



IGBC - Green Homes Rating System



**Villa at G-98, Sector 44,
Noida, Uttar Pradesh.**



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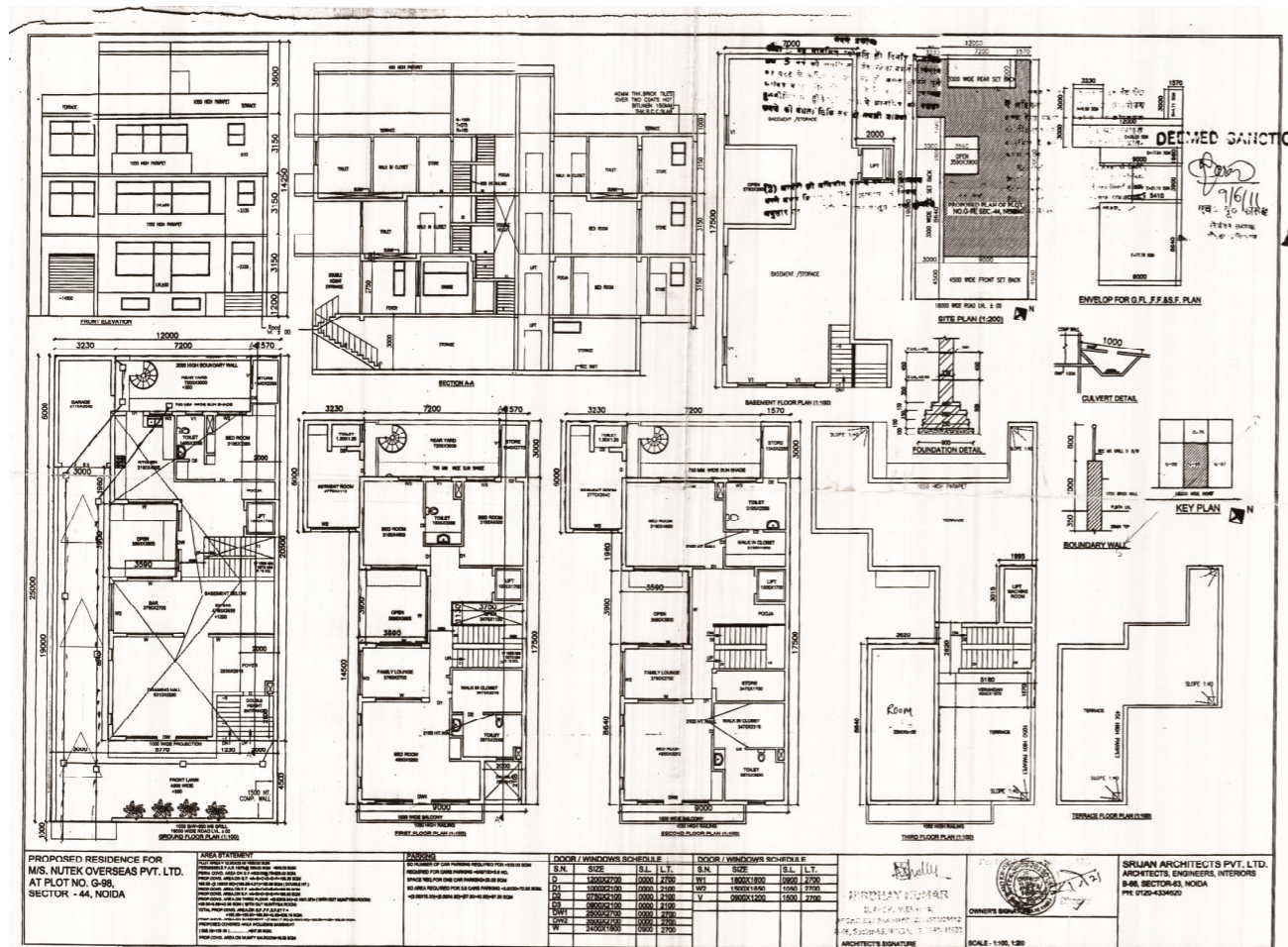


Introduction

The Proposed Villa is being developed at Noida, UP. This eco-friendly luxurious facility is coming up in the heart of Noida at sector 44.

This villa is spread across in 300 sq meters and is structurally constructed having a basement and G + 2 premises which is aspiring IGBC Green Homes Certification. Godrej & Boyce fully appreciates this excellent initiative of the Project team.

Godrej & Boyce was invited to conduct a feasibility study to explore and evaluate the feasibility for the proposed project to contend for the IGBC (Indian Green Building Council) Green Homes rating awarded by the Indian Green Building Council (IGBC).



Approved Layout of the Villa at G - 98, Sector 44, Noida

Feasibility Study:

Godrej & Boyce conducted a feasibility study with project team and the client to evaluate the feasibility for the proposed villa and eventually get the coveted IGBC (Indian Green Building Council) Green Homes rating under “Individual Residential Unit” from Indian Green Building Council.

The objective of the feasibility study was to explore, evaluate and recommend:

- Methodology of achieving the prestigious Green building Rating of IGBC under Green Homes
- Assessment for meeting prerequisites and credit points as mentioned in IGBC reference guide.
- Benefits to the owner.
- Implementation of the IGBC certification

Benefits:

The owner and the end users will have tremendous benefits in pursuing for Green Homes Rating, both tangible and intangible.

Intangible benefits:

- Health and safety of the building occupants
- Enhanced air quality
- Excellent day-lighting
- Imbibe best operating practices from day-one
- Incorporate latest techniques / technologies

Tangible benefits:

- Water Efficiency - saving 30% to 50% of portable water
- Energy Efficiency - saving 20% - 30% power
- Waste Management during and post construction

Good initiatives – Considered at Design Stage

- Adequate Parking Capacity
- Roofing with high Solar Reflectance Index (SRI)(>78) and Green roof
- Rain water harvesting
- Use of recycled material
- High efficient glazing

Executive Summary:

The Villa at G – 98, Sector 44, Noida has been evaluated for the **IGBC – Green Homes** rating during the feasibility study.

Mandatory Requirement (MR)

The IGBC rating system has 10 MR, all of which need to be met even if credit points are not attempted under a particular section. **The preliminary Study indicates that all these MR's can be met for the project.**

The MR's are as follows:

- Local Building Regulations
- Soil Erosion Control
- Rainwater Harvesting, Roof & Non – Roof 25%
- Water Efficient Plumbing Fixtures
- CFC Free Equipment
- Minimum Energy Performance
- Seperation of House-hold Waste
- Tobacco Smoke Control
- Minimum Daylighting: 50%
- Fresh Air Ventilation



Evaluation of the Study:

During the feasibility study, a realistic evaluation was made on the possible points that can be aimed for. The study reveals that the project can aspire to achieve **“Platinum Rating”**.

The aim would be to achieve at least 2 - 3 points higher than the threshold points required for the Platinum rating. With 62 likely points the project is just above the threshold to achieve Platinum Rating easily. However, project team will try to achieve more no. of points.

The summary of evaluation, for Platinum rating is as under:

• Total points available	75
• Likely / possible	62
• Doubtful	00
• Not applicable / attemptable	13

With the participation, ownership and wholehearted effort of the entire project team, it is possible to attempt and aim for the desired rating.

The detailed point-wise realistic evaluation and action required is highlighted in this report against the respective credits. The checklist of credit points is also attached in this report.



Features of Green Homes:

- Erosion and sedimentation control measures to reduce negative impacts on water and air quantity. The measure adopted would be in accordance with the National Building Codes of India (NBC) Part 10, section 1, chapter 4 – Protection of Landscape during construction.
- Roofing with high Solar Reflectance Index (SRI) (>78) or Green roof
- Over deck Insulation (R-15 to R-20) for Roof
- Water efficient fixtures with low flow
- Designing landscape more than 25% of the site area
- All the basic amenities like schools, police station, commercial, retail shops etc provided in the housing block
- Rain water harvesting designed for the capturing 100% rain water
- Additional Energy and water flow meters for measurement and verification would to be additionally incorporated in the electrical design for measurement and verification purposes.
- The building is oriented to receive ample daylight in each rooms and proper cross ventilation is achieved
- Atrium is also present in the design to assist the daylight
- All the materials used are eco-friendly and energy efficient sourced from the reputed brands
- All adhesives, sealants, carpets and paints would meet LEED recommended permissible VOC (volatile organic compounds) limits

Certification process under IGBC:

The road map towards the journey of the IGBC certification can be summarized as:

- Project Registration – Online and fee payment to IGBC
- Incorporation of suggestions of Energy & Day lighting Simulation, strategies of material selection and water efficiencies
- Periodic IGBC review and documentation
- Submit the design documents for IGBC review (For pre-certification, if applicable)
- Review by the IGBC committee
- 2nd phase submission and submitting the queries (if any) of the IGBC review
- Final review by IGBC
- Award of the IGBC certificate



IGBC Green Homes: Project Checklist

Project: Villa at G – 98, Sector 44, Noida

L	D	NA	(L: Likely; D: Doubtful; NA: Not Applicable)		
Site Selection & Planning (max 9 points)					
Y			MR 1	Local Building Regulations	Required
Y			MR 2	Soil Erosion Control	Required
1			Credit 1	Basic Amenities	1
		2	Credit 2	Natural Topology or Vegetation: 15% or 25%	2
4			Credit 4	Heat Island Effect-Roof 50% or 75%	4
1			Credit 7	Design for differently abled	1
1			Credit 8	Basic Facilities for Construction Workforce	1
7	0	2	Total		9

