Confederation of Indian Industry

indian green building council

IGBC

IGBC GREEN AFFORDABLE HOUSING

IGBC Rating System for Green Affordable Housing

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Detailed Reference Guide
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Green Affordable Housing rating system

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Green Affordable Housing – The Indian Perspective

Introduction

While rapid urbanization and growing cities provide various opportunities, there are fallouts in terms of proliferation of slums, high prices of land and building materials which render houses unaffordable for the segment at the bottom of the pyramid. Therefore, the need for adequate housing for the low-income groups will substantially increase. MoHUPA has estimated the housing shortage of 18.78 million during the 12th Five Year Plan (FYP) period of which over 95% of this housing shortage is estimated in the Economically Weaker Sections (EWS) and Low-Income Group (LIG) categories. To address this shortage, intensive efforts are required to substantially increase affordable housing stock.

Most importantly, while we create housing for these sections of the society, they need to be green too. The principles of green and sustainability are fortunately or unfortunately community-agnostic, in the sense that they also need to handle wastages a bit more carefully, be thrifty in the usage of energy & water, handle waste in a hygienic manner to avoid outbreak of epidemics, reduced use of virgin materials and above all enhance their own quality of lives.

Green Affordable Housing

Housing that is appropriate to the needs of a household and within their means to pay along with being environment conscious. The means (or capacity) of a household to pay for their housing depends on three primary factors:

- The income of the household.
- The cost of appropriate housing; and
- Other essential living costs to be met by the household, such as food and household goods, transport, education and healthcare.

The influencing parameters for such housing will take into consideration various design characteristics of the housing, alongside social, economic and cultural attributes of the household. Some central indicators of green affordable housing would be:

- Standard and quality of housing
- Availability of basic amenities
- Located close to the services, jobs and community facilities
- Energy and water efficient
- Cost efficient in maintenance & operations

Objective: *The objective of IGBC Green Affordable Housing rating is to ensure a high degree of sustainability with no / meagre additional cost to the developer or the occupant.*

Therefore, the approach would be to selectively adopt those measures that are simple and yet have profound impacts in conserving the environment. Few of the attributes that would define the success of implementing sustainability in this segment are:

- Green measures should be easily implementable
- Easy to monitor and measure
- Operation & maintenance friendly throughout the life of building
- No / Meagre costs to end-user

National Benefits Anticipated

Green concepts and techniques in the affordable housing sector can help address the following:

- Reduction in energy and water consumption
- Improved health and hygiene
- Better ventilation and natural lighting
- Fuel savings in transit of people & associated impacts

IGBC would strive to reach out the sustainability principles amongst the affordable housing community. This is a wonderful opportunity for the country to be a trend-setter amongst other countries in addressing such sections of the society.

Applicability of Rating System

The Green Affordable Housing Rating is applicable for:

- Projects applicable under PMAY scheme/ local affordable housing schemes
- Tier I Cities: Housing projects designed with carpet area less than or equal to 60 sq. m per dwelling unit, which constitutes to at least 70% of the total dwelling units in the project
- Tier II and Tier III Cities: Housing projects designed with carpet area less than or equal to 90 sq. m per dwelling unit, which constitutes to at least 70% of the total dwelling units in the project

Scope of IGBC Green Affordable Housing

IGBC Green Affordable Housing Rating System is designed for new and major renovation of affordable multi-dwelling residential buildings/project.

In general, all projects that meet the mandatory requirements specified and minimum credit points can apply for certification. Various levels of green building certification are awarded based on the total points earned.

IGBC Green Affordable Housing Rating System

IGBC Green Affordable Housing rating system addresses green features under the following categories:

- Sustainable Site
- Water Conservation
- Energy Conservation
- Materials Conservation
- Indoor Environmental Quality
- Innovation & Design Process

The guidelines detailed under each mandatory requirement & credit enables the design and construction of green affordable housing. However, every dwelling unit should meet certain mandatory requirements, which are non-negotiable.

The various levels of rating awarded are:

Certification Level	Recognition
Certified	Best Practices
Silver	Outstanding Performance
Gold	National Excellence
Platinum	Global Leadership

a. IGBC Green Affordable Housing Registration

Project teams interested in IGBC Green Affordable Housing Certification for their project must first register with IGBC. Projects can be registered on IGBC website (www.igbc.in) under 'IGBC Green Affordable Housing'. The website includes information on registration fee for IGBC member companies as well as non-members. Registration is the initial step which helps establish contact with IGBC and provides access to the required documents, templates, important communications and other necessary information.

IGBC website will have all important details on IGBC Green Affordable Housing registration & certification - process, schedule and fee.

b. Precertification

This is an option provided for projects aspiring to get precertified at the design stage. The documentation submitted for precertification must detail the project design features which will be implemented. The rating awarded under precertification is based on the project's intention to conform to the requirements of IGBC Green Affordable Housing Rating system. It is important to note that the precertification rating awarded need not necessarily correspond to the final certification.

Precertified projects are required to provide the status of the project to IGBC, in relation to the rating, once in every six months until the award of the final rating.

Pre-certification gives the owner/ developer a unique advantage to market the project to potential buyers.

The projects which seek pre-certification need to submit the following documentation:

1. General information of project including
    a. Project brief stating project type, different type of spaces, occupancy, number of floors, area statement, etc.,
    b. General drawings (in CAD and PDF format only):
        i Master/ Site plan
        ii Parking plans
        iii Floor plans
        iv Elevations
        v Sections
        vi Photographs / Rendered views
2. Common developer declaration indicating proposed measures as mentioned in specific credits
3. Filled-in Master Template (in excel format)
4. Narratives and supporting documentation such as conceptual drawings, estimate/ tentative calculations (in excel sheets), for each mandatory requirement/ credit
5. In addition, project teams can refer the 'Documentation Required for Precertification' section provided under each mandatory requirement/ credit.

The above necessary details are mentioned in this guide, under each mandatory requirement and credit.

IGBC would take 30 workings days to review the first set of precertification documents. On receiving the clarifications posed in the first review, IGBC would take another 30 working days to award the precertification.

A certificate will be provided to projects on precertification.

c. Certification

Projects which are at the completion stage can apply for certification. To earn the IGBC Green Affordable Housing Rating, the project must satisfy all the mandatory requirements and the minimum number of credit points.

The project team is expected to provide supporting documents at preliminary and final stage of submission for all the mandatory requirements and the credits attempted.

The project needs to submit the following:

1. General information of project including
    a. Project brief stating project type, different type of spaces, occupancy, number of floors, area statement, etc.,

b. General drawings (in CAD and PDF format only):

i Master/ Site plan

ii Parking plans

iii Floor plans

iv Elevations

v Sections

vi Photographs

2. Common developer declaration indicating measures as mentioned in specific credits
3. Filled-in Master Template (in excel format)
4. Narratives and supporting documentation such as drawings, calculations (in excel sheets), declarations/ contract documents, purchase invoices, manufacturer cut sheets/ letters/ material test reports, photographs, etc., for each mandatory requirement/ credit
5. In addition, project teams can refer the 'Documentation Required for Certification' section provided under each mandatory requirement/ credit.

The necessary details are mentioned in this guide, under each mandatory requirement and credit.

Documentation is submitted in two phases – preliminary submittal and final submittal:

- The preliminary submission involves those credits which can be evaluated at the design stage. The reference guide provides the list of design and construction phase credits. After the design submission, review is done by third party assessors and review comments are provided within 30 working days.
- The next phase involves submission of clarifications to preliminary review queries and final submittal. The construction document is submitted on completion of the project. This review would be provided within 30 working days, after which the rating is awarded.
- It is important to note that the mandatory requirements/ credits earned at the preliminary review are only considered as anticipated. These mandatory requirements/ credits are not awarded until the final documents are submitted, along with additional documents showing implementation of design features. If there are changes in any 'credit anticipated' after preliminary review, these changes need to be documented and resubmitted during the final review.
- IGBC will recognise affordable housing that achieves one of the rating levels with a formal letter of certification and a mountable plaque.

d. Physical Verification & Monitoring

Before the award of rating, the residential project would be physically audited to verify implementation of the design measures.

e. Certification Levels:

The threshold criteria for certification levels are as under:

Certification Level	Multi-dwelling Residential Unit	Recognition
Certified	50 – 59	Best Practices
Silver	60 - 69	Outstanding Performance
Gold	70 - 79	National Excellence
Platinum	80 - 100	Global Leadership

f. Appeal Process

In rare cases, mandatory requirements or credits may be denied due to misinterpretation of the intent. On receipt of the final review, if a Project Team feels that sufficient grounds exist to appeal a credit denied in the final review, the project has an option to appeal to IGBC for reassessment of denied mandatory requirements or credits. The documentation for the mandatory requirements or credits seeking appeal may be resubmitted to IGBC along with necessary fee. IGBC will take 35 days to review such documentation. If an appeal is pursued, please note that a different review team will assess the Appeal Documentation.

The following documentation should be submitted:

1. General information of project including
    a. Project brief stating project type, different type of spaces, occupancy, number of floors, area statement, etc.
    b. General drawings (in CAD and PDF format only):
        i. Master/ Site plan
        ii. Parking plans
        iii. Floor plans
        iv. Elevations
        v. Sections
        vi. Photographs/ Rendered views
2. Common developer declaration indicating proposed measures
3. Filled-in Letter Template for respective mandatory requirement/ credit.
4. Original, re-submittal, and appeal submittal documentation for only those mandatory requirement/credits that the project is appealing for. Also include a narrative for each appealed mandatory requirement/ credit to describe how the documents address the reviewers` comments and concerns.
5. Fee Registration, Certification, Appeal and CIR fee details are available on IGBC website (www.igbc.in) or projects can write to IGBC (igbc@cii.in).

CHECKLIST IGBC GREEN AFFORDABLE HOUSING VERSION 2.0

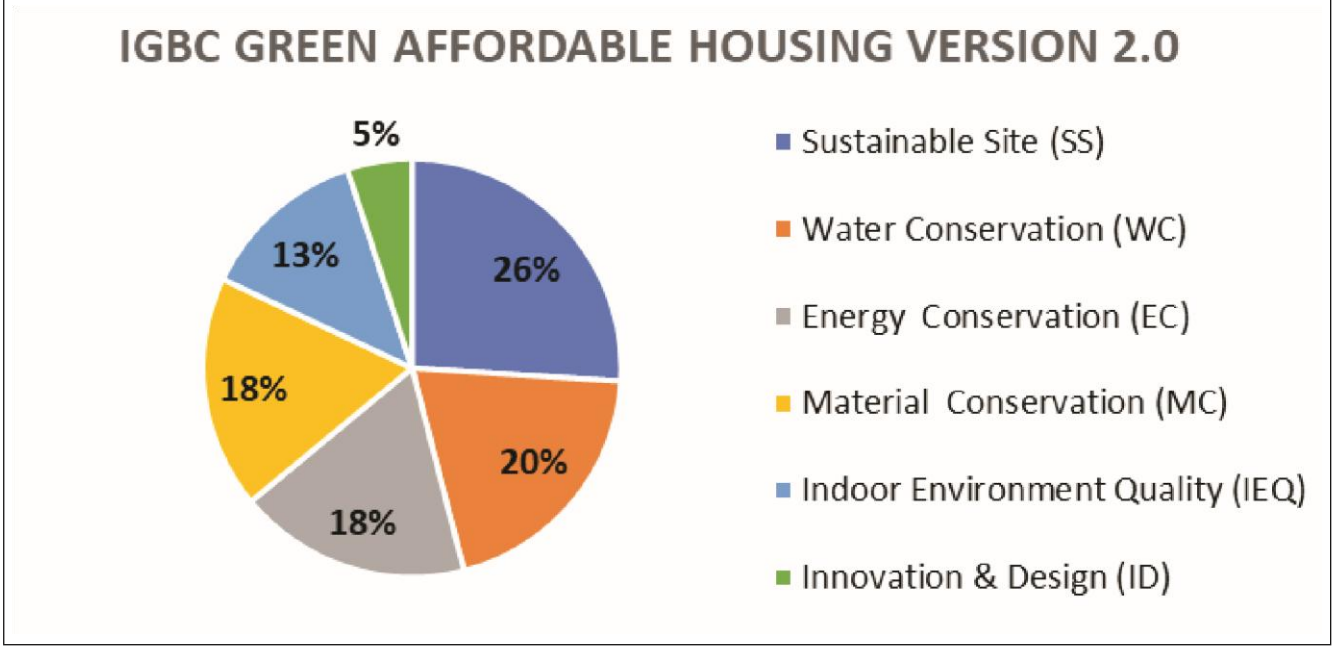
Credits	Criteria	Point(s)
Sustainable Site (SS)		
SS Mandatory Requirement 1	Local Building Regulations	M
SS Mandatory Requirement 2	Site Selection	M
SS Credit 1	Proximity to Public Transport	2
SS Credit 2	Soil Erosion Control	3
SS Credit 3	Access to Social Infrastructure	2
SS Credit 4	Green Cover on-site - 15%, 17.5% and 20%, 22.5%	4
SS Credit 5	Heat Island Effect-Non-Roof: 25%, 50%	2
SS Credit 6	Heat Island Effect-Roof: 75%, 95%	3
SS Credit 7	Parking Facilities for Tenements	4
SS Credit 8	Universal Design	2
SS Credit 9	Basic Facilities for construction workforce	2
SS Credit 10	Green Education	1
Sub Total		**25**
Water Conservation (WC)		
WC Mandatory Requirement 1	Availability of Potable Water	M
WC Mandatory Requirement 2	Rainwater Harvesting: 25%	M
WC Credit 1	Enhanced Rainwater Harvesting: 50%, 75% (or) 10%, 20% and Reuse	4
WC Credit 2	Water Efficient Plumbing Fixtures	4
WC Credit 3	Wastewater treatment: 50%, 75%, 95%	3
WC Credit 4	Treated wastewater Reuse	3
WC Credit 5	Management of Irrigation Systems	3
WC Credit 6	Water Sub-metering	3
Sub Total		**20**

Energy Conservation (EC)		
EC Mandatory Requirement 1	Energy Efficient Building Envelope	M
EC Credit 1	Enhanced Energy Efficient Building Envelope	5
EC Credit 2	Shading Elements for Building Openings	2
EC Credit 3	Efficient Lighting	3
EC Credit 4	Sensors and Control	2
EC Credit 5	On-site Renewable Energy: 20%, 40%, 60%, 80%	2
EC Credit 6	Solar Water Heating Systems: 20%, 40%, 60%, 80%	2
EC Credit 7	Energy Saving Measures in Appliances & other Equipment	2
Sub Total		**18**

Material Conservation (MC)		
MC Mandatory Requirement 1	Segregation of House-hold waste	M
MC Credit 1	Organic Waste Management: 50%, 75%	2
MC Credit 2	Handling of construction waste materials: 50%, 25%	2
MC Credit 3	Use of local Materials: 50%, 75%, 95%	3
MC Credit 4	Certified Green Products: 5%, 10%, 15%	3
MC Credit 5	Appropriate Technologies: 25%, 50%, 75%, 95%	4
MC Credit 6	Alternate Construction Materials	2
MC Credit 7	Eco friendly wood materials	2
Sub Total		**18**
Indoor Environment Quality (IEQ)		
IEQ Mandatory Requirement 1	Tobacco Smoke Control	M
IEQ Mandatory Requirement 2	Minimum Daylighting: 50%	M
IEQ Credit 1	Day Lighting: 75%, 95%	4
IEQ Credit 2	Fresh air ventilation: 50%, 75%, 95%	3
IEQ Credit 3	Cross Ventilation: 25%, 50%	2
IEQ Credit 4	Exhaust Systems	2
IEQ Credit 5	Low VOC Material, Paints & Adhesives	2

IEQ Credit 6	Occupant Well-being Facilities	1
Sub Total		**14**
Innovation & Design (ID)		
ID Credit 1	Innovation	2
ID Credit 2	Exemplary	2
ID Credit 3	IGBC Accredited Professional	1
Sub Total		**5**
Total Points		**100**

IGBC Green Affordable Housing Certification Levels		
Certification Level	**Multi-dwelling Residential Unit**	**Recognition**
Certified	50 – 59	Best Practices
Silver	60 - 69	Outstanding Performance
Gold	70 - 79	National Excellence
Platinum	80 - 100	Global Leadership



SUSTAINABLE SITE

Local Building Regulations

SS Mandatory Requirement 1

Intent:
Ensure that the building(s) complies with necessary statutory regulatory codes thereby regulating the growth of the built environment.

Requirements:
Design and execute the project as per the local building byelaws.

Benefits Anticipated:
- ❖ Restrict excessive and unsafe developments within the site

Documents Required:

Precertification Level
- Narrative with projects basic information and details of regulatory authority
- Plans approved by urban local body/ regulatory authority.

  (Or)

  Project Commencement certificate issued by local Government authority.

Note:
- *Projects which have not yet received site plan approved from local Government authority may submit an acknowledgement from the authority that the Project drawings have been submitted for approval or drawings attested by principal architect and documentation demonstrating approval from the local Authorities shall be submitted at the time of Final Certification.*
- *If the approval from local body / regulatory authority is in local language, submit English translated copy of the same.*

Certification Level
- Plans approved by urban local body/ regulatory authority.
- Letter from Principal Architect mentioning fit for occupancy

  (OR)

  Copy of Fit-for-occupancy certificate from authority.
- Time-stamped photographs of building taken at various stages of construction.

  Note: Please refer to the addendum at the end of this guide for more details on this mandatory requirement.

Site Selection

SS Mandatory Requirement 2

Intent:

Avoid the development on inappropriate sites thereby reducing the environmental impacts caused due to the location of a building on a site.

Requirements:

Avoid development of buildings, hardscapes, roads or parking areas on portions of sites that meet any of the following criteria:

- High-value farmland as defined by the relevant local, regional, state or central government agency
- Previously undeveloped land within area classified at high or very high hydro geologic risk, including any land whose elevation is lower than 5 feet (1.5 meters) above the elevation of the 100-year flood, as defined by the relevant local, regional or central government agency.
- Land specifically identified as habitat for any species listed as threatened or endangered by Wildlife Institute of India.
- Land within 100 feet (30 meters) of a wetland listed as being of high ecological value by the relevant local, regional, state, or central government agency. Renovation of an existing building is allowed if construction impact is limited to the existing development footprint.
- Previously underdeveloped land that is within 50 feet (15 meters) of a water body or Full Tank Level (FTL) that supports or could support aquatic life, recreation or industrial use, as determined by a professional biologist.
- Land that prior to acquisition for the project was public parkland.

Benefits Anticipated:

- Ensures the occupants get access to the urban environment and basic amenities.
- Helps prevent the need for expanded transportation and utility infrastructure and likely affords building occupants more access to alternative transportation when the building site is selected on a previously developed site.
- Appropriate site selection can reduce the risk of property damage due to natural events such as landslides, floods, sinkholes and soil erosion.
- Not building on inappropriate sites preserves wildlife, recreation and ecological balance.

Documents Required:

Precertification Level

- Narrative describing the project site
- Master plan indicating location of project at city/ zonal level
- Site plan approved by urban local body/ regulatory authority
- Permit from the relevant local authority in the form of a land allotment/ land use letter/ Clearance from the Ministry of Environment and Forest (MoEF), as applicable.
- Map indicating the project location details.

