



Green, Affordable and Resilience Certification for Habitats (GreenARCH) Version-1

MARCH 1, 2024

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1. Background:

In Bangladesh, the intersection of necessity of housing and the imperative for green affordable housing is critical for sustainable development. With rapid urbanization and a burgeoning population, there's a pressing need for affordable housing solutions that not only address housing shortages but also consider socio-economic factors and environmental sustainability. Green affordable housing initiatives are essential in this context, offering multiple benefits such as reduced energy costs, improved indoor air quality, and minimized environmental impact. These initiatives can uplift socio-economic conditions by providing safe and healthy living spaces for low to middle-income families, enhancing their quality of life and contributing to poverty alleviation. Moreover, integrating green building practices into affordable housing projects can stimulate economic growth by creating jobs, fostering innovation, and attracting investment in the construction sector. By prioritizing green affordable housing, Bangladesh can achieve a more equitable and sustainable development path, ensuring access to decent housing while mitigating environmental risks and promoting socio-economic well-being for all its citizens.

Bangladesh urgently requires a Green, Affordable, and Resilient Housing Certification to address the country's unique socio-economic and environmental challenges. With a rapidly growing population and increasing urbanization, there's a dire need for sustainable housing solutions that are accessible to all segments of society. A certification system specifically tailored to Bangladesh's context would ensure that new housing developments meet stringent standards for environmental sustainability, affordability, and resilience to natural disasters. By incentivizing the adoption of green building practices, such as energy efficiency, use of renewable materials, and disaster-resistant design, the certification would promote environmentally friendly and cost-effective housing options. Moreover, it would enhance the resilience of communities against the growing threats of climate change-induced disasters, such as floods, cyclones, and storms. Such a certification not only benefits individual homeowners by reducing utility costs and increasing property value but also contributes to the overall socio-economic development of the nation by creating healthier living environments, fostering economic growth in the construction sector, and reducing the strain on natural resources. Ultimately, a Green, Affordable, and Resilient Housing Certification is essential for Bangladesh to ensure sustainable urban development, mitigate climate risks, and improve the quality of life for its citizens.

Housing and Building Research Institute (HBRI) has been working on Affordable and Sustainable Housing for the peoples of Bangladesh since 1975. As a custodian authority of Bangladesh National Building Code (BNBC), HBRI has been playing significant role in the Housing sector of Bangladesh. This national research organization has been also published the Standard guideline for Rural Housing in Disaster Prone Areas in Bangladesh. In the latest edition of Bangladesh National Building Code (BNBC-2020), a new chapter of 'Energy Efficiency and Sustainability' has been introduced to address the environmental challenges. Bangladesh Bank has also taken initiative to address this challenges and published the re-financing scheme for Environment Friendly Projects and Initiatives. For the promotion of environment friendly projects and to avail the re-financing facility, a proper certification system is very necessary. For these reasons, Housing and Building Research Institute has developed the first version of Green Affordability and Resilience Certification for Homes, GreenARCH in short. With the cooperation of all relevant sectors, GreenARCH will be able to elevate the quality of housing, improve living standards, and contribute to a more sustainable and resilient built environment in Bangladesh.

2. Scope of the HBRI- GreenARCH certification System:

Generally, the Building should be Rated based on their typology. However, at the beginning stage of the GreenArch cover all residential buildings (Existing Building and New Construction). The main purpose of the rating to identify the sustainability labels of buildings to provide facility the sustainable financing. This rating system is developed in line with the BNBC2020. This voluntary rating will help to meet the housing demand of the country.

3. Rating and reference Points and Label Design

Certification level	Points
	50-60
	61-70
	71-80
	81-90
	91-100
	100 points

4. Rating Guideline



1	Site Sustainability	Points	20
	Criteria	Attempted	Points
1.1	Proximity to Public Transport	<input type="checkbox"/> Within 500m	2
		<input type="checkbox"/> Within 1000m	1
1.2	Top Soil Preservation	<input type="checkbox"/> Preserve at least 25% existing land scape or green scape of the project land	1
		<input type="checkbox"/> Preserve to fertile top soil excavated from the construction site and use the soil for land scraping.	1
1.3	Brown field Development	<input type="checkbox"/> Re Construction in Existing Vita	3
		<input type="checkbox"/> Construction in Vacant planed area	2
		<input type="checkbox"/> Construction in New Land Except agricultural Land	1
1.4	Access to Social Infrastructure ((School, Shopping Area, Marker, Bank ETC)	<input type="checkbox"/> More than 3 Social infrastructure facilities in 1 KM Radius	2
		<input type="checkbox"/> At least 2 Social infrastructure facilities in 1 KM Radius	1
1.5	Green Cover and Preservation	<input type="checkbox"/> Preserve 80% Trees/Plants at the Site	3
		<input type="checkbox"/> Preserve 50% Trees/Plants at the Site	2
		<input type="checkbox"/> Preserve 30% Trees/Plants at the Site	1
1.6	100% of the terrace is treated	<input type="checkbox"/> High SRI Paints/High SRI tiles	4
		<input type="checkbox"/> Parasol / Roof Shading	3
		<input type="checkbox"/> Green Roof Minimum 60 %	2
		<input type="checkbox"/> Typical Roof insulation	1
1.7	Basic Facilities for construction workforce	<input type="checkbox"/> Yes <input type="checkbox"/> No	2
1.8	Climate resilience Design	<input type="checkbox"/> Yes <input type="checkbox"/> No	2

2	Water Use in Buildings	Points	15
	Criteria	Attempted	Points
2.1	Efficient use of water during construction	<input type="checkbox"/> Use of surface water (river/pond/rainwater etc)	3
		<input type="checkbox"/> Use of municipal supply Water	
		<input type="checkbox"/> Using water using from other sources	2
2.2	Water Saving Fixtures	<input type="checkbox"/> Dual flush WCs	2
		<input type="checkbox"/> Low flow Hand wash taps	2
		<input type="checkbox"/> Low flow kitchen faucets	
		<input type="checkbox"/> Low flow showers	2
		<input type="checkbox"/> Urinal / Ablution	2
2.3	Optimization of Landscape water demand	<input type="checkbox"/> Yes <input type="checkbox"/> No	1
2.4	Rainwater Harvesting	<input type="checkbox"/> Yes <input type="checkbox"/> No	1

3	Energy Efficiency and Sustainability	Points	25
	Criteria	Criteria	Points
3.1	Building Envelope (Window to wall ratio)	<input type="checkbox"/> Yes <input type="checkbox"/> No	3
3.2	Shading Elements for Building Openings	<input type="checkbox"/> Yes <input type="checkbox"/> No	2
3.3	Energy Saving Measures in Appliances & other Equipment	Energy Efficient Air Conditioning Systems	4
		Energy Efficient Lift / Escalator	4
		Use Energy Efficient Fans (less than 70 Watts)	2
		Use Occupancy Sensors in Lobby's and non-Habitable Rooms	2
3.4	Renewable Energy Integration	<input type="checkbox"/> Yes <input type="checkbox"/> No	1
3.5	Building Management System	<input type="checkbox"/> Yes <input type="checkbox"/> No	1
3.6	Efficient Lighting in Apartment/Residences	<input type="checkbox"/> Use of LED light in residence - Less than 7 W/sqm	6
3.7	Efficient Lighting in Open Space/Parking	<input type="checkbox"/> Use of LED light in open/Parking area - Less Than 1.6 W/sqm	2

4	Building Materials	Points	15
	Criteria	Criteria	Points
4.1	Use of Regional Materials	<input type="checkbox"/> Building Materials 100% Produced in Bangladesh	2
		<input type="checkbox"/> Mix use of Building Materials imported from other countries	1
4.2	Material with Recycled content	<input type="checkbox"/> Use Cement with Fly ash (CEM II, BM)	1
		<input type="checkbox"/> Use of Steel produced using recycle Steel materials	1
		<input type="checkbox"/> Use of Flush Door (minimum 70% of total door)/ Particle Board with Recycled Materials in interiors decoration.	1
		<input type="checkbox"/> Reuse of building components (window, door, Etc.) or Salvage materials (bricks, rebars, grills, etc.)	1
4.3	To reduce environmental impact during construction of the project.	<input type="checkbox"/> Provide Fencing at Site and Safety measures During Construction	1
		<input type="checkbox"/> Keep Construction Materials in Marked Place with Coverage	1
		<input type="checkbox"/> Cover Properly during transportation of all Materials, Spray water to Prevent Dust Pollution, Take Measures for Reduction of Noise Pollution	1
4.4	Use of low-environmental impact materials in building	<input type="checkbox"/> Use Re use materials /Re use of Building Elements or Component	2
		<input type="checkbox"/> Use Particle Board without Urea formal Dehydrate	
		<input type="checkbox"/> Use UPVC Door Window Frame/Board	
		<input type="checkbox"/> Use Wood From Short Maturity Life/ Certified Wood from BFRI	
		<input type="checkbox"/> Use Building Materials in Exterior / Design Intervention which Require very Low Maintenance of the Building (minimum 3years)	
		<input type="checkbox"/> Use Concrete Unipaver/ permeable Blocks in Pavements	
4.5	Masonry and Partition Wall Construction	<input type="checkbox"/> Use 100% Non-fired Concrete Hollow Blocks/AAC Blocks	4
		<input type="checkbox"/> Use of Non-fired Concrete Hollow Blocks/AAC Blocks in all inner partition wall and solid Concrete Block in external walls	3
		<input type="checkbox"/> Use of 100% Non-fired Solid Concrete in all walls	2
		<input type="checkbox"/> Use of Ceramic Hollow/Auto Brick with hole prices Produce by Efficient Kiln	1

5	Indoor Environment Quality (10 Points)	Points	10
	Criteria	Criteria	Points
5.1	Use of Low VOC materials (Paint ,Glue etc.)	<input type="checkbox"/> Yes <input type="checkbox"/> No	2
5.2	Daylight access into the living spaces	<input type="checkbox"/> 75% window/opening area of rooms	4
		<input type="checkbox"/> 55% window/opening area of rooms	3
		<input type="checkbox"/> 35% window/opening area of rooms	2
		<input type="checkbox"/> 15% window/opening area of rooms	1
5.3	Fresh air ventilation	<input type="checkbox"/> Yes <input type="checkbox"/> No	1
5.4	Cross Ventilation	<input type="checkbox"/> Yes <input type="checkbox"/> No	2
5.5	Exhaust Systems (Kitchen/Toilet etc)	<input type="checkbox"/> Yes <input type="checkbox"/> No	1

6	Waste Management	Points	5
	Criteria	Criteria	Points
6.1	Waste Management (ETP/ Septic Tank, soak well etc.)	<input type="checkbox"/> Yes <input type="checkbox"/> No	4
6.2	Handling of construction waste materials	<input type="checkbox"/> Yes <input type="checkbox"/> No	1



7	Social Response	Points	5
	Criteria	Criteria	Points
7.1	Safety measures during Construction	<input type="checkbox"/> Yes <input type="checkbox"/> No	2
7.2	Fire Safety during Building Occupancy	<input type="checkbox"/> Yes <input type="checkbox"/> No	1
7.3	Gender Response	<input type="checkbox"/> Yes <input type="checkbox"/> No	1
7.4	Design for differently abled and Senior Citizen	<input type="checkbox"/> Yes <input type="checkbox"/> No	1

8	Sustainability	Points	5
	Criteria	Criteria	Points
8.1	Intervention in Sustainability	<input type="checkbox"/> Yes <input type="checkbox"/> No	5
TOTAL POINTS			100

i. Site Sustainability

01	:		i
Credit Title	:		Site Sustainability
Credits Points	:	Proximity to Public Transport	
Credit Number	:	1.1	
Points for Credit	:	2 (maximum)	
Point options	:	2 – Within 500m 1 – Within 1000m	
Goal	:	To reduce greenhouse gas emission and conservation of resources by ensuring minimum distance from the Public Transportation Station.	
Eligibility	:	The site should be located within 500m radius of an existing public transportation Station (Bus, Rail, Auto Stand etc.) to get the full credit point. If the proposed site is located within 1000m, partial credit point will be awarded.	
Required Documents for Submission:	:	Site Map, Photographs etc.	

