Infrastructure Development of Existing Communities – A Step Towards Green Communities

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Abstract: The current study is of basic infrastructure facilities in existing communities and how it can be transformed into Green communities in future. Focus is on how we can improve this process by developing sense of ownership and awareness in community dwellers for Green Community development. Sense of ownership encourages awareness and participation of community dwellers in the process of infrastructure development of their own community. Once the community has all basic infrastructure facilities it can be further developed and equipped as GREEN COMMUNITIES, which is our main objective so that we can merge our existing communities with newly developing communities of SMART CITY CONCEPT.

Keywords: **existing communities**, **green communities, infrastructure development**, **sustainability**

1.0 INTRODUCTION

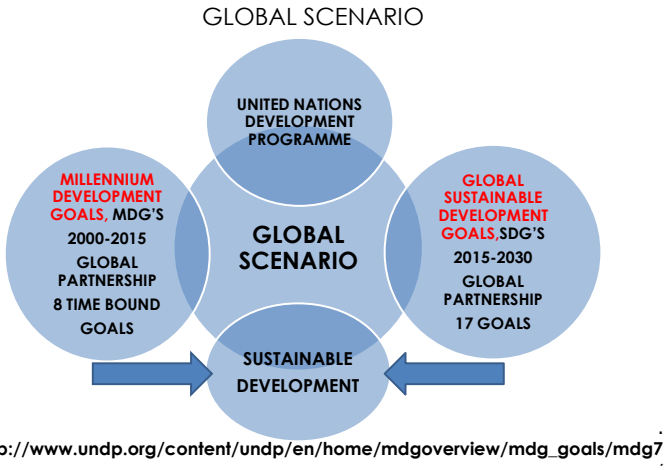
"Just as we must carefully plan for and invest in our capital infrastructure — our roads, bridges and waterlines, we must invest in our environmental or green infrastructure— our forests, wetlands, stream and rivers . . . Just as we must carefully plan for and invest in our human infrastructure — education, health service, care for the elderly and disabled — we must also invest in our green infrastructure."
— Maryland Governor Paris Glendening
January 1999

According to the UN-HABITAT Global Activity Report 2015, in the last century, the world has been rapidly urbanizing. In 2008, for the first time in history, urban population outnumbered rural population. This milestone marked the advent of a new 'urban millennium' and, by 2050, it is expected that two-thirds of the world population will be living in urban areas. With more than half of humankind living in cities and the number of urban residents growing by nearly 73 million every year it is estimated that urban areas account for 70 per cent of the world's gross domestic product and has therefore generated economic growth and prosperity for many.

The 2030 Agenda for Sustainable Development tackles this challenge through its Sustainable Development Goal 11, which aims to "make cities and human settlements inclusive, safe, resilient and sustainable"

2.0. GLOBAL SCENARIO:

In September 2000, building upon a decade of major United Nations conferences and summits, world leaders came together at the United Nations Headquarters in New York to adopt the United Nations Millennium Declaration. The Declaration committed nations to a new global partnership to reduce extreme poverty, and set out a series of eight time-bound targets - with a deadline of 2015 - that have become known as the Millennium Development Goals (MDGs).



2.1. THE 8 MILLENNIUM DEVELOPMENT GOALS

1 Eradicate extreme poverty and hunger
2 Achieve universal primary education
3 Promote gender equality and empower women
4 Reduce child mortality
5 Improve maternal health
6 Combat HIV/AIDS, malaria and other diseases
7 Ensure environmental sustainability
8 Develop a global partnership for development

2.2.THE GLOBAL SUSTAINABLE DEVELOPMENT GOALS (SDGS), Or Global Goals will guide policy and funding for the next 15 years, beginning with a historic pledge on 25 September 2015, to end poverty everywhere permanently. Transforming Our World - the 2030 Agenda for Sustainable Development (SDGs)

3.0 INDIAN CONTEXT:

The vision statement of 11th Five Year Plan of India suggest for Environmental Sustainability. With India's fast growing population, the issue of increasing urban population and providing basic amenities like water supply, sanitation, sewage, waste disposal and transport remains a huge challenge in urban areas. This challenge magnifies when development has to be with sustainable infrastructure.
Thus Globally and in India, infrastructure development in urban planning is being suggested in the process of sustainable development of communities and cities.

