

# Green building guide

[Health & Medicine](#), [Beauty](#)



® IGBC Green Homes ® IGBC Green Homes Rating System Ver 1. 0 Abridged Reference Guide April 2009 Confederation of Indian Industry CII-Sohrabji Godrej Green Business Centre ® IGBC Green Homes ® IGBC Green Homes Rating System Ver 1. 0 Abridged Reference Guide April 2009 Confederation of Indian Industry CII-Sohrabji Godrej Green Business Centre Copyright Copyright © 2008 by the Indian Green Building Council. All rights reserved. The Indian Green Building Council (IGBC) authorises you to view the IGBC Green Homes Version 1. Abridged Reference Guide for your individual use. You agree not to sell or modify the IGBC Green Homes Reference Guide or to reproduce, display or distribute IGBC Green Homes Reference Guide in any way for any public or commercial purpose, including display on a website or in a networked environment. Unauthorised use of the IGBC Green Homes Abridged Reference Guide violates copyright, trademark and other laws and is prohibited. Note that the National and local codes, norms, etc. , used in the IGBC Green Homes Reference Guide are in the public domain.

All other content in the IGBC Green Homes Reference Guide are owned by the Indian Green Building Council and are protected by copyright. Disclaimer None of the parties involved in developing the IGBC Green Homes Version 1. 0 Abridged Reference Guide, including the Indian Green Building Council assume any liability or responsibility, to the user or any third parties for any injuries, losses or damages arising out of such use. Indian Green Building Council C/o Confederation of Indian Industry CII – Sohrabji Godrej Green Business Centre Survey No. 64, Kothaguda Post Near Kothaguda Cross Roads, R R Dist Hyderabad – 500 032 2

**Acknowledgements** The IGBC Green Homes Abridged Reference Guide has been made possible through the efforts of many dedicated volunteers, staff members and others in the IGBC community. The Reference Guide was developed by the IGBC Green Homes Core Committee and many other members. We extend our deepest gratitude to all these members. Tremendous inputs also came in at the ‘ IGBC Green Homes’ launch on 02 May 2008, which had an overwhelming response from stakeholders all over the country. IGBC places on record its sincere thanks to the participating companies and individuals who enthusiastically volunteered during the break-out sessions.

Our special thanks to the following members for their participation and contributions in developing the rating programme: • Mr Sharukh Mistry, Chairman, IGBC - Green Homes Steering Committee & Director, Mistry Architects, Bangalore • • • • • • • • • • Dr Prem C Jain, Chairman, Indian Green Building Council & Chairman and Managing Director, Spectral Services Consultants Private Limited, Noida Mr Sanjay Seth, Energy Economist, Bureau of Energy of Efficiency, New Delhi Mr V Madhwa Raja, Superintending Engineer, HMDA, Hyderabad Mr Arjun Valluri,

Chairman, Surya Ray, Hyderabad Mr Ankoor Sanghvi, Architect, Ankoor Sanghvi Architects, Rajkot Dr Archana Walia, Programme Management Specialist, USAID, New Delhi Mr Chandrashekar Hariharan, CEO, Biodiversity Conservation [India] Limited, Bangalore Mr C. N. Raghavendran, Chairman, IGBC-Chennai Chapter & Partner, CRN Architects & Engineers, Chennai Mr C Shekar Reddy, President, Builders Forum, Hyderabad Mr Gerard Da Cunha,

Proprietor, Architecture Autonomous, Goa Mr H N Daruwalla, Vice President, Godrej & Boyce Mfg.

Co. Ltd. , Mumbai Mr Jaffer A A Khan, Principal Architect, JDS Architects, Bangalore Mr Jahangir Yar Khan, General Manager-Projects, Shree Ram Urban Infrastructure Ltd, Mumbai • • Dr Jyotirmay Mathur, Reader, Malaviya National Institute of Technology, Jaipur Mr K K Bhattacharya, Sr. Executive Director, DLF Utilities Pvt Ltd, Gurgaon 3 • • • • • • • • • Mr K P Raghavan, Vice President & Head - Buildings & Factories Sector, Larsen & Toubro Ltd. Chennai Mr K R Gopinath, Chairman, KRG Rainwater Foundation, Chennai Ms Meenu Garg, Consultant, Hyderabad Mr Pawan Malhotra, Managing Director, Mahindra Lifespace Developers Ltd, Mumbai Mr Rajan Rawal, Professor, CEPT University, Ahmedabad Mr Rajan Venkateswaran, Chief Architect, Larsen & Toubro Ltd, Chennai Mr Rumi P Engineer, Dy. General Manager, Godrej & Boyce Mfg. Co.

Ltd, Mumbai Mr R Sri Kumar, Additional Director General of Police, Chairman and Managing Director, Karnataka State Police Housing Corporation Limited, Bangalore Mr Sanjay Chawla, Chairman, IGBC - Hyderabad Chapter, Business Head (Commercial and SEZ), Maytas Properties Ltd, Hyderabad Ms Suhasini Ayer, Architect, Auroville Design Consultants, Pondicherry Mr Vidur Bharadwaj, Chairman, IGBC - Delhi Chapter & Managing Partner, Design & Development Consultants, New Delhi Dr Vishal Garg, Associate Professor, Centre for IT in Building Science, International Institute of Information Technology, Hyderabad Mr Zubin Irani, Managing Director, Carrier Airconditioning & Refrigeration Limited, Gurgaon • • • • 4

Our sincere thanks are due to the following organisations for their participation in the programme:

- Adapt Technologies & Consultancy Services India Pvt Ltd, Hyderabad
- ADC KRONE , Bangalore
- Advance Cooling Towers Pvt Ltd, Mumbai
- AFRA Consultancy, Hyderabad
- Ala Inc, Chennai
- Aliens Developers Private Limited, Hyderabad
- Altimate Envirocare Asia Pvt Ltd, Mumbai
- Aluplast India Pvt. Ltd, New Delhi
- Ankoor Sanghvi Architects, Rajkot
- Armstrong World Ind. India Pvt Ltd , Bangalore
- Architecture Autonomous, Goa
- Architect Hafeez Contractor, Mumbai
- Asahi India Glass Limited (AIS), Hyderabad
- Auroville Design Consultants, Pondicherry
- BambooFinance, Switzerland
- Blue Run Ventures, New Delhi
- Blue Star Limited, Hyderabad
- Brigade Group, Bangalore
- Buhari Holdings Private Limited, Chennai
- Bureau of Energy Efficiency, New Delhi
- Conserve Consultants Pvt.

- Ltd, Chennai
- Carrier Airconditioning & Refrigeration Limited, Gurgaon
- CEPT University, Ahmedabad
- CRN Architects & Engineers, Chennai
- CSR Estates, Hyderabad
- Design & Development Consultants, New Delhi
- DLF Services Limited, Gurgaon
- DLF Utilities Pvt Ltd, Gurgaon
- Dow Chemical International Pvt Ltd, Mumbai
- DSL Infrastructure & Space Developers, Hyderabad
- Dynacraft Air Controls , Mumbai
- Emaar MGF Land Limited, New Delhi
- EN3 Consulting, Chennai
- KRG Rainwater Foundation, Chennai
- KRVIA, Mumbai
- L&T Infocity Limited, Hyderabad
- Larsen & Toubro Limited, Chennai
- Lodha Group of Companies, Mumbai
- Mahindra Lifespace Developers Ltd, Mumbai
- Maithel & Associates Architects Pvt.

