



## Planning and Design of ALEAP Green Industrial Park (A-GRIP), Nandigama

March 2015

Prepared by:



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## About GIZ

GIZ has been implementing Indo-German co-operation for over 60 years. It supports change processes for sustainable development, mutually agreed by the two Governments and other funding partners. GIZ uses a bouquet of customised, innovative solutions, backed by tested German methods. GIZ India has staff strength of over 300 people, and handles an annual business volume of about €50 million (INR 400 crores).

India belongs to the G20 and BRICS, and is fast emerging as an industrial and nuclear power. Despite the country's rapidly growing economy, poverty and social issues remain a challenge. The burgeoning population and accelerated urbanisation in the country has resulted in an environment that is at risk, and greenhouse gas emissions that continue to spiral upwards. India aspires for sustainable and inclusive growth.

GIZ India is studying how it can participate in new initiatives of the Government of India, e.g. Rejuvenation of Ganga, Clean India, Skill Development, or Agricultural Innovation. GIZ currently works in areas where needs and strengths of India and Germany are in alignment.

- Energy efficiency and renewable energies:
  - Introduce German technologies and reform institutional set ups;
  - Mitigation of greenhouse gas emission;
  - More efficient power generation and industrial production;
  - Propagation of new business models for solar energy and improved cook stoves; and
  - Green energy corridors for power distribution.
- Environment:
  - Support green cities and industries;
  - Strengthen resilience to climate change;
  - Enhance productivity in agriculture;
  - Protect green spaces and biological diversity;
  - Support sustainable forests; and
  - Introduce economic incentives for a green economy.
- Sustainable economic development:
  - Access to rural finance;
  - Social security and insurance for the poor;
  - Small and medium enterprises;
  - Responsible business management, and
  - Vocational training and skill development based on the german model.

GIZs funding partners are the German Federal Ministry for Economic Cooperation and Development (BMZ), the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB), and Indian public sector clients, multilateral organisations (e.g. EU), foundations, and non-governmental organisations.

## About IGEP

The Indo-German Environment Partnership (IGEP) programme focuses on pilot measures and policy decisions of national level relevance for the enhancement of resource efficiency, reduction of environmental stress, improved service delivery in urban infrastructure services and mitigation of greenhouse gas emissions. The programme aims at responding to some key challenges identified in the policy framework of the Ministry of Environment and Forests, Government of India. The overall objective of IGEP is that the decision makers at national, state and local level use innovative solutions for the improvement of urban and industrial environmental management and for the development of an environment and climate policy that targets inclusive economic growth de-coupled from resource consumption.

## Foreword



Dr. Dieter Mutz  
Director  
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The industrial sector is an important sector for the Indian economy. From the growth of industries individually or in small clusters to more organised industrial estates the trend today is development by way of special industrial zones, investment regions, manufacturing zones, and even mega industrial corridors.

The industrial parks and the industrial investment regions in their new form have started assuming important role in the country's development. However, if not properly planned, industrial development has potential to pose tremendous risks on natural resources, environment and people. Proper planning of the industrial parks and investment zones can result in increased overall competitiveness and profitability of the residing businesses lower emissions and pollution raised resource and energy efficiency, and offers an overall healthier working environment that helps in meeting the targeted investment and employment goals.

Properly prepared development plans or master plans for industrial parks and investment zones could support not only the industries in these zones, but also go a long way in supporting Sustainable Development of the region and country as a whole. There is a need to make sure that these Development Plans and Master Plans are environment-friendly. Clean, green, and energy efficient technologies should be integrated at the planning stage itself into these industrial parks and investment zones. This requires integration of clean/green/energy efficient and environment-friendly technologies. This requires further clarification on what are such clean/green/energy efficient and environment-friendly technologies and what are the guidelines and standards that are to be considered while preparing the development plans or site master plans.

Within the context of the Indo-German Environment Partnership (IGEP) programme of the Indo German Development Cooperation, GIZ provided technical support to the Association of Lady Entrepreneurs of Andhra Pradesh (ALEAP) for site master planning of the Green Industrial Park (GRIP) project at Nandigama catering to women entrepreneurs. Several aspects of environment, resource efficiency and gender aspects were integrated into to the planning of the industrial park, besides using the benchmarks set by the German Sustainable Building Council (DGNB). A team of national and international experts with several years of standing experience in applied research and collaboration services were brought together for this task.

With the enthusiastic and active cooperation of ALEAP for taking forward this initiative of gender inclusive and environment friendly site master planning, we are sure that the Green Industrial Park would become a new landmark and set an example for other industrial parks in the country and the region.

New Delhi  
February 19, 2015

(Dr. Dieter Mutz)  
Director, GIZ (IGEP)

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ANNEXURE I  
ANNEXURE II (MAPS)

## CHAPTER 01

# ABOUT ALEAP GREEN INDUSTRIAL PARK, NANDIGAMA

### A. ABOUT THE PROJECT

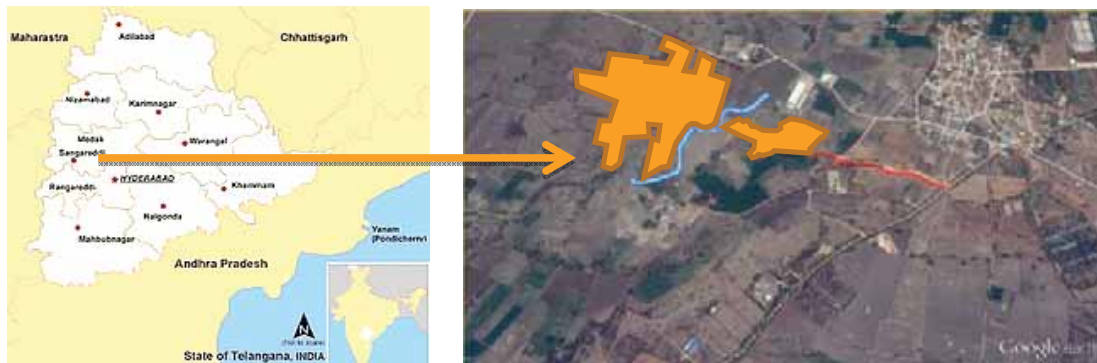
The Association of Lady Entrepreneurs of Andhra Pradesh (ALEAP) was established in 1993. It is a state level organization with an objective of upliftment of women and empowerment through establishing small and medium enterprises. To promote women entrepreneurship, ALEAP is now developing 'ALEAP – Green Industrial Park' (A-GRIP) at Nandigama near Hyderabad in the newly formed State of Telangana.

A-GRIP at Nandigama is envisioned to provide an environment conducive for women entrepreneurs and employ state-of-the-art technologies, including clean technologies, renewable energy technologies, environmental technologies and cost-effective common infrastructure.

### B. ABOUT THE SITE

- **Location, accessibility and site surroundings:**

A-GRIP is located in Nandigama village, part of Patancheru Taluka/Mandal in Medak District of Telangana. A-GRIP extends over 82.55 acres (3,34,094 m<sup>2</sup>) of land area outside the settlement area of Nandigama village. (Refer to image no. 1-1).



**Image no. 1-1: Location of site in Telangana**

[Source: <http://en.wikipedia.org/>, GIZ-IGEP]

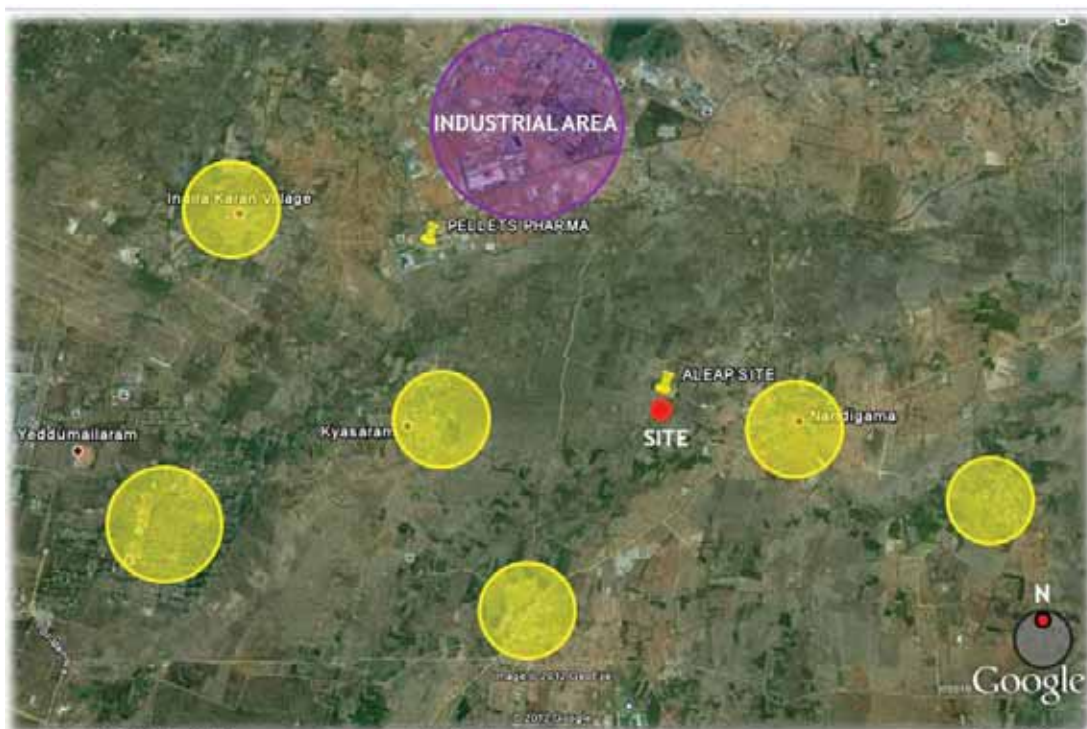
The delineated site is situated approximately 8 km south west of *Patancheru* lake in Hyderabad, Telangana. The national highway (NH- 9) passing through *Patancheru* is the nearest highway to the site. The site is about 5.06 km from the outer ring road (ORR) of Hyderabad. (Refer image no. 1-2) The site has good connectivity to the Hyderabad international airport and the *Vattinagulapally* railway station. The nearest bus station state transport is at Nandigama with bus route connectivity to many major cities of Telangana.

The site is mainly surrounded by different villages on all sides, except for the industrial area in its north-west direction. (Refer image no. 1-3) The industrial site lies outside the settlement area of Nandigama village.



**Image no. 1-2: Site proximity to outer ring road, Hyderabad**

[Source: Murty and Manyam Architects and Engineers Ltd.]



**Image no. 1-3: Surrounding settlements and activities**

[Source: Murty and Manyam Architects and Engineers Ltd.]

### C. PROCESS FOLLOWED

This section elaborates the process that was followed during the project involving multiple stakeholders. (Refer image no. 1-4).



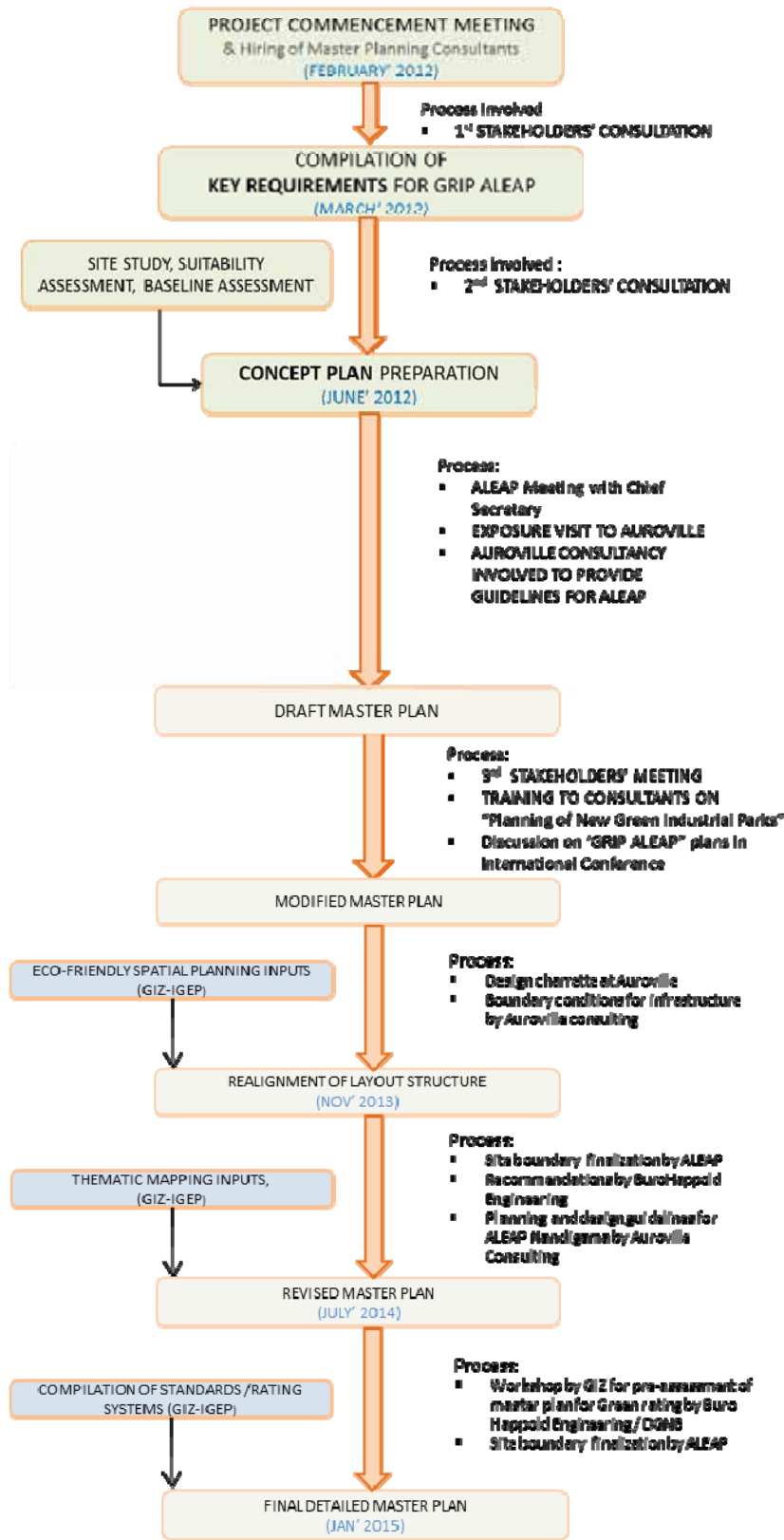


Image no. 1-4: Process of arriving at site master plan for A-GRIP

[Source: GIZ-IGEP]

ALEAP hired the services of Murty and Manyam Architects and Engineers Ltd. (Murty and Manyam) as consultants for preparing the site master plan of A-GRIP. GIZ provided technical support under the Indo-German Environment Partnership (IGEP) programme of the Indo German Development Cooperation. Auroville Consulting from Auroville was associated in providing technical assistance on different aspects. BuroHappold Engineering, Berlin and DGNB, Stuttgart was associated in reviewing the master plan and providing recommendations for green rating of the industrial park as per international standards.

Details of the process followed are given below.

- The 1<sup>st</sup> stakeholder meeting was organized by ALEAP on March 23, 2012. It was attended by women entrepreneurs, GIZ-IGEP and Murty and Manyam. The discussion mainly focused on chalking out the key requirements for the project covering the following points:
  - Plots;
  - Services;
  - Infrastructure; and
  - Other facilities.

The requirements were listed through preparation of a mind map. It was decided that Murty and Manyam would prepare a concept plan understanding requirements through more consultations with women entrepreneurs.

- The 2<sup>nd</sup> stakeholder meeting on “Site Master Planning” for A-GRIP was organized by ALEAP on June 30, 2012 (Refer image no. 1-5). The meeting mainly focused on presentation on conceptualization of the site master plan by GIZ -IGEP and Murty & Manyam. The presentation included details of:
  - Applications of renewable energy;
  - Landscaping concepts;
  - Different industry sectors proposed for A-GRIP;
  - Social infrastructure particularly catering to women employees;
  - Alternative sizing of plots as per needs of the industries proposed;
  - Roads/accessibility, parking plan for cars and loading/unloading of trucks;
  - Concepts for building design including building ventilation, orientation etc.;
  - Concepts of environmental infrastructure, viz. common effluent treatment plant, storm water management, solid waste management;
  - Fencing and security for the industrial park; and
  - System of signages.

At the end of the meeting, it was decided that the consultants would prepare a master plan based on discussed components.



**Image no. 1-5: Glimpses of 2<sup>nd</sup> stakeholders meeting**

▪ **Exposure visit:**

An exposure visit to Auroville was organised for ALEAP by GIZ-IGEP during February 5-7, 2013. (Refer image no. 1-7). The exposure visit to Auroville provided opportunity to the team to recognise various concepts elements that could potentially be integrated while preparing site master plan of A-GRIP. These include:

- Green buildings;
- Ecological landscapes;
- Organic/urban farming;
- Waste water management;
- Environment friendly building materials;
- Waste to products – composting, handmade paper units; and
- Solar energy – roof top photo voltaic, solar thermal, solar power plant, solar street lamps.



**Image no. 1-7: Glimpses of exposure visit**

Based on the learnings from the exposure visit, ALEAP decided to include the following elements in A-GRIP:

- Efficient circulation system;
- Environment friendly site master plan;
- Rainwater harvesting;
- Proper signages;
- Green factory buildings;
- Standard fencing design;
- Solid waste treatment, reuse;
- Waste water treatment, recycle/reuse;
- Environment friendly building materials;
- Green rating for buildings and industrial park ;
- Efficient industrial plot layout and building layout;
- Concept based landscaping (eg. green spine, organic farms);
- Green energy master planning (eg. PV roof tops; solar street lamps);
- Women employee friendly services (e.g., crèche, toilets, rest rooms for extended work, first aid, centralised catering/canteens, kiosks, common toilets, battery operated internal shuttle service, external connection to public transport, water dispensers, guest house, ladies room);
- Safety measures (eg. secured fencing, access control, CC cameras, fire alarms & fighting systems etc.);

- Cost Effective common services, e.g. common effluent treatment plant, vermi-compost plant (for organic waste), handmade paper unit (for paper waste), incubator facilities etc.; and
  - Micro entrepreneurship for common services, e.g., Business centres, warehousing, manning access control entry/exit, canteens/ cafeteria, outdoor functions / events, Battery operated vehicles for internal transport, cafeteria, telephone booth, horticulture/floriculture, space for outdoor events etc.
- After the exposure visit, the 3<sup>rd</sup> stakeholder meeting was organized by ALEAP on February 28, 2013. (Refer image no. 1-6)

A draft design concept and site master plan was presented jointly by GIZ-IGEP and Murty & Manyam. The presentation included details of vision, objective, site location, design concepts, green spine, green building concepts, internal and external fencing, storm water management, wastewater management, energy management and building design of administrative and services blocks. Apart from the technical planning aspects, the discussions also focused on entrepreneurship opportunities in the green spine, waste management, safety and security measures etc.



**Image no. 1-6: Glimpses of 3<sup>rd</sup> stakeholders meeting**

The draft design concept and master plan was generally accepted by the entrepreneurs. A few queries from entrepreneurs that came are listed below:

- Entrepreneurs accepted the uniform exterior building design, but said that the interiors would have to change as per their line of activity and requirements.
- Entrepreneurs asked about the reason for restriction of the building height to G+2. They were explained that to generate solar power ALEAP proposed to restrict the height of the buildings.
- Entrepreneurs asked ALEAP to provide the training on handmade paper making.
- Entrepreneurs asked ALEAP to include cold storage and banking facilities.
- Some entrepreneurs expressed need to align the layout with vastu<sup>1</sup> parameters.

The result of these stakeholders meetings were decisions to pursue following aspects in the site master panning of A-GRIP:

- Zoning for a mix of industries, including:
  - » paper, packaging, engineering, warehousing (no waste water discharges, no emissions).
  - » textiles, food, juices, herbal products (easily biodegradable waste waters, emissions from boilers only).

<sup>1</sup> Source: [http://en.wikipedia.org/wiki/Vastu\\_shastra](http://en.wikipedia.org/wiki/Vastu_shastra)

- » paints, pharma formulations, solvents, glass (easily biodegradable waste waters, emissions from boilers only).
  - Provision of environmental infrastructure (eg. common effluent treatment plant, storm water management, solid waste management);
  - Provisions for infrastructure catering to women entrepreneurs (eg. crèche);
  - Installations for harnessing renewable energy;
  - Sizing of plots as per needs of the industries;
  - Landscaping;
  - Efficient circulation and parking for cars ;
  - Provision for spaces for loading/unloading of trucks;
  - Climate responsive building design;
  - Fencing and other security installations;
  - Proper signages;
  - Common facilities at appropriate location; and
  - Construction guidelines for industrial buildings.
- **Training Programme for Consultants:**

A two-day training programme was organized by GIZ on “Planning of New Green Industrial Parks Investment Zones” for the site master planning consultants on October 3-4, 2013. (Refer image no. 1-8).

The training was conducted by GIZ and the principal resource persons for training were from BuroHappold Consulting. Teams from Murty and Manyam, ALEAP, Auroville Foundation, Confederation of Indian Industry etc. participated in the programme. The training focused on providing awareness about innovative and environment friendly site master planning practices for industrial areas.



**Image no. 1-8: Illustrations of the activities of the training programme**

[Source: GIZ-IGEP]

▪ **Design Charette**

A two-day working charette was conducted at Auroville during November 19-20, 2013 wherein the teams of ALEAP, GIZ-IGEP, Murty & Manyam and Auroville Consulting brainstormed on the alternative concepts for the site. The objective was to achieve environmental and social goals for the project, while keeping the industrial park development it economically viable.

The assembled team of experts reviewed the initial proposal by applying different layers of the functional areas identified in previous phases. The key recommendations of the experts were focussed on the attention to be given to the site's natural features and overall drainage patterns.

At the end of the visit, the design team formulated a revised layout plan with road alignment as per the contours and also detailed provisionin of all kinds of infrastructure.

The site master plan was further refined by Murty & Manyam based on the inputs of design charette and the site profile. It was then sent back to GIZ-IGEP and Auroville Collaborative team for review and comments.

▪ **Workshop on Site Master Plan of ALEAP Green Industrial Park**

A one-day workshop was conducted for finalisation of the site master plan of A-GRIP at Murty and Manyam, Hyderabad on October 11, 2014. Experts from BuroHappold Engineering, Berlin and DGNB, Stuttgart attended the workshop to review the site master plan for certification.



**Image No. 1-9: Site master plan rating workshop**

The workshop focused on pre assessment of the site master plan of A-GRIP as per DGNB rating system taking into consideration provisions such as the basic and technical infrastructure in the Site Master Plan, including following aspects:

- Storm water management;
- Waste water management;
- Solid waste management;
- Transportation/circulation systems;
- Renewable energy systems;
- Safety systems for women in industrial park; and
- Common infrastructure and services.

It was concluded that several aspects of the DGNB rating system were complied by the site master plan of A-GRIP and a formal process for DGNB pre-certification could be initiated targeting 'Gold' rating.

## CHAPTER 02

# 'GREEN' RATING SYSTEMS AND STANDARDS

### A. DGNB RATING SYSTEM<sup>2</sup>

The German Sustainable Building Council<sup>6</sup> (DGNB) provides a certification system based on international codes and standards making it easy to use in various countries while at the same time providing high quality and transparency. The DGNB System is the first, and to date only system worldwide, in which the procedure to rate buildings in different countries is an integral part of the system itself. This adaptation takes into account different climatic zones, associated cost-benchmarks, and a specific database for life-cycle assessment, within which the datasets for all European countries are made available.

Its distinguishing feature is the integrated evaluation of economic and environmental aspects as well as user comfort. The system is used internationally, whereby the DGNB pre-certificate in particular makes it an ideal design tool and is the only one worldwide that is applicable for industrial districts. The DGNB system covers all of the key aspects of sustainable building: environmental, economic, sociocultural and functional aspects, technology, processes and site. (Refer image no. 2-1) The DGNB has defined target values for each criterion. The concrete score for the 5 quality sections is calculated from the combination of the assessment points with the relevant weighting.

The main benefit of this system is that it provides assistance from initial concept to final completion. This highlights potential errors and deficiencies at an early stage and makes quality measurable and transparent. The certification process is done by the auditor. The contractor selects a suitable DGNB auditor that he can trust; and enters into a contract with the auditor and a certification contract with the DGNB. The auditor supports the contractor and supervises the process from registration via the certification up to the conclusion. There is no contractual relationship between the DGNB and the auditor in order to guarantee the greatest possible degree of objectivity and independence.