02	:		i
Credit Title	:		Site Sustainability
Credits Points	:	Top Soil Preservation	
Credit Number	:	1.2	
Points for Credit	:	2 (Cumulative)	
Point options	:	1- Preserve at least 25% existing land scape or green scape of the project land 1- Preserve to fertile top soil excavated from the construction site and use the soil for land scaping.	
Goal	:	Preservation of fertile top soil from Construction.	
Eligibility	:	Preservation of existing agricultural land and vegetation by means of non-disturbance or damage to fertile top soil and trees will receive the credit point.	
Required Documents for Submission:	:	Site Map, Photographs etc.	

03	:		i
Credit Title	:		Site Sustainability
Credits Points	:	Brown Field Development	
Credit Number	:	1.3	
Points for Credit	:	3 (maximum)	
Point options	:	3 – Reconstruction in Existing Vita	
	:	2 – Construction in Vacant Planned Area	
	:	1 – Construction in New Land except agricultural land.	
Goal	:	To encourage development in the planned area and Preservation of fertile agricultural land for food security.	
Eligibility	:	<p>If the proposed project is located on the Existing Vita, full credit score will be awarded. Construction in Vacant Planned Area and development on new planned land except agricultural land will get partial credit point. Construction on any agricultural land will not receive any credit point.</p> <p>(Developed or Planned area means; Land developed by government or private development agency, company or by any person as per land development rule and approved by the concern government organization)</p>	
Required Documents for Submission:	:	Site Survey, Photographs.	

04	:		i
Credit Title	:		Site Sustainability
Credits Points	:	Access to Social Infrastructure (School, Shopping Area, Market, Bank etc.)	
Credit Number	:	1.4	
Points for Credit	:	2 (max)	
Point options	:	2 - More than 3 Social infrastructure facilities in 1 km radius	
	:	1 – At least 2 Social infrastructure facilities in 1 km radius	
Goal	:	To ensure availability of social infrastructures or amenities facilities around the proposed/existing project. This will reduce the transportation footprint in daily life.	
Eligibility	:	<p>Three or more Social infrastructure facilities (School, Shopping Area, Markets, Bank etc.) should be located within 1km radius of the Proposed site of construction will get full credit point. Partial credit point will be awarded to the site having at least 2 (two) social infrastructure facilities within 1km radius.</p>	
Required Documents for Submission:	:	Site Map mentioning the nearby Social Infrastructures and Photographs.	



05	:		i
Credit Title	:		Site Sustainability
Credits Points	:	Green Cover and Preservation	
Credit Number	:	1.5	
Points for Credit	:	4 (maximum)	
Point options	:	4- Preservation of 80% Trees/Plants at the site	
	:	3- Preservation of 50% Trees/plants at the site	
	:	1- Preservation of 30% Trees/Plants at the site	
Goal	:	Preservation of existing trees and vegetation for the less impact on biodiversity of the site.	
Eligibility	:	Full Credit point will be awarded to the project where 80% of all the plants of the site has been preserved. Partial credit score will be given for 50% and 30% preservation of existing plantation of the Site.	
Required Documents for Submission:	:	Existing site survey detailing the trees and plants of the Site, Photograph of existing site and proposed site plan with landscape plan.	

06	:		i
Credit Title	:		Site Sustainability
Credits Points	:	Heat Island Effect Reduction	
Credit Number	:	1.6	
Points for Credit	:	4 (maximum)	
Point options	:	4- High SRI Paints/High SRI tiles	
	:	3- Parasol / Roof Shading	
	:	2- Green Roof Minimum 60%	
	:	1- Typical Roof Insulation	
Goal	:	Reduction of Heat Island Effect to preserve standard comfort in outdoor environment.	
Eligibility	:	Use of High SRI (Solar Reflective Index) Paints or Tiles on the total roof area to reduce heat island effect will get full credit point. Use of Parasol (covering used as protection from the sun) or Roof Shading (Solar Panels, Solar Water Heater) on 60% roof surface will get 3 out of 4 score point. Application of Green Roof on minimum 60% of the total roof area will be awarded 2 out of 4 score points. Typical any other Roof Insulation will get 1 out of 4 score points. Combination of High SRI Paint and Roof Shading will also get full credit points.	
Required Documents for Submission:	:	Pre-Certification: Roof Plan with Specification of the Insulation and Declaration of the Applicant of the Project. Post-Certification: Roof Plan with Specification of the Insulation, Photographs, Declaration of the Engineer in Charge.	

07	:		i
Credit Title	:		Site Sustainability
Credits Points	:	Basic Facilities for Construction Workforce	
Credit Number	:	1.7	
Points for Credit	:	2	
Point options	:	Yes/No	
Goal	:	To ensure basic amenities facilities of the construction workers of the Project.	
Eligibility	:	Provide Drinking Water facilities, Cooking Facilities, Shower Facilities Toilet facilities (M/F), Proper Accommodation of 20% Maximum number of Workers	
Required Documents for Submission:	:	Pre-certification: Declaration of the Applicant of the project, Location Map of such facilities. Post-Certification: Photograph, Declaration of the Engineer in charge.	

08	:		i
Credit Title	:		Site Sustainability
Credits Points	:	Climate resilience Design	
Credit Number	:	1.8	
Points for Credit	:	2	
Point options	:	Yes/No	
Goal	:	To promote resilience to building design.	
Eligibility	:	Credit point will be given to the project if its design and construction will be done in such ways which will prevent damages due to Salinity in Coastal Areas. Plinth level height of the project should be above of last 10 years flood level.	
Required Documents for Submission:	:	Pre-certification: Declaration of the Applicant of the project, Location Map of such facilities. Post-Certification: Photograph, Declaration of the Engineer in charge.	

ii. Water Use in Buildings

09	:		ii
Credit Title	:	Water Use in Buildings	
Credits Points	:	Efficient use of water during construction	
Credit Number	:	2.1	
Points for Credit	:	3 (maximum)	
Point options	:	3- Use of surface water (river/pond/rainwater etc). for Construction	
		2- Use of municipal supply water for Construction	
		1- Use water from other sources for Construction	
Goal	:	Reduction of the use of groundwater and Efficient use of water in Construction.	
Eligibility	:	If the project uses surface water (river/pond/rainwater etc.) for construction, full credit point will be awarded. Partial credit point of 2 (two) will be given if the project uses water from municipal supply. Credit point of 1 (one) will be awarded if the water source is any other than the above-mentioned sources. In all cases standard of water parameters should be maintained for construction.	
Required Documents for Submission:	:	Pre-Certification: Declaration of the Applicant of the Project. Post-Certification: Photograph and Declaration of the Engineer in charge.	

10	:		ii
Credit Title	:	Water Use in Buildings	
Credits Points	:	Water Saving Fixture	
Credit Number	:	2.2	
Points for Credit	:	10 (cumulative)	
Point options	:	2 – Dual Flush WCs	
		2 – Low Flow Hand Wash Taps	
		2 – Low Flow Kitchen Faucets	
		2 – Urinal/Ablution	
		2 – Low Flow Showers	
Goal	:	Promotion of Water saving Fixtures in Buildings for the conservation of water in the Environment.	
Eligibility	:	Credit points of 2 (two) will be awarded for each of the water efficiency features like, Dual Flush WCs, Low flow hand wash Taps, Low flow Kitchen Faucets, Low flow showers and use of urinal/ablution. Score points will be calculated cumulatively where maximum of 10 credit points can be achieved in this section. Specification of these water saving fixtures should be according to Bangladesh National Building Code 2020 (Table 3.4.7 of Rule 4.6.2: Efficient Fittings in Toiles – See Annexure)	
Required Documents for Submission:	:	Pre-Certification: Declaration of the Applicant of the Project & Specification of the Fixtures with Suppliers Data Sheet. Post-Certification: Declaration of the Engineer in charge and Specification of the Fixtures with Suppliers Data Sheet	

11	:	ii
Credit Title	:	Water Use in Buildings
Credits Points	:	Optimization of Landscape Water Demand
Credit Number	:	2.3
Points for Credit	:	1
Point options	:	Yes/No
Goal	:	To conserve the use of groundwater and promotion of optimization of the use of water for the maintenance of Landscape.
Eligibility	:	1. Landscape Design with Native Plants. 2. Drip irrigation system /Partial use of Rain water or recycled water for landscape.
Required Documents for Submission:	:	Pre-Certification: Declaration of the Applicant of the Project, Drawing Design Post-Certification: Declaration of the Engineer in charge, Drawing design.

12	:	ii
Credit Title	:	Water Use in Buildings
Credits Points	:	Rainwater Harvesting
Credit Number	:	2.4
Points for Credit	:	1
Point options	:	Yes/No
Goal	:	To reduce the use of groundwater and promotion of rain water harvesting system.
Eligibility	:	If the project has Rainwater harvesting system, based on the submission of the drawings and details of the rain water harvesting system detailing the capacity of the Storage tank will be given full credit point.
Required Documents for Submission:	:	Pre-Certification: Declaration of the Applicant, Post-Certification: Drawings and Details of Rainwater Harvesting System.

iii. Energy Efficiency and Sustainability

13	:	iii																														
Credit Title	:	Energy Efficiency and Sustainability																														
Credits Points	:	Building Envelop (Window to Wall Ratio)																														
Credit Number	:	3.1																														
Points for Credit	:	3																														
Point options	:	Yes/No																														
Goal	:	Reduction of Solar heat gain and Improvement of Energy Efficient indoor thermal comfort.																														
Eligibility	:	<p>This credit point will be awarded to the building where building envelop will be designed where Window to Wall Ratio will be according to the rules (rule 4.4, Part 3, Chapter 4) of Building Envelop of Bangladesh National Building Code 2020. For the Design of the Building Envelop, the Solar Heat Gain Co-efficient (SHGC) and Shading Co-efficient (SC) will be according to the following table as per BNBC-2020. (See – Annexure 2)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>WWR</th> <th>SHGC</th> <th>SC</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>0.85</td> <td>0.98</td> </tr> <tr> <td>20</td> <td>0.6</td> <td>0.69</td> </tr> <tr> <td>30</td> <td>0.5</td> <td>0.57</td> </tr> <tr> <td>40</td> <td>0.4</td> <td>0.46</td> </tr> <tr> <td>50</td> <td>0.35</td> <td>0.4</td> </tr> <tr> <td>60</td> <td>0.33</td> <td>0.38</td> </tr> <tr> <td>70</td> <td>0.31</td> <td>0.36</td> </tr> <tr> <td>80</td> <td>0.3</td> <td>0.34</td> </tr> <tr> <td>90</td> <td>0.27</td> <td>0.31</td> </tr> </tbody> </table>	WWR	SHGC	SC	10	0.85	0.98	20	0.6	0.69	30	0.5	0.57	40	0.4	0.46	50	0.35	0.4	60	0.33	0.38	70	0.31	0.36	80	0.3	0.34	90	0.27	0.31
WWR	SHGC	SC																														
10	0.85	0.98																														
20	0.6	0.69																														
30	0.5	0.57																														
40	0.4	0.46																														
50	0.35	0.4																														
60	0.33	0.38																														
70	0.31	0.36																														
80	0.3	0.34																														
90	0.27	0.31																														
Required Documents for Submission	:	<p>Pre-Certification: Drawings, Specification and Declaration of the Applicant of the project. Post Certification: Detail Design, Specification, Declaration of the Engineer in Charge.</p>																														

14	:	iii
Credit Title	:	Energy Efficiency and Sustainability
Credits Points	:	Shading Elements for Building Openings
Credit Number	:	3.2
Points for Credit	:	2
Point options	:	Yes/No
Goal	:	Reduction of Solar heat gain through window and openings for the Improvement of Energy Efficient indoor thermal comfort.
Eligibility	:	This credit point will be awarded to the building where shading elements of the project has been designed according to Bangladesh National Building Code 2020. (Rule 4.4.3, Part 3, Chapter 4 – See Annexure 2)
Required Documents for Submission	:	Pre-Certification: Drawings, Specification and Declaration of the Applicant of the project. Post Certification: Detail Design, Specification, Declaration of the Engineer in Charge.