Certification Level

- Narrative describing the project site
- Site plan approved by urban local body/ regulatory authority
- Permit from the relevant local authority in the form of a land allotment/ land use letter/ Clearance from the Ministry of Environment and Forest (MoEF), as applicable.
- Map indicating the project location details.

Proximity to Public Transport

SS Credit 1 **Points: 2**

Intent:

Encourage use of public transport, so as to reduce negative impacts caused from automobile use.

Requirements:

- Public Transport (1 point for each measure, maximum of 2 points)
  Locate the building within 1 km walking distance from an intra-city railway station (or) a bus-stop (or) other modes of public transport such as shared vans / auto-rickshaw pick-up points.

  AND / OR

- Shuttle Service (1 point)
  The project can operate or have a contract in place for shuttle services (from / to the nearest intracity railway station or bus-stop), for at least 25% of the building occupants.

  Note: This credit has a maximum of 2 points. Projects can implement any combination of the above-mentioned requirements for achieving up to 2 points.

Benefits Anticipated:

- Savings on fuel in commuting
- Less dependence on vehicular usage

Documents Required:

Precertification Level

- Narrative providing details of public transportation available within 1 km walking distance and/or shuttle services provided by the project.
- Vicinity map (e.g.: Google, etc.,) with scale highlighting the proposed/existing public transport facility within proximity from the project entrance.
- Declaration from the developer indicating the proposed shuttle service and it's capacity.

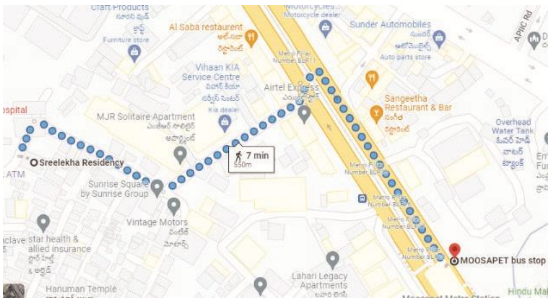
Certification Level

- Narrative providing details of public transportation available within 1 km walking distance and/or shuttle services provided by the project.
- Vicinity map (e.g.: Google, etc.,) with scale highlighting the public transport within the proximity from project entrance along with photographs of the transit facilities.
- Shuttle service facility contract (minimum 2 years) along with photographs of the shuttle vehicle(s).

Guidelines & Examples:

(These guidelines are illustrative)

Shuttle Service



Vicinity map highlighting walking distance

Exemplary Performance:

The project is NOT eligible under this credit for exemplary performance under Innovation and Design.

Soil Erosion Control

SS Credit 2 **Points: 3**

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

Requirements:
Soil erosion control measures for pre-construction and during construction must conform to the best management practices highlighting in the National Building Code 2016 (NBC) of India.

Adopt the following measures: (One point for each measure, maximum of 3 points)

- Preserve top 150 - 200 mm soil from excavation & reuse the soil for landscaping purposes within the same site and plant vegetation to prevent soil erosion
- Adopt dust suppression measures such as temporary & permanent seeding, wheel washing, regular spraying of water on the roads to prevent tracking of sediment and spraying of water on materials such as sand, bricks etc. while transportation.
- Develop a storm water management plan during construction to ensure that the storm water runoff during construction is filtered to remove the TSS* prior to releasing into the municipal storm water drain.

Benefits Anticipated:
- Preserves the fertile topsoil
- Avoids sedimentation
- Maintains health of construction workforce

Documents Required:

Precertification Level
- Narrative stating the soil erosion measures proposed
- Conceptual site plan showing topsoil stockpiling, dust suppression and storm water management strategies to be implemented.
- Declaration from the developer indicating the proposed measures

Certification Level
- Narrative stating the soil erosion measures implemented
- Site plan showing topsoil stockpiling, dust suppression and storm water management strategies implemented.

- Photographs showing topsoil stockpiling, dust suppression and storm water management strategies implemented in the project.

Note:

- *Submitted photographs must be time-stamped.*
- *At least one photograph must be submitted for each erosion / sedimentation control measure implemented.*

Guidelines & Examples:

(These guidelines are illustrative)

Stockpiling of Topsoil

Sedimentation Trenches

Sedimentation Trenches leading to Sedimentation Chamber

Gravel Driveway for Vehicles

Exemplary Performance:

The project is NOT eligible under this credit for exemplary performance under Innovation and Design.

Access to Social Infrastructure

SS Credit 3 **Points: 2**

Intent:
Provide access to basic amenities within walking distance, to reduce negative impacts caused from automobile use.

Requirements:
- Provide access to at least six basic amenities within a walking distance of 1 km from the site entrance. Basic amenities include crèche / school / anganwadi, provisional store, clinic, pharmacy, primary health centre / dispensary, ATM, entertainment zones, milk booth, saloon, parks, restaurant: *1 point*
- Additionally, provide the following within the campus: *1 point*
  - Seating facility and Tot-lot for children

    AND
  - Toilets in the common area for service staff & visitors
    - minimum one toilet for every 300 dwelling units

Note: *The project shall mandatorily have Creche or School as one of the basic amenities.*

Benefits Anticipated:
- Savings on fuel in commuting
- Less dependence on vehicular usage
- Encourages people to walk or cycle, thereby improving health

Documents Required:

Precertification Level
- Narrative describing the basic amenities and proposed measures in the site.
- Vicinity map (e.g.: Google Maps etc.,) with scale highlighting the proposed basic amenities from project entrance
- Site plan showing seating facility, tot-lot area and common area toilet(s).
- Declaration from the developer indicating the proposed measures onsite.

Certification Level
- Narrative describing the basic amenities and implemented measures in the site.
- Vicinity map (e.g.: Google Maps etc.) with scale highlighting the basic amenities from project entrance.

- Site plan showing seating facility, tot-lot area and common area toilet(s).
- Photographs showing the social infrastructure and measures implemented onsite.

Guidelines & Examples:

(These guidelines are illustrative)

Google map indicating basic amenities

School

Medical clinic and Pharma Store

Tot-lot area

Exemplary Performance:

The project is NOT eligible under this credit for exemplary performance under Innovation and Design.

Green Cover on-site – 15%, 17.5% and 20%, 22.5%

SS Credit 4 **Points: 4**

Intent:

Minimise disturbances or restore the site to reduce long-term negative environmental impacts, thereby promoting habitat and biodiversity.

Requirements:

Case A: Vegetation on Ground

Retain Natural topography* or vegetated green spaces only on ground for at least 15% of total site area.

Percentage of green cover on-site: $\frac{\text{Total landscape area on ground}}{\text{Total site area}} \times 100$	Points
≥ 15%	1
≥ 17.5%	2

Case B: Vegetation on Ground & built structures

Develop vegetated area on ground and built structures such as podium, roof surfaces, vertical surfaces to meet at least 20% of total site area.

Percentage of green cover on-site: $\frac{\text{Total landscape area on ground}}{\text{Total site area}} \times 100$	Points
≥ **20%**	**3**
≥ **22.5%**	**4**

Note: Creepers/ Climbers cannot be considered as vegetation on built structure

Benefits Anticipated:

- Increased green cover
- Restoring native and adaptive plants will require less maintenance, irrigation and fewer application of chemical fertilizers
- Attracts birds and other habitat

Documents Required:

Precertification Level

- Narrative describing the area breakup with details of landscape
- Conceptual site plan highlighting the area proposed with green cover.

- Site area calculations indicating the total site area, area with natural topography or vegetation on the ground and built structures.

Certification Level

- Narrative describing the area breakup with details of landscape
- Site plan highlighting the area covered with green cover.
- Site area calculations indicating the total site area, area with natural topography or vegetation on the ground and built structures.
- Photographs showing the site area with vegetation/ landscape

Guidelines & Examples:

(These guidelines are illustrative)

Vegetated areas on ground and podium

Exemplary Performance:

The project is eligible for exemplary performance under Innovation and Design if at least 25% of the site area is covered with vegetation on ground only or on ground and built structures.

NON-ROOF AND ROOF AREA FOR SS CREDITS 5/6

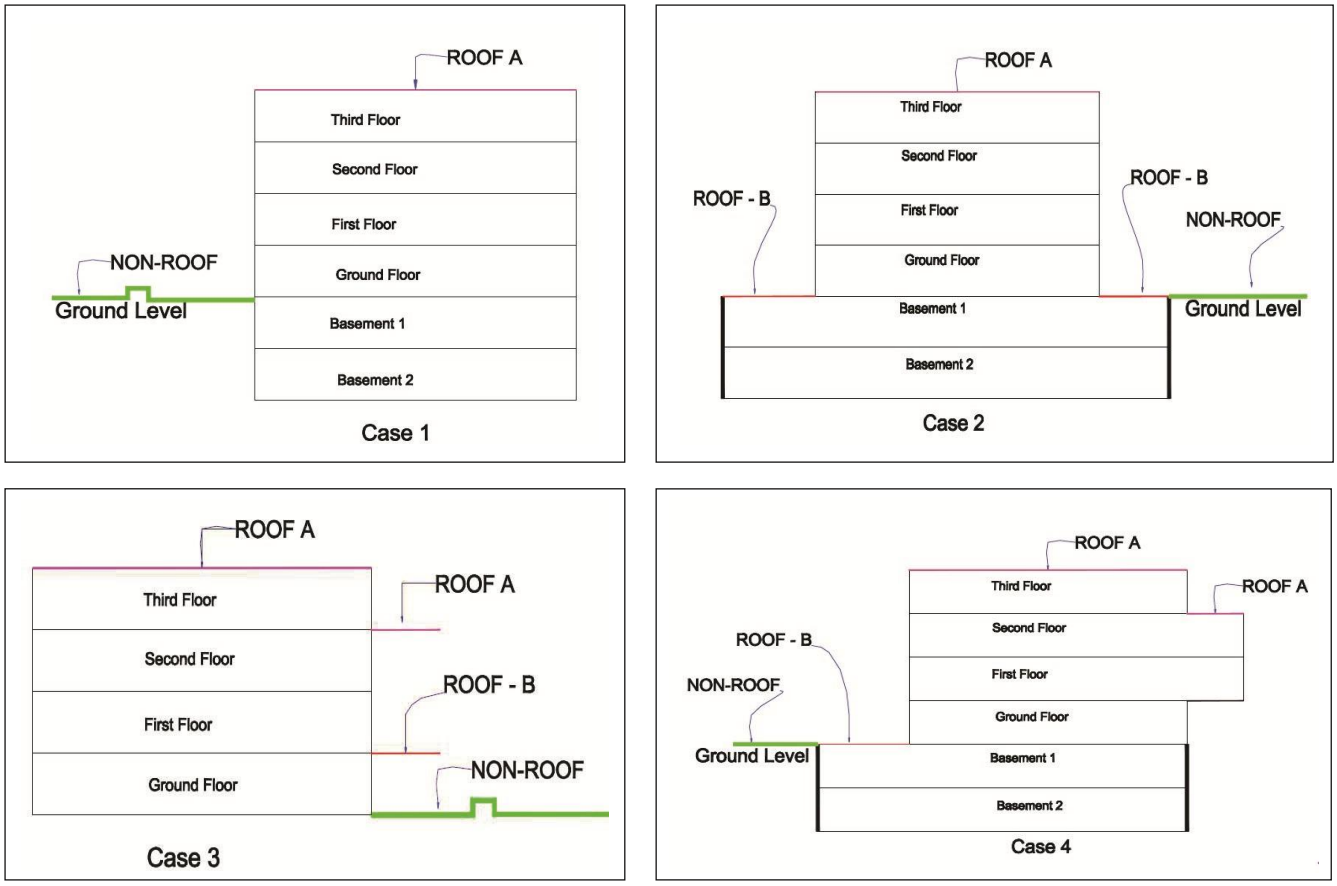
NON-ROOF: Any impervious surface area which is on ground and exposed to sky, shall be considered as 'Non-roof'. Such areas include uncovered surface parking, roads, driveways, walkways, foot paths, pavements and other impervious areas within the project site.

Note: Functional areas such as parking, roads, driveways, walkways, foot paths, pavements and other impervious areas *shall be **included** in the calculation of non-roof area.*

ROOF A: Any surface area on built structures which is exposed to sky shall be considered as 'Roof A'.

ROOF B: Basement roof exposed to sky shall come under 'Roof B'.

Note: Functional areas such as parking, roads, driveways, walkways, foot paths, pavements and other impervious areas *shall be **excluded** in the calculation of roof area.*



Non-Roof and Roof Area for SS Credits 5/6

Heat Island Effect: Non-Roof – 25%, 50%

SS Credit 5 **Points: 2**

Intent:

Minimise heat island effect so as to reduce negative impacts on micro-climate, human and biodiversity

Requirements:

Provide one or combination of the following, for at least 25% of exposed non-roof impervious/ hardscape areas within the project site:

- Shade the footpaths, pathways, roads, uncovered surface parking and other impervious/hardscaped areas with tree cover
- Install open grid pavers (or) grass pavers (or) light-coloured materials with solar reflective index (SRI) between 29-64

Points are awarded as below:

Percentage: $\frac{\text{Non–Roof area with proposed strategy}}{\text{Total Non–Roof area}} \times 100$	Points
≥ 25%	1
≥ 50%	2

Benefits Anticipated:

- Reduction in local temperature
- Better ambience

Documents Required:

Precertification Level

- Narrative describing proposed strategies to reduce heat island effect in the non-roof areas.
- Breakup of non-roof area calculations.
- Site plan highlighting non-roof impervious (hardscape) areas and areas covered with proposed measures.
- Declaration from the developer stating the proposed measures.
- Cutsheet of light-coloured materials indicating solar reflective index (SRI) between 29-64

Certification Level

- Narrative describing implemented strategies to reduce heat island effect in the non-roof areas.
- Breakup of non-roof area calculations.

- Site plan highlighting non-roof impervious (hardscape) areas and areas covered with implemented measures.
- Cutsheet along with purchase invoice of light-coloured materials indicating solar reflective index (SRI) between 29-64.
- Photographs of implemented measures.

Guidelines & Examples:
(These guidelines are illustrative)

Open Grid Pavers for Non-Roof Areas

Tree Cover for Parking Areas & Light-coloured pavers

Exemplary Performance:
The project is NOT eligible under this credit for exemplary performance under Innovation and Design.

ALTERNATE OPTION

The project is eligible for exemplary performance under Innovation and Design if at least 75% of the exposed non-roof impervious area is covered heat island mitigation measures.

Heat Island Effect: Roof – 75%, 95% and 25%

SS Credit 6 **Points: 3**

Intent:
Minimise heat island effect to reduce negative impact on micro-climate, human and biodiversity

Requirements:
Provide one or combination of the following:

- Cover at least 75% of the exposed roof areas with high SRI paint/ china mosaic tiles/ white tiles
- Provide at least 25% of the exposed roof area with green roof (vegetation)
- Points are awarded as below:

Percentage: $\frac{\text{Roof area with proposed strategy}}{\text{Total Roof area}} \times 100$	Points
≥ 75%	1
≥ 95%	2

AND

Percentage: $\frac{\text{Roof area with vegetation}}{\text{Total Roof area}} \times 100$	Points
≥ 25%	1

Benefits Anticipated:
- Reduction in local temperatures
- Better ambience

Documents Required:

Precertification Level
- Narrative describing proposed strategies to reduce heat island effect in the roof areas.
- Breakup of roof area calculations showing exposed roof area, service and utility areas and areas covered with high reflective roof materials/ vegetation.
- Conceptual site plan highlighting roof areas and areas covered with proposed measures.
- Declaration from the developer stating the proposed measures.
- Cutsheet of proposed high reflective materials

Certification Level

- Narrative describing implemented strategies to reduce heat island effect in the roof areas.
- Breakup of roof area calculations showing exposed roof area, service and utility areas and areas covered with high reflective roof materials/ vegetation.
- Site plan highlighting roof areas and areas covered with implemented measures.
- Cutsheet of proposed high reflective materials
- Photographs of the measures adopted.
- Purchase invoice/ payment receipts of the high reflective roof materials sourced for the project

Guidelines & Examples:

(These guidelines are illustrative)

Roof covered with China Mosaic tiles

Roof covered with High SRI paint

Exemplary Performance:

The project is eligible for exemplary performance under Innovation and Design if at least 50% of the exposed roof area is covered with vegetation.

Parking Facilities for Tenements

SS Credit 7

Points: 4

Intent:
Provide adequate parking within the site to minimise disturbance caused due to parking on public roads, thereby, enhancing the quality of civic life

Requirements:
Provide one or combination of the following:

- One 2-wheeler parking on-site to cater to each dwelling unit: *1 point*
- One 4-wheeler parking on-site for every 2 dwelling units (OR) as per local byelaws whichever is stringent: *1 point*
- Electrical charging for at least 10% of the dwelling units: *1 point*
- Bicycle Parking for at least 5% of the dwelling units: *1 point*

Benefits Anticipated:
- Avoid parking on roads
- Reduced traffic chaos

Documents Required:

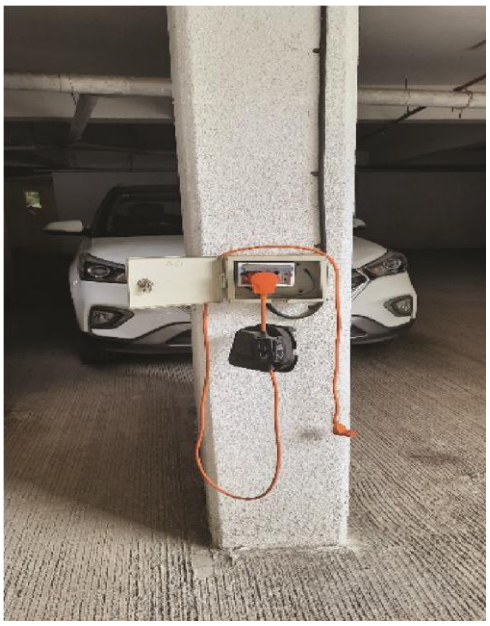
Precertification Level
- Narrative describing parking facilities proposed in the project along with calculations.
- Conceptual parking plan showing proposed parking facilities for tenements.
- A copy of the local byelaw highlighting the parking requirements.
- Declaration from the developer indicating proposed parking facilities.

Certification Level
- Narrative describing parking facilities provided in the project along with calculations.
- Parking plan showing parking facilities provided for tenements.
- A copy of the local byelaw highlighting the parking requirements.
- Photographs of parking facilities provided for tenements.

Guidelines & Examples:

(These guidelines are illustrative)

Parking for tenements



Electric Charging Facility

Exemplary Performance:

The project is NOT eligible under this credit for exemplary performance under Innovation and Design.