**Image no. 2-1: DGNB main criteria groups for rating of industrial parks**

[Source: Buro Happold Engineering, Germany]

<sup>2</sup> [www.dgnb-system.de](http://www.dgnb-system.de)

Table no. 2-1: DGNB Parameters for Industrial Districts

<b>A. ENVIRONMENTAL QUALITY</b>		
<b>Effects on the Global and Local Environment</b>	<b>ENV1.1</b>	<b>LCA - emissions</b>
	ENV1.1.1	Global Warming Potential(GWP)
	ENV1.1.2	Ozone depletion potential (ODP)
	ENV1.1.3	Photochemical Oxidants potential (POCP)
	ENV1.1.4	Acidification potential (AP)
	ENV1.1.5	Eutrophication (EP)
	ENV1.1.6	LCA New Building
	<b>ENV1.2</b>	<b>Pollutants and risk substances</b>
	ENV1.2.1	Risks of the new buildings
	ENV1.2.2	Risks of the existing buildings
	<b>ENV1.4</b>	<b>Biodiversity</b>
	ENV1.4.1	Individual measures to protect species
	ENV1.4.2	Biotope area factor
	<b>ENV1.5</b>	<b>Urban Climate Impact</b>
	ENV1.5.1	Urban Climate Index District Surface Area
	ENV1.5.2	Measures therm. Effect complex
	ENV1.5.3	Opinion therm. Effect complex
	ENV1.5.4	Cold air production areas
	ENV1.5.5	Fresh air corridors
	ENV1.5.6	Regional ventilation
	ENV1.5.7	Measures air exchange
	ENV1.5.8	Opinion on air exchange
	<b>ENV1.6</b>	<b>Environmental risk</b>
	ENV1.6.1	Environmental risk 1
	ENV1.6.2	Environmental risk 2
	ENV1.6.3	Environmental risk 3
	<b>ENV1.7</b>	<b>Water and soil protection</b>
	ENV1.7.1	Groundwater vulnerability
ENV1.7.2	Biological and chemical water quality	
ENV1.7.3	Water structure	
ENV1.7.4	Degree of sealing	
<b>Resource use and waste generation</b>	<b>ENV2.1</b>	<b>Life cycle assessment - primary energy</b>
	ENV2.1.1	Non-renewable primary energy demand
	ENV2.1.2	Total primary energy demand
	ENV2.1.3	Share of renewable primary energy
	<b>ENV2.2</b>	<b>Demand for drinking water and wastewater production</b>
	ENV2.2.1	Derivative u. Treatment process water
	ENV2.2.2	Use of recycled process water in the production
	ENV2.2.3	Use of biological treatment systems for operational and process water
	ENV2.2.4	Use of non-potable water in the production
	ENV2.2.5	Use of non-potable water for irrigation factory internal open spaces



	ENV2.2.6	Use of non-potable water in buildings
	ENV2.2.7	Black water
	<b>ENV2.3</b>	<b>Land use</b>
	ENV2.3.1	Brownfield share
	ENV2.3.2	Surface integration
	ENV2.3.3	Contaminated Sites
	ENV2.3.4	Ordnance
	<b>ENV2.4</b>	<b>Resource-saving infrastructure, Soil management</b>
	ENV2.4.1	Resource-saving building material choice
	ENV2.4.2	Recycling materials
	ENV2.4.3	Materials from renewable raw materials
	ENV2.4.4	Local and regional materials
	ENV2.4.5	Certified Building products
	ENV2.4.6	Plant material with regional origin
	ENV2.4.7	Earth masses management
<b>B. ECONOMIC QUALITY</b>		
Life Cycle Costs	<b>ECO1.1</b>	<b>Life cycle costs</b>
	ECO1.1.1	LCC Quantitative
	ECO1.1.2	LCC Qualitative
	<b>ECO1.2</b>	<b>Socio economic effects on the community</b>
	ECO1.2.1	Quantitative effects
ECO1.2.2	Qualitative effects - local work force binding	
Performance	<b>ECO2.1</b>	<b>Flexibility and conversion ability</b>
	ECO2.1.2	Flexible location
	ECO2.1.2	Mutability factory building
	ECO2.1.3	Mutability factory site
	<b>ECO2.3</b>	<b>Space Efficiency</b>
	ECO2.3.1	Development efficiency
	ECO2.3.2	Building density
	ECO2.3.3	Production process
	<b>ECO2.4</b>	<b>Value stability</b>
	ECO2.4.1	Diversification
	ECO2.4.2	Unemployment rate
	ECO2.4.3	Purchasing power index
ECO2.4.4	Training mixture	
<b>C. SOCIAL QUALITY</b>		
Health, comfort and user satisfaction	<b>SOC1.6</b>	<b>Open space</b>
	SOC1.6.1	Identity-effect
	SOC1.6.2	Thermal comfort of open spaces
	SOC1.6.3	Spaces per employee per shift
	SOC1.6.4	Accessibility of in-house clearances
	<b>SOC1.7</b>	<b>Safety</b>
	SOC1.7.1	Occupational Safety and Health
	SOC1.7.2	Fire protection
	SOC1.7.3	Occupational safety organization
	SOC1.7.4	Plant protection
	SOC1.7.5	Hazardous substances

	SOC1.7.6	Risks from transport and traffic
	<b>SOC1.8</b>	<b>Workplace comfort</b>
	SOC1.8.1.1	Planning Guidelines New - Other
	SOC1.8.1.2	Planning Guidelines New - Office
	SOC1.8.1.3	Planning Guidelines New - Labs
	SOC1.8.1.4	Planning Guidelines New – Production
	SOC1.8.1.5	Planning Guidelines New - Logistics
	SOC1.8.2.1	Inventory Analysis
	<b>SOC1.9</b>	<b>Emissions</b>
	SOC1.9.1	Air Quality
	SOC1.9.2	Noise levels at the certification limit
	SOC1.9.3	Noise by additional traffic generation
	SOC1.9.4	Noise within the industrial site
	SOC1.9.5	Lighting quality
Functionality	<b>SOC2.1</b>	<b>Accessibility</b>
	SOC2.1.1	Accessibility of the open space
	SOC2.1.2	Accessibility of the building
Design quality	<b>SOC3.4</b>	<b>Urban integration</b>
	SOC3.4.1	Involvement in the mobility network
	SOC3.4.2	Involvement in urban form u -. Structure
	SOC3.4.3	Scenic integration
	SOC3.4.4	Functional integration
	SOC3.4.5	Involvement in plant development program
	<b>SOC3.5</b>	<b>Design quality</b>
	SOC3.5.1	Design of open space / amenity
	SOC3.5.2	Design of architecture
	SOC3.5.3	Art on Location
	SOC3.5.4	Measures to implement
	<b>SOC4.2</b>	<b>Infrastructure</b>
	SOC4.2.1	Kindergarden, Child Care
	SOC4.2.2	Educational institution
	SOC4.2.3	Culture (association, religion, museum, gallery)
	SOC4.2.4	Restaurant, Bar
	SOC4.2.5	Local supply and services
	SOC4.2.6	Medical care
	SOC4.2.7	Outlet, Factory Outlet, Factory Museum
	SOC4.2.8	Customer Center
	SOC4.2.9	Training building
	SOC4.2.10	Factory sports club with sports grounds, gym
	SOC4.2.11	Supply
	SOC4.2.12	ATM
	SOC4.2.13	Supported by work - child care / day care center
	SOC4.2.14	Promoted by the factory - sports club, plant
	SOC4.2.15	Promoted by the factory - Staff Housing
	SOC4.2.16	Promoted by the factory - Miscellaneous
<b>D. TECHNICAL QUALITY</b>		

Quality of technical design	<b>TEC1.5</b>	<b>Maintenance, care and cleaning</b>	
	TEC1.5.1	Surface texture traffic areas	
	TEC1.5.2	Easy road and route guide	
	TEC1.5.3	Undeveloped green spaces	
	TEC1.5.4	Site-adapted native plants	
	TEC1.5.5	Easy-care water surfaces	
	TEC1.5.6	Technology and lighting	
	<b>TEC2.1</b>	<b>Energy Technology</b>	
	TEC2.1.1	Coverage rate of self-sufficiency	
	TEC2.1.2	Energy efficiency	
	TEC2.1.3	Flexibility and security of supply	
	Technical Infrastructure	<b>TEC2.2</b>	<b>Recycling and waste management</b>
TEC2.2.1		Waste management	
TEC2.2.2		Waste avoidance in the factory	
TEC2.2.3		Waste prevention product / packaging	
TEC2.2.4		Waste recycling	
TEC2.2.5		Waste disposal	
<b>TEC2.3</b>		<b>Storm water Management</b>	
TEC2.3.1		Field water balance	
TEC2.3.2.1		Rainwater cisterns	
TEC2.3.2.2		Use of discreet. RW measures	
TEC2.3.2.3		Free areas as wetlands	
TEC2.3.2.4		Channel storage tube with retention volume	
TEC2.3.2.5		Ponds as storm water retention basin	
Mobility		<b>TEC3.1</b>	<b>Mobility Infrastructure</b>
		TEC3.1.1	Traffic Connection
	TEC3.1.2	Vehicle offer	
	TEC3.1.3	Quality of development	
	TEC3.1.4	Intermodal Platforms	
	TEC3.1.5	Timing of public transport	
	TEC3.1.6	Design of public transport stops	
	TEC3.1.7	Quality and management of the bicycle network	
	TEC3.1.8	Stabling quantitatively	
	TEC3.1.9	Stabling qualitatively	
	TEC3.1.10	Guidance systems	
	TEC3.1.11	Pedestrian network	
	TEC3.1.12	Signalization	
	<b>TEC3.6</b>	<b>Logistics concept</b>	
	TEC3.6.1	Storage	
	TEC3.6.2	Turnover	
	TEC3.6.3	Material flow	
	TEC3.6.4	Gates and control centre	
	Quality of planning	<b>PRO1.2</b>	<b>Integrated Planning (New Buildings)</b>
		PRO1.2.1	Integrated Planning team
PRO1.2.2		Cooperation of the Planning Team	
PRO1.2.3		Integration of sustainability criteria	
<b>PRO1.3</b>		<b>Optimization of planning (New Building)</b>	
PRO1.3.1	Goal planning		

	PRO1.3.2	Preparatory work
	PRO1.3.3	Planning (big scale)
	PRO1.3.4	Planning (detailed)
	PRO1.3.5	Implementation planning and execution
	<b>PRO1.6</b>	<b>Participation</b>
	PRO1.6.1	PP - Business development concept
	PRO1.6.2	PP. - Social Spaces
	PRO1.6.3	PP - Production facilities and Architecture
	PRO1.6.4	PP - Using phase
	PRO1.6.5	Ausw. PP – Business development concept
	PRO1.6.6	Ausw. PP – Social Spaces
	PRO1.6.7	Ausw. PP – Production facilities and Architecture
	<b>PRO1.7</b>	<b>Planning concepts</b>
	PRO1.7.1	Variant of LCA comparisons
	PRO1.7.2	Soil protection concept with post-closure plan
	PRO1.7.3	Biotope networking concept
	PRO1.7.4	Integrated Water concept
	PRO1.7.5	Variant comparisons life cycle cost planning
	PRO1.7.6	Concept of functional mix of uses
	PRO1.7.7	Integrated Energy concept
	PRO1.7.8	Integrated Traffic concept
	PRO1.7.9	Integral business development concept
<b>Quality of construction</b>	<b>PRO2.1</b>	<b>Construction site, construction process (new construction)</b>
	PRO2.1.1	Logistics
	PRO2.1.2	Waste
	PRO2.1.2	Waste
	PRO2.1.3	Noise
	PRO2.1.4	Dust
	PRO2.1.5	Environmental and nature protection
	<b>PRO2.2</b>	<b>Quality Assurance and Monitoring</b>
	PRO2.2.1	Environmental Management
	PRO2.2.2	Energy management and monitoring
	PRO2.2.3	Water management and monitoring
	PRO2.2.4	Facility management
	PRO2.2.5	Corporate Social Responsibility
	<b>PRO2.4</b>	<b>Control (New Buildings)</b>
	PRO2.4.1	Project management
	PRO2.4.2	Quality assurance
	PRO2.4.3	Scheduling
PRO2.4.4	Cost control	

Source: Buro Happold Engineering, Germany

The total score for the overall project is calculated from the five quality sections based on their weighting. Based on the DGNB matrix, a rating can be derived for each industrial park. (Refer table no. 2-2)

**Table no. 2-2: Weightage for DGNB certification**

S.No.	Certification Level	Points
1	Bronze	If the total score is at least 50 percent
2	Silver	If the total score is at least 65 percent
3	Gold	If the total score is at least 80 percent

Source: Buro Happold Engineering , Germany

## B. IGBC RATING SYSTEM

The Green Building movement in India has been spearheaded by the Indian Green Building Council<sup>3</sup> (IGBC) since 2001. The rating programme is a tool which enables the designer to apply green concepts and criteria, so as to reduce the environmental impacts, which are measurable.

IGBC has five rating systems out of which two rating systems are in the context of industrial parks:

- » IGBC Green Factory Building Rating System
- » IGBC Green SEZs Rating Systems

### ▪ IGBC Green Factory Building Rating System:

IGBC Green Factory Building Rating System is a voluntary and consensus based programme. The rating system is based on materials and technologies that are currently available. This rating system facilitates the development of energy efficiency, water efficiency, health and more productive, environmentally friendly factories. The rating system evaluates certain credit points using a prescriptive approach and other credits on a performance based method. The rating system is evolved so as to be comprehensive and simultaneously user-friendly. The programme is designed to address national priorities and quality of life for factory employees.

The IGBC Green Factory Building Rating addresses both new and existing factory buildings. The existing factory buildings should address the following measures before applying for certification:

- Soil erosion control measures in future;
- Changes in design to accommodate requirements of differently abled people, like easy access to lifts, rest rooms etc.;
- Change to low flow water fixtures;
- Rainwater harvesting;
- Limit turf areas;
- Have policy for use of green materials in future;
- Minimum fresh air ventilation;
- Comfort conditions; and
- Use eco-friendly housekeeping materials.

The rating system is valid for three years. Upon completion of the three years, projects can be validated/ renewed based on the prevailing latest version. The guidelines detailed under each credit enable the design and construction of green factory building of all sizes and types. IGBC Green Factory Building Rating addresses green features under the following categories:

<sup>3</sup> <http://www.igbc.in/site/igbc/index.jsp>

- Site Selection and Planning
- Water Conservation
- Energy Conservation
- Material Conservation
- Indoor Environment Quality and Occupational Health

Different levels of green building certification are awarded based on the total credits earned. However, every Green Factory Building should meet certain mandatory requirements, which are non-negotiable. The various levels of rating awarded are:

- 'Certified' to recognize best practices;
- 'Silver' to recognize outstanding performance;
- 'Gold' to recognize national excellence; and
- 'Platinum' to recognize global leadership.

Green Factory Building rating can have tremendous benefits, both tangible and intangible. The most tangible benefits are the reduction in water and energy consumption right from the first day of occupancy. Energy savings could range from 30 – 40 % and water savings between 20 – 30%. Intangible benefits of a green factory include enhanced indoor air quality, good day lighting, health, well-being, and safety of the workforce.

#### ■ IGBC Green SEZ Rating System:

The Special Economic Zones (SEZ) policy was announced in April 2000, with an intention to make SEZs, supported by quality infrastructure, an engine for economic growth. The Indian Green Building Council along with the Ministry of Commerce & Industry prepared the Green SEZ guidelines. The IGBC Green SEZ Rating System is a voluntary and consensus-based programme. The rating system has been developed based on materials and technologies that are presently available. The objective of IGBC Green SEZ is to facilitate the creation of energy efficient, water efficient, healthy, comfortable, and environmentally friendly SEZs.

The rating system evaluates certain credit points using a prescriptive approach and other credits on a performance-based approach (refer table no. 2-3). The rating programme uses well accepted national standards and, wherever local or national standards are not available, appropriate international benchmarks are considered.

**Table no. 2-3: Weightage for IGBC Green SEZ Rating**

S.No.	Criterion		Maximum Points	Basis
<b>a</b>	<b>Site Preservation &amp; Restoration</b>			
a.i	Mandatory requirement 1	Local regulations	Required	» SEZ status from MoCI <sup>4</sup> ; and » Approval of the plan from the competent government authority.
a.ii	Mandatory requirement 2	Soil erosion	Required	» Soil erosion control measures shall conform to best management practices highlighted in

<sup>4</sup> MoCI stands for Ministry of Commerce and Industries, India

				National Building Code (NBC) 2009 of India; and » Reuse top soil for landscaping.
a.iii	Mandatory requirement 3	Nurseries	Required	» Developer/ co-developer must set up their own nurseries for plantation of saplings.
a.iv	SPR credit 1	Reduce site disturbance	4	» Preserve or transplant at least 75%, 95% of existing trees; and » Protect or restore atleast 50%-95% of the existing water bodies (by area) to promote biodiversity.
a.v	SPR credit 2	Landscape open areas ,50%, 75%	4	» Landscape open areas to an extent of at least 50% of the zone area
a.vi	SPR credit 3	Reduce impact on microclimate: non-roof	2	» For surface parking and other non-roof impervious areas (walk ways, etc.); and » Provide shade (within 5 years) and / or open grid pavement for at least 30% of such areas.
a.vii	SPR credit 4	Reduce impact on microclimate: roof, 50%, 75%	4	» Install at least 50% of the roof area with green roof or high reflective materials (SRI > 78)
a.viii	SPR credit 5	Night sky pollution reduction	2	» Lighting power densities should not exceed 80% for exterior areas and 50% for building facades.
			<b>16</b>	
<b>b</b>	<b>Site Planning &amp; Design</b>			
b.i	Mandatory Requirement	Tobacco smoke control	Required	» Smoking should be prohibited in all common/ public areas.
b.ii	SPR credit 1	Basic amenities	3	» Provide at least ten amenities within the zone such as  - ATM/ Bank; - Coffee shop; - Community center; - Day care;

				<ul style="list-style-type: none"> <li>- Fire station;</li> <li>- Fitness center;</li> <li>- Hotel;</li> <li>- Internet centre;</li> <li>- Library;</li> <li>- Medical clinic;</li> <li>- Pharmacy;</li> <li>- Place of worship;</li> <li>- Post office;</li> <li>- Restaurant; and</li> <li>- Sports club, etc.</li> </ul> <p>» Provide optical fiber communications (OFC) for efficient internet connectivity to the industrial units.</p>
b.iii	SPR credit 2	Vicinity to public transport	1	» Provide access to public transportation such as public bus station or railway station, within a distance of 1 km of any access point to the zone.
b.iv	SPR credit 3	Bicycle lanes	2	» Provide bicycle lanes (in all primary and secondary streets) to encourage occupants to commute by bicycles to and from the work place.
b.v	SPR credit 4	Footpaths and pathways	4	<p>» Provide exclusive foot paths in primary streets for comfortable pedestrian street access; and</p> <p>» Provide pedestrian pathways across various blocks in the zone.</p>
b.vi	SPR credit 5	Eco-friendly transportation, 10%, 20%	5	<p>» Provide internal transportation facilities in the zone to cater to at least 10% of the permanent occupants through low emission vehicles; and</p> <p>» Provide alternate fuel stations.</p>
b.vii	SPR credit 6	Parking facilities	2	» Provide parking facilities to meet but not exceed the local parking regulations; and



				» Allocate at least 10% of the parking capacity for carpool vehicles.
b.viii	SPR credit 7	Design for differently abled	2	» Design for easy access to all the common spaces
b.ix	SPR credit 8	Green buildings within the SEZ, 25%, 50%, 75%	6	» Design individual buildings within the SEZ in accordance with the appropriate IGBC rating system.
			<b>25</b>	
<b>c</b>	<b>Water Efficiency</b>			
c.i	Mandatory requirement 1	Rainwater harvesting, 25%	Required	» Provide rainwater harvesting or a storage system to capture at least 25% of 5-year average one day rainfall from non-roof & roof areas.
c.ii	Mandatory requirement 2	Waste water treatment, 100%	Required	» Provide an on-site waste water treatment system to treat 100% of waste water generated (industrial & non-industrial) in the zone.
c.iii	WE credit 1	Lawn design, 30%, 20%	2	» Limit the use of lawn to an extent of 20 % (minimum) of the landscaped area (both ground and terrace).
c.iv	WE credit 2	Drought tolerant species, 25%, 50%	2	» Design landscape with plant species which consume less water, to an extent of 25% of landscaped area.
c.v	WE credit 3	Efficient irrigation systems	2	» Provide highly efficient irrigation systems
c.vi	WE credit 4	Rainwater harvesting, 50%, 75%	4	» Provide rainwater harvesting or storage system to capture at least 50% of 5-year average one day rainfall from non-roof & roof areas.
c.vii	WE credit 5	Rain water filtration	1	» Construct on-site storm water treatment systems designed to remove 80% of the average annual post-development total suspended solids (TSS).

c.viii	WE credit 6	Treated waste water reuse, 50%, 75%	4	» Reduce at least 50% of water requirement by using treated waste water for landscaping.
			<b>15</b>	
<b>d</b>	<b>Energy Efficiency</b>			
d.i	Mandatory requirement	Minimum energy efficiency	Required	
d.ii	EE credit 1	Energy efficiency, 10%, 12.5%, 15%, 17.5%, 20%, 22.5%, 25%, 27.5%, 30%	12	» Optimize energy efficiency of the building and systems to reduce environmental impacts from excessive energy use.
d.iii	EE credit 2	Onsite renewable energy, 5%, 7.5%, 10%, 12.5%, 15%	5	» Install renewable energy systems to generate power through solar, wind, biomass/ biogas, or any other forms of renewable energy for at least 5% of the annual consumption (in developer's/ co-developer's scope).
d.iv	EE credit 3	Energy monitoring system	2	» Develop and implement, a measurement & verification (M&V) plan to monitor building performance.
d.v	EE credit 4	HCFC (Hydro Chloro Fluoro Carbon)-free air-conditioning systems	1	» Avoid the use of HCFC based refrigerants and ozone depleting gases which negatively impact the environment.
d.vi	EE credit 5	Off-site green power, 25%, 50%	10	» Demonstrate the project has invested in off-site green power for at least 25% of the annual energy consumption in developer's scope for atleast 2 years.
			<b>30</b>	
<b>e</b>	<b>Materials &amp; Resources</b>			
e.i	Mandatory requirement	Segregation of waste: post occupancy	Required	» Develop a waste management plan and identify methods to segregate & dispose of the waste efficiently.

e.ii	MR credit 1	Waste reduction <sup>5</sup> : during construction, 50%,75%	2	» Avoid at least 50% of the waste generated during construction from being sent to landfills and incinerators.
e.iii	MR credit 2	Organic waste management <sup>6</sup> : post occupancy, 50%, 75%	2	» Install on-site treatment plant to treat at least 50% of organic waste generated in the zone.
e.iv	MR credit 3	Materials with recycled content, 10%, 20%	2	» Select materials having recycled content such that the total recycled content constitutes at least 10% of the material.
e.v	MR credit 4	Local Materials, 50%, 75%	2	» Ensure at least 50% of the building materials (by cost; civil & interior materials only) are sourced locally within a radius of 500km.
e.vi	MR credit 5	Low volatile organic compounds (VOC) Materials: Adhesives & Sealants and paints & coatings	2	» For adhesives and sealants used within the interiors, ensure that the VOC <sup>7</sup> content does not exceed the limits as specified in the table no. 2-4.
			<b>10</b>	
<b>f</b>	<b>Innovation and Design Process</b>			
f.i	ID credit 1	Innovation & Design Process	3	» Provide design teams and projects the opportunity to be awarded points for innovative performance in Green Building categories not specifically addressed by the IGBC Green SEZ <sup>7</sup> rating system.
f.ii	ID credit 2	IGBC Accredited Professional	1	» At least one principal participant of the project team shall be an IGBC accredited professional.

<sup>6</sup> Different point are awarded for different percentage levels

<sup>7</sup> VOC means for volatile organic compound

			<b>4</b>	
	<b>Total Points</b>		<b>100</b>	

Note: Different point are awarded for different percentage levels

**Table no. 2-4: VOC<sup>8</sup> for materials**

S.No.	Type of material	VOC Limits in grams/liter (less water)
a	Adhesives & Sealants:	
1	Multipurpose construction adhesives	100
2	Pane; adhesives	50
3	Sheet applied rubber lining operations	850
4	Structural glazing adhesive	100
5	Tile adhesive	65
6	Wood Adhesive	30
b	Paint coatings:	
1	Anti-corrosive / anti-rust paints	250
2	Flat paints (Mat)	50
3	Non flat paints (Glossy)	150
4	Primers	50
5	Wood varnish	350

As shown above, the guidelines detailed under each mandatory requirement and credit enables the design and construction of green SEZs of all sizes and types. IGBC Green SEZ addresses green features under the categories namely site preservation & restoration, site planning & design, water efficiency, energy efficiency, materials & resources and innovation & design process.

Different levels of green building certification are awarded based on the total credits earned. However, every Green SEZ should meet certain mandatory requirements, which are non-negotiable. (Refer table no. 2-5).

**Table no.2-5: Criterion for Certification – IGBC**

S.No.	Certification Level	Points	Recognition
1	Certified	51-60	Best Practices
2	Silver	61-70	Outstanding Performance
3	Gold	71-80	National Excellence
4	Platinum	81-100	Global Leadership

### **C. ZONING REGULATIONS FOR DEVELOPMENT OF GREEN LAYOUTS (HMDA)<sup>9</sup>:**

Under section B of Zoning regulations and master plan, following are the various environmental planning and design measures that need to be adhered during the

<sup>8</sup> VOC means for volatile organic compound

<sup>9</sup> Zoning and development promotion regulations, (G.O. Ms. No.33), Metropolitan Development Plan-2031 for Hyderabad Metropolitan Region, Government of Andhra Pradesh. (2013)  
[http://220.227.252.236/ehmr/PDFDownload/G.O.Ms.No.33,dt.24.1.2013%20\(DMDP-2031\).pdf](http://220.227.252.236/ehmr/PDFDownload/G.O.Ms.No.33,dt.24.1.2013%20(DMDP-2031).pdf)

sustainable development of layouts. The applicant opting for Development of Green Layout and Green Development as per the norms prescribed below shall be entitled for 25% concession in the processing fee.

- **Layout planning & design as per solar geometry –**

Land assemblage and developments should follow solar geometry and lay plots with longer dimension facing north and south (with a maximum deviation of 5 degree off north) and shorter dimensions facing east and west.

