GRIHA Prakriti Rating

for Existing Day Schools

Association for Development and Research of Sustainable Habitats
&
The Energy and Resources Institute

GRIHA – Prakriti Rating for Existing Day Schools

Pilot V – 1.0

Criterion-wise Point Distribution under Review

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INTRODUCTION

GRIHA Prakriti Rating System for Sustainable Schools has been jointly developed by Association for Development and Research for Sustainable Habitats (ADaRSH) and The Energy and Resources Institute (TERI). The rating system has been developed to evaluate the environmental performance of existing day schools in India. This is the first rating system for existing buildings under the GRIHA rating system. At present, the rating has only been designed for day schools and it will be subsequently extended to day-boarding as well as residential schools.

Need –

Students spend almost half their waking hours – during their formative years – in schools. The values and lessons learnt at school become the foundation for students' outlook in life. Therefore it is extremely important to ensure that students absorb maximum positive values from their times spent in schools. Key characteristics of Sustainable schools are – noise-free classrooms with ample daylight and thermal comfort, good indoor air quality, reduced energy and water consumption, adopts measures for maintaining good sanitation, plants trees, recycles waste, adopts measures for universal accessibility and several others. Globally several studies have shown that sustainable schools offer better and more comfortable learning environments for students. Learning in an environment which is conducive to the process, which helps improve the performance of students – which is extremely desirable. In addition, a sustainable school becomes a demonstration project through which students can learn the methods of reducing their environmental impacts – it becomes an environmental learning tool with fully functioning examples of eco-friendly strategies. Therefore, ADaRSH and TERI jointly developed the GRIHA Prakriti rating system, with the intent to assist schools to reduce their environmental footprint while simultaneously empowering the next generation of citizens.

Rating System –

GRIHA Prakriti rating has been developed for existing day schools. This rating comprises of 6 sections. Each section has various criteria which have been developed to evaluate the environmental performance of ***Existing*** schools. The rating system comprises of a total of 15 criteria split across the various sections. These sections are listed below:

1. Energy
2. Comfort
3. Water
4. Solid Waste Management
5. Trees
6. Social

The GRIHA Prakriti rating for Sustainable Schools has two components:

1.Prakriti Module – The Prakriti module of the rating is designed to provide training to school faculty and students on incorporating environmental measures for the school as a whole.

2.GRIHA Module – The GRIHA module of the rating provides the assessment framework to evaluate the environmental performance of the existing day school. This is elaborated in more detail in this manual.

Process –

The GRIHA Prakriti Rating process has been split into three parts:

1. Collecting data and filling up the forms – Team of students, under the guidance of teachers, will use the various survey forms and calculators to collect data from across their school and analyze their environmental performance.
2. On-site audit – Once the forms and calculators are complete, ADaRSH will send an energy expert on site to carry out various on-site audits to cross-check the data. Post the audit, a report will be submitted to ADaRSH
3. Final review and Award of rating – ADaRSH will review the reports and data and award the rating to the school.

Criteria-

The criteria in the rating system address both Qualitative as well as Quantitative aspects in the rating. The rating has a total of 15 criteria plus 1 criterion for Innovation. The overall points for all criteria total up to 50, which have been equally distributed between Quantitative and Qualitative aspects as described in the table below. The point distribution across the various criteria was based on – cost of strategies, execution and maintenance effort required for the strategy and environmental benefit of the strategy.

S.No.	Criteria - Quantitative	Points
1	Per capita CO_2 emissions – Building and Transport	9
2	Use of energy efficient appliances	4
8	Annual water consumption	7
12	Total number of trees in school campus	5
	Total	25

S.No.	Criteria - Qualitative	Points
3	Efficient outdoor lighting	2
4	Visual comfort conditions inside classrooms	2
5	Thermal comfort conditions inside classrooms	2
6	Acoustic comfort on campus	2
7	Indoor Air Quality – applicable for Air-Conditioned classrooms only	2
9	Rainwater harvesting system with appropriate filtration system	3
10	Water Quality	2
11	Maintaining hygienic conditions in school	1
13	Adopt strategies for segregation of waste in school	1
14	Recycle Organic and Inorganic wastes	2
15	Social	6
	Total	25

Criterion List

S.No.	Criterion Name	Points
1	Per capita CO_2 emissions – Building and Transport	9
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9	Rainwater harvesting system with appropriate filtration system	3
10	Water Quality	2
11	Maintaining hygienic conditions in school	1
12	Total number of trees in school campus	5
13	Adopt strategies for segregation of waste in school	1
14	Recycle Organic and Inorganic wastes	2
15	Social	6
16	Innovation	2
	Total	50

Mandatory Points

In order to be rated under GRIHA Prakriti rating, it is mandatory for the project to achieve the minimum threshold of points in each category.