L	D	NA	(L: Likely; D: Doubtful; NA: Not Applicable)		
Water Efficiency (max 11 points)					
Y			MR 1	Rainwater Harvesting, Roof & Non Roof 25%	Required
Y			MR 2	Water Efficient Plumbing Fixtures	Required
1		1	Credit 1	Landscape Design: 20%, 40%	2
1			Credit 2	Management of Irrigation Systems	1
4			Credit 3	Rainwater Harvesting- Roof & Non Roof 50%, 75%	4
4			Credit 4	Water Efficient Plumbing Fixtures: 25%, 35%	4
10	0	1	Total		11

L	D	NA	(L: Likely; D: Doubtful; NA: Not Applicable)		
Energy Efficiency (max 17 points)					
Y			MR 1	CFC-free Requirement	Required
Y			MR 2	Minimum Energy Performance	Required
10			Credit 1	Enhanced Energy Performance	10
		6	Credit 2	On-site renewable Energy: 2.5%, 5%, 7.5%	6
4			Credit 3	Solar Water Heating: 50%, 75%, 95%	4
2			Credit 4	Energy Saving measures in other Appliances & equipments	2
16	0	6	Total		22

L	D	NA	(L: Likely; D: Doubtful; NA: Not Applicable)		
Materials & Resources (max 13 points)					
Y			MR 1	Segregation of House - hold Waste	Required
2			Credit 1	Organic waste Management, Post Occupancy: 95%	2
1			Credit 2	Handling Construction Waste Management: 50%	1
		2	Credit 3	Reuse salvaged materials: 2.5%, 5%	2
2			Credit 4	Materials with recycled content: 10%, 20%	2
2			Credit 5	Local Materials: 25%, 50%	2
4			Credit 6	Rapidly renewable materials & Certified Wood: 50%, 75%	4
11	0	2	Total		13

L	D	NA	(L: Likely; D: Doubtful; NA: Not Applicable)		
Indoor Environmental Quality (max 15 points)					
Y			MR 1	Tobacco Smoke Control	Required
Y			MR 2	Daylighting, 50%	Required
Y			MR 3	Fresh Air Ventilation	Required
2		2	Credit 1	Enhanced Daylighting 75%, 95%	4
2			Credit 2	Enhanced Fresh Air Ventilation	2
2			Credit 3	Exhaust System	2
2			Credit 4	Low VOC Materials	2
1			Credit 5	Building Flush out	1
4			Credit 6	Cross Ventilation	4
13	0	2			15

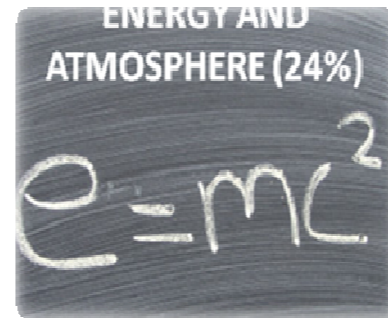
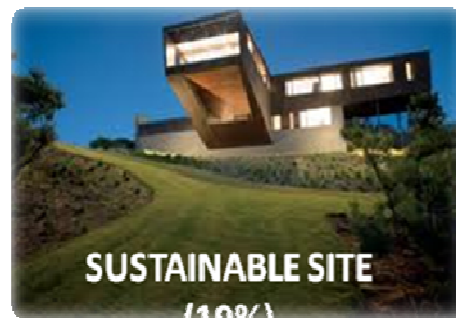
Conclusion:

The proposed Villa at G – 98, Sector 44, Noida Project is likely to get Platinum Rating.

The IGBC rating will further boost the green image and in the long run will result in a higher performance building with substantial reduction in operating costs to the owner.

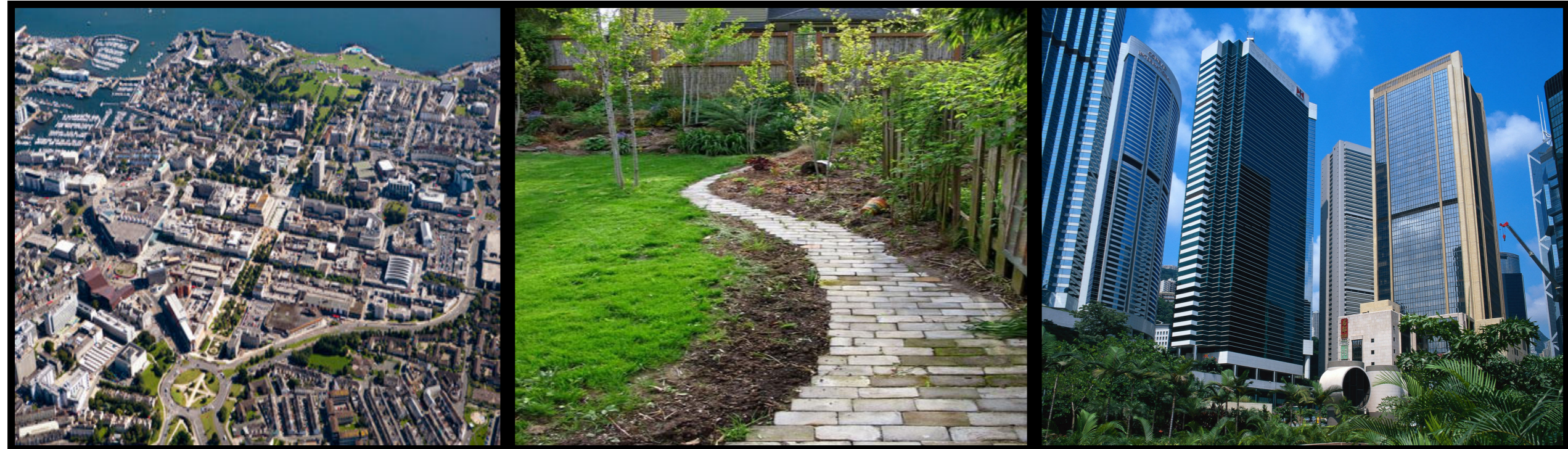
Godrej & Boyce would facilitate and guide the project team through the entire journey of IGBC certification process.

L	D	NA	(L: Likely; D: Doubtful; NA: Not Applicable)		
Innovation in Design Technology (max 5 points)					
1			Credit 1.1	Innovation in Design & Technology	1
1			Credit1.2	Innovation in Design & Technology	1
1			Credit1.3	Innovation in Design & Technology	1
1			Credit1.4	Innovation in Design & Technology	1
1			Credit 2	LEED accredited professionals	1
5	0	0			5
				Total Maximum Points	75
62	0	13	Certified 38-44 points, Silver 45-51 points, Gold 52-59 points, Platinum 60-75 points		



Categories in Detail





Site Selection & Planning

India is growing and so is the land use. With the exponential growth in the population, land use has registered an increase of 24% over the previous 10 years. This trend is replicated throughout much of the world as populations grow and migrate to urban areas.

With this growth, land that could have been put to other uses is lost. These uses could include land for growing food, and diversified eco-systems. As paved areas grow, rainwater is no longer attenuated at the point of contact with the ground and immediately runs off taking contaminants and eroding soil. Waterways get polluted.

Developed land tends to consist of a high percentage of hard scape - such as parking areas and building roofs. These are heated by the sun during the day and re-emit that heat at night which can raise local air temperatures. This can increase air conditioning loads for a building and also impact insects and other wildlife.

A site should be chosen, designed, and constructed, to minimize the impacts listed above. The social impact of the site should also be considered along with the ease of access to those working at the site.

IGBC Credits under Site Selection & Planning:

Local Building Regulations	SS MR 1
Soil Erosion Control	SS MR 2
Basic Amenities	SS Cr 1
Natural Topology or Landscape: 15%, 25%	SS Cr 2
Heat Island Effect-Roof 50%, 75%	SS Cr 4
Design for Differently Abled	SS Cr 7
Basic Facilities for Construction Workforce	SS Cr 8

SS MR 1: Local Building Regulations

Intent:

Ensure that project comply with the required statutory and regulatory codes

Requirements:

- All statutory approvals from the related authorities required and plan to be approved from government.
- Approval of the plan from the government authority

Documents Required:

The site has been allotted by the local authority. The project can meet the mandatory requirement by providing:

- Approved plans from local government authority
- Declaration that all relevant clearance are obtained



SS MR2: Soil Erosion Control

Intent:

Control soil erosion and sedimentation thereby, reducing negative impacts to the site and surroundings.

Requirements:

Following measures should be adopted to control erosion during construction and post occupancy:

- Soil Erosion measures conforming the best management practices as highlighted in NBC
- Need to stack the soil if fertile, stack and protect the same. The soil can be used for

Documentation Required:

By providing following documents, ***the requirement can be achieved:***

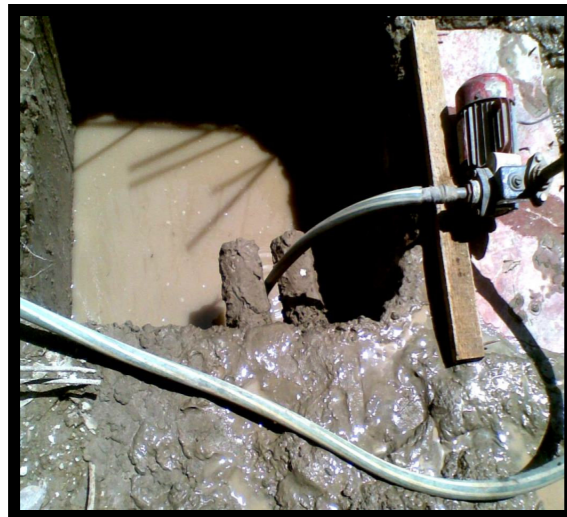
- Write-up & Photograph indicating top soil stock piling
- Narrative describing measures implemented or provide the erosion control plan adopted with drawings
- Post occupancy erosion control plan and layouts. Documents for pre-developed site with photographs
- Photos of measures taken for sedimentation control pre construction-Like providing barricading wall etc, during construction-like provision of sedimentation basin at the site & post construction
- Photographs of sedimentation basin provided for sedimentation control
- Photos for screening nets provided at gutter outlet of construction



Top Soil Covered and Preserved to be Re Used.



