

# Approach to Achieving GRIHA Existing Building Rating for Administrative Block of RGPV

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## ABSTRACT

In today's era, the way industrialization is ramping up so as pollution is also increasing. As a result of this, the demand for sustainable building is day by day is increasing. Today's need of healthy eco-friendly environment. The main motive of this paper is to examine and analyze the approaches which the ordinary building can achieve the rating of GRIHA. In this paper, we have compared various parameters of GRIHA EXISTING BUILDING with the existing administrative block of RGPV. After the analysis, we have proposed majors so that RGPV block can achieve the standards, intends to achieve maximum rating by GRIHA, building management must follow and implement these suggestions.

**Keywords:** GRIHA, RGPV, Rating, Administrative Block

## I. INTRODUCTION

The world today has suffered global warming and climate change. Besides other contributors, removal of natural resources as building materials itself uses energy, cause environmental degradation and offer to global warming. Buildings are the highest greenhouse gases emitters and energy consumers. Therefore Urgent changes are required relating to energy saving, emissions control, production and application of materials. Green building concept is a realistic solution for the mitigation of CO<sub>2</sub> emission and the reduction of energy use in the building sector. Increasing awareness of links between climate change and our lifestyles there is an increasing interest in the small residential construction sector to use green measures. An easy to use and expedient way of designing green residences, resorts, motels and small offices is underway.

### 1. Green Building

A 'green' building is a building that, in its design, construction or operation, reduces or eliminates negative impacts, and can create positive impacts, on our climate and natural environment. Green buildings preserve precious natural resources and improve our quality of life. Different countries and regions have a variety of

characteristics such as distinctive climatic conditions, unique cultures and traditions, diverse building types and ages, or wide-ranging environmental, economic and social priorities – all of which shape their approach to green building [1].

### 1.1 Green Building Rating System:

Sustainability assessment tools measures and organizes a set of KPI (Key Performance Indicators) to address and acknowledge Critical and required criteria that should be considered when designing and constructing for a sustainable future [2]. This rating programme is a tool which enables the designer to apply green concepts and reduce environmental impacts that are measurable. The rating programme covers methodologies to cover diverse climatic zones and changing lifestyles [3]. Countries That Currently Do Not Have Their Own Sustainability Assessment Rating Schemes Should aim at developing their Own tailored Scheme in the Very near Future. Therefore It Is Necessary To Understand The Various Schemes In Terms Of Assessment Methods, Scopes, Performance, Etc [4].

## 1.2 GRIHA

GRIHA (Green Rating for Integrated Habitat Assessment) Council is mandated to promote development of buildings and habitats in India through GRIHA. GRIHA Council an independent platform for the interaction on scientific and administrative issues related to sustainable habitats in the Indian subcontinent. It was founded by TERI (The Energy and Resources Institute, New Delhi) in 2005. MNRE (Ministry of New and Renewable Energy, Government of India) adopts GRIHA as a national rating system for green building in 2007, along with a handful of experts in the sustainability of built environment from across the country [5].

**Table: 1**

GRIHA categorized their rating system as follow-[6]

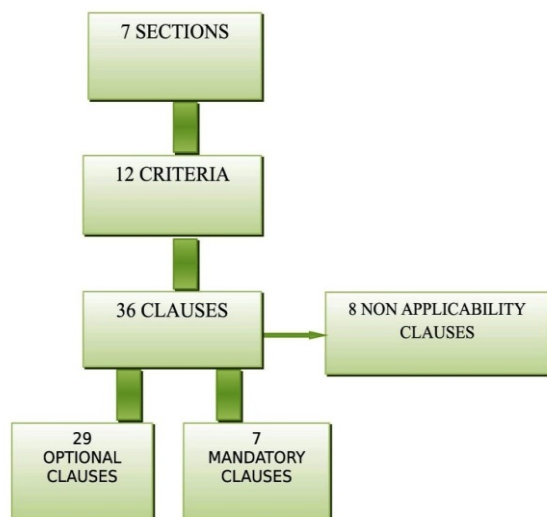
S. NO.	RATING SYSTEM	ESTABLISHED YEAR	REQUIRED CONDITION	TOTAL NO. OF CRITERION
1	GRIHA RATING SYSTEM	2007	$\geq 2500$ m <sup>2</sup>	31
2	SVA(SMALL VERSATILE AFFORDABLE) GRIHA RATING	2012	$\leq 0-2499$ m <sup>2</sup>	14
3	LARGE DEVELOPMENT GRIHA RATING	2013	$\geq 50$ hectares	-
4	PRAKRITI RATING	2014	for Sustainable Schools will be applicable only for existing school buildings in India	16
5	EXISTING BUILDING RATING SYSTEM	2017	$\geq 2500$ m <sup>2</sup>	12