Category	Maximum points	Minimum threshold
Energy	15	7
Comfort	8	4
Water	13	7
Trees	5	3
Solid Waste Management	3	1
Social	6	3
TOTAL	50	25

Rating

Points achieved	Rating
25-29	
30-34	
35-39	
40-44	
45-50	

CRITERIA

ENERGY

Constant increase in Green House Gases (GHG) is one of the most significant causes for global climate change. CO_2 is the primary GHG which is emitted through burning of fossil fuels like coal, natural gas and petroleum products. Buildings contribute to over 40% of global GHG emissions. This is directly a result of energy consumed in construction and operation of the buildings. Therefore, it is imperative to ensure that our buildings are energy efficient and incorporate renewable energy sources – which do not lead to CO_2 emissions in the process of generating energy. Transport is second only to buildings, in global GHG emissions. Therefore, use of non-emitting modes of transport like bicycling etc. becomes extremely important in order to reduce overall GHG emissions connected to the school. Even strategies like use of buses running on natural gas are helpful in reducing the overall CO_2 emissions connected to transportation. In addition to reducing the carbon footprint of the school, other measures can also be incorporated in the school to increase its energy efficiency. These are use of high-efficiency appliances for artificial light and space conditioning; and installation of efficient outdoor lighting. It is extremely important to measure energy efficiency separately from CO_2 emissions, since they are not directly linked. Reduction in CO_2 emissions can be demonstrated through use of renewable sources of energy - even in an inefficient building. Therefore, this section has two criteria for ascertaining the efficiency of the building systems (like artificial lighting) as well. This section of the rating comprises of 3 criteria which address the above concerns. These 3 criteria are –

1. Per capita CO_2 emissions – Building and Transport
2. Use of energy efficient appliances
3. Efficient outdoor lighting

This section has a total of 15 points out of which achieving 7 points is mandatory.

Criterion 1 - Per capita CO_2 emissions – Building and Transport

Intent

The intent of this criterion is to assist schools in evaluating the carbon footprint of their school buildings and transportation. IPCC studies have suggested that buildings and transportation contribute to about 40% and XX% of global CO_2 emissions respectively. Therefore, it becomes critical to understand per capita carbon footprint and to adopt strategies in order to reduce the CO_2 emissions associated with the school.

Design Guidelines

In GRIHA Prakriti rating, the CO_2 emissions will be calculated for the following two sources:

1. Buildings ; and
2. Transportation

Buildings: On the supply side, schools are dependant on the electricity from the grid as their primary source of energy, which is predominantly derived from coal-fired thermal power plants. In cases of lack of power outage, most schools are reliant on diesel generator sets or nothing at all. These two sources of energy – coal and diesel – lead to significant CO_2 emissions. On the demand side, energy is directly dependant upon the building design and lifestyle choices. Non-AC rooms consume lesser energy than AC rooms. A building which strong solar passive measures will consume lesser energy than one without.

Transport: Use of motorized transportation leads to significant CO_2 emissions. Amongst motorized forms of transport, use of private vehicles leads to higher CO_2 emissions than public transport.

There are several strategies through which the overall per capita carbon footprint can be reduced in schools. Since the rating is developed for existing buildings, there are not much changes that can be done to the building architecture. However, retrofitting measures like installation of efficient artificial lights, use of solar films on glazing etc. would contribute towards reducing the overall demand for energy. In addition to that, use of renewable sources of energy, to cater to building energy demands, can further help in reducing CO_2 emissions. In addition to that, use of cycle rickshaws, bicycling and other forms of non-motorized transport (NMT) do not contribute to CO_2 emissions. The closer students and teachers live to the schools, the lower the overall CO_2 emissions. Furthermore in public transport, buses using CNG contribute lesser CO_2 emissions to the environment than those using diesel.

Therefore, this criterion of the rating has been developed to help schools to analyze their overall carbon footprint – based solely on building and transportation energy. The per capita carbon emissions in GRIHA Prakriti rating are calculated as follows:

Building CO_2 emissions = B = kWh Demand x CO_2 emissions/kWh for that energy source (in case of R.E., CO_2 emissions/kWh are assumed to be 0)

Transport CO_2 emissions = T = total distance x CO_2 emissions for that mode of transport (in case of cycling/other NMT, CO_2 emissions are assumed as 0)

Total population of the school = P = Total students + Teachers + School Staff

$$\text{Per capita } CO_2 \text{ emissions} = \frac{B + T}{P} < \text{GRIHA Prakriti threshold}$$

Commitment

1.1 The per capita CO_2 emissions for the school should be equal to or lower than the GRIHA Prakriti threshold.

Compliance

1.2.1 Document listing the population of the school – students (fixed), teachers and staff

1.2.2 Submit last years electricity bills and diesel bills

2.2.3 Submit transportation survey forms

Appraisal

1.3.1 Calculate Building carbon footprint according to GRIHA Prakriti calculator – 3 points

1.3.2 Calculate Transport carbon footprint according to GRIHA Prakriti calculator – 3 points

1.3.3 Complete entire carbon footprint calculator of GRIHA Prakriti rating– 3 points

Criterion 2 - Use of energy efficient appliances

Intent

The objective of this criterion is to encourage retrofit of electrical systems in the existing school buildings. Installation of energy efficient technologies inside the building helps in reducing the overall connected load and energy consumed.