Sample picture of Barricading the Site Boundary



Sediment Traps are Used to Collect the Control Sediment Run-Off from the Site



Gravel Road Entrance for Soil Erosion

SS Cr 1: Basic House-hold Amenities

Intent:

Reduce negative impacts caused to the environment from automobile use by providing basic house-hold amenities, thereby, enhancing the quality of life.

Requirements:

Select a site with access to atleast five amenities, within a walking distance of 1 Km

Note: This point can be earned only if the amenities are available before or at the time of project completion.

Documentation Required:

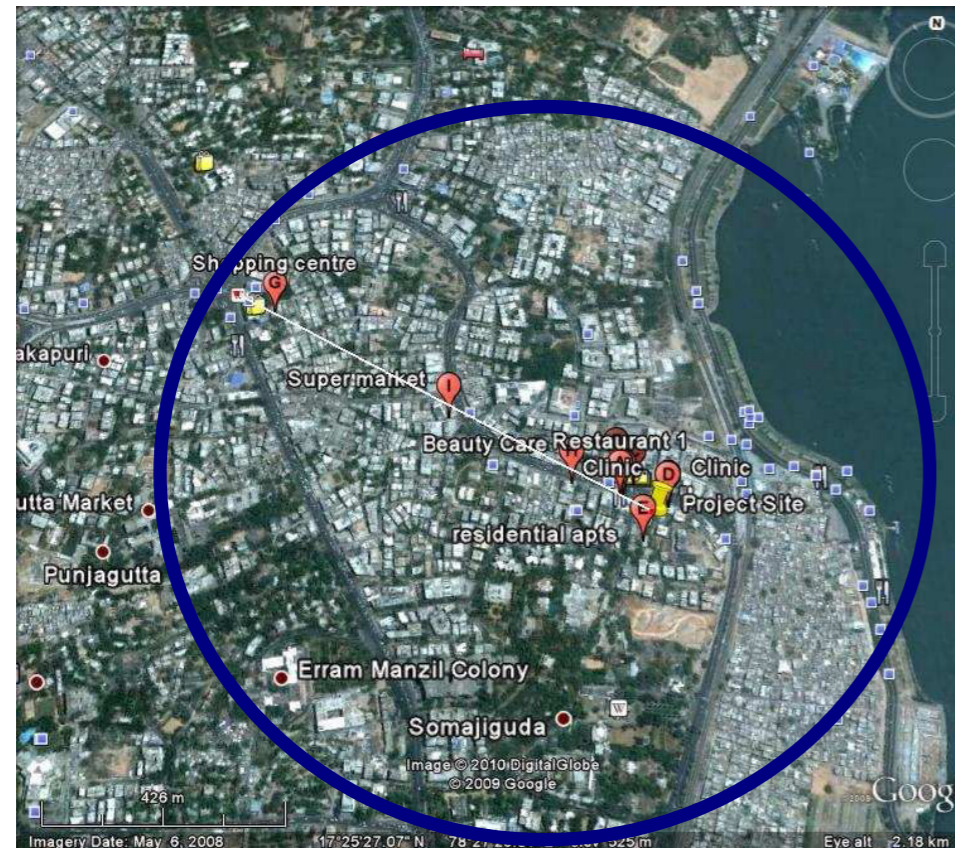
The credit can be achieved by providing

- Google map of the site with a circle of 1km radius from the site entrance to be drawn and all basic services to be shown in the circle.
- Actual photos of all the services
- Table indicating the approximate distance of the services to the site

Project Specific:

The project site is located in the vicinity of 5 basic amenities like Temple, Restaurant, Saloon, Medical shop and a grocery Store.

CREDIT ANTICIPATED: 1



Sample of Google map showing the Development Connectivity



Temple



Medical Shop



Saloon



Restaurant



Grocery Store

SS Cr 2: Natural Topology or Vegetation

Intent:

Minimize disturbances to the building site so as to reduce long-term environmental impacts

Requirements:

Avoid disturbance to site by retaining the natural topography of the site and / or design landscape for at least 15% of the site area. Points are awarded as below:

% of Natural Topography Retained	Points
15	1
25	2

Notes:

- Parking areas, walkways etc., are considered as site disturbances.
- Landscape refers to soft landscaping which include only vegetative materials.
- Natural topography in its broad sense means preserving natural features of the terrain.
- Landscaped areas over built structures such as roofs, basement etc cannot be considered for the purpose of calculation of landscaped area.
- Potted plants will not be considered as landscape

Documentation Required:

None

Project Specific:

Most of the site would be excavated and hence no natural topology or landscape area can be preserved. Hence the credit cannot be achieved.

CREDIT NOT APPLICABLE: 2

SS Cr 4: Heat Island Effect-Roof: 50%, 75%

Intent:

Reduce heat islands (thermal gradient differences between developed and undeveloped areas) to minimize impact on microclimate.

Requirements:

Use material with high solar reflectance and thermal emittance (such as, white china mosaic or white cement tiles or any other highly reflective materials) and / or provide vegetation to cover atleast 50% of the exposed roof areas. Points are awarded as below:

Percentage of green roof/high reflective material	Points
> 50%	2
>75%	4

Notes:

- Exposed roof area does not include areas occupied by equipment such as HVAC, solar water heater, photovoltaic etc,

Documentation Required:

Project team would achieve the credit by providing:

- Cut sheet of the roofing material with SRI index certificate or photo of roof with china mosaic or high Solar Reflectance Paint.
- Percentage calculation of the roof area showing 75% of the area meeting the criteria

Project Specific:

The project team has agreed to use either paints with high Solar Reflective Index or china mosaic, and hence the project.

CREDIT ANTICIPATED: 4

SS Cr 6: Design for differently abled

Intent:

To ensure that the building can cater to differently abled people

Requirement:

The building design should incorporate the following provisions for differently abled people, as applicable:

- Appropriately designed preferred car parking spaces in an area which has easy access to the main entrance or closer to the lift (one parking space for every 100 dwelling units)
- Provision for easy access to the main entrance
- Uniformity in flooring level/ ramps in common areas
- Rest rooms (toilets) in common areas designed for differently abled people
- Braille and audio assistance in lifts for visually impaired people

Documentation Required:

The credit can be achieved by providing the floor plan and drawings meeting the above mentioned requirement.

Project Specific:

The Project team confirmed that uniformity would be maintained and ramps would be provided at level difference. Also preferred parking near entrance, toilet at ground level and other requirements as per NBC would be provided.

CREDIT ANTICIPATED: 1

SS Cr 7: Basic Facilities for Construction Workforce

Intent:

Promote welfare of construction workforce by providing safe and healthy work conditions.

Requirement:

Provide the following on-site basic facilities for construction workforce:

- Mobile/ Permanent toilet (atleast one toilet seat)
- First-aid facility
- Adequate drinking water facilities
- Personal protective equipment (by owner/ contractor)
- Dust suppression measures.
- Adequate illumination levels in construction work areas.

Documentation Required:

The credit can be achieved by providing construction contract agreement having such facilities included in it and photographs of the same.

Project Specific:

Project team has provided all the requirements at site such as mobile toilet, first aid facility, drinking water facility and adequate illumination at construction site.

CREDIT ANTICIPATED: 1

Points Summary of Site Selection & Planning

<i>Anticipated</i>	<i>: 07</i>
<i>Doubtful</i>	<i>: 00</i>
<i>Not Applicable</i>	<i>: 02</i>
<i>Total</i>	<i>: 09</i>



WATER EFFICIENCY

Although more than 70% of the earth’s surface is covered in water, less than 0.5% fills the earth’s rivers and lakes and is available for our domestic uses. Research says that by 2025; the total population of the world would be 8.3 billion and 2.8 billion people would be without water. Asia and particularly India would be worst affected where the percentage of people without water would be as high as 40%.

The towns are generating considerable amount of sewage which is disposed off into the nearest water bodies without any treatment causing environmental pollution and health hazards. Due to excessive withdrawing of groundwater resources, and nature being unable to keep up with the demand, water tables have dropped. This has led to land subsidence and the intrusion of saltwater into the groundwater.

It is of utmost importance to use water judiciously and reuse & recycle water. Recycling of water is not only becoming a necessity to counter the future water crisis, but also very crucial if we are to save the nature.

Also efficient and low-flow fixtures can help to reduce the water consumption.

LEED Credits under Water Efficiency:

Rainwater Harvesting, Roof & Non-roof	WE MR 1
Water Efficient plumbing Fixtures	WE MR 2
Landscape Design, 20%, 40%	WE Cr 1
Management of Irrigation Systems	WE Cr 2
Rainwater Harvesting Roof & Non-roof: 50%, 75%	WE Cr 3
Water Efficient Plumbing Fixtures: 25%, 35%	WE Cr 4

WE MR 1: Rainwater Harvesting Roof & Non-roof

Intent:

Enhance ground water table and reduce municipal water demand through effective rain water management.