### 1.2.1 Existing Building Rating Of GRIHA-

India's existing building stock presents a great opportunity to reduce primary energy and water demands. By improving the environmental performance of existing buildings can take decisive steps towards making our buildings and habitats sustainable. It is important that buildings continuously monitor and improve their performance in order to transition to a resource efficient economy. Although more than 2/3rd of the building stock in India is yet to be built, the existing buildings are a pool of resource savings ready to be tapped. Solutions must be found for the relatively large quantum of the existing buildings in India, as there is 8700 million kWh and 74 lakh tones of CO<sub>2</sub> saving potential locked in them [7].

### 1.2.2 KEY FEATURES OF GRIHA EXISTING BUILDING RATING SYSTEM [9]

- The existing Buildings rating system of GRIHA is a performance-oriented.
- The rating system has 100 points and 4 bonus point for innovation.
- Existing building rating scheme consisting of 12 criteria classified under seven sections these are Site Parameters, Maintenance & Housekeeping, Energy, Water, Human Health & Comfort, Social Aspects, and Bonus points.
- There are seven mandatory clauses, while rest are optional.
- There are no points for the mandatory clause.
- Points are scored for meeting the intent clause of the criteria. Each criterion has points assigned to it.
- It means that a project expecting to reach the criterion would match for the points.
- Several levels of certification are awarded based on the number of points scored. The minimum points required for certification is 25.
- Required built-up area should be greater than 2,500 square meters.
- Separate clauses for air conditioned and non air conditioned space.
- It is suitable for all kinds of buildings in diverse climatic zones of the country.



**Figure 1.** Block diagram of GRIHA Standard Documentation [7]

- a. **Mandatory clause**-this is a compulsory clause of GRIHA Rating system if any building cannot fulfill mandatory clauses then they are not even eligible to apply for certification.
- b. **Optional clause**-it is not such as a mandatory clause, there is not any compulsion to fulfill these clauses. Besides it, if any building follows optional clauses then they can achieve maximum points for every individual optional clause.
- c. **Non applicability clause**- Non applicable clauses are depends on different climate and conditions of that building. These clauses do not affect the overall rating of the building, because the building somehow not full fills the compliances and condition of the particular clause.

## II. APPROACH

The study is related to climate change make me concern to do research work in the field of green building. By moving forward with the same concept it was found that green building rating system can contribute more to solving the problems of climate change. On analytical data of present status of construction in India and future forecasting of construction industries ,base of research that is the best way to provide the Green Construction solutions.

Through the study about the status of Green Building construction in India, It was found that Indian Green

Building Council (IGBC) and GRIHA are the two important agencies which provide Green Building ratings to the newly proposed building construction as well as existing building construction. Out of which IGBC followed the International Rating as such Leadership in Energy and Environmental Design (LEED) whereas GRIHA have its own developed rating system. As GRIHA recently introduced Green Building Rating System for existing constructed building, so for this research and analysis of work prefer the same to achieving the ratings for the Administrative Block of RGPV.

## 3. WORKING AREA-

Rajiv Gandhi Proudhyogiki Vishwavidyalaya Established in the year 1998, by Madhya Pradesh Vidhan Sabha Act 13, 1998. Over a sprawling Campus of about 247 acres, the RGPV is marching towards development into a center of excellence in the arena of Technical Education, Research and Innovations [10].Administrative block of RGPV is occupied on 1 August, 2012.The area of this building is 1, 05,770 m<sup>2</sup>. South oriented building having two more floors after ground level. Two open to sky courtyards in block which enhance the ventilation of the building and also improve the day light with four entrances.