- **Eco-friendly transportation on-site –**

Adequate provision for bicycle tracks, shaded footpaths for sites equal to or more than 50 acres in size. Provide cluster layouts instead of linear layout to reduce vehicular lengths. Provisions for battery charging facilities in sites over 50 acres @ one in 50 cars parked.

- **Energy efficient street lighting –**

50-100% of outdoor lighting should be met with solar photovoltaic or in combination with other renewable sources of energy, i.e., bio-mass, fuel cell, wind etc. The outdoor lighting must be provided with micro-controller based time switch.

- **Provision for minimum local amenities –**

Basic amenities such as grocery store, pharmacy, ATM, park should be located within 500m radius of any large residential/commercial development. If basic amenities are not available, space should be provided to include them within the site.

- **Conserving site vegetation –**

Land assemblage and developments should conserve existing site vegetation and pockets of microhabitats. Existing trees should be protected where ever possible. Provisions should be defined to protect site vegetation retained on site during construction as described in NBC and MoEF manuals.

- **Conserving site geology –**

All rock formations on site need to be integrated into the layout design where ever possible taking adequate measures for stabilization. Native flora, fauna and existing in rock clusters should not be disturbed but integrated into the layout design where ever possible.

- **Soil conservation and erosion control –**

Measures need to be taken before the commencement of site preparation activities in order to conserve topsoil, reduce erosion and soil pollution through site demarcation measures, spill prevention measures and temporary drainage channels with sedimentation basins.

- **Adherence to site contours –**

No disturbance, grading of land or stripping of vegetation shall be permitted on slopes of 25% or steeper. Any proposed disturbance for roadway crossings or utility construction shall require variance application and approval. Roads and driveways shall follow the natural topography to the greatest extent possible to minimize the cutting and grading of critical slope areas.

- **Integrated approach for Sustainable Urban Drainage System (SUDS) –**

Sites with areas less than 10000 m<sup>2</sup> shall implement rain water harvesting and SUDS source control and infiltration instruments such as infiltration trenches, infiltration basins, green roofs, permeable paving, etc. Larger sites (site area greater than 10000 m<sup>2</sup>) shall implement other SUDS techniques integrated with the smaller techniques wherever applicable. Open sites, i.e., sites where construction development has not yet been planned shall also implement SUDS/ storm water drainage so as not to allow water logging.

- **Water conserving landscaping –**

Land assemblage and developments with no grey water or waste water treatment or rainwater collection, no more than 25% to be covered by lawns, exotic or ornamental plants, lawn areas should not have a slope of greater than 25%. At least 50% of the total landscaped area in the site should use water conserving vegetation such as native species or xeriscape and at least 40% water savings should be achieved in all sites with vegetated area > 50 m<sup>2</sup> by using efficient irrigation equipment.

- **Water recycling & reuse –**

If a site does not have access to a public sewer line and discharges waste water, an appropriate waste water treatment system should be installed and at least 75% of the total treated water should be reused on site. If a site has access to a public sewer line, grey water re-use potential of the site need to be assessed. If potential savings on potable water exceeds 20%, an appropriate grey water treatment system is recommended and at least 80% of the total treated grey water should be reused on-site.

- **Provisions for rainwater harvesting on-site –**

All land assemblage and developments with a water saving potential of less than 10% of their potable water demand from rainwater collection should divert roof top and water from open areas into a percolation pit. Percolation pits should be sized appropriately and maintained regularly.

- **Zero discharge of waste water and storm water from site –**

All large developments (>50 acres site area) must adhere to 'Zero Discharge' of treated waste water and storm water outside site limits.

- **Operation & maintenance requirement for decentralized WWTS –**

All decentralized waste water treatment systems (WWTS) should employ qualified personnel to operate and maintain the system. The personnel involved in operation and maintenance should be a full time employee and maintenance and operation (M&O) contract should be signed with a waste water management company for its provision.

- **Provisions for safe disposal of unused treated waste water –**

Treated unused waste water should be disposed directly on ground for ground water recharge, used for irrigating nearby community parks, used for construction activities, disposed into a sewer line or a storm water drain or a lake, stream, pond or other surface water bodies.

- **Reducing storm water runoff and heat island effect through permeable paving –**

Total paved area of the site under parking, roads, paths, or any other use should not exceed 25% of the un-built site area or net imperviousness of the un-built site should not go beyond the imperviousness factor as prescribed by the NBC<sup>10</sup>, whichever is more stringent.

- **Reduction of outdoor light pollution –**

Fixtures and fittings used for external lighting should be a minimum of 4 stars BEE rated. Provide for control devices on at least 50% of all the installed lighting fixtures. Use low albedo and rough surfaces around the luminaire to ensure that less light is reflected in the surroundings.

- **Provisions for waste management on-site –**

Land assemblage and developments should have a place allocated for sorting domestic waste and treating organic/biodegradable waste through composting. This space should have vehicular access and protected from wind and rain.

#### **D. SITE LAYOUT STANDARDS**

Since the site is under *Patancheru mandal*, its layout plan would be approved by the Hyderabad Metropolitan Development Authority of the Government of Andhra Pradesh. Hence, the planning and design of A-GRIP should adhere to the relevant G.Os (Government Orders) pertaining to the norms and standards for various components of the layout and its components.

The relevant government orders<sup>11</sup> of HMDA were reviewed, keeping a focus on the relevant components for the Industrial area/ park. (Refer table no. 2-6). These components were:

- Scale and components of drawings;
- Layout and subdivision regulations;
- Building activities restriction around water bodies;
- Water bodies;
- Electricity lines;
- Road and Cul-de-sacs; and
- Social infrastructure.

**Table no. 2-6: Summary of Standards (Andhra Pradesh)**

S.No.	Category	Norms and Standards	Source
1	Scale and Components	The application for permission of individual industries shall be accompanied by, -  » A site plan drawn to scale of not less than 1:1000 showing all physical details of the land, boundaries of the land, the	PART A, RULE 3  <i>The Andhra Pradesh Gram Panchayat Land Development (Layout and building) Rules – 2002</i>  <i>G.O. no. 67</i>

<sup>10</sup> NBC stands for National Building Code

<sup>11</sup> Zoning and development promotion regulations, (G.O. Ms. No.33), Metropolitan Development Plan-2031 for Hyderabad Metropolitan Region, Government of Andhra Pradesh. (2013)

		<p>surrounding existing layouts/lands, and existing approach roads to the land where the layout is proposed;</p> <p>» A Layout Plan (in required number of copies) drawn to a scale of not less than 1:500 showing boundaries of land, proposed number of building plots with dimensions and area of each plot, and its uses as per these rules; alignment and width of the proposed streets/roads; dimensions and areas of open space, provided according to these rules</p>	
2	Layout Sub-Division Regulations	<p>The Layout proposal shall conform to the following requirements:</p> <p>» Minimum width of proposed roads in the layout shall be 10 meters for residential roads and 12 meters for all non-residential road layouts. Notwithstanding the above minimum width, the Executive Authority may insist upon larger road widths depending upon local conditions or importance of any particular road etc., as exhibited in Table 2-10. The width of the roads in the layouts shall be in conformity with the General Town Planning Scheme or the Indicative Land Use Plan or Master Plan, if any in force;</p> <p>» Minimum open space set apart in the proposed layout for playground/park/educational institution or for any other public purpose shall be at the rate of 10% of the total site area.</p> <p>» The minimum plot size for non-residential layouts shall be 300 m<sup>2</sup> except in cases of Commercial or Mercantile buildings, for which the minimum plot size shall be 18 m<sup>2</sup>.</p>	<p>PART A, RULE 4</p> <p><i>The Andhra Pradesh Gram Panchayat Land Development (Layout and building) Rules – 2002</i> G.O. no. 67</p>
3	Building activities restriction around water bodies	<p>» In water body zone no construction is permitted.</p> <p>» No building/ development activity shall be allowed in the bed of water bodies like river, or nala, and in the</p>	<p>Section 1.9</p> <p><i>Zoning and development promotion regulations,</i> G.O. no. 33</p>



		Full Tank Level (FTL) of any lake, pond, cheruvu or kunta / shikam lands.	
4	Water Bodies	<p>» The water bodies and courses shall be maintained as recreational/Green buffer zone, and no building activity other than recreational use shall be carried out within</p> <ul style="list-style-type: none"> <li>- 30 meters from the boundary of Lakes of area 10 Ha and above;</li> <li>- 9 meters from the boundary of lakes of area less than 10 Ha / kuntas / shikam lands</li> <li>- 9 meters from the boundaries of Canal, Vagu, etc.</li> <li>- 2 meters from the defined boundary of Nala.</li> </ul>	<p>Section 1.9</p> <p><i>Zoning and development promotion regulations,</i></p> <p>G.O. no. 33</p>
5	Electrical lines	<p>» In case of electricity power lines, the land all along and below the power line shall be developed as a green belt to an extent of the width of the tower base; on either side of the green belt there shall be a minimum of 10m wide roads or other thoroughfares, as defined in the Master Plan.</p>	<p>RULE 3(c)</p> <p><i>'The Andhra Pradesh Building Rules - 2012'.Municipal Administration and Urban Development Department</i></p> <p>G.O. no. 168</p>
6	Road	(refer to Table 2-7)	<p>Section 1.9</p> <p><i>Zoning and development promotion regulations,</i></p> <p>G.O. no. 33</p>
7	Social Infrastructure	(refer to Table 2-8)	<p><i>The Andhra Pradesh Gram Panchayat Land Development (Layouts and Building) Rules – 2002 – Amendments – Orders – Issued</i></p> <p>G.O. no. 274</p> <p>(Amendment to GO. 67)</p>

Table no. 2-7: Street Standards

S.No	Road length	Width of the road for commercial, group housing, industrial, other non-residential plot/ use or for mixed use (in metre)	Other requirements
1	Up to 300 m	12	Utilities and services to be underground and located preferable under the

			footpaths and not under the main carriageway
2	Above 300 and upto 500 m	15	Utilities and services to be underground and located preferable under the footpaths and not under the main carriageway
3	500 and less than 1000 m	18	Utilities and services to be underground and located preferable under the footpaths and not under the main carriageway and mountable road divider essential
4	1000 and above	36	Median and service road development essential; Utilities and services to be underground and located preferably on service roads and under footpaths and not under main carriageway.

**Table no. 2-8: Social Infrastructure**

S. No.	Type of Facility	Sub-Type	Scale	Minimum Area required
1	Educational	Nursery School Primary School High School Degree College	1 for 4000 Population 1 for 4000 Population 1 for 16000 Population 1 for 80000 to 1 Lakhs <sup>12</sup> population	0.1. Ha 0.4 to 0.6 Ha 1.6 to 2.0 Ha 4 to 6 Ha
2	Health	General Hospital	1 for every 16000 population 1 for 80000 to 1 lakhs population	1.0 Ha 4 Ha for 200 beds and 4 Ha for residential quarters <sup>13</sup>
3	Commercial facilities	Shops	Upto 10 shops for 4000 population Upto 20 Shops for 16000 population Upto 80 to 100 Shops for 80000 population	0.05 to 0.01 Ha 0.40 Ha 2.05 Ha
4	Communication facilities and Essential	Sub-Post Office, Post and Tele-Graph	1 for 100000 population	1.0 Ha

<sup>12</sup> 1 Lakh stands for 0.1 million units

<sup>13</sup> Quarter is a common term in India referring to Housing provided by an employer or by the government

	Services	Office-cum-Delivery and booking Telephone Exchange for 1000 Lines		
		Electrical sub-Station. Police Station	1 in all Shopping Centres 1 for every 50,000 population	12 X12 m 0.8 Ha
		Police Post	1 for every 20,000 population	0.4 Ha
		Fire Station	1 every 5kms radial distance	0.8 Ha
5	Social and Cultural facilities	Religious building	1 for every 15,000 population	0.8 Ha (shall be at 60 m. away from the street junctions)
		Community Hall and Library	1 for every 25,000 population	0.30 Ha with parking location in zonal shopping centre; business and commercial not in residential zone.

## E. STATUTORY REQUIREMENTS OF BUFFER ZONE

Under "Technical EIA Guidance Manual for Industrial Estates" from the Ministry of Environment and Forests, of the Government of India, the following guidelines have been mentioned:

- Planning and establishment: The State Industrial Development Corporations (SIDC) and Development Authorities (DA) will identify the alternative sites and control the land use in the region and within industrial complexes. Detailed master plans for the IE may be prepared indicating the phases of development and also in defining the land use pattern for the surrounding buffer zone. This would ensure controlled development in the future.  
[Page no 3-20]
- Under the section "steps involved in identification of a site" the following is mentioned:  
*'The various steps involved in the identification of a suitable site for Industrial Estates (IE) include: Providing appropriate buffer zones around IEs.'*  
[Page no 3-27]
- Under the section of "risk based land use planning", following is mentioned:  
*'The use of adequate buffer zones within such industrial parks is particularly important and the use of site specific risk assessments is desirable.'*  
[Page no 3-32]
- Under section of "Emergency management", the following is mentioned:  
The four core elements of emergency management are:  
*'Prevention/mitigation- land-use planning, dangerous goods corridors, buffer zones and process safety management of industry.'*

[Page no 3-38]

- Under the section "terms of reference for EIA studies", the following is mentioned:

Anticipated environmental impacts are:

*'Odour mitigation plan may be described. Also make provision of green cover as a measure for mitigation of dust and noise and buffer between habitation and industry.'*

[Page no 4-20]

- Under the section "operational aspects of EIA", the following is mentioned:

The EIA report will be typically examined for the following:

*'Project site description supported by topographic maps and photographs –detailed description of topography, land use and activities at the proposed project site and its surroundings (buffer zone) supported by photographic evidence'*

[Page no 4-49]

Above excerpts reiterate the importance of buffer zones for industrial parks for both functional as well as regulatory requirements.

## F. VARIOUS PROGRAMMES

- **CLUSTER DEVELOPMENT PROGRAMME:**

The Cluster Development Programme (MSE-CDP)<sup>14</sup> of the Ministry of Micro, Small and Medium Enterprises (MSME), of the Government of India provides for the following in industrial clusters:

- Hard intervention/Common facility centers (CFCs):
  - » Creation of tangible 'assets' like testing facility;
  - » Design centre;
  - » Production centre;
  - » Effluent treatment plant,
  - » Training centre;
  - » Research and development centre;
  - » Raw material bank/sales depot;
  - » Product display centre;
  - » Information centre; and
  - » Any other need based facility.
- Infrastructure development:
  - » Development of land;
  - » Provision of water supply;
  - » Drainage;
  - » Power distribution;
  - » Non-conventional sources of energy for common captive use; and
  - » Construction of roads, common facilities such as First-aid Centre, Canteen, other need based infrastructural facilities in new industrial (multi- product) areas/estates or existing industrial areas/estates/clusters.

<sup>14</sup> Modified Guidelines of MSE-CDP; Ministry of Micro, Small and Medium Enterprises (MSME), Government of India (GoI)

▪ **MEGA LEATHER CLUSTER DEVELOPMENT<sup>15</sup>:**

The leather industry in India provides jobs to about 2.5 million people. The main objective of developing Mega Leather Clusters is to create world-class infrastructure and to integrate the production chain in a manner that caters to the business needs of the leather industry so as to cater to the domestic market and exports. The suggested planning approach includes:

- **Extent:** The cluster should have a minimum area of 25 acres (to be set up without tanneries) and 40 acres (to be set up with tanneries) and the land development cost will include a secured compound wall, wire fence, and site development.
- **Core infrastructure:** Road network, power supply including installation of captive power plant, water supply system, water storage with rain harvesting facility, storm water drainage and sewage lines, streetlights, secured compound wall/wire fence, solid waste disposal plant/ common effluent treatment plant, signage, landscaping and entry-exit gate and parking facilities.
- **Social Infrastructure:**
  - » Common facility centre which include warehouse, trade/ display/ exhibition/ convention/ information centre, design centre, craft based resources centre, hostel with dormitory, raw material bank and additional common facilities like communication network (including broadband service), administrative building, firefighting station, infrastructure to ensure better environment for differently abled.
  - » Provisions for a post office, health centre and primary school may be made by dovetailing with other Government of India/State government schemes.
- **Production Infrastructure:** Ready-to-use factory sheds with plug-in facility for machinery/ equipment.
- **HRD<sup>16</sup> and Social Infrastructure:** Training centres, recruitment centre, workflow training centre, classroom with LCD projector, library, recreation centre, workers' hostel, faculty room, crèche & canteen, labour restroom, and management consultancy centre.
- **R&D Infrastructure:** Product design & development support centre, testing laboratory, quality benchmark centre, material research, basic product technology research, pre-competitive collaborative research and market research.
- **Export services related infrastructure:** Clearing agents, customs/ central excise/ service tax offices and DGFT<sup>17</sup> liaison office.

▪ **HANDLOOM CLUSTER DEVELOPMENT<sup>18</sup>:**

The objective of developing Mega Handloom Clusters is to improve infrastructure facilities, with better storage facilities, technology up-gradation in pre-loom/ on-loom/ post-loom operations, weaving shed, skill up-gradation, design inputs, health facilities,

<sup>15</sup> Mega Leather Cluster Sub-Scheme of the Indian Leather Development Programme, Department of Industrial Policy & Promotion, Ministry of Commerce & Industry, GoI; [http://www.leatherindia.org/documents/pdf/guidelines\\_mega-leather-cluster.pdf](http://www.leatherindia.org/documents/pdf/guidelines_mega-leather-cluster.pdf)

<sup>16</sup> HRD stands for Human resource development

<sup>17</sup> DGFT stands for Director General of Foreign Trade, Government of India

<sup>18</sup> Handloom Cluster Development Scheme (CHCDS) – Mega Handloom Cluster; Office of the Development Commissioner for Handlooms, Ministry of Textiles, GoI; [www.handlooms.nic.in](http://www.handlooms.nic.in)

etc. which would eventually be able to meet the discerning and changing market demands both at domestic and at the international level. The development of mega handloom clusters would also raise living standards of the millions of weavers engaged in the handloom industry. The Handloom clusters would include:

- A common facility centre (CFC) to carry out warping, dyeing, pre and post loom operations, for setting up of a water treatment plant, effluent treatment plant, testing labs, common work shed for mass production, exhibition hall, display-cum-showroom, conference hall, warehouse, etc.
- Common infrastructure such as road connectivity to the clusters where there are no roads, repair of roads, street lighting, bore wells, renovation of primary school building and primary health centres, etc.

▪ **INDUSTRIAL PARK SCHEME 2008<sup>19</sup>:**

- “Infrastructure facility” is defined as facilities required for development, operation, and maintenance of the industrial park and include roads (including approach roads), water supply, sewerage and effluent treatment facilities, solid waste management facilities, telecom network, generation and distribution of power, and air conditioning.
- The area allocated or to be allocated to industrial units shall not be less than ninety per cent of the allocable area.
- There shall be a minimum of thirty industrial units located in an industrial park.
- For the purpose of calculating the minimum number of industrial units; all units of a person and his associated enterprises will be treated as a single unit.
- The minimum constructed floor area shall not be less than 50,000 m<sup>2</sup>.
- No industrial unit, along with the units of an associated enterprise, shall occupy more than twenty five per cent of the allocable area.
- The industrial park should be owned by only one undertaking.
- Industrial units shall undertake only manufacturing activity as defined in section D of the National Classification 2004 code, issued by the Central Statistical Organization, Department of Statistics.

▪ **PETROLEUM, CHEMICALS, AND PETROCHEMICALS INVESTMENT REGION (PCPIR)<sup>20</sup> :**

A Petroleum, Chemicals, and Petrochemicals Investment Region (PCPIR) would be a specifically delineated investment region with an area of around 250 km<sup>2</sup> planned for the establishment of manufacturing facilities for domestic and export led production in petroleum, chemicals, & petrochemicals, along with the associated services and infrastructure.

- A PCPIR would be a combination of production units, public utilities, logistics, environmental protection mechanisms, residential areas, and administrative services. The minimum processing area for the PCPIR will be about 40% of the total

<sup>19</sup> Industrial Park Scheme 2008, Department of Revenue, Ministry of Finance, GoI; [http://incometaxindia.gov.in/archive/IndustrialParkScheme\\_04072008.pdf](http://incometaxindia.gov.in/archive/IndustrialParkScheme_04072008.pdf)

<sup>20</sup> Policy Resolution for Promotion of Petroleum, Chemicals and Petrochemical Investment Regions (PCPIRs), Ministry of Chemicals and Fertilizers, GoI; <http://chemicals.gov.in/PCPIRPolicy.pdf>

designated area, i.e., around 100 km<sup>2</sup>. The processing area may or may not be contiguous.

- The PCPIR may include one or more special economic zones, industrial parks, free trade & warehousing zones, export oriented units, or growth centres, duly notified under the relevant central or state legislation or policy.
- The master plan will consist of a regional development plan specifying land use for processing and non-processing areas, as well as technical details regarding the number and nature of downstream units that may come up in the PCPIR, based on available feedstock.
- The site should have port connectivity/port condition
- Available draft, existing facilities, and natural calamity risk should be considered
- Ecological balance and sustainable development in the region should be ensured. Also, conformity with environmental laws in force should be ensured.
- The basic infrastructure in PCPIR would include:
  - » Power connectivity and availability of reliable and good quality power. The units may also seek open access as per the regulations of the state electricity regulator commission;
  - » Provision of bulk requirements of water;
  - » Road connectivity (state roads); and
  - » Sewerage and effluent treatment linkages from the edge of the PCPIR to the final disposal sites.

**State level guidelines/standards:** At the State level too, there are no explicitly defined standards and guidelines for site master plans or development plans for industrial estates and industrial investment zones.

▪ **GUJARAT:**

The Government of Gujarat has “Guidelines for Planning of Industrial Parks”<sup>21</sup>. Highlights are given below:

- Industrial Park should be provided link infrastructure, viz. such as such as road, including toll road, bridges, runways, and other airport facilities; transmission or distribution of power by laying a network of new transmission or distribution lines of electricity; telephone lines telecommunications network; pipelines for water, crude oil, slurry, waterways, port facilities; canal networks for irrigation, sanitation or sewerage, and waste/solid waste, water pipe line; railway tracks, signaling system, stations; gas pipe line.
- The overall planning and layout should provide a maximum of 70% processing area; 20% of allocable area is for development of roads, industrial infrastructure, and other amenities. Subsequently, if the developer desires, 20 % area can be utilized for utility, housing, and amenities.
- The overall planning and layout should provide a minimum of 20% of the land area for the development of roads. Roads may be categorized as follows:

<sup>21</sup> “Guidelines for Planning of Industrial Parks”, Scheme for Financial Assistance to Industrial Park’ Ref: GR No: BJT/1008/626/Part-1/G, Dated 20/10/2011 of the Government of Gujarat

- » Main entrance or approach road - width not less than 30 m;
  - » Trunk roads - width not less than 20 m; and
  - » Tertiary roads - width not less than 12 m.
- Cross section of the road should accommodate a storm water drain of adequate size, shape, and cross section. Footpaths should be of flexible/replaceable material of construction. Street light should be provided on either side of the road. In the case that a central median is provided on the road, the street light should be set up there.
  - Provision of common open space area, utility plots or public purpose areas shall be governed by the General Development Control Regulation (GDCR) of the concerned urban development authority or the competent authority approving the detailed development plan.
  - The developer should provide source and transmission of power within the park at the planning stage. The developer should provide source of water, conveyance, treatment, adequate storage and distribution within the park. The developer shall design the waste water handling system for the capacity of 80% of the water quantity to be supplied to the industries. The developer should make sufficient provision of land for collection, treatment, and disposal of solid waste arising out of the park.

The “Guidelines for Preparing the Master Plan of SEZ Areas”<sup>22</sup> of Gujarat details the contents of the Master Plan:

- Proposals for designating the use of the land for residential, commercial, industrial, and recreational purposes;
- Proposals for the designation of land for public purposes;
- Proposals for transport, communications, water supply, drainage, sewage disposal, other public utility amenities, and services, including the supply of electricity and gas;
- Proposals for designation of sites for service industries, general industries, obnoxious and hazardous industries;
- Provisions for preventing or removing pollution of water or air, caused by the discharge of waste or other means as a result of the use of land;
- Provision of general development control regulation for controlling and regulating the use and development of land within the development area, including imposition of conditions and restrictions in regard to the open space to be maintained for buildings, the percentage of building area for a plot, the locations, number, size, height, number of storeys and character of buildings, and the density of the built up area allowed in a specified area, etc.

These Guidelines also suggest percentages for land use under different categories in non-processing area and categorization of road hierarchy, including arterial roads, sub-arterial roads, collector streets and local streets.