4.0 GREEN COMMUNITIES:

"Green" neighborhoods aren't necessarily a new concept. In the Sixties droves of people headed out West to live in smaller communes. These camps, farms and ranches grew their own food and developed an awareness for the environment and its conservation long before it was mainstream. These nomadic folks were labeled by the majority of the population at that time as "tree-huggers" and "hippies." What the majority of the population didn't realize, though, was that those folks were on to something. They may not have called it green living, but that's exactly what they were doing.

Times have changed, and now going green is not only popular, it's a necessity if the 7 billion of us that share this planet hope to make it last. It's not just the occasional commune that's embracing green living. Entire communities in some of the busiest cities in the world are creating green neighborhoods, and the results are extremely positive.

A "Green Community" is an intentional approach to growth that strives to protect natural drainage of the land and the streams within a watershed. As communities continue to develop in Iowa, Growing Green Communities is committed to creating a "recipe" of what a green community would include.

The following seven principles are included in our definition of a green community:

SEVEN PRINCIPLES OF GREEN COMMUNITIES	
S.NO.	
1	WATER MANAGEMENT
2	GREEN INFRASTRUCTURE
3	NATURAL LANDSCAPES
4	APPROPRIATE TRANSPORTATION NETWORKS
5	LIVABLE COMMUNITIES
6	COMMUNITY CHARACTER
7	LOCAL ECONOMIC HEALTH

4.1.I WATER MANAGEMENT:

The first component of a green community is the way water is managed. Storm water is handled as a resource instead of a waste product by retaining as much storm water as possible on site and within the absorption capacity of the natural landscape. The goal is not to send storm water to the nearest body of water as quickly as possible; instead water is allowed to permeate the ground where it falls and filter cleanly into the water table.

S.NO.	WATER MANAGEMENT
1	STORM WATER AS A RESOURCE TO RETAIN WATER TABLE
2	REDUCE IMPERVIOUS SURFACES
3	STONE AND CONCRETE PAVERS INSTEAD OF SOLID CONCRETE OR ASPHALT.
4	A RATIO OF PARKING SPACES TO SQUARE FOOTAGE PREFERRED (ECS)
5	ONE TREE PER 25 LINEAR FEET OF PARKING FRONTAGE
6	DEEP-ROOTED NATIVE PRAIRIE PLANTS TO ABSORB AND FILTER STORM WATER BEFORE IT LEAVES THE DEVELOPMENT AREA.
7	BUFFER ZONES ENFORCED THROUGH ZONING ORDINANCES
8	PREVENT DEVELOPMENT WITHIN 100 FEET OF PROTECTED WATER RESOURCES.

Finally, natural water resources such as wetlands, rivers, lakes, and 100 year flood plains should be protected, and development limited to agriculture, public and private parks, passive recreation, and yard areas.

4.1.II GREEN INFRASTRUCTURE:

A planning and policy initiative should take place to discuss strategies for building a green community. This process should:

S.NO.	GREEN INFRASTRUCTURE
1	ACTIVE PARTICIPATION OF LOCAL OFFICIALS, STAFF, AND THE PUBLIC IN THE GREEN INFRASTRUCTURE VISIONING AND PLANNING PROCESS.
2	PRIORITIZE GREEN INFRASTRUCTURE PROTECTION AS A PRIMARY PUBLIC AND PRIVATE INVESTMENT AND INCORPORATE GREEN INFRASTRUCTURE INTO COMMUNITY PLANS, POLICIES, AND ORDINANCES.
3	IDENTIFY GREEN SPACES, SENSITIVE LANDSCAPE ELEMENTS, NATURAL AREAS, WATERWAYS, WETLANDS, AND OTHER LANDSCAPE ELEMENTS IMPORTANT TO THE COMMUNITY INCORPORATE THEM INTO A NATURAL AREAS OVERLAY DISTRICT AND ESTABLISH ALLOWABLE USES AND STANDARDS FOR THESE AREAS.
4	SET PROTECTIVE BUFFERS AROUND EACH OF THE FEATURES MENTIONED ABOVE TO PROVIDE ADEQUATE PROTECTION.
5	FOR PROPOSED NEW DEVELOPMENT, IDENTIFY THE GREEN INFRASTRUCTURE NEEDS AND SENSITIVE FEATURES OF THE AREA AND CONSTRUCT DEVELOPMENTS ON REMAINING LAND FOR MINIMAL INTERFERENCE.
6	OPEN SPACES SHOULD BE INTERCONNECTED NETWORKS ENVELOPING EACH INDIVIDUAL SUB-DEVELOPMENT TO CREATE A SENSE OF COMMUNITY RATHER THAN DIVIDING AND ISOLATING RESIDENTS.
7	A PROGRAM DESIGNED TO ENCOURAGE DONATIONS FROM RESIDENTS SHOULD BE IMPLEMENTED, AS WELL AS A TAX INCENTIVE TO LANDOWNERS WILLING TO KEEP A PORTION OF THEIR PROPERTY NATURAL AND UNDEVELOPED.