Requirements:

Provide rainwater harvesting or storage system to capture atleast 25% of the runoff volumes from the roof surfaces.

In coastal areas where the groundwater table is shallow and water percolation is limited, collection tanks may be provided meeting the above requirement.

Note:

For normal annual rainfall refer Metrological Department data at <http://www.imd.gov.in>

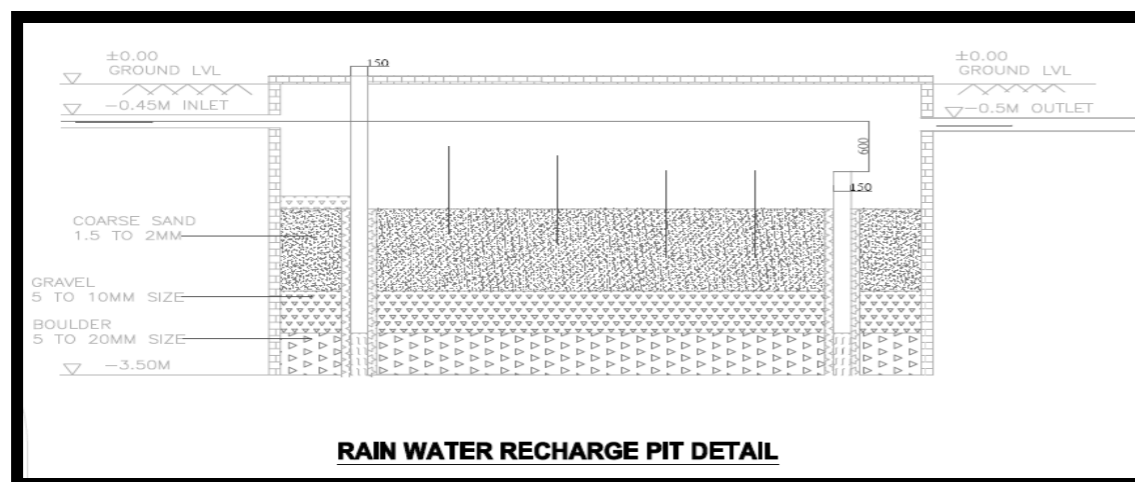
Documents Required:

The mandatory requirement can be met by providing

- Rainwater harvesting calculations
- Rainfall data
- Location of the rainwater harvesting pits with section details

Project Specific:

The project confirmed that there would be rainwater harvesting pits and/or collection tank to capture 100% run-off from the roof and non-roof.



WE MR 2: Water Efficient Plumbing Fixtures

Intent:

Minimize the use of municipal water and reduce load on waste water systems.

Requirements:

Select water fixtures whose average flow rates / capacities meet the values mentioned in the table below:

Baseline Flow Rates for Water Fixtures in a Typical Household

S.No	Items	Baseline	Units
1	Flush Fixtures	6/3	LPF
2	Flow Fixtures	10	LPM

Note:

- Flow fixtures include faucets, basin mixer, taps, showers, shower mixers.
- The baseline flows can be demonstrated at flowing water pressure of 3 bar.
- Flowing water pressure of 3 bar does not mean that the water supply in the building is at 3 bar. The building fixtures can operate at lower pressures but to show compliance under this credit, the design flow rates are to be submitted at 3 bar.
- The average flow rate is a simple arithmetic average of all the respective flush /flow fixtures

Documents Required:

Hence the mandatory requirement can be easily met by providing

- Water fixtures certificate mentioning the flow rates at 3 bar pressure
- Water calculation and water balance for the complete building

Project Specific:

The project team confirmed that the water fixtures selected would be low flow and atleast 20% below the above baseline.



WE CR 1: Landscape Design: 20%, 40%

Intent:

Design landscape to ensure minimum water consumption.

Requirements:

Limit the use of turf on the site so as to conserve water.

Points are awarded as below:

Drought Tolerant Species as a Percentage of Total Landscaped Area	Points
> 20%	1
> 40%	2

Areas planted with turf should not exceed a slope of 25 percent (i.e., a 4 to 1 slope).

Note:

This point is applicable only for those projects which has 15% of the site area landscaped

Documents Required:

The following documents would be required to achieve the credit:

- Landscape plan with area details of each landscape type and also the species that would be grown

Project Specific:

The landscaped area would be mixed of trees, shrubs, turf etc. At present, the design team anticipates that it would be difficult to limit the turf area below 40% and hence only one credit is anticipated.

CREDIT ANTICIPATED: 1

CREDIT NOT ANTICIPATED: 1

WE CR 2: Management of Irrigation Systems

Intent:

Reduce the demand for irrigation water through water-efficient management techniques

Requirements: (1 point for 3 features)

Features from the following should be incorporated:

- Provide a central shut-off valve
- Turf and each type of bedding area must be segregated into independent zones based on watering needs
- Atleast 50% of landscape planting beds must have drip irrigation system to reduce evaporation
- Pressure regulating device(s) to maintain optimal pressure to prevent water loss
- Any other innovative methods for watering

Documentation Required:

The document required to achieve this credit are

- Manufacturer’s datasheet and relevant drawings for the feature incorporated

Project Specific:

The project team has confirm that 3 features like central shut off valve, drip irrigation system and pressure regulating device will be incorporated.

CREDIT ANTICIPATED: 1



Drip Irrigation

WE Cr 3: Rainwater Harvesting, Roof & Non-Roof: 50%, 75%

Intent:

Enhance ground water table and reduce municipal water demand through effective rain water management.

Requirements:

Provide rainwater harvesting or storage system to capture atleast 50% of the runoff volumes from the roof surfaces. The harvesting system designed should cater to atleast 1 day of normal rainfall* occurred in the last 5 years.

Rainwater Harvesting System to capture / recharge	Points
>50% runoff from roof & non roof area	2
>75% runoff from roof & non roof area	4

Note:

For normal annual rainfall refer Metrological Department data at <http://www.imd.gov.in>

Documents Required:

The credit can be achieved by providing

- Rainwater harvesting calculations
- Rainfall data
- Location of the rainwater harvesting pits with section details

Project Specific: The project confirmed that there would be rainwater harvesting pits and/or collection tank to capture 100% run-off from the roof and non-roof.

CREDIT ANTICIPATED:

4

WE Cr 4: Water Efficient Plumbing Fixtures

Intent:

Minimize the use of municipal water and reduce load on waste water systems.

Requirements:

Select water efficient plumbing fixtures whose flow rates / capacities are atleast 25% less than the baseline criteria meet the values mentioned in the table below:

Baseline Flow Rates for Water Fixtures in a Typical Household

S. No	Items	Baseline	Units
1	Flush Fixtures	6/3	LPF
2	Flow Fixtures	10	LPM

Water Efficient Plumbing Fixtures	Points
<25% less than baseline criteria	2
<35% less than baseline criteria	4

Note:

- Flow fixtures include faucets, basin mixer, taps, showers, shower mixers.
- The baseline flows can be demonstrated at flowing water pressure of 3 bar.
- Flowing water pressure of 3 bar does not mean that the water supply in the building is at 3 bar. The building fixtures can operate at lower pressures but to show compliance under this credit, the design flow rates are to be submitted at 3 bar.
- The average flow rate is a simple arithmetic average of all the respective flush /flow fixtures

Documentation Required:

The credit can be achieved by providing

- Water fixtures certificate mentioning the flow rates at 3 bar pressure
- Water calculation and water balance for the complete building

Project Specific:

The project team confirmed that the water fixtures selected would be low flow and atleast 35% below the above baseline.

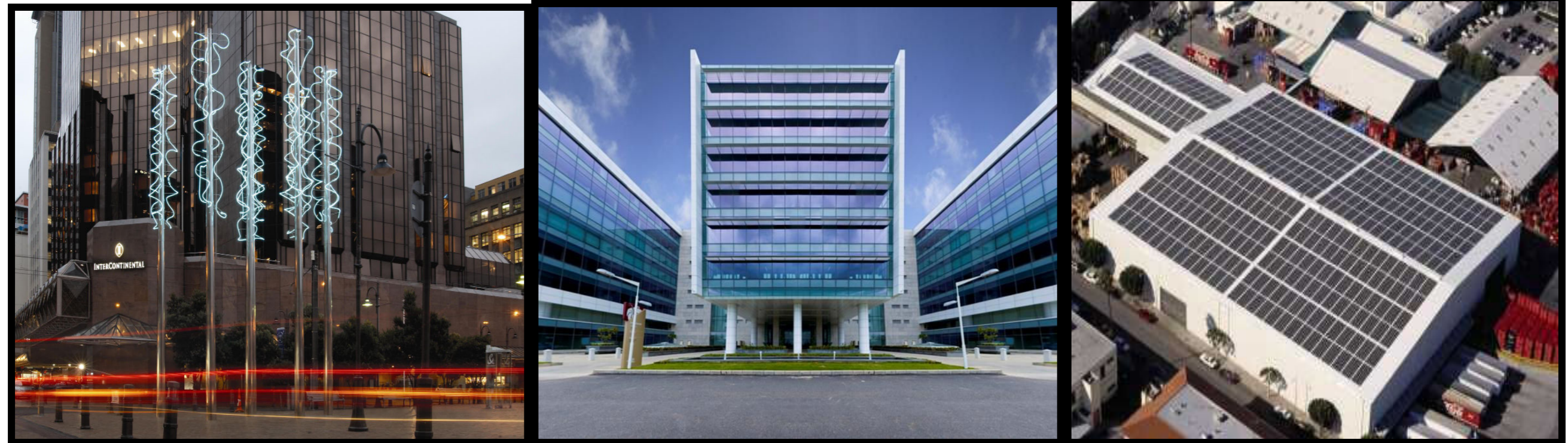
CREDIT ANTICIPATED:

4

Points Summary of Water Efficiency

<i>Anticipated</i>	<i>: 10</i>
<i>Doubtful</i>	<i>: 00</i>
<i>Not Applicable</i>	<i>: 01</i>
<i>Total</i>	<i>: 11</i>





ENERGY EFFICIENCY

Building all over the world consume huge amount of electricity. The power generated by fossils fuels such as oil and coal impact the environment beginning with their extraction, transportation, refining and distribution. These release carbon dioxide which contributes to global climate change.