Universal Design

SS Credit 8

Points: 2

Intent:

Ensure that the building design caters to differently abled and senior citizens for their wellbeing **Requirements:**

Provide the following features: (any 2 measures, 1 point; all 3 measures 2 points)

- Non-slippery ramps with handrails on at least one side for easy access till main entrance
- Special parking provision for differently abled near lifts/ main entrance
- Lift Facility:
  - Case 1: Projects with lift facility – provide uniform flooring levels/ ramps with handrail till lift facility
  - Case 2: Projects without lifts – provide declaration mentioning that preferred allotments of housing are provided for differently abled in ground floor and ramps shall be provided till ground floor
- Differently abled friendly toilet in the common area facility as per NBC standards

Benefits Anticipated:

- Comfortable living conditions for the differently abled and senior citizens

Documents Required:

Precertification Level

- Narrative describing all measures proposed in the building for differently abled.
- Conceptual plans highlighting provisions for differently abled.
- Declaration from the developer stating the proposed measures

Certification Level

- Narrative describing all measures implemented in the building for differently abled.
- Plans highlighting provisions for differently abled.
- Photographs of measures implemented.

Guidelines & Examples:

(These guidelines are illustrative)

Non-slippery ramps with handrails

Differently abled Toilet

Exemplary Performance:

The project is NOT eligible under this credit for exemplary performance under Innovation and Design.

Basic Facilities for Construction Workforce

SS Credit 9 **Points: 2**

Intent:

Provide facilities for wellbeing and hygiene of the construction workforce to enhance the quality of life and promote safe and healthy work conditions.

Requirements:

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

- Adequate drinking water facilities to workforce
- Safety and personal protective equipment
- Sanitary measures to meet or exceed local / labour bye-law requirement (OR) Provide at least one toilet seat/ urinal for every 50 workers (separate for men and women)
- Adequate illumination levels in construction work areas
- First-aid and emergency facilities

Benefits Anticipated:

- Better work environment leading to better productivity
- Health and wellbeing of workforce

Documents Required:

Precertification Level

- Narrative describing the basic facilities proposed in the project for construction workforce.
- Conceptual site plan highlighting the basic facilities proposed for the construction workforce.

Certification Level

- Narrative describing the basic facilities provided in the project for construction workforce.
- Site plan highlighting the basic facilities provided for the construction workforce
- Photographs showing the implemented strategies for wellbeing of construction work force.

Guidelines & Examples:

(*These guidelines are illustrative)*

Personal Protective Equipment

Adequate illumination levels in construction area

Exemplary Performance:

The project is NOT eligible under this credit for exemplary performance under Innovation and Design.

Green Education

SS Credit 10

Points: 1

Intent:

Educate the workforce during construction phase and occupants post construction to sustain the green features through the life of the building, thereby reducing the negative impacts associated on environment

Requirements:

1. **During construction**
    a. Awareness sessions for construction workforce on green & safety measures – a minimum of one awareness session in the local language must be conducted
    b. Display signages indicating envisaged green features in the local language and English
2. **Post construction:**
    a. Project brochure highlighting the green features proposed
    b. Awareness sessions to prospective occupants – a minimum of one awareness session in the local language must be conducted
    c. Circulate green home guidelines in English as well as the local language
    d. Permanent signages in English as well as the local language highlighting the implemented green features / systems

Benefits Anticipated:

- Awareness to workforce and occupants
- Maintenance of green measures in the project

Documents Required:

Precertification Level

- Narrative describing the during and post construction measures
- Declaration from owner stating the schedule of awareness sessions planned
- Photographs of the awareness signages displayed in construction site, as applicable
- Project brochure highlighting the green features / systems planned and their benefits

Certification Level

- Narrative describing the during and post construction measures
- Copy of an easy-to-understand green home guide (English and local language) circulated to occupants

- Photographs of the following:
    - Measures taken during construction:
        - Awareness sessions conducted to construction workforce
        - Awareness signages in English as well as the local language highlighting the proposed green features / systems
    - Measures taken after construction:
        - Awareness sessions conducted to prospective occupants
        - Permanent post-occupancy awareness signages in English as well as the local language highlighting the implemented green features / systems
        - Acknowledgment of receipt of green home guidelines by occupants

Exemplary Performance:

The project is NOT eligible under this credit for exemplary performance under Innovation and Design.

WATER CONSERVATION

Availability of Potable Water

WC Mandatory Requirement 1

Intent:
Ensure that households are provided with piped water supply to meet water requirements, so as to ensure that the community is habitable

Requirements:
Provide piped potable water supply and storage system, considering 135 litres of water per person per day.

Benefits Anticipated:
- ❖ Improved hygiene and quality of life

Documents Required:

Precertification Level
- Narrative describing the proposed storage systems for providing water supply to households.
- Calculations indicating the total potable water requirement in the project.
- Conceptual site plan highlighting the location of proposed storage systems.

Certification Level
- Narrative describing the storage systems for providing water supply to households.
- Calculations indicating the total potable water requirement in the project.
- Site plan highlighting the location of storage systems provided
- Photographs of installed water storage systems.

Rainwater Harvesting – 25%

WC Mandatory Requirement 2

Intent:
Implement Rainwater management systems to enhance ground water table and reduce dependency on municipal water demand

Requirements:

Case 1:
Provide rainwater harvesting system to capture at least 25% of run-off volume from roof and non-roof areas. The harvesting system designed should cater to at least 1 day of normal rainfall* occurred in the last 5 years.

Case 2:
In areas where the central/ state ground water board does not recommend artificial rainwater recharge (or) if the groundwater table is less than 8 m, the project is deemed to meet the mandatory requirement.

Rainwater Harvesting Calculations
Rainwater runoff from site = Total site Area X Runoff Coefficient X Average rainfall per day

Notes:

- *Average rainfall per day considerations*
  - *Region with average rainfall during the year up to 1000 mm to consider avg. rainfall per day as 20mm for RWH calculations.*
  - *Region with average rainfall during the year from 1001 mm-2000 mm to consider avg. rainfall per day as 25 mm for RWH calculations.*
  - *Region with average rainfall during the year from 2001 mm – 3000 mm to consider avg. rainfall per day as 30 mm for RWH calculations.*
- *Refer to annexure for average annual rainfall for the various cities or from the website – https://hydro.imd.gov.in/hydrometweb/(S(amesrkewoqdc11550u3moyer))/DistrictRaifall.aspx*
- *Runoff coefficient for typical surfaces can be used from the below table:*

Table 2 - Runoff coefficients for Typical Surface Types

S No	Surface Type	Runoff Coefficient
1	Cemented / Tiled Roof	0.95
2	Cemented or Pavement	0.95
3	Pavement Asphalt	0.9
4	Open-grid Grass Pavement	0.5
5	Roof Garden (> 500 mm thickness)	0.1
6	Garden, Farms, Parks	0.3

Benefits Anticipated:

- Reduce dependence on municipal supply of water.
- Reduce the amount of water being discharged into drains and watercourses thereby reducing the risk of localised flooding.
- Recharging of aquifers maintains or augments natural groundwater, would conserve surface water and combat progressive depletion of groundwater levels.

Documents Required:

Precertification Level

- Narrative describing the ground water level and proposed strategies for rainwater harvesting
- Last 5 years rainfall data
- Calculations indicating the rainwater runoff volume and harvesting system capacity
- Plans and cross section of proposed harvesting system
- Conceptual site plan indicating the storm water layout and proposed harvesting system
- Soil test report indicating the ground water level
- Declaration from the developer indicating the proposed rainwater harvesting system

Certification Level

- Narrative describing the ground water level and implemented strategies for rainwater harvesting
- Last 5 years rainfall data
- Calculations indicating the rainwater runoff volume and harvesting system capacity
- Plans and cross section of harvesting system provided
- Site plan indicating the storm water layout and harvesting system provided
- Soil test report indicating the ground water level
- Photographs of installed rain water harvesting and storage systems

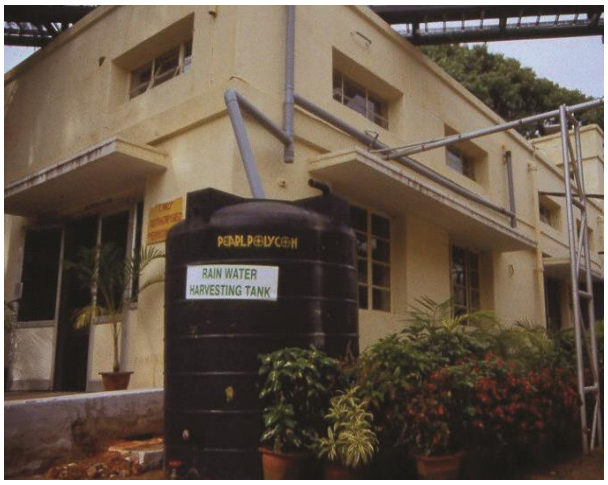
Guidelines & Examples:

Provide rainwater harvesting system to capture at least 25% of run-off volumes from roof and non-roof areas for a project located in Hyderabad with a total site area of 2,000 sq. m.

Rainwater Harvesting calculations				
S. No	**Surface Type**	**Runoff Coefficient**	**Area (Sq. m)**	**Impervious Area (Sq. m)**
1	Cemented / Tiled Roof	0.95	1000	950
2	Cemented or Pavement	0.95	500	475
3	Pavement Asphalt	0.9	0	0
4	Open-grid Grass Pavement	0.5	100	50
5	Roof Garden (> 500 mm thickness)	0.1		0

6	Garden, Farms, Parks	0.3	400	120
	Total Impervious area (sq. m)			1,595
Average Normal rainfall per day (m)				0.02
Total roof & nonroof runoff volume (cu.m)				31.9
Total Storage or harvesting capacity (cu.m)				25
Percentage of Rainwater harvesting done				78%

Recharge pit with borewell



Roof top rainwater harvesting tank

Roof top rainwater harvesting filters

Rainwater Harvesting – 50%, 75% or 10%, 20% and Reuse

WC Credit 1 **Points: 4**

Intent:
Implement Rainwater management systems to enhance ground water table and reduce dependency on municipal water demand

Requirements:

Case 1:
Provide rainwater harvesting system to capture at least 50% of run-off volume from roof and non-roof areas. The harvesting system designed should cater to at least 1 day of normal rainfall* occurred in the last 5 years.

Points are awarded as below:

Rainwater harvesting system to capture / recharge runoff from site	Points
≥ 50% from roof & non-roof areas	2
≥ 75% from roof & non-roof areas	4

Case 2:
In areas where the central/ state ground water board does not recommend artificial rainwater recharge (or) if the groundwater table is less than 8 m, the projects can show compliance by storage & reuse. Provide rainwater harvesting system to capture at least 10% of run-off volume from roof and non-roof areas. The harvesting system designed should cater to at least 1 day of normal rainfall* occurred in the last 5 years Points are awarded as below:

Rainwater harvesting system to capture	Points
≥ 10% from roof & non-roof areas	2
≥ 20% from roof & non-roof areas	4

AND

Reuse

Reuse at least 50% of captured harvested rainwater within the project.

Rainwater Harvesting Calculations
Rainwater runoff from site = Total site Area X Runoff Coefficient X Average rainfall per day

Notes:

- *Average rainfall per day considerations*
  - *Region with average rainfall during the year up to 1000 mm to consider avg. rainfall per day as 20mm for RWH calculations.*

- *Region with average rainfall during the year from 1001 mm-2000 mm to consider avg. rainfall per day as 25 mm for RWH calculations.*
- *Region with average rainfall during the year from 2001 mm – 3000 mm to consider avg. rainfall per day as 30 mm for RWH calculations.*

- *Refer to annexure for average annual rainfall for the various cities or from the websites - https://hydro.imd.gov.in/hydrometweb/(S(amesrkewoqdc11550u3moyer))/DistrictRaifall.aspx*
- *Runoff coefficient for typical surfaces can be used from the below table:*

Table 2 - Runoff coefficients for Typical Surface Types

S No	Surface Type	Runoff Coefficient
1	Cemented / Tiled Roof	0.95
2	Cemented or Pavement	0.95
3	Pavement Asphalt	0.9
4	Open-grid Grass Pavement	0.5
5	Roof Garden (> 500 mm thickness)	0.1
6	Garden, Farms, Parks	0.3

Benefits Anticipated:

- Reduce dependence on municipal supply of water.
- Reduce the amount of water being discharged into drains and watercourses thereby reducing the risk of localised flooding.
- Recharging of aquifers maintains or augments natural groundwater, would conserve surface water and combat progressive depletion of groundwater levels.

Documents Required:

Precertification Level

- Narrative describing the ground water level, proposed strategies for rainwater harvesting and reuse
- Last 5 years rainfall data
- Calculations indicating the rainwater runoff volume, harvesting system capacity and reuse applications capacity
- Plans and cross section of proposed harvesting system
- Conceptual site plan indicating the storm water layout and proposed harvesting system
- Soil test report indicating the ground water level
- Declaration from the developer indicating the proposed rainwater harvesting system and reuse applications

Certification Level

- Narrative describing the ground water level and implemented strategies for rainwater harvesting
- Last 5 years rainfall data
- Calculations indicating the rainwater runoff volume and harvesting system capacity
- Plans and cross section of harvesting system provided
- Site plan indicating the storm water layout and harvesting system provided
- Soil test report indicating the ground water level
- Photographs of installed water storage systems and reuse applications

Guidelines & Examples:

Provide rainwater harvesting system to capture at least 50% of run-off volumes from roof and non-roof areas for a project located in Hyderabad with a total site area of 2,000 sqm.

Rainwater Harvesting calculations				
S. No	**Surface Type**	**Runoff Coefficient**	**Area (sq. m)**	**Impervious Area (sq. m)**
1	Cemented / Tiled Roof	0.95	1000	950
2	Cemented or Pavement	0.95	500	475
3	Pavement Asphalt	0.9	0	0
4	Open-grid Grass Pavement	0.5	100	50
5	Roof Garden (> 500 mm thickness)	0.1		0
6	Garden, Farms, Parks	0.3	400	120
	Total Impervious area (sq.m)			1595
Average Normal rainfall per day (m)				0.02
Total roof & nonroof runoff volume (cu.m)				31.9
Total Storage or harvesting capacity (cu.m)				25
Percentage of Rainwater harvesting done				78%

Reuse of harvested rainwater (cu.m)	15
Percentage of harvested rainwater reused within the project	**60%**

Exemplary Performance:

The project is eligible for 1 point for exemplary performance under Innovation and Design if

Case 1: Harvesting capacity provided ≥ 95% of runoff from roof & non-roof areas

Case 2: Harvesting capacity provided ≥ 30% of runoff from roof & non-roof areas AND at least 50% of captured harvested rainwater is reused within the project.

Water Efficient Plumbing Fixtures

WC Credit 2

Points: 4

Intent:
Enhance efficiency of plumbing fixtures, thereby minimising potable water use

Requirements:
Install water efficient fixtures in dwelling units and common areas *(1 point each measure)*

- Aerators for taps in dwelling units
- Water closets with dual flush in dwelling units
- Aerators for Shower heads in dwelling units
- Water efficient fixtures in common area toilets

Note:

- *Aerators installed for taps and showers must limit flow rate to 6 litres per minute or less under 4 bar pressure.*
- *Flush volumes of dual flush water closets should not exceed 6 litres per flush for the full volume and 3 litres per flush for the small volume.*

Benefits Anticipated:
- Reduces water consumption
- Decrease the load on municipal supply of potable water
- Reduces consumption of groundwater

Documents Required:

Precertification Level
- Narrative describing proposed plumbing fixtures (flow and flush), with respective make & model
- Manufacture cut-sheets/ brochures/ letters indicating the flow rates of the proposed plumbing flow and flush fixtures.
- Declaration from the developer indicating the proposed plumbing fixtures (flow and flush)

Certification Level
- Narrative describing installed plumbing fixtures (flow and flush), with respective make & model
- Manufacture cut-sheets/ brochures/ letters indicating the flow rates of the proposed plumbing flow and flush fixtures.
- Declaration from the developer indicating the installed plumbing fixtures (flow and flush)
- Photographs showing the water efficient plumbing fixtures installed.
- Purchase invoice or payment receipts of plumbing fixtures (flow and flush) with make & model.

Guidelines & Examples:

(These guidelines are illustrative)

Aerators fitted to tap and dual flush cistern

Exemplary Performance:

The project is NOT eligible under this credit for exemplary performance under Innovation and Design.

Wastewater Treatment: 50%, 75%, 95%

WC Credit 3 **Points: 3**

Intent:
Reduce potable water consumption and wastewater generation to minimise the burden on municipal water supply

Requirements:
Provide on-site wastewater treatment system to treat minimum 50% of the wastewater generated within the project.

Points are awarded as below:

Percentage: $\frac{\text{Capacity of wastewater treatment system}}{\text{Total Wastewater generated}} \times 100$	Points
≥ 50%	1
≥ 75%	2
≥ 95%	3

Benefits Anticipated:
- ❖ Self-sufficiency of water needs within the project
- ❖ Reduces the dependency on municipal water supply

Documents Required:

Precertification Level
- Narrative describing the proposed on-site wastewater treatment plant/ system, along with quality standards of wastewater treated.
- Tentative daily and annual water balance of the project.
- Conceptual site plan highlighting the location of proposed on-site wastewater treatment system.
- Declaration from the developer indicating the capacity of the proposed wastewater treatment system.

Certification Level
- Narrative describing the installed on-site wastewater treatment plant/ system, along with quality standards of wastewater treated.
- Tentative daily and annual water balance of the project.
- Site plan highlighting the location of installed on-site wastewater treatment system.
- Declaration from the developer indicating the capacity of the installed wastewater treatment system.
- Photographs showing the on-site wastewater treatment system installed.

Guidelines & Examples:

(These guidelines are illustrative)

Decentralised Wastewater Treatment system

Exemplary Performance:

The project is eligible for exemplary performance under Innovation and Design if the project has Non-mechanical, Biological and natural ways of treating the wastewater.

Treated Wastewater Reuse

WC Credit 4

Points: 3

Intent:
Encourage use of treated wastewater to reduce dependence on municipal water

Requirements:
Reuse the treated wastewater on-site the following applications *(1 point for each measure)*:

- Flushing
- Landscaping
- Vehicle wash applications/ Other appropriate applications

Benefits Anticipated:
- Self-sufficiency of water needs within the project
- Reduces the dependency on municipal water supply

Documents Required:

Precertification Level
- Narrative describing the proposed use of the treated water on site.
- Schematic drawing showing proposed dual plumbing lines, if treated wastewater is reused for flushing.
- Tentative daily and annual water balance of project.
- Declaration from the developer indicating the proposed use of the treated water on site

Certification Level
- Narrative describing the use of the treated water on site.
- Single line drawing showing dual plumbing lines, if treated wastewater is reused for flushing.
- Tentative daily and annual water balance of project.
- Declaration from the developer indicating the use of the treated water on site
- Photographs showing reusing of treated for flushing/ landscaping/ vehicle wash

Exemplary Performance:
- The project is NOT eligible under this credit for exemplary performance under Innovation and Design.

