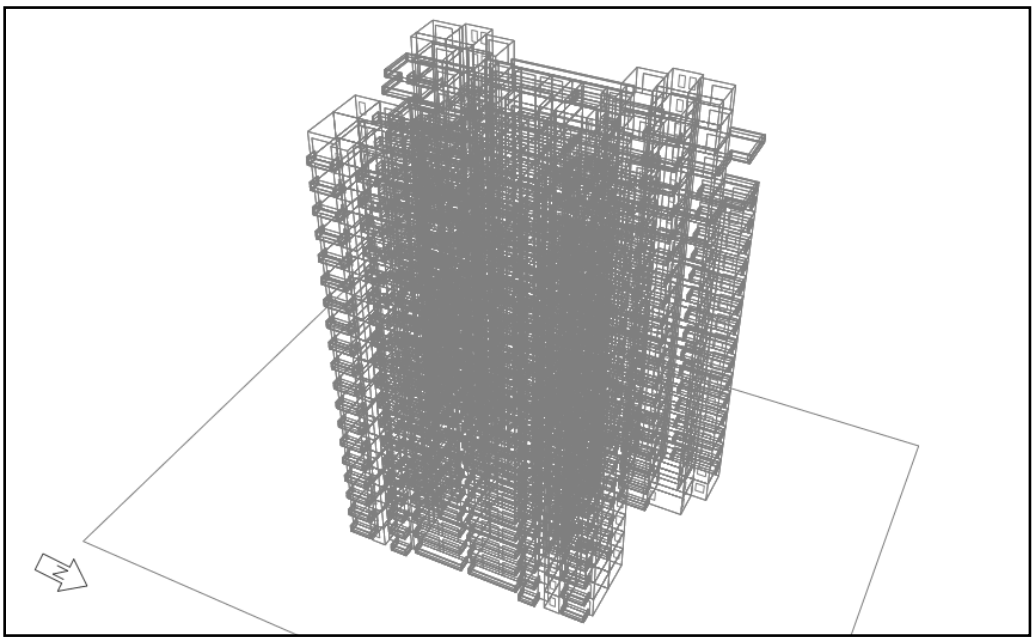


Energy Model Image of the Tower 20, 24, 25

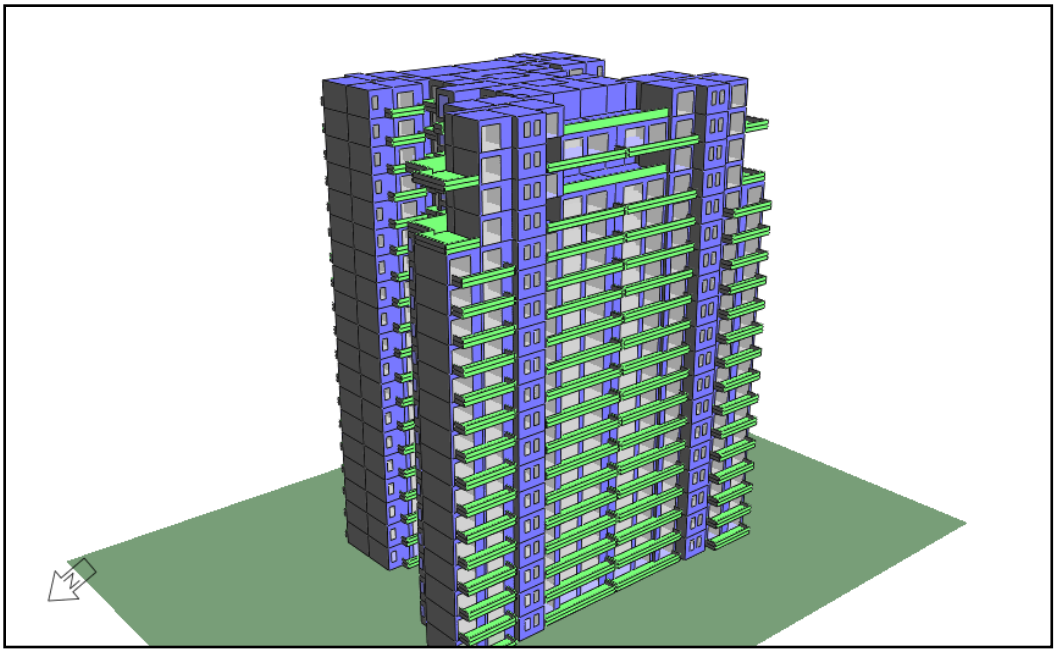


Energy Models

Envelope Design Model of The Tower 26



Energy Model Image of the Tower 26



Energy Performance Benchmarking

Design Case Energy Consumption

Month	Total lights energy (MWh)	Total equip energy (MWh)
Date		
Jan 01-31	32.1501	37.6115
Feb 01-28	29.0388	33.9717
Mar 01-31	32.1501	37.6115
Apr 01-30	31.113	36.3982
May 01-31	32.1501	37.6115
Jun 01-30	31.113	36.3982
Jul 01-31	32.1501	37.6115
Aug 01-31	32.1501	37.6115
Sep 01-30	31.113	36.3982
Oct 01-31	32.1501	37.6115
Nov 01-30	31.113	36.3982
Dec 01-31	32.1501	37.6115
Summed total	378.5409	442.8453

Base Case Energy Consumption

Month	Total lights energy (MWh)	Total equip energy (MWh)
Date		
Jan 01-31	45.9269	53.7316
Feb 01-28	41.4824	48.5318
Mar 01-31	45.9269	53.7316
Apr 01-30	44.4454	51.9983
May 01-31	45.9269	53.7316
Jun 01-30	44.4454	51.9983
Jul 01-31	45.9269	53.7316
Aug 01-31	45.9269	53.7316
Sep 01-30	44.4454	51.9983
Oct 01-31	45.9269	53.7316
Nov 01-30	44.4454	51.9983
Dec 01-31	45.9269	53.7316
Summed total	540.7522	632.6463

Comparison between Design & Base Case

Alternative	Total lights energy (MWH)	Total equipments (MWH)
Base case	540.7522	632.6463
Design case	378.5409	442.8453
Energy Cost Savings over Base case	**30%**	**30%**

Result Summary

- In Compared results of Design and Base case, **30%** saving are noticed (base on the 30% reduction in Lighting Power Densities; Refer Table on Pg No. 12)
- For additional efficiencies, Sensors are recommended for the non-regularly occupied spaces.

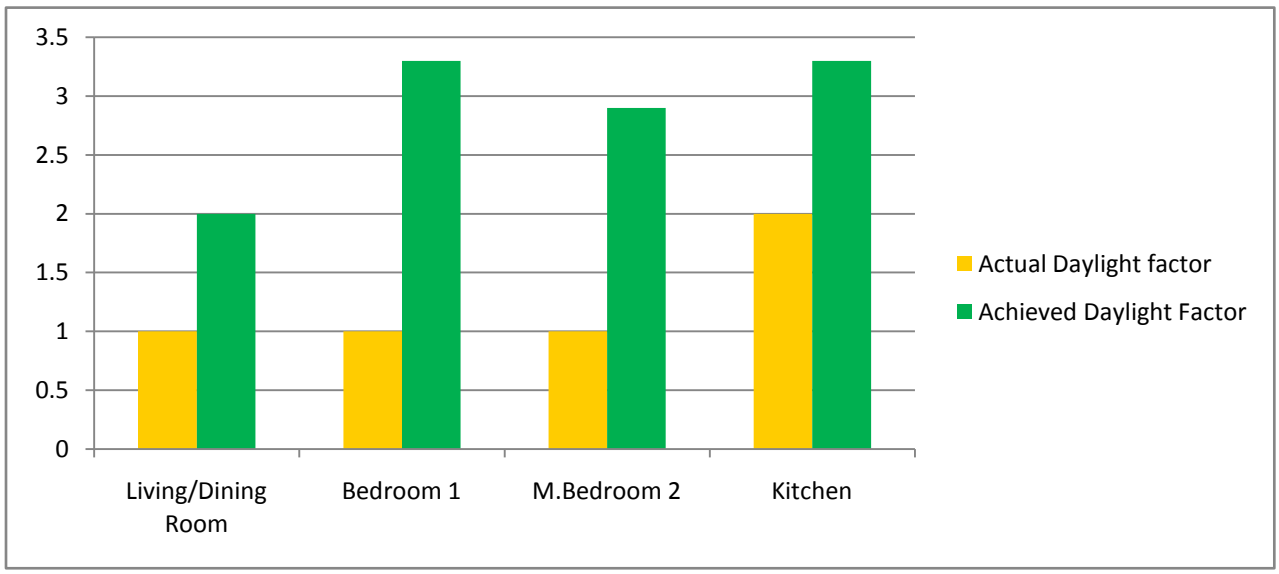
Daylight Analysis

Comparison between Design & LEED Requirement

Tower 21,22,23

Type 1 -2BHK

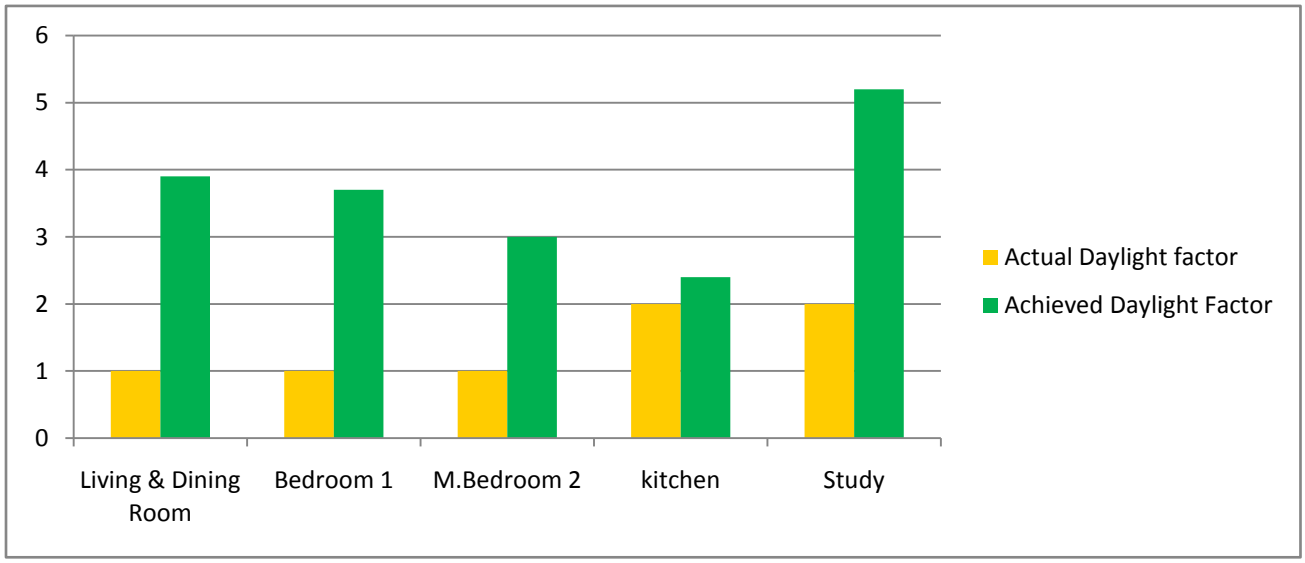
Sr. no	Typical floor flat	Actual Daylight factor	Achieved Daylight Factor
1	Living/Dining Room	1	2.0
2	Bedroom 1	1	3.3
3	M.Bedroom 2	1	2.9
4	Kitchen	2	3.3



As per the analysis, with the given building specification the building is achieving fairly high day light in all regularly occupied spaces.

Type 2- 2 BHK

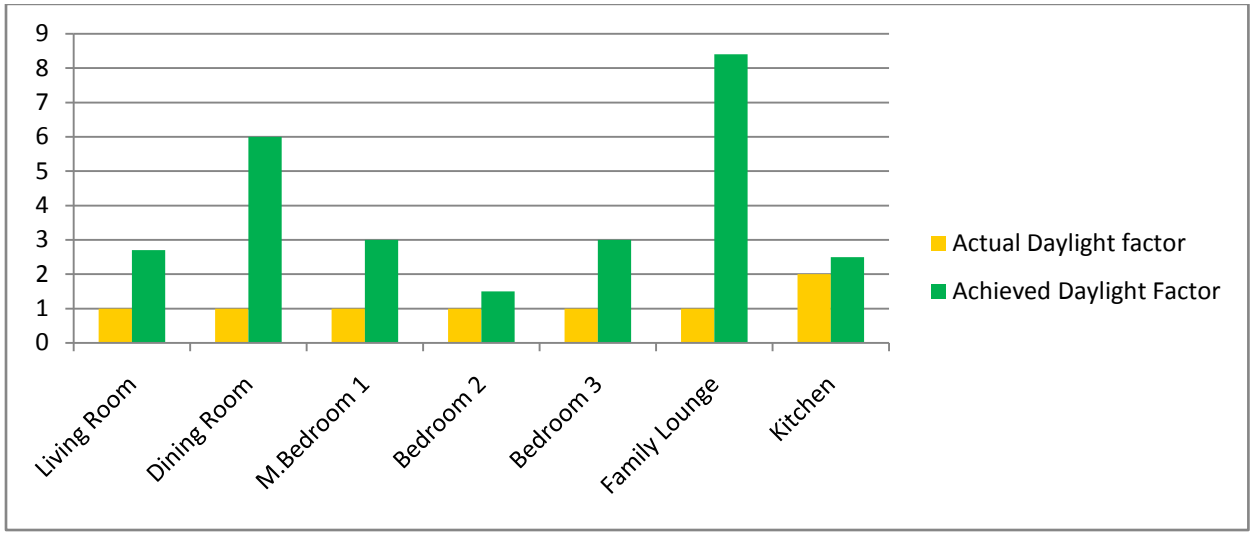
Sr. no	Typical floor flat	Actual Daylight factor	Achieved Daylight Factor
1	Living & Dining Room	1	3.9
2	Bedroom 1	1	3.7
3	M.Bedroom 2	1	3.0
4	kitchen	2	2.4
5	Study	2	5.2



As per the analysis, with the given building specification, the building is achieving fairly high day light in regularly occupied areas.

Type 3- 3BHK

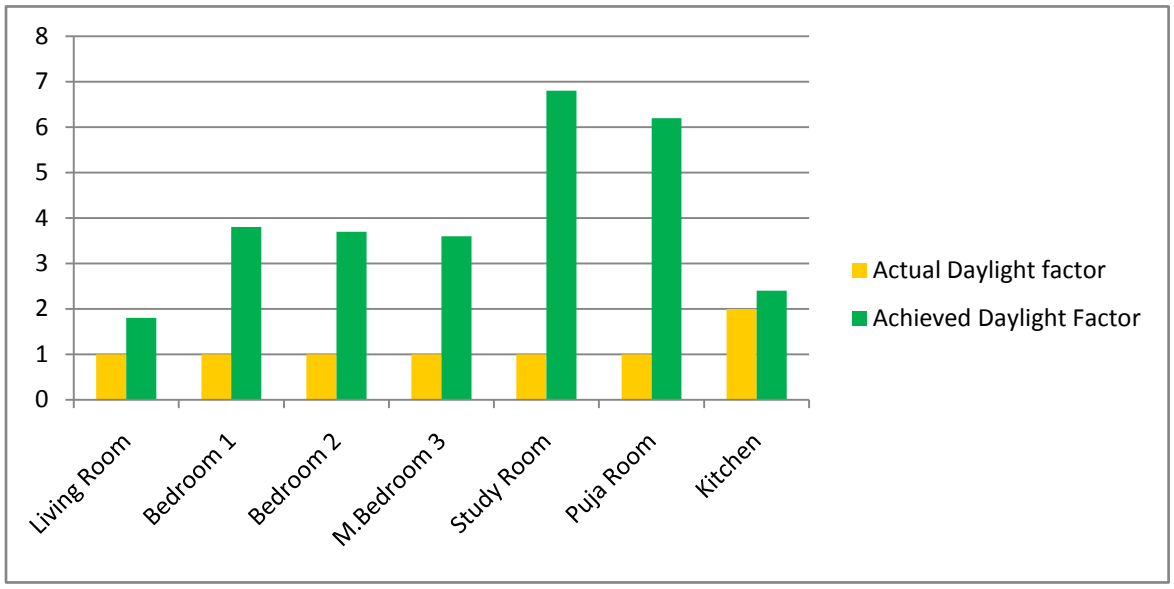
Sr. no	Typical floor flat	Actual Daylight factor	Achieved Daylight Factor
1	Living Room	1	2.7
2	Dining Room	1	6.0
3	M.Bedroom 1	1	3.0
4	Bedroom 2	1	1.5
5	Bedroom 3	1	3.0
6	Family Lounge	1	8.4
7	Kitchen	2	2.5



As per the analysis, with the given building specification, the building is achieving fairly high day light in regularly occupied areas.

Type 4- 3 BHK

Sr. no	Typical floor flat	Actual Daylight factor	Achieved Daylight Factor
1	Living Room	1	1.8
2	Bedroom 1	1	3.8
3	Bedroom 2	1	3.7
4	M.Bedroom 3	1	3.6
5	Study Room	1	6.8
6	Puja Room	1	6.2
7	Kitchen	2	2.4

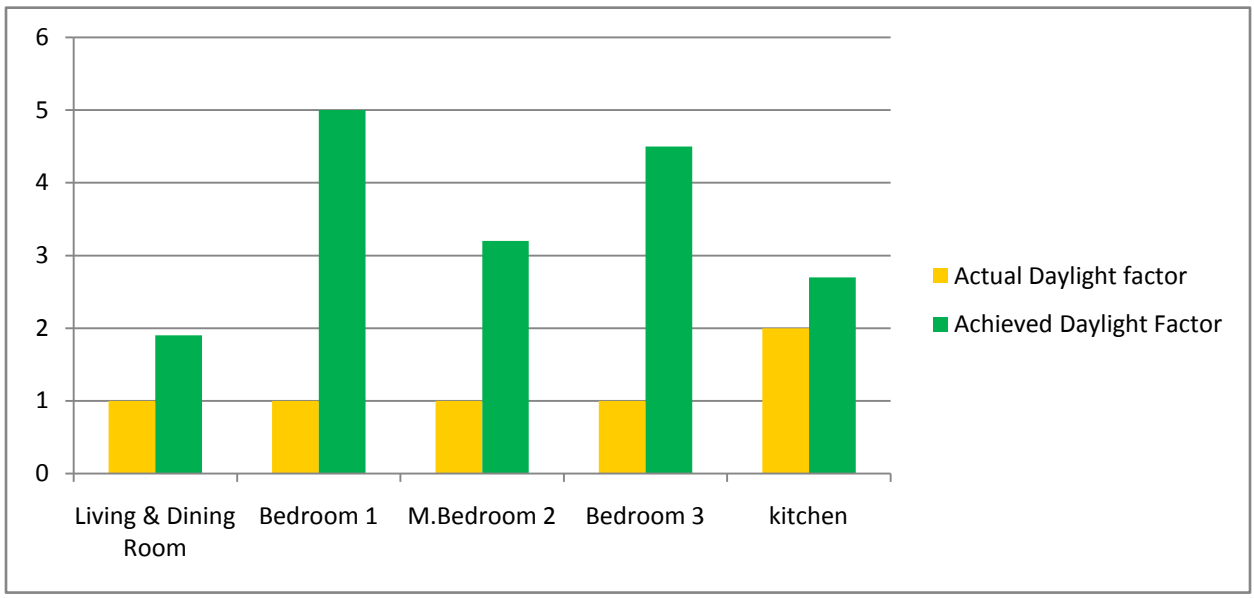


As per the analysis, with the given building specification, the living/kitchen and bedroom are achieving fairly high day light in all rooms.

Tower 20,24,25

Type 1-3 BHK

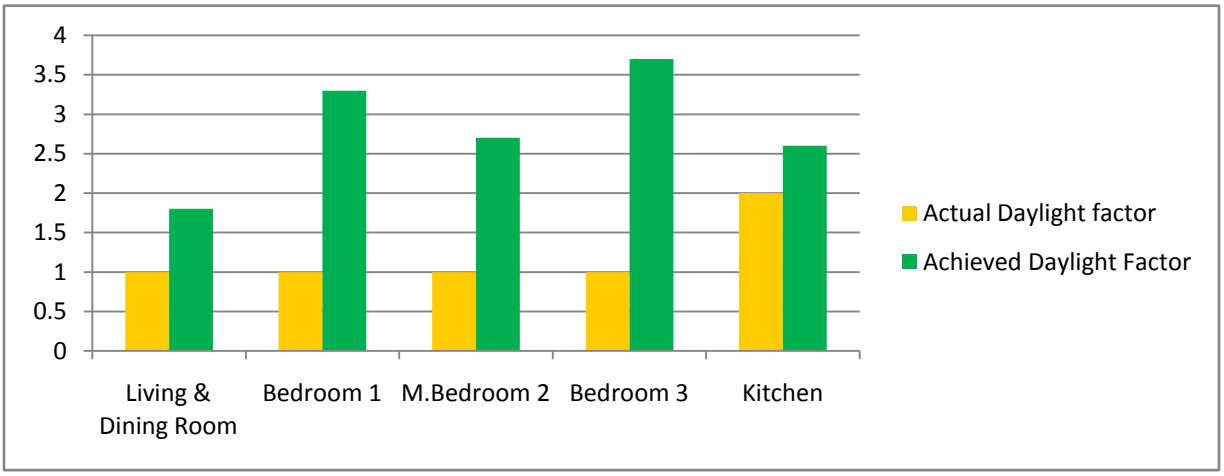
Sr. no	Typical floor flat	Actual Daylight factor	Achieved Daylight Factor
1	Living & Dining Room	1	1.9
2	Bedroom 1	1	5.0
3	M.Bedroom 2	1	3.2
4	Bedroom 3	1	4.5
5	kitchen	2	2.7



As per the analysis, with the given building specification, the rooms is achieving fairly high day light in all regularly occupied spaces.

Type 2- 3BHK

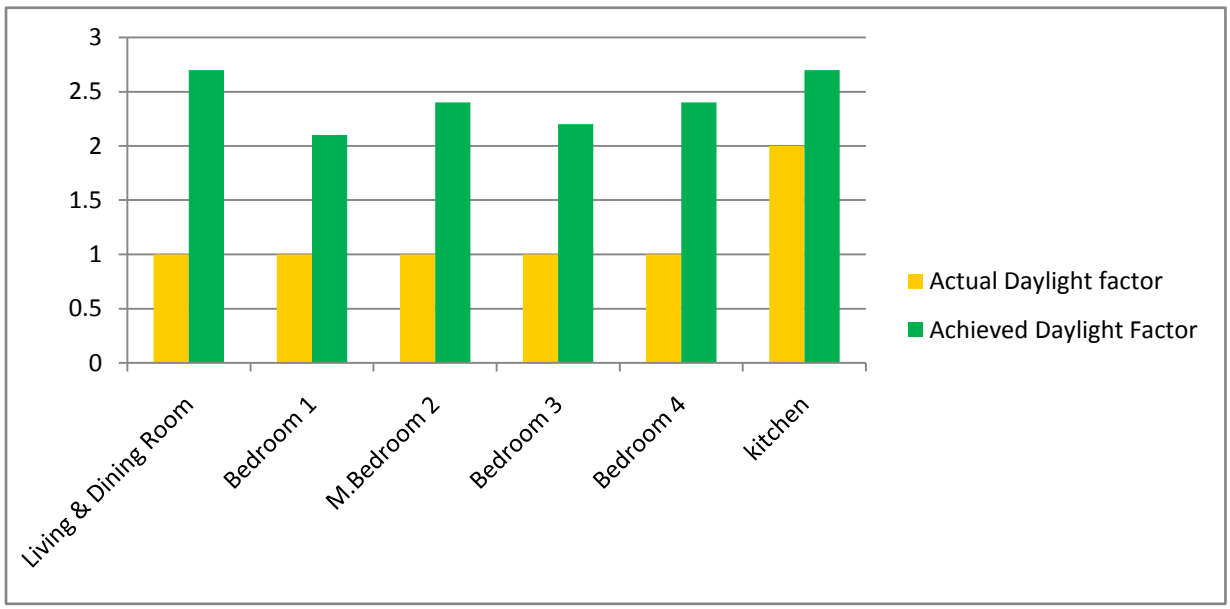
Sr. no	Typical floor flat	Actual Daylight factor	Achieved Daylight Factor
1	Living & Dining Room	1	1.8
2	Bedroom 1	1	3.3
3	M.Bedroom 2	1	2.7
4	Bedroom 3	1	3.7
5	Kitchen	2	2.6



As per the analysis, with the given building specification, the rooms is achieving fairly high day light in all regularly occupied spaces.

Type 3- 4BHK (Duplex flat)

Sr. no	Typical floor flat	Actual Daylight factor	Achieved Daylight Factor
1	Living & Dining Room	1	2.7
2	Bedroom 1	1	2.1
3	M.Bedroom 2	1	2.4
4	Bedroom 3	1	2.2
5	Bedroom 4	1	2.4
6	kitchen	2	2.7

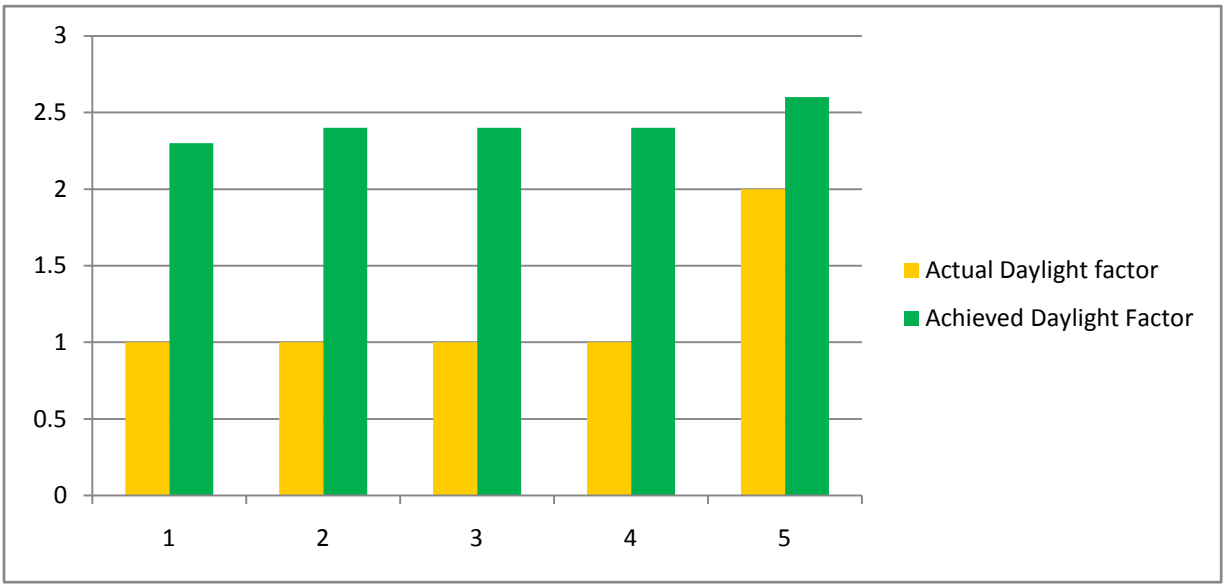


As per the analysis, with the given building specification, the rooms is achieving fairly high day light in all regularly occupied spaces.

Tower 26

Type 1- 3BHK

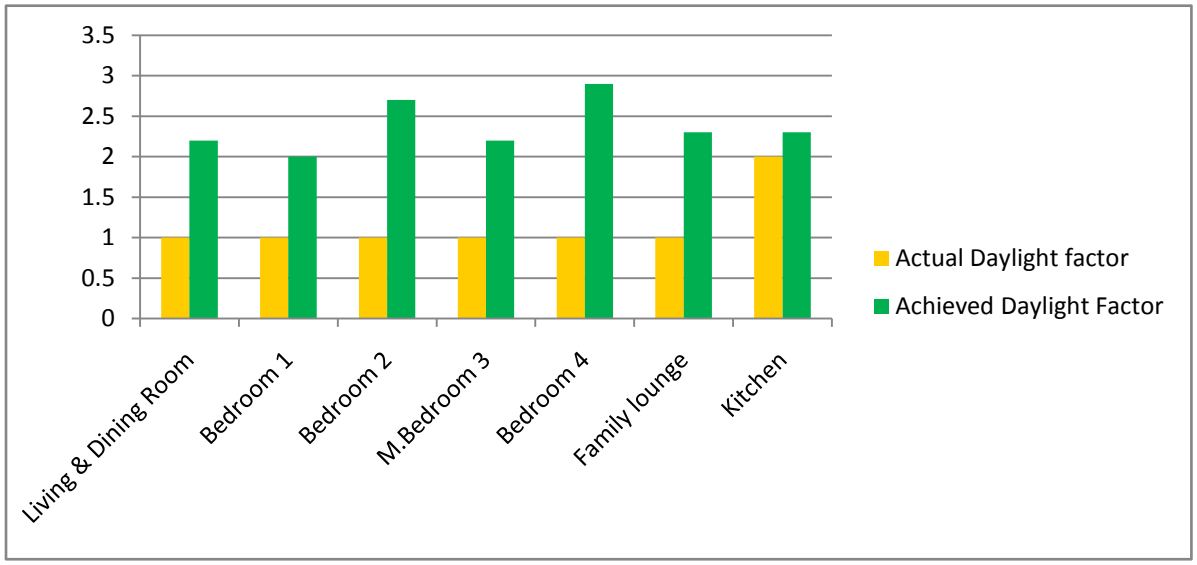
Sr. no	Typical floor flat	Actual Daylight factor	Achieved Daylight Factor
1	Living & Dining Room	1	2.3
2	Bedroom 1	1	2.4
3	M.Bedroom 2	1	2.4
4	Bedroom 3	1	2.4
5	kitchen	2	2.6



As per the analysis, with the given building specification, the rooms is achieving fairly high day light in all regularly occupied spaces.

Type 2- 4BHK

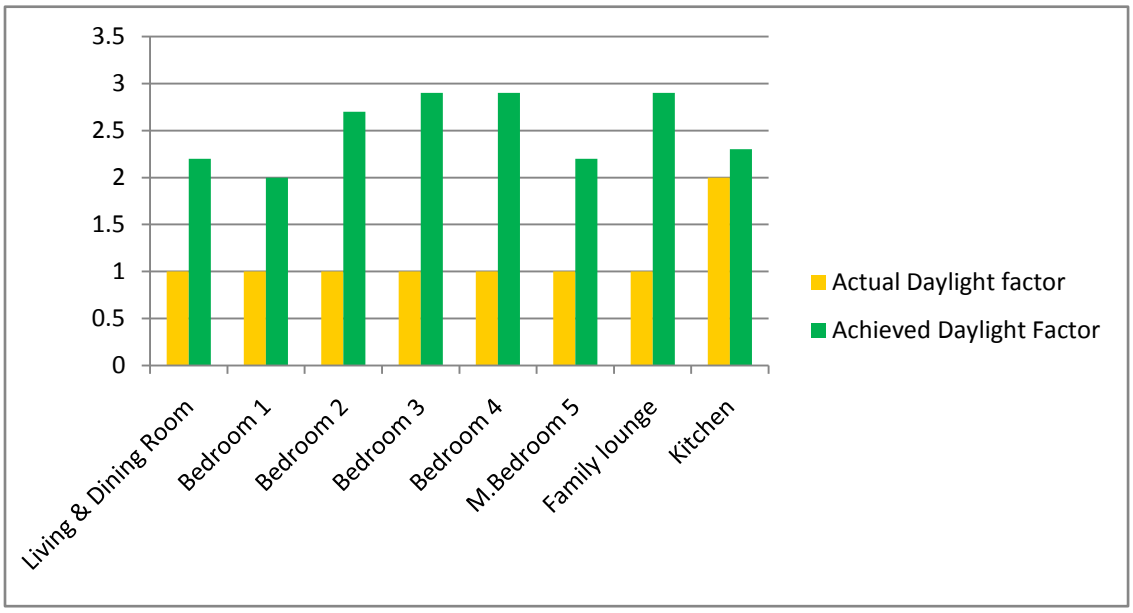
Sr. no	Typical floor flat	Actual Daylight factor	Achieved Daylight Factor
1	Living & Dining Room	1	2.2
2	Bedroom 1	1	2.0
3	Bedroom 2	1	2.7
4	M.Bedroom 3	1	2.2
5	Bedroom 4	1	2.9
6	Family lounge	1	2.3
7	Kitchen	2	2.3



As per the analysis, with the given building specification, the rooms is achieving fairly high day light in all regularly occupied spaces.

Type 3- 5BHK

Sr. no	Typical floor flat	Actual Daylight factor	Achieved Daylight Factor
1	Living & Dining Room	1	2.2
2	Bedroom 1	1	2.0
3	Bedroom 2	1	2.7
4	Bedroom 3	1	2.9
5	Bedroom 4	1	2.9
6	M.Bedroom 5	1	2.2
7	Family lounge	1	2.9
8	Kitchen	2	2.3

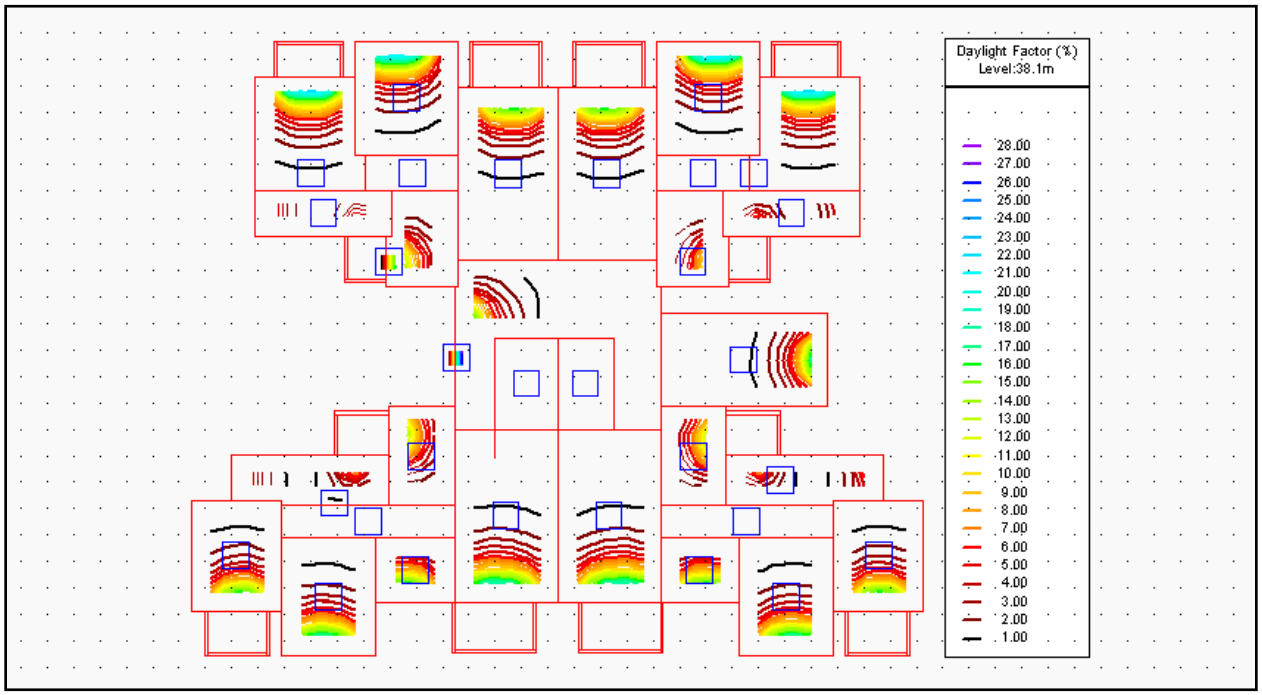


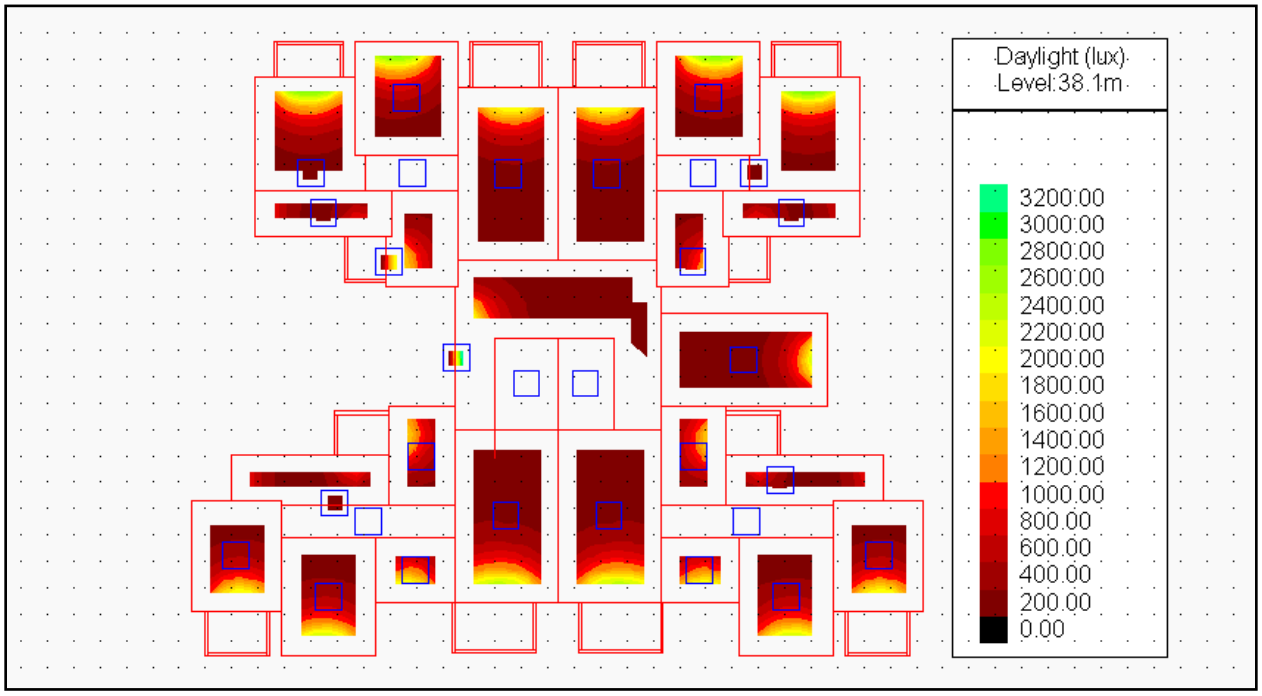
As per the analysis, with the given building specification, the rooms is achieving fairly high day light in all regularly occupied spaces.

Thereby, the project intends to ensure the connectivity between the interior and the exterior environment by providing the adequate daylighting.