<sup>22</sup> Guidelines for preparing a master plan of SEZ area for the purpose of section 6(2)(b) and 13(1)(a) of the Gujarat Special Economic Zone Act, 2004 , [http://ic.gujarat.gov.in/wp-content/uploads/2011/03/sez\\_guideline.pdf](http://ic.gujarat.gov.in/wp-content/uploads/2011/03/sez_guideline.pdf)



▪ **GUJARAT PCPIR – DEVELOPMENT GUIDELINES<sup>23</sup>:**

- Minimum plot size for layout & subdivision of land for industrial uses shall be minimum 500 m<sup>2</sup>.
- Margins to be provided for industrial plots:
  - » Plot of more than 500 m<sup>2</sup> and up to 1000 m<sup>2</sup> – road side margin of 6.0 m and on other sides margin of 3.0 m
  - » Plot of more than 1000 m<sup>2</sup> and up to 2500 m<sup>2</sup> – road side margin of 6.0 m and on other sides margin of 4.5 m
  - » Plots of 2500 m<sup>2</sup> to 5000 m<sup>2</sup> – road side margin of 7.5 m and on other side margin of. 4.5 m
  - » Plots above 5000 m<sup>2</sup>– road side margin of 9 m and on other side margin of 6 m
- Requirement of Road Width:
  - » Road width of 12 m for road a length of up to 150 m
  - » Road width of 15 m for a road length of 150 m to 300 m
  - » Road width of 18 m for road length of 300 m and above
- Curves for the roads should be:
  - » 4.5 m radius if the width of the road is 9 m or less
  - » 6.0 m radius if the width of the roads is more than 9 m but not more than 18 M
  - » 7.5 m radius if the width of the road exceeds 18 m
- The length of a building shall not be more than 150.00 m in any case.
- No development whatsoever whether by filling or otherwise shall be carried out within 30 m from the boundary of the bank of the a river where there is no river embankment, and within 15 m such distance as may be prescribed under any other general or specific orders of Government and appropriate authority whichever is more, from river where there is river embankment but in case of nala, canal, talav, lake, water-bodies etc. it shall be 9.00 m.
- Building unit having 1000 m<sup>2</sup> and above need to plant at least 3 trees for every 200 m<sup>2</sup> of the building; trees shall have to be shown on the site plan/layout plan and also has to be maintained the same.

▪ **HARYANA:**

The Estate Management Procedures (EMP), 2011<sup>24</sup> of the Haryana State Industrial & Infrastructure Development Corporation Ltd. provides for:

- **Primary level infrastructure:** motorable roads for access to the site; water supply system; electrical infrastructure comprising of the distribution system network, sewerage system, and drainage system.
- **Secondary level Infrastructure facilities:** sewerage treatment/CETP<sup>25</sup>; security/policing; convenience shopping facilities; idle parking spaces; green cover and parks;

<sup>23</sup> General Development Control Regulations, Gujarat Petroleum, Chemical & Petrochemical Special Investment Regional Development Authority <http://gujaratpcpir.org/pdf/general-development-control-regulations.pdf>

<sup>24</sup> Estate Management Procedures (EMP), 2011 of the Haryana State Industrial & Infrastructure Development Corporation

<sup>25</sup> CETP stands for Common effluent treatment plant

and solid waste disposal sites.

- **Tertiary Level Facilities:** communications/telecom services; post office; banking; provision for institutional sites; provision for financial market & insurance; R & D centres; skill development centres; conferencing & entertainment; exhibition & display facilities; cargo logistics centres/ custom-bonded warehousing; petrol & service stations; social infrastructure: industrial housing; healthcare & medical attendance services; dispensary/ hospital; schooling (if residential facilities are provided); organized transport linkages.

#### ▪ **PUNJAB:**

The guidelines for the development of Industrial Parks/Estates/Agro Parks/IT Parks, by Private Entrepreneurs/Agencies in the State of Punjab provide for:

- The minimum quantum of land for any such park shall be 10 acres. A minimum of 60% of the area will have to be developed as industrial pocket, a maximum of 30% of the area may be developed as a residential pocket, and 10% of the area can be developed as a commercial pocket. Department of Industries may however reduce the permissible limits for non-industrial use in particular cases.
- Permissible saleable area in the industrial pocket shall be 65% in the residential pocket 60% and for the commercial pocket 40%. Balance of area shall be used for common facilities, open spaces, green belt etc. as per approved zoning plan and as per applicable byelaws.
- Floor Area Ratio (FAR) and ground coverage will be as per applicable byelaws/regulations in the area. The zoning and layout plan will be cleared by a competent authority, declared by Director of Industries & Commerce, Punjab.
- Common facilities would include the facilities for air conditioning, roads (including approach roads), water supply, sewerage facilities, common effluent treatment facilities, telecom networks, generation and distribution of power, provided that the facilities are used in more than 2 industrial units in the industrial park.
- The entrepreneurs shall have to first develop an industrial estate and at least 50% of industrial plots will have to be ready for possession before the commercial and housing facilities are allowed to be used/sold/allotted/ rented/leased etc. The minimum number of units in the park will be five.
- Infrastructure development would include roads (including approach roads) water supply and sewerage facilities, common effluent treatment facilities, telecom networks, generation and distribution of power, parking facilities, parks, street light and such other facilities as are of common use for industrial activities which are identifiable and are to be commonly used.
- Industrial Parks with a residential component shall have only non-polluting units. The distance between industrial area and other areas will be in accordance with guidelines issued by PPCB (Punjab Pollution Control Board) from time to time.
- As per the Guidelines for Planning Mega Projects, Punjab<sup>26</sup>, the categorization of Industrial parks on the basis of area is:
  - » Category A: 750 acres of land and above

<sup>26</sup>[http://puda.nic.in/img/uploads/NEW\\_formatted\\_Guidelines\\_of\\_Mega\\_Projects.pdf](http://puda.nic.in/img/uploads/NEW_formatted_Guidelines_of_Mega_Projects.pdf)

- » Category B: 500 acres of land and above
- » Category C: 250 acres of land and above

▪ **TAMIL NADU<sup>27</sup>:**

As per the Industrial Policy of the Government of Tamil Nadu (2007), the minimum area for an industrial park is 250 acres, with provision of 5 major manufacturing units and 50 SMEs<sup>28</sup>. The percentage distribution of land for various uses in an industrial park shall be:

- Processing area (industrial plots for manufacturing, ready built sheds for industrial use, research and development centres, testing & certification centres, pathways and roads): not less than 65 % of the total area.
- Non-Processing Area: not more than 35% area.
- Business related non-processing area (office space for business support to processing area; customs bonded warehouses and ICD<sup>29</sup>; convention centers; Business centres- financial services; education and skill training centres related to processing area; guest houses for use by businesses in processing area): not more than 20% of total area
- Social Infrastructure (housing, schools, hospitals, general purpose education and training institutions, entertainment & shopping centres, open spaces, roads and pathways): not more than 15% of total area.

▪ **DELHI<sup>30</sup>:**

As per the Master Plan for Delhi – 2021, the percentage distribution of land for various uses in industrial parks is as follows:

**Table no. 2-12: Percentage Distribution of Land Uses In Industrial Park**

S.No.	Land Use	Percentage
1	Industrial plots (net area)	55-60
2	Recreational Buffer zones, Parks, Water bodies, Green under High tension electrical lines etc.	10-12
3	Commercial Shopping Centre, Petrol Pumps, Guest House/ Budget Hotels, Lodging and Boarding, Service and Repair shops, Communication / Telephone Exchange etc.	2-3
4	Facilities <u>Public and semi – public:</u> Fire Station/ Fire Post, Police Station / Police Post, Hospital / Dispensary, Day Care Centre Etc. <u>Utilities:</u> Electric Sub-Station, CETPs, Pumping station, Underground Reservoir / Fire Fighting tanks and other utilities etc.	8-10

<sup>27</sup> [http://www.tidco.com/images/industrialpolicy\\_e\\_2007.pdf](http://www.tidco.com/images/industrialpolicy_e_2007.pdf)

<sup>28</sup> SME stands for Small and medium Industries

<sup>29</sup> ICD stands for Inland Container Depot

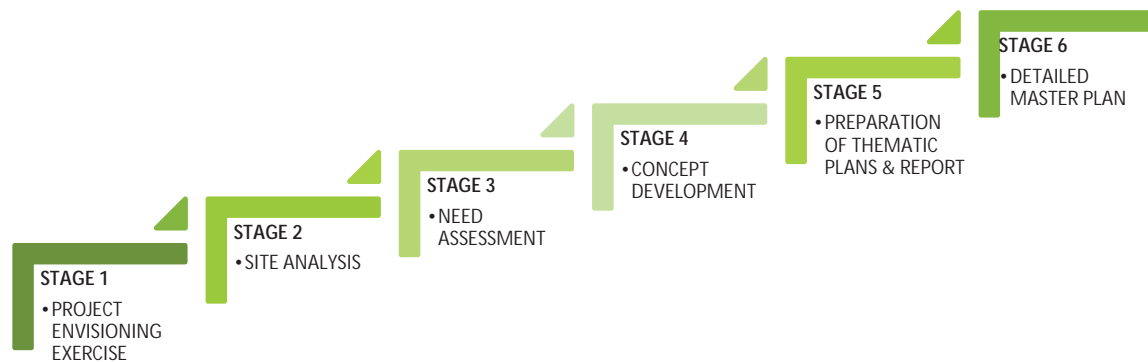
<sup>30</sup> Master Plan for Delhi – 2021, Delhi Development Authority  
<https://dda.org.in/ddanew/pdf/Planning/reprint%20mpd2021.pdf>

5	Transportation Circulation, Loading/Unloading Area, Parking, ideal truck Parking, Goods Vehicle parking etc.	18-20
		100

## CHAPTER 03

# SITE MASTER PLANNING OF A-GRIP

This phase of the project delved into developing thematic layers and detailed site master plan taking into consideration the competing goals of environment friendly master planning as well as economic viability through maximization of saleable plots. A technical process has been followed for spatial planning of A-GRIP wherein each stage served as a premise for the stage succeeding it. (Refer image no. 3-1)



**Image no. 3-1: Stages of Spatial planning followed**

[Source: GIZ-IGEP]

The following sections of the chapter would detail out these stages.

### A. PROJECT ENVISIONING EXERCISE:

A consultative process with all the stakeholders including ALEAP, future tenants of the industrial park, GIZ and Murthy & Manyam was adopted since the inception of the project. ALEAP expressed its self-motivation for sustainable development through following vision:

*“The Green Industrial Park, Nandigama is envisioned to be a model Green Industrial Park that provides an environment conducive for women entrepreneurs and employs state-of-the art technologies, including clean technologies, renewable energy technologies, environmental technologies and cost-effective common infrastructure.”*

This vision was further validated with the area programme for each individual functional area and further refined by Auroville consulting<sup>31</sup> as below:

*“Empowering women by creating safe, supportive and replicable entrepreneurial environments that foster integral sustainability, collective prosperity, innovation and adaptability to local cultures.”*

<sup>31</sup> “Planning and design guidelines Green Industrial Park for ALEAP, Nandigama, Andhra Pradesh, India” by Auroville Consulting, 2014.

## B. SITE ANALYSIS:

Site assessment was done to understand the context of site, topography, drainage pattern, surface water, wind, radiation and rainfall to interpret the site profile to determine its impact on spatial planning and design.

### ▪ Surface water:

20 m wide *nallah*/drain (width varies across length) exists dividing the site into 2 parcels: site 1 having an area of 68.29 acres and lying on the western side of the *nallah*/drain and site 2 having an area of 14.25 acres and lying to the east of the *nallah*/drain. (Refer Map no. 3-1).

### ▪ Topography:

From contour analysis, it was observed that the site has 1:7 slope for the parcel of land to the west of the *nallah*/drain and 1:4 slope for the parcel of land lying to the east of the *nallah*<sup>32</sup>/ drain. Both the site parcels on either side slopes down towards the *nallah*/ drain. (Refer Map no. 3-7). Hence, the natural drainage of the site is advantageous for sewerage and drainage layout. The site is characterized by clayey soil with very less porosity resulting in high surface run-off.

### ▪ Wind:

In the climate study the wind rose pattern was studied to find out the prevailing wind speed, direction and duration with respect to the site. The analysis revealed that the predominant wind direction is along south-west and north-east channel. Also, the temperature of the wind from the north-east and south-west is cooler compared to those from other direction.

### ▪ Temperature and radiation:

The climate of the area is characterized by hot dry season throughout the year and hot and humid monsoon during June-July months of the year. May is the hottest month with the mean daily temperature of about 40°C. December is the coldest month with a mean daily temperature of about 29°C. (Refer table no. 3-1)

The average daily incident radiation on a vertical surface has been deduced from the sun path diagram and utilized to decide the orientation of building blocks.

**Table no. 3-1: Monthly maximum-minimum temperatures in Medak (2012)**

Month	Jan.	Feb.	Mar.	Apr.	May	June	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Minimum	14.4	16.5	17.2	23.3	25.0	23.8	22.1	21.3	NA	17.3	14.9	13.0
Maximum	30.9	35.0	38.0	39.8	42.7	36.0	30.6	29.8	NA	31.4	30.3	31.4

Source: <http://www.telangana.gov.in/TelanganaStateProfile/3-Climate.pdf>

An observation that emerged out of the analysis of temperature and radiation was that on an average 5.22 Kwh / m<sup>2</sup>/ day is received which could be a potential for harnessing solar energy.

<sup>32</sup> Nallah means the drain in Hindi language.

▪ **Rainfall:**

The area gets two monsoons in varying degrees, the southwest monsoon from June till August, and northeast monsoon from September to November. The average annual rainfall of the district is 910 mm<sup>33</sup>, which ranges from least rainfall in December, January and February and March and highest in July. The monthly rainfall distribution over a period of five years is given in Table no. 3-2.

**Table no. 3-2: Arithmetic averages of rainfall in Medak district (2009-13)**

Year	Jan.	Feb.	Mar.	Apr.	May	June	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
2009	0	0	0	6.6	21	52.3	64.3	157.6	142.7	41.2	13.8	4.6
2010	9.7	13.5	0	5.5	5.3	83.8	337.0	269.9	199.6	95.2	18.3	0.6
2011	0	0	3	30.5	1.9	48.9	283.7	245.9	64.3	14.2	2.4	0
2012	0	0	0	6.8	35.6	170.0	224.0	132.0	127.6	82.9	64.1	0
2013	4.1	18.6	0	27.1	13.2	135.3	348.5	130.5	179.6	178.0	32.5	0.7

Source: District rainfall (mm) for last five years, Hydro met division, India Meteorological Department  
<http://www.imd.gov.in/section/hydro/distrainfall/webbrain/andhra/medak.txt>

For Medak district in particular, it has been recommended by Central Ground Water Board<sup>34</sup> that large scale artificial recharge structures like percolation tanks, check dams, farm ponds, embankment structures should be provided on watershed basis so as to augment ground water storage. It is important to build the artificial recharge structures based on the topography, soil, slope, surface run off available and hydrogeological conditions.

Based on the observations from rainfall data as well recommendations from Central Ground Water Board, following planning consideration were derived-

- The site can provide potential of rain water collection during the months of June, July, August, September and October. (maximum rainfall is received during July to August up to 400-450 mm/ month); and
- The environment infrastructure should include conservation of rain water and adoption of techniques like recycle and reuse.

▪ **Spatial Planning considerations from site analysis:**

Following analysis evolved out of analyzing different physical attributes of the site.

- The land use structure should be designed according to natural slope so that minimum site disturbance happens and natural drainage is also retained.
- The longitudinal axis of the site is along north-west to south-east. This can be an appropriate location for green lung space of the industrial park.
- The wind flow within the site moves mainly in the south-west to north-east direction and vice versa and hence the siting of the STP should be done accordingly.

<sup>33</sup> & <sup>4</sup> Ground water brochure, Medak district, Andhra Pradesh, Central Ground Water Board, Ministry of Water Resources, Government of India  
[http://www.cgwb.gov.in/District\\_Profile/Telangana/Medak.pdf](http://www.cgwb.gov.in/District_Profile/Telangana/Medak.pdf)

- Efficient onsite management of water resources and waste water should be done to prevent the negative impact on the surroundings.
- The site has potential for solar energy which should be explored.
- Building design should be climate responsive so that the working environment is comfortable for the employees as well as less dependence is given to the artificial cooling etc.
- A large number of workers shall be most likely employed from the surrounding villages, helping them acquire new skills. Hence, training facilities should be included.

Site analysis formed the basis of evolving structure plan and assessing the infrastructure for A-GRIP.

### C. INFRASTRUCTURE NEEDS ASSESSMENT

In this stage, the project team conducted two site visits (in April 2013 and July 2013) to gain a better understanding of the physical conditions, transportation connections, access, nature of the surrounding uses, and informal interviews with residents from nearby villages during different seasons (pre-monsoon and monsoon).<sup>35</sup> Future tenants of A-GRIP were given a questionnaire to understand their needs and priorities. (Refer annex 3-4). The results showed their priorities towards specific infrastructure as summarized below:

**Table no. 3-3: Results from the survey conducted for infrastructure priorities**

S.No.	Common service	Critical	Important	Minor important	Not important	Not answered	Total
1	Safe transport for workers from major pickup points	27	37	7	-	-	71
2	Affordable canteen for workers	24	38	5	4	-	71
3	Information desk	17	49	-	5	-	71
4	Common security services	17	54	-	-	-	71
5	Courier and postage services	17	47	7	-	-	71
6	Common eating spaces for workers (home cooked food)	16	29	16	10	-	71
7	Financial and accounting services	13	40	13	4	1	71
8	Common conference rooms	13	43	13	2	-	71
9	HR helpdesk (for recruitment support)	10	52	2	7	-	71
10	Exhibition hall for fests	9	30	21	11	-	71
11	Housekeeping services	9	54	4	2	2	71
12	Gardening and landscaping services	9	39	21	2	-	71
13	Legal advisory services	8	40	18	4	1	71

<sup>35</sup> 'Planning and Design Green Industrial Park, ALEAP, Nandigama', Auroville Consulting 2014



14	Centralized packaging and dispatching units	6	31	21	13	-	71
15	Printing and DTP services	-	38	19	14	-	71

Source: 'Planning and Design Green Industrial Park, ALEAP, Nandigama', Auroville Consulting 2014

Based on preliminary data analysis, site observations and interaction with stakeholders (refer Chapter no. 1), estimations about demography, water demand, traffic generation etc. were done. Details<sup>36</sup> are given below.

- Population

**Table 3-4: Estimated population**

S.No.	Category	Inhabitants	Visitors
1	Industry	7,500 ~220 per acre	900~5 per plot
2	Service	1,500	10,000

Source: 'Planning and Design Green Industrial Park, ALEAP, Nandigama', Auroville Consulting

- Water

**Table 3-5: Estimated water requirement**

S.No.	Water requirement (litres/ day)	Domestic	Industrial	Cooling
1	Industry	360000, (30lts ppd, 2 shifts)	360k, 50% more than domestic	81k, 15% of industrial
2	Service	72k, 30lts ppd, 2 shifts	-	-

Source: 'Planning and Design Green Industrial Park, ALEAP, Nandigama', Auroville Consulting

- Sewage

<sup>36</sup> ALEAP Industrial Park at Nandigama: Baseline Data, Auroville Collaborative, 2013.

**Table 3-6: Estimated sewage output**

S.No.	Sewage output (litres/ day)	Inhabitants	Industrial	Cooling
1	Industry	2,88,000 (80% of water consumed)	3,24,000 (60% of water consumed)	24,30,000 (60% of water consumed)
2	Service	57.60,000 (80% of water consumed)		

Source: 'Planning and Design Green Industrial Park, ALEAP, Nandigama', Auroville Consulting

- **Solid waste generation**

**Table 3-7: Estimated Solid waste generation**

S.No.	Solid waste generated (metric ton/ day)	Bio-degradable	Non-Hazardous	Hazardous
1	Industry	14	150 (field estimate)	7.50 (field estimate)
2	Service	1.20 (200 gms per person 2 shifts)	1.80 (200 gms per person 2 shifts)	-

Source: 'Planning and Design Green Industrial Park, ALEAP, Nandigama', Auroville Consulting

- **Traffic generation**

**Table 3-8: Estimated traffic generation**

S.No.	Traffic generation per day	2-wheelers	4-wheelers	Trucks/ Vans
1	Industry	3,000	300	500
2	Service	300 (20% of population)	30 (2% of population)	-

Source: 'Planning and Design Green Industrial Park, ALEAP, Nandigama', Auroville Consulting

- **Renewable energy**

**Table 3-9: Renewable energy potential**

S.No.	Renewable energy potential	Solar PV	Bio-gas	Wind
1	Industry	~ 4.50- 5.50 MW 12 acres rooftop (flat/tilted)	700 cu.m (15-40 metric tons of bio degradable waste per day; 773 KL waste water)	~ 0.20 MW
2	Service	~ 0.10 mw 0.19 acres	-	-

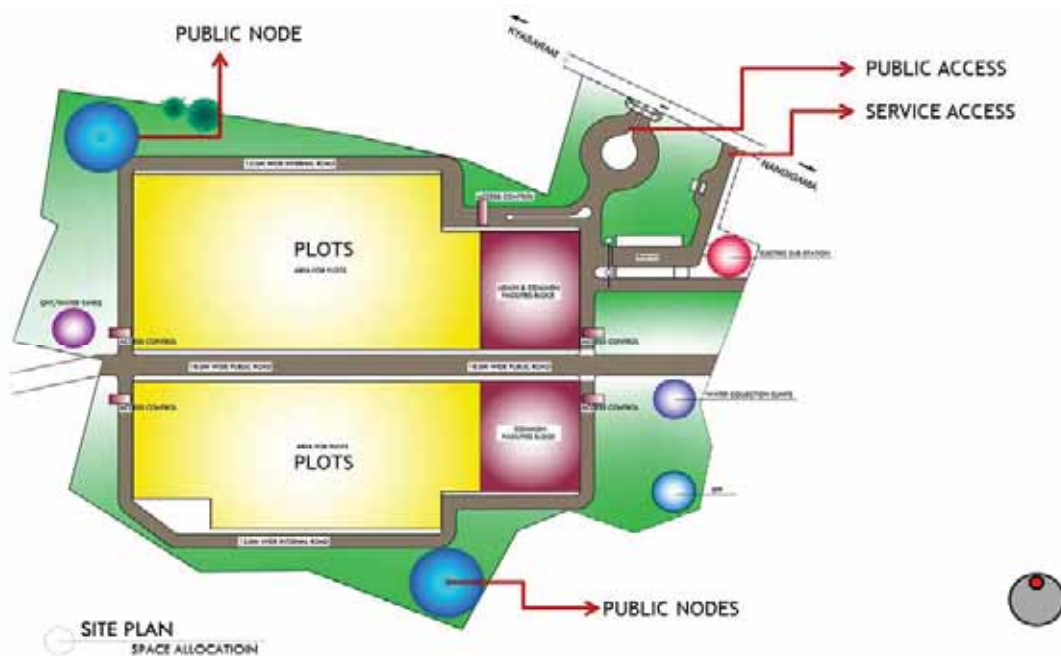
Source: 'Planning and Design Green Industrial Park, ALEAP, Nandigama', Auroville Consulting

Based on the above boundary conditions, area requirement for different facility components were calculated taking reference from design guidelines forwarded by Auroville Collaborative and local norms and standards. These have been elaborated in individual sections on basic, technical, environmental, technical and social infrastructure.

## D. CONCEPT DEVELOPMENT

This section reflects upon the integrated planning approach, which was followed for preparing an environment friendly site master plan for A-GRIP. The goal was to apply principles of physical planning so that it has positive implications not only on the visually quality, but also on the efficiency and functioning of the industrial park as a whole.

Initially, a conceptual plan was drafted by ALEAP's consultants with an objective to achieve maximum number of plots in the site area. (Refer image no. 3-1). However, after analysis it was realized that in order to achieve ALEAP's vision, the elements like safety, empowerment, sustainability, innovation etc. should be manifested in the physical planning and design of the industrial park. Hence, reconceptualization was done in order to relate the vision with the design.



**Image no. 3-1: Concept Plan**

[Source: Murty and Manyam Architects and Engineers]

### ■ Modified concept

The modified concept was based on the consideration to maximize the number of industrial plots without compromising the environmental parameters.

#### ● Circulation

The roads were reoriented according to the contours of the site. A hierarchy of pedestrian, vehicular and service access roads was created to minimize conflicts between the different vehicle types and modes of transport. A secondary network of green pathways was created to intercept the vehicular movement and create more cohesive and interactive working and travel environment. Parking facilities were decentralized to ensure that people walk to the individual plots/ amenities rather than park on roads in front of them thereby creating congestion.

- **Land use and zoning**

The concept for urban planning was the positioning of clusters of facilities as per the zones. A buffer zone was introduced along the periphery of the site to minimize the impact on the surrounding agricultural area. To create an interface zone, units with relatively low toxicity units, service areas or recreational areas were placed along the boundary. The public utilities, common functional areas are planned to utilize the peripheral notches of the site.

- **Green areas and storm water management**

The goal was to create an economically productive as well as aesthetic green network to achieve a healthy working environment. The concept of green spaces was to create a network of interconnected green areas integrated with the storm water management and landscaping. As per the contours and site profile, a central spine was created as a huge lung space to serve as interactive and storm water management space. This gave way to the layout of industrial clusters on either side of the central spine road and intercepted with secondary road networks. Also, the storm water run-off was channelized through the secondary greens that end in a loop to merge at the central green spine. (Refer image no. 3-2).