Management of Irrigation Systems

WC Credit 5 **Points: 3**

Intent:
Provide water efficient management systems and techniques for irrigation to reduce dependence on municipal water

Requirements:
Provide efficient irrigation systems incorporating the features mentioned below: *(every two measures 1-point, maximum points: 3)*

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

Benefits Anticipated:
- About 40 - 60% of water savings for landscape irrigation
- Controlled and optimised irrigation results in healthier plants

Documents Required:

Precertification Level
- Narrative describing all the proposed water efficient irrigation systems and techniques.
- Conceptual landscape plan highlighting proposed irrigation systems.
- Manufacturer's cut-sheets/ brochures of the proposed water efficient irrigation systems.
- Declaration from the developer indicating the proposed water efficient irrigation systems

Certification Level
- Narrative describing all the water efficient irrigation systems and techniques.
- Landscape plan highlighting irrigation systems.
- Manufacturer's cut-sheets/ brochures of the water efficient irrigation systems provided.
- Declaration from the developer indicating the water efficient irrigation systems
- Photographs showing the installed irrigation systems and techniques.

Guidelines & Examples:

(These guidelines are illustrative)

Drip irrigation system

Sprinkler system

Exemplary Performance:

- The project is NOT eligible under this credit for exemplary performance under Innovation and Design.

Water Sub-metering

WC Credit 6 **Points: 3**

Intent:
Encourage water sub-metering to monitor water performance in the project, and thereby save potable water

Requirements:
Provide water sub meters for the following: (maximum 3 points)

- Common area applications: 1 point
- Vertical raisers for each block: 1 point
- Every dwelling unit: 2 points

Benefits Anticipated:

- Measure any deviations in the water lines
- Reduce additional water costs

Documents Required:

Precertification Level

- Narrative describing the proposed list of water sub metering systems in the project
- Single line diagram (SLD) showing the proposed water sub metering system
- Declaration from the developer indicating the proposed list of water sub metering systems in the project

Certification Level

- Narrative describing the list of water sub metering systems implemented in the project
- Single line diagram (SLD) showing the implemented water sub metering system
- Purchase invoice of installed water meters
- Photographs of the installed meters

Guidelines & Examples:
(These guidelines are illustrative)

Water meter

Exemplary Performance:
The project is NOT eligible under this credit for exemplary performance under Innovation and Design.

ENERGY CONSERVATION

Energy Efficient Building Envelope

EC Mandatory Requirement 1

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

Requirements:
Implement efficient roof and glazing for building envelope measures to improve the energy efficiency.

- **Roof:** The project must ensure that the U-value of the overall Roof assembly shall meet the baseline criteria of ≤ 1.8 W/m^{2}K
- **Glazing:** The project must ensure that the U-value of the Glazing of all windows shall meet the baseline criteria of ≤ 5.7 W/m^{2}K

Benefits Anticipated:
- **Reduced energy bills**
- **Energy cost saving for up to 20-30%**

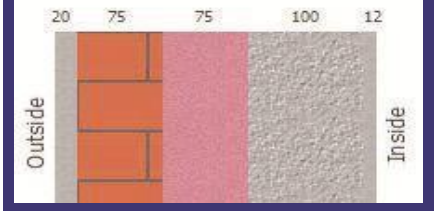
Documents Required:

Precertification Level
- Narrative stating the climate zone and U-value of proposed roof assembly and glazing
- Comparison of the baseline envelope parameters and the proposed envelope parameters
- Cross section of roof assembly
- Details of proposed glazing along with the list of identified manufacturers and respective specifications of glazing (U-value)
- Declaration from the developer indicating the proposed measures

Certification Level
- Narrative stating the climate zone and U-value of roof assembly and glazing
- Comparison of the baseline envelope parameters and implemented envelope parameters
- Cross section of roof assembly
- Details of glazing along with specifications of glazing (U-value)
- Declaration from the developer indicating the implemented measures
- Photographs showing the implemented strategies
- Purchase invoice of glass and roofing materials

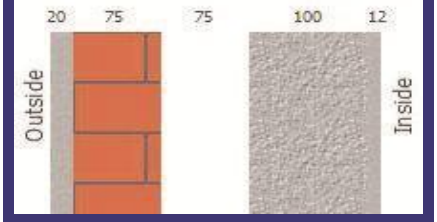
Guidelines & Examples:

Common approximate U-values for Roof compositions



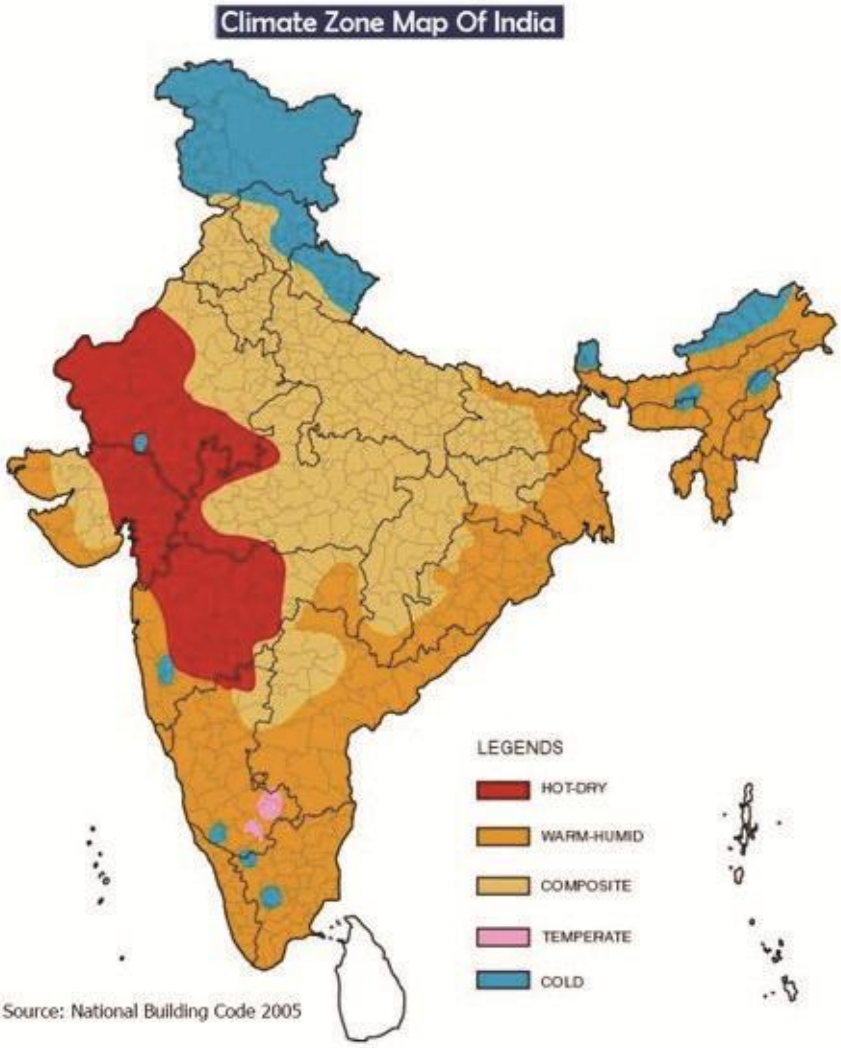
Assembly: 100mm RCC slab with 75 mm XPS, 75mm brick bat coba, 20mm external & 12mm internal plaster

U-value: 0.43 W/m²K



Assembly: 100mm RCC slab with 75mm EPS, 75mm brick bat coba, 20mm external & 12 mm internal plaster

U-value: 0.39 W/m²K



Enhanced Energy Efficient Building Envelope

EC Credit 1 **Points: 5**

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

Requirements:
Implement efficient wall, roof and glazing for building envelope measures to improve the energy efficiency. *(1 point for each parameter)*

- **Wall:** The project must ensure that the overall U-value of the wall assembly shall meet the baseline criteria based on climatic zones of India as mentioned in the below table:

Climate Zone	Maximum U-value of overall wall assembly (W/m^2K)
Composite & Hot-Dry	1.8
Warm-Humid	2.0
Temperate	2.2

- **Roof:** The project must ensure that the U-value of the overall Roof assembly shall meet the baseline criteria of ≤ 1.5 W/m^2K

- **Solar Heat Gain Coefficient (SHGC) of Glazing:** The project must ensure that the SHGC of the Glazing of all windows shall meet the baseline criteria based on the climatic zones of India as mentioned in the table below:

Climate Zone *	Maximum SHGC Value	
	1 point	2 points
Composite	0.5	0.42
Hot and Dry	0.5	0.42
Warm and Humid	0.5	0.42
Moderate	0.6	0.48
Cold	0.8	0.80

- **Visible Light Transmittance (VLT):** The project must ensure that the VLT of the Glazing of all windows shall meet the baseline criteria of ≥ 0.40 or 40%.

Benefits Anticipated:
- Reduced energy bills
- Energy cost saving for up to 20-30%

Documents Required:

Precertification Level

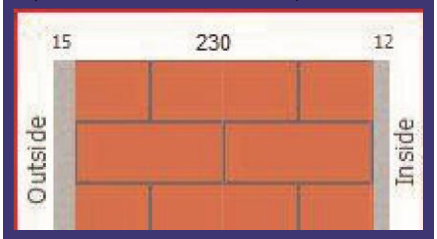
- Narrative stating the climate zone and U-value of proposed wall assembly and roof assembly along with the SHGC and VLT of glazing
- Comparison of the baseline envelope parameters and the proposed envelope parameters.
- Cross section of wall and roof assembly
- Details of proposed glazing along with the list of identified manufacturers and respective specifications of glazing (SHGC and VLT)
- Declaration from the developer indicating the proposed measures

Certification Level

- Narrative stating the climate zone and U-value of provided wall assembly, roof assembly and glazing, SHGC and VLT of glazing
- Comparison of the baseline envelope parameters and implemented envelope parameters.
- Cross section of wall and roof assembly
- Details of glazing along with specifications of glazing installed (SHGC and VLT)
- Declaration from the developer indicating the implemented measures
- Photographs showing the implemented strategies
- Purchase invoice of glass, wall, and roofing materials

Guidelines & Examples:

Approximate U-values for common wall compositions (for reference only, not all options below comply with the requirements of this credit).



Assembly: 230mm Brick wall with 15mm external & 12mm internal plaster

U-value: 1.91 W/m²K

Assembly: 200mm concrete block with 15mm external & 12mm internal plaster

U-value: 3.09 W/m²K

Assembly: 200mm AAC block with 15mm external & 12mm internal plaster

U-value: 0.56 W/m²K

Assembly: 140mm porotherm block with 100mm glass fibre

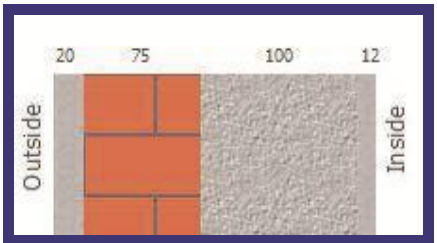
U-value: <0.27 W/m²K

Assembly: 150mm CLC block with 15mm external & 12mm internal plaster

U-value: 0.80 W/m²K

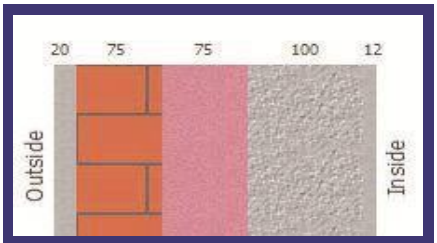
Assembly: 100mm RCC wall

U-value: 5.45 W/m²K



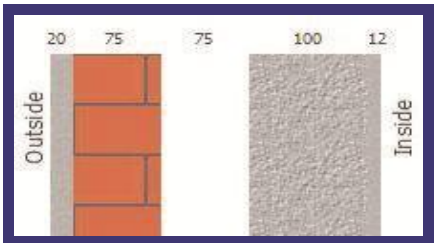
Assembly: 100mm RCC slab with 75mm brick bat coba, 20mm external & 12mm internal plaster

U-value: 2.93 W/m²K



Assembly: 100mm RCC slab with 75mm XPS, 75mm brick bat coba, 20mm external & 12mm internal plaster

U-value: 0.43 W/m²K



Assembly: 100mm RCC slab with 75mm EPS, 75mm brick bat coba, 20mm external & 12mm internal plaster

U-value: 0.39 W/m²K

Exemplary Performance:

The project is NOT eligible under this credit for exemplary performance under Innovation and Design.

Shading Elements for Building Openings

EC Credit 2

Points: 2

Intent:
Incorporate shading elements for external openings to improve energy efficiency

Requirements:
Provide shading devices over external openings

- At least 80% of the exterior opening area (fenestration) shall have sunshades/ chajjas with a projection factor of 0.5 or more**.** *(1 point)*

(AND / OR)

- Climate responsive concepts and design features as applicable**:** *(1 point)*
  - E.g.: Extended louvers, punched windows, pergolas, horizontal and vertical landscaping, etc.,

Benefits Anticipated:
- Reduced energy bills

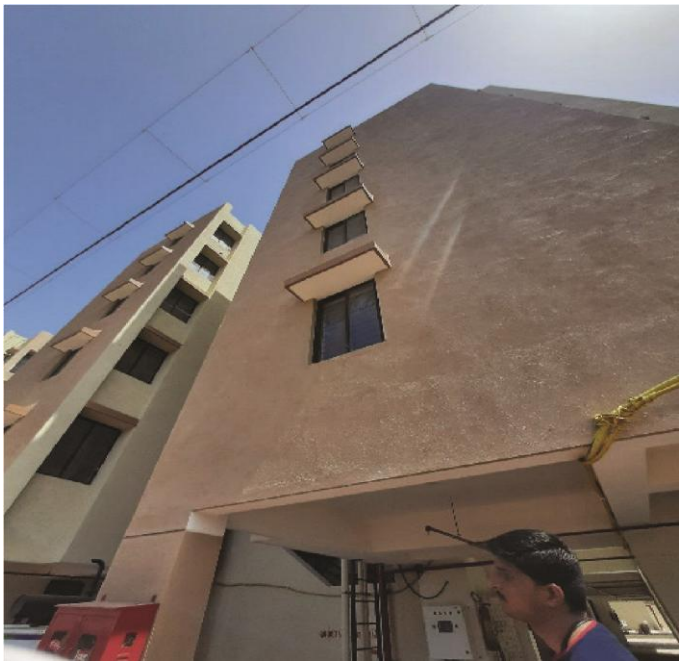
Documents Required:

Precertification Level:
- Narrative describing the proposed shading elements
- Conceptual plans indicating proposed width of sunshades/ chajjas and climate responsive concepts

Certification Level:
- Narrative describing the proposed shading elements
- Plans indicating width of sunshades/ chajjas and climate responsive concepts
- External building photographs showing the shading elements and shading devices.

Guidelines & Examples:

(These guidelines are illustrative)



Sunshades

Shaded balconies

Slab overhangs shading windows and balconies

Exemplary Performance:

The project is NOT eligible under this credit for exemplary performance under Innovation and Design.

Efficient Lighting

EC Credit 3

Points: 3

Intent:

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

Requirements:

Use energy efficient lighting fixtures to reduce the lighting power densities (LPD) in all exterior, common and parking areas. *(1 point for each measure)*

❖ Design lighting such that the lighting power density (LPD) shall meet the following maximum values:

Lighting	Applicable Areas	Baseline Lighting Power Density (LPD)
Exterior Lighting, excluding Parking Area (for residential & non-residential units)	Landscaping, Façade, Street lighting, Pathways, Signage's, etc.,	≤ 2.15W/m^2
Common Area Lighting, excluding Parking Area (for residential & non-residential units)	Corridors, Lobbies, Staircases, Terrace, etc.,	≤ 3.23 W/m^2
Parking Area	Surface parking (covered & uncovered), Basement parking	≤ 1.6 W/m^2

Reference: NBC,2016

Benefits Anticipated:

❖ 20% - 30% energy cost savings

Documents Required:

Precertification Level

- Narrative describing the proposed lighting design
- Conceptual plans indicating the lighting layouts
- List of proposed lighting fixtures to be installed in all exterior, common and parking areas
- LPD calculations as per submitted lighting layouts

Certification Level

- Narrative describing the implemented lighting design
- Plans indicating the lighting layouts
- List of lighting fixtures installed in all exterior, common and parking areas
- LPD calculations as per submitted lighting layouts

- Photographs showing the installed energy efficient light fixtures
- Manufacturer cut-sheets/ brochures/ letters indicating the wattage and type of light fixtures installed

Guidelines & Examples:

(These guidelines are illustrative)

Efficient lighting design

LED lighting fixtures

Exemplary Performance:

The project is NOT eligible under this credit for exemplary performance under Innovation and Design.

Sensors and Controls

EC Credit 4

Points: 2

Intent:

Enhance energy efficiency of the lighting system(s) to reduce environmental impacts from excessive energy use

Requirements:

Install following for all (i.e. 100% of) non-emergency exterior & common area lighting such as façade, pathways, landscaping, surface and covered parking, street lighting, staircases in common areas & common toilets: *(1 point for each measure; maximum 2 points)*

- Day light sensor
- Occupancy / Motion sensor
- Timer based controls

Benefits Anticipated:

- 20% - 30% energy cost savings

Documents Required:

Precertification Level

- Narrative describing the proposed lighting sensors and controls
- Conceptual lighting layout of interior and common areas for each typical floor showing the proposed lighting sensors and controls
- Conceptual exterior lighting layout highlighting the lighting sensors and controls
- Proposed list of lighting sensors and control systems with manufacturer details
- Declaration from the developer indicating the proposed lighting sensors and control systems

Certification Level

- Narrative describing the lighting sensors and controls
- Lighting layout of interior and common areas for each typical floor showing the lighting sensors and controls
- Exterior lighting layout highlighting the lighting sensors and controls
- List of lighting sensors and control systems with manufacturer details
- Declaration from the developer indicating the lighting sensors and control systems
- Purchase invoices of the installed lighting sensors and control systems
- Photographs of the installed lighting sensors and control systems

Exemplary Performance:

The project is NOT eligible under this credit for exemplary performance under Innovation and Design.

On-site Renewable Energy: 20%, 40%, 60%, 80%

EC Credit 5 **Points: 2**

Intent:
Promote self-sufficiency in energy through renewable technologies for on-site power generation and use within the project.

Requirements:
Install renewable energy systems for at least 50% of annual energy consumption for common area lighting requirements.

Points are awarded as below:

$\text{Percentage} = \frac{\text{Annual energy consumption for common area lighting}}{\text{Total on-site renewable energy generated annually}} \times 100$	Points
≥ 20 %	1
≥ 40 %	2
≥ 60 %	3
≥ 80 %	4

Note: This credit shares a total of 4 points with EE Credit 6 – Solar Water Heating Systems. Projects can implement any combination of on-site renewable energy systems and/or solar water heating systems to achieve up to 4 points in total.

Benefits Anticipated:
- ❖ Reduces the adverse environmental impacts caused by fossil fuel based energy production and use
- ❖ Ensures energy security for the country

Documents Required:

Precertification Level
- Narrative describing the proposed renewable energy system
- Tentative calculations indicating the annual energy consumption for common area lighting requirement of the project in kW
- NREL report indicating the annual energy generation from proposed on-site renewable energy system in kWh/year
- Proposed list of renewable energy systems with manufacturer details
- Conceptual site plans showing the location of proposed renewable energy systems.
- Declaration from the developer indicating the capacity of proposed renewable energy systems

Certification Level

- Narrative describing the installed renewable energy system
- Tentative calculations indicating the annual energy consumption for common area lighting requirement of the project in kW
- NREL report indicating the annual energy generation from installed on-site renewable energy system in kWh/year
- Renewable energy systems with manufacturer details
- Site plans showing the location of renewable energy systems
- Declaration from the developer indicating the capacity of renewable energy systems
- Purchase invoices of the installed RE Systems
- Photographs of the installed RE systems

Guidelines & Examples:

(These guidelines are illustrative)

On-site Solar PV energy system

Exemplary Performance:

The project is eligible for exemplary performance under Innovation and Design if the project has On-site Renewable Energy system to meet more than 95% of annual common area requirement.