Design Guidelines

Most of the existing school buildings have old artificial lighting systems, fans and air-conditioners (if any) which consume a significant amount of energy. Retrofit of these school buildings is an important step in the process of conserving energy. Most of the existing school buildings still use T12 fluorescent tube lights and 70W fans. There are today technologies available which are far more efficient and consume lesser energy. CFLs, T5 fluorescent tubular lamps and LEDs consume significantly lower energy than T12 ones and have much lesser connected load. BEE star labeled fans operate at about 40-50 W instead of 70W. Therefore, it becomes extremely critical for schools to retrofit their existing artificial lights and fans with more efficient ones. The same holds true for air-conditioners as new BEE star labeled air-conditioners consume much lesser energy than older air-conditioners.

In this criterion, the connected load per sq.m. of built-up area is considered as a metric for evaluating energy efficiency of the building. The calculations for the same are given below:

Total connected load = X = connected load for all internal artificial lights +
connected load for all fans +
connected load for air-conditioners (if applicable) kW

Total built up area of the school = Y sq.m.

Connected load per sq.m. = X / Y < 17 kW/sq.m. (for non-AC schools)
X / Y < 72 kW/sq.m. (for 100% AC schools)

These thresholds have been derived from ECBC, NBC and conventional practice.

Commitment

2.1.1 Retrofit the building electrical system to improve energy efficiency of the school

Compliance

2.2.1 Submit an electrical plan of the building highlighting the various internal artificial lighting, fans and HVAC (if applicable)

2.2.2 Submit technical specifications/details of the artificial lighting system, fans and HVAC

Appraisal

2.3.1 Ensure that the connected load per sq.m. built-up area is lower than the GRIHA Prakriti threshold – 4 points

Criterion 3 – Efficient Outdoor lighting

Intent

The objective of this criterion is to promote energy efficient outdoor lighting.

Design Guidelines

There are two parts to making external artificial lighting energy efficient:

1. Selection of efficient lamps; and
2. Automatic controls for outdoor lights

It should be ensured that all outdoor lamps have high efficacy. Efficacy is measured in lumens/watt. The higher the efficacy of the lamp, the more its light output per watt of electricity consumed. The efficacy of all outdoor lamps should conform to the Table 3.1 given below:

Table 3.1 Luminous efficacy thresholds for outdoor lamps

Lamp Type	Efficacy threshold (lumens/W)
CFL	50
FL	75
MH	75
HPSV	90
LED	50

In addition, all external lighting should be controlled through automatic controls. Installation of automatic controls is the best mechanism to manage external artificial lighting and results in significant energy savings through effective control. The school may opt for lighting control or timer-based systems for external lighting.

Commitment

3.1.1 Ensure that all outdoor lamps comply with the luminous efficacy thresholds as mentioned in Table 3.1 above.

3.1.2 Install automatic controls for all outdoor lights

Compliance

3.2.1 Submit electrical drawings and site photographs demonstrating installation of automatic controls for outdoor lighting

3.2.1 Submit completed survey table listing all outdoor lamps and their efficacy calculations

Appraisal

3.3.1 All outdoor lamps are high efficacy lamps – 1 point

3.3.2 All outdoor lights are controlled through automatic controls – 1 point

COMFORT

The predominant function of any building is to provide comfortable living/working conditions to its occupants. Since students' spend majority of their time in school, studying inside classrooms, good indoor comfort conditions are essential for their health and academic performance. Uncomfortable studying conditions inside a school will force the students to rely on electro-mechanical systems to be comfortable, thereby increasing energy consumption. For example, if the amount of daylight entering a classroom is less and students find it hard to concentrate and read, then they would turn on artificial lights in order to be able to focus on the task at hand. In addition to the above, in case the artificial lighting system also does not provide satisfactory levels of illumination, then the students will be forced to study in discomfort. The same hold true for thermal and acoustic comfort. Therefore, ensuring comfortable working conditions inside a school is of prime importance. This section elaborates on the various comfort criteria which are essential to be met in a school. These are listed below –

4. Visual comfort conditions inside classrooms
5. Thermal comfort conditions inside classrooms
6. Acoustic comfort inside classrooms
7. Indoor Air Quality – applicable for Air-Conditioned classrooms only

This section has a total of 8 points out of which achieving 4 points is mandatory.