It is also a priority to manage and restore natural areas and processes. Areas designated as natural areas should be entirely composed of native landscapes; areas designated as open space should be naturally landscaped or restored to the greatest extent possible while retaining space for other designated uses. Green spaces should be linked, networked, and incorporated into a regional green infrastructure, trail, and natural area plan. Land owners could also donate portions of their property to conservation easements to ensure its protection perpetually.

4.1.III NATURAL LANDSCAPES:

Local policies and city ordinances should be amended to protect and encourage the use of natural landscaping through sustainable growth and native vegetation. Zoning, subdivision, and building codes should require sustainable site designs and natural landscaping, and municipal and public locations should serve as models for green development. Builders, developers, and homeowners should be encouraged to use the following green site selection for development.

S.NO.	NATURAL LANSCAPES
1	SELECTION SITES TO MAXIMIZE ACCESS TO PUBLIC TRANSPORTATION, SCHOOLS, EMPLOYERS, PARKS, LIBRARIES, SHOPPING AREAS, AND COMMUNITY SERVICES, USING EXISTING INFRASTRUCTURE AND REUSING EXISTING BUILT SITES/STRUCTURES.
2	USING NATURAL SITE FEATURES (LANDFORMS, VEGETATION, SUN ANGLES), BUILDING ORIENTATION, AND LANDSCAPING TO PROVIDE SHADE DURING SUMMER, MAXIMIZE SOLAR HEATING DURING THE WINTER, AND USE NATURAL DAY LIGHTING FOR LIGHT NEEDS.
3	PROTECT SENSITIVE LANDSCAPE ELEMENTS LIKE STREAM CORRIDORS, WETLANDS, SHORELINES AND FLOODPLAINS; AQUIFER RECHARGE AREAS; STEEP SLOPES; WILDLIFE HABITAT, PRAIRIES, TREES, WOODLANDS, AND OTHER NATURAL VEGETATION; AND HISTORIC, ARCHAEOLOGICAL, AND CULTURAL FEATURES. USE TECHNIQUES LIKE CONSERVATION EASEMENTS, REGULATION, OVERLAYS, AND BUFFER ZONES. PROTECTED AREAS SHOWN ON CONSTRUCTION PLANS.
4	MINIMIZE CLEARING, GRADING, AND OTHER SITE DISTURBANCES, IN ENVIRONMENTALLY SENSITIVE AREAS, AND CONTROL EROSION AND SEDIMENTATION DURING CONSTRUCTION PROCESS USING TECHNIQUES SUCH AS TEMPORARY AND PERMANENT SEEDING, MULCHING, EARTH DIKES, SILT FENCING, SEDIMENT TRAPS, AND SEDIMENT BASINS.
5	USE CLUSTER OR CONSERVATION DEVELOPMENT FOR MULTIPLE BUILDING SITES REDUCING LAND CONSUMED FOR DEVELOPMENT. LOCATE NEW BUILDINGS CLOSE TO THE EXISTING DEVELOPED AREAS TO MINIMIZE SPRAWL.

4.1. IV APPROPRIATE TRANSPORTATION NETWORKS:

Railways, roadways, trails, and walkways should serve both transportation and recreational needs.