Solar Water Heating Systems: 20%, 40%, 60%, 80%

EC Credit 6 **Points: 2**

Intent:
Encourage use of on-site solar water heating systems to improve energy efficiency.

Requirements:
Install on-site solar water heating systems for at least 25% of total hot water requirements of the project. Points are awarded as below:

Hot water through solar water heating system as a percentage of total hot water requirements of the project	Points
≥ 20 %	1
≥ 40%	2
≥ 60 %	3
≥ 80%	4

Note 1: Consider hot water requirement as 20 litres per person per day

Note 2: This credit shares a total of 4 points with EE Credit 5 – On-site Renewable Energy. Projects can implement any combination of on-site renewable energy systems and/or solar water heating systems to achieve up to 4 points in total.

Benefits Anticipated:
- ❖ Reduces the adverse environmental impacts caused by fossil fuel based energy production and use
- ❖ Ensures energy security for the country

Documents Required:

Precertification Level
- Narrative describing the proposed solar water heating systems
- Tentative calculations indicating the total hot water requirement of the project in KLD
- Manufacturing details of proposed solar water heating systems
- Conceptual site plans showing the location of proposed solar water heating systems
- Declaration from the developer indicating the capacity of solar water heating systems

Certification Level
- Narrative describing the installed solar water heating systems
- Tentative calculations indicating the total hot water requirement of the project in KLD
- Manufacturing details of installed solar water heating systems

- Site plan showing the location of installed solar water heating systems
- Declaration from the developer indicating the capacity of solar water heating systems
- Purchase invoices of the installed solar water heating systems
- Photographs of the installed solar water heating systems

Guidelines & Examples:

(These guidelines are illustrative)

Solar Water heater

Exemplary Performance:

The project is eligible for exemplary performance under Innovation and Design if the project has solar water heating system to meet more than 75% of annual common area requirement.

Energy Saving Measures in Appliances & other Equipment

EC Credit 7 **Points: 2**

Intent:
Conserve energy in the use of appliances and other equipment, thereby reducing environmental impacts.

Requirements:
Provide the following (each application 1 point, Maximum 2 points):

- Pumps: BEE 4-Star rated pumps or Minimum 60% efficiency for pumps for capacity greater than 3HP and ISI certified pumps for others
- Motors: The minimum efficiency of Motors shall be BEE 4-star rated Motors (or) International Efficiency with class 3 (IE 3)
- Other energy efficient equipment/ system

Benefits Anticipated:
- Reduction in energy consumption, thereby reducing associated adverse environmental impacts

Documents Required:

Precertification Level
- Narrative describing proposed energy efficient appliances & other equipment in the project, with the energy efficiency parameters
- Declaration from the developers indicting the energy efficient appliances & other equipment in the project, with the energy efficiency parameters

Certification Level
- Narrative describing installed energy efficient appliances & other equipment in the project, with the energy efficiency parameters
- Declaration from the developers indicating the energy efficient appliances & other equipment in the project, with the energy efficiency parameters
- Manufacturer's cut-sheets/ brochures of the installed appliances and others equipment
- Purchase invoices of the installed appliances & equipment
- Photographs of the installed appliances and other equipment

Guidelines & Examples:

(These guidelines are illustrative)

Energy Efficient Pumps & Motors

Exemplary Performance:

The project is NOT eligible under this credit for exemplary performance under Innovation and Design.

MATERIAL CONSERVATION

Separation of Household Waste

MC Mandatory Requirement 1

Intent:
Facilitate segregation of house-hold waste at source so as to prevent waste being sent to landfills

Requirements:
- ❖ Provide separate bins to collect dry waste (paper, plastic, metals, glass, etc.,) and wet waste (organic) for every dwelling unit.
- ❖ Additionally provide separate bins in a centralised/ common facility to collect waste such as dry waste, wet waste, e-waste, medical and paper waste.

Benefits Anticipated:
- ❖ Reduces the burden on landfills

Documents Required:

Precertification Level
- Narrative describing the strategies to be implemented to segregate and divert dry & wet waste
- Conceptual plan showing the location of the proposed waste bins for individual units and common facilities
- Declaration from the developer indicating the provision of separate bins (dry and wet) for every dwelling unit

Certification Level
- Narrative describing the strategies implemented to segregate and divert dry & wet waste
- Plan showing the location of the waste bins at individual units and common facilities
- Declaration from the developer indicating the provision of separate bins (dry and wet) for every dwelling unit
- Purchase invoice of colour coded bins for wet and dry waste segregation for all dwelling units
- Photographs showing the dry and wet bins at dwelling unit level along with separate bins at common segregation area

Guidelines & Examples:

(These guidelines are illustrative)

Dry Waste Segregation

Wet Waste Segregation

Exemplary Performance:

The project is NOT eligible under this credit for exemplary performance under Innovation and Design.

Organic Waste Management: 50%, 75%

MC Credit 1 **Points: 2**

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

Requirements:
Install on-site waste treatment systems viz., dump-pits, organic waste converter or Vermi-Composting, etc., to treat at least 50% of the organic waste generated and reuse them for landscaping needs.

Points are awarded as below:

Percentage of organic waste treated: $\frac{\text{Organic waste converter capacity}}{\text{Total organic waste generated on-site}} \times 100$	Points
≥ 50%	1
≥ 75%	2

Note: *Organic waste generated per person per day should be considered as 0.25 kg.*

Benefits Anticipated:
- ❖ Reduces the burden on landfills.
- ❖ Improved hygiene and sanitation

Documents Required:

Precertification Level
- Narrative describing the proposed organic waste treatment system and its capacity
- Tentative calculations indicating the amount of organic (bio-degradable) waste generated
- Conceptual site plan highlighting the location of proposed on-site organic waste treatment system
- Manufacturer brochure of the proposed organic waste treatment system, as applicable
- Declaration from the developer indicating the capacity of organic waste treatment system

Certification Level
- Narrative describing the installed organic waste treatment system and its capacity
- Calculations indicating the amount of organic (bio-degradable) waste generated
- Site plan highlighting the location of installed on-site organic waste treatment system
- Manufacturer brochure of the organic waste treatment system
- Declaration from the developer indicating the capacity of organic waste treatment system
- Photographs showing the organic treatment implemented on-site

Guidelines & Examples:

(These guidelines are illustrative)

Organic Waste Converter

Vermi Composting

Organic Waste Composters

Exemplary Performance:

The project is eligible for exemplary performance under Innovation and Design if the project has on-site waste treatment systems to treat at least 95% of the organic waste generated.

Handling of Construction Waste Materials: 50%, 25%

MC Credit 2 **Points: 2**

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

Requirements:
Avoid at least 50% of the waste generated (by either weight or volume) during construction from being sent to land-fills.

Points are awarded as below:
- Segregation and reuse of at least 50% of waste materials on-site. *(1 point)*
- At least 25% of waste diversion to haulers *(1 point)*

Notes:
- *Excavated earth & stones should not be considered under this credit, as these are natural resources.*
- *Temporary materials such as materials used for formwork, scaffolding shall not be considered for credit calculations.*

Benefits Anticipated:
- Reduces the burden on landfills and associated environmental impacts.
- Reduces impacts associated with resource extraction & processing.

Documents Required:

Precertification Level
- Narrative describing the proposed strategies in handling the construction waste
- Conceptual site plan highlighting the proposed construction waste management yard
- Calculations indicating the amount of waste generated, reused, recycled and sent to landfill, either by weight or volume
- List of construction waste materials likely to be generated and diverted from landfills for reuse and recycle
- List of identified haulers
- Declaration from the developer describing the proposed strategies in handling the construction waste

Certification Level
- Narrative describing the implemented strategies in handling the construction waste
- Site plan highlighting the construction waste management yard
- Calculations indicating the amount of waste generated, reused, recycled and sent to landfill, either by weight or volume

- List of construction waste materials generated and diverted from landfills for reuse and recycle
- Receipts / challans from construction waste haulers
- Photographs showing the construction waste management including segregated wate collection, reuse on site and disposal via waste haulers

Note:

- *Submitted photographs must be time-stamped.*
- *At least one photograph must be submitted for each type of reuse on site.*

Guidelines & Examples:
(These guidelines are illustrative)

Segregated collection of metal scrap and paint cans

Construction waste collection on site

Exemplary Performance:
The project is NOT eligible under this credit for exemplary performance under Innovation and Design.

Use of Local Material: 50%, 75%, 95%

MC Credit 3 **Points: 3**

Intent:
Encourage use of building materials available locally thereby minimising the associated environmental impacts resulting from transportation

Requirements:
- ❖ Source at least 50% materials which are extracted and manufactured, locally within a distance of 400 kms
- ❖ Survey and identify building materials which are in the specified distance, in early stages of project design.

Points are awarded as below:

Percentage: $\frac{\text{Cost of Local materials used}}{\text{Total Cost of the materials}*} \times 100$	Points
50%	1
75%	2
95%	3

***Note:** *Total cost of materials does not include the labour charges.*

Benefits Anticipated:
- ❖ Decreased transportation costs for the project
- ❖ Supports local economy

Documents Required:

Precertification Level
- Narrative describing the proposed strategies implemented to source local materials
- List/ Bill of Quantities (BOQ) of proposed local materials specifying approximate distance from the project site to place of manufacturing units
- Master material sheet highlighting percentage of local materials sourced (in terms of cost) with respect to the total materials cost of the project
- Google map indicating the approximate distance from the project site to place of manufacturing units
- Declaration from the developer indicating the use of local materials

Certification Level
- Narrative describing the strategies implemented to source local materials
- List/ Bill of Quantities (BOQ) of local materials specifying approximate distance from the project site to place of manufacturing units
- Master material sheet highlighting percentage of local materials sourced (in terms of cost) with respect to the total materials cost of the project
- Google map indicating the approximate distance from the project site to place of manufacturing units

- Supplier / vendor declaration letter indicating the distance from the project site to the place of manufacturing unit. Supplier / vendor declaration letters must be dated within 1 year prior to documentation submission.
- Purchase invoices specifying the make / model of the local materials used

Exemplary Performance:

The project is NOT eligible under this credit for exemplary performance under Innovation and Design.

Certified Green Products: 5%, 10%, 15%

MC Credit 4 **Points: 3**

Intent:
Use certified green building materials, products, and equipment, so as to reduce dependence on materials that have associated negative environmental impacts**.**

Requirements:
Ensure that the project source GreenPro eco-labelled (or) any other Eco-labelled products & materials for building construction. The purchased quantity of eco-labelled products to be at least 5% of the total cost of products & materials used for construction.

Note: *For GreenPro eco-labelled products & categories, please refer the GreenPro directory.*

Points are awarded as below:

Percentage of Green products & materials used for construction:	Points
≥ 5%	1
≥ 10%	2
≥ 15%	3

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 electrical, mechanical & plumbing - equipment, systems & appliances and movable materials & furniture should not be considered in the total material cost*

Benefits Anticipated:
❖ Reduce dependency on products and materials with negative impact on environment

Documents Required:

Precertification Level
- Narrative on green certified building materials, products & equipment available
- Proposed list of green certified building materials, products & equipment
- Master material sheet highlighting percentage of green certified materials (in terms of cost) with respect to the total materials cost of the project
- Manufacturer brochure of the materials, products & equipment to be procured
- Supporting document indicating the green product certification
- Declaration from the developer indicating the use of green certified material

Certification Level

- Narrative on green certified building materials, products & equipment available
- List of green certified building materials, products & equipment
- Master material sheet highlighting percentage of green certified materials (in terms of cost) with respect to the total materials cost of the project
- Manufacturer brochure of the materials, products & equipment used
- Supporting document indicating the green product certification
- Purchase invoice specifying the make / model of the green products procured

Exemplary Performance:

The project is eligible for exemplary performance under Innovation and Design if the project has more than 20% of green certified materials.

Appropriate Technologies: 25%, 50%, 75%, 95%

MC Credit 5 **Points: 4**

Intent:
Encourage use of appropriate construction technologies to conserve natural resources and thereby reduce environmental impacts

Requirements:
At least 25% (by cost) of the structure should be constructed using appropriate and cost-effective technologies without compromising on strength, durability & functional performance and encourage use of alternative technologies.

$\frac{\text{Cost of Structure constructed with alternative technologies}}{\text{Total Cost of the structure}} \times 100$	Points
25%	1
50%	2
75%	3
95%	4

Project can consider using the following technologies:
- Monolithic Concrete Construction
- Precast Concrete Construction for Super structures
- Glass Fiber Reinforced Gypsum (GFRG) Panel Building System
- Use of Compressed Stabilized Earth Blocks
- Filler Slabs
- Any other innovative technologies

Notes: *For further details on available alternative technologies please refer to Building Materials & Technology Promotion Council (BMTPC)*

Benefits Anticipated:
- Fast track construction
- Minimum wastage of materials
- Better strength and durability
- Provides quality working environment for the Work force

Documents Required:

Precertification Level

- Narrative describing the proposed strategies for use of proposed appropriate construction technologies.
- Calculation showing percentage of cost involved in construction of appropriate and cost-effective technologies without compromising on strength, durability & functional performance
- Declaration from the developer indicating the use of proposed appropriate construction technologies.

Certification Level

- Narrative describing the implemented strategies for use of appropriate construction technologies.
- Calculation showing percentage of cost involved in construction of appropriate and cost-effective technologies without compromising on strength, durability & functional performance
- On-site photographs of the implemented alternate construction techniques

Guidelines & Examples:

(These guidelines are illustrative)

Monolithic Concrete Construction - BDA

GFRG Demonstration Building – IIT Madras

Exemplary Performance:

The project is NOT eligible under this credit for exemplary performance under Innovation and Design.

Alternative Construction Materials

MC Credit 6 **Points: 2**

Intent:
Encourage use of alternative construction materials to conserve natural resources and thereby reduce environmental impacts

Requirements:
Use of Alternative Construction Materials for 100% of the material of the following applications: (1 point for each measure; maximum 2 points)

- Concreting using artificial sand
- Concreting using artificial aggregates
- Plastering using artificial sand
- Plastering using Pre-mix plasters
- Curing compounds
- Alternate to Wood based materials for door and window frames

Benefits Anticipated:
- Savings in natural resources consumption.
- Better strength and durability

Documents Required:
Precertification Level
- Narrative describing the proposed strategies for use of alternate construction materials to replace the natural resources in construction.
- Proposed list of identified materials
- Master material sheet highlighting the total materials cost of the project
- Declaration from the developer indicating the list of alternate construction materials to replace the natural resources in construction.

Certification Level
- Narrative describing the strategies for use of alternate construction materials to replace the natural resources in construction.
- List of alternate construction materials used in the project
- Master material sheet highlighting the total materials cost of the project
- On-site photographs of the implemented alternate construction materials.
- Purchase invoices specifying the make / model of the implemented alternate construction materials.
- Cut sheets/ brochures from manufacturers.

Exemplary Performance:

The project is NOT eligible under this credit for exemplary performance under Innovation and Design.

Eco-friendly Wood-based Materials

MC Credit 7 **Points: 2**

Intent:
Minimise use of new wood-based products, thereby reducing impacts of deforestation.

Requirements:
Ensure new wood-based products (by cost) used in the building are:

- ❖ Alternate to wood-based materials for doors and windows (2 points)
- ❖ Projects using wood-based applications shall consider for at least >50% of wood-based materials as:
  - Rapidly Renewable or
  - Composite/ Agri based wood/ Recycled waste wood
  - FSC certified wood

$\frac{\text{Cost of alternate wood products/ Certified Timber}}{\text{Total cost of wood – based products}} \times 100$	Points
50%	1
75%	2

Notes:

- **Rapidly renewable materials are those that can be harvested and used within a ten-year cycle. Example: Bamboo, Eucalyptus, Bagasse based materials, Jute based materials, cotton blinds, rubber wood etc.,*
- *** Composite / Agri based wood / recycled waste wood examples include (but not limited to) MDF boards, particle boards, linoleum boards, etc.,*

Benefits Anticipated:
- ❖ Reduce dependency on virgin wood
- ❖ Avoids deforestation

Documents Required:

Precertification Level
- Narrative describing the proposed strategies to source rapidly renewable materials (and/ or) Composite / Agri based wood (and/or) certified timber.
- List applications where rapidly renewable material (and/ or) certified wood by FSC/ (PEFC) (and/or) Composite / Agri based wood are used
- List of proposed manufacturers to source rapidly renewable material (and/or) certified wood by FSC/ (PEFC)/ equivalent.
- Tentative calculations indicating the percentage of rapidly renewable material (and/or) certified wood by FSC/ (PEFC)(and/ or) Composite / Agri based wood, to the total cost of new wood used in the project. If

certified wood is sourced, provide manufacturer CoC number/ certificate and details of type of certified wood e.g. pure, mixed, etc.,

- Declaration from the developer indicating the use of Alternate to wood-based materials for doors and windows or Eco-friendly Wood based materials

Certification Level

- Narrative describing the strategies implemented to source rapidly renewable materials (and/ or) Composite / Agri based wood (and/or) certified timber.
- List applications where rapidly renewable material (and/ or) certified wood by FSC/ (PEFC) (and/or) Composite / Agri based wood are used
- List of manufacturers rapidly renewable material (and/or) certified wood by FSC/ (PEFC)/ equivalent have been sourced.
- Calculations indicating the percentage of rapidly renewable material (and/or) certified wood by FSC/ (PEFC)(and/ or) Composite / Agri based wood, to the total cost of new wood used in the project. If certified wood is sourced, provide manufacturer CoC number/ certificate and details of type of certified wood e.g. pure, mixed, etc.,
- Purchase invoices specifying the make / model of the Alternate to wood-based materials for doors and windows or Eco-friendly Wood based materials used
- On site photographs of the Alternate to wood-based materials for doors and windows or Eco-friendly Wood based materials used

Exemplary Performance:

The project is NOT eligible under this credit for exemplary performance under Innovation and Design.

INDOOR ENVIRONMENT QUALITY

Tobacco Smoke Control

IEQ Mandatory Requirement 1

Intent:
Minimise exposure of non-smokers to the adverse health impacts arising due to passive smoking.

Requirements:
Smoking should be prohibited in all the common areas of the building.