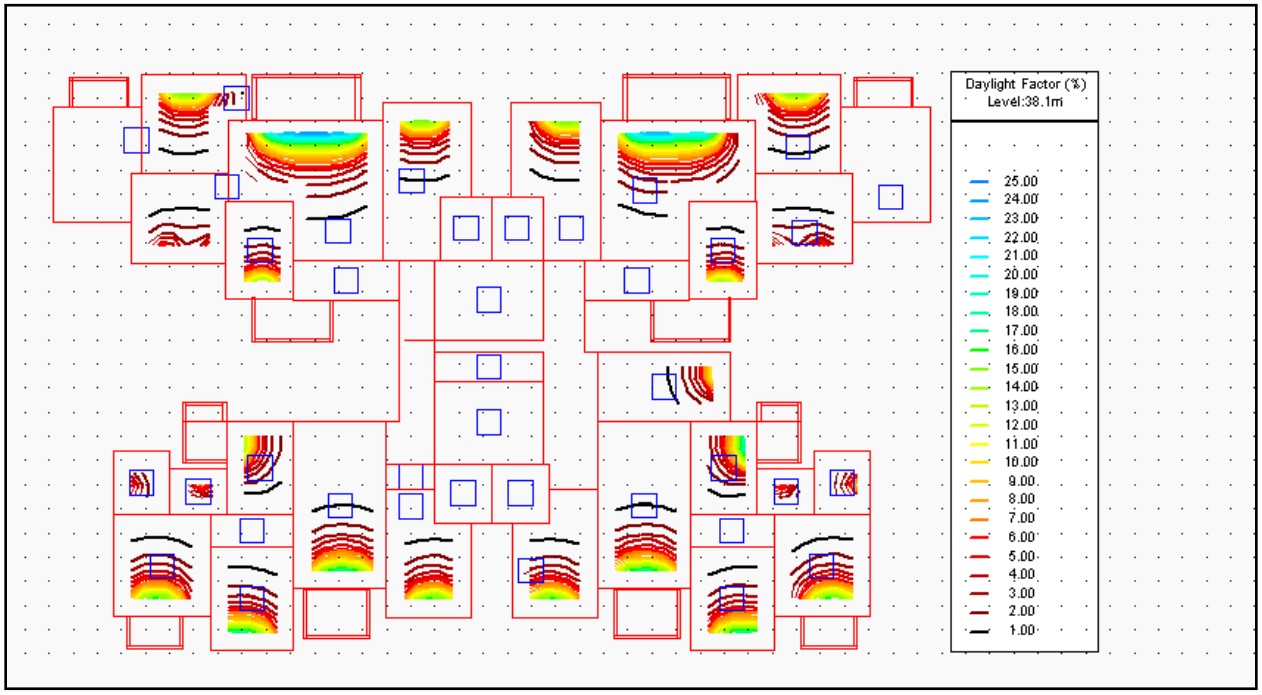
Daylight Graphical Analysis with VLT 62%

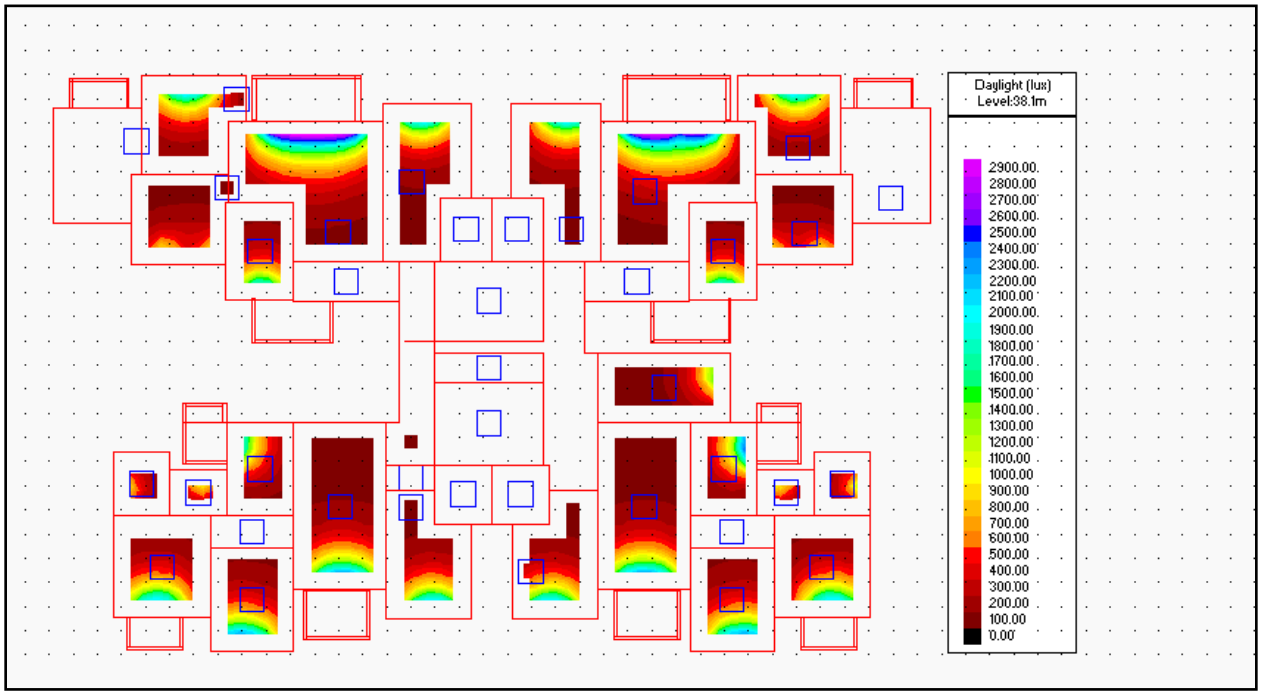
Tower 21, 22, 23- Typical floor plan



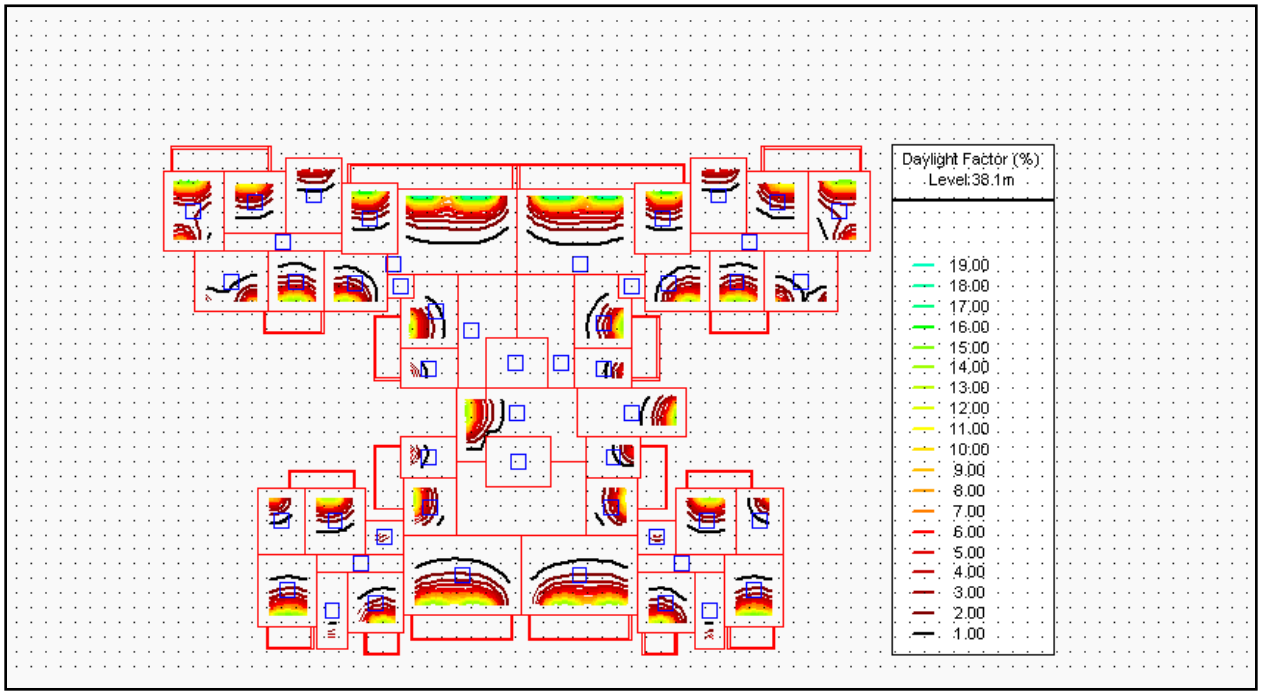


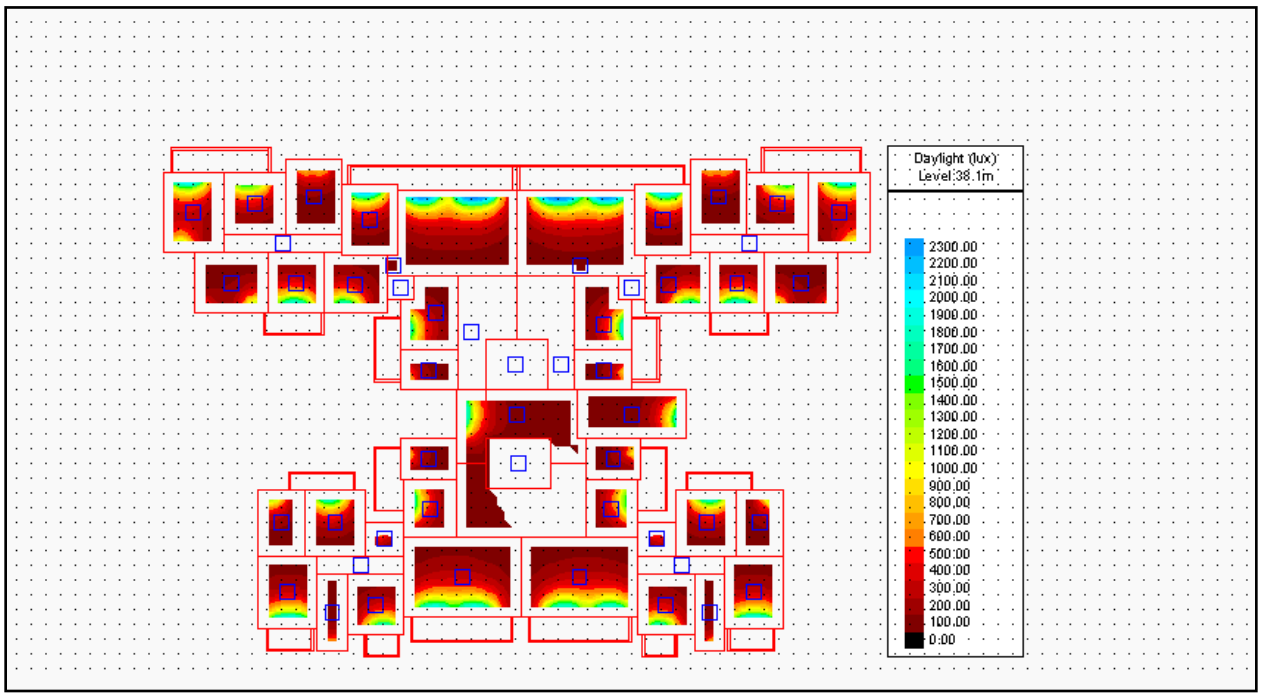
Tower 20, 24, 25- Typical floor plan





Tower 26- Typical floor plan





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Energy -Analysis, Sun Path & Daylight Report

Central Park Belgravia-I Project

2013

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ENERGY ANALYSIS METHODOLOGY

The Proposed Building has been evaluated on the basis of the methodology outlined in ECBC Standard-**Whole Building Performance Method.**

Whole building energy simulation analysis is used to predict the annual energy performance of a building design. The analysis is carried out by first developing a detailed building energy simulation model. The simulation programme is then used to test the thermal response & to calculate the energy use of the building model using a weather data file to capture the climatic impact on the building. This type of analysis is referred as Whole Building Performance (WBP) Method. Whole building energy simulation is the most sophisticated way of analyzing the impact of energy efficiency measures in an integrated manner.

IES <VE> 2012 simulation tool has been used for modelling the baseline and the proposed building.

As specified by the WBP Method, the Proposed and Budget Buildings are identical in terms of:

- Design Model
- Simulation software
- Thermal Blocks
- Weather data (Gurgaon, Delhi, India)
- Occupancies

STANDARADS AND SOFTWARE TOOLS USED FOR ANALYSIS

Standard used for the Analysis

Standard used for the analysis is ECBC (Energy Conservation Building Code). The purpose of ECBC is to provide minimum requirements for energy efficient design & construction of buildings & their systems. Estimates based on computer simulation models indicate that ECBC complaint buildings can use 40-60 % less energy than conventional buildings. It is estimated that a nationwide mandatory enforcement of the ECBC will yield a annual savings of approximately 1.7 billion kWh.

ECBC was developed as a first step towards promoting energy efficiency in the building sector. The ECBC user Guide (also referred to as “The Guide” in this document) has been developed to provide detailed guidance to building owners, designers, engineers, builders, energy consultants, and others on how to comply with the code. It provides expanded interpretation, examples, supplementary information to assist in applying ECBC during the design and construction of new buildings as well as additions and alterations to existing buildings.

This Guide can also be used as a document by “authorities having jurisdiction” in the enforcement of code once it is made mandatory. The guide follows the nomenclature of the code. It is written both as a reference and as a instruction guide, and can be help- full to anyone who is directly or in- directly involved in the construction and design and construction of ECBC-compliant buildings.

The code is applicable to the buildings or building complexes that have a connected load of 500 kW or greater or a contract demand of 600 kVA or greater. This code would become mandatory as and when it is notified by the Central and the State government in the official Gazette (P) of S14 or clause (a) of S 15 of the energy conservation act 2001 (52 of 2001)

This code is applicable to the following Building System-

- Building envelopes expect for unconditioned storage spaces or warehouse
- Mechanical System and equipment, including heating, ventilation and air conditioning, (HVAC)
- Service hot water heating
- Interior and exterior lighting
- Electrical power and motors

This code is not- applicable to the following Building System-

- Buildings that do not use either electricity or fossil- fuel
- Equipment and portions of building system that use energy primarily for manufacturing process

Software used for Analysis

Energy Modelling & Simulation is a holistic approach to achieve energy savings in a building. The process of energy modelling is being done in the following phases:

- 3 Dimensional Modelling
- Base Building Energy Consumption Results
- Development of Energy Efficiency Measures
- Design Building Energy Consumption Results

Software used for the Project is IES. IES <VE>

Integrated Environmental Solutions (IES) is a world leading provider of integrated performance analysis software and consulting services for sustainable building design. Comparative analysis at the early stage, using ballpark figures, is useful to check feasibility, quantify and inform design team decision making. It can help with those all important master planning, orientation, massing and form decisions; justifying choices and differentiating project proposals.

Detailed analysis provides more accurate figures and results for system sizing, fine tuning, compliance, costing and documentation. Results and analysis can be presented to clients and building control, justifying design decisions and offering you competitive advantage.

IES provides a wide range of different analysis options and capabilities designed to give feedback quickly and efficiently at the relevant level. All are powered by the sophisticated <Virtual Environment> performance modelling engine that undertakes detailed simulations at hourly or smaller increments as necessary.

Energy Simulation Software Salient Features

- Undertake energy performance snapshots to assess impact of design decisions
- Develop building loads and impact of conservation strategies
- Develop carbon footprint reduction strategies
- Assess passive/hybrid/renewable strategies
- Assess the impact of daylight and solar
- Incorporate bulk airflow, ventilation and indoor air quality into the equation
- Assess compliance with a range of worldwide regulations and voluntary codes

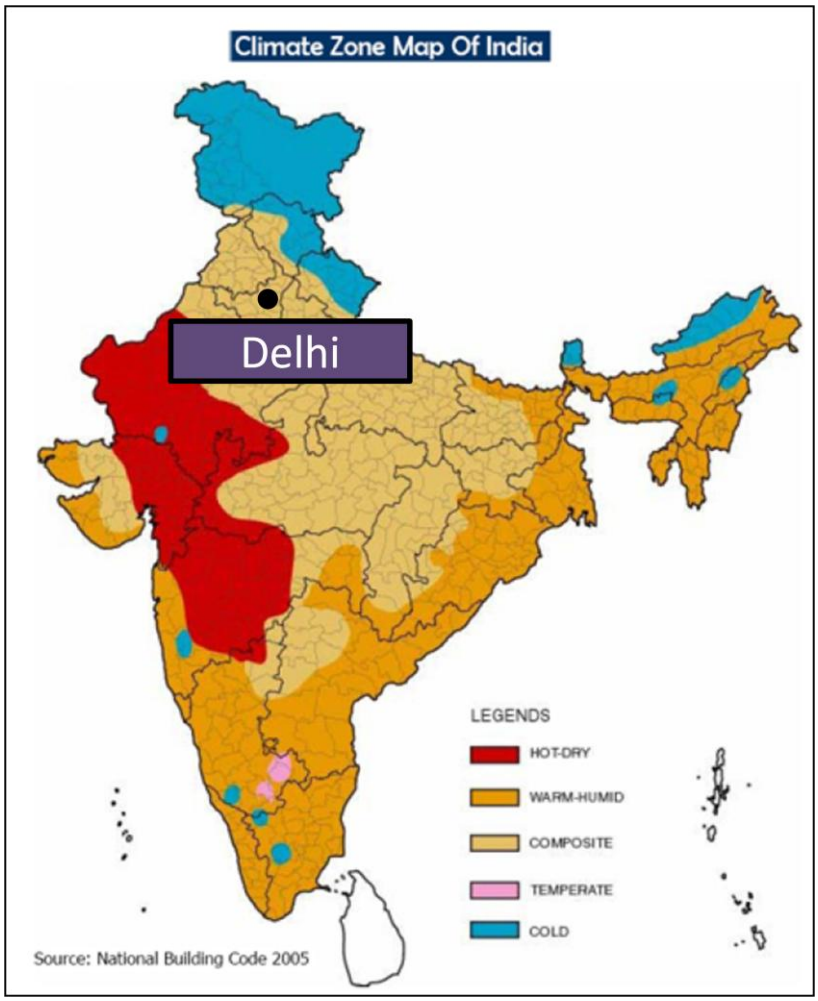
We have used the following modules of IES for completion of this report:

- Model IT – 3D building modeller
- Sun Cast – Solar shading analysis
- FlucsDL– Day Light analysis
- ApacheSim – Thermal analysis

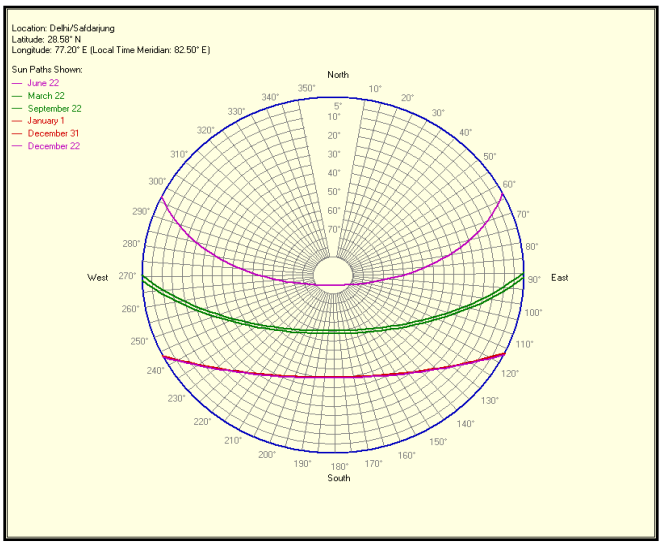
PROJECT TECHNICAL DESIGN SUMMARY

Climatology

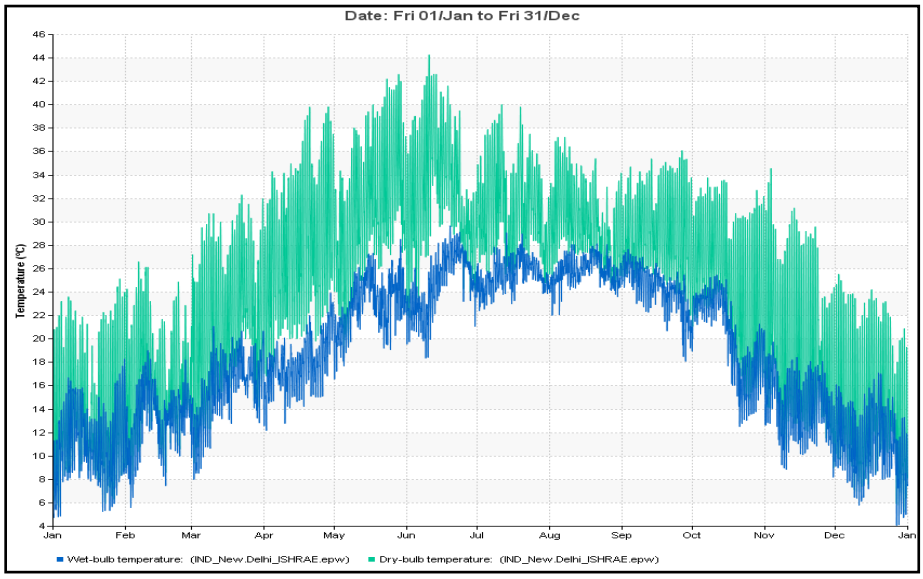
India possesses large variety of climates, which broadly categorizes into five regions. Project is located in Gurgaon, Delhi. According to ECBC User Guide, Table 13.2, Climatic Zones of Major Indian Cities, Project follows Composite climate as shown in the adjoining image



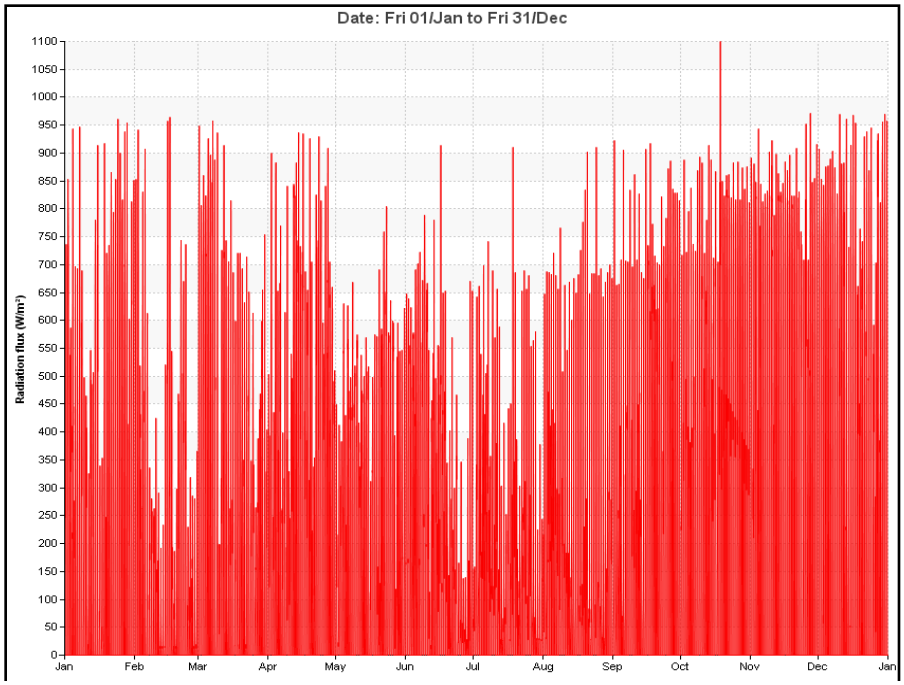
Sun Path Diagram



Minimum and Maximum Temperatures at Gurgaon



Dry Bulb & Wet bulb Variation



Radiation Graph

Energy Input Parameters

Following is the summary of input parameters of Base case as per ECBC & Proposed case as per design of the Project:

Base & Proposed Case Parameters

BASE & PROPOSED CASE PARAMETERS		
Model Input Parameter	**Proposed Design Input**	**Base case Design Input**
Exterior Wall Construction	RCC walls, With Insulated paint. U value: 1.7855W/ m^2 K	U Value of overall assembly 0.440 W/ m^2 K. Minimum R value of insulation alone 2.10 m2 K/W
Roof Construction	Standard Roof with SRI paint U value 0.605 W/m2 K	U Value of overall assembly 0.409 W/ m^2 K. Minimum R value of insulation alone 2.1 m2 K/W
Fenestration U Value	DGU U value-1.77 W/ m^2K	3.30 W/ m^2 K
Fenestration SHGC	0.36	0.20
Fenestration VLT	62%	Minimum VLT 27 %
LPD (W/m2)	Space by Space Method for Lighting Power density calculation considered	
EPD (W/m2)	Space wise Equipment Power density calculated and provided in section ….	

Envelope Analysis

Exterior Wall Parameters

Exterior Wall (outer to Inner)	Thickness (m)	k-Value (w/m ^{0}K)	Density, kg/m^3	U-value w/m^{20}k (k/Thickness)	R-value (1/U)
POP inner side	0.009	0.16	801	17.77778	0.05625
Cement Plaster	0.012	0.5	1300	41.66667	0.024
Common Brick	0.23	0.84	1700	3.652174	0.27381
Cement Plaster outer side	0.018	0.5	1300	27.77778	0.036
Overall exterior wall value	**0.4**			**1.785**	**0.097515**

Roof Assembly Parameters

Roof Assembly	Thickness (m)	k-Value (w/m ^{0}K)	Density, kg/m^3	U-value w/m^{20}k (k/Thickness)	R-value (1/U)
Brick bat coba	0.125	0.19	600	1.52	0.658
Cement concrete slab	0.125	0.16	500	1.28	0.781
Cement plaster	0.006	0.5	1300	83.33333	0.012
POP	0.009	0.16	801	17.77778	0.056
Overall exterior wall value	**0.435**			**0.607**	**0.377**

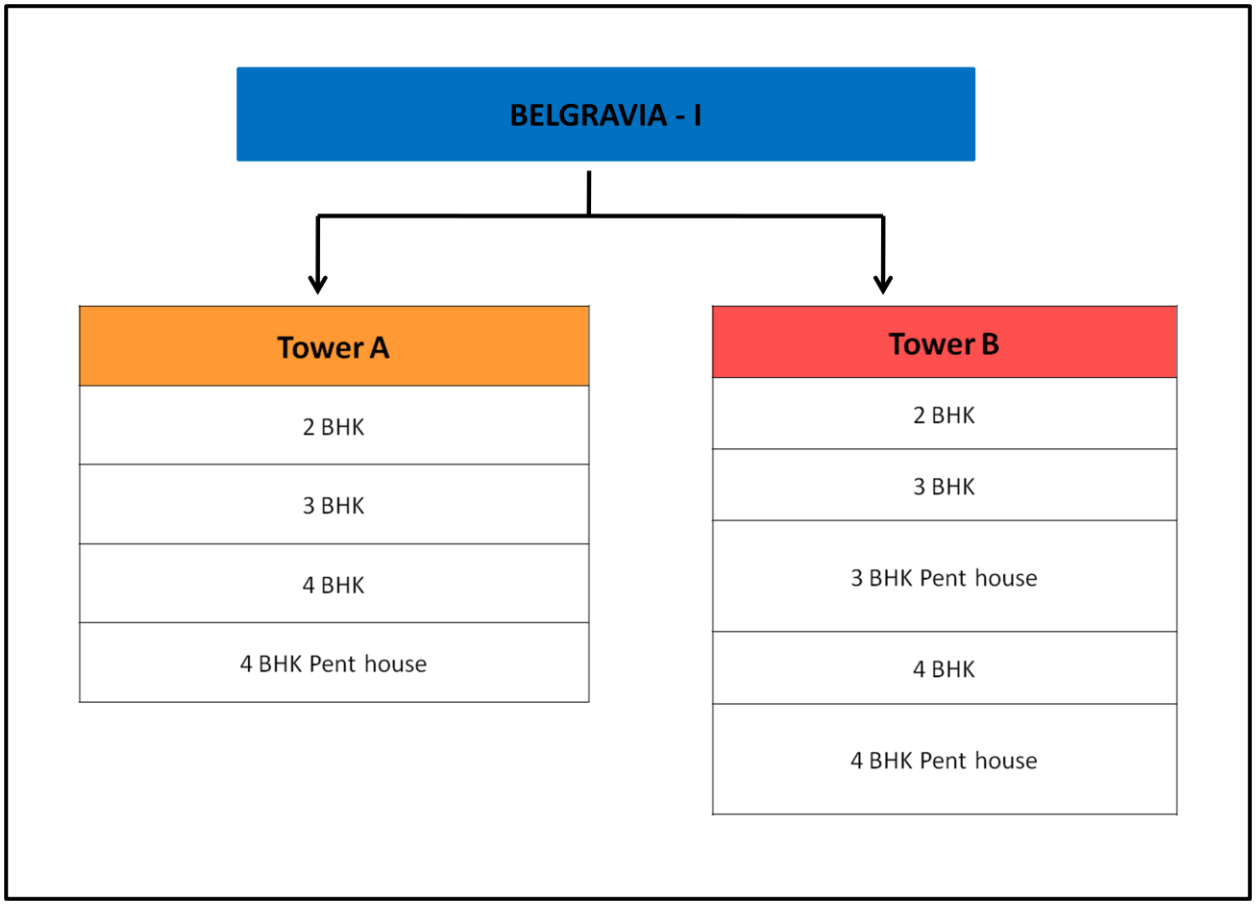
Lighting Analysis

LPD Calculation for Exterior & Interior

Lighting	Applicable Areas	Base case Lighting Power Density (LPD)	Design Lighting Power Density (LPD) 30% Reduction	Design Lighting Power Density (LPD) 20% Reduction
Interior Lighting **(for residential units)**	Individual dwelling unit, Apartments, Villas, Gated communities	5.00 W/m2	3.5 W/m2	4 W/m2
Exterior Lighting, excluding Parking Area (for residential & nonresidential units)	Landscaping, Façade, Street lighting, Pathways, Signage's, etc.,	2.5 W/m2	1.75 W/m2	2 W/m2
Common Area Lighting, excluding Parking Area (for residential & nonresidential units)	Corridors, Lobbies, Staircases, Terrace, etc.,	4.0 W/m2	2.8 W/m2	3.2 W/m2
Parking Area	Surface parking (covered & uncovered), Basement parking,	2.5 W/m2	1.75 W/m2	2 W/m2

- **The project must ensure that the interior, exterior, common and parking area lighting Power densities are reduced by at least 20% from the baseline values through 'building area method'**
- **For Lighting Power Density (LPD) Design case, 30% reduction is considered for analysis.**

BUILDING MAPPING

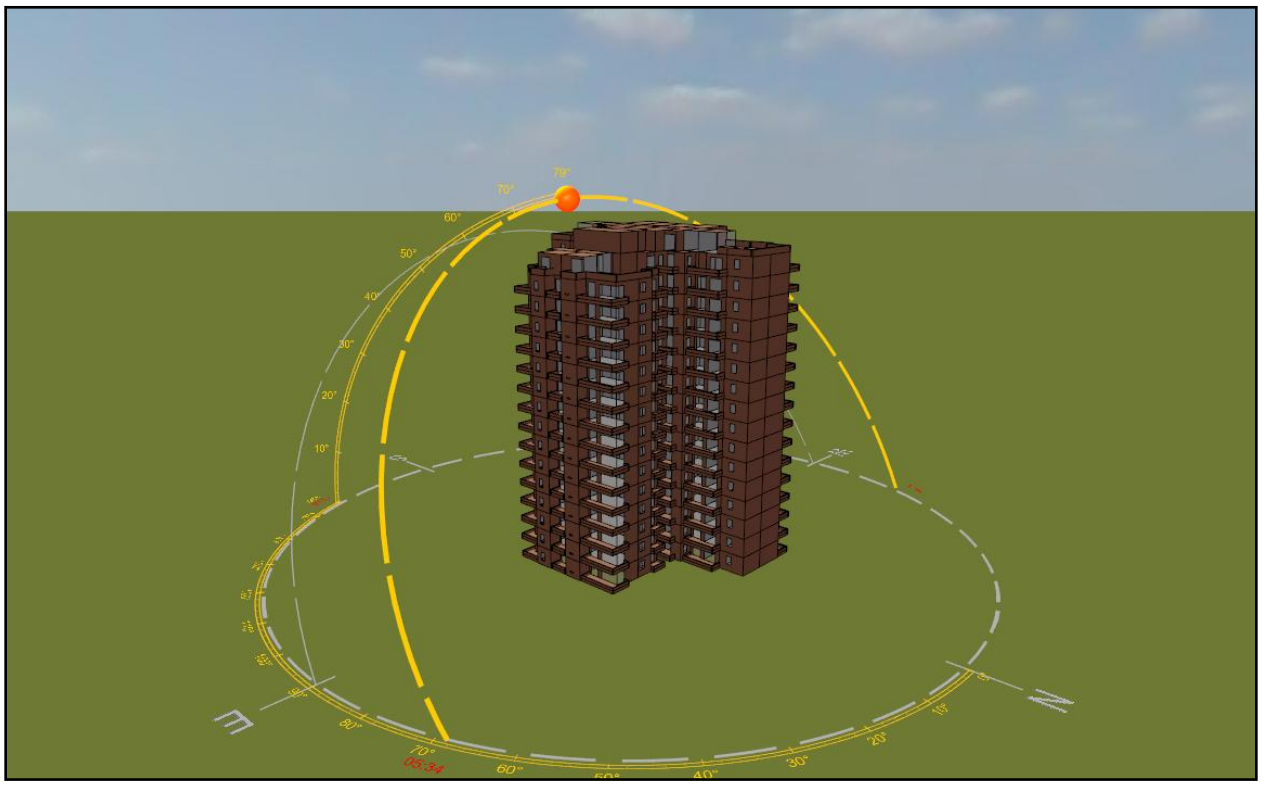


The table shown above is the summary of the Central park-Belgravia I project and we are considering residential areas for our analysis. We have considered the typical floors of Tower A & B for analysis.

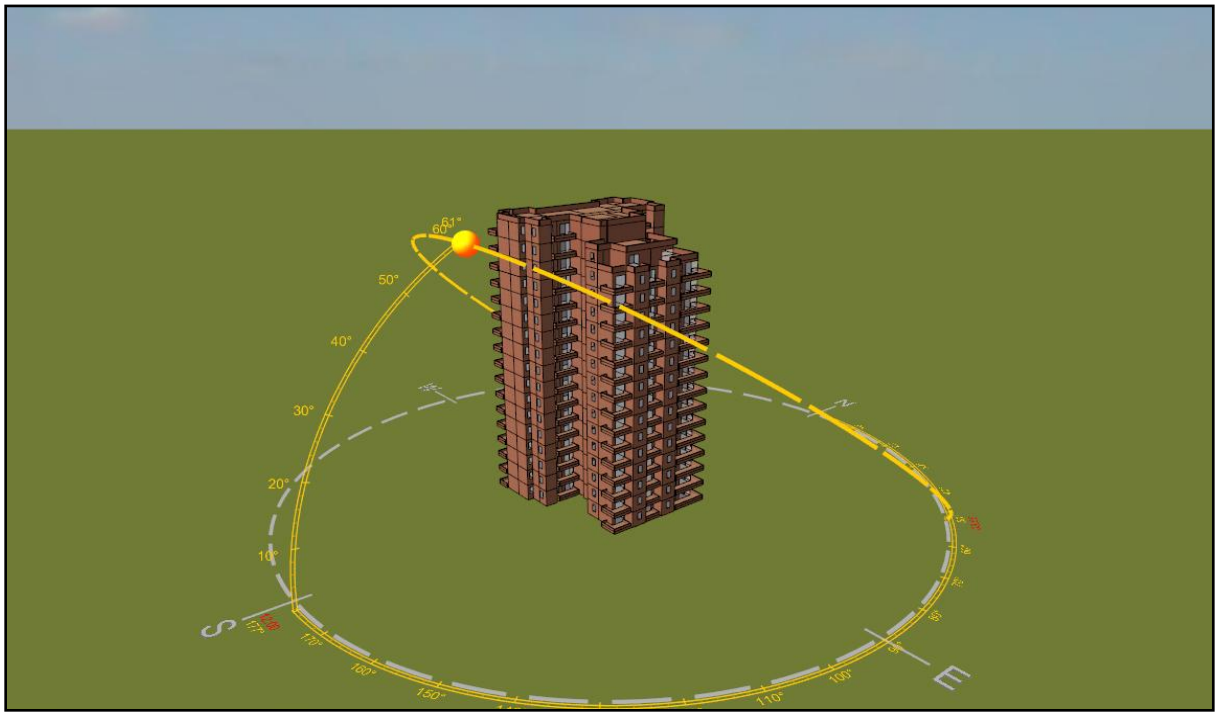
CENTRAL PARK-BELGRAVIA-I ANALYSIS

Energy & Day Light Analysis of Belgravia-I building

Tower A



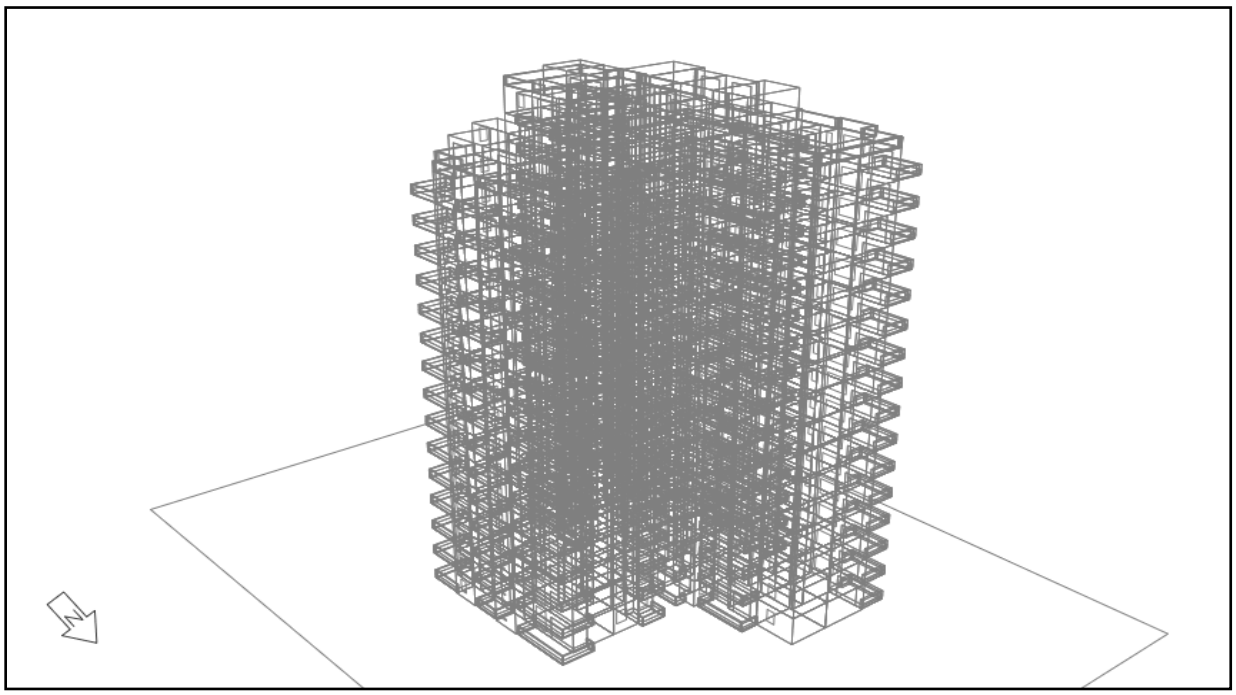
Tower B



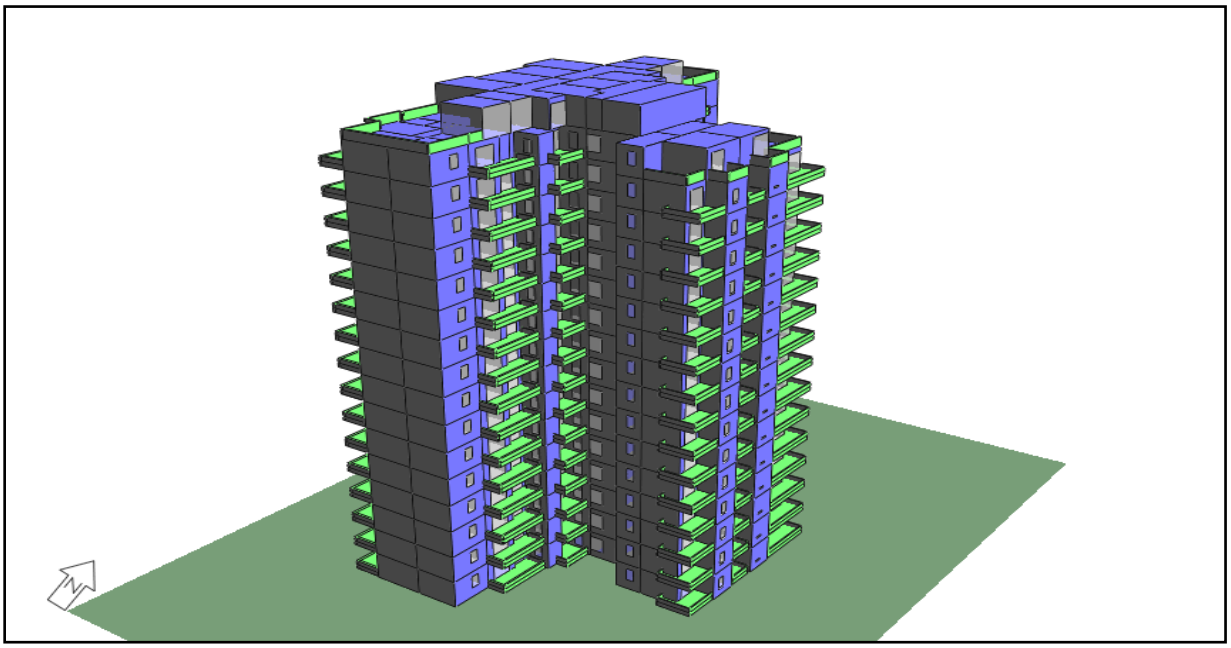
Sun Path Analysis: Energy & Daylighting

Energy Models

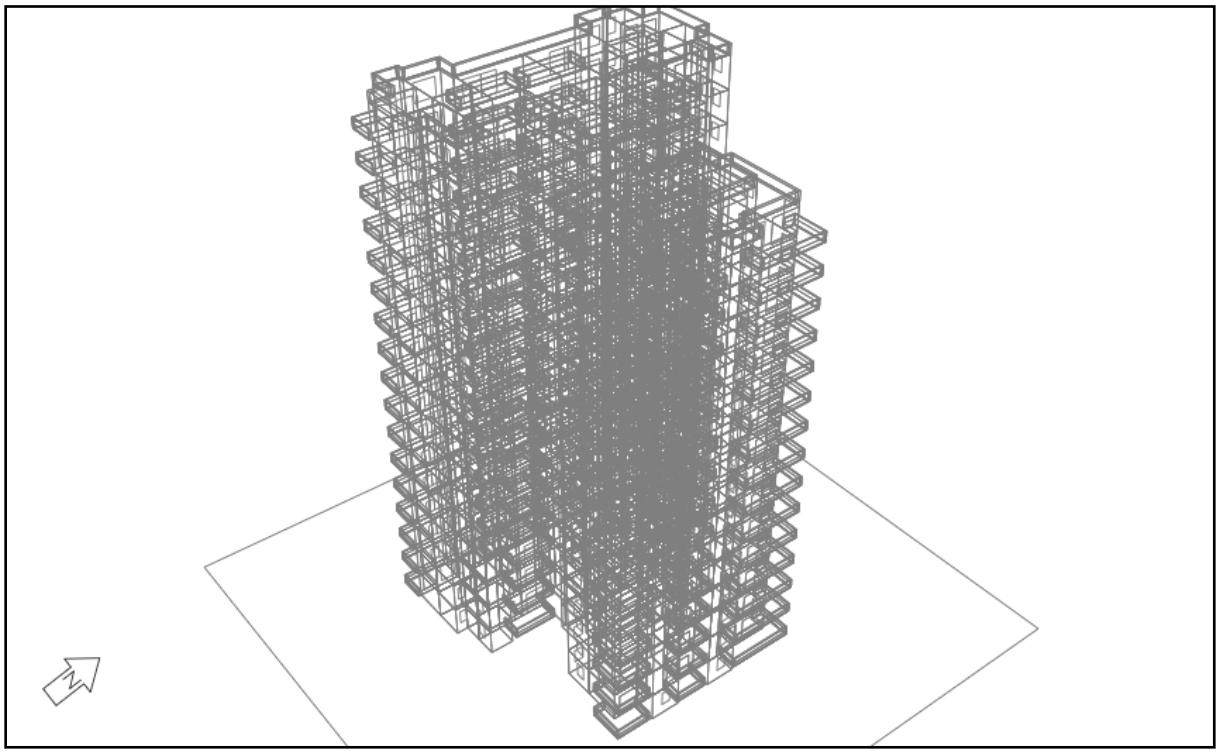
Envelope Design Model of The Tower A



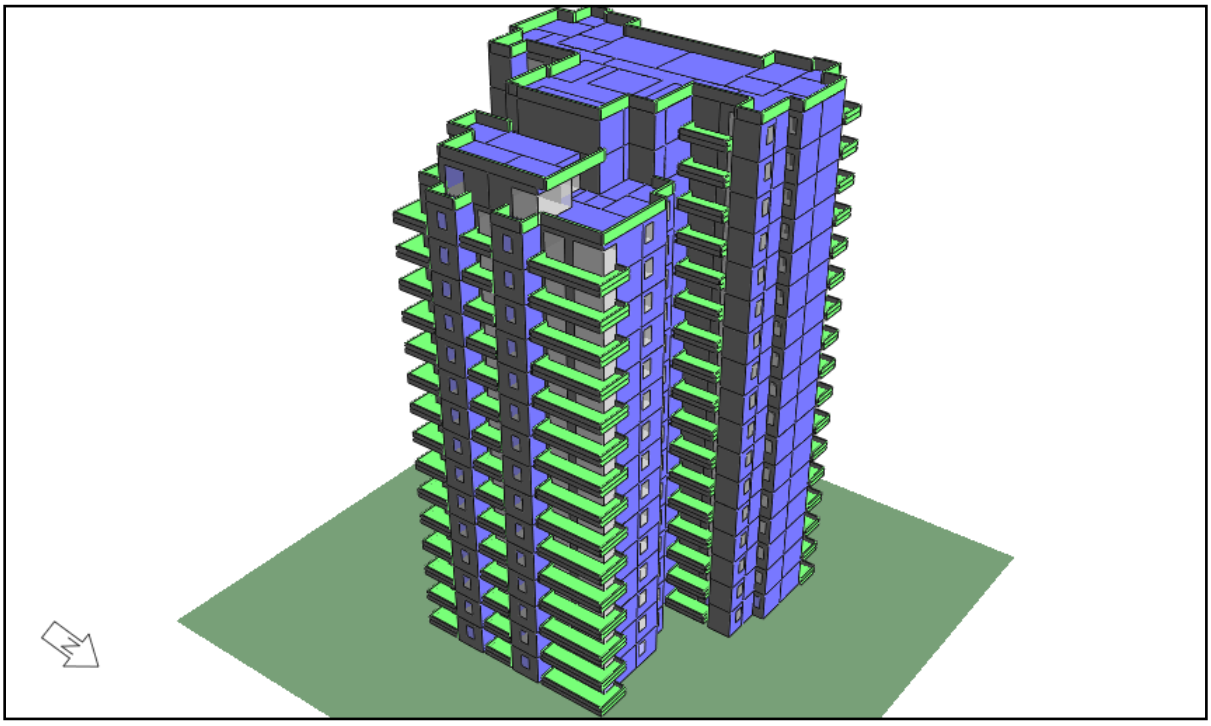
Energy Model Image of the Tower A



Envelope Design Model of The Tower B



Energy Model Image of the Tower B



Energy Performance Benchmarking

Design Case Energy Consumption

Month Date	Total lights energy (MWh)	Total equip energy (MWh)
Jan 01-31	43.6157	51.0279
Feb 01-28	39.3948	46.0898
Mar 01-31	43.6157	51.0279
Apr 01-30	42.2087	49.3819
May 01-31	43.6157	51.0279
Jun 01-30	42.2087	49.3819
Jul 01-31	43.6157	51.0279
Aug 01-31	43.6157	51.0279
Sep 01-30	42.2087	49.3819
Oct 01-31	43.6157	51.0279
Nov 01-30	42.2087	49.3819
Dec 01-31	43.6157	51.0279
Summed total	513.5395	600.8129

Base Case Energy Consumption

Month Date	Total lights energy (MWh)	Total equip energy (MWh)
Jan 01-31	62.3114	72.8971
Feb 01-28	56.2813	65.8425
Mar 01-31	62.3114	72.8971
Apr 01-30	60.3014	70.5456
May 01-31	62.3114	72.8971
Jun 01-30	60.3014	70.5456
Jul 01-31	62.3114	72.8971
Aug 01-31	62.3114	72.8971
Sep 01-30	60.3014	70.5456
Oct 01-31	62.3114	72.8971
Nov 01-30	60.3014	70.5456
Dec 01-31	62.3114	72.8971
Summed total	733.6669	858.305

Comparison between Design & Base Case

Alternative	Total lights energy (MWH)	Total equipments (MWH)
Base case	733.6669	858.305
Design case	513.5395	600.8129
Energy Cost Savings over Base case	**30%**	**30%**

Result Summary

- In Compared results of Design and Base case, **30%** saving are noticed (base on the 30% reduction in Lighting Power Densities; Refer Table on Pg No. 12)
- For additional efficiencies, Sensors are recommended for the non-regularly occupied spaces.