15	:	iii
Credit Title	:	Energy Efficiency and Sustainability
Credits Points	:	Energy Saving Measures in Appliances & other Equipment
Credit Number	:	3.3
Points for Credit	:	10 (maximum)
Point options	:	4 – Energy Efficient Air Conditioning System
	:	4 – Energy Efficient Lift/ Escalator
	:	2 – Energy Efficient Ceiling Fans (Less than 70 Watts)
	:	2 – Occupancy Sensors in Lobby and Non-Habitable Rooms
	:	2 – Energy Efficient Motor / Water pump (IE1)
Goal	:	To Promote energy efficient appliances and equipment.
Eligibility	:	Total of 8 credit points has been reserved for the application of Energy Saving measures in Appliances and other equipment in Buildings. Among them, 2 credit point will be awarded if the building install energy efficient Air Conditioning System (VRF/Inverter). Another 2 point will be given for the use of energy efficient Lift/Escalator. 2 Credit point has been reserved for the use of Energy Efficient Ceiling Fans which will be less than 70 Watts. Credit Point of 2 will be given for the use of Occupancy sensors in Lobby and other non-habitable rooms of the building. For the application of multiple features from the above-mentioned measures will get combined credit score accordingly.
Required Documents for Submission	:	Pre-Certification: Specification of the Appliances, Declaration of the Applicant of the Project. Post-Certification: Specification of the Appliances, Declaration of the Engineer in charge.

16	:	iii
Credit Title	:	Energy Efficiency and Sustainability
Credits Points	:	Renewable Energy Integration
Credit Number	:	3.4
Points for Credit	:	1
Point options	:	Yes/No
Goal	:	To promote renewable energy in buildings and the reduction of the use of natural resources for energy production.
Eligibility	:	If the building integrates renewable energy for the reduction of natural resources for energy production, the credit score will be awarded to the building.
Required Documents for Submission	:	Pre-Certification: Drawings and Details, Declaration of the Applicants. Post-certification: Drawings, Specification and Declaration of the Engineer in Charge.
Remarks	:	

17	:	iii
Credit Title	:	Energy Efficiency and Sustainability
Credits Points	:	Building Management System
Credit Number	:	3.5
Points for Credit	:	1
Point options	:	Yes/No
Goal	:	To prevent loss of energy using Building Management System.
Eligibility	:	Credit Point will be awarded to the building where Building Management System has been installed for the prevention of the loss of energy.
Required Documents for Submission	:	Pre-Certification: Declaration of the Applicant of the Project. Post-Certification: Details of the Building Management System, Declaration of the Engineer in charge.
Remarks	:	

18	:	iii
Credit Title	:	Energy Efficiency and Sustainability
Credits Points	:	Efficient Lighting in Apartments/Residence
Credit Number	:	3.6
Points for Credit	:	6
Point options	:	Use of LED light in residence - Less than 7 W/sqm
Goal	:	To increase efficiency of Lighting and Reduction of Power Consumption in Apartments or Residences.
Eligibility	:	If the building uses LED Lights in Apartments or Residences which will be less than 7 W/Sqm, full credit points will be awarded.
Required Documents for Submission	:	Pre-Certification: Electrical Layout, Declaration of the Applicant of the Project. Post-Certification: Lighting Design, Specification with Suppliers Cut sheet, Declaration of the Engineer in Charge.

19	:	iii
Credit Title	:	Energy Efficiency and Sustainability
Credits Points	:	Efficient Lighting in Open Space/Parking
Credit Number	:	3.7
Points for Credit	:	2
Point options	:	Use of LED light in open/Parking area - Less Than 1.6 W/sqm
Goal	:	To reduce power consumption and increase efficiency of Lighting in Open Space or Parking Areas.
Eligibility	:	<ul style="list-style-type: none"> • If the building uses LED Lights in its surrounding open spaces or Parking areas which is less than 1.6 W/sqm, full credit points will be awarded. • All light in outdoor area should be downward focused.
Required Documents for Submission	:	Pre-Certification: Design of Lighting, Declaration of the Applicant of the Project. Post-Certification: Detailed Design of Lights with Specification, Inventory of the Lights with Suppliers Cut Sheet, Declaration of the Engineer in Charge.

iv. Building Material

20	:	iv
Credit Title	:	Building Materials
Credits Points	:	Use of Regional Materials
Credit Number	:	4.1
Points for Credit	:	2 (maximum)
Point options	:	2– Building Materials 100% Produced in Bangladesh
	:	1 – Mix use of Building Materials imported from others
Goal	:	Promotion of Regional Materials and Reduction of Carbon Footprint.
Eligibility	:	If the proposed project is constructed using 100% Bangladesh produced Building material, full credit points will be awarded. Mix use of building material which are imported from other countries will get 2 out of 4 credit point.
Required Documents for Submission	:	Pre-Certification: Detailed BOQ and Declaration of the Applicant/ Post-Certification: Material Inventory and Declaration of Engineer in charge.

21	:	iv
Credit Title	:	Building Materials
Credits Points	:	Material with Recycled Content
Credit Number	:	4.2
Points for Credit	:	4 (cumulative)
Point options	:	1 – Use cement with Fly ash (CEM II, BM)
	:	1 – Use of Steel produced using recycle steel materials.
	:	1 – Use of Flush Door (minimum 70% of total door)/ Particle Board with Recycled Materials in interiors decoration.
	:	1 – Reuse of building components (window, door, Etc.) or Salvage materials (bricks, rebars, grills, etc.)
Goal	:	Promotion of the Materials with recycled contents in construction.
Eligibility	:	Use of cement with Fly ash (CEM II, BM) will also receive 1 credit point. Use of steel produced using recycle steel materials will receive 1 credit point. If the project uses minimum of 70% flush doors, /Use of Particle Board with recycled materials will also receive 1 credit point. Reuse of Building Component (window, door, Etc.) or Salvage materials (bricks, rebars, grills, etc.) Total 4 points cumulatively achievable.
Required Documents for Submission	:	Pre-Certification: Detailed BOQ and Declaration of the Applicant/ Post-Certification: Material Inventory and Declaration of Engineer in charge.

22	:	iv
Credit Title	:	Building Materials
Credits Points	:	Materials and Construction Management
Credit Number	:	4.3
Points for Credit	:	3 (cumulative)
Point options	:	1 – Provide Fencing at Site and Safety measures during construction
		1 – Keep Construction Materials in Marked Place with Coverage
		1 – Cover Properly during transportation of all Materials, Spray water to Prevent Dust Pollution, Take Measures for Reduction of Noise Pollution
Goal	:	To reduce environmental impact during construction of the project.
Eligibility	:	Credit Point of 1 will be awarded to the project for each of measures, like: Providing fencing at Site and Safety measures during construction, keeping construction materials in Marked Place with Covering, Proper covering during transportation of all Materials and Spraying water to prevent Dust Pollution as well as taking measures for reduction of noise pollution. Full credit point of 3 will be awarded to the project for taking all the above-mentioned measures.
Required Documents for Submission	:	Pre-Certification: Declaration of the applicant of the project. Post-Certification: Photo Evidence and Declaration of the Engineer in charge.

23	:	iv
Credit Title	:	Building Materials
Credits Points	:	Use of low-environmental impact materials in Building
Credit Number	:	4.4
Points for Credit	:	2 (1+1)
Point options	:	Credit score of 1 out of 2 will be awarded for the compliance of any one of the following features. Another credit score will be awarded for the compliance of more than one feature from the following list.
		<ul style="list-style-type: none"> • Use UPVC Door Window Frame/Board
		<ul style="list-style-type: none"> • Use Wood from Short Maturity life trees/ Certified Wood from BFRI
		<ul style="list-style-type: none"> • Use Building Materials in Exterior / Design Intervention which Require very Low Maintenance of the Building (maintenance required not less than 3years after application of such materials)
	:	<ul style="list-style-type: none"> • Use permeable Uni paver / concrete blocks/ recycled pvc tile in Pavements
Goal	:	Promotion of the use of materials in construction of the building which have low-environmental impact.
Eligibility	:	Credit score of 1 out of 2 will be awarded for the compliance of any one of the following features. Another credit score will be awarded for the compliance of more than one feature from the following list: Use of UPVC Door Window Frame/Board, use wood from short maturity life/certified wood from BFRI, use Building Materials in Exterior / Design Intervention which require very Low Maintenance of the Building, use of permeable Unipaver / Concrete Blocks/ Recycled PVC Tiles in Pavements.
Required Documents for Submission	:	Pre-Certification: Material Specification, Declaration of the Applicant. Post Certification: Material Inventory with Suppliers Specification, Declaration of the Engineer in Charge.

24	:	iv
Credit Title	:	Building Materials
Credits Points	:	Masonry and Partition Wall Construction
Credit Number	:	4.5
Points for Credit	:	4
Point options	:	4 – Use of 100% Non-fired Concrete Hollow Blocks/AAC Blocks
		3- Use of Non-fired Concrete Hollow Blocks/AAC Blocks in all inner partition wall and solid Concrete Block in external walls
		2 – Use of 100% Non-fired Solid Concrete in all walls
		1– Use of Ceramic Hollow/Auto Brick with holes Produce by Efficient Kiln.
Goal	:	To reduce Carbon Emission produced by Masonry Unit and Promotion of Environment Friendly Masonry and Partition Wall Materials.
Eligibility	:	If the building uses 100% non-fired Concrete Hollow Block/AAC, it will receive full credit point. In the case of mixed usage of non-fired Concrete Hollow Blocks/AAC Blocks, the awardable credit point will be 3 out of 4. Credit points of 2 out of 4 will be given for 100% usage of non-fired Solid Concrete Block in all walls. 1 out of 5 credit points will be awarded for the use of ceramic Hollow or Auto Bricks produced by efficient kilns. No points will be awarded for using traditional clay fired brick.
Required Documents for Submission	:	Pre-Certification: Material Specification, Declaration of the Applicant. Post Certification: Material Inventory with Suppliers Specification, Declaration of the Engineer in Charge.

v. Indoor Environment Quality

25	:		v
Credit Title	:	Indoor Environment Quality	
Credits Points	:	Use of Low VOC Materials (Paint, Glue etc.)	
Credit Number	:	5.1	
Points for Credit	:	2	
Point options	:	Yes/No	
Goal	:	To ensure fresh breathing interior environment.	
Eligibility	:	<p>All interior finishing products (Paint, Tiles, Venire wood, Particle Board)</p> <ul style="list-style-type: none"> - Paint - Maximum VOC level 10g/L - Venire & particle board- Free of Added urea formal dehydrate - Adhesive - Maximum VOC level 10g/L 	
Required Documents for Submission	:	<p>Pre-Certification: Declaration of the Applicant of the Project.</p> <p>Post-Certification: Materials Specification or Data Sheet, Material Inventory, Declaration of the Engineer in Charge.</p>	

26	:		v
Credit Title	:	Indoor Environment Quality	
Credits Points	:	Daylight Access into Living Spaces	
Credit Number	:	5.2	
Points for Credit	:	4 (Maximum)	
Point options	:	4 – 75% window/opening area of rooms	
		3 – 55% window/opening area of rooms	
		2 – 35% window/opening area of rooms	
		1 – 15% window/opening area of rooms	
Goal	:	To ensure minimum required light use and save energy.	
Eligibility	:	<p>Full credit points will be awarded to the project where, window area is minimum of 75% of the cumulative average of all habitation rooms floor area. Similarly, 3 out of 4 Credit point will be given to the project where window area is 55%, 2 out of 4 credit point will be given to the project having 35% window area and 1 Credit Point will be awarded to minimum of 15% window area.</p>	
Required Documents for Submission	:	<p>Pre-Certification: Detailed Drawings, Window Schedule and Declaration of the Applicant of the Project.</p> <p>Post-Certification: Detailed Drawings, Window Schedule, Photograph and Declaration of the Engineer in Charge.</p>	

27	:	v
Credit Title	:	Indoor Environment Quality
Credits Points	:	Fresh Air Ventilation
Credit Number	:	5.3
Points for Credit	:	2
Point options	:	Yes/No
Goal	:	Reduction of CO ₂ and Maintain proper O ₂ level for the Proper indoor Environment.
Eligibility	:	Credit Point will be awarded to the project where fresh air unit has been installed with the Air Conditioning system of the building for the reduction of CO ₂ level of the indoor environment.
Required Documents for Submission	:	Pre: Proper drawing design of Fresh air ventilation, Declaration of the Applicant of the Project. Post: Drawing Design, Photograph, and Declaration of the Engineer in Charge.