**Figure 2.** RGPV Administrative Block 3D view

## III. OBSERVATION AND SUGGESTION

### 4.1 SECTION 1: SITE PARAMETERS

#### 4.1.1 Criterion 1-Accessibility to Basic Services

**Clause no 1:** Availability of at least 5 basic amenities within the campus or within 500 m walking distance from the main entrance of project [7].

- Remark-5 basic amenities are present within the campus here administrative building fulfil the clause.

**Clause no 2:** Collective transport service to nearest public transportation nodes is provided for building occupants [7].

- Suggestion-CNG vehicles are available for the building occupants but there is no charging point for electric vehicles.

#### 4.1.2 Criterion 2-Microclimatic Impact

**Clause no 3:** the total number of trees planted on site with GRIHA for Existing Building threshold of 1 tree per 80 m<sup>2</sup> of total site/plot area [7].

- Remark- site area is not available to the project so as according to GRIHA Existing Building Rating Manual, clause no. 3 is non-applicability clause.

**Clause no 4:** More than 50% of the site surface visible to the sky (including building roofs) are either soft paved/covered with high SRI coating (SRI >50)/shaded by trees/shaded by vegetated pergolas/shaded by solar panels or any combination of these strategies [7].

- Suggestion- Administrative building have roof surface area where SRI coating can be done or solar panel can be installed and surroundings the courtyard plantation is needed.

## 4.2 SECTION 2: MAINTENANCE & HOUSEKEEPING

### 4.2.1 Criterion 3-Maintenance, Green Procurement & Waste Management

**Clause no 5:** Ensure that maintenance and housekeeping protocols are maintained and followed for electrical, HVAC, plumbing systems, and civil repair work.

- Clause- this is a **mandatory clause**.
- Suggestion- Systems provided in Maintenance checklist protocols of the GRIHA Existing building rating, some of the items are not in working condition at the site. Maintenance of the systems that are in working condition at the proposed site is done by periodically but there is no record of maintenance found.

**Clause no 6:** In case of conditioned spaces all HVAC equipment are CFC-free and all insulation used in buildings should be CFC- and HCFC free OR phase-out plan for HCFC/CFC using equipment. Fire fighting equipment is Halon-free [7].

- Clause- this is a **mandatory clause**.
- Suggestion-As HVAC system is not installed in building but mostly Air conditioned working at the site are CFC-free and fire fighting equipments are also Halon Free.

**Clause no 7:** Maintain and follow a policy of purchasing environment-friendly cleaning and pest control products for housekeeping materials with low ODP in building interiors [7].

- Clause- this is a **mandatory clause**.
- Suggestion-As observed at the building cleaning and pest control products for housekeeping materials are not eco friendly and also not have low ODP.

**Clause no 8:** Maintain and follow a policy of purchasing appliances with at least 3-star BEE rating for all appliances under the scheme of the BEE Star Rating program [7].

- Clause- this is a **mandatory clause**.
- Suggestion-Appliances used in building are not BEE Rated. So it's suggested to the administration that installed all appliances as according to BEE Star Rating Programme at least 3 star rated.

**Clause no 9:** Provide infrastructure (multicoloured dustbins/ different garbage chutes) to building occupants to ensure segregation of waste at source [7].

- Suggestion-There is no infrastructure available in building for waste segregation. So arrange multicoloured dustbins/ different garbage chutes in the premises.

**Clause no 10:** Provide dedicated, segregated and hygienic storage spaces in the project site to store different wastes before treatment /recycling [7].

- **Suggestion**-Arrange the facility for waste segregation /treatment/recycling. Also provide the hygienic storage space.

**Clause no 11:** Provide contractual tie-ups with waste recyclers for safe recycling for recyclable wastes, like metal, paper, plastic, glass, e-waste, etc [7].

- **Suggestion**-It is suggested that contractual tie-ups with waste recyclers for safe recycling of paper can be done with the EPCO Bhopal.

**Clause no 12:** Implement strategies to treat all organic (kitchen and landscape) waste on-site and to convert it into a resource (manure, biogas, etc.) and reuse [7].

- Remark- As organic (kitchen and landscape) waste generated on-site is much less in quantity than the quantity needed as according to GRIHA norms so it's a non applicable criterion.