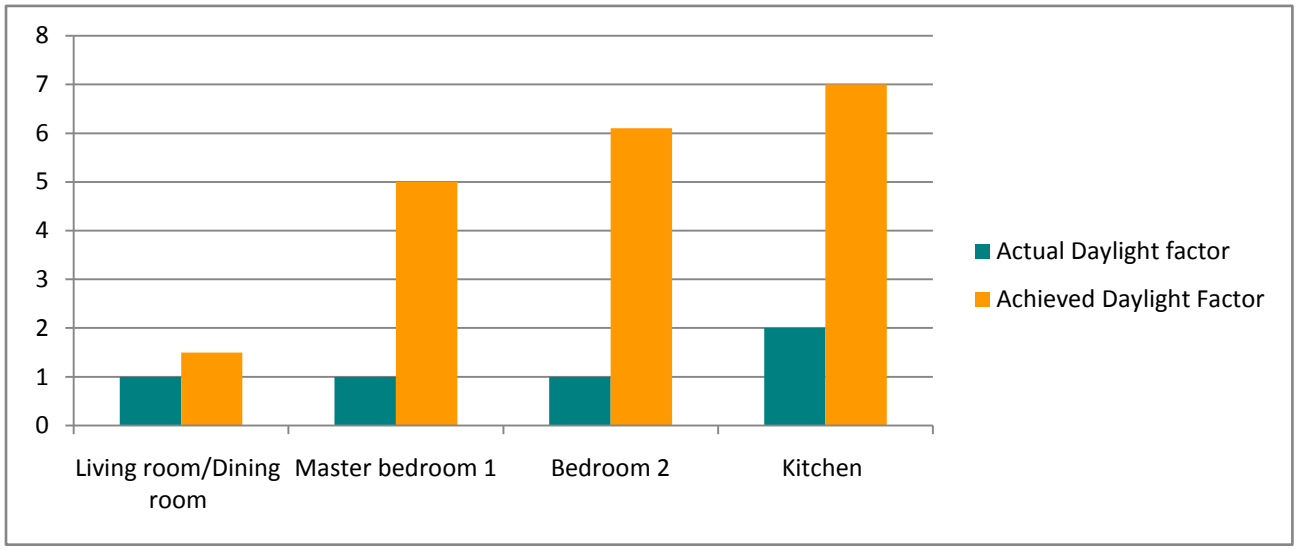
Daylight Analysis

Comparison between Design & LEED Requirement

Tower A and B

Type 1 -2BHK

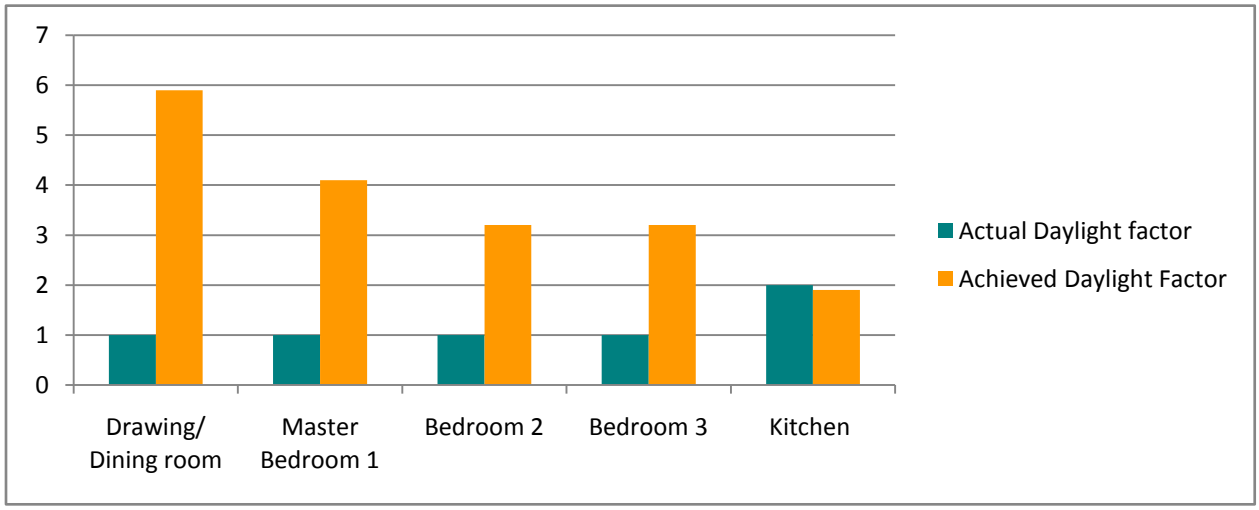
Sr. no	Typical floor flat	Actual Daylight factor	Achieved Daylight Factor
1	Living room/Dining room	1	1.5
2	Master bedroom 1	1	5.0
3	Bedroom 2	1	6.1
4	Kitchen	2	7.0



As per the analysis, with the given building specification the building is achieving fairly high day light in all regularly occupied spaces. Thereby, the project intends to ensure the connectivity between the interior and the exterior environment by providing the adequate daylighting.

Type 2- 3 BHK

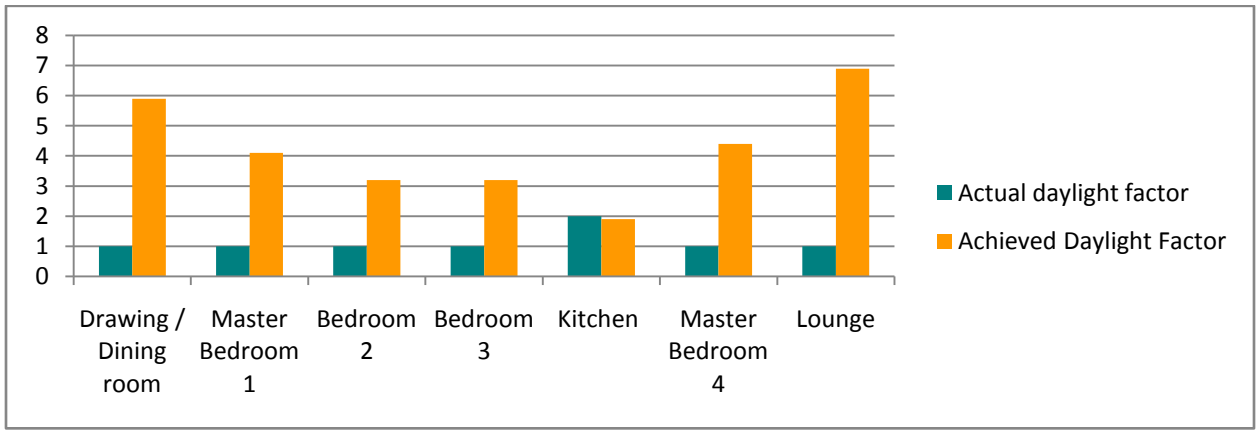
Sr. no	Typical floor flat	Actual Daylight factor	Achieved Daylight Factor
1	Drawing/ Dining room	1	5.9
2	Master Bedroom 1	1	4.1
3	Bedroom 2	1	3.2
4	Bedroom 3	1	3.2
5	Kitchen	2	1.9



As per the analysis, with the given building specification, the building is achieving fairly high day light in Bedroom and Drawing/dining room and less daylight is achieved in kitchen which is acceptable as per compliance.

Type 3- 4 BHK(Pent house)

Sr. no	Typical floor flat	Actual daylight factor	Achieved Daylight Factor
1	Drawing / Dining room	1	5.9
2	Master Bedroom 1	1	4.1
3	Bedroom 2	1	3.2
4	Bedroom 3	1	3.2
5	Kitchen	2	1.9
6	Master Bedroom 4	1	4.4
7	Lounge	1	6.9

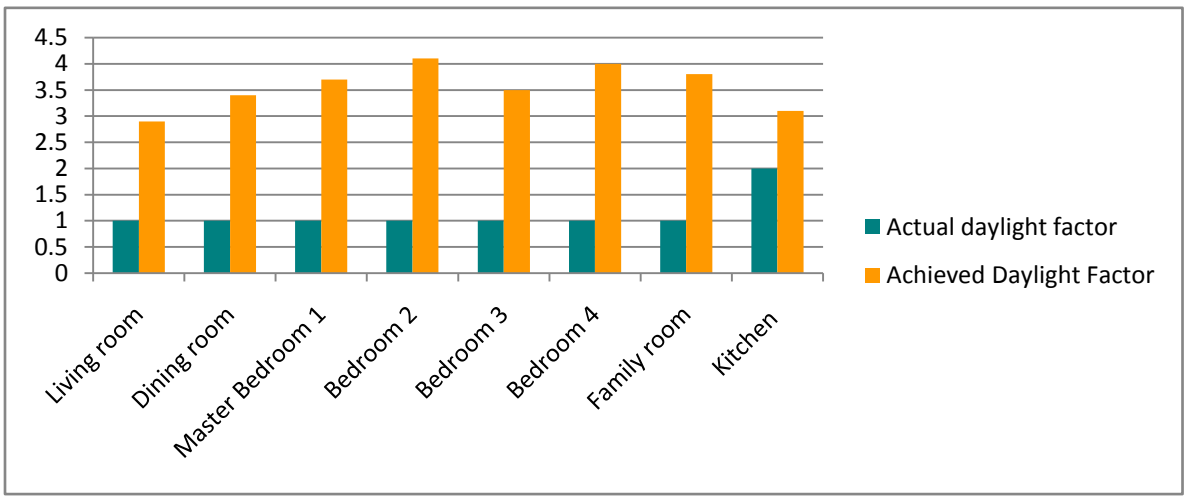


As per the analysis, with the given building specification, the building is achieving fairly high day light in Bedroom and Drawing/dining room and less daylight is achieved in kitchen which is acceptable as per compliance.

Tower A

Type 1- 4 BHK

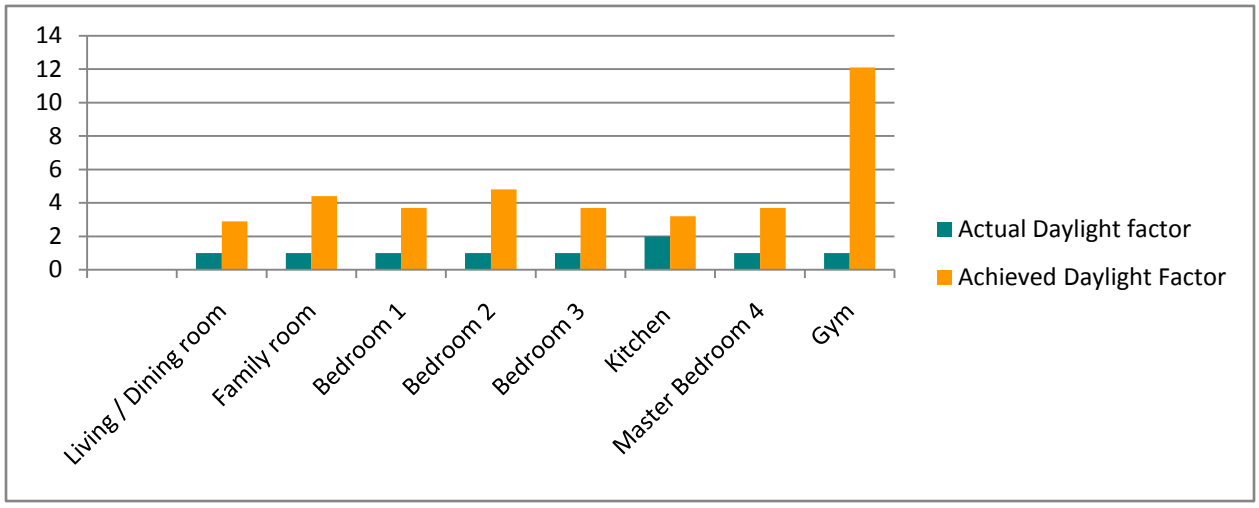
Sr. no	Typical floor flat	Actual daylight factor	Achieved Daylight Factor
1	Living room	1	2.9
2	Dining room	1	3.4
3	Master Bedroom 1	1	3.7
4	Bedroom 2	1	4.1
5	Bedroom 3	1	3.5
6	Bedroom 4	1	4.0
7	Family room	1	3.8
8	Kitchen	2	3.1



As per the analysis, with the given building specification, the living/kitchen and bedroom are achieving fairly high day light in all rooms.

Type 2- 4 BHK(Pent house)

Sr. no	Typical floor flat	Actual daylight factor	Achieved Daylight Factor
1	Living / Dining room	1	2.9
2	Family room	1	4.4
3	Bedroom 1	1	3.7
4	Bedroom 2	1	4.8
5	Bedroom 3	1	3.7
6	Kitchen	2	3.2
7	Master Bedroom 4	1	3.7
8	Gym	1	12.1

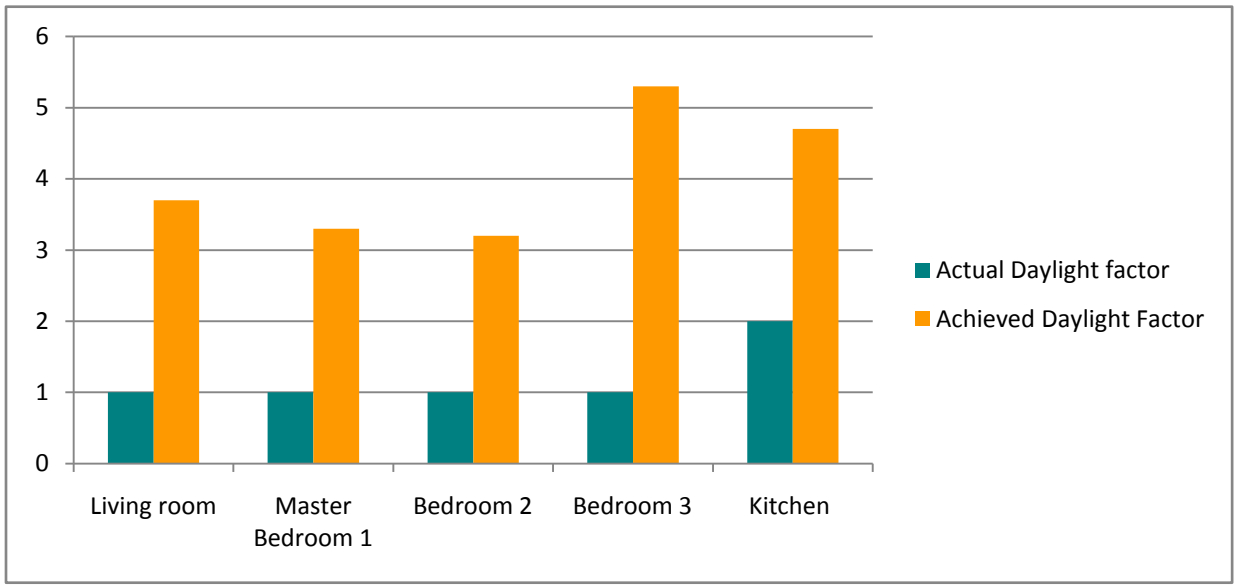


As per the analysis, with the given building specification, the rooms is achieving fairly high day light in all regularly occupied spaces.

Tower B

Type 1- 3BHK

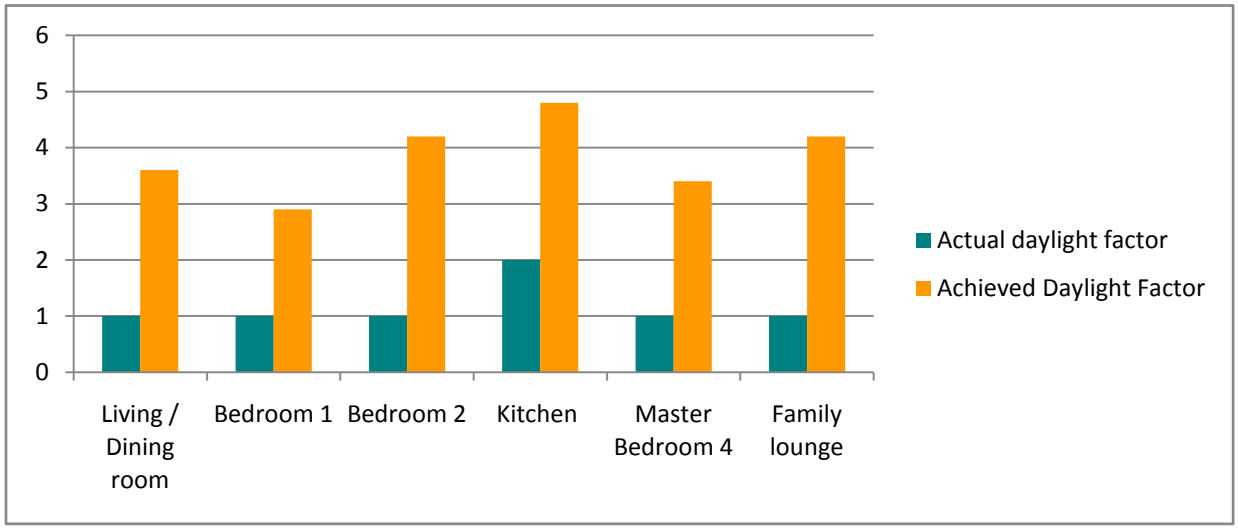
Sr. no	Typical floor flat	Actual Daylight factor	Achieved Daylight Factor
1	Living room	1	3.7
2	Master Bedroom 1	1	3.3
3	Bedroom 2	1	3.2
4	Bedroom 3	1	5.3
5	Kitchen	2	4.7



As per the analysis, with the given building specification, the rooms is achieving fairly high day light in all regularly occupied spaces.

Type 2- 3BHK (Pent house)

Sr. no	Typical floor flat	Actual daylight factor	Achieved Daylight Factor
1	Living / Dining room	1	3.6
2	Bedroom 1	1	2.9
3	Bedroom 2	1	4.2
4	Kitchen	2	4.8
5	Master Bedroom 4	1	3.4
6	Family lounge	1	4.2

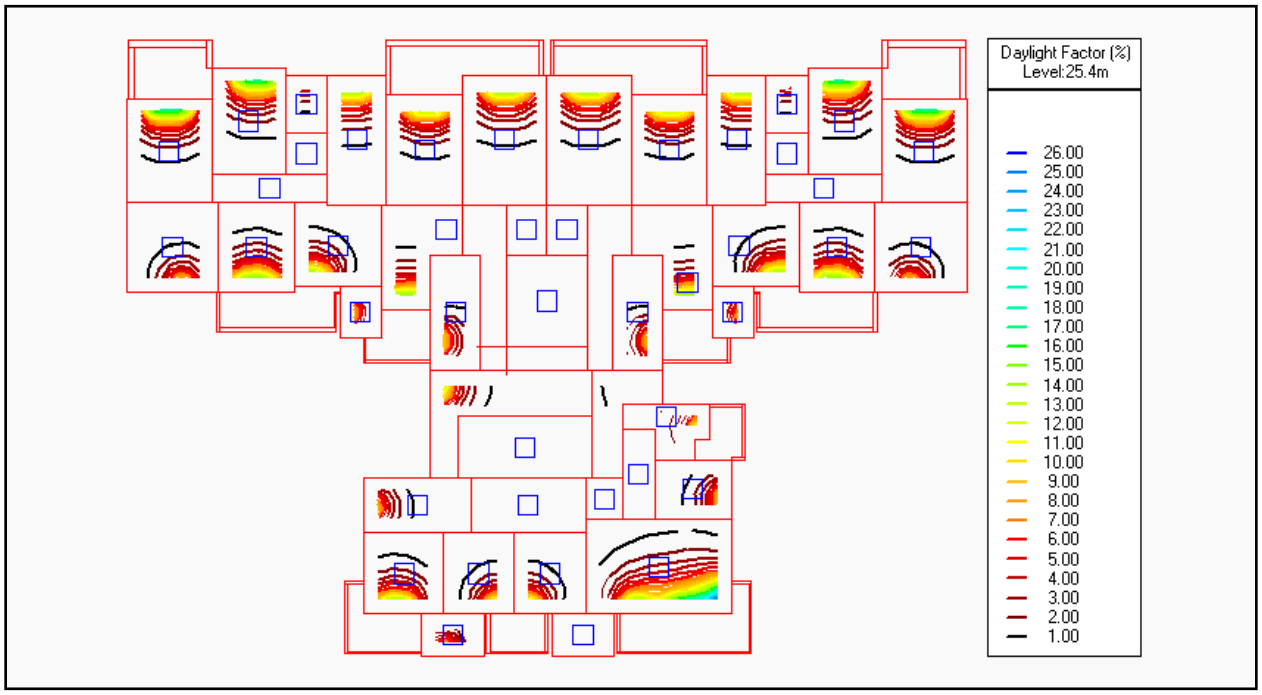


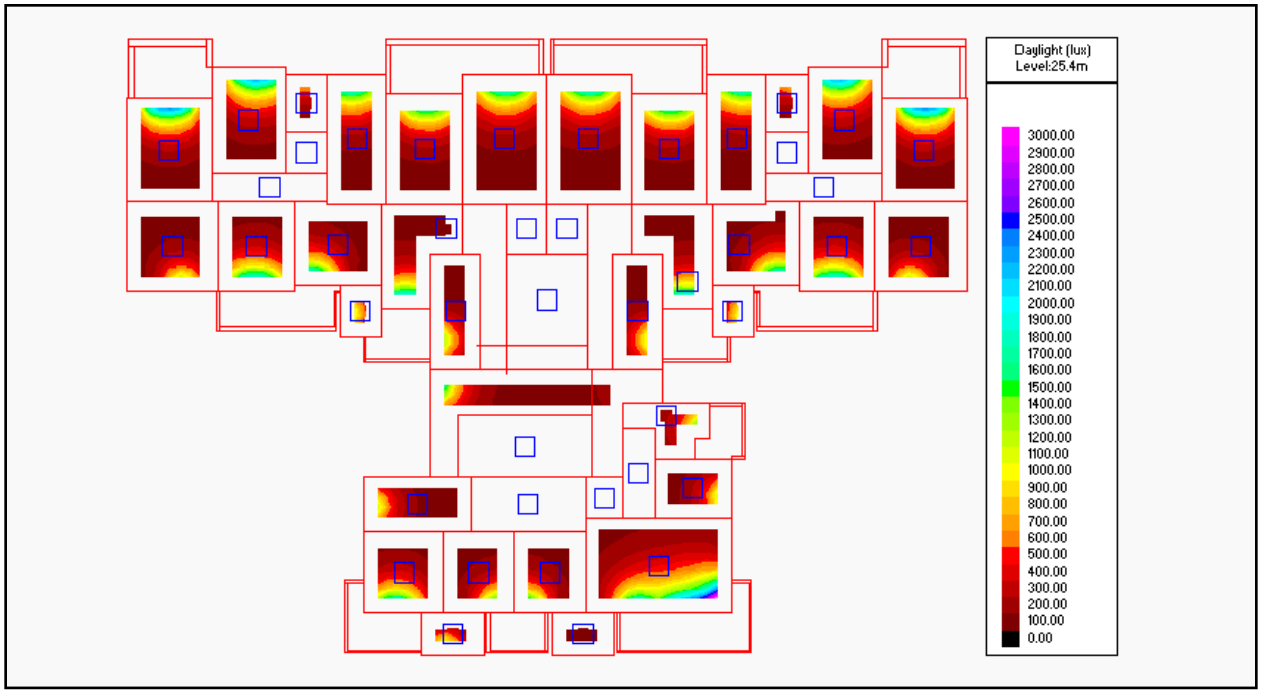
As per the analysis, with the given building specification, the rooms is achieving fairly high day light in all regularly occupied spaces.

Thereby, the project intends to ensure the connectivity between the interior and the exterior environment by providing the adequate daylighting.

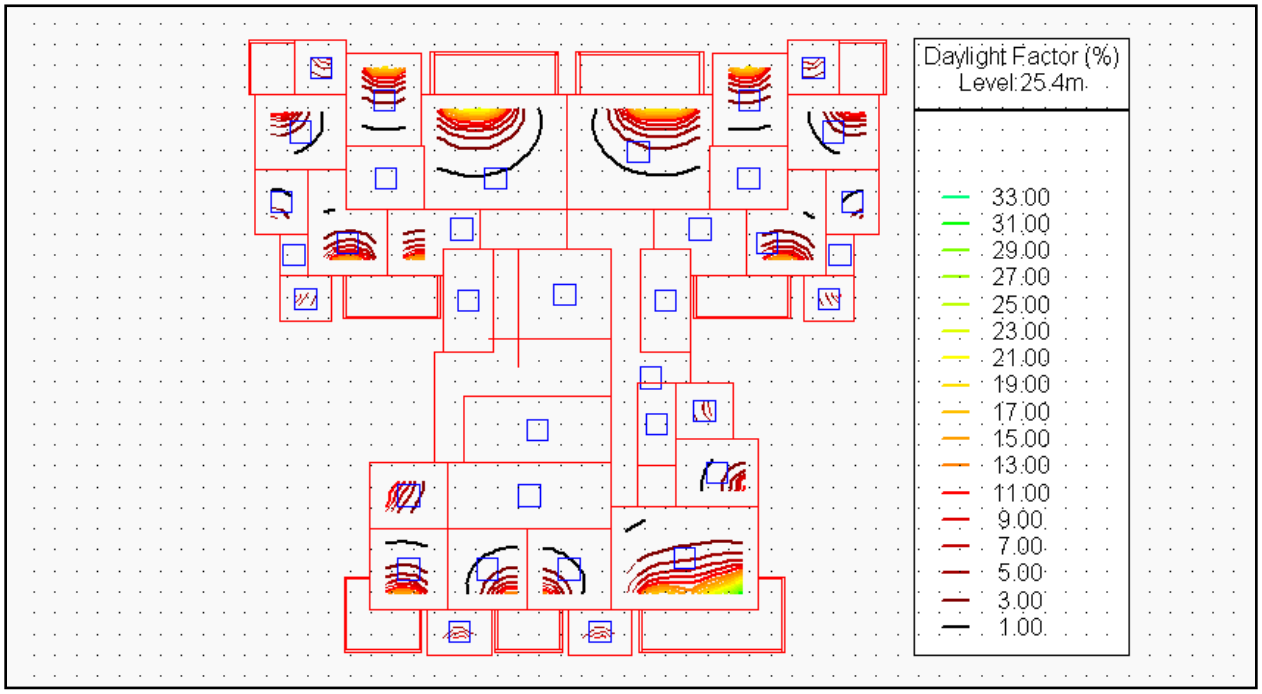
Daylight Graphical Analysis with VLT 62%

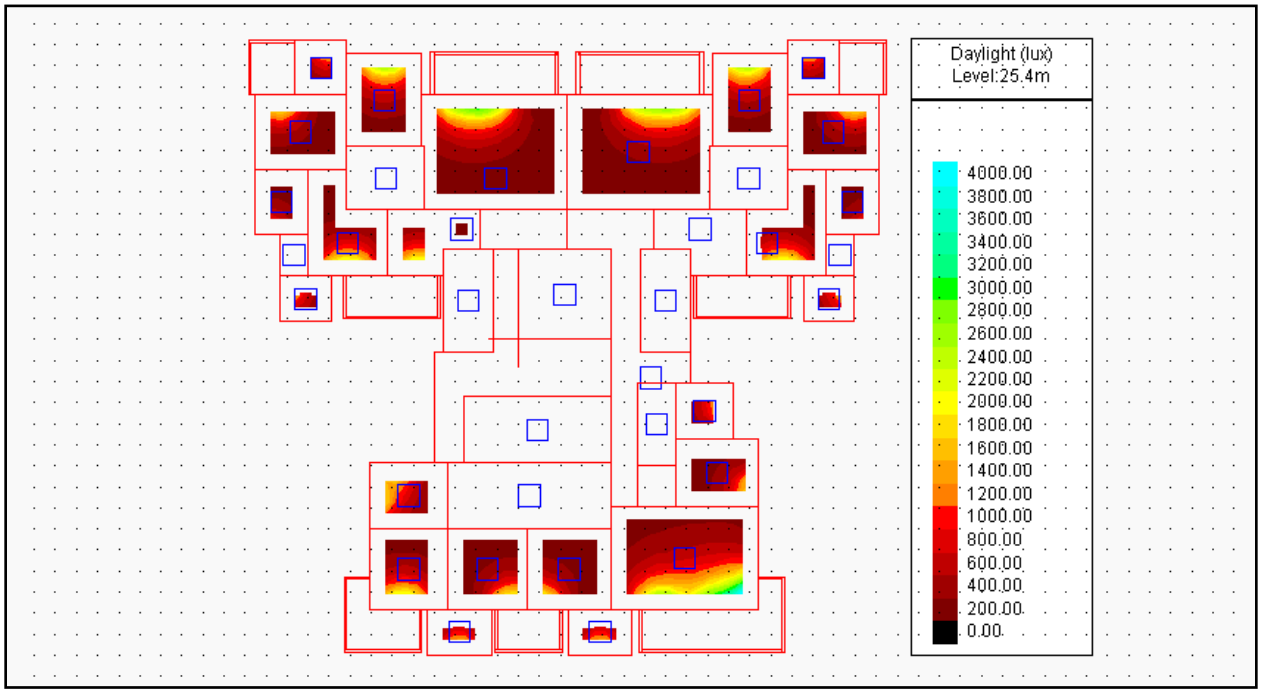
Tower A- Typical floor plan





Tower B- Typical floor plan





Annexure C

A detailed traffic management and a traffic decongestion plan

SWETA ESTATE PVT. LTD.

TRAFFIC IMPACT ASSESSMENT OF CENTRAL PARK-II, SOHNA ROAD, GURGAON

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JUNE 2017

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1.1 Background

1.2 Need for study

1.3 Study Objectives

1.4 Scope of Services

1.5 Study Outputs

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2.1 Sources of Secondary Data

2.2 Assumptions

3.0 DATA ANALYSIS

3.1 Trip generation potential of study area within 1 km radius

3.2 Traffic volumes on road network outside the project area without/ with project

4.0 MITIGATION MEASURES

CHAPTER 1.0 INTRODUCTION

1.1 BACKGROUND

The Sweta Estates ltd (Client) has constructed a Housing complex called Central Park II at the Intersection of Sohna Road and Netaji Subhash Marg in Gurugram city. Both the roads are arterials and are designed to carry heavy traffic volumes during peak hours at an acceptable Level of Service. The addition of traffic from adjacent land uses must not affect the carrying capacity of these Arterial roads. Also the traffic on arterial roads must not affect the access and value of the properties adjacent to the road. This is the essence of Traffic impact assessment study. The client has assigned the work of Traffic impact assessment of the Central Park II project on surrounding road network to M/s TPA Engineering Consultancy (I) Pvt Ltd which has gained experience of carrying similar studies in past.

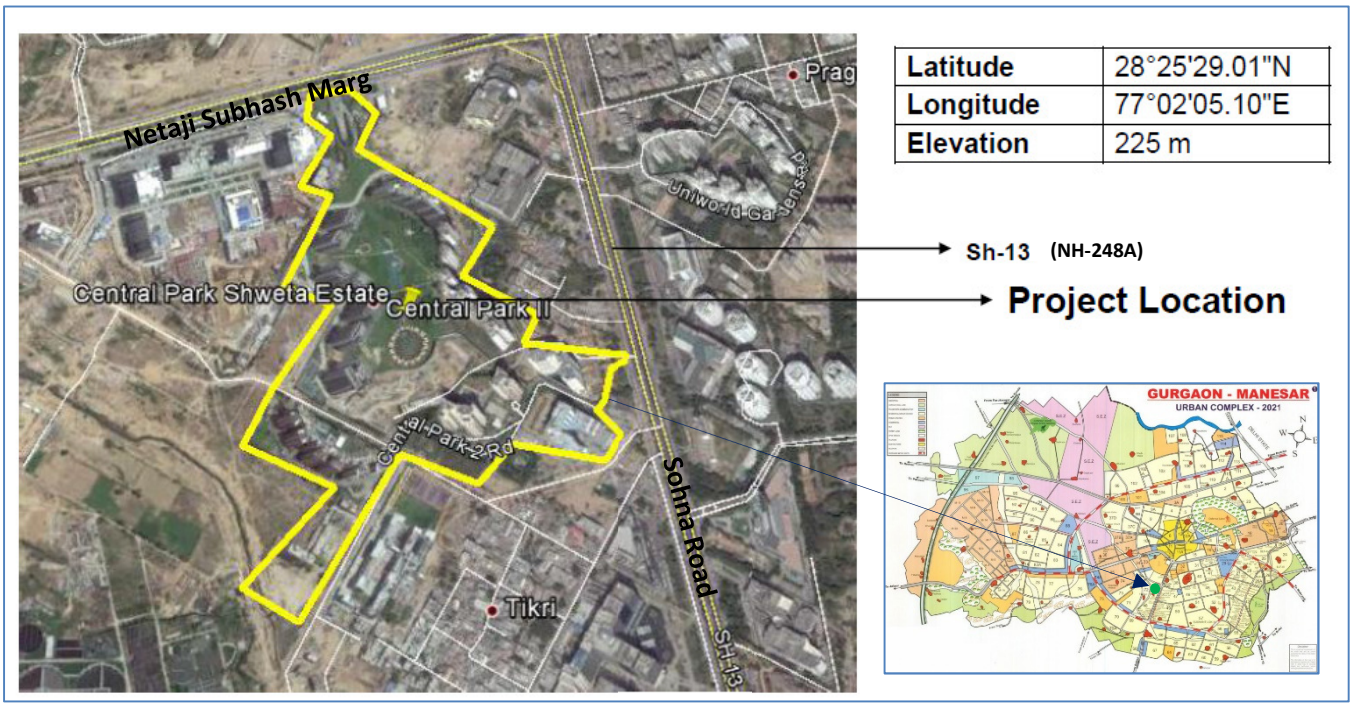

Figure 1.1 Project Site

1.2 NEED FOR STUDY

The project site is likely to add significant number of trips, especially during the peak hours in addition to the existing traffic. This may lead to conflict with the traffic on the arterial street outside the site leading to congestion on the access roads emanating from the project site as well as the arterial road along it. Also the traffic on the arterial streets may affect the access to the project, cause delays affect safety, thereby lowering its attractiveness to the users / residents of the complex. A need exists to examine the likely traffic impact and suggest mitigating measures to minimize the impact.

1.3 STUDY OBJECTIVES

- To estimate the traffic generated from land use within 1 km project site the surrounding road network in horizon year.
- To estimate the traffic volumes generated by the project site ,especially during the peak hours
- To identify the impact of generated traffic from site on Level of Service of approach roads
- To suggest mitigating measures to minimize the traffic impact.

1.4 SCOPE OF SERVICES

- Use the master plan to estimate the trips generated from area within 1 km radius
- Estimate the trips generated from project site using parking data
- Appreciation of impact on the Level of Services outside
- Preparation of De-congestion plan which is to be certified and approved by the State Urban Development and Transport Department.

1.5 DATA SOURCES

The consultant would use the secondary data to carry out analysis. . Also suitable assumptions would be made based on experience of consultant with similar projects. The secondary data to be used is listed in next chapter.

1.6 STUDY OUTPUTS

- Project Report
- Drawings showing the Mitigation measures.

CHAPTER 2.0 DATA COLLECTION

2.1 SOURCES OF SECONDARY DATA

- Land use and Population Densities in the 1 km radius around the site from the Gurgaon-Manesar Master Plan -2031
- Trip Generation Rate from ITE (Institute of Transportation Engineers of America) 8th edition
- Information regarding Vehicles Composition, Occupancy of passenger vehicles, Share of Peak Hour Trips etc. from Integrated Mobility Plan for Gurgaon Manesar Urban Complex Report prepared by Urban Mass Transit Company, Delhi (UMTC).

2.2 ASSUMPTIONS

- Directional Distribution of approach traffic at study intersection outside project site based on directional distribution at a neighboring intersection
- Per Capita Trip Rate for Project site by mechanical modes @ 1.50 trips per person

CHAPTER 3.0 DATA ANALYSIS

3.1 ESTIMATING TRIP GENERATION POTENTIAL OF STUDY AREA – METHOD STATEMENT

The consultants have considered the study area within the radius of 1 km around the intersection (between Sohna Road and Netaji Subhash Marg) outside the project site. The proposed Land Uses and the population densities for year 2031, as given in the master plan, have been considered for estimating the population within the earmarked area. The number of vehicular trips is estimated by multiplying the Per Capita Trips Rate with the population in this area.

The traffic estimated is assumed to originate from the centroids of the four quadrants and will be using these two roads only for long distance trips. It is also assumed that during peak hour the directional distribution between incoming and outgoing trips in each of the four quadrants is in the ratio of 60:40. This means, for example, that during evening peak hour 60% trips are entering in to the area and 40% trips are moving out. This generated traffic is then distributed on the network through these arterial roads only.

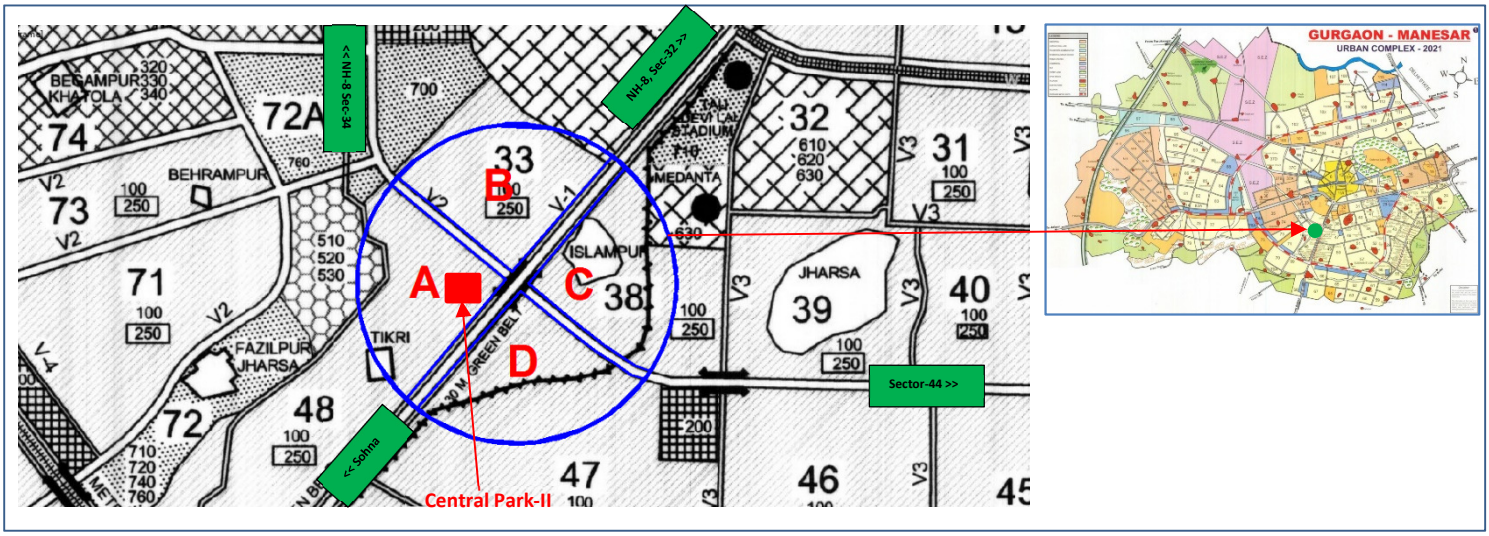

Figure 3.1 Study Zones within 1 km radius of intersection outside the Central Park II

3.2 TRAFFIC VOLUMES ON ROAD NETWORK OUTSIDE THE PROJECT AREA WITHOUT/ WITH PROJECT

The traffic generated from the study area is assigned on the road network and, capacity analysis is carried out **without** taking into consideration the traffic generated from the Central park-II. The Design Service Volume of six lane divided carriageway (Arterial Road) is 5400 PCU's per hour. The traffic along the western approach of Netaji Subhash Marg is estimated to be 3224 PCU's. The volume to capacity ratio is accordingly 0.60 in year 2031 **(Figure 3.2)** thereby offering a Level of Service 'C' which is and is acceptable for urban roads.