- Ltd, Jaipur
- Malaviya National Institute of Technology, Jaipur
- Manasaram Architects, Bangalore
- Master Consultancy & Productivity Pvt Ltd,

Hyderabad • Maxvel Technologies Pvt Ltd, Mumbai • Maytas Properties Ltd, Hyderabad • Mistry Architects, Bangalore • Mozaic Design Combine, Goa • Nippon Paint (India) Pvt Ltd, Hyderabad • Oceanus Infrastructure (P) Ltd, Bangalore • Olympia Tech Park, Chennai • Orbit Group, Kolkata • Owens Corning Enterprise (India) Pvt Ltd, Mumbai • Parsvnath Developers Ltd, New Delhi • Potential Service Consultants (P) Ltd, Bangalore • Prasad Escendo Consultancy, Hyderabad • Rajarathnam Constructions (P) Ltd, Chennai • Rajco Metal Industries Pvt Ltd, Mumbai • RITES Ltd, Gurgaon • Roads and Buildings Dept. , Govt. , AP, Hyderabad • S V Properties, Hyderabad • S&S Constructions (India) Pvt. Ltd, Hyderabad • Sai Construction Corporation, Hyderabad • Saint - Gobain Glass India Ltd, Chennai • Sangam Project Consultants, Mumbai • Satya Vani Project & Consultants Pvt. Ltd, Hyderabad • Schneider Electric India Pvt. Ltd, New Delhi • 5 Energy Conservation Mission, Hyderabad • Everest Industries Ltd, Gopalapuram Tamilnadu • ETA Engineering Private Limited, Hyderabad • Eximcorp India Pvt Ltd, New Delhi • Federation of Engineering Institutions of South and Central Asia, Hyderabad • Forbo Flooring India, New Delhi • Forum (FBH), Hyderabad • Genesis Planner (Pvt) Ltd, Mumbai • Gherzi Eastern Limited, Mumbai • Ghosh, Bose & Associates, Kolkata • GMR Hyderabad Intl. Ltd, Hyderabad • Godrej & Boyce Mfg. Co. Ltd, Mumbai • Godrej Properties, Mumbai • Greentech Knowledge Solutions (P) Ltd, New Delhi • Green Tek Indika (GTI), Hyderabad • Hindustan Aeronautics Ltd, Hyderabad • Honeywell, Chennai • Indu Projects Limited, Hyderabad • Infinity Infotech Parks Ltd, Kolkata • Infinity Township Pvt.

Ltd, Hyderabad • Infosys BPO Limited, Bangalore • Interface Flor India Pvt Ltd, Hyderabad • International Institute of Information Technology, Hyderabad • JDS Architects, Bangalore • Johnson Controls, Mumbai • Jones Lang LaSalle Meghraj, Gurgaon • Kalpataru Ltd, Mumbai • Karnataka State Police Housing Corporation Limited, Bangalore • Khivraj Tech Park Pvt Ltd, Chennai • Kirloskar Brothers Ltd, Coimbatore • K Raheja Corp, Mumbai • Sequoia Capital India Advisors Pvt. Ltd, Bangalore • Sevcon (India) Pvt Ltd, New Delhi • SEW Constructions Ltd, Hyderabad • Shapoorji Pallonji & Company Limited, Mumbai • Shika Management Services, Hyderabad • Shilpa Architects, Chennai • SMR Builders Pvt Ltd, Hyderabad • SMR Live Spaces, Hyderabad • Shree Ram Urban Infrastructure Ltd, Mumbai • Spectral Services Consultants Private Limited, Noida • Srinivasa Shipping & Property Development Ltd, Chennai • Studio Decode, Bangalore • Suchirindia Developers Pvt Ltd, Hyderabad • Sukan Automatics Pvt.

Ltd, Hyderabad • Surbana International Consultants (India) Pvt Ltd, Hyderabad • Supreme Petrochem Ltd, Mumbai • Tameer Consulting Associates, Hyderabad • Tata Housing Development Co. Ltd, Bangalore • Team Labs & Consultants, Jaipur • Terra Verde Architects, Hyderabad • The Indian Institute of Architects, New Delhi • Total Environment, Bangalore • TSI Ventures, Bangalore • UNUS Architects and Interior Designers, Hyderabad • U P Twiga Fiberglass Ltd, Hyderabad • USAID, New Delhi • Vida Calma Homes Private Limited, Goa • Virtuoso Consultants, Hyderabad • Voltas Limited, Hyderabad • V Raheja Design Construction, Bangalore

6 ® Contents  
Foreword from Indian Green Building Council IGBC Green Homes 9 10 11 11  
12 14 17 18

Introduction Benefits of Green Homes National Priorities addressed in the Rating system IGBC Green Home Rating System IGBC Green Home Process Updates and Addenda Green Homes Project Checklist Site Selection and Planning Mandatory Requirement 1 Mandatory Requirement 2 Site Credit 1. 0 Site Credit 2. 0 Site Credit 3. 0 Site Credit 4. 0 Site Credit 5. 0 Site Credit 6. 0 Site Credit 7. 0 Water Efficiency Mandatory Requirement 1 Mandatory Requirement 2 Water Credit 1. 0 Water Credit 2. 0 Water Credit 3. 0 Water Credit 4. 0 Water Credit 5. 0 Water Credit 6. 0 Water Credit 7. 0 Water Credit 8. 0 Water Credit 9. 0 Energy Efficiency Mandatory Requirement 1 Mandatory Requirement 2 Energy Credit 1. 0 Energy Credit 2. 0 Energy Credit 3. 0 Energy Credit 4. 0 Energy Credit 5. 0 Energy Credit 6. Energy Credit 7. 0 Energy Credit 8. 0 CFC-Free Equipment Minimum Energy Performance Energy Performance Energy Metering Refrigerators Solar Water Heating Systems : 50%, 75%, 95% Captive power Generation Onsite Renewable Energy : 2. 5%, 5. 0%, 7. 5%, 10% Efficient Luminaries & Lighting Power Density: 20% Energy Saving Measures in other Appliances & Equipment 7 Local Regulations Soil Erosion Basic Amenities Natural Topography or Landscape : 15%, 20% Heat Island Effect – Roof : 50%, 75% Parking Facilities for Visitors Electric Charging Facility for Vehicles Design for Differently Abled Green Home Guidelines – Design & Post Occupancy 21 22 23 25 26 27 28 29 30

Rainwater Harvesting, 50% Water Efficient Fixtures Turf Design : 20%, 40% Drought Tolerant Species : 25% Management of Irrigation Systems Rainwater Harvesting, 75%, 95% Grey Water Treatment : 50%, 75%, 95% Treated Grey Water for Landscaping : 50%, 75%, 95% Treated Grey Water for Flushing :