Green Buildings help to address these issues in two primary ways: to reduce the energy consumption and by using renewable sources to generate electricity. The energy performance of the buildings can be improved with the help of efficient and innovative designs both in active and passive systems. Starting with building envelope to the systems and operation controls on the systems all contribute to efficient building performance and in turn lower the operational costs. Commissioning & integration of the systems is necessary to ensure the design parameters are achieved during operations

Efficient design would alone not ensure improved performance, continuous monitoring and measuring the consumption is also equally essential. As the saying goes, “One cannot save what one cannot measure.”

LEED Credits under Energy Efficiency:

CFC- Free Equipment	EE MR 1
Minimum Energy Performance	EE MR 2
Enhanced Energy Performance	EE Cr 1
On-site Renewable Energy: 2.5%, 5%, 7.5%	EE Cr 2
Solar Water Heating Systems: 50%, 75%, 95%	EE Cr 3
Energy Saving Measures in other Appliances & Equipments	EE Cr 4

EE MR 1: CFC-Free Equipment

Intent:

Avoid use of refrigerants and ozone depleting gases which has negative impact to the environment.

Requirement:

Refrigerants used in Heating, Ventilation & Air-conditioning (HVAC) equipment and unitary air-conditioners installed must be CFC-free

Documentation Required:

The villa would be conditioned and VRF system would be installed. The refrigerant used in the system would be CFC-free. Hence the mandatory requirement can be met by providing

- Manufactures' datasheet of Variable Refrigerant Volume systems



EE MR 2: Minimum Energy Performance

Intent:

Improve energy efficiency of the building(s) to reduce environmental impacts from excessive energy use.

Requirement:

The project can choose any one of the following options:

Option 1 - Prescriptive Approach

Option 2 – Performance Based Approach

Option 1 - Prescriptive Approach

The prescriptive approach allows the project to comply with applicable criteria for all the parameters as outlined below:

1. Building Envelope:

The project must ensure that the following building envelope measures meet the baseline criteria as outlined in Annexure –I.

- Solar Heat Gain Coefficient (SHGC) *
- Window Glazing U-value (*only if WWR > 30%*)**
- Overall Roof Assembly U-value

Note:

- **Low SHGC value can be achieved through chajjas or efficient fenestration or a combination of both*
- ***Compliance for window glazing U-value should be shown only if window-to-wall ratio (WWR) is more than 30%*
- *Compliance for overall wall assembly U-value need not be shown for mandatory requirement*

B. Lighting Power Densities

The project must ensure that the interior, exterior, common and parking area lighting power densities meet the baseline values through 'building area method' as outlined in Annexure–I.

C. Air-conditioning and Heating systems/ equipment

The project must ensure that the air-conditioning systems meet the baseline criteria as outlined below:

- Unitary air-conditioners must meet the baseline criteria (Annexure I)
- Centralized air-conditioning chiller should meet the criteria as per Annexure I

Option 2 – Simulation Based Approach

The simulation (performance) based approach involves a building energy simulation and modeling. This approach allows the project to demonstrate compliance with the baseline criteria.

The project must perform building energy simulation considering the following, as per annexure - I:

Building envelope

- Solar heat gain coefficient (SHGC)
- Window glazing U-value
- Overall wall assembly U-value
- Overall roof assembly U-value

Lighting

- Interior, exterior, common & parking area lighting, whichever is in owner's / developer's scope

Air-conditioning**Space heating****Plug loads & Process loads**

The following comfort conditions should be considered for energy simulation:

- Indoor temperature set point for simulation should be 26°C for cooling systems & 20°C for Space heating systems all through the year.
- Comfort conditions should be considered both for summer and winter.

Notes:

- Trade-offs among different building parameters (such as lighting, air-conditioning, etc.,) are permissible.
- Projects which use on-site renewable energy sources (such as solar photovoltaic, wind turbines, etc.,) can be subtracted from the total energy of the proposed case.

- Solar hot water systems should not be modeled in both base case and proposed case, to show energy savings. Such systems are separately recognized under EE Credit 3 – Solar water heating systems.
- Electric water heating system should be considered under Plug loads.
- The base case requirements for the energy simulation module are given in Annexure - I.
- The protocol for energy simulation, calculation of the proposed & baseline building performance and indicative format for reporting energy simulation results are detailed in Annexure - III.

Documentation Required:***The project can achieve the requirement by***

- Whole Building Simulation report demonstrating the performance of the building over the base line ASHRAE requirements

Following are the suggested energy efficiency measures to be considered:

- Roof Insulation (Over deck); High Albedo Roof
- Wall: Hollow blocks/Autoclave Aerated Concrete blocks Insulation of wall
- High performance Glass
- Lighting: 0.8 W/sq.ft. or less in common areas
- Reduce exterior Lighting consumption by atleast 20%
- Energy Efficient VRF systems (with COP 4.2)

Project Specific: The team would perform the Whole Building Simulation of the project and recommend measures to increase the percentage savings with respect to the ASHRAE baselines.

EE Cr 1: Enhanced Energy Performance

Intent:

Enhance energy efficiency of the building(s) to reduce environmental impacts from excessive energy use.

Requirement:

The project can choose any one of the following options:

- Option 1 – Prescriptive Approach (Maximum 10 points)
- Option 2 – Performance Based Approach (Maximum 10 points)

Performance Based Approach

The simulation (performance) based approach involves a building energy simulation and modeling. This approach allows the project to demonstrate improvements over the baseline criteria.

Points are awarded based on energy cost percentage savings as detailed below:

Percentage Energy Cost Savings above Base case (%)	Points
3	1
6	2
9	3
12	4
15	5
18	6
21	7
24	8
27	9
30	10

The project must perform building energy simulation considering the following, as per annexure - I:

1. Building envelope:

- Solar heat gain coefficient (SHGC)
- Window glazing U-value
- Overall wall assembly U-value
- Overall roof assembly U-value

2. Lighting

- Interior, exterior, common & parking area lighting, whichever is in owner's / developer's scope

3. Air-conditioning

4. Space heating

5. Plug loads & Process loads

The following comfort conditions should be considered for energy simulation:

- Indoor temperature set point for simulation should be 26°C for cooling systems & 20°C for Space heating systems all through the year.
- Comfort conditions should be considered both for summer and winter.

Notes:

- Trade-offs among different building parameters (such as lighting, air-conditioning, etc.,) is permissible.
- Projects which use on-site renewable energy sources (such as solar photovoltaic, wind turbines, etc.,) can be subtracted from the total energy of the proposed case.
- Solar hot water systems should not be modeled in both base case and proposed case, to show energy savings. Such systems are separately recognized under EE Credit 3 – Solar water heating systems.
- Electric water heating system should be considered under Plug loads.
- The base case requirements for the energy simulation module are given in Annexure - I.
- The protocol for energy simulation, calculation of the proposed & baseline building performance and indicative format for reporting energy simulation results are detailed in Annexure - III.

Documentation Required:

The project can achieve the requirement by

- Whole Building Simulation report demonstrating the performance of the building over the base line ASHRAE requirements

Following are the suggested energy efficiency measures to be considered:

- Roof Insulation (Over deck); High Albedo Roof
- Wall: Hollow blocks/Autoclave Aerated Concrete blocks Insulation of wall
- High performance Glass
- Lighting: 0.8 W/sq.ft. or less in common areas
- Reduce exterior Lighting consumption by atleast 20%
- Energy Efficient VRF systems are used

Project Specific: The team would perform the Whole Building Simulation of the project and recommend measures to increase the percentage savings with respect to the ASHRAE baselines. With the current design consideration the team anticipates all 10 credits.

CREDIT ANTICIPATED: 10

EE Cr 2: On-site Renewable Energy : 2.5%, 5%, 7.5%

Intent:

Promote self sufficiency in energy through renewable technologies for on-site power generation and use within the building

Requirement:

Install renewable energy systems for atleast 5% of annual consumption of the building.

Points for Renewable Energy Power:

Renewable Energy as a Percentage of annual consumption	Points
>5 %	2
> 10 %	4
> 15 %	6

Documentation Required:

There are no on-site installations to generate renewable energy and hence no points are attempted

CREDIT NOT APPLICABLE: 6



EE Cr 3: Solar Water Heating : 50%, 95%**Intent:**

To encourage use of solar energy for water heating applications in the building

Requirement:

Provide solar water heating system to satisfy hot water requirement for domestic purposes. The minimum hot water requirement for domestic purposes should be calculated for 250liters per person per day.