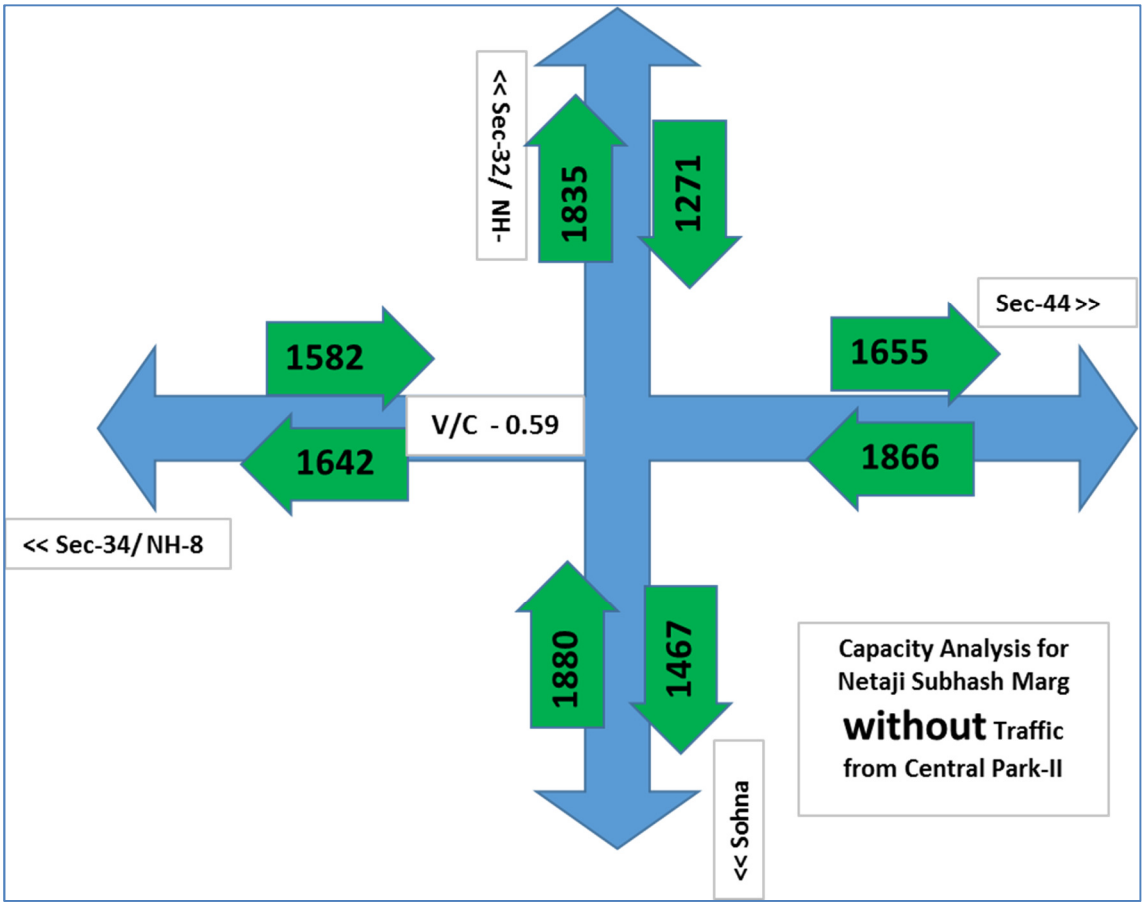

Figure 3.2 Capacity Analysis for Netaji Subhash Marg without Traffic from Central Park-II

The traffic generated from the project site is assumed to be 25% of total required parking. The remaining traffic will be moving into or outside the project site during the remaining hours of the day and have not being considered as they are random in character and cannot be quantified.

The total amount of inflowing or outgoing traffic is 709 PCU's during morning or evening peak period. It is further assume that 70% of this traffic is entering in evening peak period or leaving in the morning peak period and the remaining 30% is in the other direction. The calculations are shows in **Table 3.1.**

Table 3.1 Calculation for inflow/ outflow of peak hour traffic from project site

Parking	Nos. in Car
Total Car Parking	3160
Assume 25% cars will moving into or out of project site in any peak hour	790
assume 70 % of peak trips leaving the project site in morning peak hour	553
assume 30 % of peak trips entering the project site in morning peak hour	166
In Evening peak hour the pattern will be reverse	
assume 30 % of peak trips leaving the project site in evening peak hour	166
assume 70 % of peak trips entering the project site in evening peak hour	553

Source: Consultant Estimates

Subsequently the traffic generated from Central Park-II during peak hour is added to the traffic flow. This is estimated to result in a marginal reduction in the level of service of road. The volume to capacity ratio will increase to 0.73 **(Figure 3.3)** which is marginally higher than the acceptable limit of 0.7. Hence it could be concluded that the addition of traffic from Central Park-II will not adversely impact the flow of traffic on Netaji Subhash Marg and Sohna Road, provided certain mitigative measures are taken, as presented in the succeeding chapter.

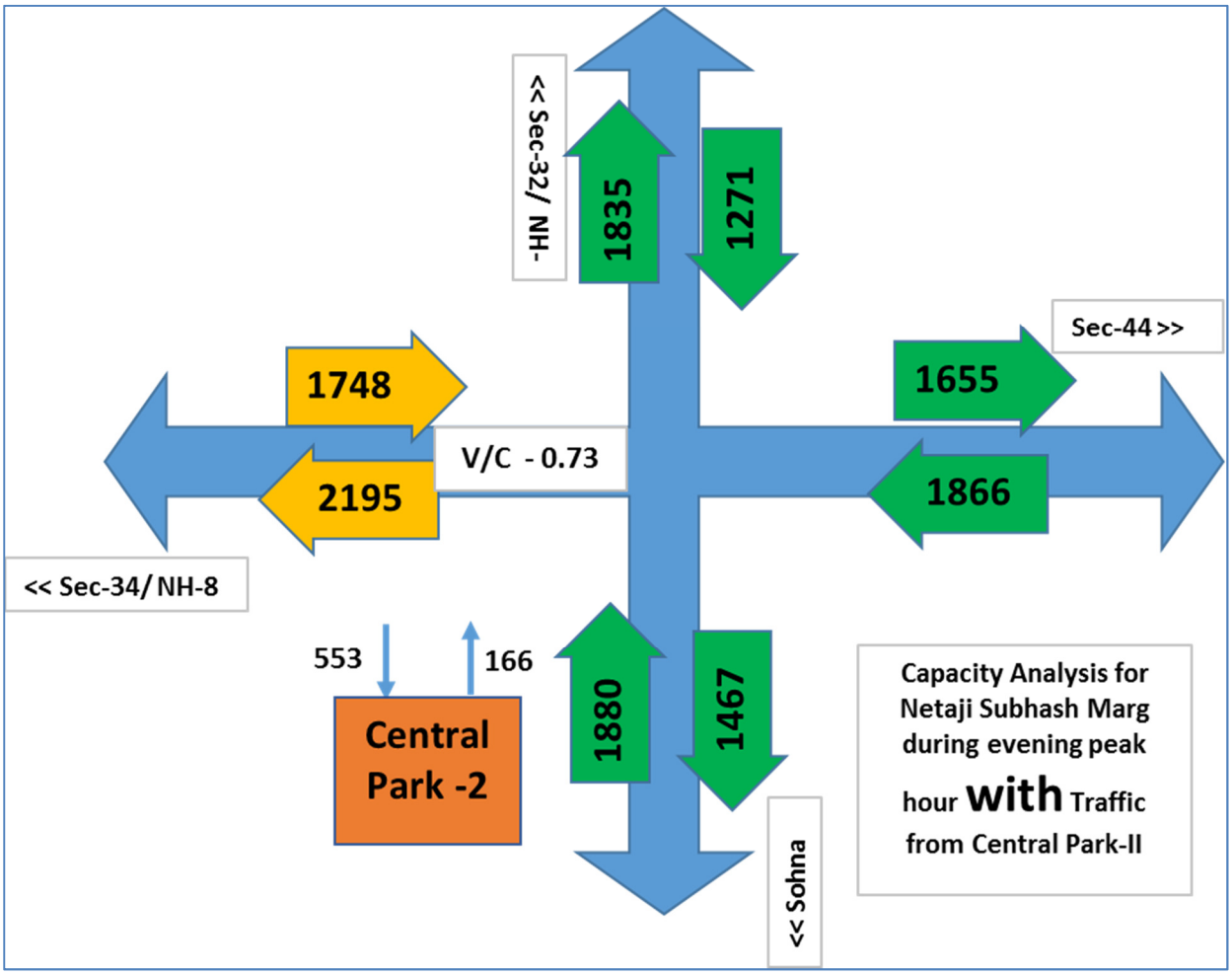

Figure 3.3 Capacity Analysis for Netaji Subhash Marg with Traffic from Central Park-II

CHAPTER 4.0 MITIGATION MEASURES

The consultant has suggested plan for improvement of access to the project site from the Netaji Subhash Marg. This is presented in **Figure 4.1 and Figure 4.2** for Netaji Subhash Marg and Sohna Road respectively. The plan includes modification of geometrics, lane markings and signs to provide information to the road users before entering or leaving the project site, without affecting the traffic on the main carriageway. While the traffic entering into the project site does not face any problems, the outgoing traffic has to move 620 mts. towards west to execute a U-Turn or will move straight. As this distance is sufficient for weaving, it will not have much impact on flow of traffic.

The traffic entering from Sohna Road is relatively minor entry and this has to be through the service road whose geometrics need to be improved as suggested in the drawing, coupled with signage and lane markings.

PRODUCED BY AN AUTODESK EDUCATIONAL PRODUCT

Latitude	28°25'29.01"N
Longitude	77°02'05.10"E
Elevation	225 m

KEY PLAN

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PRODUCED BY AN AUTODESK EDUCATIONAL PRODUCT

N

24.0 M WIDE ROAD

T-8 (TYPE

T-9 (TYPE B)

THE ROOM DEVELOPMENT

EXISTING ACCESS

268

CENTRAL PARK II

IN

OUT

SECURITY CHECK POST

R15

R20

R10

R8

9.5

9

7

FOOTPATH
SERVICE ROAD
FOOTPATH
CARRIAGE WAY
MEDIAN
CARRIAGE WAY

156

PROPOSED ACCESS

19

2.7
1.5
11
11
2.5

TO SOHNA

TO NH-8

LEGEND:-
PROPOSED ROAD
PROPOSED FOOTPATH
PROPOSED MEDIAN

NOTE:-
1. ALL DIMENSIONS ARE IN METER.
2. ACCESS TO PROPERTY FROM SOHNA ROAD ONLY THROUGH SERVICE ROAD.

FIGURE: 4.1 PROPERTY ACCESS IMPROVEMENT PLAN (NETAJI SUBASH MARG)

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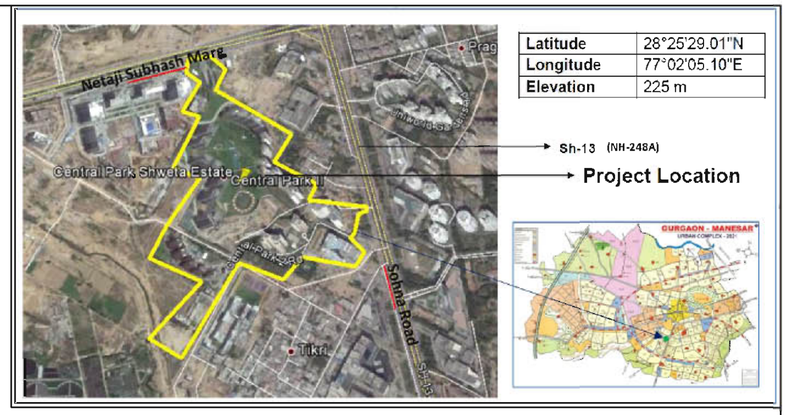
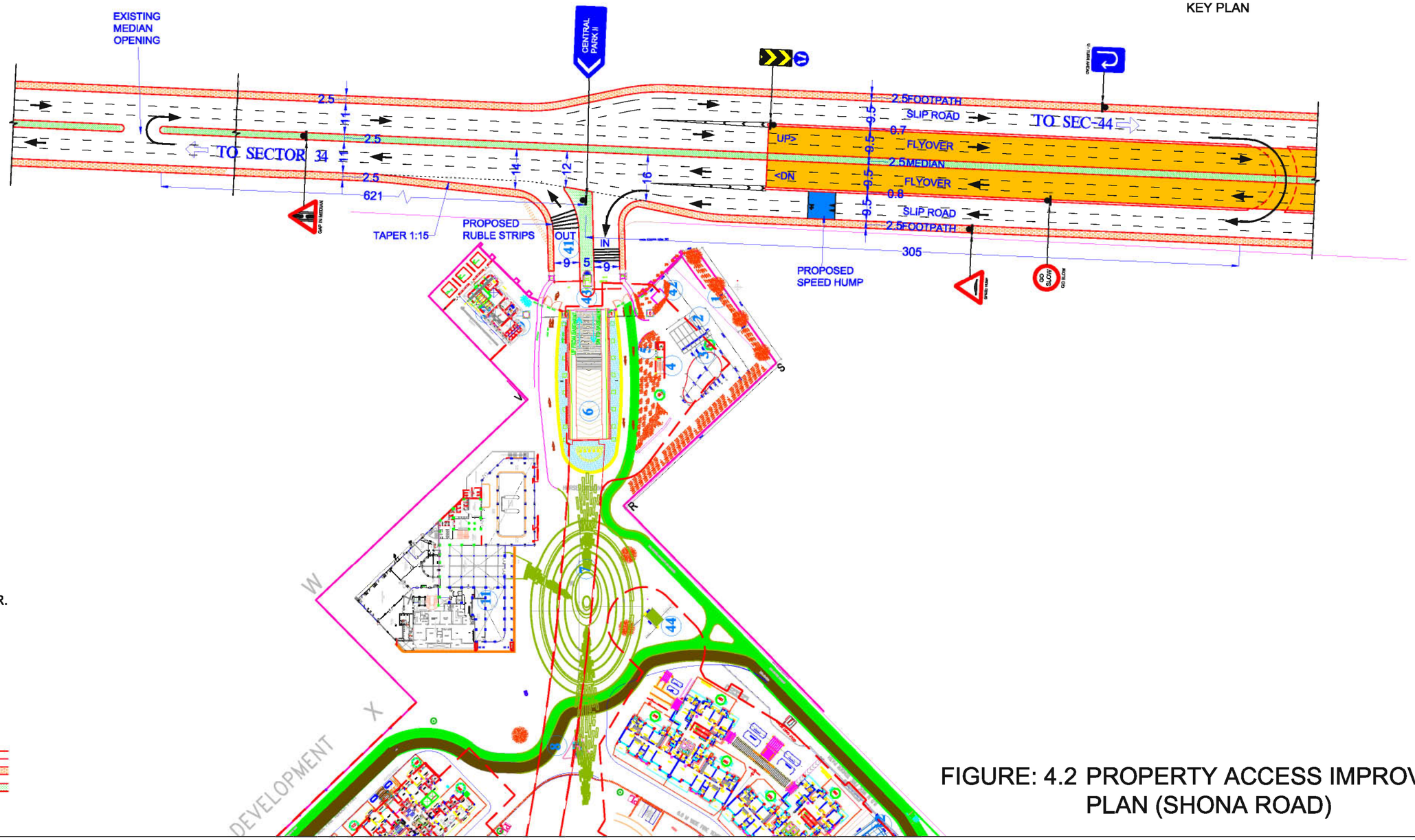
PRODUCED BY AN AUTODESK EDUCATIONAL PRODUCT



Latitude	28°25'29.01"N
Longitude	77°02'05.10"E
Elevation	225 m

KEY PLAN



NOTE:-
1. ALL DIMENSIONS ARE IN METER.

LEGEND:-
PROPOSED ROAD
PROPOSED FOOTPATH
PROPOSED MEDIAN

FIGURE: 4.2 PROPERTY ACCESS IMPROVEMENT PLAN (SHONA ROAD)

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References:

- *ITE Trip Generation Rates - 8th Edition*
- *Integrated Mobility Plan for Gurgaon Manesar Urban Complex, UMTC, DTCP*
- *Master Plan, Gurgaon-Manesar-2031*

ANNEXURE-D

ECBC Compliance Report

LSquare Solutions
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Energy -Analysis, Sun Path & Daylight Report

Central Park Belgravia-I Project

2013

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ENERGY ANALYSIS METHODOLOGY

The Proposed Building has been evaluated on the basis of the methodology outlined in ECBC Standard-**Whole Building Performance Method.**

Whole building energy simulation analysis is used to predict the annual energy performance of a building design. The analysis is carried out by first developing a detailed building energy simulation model. The simulation programme is then used to test the thermal response & to calculate the energy use of the building model using a weather data file to capture the climatic impact on the building. This type of analysis is referred as Whole Building Performance (WBP) Method. Whole building energy simulation is the most sophisticated way of analyzing the impact of energy efficiency measures in an integrated manner.

IES <VE> 2012 simulation tool has been used for modelling the baseline and the proposed building.

As specified by the WBP Method, the Proposed and Budget Buildings are identical in terms of:

- Design Model
- Simulation software
- Thermal Blocks
- Weather data (Gurgaon, Delhi, India)
- Occupancies

STANDARADS AND SOFTWARE TOOLS USED FOR ANALYSIS

Standard used for the Analysis

Standard used for the analysis is ECBC (Energy Conservation Building Code). The purpose of ECBC is to provide minimum requirements for energy efficient design & construction of buildings & their systems. Estimates based on computer simulation models indicate that ECBC complaint buildings can use 40-60 % less energy than conventional buildings. It is estimated that a nationwide mandatory enforcement of the ECBC will yield a annual savings of approximately 1.7 billion kWh.

ECBC was developed as a first step towards promoting energy efficiency in the building sector. The ECBC user Guide (also referred to as “The Guide” in this document) has been developed to provide detailed guidance to building owners, designers, engineers, builders, energy consultants, and others on how to comply with the code. It provides expanded interpretation, examples, supplementary information to assist in applying ECBC during the design and construction of new buildings as well as additions and alterations to existing buildings.

This Guide can also be used as a document by “authorities having jurisdiction” in the enforcement of code once it is made mandatory. The guide follows the nomenclature of the code. It is written both as a reference and as a instruction guide, and can be help- full to anyone who is directly or in- directly involved in the construction and design and construction of ECBC-compliant buildings.

The code is applicable to the buildings or building complexes that have a connected load of 500 kW or greater or a contract demand of 600 kVA or greater. This code would become mandatory as and when it is notified by the Central and the State government in the official Gazette (P) of S14 or clause (a) of S 15 of the energy conservation act 2001 (52 of 2001)

This code is applicable to the following Building System-

- Building envelopes expect for unconditioned storage spaces or warehouse
- Mechanical System and equipment, including heating, ventilation and air conditioning, (HVAC)
- Service hot water heating
- Interior and exterior lighting
- Electrical power and motors

This code is not- applicable to the following Building System-

- Buildings that do not use either electricity or fossil- fuel
- Equipment and portions of building system that use energy primarily for manufacturing process

Software used for Analysis

Energy Modelling & Simulation is a holistic approach to achieve energy savings in a building. The process of energy modelling is being done in the following phases:

- 3 Dimensional Modelling
- Base Building Energy Consumption Results
- Development of Energy Efficiency Measures
- Design Building Energy Consumption Results

Software used for the Project is IES. IES <VE>

Integrated Environmental Solutions (IES) is a world leading provider of integrated performance analysis software and consulting services for sustainable building design. Comparative analysis at the early stage, using ballpark figures, is useful to check feasibility, quantify and inform design team decision making. It can help with those all important master planning, orientation, massing and form decisions; justifying choices and differentiating project proposals.

Detailed analysis provides more accurate figures and results for system sizing, fine tuning, compliance, costing and documentation. Results and analysis can be presented to clients and building control, justifying design decisions and offering you competitive advantage.

IES provides a wide range of different analysis options and capabilities designed to give feedback quickly and efficiently at the relevant level. All are powered by the sophisticated <Virtual Environment> performance modelling engine that undertakes detailed simulations at hourly or smaller increments as necessary.

Energy Simulation Software Salient Features

- Undertake energy performance snapshots to assess impact of design decisions
- Develop building loads and impact of conservation strategies
- Develop carbon footprint reduction strategies
- Assess passive/hybrid/renewable strategies
- Assess the impact of daylight and solar
- Incorporate bulk airflow, ventilation and indoor air quality into the equation
- Assess compliance with a range of worldwide regulations and voluntary codes

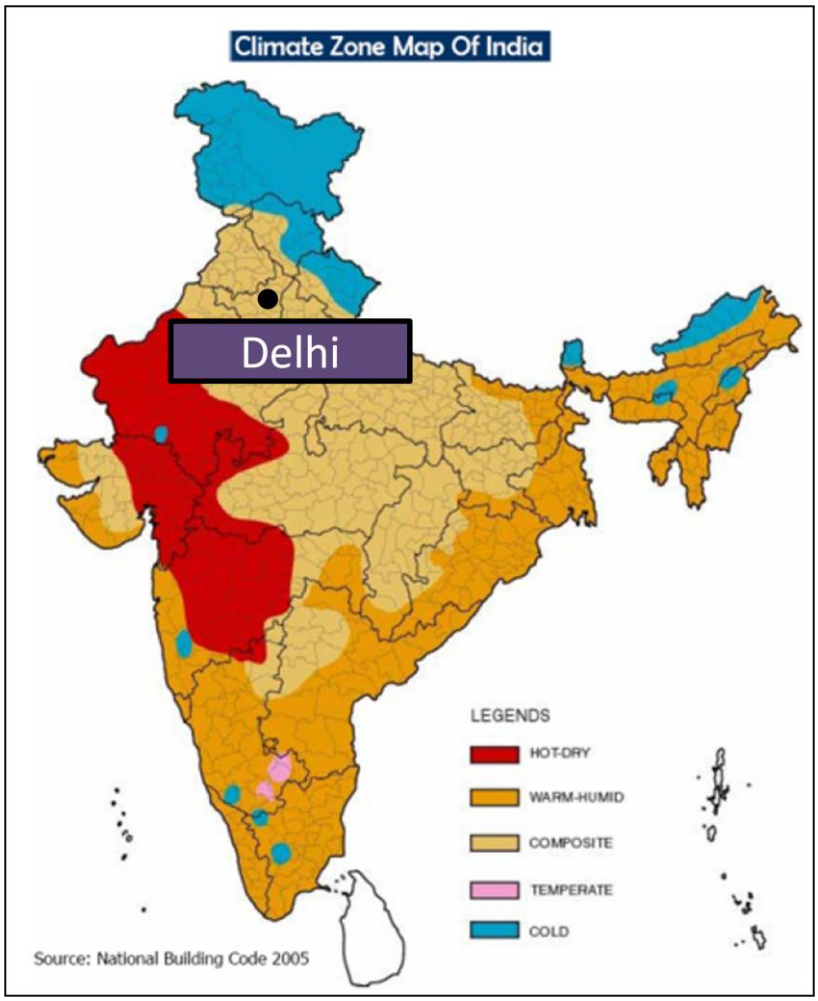
We have used the following modules of IES for completion of this report:

- Model IT – 3D building modeller
- Sun Cast – Solar shading analysis
- FlucsDL– Day Light analysis
- ApacheSim – Thermal analysis

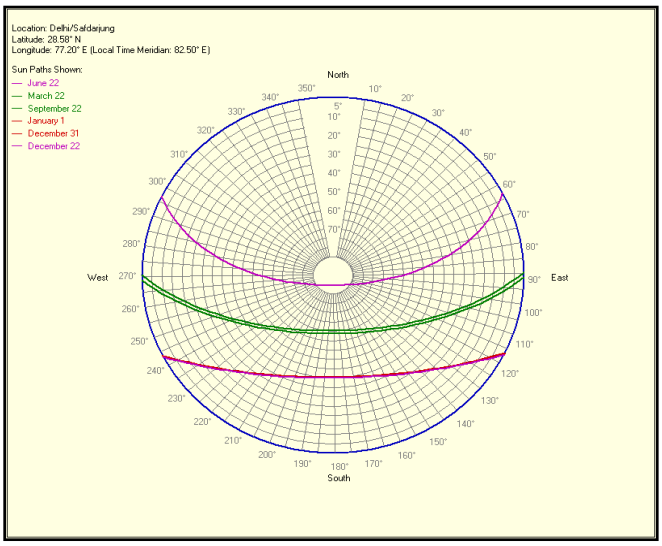
PROJECT TECHNICAL DESIGN SUMMARY

Climatology

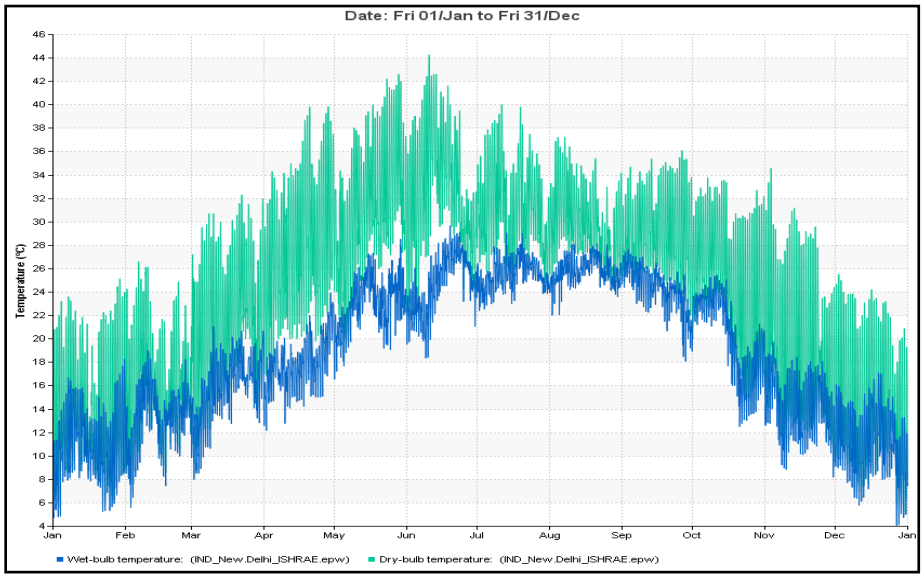
India possesses large variety of climates, which broadly categorizes into five regions. Project is located in Gurgaon, Delhi. According to ECBC User Guide, Table 13.2, Climatic Zones of Major Indian Cities, Project follows Composite climate as shown in the adjoining image



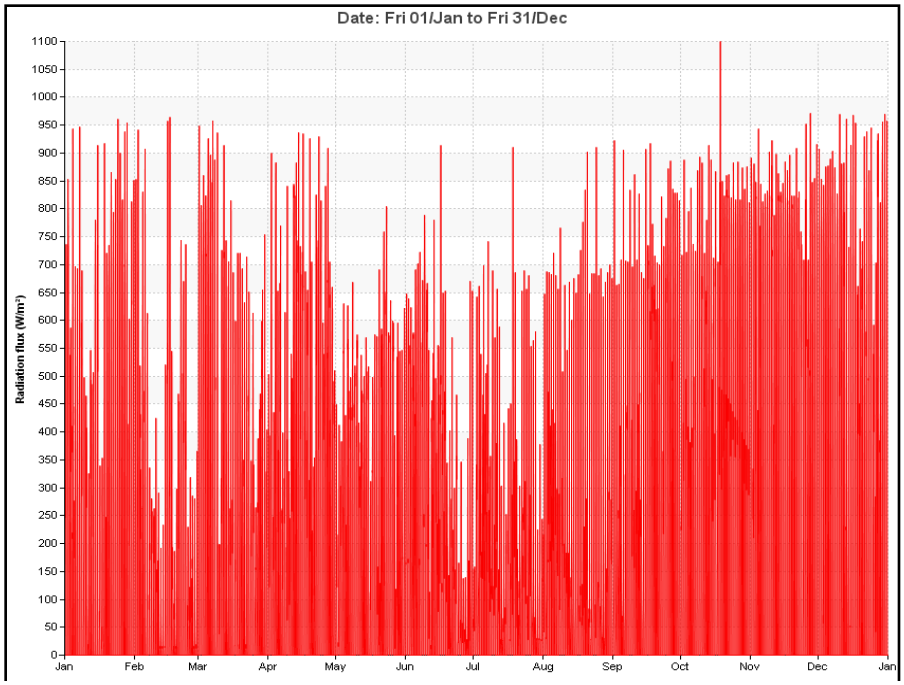
Sun Path Diagram



Minimum and Maximum Temperatures at Gurgaon



Dry Bulb & Wet bulb Variation



Radiation Graph

Energy Input Parameters

Following is the summary of input parameters of Base case as per ECBC & Proposed case as per design of the Project:

Base & Proposed Case Parameters

BASE & PROPOSED CASE PARAMETERS		
Model Input Parameter	**Proposed Design Input**	**Base case Design Input**
Exterior Wall Construction	RCC walls, With Insulated paint. U value: 1.7855W/ m^2 K	U Value of overall assembly 0.440 W/ m^2 K. Minimum R value of insulation alone 2.10 m2 K/W
Roof Construction	Standard Roof with SRI paint U value 0.605 W/m2 K	U Value of overall assembly 0.409 W/ m^2 K. Minimum R value of insulation alone 2.1 m2 K/W
Fenestration U Value	DGU U value-1.77 W/ m^2K	3.30 W/ m^2 K
Fenestration SHGC	0.36	0.20
Fenestration VLT	62%	Minimum VLT 27 %
LPD (W/m2)	Space by Space Method for Lighting Power density calculation considered	
EPD (W/m2)	Space wise Equipment Power density calculated and provided in section ….	

Envelope Analysis

Exterior Wall Parameters

Exterior Wall (outer to Inner)	Thickness (m)	k-Value (w/m ^{0}K)	Density, kg/m^3	U-value w/m^{20}k (k/Thickness)	R-value (1/U)
POP inner side	0.009	0.16	801	17.77778	0.05625
Cement Plaster	0.012	0.5	1300	41.66667	0.024
Common Brick	0.23	0.84	1700	3.652174	0.27381
Cement Plaster outer side	0.018	0.5	1300	27.77778	0.036
Overall exterior wall value	**0.4**			**1.785**	**0.097515**

Roof Assembly Parameters

Roof Assembly	Thickness (m)	k-Value (w/m ^{0}K)	Density, kg/m^3	U-value w/m^{20}k (k/Thickness)	R-value (1/U)
Brick bat coba	0.125	0.19	600	1.52	0.658
Cement concrete slab	0.125	0.16	500	1.28	0.781
Cement plaster	0.006	0.5	1300	83.33333	0.012
POP	0.009	0.16	801	17.77778	0.056
Overall exterior wall value	**0.435**			**0.607**	**0.377**

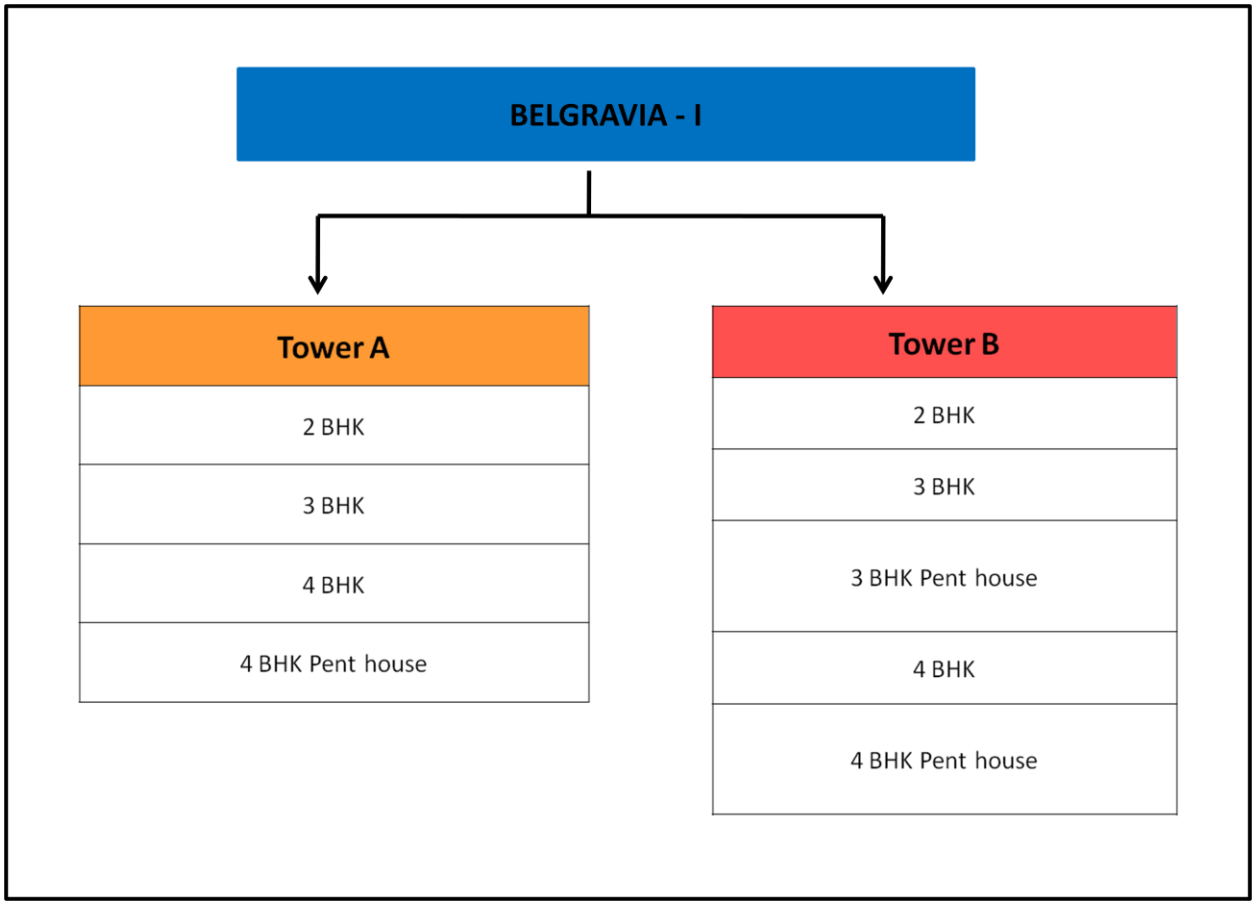
Lighting Analysis

LPD Calculation for Exterior & Interior

Lighting	Applicable Areas	Base case Lighting Power Density (LPD)	Design Lighting Power Density (LPD) 30% Reduction	Design Lighting Power Density (LPD) 20% Reduction
Interior Lighting **(for residential units)**	Individual dwelling unit, Apartments, Villas, Gated communities	5.00 W/m2	3.5 W/m2	4 W/m2
Exterior Lighting, excluding Parking Area (for residential & nonresidential units)	Landscaping, Façade, Street lighting, Pathways, Signage's, etc.,	2.5 W/m2	1.75 W/m2	2 W/m2
Common Area Lighting, excluding Parking Area (for residential & nonresidential units)	Corridors, Lobbies, Staircases, Terrace, etc.,	4.0 W/m2	2.8 W/m2	3.2 W/m2
Parking Area	Surface parking (covered & uncovered), Basement parking,	2.5 W/m2	1.75 W/m2	2 W/m2

- **The project must ensure that the interior, exterior, common and parking area lighting Power densities are reduced by at least 20% from the baseline values through 'building area method'**
- **For Lighting Power Density (LPD) Design case, 30% reduction is considered for analysis.**

BUILDING MAPPING

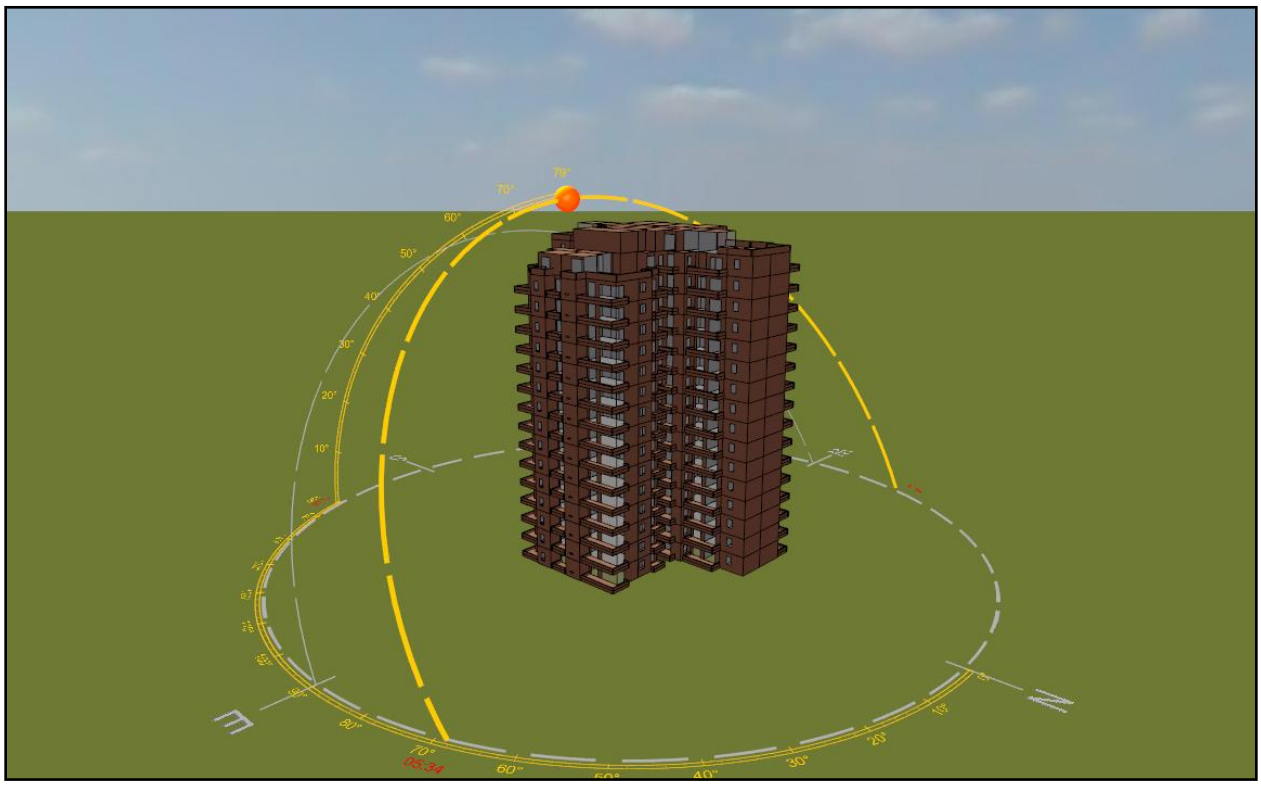


The table shown above is the summary of the Central park-Belgravia I project and we are considering residential areas for our analysis. We have considered the typical floors of Tower A & B for analysis.