#### 4.2.2 Criterion 4-metering & monitoring

**Clause no 13:** Demonstrate compliance with the basic metering requirements as mentioned below

##### a. Basic metering requirements

Ensure regular monitoring of building's energy consumption by installing digital meters at the following point sources:

- Utility grid
- On-site renewable energy system
- Diesel generators, gas generator set, etc.

##### b. Water metering requirements

Ensure regular monitoring of building's water consumption by installing digital meters at the following point sources:

- Municipal supply
- Bore well
- Tanker water
- STP Inlet and Outlet

Additionally, quality of water used for various purposes shall conform to relevant national standards (BIS/CPCB). Water quality should be tested at least quarterly [7].

- Clause- this is a **mandatory clause**.
- Suggestion-Arrange to install digital meters for electricity consumption and water consumption .It is also suggested that water used for various purpose its quality should be tested at least quarterly to confirm its national standards(BIS/CPCB).

**Clause no 14:** Advanced metering requirements

##### a. Energy metering requirement

Sub-meters at the following point sources:

##### a.1 Commercial buildings:

- HVAC plant, AHU, cooling tower and chillers (BTU meters)

- Lighting (indoor and outdoor)
- Each commercial tenant
- Water pumping

##### a.2 Water metering requirement-

Sub-meters at the following point sources:

- Irrigation
- Cooling towers
- Fresh water and waste water consumption at each building level
- Captured Rainwater

##### a.3 Comfort and air quality-

Ensure regular Monitoring and open display of the following metrics of indoor air:

- Air temperature
- Relative humidity
- CO2 levels (ppm) Install sensors in basement and/or closed parking areas, and regularly occupied spaces [7].

**Suggestion**-Install sub meters at the applicable facilities in above list and do monitoring for comfort and air quality to the given parameters in above list.

**Clause no 15:** Install one-way communicable smart meters and monitoring system capable of:

- Tracking consumption of energy/water through a web-hosted portal.
- Hourly data reporting in near-real time.
- Tracking consumption patterns.
- Setting consumption targets and alarms.
- Comparing historical and benchmark data.
- Real-time monitoring with user interface which can operate on mobile devices [7].
- **Suggestion**-Install communicable smart meters and monitored systems which is capable of tracking consumption of electricity and water.

**Clause no 16:** Provide two-way communication for consumers and connect to GRIHA IT platform to allow for communication on the following:

- Monthly energy consumption and water consumption.
- Average energy and water consumption for display to building occupants to assess building energy and water efficiency [7].

**Suggestion**-Once we install communicable meters then we have opportunity to provide two way communication for consumers and connect to GRIHA IT platform to allow for communication on the above given ways.

## 4.3 SECTION 3: ENERGY

### 4.3.1 Criterion 5 Energy efficiency

**Clause no 17:** Provide building energy consumption information.

Clause-this is a **mandatory clause**.

**Suggestion-** Submit the all related bills of energy consumption at least for 12 Months.

**Clause no 18:** Implementation of operation and maintenance no cost EEMs' [7].

**Suggestion-** Do monitoring and maintenance of all equipments such as Lightning, Office Equipments, Heating and Cooling, Communication and Education as according to EEEMs.

**Clause no 19:** Demonstrate percentage reduction in energy consumption over the base case as mentioned in Table below:

- % Reduction in energy consumption =  $\left(\frac{A-B}{A}\right) \times 100$

A = Base case energy consumption<sup>11</sup> (kWh/ year)

B = Existing case energy consumption<sup>12</sup> (kWh/year)

**Table 2.** Percentage reduction in energy consumption [7]

% Reduction in energy consumption residential building	%Reduction in energy consumption for non-residential and commercial building	Points
3	4	2
6	8	5
9	12	8
12	16	11
15	20	15

**Suggestion-** After installation of BEE rated equipments; Building can achieve the point's min 2 to max 15. For finding the base case of the building it should have the sub meters.

### 4.3.2 Criterion 6-Renewable Energy Utilization

Project can demonstrate compliance with either of the two alternatives-

**Clause no 20:** Alternative I: On-site/On-site & off-site combination of renewable energy system installation to offset a part of the annual total energy consumption [7]. Percentage of on-site/on-site and offsite generation of energy from renewable energy source.