28	:	v
Credit Title	:	Indoor Environment Quality
Credits Points	:	Cross Ventilation
Credit Number	:	5.4
Points for Credit	:	1
Point options	:	Yes/No
Goal	:	To ensure proper ventilation and thermal comfort in indoor environment and to encourage the passive ventilation system.
Eligibility	:	Credit Point will be awarded to the project where 2/3 rd of all habitable rooms have multiple window for proper cross ventilation and thermal comfort of the inhabitants of the Building.
Required Documents for Submission	:	Pre-Certification: Detailed Drawings and Declaration of the Applicant. Post-Certification: Detailed Drawings, Photographs and Declaration of the Engineer in Charge.

29	:	v
Credit Title	:	Indoor Environment Quality
Credits Points	:	Exhaust System
Credit Number	:	5.5
Points for Credit	:	1
Point options	:	Yes/No
Goal	:	To maintain better indoor air quality in kitchen and toilets.
Eligibility	:	Credit point will be awarded to the project where Exhaust Fan, Kitchen Hood or any other exhaust appliances has been installed to maintain the proper indoor air quality in the Kitchen, Toilet or any such kinds of spaces.
Required Documents for Submission	:	Pre-Certification: Detailed Drawings & Declaration of the Applicant. Post: Detailed Drawing, Photograph & Declaration of the Engineer in Charge.

vi. Waste Management

30	:	vi
Credit Title	:	Waste Management
Credits Points	:	Waste Management (ETP/Septic Tank, soak well etc.)
Credit Number	:	6.1
Points for Credit	:	4
Point options	:	Yes/No
Goal	:	To ensure proper waste water disposal from Buildings.
Eligibility	:	Credit Point will be awarded to those buildings where waste water disposal system should be attached to the ETP/Septic Tank, Soak Well etc.
Required Documents for Submission	:	Pre-Certification: Plumbing Drawings and Declaration of the Applicant of the Project. Post-Certification: Plumbing Drawings, Photographs and Declaration of the Engineer in Charge.

31	:	vi
Credit Title	:	Waste Management
Credits Points	:	Handling of construction waste materials
Credit Number	:	6.2
Points for Credit	:	1
Point options	:	Yes/No
Goal	:	Proper handling of Construction Waster during Construction and transportation to prevent pollution and proper management of waste.
Eligibility	:	Credit points will be awarded to the Project where preservation of construction waste has been done properly and transportation of waste has been done through covered vehicle.
Required Documents for Submission	:	Pre-Certification: Declaration of the Applicant of the Project. Post-Certification: Inventory of the generated waste and recycled quantity, Photo Evidence, Declaration of the Engineer in Charge.

vii. Social Response

32	:	vii
Credit Title	:	Social Response
Credits Points	:	Safety Measures during Construction
Credit Number	:	7.1
Points for Credit	:	2
Point options	:	Yes/No
Goal	:	Ensure safety of all relevant personals during construction.
Eligibility	:	<ul style="list-style-type: none"> • Provide all kinds of Safety vest, noise & welding protection equipment to all construction workers • Preserve instant firefighting equipment and first aid box at site • Arrange safety training for worker, • Mark with safety and quotation signage, emergency light, emergency exit during construction • Provide temporary railing or barrier to stair, lift core, parapet area. • Assign a Physician for regular health checkup once in a month and emergency response period. • Provide Fencing around the site • Provide safety Nate both horizontal and Vertical direction for construction.
Required Documents for Submission	:	Safety Equipment List, Declaration of the Architect/Engineer of the Project, Photographs etc.

33	:	vii
Credit Title	:	Social Response
Credits Points	:	Fire Safety during Building Occupancy
Credit Number	:	7.2
Points for Credit	:	1
Point options	:	Yes/No
Goal	:	Ensure Safety during the Operation Period of the building.
Eligibility	:	Full credit point will be awarded if the building is designed considering the rules of Part 4: Fire Protection section of the Bangladesh National Building Code (BNBC 2020). During operation period all Fire safety equipment will have to be in place as per design.
Required Documents for Submission	:	Pre-Certification: Detailed drawing of Fire Safety, Equipment List. Post-Certification: Declaration of the Architect/Engineer in charge.

34	:	vii
Credit Title	:	Social Response
Credits Points	:	Gender Response
Credit Number	:	7.3
Points for Credit	:	1
Point options	:	Yes/No
Goal	:	To address the gender issues in construction.
Eligibility	:	Credit point will be awarded if 20% of total worker is either female/ transgender/ differently abled or collectively.
Required Documents for Submission	:	Pre-Certification: Declaration of the Applicant of the Project. Post-Certification: Attendance sheet of Workers and Certification of the Engineer in charge of the project.

35	:	vii
Credit Title	:	Social Response
Credits Points	:	Design for differently abled and Senior Citizens
Credit Number	:	7.4
Points for Credit	:	1
Point options	:	Yes/No
Goal	:	Ensure Universal Accessibility of the building for differently abled, physically challenged or senior citizens.
Eligibility	:	If the building is designed considering the rules of Universal Accessibility of Part 3, Appendix D of Bangladesh National Building Code (BNBC-2020), the credit point will be awarded.
Required Documents for Submission	:	Detailed Drawings mentioning the relevant dimensions regarding Universal Accessibility.

viii. Innovation in Sustainability

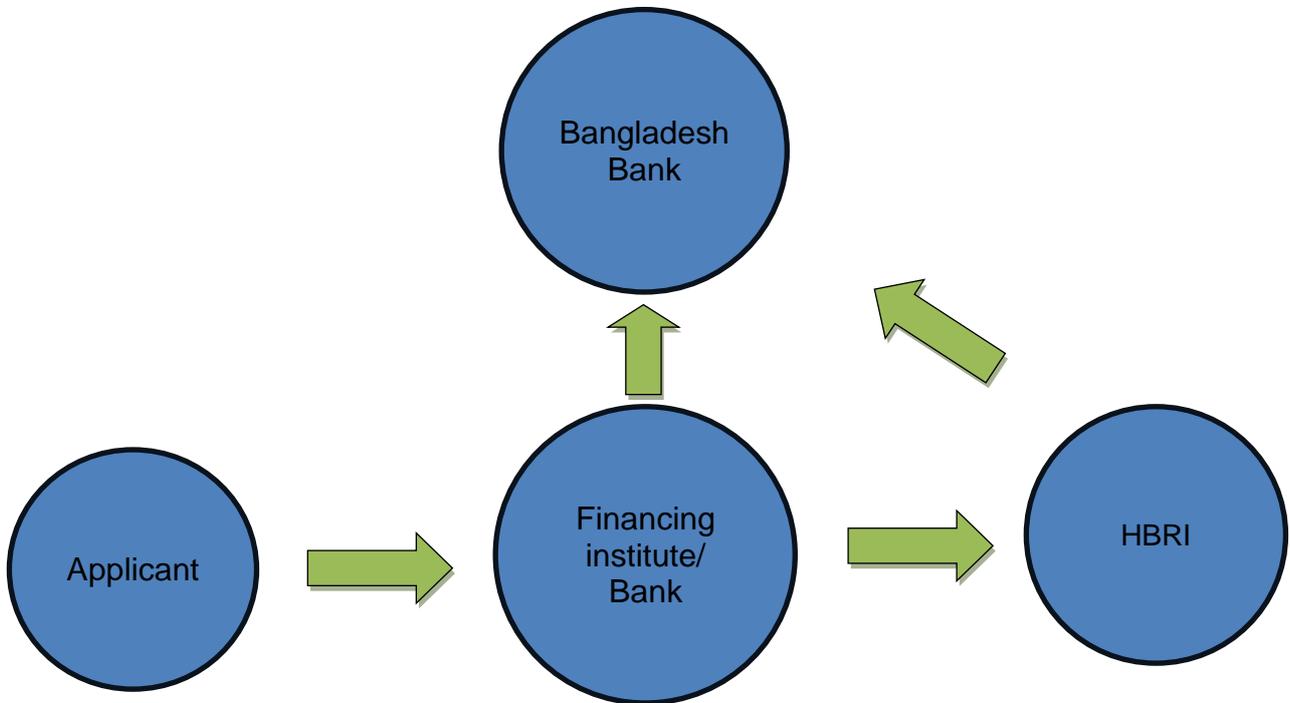
36	:	viii
Credit Title	:	Innovation in Sustainability
Credits Points	:	Intervention in Sustainability
Credit Number	:	8.1
Points for Credit	:	5
Point options	:	Yes/No
Goal	:	To encourage activities that leads to sustainable solution or approach
Eligibility	:	If the applicant demonstrates any significant Intervention in Sustainability or conduct awareness program for the dissemination of the sustainable solution of the building will get full credit score or If the applicant can submit documents supporting his/her donation or funding towards Sustainable intervention to any relevant research/development activities will also be awarded with full credit score.
Required Documents for Submission	:	Proof/Documents of such Activities.

5. GreenARCH Certification Process:

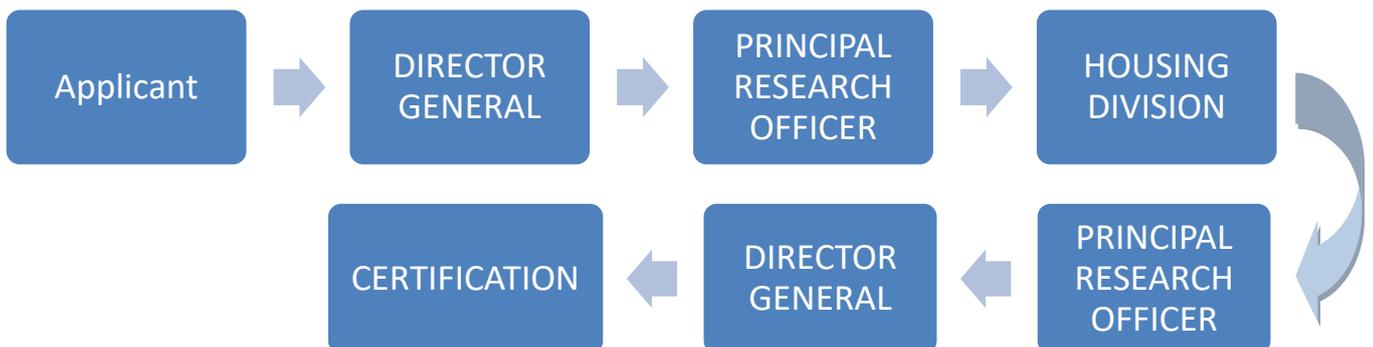
Option A: (Financing Institute to HBRI):

This system will fascinate the refinancing scheme of Bangladesh bank. The applicant will submit a loan application to financing institute for financing. The financing institute will forward the application to HBRI for precertification and after reviewing the document and based on the declaration (Signed on non-judicial stamp) made by the applicant the HBRI will provide a Precertification of GreenARCH. After completion of the project the Post Certification will awarded to the Project.