Criterion 4 - Visual comfort conditions inside classrooms

Intent

The intent of this criterion is to ensure that the classrooms and other spaces in the school meet the lighting levels as prescribed in National Building Code 2005.

Design Guidelines

Studying in low indoor lighting conditions directly impacts the learning ability of students. Lack of adequate lighting causes strain on the students' eyes. Good lighting conditions are essential for visual comprehension. Good indoor lighting levels can be achieved through a combination of daylighting and indoor artificial lighting. The schools must ensure that all classrooms, libraries, laboratories and other space within the school comply with the NBC 2005 recommended minimum lux levels. In schools where daylighting is not sufficient to meet these lux levels, use of artificial lighting systems is recommend to make up the shortfall in lighting levels. The minimum thresholds, recommended as per NBC 2005, for some of these spaces is mentioned below in Table 4. 1:

Buildings & Processes	Recommended Illuminance (lux)
Classrooms	300
Activity area	300
Libraries	300
Manual training	300

Commitment

4.1.1 Ensure that all living spaces meet the NBC 2005 recommended lux levels.

Compliance

4.2.1 Submit audit report to demonstrate compliance with 4.1.1

Appraisal

4.3.1 Over 50% of living area meet NBC-2005 recommended lux levels – 1 point

4.3.2 Over 75% of living area meet NBC-2005 recommended lux levels – 2 points

Criterion 5 - Thermal comfort conditions inside classrooms

Intent

The intent of this criterion is to evaluate the ambient air temperature and the relative humidity levels to ensure that classrooms and other spaces meet the thermal comfort thresholds as prescribed in National Building Code 2005.

Design Guidelines

Thermal discomfort in school buildings can create unsatisfactory conditions for both teachers and students which is disturbing for them, reducing their working productivity, attention and performance in studies. Excessive heat build up inside classrooms coupled with reduced ventilation can lead to thermal discomfort amongst students. Schools should monitor the indoor temperature and humidity levels to ensure that they adhere to the thermal comfort norms as prescribed in NBC 2005 mentioned below:

Category	Inside design conditions	
	Temperature	Relative Humidity
Class Room	< 33˚C	RH < 70%

In case the indoor temperature and/or humidity levels are not compliant, measures should be taken to improve indoor thermal comfort. Some of these measures for existing schools are listed below:

- Paint exterior walls and roof with High Reflective/ High SRI paints
- Provide additional shading on windows through use of internal blinds or external overhangs
- Increase internal wind circulation through improving natural ventilation
- Installation of mechanical systems like evaporative coolers, increased number of fans etc.

Commitment

5.1.1 Ensure that all living spaces meet the NBC 2005 recommended thermal comfort conditions. (temperature and relative humidity)

Compliance

5.2.1 Submit thermal comfort audit report to demonstrate compliance with 5.1.1

Appraisal

5.3.1 Over 50% of living area meet NBC recommended thermal comfort conditions – 1 point

5.3.2 Over 75% of living area meet NBC recommended thermal comfort conditions – 2 points

Criterion 6 - Acoustic comfort on campus

Intent

The objective of this criterion is to ensure acoustic comfort for students in the school.

Design Guidelines

Noise pollution in and around educational area can directly affect the learning experience of students since all learning activities involve a significant component of sound: teacher-student interactions or Audio-Visual features. Therefore any source of external noise can lead to distraction amongst students. In addition to external sources of noise, the acoustic properties of classroom's interiors are extremely important. Inadequate treatment of surfaces often lead to sound reverberation which directly affects the ability of a student to comprehend the lessons being taught in the class. Measures must be adopted in schools to ensure acoustic comfort for students in school. The outdoor ambient decibel levels must comply with Central Pollution Control Board (CPCB) norms and indoor sound levels must adhere to NBC 2005 norms. If a school is located in a high-noise zone, it can install acoustic barriers on its periphery to reduce the sound transmission into its boundary. Indoor noise and reverberation can be reduced by installation of interior finishes with high Noise Reduction Coefficient (NRC). Materials with high NRC absorb most of the sound falling on them, thereby providing better acoustic comfort inside classrooms.

Indoor Noise levels: NBC - 2005, Part 8, Section 4	
Location	Noise Level dB
Auditorium	20-25
Music Room	25-30
Library	35-40
Class Room	40-45

Outdoor Noise Levels, CPCB	
Area	Noise Level Limits – dB Daytime
School (Residential Zone equivalent)	55

Commitment

6.1.1 Outdoor noise levels in the school should be within the prescribed limits as per CPCB.

6.2.1 Indoor noise levels in the school should be within the prescribed limits as per NBC 2005.

Compliance

6.2.1 Submit audit report to demonstrate compliance with 6.1.1

Appraisal

6.3.1 Outdoor decibel levels are incompliance with CPCB – 1 points.

6.3.2 Indoor decibel levels are incompliance with NBC 2005 – 1 point.

Criterion 7 - Indoor Air Quality

- Applicable for AC Classrooms only

Intent

The objective of this criteria is to ensure good Indoor Air Quality (IAQ) for students inside the classrooms.