50%, 75%, 95% Water Efficient Fixtures : 20%, 30% Water Metering 32 33 34  
 35 36 37 39 41 43 45 47 49 50 51 57 58 59 60 61 62 64 Materials Mandatory  
 Requirement 1 Materials Credit 1. 0 Materials Credit 2. 0 Materials Credit 3. 0  
 Materials Credit 4. 0 Materials Credit 5. 0 Materials Credit 6. 0 Materials  
 Credit 7. 0 Separation of Wastes Waste Reduction during Construction : 75%  
 Organic Waste Management, Post Occupancy : 50%, 95% Materials with  
 Recycled Content : 10%, 20% Rapidly Renewable Materials : 2. 5%, 5% Local  
 Materials : 50%, 75% Reuse of Salvaged Materials : 2. 5%, 5% Certified Wood  
 Based Materials and Furniture: 50%, 75% 66 67 68 69 70 71 72 73

Indoor Environmental Quality Mandatory Requirement 1 Mandatory  
 Requirement 2 Mandatory Requirement 3 IEQ Credit 1. 0 IEQ Credit 2. 0 IEQ  
 Credit 3. 0 IEQ Credit 4. 0 IEQ Credit 5. 0 IEQ Credit 6. 0 IEQ Credit 7. 0  
 Innovation and Design Process INN Credit 1. 1 INN Credit 1. 2 INN Credit 1. 3  
 INN Credit 2. 0 Annexure Abbreviations Innovation and Design Process  
 Innovation and Design process Innovation and Design Process IGBC AP 91 91  
 91 92 93 103 Tobacco Smoke Control Daylighting : 50% Fresh Air Ventilation  
 Exhaust Systems Enhanced Fresh Air Ventilation : 30% Low VOC Materials  
 Carpets : 5% Building Flush Out Daylighting : 75%, 85%, 95% Cross  
 Ventilation 75 76 78 80 81 83 85 86 87 89 8

Foreword from the IGBC India is witnessing tremendous growth in  
 infrastructure and construction development. The construction industry in  
 India is one of the largest economic activities and is growing at an average  
 rate of 9. 5% as compared to the global average of 5%. As the sector is  
 growing rapidly, preserving the environment poses a host of challenges. To  
 enable the construction industry to be environmentally sensitive, CII-Sohrabji

Godrej Green Business Centre has established the Indian Green Building Council (IGBC). IGBC is a consensus driven not-forprofit council representing the building industry, consisting of more than 500 committed members.

The council encourages builders, developers and owners to build green to enhance the economic and environmental performance of buildings. The Green Building Movement in India has been spearheaded by IGBC since 2001, by creating national awareness. The council's activities have enabled a market transformation with regard to Green Building concepts, materials and technologies. IGBC continuously works to provide tools that facilitate the adoption of green building practices in India. The development of IGBC Green Homes Rating System is another important step in this direction. IGBC Membership IGBC draws its strength from its members who have been partners in facilitating the Green Building Movement in India.

The local chapters led by individual champions and committed members have been instrumental in reaching out the vision of the IGBC at the regional levels. IGBC is today seen as a leader in spearheading the Indian green building movement. The council is member driven and consensus based.

Contact : Indian Green Building Council C/o Confederation of Indian Industry  
CII – Sohrabji Godrej Green Business Centre Survey No. 64, Kothaguda Post  
Near Kothaguda Cross Roads, R R District Hyderabad – 500 032, India Ph:  
+91 40 23112971-74 Fax : +91 40 23112837 Email:[email protected]in Web:  
www. igbc. in

9 I. Introduction The housing sector in India is growing at a rapid pace and contributing immensely to the growth of the economy.

This augurs well for the country and now there is an imminent need to introduce green concepts and techniques in this sector, which can aid growth

in a sustainable manner. Green concepts and techniques in the residential sector can help address national issues like handling of consumer waste, water efficiency, reduction in fossil fuel use in commuting, energy efficiency and conserving natural resources. Most importantly, these concepts can enhance occupant health, happiness and wellbeing. Against this background, Indian Green Building Council (IGBC) has launched 'IGBC Green Homes Rating System' to address the national priorities. By applying IGBC Green Homes criteria, homes which are sustainable over the life cycle of the building can be constructed.

This rating programme is a tool which enables the designer to apply green concepts and criteria, so as to reduce the environmental impacts, which are measurable. The programme covers methodologies to cover diverse climatic zones and changing lifestyles. IGBC Green Homes is the first rating programme developed in India, exclusively for the residential sector. It is based on accepted energy and environmental principles and strikes a balance between known established practices and emerging concepts. The system is designed to be comprehensive in scope, yet simple in operation. IGBC has set up the Green Homes Core Committee to develop the rating programme. This committee comprised of key stakeholders including architects, developers, home owners, manufacturers, institutions and industry representatives.

The committee, with a diverse background and knowledge has enriched the rating system both in its content and process.

## 10 II. Benefits of Green Homes

Green homes can have tremendous benefits, both tangible and intangible. The most tangible benefits are the reduction in water and energy

consumption right from day one of occupancy. The energy savings could range from 20 – 30 % and water savings around 30 – 50%. Intangible benefits of Green homes include enhanced air quality, excellent daylighting, health & wellbeing of the occupants, safety benefits and conservation of scarce national resources. Green Homes rating system can also enhance marketability of a project. III.

**National Priorities Addressed in the Rating System** The Green Homes Rating System addresses the most important National priorities which include water conservation, handling of consumer waste, energy conservation, conservation of resources like wood and lesser dependence on usage of virgin materials. **Water Efficiency:** Most of the Asian countries are water stressed and in countries like India the water table has reduced drastically over the last decade. Green Homes encourages use of water in a self - sustainable manner through reducing, recycling and reusing strategies. By adopting this rating programme green homes can save potable water to an extent of 30 – 50%.

**Handling of House -hold Waste:** Handling of waste in residential buildings is extremely difficult as most of the waste generated is not segregated at source and has a high probability of going to land fills. This continues to be a challenge to the municipalities which needs to be addressed. IGBC intends to address this by encouraging green homes to segregate the house hold waste. **Energy Efficiency:** The residential sector is a large consumer of electrical energy. IGBC Green Homes can reduce energy consumption through energy efficient lighting, air conditioning systems, motors, pumps etc. , The rating system encourages green homes which select and use BEE

labeled equipment and appliances. The energy savings that can be realised by adopting this rating programme can be to the tune of 20 – 30%.

**Reduced Use of Fossil Fuels:** Fossil fuel is a slowly depleting resource, world over. The use of fossil fuel for transportation has been a major source of pollution. The rating system encourages the use of alternate fuels for transportation and captive power generation.

**Reduced Dependency on Virgin Materials:** The rating system encourages projects to use recycled & reused material and discourages the use of virgin wood thereby addressing environmental impacts associated with extraction and processing of virgin materials. Reduced usage of virgin wood is also encouraged.

**11 Health and Well-being of Occupants:** Health and well-being of occupants is the most important aspect of Green Homes.