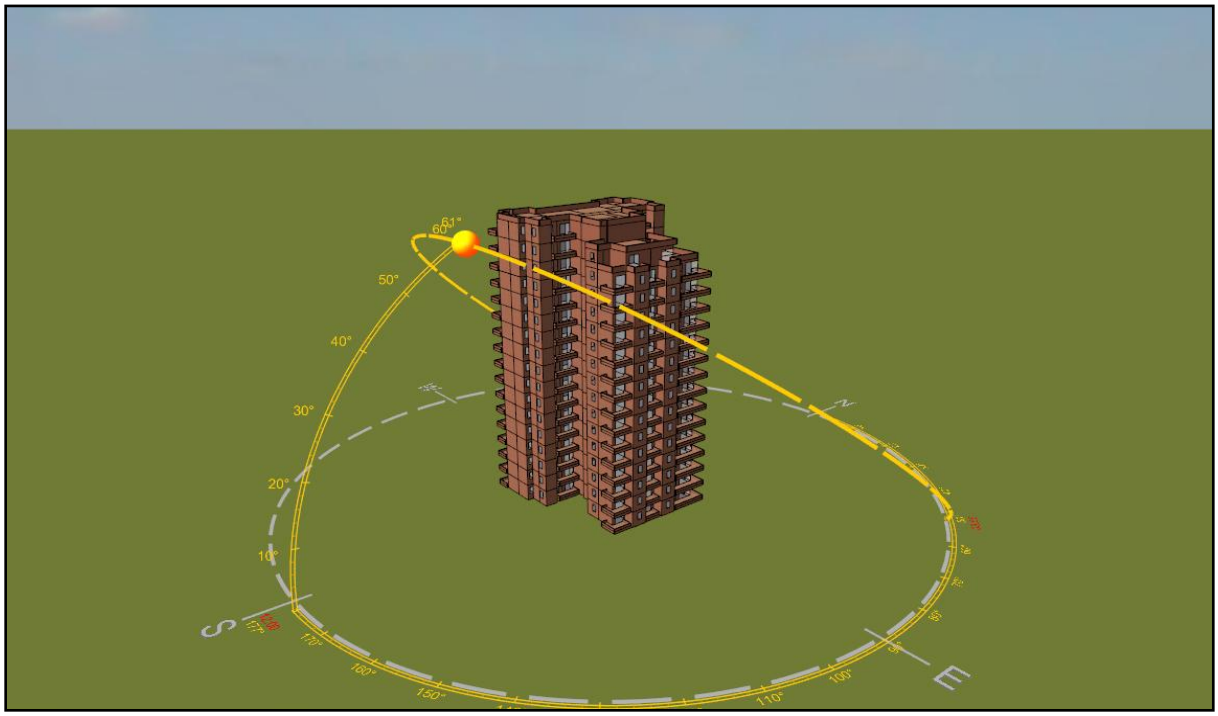
CENTRAL PARK-BELGRAVIA-I ANALYSIS

Energy & Day Light Analysis of Belgravia-I building

Tower A



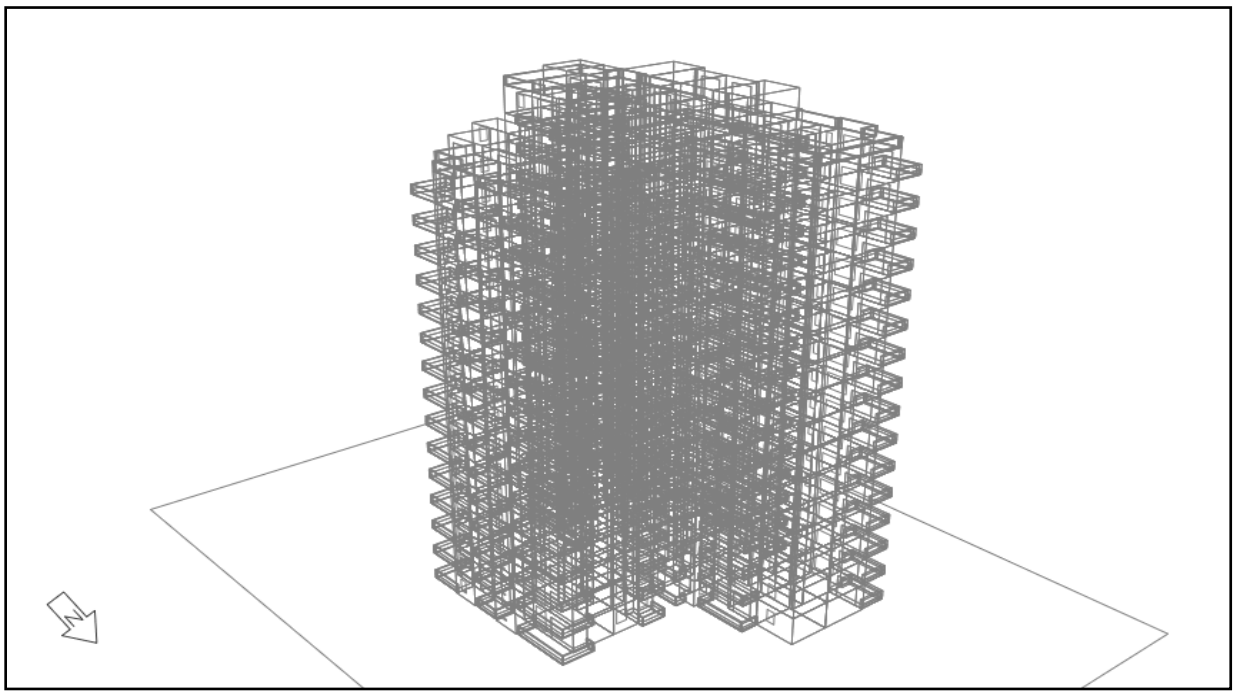
Tower B



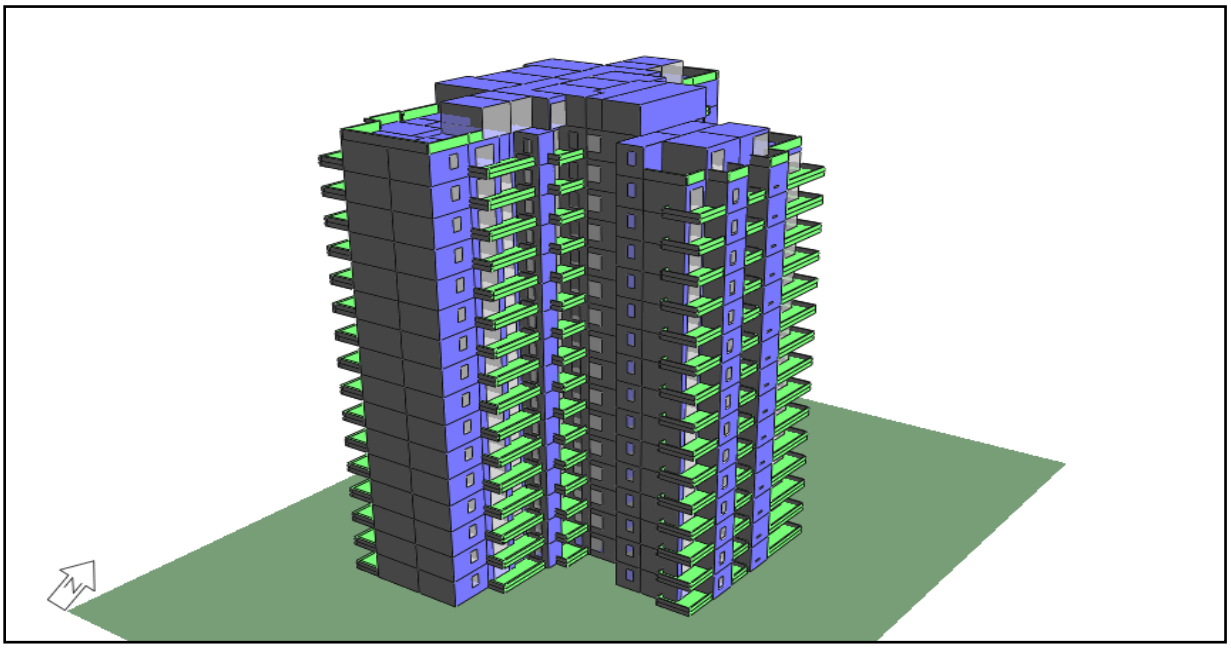
Sun Path Analysis: Energy & Daylighting

Energy Models

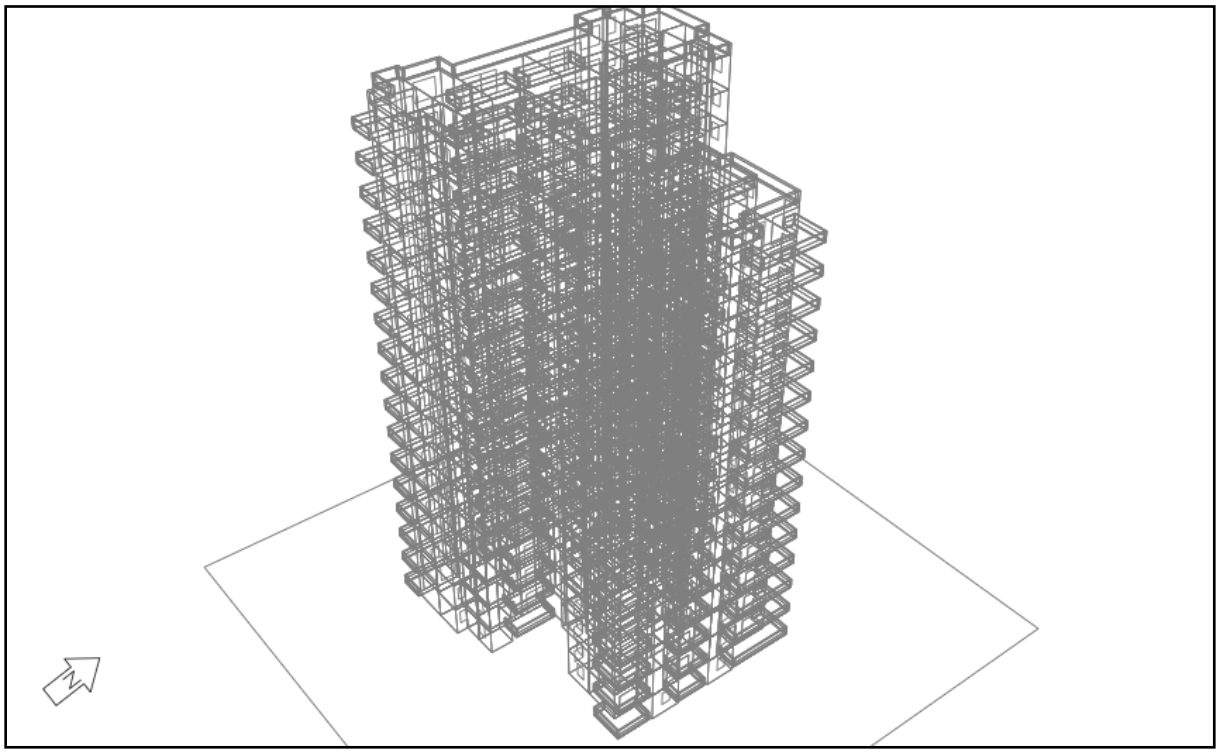
Envelope Design Model of The Tower A



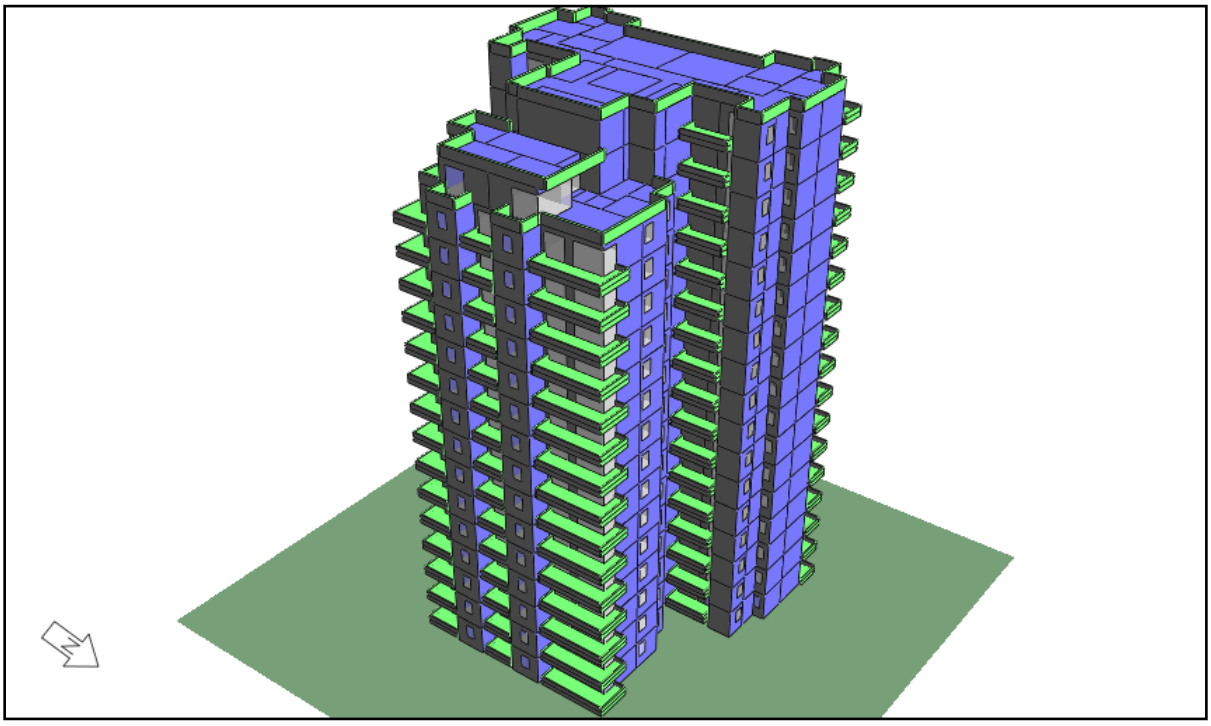
Energy Model Image of the Tower A



Envelope Design Model of The Tower B



Energy Model Image of the Tower B



Energy Performance Benchmarking

Design Case Energy Consumption

Month Date	Total lights energy (MWh)	Total equip energy (MWh)
Jan 01-31	43.6157	51.0279
Feb 01-28	39.3948	46.0898
Mar 01-31	43.6157	51.0279
Apr 01-30	42.2087	49.3819
May 01-31	43.6157	51.0279
Jun 01-30	42.2087	49.3819
Jul 01-31	43.6157	51.0279
Aug 01-31	43.6157	51.0279
Sep 01-30	42.2087	49.3819
Oct 01-31	43.6157	51.0279
Nov 01-30	42.2087	49.3819
Dec 01-31	43.6157	51.0279
Summed total	513.5395	600.8129

Base Case Energy Consumption

Month Date	Total lights energy (MWh)	Total equip energy (MWh)
Jan 01-31	62.3114	72.8971
Feb 01-28	56.2813	65.8425
Mar 01-31	62.3114	72.8971
Apr 01-30	60.3014	70.5456
May 01-31	62.3114	72.8971
Jun 01-30	60.3014	70.5456
Jul 01-31	62.3114	72.8971
Aug 01-31	62.3114	72.8971
Sep 01-30	60.3014	70.5456
Oct 01-31	62.3114	72.8971
Nov 01-30	60.3014	70.5456
Dec 01-31	62.3114	72.8971
Summed total	733.6669	858.305

Comparison between Design & Base Case

Alternative	Total lights energy (MWH)	Total equipments (MWH)
Base case	733.6669	858.305
Design case	513.5395	600.8129
Energy Cost Savings over Base case	**30%**	**30%**

Result Summary

- In Compared results of Design and Base case, **30%** saving are noticed (base on the 30% reduction in Lighting Power Densities; Refer Table on Pg No. 12)
- For additional efficiencies, Sensors are recommended for the non-regularly occupied spaces.

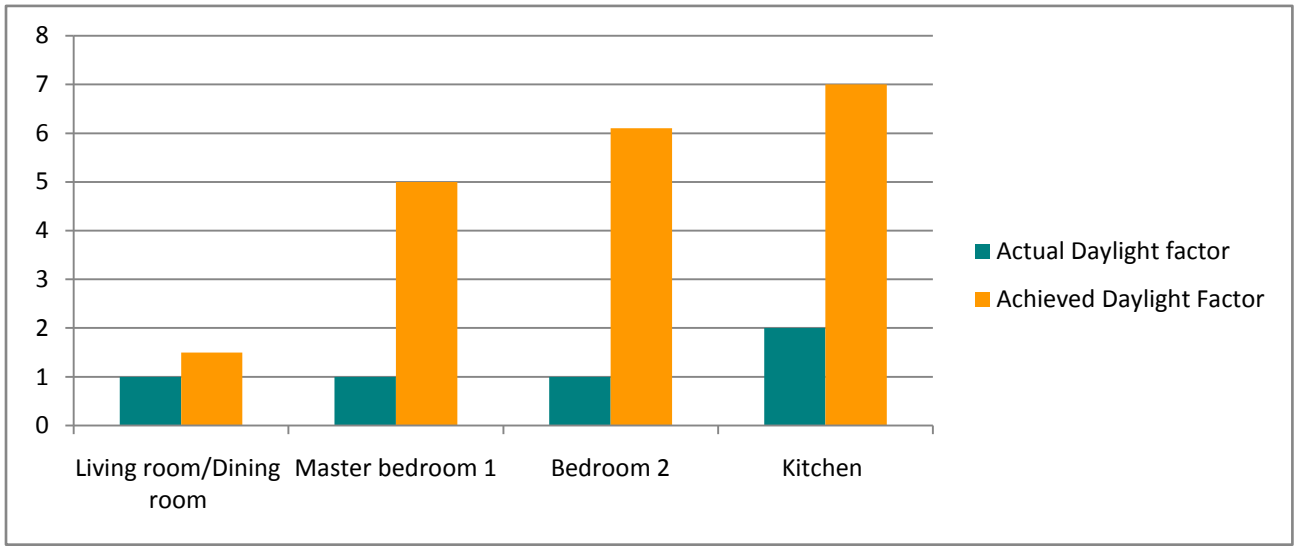
Daylight Analysis

Comparison between Design & LEED Requirement

Tower A and B

Type 1 -2BHK

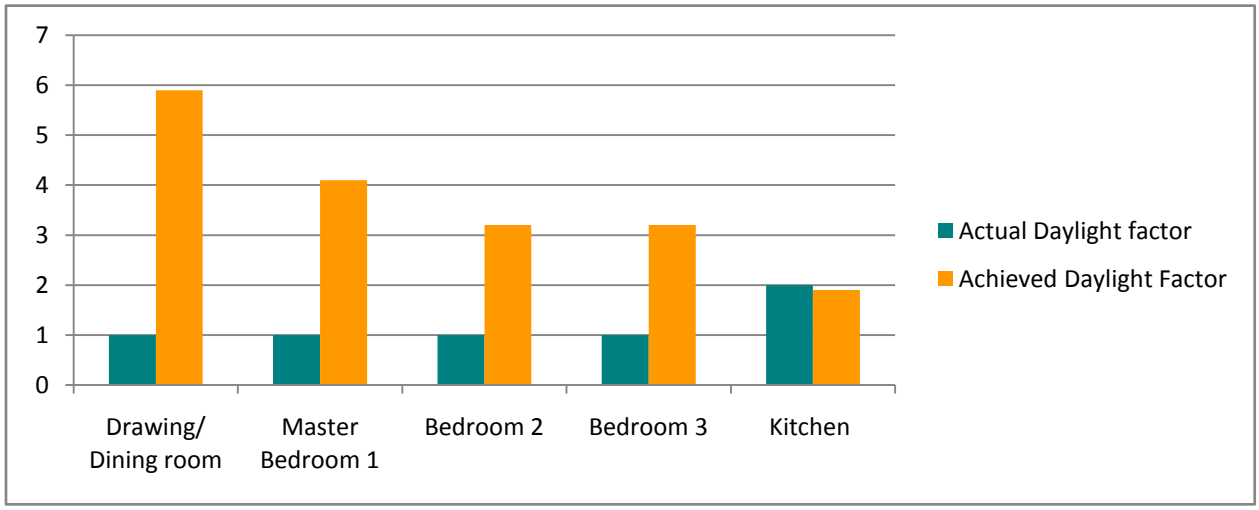
Sr. no	Typical floor flat	Actual Daylight factor	Achieved Daylight Factor
1	Living room/Dining room	1	1.5
2	Master bedroom 1	1	5.0
3	Bedroom 2	1	6.1
4	Kitchen	2	7.0



As per the analysis, with the given building specification the building is achieving fairly high day light in all regularly occupied spaces. Thereby, the project intends to ensure the connectivity between the interior and the exterior environment by providing the adequate daylighting.

Type 2- 3 BHK

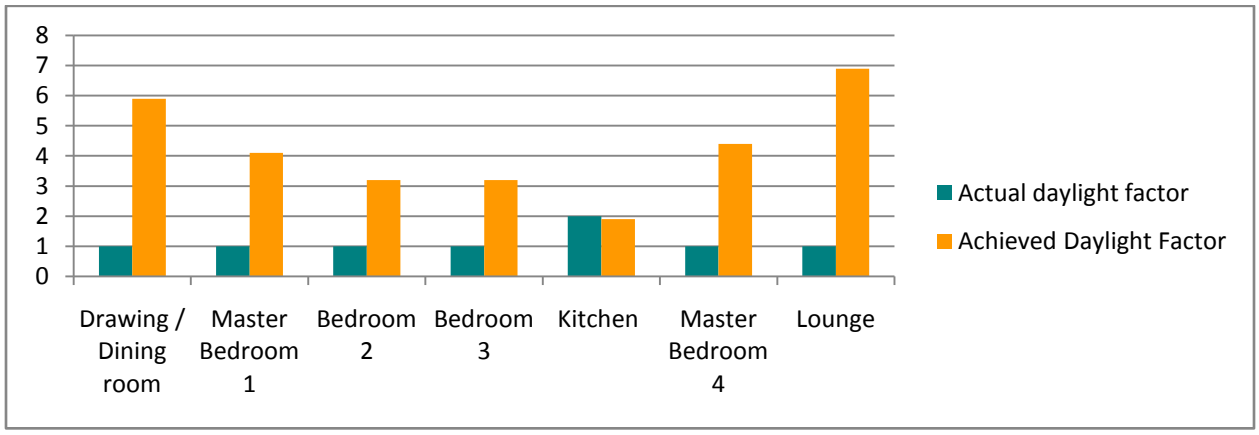
Sr. no	Typical floor flat	Actual Daylight factor	Achieved Daylight Factor
1	Drawing/ Dining room	1	5.9
2	Master Bedroom 1	1	4.1
3	Bedroom 2	1	3.2
4	Bedroom 3	1	3.2
5	Kitchen	2	1.9



As per the analysis, with the given building specification, the building is achieving fairly high day light in Bedroom and Drawing/dining room and less daylight is achieved in kitchen which is acceptable as per compliance.

Type 3- 4 BHK(Pent house)

Sr. no	Typical floor flat	Actual daylight factor	Achieved Daylight Factor
1	Drawing / Dining room	1	5.9
2	Master Bedroom 1	1	4.1
3	Bedroom 2	1	3.2
4	Bedroom 3	1	3.2
5	Kitchen	2	1.9
6	Master Bedroom 4	1	4.4
7	Lounge	1	6.9

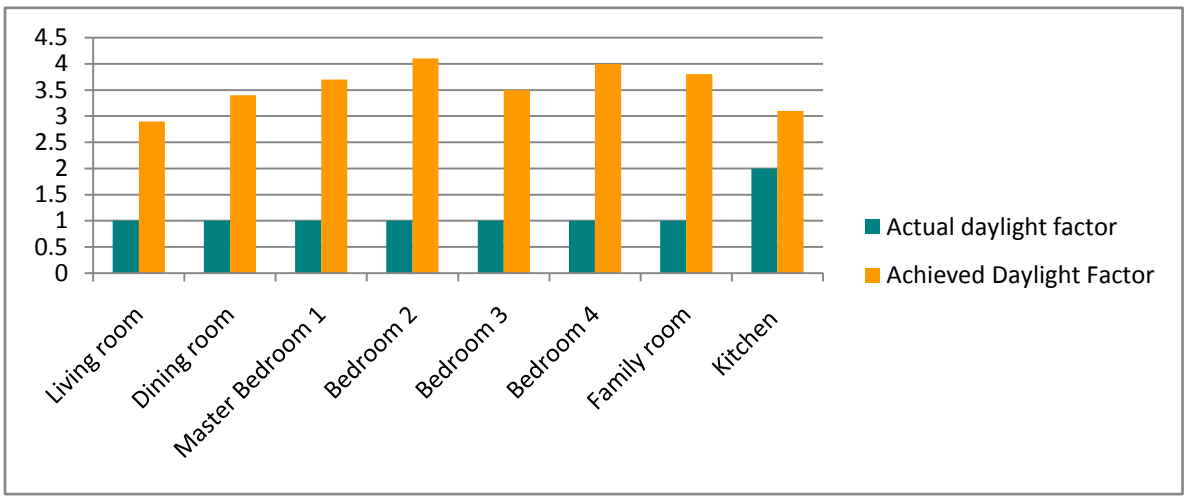


As per the analysis, with the given building specification, the building is achieving fairly high day light in Bedroom and Drawing/dining room and less daylight is achieved in kitchen which is acceptable as per compliance.

Tower A

Type 1- 4 BHK

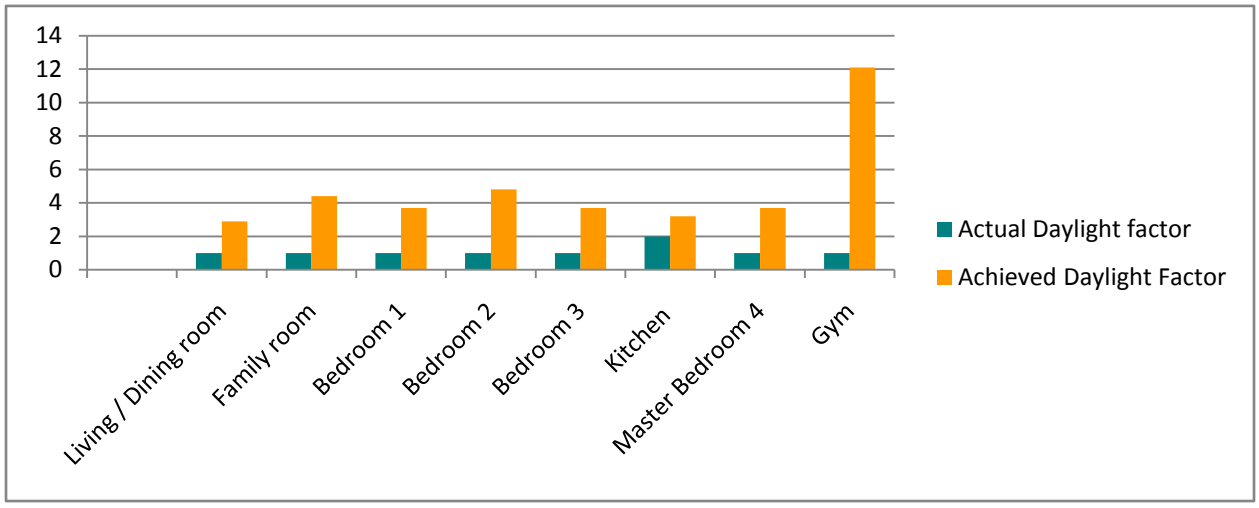
Sr. no	Typical floor flat	Actual daylight factor	Achieved Daylight Factor
1	Living room	1	2.9
2	Dining room	1	3.4
3	Master Bedroom 1	1	3.7
4	Bedroom 2	1	4.1
5	Bedroom 3	1	3.5
6	Bedroom 4	1	4.0
7	Family room	1	3.8
8	Kitchen	2	3.1



As per the analysis, with the given building specification, the living/kitchen and bedroom are achieving fairly high day light in all rooms.

Type 2- 4 BHK(Pent house)

Sr. no	Typical floor flat	Actual daylight factor	Achieved Daylight Factor
1	Living / Dining room	1	2.9
2	Family room	1	4.4
3	Bedroom 1	1	3.7
4	Bedroom 2	1	4.8
5	Bedroom 3	1	3.7
6	Kitchen	2	3.2
7	Master Bedroom 4	1	3.7
8	Gym	1	12.1

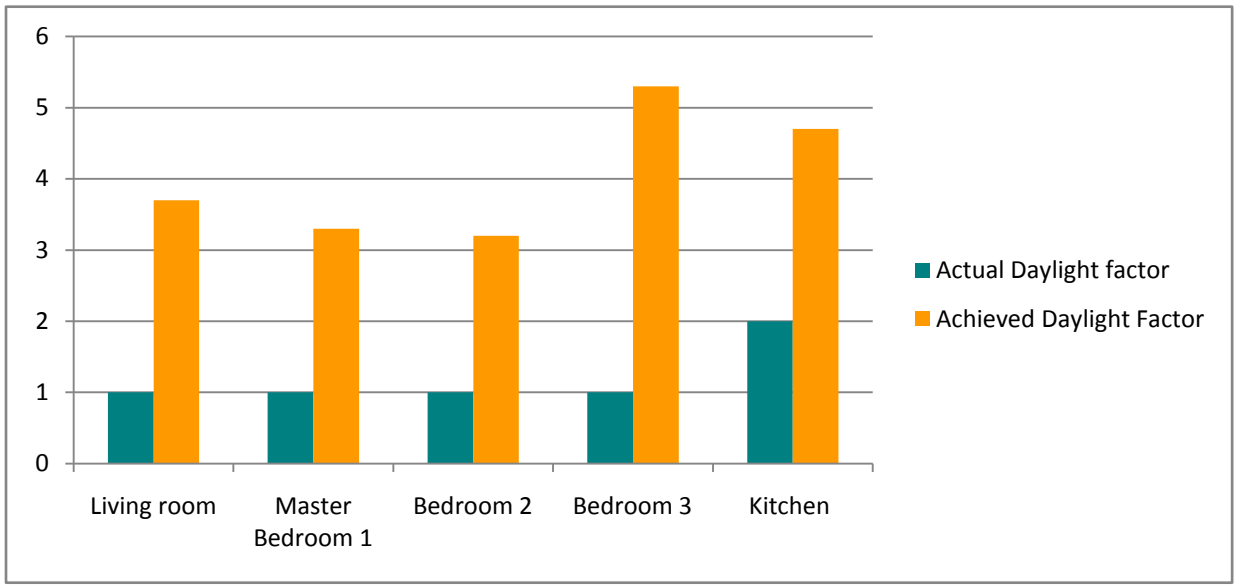


As per the analysis, with the given building specification, the rooms is achieving fairly high day light in all regularly occupied spaces.

Tower B

Type 1- 3BHK

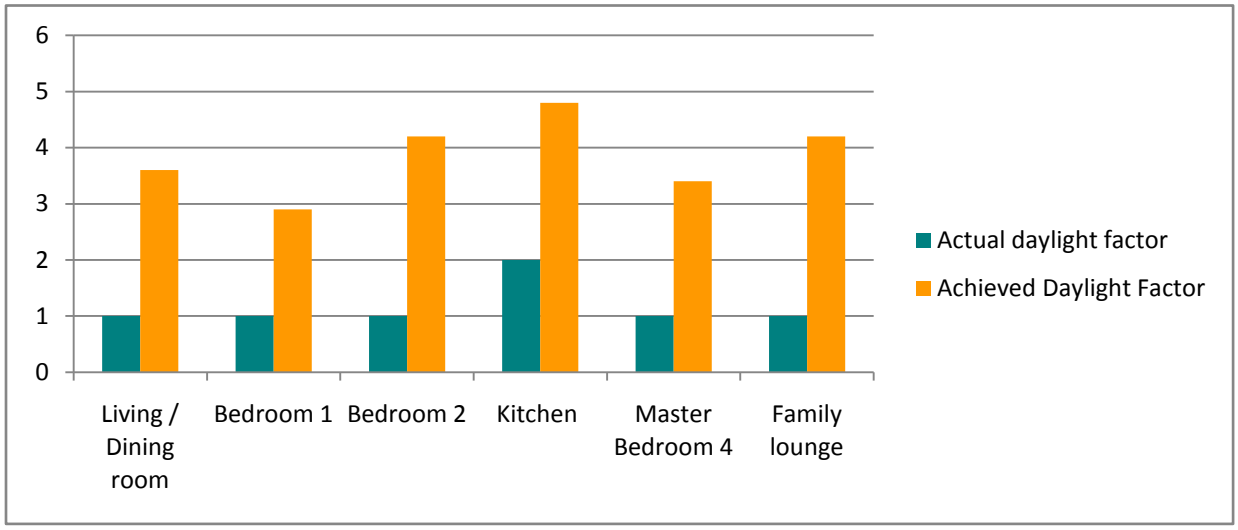
Sr. no	Typical floor flat	Actual Daylight factor	Achieved Daylight Factor
1	Living room	1	3.7
2	Master Bedroom 1	1	3.3
3	Bedroom 2	1	3.2
4	Bedroom 3	1	5.3
5	Kitchen	2	4.7



As per the analysis, with the given building specification, the rooms is achieving fairly high day light in all regularly occupied spaces.

Type 2- 3BHK (Pent house)

Sr. no	Typical floor flat	Actual daylight factor	Achieved Daylight Factor
1	Living / Dining room	1	3.6
2	Bedroom 1	1	2.9
3	Bedroom 2	1	4.2
4	Kitchen	2	4.8
5	Master Bedroom 4	1	3.4
6	Family lounge	1	4.2

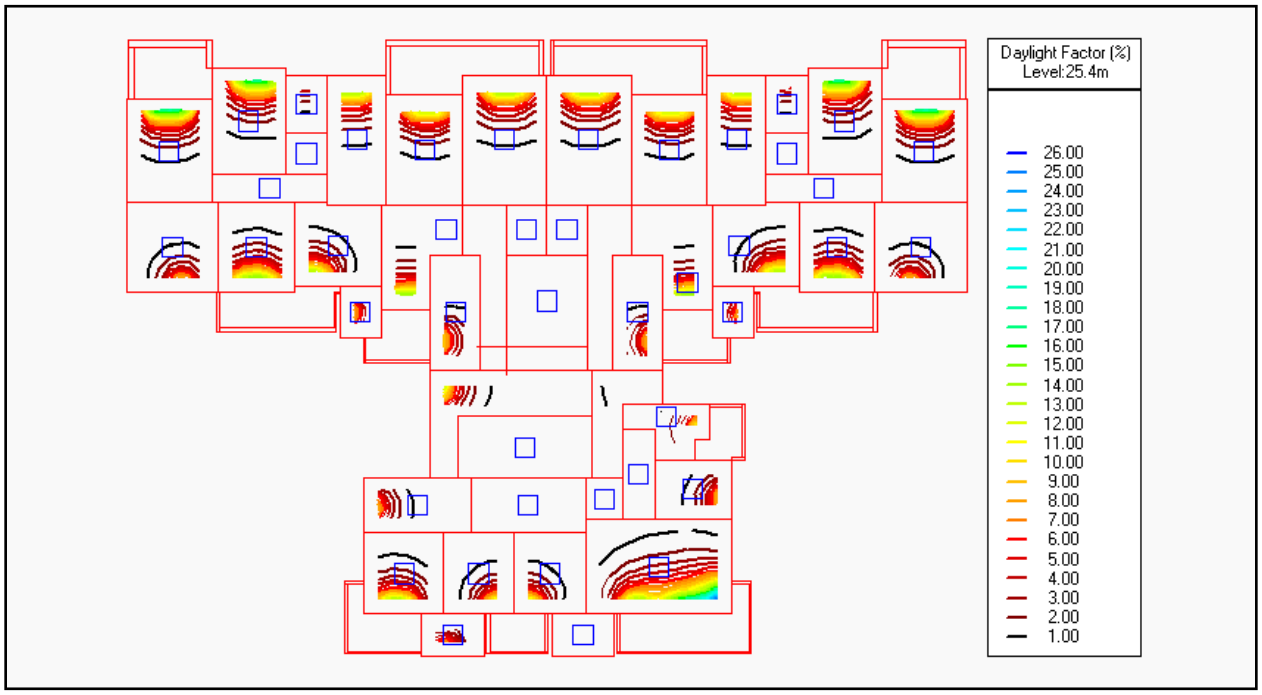


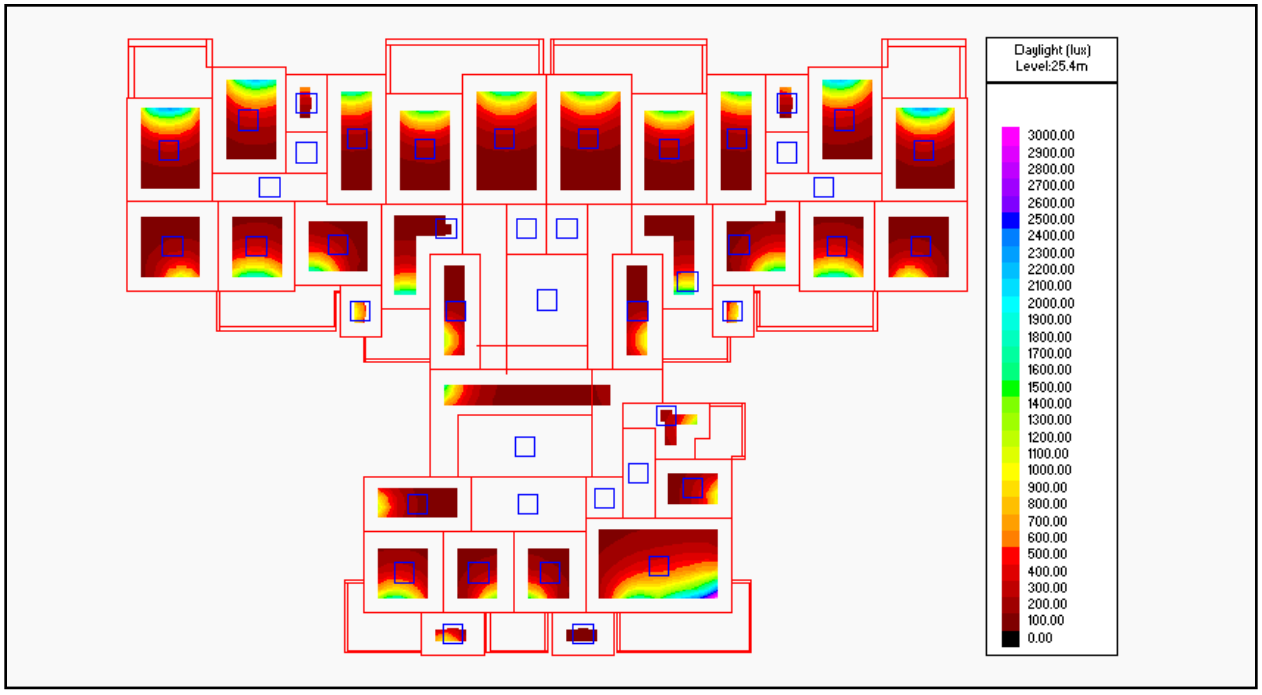
As per the analysis, with the given building specification, the rooms is achieving fairly high day light in all regularly occupied spaces.

Thereby, the project intends to ensure the connectivity between the interior and the exterior environment by providing the adequate daylighting.

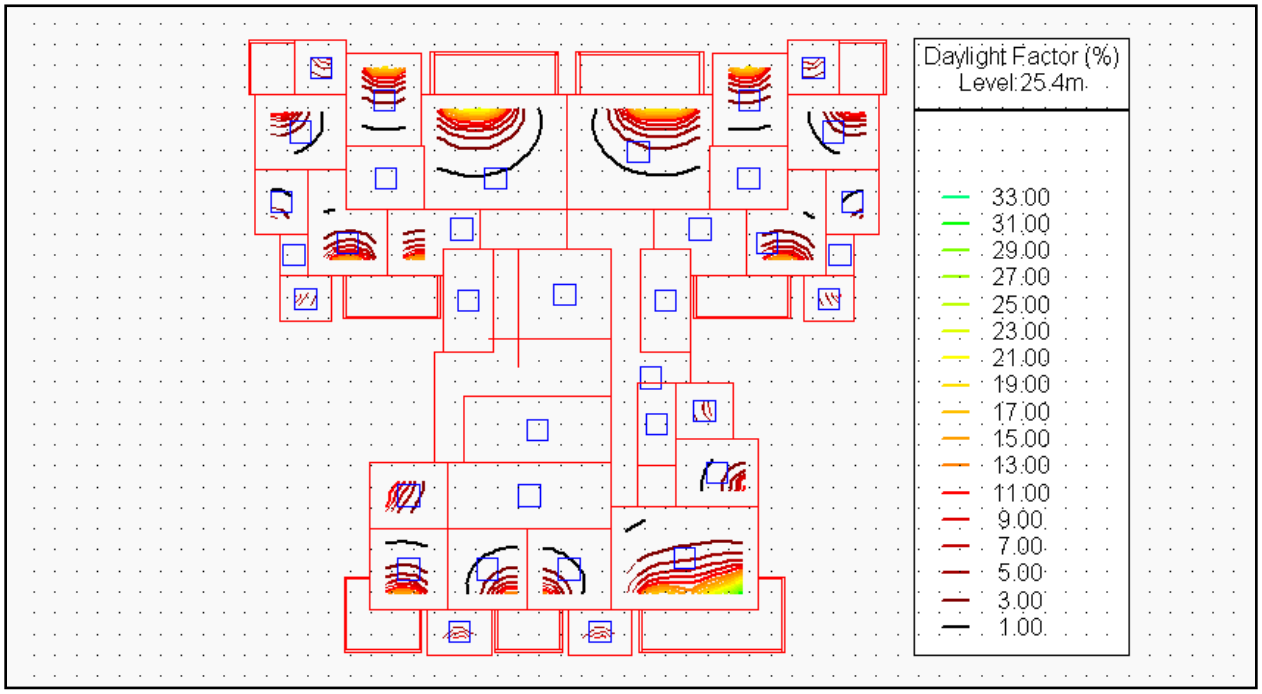
Daylight Graphical Analysis with VLT 62%

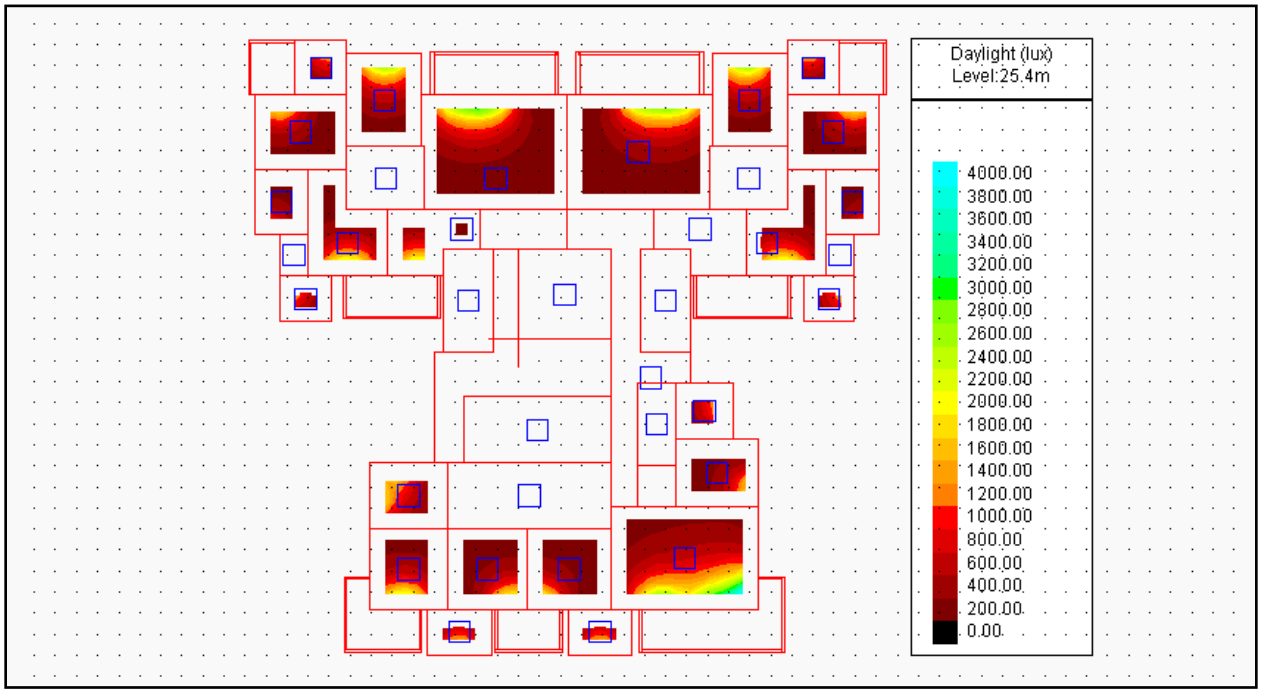
Tower A- Typical floor plan





Tower B- Typical floor plan





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Central Park Belgravia-II Project

2013

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ENERGY ANALYSIS METHODOLOGY

The Proposed Building has been evaluated on the basis of the methodology outlined in ECBC Standard-**Whole Building Performance Method.**

Whole building energy simulation analysis is used to predict the annual energy performance of a building design. The analysis is carried out by first developing a detailed building energy simulation model. The simulation programme is then used to test the thermal response & to calculate the energy use of the building model using a weather data file to capture the climatic impact on the building. This type of analysis is referred as Whole Building Performance (WBP) Method. Whole building energy simulation is the most sophisticated way of analyzing the impact of energy efficiency measures in an integrated manner.