The Technical team of the financial institution will monitor, coordinate and preliminary assess the project. The HBRI authority will check and award the rating either based on given document or also may physically visit the project if required. The information of the Certification will be uploaded in HBRI Website.

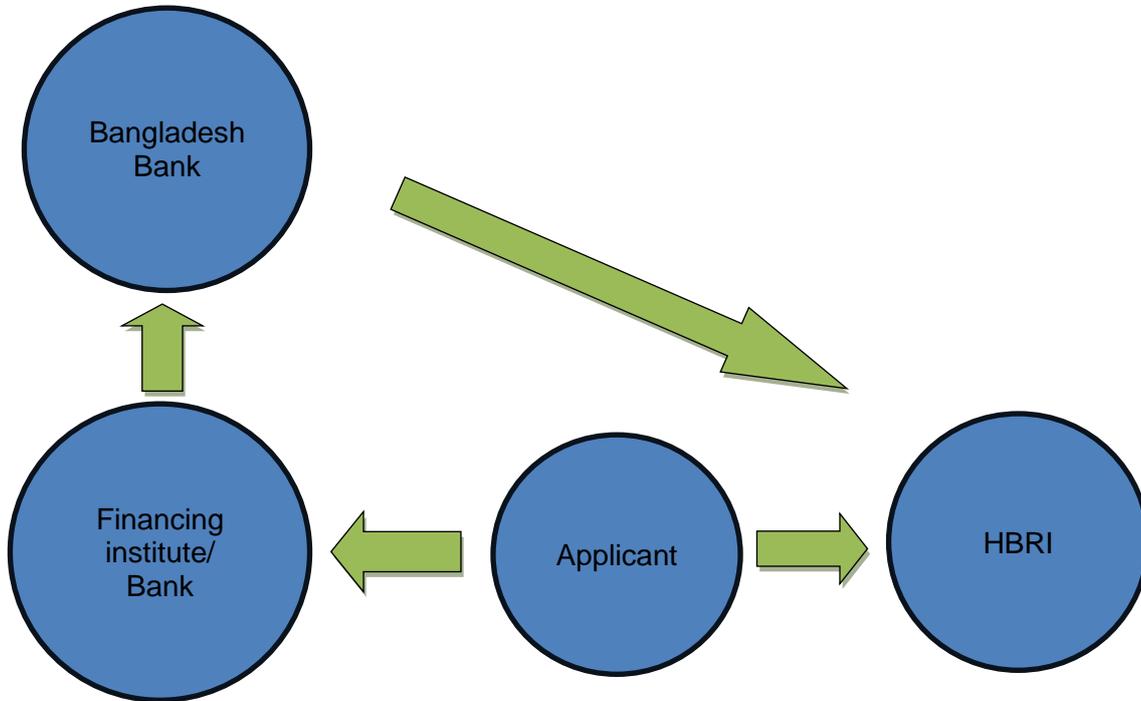


Application Process:

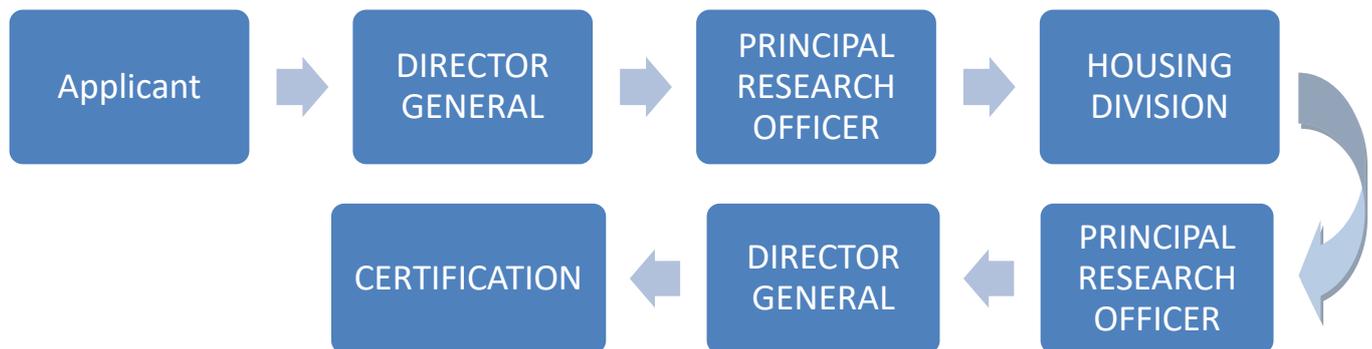


Option B (Applicant to HBRI):

Any Applicant may also directly apply to HBRI to certify his project. The fee structure will be different from option A. as the evaluation will directly be done by HBRI. The Applicant may also apply for similar loan after getting the precertification from HBRI directly. The information of the Certification will be uploaded in HBRI Website.



Application Process:



6. Fee Structure:

Certification Process A

- i. 10,000.00 (Ten Thousand) Registration Fees upto 3000 sft.
- ii. 2 tk per sft. up to 5000 sft floor area for Occupancy type A1 and A2
- iii. 5 tk per sft. sft floor area for Occupancy type A3 and floor area more than 5000 of occupancy type A1 &A2
- iv. 10 tk per sft. for Occupancy type A4&A5
- v. 5000 taka for Pre certification for Occupancy A1&A2
- vi. 10,000 taka for Pre certification for Occupancy A3, A4&A5

Certification Process B

- i. 20,000.00 (Ten Thousand) Registration Fees
- ii. 5 tk per sft. floor area for Occupancy type A1 and A2 for upto 3000 sft
- iii. 10 tk per sft. Upto floor area for Occupancy type A3
- iv. 15tk per sft. for Occupancy type A4&A5
- v. 15,000.00 for only Pre certification
- vi. Additional visit expanses (if necessary).

7. GreenARCH Preparation Team:

Advisor:

Md. Ashraful Alam, Director General, HBRI

Prepared by:

Md. Nafizur Rahman, Principal Research Officer, HBRI

Monjur Parvez, Senior Research Architect (A.C), HBRI

Md. Muktadir Abedin, Assistant Architect, HBRI

Annexure 1: Project Registration Form**Green, Affordable and Resilience Certification for Habitats (GreenARCH):****Project Registration**

General Project Information

Project Name:

Address:

Post Code:

GPS Coordinate:

Occupancy Type:

Project Details

Site Area:

Total Built-up Area

No. of buildings within site:

Date of Construction Commencement:

Date of Construction Completion:

No. of Buildings:

Developer/ Owner's Contact Information

Primary Contact

Name:

Designation:

Organization:

Office Address:

Post Code:

Telephone Number:

Mobile Number:

Email ID:

Membership No:



Project Coordinator Contact Information

Name:
Designation:
Organization:
Address :
Post Code:
Telephone Number:
Mobile Number:
Primary Email ID :
Secondary Email ID :

Architect & Engineer Contact Information (If Any)

Name:
Organization:
*Address:
Telephone Number:
*Mobile Number:
*Email ID:
Website:
IAB/IEB Membership No:

Recommendation Financial Institute Details (If Any)

Annexure 2: Energy Efficiency and Sustainability Chapter of BNBC (Part-3, Chapter-4)

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বাংলাদেশ গেজেট, অতিরিক্ত, ফেব্রুয়ারি ১১, ২০২১

PART III Chapter 4 Energy Efficiency and Sustainability

4.1 Scope

The purpose of including this Chapter in the Code is to enhance the design and construction of buildings through the use of building concepts having a positive environmental impact and encourage sustainable construction practices, allowing efficiency and conservation of energy, water and building materials, and to promote resource efficiency.

In addition to the clauses stipulated here, all Codes and standards relevant to a building occupancy as set forth in other Sections of this Code will be applicable during implementation.

Design and drawings will be submitted to indicate the location, nature and scope of the proposed energy efficient/sustainable feature. These shall indicate compliance to the provisions of this Code, and will be supplied by the relevant design professionals, e.g. electrical engineers, mechanical engineers, plumbing engineers, etc., supporting architectural drawings.

4.1.1 Rationale for Sustainable/Green Buildings

Climate change is an established phenomenon affecting the environment globally and it is recognized that buildings and the built environment play a vital role in the process, impacting on the natural environment and the quality of life. Sustainable development concepts and approaches applied to the design, construction and operation of buildings or to any built environment can enhance both the economic and environmental benefits of the community in Bangladesh and around the world. Energy efficiency and sustainability is not an individual issue rather an integrated and inseparable part of the building design and construction process. The benefits of sustainable design principles include resource and energy efficiency, healthy buildings and materials, ecologically and socially sensitive land use and strengthened local economics and the communities, objectives vital for future development of Bangladesh.

4.2 Definitions

DAYLIGHT ZONE	An area with a depth of 5m parallel to any glazed external wall.
EMERGENCY LIGHTING	Lighting used for emergency spaces and functions, e.g. in fire stairs, for egress path signage.
GREY WATER	Waste water generated from wash hand basins, showers and baths, Grey water often excludes discharge from laundry, dishwashers and kitchen sinks due to the high nutrient levels. It differs from the discharge of WC's which is designated sewage or black water to indicate it contains human waste.
REGULARLY OCCUPIED SPACE	All the main areas in the buildings that are used on a frequent basis, such as living rooms, bedrooms, classrooms, lobbies, meeting rooms, hall rooms and office spaces. Service spaces like toilets, bathrooms, corridors and stores will not be considered as frequently occupied areas.
WINDOW TO WALL RATIO OF BUILDING (WWRB)	The window-to-wall ratio 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. It does not include glass surfaces used ornamentally or as cladding, which do not provide transparency to the interior. Only facade surfaces are counted in the ratio, and not roof surfaces.
LIGHTING POWER DENSITY (LPD)	Average total lighting power installed divided by the total occupied area.
SHADING COEFFICIENT (SC)	The ratio of solar heat gain at normal incidence through glazing to that occurring through 1/8 inch thick clear, double-strength glass. Shading coefficient, as used herein, does not include interior, exterior, or integral shading devices.
SOLAR HEAT GAIN COEFFICIENT (SHGC)	An indicator of glazing performance is the amount of heat admitted through the glass vis-à-vis the total heat incident on the glass by virtue of direct solar radiation. The unit is a simple fraction or percentage.

U-VALUE (THERMAL TRANSMITTANCE)	Heat transmission in unit time through unit area of a material or construction and the boundary air films, induced by unit temperature difference between the environments on each side. Units of U-value are $W/m^2/°k$
VISIBLE LIGHT TRANSMITTANCE (VLT)	Amount of light transmitted through glazing, expressed as a simple fraction or percentage

4.3 Site Sustainability

This Section deals with sites to ensure energy efficiency through passive and low energy architectural features and management of resources.

4.3.1 Mandatory Unpaved Area

Fifty (50) percent of mandatory open space shall be permeable on sites of all occupancy categories. The permeable area shall not remain bare generating dust, but will have green cover or be treated with perforated paving ($\geq 50\%$), organic mulch, charcoal, etc.

4.3.2 Site Drainage and Run-Off Coefficient

Designs shall indicate site drainage considerations along with flash flooding and erosion prevention measures for sites above $1340 m^2$ in area. As excessive paving is largely responsible for fast water run-off and flash flooding, design shall indicate measures taken to make paving permeable. The net run-off from a site shall be a maximum of sixty (60) percent. The following method will be used for the calculations, in conjunction with Table 3.4.1:

$$\text{Total Perviousness on Open Area of Site } (A_p) = A_1 \times C_1 + A_2 \times C_2 + \dots \quad (3.4.1)$$

Where, A_1 , A_2 , etc., being the areas of various surfaces, e.g. Pavements, roads, vegetation, etc., with different run-off coefficients C_1 , C_2 , C_3 etc., shown in the Table 3.4.1.