Points are awarded as below:

Hot water through solar water heating as a Percentage of total hot water requirement	Points
> 50%	2
> 95%	4

Documentation Required:

The credit can be achieved by providing

- Solar water heating system drawings with design data
- Hot water calculation

Project Specific: The design team confirmed that more than 95% of the hot water requirement would be met by Solar Water heating system installed in the project

CREDIT ANTICIPATED: 4

EE Cr 4: Energy Savings Measures in other Appliances & Equipments**Intent:**

Conserve energy in the use of house-hold appliances and other equipment, thereby reducing environmental impacts.

Requirement:

Provide any four of the following with minimum BEE 4-star rated or equivalent appliances:

- Ceiling Fans
- Electric geysers
- Refrigerators
- Television
- Washing machines (Semi-automatic/ Automatic)
- Pumps & Motors*
- Other rated appliances

** Where BEE star rating is not applicable, compliance can be shown through ISI certified Pumps & Motors*

Documentation Required:

The credit can be achieved by providing

- Manufactures' datasheet or drawings as applicable

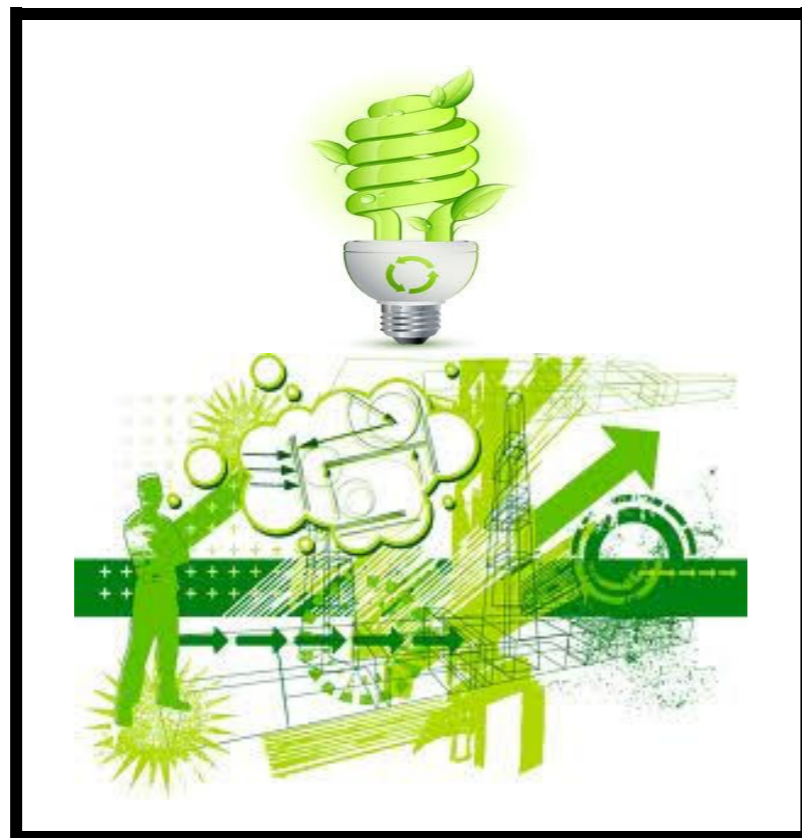
Project Specific:

Project team has confirmed that more than 4 of the above features would be minimum BEE 4 star rated appliances.

CREDIT ANTICIPATED: 2

Points Summary of Energy Efficiency

Anticipated	: 16
Doubtful	: 00
Not Applicable	: 06
Total	: 22





MATERIALS & RESOURCES

Building materials choices are important in sustainable design because of the extensive network of extraction, processing and transportation steps required to process them. Activities required to prepare them may pollute air and water, destroy natural habitat and deplete natural resources.

The effective strategies for minimizing the environmental impact include reuse of the existing building structures instead of completely demolishing the structures to erect new structures, use salvaged materials which can be refurbished to increase their life-span, using the materials which are locally available. The local materials would boost the local economy as well as reduce the transportation costs.

Recycling of the construction waste materials at site or to recyclers / scrap dealers thereby avoiding the materials being dumped into landfills. Materials with high recycled should be preferred as these help to reduce the requirement of virgin materials.

LEED Credits under Materials & Resources:

Seperation of House - hold Waste	MR MR 1
Organic Waste Management, Post Occupancy: 95%	MR Cr 1
Handling of Construction Waste Materials: 50%	MR Cr 2
Reuse of Salvaged Materials: 2.5%, 5%	MR Cr 3
Materials with Recycled Content: 10%, 20%	MR Cr 4
Local Materials: 25%, 50%	MR Cr 5
Rapidly renewable materials & Certified wood: 50% & 75%	MR Cr 6

MR MR 1: Separation of House - hold Waste

Intent:

Facilitate segregation of house-hold waste at source so as to prevent such waste being sent to land-fills.

Requirement:

Provide separate bins to collect dry waste (paper, plastic, metals, glass, etc.,) and wet waste (organic).

Documentation Required:

The credit requirement can be achieved by providing

- Floor highlighting waste bins

Project Specific: The project team has confirmed that the villa premises would have garbage chutes for dry and wet waste separate. Hence the mandatory requirement can be met by providing

- Typical plan showing the location of the waste bins



Separation of Waste

MR Cr 1: Organic Waste Management, Post-Occupancy

Intent:

Ensure effective organic waste management, post-occupancy, so as to prevent waste being sent to landfills.

Requirement:

Install on-site waste treatment system for treating 95% organic waste generated from the building. The output from such systems like manure, power, etc., should be reused in-situ.

Note: Organic waste includes household kitchen waste and garden waste

Documentation Required:

The credit can be achieved by providing

- Organic waste converter cut sheets and its process.
- The capacity of the convertor should be adequate to process the total waste generated in the villa

Project Specific: At present the project team as ensured effective waste management by using on-site waste recyclers or vermi-composting. Other technologies include digesters, gasifiers etc

CREDIT ANTICIPATED:

2

MR Cr 2: Handling of Construction Waste Materials

Intent:

Encourage practices to manage construction waste, thereby, avoiding waste being sent to land-fills.

Requirement:

Avoid atleast 50% of the waste generated (by either weight or volume) during construction from being sent to landfills.

Documentation Required:

The credit requirement can be achieved by providing

- Waste material checklist with recycler declaration

Project Specific:

The Project has confirmed to record all the construction waste that would be disposed out of the site. Most of the wastes such as scrap steel, broken glass, gypsum etc would be taken back by the vendor or sold to scrap dealer.

CREDIT ANTICIPATED:

1

MR Cr 3: Reuse of Salvaged Materials: 2.5%, 5%

Intent:

Encourage the use of salvaged building materials and products to reduce the demand for virgin materials thereby minimizing the impacts associated with extraction and processing of virgin materials

Requirement:

Ensure atleast 2.5% of the total building materials by cost used in the building is salvaged, refurbished and reused.

Percentage of Salvaged Materials	Points
> 2.5 %	1
> 5 %	2

Documentation Required:

The project can achieve the credits by providing

- Master material list with cost
- Certificates from the manufacture indicating the renewable/salvaged material/value

Project Specific:

The project team, currently do not anticipate any use of renewable materials in the project that would amount to the minimum 2.5% of the total building cost. Hence **the credit cannot be achieved**

CREDIT NOT APPLICABLE:

2

MR Cr 4: Materials with Recycled Content: 10%, 20%

Intent:

To encourage the use of products which contain recycled materials to reduce environmental impacts associated with the use of virgin materials.

Requirement:

Use materials with recycled content such that the total recycled content constitutes atleast 10% of the total cost of the materials used in the project.

Points for Recycled Content:

Percentage of Recycled Content	Points
> 10 %	1
> 20 %	2

Notes:

- *Material Cost = Total Cost – (Labour Cost + Installation Cost)*
- *If Labour and Installation cost is not known, the default material cost can be considered as 60% of the total cost of the component*
- *Cost of equipment, systems, lighting fixtures, appliances, movable furniture need not be considered in the total material cost*

Documentation Required:

The project can achieve the credits by providing

- Master material list with cost
- Certificates from the manufacture indicating the recycled content in the material

Project Specific: Most of the materials like glass, steel, cement, tiles etc that are proposed for the project would contain high recycled content.

CREDIT ANTICIPATED:

2

MR Cr 5: Local Materials: 25%, 50%

Intent:

Encourage the use of building materials available locally thereby minimizing the associated environmental impacts.

Requirement:

Ensure atleast 50% of the total building materials by cost used in the building should have been manufactured within a radius of 400 Km.

Points for Local Materials:

Percentage of Local Materials	Points
> 25 %	1
> 50 %	2

Notes:

- *Material Cost = Total Cost – (Labour Cost + Installation Cost)*
- *If Labour and Installation cost is not known, the default material cost can be considered as 60% of the total cost of the component*
- *Cost of equipment, systems, lighting fixtures, appliances, movable furniture need not be considered in the total material cost*

Documentation Required:

The project can achieve the credits by providing

- Master material list with cost
- Certificates from the manufacture highlighting the location from where the material is manufactured.

Project Specific:

Most of the materials that are proposed for the project would be procured locally. Some of these materials are also extracted and harvested locally.

CREDIT ANTICIPATED:

2

MR Cr 6: Rapidly Renewable Materials & Certified Woods

Intent:
 Minimize use of virgin wood thereby encouraging responsible forest management and maximize use of materials which are rapidly renewable.