IES <VE> 2012 simulation tool has been used for modelling the baseline and the proposed building.

As specified by the WBP Method, the Proposed and Budget Buildings are identical in terms of:

- Design Model
- Simulation software
- Thermal Blocks
- Weather data (Gurgaon, Delhi, India)
- Occupancies

STANDARADS AND SOFTWARE TOOLS USED FOR ANALYSIS

Standard used for the Analysis

Standard used for the analysis is ECBC (Energy Conservation Building Code). The purpose of ECBC is to provide minimum requirements for energy efficient design & construction of buildings & their systems. Estimates based on computer simulation models indicate that ECBC complaint buildings can use 40-60 % less energy than conventional buildings. It is estimated that a nationwide mandatory enforcement of the ECBC will yield a annual savings of approximately 1.7 billion kWh.

ECBC was developed as a first step towards promoting energy efficiency in the building sector. The ECBC user Guide (also referred to as “The Guide” in this document) has been developed to provide detailed guidance to building owners, designers, engineers, builders, energy consultants, and others on how to comply with the code. It provides expanded interpretation, examples, supplementary information to assist in applying ECBC during the design and construction of new buildings as well as additions and alterations to existing buildings.

This Guide can also be used as a document by “authorities having jurisdiction” in the enforcement of code once it is made mandatory. The guide follows the nomenclature of the code. It is written both as a reference and as a instruction guide, and can be help- full to anyone who is directly or in- directly involved in the construction and design and construction of ECBC-compliant buildings.

The code is applicable to the buildings or building complexes that have a connected load of 500 kW or greater or a contract demand of 600 kVA or greater. This code would become mandatory as and when it is notified by the Central and the State government in the official Gazette (P) of S14 or clause (a) of S 15 of the energy conservation act 2001 (52 of 2001)

This code is applicable to the following Building System-

- Building envelopes expect for unconditioned storage spaces or warehouse
- Mechanical System and equipment, including heating, ventilation and air conditioning, (HVAC)
- Service hot water heating
- Interior and exterior lighting
- Electrical power and motors

This code is not- applicable to the following Building System-

- Buildings that do not use either electricity or fossil- fuel
- Equipment and portions of building system that use energy primarily for manufacturing process

Software used for Analysis

Energy Modelling & Simulation is a holistic approach to achieve energy savings in a building. The process of energy modelling is being done in the following phases:

- 3 Dimensional Modelling
- Base Building Energy Consumption Results
- Development of Energy Efficiency Measures
- Design Building Energy Consumption Results

Software used for the Project is IES. IES <VE>

Integrated Environmental Solutions (IES) is a world leading provider of integrated performance analysis software and consulting services for sustainable building design. Comparative analysis at the early stage, using ballpark figures, is useful to check feasibility, quantify and inform design team decision making. It can help with those all important master planning, orientation, massing and form decisions; justifying choices and differentiating project proposals.

Detailed analysis provides more accurate figures and results for system sizing, fine tuning, compliance, costing and documentation. Results and analysis can be presented to clients and building control, justifying design decisions and offering you competitive advantage.

IES provides a wide range of different analysis options and capabilities designed to give feedback quickly and efficiently at the relevant level. All are powered by the sophisticated <Virtual Environment> performance modelling engine that undertakes detailed simulations at hourly or smaller increments as necessary.

Energy Simulation Software Salient Features

- Undertake energy performance snapshots to assess impact of design decisions
- Develop building loads and impact of conservation strategies
- Develop carbon footprint reduction strategies
- Assess passive/hybrid/renewable strategies
- Assess the impact of daylight and solar
- Incorporate bulk airflow, ventilation and indoor air quality into the equation
- Assess compliance with a range of worldwide regulations and voluntary codes

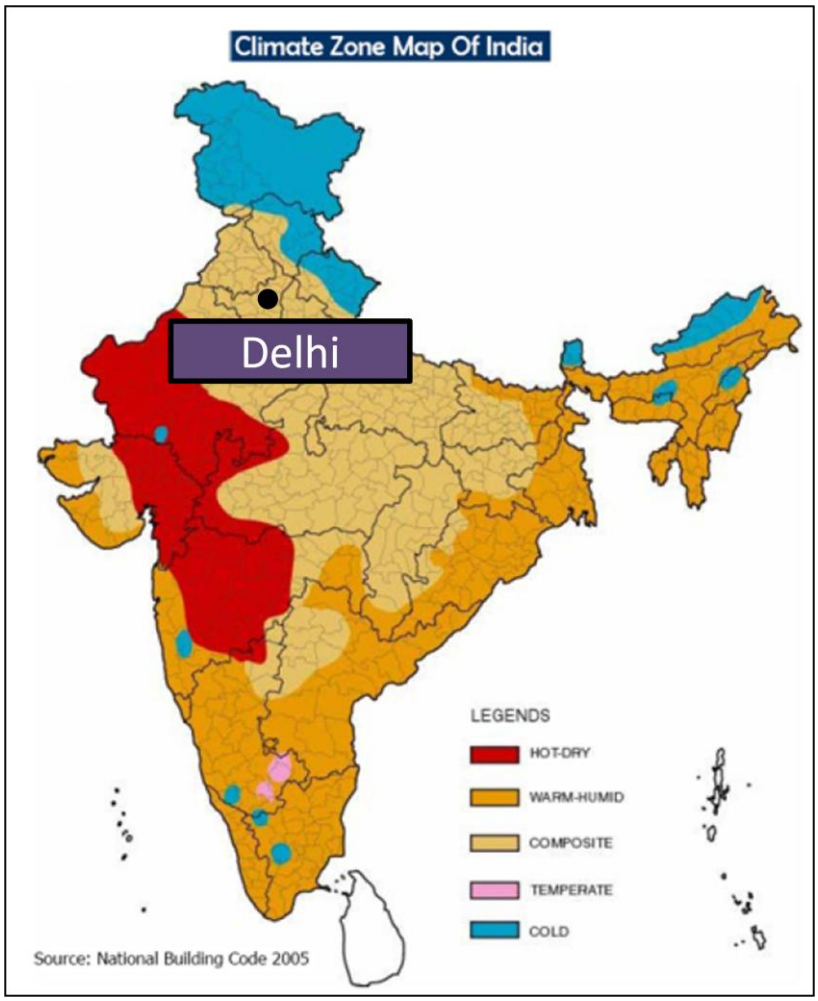
We have used the following modules of IES for completion of this report:

- Model IT – 3D building modeller
- Sun Cast – Solar shading analysis
- FlucsDL– Day Light analysis
- ApacheSim – Thermal analysis

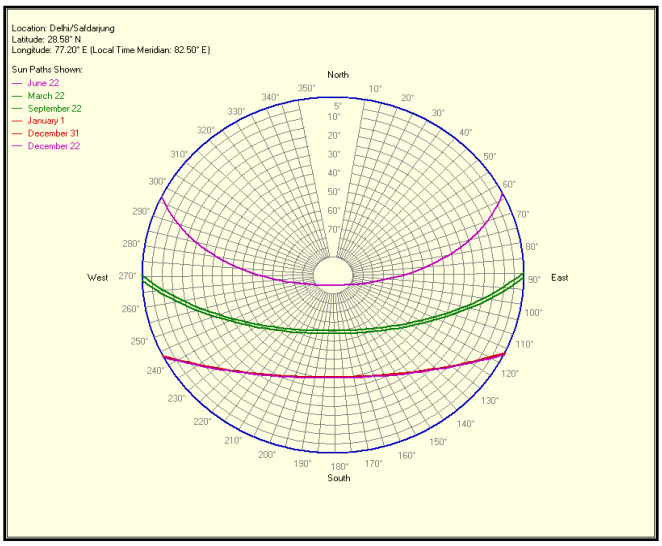
PROJECT TECHNICAL DESIGN SUMMARY

Climatology

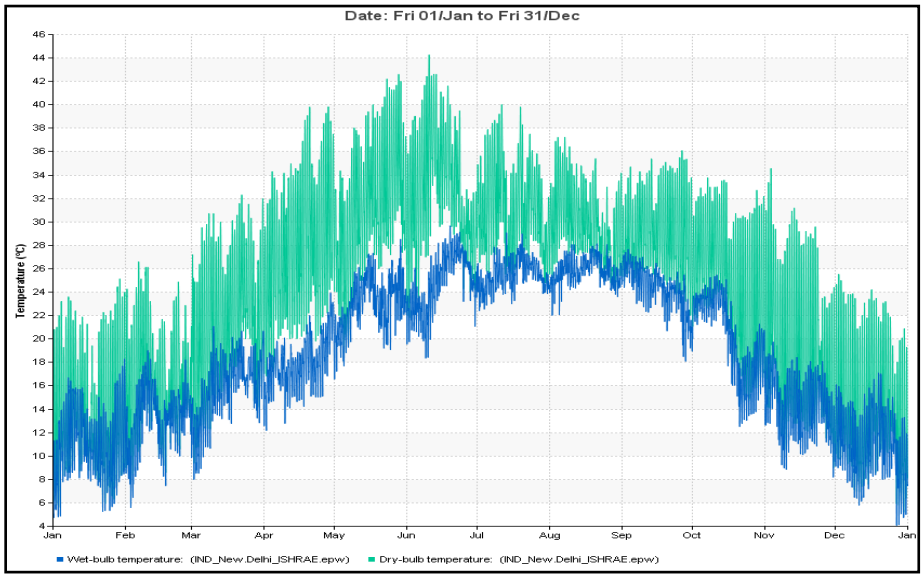
India possesses large variety of climates, which broadly categorizes into five regions. Project is located in Gurgaon, Delhi. According to ECBC User Guide, Table 13.2, Climatic Zones of Major Indian Cities, Project follows Composite climate as shown in the adjoining image



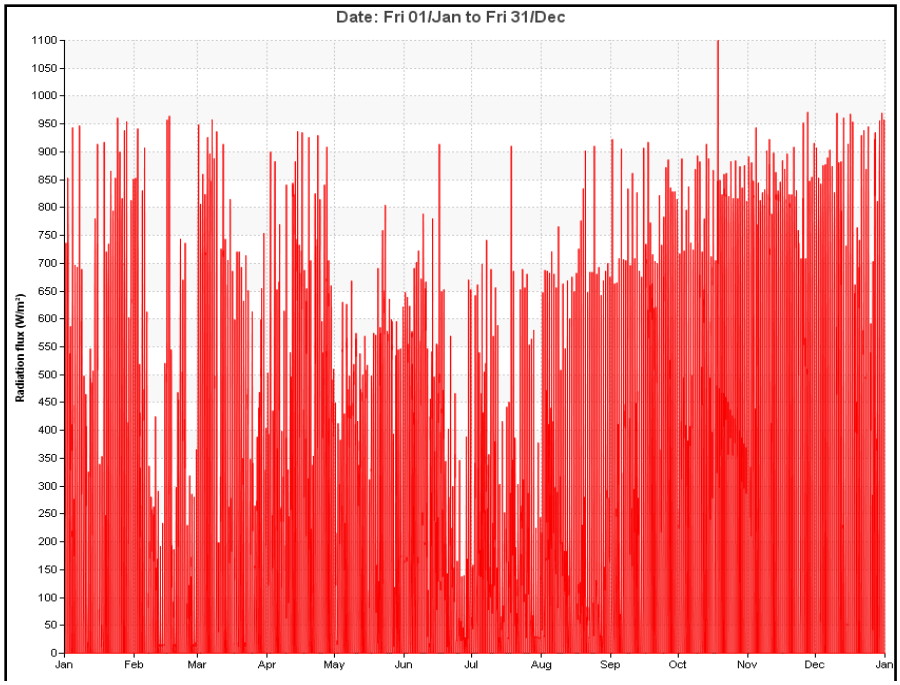
Sun Path Diagram



Minimum and Maximum Temperatures at Gurgaon



Dry Bulb & Wet bulb Variation



Radiation Graph

Energy Input Parameters

Following is the summary of input parameters of Base case as per ECBC & Proposed case as per design of the Project:

Base & Proposed Case Parameters

BASE & PROPOSED CASE PARAMETERS		
Model Input Parameter	**Proposed Design Input**	**Base case Design Input**
Exterior Wall Construction	RCC walls, With Insulated paint. U value: 1.7855W/ m^2 K	U Value of overall assembly 0.440 W/ m^2 K. Minimum R value of insulation alone 2.10 m2 K/W
Roof Construction	Standard Roof with SRI paint U value 0.605 W/m2 K	U Value of overall assembly 0.409 W/ m^2 K. Minimum R value of insulation alone 2.1 m2 K/W
Fenestration U Value	DGU U value-1.77 W/ m^2K	3.30 W/ m^2 K
Fenestration SHGC	0.36	0.20
Fenestration VLT	62%	Minimum VLT 27 %
LPD (W/m2)	Space by Space Method for Lighting Power density calculation considered	
EPD (W/m2)	Space wise Equipment Power density calculated and provided in section ….	

Envelope Analysis

Exterior Wall Parameters

Exterior Wall (outer to Inner)	Thickness (m)	k-Value (w/m ^{0}K)	Density, kg/m^3	U-value w/m^{20}k (k/Thickness)	R-value (1/U)
POP inner side	0.009	0.16	801	17.77778	0.05625
Cement Plaster	0.012	0.5	1300	41.66667	0.024
Common Brick	0.23	0.84	1700	3.652174	0.27381
Cement Plaster outer side	0.018	0.5	1300	27.77778	0.036
Overall exterior wall value	**0.4**			**1.785**	**0.097515**

Roof Assembly Parameters

Roof Assembly	Thickness (m)	k-Value (w/m ^{0}K)	Density, kg/m^3	U-value w/m^{20}k (k/Thickness)	R-value (1/U)
Brick bat coba	0.125	0.19	600	1.52	0.658
Cement concrete slab	0.125	0.16	500	1.28	0.781
Cement plaster	0.006	0.5	1300	83.33333	0.012
POP	0.009	0.16	801	17.77778	0.056
Overall exterior wall value	**0.435**			**0.607**	**0.377**

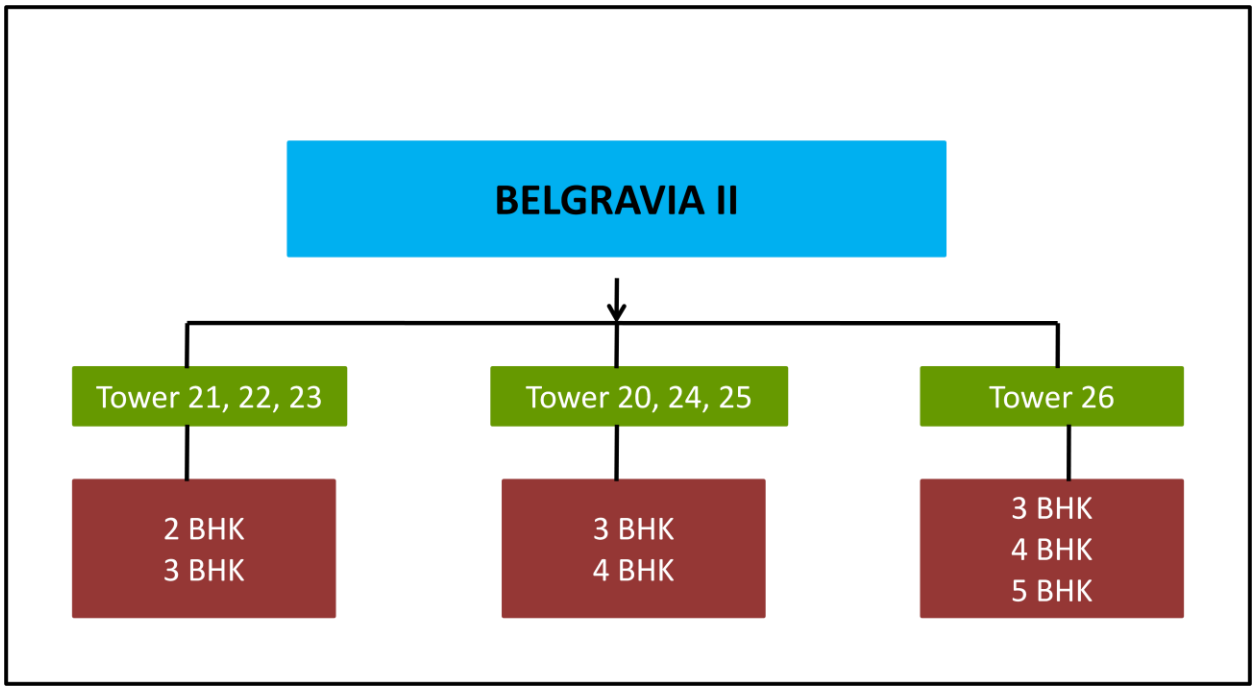
Lighting Analysis

LPD Calculation for Exterior & Interior

Lighting	Applicable Areas	Base case Lighting Power Density (LPD)	Design Lighting Power Density (LPD) 30% Reduction	Design Lighting Power Density (LPD) 20% Reduction
Interior Lighting **(for residential units)**	Individual dwelling unit, Apartments, Villas, Gated communities	5.00 W/m2	3.5 W/m2	4 W/m2
Exterior Lighting, excluding Parking Area (for residential & nonresidential units)	Landscaping, Façade, Street lighting, Pathways, Signage's, etc.,	2.5 W/m2	1.75 W/m2	2 W/m2
Common Area Lighting, excluding Parking Area (for residential & nonresidential units)	Corridors, Lobbies, Staircases, Terrace, etc.,	4.0 W/m2	2.8 W/m2	3.2 W/m2
Parking Area	Surface parking (covered & uncovered), Basement parking,	2.5 W/m2	1.75 W/m2	2 W/m2

- **The project must ensure that the interior, exterior, common and parking area lighting Power densities are reduced by at least 20% from the baseline values through 'building area method'**
- **For Lighting Power Density (LPD) Design case, 30% reduction is considered for analysis.**

BUILDING MAPPING

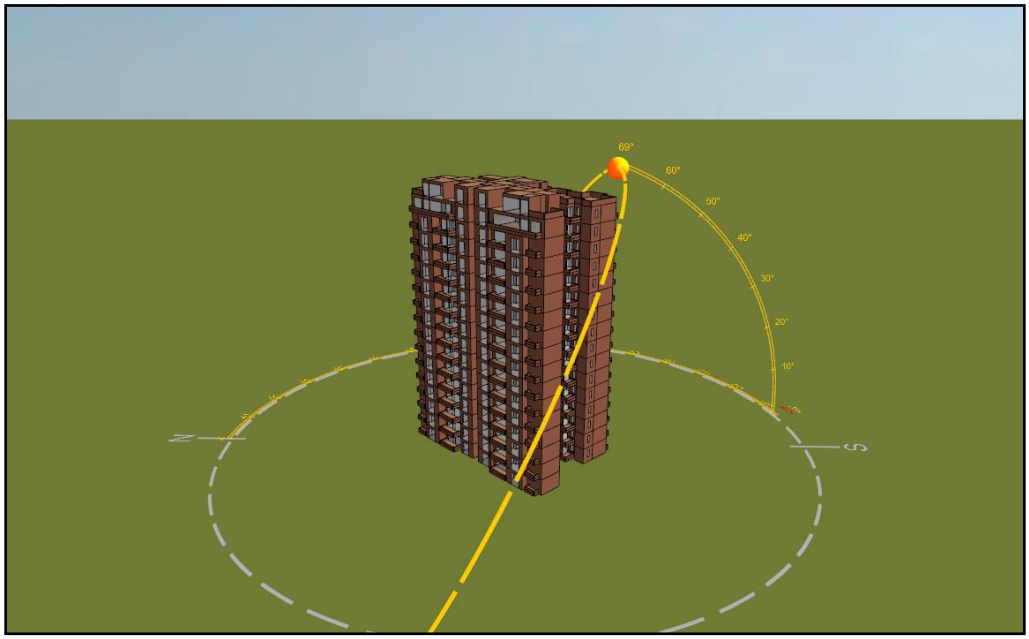


The table shown above is the summary of the Central park-Belgravia II project and we are considering residential areas for our analysis. We have considered the typical floors of Tower 20 to 26 for analysis.

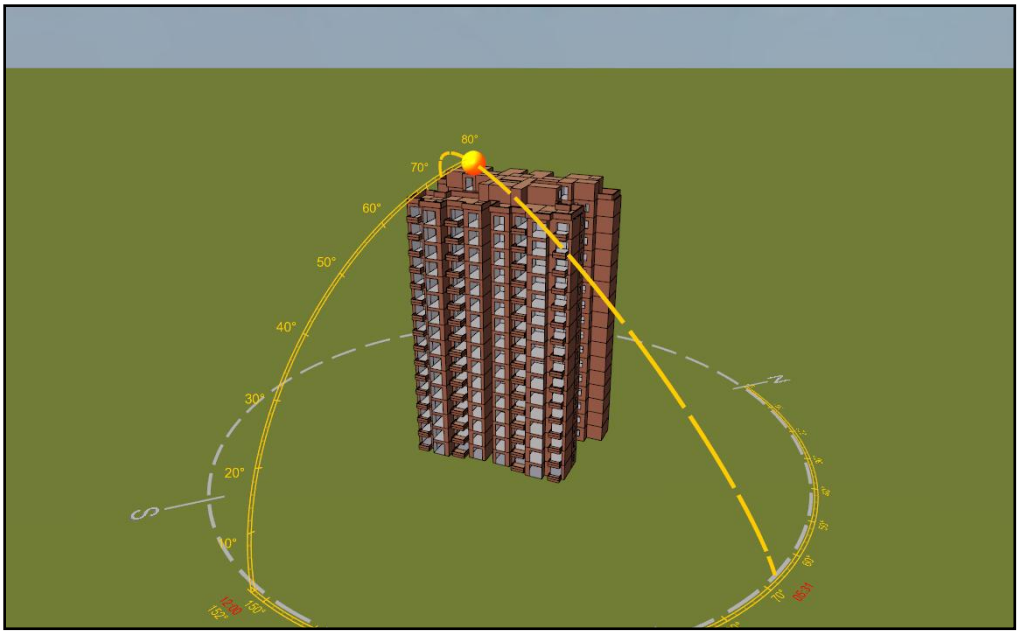
CENTRAL PARK-BELGRAVIA-II ANALYSIS

Energy & Day Light Analysis of Belgravia-II building

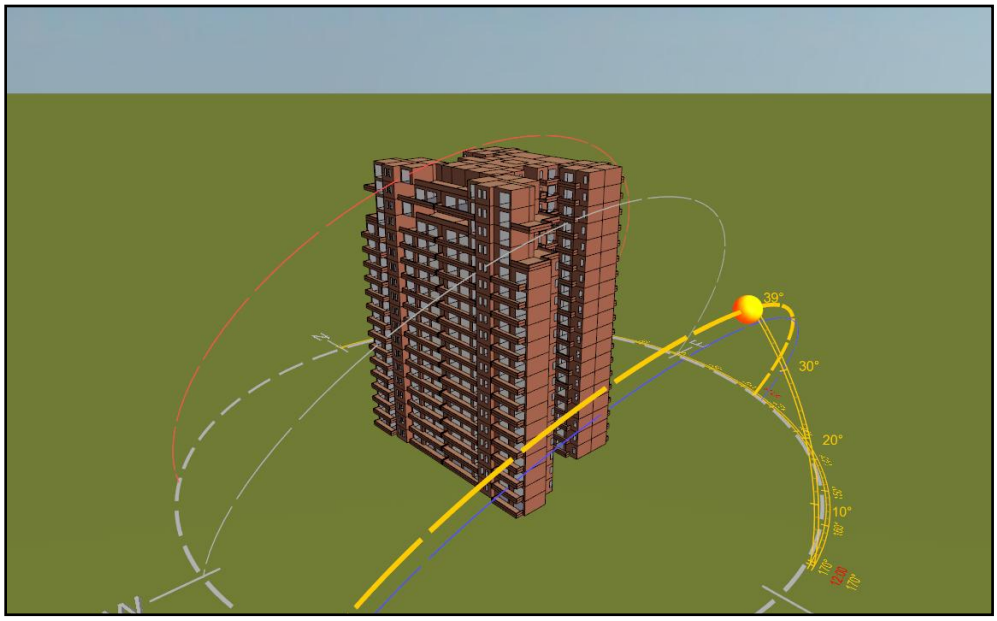
Tower 21, 22, 23



Tower 20, 24, 25



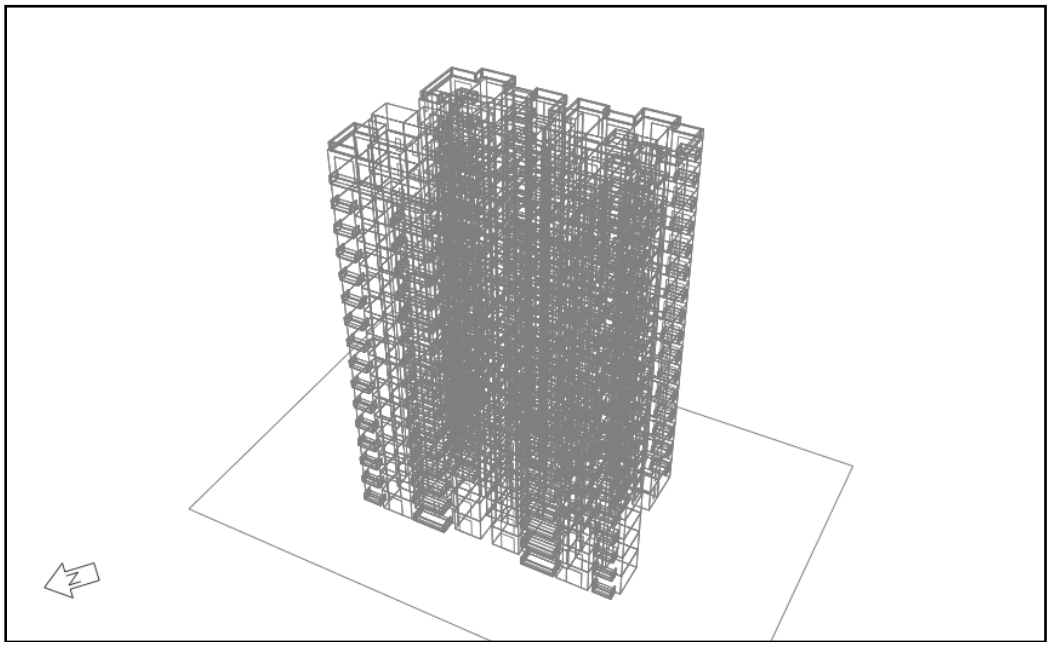
Tower 26



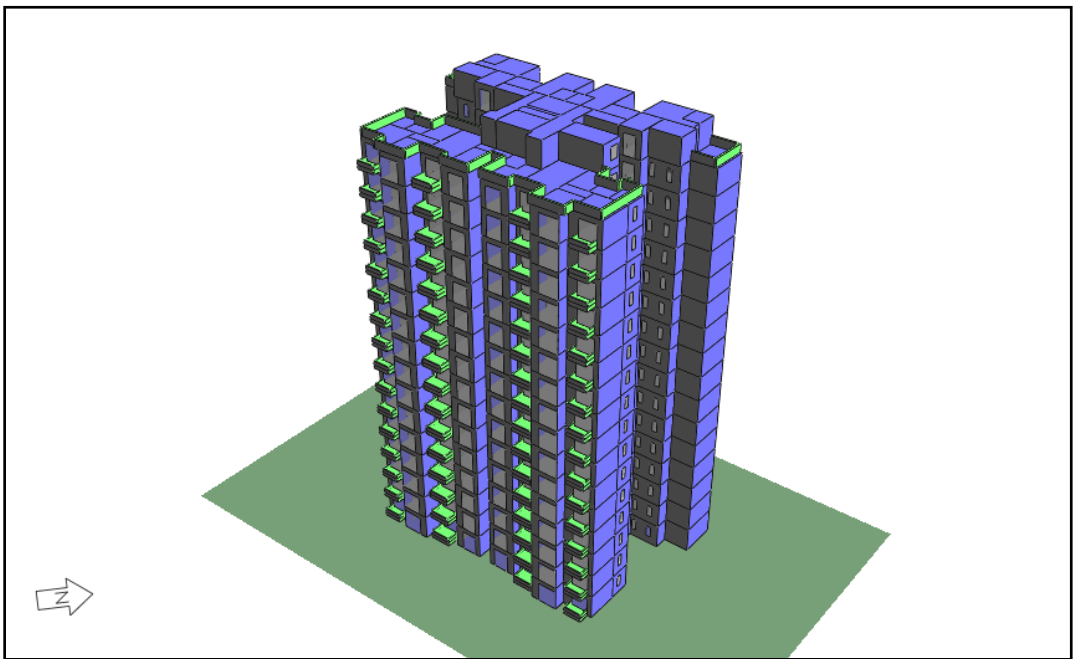
Sun Path Analysis: Energy & Daylighting

Energy Models

Envelope Design Model of The Tower 21, 22, 23

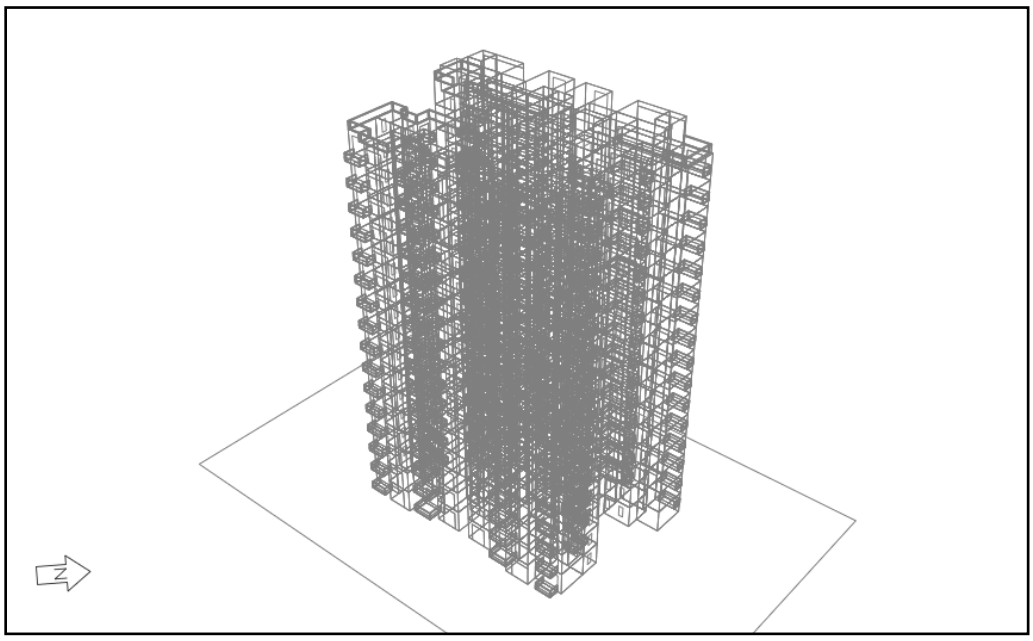


Energy Model Image of the Tower 21, 22, 23

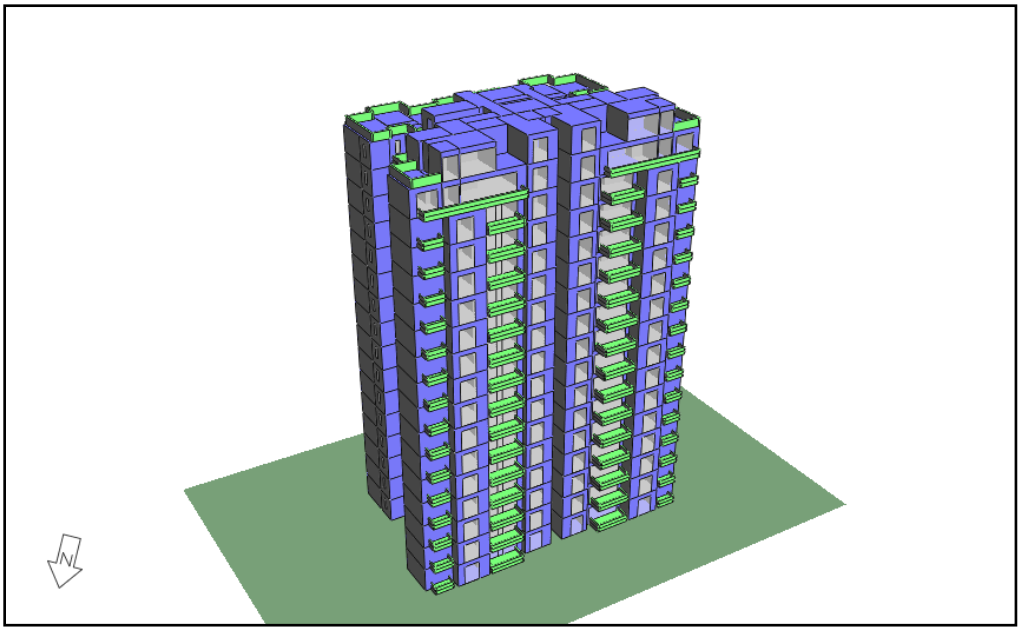


Energy Models

Envelope Design Model of The Tower 20, 24, 25

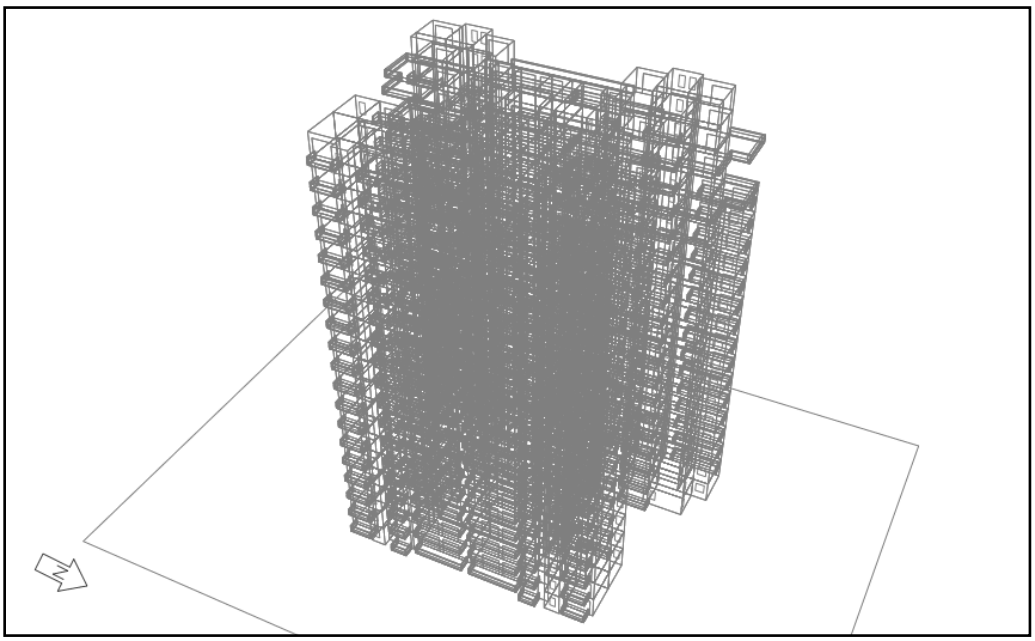


Energy Model Image of the Tower 20, 24, 25

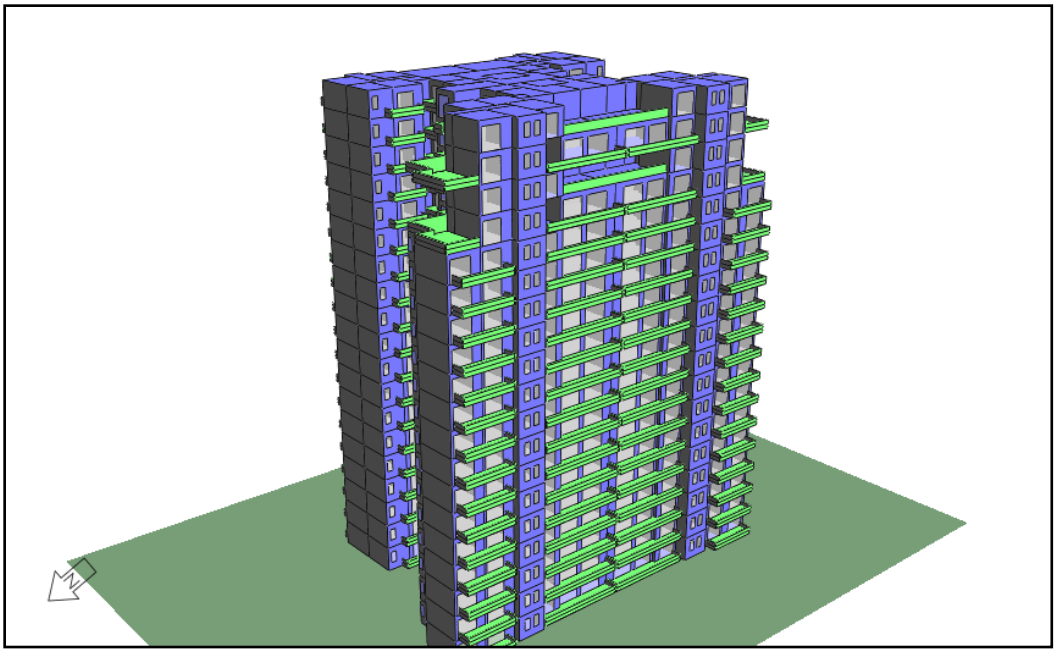


Energy Models

Envelope Design Model of The Tower 26



Energy Model Image of the Tower 26



Energy Performance Benchmarking

Design Case Energy Consumption

Month	Total lights energy (MWh)	Total equip energy (MWh)
Date		
Jan 01-31	32.1501	37.6115
Feb 01-28	29.0388	33.9717
Mar 01-31	32.1501	37.6115
Apr 01-30	31.113	36.3982
May 01-31	32.1501	37.6115
Jun 01-30	31.113	36.3982
Jul 01-31	32.1501	37.6115
Aug 01-31	32.1501	37.6115
Sep 01-30	31.113	36.3982
Oct 01-31	32.1501	37.6115
Nov 01-30	31.113	36.3982
Dec 01-31	32.1501	37.6115
Summed total	378.5409	442.8453

Base Case Energy Consumption

Month	Total lights energy (MWh)	Total equip energy (MWh)
Date		
Jan 01-31	45.9269	53.7316
Feb 01-28	41.4824	48.5318
Mar 01-31	45.9269	53.7316
Apr 01-30	44.4454	51.9983
May 01-31	45.9269	53.7316
Jun 01-30	44.4454	51.9983
Jul 01-31	45.9269	53.7316
Aug 01-31	45.9269	53.7316
Sep 01-30	44.4454	51.9983
Oct 01-31	45.9269	53.7316
Nov 01-30	44.4454	51.9983
Dec 01-31	45.9269	53.7316
Summed total	540.7522	632.6463

Comparison between Design & Base Case

Alternative	Total lights energy (MWH)	Total equipments (MWH)
Base case	540.7522	632.6463
Design case	378.5409	442.8453
Energy Cost Savings over Base case	**30%**	**30%**

Result Summary

- In Compared results of Design and Base case, **30%** saving are noticed (base on the 30% reduction in Lighting Power Densities; Refer Table on Pg No. 12)
- For additional efficiencies, Sensors are recommended for the non-regularly occupied spaces.