Design Guidelines

Poor indoor air quality in schools can lead to headaches, fatigue , cough/sneezing and dizziness amongst teachers and students. Higher levels of indoor CO (Carbon Monoxide) and RSPM (Respirable Suspended Particulate Matter) can directly affect the health of teachers and students in a school. Therefore, it is extremely critical to ensure good IAQ inside the school. The school should conduct an IAQ audit must be conducted for AC classrooms to check the indoor CO and RSPM levels. Indoor CO levels help in determining whether sufficient quantities of fresh air is being provided inside the classrooms or not. High RSPM levels in indoor air reflects on requirement to change the filters in the Air Conditioning system. Based on the IAQ audit, the school can take appropriate measure to ensure that the indoor CO and RSPM levels comply with the thresholds established by World Health Organization norms. These thresholds have been provided below:

Pollutants	Concentration in ambient air
CO	10.0 (mg/m^3)
RSPM (PM_{10})	20 ($\mu g/m^3$)
Source: ***WHO guidelines for Indoor Air Quality***	

Commitment

7.1.1 CO and RSPM levels in the school should be within the mentioned limits as per WHO norms.

Compliance

7.2.1 Submit IAQ audit report to demonstrate compliance with 7.1.1

Appraisal

7.3.1 Indoor CO levels are in compliance with WHO standards. – 1 point

7.3.2 Indoor RSPM levels are in compliance with WHO standards. – 1 point


WATER

The gap between the supply and demand of potable water has been widening significantly in the recent years. People are relying on sourcing groundwater to cater to the rising demand, which has led to the rapid depletion of ground water table across the country. In addition to the mismatch between demand and supply of water, the quality of water available does not comply with the norms set by the Bureau of Indian Standards (BIS). Therefore, it becomes important to create provisions for the school to be water sufficient and hygienic. This section of the rating comprises of 3 criteria –

8. Annual water consumption
9. Rainwater harvesting system with appropriate filtration system
10. Water Quality
11. Maintaining hygienic conditions in school

This section has a total of 13 points out of which achieving 7 are mandatory.

Criterion 8 - Annual water consumption

Intent

The objective of this criterion is to promote water efficiency and sufficiency in schools through rainwater harvesting and waste water recycle and reuse.

Design Guidelines

Water scarcity is a significant problem in our cities today. With the constant mismatch between demand and supply in water supply, it is imperative for schools to become water sufficient. This is to ensure that the overall pressure on municipal supply is reduced and to ensure water availability in the school. Schools can reduce their demand on the municipal supply through the following two measures:

1. Harvesting and storing rainwater – Rooftop rainwater is one of the purest forms of water. In majority of the buildings, including schools, this water is simply drained into the storm water drains. Rooftop rainwater can be captured and stored for reuse. Rooftop rainwater requires minimal filtration and is clean enough for most domestic needs (drinking would require some more purification).
2. Recycle and reuse of waste water – In larger schools, a Sewage Treatment Plant (STP) can be set up and waste water from the STP can be recycled and reused for purposes like landscape.

Both these strategies can help in reducing the quantity of fresh water required from the local municipal supply, thereby assisting in reducing the overall water demand in the locality.

However, there are many schools in India where students do not receive sufficient quantities of water for daily consumption, thereby effecting their hygiene levels. It is therefore important that the overall water consumption should not go below the minimum recommended standards of WHO. These consumption thresholds have been mentioned in Table 8.1 below:

Table 8.1 – Water Consumption thresholds

Type	NBC recommended lpcd	Minimum lpcd limit as per WHO
Student	45	15
Teachers /Staff	45	15
Floating Population/Visitors	15	5

The calculations for the compliance are as follows:

Total water consumed by the School = W_c

Minimum water required by the school as per WHO = W_{min}

Total water consumed by the school from municipal supply= W_{ms}

Total recycled waste water = W_w

Total rainwater captured and reused = W_{rwh}

Total water demand for the school as per NBC 2005 = W_{NBC}

Therefore;

$$W_c = W_{ms} + W_w + W_{rwh} \quad \text{and;}$$

$$W_{min} < W_c \quad \& \quad W_{ms} < W_{NBC}$$

Commitment

8.1.1 Ensure that the overall water consumption is greater than WHO recommended consumption standards

8.1.2 Ensure that the overall water consumed from the municipal supply is less than NBC 2005 recommended water consumption levels

Compliance

8.2.1 Submit water consumption bills for a period of one year

8.2.2 Submit narrative and photographs of the waste water treatment facility and/or Rainwater harvesting system installed on site

8.2.3 Submit metered consumption details for recycled waste water and harvested rainwater.

Appraisal

8.3.1 Total water consumption on site is greater than WHO norms – 4 points

8.3.2 Total water consumption from the municipal supply is less than NBC 2005 norms – 3 points

Criterion 9 - Rainwater harvesting system with appropriate filtration system

Intent

The intent of this criterion is to promote rainwater harvesting on site for reuse in building as well as recharge into the ground water aquifer.