Requirement:
 Wood certified by Forest Stewardship Council (FSC) or Programme for the Endorsement for Forest Certification (PEFC) or equivalent

Percentage of Rapidly Renewable Material / Certified Wood	Points
> 50 %	2
> 75 %	4

Documentation Required:
 The project can achieve the credits by providing

- FSC wood cut sheet highlighting COC number

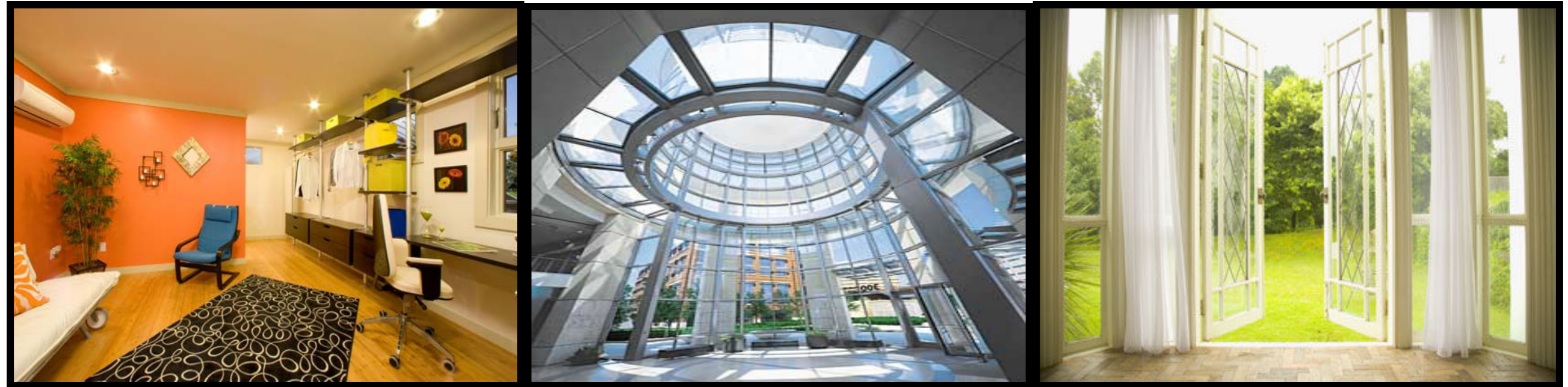
Project Specific:
 The project team, anticipate the use of 100% certified wood in the project.

CREDIT ANTICIPATED: 4



Points Summary of Materials & Resources

Anticipated : 11
Doubtful : 00
Not Applicable : 02
Total : 13



INDOOR ENVIRONMENTAL QUALITY

Most of us spend majority of our time indoors be at our home or office and hence it is essential that the levels of pollutants should be minimum. Indoor Air Quality needs to be maintained as pollutants cause health reactions in the form of allergies and other Sick Building Syndrome causing loss of health and productivity.

Preventing IAQ problems is generally much less expensive than identifying them and solving them after they occur. Evaluation of the properties from carpets, paints, adhesives etc with low levels of potentially irritating gases and reduce occupant exposure. Providing high ratios of filtered fresh air, better ventilation, managing moisture can provide optimal air quality for building occupants. Here use of sensors can alert the building management staff to potential IAQ problems and can also effectively balance the energy and IEQ issues.

Occupant well-being can be improved by providing views to the exterior and by providing natural daylight. In addition, providing individual controls to control the thermal environment can further increase their satisfaction and in turn productivity.

LEED Credits under Indoor Environmental Quality:

Tobacco Smoke Control	IEQ MR 1
Daylighting: 50%	IEQ MR 2
Fresh Air Ventilation	IEQ MR 3
Enhanced Daylight: 75%, 95%	IEQ Cr 1
Enhanced Fresh Air Ventilation	IEQ Cr 2
Exhaust System	IEQ Cr 3
Low VOC materials	IEQ Cr 4
Building Flush out	IEQ Cr 5
Cross Ventilation	IEQ Cr 6



IEQ MR 1: Tobacco Smoke Control

Intent:

Minimize exposure of non-smokers to the adverse health impacts arising due to passive smoking, post occupancy.

Requirement:

Smoking should be prohibited in the common areas of the building.

Documentation Required:

The mandatory requirement can be met by providing

- Locations of signages that would be placed
- “No Smoking” policy from the management

Project Specific:

The project team has confirmed that the common areas would be “NO SMOKING” zone and signages would be placed at all prominent locations to educate the building occupants and visitors.



IEQ MR 2: Daylighting: 50%

Intent:

To ensure connectivity between the interior and the exterior environment, by providing good day lighting

Requirement:

Option 1: Prescriptive Approach

Achieve minimum glazing factors as below in atleast 50% of the regularly occupied spaces.

Space Type	Glazing Factor (GF)
Living Spaces	1
Study room	2
Kitchens	2

Average Glazing factor can be calculated using the formula given below:

$$\text{Daylight} = \frac{\text{Window Area [SF]}}{\text{Factor Floor Area [SF]}} \times \text{Actual Visible transmittance} \times \text{Constant}$$

Constant Values:

Window on wall : 0.2

Window on roof (skylight) : 1.0

Note:

Window openings where the angle of obstruction of objects obscuring the sky dome is greater than 70 deg. from the horizontal shall not be considered for daylight calculations

Option 2: Simulation Approach

Demonstrate through computer simulation that 50% of the regularly occupied spaces achieve daylight illuminance levels of a minimum of 10 foot-candles (fc) (108 lux) in a clear sky condition on September 21 at 12 noon, at working plane

Documentation Required:

The mandatory requirement can met be providing

- Daylight calculations
- Plans and elevations of the building

Project Specific:

The day lighting calculations were conducted by simulation method as prescribed in the IGBC Green Homes Guidelines. The result suggests that more than 85% of the spaces achieve 2% daylight.



IEQ MR 3: Fresh Air Ventilation

Intent:

To avoid indoor pollutants affecting indoor air quality by providing adequate outdoor air ventilation

Requirement:

For Air Conditioned Spaces:

Design a ventilation system for air conditioned spaces, to meet a requirement of 5 cfm per person for each air conditioned space.

For Non-Air conditioned Spaces:

Install openable windows or doors in living spaces, kitchens and bathrooms such that the openable area is designed to meet the criteria as outlined in the table below:

Design Criteria for Openable Windows and Doors:

Space Type	Openable area as a percentage of total carpet area
Living Spaces	10%
Kitchens	8%
Bathrooms	4%

Note: For sliding doors/windows, only openable area to exterior shall be considered in calculations

Documentation Required:

The mandatory requirement would be fulfilled by providing

- Fresh air duct layout with calculation

Project Specific:

Most of the areas would be conditioned and treated Fresh air would be provided to all the spaces. The design is sufficient to meet the requirements of 5cfm/person. For non air-conditioned systems, the openable windows are designed to ensure sufficient air changes per hour.

IEQ Cr 1: Enhanced Daylighting: 75%, 95%

Intent:

To ensure connectivity between the interior and the exterior environment, by providing good day lighting

Requirement:

Option 1: Prescriptive Approach

Achieve minimum glazing factors as below in atleast 75% of the regularly occupied spaces.

Points are awarded as:

Percentage of Regularly Occupied Spaces with Daylighting	Points
> 75 %	2
> 95 %	4

The glazing factors are as follows:

Space Type	Glazing Factor (GF)
Living Spaces	1
Study room	2
Kitchens	2

Average Glazing factor can be calculated using the formula given below:

$$\text{Daylight} = \frac{\text{Window Area [SF]}}{\text{Factor Floor Area [SF]}} \times \text{Actual Visible transmittance} \times \text{Constant}$$

Constant Values:

Window on wall : 0.2

Window on roof (skylight) : 1.0

Note:

Window openings where the angle of obstruction of objects obscuring the sky dome is greater than 70 deg. from the horizontal shall not be considered for daylight calculations

Option 2: Simulation Approach

Demonstrate through computer simulation that 75% of the regularly occupied spaces achieve daylight illuminance levels of a minimum of 10 foot-candles (fc) (108 lux) in a clear sky condition on September 21 at 12 noon, at working plane

Documentation Required:

The credit can met be providing

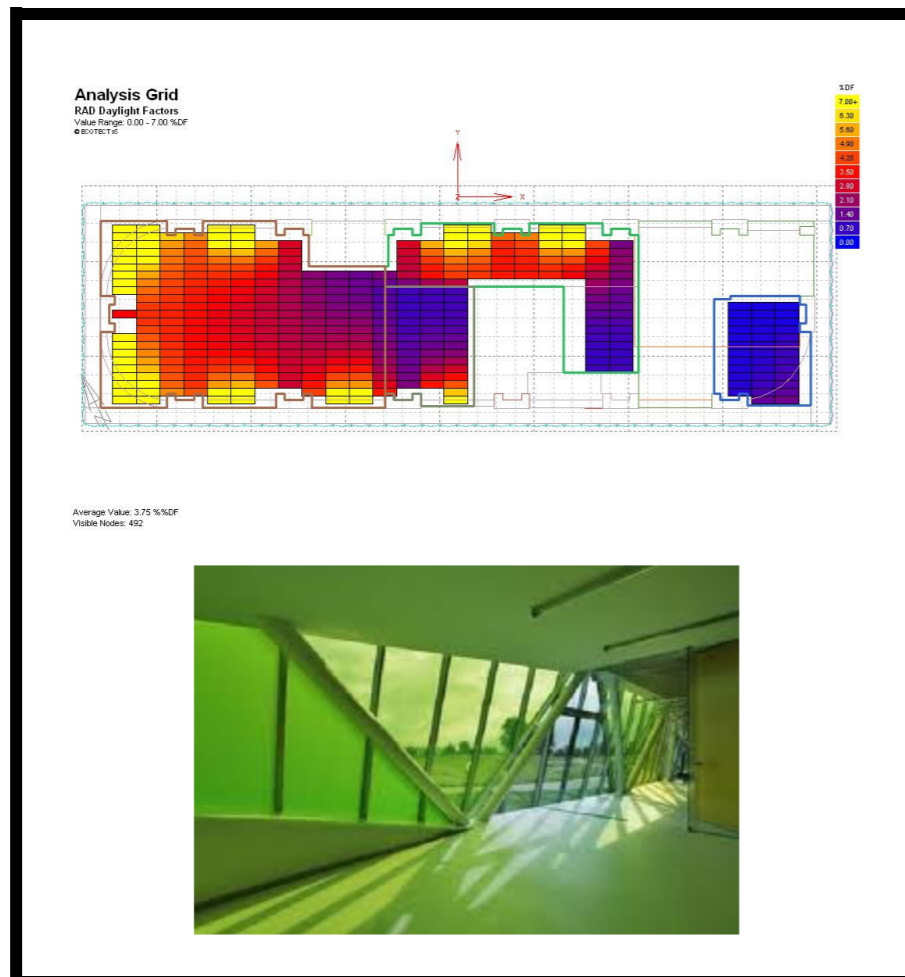
- Daylight calculations
- Plans and elevations of the building