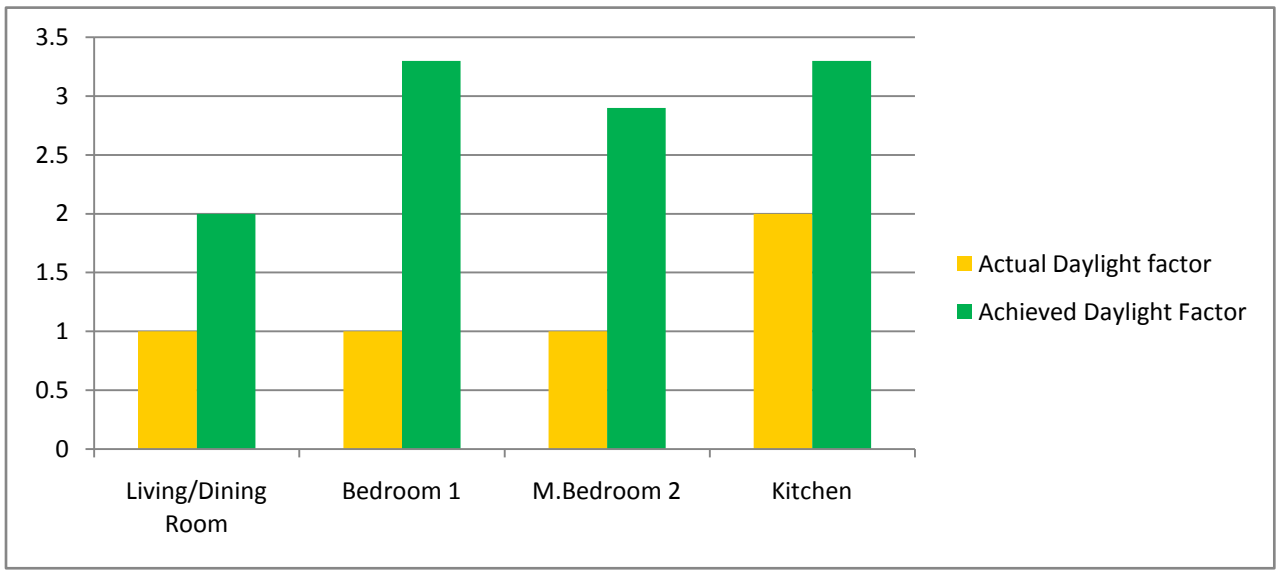
Daylight Analysis

Comparison between Design & LEED Requirement

Tower 21,22,23

Type 1 -2BHK

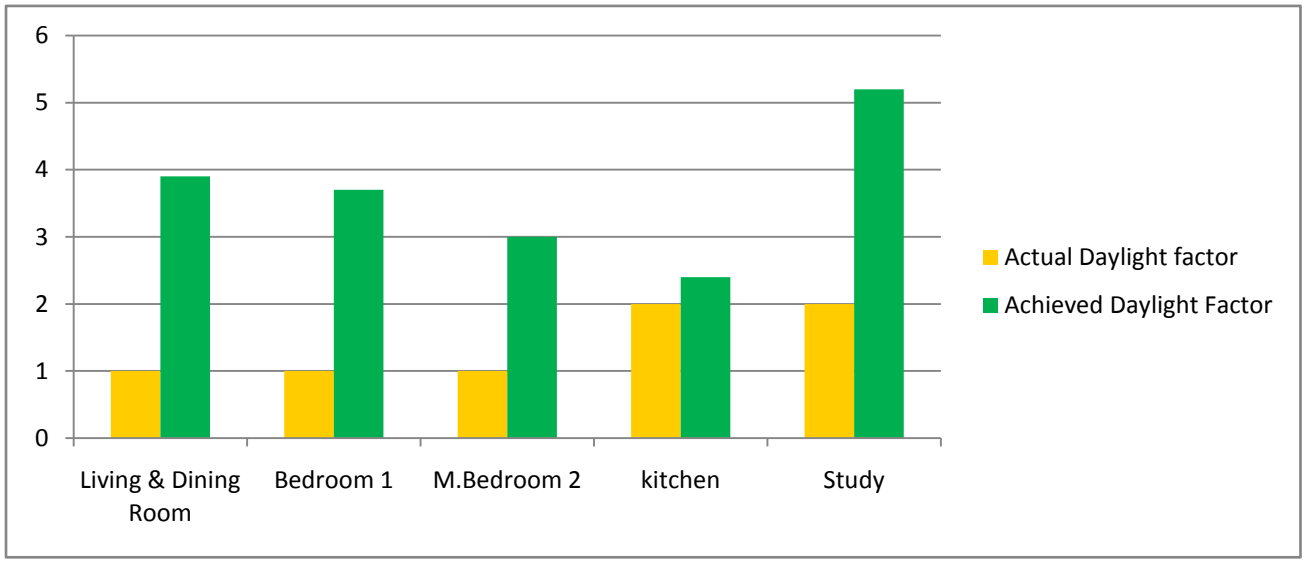
Sr. no	Typical floor flat	Actual Daylight factor	Achieved Daylight Factor
1	Living/Dining Room	1	2.0
2	Bedroom 1	1	3.3
3	M.Bedroom 2	1	2.9
4	Kitchen	2	3.3



As per the analysis, with the given building specification the building is achieving fairly high day light in all regularly occupied spaces.

Type 2- 2 BHK

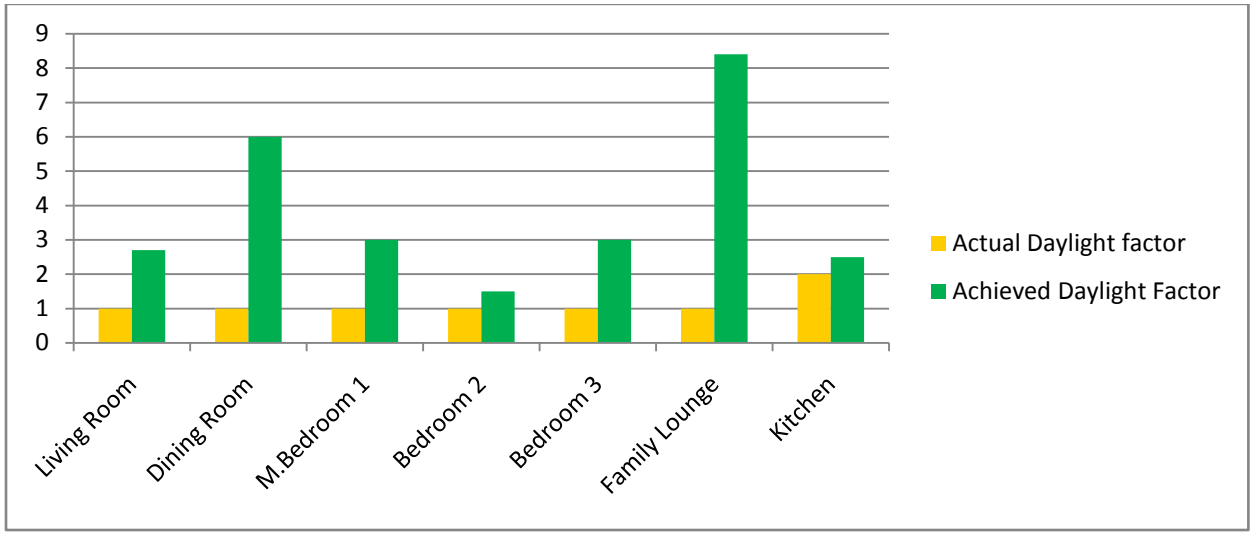
Sr. no	Typical floor flat	Actual Daylight factor	Achieved Daylight Factor
1	Living & Dining Room	1	3.9
2	Bedroom 1	1	3.7
3	M.Bedroom 2	1	3.0
4	kitchen	2	2.4
5	Study	2	5.2



As per the analysis, with the given building specification, the building is achieving fairly high day light in regularly occupied areas.

Type 3- 3BHK

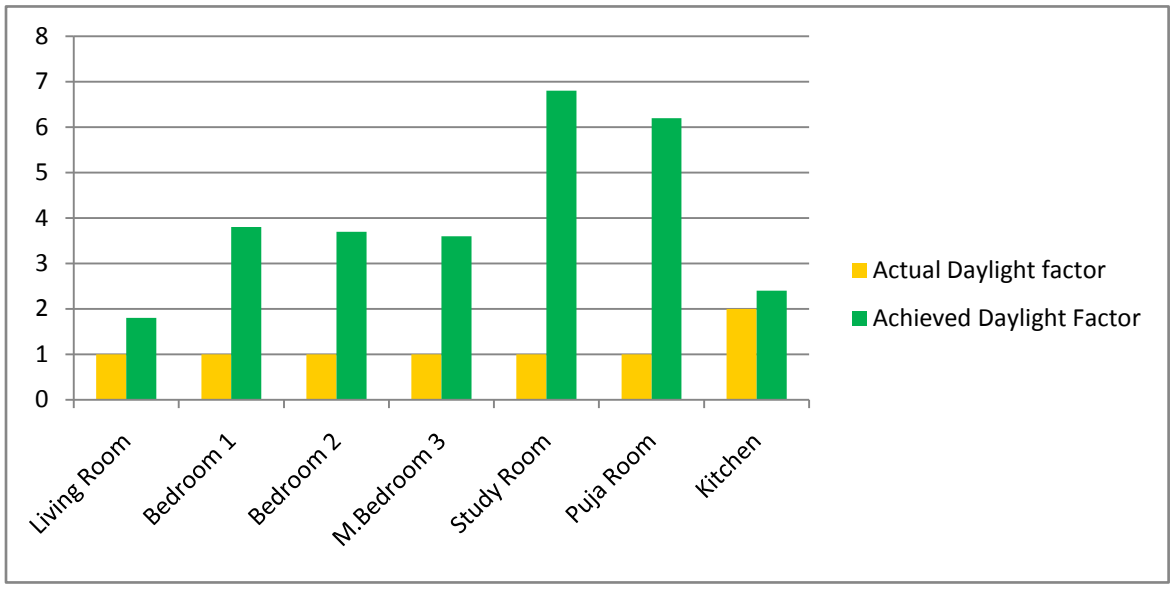
Sr. no	Typical floor flat	Actual Daylight factor	Achieved Daylight Factor
1	Living Room	1	2.7
2	Dining Room	1	6.0
3	M.Bedroom 1	1	3.0
4	Bedroom 2	1	1.5
5	Bedroom 3	1	3.0
6	Family Lounge	1	8.4
7	Kitchen	2	2.5



As per the analysis, with the given building specification, the building is achieving fairly high day light in regularly occupied areas.

Type 4- 3 BHK

Sr. no	Typical floor flat	Actual Daylight factor	Achieved Daylight Factor
1	Living Room	1	1.8
2	Bedroom 1	1	3.8
3	Bedroom 2	1	3.7
4	M.Bedroom 3	1	3.6
5	Study Room	1	6.8
6	Puja Room	1	6.2
7	Kitchen	2	2.4

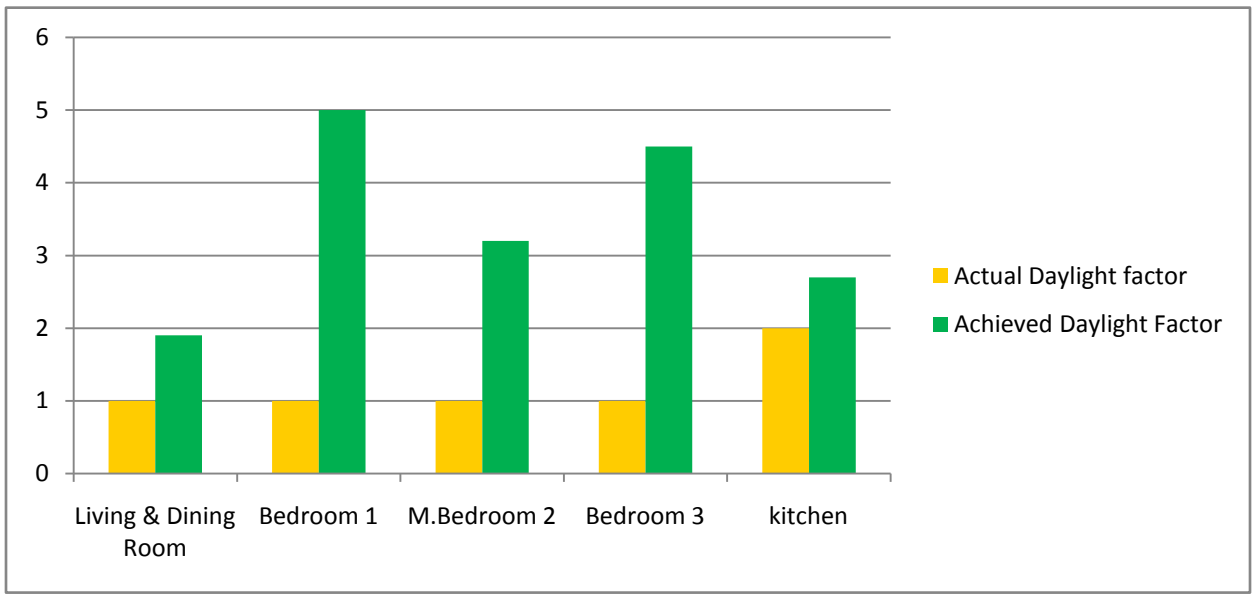


As per the analysis, with the given building specification, the living/kitchen and bedroom are achieving fairly high day light in all rooms.

Tower 20,24,25

Type 1-3 BHK

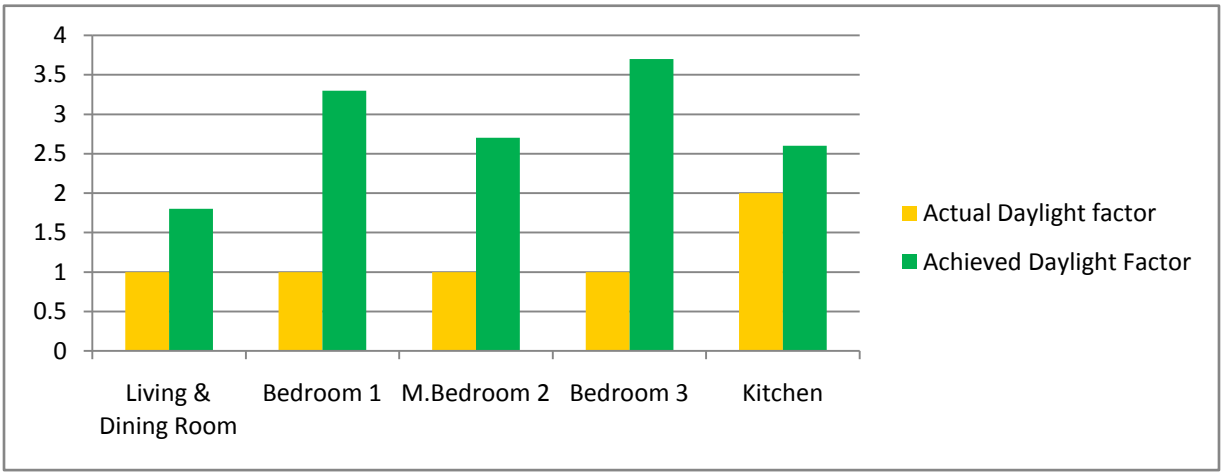
Sr. no	Typical floor flat	Actual Daylight factor	Achieved Daylight Factor
1	Living & Dining Room	1	1.9
2	Bedroom 1	1	5.0
3	M.Bedroom 2	1	3.2
4	Bedroom 3	1	4.5
5	kitchen	2	2.7



As per the analysis, with the given building specification, the rooms is achieving fairly high day light in all regularly occupied spaces.

Type 2- 3BHK

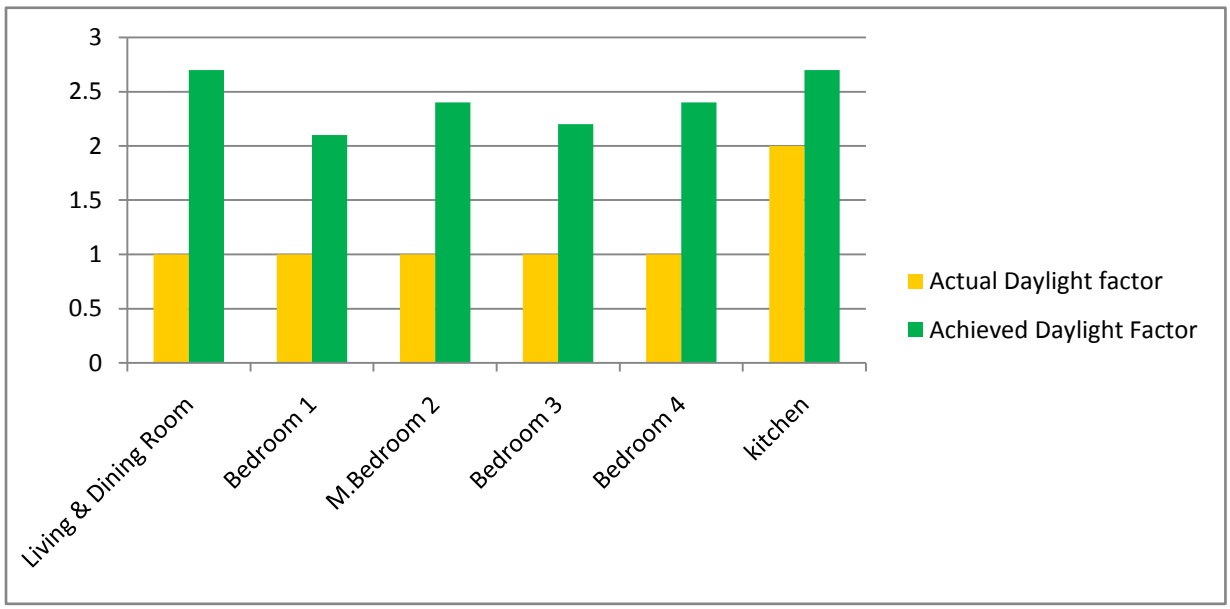
Sr. no	Typical floor flat	Actual Daylight factor	Achieved Daylight Factor
1	Living & Dining Room	1	1.8
2	Bedroom 1	1	3.3
3	M.Bedroom 2	1	2.7
4	Bedroom 3	1	3.7
5	Kitchen	2	2.6



As per the analysis, with the given building specification, the rooms is achieving fairly high day light in all regularly occupied spaces.

Type 3- 4BHK (Duplex flat)

Sr. no	Typical floor flat	Actual Daylight factor	Achieved Daylight Factor
1	Living & Dining Room	1	2.7
2	Bedroom 1	1	2.1
3	M.Bedroom 2	1	2.4
4	Bedroom 3	1	2.2
5	Bedroom 4	1	2.4
6	kitchen	2	2.7

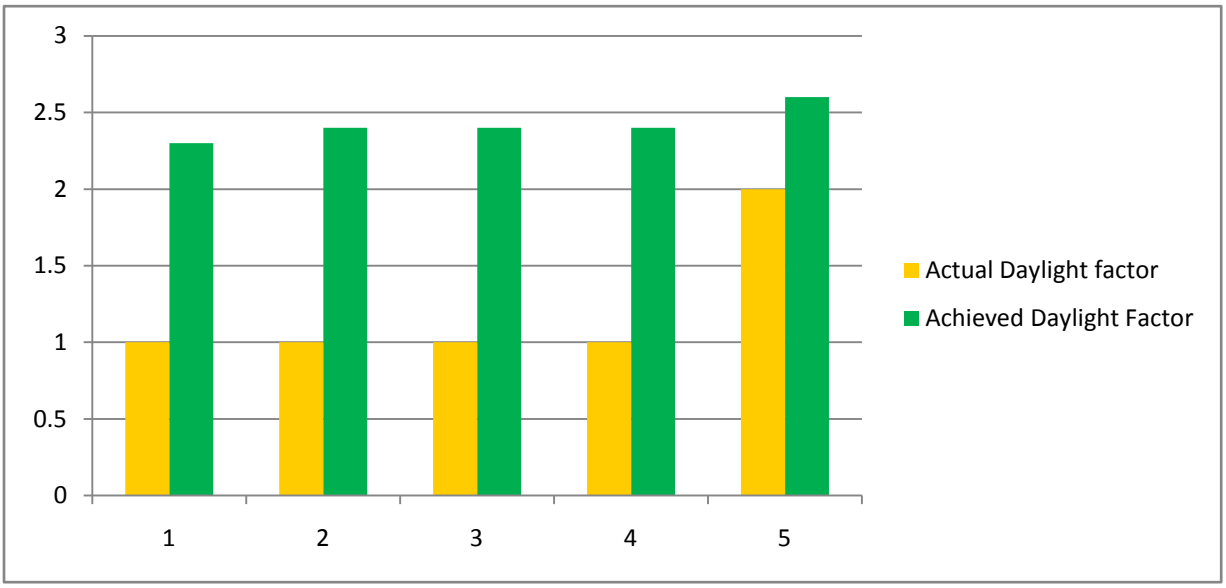


As per the analysis, with the given building specification, the rooms is achieving fairly high day light in all regularly occupied spaces.

Tower 26

Type 1- 3BHK

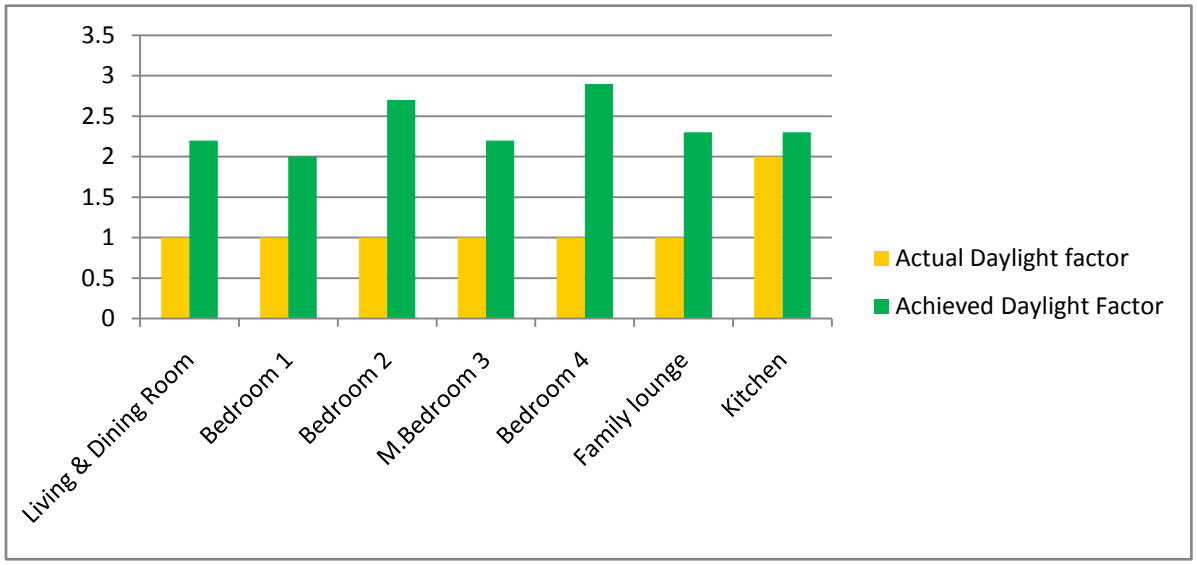
Sr. no	Typical floor flat	Actual Daylight factor	Achieved Daylight Factor
1	Living & Dining Room	1	2.3
2	Bedroom 1	1	2.4
3	M.Bedroom 2	1	2.4
4	Bedroom 3	1	2.4
5	kitchen	2	2.6



As per the analysis, with the given building specification, the rooms is achieving fairly high day light in all regularly occupied spaces.

Type 2- 4BHK

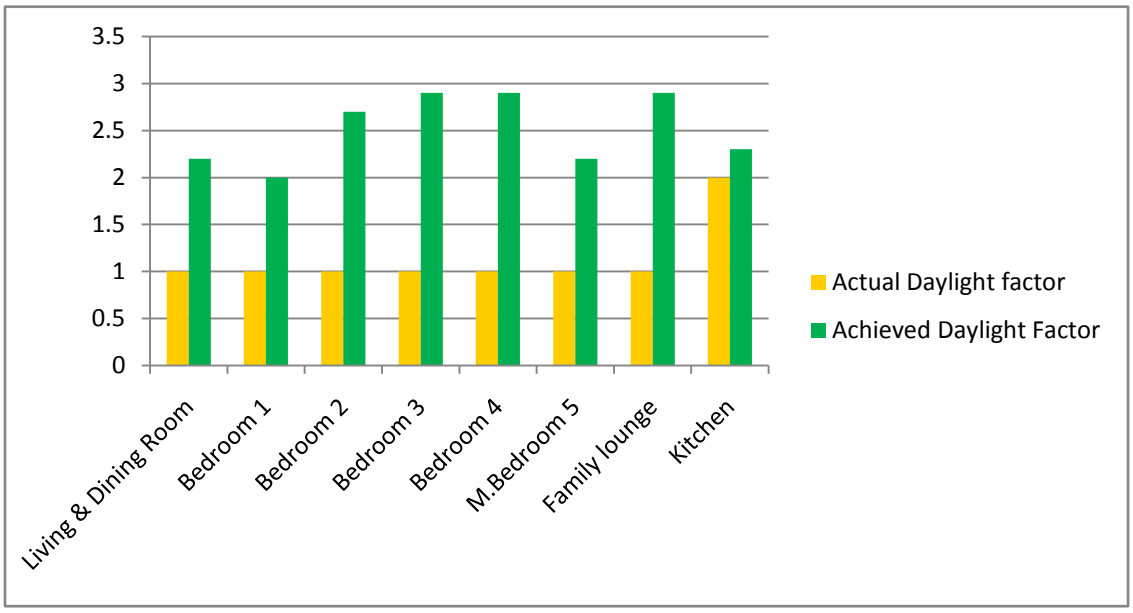
Sr. no	Typical floor flat	Actual Daylight factor	Achieved Daylight Factor
1	Living & Dining Room	1	2.2
2	Bedroom 1	1	2.0
3	Bedroom 2	1	2.7
4	M.Bedroom 3	1	2.2
5	Bedroom 4	1	2.9
6	Family lounge	1	2.3
7	Kitchen	2	2.3



As per the analysis, with the given building specification, the rooms is achieving fairly high day light in all regularly occupied spaces.

Type 3- 5BHK

Sr. no	Typical floor flat	Actual Daylight factor	Achieved Daylight Factor
1	Living & Dining Room	1	2.2
2	Bedroom 1	1	2.0
3	Bedroom 2	1	2.7
4	Bedroom 3	1	2.9
5	Bedroom 4	1	2.9
6	M.Bedroom 5	1	2.2
7	Family lounge	1	2.9
8	Kitchen	2	2.3

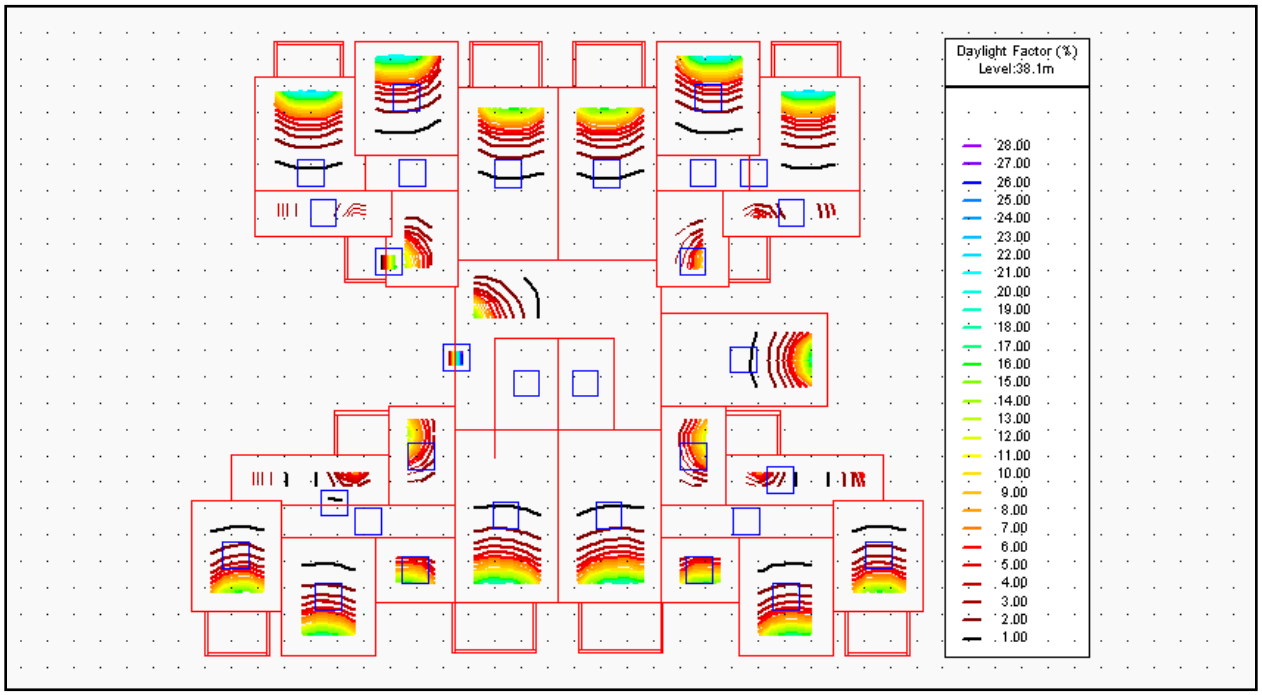


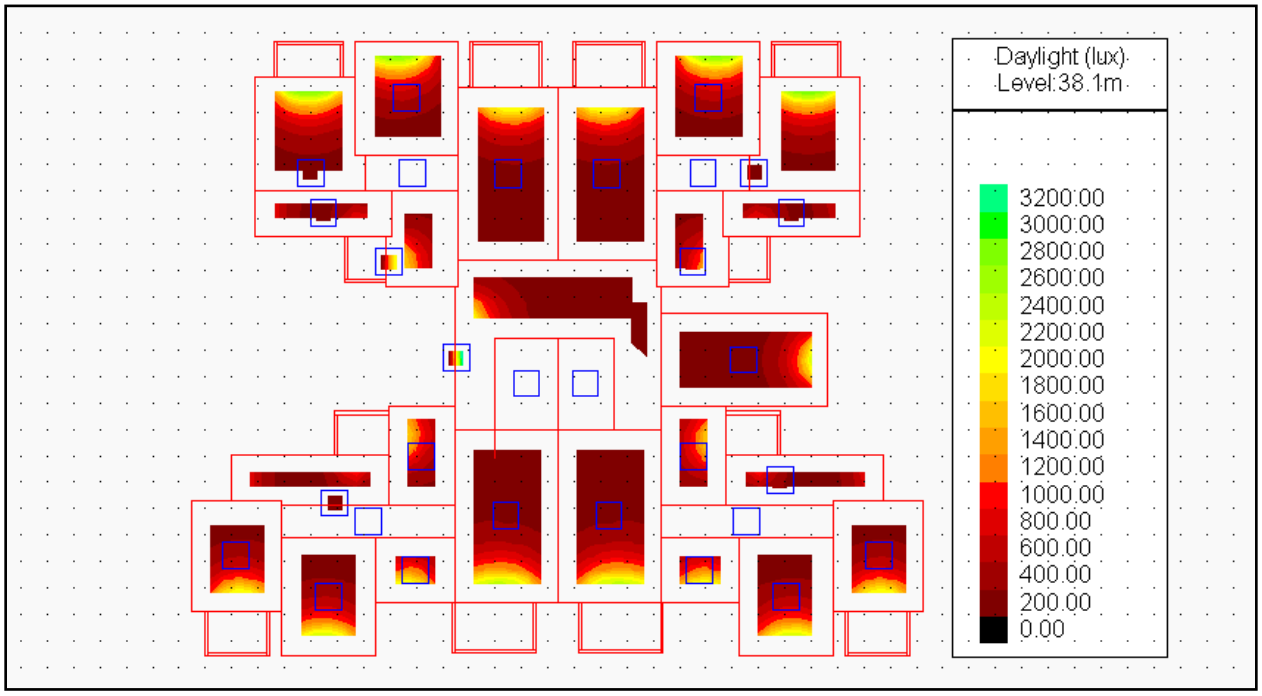
As per the analysis, with the given building specification, the rooms is achieving fairly high day light in all regularly occupied spaces.

Thereby, the project intends to ensure the connectivity between the interior and the exterior environment by providing the adequate daylighting.

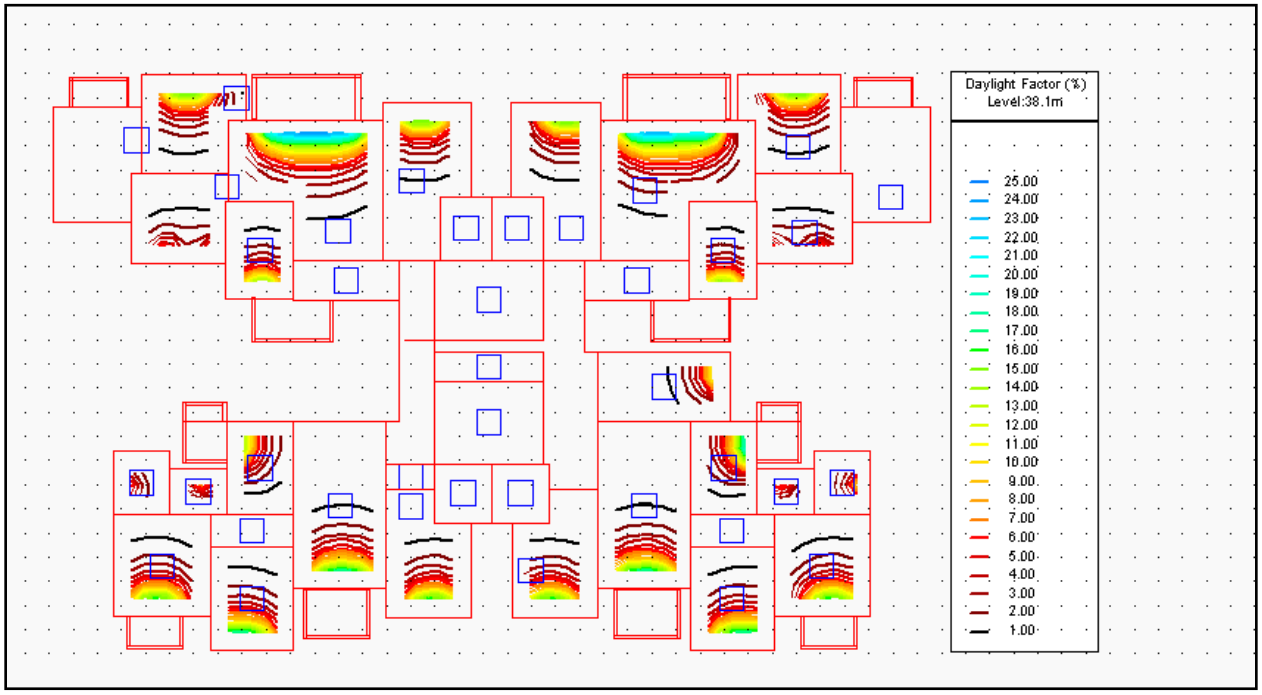
Daylight Graphical Analysis with VLT 62%

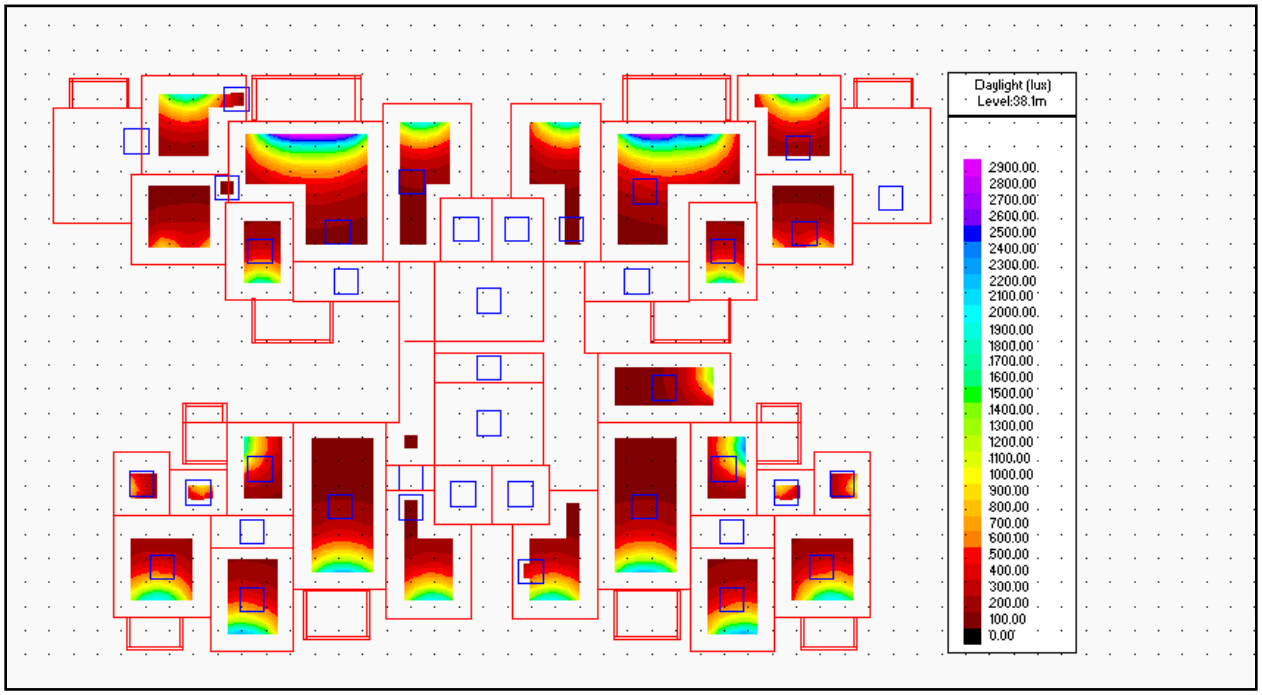
Tower 21, 22, 23- Typical floor plan



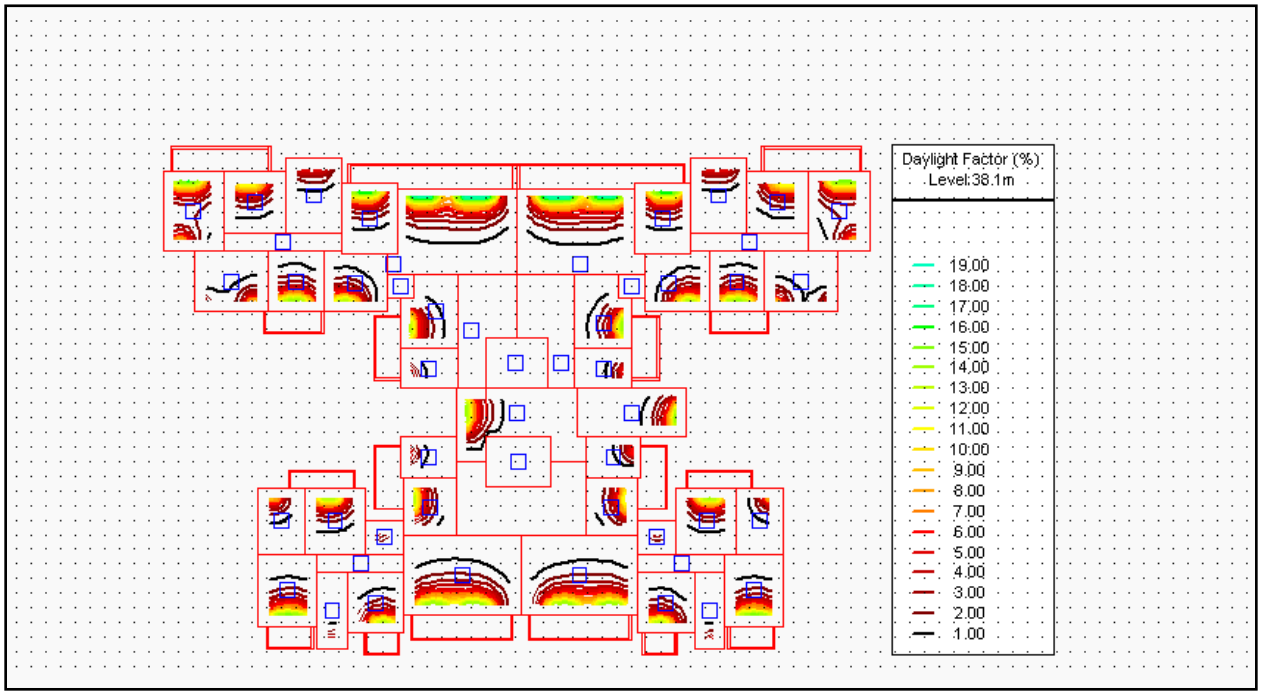


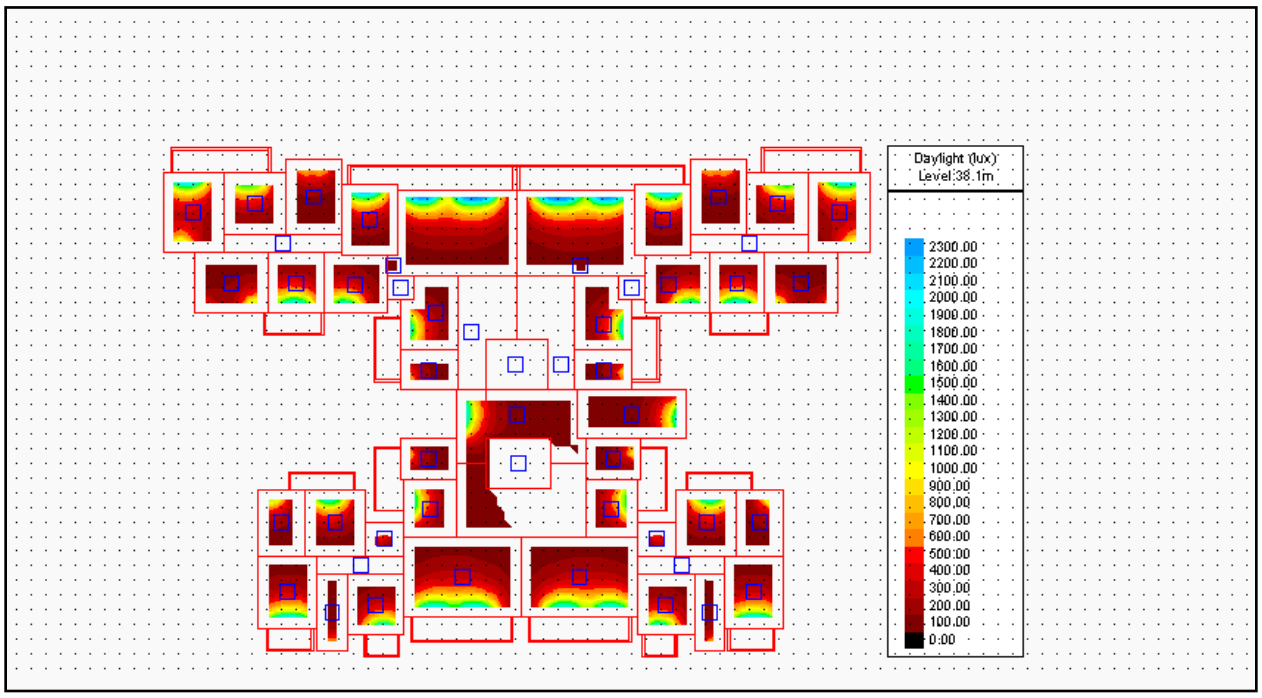
Tower 20, 24, 25- Typical floor plan





Tower 26- Typical floor plan





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Energy -Analysis, Sun Path & Daylight Report

Central Park The Room Project

2013

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ENERGY ANALYSIS METHODOLOGY

The Proposed Building has been evaluated on the basis of the methodology outlined in ECBC Standard-**Whole Building Performance Method.**

Whole building energy simulation analysis is used to predict the annual energy performance of a building design. The analysis is carried out by first developing a detailed building energy simulation model. The simulation programme is then used to test the thermal response & to calculate the energy use of the building model using a weather data file to capture the climatic impact on the building. This type of analysis is referred as Whole Building Performance (WBP) Method. Whole building energy simulation is the most sophisticated way of analyzing the impact of energy efficiency measures in an integrated manner.