IGBC Green Homes Rating System ensures minimum performance of daylighting and ventilation aspects which are critical in a home. The rating system recognises measures to minimise the indoor air pollutants.

**IV. IGBC Green Homes Rating System** IGBC has set up the Green Homes Core Committee to focus on residential sector. The committee includes architects, realtors, experts on building science and industry representatives. The varied experience and professions of the committee members brings in a holistic perspective in the process of developing the rating programme.

**A. Evolution of the Rating System** IGBC, in its endeavor to extend green building concepts to all building types envisioned a rating programme for homes in December 2007.

A core committee was formed under the leadership of Ar Sharukh Mistry, Mistry Architects, Bangalore. The committee drafted the pilot version of the

<https://assignbuster.com/green-building-guide/>

programme which was launched in May 2008. The rating system is designed to suit Indian climate and construction practices. About 220 members representing 120 organisations participated in the pilot programme. 52 projects with 41.5 million sq. ft of building footprint area from various climatic zones registered under the pilot rating programme. After one year of implementation, feedback from pilot projects were reviewed by the core committee and the suggestions have been incorporated in the final rating system launched in March 2009. The rating system will be subjected to a review by the core committee, every 6 months, to ensure that it is updated and contemporary.

**B. Features of IGBC Green Homes**

IGBC Green Homes Rating System is a voluntary and consensus based programme. The rating system has been developed based on materials and technologies that are presently available. The objective of IGBC Green Homes is to facilitate the creation of energy efficient, water efficient, healthy, comfortable and environmentally friendly houses. The rating system evaluates certain credit points using a prescriptive approach and other credits on a performance based approach. The rating system is evolved so as to be comprehensive and at the same time user-friendly.

The programme is fundamentally designed to address national priorities and quality of life for occupants.

12 The rating programme uses well accepted national standards and wherever local or national standards are not available, appropriate international benchmarks have been considered.

**C. Scope of IGBC Green Homes**

IGBC Green Homes Rating System is a measurement system designed for rating new residential buildings which broadly include two construction types:

1. Dwellings where interiors are part

of the project. 2. Dwellings where interiors are not part of the project  
\*Interiors include but not limited to refrigerators, internal lighting, furniture, carpets, etc.

Based on the scope of work, projects can choose any of the above options. The following categories of dwelling can apply for rating: v Individual homes v Gated communities v High rise residential apartments v Existing residential buildings v Residential buildings with major renovation v Hostels, Service apartments, Resorts, Motels and Guest houses In general all dwelling spaces which can meet the mandatory requirements and minimum points can apply. Various levels of green building certification are awarded based on the total points earned. D. The Future of IGBC Green Homes Many new green building materials, equipment and technologies are being introduced in the market.

With continuous up-gradation and introduction of new green technologies and products, it is important that the rating programme also keeps pace with current standards and technologies. Therefore, the rating programme will also undergo periodic revisions to incorporate the latest advances and changes. It is important to note that project teams applying for IGBC Green Homes should register their projects with the latest version of the rating system. During the course of implementation, projects have an option to transit to the latest version of the rating system. IGBC will highlight new developments on its website on a continuous basis at [www.igbc.in](http://www.igbc.in) 13 V. IGBC Green Homes Process The guidelines detailed under each credit enable the design and construction of green homes of all sizes and types.

IGBC Green Homes addresses green features under the following categories:  
v Site Selection and Planning v Water Efficiency v v v v Energy Efficiency

<https://assignbuster.com/green-building-guide/>

Materials Indoor Environmental Quality Innovation & Design Process Different levels of green building certification are awarded based on the total credits earned. However, every Green Home should meet certain mandatory requirements, which are non-negotiable. The various levels of rating awarded are: v ' Certified' to recognise best practices v ' Silver' to recognise outstanding performance v ' Gold' to recognise national excellence v ' Platinum' to recognise global leadership a. When to use IGBC Green Homes IGBC Green Homes is designed primarily for new residential buildings.

However, it is also applicable for existing buildings redesigned in accordance with the IGBC Green Homes criteria. The project team can evaluate all the possible points to apply under the rating system using a suitable checklist. The project can apply for IGBC Green Homes certification if it can meet all mandatory requirements and achieve the minimum required points. b. IGBC Green Homes Registration Project teams interested in IGBC Green Homes Certification for their project must first register with IGBC. Projects can be registered on IGBC website ([www.igbc.in](http://www.igbc.in)) under ' IGBC Green Homes'. 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. Consult the web site for important details about IGBC Green Homes application as well as the certification review process, schedule and fee. 14 c. IGBC Green Homes Certification Levels The rating system caters to projects like individual houses, apartments, motels, resorts, hostels, etc. , Amongst the different



types, projects are broadly classified into two categories: v Projects where interiors are part of scope of work v Projects where interiors are not part of the scope of work Interiors include but not limited to materials like interior finishes & furniture and appliances like refrigerators, fans, lights etc. As a general guideline, individual owners can use the checklist ‘ Projects with Interiors’ and developers & builders can use the checklist titled ‘ Projects without Interiors’. However, if the context varies, projects can adopt the one which is the closest fit. The threshold criteria for certification levels are as under:

Certification Level	Certified	Silver	Gold	Platinum	Points for projects with interiors	Points for projects without interiors
	32	39	40	47	48	59
	60	80				

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

Supporting documents are those which provide specific proof of meeting the required performance level, such as, specifications, drawings (in native format only), cutsheets, manufacturer’s literature, purchase invoices and other documents. These details are mentioned in this guide, under each credit / mandatory requirement. Documentation is submitted in two phases – design submittals and construction submittals: v The design 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 would be provided within 40 working days. v The next phase involves submission of clarifications to design queries and construction document submittal.

The construction document is submitted on completion of the project. This review will also be provided within 40 working days, after which the rating is awarded. 15 It is important to note that the credits earned at the design review are only considered as anticipated and are not awarded until the final construction documents are submitted along with additional documents showing implementation of design features. If there are changes for any design credit anticipated, these changes need to be documented and resubmitted for the construction review phase. IGBC will recognise homes that achieve one of the rating levels with a formal letter of certification and a mountable plaque. e.

Precertification Projects by developers can register for 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 Green Homes 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.

Precertification gives the owner/developer a unique advantage to market the project to potential buyers. Those projects which seek precertification need to submit the following documentation: • • • • For each credit, a narrative on how the project would meet the goal Design calculations, wherever appropriate Drawings (in native format only) as appropriate Filled in

templates wherever applicable IGBC would take 40 working days to review the first set of precertification documents. On receiving the clarifications posed in the first review, IGBC would take another 40 working days to award the precertification. A certificate and a letter are provided to projects on precertification. f.