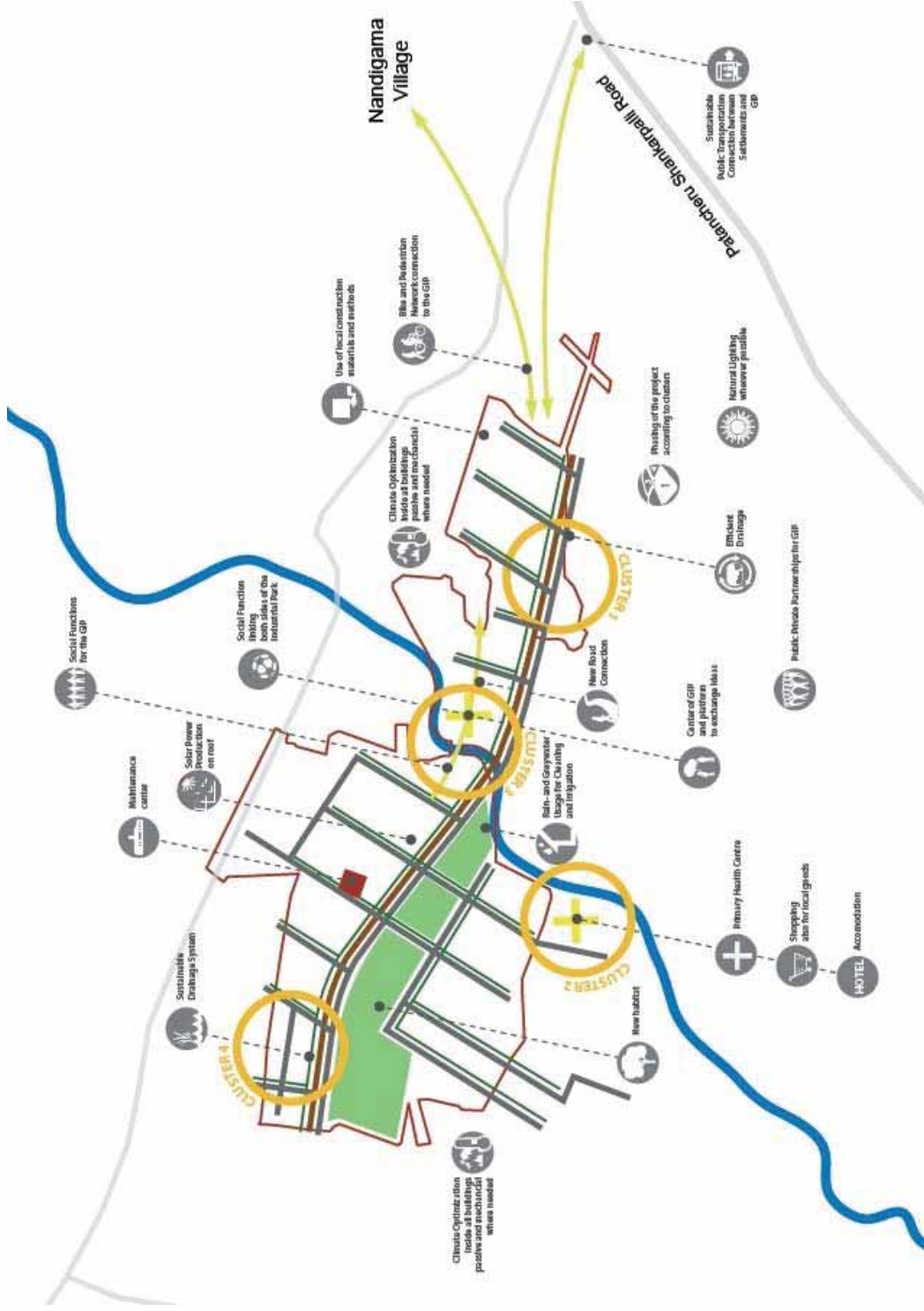
**Image no. 3-2: Integrated green network**

[Source: GIZ-IGEP]

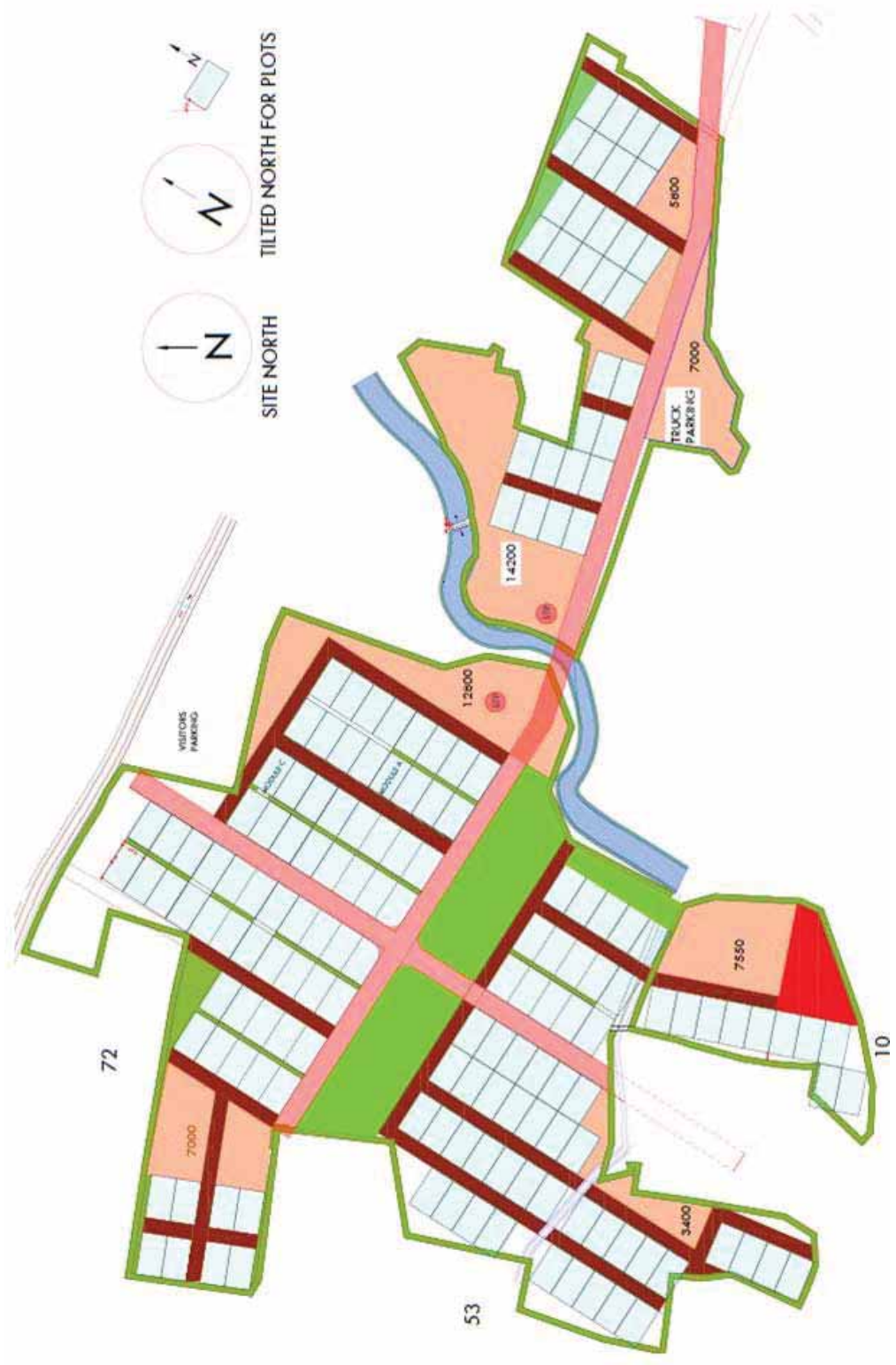
- **Other recommendations**

In addition to above, following were the recommendations from Buro Happold Engineering for modifying the concept plan and specific thematic plans. (Also refer image no. 3-3). –

- It was recommended to develop the clusters of industries as per pollution potential so that it can help in waste management effectively and prevent water from other clusters getting contaminated. It would also help in provision/creation of common infrastructure in each cluster.
- It was recommended that the social infrastructure should include services for the elderly to complement the infrastructure on the neighbouring settlements.



**Image no. 3-3: Recommendations of Buro Happold Engineering for A-GRIP**  
 [Source: Buro Happold Engineering, Germany]



**Image no. 3-4: Modified Concept Plan realigned as per contours**  
 [Source: Murty and Manyam Architects and Engineers Ltd.]

- Uniformity of structures was recommended for possibility of expansion and easy maintenance.
- Involvement of local citizens was recommended to make this industrial park a place people appreciate and have belongingness.
- It was also recommended to optimize the open space in the industrial park and spend more money on higher quality open spaces.

Hence this led to the modified concept for A-GRIP. (Refer image no. 3-4). This stage was succeeded by the preparation of thematic plans which has been described in the sections namely: Basic infrastructure, Technical Infrastructure, Environmental infrastructure and Social infrastructure.

## E. BASIC INFRASTRUCTURE

### ▪ ZONING

#### 1. Industrial Zones

The division of industrial zones in A-GRIP has been done to cluster similar industries together and provide for their common infrastructure. Industrial zones like Pharmaceutical formulations and general engineering were zoned towards the core of the industrial park and closest to the effluent treatment plant. Also, industries like herbal products, garments, paper and packaging, solar products and food processing functions were zoned towards the edges of the industrial park since they are least toxic and will have minimum impact on surroundings. The industries for plastic products have been near to the centre of the industrial park. (Refer table no.3-1, map no. 3-2)

**Table no. 3-1: Area Distribution in Zones**

S.No.	Zone	Area under industrial plots (m <sup>2</sup> )	Percentage
1	Herbal products	10020	5.6%
2	Paper and packaging	28560	16.0 %
3	General engineering	13205	7.4%
4	Pharmaceutical units	22746	12.7%
5	Garments	12504	7.0%
6	Food processing	21745	12.2%
7	Plastic products	30277	16.9%
8	Solar products	10026	5.6%
9	Electronics	19268	10.8%
10	Warehousing	5026	2.8%
	Total industrial use	178634	100.0%

Source: Estimated by GIZ- IGEP

### ▪ Permissible Industries:

The plot allotment should be as per the list of the permissible industries (Refer Annex I: 3-1). Brief description is given in table no. 3-2.

**Table no. 3-2: Permissible Industries in Zones**

S.No.	Industrial Zone	Allowed Industries
1	<b>Zone 1:</b> Herbal products	Units producing herbal ingredients and formulations will be allowed.
2	<b>Zone 2:</b> Paper and packaging	Corrugated packaging units and recycled paper products units will be allowed.
3	<b>Zone 3:</b> General engineering	Engineering industries including fabrications units, general engineering works, etc. will be allowed.
4	<b>Zone 4:</b> Pharmaceutical formulations	Pharmaceutical formulations will be allowed. The waste water produced by these units should be easily biodegradable. Emissions from boilers only.
5	<b>Zone 5:</b> Garments	Units for design and manufacture of clothing will be allowed.
6	<b>Zone 6:</b> Food processing	Manufacturing of consumer food and beverages, grain processing and food preservation will be allowed.
7	<b>Zone 7:</b> Plastic products	Manufacturing of plastic bottles and caps will be allowed.
8	<b>Zone 8:</b> Solar products	Manufacturing of solar water heaters, solar inverters and solar panels will be allowed.
9	<b>Zone 9:</b> Electronics	Green category industries of MSME scale will be allowed.

In addition, all above zones should adhere to following parameters:

- » The industrial waste water, including domestic waste water from canteens, floor washing, etc. should not exceed 20 KLD.
- » Industries should not generate any atmospheric emissions from processes or operations except from DG sets.
- » Industries should not generate any types of hazardous wastes.
- » Industries should not be involved in handling any types of toxic or hazardous chemicals.

▪ **Restricted Industries:**

Industry processes or operations that are likely to cause pollution or any adverse impact on the environment will not be allowed in A-GRIP. (Refer Annex I: 3-2).

Any industry involved in the following industrial operations or processes will not be allowed in A-GRIP:



- » Dust or odors from handling of materials, industrial processes or operations that are detrimental to human health and the environment
- » Any pollutant emissions or toxic emissions from production processes, storage/ handling and transportation of materials, emissions from combustion of fossil fuels in boilers or heaters, etc., emissions from incineration of waste etc.
- » Any storage of hazardous goods or materials.
- » Generation of noise and vibration, emissions of light and heat that are detrimental to human health and the environment.
- » Generation of hazardous wastes (as per Hazardous Waste Management Rules<sup>37</sup>).
- » Risks of contamination of land or water from releases of pollutants into the ground or into sewers, surface waters or groundwater from:
  - Handling, storage, use, or spillage of hazardous materials
  - Discharge of sewage or other effluents to water or the land (expected mode and place of discharge)
  - Deposition of pollutants emitted to air into the land or into water
  - Any other sources
- » Risk of accidents during construction or operation of the project, which could affect human health or the environment, like:
  - From explosions, spillages, fires, etc.
  - From storage, handling, use, or production of hazardous substances
  - From any other causes
- » Storage and handling of chemicals, hazardous materials, and inflammable materials.
- » Underground works including mining or tunneling.
- » Use of substances or materials, which are hazardous (as per MSIHC rules<sup>38</sup>) to human health or the environment.

▪ **PLOT SIZING AND ORIENTATION**

• **Plot sizing**

The area requirement per plot was derived based on the requirements of women entrepreneurs of ALEAP. There were 3 plot sizes derived out of discussion in stakeholders meetings and requirements of women entrepreneurs. However, the plot dimensions were standardized (refer table no. 3-2) based on the golden ratio<sup>39</sup>. This was done to achieve linear, viable spans of structure and optimum setbacks. Details are given below:

<sup>37</sup> Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008, issued vide number S.O.2265 (E), dated the 24th September, 2008 by Central government of India  
<http://www.cpcb.nic.in/divisionsofheadoffice/hwmd/mhtrules2008.pdf>

<sup>38</sup> [http://www.cpcb.nic.in/upload/NewItems/NewItem\\_158\\_MSIHC-REPORT.pdf](http://www.cpcb.nic.in/upload/NewItems/NewItem_158_MSIHC-REPORT.pdf)

<sup>39</sup> [http://en.wikipedia.org/wiki/Golden\\_ratio](http://en.wikipedia.org/wiki/Golden_ratio)

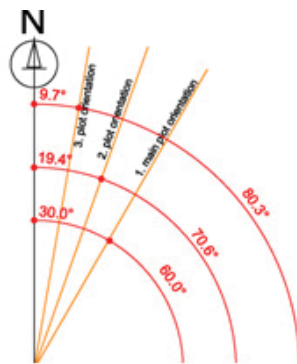
**Table 3-2: Different Categories of Plots in the Park**

S. No.	Plot Size Dimension in m (area in square yards)	No. of Plots for each plot types in the site
1	38 x 22 (1000)	174
2	26 x 20 (620)	6
3	varies (as shown in master plan)	14

Source: Murty and Manyam Architects and Engineers

- **Plot orientation**

Plot orientation (the angle of incidence most of the plots on the site vis-a-vis the North) was done according to the optimum orientation for climatic comfort. (Refer image no. 3-5)



**Image no 3-5: Plot orientation: Image no 3-6: Most followed plot orientation**

[Source: Planning and Design Green Industrial Park, ALEAP, Nandigama', Auroville Consulting 2014]



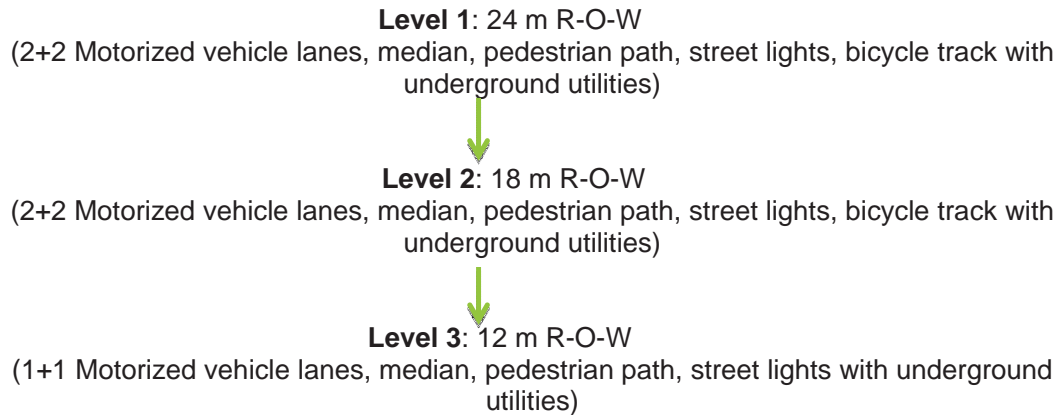
**Image no 3-7: Context specific plot orientation**

[Source: Planning and Design Green Industrial Park, ALEAP, Nandigama', Auroville Consulting 2014]

Most of the plots in the proposed layout are at 30° to the North. (Refer image no. 3-6). Remaining plots are at an angle of incidence between 9.7° to 19.4° N. (Refer image no. 3-7).

- **ROAD NETWORK**

The Site Master Plan has provided for road hierarchy as below:



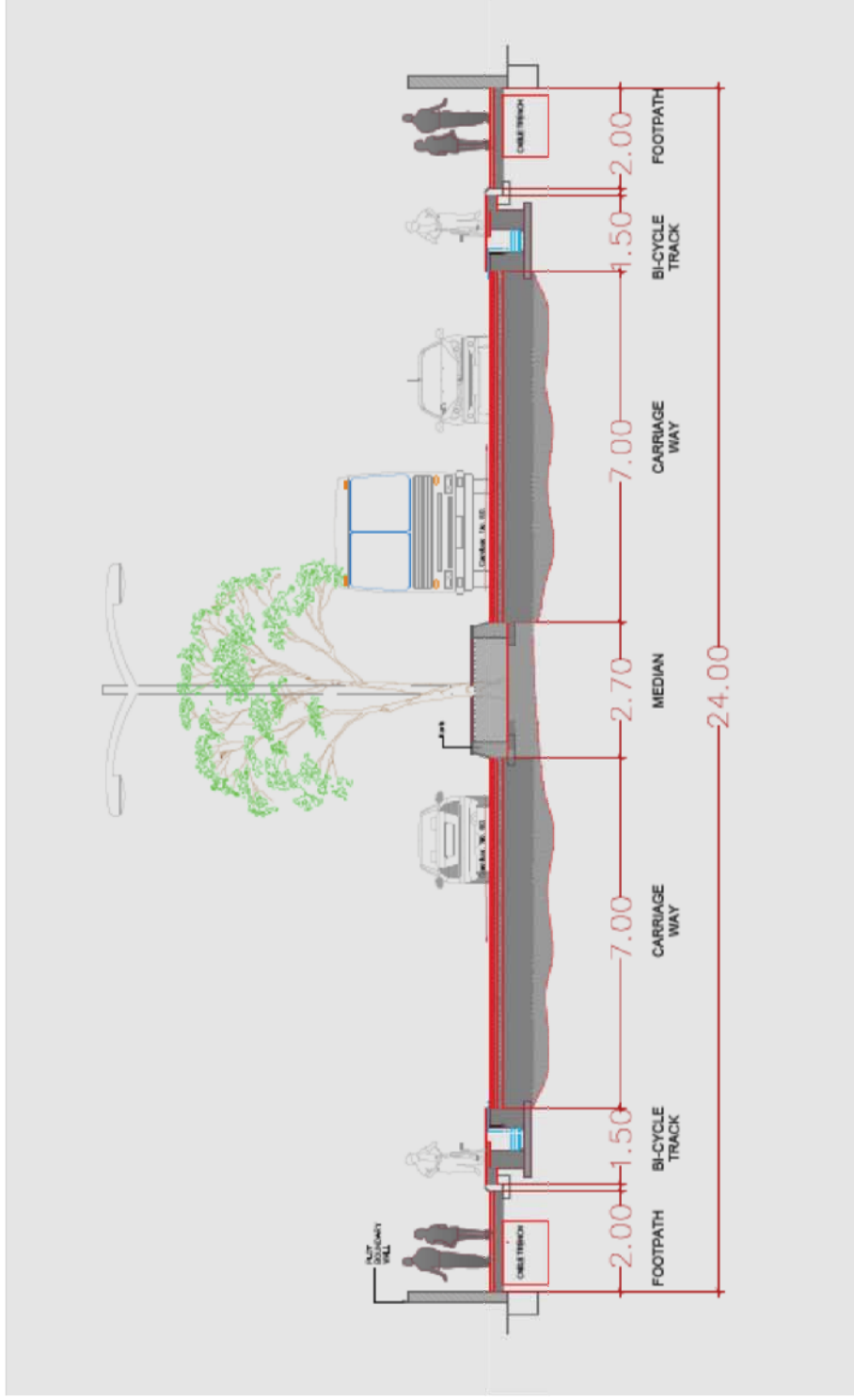
Certain referred guidelines and examples are mentioned below:

- As per PCPIR: Roads may be categorized as follows:
  - » Main entrance or approach road - width not less than 30 m;
  - » Trunk roads - width not less than 20 m; and
  - » Tertiary roads - width not less than 12 m.
- As per the Gujarat PCPIR, requirement of road width are:
  - » Road width of 12 m for road length up to 150 m;
  - » Road width of 15 m for road length of 150 m to 300 m; and
  - » Road width of 18 m for road length of 300 m and above.
- Curves for the roads should be:
  - » 4.5 m radius if the width of the road is 9 m or less;
  - » 6.0 m radius if the width of the roads is more than 9 m but not more than 18 m; and
  - » 7.5 m radius if the width of the road exceeds 18 m.
- As per the state norms<sup>40</sup>:
  - » Minimum width of proposed roads in the layout shall be 10 meters for residential and 12 meters for all non-residential layouts. Notwithstanding the above minimum width, the Executive Authority may insist upon larger road widths depending upon local conditions or importance of any particular road etc. The width of the roads in the layouts shall be in conformity with the General Town Planning Scheme or the Indicative Land Use Plan or Master Plan, if any in force.
  - » Road and Cul-De-Sacs: 9 m to 18 m for main internal approach roads; 9 m for other internal roads and also for looped roads; and 8 m for cul-de-sac roads (with a minimum radius 9m) between 50-100 m in length.

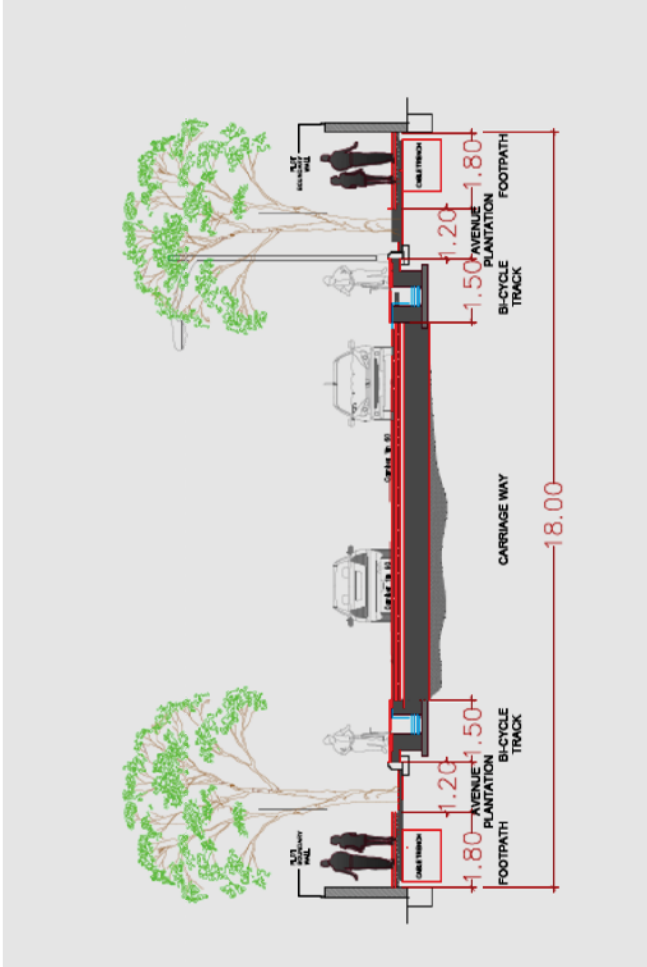
Road cross sections of A-GRIP have been standardized as per the URDPFI<sup>41</sup> Guidelines of the Institute of Urban Transport, Ministry of Urban Development of India. Refer image no. 3-8, 3-9

<sup>40</sup> The Andhra Pradesh Gram Panchayat Land Development (Layout and building) Rules – 2002 – Government order no. 67





**Image no. 3-8: Standard road cross sections for 24 m wide main road**  
 [Source: GIZ-IGEP]



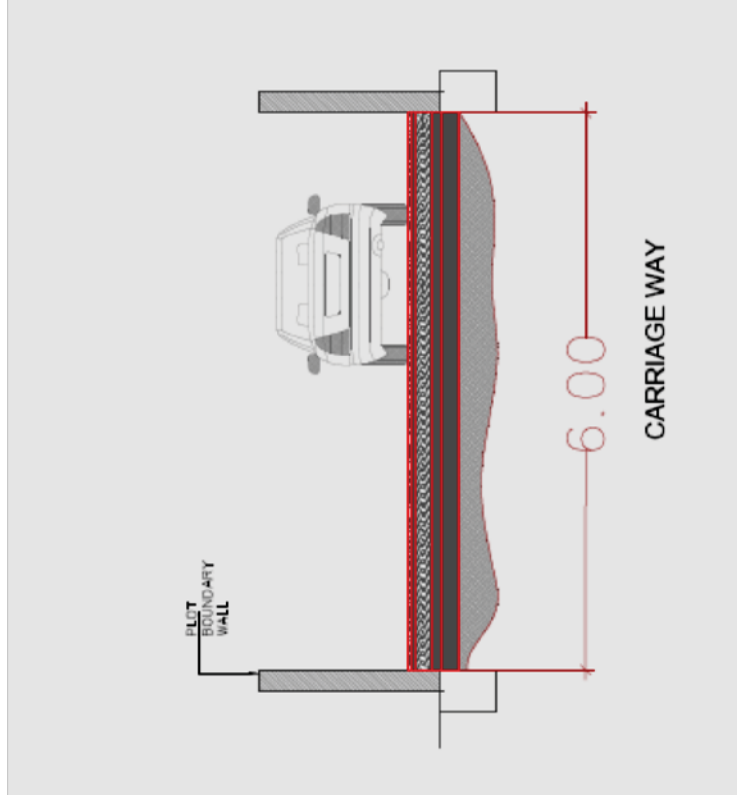
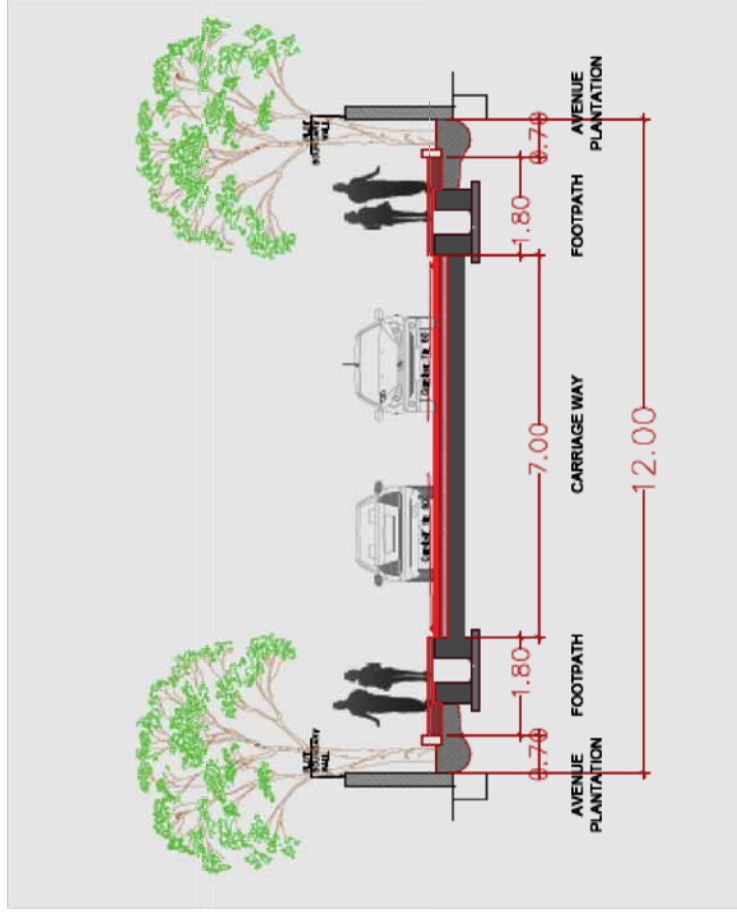


Image no. 3-9: Standard road cross sections for 18 m, 12m and 6 m road

[Source: GIZ-I(GEP)]

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- **Entry/Exit provisions**

The main entry to A-GRIP besides being a regulatory, safety and monitoring structure needs to establish an identity to the park. The main entry gate has been proposed to reflect the unique identity of the Green Industrial Park and integrate local architectural elements. (Refer image no. 3-10). The entry gate will have provisions for CCTV<sup>42</sup>, access control to monitor and control movement of vehicles through the industrial park. (Refer Annex II: map no. 3-3)



**Image no. 3-10: Example of view of main entrance gate**

[Source: GIZ- IGEP]

The main entrance will have following proposed provisions:

- Iconic entrance gate ;
- Separate gates with movement tracks for entry / exit traffic;
- The gates should be designed for quick operation, to either shut down or open fully for evacuation in case of emergencies;
- Security cabin with full visual access to the vehicles and personnel entering and leaving the park;
- Distinction between 4 wheeler, bicycle and pedestrian traffic;
- Electronic surveillance systems with CCTV ;
- Information centre;
- A-GRIP Map & posters to showcase how individual tenants/workers could contribute towards making it a truly Green Industrial Park. (Refer image no. 3-11);
- Parking facility - to provide for adequate parking/standing of trucks to avoid queuing at the entry/exit and to provide parking for those who want to use bicycles or battery operated vehicles;
- Battery operated shuttle service;
- Bus stop for external transport;
- Bus stop and parking for internal transport;
- Adequate front space (in front of gate) for landscaping and design elements;
- Public toilets; and
- Drinking water facility.