Project Specific:

The day lighting calculations were conducted by simulation method as prescribed in the IGBC Green Homes Guidelines. The result suggests more than 85% of living spaces achieve daylight and hence 2 credits can be achieved.

CREDIT ANTICIPATED: 2

CREDIT NOT APPLICABLE: 2



IEQ Cr 2: Enhanced Fresh Air Ventilation

Intent:

To avoid indoor pollutants affecting indoor air quality by providing adequate outdoor air ventilation

Requirement:

For Air Conditioned Spaces:

Design a ventilation system for air conditioned spaces, to meet a requirement of 6.5 cfm per person for each air conditioned space.

For Non-Air conditioned Spaces:

Install operable windows or doors in living spaces, kitchens and bathrooms such that the operable area is designed to meet the criteria as outlined in the table below:

Design Criteria for Operable Windows and Doors:

Space Type	Operable area as a percentage of total carpet area
Living Spaces	13%
Kitchens	10%
Bathrooms	5%

Note: For sliding doors/windows, only operable area to exterior shall be considered in calculations

Documentation Required:

The mandatory requirement would be fulfilled by providing

- Fresh air duct layout with calculation

Project Specific:

Most of the areas would be conditioned and treated Fresh air would be provided to all the spaces. The design is sufficient to meet the requirements of 6.5 cfm/person. For non air-conditioned systems, the operable windows are designed to ensure sufficient air changes per hour.

CREDIT ANTICIPATED: 2

IEQ Cr 3: Exhaust System

Intent:

Ensure that kitchens and bathrooms are adequately ventilated, so as to improve the quality of indoor environment.

Requirement:

Design the exhaust systems in kitchen and bathrooms as per the requirements provided in the table below:

Location	Minimum Airflow	
Kitchen	For < 9.3 sq.m (100 sq.ft) floor area	100 cfm
Bathroom	For < 4.64 sq.m (50 sq.ft) floor area	50 cfm

Note:

- For rooms with higher floor areas than the above values, airflow has to be proportionally increased.
- For kitchens, kitchen range vent hoods which meet the above air flows are also acceptable
- Ensure exhaust systems take away the polluted indoor air to the outdoors (i.e. exhaust outlets into common areas are not allowed)

Documentation Required:

The credit can achieve this credit by providing Exhaust system layout highlighting CFM (Kitchen and Toilets)

Project Specific:

The project team has confirmed that the Exhaust systems for kitchen and toilets will be provided as per the requirement and the credit can be achieved

CREDIT ANTICIPATED:

1

IEQ Cr 4: Low VOC Materials

Intent:

To encourage the use of materials with low emissions so as to reduce adverse health impacts for building occupants

Requirement:

Use paints with low or no VOC content to the extent of 100% of interior wall surface area. (1 point)

AND

For adhesives and sealants used within the interiors ensure that the VOC content does not exceed the limits as specified in the table below. (1 point)

Type of material	VOC Limit
Paints:	
Non flat paints	150 g/L
Flat (Mat) paints	50 g/L
Anti corrosive/ anti rust paints	250 g/L
Adhesives:	
Wood flooring Adhesive	30 g/L
Tile adhesives	100 g/L
Indoor carpet adhesives	350 g/L
Varnish	65 g/L
Wood	50 g/L

Documentation Required:

The credit can be achieved by providing

- Certificates of the products specifying the VOC limit and the area of usage

Project Specific:

The materials with the above specifications are easily available locally and would be procured. The relevant certificates would be sourced from the vendors. Hence the project can achieve the credits

CREDIT ANTICIPATED:

2

IEQ Cr 5: Building Flush out**Intent:**

Avoid occupant's exposure to indoor airborne contaminants before occupying the premises, so as to reduce the adverse health impacts on building occupants.

Requirement:

Perform a building flush-out for ten days by keeping all windows open before the building is occupied.

Flushing is to be carried after paints & coatings and adhesives & sealants have been applied.

Documentation Required:

The credit can met be providing Declaration of the flush out

Project Specific:

The Project team has confirmed that the building flush out will be carried out and hence the credit could be achieved.

CREDIT ANTICIPATED: 1

IEQ Cr 6: Cross Ventilation**Intent:**

Encourage adequate cross ventilation in the design thereby, providing a healthy environment.

Requirement:

Ensure that minimum 50% of the regularly occupied spaces (by area) in each dwelling unit shall have an opening (doors/ ventilators/ windows) to the outdoor environment, in atleast two of the orientations.

Percentage of Regularly Occupied Spaces with Cross Ventilation	Points
> 50 %	2
> 75 %	4

Note:

- Regularly occupied spaces include living room, bed rooms, dining room, study room, kitchen, etc
- The doors/ ventilators/ windows should not have any obstruction within 2 m from outside surface.
- The opening considered should meet IEQ Mandatory Requirement 3 - Fresh Air Ventilation criterion.
- Regularly occupied spaces with an opening to the outdoors only in one orientation can also be considered for calculations, if there is a permanent opening to the adjoining room which meets cross ventilation criteria

Documentation Required:

The credit can be achieved by providing

- Floor plans showing each regularly occupied area has opening from 2 orientations

Project Specific:

The building plans have been studied and it is seen that almost all the regularly occupied areas have openings at atleast 2 orientations. Hence the project can achieve the credits

CREDIT ANTICIPATED: 4

Points Summary of Indoor Environmental Quality

<i>Anticipated</i>	<i>: 13</i>
<i>Doubtful</i>	<i>: 00</i>
<i>Not Applicable</i>	<i>: 02</i>
<i>Total</i>	<i>: 15</i>



INNOVATION IN DESIGN & TECHNOLOGY

Sustainable design strategies and measures are constantly evolving and improving. New technologies are continually introduced to the market place and scientific research influences building design strategies.

New innovative methods to increase the efficiency of the building performance or any new strategies implemented which reduce or eliminate any negative environmental impact should be highlighted. These documentation and illustration would enable other projects to implement the same and achieve global benefits.

The acknowledgement to innovative strategies not only encourages the project team but also opens the gateway for many more projects to follow the suit.

IGBC Credits under Innovation & Design Process:

Innovation in Design	ID Cr 1.1
Innovation in Design	ID Cr 1.2
Innovation in Design	ID Cr 1.3
Innovation in Design	ID Cr 1.4
LEED Accredited Professional	ID Cr 2

ID Cr 1.1/1.2/1.3/1.4: Innovation & Design Process

Intent:

To provide design teams and projects the opportunity to be awarded points for exceptional performance above requirements set by the IGBC Green Homes Rating System and/or innovative performance in Green Building categories not specifically addressed by the IGBC Green Homes Rating System.

Requirement:

Identify the intent of the proposed innovation credit, the proposed requirement for compliance, and the proposed documentation to demonstrate compliance, and the design approach used to meet the required elements

Documentation Required:

The following can be considered for credit points under innovation:

- Exemplary performance under any of the credits.
- Strategies or measures not covered by IGBC Green Homes such as
 - Adoption of passive architecture techniques
 - Green education etc

The project is certain that atleast 2 out of the 3 innovation credits can be achieved with the exemplary performance and Green Education. Hence the project can achieve 2 credits and 1 is kept as doubtful. There are no additional documents required to claim credits under innovation if the credit are exemplary performance based. Same documents will suffice the requirement

CREDIT ANTICIPATED: 4

ID Cr 2: IGBC Accredited Professional

Intent:

To support and encourage the involvement of IGBC AP accredited professionals in the green home building project

Requirement:

Atleast one principal participant of the project team shall be an IGBC AP

Documentation Required:

The project consists of one IGBC Accredited Professional handling the facilitation process for the project and hence the credit can be achieved by providing

- Certificate of IGBC Accredited Professional

CREDIT ANTICIPATED: 1



Points Summary of Innovation & Design

Anticipated	: 05
Doubtful	: 00
Not Applicable	: 00
Total	: 05

Conclusion:

Based on the above study, we can summarize the credit summary as below:

Category	Anticipated	Doubtful	NA
Site Selection & Planning	07	00	02
Water Efficiency	10	00	01
Energy & Atmosphere	16	00	06
Materials & Resources	11	00	02
Indoor Environmental Quality	13	00	02
Innovation & Design	05	00	00
Total	62	00	13

Hence the project can achieve *“Platinum”* rating.