Benefits Anticipated:
- ❖ Reduces health hazards caused due to passive smoking
- ❖ Improves air quality thereby improving the health of the community as a whole

Documents Required:

Precertification Level
- Narrative describing proposed implementation strategies to be adopted to control smoking on site
- Tenant guidelines indicating 'No smoking' policy
- Declaration from the developer indicating that smoking is prohibited in all the common areas of the building

Certification Level
- Narrative describing the strategies adopted to control smoking on site
- Tenant guidelines indicating 'No smoking' policy
- Declaration from the developer indicating that smoking is prohibited in all the common areas of the building
- Photographs showing no smoking signages in the project

Minimum Daylighting: 50%

IEQ Mandatory Requirement 2

Intent:
Ensure adequate daylighting in the interior and the exterior environment, to improve occupant well-being

Requirements:
Achieve a minimum glazing factor (GF) or lux level for at least 50% of regularly occupied spaces in each dwelling unit

- Multiple openings of adequate window sizes to the exteriors, openings in proper orientation preferably north or east facing

Option 1: Prescriptive Approach
Achieve minimum glazing factors as listed below in at least 50% of the regularly occupied spaces in each dwelling unit.

Glazing factors for Regularly Occupied Spaces

Type of Regularly Occupied Spaces	Glazing Factor (GF)*
Living/ Bedroom	1
Multi-purpose room	1
Kitchen	2

Note:

For other regularly occupied spaces which are not listed in the table above, a minimum glazing factor of 1 should be achieved.

Glazing Factor Calculation:
Glazing factor can be calculated using the formula given below:

$$Glazing\ Factor\ = \frac{Window\ Area\ (sq.m.) \times Actual\ Visible\ Transmittance\ of\ Glazing\ \times Constant\ \times 100}{Floor\ Area\ [sq.m]}$$

Constant Values:
Windows on wall : 0.2

Window on roof (skylight) : 1.0

Notes:

- *Regularly occupied spaces include living room, bedrooms, dining room, study room, kitchen, etc.,*
- *Regularly occupied spaces which are used for multi- purpose, such as living-cum-dining room, can be considered as separate spaces based on the function. The room boundary need not be a physical boundary.*
- *Window openings in dwelling unit where the angle of obstruction of objects obscuring the sky dome is greater than 70^0 from the horizontal shall not be considered for daylight calculations (refer following figure)*

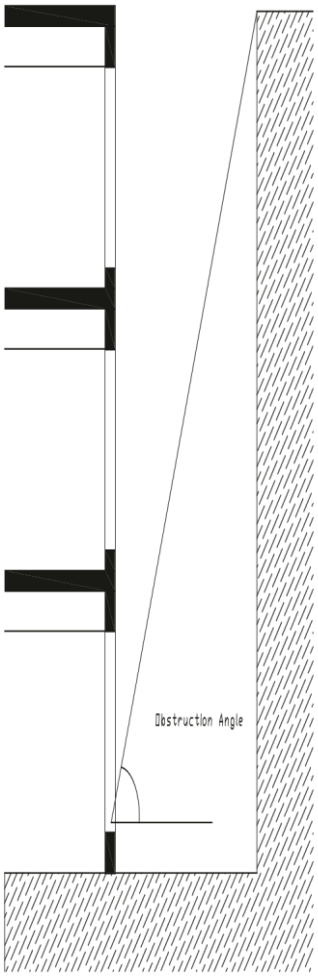


Figure – Angle of Obstruction

Option 2: Measurement/ Simulation Approach

Demonstrate through daylight illuminance measurement that at least 50% of the regularly occupied spaces in each dwelling unit in the building achieve daylight illuminance levels for a minimum of 110 Lux. Measurements shall be taken at 2 feet 6 inches height at 9 am, 12 pm, and 3 pm, on a 10-foot square grid.

(OR)

Demonstrate through computer simulation that at least 50% of the regularly occupied spaces in each dwelling unit in the building achieve daylight illuminance levels for a minimum of 110 Lux in a clear sky condition on 21st September at 12 noon, at 2 feet 6 inches height.

Benefits Anticipated:

- Lower electricity bills
- Improves quality of life
- Better health and well-being of occupants

Documents Required:

Precertification Level

- Narrative describing the Proposed daylighting strategies
- Site/ master plan showing all the nearby buildings indicating angle of obstruction
- All floor plans indicating door/ window schedules
- Calculations indicating the percentage of area meeting the daylight requirement
- Manufacturer/ brochure/ cut-sheet / letter of proposed glass showing the visual light transmittance

Certification Level

- Narrative describing the implemented daylighting strategies
- Site/ master plan showing all the buildings indicating angle of obstruction
- All floor plans indicating door/ window schedules
- Calculations indicating the percentage of area meeting the daylight requirement
- Manufacturer/ brochure/ cut-sheet / letter of installed glass showing the visual light transmittance
- Simulation reports as applicable
- Photographs of interior spaces of dwelling units

Guidelines & Examples:

(These guidelines are illustrative)

Daylighting

Enhanced Daylighting: 75%, 95%

IEQ Credit 1 **Points: 4**

Intent:
Ensure adequate daylighting in the interior and the exterior environment, to improve occupant well-being

Requirements:
Achieve a minimum glazing factor (GF) or lux level for all regularly occupied spaces.

- Multiple openings of adequate window sizes to the exteriors, openings in proper orientation preferably north or east facing

Points are awarded as below:

Percentage of Daylighting: $\frac{\text{Regularly occupied area with GF}}{\text{Total Regularly occupied area}} \times 100$	Points
75%	2
95%	4

Note:

Points are awarded based on the dwelling unit with the lowest floor area that achieves adequate daylight.

Option 1: Prescriptive Approach
Achieve minimum glazing factors as listed below in at least 75% of the regularly occupied spaces in each dwelling unit.

Glazing factors for Regularly Occupied Spaces

Type of Regularly Occupied Spaces	Glazing Factor (GF)*
Living/ Bedroom	1
Multi-purpose room	1
Kitchen	2

Note:

For other regularly occupied spaces which are not listed in the table above, a minimum glazing factor of 1 should be achieved.

Glazing Factor Calculation:
Glazing factor can be calculated using the formula given below:

$$Glazing\ Factor\ = \frac{Window\ Area\ (sq.m.) \times Actual\ Visible\ Transmittance\ of\ Glazing\ \times Constant\ \times 100}{Floor\ Area\ [sq.m]}$$

Constant Values:
Windows on wall : 0.2

Window on roof (skylight) : 1.0

Notes:

- *Regularly occupied spaces include living room, bedrooms, dining room, study room, kitchen, etc.,*
- *Regularly occupied spaces which are used for multi- purpose, such as living-cum-dining room, can be considered as separate spaces based on the function. The room boundary need not be a physical boundary.*
- *Window openings in dwelling unit where the angle of obstruction of objects obscuring the sky dome is greater than 70^0 from the horizontal shall not be considered for daylight calculations (refer figure no.1)*

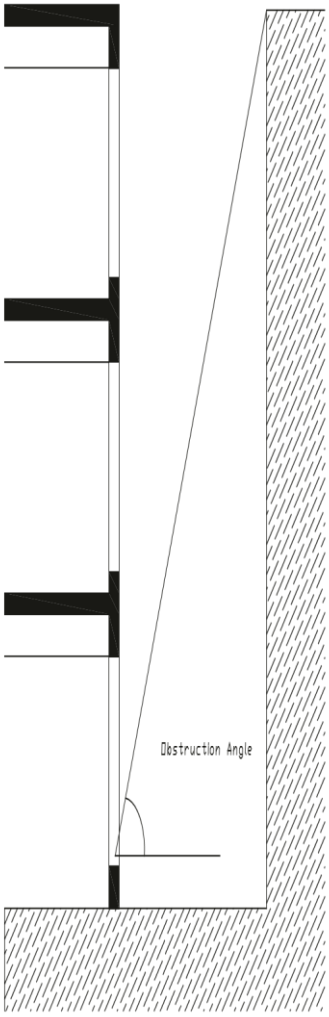


Figure – Angle of Obstruction

Option 2: Measurement/ Simulation Approach

Demonstrate through daylight illuminance measurement that at least 75% of the regularly occupied spaces in each dwelling unit achieve daylight illuminance levels for a minimum of 110 Lux. Measurements shall be taken at 2 feet 6 inches height at 9 am, 12 pm, and 3 pm, on a 10-foot square grid.

(OR)

Demonstrate through computer simulation that at least 75% of the regularly occupied spaces in each dwelling unit achieve daylight illuminance levels for a minimum of 110 Lux in a clear sky condition on 21st September at 12 noon, at 2 feet 6 inches height.

Benefits Anticipated:

- ❖ Lower electricity bills
- ❖ Improves quality of life
- ❖ Better health and well-being of occupants.

Documents Required:

Precertification Level

- Narrative describing the Proposed daylighting strategies
- Site/ master plan showing all the buildings indicating angle of obstruction
- All floor plans indicating door/ window schedules
- Calculations indicating the percentage of area meeting the daylight requirement
- Manufacturer/ brochure/ cut-sheet / letter of proposed glass showing the visual light transmittance

Certification Level

- Narrative describing the implemented daylighting strategies
- Site/ master plan showing all the buildings indicating angle of obstruction
- All floor plans indicating door/ window schedules
- Calculations indicating the percentage of area meeting the daylight requirement
- Manufacturer/ brochure/ cut-sheet / letter of installed glass showing the visual light transmittance
- Simulation reports as applicable
- Photographs of interior spaces of dwelling units

Exemplary Performance:

The project is NOT eligible under this credit for exemplary performance under Innovation and Design.

Fresh Air Ventilation: 50%, 75%, 95%

IEQ Credit 2

Points: 3

Intent:
Avoid indoor pollutants by providing adequate air ventilation, thereby enhancing the indoor environment quality

Requirements:

- Provide openable windows or doors and ventilators to the exteriors in all regularly occupied spaces of each dwelling unit such that the openable area is designed as outlined in the table below:

Space type	Percentage: $\frac{\text{Openable area}}{\text{Total carpet area}} \times 100$
Living Spaces/Bedroom	10%
Kitchen	8%
Bathrooms	4%

Notes:

- *Net Openable area as a percentage of total carpet area shall be calculated room by room*
- *For sliding windows / doors, only openable area to the exteriors shall be considered in calculations*

Points are awarded as below:

Percentage of Ventilation in Regularly Occupied Spaces: $\frac{\text{Carpet area of rooms in a dwelling unit meeting above criteria}}{\text{Total carpet area of a dwelling unit}}$	Points
50%	1
75%	2
95%	3

Note: *Points are awarded based on the dwelling unit with the lowest percentage of ventilation.*

Benefits Anticipated:

- Enhances indoor air quality
- Improves quality of life
- Good health and wellbeing of the occupants

Documents Required:

Precertification Level

- Narrative describing the proposed Ventilation strategies
- All floor plans indicating door/ window schedules
- Tentative calculations showing percentage of ventilation in regularly occupied spaces

Certification Level

- Narrative describing the implemented Ventilation strategies
- All floor plans indicating door/ window schedules
- Calculations showing percentage of ventilation in regularly occupied spaces
- Photographs of the interior spaces showing windows ‘

Guidelines & Examples:

These guidelines are illustrative)

Fresh Air Ventilation

Exemplary Performance:

The project is NOT eligible under this credit for exemplary performance under Innovation and Design.

Cross Ventilation: 25%, 50%

IEQ Credit 3

Points: 2

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

Requirements:
Provide openable doors / windows / ventilators to the exteriors in all regularly occupied spaces of each dwelling unit in at least two of the orientations.

Percentage of regularly occupied spaces with cross ventilation	Points
≥25%	1
≥50%	2

Notes:

- *Regularly occupied spaces include living room, bedroom, dining room, study room, kitchen.*
- *The windows/ ventilators should not have any obstruction within 2 m from outside surface.*
- *The openings considered should meet IEQ Credit 2.*
- *Main door/door opening into approach corridor/ common lobby cannot be considered for cross ventilation.*
- *Window openings/ventilators into common lobby with permanent opening to exterior can be considered to meet the credit requirement.*

Benefits Anticipated:

- Enables good circulation of fresh air
- Flushes out contaminants and provide a better indoor environment

Documents Required:

Precertification Level

- Narrative describing the proposed Cross Ventilation strategies
- Conceptual floor plans with door/ window schedules for each typical dwelling unit
- Tentative calculations indicating regularly occupied spaces compliant with cross ventilation

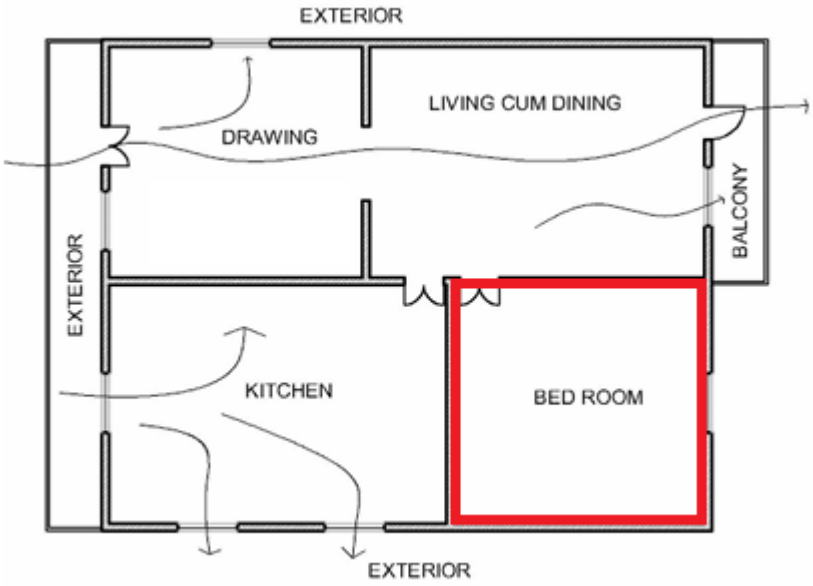
Certification Level

- Narrative describing the implemented Cross Ventilation strategies
- Floor plans with door/ window schedules for each typical dwelling unit
- Calculations indicating regularly occupied spaces compliant with cross ventilation
- Photographs of opening and windows promoting cross ventilation

Guidelines & Examples:

These guidelines are illustrative)

Example 1: Room with cross ventilation



Example 2: Drawing / Living cum Dining / Kitchen have access to cross ventilation

Exemplary Performance:

The project is eligible for exemplary performance under Innovation and Design if the percentage of regularly occupied spaces with cross ventilation >50%.

Exhaust Systems

IEQ Credit 4

Points: 2

Intent:

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

Requirements:

Design exhausts systems in bathrooms and kitchens as per the requirements provided in the table below:

Location	Floor Area	Minimum Airflow
Bathroom	≤ 4.64 sq. m (50 sq. ft)	50 cfm
Kitchen	≤ 9.3 sq. m (100 sq. ft)	100 cfm

❖ **Mechanical Exhaust system:** (1 point)

(AND / OR)

❖ **Ventilators or openings above lintel level: (1 point)**

- Incorporated with mesh to keep insects out

Notes:

- *For bathrooms with higher floor areas than the above values, airflow has to be proportionally increased.*
- *Ensure exhaust systems take away the polluted indoor air to the outdoors (i.e. exhaust outlets into common areas are not allowed).*

Benefits Anticipated:

❖ Flushes out contaminants and provide a better indoor environment

Documents Required:

Precertification Level

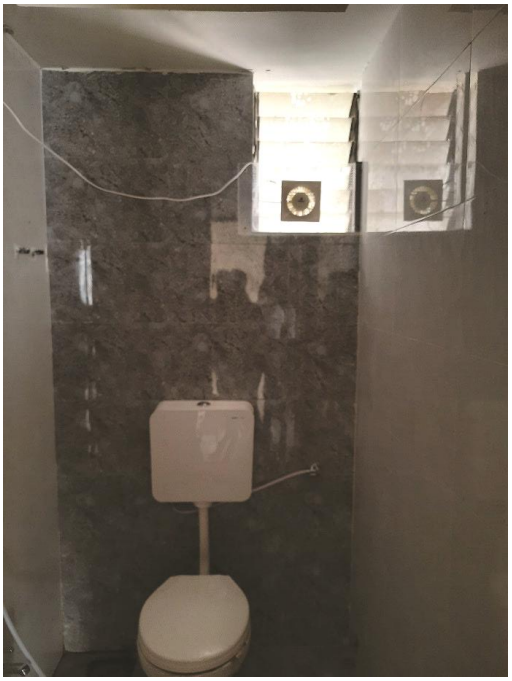
- Narrative describing the exhaust systems proposed in the project
- Conceptual floor plan showing the location of exhaust systems and/or ventilators in bath rooms and kitchens
- Technical specifications of the proposed exhaust system(s) where applicable
- Declaration from the developer indicating the proposed exhaust systems

Certification Level

- Narrative describing the exhaust systems installed in the project
- Floor plans showing the location of exhaust systems and/or ventilators in bathrooms & kitchens
- Technical specifications of the installed exhaust system(s) and photographs
- Purchase invoice/ payment receipts and photographs showing the installed exhaust systems
- Photographs of ventilators or high openings above lintel

Guidelines & Examples:

These guidelines are illustrative)



Exhaust fan in bathroom

Exemplary Performance:

The project is NOT eligible under this credit for exemplary performance under Innovation and Design.

Low VOC Materials, Paints & Adhesives

IEQ Credit 5

Points: 2

Intent:

Encourage use of materials with low emissions so as to reduce adverse health impacts on building occupants

Requirements:

Use low VOC paints, sealants and adhesives to reduce adverse health impacts on building occupants.

- For paints and coatings used for the interior walls and ceilings, source GreenPro or any other Eco-label certified paints and coatings (including primers) / lime-based surface treatments / ensure that the VOC content does not exceed the limits as specified in the table below. *(1 point)*

(AND / OR)

- For adhesives and sealants used within the interiors, source GreenPro Eco-label or any other Eco-label certified adhesives and sealants / ensure that the VOC content does not exceed the limits as specified in the table below *(1 point)*

Type of material	VOC Limit (g/L less water)
Paints:	
Non-flat (Glossy) paints	150
Flat (Mat) paints	50
Anti-corrosive/ anti-rust paints	250
Varnish	350
Adhesives:	
Glazing adhesive	100
Tile adhesives	65
Wood adhesive	30
Wood flooring adhesive	100

Benefits Anticipated:

- Reduces impact on health of occupants
- Eliminates sick building syndrome

Documents Required:

Precertification Level

- Narrative with list of proposed Eco-labelled and/or low VOC content materials (make & model) to be used in the building interiors
- Cut sheets indicating the Eco-labelled and/or VOC levels of the proposed materials
- Declaration from the developer indicating the use of low or no VOC content materials

Certification Level

- Narrative with list of Eco-labelled and/or low VOC content materials (make & model) used in the building interiors
- Purchase invoice/ payment receipts of the paint & adhesives sourced for the project
- Manufacturer/ brochure/ cut-sheet/ letter of Eco-labelled / Low VOC paints, adhesives and sealants used.
- Photographs of the labels of the Eco-labelled / low or no VOC paints, adhesives and sealants used

Guidelines & Examples:

(These guidelines are illustrative)

Low VOC paint

Exemplary Performance:

The project is NOT eligible under this credit for exemplary performance under Innovation and Design.

Occupant Well-being Facilities

IEQ Credit 6

Points: 1

Intent:
Provide occupant well-being facilities, so as to enhance physical, emotional and spiritual well-being of building occupants.