**Table: 2**

Percentage offset for daytime occupied commercial building	Points
<b>2.5%(only on site)</b>	<b>mandatory</b>
5%	3
10%	5
15%	7
20%	10
25%	15

**Suggestion--** After installation of onsite solar power plant on roof building can achieve the point's min 3 to max 15.

**Clause no 21:** Alternative II: Off-site renewable energy system to offset a part of total energy consumption Points will be awarded as mentioned in below.

**Table 3.** Percentage of off-site generation of energy from renewable energy sources [7]

Percentages off set of energy consumption	Points
10	Mandatory
20	3
40	5
60	7
80	10
100	15

- **Suggestion-** As we will go for clause 20 so clause 21 is not applicable.

## 4.4 SECTION 4: WATER

### 4.4.1 Criterion 7-WATER FOOTPRINT

**Clause no 22:** Detailed water audit report clearly demonstrating the water supply and usage study, process and system audit, and discharge analysis [7].

- Clause-this is a mandatory clause.
- **Suggestion-** Conduct water audit.

**Clause no 23:** Reduction in building water consumption by 30% below the base case through water efficient fixtures. Refer Tables for flow values of water fixtures to create base case [7].

**Methodology for calculating water consumption and water use reduction is as follows:**

$$\text{Water consumption (lpd)} = N \times FR \times U$$

**N = Total occupants**

**FR = Flow rate of each type of fixtures**

**U = Number of uses of each type of fixtures fixed**

$$\text{Water use reduction (\%)} = \left( \frac{A-B}{A} \right) \times 100$$

**A = Annual building water consumption through water fixture- Base case (litters/year)**

**B = Annual building water consumption through water fixture- Existing case (litres/year)**

**Suggestion-**As it is observed that some of the water fixtures of the administrative building are either damage or not working properly so it is suggested that please do fix the damaged fixtures and those are damaged replace these by newer one.

**Clause no 24:** Minimizing lawn area and restricting it to 25% of the total landscaped area [7].



**Figure 3.** Building Netaji Shubash Chandra base[8]

**Suggestion-** As shown in image management can arrange the things in 2 courtyards available in building premises for reduction of landscape area.

**Clause no 25:** Use of water-efficient irrigation systems to reduce the water requirement by at least 50% from the GRIHA base case.

Methodology for calculating landscape water requirement and reduction is as follows:

$$\text{Landscape water requirement (lpd)} = \frac{(\text{plant factor} \times \text{Evapotranspiration (mpd)} \times \text{canopy area (sq.m)})}{\text{Irrigation system efficiency}} \times 100$$

- Plant factor refers to water requirement of the plants.
- Evapotranspiration rate refers to the amount of water required by the plant for healthy growth and determines the rate at which the plant loses water through evaporation.
- Canopy area refers to the area covered by shrubs, grass covers, and trees in the plan view.
- Irrigation system efficiency refers to the ability of an irrigation system to deliver water to plants without any water loss.

$$\text{Landscape water use reduction (\%)} = \left( \frac{A-B}{A} \right) \times 100$$

**A = Annual landscape water demand of base case**

**B = Annual landscape water demand of existing Case**

**Suggestion-** As it is observed that administrative building campus have gardens which needed water frequently so for that it is suggested that workers team should use water efficient irrigation system.

**Clause no 26:** Provision of on-site sewage water treatment system:

- 100 % of grey<sup>18</sup> water treatment on site.
- Treatment of sewage<sup>19</sup> water (grey water and black water combined) to meet 100% of non-potable water requirement [7].

**Suggestion-** As the waste water generated by building is much less than the 10KLD (Kilo litres per day), so as according to GRIHA Existing Building Rating Manual, clause no. 26 is non applicability clause.