Design Guidelines

Constant extraction of groundwater to meet water demand has led to rapid depletion of ground water sources. It is imperative to recharge ground water table in order to help in restoring the ground water levels. Surplus rooftop rainwater can be captured and recharged into the ground water aquifer. This can be done through creation of recharge bore wells/recharge pits in the school. In addition, it is important that recharge pits filter out the sediments and other contaminants from the run-off rainwater before the water is recharged in the ground water aquifer. This helps in avoiding contamination of ground water sources. Therefore all rainwater recharge systems should have an appropriate filtration system installed.

Commitment

9.1.1 Recharge rainwater into the ground water aquifer

9.1.2 Installation of a filtration system is critical in order to prevent contamination of ground water aquifer

Compliance

9.2.1 Submit drawings of the rainwater storage tank, ground water recharge pit and filtration system

9.2.2 Submit photographs of the rainwater recharge pit

Appraisal

9.3.1 The school should have a rainwater harvesting and recharge system along with necessary filtration systems – 3 points

Criterion 10 - Water Quality

Intent

The intent of this criterion is to ensure that students, teachers and other staff of the school have access to clean , potable water for their daily uses in order to maintain hygiene levels.

Design Guidelines

It is important to ensure that the students, teachers and staff of the school have access to clean, potable water ,whatever may be the source of supply. If the water from the local municipal supply does not meet the desired quality standards, it is recommended for the school to install a water treatment system. The school must routinely test its water supply and ensure that it complies with the Bureau of Indian Standards (BIS) norms.

Commitment

10.1.1 Ensure that the quality of water utilized in the school meets the BIS norms

10.1.2 Create and implement an annual water quality checking and sampling plan

Compliance

10.2.1 Submit water quality test reports

10.2.2 Submit narratives and photographs highlighting filtration systems installed in the school and their maintenance plan

Appraisal

10.3.1 Water quality in the school meets the BIS norms – 2 points

Criterion 11 – Maintaining hygienic conditions in school

Intent

The intent of this criterion is to ensure good sanitation conditions in school.

Design Guidelines

Lack of hygiene and sanitation in schools poses a health risk for students. Measures must be adopted to ensure that the school premises are hygienically maintained. All toilets should have appropriate and functional ventilation strategies to ensure that there is no prevalent foul smell. All leaking taps should be fixed and plumbing system should be well-maintained. Soap should be provided for hand washing. The school premises should be cleaned and disinfected daily.

Commitment

11.1.1 Ensure adoption of appropriate measures for maintaining hygienic conditions in schools

Compliance

11.2.1 Submit photographs and narrative for explaining the measures taken by the school to maintain hygienic conditions in the school premises.

Appraisal

11.3.1 Good sanitation measures have been implemented in school premises as mentioned above– 1 points

TREES

Trees are essential to our biosphere and offer a wide range of benefits to our environment. Whether a school is large or small, or in a rural or urban area, the elementary process for planting and maintaining trees in its surrounding is essential. Trees offer us several benefits like absorbing pollutant gases like CO_2, NOx, SOX etc., reduce dust pollution, reducing Urban Heat Island Effect, supporting local biodiversity etc. Therefore, it is imperative to ensure that all sites have significant number of trees on site. This section has 1 criterion which addresses the same –

12. Total number of trees in school campus

This section has a total of 5 points, out of which achieving 3 points in mandatory

Criterion 12 - Total number of trees in school campus

Intent

The intent of this criterion is to promote the plantation of native trees within the school campus.

Design Guidelines

Conduct a survey of existing trees on site and ascertain if the total number of trees on site adhere to the threshold mentioned in Table 12.1. In a situation where the total number of trees on the campus do not comply with the threshold, then plant additional trees in order to comply with the same. The new trees being planted on site should be native/naturalized.

Table 12.1 – GRIHA Prakriti threshold for total number of trees on site

Site Area	Number of trees
Less than or equal to 250 sq.m.	2
Between 251 sq.m and 750 sq.m.	3
Site area greater than 750 sq.m.	1 tree per every 250sq.m. of site area.

Commitment

12.1.1 – The total number of trees planted on site should comply with the ratio prescribed in Table 12.1.