4.3.3 Vegetation Plan

For sites above three (3) acres, it is mandatory for a vegetation plan to be submitted along with the site plan and Irrigation Plan, where priority shall be given to native plants in the selection for planting.

4.3.4 Irrigation Plan

4.3.4.1 For sites above ten (10) acres, an irrigation plan with construction details shall be submitted with the site plan, where considerations shall include for management of rainwater.

4.3.4.2 For these sites a retention pond of $\geq 3\%$ of site area shall be provided. This shall include any existing natural water body within the site.

Table 3.4.1: Run-Off Coefficients of Various Surfaces

Surface Type	Run-Off Coefficient, C
Roofs, conventional	0.95
Green Roofs (soil/growing medium depth \geq 300 mm)	0.45
Concrete paving	0.95
Gravel	0.75
Brick paving	0.85
Vegetation:	
1-3%	0.20
3-10%	0.25
>10%	0.30
Turf Slopes:	
0-1%	0.25
1-3%	0.35
3-10%	0.40
>10%	0.45

4.3.5 Rain Water Harvesting System

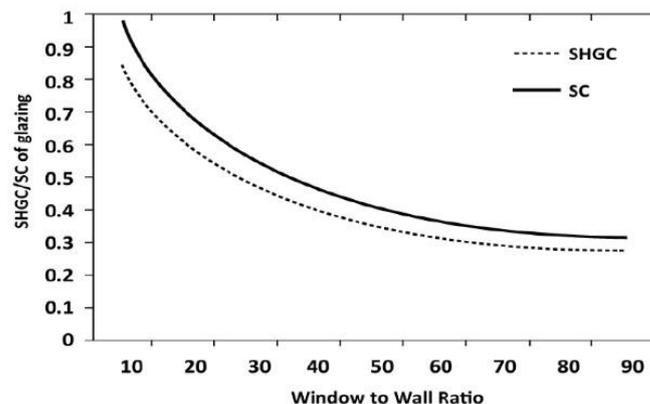
4.3.5.1 Buildings of total floor area \geq 4000 m² shall have its own rain water harvesting system as discussed in Chapter 7 Part 8 and installed complying with Section 7.13 Part 8, of this Code. The reservoir capacity shall be a multiple of the area of Ground Coverage of the building and a rain collection coefficient of 0.073.

4.3.5.2 The rainwater reservoir may be placed under the roof or at lower levels, including underground.

4.4 BUILDING ENVELOPE

4.4.1 Window to Wall Ratio

4.4.1.1 For mechanically ventilated and cooled buildings of all occupancies, other than Hazardous and Storage, the Window to Wall ratio of building (WWRB), will be determined in conjunction with the glazing performance, as indicated by the Solar Heat Gain Coefficient (SHGC) or Shading Coefficient (SC) of the glass used. The relationship is given in Figure 3.4.1 and Table 3.4.2.

**Figure 3.4.1 Selection of glazing SHGC based on WWR**

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বাংলাদেশ গেজেট, অতিরিক্ত, ফেব্রুয়ারি ১১, ২০২১

Table 3.4.2 Selection of Glazing SHGC Based on WWR in Tabular Format

WWR	SHGC	SC
10	0.85	0.98
20	0.6	0.69
30	0.5	0.57
40	0.4	0.46
50	0.35	0.4
60	0.33	0.38
70	0.31	0.36
80	0.3	0.34
90	0.27	0.31

4.4.1.2 In all of the above cases, the Visible Light Transmittance (VLT) of the glazed element shall not be lower than thirty five (35) percent.

4.4.1.3 For Air-conditioned buildings with external shading, permitted SGHC limit may be adjusted, but the increase shall not exceed values determined by Eq. 3.4.2 below:

$$SHGC_{adj} = SHGC + A \quad (3.4.2)$$

Where,

$SHGC_{adj}$ is the adjusted solar heat gain coefficient limit for windows with shading

$SHGC$ is the solar heat gain coefficient from Table 3.4.2

A is the SHGC correction factor for the external shading as per Table 3.4.3 or Table 3.4.4: For a window with overhang and fin, the value of A can be only used either from overhang or from fin.

4.4.1.4 For naturally ventilated buildings, window size shall be based on Sec 4.4.2. Window Openings of this Code and shading shall be provided as per Sec 4.4.3.

4.4.1.5 Window size shall under no circumstances be less than as stipulated under Part 3: Chapter 1, Section 1.17 of this Code.

Table 3.4.3: Correction Factor against Overhang Shading Projection Factor

Overhang Projection Factor	SHGC Correction Factor(A)
0.0	0.00
0.1	0.05
0.2	0.09
0.3	0.14
0.4	0.19
0.5	0.24
0.6	0.28
0.7	0.33
0.8	0.38
0.9	0.43
1 or higher	0.47

Projection factor for overhang is the depth of the overhang divided by the height of the window

Table 3.4.4: Correction Factor against Vertical Shading (fins) Projection Factor

Vertical Shading (Fins) Projection Factor	SHGC Correction Factor (A)
0.0	0.00
0.1	0.04
0.2	0.08
0.3	0.12
0.4	0.16
0.5	0.20
0.6	0.24
0.7	0.28
0.8	0.32
0.9	0.36
1 or higher	0.40

Projection factor of fins is the depth/length of fin divided by the width of the window.

4.4.2 Window Openings

Mechanically ventilated and cooled buildings of all occupancies, other than hazardous, retail and storage, shall have the provision of using natural ventilation for cooling and fresh air, in frequently occupied areas, with a fraction $\geq 4\%$ of the floor area being specified as openable windows. Openable balcony doors can be counted in this calculation. Note if the window area defined under Sec 4.4.1 is less than openable area, then fifty (50) percent of window area should be openable.

4.4.2.1 Naturally ventilated buildings of all occupancies, other than hazardous and storage, shall provide for fifty (50) percent of its window area to be openable.

4.4.2.2 All the openable windows above ground should be designed with safety measures in place such as protection hand rails for child safety.

4.4.2.3 Windows to any regularly occupied space on exterior walls in naturally ventilated buildings shall be shaded conforming to Sec 4.4.3.

4.4.3 Shading

4.4.3.1 For naturally ventilated buildings of all occupancies, horizontal sunshades shall be provided over windows on South, East and West, the depth of which shall be calculated by multiplying the window height with a factor of 0.234 (Figure 3.4.2). Horizontal louvers can be used instead of sunshades, in which case, depth of louver shall not be less than 0.234 times the gaps between the louvers (Figure 3.4.3).

4.4.3.2 Vertical Shading devices shall be provided on the West, depth of which shall be calculated, by multiplying the gaps between the vertical fins, or the window width if the shades border the window width, with a factor of 0.234 (Figure 3.4.4).

Exceptions:

- (a) The above rule shall be relaxed if it can be demonstrated that shading is achieved by existing neighbouring structures.
- (b) The north side of all buildings are exempt from the above rules.

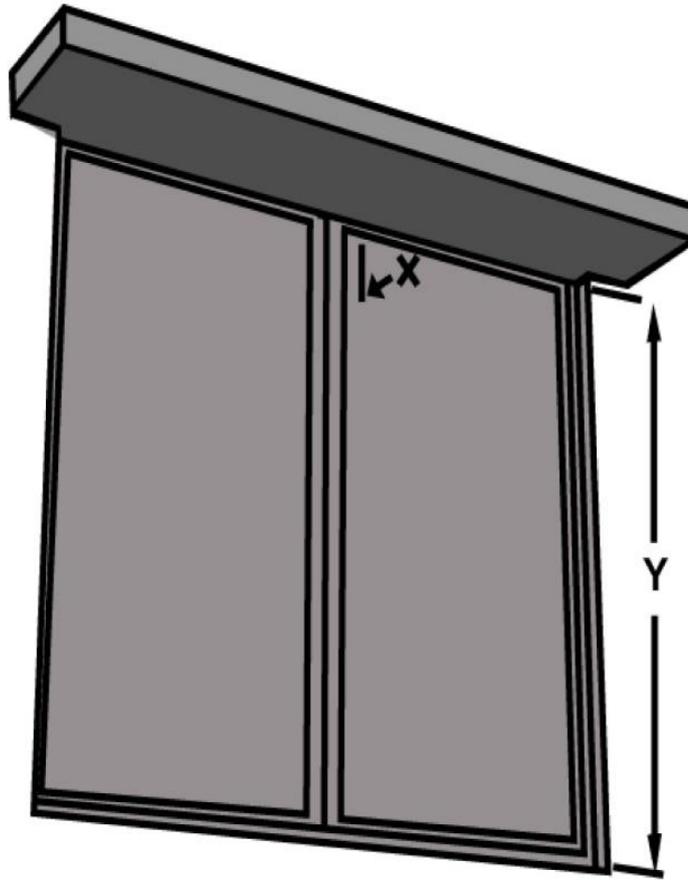


Figure 3.4.2 Horizontal shade: $x \geq 0.234y$

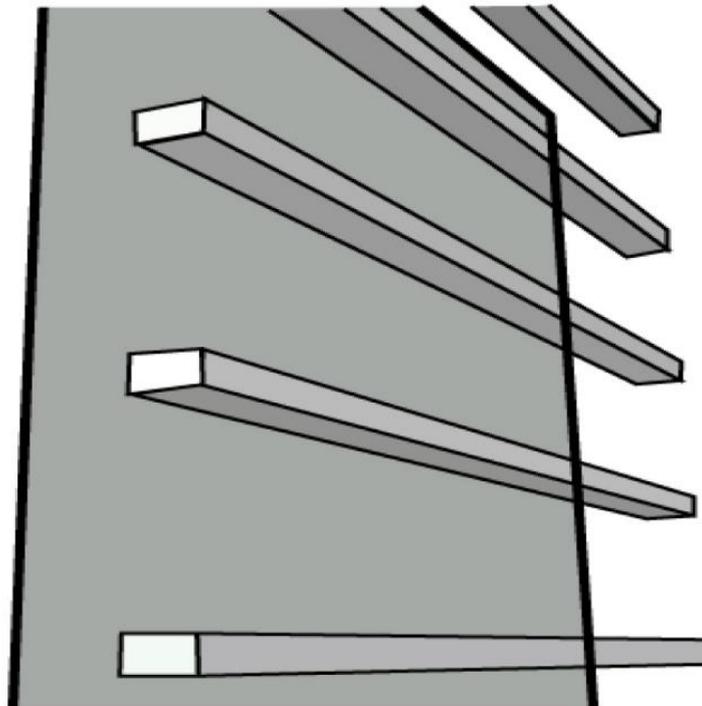


Figure 3.4.3 Horizontal Louvres: relationship between depth (x) and gap (y): $x \geq 0.234y$