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<sup>42</sup> CCTV stands for Closed-circuit television





**Image no. 3-11: Example view of access control and display of A-GRIP map**

[Source: GIZ- IGEP]

The entry gate could be manned through the ALEAP management or services could be put in place through appropriate business models (e.g. Public Private Partnership). An entry fee could be charged, which could be used for maintaining parking facilities and other road infrastructure.

▪ **Mobility: Eco Efficient Transportation**

The transportation for A-GRIP is proposed to include appropriate road hierarchy, mobility of goods and passengers (internal and external transportation), parking, pedestrian pathways, bicycle ways, truck parking and linkages to external transport systems.

• **External Linkages**

- » It has been suggested that ALEAP should take up with the State Government or its agencies to improve/provide external road linkages between the A-GRIP and nearby settlements or housing areas from where workers/ employees will travel to the park.
- » Bus stops and pedestrian access points have been allocated near the main entrance of A-GRIP for providing easy access to regional bus service.
- » It has been suggested that eco-friendly public transportation such as battery operated vehicles, CNG buses should to operate from A-GRIP to the nearby settlement, housing areas, railway station, bus station etc. The services could be put in place through appropriate business model (e.g., PPP).
- » A bike and pedestrian network has been created between the surrounding settlements and the A-GRIP as well as within the A-GRIP for workers.

- **Internal mobility**

- » Battery operated vehicles have been suggested for internal transport for employees/workers/visitors. The services have been recommended to be put in place through appropriate business model (e.g. PPP).
- » Bus stops/shelters have been proposed in the site master plan of the A-GRIP.
- » Bicycle ways and spaces for bicycle stations have been proposed in the site master plan of A-GRIP. The services are suggested to be put in place through appropriate business models (e.g. PPP).
- » For private vehicles, adequate parking facilities has been provided at the entry/exit points, at central level, and at zonal level.

- **Bicycle ways**

Bicycle tracks, bicycle stations, and bicycle parking facilities have been provided in the Site Master Plan of the A-GRIP to encourage the usage of bicycles for getting to work.(Refer image no. 3-12). Dedicated cycle tracks on 3 major hierarchical roads i.e. 24 and 18 m have been proposed in the Basic Infrastructure Plan. (Refer Annex II: map no. 3-3) The services are suggested to be put in place through appropriate business models (e.g. PPP).



**Image no. 3-12: Example of Sheltered Bi-cycle parking**

[Source: [http://www.seattle.gov/transportation/docs/bmp/2013/BMP%20lunch%20and%20learn\\_june.pdf](http://www.seattle.gov/transportation/docs/bmp/2013/BMP%20lunch%20and%20learn_june.pdf)]

- **Pedestrian Network**

A-GRIP has been proposed with extensive pedestrian network consisting of sidewalks along roads and green pathways to create a system of safe and convenient pedestrian ways throughout the zones. (Refer Annex II- map no. 3-3). The green pathways provided would give a natural, attractive and safe option of travel. (Refer image no. 3-13). The width of secondary greens between the plots has been given in a manner to provide for a loop of pedestrian and cycling along the streets and through the green pathways behind plots.

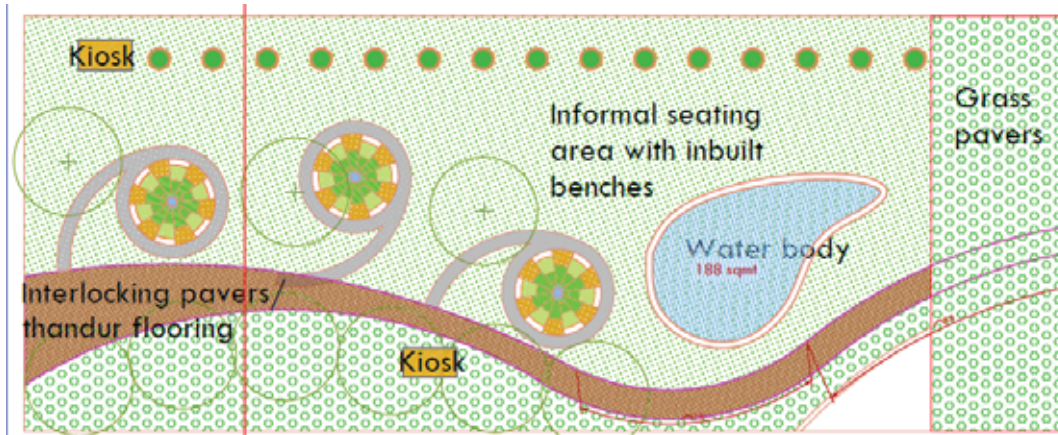


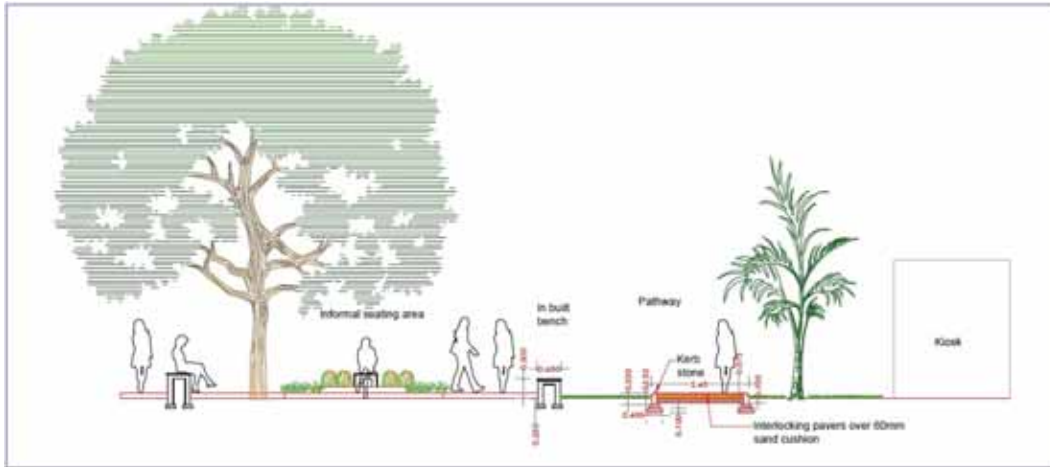
**Image no. 3-13: Green path through the row of industrial plots**

[Source: Murty & Manyam Architects and Engineers ]

Following provisions will be made along the walking tracks:

- Provision of amenities that encourage pedestrian movement, such as benches, street trees, waste receptacles, pedestrian- scaled street lighting, shelter at public areas and curb cuts for accessibility to collector/distributor roads .(refer image no. 3-14)
- Food and other related kiosks along green pathways zones to avoid conflicts in movement of vehicles and people.
- Pedestrian routes with avenue trees of indigenous species interspersed with hard landscaping, comprising of benches, street lighting and accessible curbs.





**Image no. 3-14: Sitting and interacting amenities in walking zones**

[Source: Murty & Manyam Architects and Engineers]

- **Parking provision**

Safe and convenient parking has been planned between the working areas and the basic amenities so that neither they are underutilized, nor only used by persons who have personal vehicles. Sustainable features such as permeable pavement, pedestrian network, landscaping, trees and applicable storm water drainage have been proposed in the parking areas.

- **Truck parking**

Planning for parking sites has been done based on hierarchy, purpose, safety accessibility and space standard (Refer Annex I: 3-3). To avoid truck parking on-street in a haphazard manner, parking should be provided at: a) park level (overnight stay), b) zone/cluster level (temporary stay), and c) plot level (loading/unloading). The hierarchy of parking is shown below:

- Centralised truck parking** • For long halt trucks
- Zone level truck Parking** • For trucks waiting to reach an individual plot within the zone
- Plot level truck parking** • For loading /unloading activity within the park

The parking requirement for long halt trucks has been worked out for every zone and added up for the central level facility, as shown below.

**Table no. 3-4: Parking provision for trucks**

S.No.	Location	Capacity (No. of trucks)	Area (m <sup>2</sup> )
1	P1 (Main truck parking)	70 (approx.)	4957
2	P2	8	1106
3	P3	11	2498
	<b>Total</b>		

Source: Estimated by GIZ- IGEP

Since there will be a lot of trucks for shorter and longer periods, it is likely that the oil spillage on the paving may happen which can be dangerous if mixed with the storm water runoff. For prevention of oil spillage, it is recommended that a plastic container should be placed underneath the engine to collect spilled engine oil. (Refer image no 3-15).



**Image no. 3-15 : Example of oil spill collection of trucks**

[Source: Buro Happold Engineering, Germany]

- **Employee parking**

For passenger cars and motorbikes, adequate parking areas has been provided for: a) parking close to individual plots (cars and two wheelers of employees), and b) at individual plots (temporary parking for visitors).

**Table no. 3-5: Parking provision for other vehicles**

S.No.	Location	Capacity		Area (m <sup>2</sup> )
		2 Wheeler (Motorized and non-motorized)	4 Wheeler	
1	Parking -A	52	53	1723
2	Parking -B	26	20	672
3	Parking -C	13	14	448
4	Parking -D	14	17	579
5	Parking -E	18	37	1204
6	Parking -F	43	29	1237
	Total	166	170	5863

Source: Map no.3-3

- **Bus Bays**

Along the collector road and close to the zonal facilities, bus bays are proposed to integrate mobility and infrastructure. As per the Indian Road Congress (IRC) Codes 86-1983,

- Bus bays should be located 75 m from the intersection on either side.
- Bus bays should be provided by recessing the curb to avoid conflict with moving traffic.
- The length of the recess should be 15 m for a single bus stop.
- The taper should be desirably 1:8 (in meters)
- The depth of the recess should be 4.5 m for single bus stop.
- A minimum 1.5m footpath should be ensured behind the bus bays.

With above considerations, the bus bays should be constructed.

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## ▪ Signage

The purpose of this guideline is to provide the site management with the tools necessary to help users find their way in and around the A-GRIP. The following types of signage have been envisaged:

- Directional signage along major roads, pedestrian ways, and bicycle ways;
- Building identification signage;
- Signage on landmarks, central facilities, zonal facilities etc.;
- Signage pertaining to names of industries;
- Information signage; and
- Advertisement boards/hoardings.

Above signages can be classified into the categories of mandatory and cautionary signages. These have been listed under annex 3-6 and 3-7 respectively.

Following parameters for signages are proposed to achieve a single thread and interconnected character in A-GRIP:

- Building identification signage includes the name of the building or tenant.
- Freestanding identification signage may include the building address and should be located near the street frontage and ground mounted in a landscape setting. (Refer image no. 3-16).
- Materials and colours used on the signage should be consistent and compatible with the Building Design.
- Signage should be integrated with road cross sections and landscaping features.
- A uniform system of colour, placing, and text should be followed to avoid confusion. Advertisement boards and hoardings should be located suitably, integrating with the landscaping.



**Image no 3-16.: Example of signage for building identification**

[Source: Murty & Manyam Architects and Engineers Ltd.]

- **Fire, Safety And Security**

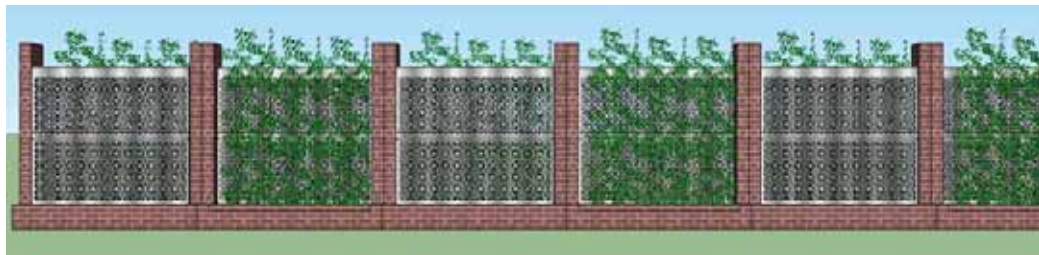
- **Security**

Security system in A-GRIP is proposed to address the safety for the property and personnel working in the park from theft, harassment, intrusion and unwanted vehicles and activities. A centralized security office is proposed at the main entrance of the A-GRIP.

- Dimensions of security cabin = 11.6 m X 3.85 m
- Area of security cabin at main entrance = 44.66 m<sup>2</sup>

- **Fencing**

The industrial park is proposed to have fencing all around. The fencing should be made of environmentally-friendly materials and should have an elegant design.(Refer image no. 3-17). Provisions have been made for a buffer zone (with varying width between 2-4 m) and a road along the periphery to provide easy access for fire protection and emergencies. The buffer zone is proposed to have dense and indigenous plantation. (Refer image no. 3-19)



**Image no.3-17: Green fencing designs**

[Source: Murty & Manyam Architects and Engineers Ltd.]

- **Cameras and emergency blue lights**

The A-GRIP has provisions for close circuit (CC) cameras placed at all strategic locations in the industrial park. All these CC cameras are connected to the central security office.

It has been proposed to install the emergency blue lights along the roads and at public spaces for safety of the employees. (Refer image no. 3-18). In situation of emergency, users can communicate directly with security centre by pressing the red button of these units.



**Image no.3-18: Emergency blue lights**

[Source: <http://www.southernct.edu>]

- **Fire station**

Provision has been made in the Site Master Plan for a fire station. 400 m<sup>2</sup> site has been proposed for the fire station. In addition, a disaster management centre should

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be provided on the first floor of the fire station to equip and manage the park in case of emergency/ disasters.

▪ **Utilities**

As per G.O. no. 33 of Government of Andhra Pradesh (issued prior to the State bifurcation), A-GRIP should have all the utilities lines below the ground but not under the main carriage way. Following utilities are proposed:

- Power transmission lines
- Water conveyance, treatment, adequate storage and distribution within the park.
- Telephone lines, telecommunications network.
- Each Zone of A-GRIP shall have Optical Fiber Connectivity (OFC) to provide efficient internet and broad band connectivity to the units.

In addition to the above, a power sub-station is also proposed with site area of 2500 m<sup>2</sup>.

**F. TECHNICAL INFRASTRUCTURE**

(Refer Annex II: map no. 3-4)

**1. LOGISTIC FACILITIES:**

▪ **Warehouses/Raw Material Depots**

Space for a warehouse has been provided in the Site Master Plan of the A-GRIP, which can be either run by an individual operator or owned by ALEAP and leased by individual industries. The proposed site area of warehouse is 2500 m<sup>2</sup>.

▪ **Maintenance centre**

For maintaining the upkeep of vehicles, 1 maintenance centre of 100 m<sup>2</sup> site area has been provided.

▪ **Weigh bridge/station**

To serve the industrial park, one weighing bridge is proposed with dimensions of 18 m x 3 m is proposed so that it can cater even the multi-axle vehicles.

**2. BUSINESS FACILITIES:**

▪ **Facility complex**

The complex facility, with site area of 3,440 m<sup>2</sup> (Ground + 2 floors), will have following facilities-

- Marketing
- Exhibition
- Research and development
- Auditorium
- Training centre to undertake training needs, including vocational training, entrepreneurship development, etc.
- Visitor's Information centre for providing the information on sustainable development and eco-friendly measures adopted in A-GRIP.



- Incubators for entrepreneurship promotion.

- **Business centre**

A Business Centre has been proposed to co-locate various business related functions like restaurant, bank, post office and courier services. (Area = 850 m<sup>2</sup> - Ground + 1 floors). The Business Centre is envisaged similar to the “One-Stop-Service Centre”, as provided in the APSEZ, Vishakhapatnam.(refer image 3-19).



**Image no. 3-19: Example of “One Stop Service Centre” at APSEZ Visakhapatnam**

### **3. BUILDING ARCHITECTURE**

- **Green Building**

Buildings should be oriented and designed to conserve non-renewable energy, reduce running costs of buildings with little or no additional building cost. Hence, it is proposed that, all the factory buildings as well as administrative buildings in the A-GRIP would be green factory buildings as per IGBC rating system.(Refer image no. 3-2).

The Indian Green Building Council (IGBC) Rating System (refer chapter 2, section – B) for Green Buildings take into consideration the following parameters:

- Sustainable sites;
- Water efficiency;
- Energy & atmosphere;
- Material & resources; and
- Indoor environmental quality.

The various levels of rating awarded are:

- ‘Certified’ to recognize best practices;

- 'Silver' to recognize outstanding performance;
- 'Gold' to recognize national excellence; and
- 'Platinum' to recognize global leadership.



**Image no. 3-20: Examples of Green Factory Buildings at Sri City, Tada, Andhra Pradesh**

- **Building design:**

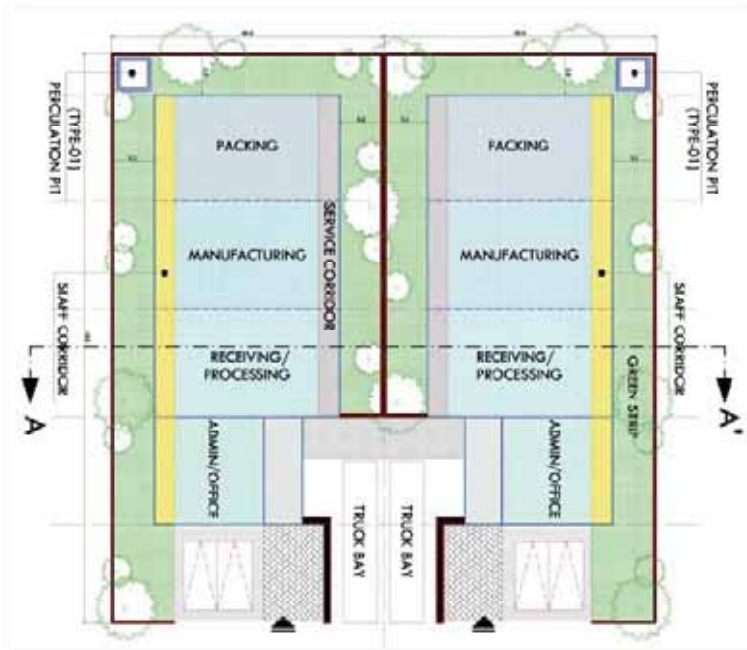
Based on the site analysis (section B), A-GRIP will have climatically suitable building envelope shape and/or orientation for tropical Wet-Dry climate to reduce operational energy use. This has been achieved by adhering to following parameters:

- » All apertures are designed for maximum sun and rain protection in order to minimize glare and allow the space to be used with open windows ensuring ventilation. This will reduce heat intake and reduce cooling needs while modulating natural lighting conditions.



**Image no. 3-20: Examples of Roof lights**  
[Source: Murty & Manyam Architects and Engineers Ltd.]

- » Solar passive features should be integrated into the building design such as shading of walls, windows, and roofs. (Refer image no. 3-20).
- » Windows and/or roof vents are to be provided at all levels within the building to ensure cross ventilation and heat purging.
- » Attempts have been made to standardize plot layout to achieve climate optimization inside the buildings in a passive way. (refer image no. 3-21)



**Image no. 3-21: Standard block layout and façade of Abutting plots**

[Source: Murty & Manyam Architects and Engineers]

- » Uniform building codes (plot layout, building exteriors, signage, colours etc.) should be followed as an urban design measure.

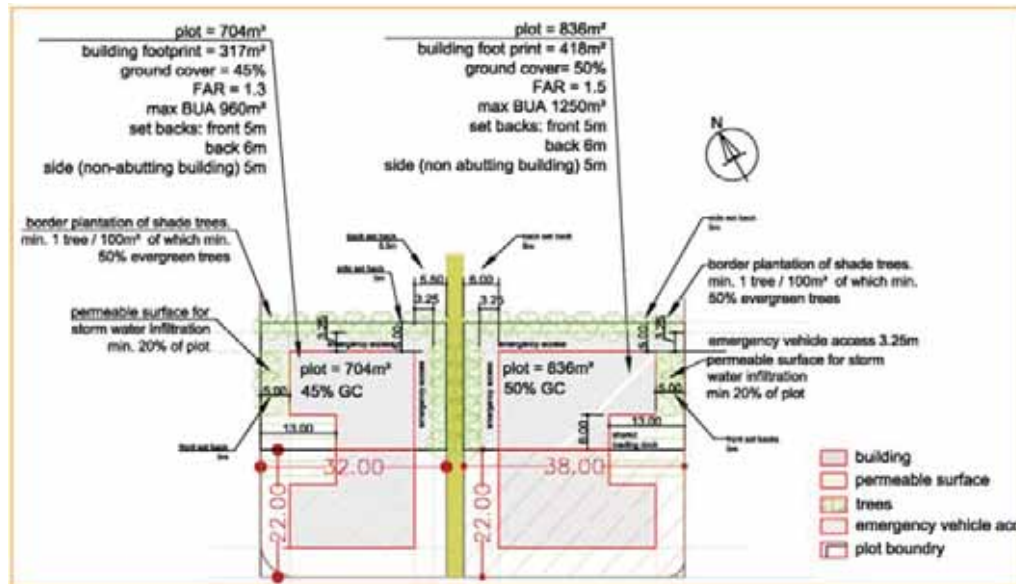


Image no. 3-22: Built vs open area in plot design

[Source: Auroville Consulting]

- » Peripheral tree plantation should be provided in the front, side and back of the plot with evergreen trees to shade the building and open areas, to prevent heat island effect, with a minimum of 1 tree per 100m<sup>2</sup>. (Refer image no. 3-22).
- » FAR and ground coverage will be as per applicable byelaws/regulations in the area.

- **Building materials:**

- » Local building materials that have minimum processing and pretreatment should be used.
- » “Green Building” and “Barrier Free Building” concepts should be followed.
- » Materials for buildings have been proposed to be selected based on -
  - Local availability and accessibility
  - Ease of assembly
  - Low operational energy needs
  - Suitability for the project function

- **Roof form and Orientation**

- » Glazing on east and west façades should be avoided or minimized with the exception of street facing façades which shall be appropriately shaded or treated to avoid solar glare.
- » External shading devices (overhangs, awnings, shutters, and directional louvers) are encouraged for all north, south, west and east facing openings.
- » Internal lighting should be achieved primarily through natural daylight using light shelves to provide glare free, indirect lighting, as the local sunlight tends to be harsh. Also, allowing direct penetration of sunlight into the buildings results in the heating of internal spaces.