Requirements:
Demonstrate that the project has community well-being facilities of appropriate size (such as yoga/ meditation room/ reading room or any gathering space and common seating spaces).

Benefits Anticipated:
- ❖ Enhance social connectivity
- ❖ Promote health & wellbeing

Documents Required:

Precertification Level
- Narrative with details of proposed community well-being facilities
- Conceptual plans highlighting total area of the facility with dimensions and calculation of number of people it caters to
- Declaration from the developer indicating the proposed community well-being facilities

Certification Level
- Narrative with details of provided community well-being facilities
- Plans highlighting total area of the facility with dimensions and calculation of number of people it caters to
- Photographs of facility provided for occupant's well-being

Guidelines & Examples:

(These guidelines are illustrative)

Gymnasium

Outdoor sports facility

Exemplary Performance:

The project is NOT eligible under this credit for exemplary performance under Innovation and Design.

INNOVATION & DESIGN PROCESS

Innovation & Design Process

Innovative Practices - ID Credit 1 **Points: 2**

Intent:
Provide design teams and projects an opportunity to attempt for innovative performance* in green building categories not specifically addressed by the IGBC Green Affordable Housing Rating System.

Requirements:
Credit 1.1: Innovative practices (*1 point for each of the credits; maximum 2 points)*

The projects can also identify the innovation strategies those are not addressed by any existing credits in the rating system. Identify the intent of the proposed innovation credit, to achieve significant, measurable environmental performance requirements for compliance of the credit.

Credit 1.2: Innovative practices

Same as credit 1.1

Benefits Anticipated:
- ❖ Leads to more sustainable design/ practices thereby benefiting the environment

Documents Required:

Precertification Level
- Narrative describing intent, requirements, proposed potential strategies and technologies adopted to achieve the respective innovative practices credit. Strategies proposed must be significantly better than standard sustainable design practices
- Tentative quantitative performance improvements, comparing a baseline and design case.
- Other supporting documents such as drawings, photographs, illustrations, cut sheets, test reports, etc., as applicable

Certification Level
- Narrative describing intent, requirements, potential strategies and technologies adopted in the respective innovation credits. Strategies adopted must be significantly better than standard sustainable design practices
- Quantitative performance improvements, comparing a baseline and design case.
- Other supporting documents such as drawings, photographs, illustrations, cut sheets, test reports, etc., as applicable

Note: Please refer to the addendum at the end of this guide for additional details pertaining to this credit.

Innovation & Design Process

Exemplary Performance - ID Credit 2

Points: 2

Intent:

Exemplary performance strategies result in performances that greatly exceed the performance level or expand the scope required by an existing Green Affordable Housing credit. To earn exemplary performance credits, teams must meet the performance level defined by the next step in the threshold progression. For credits with more than 1 compliance path, an Innovation and Design Process point can be earned by satisfying more than 1 compliance path if their benefits are additive.

Requirements:

Credit 2.1: Exemplary Performance *(1 point for each of the credits; maximum 2 points)*

Identify the intent of the proposed Exemplary Performance credit, the proposed requirement for compliance and the proposed documentation to demonstrate compliance and the design approach used to meet the required measures.

Credit 2.2: Exemplary Performance

Same as credit 2.1

Benefits Anticipated:

- Leads to more sustainable design/ practices thereby benefiting the environment

Documents Required:

Precertification Level

- Narrative describing intent, requirements, proposed potential strategies and technologies adopted to achieve the respective exemplary performance. Strategies proposed must be significantly better than standard sustainable design practices.
- Tentative quantitative performance improvements, comparing a baseline and design case.
- Other supporting documents such as drawings, photographs, illustrations, cut sheets, test reports, etc., as applicable

Certification Level

- Narrative describing intent, requirements, potential strategies and technologies adopted in the respective exemplary performance credits. Strategies adopted must be significantly better than standard sustainable design practices
- Quantitative performance improvements, comparing a baseline and design case.
- Other supporting documents such as drawings, photographs, illustrations, cut sheets, test reports, etc., as applicable

IGBC Accredited Professional

ID Credit 3

Points: 1

Intent:

Support and encourage involvement of IGBC Accredited Professional in green affordable housing projects, so as to integrate appropriate design measures and streamline certification process

Requirements:

At least one principal participant of the project team shall be an IGBC Accredited Professional.

Benefits Anticipated:

- ❖ Hand holding the project team in designing green buildings.
- ❖ Impart knowledge to other team members about green buildings.

Documents Required:

Precertification Level

- A copy of IGBC Accredited Professional certificate of the principal participant.

Certification Level

- A copy of IGBC Accredited Professional certificate of the principal participant.

IGBC Green Affordable Housing Rating System Latest Addendum – 14 June 2024

- Applicable to all registered projects under IGBC Green Homes Rating System, IGBC Affordable Housing Rating systems
- Precertified / Provisionally certified projects can show compliance as per Addendum as and when they come for Certification.

S. No.	Credit Name	Addendum
1	SD Mandatory (Case B) REDEVELOPMENT PROJECT (Precertification Stage)	Projects attempting for redevelopment, should submit the following: a. Legal Agreement: Provide a copy of the signed legal agreement with the housing society, ensuring compliance with the Pune Municipal Corporation (PMC) guidelines or the relevant local authority in other cities. b. Approval Drawing: Submit the approved drawings from PMC in Pune or the local authority in other cities. c. Sustainable Demolition: According to the Maharashtra Regional and Town Planning (MRTP) Act, no development, including the demolition of existing buildings, can start without a Commencement Certificate (CC). Developers must notify occupants prior to demolition, as the CC is issued only post-demolition.
2	SD Mandatory (Case B) REDEVELOPMENT PROJECT (Certification Stage)	In addition to above, project should submit the following: d. Redevelopment Approval: Once residents have relocated, and all approvals are in place, demolition and construction can commence per the sanctioned plan by PMC. Submit six-monthly progress reports during the construction phase. e. Completion Certificate: Obtain a Completion Certificate from PMC or the local authority at the certification stage.

		f. Waste Management: During redevelopment, implement effective waste management strategies. Analyze construction and demolition waste to propose measures for recovery, reuse, recycling, and reduction.
3	Revoke / withdraw of housekeeping chemicals under innovation criteria	The project is advised to explore other innovation categories. Please note: Green Housekeeping is already considered as part of green education & awareness (Site Module) and Certified green products under the Materials category (provided project has a contract with the vendor, including costing, is mentioned). *Note: Even if this was awarded in the previous precertification phase, it will not be awarded at the certification phase. Therefore, the project is encouraged to pursue another innovation.*

Abbreviations

- **BEE** – Bureau of Energy Efficiency
- **DEWATS** - Decentralized Wastewater Treatment Systems
- **ECBC** – Energy Conservation Building Code
- **FSI /FAR** – Floor Space Index / Floor Area Ratio
- **LED –** Light emitting diode
- **NREL –** National Renewable Energy Laboratory
- **IMD –** Indian Meteorological Department
- **MoEF** – Ministry of Environment and Forestry
- **NBC** – National Building Code of India
- **RE** – Renewable Energy
- **STP** – Sewage Treatment Plant
- **VLT** – Visible Light Transmittance
- **VOC** – Volatile Organic Compound

Glossary of Terms

Adapted Plants: Plants that reliably grow well in a given habitat with minimal attention from humans in the form of winter protection, pest protection, water irrigation, or fertilization once root systems are established in the soil. Adapted plants are considered to be low maintenance but not invasive.

Aerator is often found at the tip of water faucets. Aerators can be simply screwed onto the faucet head, creating a non-splashing stream and often delivering a mixture of water and air.

Agrifiber is composite panel product derived from recovered agricultural waste fiber from sources including, but not limited to, cereal straw, sugarcane bagasse, sunflower husk, walnut shells, coconut husks, and agricultural prunings. The raw fibers are processed and mixed with resins to produce panel products with characteristics similar to those derived from woodfiber

BEE Star Rating System for building, developed by Bureau of Energy Efficiency, Ministry of Power, Govt. of India, rates energy efficient buildings based on their actual performance in terms of specific energy use. The Rating is on 1-5 scale, with 5 labelled buildings being the most efficient. (http://www.beeindia.in/)

Biodiversity: The variety of life in all forms, levels and combinations, including ecosystems diversity, species diversity, and genetic diversity.

Daylighting is the controlled admission of natural light into a space through glazing with the intent of reducing or eliminating electric lighting. By utilizing solar light, day lighting creates a stimulating and productive environment for building occupants.

The Decentralised wastewater treatment system is a simple design, non-dependent on energy, reliable, long-lasting, tolerant towards inflow fluctuation and low in costs. It can treat organic wastewater from domestic and industrial sources.

Development footprint is the area affected by development or by project site activity. Hardscape, access roads, parking lots, non-building facilities, and the building itself are all included in the development footprint.

Dual flush toilet: A dual-flush toilet is a variation of the flush toilet that uses two handles to flush different levels of water. The smaller level is designed for liquid waste, and the larger is designed for solid waste.

Erosion: A combination of processes in which materials of the earth's surface are loosened, dissolved or worn away, and transported from one place to another by natural agents (such as water, wind or gravel).

E-waste: It includes discarded materials from a range of electronic devices such as computers, refrigerators, televisions, air-conditioners, personal stereos, mobile phones etc.

Fly Ash: The solid residue derived from incineration processes. Fly ash can be used as substitute for Portland cement in concrete.

Flow rate: Flow rate is a parameter used to mark the efficiency of appliances using liquids. For water fixtures, flow rates give the amount of water (in litres) that flows from a particular fixture in a given time (in minutes)

Grass Pavers: Cellular blocks with grass growing in the voids. These are mostly used for external paving, gardens. They need maintenance and have good infiltration capacity.

Heat Island Effect: Occurs when warmer temperatures are experienced in urban landscapes compared to adjacent rural areas as a result of solar energy retention on constructed surfaces. Principal surfaces that contribute to the heat island effect include streets, sidewalks, parking lots and buildings.

Impervious areas are surfaces that promote runoff of precipitation volumes instead of infiltration into the subsurface

Landfills are waste disposal sites for solid waste from human activities

Landscape Area: Area of the site equal to the total site area less the building footprint, paved surfaces, water bodies, patios. Etc.,

Lighting Power Density (LPD) is the installed lighting power, per unit area.

Low-flow fixtures use high pressure to produce a comfortable, pleasing flow without using much water.

LUX (lx) is the SI unit of illuminance and luminous emittance, measuring luminous flux per unit area. It is equal to one lumen per square metre.

Native (Indigenous) Plants: Any plant species that occurs and grows naturally in a specific region. Native plant species do not require watering other than during the initial years of establishment.

Open Space Area: The property area minus the development footprint or as defined by local zoning requirements. Open space must be vegetated and pervious, also includes non-vehicular, pedestrian oriented hardscape spaces.

Open grid pavers are less than 50% impervious and accommodates vegetation in the open cells.

Phytoremediation is a Natural Biological system that has emerged as a safe, efficient and cost-effective solution for remediation of water or soil contaminated by wide array of contaminants. Phytoremediation acts as a powerful physical, chemical and biological filter by the use of plants for the removal of pollutants from contaminated soil or water.

Potable Water: Water suitable for drinking and supplied from wells or municipal water systems.

Projection Factor is a ratio of the length of overhang projection divided by height from windowsill to the bottom end of the overhang (must be permanent)

Recycled content is the proportion, by mass, of pre-consumer or postconsumer recycled material in a product.
(IS 14021).

Regularly occupied spaces include living room, bedroom, dining room, study room, kitchen etc.

Sewage Treatment: It is a process of removing contaminants from wastewater and house-hold sewage. Its objective is to produce an environmentally safe fluid waste stream suitable for disposal or reuse using advanced technology it is possible to reuse sewage affluent for drinking water.

Sick building syndrome is a situation in which a substantial portion of building occupants experience acute discomfort and negative health effects as result of exposure to contaminated air inside the building.

Solar Reflective Index (SRI) is a measure of a material's ability to reject solar heat, as shown by a small temperature rise. It is defined so that a standard black (reflectance 0.05, emittance 0.90) is 0 and standard white (reflectance 0.80, emittance 0.90) is 100.Materials with highest SRI values are the coolest choice for paving.

Topsoil conservation: The process of removing and protecting the topsoil from any construction or development site for reusing it onsite later.

Transplantation: The process of digging up a plant / tree and moving it to another location.

U – Value: The heat transmission in unit time through unit area of a material or construction and boundary air films, induced by unit temperature difference between the environments on each side.

Vegetated area: The area in the site which has plantation or greenery on it in any form, such as shrubs, grass, trees etc.

Visible Light Transmittance (VLT): It refers to the percentage of visible light that passes through a piece of glass or glazing material.

Volatile Organic Compounds (VOCs) are carbon compounds that participate in atmospheric photochemical reactions (excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and carbonates and ammonium carbonates). The compounds vaporise (become a gas) at normal room temperatures

Walking distance is the length of the walkable pathway between the building and public transportation.

Window-to-Wall Ratio (WWR) of a building is the percentage of its facade taken up by light-transmitting glazing surfaces, including windows and translucent surfaces such as glass bricks.

Best practices for documentation

Below are guidelines that will ensure good quality of documentation that is required for the preliminary / final certification of projects. Project teams are encouraged to adopt these guidelines.

Collection of documents

- Start collecting and collating documents from the start of the project and maintain collection until the project is completed.
- Turn time stamps while taking photographs – this helps in demonstrating that best practises have been maintained over the duration of the project.
- Obtain manufacturer letters at the time of procurement. It is often difficult to obtain manufacturer letters at a later date.
- Ensure that manufacturer letters are dated and specifically refer to the project being certified. Generic manufacturer letters are often very old and no longer correct / applicable.

Submission package

- **Organizing documentation:** Create a folder for each module (Sustainable Site, Water Conservation, etc.) and a general folder for general documents that apply across modules (project drawings such as plans, elevations, sections, 3D views, etc). Under each module folder, create a sub-folder for each mandatory requirement or credit the project team wishes to pursue. Please use succinct folder, sub-folder and file names as some operating systems will not correctly handle very lengthy file and folder names.

  Examples of succinct folder and file names:
  \SS\MR1\Narrative.pdf
  \WC\MR2-CR2\Invoices\

  When the submission package is ready for submission, compress the top-level folder and all underlying files and sub-folders so that the documents can be submitted as a single file. Before submitting, open the compressed file and ensure that all files and sub-folders can be properly extracted.

- **Narratives:** It is a good practice to submit a narrative for each mandatory requirement or credit the project pursues. The narrative is typically an overarching document that describes the implementation approach taken by the project. It also provides specific information such as which options under a credit the project is availing and lists the supporting documents being submitted.

- **Consistency across documents:** Ensure consistency of calculated values, product names, etc. across the various documents being submitted. If using the Master Template provided by IGBC, ensure consistency between the template and other documents being submitted. When submitting data sheets and purchase invoices for specific products / systems, please ensure that the same brand and model names are use across the various documents.

- **Completeness of documents:** This guide specifies the documents required for each mandatory requirement and credit. Ensure that all required documents are provided in the submission package. It is good practise to conduct a quality check of the submission package to ensure completeness and correctness of documents before submitting to IGBC.

Case Study 1

MRG 93 is a affordable housing project in Gurugram. The project has achieved the IGBC Green Affordable Housing certification with Platinum rating.

This pictorial case study highlights some of the green features and systems implemented in this project.

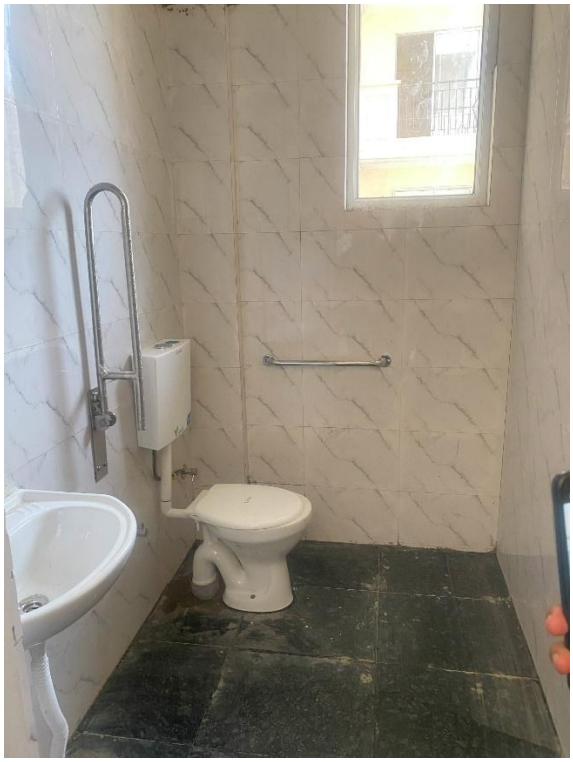
Sustainable Site

The following measures were implemented to ensure Site Sustainability:

- Access to social infrastructure: restaurant, hospital, shopping mall, fuelling station, place of worship and gym are located within 1 km
- Heat island effect mitigation – roof: high SRI coating for all exposed areas of the roof
- Heat island effect mitigation – non-roof: extensive use of grass pavers, light coloured pavers and shade from trees
- Extensive green cover on site consisting of native, drought tolerant plant species
- Several measures implemented to facilitate universal access: reserved parking for disabled persons, specially designed toilets in common areas, ramps with handrails, elevators with audio assistance
- Parking as per local bye laws
- Green education and awareness initiatives undertaken

Heat Island mitigation – non-roof

Heat Island mitigation – roof



Facilities for universal access – ramp with handrail, specially equipped toilets

Water Conservation - following measures have been implemented to conserve water:

- Water efficient low flow fixtures installed to minimize water use
- Rainwater harvesting system to harvest roof as well as non-roof runoff
- 100% of wastewater is treated on site and reuse for landscape watering
- Water efficient irrigation system

Dual flush water closets

Rainwater harvesting pits

Drip irrigation system

Wastewater treatment system

Energy Conservation - following measures have been implemented to conserve energy:

- Adequate shading provided for windows and balconies
- Energy efficient lighting inside dwelling units, common areas and exterior spaces
- Solar PV renewable energy system that powers 75% of common area lighting

Shading for windows and balconies

Energy efficient lighting

Rooftop solar photovoltaic renewable energy system for common area lighting

Material Conservation - following measures have been implemented to conserve materials and resources:

- Segregated collection and processing of waste implemented
- Organic Waste Management: 100% of the organic waste generated in the building is composted on site
- Extensive use of local and low energy materials

Organic waste composting

Segregated collection of recyclable waste

Indoor Environment Quality

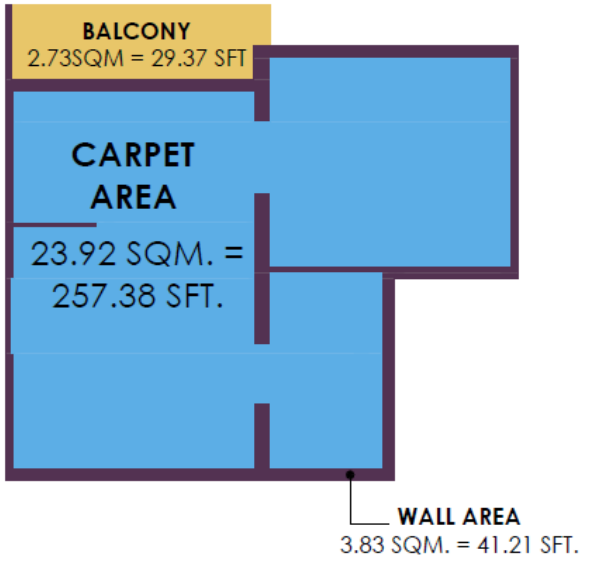
- Tobacco smoke control implemented
- Daylighting: Abundant natural light in all living spaces
- Fresh Air Ventilation: Enhanced ventilation in all spaces
- Facilities for occupant well-being

Abundant daylight and ventilation

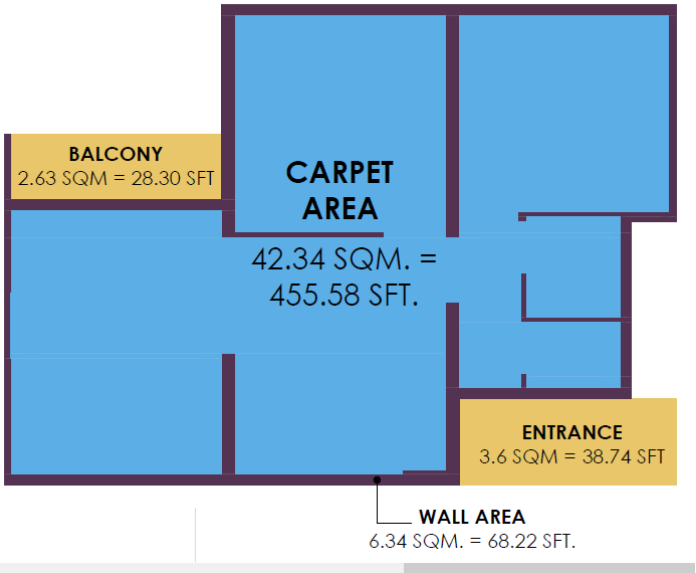
Exhaust systems in bathrooms

Case Study 2

Mahindra Happinest is an affordable housing project in Avadi, Chennai. The project consists of 604 dwelling units (1 and 2 BHK) on a site area of 3.5 acres. Mahindra Happinest has achieved the IGBC Green Affordable Housing certification with Platinum rating.