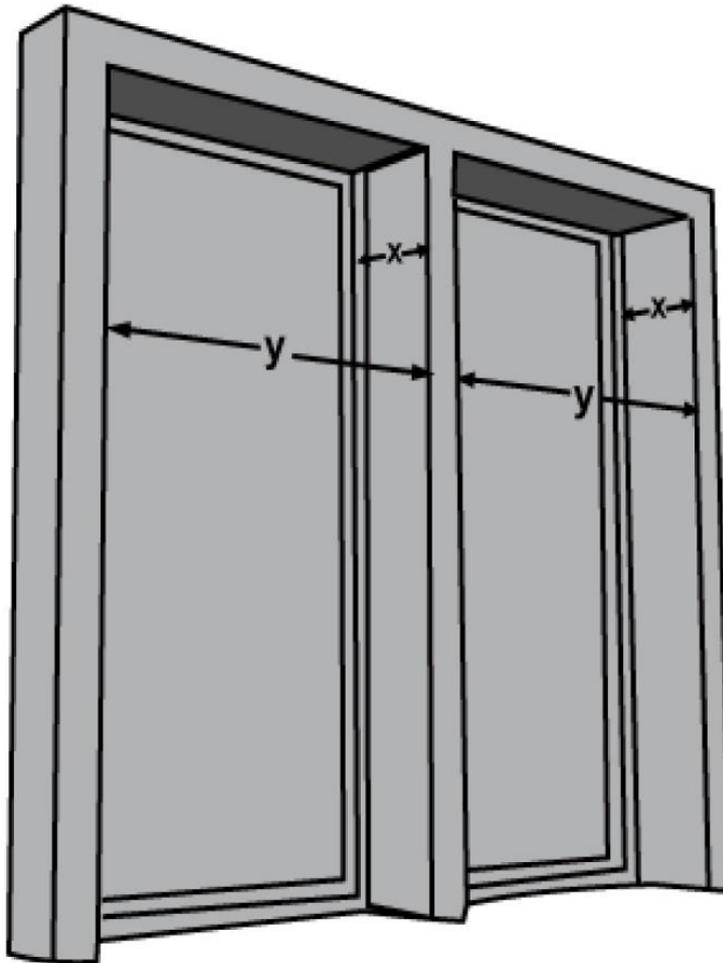


Figure 3.4.4 Vertical shading or louvres: relationship between depth (x) and gap (y): $x \geq 0.234y$

4.4.4 Roof Insulation and Green Roofing System

4.4.4.1 Fifty (50) percent of horizontal exposed roof slabs of Buildings of Occupancy B, C, D and E, shall have green roofing system, to manage water run-off from roof tops, to control internal temperatures within the top floors and to reduce the carbon footprint of the building. This shall not include any covered roof surface, e.g. solar panels, solar thermal heaters, machinery for mechanical or electrical systems, water tanks, etc. Stair loft or machine room tops will be exempt from this rule.

- (a) The roof slab design shall consider structural support of the green roof system, with growing medium of minimum 300 mm.
- (b) The design will indicate protection from dampness and provide a drainage system

4.4.4.2 Horizontal roof slabs, which are not covered by green roofing system, will have roof slabs with insulation, so that the time lag and decrement factor is greater than the other floor slabs of the building.

4.5 Energy Efficient Building Systems

4.5.1 Daylighting and Supplementary Lighting System

4.5.1.1 Window area shall not be less than 14 percent or 1/7th of the total floor area of the building.

4.5.1.2 Every regularly occupied space shall contain a minimum percentage of day-lit area along the building perimeter zones, with no window less than an area of 1 m² and will ensure the appropriate stipulations given below.

- (a) for rooms that measure less than 8 m in depth, window area shall be at least 20 percent of the area of the external wall of the room.
- (b) for rooms that measure between 8 to 14 m in depth, window area shall be at least 30 percent of the area of the external wall of the room and 35 percent of the external wall.
- (c) for rooms that measure more than 14 m in depth, window area shall be at least 35 percent of the area of the external wall of the room.

4.5.1.3 For Buildings of Occupancy A5, B, C, E1 and E2, photoelectric sensors shall be connected to luminaires, to enable dimming or switching off lamps that do not require to be operated, due to the presence of adequate daylight. The photoelectric sensor shall be located approximately at half (½) the depth of day-lit zone.

4.5.1.4 If occupancy sensors are installed in the daylight area, the occupancy sensor shall override the daylight sensor during non-occupancy period.

Exceptions:

- (a) Zones with special requirements are exempt from the stipulation of Sec 4.5.1.3. The designer shall justify the reason for exemption.
- (b) Hotel guest rooms are exempt.

4.5.2 Lighting Power Density

4.5.2.1 Lighting Power Density (LPD) of the values set in Table 3.4.5 shall be provided for the respective functions within all building occupancies, or as specified.

4.5.2.2 In addition to Sec 4.5.2.1, Illumination values (Lux) as specified in Tables 8.1.5 to 8.1.14 of Part 8 of this Code shall be provided for buildings of the respective occupancies.

4.5.3 Occupancy Sensors

4.5.3.1 In order to limit the use of electricity in the unoccupied areas of buildings, occupancy sensors linked to lighting (except for emergency and security lighting) shall be installed in the public areas of buildings of occupancies specified in Table 3.4.6.

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Table 3.4.5: Maximum Allowable Lighting Power Density for Different Occupancies

Occupancy		Maximum LPD (W/m ²)
E1 and E2	Offices	9
F1 and F2	Retail/Mercantile	13
A5	Hotels	9
D1	Hospitals	11
A1, A2 and A3	Apartments/residences	7
B	Educational	11
All occupancies	Covered parking*	3
All occupancies	Open/outdoor parking	1.6

* LPD for car parks shall calculated from the total lighting power divided by the total car park area

Table 3.4.6: Applicability of Occupancy Sensors

Occupancy		Applicability
E1 and E2	Offices	Meeting rooms and corridors
A5	Hotels	Meeting rooms and corridors
A3	Apartments	Covered car parks and corridors
B	Educational	Covered car parks and corridors

4.5.3.2 For car parks a minimum 2/3rd of the lighting shall be controlled by occupancy sensors.

4.5.3.3 Emergency lighting shall not be connected to occupancy sensors.

4.5.4 Ceiling/ Wall Mounted Fans

4.5.4.1 For naturally ventilated buildings of occupancy A, ceiling/wall mounted fans shall be provided in each regularly occupied space.

4.5.4.2 For buildings of occupancy B, C, D, E and I, ceiling/wall mounted fans shall be provided in each room larger than 25 m², with a minimum of one fan every 25 m².

Exceptions:

- Corridors of buildings of all occupancies
- ICU, CCU, operating theatres of Hospitals and Clinics

4.5.5 Lift and Escalator Efficiencies

4.5.5.1 Escalators, in buildings of all occupancies, shall be fitted with controls to reduce speed or to stop when no traffic is detected.

4.5.5.2 Such escalators shall be designed with one of the energy saving features as described in i or ii below:

- (i) Reduced speed control: The escalator shall change to a slower speed when no activity has been detected for a period of a maximum of three (3) minutes. Detection shall be by photocell activation at the top and bottom landing areas.
- (ii) Use on demand: The escalator shall shut down when no activity has been detected for a period of a maximum of fifteen (15) minutes, designed with energy efficient soft start technology. The escalator shall start automatically when required; activation shall be by photocells installed in the top and bottom landing areas.

4.5.5.3 Elevators (lift) in buildings of occupancy A5, D1, E1, E2, F1, F2, I1 and I3 occupancies shall be provided with controls to reduce the energy demand, using the following features in traction drive elevators:

- (a) AC Variable-Voltage and Variable-Frequency (VVVF) drives on non-hydraulic elevators.
- (b) An average lamp efficacy, across all fittings in the lift car, of >55 lamp lumens/circuit watt, with provision for switching off, when lift is inactive for a period of a maximum of five (5) minutes.
- (c) The provision to operate in stand-by condition during off-peak periods, when the lift has been inactive for a period of a maximum of five (5) minutes.

4.5.6 Renewable Energy Options

4.5.6.1 Buildings of occupancy A shall use Solar or other renewable sources of energy to power 3% of the total electric load of the building, applicable to the uses in Sec 4.5.6.3.

4.5.6.2 Buildings of all occupancies other than A, shall use Solar or other renewable sources of energy to power 5% of the lighting and fan loads of the entire building, mandatory to uses in Sec 4.5.6.3.

4.5.6.3 For all occupancies, the solar or other renewable energy connection shall power spaces in the following order of priority: lighting in underground/basement spaces, dark corridors, supplementary lighting, fans, emergency lighting like fire stairs, emergency signage egress path lighting, etc.

4.5.7 Heating Ventilation and Air-conditioning (HVAC) System

For conditioned buildings, any Heating Ventilation and Air conditioning (HVAC) system planned for installation will meet energy efficiency standards specified in Part 8 of this Code.

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4.6 Internal Water Management

4.6.1 Reuse of Grey Water

Buildings of occupancy A5, E1 and E2 and I shall reuse grey water for water efficiency and management.

Grey water from wash basin shall be reused in toilet flushing and/or irrigation after filtration to ensure a BOD (Biochemical Oxygen Demand) level <50. Such water shall not be considered potable.

4.6.2 Efficient Fittings in Toilets

Water efficient fittings, including faucets, showerheads and flushes, that use less water for the same function as effectively as standard models, shall be used in buildings of all occupancies. The low flow fixtures shown in Table 3.4.7 shall be used.

Table 3.4.7: Fixture Ratings

Type of Fixtures	Quantity (max)	Unit
Water closets	Dual Flush (6/4)	liters/flushing cycle (full/low)
Shower	9.5	liters/min at 551 kPa
Urinals	3	liters/flushing cycle
Hand wash taps	6	liters/min at 417.7 kPa
Kitchen/pantry faucets	6	liters/min at 417.7 kPa

4.6.3 Service Hot Water and Pumping

In order to reduce the energy used for water heating, buildings of occupancy A5 and D1 shall use solar hot water system to supply a minimum of thirty (30) percent of the total building hot water requirements. The solar hot water system can be flat plate solar collectors or vacuum tube solar system, this system must be designed and installed with the backup system or as a pre heating for the main hot water system.

PART III

Appendix A

Planning and Development Control

A.1 Scope

In absence of planning and zoning code in the national level, this Appendix states certain planning guidelines for development control and for environmental and human safety. The guidelines formulated in this Appendix are suggestive.

A.2 Land Use Classification

Land is a finite resource. An integrated and hierarchical planning from national to local level of this resource is essential to identify and use its potential in compliance with the National Land Use Policy.

Every city, township, municipality or other settlements shall have planning and zoning regulations administered by the authority having jurisdiction to guide the existing and future developments of that settlement in compliance with the National Land Use Policy and with local or regional master planning. Any land-use planning shall clearly classify the following uses:

- (a) Permitted land use
- (b) Conditionally permitted land-use and
- (c) Restricted land use

Any such plan shall also include the preservation of open spaces and water bodies as part of the land use planning.

A.3 General Guidelines For Residential Density Planning

A.3.1 Control of residential density is a fundamental component of effective land use planning, as the relative distribution of population has major implications for all other provisions. In determining Residential density, a coherent view should be considered to achieve integrated land-use, transport, environmental and infrastructural planning.

A.3.2 Along with this integrated approach, the following factors shall also guide the residential density:

- (a) A hierarchy of residential densities should be maintained to ensure diversity of housing needs.
- (b) Residential density of an area shall correspond to the capacity of existing and planned infrastructure and environmental features of that area.

- (c) Densities should be planned in such a way that encourage public transport and reduce travel demand.
- (d) For large cities higher densities around stations and interchanges of rail based public transport system may be encouraged to reduce reliance on road based public transport system.
- (e) Since higher density residential development near high capacity transportation system creates pressure on urban land use planning, careful environmental planning with definitive environmental objectives shall be there for such instances.
- (f) To protect environmentally sensitive areas or areas of historical importance, a low density residential development should be proposed where and as necessary.
- (g) In heavily built up areas such as old towns, provision of Transfer of Development Rights (TDR) could be implemented to control over-crowding.

A.3.3 The maximum allowable density of a residential development shall be guided by the Planning Guidelines for a zone or area or locality or township which shall be prepared under and administered by the authority having jurisdiction. Floor Area Ratio (FAR) for any development shall comply with any such planning guidelines. Where such density guideline is not available, the maximum allowable density for a residential development shall be 175 units per hectare.