**Clause no 27:** Provision of rainwater harvesting system:

- Only roof rainwater harvesting
- 100% of catchment area



**Suggestion-** Install rainwater harvesting system.

#### 4.4.2 Criterion 8 Reduction In Cumulative Water Performance

##### Clause no 28:

- Cumulative water performance (WP) reduces to 20% of total water use. – **2 points**
- Cumulative WP reduces to 30% of total water use. – **3 points**
- Cumulative WP reduces to 50% of total water use. – **6 points**
- Cumulative WP reduces to 70% of total water use. – **10 points**

*Cumulative water performance =*

$\frac{\text{Annual water demand of municipal ground water}}{\text{Annual water demand of project}} \times 100$
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Annual fresh water demand (litres /year)=  
(Annual water demand of the project) – (Annual water recycled & reused)

Annual water demand litres/year of the project includes the water requirement of the following:

- Planned and floating population,
- Landscape, and
- Services like HVAC, fire-fighting, and so on.

**Suggestion-** As it is clearly mentioned that as the percentage of cumulative water performance reduces in percentage accordingly administrative building of RGPV get the points to achieve the ratings.

#### 4.5 SECTION 5: HUMAN HEALTH & COMFORT

##### 4.5.1 Criterion 9-Achieving Indoor Comfort Requirements

**Clause no 29:** Demonstrate that project can achieve thermal comfort requirements of NBC 2005 or ASHRAE 55 or requirement of Indian Adaptive Comfort Model.22

**Suggestion-**Administrative management has suggested doing checkups of the thermal comfort requirements as according to NBC 2005 or ASHRAE 55 or requirement of Indian Adaptive Comfort Model.22

**Clause no 30:** Demonstrate following –

- Artificial lighting Lux level to fall within limits (lower and higher range limits), space/task specific lighting levels as per NBC 2005.
- Daylight Factor (DF) of at least 25% of all living area should meet the adequate levels as prescribed in SP 41.

**Suggestion-** As observed that somehow building full fill the requirement of clause no. 33 management should have submit the details as according to the compliance given as following.

**Clause no 31 :**The indoor noise levels should be within the acceptable limits as specified in NBC 2005 and key noise source on site (such as, diesel genset, chiller plant, etc.) should have sufficient acoustic insulation as per NBC 2005 norms.

**Suggestion-** As observed there is not such any noise source in the building.

##### 4.5.2 Criterion 10 Maintaining Indoor Air Quality

**Clause no 32:** Smoking must be banned/ prohibited within the building premises. In case smoking is allowed, the air from the smoking area must be isolated to prevent recirculation of tobacco smoke-containing air to non-smoking areas.

- Clause-this is a **mandatory clause**.

**Suggestion-**

- Allocate smoking area outside the building campus.
- Taking seriously action on no-smoking policy poster

**Clause no 33:** Meet the minimum requirements of -

- CPCB National Ambient Air Quality Standard (NAAQS) for quality of fresh air.25
- ASHRAE Standard 62.1–2010, Ventilation for Acceptable Indoor Air Quality or a NBC-2005 for quantity of fresh air.

**Remark :** suggestion is not required because administrative building is windows operable so as according to GRIHA Existing Building Rating Manual, clause no. 36 is non applicability clause.

#### 4.6 SECTION 6: SOCIAL ASPECTS

##### 4.6.1 Criterion N 11-Universal Accessibility & Environmental Awareness



**Clause no 34:** Provide facilities as per Harmonised Guidelines<sup>27</sup> and space standards for barrier-free built environment for the differently-abled person and elderly people for following minimum requirement in residential and public buildings.

**Suggestion-**to full fill this clause administrative building should have toilet for persons with special need and proper shaded parking is required.

**Clause no 35:** Adopt strategies to increase environmental awareness among users and visitors.

**Suggestion-**some strategies are listed below to increase environmental awareness these are:

- The Innovative display on ‘Environmental concerns and possible solutions at individual level ‘in common area/lobby or any other relevant location where the footfall would be maximum.
- Local outreach through posters, brochures, newspapers, and social media.
- Awareness programs for occupants/ and O & M staff.

#### 4.7 SECTION 7: BONUS POINTS

##### 4.7.1 Criterion 12: INNOVATIONS

**Clause no 36:** The project can adopt a maximum of two strategies. Each strategy carries 2 points.

**Suggestion-** Renewable energy solar power plant on roof space and net zero water discharge(rain water harvesting system and STP plant)

### IV.RESULT AND DISCUSSION

As total available rating points for the administrative block are 90. Study concluded that if in present we are going to apply for GRIHA ratings administrative block will achieve only 3 points but as the suggestion given in study will apply then building can achieve at minimum range 55+4 (Bonus points) total 59 points it make the building possible to achieve 3 star but if management of building do little more effort to implement of all suggestions strictly to achieve maximum range of points i.e. 88+4(Bonus Points) total 92 points can make possible to building for achieve 5 star rating. So it is concluded that by the implementation of suggestions given in the study building can achieve up to 5 star GRIHA rating.