S.NO.	APPROPRIATE TRANSPORTATION NETWORKS
1	NEIGHBORHOOD/COMMUNITY DESIGN SHOULD BE BASED ON AN INTEGRATED NETWORK OF ROADS AND OTHER TRANSPORTATION PATHWAYS TO PROVIDE MULTIPLE ROUTES FOR CIRCULATION, UNLIKE CONVENTIONAL SUBDIVISION THAT RELIES ON ONE OR A FEW ACCESS POINTS TO MAJOR ROADS, RESULTING IN CONCENTRATIONS OF TRAFFIC AND CONGESTION.
2	AN INTERCONNECTED NETWORK OF STREETS HAS BEEN SHOWN TO PROVIDE DRIVERS MORE TRAVEL OPTIONS, THUS REDUCING ROADWAY CONGESTION ON NEARBY MAJOR ROADWAYS.
3	DESIGN SHOULD BE MORE PEDESTRIAN AND BICYCLE FRIENDLY ALLOWING MORE DIRECT PATHS.
4	ALL NEW DEVELOPMENTS SHOULD HAVE A BICYCLE / PEDESTRIAN TRAIL PLAN CONNECTING TO A REGIONAL TRAIL SYSTEM.
5	NEW HOMES AND BUSINESSES SHOULD BE CONVENIENT TO SCHOOLS, PARKS, AND SHOPS. STREETS SHOULD BE DESIGNED WITH PEDESTRIANS IN MIND; WITH BETTER VISIBILITY AND MORE FREQUENT CROSSWALKS AND SIGNS.

4.1.V LIVABLE COMMUNITIES:

Residential areas should be mixed with commercial areas to provide convenient access to schools, shops, services, and recreation, and with appropriate transportation alternatives. Zoning codes should be revised to allow developers more flexible, integrated designs. Allow for mixed uses within buildings, such as residential units above street-level retail units, to provide a regular customer base, place more 'watchful eyes' on the street, and extend business hours into the evening.

Allow flexible zoning districts where building use can vary between commercial, residential, and business uses according to market demand. Allow owners and occupants flexibility to determine appropriate uses for their buildings. Also allow flexible zoning for transition areas between residential and commercial districts that can incorporate both uses.

Avoid incompatible uses such as warehouse retailers, large home improvement stores, auto dealerships, and drive through franchises within the central commercial district. Update zoning and building codes to encourage downtown, mixed-use shopping districts rather than strip-mall developments in fringe areas. These developments compete with and often drain town centers and do not provide the same aesthetic and economic benefits.

S.NO.	LIVABLE COMMUNITIES
1	CREATE ACTIVE, INVITING, AND COMFORTABLE PUBLIC SPACES AND DESTINATIONS THAT ENTICE PEOPLE TO STOP, EXPLORE, AND TAKE CARE OF DAILY ACTIVITIES.
2	UNIQUE FEEL AND APPEARANCE OF A COMMUNITY IS ESSENTIAL TO ITS SUCCESS.
3	WORK WITH BUSINESSES TO INSTALL SIDEWALK AMENITIES SUCH AS SEATING, SHADE, WATER FOUNTAINS, FOOD AND COFFEE CARTS, DISPLAY TABLES, WEATHER PROTECTION, TRASH RECEPTACLES, AND A FOCAL POINT SUCH AS A FOUNTAIN OR PUBLIC ART PIECE.

4.1.VI COMMUNITY CHARACTER

Develop community design guidelines, codes, and ordinances to protect and enhance character, aesthetics, historic features, and architectural harmony. Identify areas of architectural or natural significance, appealing public spaces, and areas that require aesthetic improvements. Involve residents and professionals in efforts to develop guidelines for buildings and exterior spaces by holding community design workshops. Engage city and village planners, landscape architects, historic preservationists, developers, and architects to deliver presentations on how your community can adopt good design principles.

Develop downtown and historic zoning districts that specify desired design elements, such as lighting, seating, and landscaping, for areas with historic significance and existing distinctive character. Protect natural landscape elements, topography, and views and vistas throughout the corridor, especially as perceived from roads and other public spaces.