Compliance

12.2.1 – Submit tree survey highlighting the total number of trees on site and their species

12.2.2 – Submit document mentioning the total site area

Appraisal

12.3.1 – The total number of trees on site comply with the GRIHA Prakriti threshold – 2 points

12.3.2 – The total number of trees on site exceed GRIHA Prakriti threshold by 10% - 3 points

12.3.3 – The total number of trees on site exceed GRIHA Prakriti threshold by 20% - 4 points

12.3.4 – The total number of trees on site exceed GRIHA Prakriti threshold by 30% - 5 points

SOLID WASTE

A clean and healthy environment supports effective learning and offers a conducive learning environment to the students. Solid waste – both organic and inorganic – is generated by human activities and unless disposed off safely, presents a potential threat to health and well being of people. By reducing, reusing, and recycling solid waste we can decrease the demands on natural resources, as well as the rate at which they are consumed. A large amount of this waste is recyclable, such as organic waste, wastepaper, plastic, glass, metal etc. Almost 70% of total municipal solid waste is recyclable – if the practice of waste segregation is appropriately adopted. Recycle and reuse of such solid waste can help reduce energy consumption and requirement for natural resources for manufacturing products. It also helps in reducing the size of our municipal landfills. In addition, reduction in waste leads to reduction in air and water pollution. Therefore, ensuring solid waste management in schools is of key importance.

This section of the rating comprises of 2 criteria which address the above concerns. These 2 criteria are –

13. Adopt strategies for segregation of waste in school

14. Recycle Organic and Inorganic wastes

This section has a total of 3 points, out of which achieving 1 point is mandatory

Criterion 13 - Adopt strategies for segregation of waste in school

Intent

The intent of the criterion is to promote adoption of strategies in school for segregation for organic and inorganic waste.

Design Guidelines

Solid waste, if not collected and recycled, ends up in the municipal landfills. Municipal landfill sites in Indian cities, have been expanding and overflowing. This leads to several environmental hazards like water and air pollution through leachates, soil contamination etc. Recycling of solid waste can significantly reduce the quantity of solid waste being dumped into our landfills. Solid waste can be recycled and reused and an extremely important step in the process is – Segregation of waste. Unsegregated solid waste ends up in landfills whereas segregated waste can be recycled easily. Students in schools must have access to multi-coloured dustbins in their classrooms, corridors etc. so that waste segregation happens at the source itself. Once the waste is segregated, it can be recycled - inside or outside the school.

Commitment

13.1.1 Use of multi-colour dust bins for the collection of different categories of solid waste (biodegradable, non-biodegradable) in classrooms and within school campus.

Compliance

13.2.1 Narrative along with the photographs indicating use of multi-colour dustbins in school .

Appraisal

13.3.1 Multi-coloured dustbins are provided in all classrooms/corridors– 1 point.

Criterion 14 - Recycle Organic and Inorganic wastes

Intent

The intent of the criterion is to promote recycling of organic and inorganic solid waste generated in the school.

Design Guidelines

According to Central Pollution Control Board (CPCB), out of the total solid waste collected in our cities, over 45% is organic waste and almost 25% is recyclable inorganic waste. If appropriate measures are put in place to recycle this waste, the total amount of solid waste reaching the municipal landfills will reduce by about 70%. In addition to reducing environmental problems associated with landfills, recycling of solid waste also helps in reducing materials and energy required to manufacture new products. In schools, organic waste comes from food waste and landscape waste like dry twigs and leaves etc. Waste paper, waste plastic etc. form part of inorganic waste in schools. Once, segregated, strategies can be adopted to recycle all the waste. Organic waste can be treated and converted into biogas and/or manure. Schools can install Organic Waste Composters or adopt strategies like Vermicomposting which convert organic food and landscape waste into manure and/or biogas. While biogas can be reused in the school kitchen, manure can be used for landscaping purposes. Inorganic solid waste is non-biodegradable. Therefore, recycling of inorganic waste is even extremely important. Since inorganic waste requires specialized treatment at a large-scale, it is recommended for the schools to enter into contractual tie-ups with local recyclers (formal or informal).

Commitment

14.1.1 Adopt strategies in the school which help in recycle and reuse of organic waste into a resource (biogas/manure).

14.2.2 Adopt strategies which help in recycling inorganic wastes like paper, plastics etc.

Compliance

14.2.1 Calculation indicating the generation and reuse of by-products from the waste treatment plant.

14.3.2 Narrative highlighting the recycling measures being taken in schools to recycle inorganic wastes like paper, metal, plastic etc.

Appraisal

14.3.1 All organic waste generated in the school is converted to biogas/manure – 1 point

14.3.2 Ensure appropriate strategies are in place for recycling of paper, plastics etc. through tie-ups with informal/formal recyclers – 1 point

SOCIAL

The idea of sustainable development rests on three pillars – environmental sustainability, social sustainability and economic sustainability. It is important for all pillars to be given equal importance for Sustainable development strategies to be successful. Therefore, in this rating of Green Schools, a section on Social initiatives has been introduced. There are several aspects related to equity, safety, awareness, community interaction etc. which get addressed in this section. It is important for the students to be able to link and understand importance of social sustainability along with environmental sustainability.