A.4 General Planning Guidelines For Open Space Requirements

In a high density context like ours, pressure on land is extreme. Preserving open spaces and maintaining environmental balance become a priority in this context. In any planning process, open space must be planned as a land use in its own right and not as the remainder after providing other land uses. The hierarchy of Recreational open spaces in planning settlements may be as following:

- (a) Local Open Space
- (b) Ward Open Space
- (c) Regional Open Space

Authorities having jurisdiction shall determine the extent of the terms ‘local’, ‘ward’ and ‘region’ on the basis of governance structure and the master planning for any particular area. However, in developing any area layout as specified in Sec A.5.2 of this Appendix, provisions for Local open space should be applicable. All open spaces in this hierarchy should act as a connected component of an open space network. The following paragraphs indicate few guidelines on location and space requirements for such open spaces.

A.4.1 Every locality should have Local Open Space which is required to meet primarily the passive recreational needs (e.g. outdoor sitting, jogging/ walking tracks, playgrounds for children etc.) of the population. Such spaces should be located either within the residential neighborhood or somewhere centrally to serve a wider area of more than one neighborhood. Considering the projected future population of a locality, a minimum requirement of 1 m² of Local open space per locality occupant should be allotted. Where possible such open spaces should be at least 500 m².

A.4.2 Every ward in a city or town or union should have Ward Open Space which is required to meet the active recreational needs (e.g. standard facilities for sports) and passive recreational needs of the ward population. Considering the projected future population of a Ward, a minimum requirement of 1 m² Ward Open Space per Ward occupant should be allotted. Where possible such open spaces should be at least 10,000 m² (1 hectare).

A.4.3 Every region should have Regional Open Space which is required to meet wider recreational needs of the population that cannot be served by local or ward open spaces. In metropolitan areas, Ward Open Space may supplement for 50 percent of the Regional Open Space requirement. Conscious planning effort are needed to create/ designate and/ or preserve 'Regional Open Spaces' located close to major public transport routes, taking advantage of natural landscape, waterfront, hill views, forest areas and/or views to special features that may draw visitors from all around. Where possible such open spaces should be at least 50,000 m² (5 hectare).

A.5 Community Open Space And Amenities

Every plot as specified in Sections A.5.1 and A.5.2 shall have community open space which is required to meet primarily the passive recreational needs (e.g. outdoor sitting, jogging/walking tracks, playgrounds for children etc.) of the population. Such spaces shall be located within the plot boundary. Considering the types of development, the following minimum requirements of community open space and amenities shall be applicable as per guideline of Sections A.5.1 and A.5.2 of this Appendix.

A.5.1 Community Space for a Single Tall Building or Group of Buildings In a Plot

For all residential or residential-cum-business buildings having ten or more storeys, or for all plots on which more than one residential or residential-cum-business buildings are constructed, community built space at the rate of 5 percent of the total floor area shall be provided within the building for use of the occupants of the building solely. Roofs of such buildings shall not be considered as community open spaces.

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For residential or residential-cum-business plots measuring more than 0.1 hectare, 10 percent of the area of land or 1 m² per occupant of the plot, whichever is larger, shall be left vacant to be used as children's playground. This playground shall be contiguous and shall have a length not exceeding 2.5 times its width. The playground may extend into the mandatory open space of the plot.

Open space and amenities for residential or residential-cum-business plots measuring more than 0.4 hectare shall be as per guidelines of Sec A.5.2 of this Chapter.

A.5.2 Community Open Space and Amenities in Area Layouts

(a) Residential or Business Areas

In dividing any land measuring a total of 0.4 hectares or more into residential or business plots, community open spaces and amenities shall be reserved for recreational, educational, health care and other purposes depending on the size of the population for which the layout is planned. For planning such open spaces and amenities the guidelines of Sec A.4 of this Appendix and Sec B.3 of Appendix B shall be applicable.

(b) Industrial Areas

In dividing any land measuring a total of 1 hectare or more into industrial plots, 5 percent of the total land area shall be reserved as amenity open space which shall be used as lawn, park or garden. The minimum size of such open space shall be 600 m². When the area of the open space exceeds 1000 m², the area of land in excess of 1000 m² can be used for the construction of buildings for banks, clinics, welfare centers and other common facilities for use of the persons working in the industries.

A.6 Plot Size

Plot divisions and plot sizes are part of integrated planning decision of detail area plan and shall be determined by the Area Development Authority having jurisdiction. Where no such guideline exists or yet to be undertaken, the following criteria mentioned in Sections A.6.1 to A.6.8 regarding plot size shall be applicable.

A.6.1 Residential Plots

- (a) For any future development, the minimum size of the plot for Occupancy A1, A2 and A3 shall be 66 m², 133 m² and 200 m² respectively.

The sizes of the plots and the corresponding minimum widths of road frontage of the plots shall be as specified in Table 3.A.1 provided that:

- (i) Plots accessible by link roads shall be considered to have a frontage equal to the width of the link road, and
- (ii) Plots of irregular shape abutting the road shall be considered to have a frontage equal to their average width parallel to the road.

- (b) The limitations of plot sizes and frontages imposed in Sec A.6.1 (a) above may be waived for approved affordable housing including site and service schemes. Guidelines governing the planning and design of such housing are given in Appendix B.
- (c) The minimum size of the plot for a group housing development scheme and other special requirements for group housing developments shall be as specified or approved by the respective city development authority.
- (d) For minimum standard transitional housing, government may allow smaller plots following the guidelines mentioned in Appendix B.

Table 3.A.1: Minimum Frontage of Residential Plot

Type of Residential Development	Plot Size (m ²)	Minimum Frontage (m)
Approved row type houses	66 (Minimum size)	4.5
	Over 66 to below 133	8
Semi-detached houses	133 (Minimum size)	8
	Over 133 to 200	8-10
	Over 200 to 267	10-12
	Over 267 to 334	12
Detached	Over 267 to 334	12
	Over 335 to 669	16
	Over 669	24

Note: For plot sizes larger than 133 m² detached house type may be allowed provided that the site frontage is 12 m or more

A.6.2 Plots for Educational Buildings

The minimum size of plot for educational buildings shall be based on occupant capacity and shall be at the rate of 4 m² per pupil or occupant. With exception for nursery school the minimum plot size required for educational purpose shall be 3950 m² (see Appendix B).

A.6.3 Plots for Assembly Halls, Theatres, Cinema

The minimum size of plot for assembly halls, theatres, cinema halls and other similar buildings where people gather for entertainment or other public functions shall be based on the seating capacity of the building and shall be at the rate of 3 m² per seat. Table 3.A.2 shows the minimum plot size for such function:

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Table 3.A.2: Plot Sizes for Assembly Occupancy

Sub-Category	Nature of Use or Occupancy	Minimum Plot Size
I1	Large assembly with fixed seats (1000 seats or more)	3000 m ²
I2	Small assembly with fixed seats (less than 1000 seats)	3 m ² per seated person
I3	Large assembly without fixed seats (300 or more occupants)	900 m ²
I4	Small assembly without fixed seats (less than 300 seats)	3 m ² per seated person
I5	Sports facilities	Related to event and spectator capacity

A.6.4 Plots for Community Centers

The size of plot for rural or urban community centers shall be not less than 1300 m² and commensurate with the size of the community.

A.6.5 Business and Mercantile Plots

The minimum size of a business and mercantile plot shall be 200 m² and its road frontage width shall not be less than 10 m.

A.6.6 Industrial Plots

The minimum size of an industrial plot shall be 300 m² and its road frontage width shall not be less than 15 m.

A.6.7 Petrol Filling Stations

The minimum size of the plot for a petrol filling station without service bay or repair workshop shall be 500 m² and its road frontage width shall not be less than 30 m. The minimum size of the plot for a petrol filling station with service bay but without repair workshop shall be 1100 m² and its road frontage width shall not be less than 30 m.

A.6.8 Plots for Other Uses

The minimum sizes of plots for buildings for uses other than those mentioned in Sections A.6.1 to A.6.7 shall be as determined by the Authority having jurisdiction.

Annexure 3: List of Abbreviations

HBRI	Housing and Building Research Institute
BNBC	Bangladesh National Building Code
BFRI	Bangladesh Forest Research Institute, Bangladesh
DoE	Department of Environment , Bangladesh
IAB	Institute of Architects Bangladesh
IEB	Institute of Engineers, Bangladesh
BDT	Bangladeshi Currency (Taka)
BMS	Building Management System
HVAC	heating, ventilation, and air conditioning
LPD	Light Power Density
lpf	Liter per Flush
lpm	Liter per Minute
°C	Degree Centigrade
kW/TR	Killo watt per Ton of Refrigeration
Kpa	kilo pascal
kWh	Kilowatt hour
kVAR	Kilo Volt Ampere Reactive
kVA	Kilo Volt Ampere
kCal	Kilo Calorie
MT	Metric Ton
NG	Natural Gas
PF	Power factor
REB	Rural Electrification Board
ROT	Rule of Thumb
SEC	Specific energy consumption
V	Volt
A	Ampere
hr	Hour
CO ₂	Carbon Dioxide
sft	Square Feet
sqm	Square meter
W/m ²	Watt per Mitre Square
STP	Sewerage Treatment Plant
ETP	Effluent Treatment Plant
WWTP	Waste Water Treatment Plant

Annexure 4: Letter from Bangladesh Bank



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বাংলাদেশ ব্যাংক
(সেন্ট্রাল ব্যাংক অব বাংলাদেশ)
প্রধান কার্যালয়
মতিঝিল, ঢাকা-১০০০
বাংলাদেশ।

সাসটেইনেবল ফাইন্যান্স ডিপার্টমেন্ট

সূত্র নং: এসএফডি(জিবিআরএস/আরএভজি)১০০৪/৫/১/২০২৪-৫২২

তারিখ: ১১ ফেব্রুয়ারি ২০২৪

মহাপরিচালক
হাউজিং এন্ড বিল্ডিং রিসার্চ ইনস্টিটিউট
প্রধান কার্যালয়
১২০/৩, দারুস সালাম, মিরপুর
ঢাকা-১২১৬।

প্রিয় মহোদয়,

**পরিবেশবান্ধব পণ্য/একক/উদ্যোগের জন্য পুনঃ অর্থায়ন কিম'-এ
'হাউজিং এন্ড বিল্ডিং রিসার্চ ইনস্টিটিউট' এর সার্ভিকেশন কে স্বীকৃতি প্রদান প্রসঙ্গে।**

আপনাদের ১৭ ও ২০ ডিসেম্বর ২০২৩ তারিখের স্মারক নং: ২৫.৪৪.২৬০০.০০০.৯৯.০১৪.২২.২২৩ ও স্মারক নং: ২৫.৪৪.২৬০০.০০০.৯৯.০১৪.২২.২২৫ এর প্রতি দৃষ্টি আকর্ষণ করা যাচ্ছে।

০২। এসএফডি সার্কুলার নং: ০২/২০২৩ এর আওতায় Climate Resilient Housing & Green Building Feature এবং পরিবেশবান্ধব ইট উৎপাদনকারী প্রতিষ্ঠান স্থাপনে পুনঃ অর্থায়ন প্রাপ্তির ক্ষেত্রে আপনাদের প্রতিষ্ঠান কর্তৃক প্রদত্ত বিধি/প্রত্যয়ণ/পরিপত্র প্রযোজ্য/স্বীকৃত হবে।

০৩। বিষয়টি সদয় অবগতি এবং প্রয়োজনীয় ব্যবস্থা গ্রহণের নিমিত্ত উপযুক্ত কর্তৃপক্ষ কর্তৃক অনুমোদনক্রমে প্রেরণ করা হলো।

আপনাদের বিশ্বস্ত,

(এস.এম.তৌফিকুল হক সৌরভ)

যুগ্ম পরিচালক

ফোন: ০১৫৫২৩৬৬৮৩৩

ই-মেইল: toufiq.sowrov@bb.org.bd