**Credit Interpretation Ruling** In some instances the design team can face certain challenges in applying or interpreting a mandatory requirement or a credit. It can also happen in cases where the project can opt to achieve the same goal through a different compliance route. To resolve this IGBC uses the process of 'Credit Interpretation Ruling' (CIR) to ensure that rulings are consistent and applicable to other projects as well. 16 The following are the steps to be followed in case the project team faces a problem:

- v Consult the Reference Guide for description of the credit goal, compliance options and calculations.
- v Review the goal of the credit or mandatory requirement and self-evaluate whether the project satisfies the goal. Review the Credit Interpretation web page for previous CIR on the relevant credit or mandatory requirement. All projects registered under IGBC Green Homes will have access to this page.
- v If a similar CIR has not been addressed or does not answer the question sufficiently, submit a credit interpretation request. Only registered projects are eligible to post CIRs. Two CIRs are answered without levying any fee and for any CIR beyond the first two CIRs, a fee is levied.

g. **Appeal** Generally credits get denied due to misinterpretation of the goal. On receipt of the final review, the project team has the option to appeal to IGBC for reassessment of denied credits or mandatory requirements.

The documentation for the mandatory requirements or credits seeking appeal may be resubmitted to IGBC along with necessary fee. IGBC will take 40 working days to review such documentation. These submissions would be reviewed by an assessor not involved in the earlier assessments. Documentation for appeals should include the following i. Documentation submitted for design submission ii. Documentation submitted for construction submission iii. Clarifications along with necessary drawings and calculations VI. Fee Certification fee details can be found on IGBC website. VII. Updates and Addenda This is the first version of IGBC Green Homes Abridged Reference Guide. As the rating system continues to improve and evolve, updates and addenda to the reference guide will be made available through the website. These additions will be incorporated in the next version of the rating system. 17 Points Available Checklist for Green Homes Site Selection and Planning Local Regulations Soil Erosion Basic Amenities Natural Topography or Landscape : 15%, 25% Heat Island Effect - Roof : 50%, 75% Parking Facilities for Visitors Electric charging Facility for Vehicles Design for Differently Abled Green Home Guidelines - Design & Post Occupancy Projects with Interiors Projects without Interiors Mandatory Requirement 1 Mandatory Requirement 2 Site Credit 1. 0 Site Credit 2. 0 Site Credit 3. 0 Site Credit 4. 0 Site Credit 5. 0 Site Credit 6. 0 Site Credit 7. 0

Required Required 1 2 2 1 1 1 NA 8 Required Required 1 2 2 1 1 1 1 9  
 Required Required 2 1 2 2 3 3 3 3 1 20 Required Required 10 1 NA 3 1 4 1 1  
 21 Mandatory Requirement 1 Mandatory Requirement 2 Water Credit 1. 0  
 Water Credit 2. 0 Water Credit 3. 0 Water Credit 4. 0 Water Credit 5. 0 Water  
 Credit 6. 0 Water Credit 7. 0 Water Credit 8. 0 Water Credit 9. 0 Water

Efficiency Rainwater Harvesting, 50% Water Efficient Fixtures Turf Design : 20%, 40% Drought Tolerant Species : 25% Management of Irrigation Systems Rainwater Harvesting : 75%, 95% Grey Water Treatment : 50%, 75%, 95% Treated Grey Water for Landscaping : 50%, 75%, 95% Treated Grey Water for

Flushing : 50%, 75%, 95% Water Efficient Fixtures : 20%, 30% Water Metering Energy Efficiency CFC Free Equipment Minimum Energy Performance Energy Performance Energy Metering Refrigerators Solar Water Heating Systems : 50%, 75%, 95% Captive Power Generation On-site Renewable Energy : 2. 5%, 5. 0%, 7. 5%, 10% Efficient luminaries & Lighting power density : 20% Energy Saving Measures in Other Appliances & Equipment Required Required 2 1 2 2 3 3 3 3 1 20 Mandatory Requirement 1 Mandatory Requirement 2 Energy Credit 1. 0 Energy Credit 2. 0 Energy Credit 3. 0 Energy Credit 4. 0 Energy Credit 5. 0 Energy Credit 6. 0 Energy Credit 7. 0 Energy Credit 8. 0 Required Required 10 1 1 3 1 4 1 1 22 18 Materials Mandatory Requirement 1 Material Credit 1. 0 Material Credit 2. 0 Material Credit 3. 0 Material Credit 4. 0 Materials Credit 5. 0 Material Credit 6. 0 Material Credit 7. Separation of Waste Waste Reduction During Construction : 75% Organic Waste Management, Post Occupancy : 50%, 95% Materials with Recycled Content : 10%, 20% Rapidly Renewable Materials : 2. 5%, 5% Local Materials : 50%, 75% Reuse of Salvaged Materials : 2. 5%, 5% Certified Wood Based Materials and Furniture : 50%, 75% Indoor Environmental Quality Tobacco Smoke Control Daylighting : 50% Fresh Air Ventilation Exhaust Systems Enhanced Fresh Air Ventilation : 30% Low VOC Materials Carpets : 5% Building Flush Out Daylighting : 75%, 85%, 95% Cross

Ventilation Innovation and Design Process Innovation and Design Process  
 Innovation and Design Process Innovation and Design Process IGBC AP Total  
 Required 1 2 2 2 2 2 2 13 Mandatory Requirement 1 Mandatory Requirement  
 2 Mandatory Requirement 3 IEQ Credit 1. IEQ Credit 2. 0 IEQ Credit 3. 0 IEQ  
 Credit 4. 0 IEQ Credit 5. 0 IEQ Credit 6. 0 IEQ Credit 7. 0 Required Required  
 Required 2 2 2 1 1 3 2 13 INN Credit 1. 1 INN Credit 1. 2 INN Credit 1. 3 INN  
 Credit 2. 0 1 1 1 1 4 80 Required 1 2 2 1 2 2 2 12 Required Required  
 Required NA 2 2 NA NA 3 2 9 1 1 1 1 4 75 IGBC Green Homes Certification  
 Levels Rating Certified Silver Gold Platinum Projects with Interiors 32 – 39 40  
 – 47 48 – 59 60 – 80 Points Projects without Interiors 30 – 36 37 – 44 45 – 55  
 56 – 75 19 SITE SELECTION AND PLANNING Site Selection and Planning 20  
 SITE SELECTION AND PLANNING Local Regulations Mandatory Requirement 1  
 Goal: Construction Submittal

To ensure that the building complies with the required statutory regulatory  
 codes. Compliance Options: The following measures need to be ensured: • •  
 Approval of the plan from the competent Government authority Fit for  
 occupancy document from the competent Government authority  
 Documentation Required: Provide an approved plan and / or fit for occupancy  
 documents obtained from the competent Government authority. Provide  
 photographs / as-built drawings of the completed building. Approach and  
 Methodologies: Survey the statutory requirements in the area that the  
 building is constructed. Ensure that these requirements are incorporated at  
 the design stage. 21 SITE SELECTION AND PLANNING

Soil Erosion Mandatory Requirement 2 Goal: To control soil erosion and  
 thereby reduce negative impacts to the site. Compliance Options: Adopt the

following measures: Construction Submittal v Ensure erosion control measures that conform to the best management practices highlighted in the National Building Code (NBC) of India. v Ensure that topsoil is stockpiled for reuse later. v Develop appropriate measures to address soil erosion, post occupancy. Documentation Required: Provide photographs to show stockpiling of topsoil. Submit a description on the measures implemented / provide the erosion control plan adopted. Submit a post occupancy erosion control plan.