S.NO.	COMMUNITY CHARACTER
1	USE PEDESTRIAN-FRIENDLY DESIGNS AND INCLUDE SIDEWALK CAFES, PARKS, PLAZAS, AND CORNER SHOPS.
2	LOCATE PARKING AREAS AND GARAGES BEHIND RATHER THAN IN FRONT OF BUSINESSES.
3	COOPERATE WITH THE LOCAL ART COMMUNITY TO DEVELOP PUBLIC "TOUCHABLE" ART PROJECTS FOR PARKS, PLAZAS, AND OTHER PUBLIC SPACES.
4	INSTALL SEATING, LIGHTING, AND LANDSCAPING IN EXISTING PUBLIC SPACES AS WELL AS IN NEW DEVELOPMENTS TO ENHANCE SAFETY, VISIBILITY, AND APPEAL. ALSO PROVIDE AND MAINTAIN CLEAN PUBLIC RESTROOMS AND DRINKING FOUNTAINS.
5	CREATE QUIET RESIDENTIAL LANES WITH NARROWER STREETS TO SLOW TRAFFIC AND ENHANCE COMMUNITY ATMOSPHERE. ENCOURAGE FRONT PORCHES TO ENHANCE RESIDENTIAL AREAS.
6	FOR HEAVIER TRAFFIC AREAS, DESIGN OR RETROFIT ROADWAYS FOR A BOULEVARD OR PARKWAY APPEARANCE WITH LANDSCAPED MEDIANS, STREET TREE PLANTINGS, BIKE LANES, AND SIDEWALKS.
7	PROTECT AND RESTORE CULTURAL AND HISTORIC ELEMENTS THAT ADD TO THE CHARACTER OF THE COMMUNITY.
8	PROTECT ELEMENTS SUCH AS GREEN SPACE, NEIGHBORHOOD TREES SCENIC AND RUSTIC ROADS, FARMSTEADS, AND FORESTED AREAS, WHICH PROVIDE A DISTINCT AND UNIQUE COMMUNITY SENSE OF PLACE

Require developers to design buildings for a specific site, and to avoid using stock plans. Work with business owners, especially franchises, to develop acceptable building facades and signage consistent with the established character of a community rather than using visually unappealing generic designs. Ensure that redevelopment in existing neighborhoods is consistent with their scale and character and enhances their visual appeal.

4.1.VII LOCAL ECONOMIC HEALTH:

Invest in and support local schools, colleges, and training programs, especially in technology and local trades. Sound education is the first step to a well-developed workforce. Involve local businesses in discussions about curriculum structure at local high schools. By helping to structure education programs, businesses can assure a constant stream of well-prepared potential employees.

Take advantage of the federal structure and funding for workforce development programs. Work with the local workforce investment boards that serve your community. Publicize your community's workforce development programs. Such programs can be strong incentives for new businesses to locate in your community.

Organize local employers. As a group, employers may be able to work together to provide valuable services such as job databases, daycare, skills training, and transportation. Assist businesses in providing support services such as shuttle buses, childcare, and interest free loans. Promote locally-owned large and small businesses, including organic farms, mar loyal and better neighbors to the community.

Revitalize the downtown and main streets and improve and protect community character to attract economic development.