- » Provision of 'Green' roofs, combined with photo voltaic cells, has been proposed for all industrial buildings as well as common facility buildings. The roof top will therefore become a source of renewable energy and at the same time will provide shade to the roof to minimize heating, thereby reducing cooling loads. (Refer images no. 3-13)

- **Renewable Energy/Energy Efficiency Provisions**

Following measures have been taken to use the renewable energy:

- Industrial park level measures:
  - » All buildings in the A-GRIP have to be energy efficient as per the Energy Conservation Building Code (ECBC). Process loads for industrial buildings are excluded.
  - » Solar street lighting installations with individual battery backup are proposed. This practice can be altered by setting up pocket grid tied SPV systems or centralized grid tied SPV systems that are designed to only generate the equivalent amount of electricity the street lights draw from the grid in order to reduce system maintenance.
  - » All common spaces, including street lights (where there is no use of light for reading purposes), shall use "LED.(Refer image no. 3-23)
  - » 100% of internal & external lighting fixtures should be BEE star rated, wherever applicable. The usage of incandescent lamps is not allowed.
  - » At least 25% of the installed external lighting load should be solar powered.



**Image no. 3-23: Example of Solar powered LED Street lights**

[Source: <http://www.truelite.us/solar-street-lights/>]

- To save energy at night, it is recommended that shielded lights (refer image no 3-24), are provided. This will save energy, monetary expenses as well as night sky pollution. Such a provision can minimize glare and make driving easier on the eyes at night.



**Image no. 3-24: Example of proposed shielded flood lights**

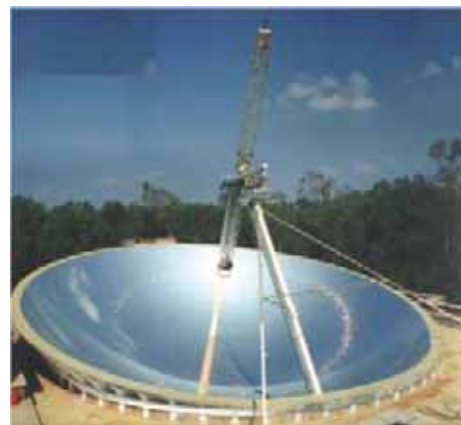
[Source: <http://www.skyandtelescope.com/astronomy-resources/your-home-lighting-guide/>]

- » To save energy and promote a sense of collective approach towards renewable energy, it is recommended that solar power should be used for the cooking purposes at central canteen at the common canteen for workers. (refer image no 3-25, 3-26)



**Image no. 3-25: Example of renewable energy application for steam generation at Akshar Dham temple, new Delhi for community cooking**

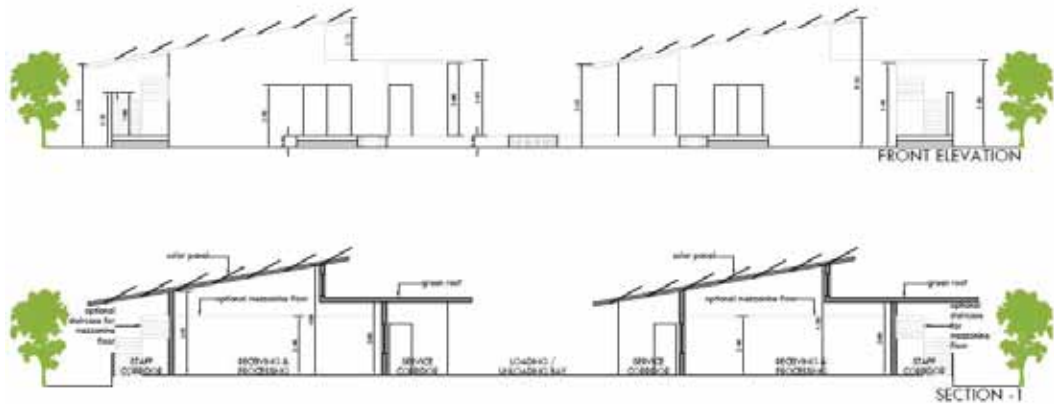
[Source: Presentation on "ARUN® Solar Thermal System & its applications", by Clique Solar in the International Conference]



**Image no.3-26: Solar Bowl at the solar kitchen- Community kitchen at Auroville**

[Source: [http://www.aurore.in/the%20power%20of%20human%20unity%20june\\_2004.pdf](http://www.aurore.in/the%20power%20of%20human%20unity%20june_2004.pdf)]

- Building level measures:
  - » Use solar thermal and solar PV energy on roof tops, combined with roof shading to reduce cooling needs .( Refer image no. 3-27)



**Image no. 3-27: Installations for use of solar energy in industrial buildings**  
 [Source: Murty & Manyam Architects and Engineers]

## G. ENVIRONMENTAL INFRASTRUCTURE

### ▪ Storm Water Management

The storm water management system provided for A-GRIP includes:

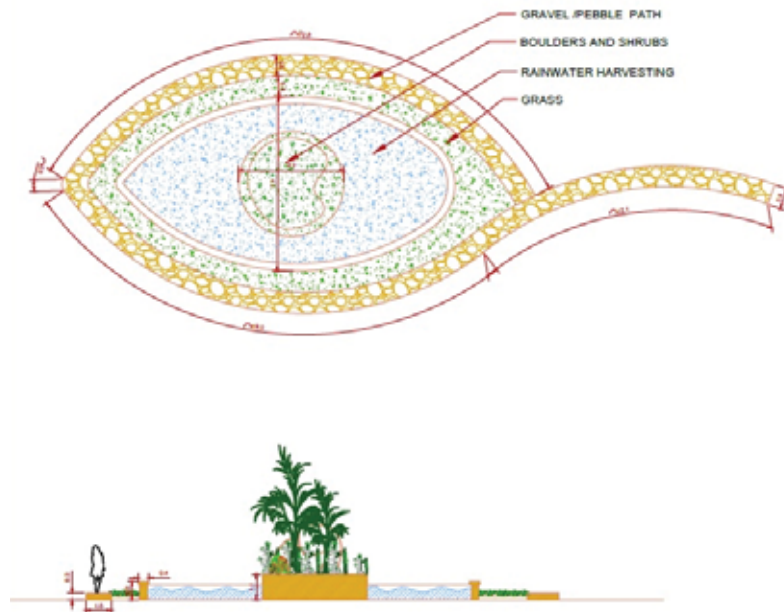
- The slopes/contours of the industrial park have been assessed and accordingly storm water drains should be provided along the roads accordingly. (Refer Annex II: map no. 3-10).
- All the pond locations in A-GRIP have has been integrated into the green areas to co-create storm water management and recreational zones, which can be visually attractive, cost effective, as well as socially functional. (Refer image no. 3-28).



**Image no. 3-28: Detail design of 'Green spine' at A-GRIP**

[Source: Murty & Manyam Architects and Engineers]

- The storm water collected from each zone will be collected in rain water harvesting pits in the central green spine, tested and treated if required, and then sent for recycle/reuse.(Refer image no. 3-29). The storm water collection would be on the basis of 1 hr peak rainfall with 85% coefficient of runoff. (Refer to Rain water harvesting and conservation manual. Central public works department, New Delhi).



**Image no.3-29: Rain water harvesting pond details**

[Source: Murty & Manyam Architects and Engineers]

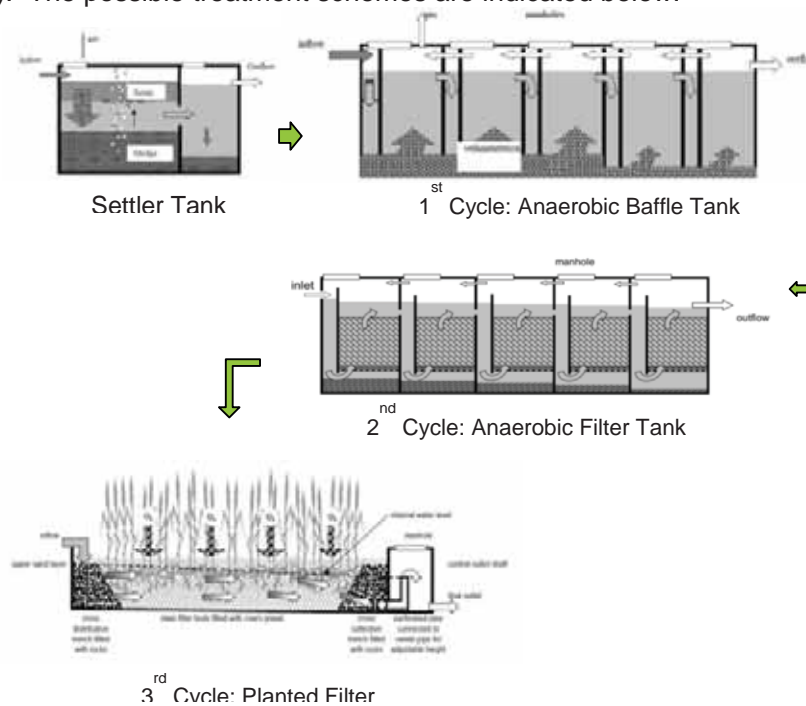
- The services for storm water management will be taken up through appropriate business cases (e.g. PPP).
- Individual industries should be required to recycle/reuse storm water collected from their premises, after treatment.



▪ **Wastewater management**

The Site Master Plan has the following provisions for waste water management:

- The legal provisions under environmental laws -such as the Water (Prevention and Control of Pollution) Act 1974, Air (Prevention and Control of Pollution) Act 1981, Environmental (Protection) Act 1986, etc.- should be strictly adhered to while planning, designing, establishing, and operating the wastewater treatment plants.
- Provisions for wastewater conveyance system in accordance with slopes and zoning of industries.
- A-GRIP will house only non-polluting industries. The wastewater quality will be of an easily biodegradable nature with COD: BOD<sup>43</sup> ratio of less than 2.
- Provision of the Decentralized Effluent Treatment Plant or Plants (DEWATS) at the lowest elevation area to allow for maximum gravity flow and to also avoid electrical energy for pumping during treatment. (Refer image no. 3-30 and 3-31). Treated effluent should be supplied for secondary use as much as possible by a gravity flow system to re-use the recuperated water for horticulture and orchards.
- Ban on all toxic effluents (such as biocides, carcinogenic substances, heavy metals, any tenacious and non-degradable synthetic substances and mineral oil products) from the sewer system.
- One decentralized wastewater treatment plants of 5,000 m<sup>2</sup> has been planned for the site. It has been aligned with the slopes/contours of the site. (Refer Annex II: map 3-5). The possible treatment schemes are indicated below.



**Image no. 3-30: Decentralized wastewater treatment system with root zone treatment**

[Source: Auroville Centre for Scientific Research]

<sup>43</sup> COD stands for Chemical Oxygen Demand, BOD stands for Biochemical Oxygen Demand

The treated water (after complying with the required standards) shall be recycled/reused. For this purpose, any additional requirements for tertiary treatment, depending on the reuse requirements, should also be incorporated. For recycling purposes, online monitoring systems for pollution parameters should be installed before and after the treatment of wastewater. Also, for irrigation systems, the required infrastructure, including conveyance systems, sprinklers, etc., should be installed.



Image no. 3-31: Decentralized treatment system with Schauberger vortices

#### ▪ Solid Waste Management

A-GRIP has provisions for solid waste management including:

- Collection, transportation, storage, and disposal of wastes (Recycling Centre).
- Provisions for a handmade paper unit and provisions for dust bins in the public areas are part of this scheme. (Refer image no. 3-32 )
- For solid waste management, a site of 300 m<sup>2</sup> has been earmarked. In this area, facilities such as a vermicomposting plant for recycling compostable organic wastes, a handmade paper plant for recycling of waste paper, etc. would be encouraged through micro enterprises, which will help convert wastes to products as well as provide employment and means of income generation. (Refer image no. 33)
- Provisions have been made in the road cross sections for roadside dustbins.
- Wastes shall be collected separately depending on the types of wastes, including hazardous wastes (Refer Hazardous Wastes (Handling and Management Rules), municipal solid wastes (Refer Municipal Solid Waste Management Rules), plastic wastes (Refer Plastic Wastes Management & Handling Rules), e-wastes (Refer e-Wastes Management and Handling Rules) etc.
- Based on viable business models, service delivery models should be set up for waste management.



**Image no. 3-32: Example of Handmade paper unit at ALEAP Industrial Park, Gajularamaram**

[Source: GIZ- IGEP ]



**Image no. 3-33: Example of vermi-compost plant at ALEAP Industrial Park, Gajularamaram**

[Source: GIZ- IGEP ]

#### ■ Green/Open Spaces/Landscapes

The green spaces in the Industrial Park have the following main functions:

- Micro-climatic control (temperature, heat, etc.).
- Aesthetics and leisure space.
- Pollutant absorption.
- Serve as walking trails
- Serve as buffer to the industrial activity and road transportation.

Key features of the green/open spaces/landscapes in the industrial park:

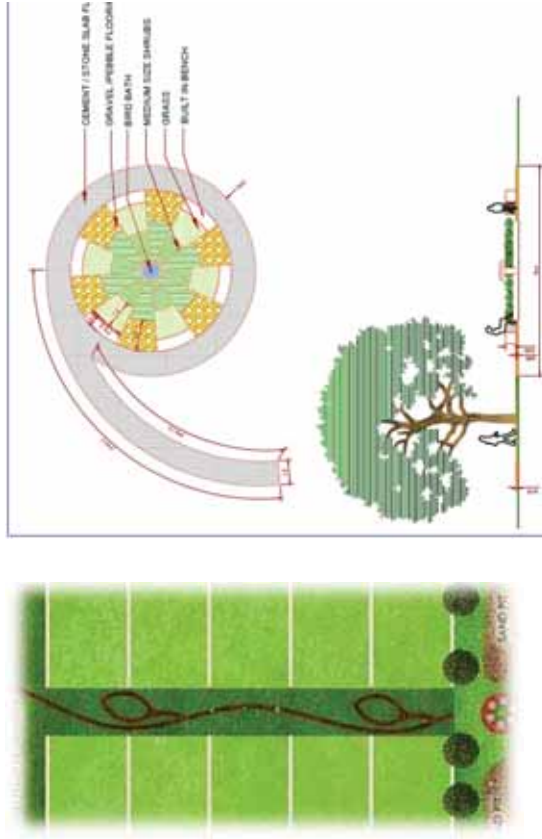
- Hierarchy of green spaces has been proposed in A-GRIP. Provision of prominent green spine and landscaped areas with hierarchy:
  - Central green – lung space for the industrial park (refer image no. 3-34)
  - Green belts at the periphery to act as a buffer
  - Vertical and horizontal stretches of greens spreading across the industrial park in the form of avenue plantations and green pathways

- 
- Greens at the plot level
    - Parallel green pathways between the plots are planned to serve as eco-friendly walk ways.
    - Avenue plantations have been proposed along the major roads to give shade to vehicles, reduce pollution, and provide beautiful streetscapes to onlookers.
    - Landscaping at the entry/exit points and at central zones; provisions for interconnected landscapes with network of primary and secondary greens to provide visual and functional continuity, functions of beautification, buffer, micro-climate control, promotion of existing habitat, etc.;
    - Green areas are proposed to be interspersed with sitting spaces which are shaded and accessible. (Refer image no. 35)
    - Landmarks with signature architecture have been proposed at the central green.



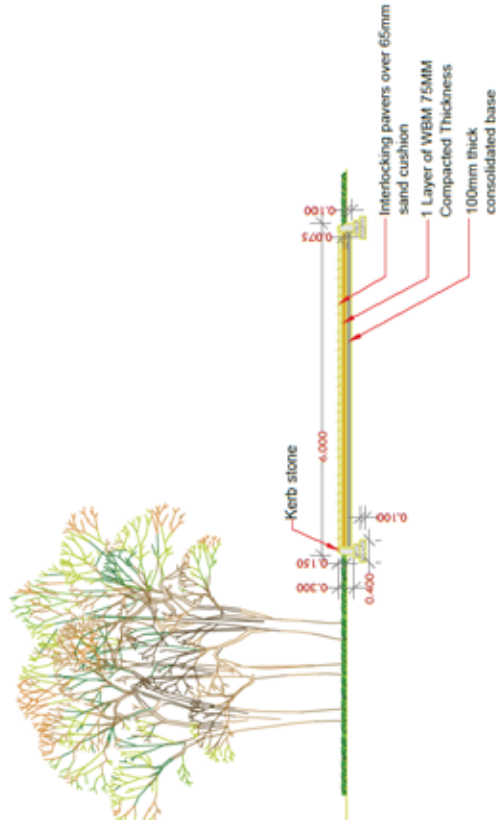
**Image no. 3-34: Detail design of 'Green Spine' at A-GRIP**

[Source: Murty and Manyam Architects and Engineers]



**Image no. 3-35: Detail design of 'Green Pathway' at A-GRIP**

[Source: Murty and Manyam Architects and Engineers]



- » Types of plants that should be considered for landscaping in A-GRIP are:
- Native plant species that make a positive contribution to biodiversity conservation, particularly with reference to pollinators. Increase awareness of tenants to the benefits of biodiversity, instilling in them sensitivity towards the conservation of biodiversity.
  - Aquatic plants, fishes, and water edge vegetation are proposed to be grown in rainwater harvesting ponds for effective mosquito control and balance of nutrients in the water.
  - Drought tolerant species that will reduce the use of water resources should be used.
  - Plants that have commercial potential in the preparation of herbal products.
  - Pest tolerant species that do not require toxic chemicals. The maintenance program must have a clear reference to pest control and plant feeding through organic principles. Use of standard plant species could lead to pest problems in the future and might require toxic chemicals to control them, which must be avoided.
  - Pollution resistant species as well as species that help in pollutant absorption should be used. (Refer Publication of the Central Pollution Control Board on 'Guidelines for Development of Green Belts'<sup>44</sup>).

▪ **Resource Efficiency**

A-GRIP has provisions for resource efficiency, including:

- Provisions for rainwater harvesting, recycle/reuse of water (Refer to the section on storm water);
- Provisions for recycle/reuse of treated wastewater (Refer to the section on wastewater);
- Provisions of renewable energy (Refer to the section on energy);
- Provisions for green factory building. (Refer to the section on energy);

▪ **Environmental Monitoring**

A comprehensive environmental monitoring data management system is proposed to be commissioned so that it provides a central unified dashboard for managing all data. Publishing of the results of the monitoring system would reflect the transparency and active initiative towards ethos of green development by ALEAP.

A-GRIP has provisions for 02 environment monitoring stations. It is proposed that the data will be displayed inside the industrial park as well as at the entry/exit points. Also, the data will be accessible via internet. (Refer image no. 3-36).

<sup>44</sup>[http://www.cpcb.nic.in/upload/Publications/Publication\\_513\\_GuidelinesForDevelopingGreenbelts.pdf](http://www.cpcb.nic.in/upload/Publications/Publication_513_GuidelinesForDevelopingGreenbelts.pdf)



**Image no. 3-36: Example of online monitoring and display systems at Map Ta Put Industrial Estate in Thailand**

## **H. SOCIAL & FUNCTIONAL INFRASTRUCTURE**

Provision of amenities for public spaces within an industrial park is dependent on the size of the industrial park i.e., land area and population, location of the Industrial Park and the type of industries.

The social infrastructure in the industrial park will cater to the industrial park as well as to the surrounding settlements area. (Refer Annex II: map. No. 3-6) .It is detailed below:

### **▪ Education and training:**

- Provisions have been made for incubators, training facilities, product testing facilities, environmental monitoring facilities, etc.

### **▪ Gender specific:**

- To cater to women employees, provisions for public toilets and dormitories have been made.
- Provisions for strengthening safety and security have been made like street lighting all all roads and on the side and rear boundaries, emergency blue lights along the roads connected to the main security control system, fencing around the park, regulated entry/ exits etc.
- Special provisions have been made for crèche rest rooms for extended work, health centre, canteens/food outlets, kiosks, water dispensers, guest house, ladies room etc.
- For gender friendly mobility, internal shuttle service (battery operated), external connection to public transport are proposed.

### **▪ Health care:**

- A health centre has been proposed to support the workers of A-GRIP.

### **▪ Food services:**

- Food services are planned to provide for beverages, refreshments, snacks, fast food, take away etc. These include:
  - Food kiosks (with pavement seating) at cluster level providing hot and cold beverages, snacks for quick breaks
  - Canteens that provide subsidized meals

- Restaurants / cafeterias attached to the convention centre, recreational facilities, guest houses and dormitories
- Shaded interaction areas with tables and benches located close to the food kiosks

Area proposed for food facilities:

**Table no. 3-15: Provision for canteens**

S.No.	Location	Area (m <sup>2</sup> )
1	Canteen	3750
2	Restaurant (as part of an integrated complex )	850

Source: Annex . II : Map no. 3-6

▪ **Worker specific:**

- A-GRIP has a Guest House for visitors and service engineers etc., and dormitories for workers.



**Image no. 3-40: Example of Guest House at Brandix India Apparel City, Vizag, Andhra Pradesh**



**Image no. 3-41: Example of Food Court at Brandix India Apparel City, Vizag, Andhra Pradesh**

- Special arrangements have been made for truck drivers for their stay, repair of trucks, food and sanitation.
- For the benefit of workers and employees, provisions have been made for parking of vehicles, internal and external transport.
- Provisions have been made for drinking water, ATMs, super market, medical facilities, a dispensary/health centre, a post office, an internet centre, toilets, shops for convenience goods, crèche, and accommodation for late working shifts.
- Provisions for tea shops, small restaurants, and kiosks with sitting spaces have been made.
- For safety & security of employees, provisions for CC cameras, fencing, a security office and security cabins have been made.
- A dormitory has been proposed at the central facility area for truck drivers. The dormitory will have beds and attached toilets, cooking facilities, and a shop catering to daily needs.



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- **Public Toilets**

- All the plots with the industrial units should provide toilets and rest rooms for their employees and vendors.
- At an overall site level, provision of toilets is essential to meet the needs of visitors. Hence, at six locations public toilets are proposed.



**Image no. 3-42: Example of a Public Toilet**

[Source: Illustrated in 'Climate Change adaptation plan for Industrial estates of Gujarat' by CEPT University, Ahmedabad]

- **Recreational and socio-cultural infrastructure:**

Provisions have been made in public spaces for the benefit of employees/workers. These include sports fields, an amphitheater/auditorium, landmark area, green/landscaped area, etc.

- **Art in industrial park**

One landmark building should be created as a unique symbol of harmony, efficiency, and sustainability within the A-GRIP. It can be a building or a sculpture. It should represent philosophy behind a Green Industrial Park. This shall create a unique identity of the industrial park. As an economic leverage, such a landmark could also enhance the scope of educational tourism to the industrial park.

## CHAPTER 04

# INFRASTRUCTURE PROVISIONS AND QUALITY BENCHMARKS

### A. HIGHLIGHTS OF THE SITE MASTER PLAN OF A-GRIP

- Overview of the site master plan<sup>45</sup>

<b>Total area of the site</b>	» 82.55 acres
<b>Expected number of enterprises</b>	» About 170
<b>Expected number of service related entrepreneurs catering to A-GRIP</b>	» About 24
<b>Project cost</b>	» Approx. INR 37.75 cr <sup>46</sup> ≈ 6 million \$ (including land cost, infrastructure and services; excluding factory buildings cost)
<b>Expected employment generation</b>	» 12,000 (direct employment)
<b>Targeted investments</b>	» INR 300 cr ≈ 48 million \$
<b>Site master plan inputs by</b>	» Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH » Auroville Consulting » Buro Happold Engineering, Germany » German Sustainable Building Council (DGNB), Germany
<b>Site Master Plan finalization by</b>	» ALEAP » Murthy and Manyam Architects and Engineers Ltd.

- Scale of the site master plan

The site master plan has been drawn in Auto Cad in metric system. Hence, the plan can be digitally printed in all scales required for submissions to local authorities for approvals:

<sup>45</sup> Details as provide by ALEAP management

<sup>46</sup> Cr stands for Crore. A Crore is a unit in the south Asian numbering system equal to ten million.

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Revised master plan has been provided in 1:2500 scale [Refer to Table no. 7.6: Comparison of scale of maps, Urban and regional development plan formulation and implementation guidelines, 2014, Ministry of Urban Development, India]

▪ **Land use as per site master plan**

The land at the site has been used optimally and efficiently. All the land uses have been located so as to avoid land use conflicts, to the best extent possible. The industrial park has been planned keeping in mind the norms and standards as discussed in Chapter 2 & 3. (Refer Annex II: map no. 3-1). Details of land use are given in table no. 4.1.

▪ **Industrial Plots in Site Master Plan**

A diversity of plots ranging from 518 m<sup>2</sup> (620 sq yd) to 836 m<sup>2</sup> (1000 sq yd) along with bigger odd size plots have been provided in the site master plan which will for flexibility. This has made the A-GRIP inclusive for all level of entrepreneurs. For details, refer to Chapter 3.