Approach and Methodologies: Evolve strategies to stockpile top soil and reuse later for landscaping purpose or stockpiled soil can be donated to other sites for landscaping purpose. Consider adopting measures such as temporary and permanent seeding, mulching, earth dikes, silt fencing, sediment traps, and sediment basins as appropriate. Open areas can be landscaped (eg. , grass, trees, shrubs). Paved areas can be installed with permeable paving. For impermeable surfaces direct all run off towards storm water collection pits. 22 SITE SELECTION AND PLANNING Basic Amenities Site Credit 1. 0 Goal: Design Submittal Point: 1 To reduce the negative impacts from automobile use and enhance the overall quality of life by providing amenities.

Compliance Options: Select a site with access to atleast five amenities, within a walking distance of 1 Km (see list in Exhibit A) AND In multi-dwelling units, provide seating area & toilets in the common area and tot-lots within the campus. Note: This point can be earned only if the amenities are available before or at the time of project completion. Documentation Required: Provide an area map (to scale) indicating the path and distances

from the proposed building to the household amenities or public transport systems. Provide photographs. Approach and Methodologies: Select sites near public transit and / or household services and amenities that are accessible by safe, convenient pedestrian pathways. Only restaurants can be counted twice and all other amenities to be considered only once. 23

SITE SELECTION AND PLANNING Exhibit A - List of Basic Amenities • • • • •

• • • • • • • • • • • Grocery store Electrician / Plumbing services School  
Dhobi / Laundry Bank / ATM Creche Fitness Center /Gym Library Medical  
clinic / Hospital Pharmacy Post Office / Courier service Place of Worship  
Restaurant Supermarket Other neighborhood-serving retail Electricity /  
Water utility bills payment counter Playground Jogging track 24

SITE SELECTION AND PLANNING Natural Topography or Landscape : 15%, 25%  
Site Credit 2. 0 Goal: Construction Submittal Points: 2 Minimise disturbances  
to the building site so as to reduce long-term environmental impacts.  
Compliance Options: Avoid disturbance to site by retaining the natural  
topography of the site and / or design landscape for at least 15% of the site  
area. Points are awarded as below: Points for retaining natural topography or  
landscaping Percentage of site area with natural topography and/or  
landscaped area > 15% > 25% Notes: • • • • • Parking areas, walkways  
etc. , are considered as site disturbances. Landscape refers to soft  
landscaping which include only vegetative materials. Natural topography in  
its broad sense means preserving natural features of the terrain. Landscaped  
areas over built structures such as roofs, basement etc cannot be considered  
for the purpose of calculation of landscaped area. Potted plants will not be  
considered as landscape. Points 1 2



Documentation Required: Provide drawings, calculations and photographs showing the site area with natural topography (and / or) landscaped area.

Approach and Methodologies: Design the building with a minimal footprint (by tightening design needs and stacking floor plans). Consider retaining the natural topography in the site or design landscape to the extent possible. In sites which have fully grown trees, avoid destruction. Avoid developing paved surfaces on the site, as much as possible.

25 SITE SELECTION AND PLANNING Heat Island Effect - Roof : 50%, 75% Site Credit 3. 0 Goal: Construction Submittal Points: 2 Reduce heat islands (thermal gradient differences between developed and undeveloped areas) to minimise impact on microclimate.

Compliance Options: Use material with high solar reflectance and thermal emittance (such as, white china mosaic or white cement tiles or any other highly reflective materials) and / or provide vegetation to cover atleast 50% of the exposed roof areas. Points are awarded as below: Points for Heat Island Effect – Roof Percentage of green roof/ high reflective material > 50% > 75% Note: Exposed roof area does not include areas occupied by equipment such as HVAC, solar water heater, photovoltaic etc. ,

Documentation Required: Provide roof drawings highlighting location and the extent of highly reflective roof materials / green roof provided.

Approach and Methodologies: To maximise energy savings and minimise heat island effect, select materials that exhibit high reflectivity and high emissivity. Consider providing green roofs or using highly reflective materials over roof to reduce the heat island effect. Typical materials with high reflective properties include china mosaic, white cement tiles, paints with

high Solar Reflective Index (SRI) values etc. , Points 1 2 26 SITE SELECTION AND PLANNING Parking Facilities for Visitors Site Credit 4. 0 Goal: Design Submittal Points: 1 To provide adequate parking within the site to minimise disturbance caused due to parking on public roads and thereby enhance quality of life.

Compliance Options: Parking capacity to be provided as per local byelaws and parking for visitors to be provided as follows: • • For individual homes provide 1 visitor car park For multi-dwelling units provide an additional 10% parking area over and above the local code, reserved for visitors only. Documentation Required: Provide calculations on parking provisions as per local regulations. Submit plans indicating the visitor car park area. Approach and Methodologies: Design the building to ensure adequate parking provisions are made to cater to the occupants as well as the visitors. Parking provisions should take into account two wheelers and four wheelers. While designing parking facilities, consider basement/ stilts parking to reduce the heat island effect. When surface parking is planned, consider permanent cover; or other design strategies to address heat island effect as a result of such provisions. 27

SITE SELECTION AND PLANNING Electric Charging Facility for Vehicles Site Credit 5. 0 Goal: Design Submittal Point: 1 To encourage the use of electric vehicles to reduce pollution from automobile use. Compliance Options: Provide electric charging facility within the site, as follows: • • For individual homes provide atleast one such facility For multi-dwelling units provide electric charging facility, to cover 10% of the total parking capacity reserved for building occupants and visitors. The electric charging facility should cater

to both two wheelers and four wheelers. Documentation Required: Provide parking plans showing provisions for electric charging facility.

Provide calculations demonstrating that these facilities meet the credit criteria. Approach and Methodologies: Survey the type of electric vehicles already plying on the roads and also survey the kind of vehicles which may come up in the future. Create facilities so as to charge these kinds of vehicles. Consider having adequate number of charging facilities based on the charging time. While considering such charging facilities, ensure that all safety aspects have been addressed. 28 SITE SELECTION AND PLANNING

Design for Differently Abled Site Credit 6. 0 Goal: To ensure that the building can cater to differently abled people Compliance Options: Design Submittal Point: 1

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

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

Approach and Methodologies: Identify all probable facilities required to cater to differently abled people. Design the building to ensure that certain basic minimum provisions for differently abled people are incorporated. 29 SITE SELECTION AND PLANNING Green Home Guidelines – Design & Post <https://assignbuster.com/green-building-guide/>

Occupancy Site Credit 7. 0 Design Submittal Point: 1 Not applicable for projects with interiors Goal: Provide prospective buyers and occupants with descriptive guidelines that educate and help them implement green design features within their apartment / houses. Compliance Options: Marketing and design stage: Include green design features proposed along with details of the green homes rating pursued in the marketing brochures.