IES <VE> 2012 simulation tool has been used for modelling the baseline and the proposed building.

As specified by the WBP Method, the Proposed and Budget Buildings are identical in terms of:

- Design Model
- Simulation software
- Thermal Blocks
- Weather data (Gurgaon, Delhi, India)
- Occupancies

STANDARADS AND SOFTWARE TOOLS USED FOR ANALYSIS

Standard used for the Analysis

Standard used for the analysis is ECBC (Energy Conservation Building Code). The purpose of ECBC is to provide minimum requirements for energy efficient design & construction of buildings & their systems. Estimates based on computer simulation models indicate that ECBC complaint buildings can use 40-60 % less energy than conventional buildings. It is estimated that a nationwide mandatory enforcement of the ECBC will yield a annual savings of approximately 1.7 billion kWh.

ECBC was developed as a first step towards promoting energy efficiency in the building sector. The ECBC user Guide (also referred to as “The Guide” in this document) has been developed to provide detailed guidance to building owners, designers, engineers, builders, energy consultants, and others on how to comply with the code. It provides expanded interpretation, examples, supplementary information to assist in applying ECBC during the design and construction of new buildings as well as additions and alterations to existing buildings

This Guide can also be used as a document by “authorities having jurisdiction” in the enforcement of code once it is made mandatory. The guide follows the nomenclature of the code. It is written both as a reference and as a instruction guide, and can be help- full to anyone who is directly or in- directly involved in the construction and design and construction of ECBC-compliant buildings.

The code is applicable to the buildings or building complexes that have a connected load of 500 kW or greater or a contract demand of 600 kVA or greater. This code would become mandatory as and when it is notified by the Central and the State government in the official Gazette (P) of S14 or clause (a) of S 15 of the energy conservation act 2001 (52 of 2001)

This code is applicable to the following Building System-

- Building envelopes expect for unconditioned storage spaces or warehouse
- Mechanical System and equipment, including heating, ventilation and air conditioning, (HVAC)
- Service hot water heating
- Interior and exterior lighting
- Electrical power and motors

This code is not- applicable to the following Building System-

- Buildings that do not use either electricity or fossil- fuel
- Equipment and portions of building system that use energy primarily for manufacturing process

Software used for Analysis

Energy Modelling & Simulation is a holistic approach to achieve energy savings in a building. The process of energy modelling is being done in the following phases:

- 3 Dimensional Modelling
- Base Building Energy Consumption Results
- Development of Energy Efficiency Measures
- Design Building Energy Consumption Results

Software used for the Project is IES. IES <VE>

Integrated Environmental Solutions (IES) is a world leading provider of integrated performance analysis software and consulting services for sustainable building design. Comparative analysis at the early stage, using ballpark figures, is useful to check feasibility, quantify and inform design team decision making. It can help with those all important master planning, orientation, massing and form decisions; justifying choices and differentiating project proposals.

Detailed analysis provides more accurate figures and results for system sizing, fine tuning, compliance, costing and documentation. Results and analysis can be presented to clients and building control, justifying design decisions and offering you competitive advantage.

IES provides a wide range of different analysis options and capabilities designed to give feedback quickly and efficiently at the relevant level. All are powered by the sophisticated <Virtual Environment> performance modelling engine that undertakes detailed simulations at hourly or smaller increments as necessary.

Energy Simulation Software Salient Features

- Undertake energy performance snapshots to assess impact of design decisions
- Develop building loads and impact of conservation strategies
- Develop carbon footprint reduction strategies
- Assess passive/hybrid/renewable strategies
- Assess the impact of daylight and solar
- Incorporate bulk airflow, ventilation and indoor air quality into the equation
- Assess compliance with a range of worldwide regulations and voluntary codes

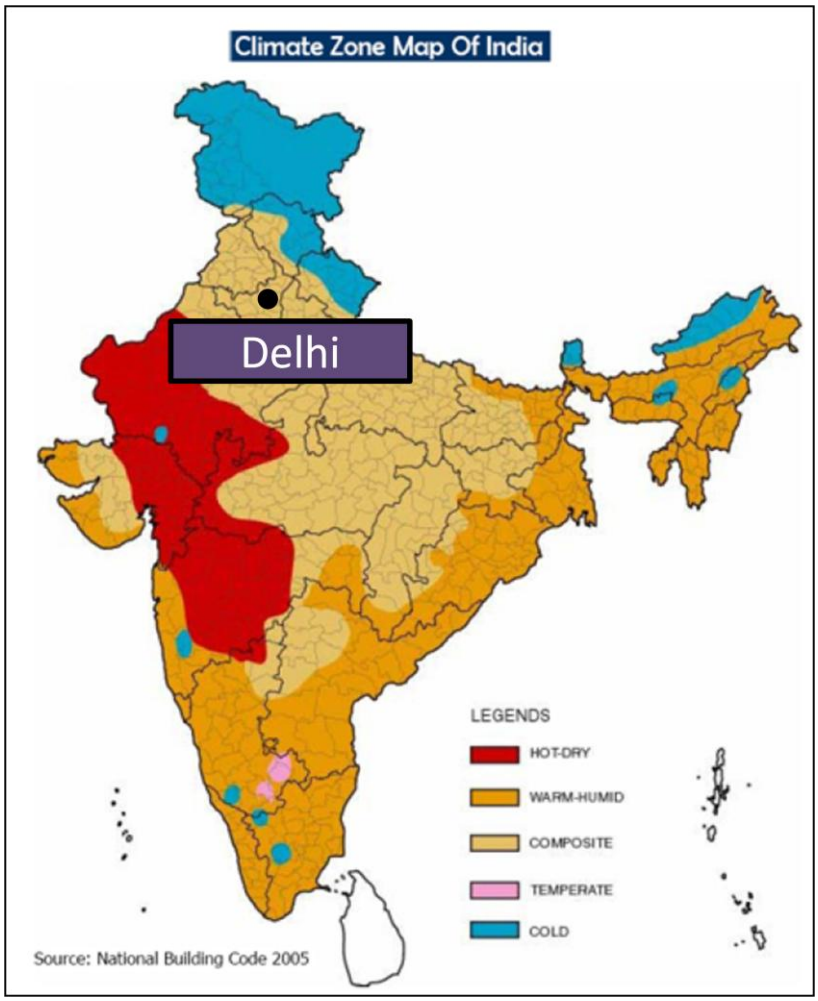
We have used the following modules of IES for completion of this report:

- Model IT – 3D building modeller
- Sun Cast – Solar shading analysis
- FlucsDL– Day Light analysis
- ApacheSim – Thermal analysis

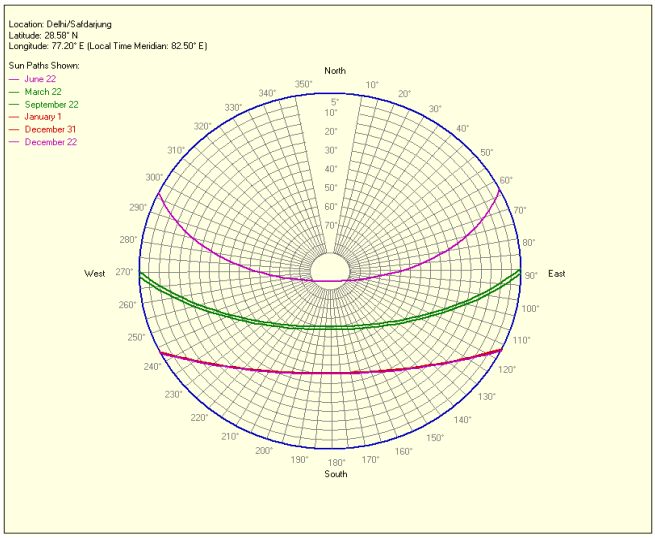
PROJECT TECHNICAL DESIGN SUMMARY

Climatology

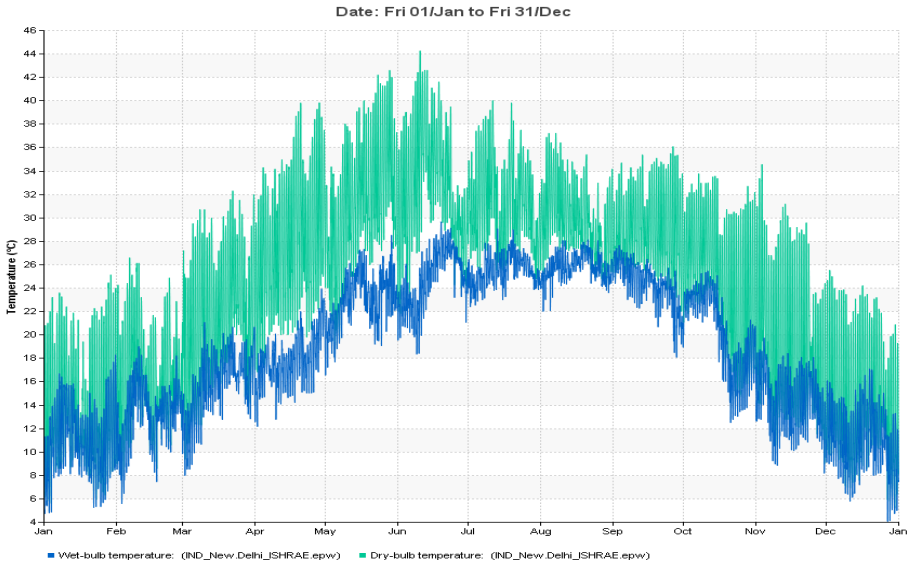
India possesses large variety of climates, which broadly categorizes into five regions. Project is located in Gurgaon, Delhi. According to ECBC User Guide, Table 13.2, Climatic Zones of Major Indian Cities, Project follows Composite climate as shown in the adjoining image



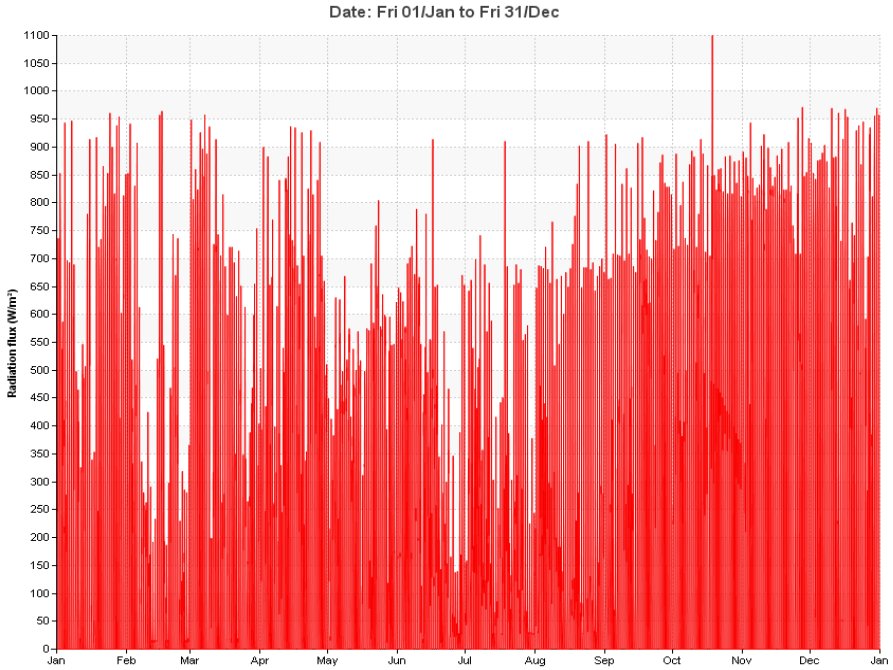
Sun Path Diagram



Minimum and Maximum Temperatures at Gurgaon



Dry Bulb & Wet bulb Variation



Radiation Graph

Energy Input Parameters

Following is the summary of input parameters of Base case as per ECBC & Proposed case as per design of the Project:

Base & Proposed Case Parameters

BASE & PROPOSED CASE PARAMETERS		
Model Input Parameter	**Proposed Design Input**	**ECBC Design Input**
Exterior Wall Construction	RCC walls, With Insulated paint. U value: 1.988 W/ m^2 K	U Value of overall assembly 0.440 W/ m^2 K. Minimum R value of insulation alone 2.10 m2 K/W
Roof Construction	Standard Roof with SRI paint U value 0.738 W/m2 K	U Value of overall assembly 0.409 W/ m^2 K. Minimum R value of insulation alone 2.1 m2 K/W
Fenestration U Value	DGU U value-1.8W/ m^2K	3.30 W/ m^2 K
Fenestration SHGC	0.38	0.20
Fenestration VLT	62%	Minimum VLT 27 %
LPD (W/m2)	Space by Space Method for Lighting Power density calculation considered	
EPD (W/m2)	Space wise Equipment Power density calculated and provided in section ….	

Envelope Analysis

Exterior Wall Parameters

Exterior Wall (outer to Inner)	Thickness (m)	k-Value (w/m ^{0}K)	Density, kg/m^3	U-value w/m^{20}k (k/Thickness)	R-value (1/U)
Plaster	0.03	0.5	1300	16.67	0.06
Face brick HF-A7	0.34	1.331	2003	3.91	0.26
Gypsum plaster board	0.03	0.16	950	5.33	0.19
Overall exterior wall value	**0.4**			**1.99**	**0.50**
Expected U-value = 1.988					

Roof Assembly Parameters

Roof Assembly	Thickness (m)	k-Value (w/m ^{0}K)	Density, kg/m^3	U-value w/m^{20}k (k/Thickness)	R-value (1/U)
Thermalite-high strength	0.065	0.16	950	2.46	0.41
Plaster (dense)	0.015	0.025	30	1.67	0.60
Cast concrete(light weight)	0.34	1.331	2083	3.91	0.26
Plaster (dense)	0.015	0.16	950	10.67	0.09
Overall exterior wall value	**0.435**			**0.74**	**1.36**
Expected U-value= 0.40					

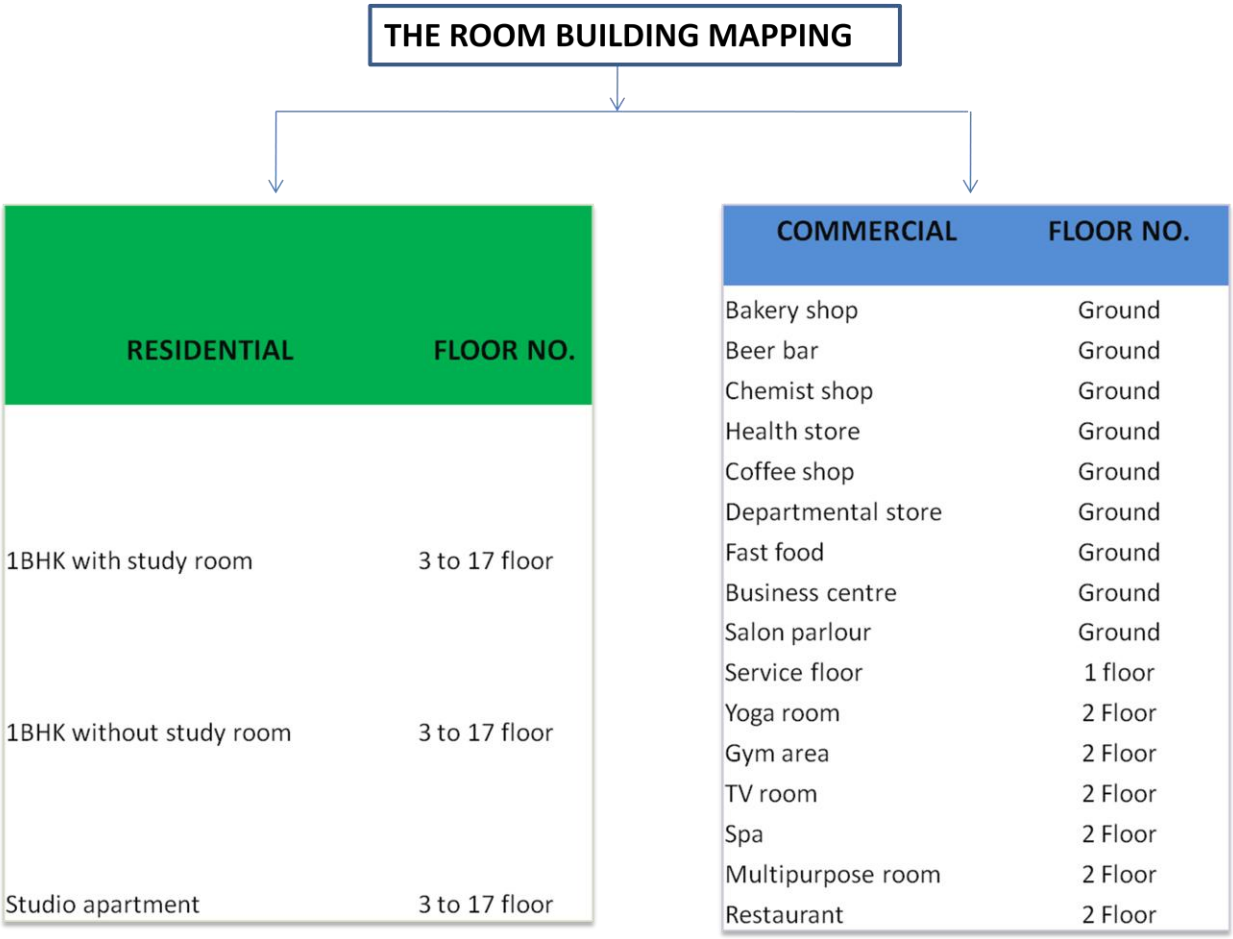
Lighting Analysis

LPD Calculation for Exterior & Interior

Lighting	Applicable Areas	ECBC Lighting Power Density (LPD)	Design Lighting Power Density (LPD) 30% Reduction	Design Lighting Power Density (LPD) 20% Reduction
Interior Lighting **(for residential units)**	Individual dwelling unit, Apartments, Villas, Gated communities	5.00 W/m2	3.5 W/m2	4 W/m2
Exterior Lighting, excluding Parking Area (for residential & nonresidential units)	Landscaping, Façade, Street lighting, Pathways, Signage's, etc.,	2.5 W/m2	1.75 W/m2	2 W/m2
Common Area Lighting, excluding Parking Area (for residential & nonresidential units)	Corridors, Lobbies, Staircases, Terrace, etc.,	4.0 W/m2	2.8 W/m2	3.2 W/m2
Parking Area	Surface parking (covered & uncovered), Basement parking,	2.5 W/m2	1.75 W/m2	2 W/m2

- **The project must ensure that the interior, exterior, common and parking area lighting Power densities are reduced by at least 20% from the baseline values through 'building area method'**
- **For Lighting Power Density (LPD) Design case, 30% reduction is considered for analysis.**

BUILDING MAPPING



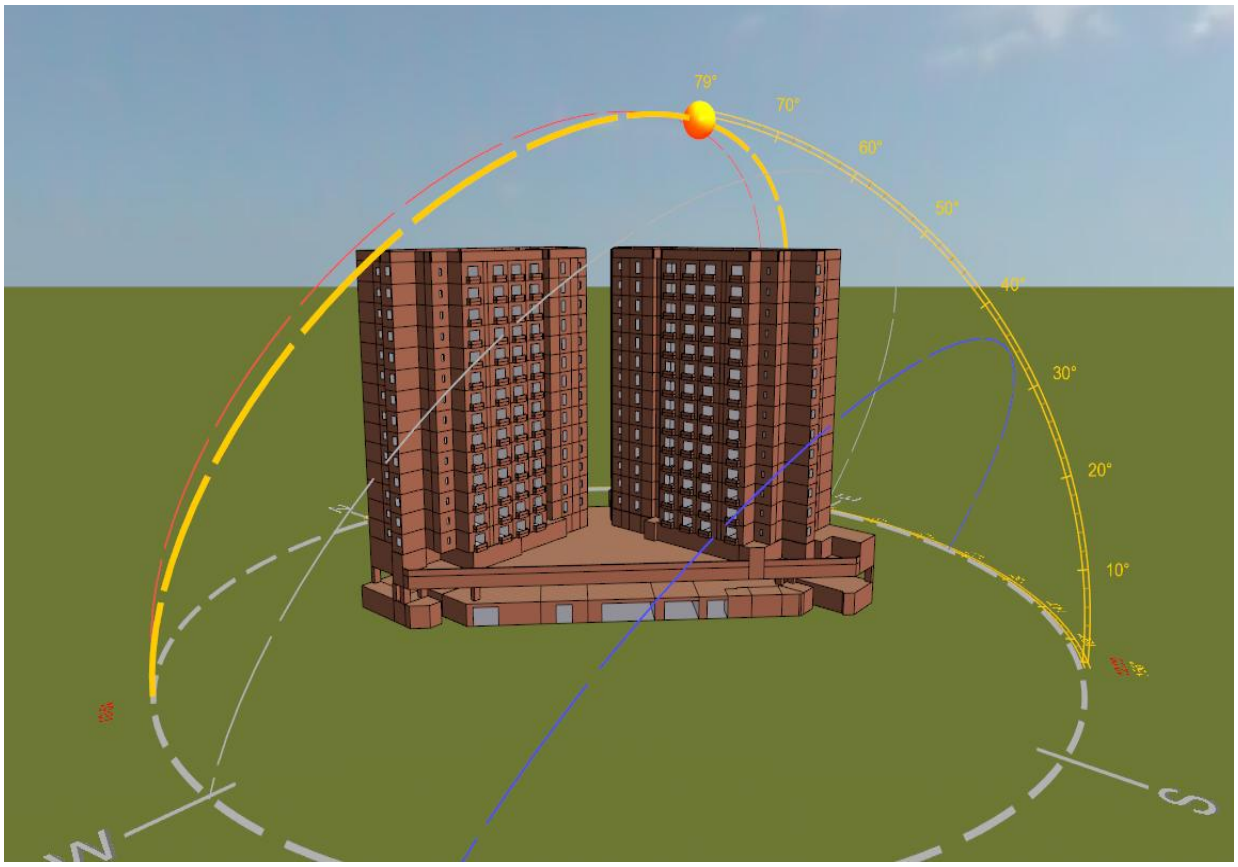
RESIDENTIAL	FLOOR NO.
1BHK with study room	3 to 17 floor
1BHK without study room	3 to 17 floor
Studio apartment	3 to 17 floor

COMMERCIAL	FLOOR NO.
Bakery shop	Ground
Beer bar	Ground
Chemist shop	Ground
Health store	Ground
Coffee shop	Ground
Departmental store	Ground
Fast food	Ground
Business centre	Ground
Salon parlour	Ground
Service floor	1 floor
Yoga room	2 Floor
Gym area	2 Floor
TV room	2 Floor
Spa	2 Floor
Multipurpose room	2 Floor
Restaurant	2 Floor

The table shown above is the summary of the Central park-The Room project and we are considering residential areas for our analysis. We have considered the typical floors from third to seventeenth floor.

CENTRAL PARK-THE ROOM ANALYSIS

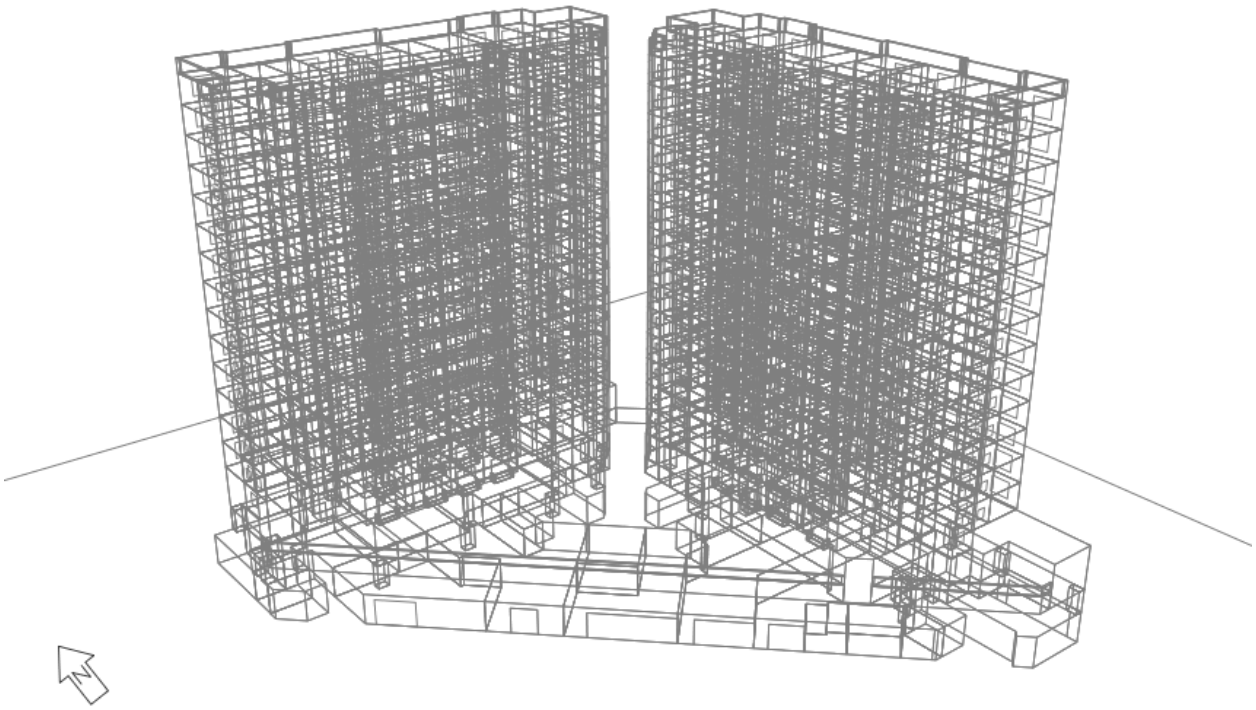
Energy & Day Light Analysis Of The Room building



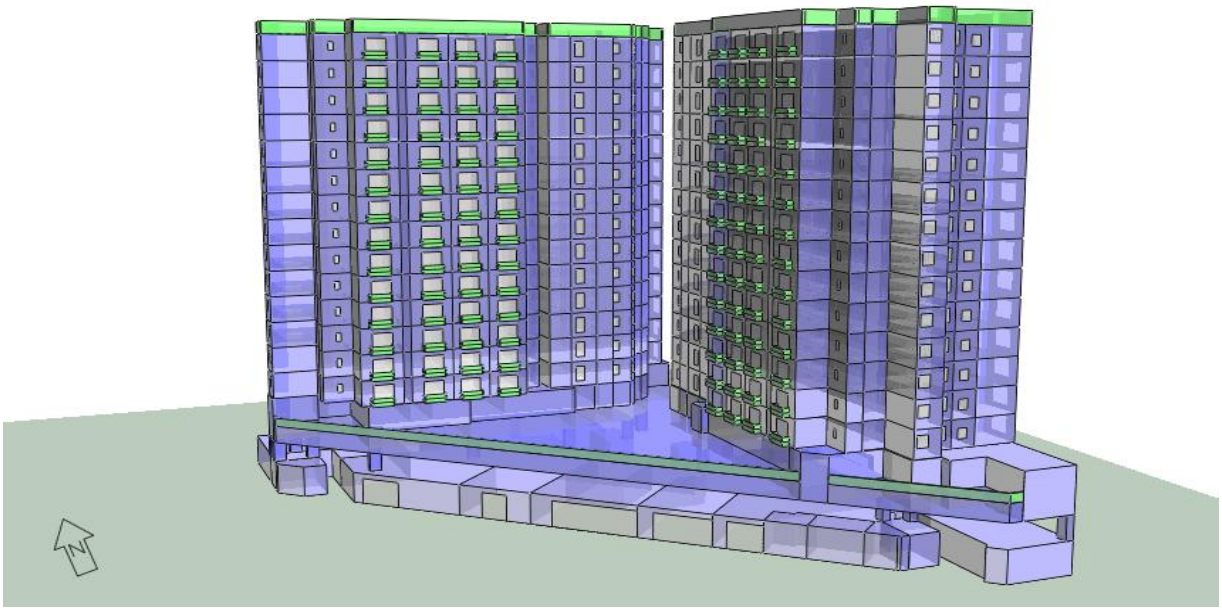
Sun Path Analysis: Energy & Daylighting

Energy Models

Envelope Design Model of The Room Building



Energy Model Image of The Room Building



Energy Performance Benchmarking

Design Case Energy Consumption

Month	Total lights energy (MWh)	Total equip energy (MWh)
Date		
Jan 01-31	2.5491	4.1787
Feb 01-28	2.3024	3.7743
Mar 01-31	2.5491	4.1787
Apr 01-30	2.4669	4.0439
May 01-31	2.5491	4.1787
Jun 01-30	2.4669	4.0439
Jul 01-31	2.5491	4.1787
Aug 01-31	2.5491	4.1787
Sep 01-30	2.4669	4.0439
Oct 01-31	2.5491	4.1787
Nov 01-30	2.4669	4.0439
Dec 01-31	2.5491	4.1787
Summed total	30.014	49.2011

ECBC Case Energy Consumption

Month	Total lights energy (MWh)	Total equip energy (MWh)
Date		
Jan 01-31	3.6406	5.971
Feb 01-28	3.2883	5.3931
Mar 01-31	3.6406	5.971
Apr 01-30	3.5232	5.7784
May 01-31	3.6406	5.971
Jun 01-30	3.5232	5.7784
Jul 01-31	3.6406	5.971
Aug 01-31	3.6406	5.971
Sep 01-30	3.5232	5.7784
Oct 01-31	3.6406	5.971
Nov 01-30	3.5232	5.7784
Dec 01-31	3.6406	5.971
Summed total	42.8654	70.3033

Comparison between Design & ECBC Case

Alternative	Total lights energy	Total equipments
	(MWH)	**(MWH)**
ECGC case	42.8654	70.3033
Design case	30.014	49.2011
Energy Cost Savings over ECBC average base case	**30%**	**30%**

Result Summary

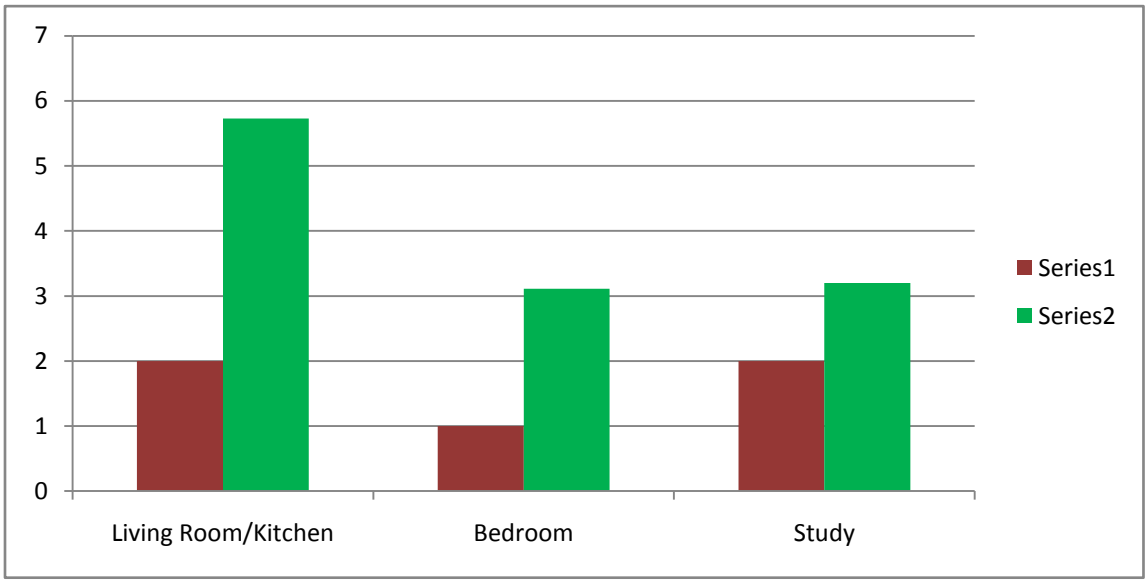
- To compare, an appropriate occupancy per typical dwelling unit is considered with conventional residential energy operational schedule.
- In Compared results of Design and ECBC case, **30%** saving are noticed (base on the 30% reduction in Lighting Power Densities; Refer Table on Pg No. 12
- For additional efficiencies, Sensors are recommended for the non-regularly occupied spaces.

Daylight Analysis

Comparison between Design & LEED Requirement

Type 1 with study room

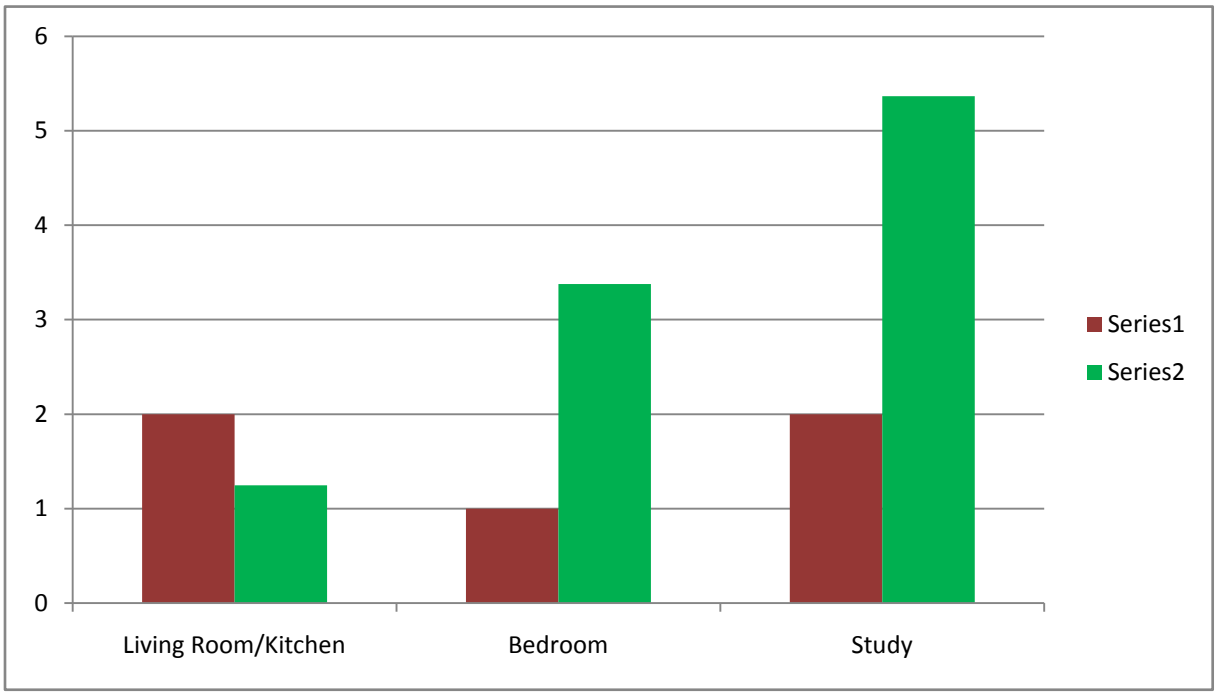
Sr. no	Typical floor flat	Actual Requirement	Daylight Factor	Window nomenclature
1	Living Room/Kitchen	2	5.73	SG1
2	Bedroom	1	3.11	W1
3	Study	2	3.20	W4A



As per the analysis, with the given building specification the building is achieving fairly high day light in all regularly occupied spaces. Thereby, the project intends to ensure the connectivity between the interior and the exterior environment by providing the adequate daylighting.

Type 2 with study room

Sr. no	Typical floor flat	Actual Requirement	Daylight Factor	Window nomenclature
1	Living Room/Kitchen	2	1.25	W3
2	Bedroom	1	3.38	W1
3	Study	2	5.37	W2A



As per the analysis, with the given building specification, the building is achieving fairly high day light in Bedroom and study and less daylight is achieved in living/ kitchen. Thereby, the project intends to ensure the connectivity between the interior and the exterior environment by providing the adequate daylighting.

Type 3 without study room

Sr. no	Typical floor flat	Actual Requirement	Daylight Factor	Window nomenclature
1	Living Room/Kitchen	2	2.50	DW1
2	Bedroom	1	1.62	W4

As per the analysis, with the given building specification, the living/kitchen and bedroom are achieving fairly high day light in all rooms. Thereby, the project intends to ensure the connectivity between the interior and the exterior environment by providing the adequate daylighting.

Type 4

Sr. no	Typical floor flat	Actual Requirement	Daylight Factor	Window nomenclature
1	Studio/kitchen	2	5.62	SG1

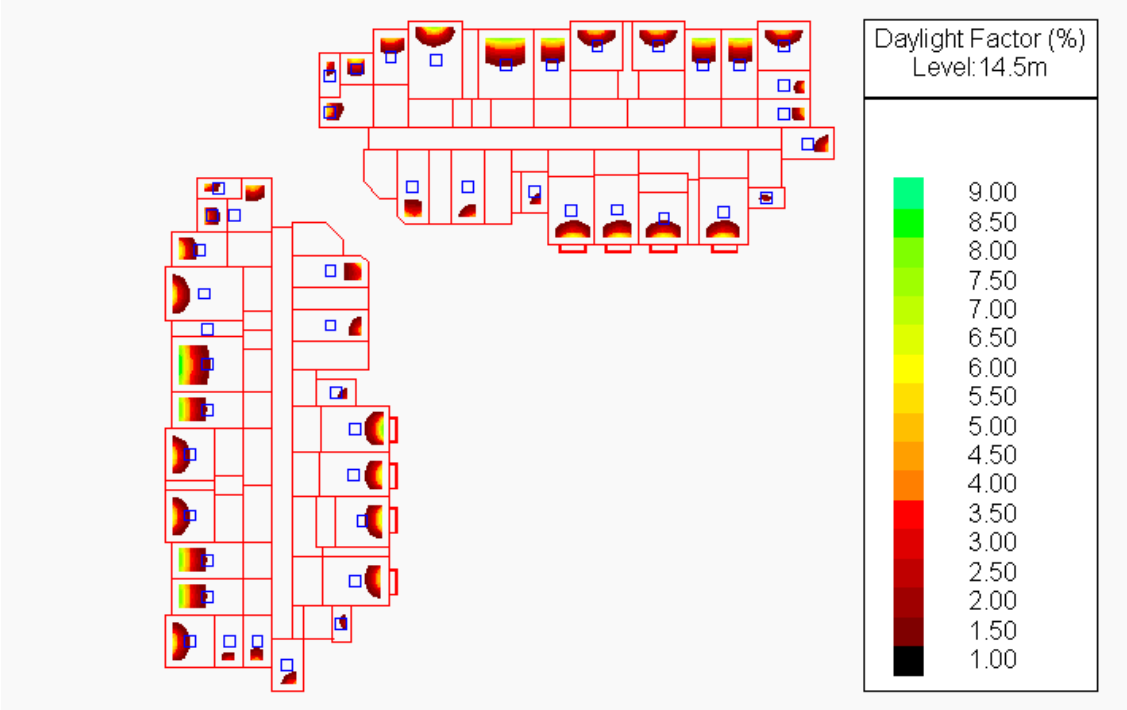
As per the analysis, with the given building specification, the rooms is achieving fairly high day light in Studio and kitchen. Thereby, the project intends to ensure the connectivity between the interior and the exterior environment by providing the adequate daylighting.

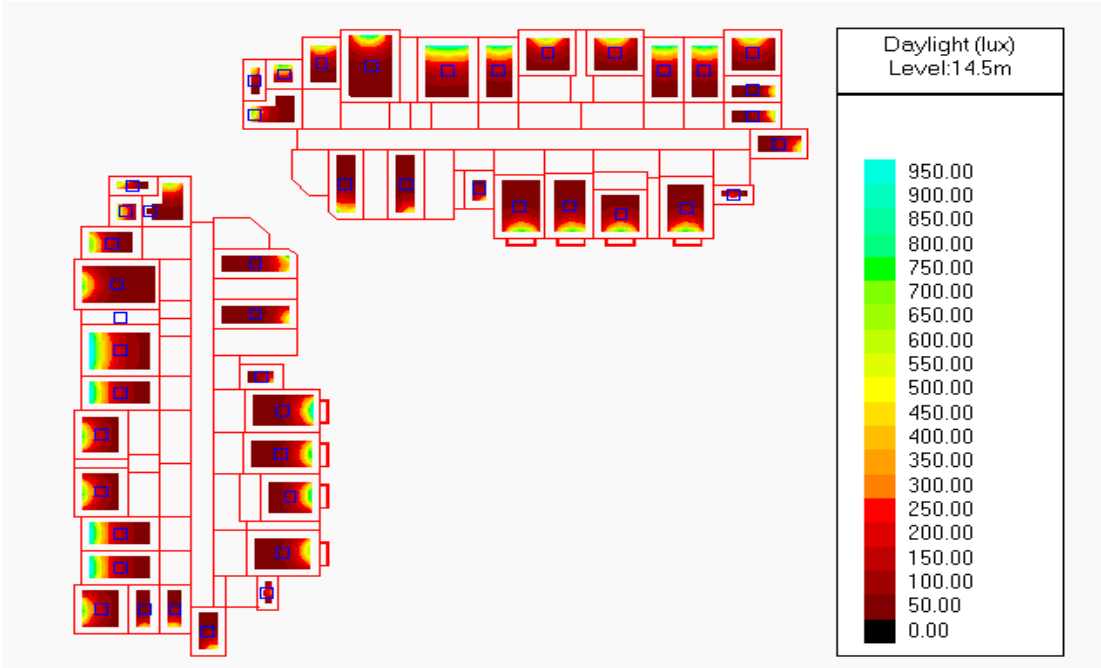
Type 5

Sr. no	Typical floor flat	Actual Requirement	Daylight Factor	Window nomenclature
1	Studio/kitchen	2	1.44	DW1

As per the analysis, with the given building specification, the Studio and kitchen is not achieving fairly high day light. Thereby, the project intends to ensure the connectivity between the interior and the exterior environment by providing the adequate daylighting.

Daylight Graphical Analysis with VLT 62%





This is the graphical analysis showing the lux levels and daylight factor.