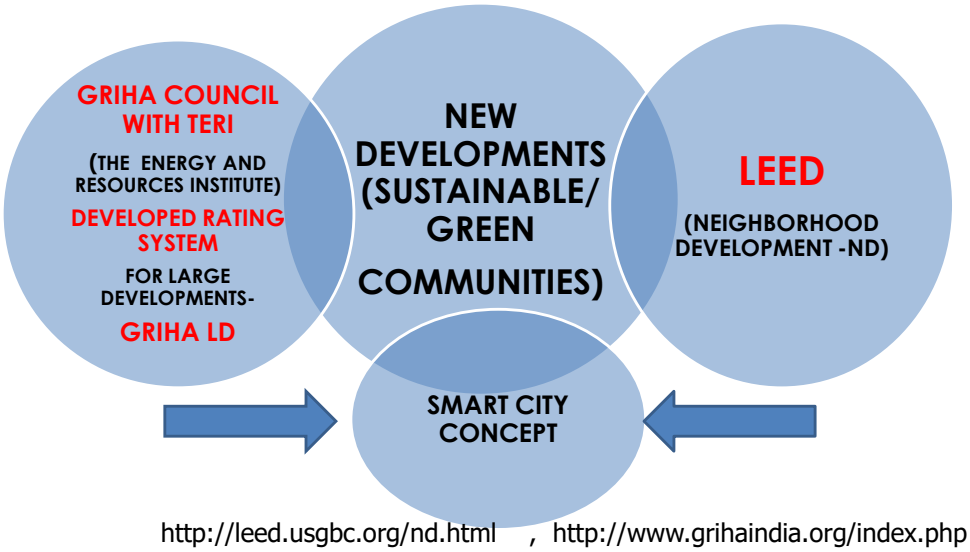
S.NO.	LOCAL ECONOMIC HEALTH
1	FACILITATE PARTNERSHIPS BETWEEN LOCAL BUSINESSES AND LOCAL COMMUNITY DEVELOPMENT GROUPS.
2	PROVIDE FINANCIAL INCENTIVES TO ATTRACT PRIVATE SECTOR PARTICIPATION AND IMPLEMENT PROJECTS.
3	SUPPORT THE LOCAL ECONOMY AND LOCALLY-OWNED BUSINESSES. INVESTIGATE ECONOMICALLY BENEFICIAL ECO-TOURISM ACTIVITIES SUCH AS ORGANIC FARMING, BED-AND-BREAKFAST LODGING, AND FALL COLOR TOURS, ETC., AND PROTECT RESOURCES THAT SUPPORT THESE ACTIVITIES SUCH AS PRIME AGRICULTURAL LAND AND RURAL CHARACTER.
4	HIRE QUALIFIED LOCAL WORKERS FOR GOVERNMENT JOBS AND ENCOURAGE BUSINESSES TO HIRE FROM THE LOCAL LABOR FORCE TO STRENGTHEN COMMUNITY RELATIONS.
5	PROVIDE REGULATORY FLEXIBILITY AND INCENTIVES SUCH AS TAX BREAKS OR LOANS FOR BUSINESSES TO LOCATE WITHIN THE URBAN CORE INSTEAD OF BUILDING IN UNDEVELOPED AREAS.

5.0 SUSTAINABILITY AND SUSTAINABILITY REPORTING TOOLS:

To guide stakeholders in making informed plans and decisions, sustainability reporting tools (SRTs) have evolved from a primary focus on environmental issues of single buildings such as Green Star, BREEAM and LEED [3] to the assessment of the sustainability of communities. This is, in part, due to the criticism that SRTs for buildings are incapable of addressing the volume of sustainability challenges that are beyond environmental issues [3, 4]. The scaling up of SRTs to a community level is perceived as an effective way of tackling a range of sustainability issues: pollution, biodiversity, social needs, transportation, climate change and energy among others synergistically [4]. Some of the more established SRTs to assess the sustainability of communities include BREEAM for Communities, CASBEE for Urban Development, Green Star for Communities, LEED for neighborhood Development, Sustainable Tools for Assessing and Rating (STAR), Eco City and HQE2R.

SUSTAINABILITY AND NEW COMMUNITIES/ NEIGHBORHOOD DEVELOPMENTS

CERTIFICATION AND LARGE SCALE DEVELOPMNET



http://leed.usgbc.org/nd.html , http://www.grihaindia.org/index.php

GRIHA: LARGE SCALE DEVELOPMENT

GRIHA

- **GRIHA Council**, in association **with The Energy and Resources Institute (TERI)** and the Ministry of New and Renewable Energy (MNRE), has launched the **Green Rating for Integrated Habitat Assessment (GRIHA)** and **Simple Versatile Affordable GRIHA (SVA GRIHA),** in order to address and promote green buildings in India.
- However, a need was felt to create a framework to assess the environmental performance of larger developments, the singular units which together **make up cities – neighborhood/townships – and with this focus;**
- **GRIHA Council along with TERI** has developed a rating system for large developments titled – **GRIHA LD (Large Developments).**
- The intent of **GRIHA LD** is to provide a consolidated framework for assessment of environmental impacts of large scale developments.
- **Qualification for rating**
  All projects which satisfy either of the following two thresholds may apply for a GRIHA LD rating:
- **Total site area greater than or equal to 50 hectare**