Post Occupancy stage: Publish green home guidelines providing information that helps occupants to implement green ideas. Documentation Required: Provide a copy of the marketing brochure along with green design features. Also submit a copy of the ' Green Home Guidelines' which will be given to the occupants. Approach and Methodologies: Develop a summary of sustainable design features incorporated in the Green Home project. Also include tips and guidelines which can be considered by the occupants in designing the interiors. 30 WATER EFFICIENCY Water Efficiency 31 WATER EFFICIENCY Rainwater Harvesting, 50% Mandatory Requirement 1 Goal: Construction Submittal

To increase the ground water table or to reduce the usage of water through effective and appropriate rainwater management. Compliance Options: Provide rainwater harvesting or storage system to capture atleast 50% of the runoff volumes from the roof surfaces. In coastal areas where the groundwater table is shallow and water percolation is limited, collection tanks may be provided meeting the above requirement. Runoff coefficients for Typical Surface Types S. No 1 2 3 4 5 Note: For normal annual rainfall refer Metrological Department data at <http://www.imd.gov.in> Documentation Required: Provide details on the rainwater harvesting system

specifying storage capacity and volume of water captured. Provide details of captured rainwater.

Approach and Methodologies: Survey the water table in the area. Design appropriate harvesting system based on the sub-surface characteristics. Factors to be considered include weathering, fractures & joints for rocky sites and thickness of aquifer for sedimentary sites. Capture rainwater from roof top for reuse. The design should also include flushing arrangement to let out impurities in the first few showers. Such pollutants and impurities include paper waste, leaves, bird droppings, dust, etc. Surface Type Cemented/ tiled Roof Roofs Conventional Roof Garden ( 500 mm) Runoff Coefficient 0. 95 0. 95 0. 95 0. 30 0. 10 32 WATER EFFICIENCY Water Efficient Fixtures Mandatory Requirement 2

Goal: To minimise indoor water usage by installing efficient water fixtures. Compliance Options: Construction Submittal Select water fixtures whose average flow rates / capacities meet the values mentioned in the table below: Baseline Flow Rates / Capacity for Water Fixtures in a Typical Household S. No 1 2 Items Flush fixtures Flow fixtures Units LPF LPM Base line average flow rates / capacity 6/3 12 \* At a flowing water pressure of 3 bar Notes: • • Flow fixtures include faucets, basin mixer, taps, showers, shower mixers. The baseline flows can be demonstrated at flowing water pressure of 3 bar. Flowing water pressure of 3bar does not mean that the water supply in the building is at 3 bar. The uilding fixtures can operate at lower pressures but to show compliance under this credit, the design flow rates are to be submitted at 3 bar. The average flow rate is a simple arithmetic average of all the respective flush / flow fixtures. • Documentation

Required: Submit data manual by product manufacturer to confirm that conditions above have been satisfied. Approach and Methodologies: While selecting water fixtures, look for the efficiencies. The product catalogue or the brochure may detail the flow rates at various pressures. Fixtures are available with ultra high efficiency which can reduce substantial quantity of water consumption. 33 WATER EFFICIENCY Turf Design : 20%, 40% Water Credit 1. 0

Goal: To limit such landscape which consumes large quantities of water.

Compliance Options: Design Submittal Points: 2 Limit the use of turf on the site so as to conserve water. Points are awarded as below. Points for Limited Use of Turf Turf area as a percentage of total landscaped area < 20% < 40%

Points 2 1 Areas planted with turf should not exceed a slope of 25 percent (i. e. , a 4 to 1 slope). Notes: • • This point is applicable only for those projects

which have atleast 15% of the site area landscaped. Landscape refers to soft landscaping which include only vegetative materials. Documentation

Required: Provide a landscape plan specifying the species used.

Provide photographs. Approach and Methodologies: During landscape design minimise turf to the extent possible. Select plants, shrubs and trees which consume less water. 34 WATER EFFICIENCY Drought Tolerant Species : 25%

Water Credit 2. 0 Goal: Landscape to be designed to ensure minimum consumption of water. Compliance Options: Design Submittal Points: 1

Ensure that atleast 25% of the landscaped area is planted with drought tolerant species. Notes: • • This point is applicable only for those projects

which have atleast 15% of the site/ plot area landscaped. Drought tolerant species are those species that do not require supplemental irrigation.

Generally accepted time frame for temporary irrigation is one to two years.

**Documentation Required:** Provide a landscape plan indicating the percentage of landscaped area which uses drought tolerant species. Also provide a list of the species used and highlight their drought tolerant nature.

**Approach and Methodologies:** Select species that are well-adapted to the site. Select those species which are drought tolerant. Consider xeriscaping as an approach for landscaping.

35 WATER EFFICIENCY Management of Irrigation Systems Water Credit 3.0 Goal: Construction Submittal Points: 2 Reduce the demand for irrigation water through water-efficient management techniques.

**Compliance Options:** (1 point for any three features) Provide highly efficient irrigation system incorporating atleast two features mentioned below: • • • •

- • • Provide a central shut-off valve
- Provide a moisture sensor controller

Turf and each type of bedding area must be segregated into independent zones based on watering needs Atleast 50% of landscape planting beds must have drip irrigation system to reduce evaporation Install time based controller for the valves such that the evaporation loss is minimum and plant health is ensured Use pressure regulating devices to maintain optimal pressure to prevent water loss Any other innovative methods for watering

**Documentation Required:** Provide a detailed description of managing the irrigation systems installed. Provide landscape plans with the names of the species. Provide cut sheets and photographs of the systems installed.

**Approach and Methodologies:** The irrigation management system must be designed based on the requirements of the landscape plan, and installed as per the design. The designer and the installer must work together and

ensure the planned performance of the system. 36 WATER EFFICIENCY Rainwater Harvesting, 75%, 95% Water Credit 4. 0 Goal: Construction Submittal Points: 2 To increase the ground water table or to reduce the usage of water through effective and appropriate rainwater management. Compliance Options: Provide rainwater harvesting system to capture roof water generated from roof area to utilize in landscape irrigation or indoor water usage. In coastal areas where the groundwater table is shallow and water percolation is limited, collection tanks may be provided meeting the above requirement.

Points are awarded as below: Points for Rainwater Harvesting Rainwater Harvesting System to capture / recharge • 75% runoff from roof area • 95% runoff from roof area Notes: • • In areas where recharging the aquifer is not feasible, collection and reuse may be considered. For normal annual <http://www.imd.gov.in/rainfall> refer Metrological Department data at Points 1 2 Documentation Required: Provide details on the rainwater harvesting system specifying storage capacity and volume of water captured. Provide details of captured rainwater. 37 WATER EFFICIENCY Approach and Methodologies: Survey the water table in the area. Design appropriate harvesting structure based on the sub-surface characteristics. Factors to be considered include weathering, fractures & joints for rocky sites and thickness of aquifer for sedimentary sites.