**Table: 4**

S. no	Section	Criterion name	Max . Points	Max. Points for administrative building	Current status	After applying the suggestion
1	Site parameters	Accessibility to basic services	2	2	1	2
		Microclimatic impact	4	2	0	2
2	Maintenance & housekeeping	Maintenance , green procurement and waste management	7	5	0	5
		Metering & monitoring	10	10	0	10
3	Energy	Energy efficiency	20	20	0	7 to 20
		Renewable energy utilization	15	15	0	3 to 15
4	Water	Water footprint	15	11	0	9
		Reduction in cumulative water performance	10	10	0	2 to 10
5	Human health & comfort	Achieving indoor comfort requirements	8	8	2	8
		Maintaining Good IAQ	4	2	0	2
6	Social aspects	Universal accessibility & environment awareness	5	5	0	5
7	Bonus points	innovations	4	4	0	4

In above table the different sections of the GRIHA ratings system has define in the tabular form with their criterion along the maximum points can achieved correspondingly. Furthermore in next column the

maximum points that administrative block can achieve after eliminating the non-applicable clause is described. In next column the current status of achieving points of the administrative block is given finally in last column the total points that building can achieve after applying the all suggestions.

- In section 1 that is related to site parameters have two criteria i.e. Accessibility to basic services and Microclimatic impact. After applying the suggestion the maximum points can achieve in both of the criterion is 2.
- In section 2 that is about Maintenance & housekeeping having criterion such as Maintenance, green procurement and waste management and Metering & monitoring. In these criteria administrative building can achieve 5 & 10 points respectively after applying the suggestion.
- Section 3 is regarding to Energy in which two criterion are given Energy efficiency and Renewable energy utilization in which after applying the suggestion energy efficiency criterion building can achieve min 7 to max 20 points same in second criterion building can achieve min 3 to max 15 points.
- In section 4 i.e. Water having two criterion Water footprints and Reduction in cumulative water performance if we apply the suggestions given by that administrative building can achieve 9 points in water footprint criterion and min 2 to max 10 in the second criterion.
- Sections 5 is all about human health and comfort having two different criterion as Achieving indoor comfort requirements and Maintaining Good IAQ in these criteria building can achieve 8 and 2 points respectively.
- In section 6 as name social aspects have only 1 criterion i.e. universal accessibility & environment awareness in which administrative building can achieve 5 points.
- Sections 7 i.e. last section is all about bonus points in that particular section criterion innovation is applicable in which up to 4 points building can achieve. if management apply any one of the innovative technique building can achieve 2 bonus points and for achieving 4 bonus points management have to apply 2 innovative techniques.

## V. THRESHOLD RATING FOR GRIHA EXISTING BUILDING [7]

Table: 5

POINTS	RATING
25-40	1 star
41-55	2 star
56-70	3 star
71-85	4 star
86 and above	5 star

## VI. THRESHOLD RATING FOR ADMINISTRATIVE BLOCK OF RGPV BY GRIHA

Threshold rating is applicable to RGPV administrative block, obtained after deduction of the non applicable criteria points.

Table: 6

POINTS	RATING
23-36	1 star
37-50	2 star
51-63	3 star
64-77	4 star
78 and above	5 star

## VII. CONCLUSION

Since the field of building assessment with green building rating parameter is vast, the aim of this study is to clarify that, what approach are needed to transforming the administrative block of RGPV to sustainable building. The proposed study is based on the comparison of various rating criteria of GRIHA existing building rating system with the actual status of administrative block of RGPV. It is concluded that after taking corrective measures suggested in submitted report if implemented by the authorities certainly helps us to achieve 5-star rating for administrative block of RGPV. It is seen that report will make a significant change with respect to achieved points earlier from 3 points to later 92 points which makes possible to achieve 5 star ratings.

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