Floor plan - 1 BHK unit



Floor plan - 2 BHK unit

Sustainable Site

The following measures were implemented to ensure Site Sustainability:

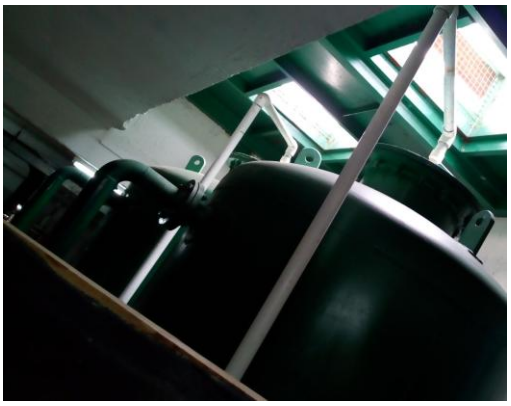
- Access to public transportation: nearest public bus stop is 650m from the entrance
- Access to social infrastructure: pharmacy, pre-school, provision stores, ATM, playgrounds, milk booth and wedding hall / convention centre are located within 1 km
- Covered car parking provided for residents as per bye laws
- 15% of site area dedicated to vegetation
- Green awareness initiatives undertaken

Green Awareness Initiatives

Water Conservation - following measures have been implemented to conserve water:

- Potable water: Water Treatment Plant provides good quality potable water
- Water efficient low flow fixtures installed
- Rainwater harvesting system consisting of a large well and 6 percolation pits
- 100% of wastewater is treated on site and reuse for landscape watering
- Water meters provided to monitor various sources of water consumption

Rainwater harvesting well on campus



Sewage Treatment Plant on campus

Water treatment plant on campus

Water metering

Energy Conservation - following measures have been implemented to conserve energy:

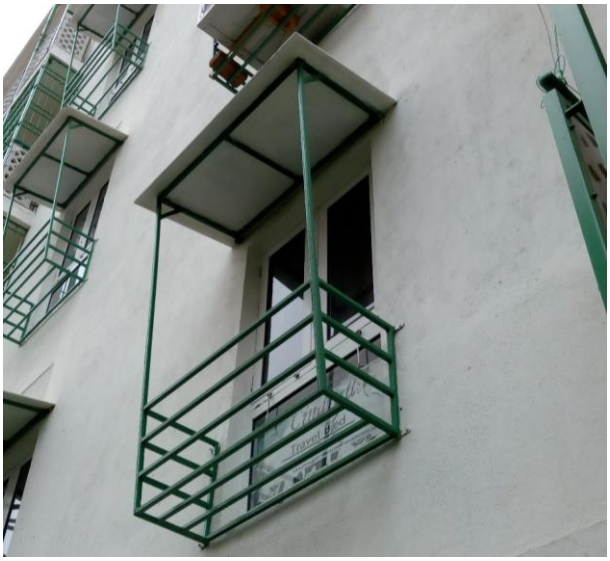
- Efficient energy envelope: exterior walls made of insulating CLC blocks
- Adequate shading provided for windows and balconies
- Solar lights provided for exterior lighting

Material Conservation - following measures have been implemented to conserve materials and resources:

- Segregated collection and processing of waste implemented
- Organic Waste Management: 100% of the organic waste generated in the building is composted on site
- Extensive use of local and low energy materials

Indoor Environment Quality

- Tobacco smoke control implemented
- Daylighting: Abundant natural light in all living spaces
- Fresh Air Ventilation: Enhanced ventilation in all spaces
- Low VOC interior finishes



Shading for windows

Organic Waste Composter (800 kg per day)

Abundant natural light and ventilation

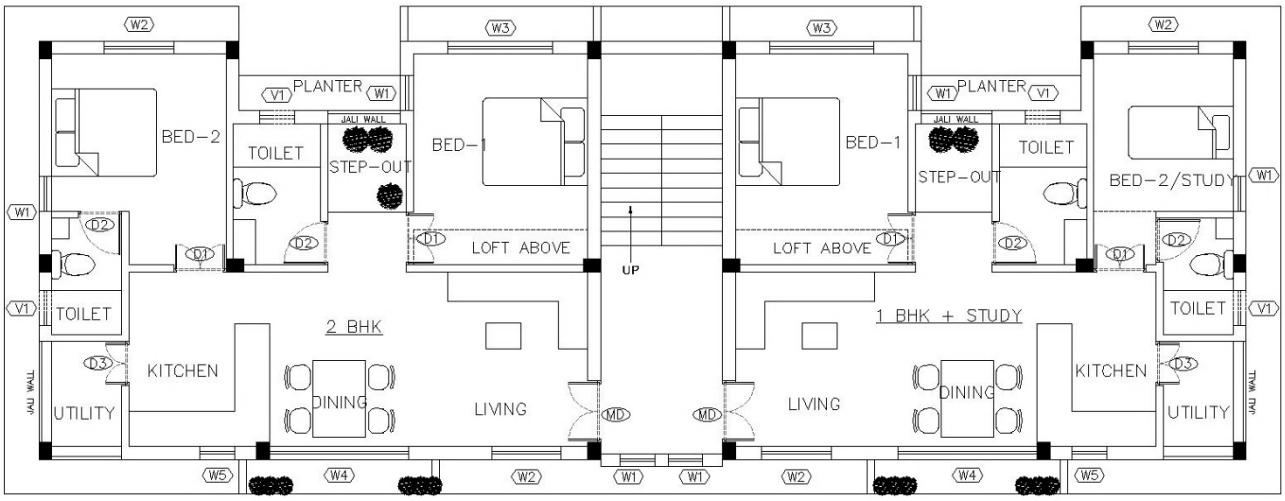
Case Study 3

The Staff Housing for a day school in Chennai consists of one building with six apartments which provides affordable housing to young teachers who live on campus. The building was designed to be environmentally sustainable and was constructed in 2023.

Entrance and front façade

Rear façade

The 6 apartments consist of two types: 2 BHK and 1 BHK + Study as shown in the floor plan below.



The staff housing is part of a green school campus that has been certified by the Indian Green Building Council. This building has been designed and constructed to be an environmentally sensitive building. The following pages highlight the key green features of this building.

Sustainable Site

The following measures were implemented to ensure Site Sustainability:

- Access to public transportation: nearest public bus stop is 750m from the building
- Soil erosion control: topsoil preserved and reused for landscaping; site barricading and various other pollution control measures implemented; post-occupancy: 100% of exposed site area vegetated; RWH
- Access to social infrastructure: post office, school, provision stores, primary health centre, playgrounds, milk booth and salon located within 1 km
- Area with green cover exceeds 50% of site area.
- Heat Island Effect Non-roof: minimal hardscape on site which consists of a pathway with light grey stone
- Heat Island Effect Roof: 100% of the exposed roof is covered with a high SRI coating

Green cover on site; heat island effect non-roof

Heat island effect roof – high SRI coating

Site barricading during construction; preservation of existing trees

Minimal hardscape

Water Conservation - following measures have been implemented to conserve water:

- Potable water: is provided to all apartments via an overhead water tank of capacity of 4,500 litres

- Rainwater harvesting
    - Roof runoff is filtered via rainwater filters and is stored in an underground sump for reuse
    - Ground runoff is percolated into the ground via 4 percolation pits
- Water use reduction
    - Dual flush water closets
    - All flow fixtures procured with aerators
- Waste water treatment and reuse
    - All black water generated on site (wastewater from toilets) is treated via biodigesters
    - All grey water (wastewater from showers, wash basins, sinks) is treated using a DEWATS system that uses natural filtration and phytoremediation processes to treat the wastewater
    - Treated wastewater is reused for landscape watering
- Landscape consisting of existing native trees, native shrubs and naturally growing native grass

Rainwater harvesting filters

Dual flush water closets and flow fixtures with aerators

Bio-digesters for treatment of black water

DEWATS treatment of grey water

Energy Conservation - following measures have been implemented to conserve energy:

- Efficient energy envelope: exterior walls made of insulating hollow terracotta blocks; high windows with ventilators on top for deep penetration of natural light and exhaust for hot air

- Shading: slab overhangs at every floor act as sunshades for the windows below
- Renewable energy: 6 KWp of rooftop solar photovoltaic energy system offsets 100% of the common area lighting and as well as 100% of the energy use for fans and lights inside dwelling units.
- Energy efficient lighting: only LED lights have been installed inside dwelling units, in common areas and for exterior lighting
- Energy efficient appliances: energy efficient BLDC fans and BEE 3 Star rated water heaters installed in dwelling units; automatic level controllers have been installed for operating the overhead water tank

Exterior walls made of insulating blocks; slab overhangs which act as sunshades

6 KWp rooftop SPV system

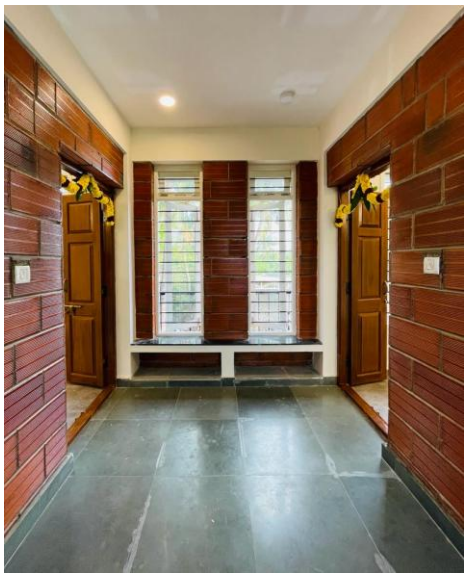
LED lights & BLDC fans; high ventilators

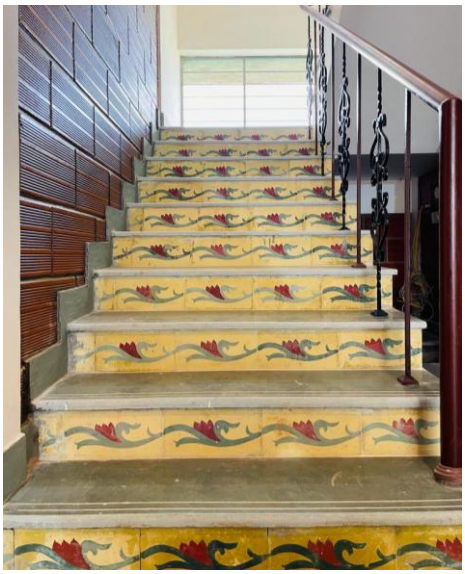
Material Conservation - following measures have been implemented to conserve materials and resources:

- Segregated collection and processing of waste implemented throughout the school campus
- Organic Waste Management: 100% of the organic waste generated in the building is composted on site.

- Extensive use of local materials: over 75% of total material cost
- Extensive use of low-energy / natural materials: flooring consists of handmade natural stone and handmade Athangudi tiles
- Reuse of salvaged doors (100% of doors); use of salvaged wood for 100% of windows
- Unplastered exterior and common area walls to reduce use of cement

Organic composter on site


Natural stone flooring

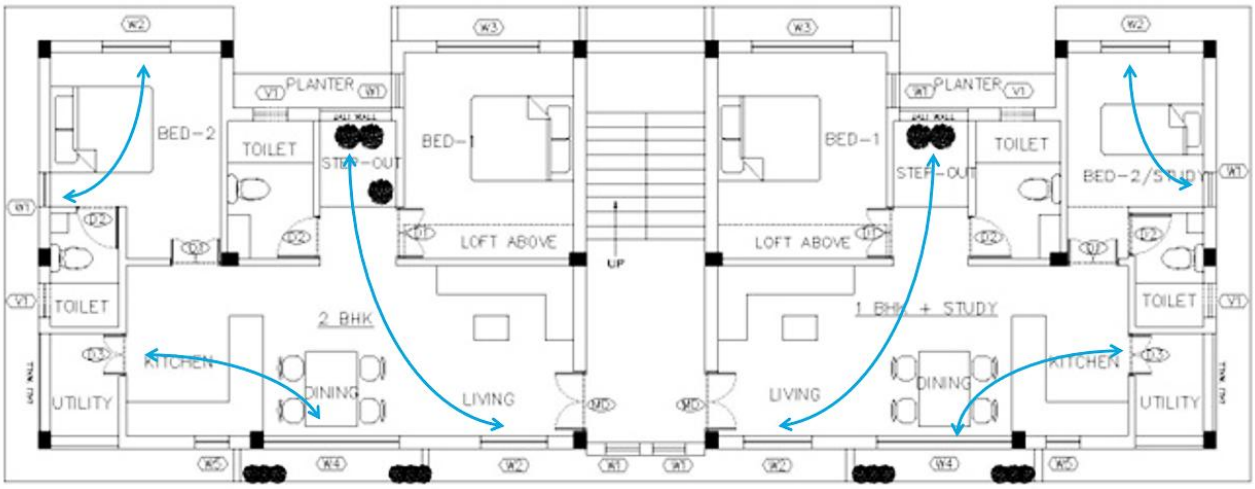

Handmade Athangudi tile flooring


Salvaged doors and windows made using salvaged wood recovered from demolition of old buildings

Indoor Environment Quality

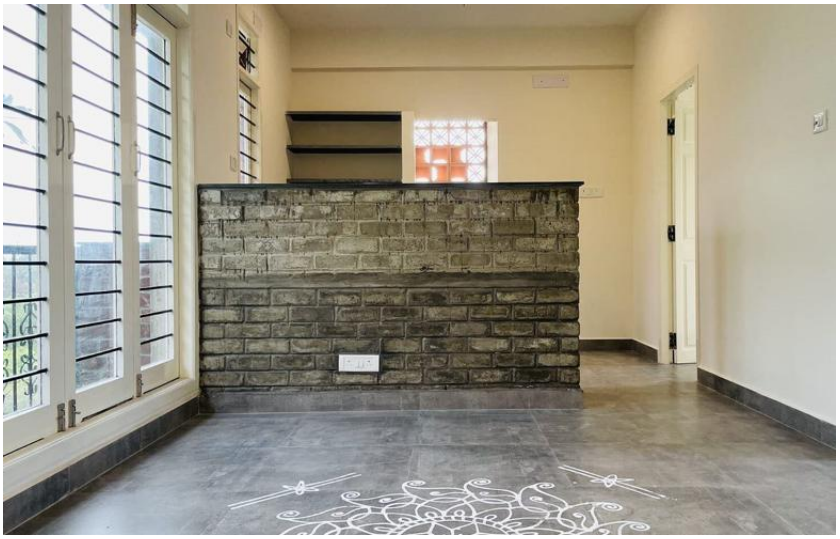
- Daylighting: 100% of the regularly occupied spaces have access to adequate natural light; windows that extend up to the beam bottom bring natural light deep into all living spaces
- Fresh Air Ventilation: 100% of the spaces comply with the requirements of enhanced ventilation

- Cross Ventilation: 75% of the regularly occupied spaces in dwelling units have cross ventilation
- Exhaust systems: exhaust fans have been provided inside bathrooms
- Low VOC water-based emulsion paints used for all interior and exterior surfaces



Cross ventilation available for 75% of the living spaces inside dwelling units

Well-ventilated bathrooms



Abundant natural light and cross ventilation in living spaces

Notes

Confederation of Indian Industry

IGBC

About CII (Confederation of Indian Industry)

The Confederation of Indian Industry (CII) works to create and sustain an environment conducive to the development of India, partnering industry, Government, and civil society through working closely with Government on policy issues, interfacing with thought leaders, and enhancing efficiency, competitiveness and business opportunities for industry.
Founded in 1895 and celebrating 125 years in 2020, India's premier business association has more than 9,100 members, from the private as well as public sectors, and an indirect membership of over 300,000 enterprises from around 291 national and regional sectoral industry bodies.
With 62 offices, including 10 Centres of Excellence, in India, and 8 overseas offices in Australia, Egypt, Germany, Indonesia, Singapore, UAE, UK, and USA, as well as institutional partnerships with 350 counterpart organizations in 133 countries, CII serves as a reference point for Indian industry and the international business community.

About IGBC (Indian Green Building Council)

The Indian Green Building Council (IGBC), part of the Confederation of Indian Industry (CII) was formed in the year 2001. The vision of the council is, "To enable a sustainable built environment for all and facilitate India to be one of the global leaders in the sustainable built environment by 2025".
The council offers a wide array of services which include developing new green building rating programmes, certification services and green building training programmes. The council also organises Green Building Congress, its annual flagship event on green buildings.
The council is committee-based, member-driven and consensus-focused. All the stakeholders of construction industry comprising of architects, developers, product manufacturers, corporate, Government, academia and nodal agencies participate in the council activities through local chapters. The council also closely works with several State Governments, Central Government, World Green Building Council, bilateral multi-lateral agencies in promoting green building concepts in the country.

Confederation of Indian Industry

CII - Sohrabji Godrej Green Business Centre

Indian Green Building Council

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