Capture rainwater from roof top for reuse. The design should also include flushing arrangement to let out impurities in the first few showers. Such pollutants and impurities include paper waste, leaves, bird droppings, dust, etc. 38 WATER EFFICIENCY Grey Water Treatment : 50%, 75%, 95% Water



Credit 5.0 Goal: Construction Submittal Points: 3 Reduce the consumption of water by in situ treatment of grey water generated so as not to pollute the municipal streams. Compliance Options: Provide an on-site grey water treatment system to treat at least 50% of grey water generated in the building, to standards suitable for flushing and landscaping purpose.

Points are awarded as below: Points for Grey Water Treatment Grey Water Treated as a Percentage of Total Grey Water generated in Building • 50% • 75% • 95% Note: Grey water is neither clean nor heavily soiled waste water that comes from clothes washers, bathtub, showers, bathroom wash basins, kitchen sinks and dish washers. More specifically, it is the untreated waste water which has not come into contact with toilet waste. Documentation Required: Provide a detailed description of the on-site grey water treatment system. Provide photographs / cut sheets from the manufacturers. Provide water balance of the building. Provide details of usage of treated grey water within the building. Points 2 3 39 WATER EFFICIENCY Approach and Methodologies: Calculate the grey water volumes generated in the building. Design appropriately the capacity of the on-site grey water treatment system. While designing the treatment system, ensure that the treated grey water meets the required quality standards based on its purpose of application. Have signages all around the building to caution occupants and housekeeping staff that this water is not potable. 40 WATER EFFICIENCY Treated Grey Water for Landscaping : 50%, 75%, 95% Water Credit 6.0 Goal: Construction Submittal Points: 3 Reduce demand for fresh water by using treated grey water for landscaping.

Compliance Options: Reduce atleast 50% of potable water requirement for landscaping by using treated grey water generated within the site. AND The treated grey water for reuse must conform to the quality standards as prescribed by Central / State Pollution Control Board. Points are awarded as below. Points for Treated Grey Water for Landscaping Percentage of Treated Grey Water Treated used for Landscaping • 50% • 75% • 95% Points 1 2 3

Note: This point can be claimed only if the grey water that is reused is treated in situ. Documentation Required: Provide a detailed description of landscaping water requirement and how the treated grey water or rain water will meet this requirement. Also provide calculations on quantity and quality of grey water reused. 41

WATER EFFICIENCY Approach and Methodologies: Install an adequately sized grey water treatment plant. Ensure that the quality of the treated grey water is fit and safe for reuse. Prioritise the use of treated grey water such that irrigation requirements are given top priority. Excess treated grey water can also be used for flushing and make-up water for air-conditioning systems. Ensure periodic testing of the treated water to meet the quality standards as prescribed by Central / State Pollution Control Board. 42

WATER EFFICIENCY Treated Grey Water for Flushing : 50%, 75%, 95% Water Credit 7. 0 Goal: Construction Submittal Points: 3 Reduce demand for fresh water by using treated grey water for flushing requirements.

Compliance Options: Provide separate water plumbing lines for flushing purpose and source atleast 50% of the flushing water requirements from the treated grey water available. AND The treated grey water for reuse must conform to the quality standards as prescribed by Central / State Pollution

Control Board. Points are awarded as below. Points for Treated Grey Water for Flushing Percentage of Treated Grey Water Treated used for Flushing • 50% • 75% • 95% Note: This point can be claimed only if the grey water that is reused is treated in situ. Documentation Required: Submit drawings showing separate plumbing lines for treated grey water. Provide calculations to show the quantity of grey water used for flushing.

Points 1 2 3 43 WATER EFFICIENCY Approach and Methodologies: Evaluate the water consumption in the building and ascertain the quantity of grey water generated. Also evaluate the availability of grey water for flushing purposes and accordingly install the dual plumbing lines. Design the plumbing system accordingly. 44 WATER EFFICIENCY Water Efficient Fixtures : 20%, 30% Water Credit 8. 0 Goal: To minimise indoor water usage by installing efficient water fixtures. Compliance Options: Construction Submittal Points: 3 Select water fixtures whose average flow rates / capacities are lower than the given baseline values for all the items mentioned below.

Points are awarded as below: Points for Water Efficient Flow Fixtures Points Awarded S. No 1 2 Items Flush fixtures Flow fixtures \* Base line Average Flow / Capacity 6/3 12 Units LPF LPM Water consumption 20% lower than baseline 1 Water consumption 30% lower than baseline 1 2 \* At a flowing water pressure of 3 bar Notes: • • Flow fixtures include faucets, basin mixer, taps, showers, shower mixers. The baseline flows can be demonstrated at flowing water pressure of 3 bar. Flowing water pressure of 3bar does not mean that the water supply in the building is at 3 bar. The building fixtures can operate

at lower pressures but to show compliance under this credit, the design flow rates are to be submitted at 3 bar.

The average flow rate is a simple arithmetic average of all the respective flush / flow fixtures. • Documentation Required: Submit data manual by product manufacturer to confirm that conditions above have been satisfied. Provide calculations to show the percentage of water savings. 45 WATER EFFICIENCY Approach and Methodologies: While selecting water fixtures, look for the efficiencies. The product catalogue or the brochure may detail the flow rates at various pressures. Fixtures are available with ultra high efficiency which can reduce substantial quantity of water consumption. 46 WATER EFFICIENCY Water Metering Water Credit 9. 0 Goal: Design Submittal Points: 1

To encourage continuous monitoring and enhance the performance of the residential dwelling unit(s). Compliance Options: Provide water meters for any three of the following: • • • • • • Treated grey water consumption Landscape water consumption Rain water reuse Airconditioning cooling tower make-up Hot water consumption Any other major source of water consumption such as, swimmingpools, water fountain, common car wash facilities Documentation Required: Describe the metering equipment installed. Provide cut sheets for the meters installed. Approach and Methodologies: Identify all the major water consuming areas and install systems to monitor their consumptions.

Develop and implement a measurement and verification mechanism to compare predicted water savings to actual water consumption. 47 ENERGY EFFICIENCY Energy Efficiency 48 ENERGY EFFICIENCY CFC-Free Equipment

**Mandatory Requirement 1 Goal:** Design Submittal To avoid the use of such refrigerants and ozone layer depleting gases which will negatively impact the environment **Compliance Options:** Refrigerants used in Heating, Ventilation & Air-conditioning (HVAC) equipment and unitary air-conditioners installed must be CFC-free. **Documentation Required:** Provide a declaration signed by a responsible party declaring that the building HVAC systems do not use CFC based refrigerants. **Approach and Methodologies:** Survey the market for all CFC-free HVAC systems.

Such systems are also available in smaller capacities. Install HVAC equipment which does not use CFC based refrigerant. 49 **ENERGY EFFICIENCY** **Minimum Energy Performance Mandatory Requirement 2 Goal:** Design Submittal Optimise energy efficiency of the building to reduce environmental impacts from excessive energy use. **Compliance Options:** The project should achieve the following minimum number of points as illustrated under the Energy Credit 1. 0: Type of Building Non Air-conditioned Air-conditioned Minimum number of points to be achieved 3 4 For further details, refer to Energy Credit 1. 0. 50 **ENERGY EFFICIENCY** **Energy Performance** Energy Credit 1. 0 Design Submittal Points: 10