GRIHA: LARGE SCALE DEVELOPMENT

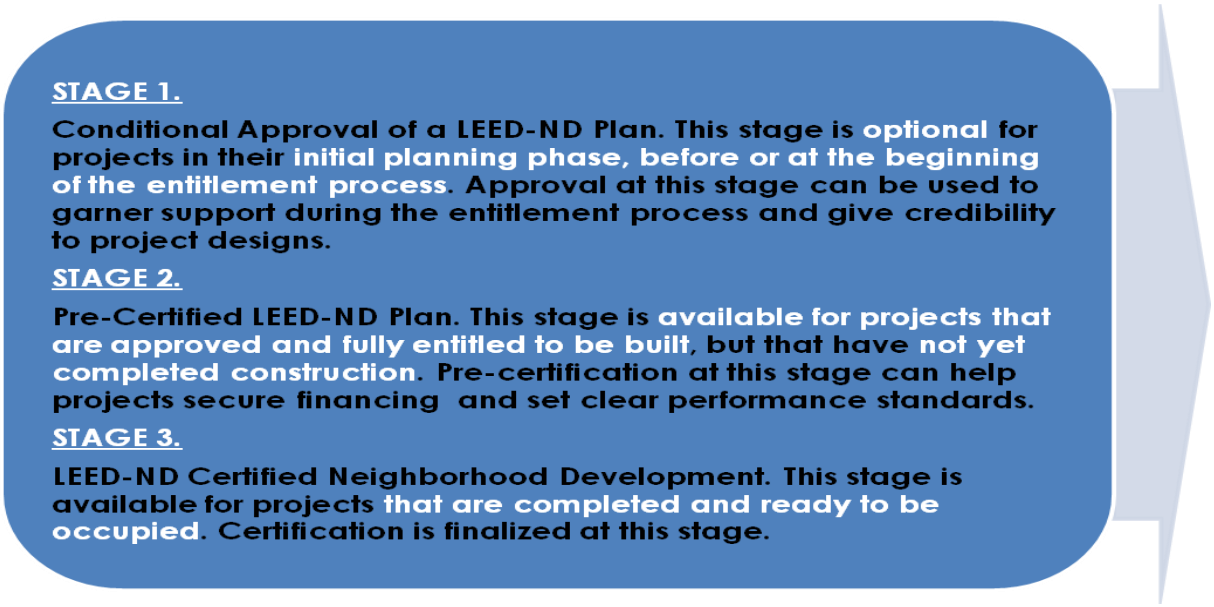
GRIHA

- All sites in their native state sustain various ecological cycles and do not have any detrimental impact on their surroundings. Construction leads to disruption of various cycles as well as exerts demand for various resources like energy, water, etc. Therefore, conventional construction practices have a detrimental impact on their surroundings. In the framework of GRIHA LD, projects which reduce their detrimental impact on the surroundings to the minimum and attempt to become self-sufficient in aspects like energy, water, etc., will be given the highest rating. Therefore, the lower the negative impact of a development on its surrounding, the better the GRIHA LD star rating.

In GRIHA LD the development will be evaluated in six different sections as listed below:

- Site Planning
- Energy
- Water and waste water
- Solid waste management
- Transport
- Social
- **Each section comprises two parts: Quantitative and Qualitative.** Each section will be evaluated on quantitative (except Social) parameters as well as qualitative.
- In the section on Social, since there are no quantitative parameters, the evaluation will be done based on only qualitative parameters.

LEED: NEIGHBOURHOOD DEVELOPMENT



Sustainability and Existing Communities/ Neighborhood Developments

GAP

6.0 Conclusion

Sustainable infrastructure development of existing communities lacks attention from both the academia and political decision-makers. In the last few years new community /neighborhood developments has attracted interest from them. LEED ,GRIHA and BREEAM have rating system only for new community/ neighborhood developments .There are no certification agencies, no norms, no parameters, no model, no specific study, no indicators for transformation of old existing community development to Green Community development. There is a wide range of scope for researchers to research and analyze emerging issues on the sustainability agenda, such as urban governance, citizens' empowerment and participation, sense of place, urban livability etc. for old existing community /neighborhood developments. Further finding an appropriate linking of parameters common between service providers, ULB's (Urban Local Bodies) and users (community dwellers) to develop some Model or Matrix for its enhanced working in future. *Green community: A step towards Smart City development as whole.*

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