This section of the rating comprises of 1 criterion which address the above concerns. This criterion is –

15. Social Initiatives

This section has a total of 6 points, out of which achieving 3 points in mandatory

Criterion 15 – Social Initiatives

Intent

The intent of this criterion is to address social parameters in the school.

Design Guidelines

There are several different parts in this criterion. They are being elaborated here separately:

Built up area per capita: A key part of sustainable development includes equitable distribution of resources. This aspect is applicable to buildings as well. A key component of social sustainability is to assess the built up area assigned per capita in a building. The area should not be too high or too little. The space given to each student should be optimal. The total built-up are per capita of the school should fall within the GRIHA Prakriti threshold range provided below:

1.1 sq.m. < Built-up area/Capita < 8 sq.m.

•**Universal Accessibility**: Design for Universal Accessibility is an approach that encourages social inclusion for the broadest range of users. Schools should provide satisfactory provisions to ensure that students with disabilities feel no discomfort while in the school and should feel as independent as possible. Ramps, lifts, disabled-friendly toilets etc. are some of the measures that should be incorporated in the school.

• **Activities on environmental and social awareness:** Environmental education is an integral part of school syllabus. Engaging in practical activities related to environmental education helps students develop a better understanding of the issues and has a deeper impact on them. Students can be engaged in various practical activities like debates, nature walks etc. Schools can organize recycling days, environmental photography competitions etc. It is recommended for the school to organize at least 10 such activities annually for the students. Engaging with the surrounding communities helps imbibe social values in students. The school should hold routine activities through which students can engage with their neighboring communities. For example, students can be involved in teaching children of economically weaker sections of the society living near the school.

•**Visual representation of energy and water consumption in schools**: "What gets measured gets managed". Therefore, the school should display its total energy and water consumption for the students to see and understand. Once the consumption numbers are available to students, they can keep track of overall performance of the school and understand whether any measures for efficiency which they take actually result in reduction in energy or water consumption. This display can be weekly or monthly and can be in the form of enlarged printouts of bills or a digital display.

•**Annual health checkups/immunization in schools**: Students' health has a significant impact on their academic performance in schools. Schools should conduct annual health camps in schools to monitor students' health. Annual health check-ups have several benefits. Annual health camps help in dissemination of health education amongst students. Such camps can also help in early diagnosis and prevention of health problems.

•**Fire safety regulations**: No task is as important as creating a safe learning environment for students. Recent occurrences of children deaths due to building collapse, fire accidents, and stampede bring into consideration the need to be continually vigilant to ensure for fire safety of students and staff in schools. The schools must implement sufficient measures in the school to ensure that the school is compliant with the various Fire Safety norms as prescribed by the local fire authorities.

Commitment

15.1.1 The total built-up area per capita should fall in the recommended threshold

15.1.2 The school campus should be designed for Universal Accessibility as per NBC guidelines

15.1.3 Schools should annually conduct more that 10 activities with an environmental and social focus

15.1.4 Schools should display its daily water and energy savings

15.1.5Schools should conduct annual health checkups for students

15.1.6 Schools should meet the fire safety regulations as per the local fire authorities

Compliance

15.2.1 Submit required calculation to demonstrate compliance with built-up area per capita.

15.2.2 Submit Narrative along with the photographs to comply with 15.1.2

15.2.3 Submit Narrative along with the photographs to comply with 15.1.3

15.2.4 Submit Narrative along with the photographs to comply with 15.1.4

15.2.5 Submit photographs along with a certificate from a doctor for conducting health checkups for students.

15.2.6 Submit a copy of the fire safety certificate from the local fire department of the area.

Appraisal

15.3.1 The built-up area/capita complies with the GRIHA Prakriti threshold – **1 point**

15.3.2 The school incorporates universal accessibility measures as per NBC 2005 – **1 point**

15.3.3 More than 10 annual environmental and social activities are conducted in the school(not connected to textbooks) – **1 point**

15.3.4 The school visually represents its energy and water consumption – **1 point**

15.3.5 Annual health checkups/immunization camps for students – **1 point**

15.3.6 School complies with Fire Safety norms– **1 point**

Criterion 16 – Innovation

Intent

The intent of awarding points for innovation is to reward additional measures adopted by the school which have not been covered in the previous 15 criterion

Commitment

16.1.1 Adopt strategies, independent of the previous 15 criterion, to make the school more sustainable

Compliances

16.2.1 Submit documents/narrative highlighting the measures adopted on site

Appraisal

16.1.3 For each innovation – 1 point (maximum 2 points)

GRIHA

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