▪ **Industrial zoning as per site master plan**

The division of industrial zones in A-GRIP has been done to cluster similar industries together and provide for their common infrastructure. There are 10 zones which have been located considering compatibility within the industrial park as well as with the surroundings. The zones are listed below:

- » Herbal products
- » Paper and packaging
- » General engineering
- » Pharmaceutical units
- » Garments
- » Food processing
- » Plastic products
- » Solar products
- » Electronics
- » Warehousing

Details of the land use distribution of A-GRIP are as below:

**Table No. 4-1: Land use distribution in A-GRIP**

S.No.	Land Use	Standard	Area (m <sup>2</sup> )	Percentage
1	Industrial	55%-60%	173377	51.89%
2	Commercial	2%-3%	3504	1.05%
2	Recreational Buffer zones Parks , Sports field, Green Pathways	10%-12%	14597 23938	11.53%
3	Facilities Common facilities: Fire station/ Fire post, Police Station / Police post, Hospital / Dispensary, Day Care Centre etc. Services: Electric sub-station, STP, Pumping station, Underground reservoir / Firefighting tanks and other utilities etc.	8-10%	18732 26891	13.65%
4	Transportation Circulation, Loading/unloading area, Parking, Truck Parking, Goods vehicle parking etc.	18-20%	73055	21.88%
<b>TOTAL AREA</b>			<b>334094</b>	<b>100%</b>

Note: \*Refer to Chapter no. 2.

## B. BASIC INFRASTRUCTURE PROVIDED

S.No.	Parameter	Provision
1.	<b>Road network</b>	<ul style="list-style-type: none"> <li>» Hierarchy of roads proposed-               <ul style="list-style-type: none"> <li>- Level 1: 24 m R-O-W<sup>47</sup> (2+2 lanes, median, sidewalk, cycle track and underground utilities)</li> <li>- Level 2: 18 m R-O-W (2+2 lanes, median, sidewalk, cycle track, avenue plantation and underground utilities)</li> <li>- Level 2: 12 m R-O-W (1+1 lanes, sidewalk and underground utilities)</li> </ul> </li> </ul>
2.	<b>Entry/Exit Provisions</b>	<ul style="list-style-type: none"> <li>» Main entry gate A-GRIP proposed with signature architecture to reflect the unique identity of the Green Industrial Park</li> <li>» Additional facilities-               <ul style="list-style-type: none"> <li>- Security centre</li> <li>- Map of A-GRIP</li> <li>- Bus parking for external transport</li> <li>- Bus parking for internal transport</li> <li>- Truck/ car parking facilities</li> <li>- Space in front of gate for landscaping</li> <li>- An information centre</li> <li>- Public toilets</li> <li>- A drinking water facility</li> </ul> </li> </ul>
3.	<b>Mobility - Eco Efficient Transportation</b>	<ul style="list-style-type: none"> <li>» Provisions for external linkages -               <ul style="list-style-type: none"> <li>- Bus stop and pedestrian access points near the main entrance of the park</li> <li>- Recommendations for strengthening the surrounding bicycle and pedestrian network</li> <li>- Eco-friendly public transportation such as battery operated /CNG vehicles from A-GRIP to the nearby settlements, railway station, bus station, etc.</li> </ul> </li> <li>» Provisions for internal mobility-               <ul style="list-style-type: none"> <li>- Battery operated / CNG vehicles for internal transport</li> <li>- Provisions for bus stops/shelters throughout the park</li> </ul> </li> </ul>

<sup>47</sup> R-O-W stands for Right of way of the road between two property lines

		<ul style="list-style-type: none"> <li>- Dedicated bicycle tracks and pedestrian paths along the roads</li> <li>- Adequate parking facilities for all vehicles at the entry/exit points and within the industrial zones</li> </ul>
4.	<b>Bicycles Ways</b>	» Provisions for bicycle tracks and parking facilities to encourage bicycling to work
5.	<b>Pedestrian Network</b>	» Extensive pedestrian network consisting of sidewalks along roads and pathways in the green corridors proposed to create a network of safe and convenient pedestrian movement
6.	<b>Parking at A-GRIP at Nandigama</b>	<p>» Parking proposed at: park level (overnight stay), zone/cluster level (temporary stay), and plot level (loading/unloading) Refer to Chapter 3 for details</p> <p>» Parking provisions include:</p> <ul style="list-style-type: none"> <li>- Centralized truck parking</li> <li>- Zone level parking facilities for buses, four wheelers, three wheelers and non-motorized vehicles</li> </ul>
7.	<b>Signage</b>	<p>» Recommended system of signages-</p> <ul style="list-style-type: none"> <li>- Directional signage along major roads, pedestrian ways and bicycle ways</li> <li>- Signage on landmarks, central facilities, zonal facilities etc.</li> <li>- Uniform signages pertaining to names of industries</li> <li>- Information signages</li> <li>- Advertisement boards/hoardings</li> </ul>
8.	<b>Security</b>	<p>» Proposed security measures -</p> <ul style="list-style-type: none"> <li>- Centralized security operations communications center at the main entrance</li> <li>- Close circuit (CCTV) cameras at strategic locations in the industrial park</li> <li>- Emergency blue light phones along the roads</li> </ul>
9.	<b>Fencing</b>	» Elegantly designed fencing all around the industrial park built with environment-friendly materials

12.	<b>Fire and Disaster Management</b>	<ul style="list-style-type: none"> <li>» Proposed fire safety measures at the industrial park level- <ul style="list-style-type: none"> <li>- Provision for a fire station</li> <li>- Disaster management centre at the first floor of the fire station to manage the park in case of emergency/ disasters</li> </ul> </li> </ul>
13.	<b>Utilities</b>	<ul style="list-style-type: none"> <li>» Provisions for utilities in A-GRIP- <ul style="list-style-type: none"> <li>- Power transmission lines and a sub-station</li> <li>- Water conveyance, treatment, adequate storage and distribution within the park</li> <li>- Telephone lines</li> </ul> </li> </ul>

### C. TECHNICAL INFRASTRUCTURE PROVIDED

S.No.	Parameter	Provision
1.	<b>Warehouses/Raw Material Depots</b>	<ul style="list-style-type: none"> <li>» A warehouse proposed (Site area = 2500 m<sup>2</sup>)</li> </ul>
2.	<b>Business centre (One stop service centre)</b>	<ul style="list-style-type: none"> <li>» A Business centre with various related functions like restaurant, bank, post office and courier services (Site area = 850 m<sup>2</sup> -Ground + 1 floors)</li> </ul>
3.	<b>Facility complex</b>	<ul style="list-style-type: none"> <li>» A facility complex proposed with facilities like information centre, marketing, exhibition, research and development, auditorium, training centre, incubators for entrepreneurship promotion etc. (Site area = 3440 m<sup>2</sup> - Ground + 2 floors)</li> </ul>
4.	<b>Administrative Building</b>	<ul style="list-style-type: none"> <li>» Provision for an administrative unit office within the facility complex for management A-GRIP</li> </ul>
5.	<b>Green Factory Buildings</b>	<ul style="list-style-type: none"> <li>» Recommendations given for industries to follow IGBC norms</li> <li>» Climate responsive design of buildings recommended</li> </ul>
6.	<b>Renewable Energy/Energy Efficiency Provisions</b>	<ul style="list-style-type: none"> <li>» Proposed energy efficiency measures – <ul style="list-style-type: none"> <li>- Energy Conservation Building Code recommended for all buildings. (Process loads for industrial buildings excluded)</li> <li>- All industrial buildings with roof top photo voltaic panel installations</li> <li>- 100% of internal and external lighting fixtures to be BEE star rated, wherever applicable</li> </ul> </li> </ul>

		<ul style="list-style-type: none"> <li>- Use of 'LED' in all common spaces whereas use of incandescent lamps not allowed</li> <li>- Installation of shielded lights to save energy and night sky pollution</li> <li>- Use of solar energy for cooking purposes at central canteen</li> </ul>
7.	<b>Utilities</b>	<ul style="list-style-type: none"> <li>» Proposed utilities – <ul style="list-style-type: none"> <li>- Underground utility lines</li> <li>- Electricity sub-station (Site area = 2500 m<sup>2</sup>)</li> <li>-</li> </ul> </li> </ul>
8.	<b>Maintenance centre</b>	<ul style="list-style-type: none"> <li>» A maintenance centre proposed for maintaining the upkeep of vehicles (Site area = 100 m<sup>2</sup>)</li> </ul>
9.	<b>Weigh Stations</b>	<ul style="list-style-type: none"> <li>» A weigh station proposed as part of logistic infrastructure</li> </ul>

#### D. ENVIRONMENTAL INFRASTRUCTURE PROVIDED

S.No.	Parameter	Provision
1.	<b>Storm Water Management</b>	<ul style="list-style-type: none"> <li>» Layout design as per topography so that the storm water drains follow the natural drainage system</li> <li>» Decentralized storm water management system proposed for cost effectiveness</li> <li>» Collection and treatment of run-off of first rains at 1 hour peak rainfall to avoid any contamination risks</li> <li>» Pooling of water and integration into green landscapes</li> <li>» Recycle/reuse provisions for industrial, horticulture etc.</li> </ul>
2.	<b>Wastewater Management</b>	<ul style="list-style-type: none"> <li>» Provisions for wastewater conveyance system in accordance with slopes and zoning of industries</li> <li>» Provisions for Decentralized waste water treatment system (Site area = 5000 m<sup>2</sup>)</li> </ul>
3.	<b>Solid Waste Management</b>	<ul style="list-style-type: none"> <li>» Provisions for collection, transportation, storage, and disposal of wastes</li> <li>» Elegantly designed dustbins in public places</li> <li>» Recycling centre for e-waste, vermi-compost plant, and handmade paper plant etc. (Site area = 300 m<sup>2</sup>)</li> </ul>
4.	<b>Green/Open Spaces/</b>	<ul style="list-style-type: none"> <li>» Central green spine designed as a lung space of the industrial park</li> </ul>



	<b>Landscapes</b>	<ul style="list-style-type: none"> <li>» Green belts at the periphery to act as a buffer for the surroundings</li> <li>» Vertical and horizontal stretches of greens spreading across A-GRIP in the form of avenue plantations and green pathways</li> <li>» Greens at the plot level</li> </ul>
<b>5.</b>	<b>Resource Efficiency</b>	<ul style="list-style-type: none"> <li>» Provisions for rainwater harvesting</li> <li>» Provisions for recycle/reuse of treated wastewater</li> <li>» Provisions of renewable energy</li> <li>» Recommendations for green factory buildings and climate responsive building design</li> </ul>
<b>6.</b>	<b>Environmental monitoring</b>	<ul style="list-style-type: none"> <li>» 20 environment monitoring stations</li> <li>» Data display inside the industrial park as well as at the entry/exit points</li> <li>» Data display via internet</li> </ul>

## **E. SOCIAL INFRASTRUCTURE PROVIDED**

<b>S.No.</b>	<b>Parameter</b>	<b>Provision</b>
<b>1.</b>	<b>Food and beverages</b>	<ul style="list-style-type: none"> <li>» Canteen (3750 m<sup>2</sup> , Ground floor+ 2)</li> <li>» 14 Kiosks, tea/coffee shops (13.5 m<sup>2</sup> each)</li> <li>» Restaurant within business centre</li> </ul>
<b>2.</b>	<b>Education and training</b>	<ul style="list-style-type: none"> <li>» Training centre within facility complex</li> </ul>
<b>3.</b>	<b>Entrepreneurship development</b>	<ul style="list-style-type: none"> <li>» Incubators within facility complex</li> <li>» Accommodation/dormitory</li> </ul>
<b>4.</b>	<b>Recreational facilities</b>	<ul style="list-style-type: none"> <li>» 3 outdoor courts for basketball and outdoor tennis</li> <li>» Landmark and its precincts</li> <li>» Green/landscaped areas</li> </ul>
<b>5.</b>	<b>Guest House</b>	<ul style="list-style-type: none"> <li>» Guest House for visitors and service engineers etc. (1,850 m<sup>2</sup> , Ground floor+1)</li> </ul>

6.	<b>Special arrangements for truck drivers</b>	<ul style="list-style-type: none"> <li>» Dormitories for overnight stay</li> </ul>
7.	<b>Transportation/ mobility arrangements</b>	<ul style="list-style-type: none"> <li>» Parking facilities for vehicles</li> <li>» Eco-friendly internal public transport</li> <li>» External transport to bus terminus, railway station, etc.</li> <li>» Bicycle tracks and parking areas</li> <li>» Pedestrian pathways along roads, green pathways through plotted area</li> </ul>
8.	<b>Safety &amp; security</b>	<ul style="list-style-type: none"> <li>» Fire station ( Site area= 400 m<sup>2</sup>)</li> <li>» Provisions for CCTV<sup>48</sup> cameras</li> <li>» Fencing along the boundary</li> <li>» Security office and security cabins</li> <li>» Emergency blue phones along roads</li> <li>» Well- lit public spaces, roads, emergency access / exits and rear / side boundaries of the industrial plots</li> </ul>
9.	<b>Gender aspects: provisions for women employees</b>	<ul style="list-style-type: none"> <li>» Crèche for children of the employees</li> <li>» Guest house accommodation</li> <li>» Provisions for strengthening of safety and security</li> <li>» Provisions for internal and external transportation</li> <li>» Provisions for health centre, canteens/ food outlets, kiosks, toilets, battery operated shuttle service</li> </ul>
10.	<b>Other provisions</b>	<ul style="list-style-type: none"> <li>» A health centre within facility complex</li> <li>» Super market and ATM ( Site area= 200 m<sup>2</sup>)</li> <li>» 7 Public toilets ( 15 m<sup>2</sup> each)</li> <li>» Water dispensers at public places</li> </ul>

## **F. GREEN RATING OF A-GRIP AT NANDIGAMA**

### **1. Technical Quality**

<sup>48</sup> CCTV stands for Closed-circuit television

S.No.	Parameter	Provisions
1.	<b>Renewable energy and efficiency</b>	<ul style="list-style-type: none"> <li>» Solar energy street lamps</li> <li>» Solar panels (PVs) on roof tops of factory buildings (Green Factory Buildings) and insulated rooftops</li> <li>» Solar energy generation in public/common areas</li> </ul>
2.	<b>Quality of transport systems</b>	<ul style="list-style-type: none"> <li>» Circulation system with hierarchy of roads</li> <li>» Entry and exit gates with access control</li> <li>» Internal and external transportation systems</li> <li>» Adequate parking facilities at entry/exist, centralized parking, zone level parking, plot level parking</li> </ul>
3.	<b>Quality of motorized private transport infrastructure</b>	<ul style="list-style-type: none"> <li>» Recommendations for encouraging carpooling</li> <li>» Battery operated shuttle service from entry gates to facilitate public transit within the industrial park.</li> </ul>
4.	<b>Quality of public transport infrastructure</b>	<ul style="list-style-type: none"> <li>» Eco-friendly internal transport with battery operated vehicles</li> <li>» External transport – CNG<sup>49</sup> buses/ battery operated vehicles</li> </ul>
5.	<b>Quality of bicycle infrastructure</b>	<ul style="list-style-type: none"> <li>» Bicycle tracks and parking</li> <li>» Encouragement for bicycling to work</li> </ul>
6.	<b>Quality of pedestrian infrastructure</b>	<ul style="list-style-type: none"> <li>» Extensive safe pedestrian pathways along roads</li> <li>» Green pathways and pedestrian paths along roads</li> </ul>
7.	<b>Quality of overall logistics concept and others</b>	<ul style="list-style-type: none"> <li>» Warehousing</li> <li>» Fire, disaster risk management</li> <li>» Weigh bridges</li> <li>» Automobile service station</li> <li>» Provisions for social and environmental infrastructure</li> <li>» Business centre (one-stop-services), administrative building, information centre, marketing and product exhibition centre, warehouses/raw material depots</li> <li>» Training centre, incubation centre</li> </ul>

<sup>49</sup> Compressed Natural Gas

		<ul style="list-style-type: none"> <li>» Research and development facility</li> <li>» Signage</li> </ul>
8.	<b>Resource-efficient infrastructure</b>	<ul style="list-style-type: none"> <li>» Green Factory Buildings and Green Buildings</li> <li>» Usage of eco-friendly building materials for roads, fencing, buildings, etc.</li> <li>» Energy efficient lighting, solid waste management and wastewater management systems</li> <li>» Use of solar energy</li> </ul>

## 2. Economic Quality

S.No.	Parameter	Provisions
1.	<b>Qualitative effects (indirect costs and revenues)</b>	<ul style="list-style-type: none"> <li>» Revenues from access control at entry/exit gates</li> <li>» Revenues from parking facilities</li> <li>» Revenues from plot allotment</li> <li>» Revenues from allotment/outsourcing of services</li> <li>» Revenues from outsourcing social infrastructure, such as kiosks, canteens, guesthouses, training centres, crèche, etc.</li> </ul>
2.	<b>Land value development</b>	<ul style="list-style-type: none"> <li>» Different category of zones (industrial, green, amenity) to maximize economic value of the site</li> <li>» Commercial agriculture/ organic farming in green areas</li> <li>» Sale value of allocable land within market rates (INR 1170 per m<sup>2</sup> i.e. 18.49 \$ per m<sup>2</sup>)</li> <li>» Investments targeted to the tune of INR 37.75 cr. i.e. 5.9 million \$</li> </ul>
3.	<b>Efficient land use</b>	<ul style="list-style-type: none"> <li>» Land use break-up in accordance with applicable laws/rules/norms</li> <li>» Integrated open spaces with amenities and industrial plots</li> <li>» Bicycle tracks and pedestrian paths integrated with primary circulation network and green spaces</li> <li>» Landscapes and green belts distributed for</li> </ul>

		environmental function and aesthetics
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### 3. Environmental Quality

S.No.	Parameter	Provisions
1.	<b>Efficient waste management</b>	<ul style="list-style-type: none"> <li>» Dust bins in public places</li> <li>» Vermi-compost plant, handmade paper unit and recycling centre for recycling of wastes</li> <li>» Waste management systems</li> </ul>
2.	<b>Rain water management</b>	<ul style="list-style-type: none"> <li>» Storm water drainage</li> <li>» Collection of 1hr peak rainfall and treatment to prevent contamination risks</li> <li>» Pooling of treated rainwater and integration into landscapes via ponds</li> </ul>
3.	<b>Changing microclimate</b>	<ul style="list-style-type: none"> <li>» Open spaces, landscaped and hierarchical green areas that crisscross the A-GRIP site</li> <li>» Water bodies integrated with green areas to provide for ventilation and microclimate control</li> </ul>
4.	<b>Biodiversity</b>	<ul style="list-style-type: none"> <li>» Extensive greenery and plantation of native species proposed to encourage local habitat</li> </ul>
5.	<b>Emissions and air pollution control</b>	<ul style="list-style-type: none"> <li>» Plot allotment only to non-polluting industries</li> <li>» Eco-efficient mobility with battery operated vehicles, CNG buses for internal/external transport , bicycling tracks, and pedestrian pathways</li> <li>» Online air quality monitoring station and display boards</li> </ul>
6.	<b>Water and soil protection</b>	<ul style="list-style-type: none"> <li>» Prevention of soil contamination and surface water pollution</li> <li>» Storm water management systems, including collection, treatment, and recycle/reuse to prevent pollution/contamination risks to surface/ground water</li> <li>» Waste water management system- including tertiary treatment for recycle/ reuse, to prevent pollution /contamination risks to soil and surface/ ground water</li> <li>» Biological and chemical water quality: Decentralized wastewater treatment systems with tertiary treatment to prevent any bacteriological or chemical contamination</li> </ul>

		<ul style="list-style-type: none"> <li>» Water structures and quality: Proper conveyance systems and linked tanks for storm water and waste water</li> <li>» Online monitoring systems will be provided to ensure water quality.</li> <li>» Online monitoring systems to check pollution threats</li> </ul>
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#### 4. Socio-Cultural and Functional Quality

S.No.	Parameter	Provisions
1.	<b>Social quality and infrastructure</b>	<ul style="list-style-type: none"> <li>» Training centre to cater to vocational training, incubator for entrepreneurship promotion</li> <li>» Public toilets</li> <li>» Drinking water facilities</li> <li>» ATM, post office/courier service, bank</li> <li>» Information centre</li> <li>» Guest house, dormitories for employees/workers/visitors/ truck drivers</li> <li>» Food services</li> <li>» Recreational facilities</li> <li>» Transportation/mobility arrangements</li> <li>» Safety &amp; security provisions</li> </ul>
2.	<b>Gender considerations</b>	<ul style="list-style-type: none"> <li>» Special provisions for women employees, including play schools and crèche for infant children of workers, ladies toilets, and accommodation for late working hours</li> <li>» Safety and security,</li> <li>» Internal and external transportation</li> <li>» Health centre, canteens/ food outlets, kiosks, toilets, internal shuttle service (battery operated)</li> </ul>
3.	<b>Health, comfort and user satisfaction</b>	<ul style="list-style-type: none"> <li>» Health Centre</li> <li>» Recreational areas, such as sports fields, a landmark area, greenery, parks etc.</li> <li>» Safety provisions including security at entry/exits, access control, fencing, CC cameras across the site</li> </ul>

		<ul style="list-style-type: none"> <li>» Landmark area for identity creation and social interaction</li> <li>» Signature architecture for the landmark area, entry/exits, elegantly designed green factory buildings and landscaped areas to provide visual identity</li> </ul>
4.	<b>Functional and design quality</b>	<ul style="list-style-type: none"> <li>» Signature architecture and visual impact</li> <li>» Mobility integrated with existing transport/mobility network</li> <li>» Master Plan aligned with slopes/contours</li> <li>» Art in the design – traffic islands, landscaped areas at the entry/exist gates etc.</li> </ul>

## 5. Administrative and Management Quality

S.No.	Parameter	Provisions
1.	<b>Overall Management</b>	<ul style="list-style-type: none"> <li>» Industrial Area Local Authority (IALA) with elected representatives from industries to manage A-GRIP</li> </ul>
2.	<b>Site development</b>	<ul style="list-style-type: none"> <li>» Site development through a tendering</li> <li>» PPP<sup>50</sup> models wherever feasible</li> </ul>
3.	<b>Services</b>	<ul style="list-style-type: none"> <li>» Services such as waste management and wastewater management proposed to be tendered out based on appropriate business models (BOOT<sup>51</sup> etc.) and green procurement principles</li> <li>» Services such as manning entry/exits, security etc. proposed to be outsourced</li> <li>» Infrastructure such as weigh-bridge, warehouses, commercial areas, parking areas proposed to be leased out through a tender process</li> </ul>
4.	<b>Plot allotment</b>	<ul style="list-style-type: none"> <li>» Plot allotment will be undertaken by ALEAP.</li> <li>» Recommendation for plot allotments- <ul style="list-style-type: none"> <li>- Industries which are permissible as per the zone</li> <li>- Industries that will not utilize the common infrastructure and services in A-GRIP (so that underutilization of infrastructure does not</li> </ul> </li> </ul>

<sup>50</sup> PPP means Public private partnership

<sup>51</sup> BOOT refers to Build –own- operate and transfer.

		<p>happen).</p> <ul style="list-style-type: none"> <li>- Allottees who commit to adhere to the building level measures for green building norms, rainwater harvesting, etc.</li> </ul>
5.	<b>Costing</b>	<ul style="list-style-type: none"> <li>» Costs of development to be divided to the allocable area. (By dividing total development cost of essential infrastructure from the allocable area)</li> <li>» Costs towards common services proposed to be payable by the allottees as per respective business cases</li> </ul>

**G. UNIQUE SELLING PROPOSITION (USPs) OF THE SITE MASTER PLAN OF A-GRIP, NANDIGAMA**





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<b>Direct employment for about 12,000 people</b>	<b>Investments to the tune of Rs 37.75</b>	<b>Saleable area at INR 1170 per m<sup>2</sup></b>
<b>Over 170 industrial enterprises and about 24 services</b>	<b>Cost effective common infrastructure and services</b>	<b>Industrial park management system (IALA)</b>
<b>Bicycling-to-Work provisions</b>	<b>Pedestrian pathways</b>	<b>Fire, safety, and disaster risk management</b>
<b>Environmental monitoring and public display of relevant environmental data</b>	<b>Dedicated zones and flexible plot sizes</b>	<b>Several revenue options to strengthen industrial park management</b>
<b>Worker and member involvement</b>	<b>Fostering Gender Equality</b>	<b>Vast community facilities</b>

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## ANNEXURE I

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### Annex3-1: Indicative List of Industries Allowed

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1. *Agarbatti* (Incense sticks) and similar products
2. Agricultural equipment manufacturing units
3. Air conditioner parts
4. Aluminium doors / windows / fittings / furniture
5. Assembly and repair of bicycles
6. Assembly and repair of electrical gadgets
7. Assembly and repair of sewing machines
8. Assembly and repair of electronic goods
9. Assembly of coolers
10. *Atta chakki* (flour mill), spices (except chillies)
11. Auto parts (lathe work)
12. Automobile servicing and repairing stations
13. Ball pen refill
14. Barbed wire making
15. Basket making
16. Batic works
17. Belts and buckles
18. Bio-gas
19. Biscuit, cakes, and cookies making
20. Black smithy
21. Bianco cake
22. Block making and photo enlarging
23. Book binding
24. Bread and bakeries
25. Brooms & brushes
26. Bulbs (battery)

- 
27. Button making, fixing of buttons and hooks
  28. Candles
  29. Cane and bamboo products
  30. Canvas bags and hold-all making
  31. Canned fruits & vegetables
  32. Cardboard boxes
  33. Carpentry
  34. Cement jellies, cement tanks, manhole covers, and wall rings etc.
  35. Chewing gum and *supari* (beetle nut)
  36. Clay and modeling
  37. Clarified Fruit Juices from pulpy fruits
  38. Coir and jute products
  39. Cold storage < 10 t capacity
  40. Confectionery and bubble gum
  41. Copper and brass art wares
  42. Cordages, rope, and twine making
  43. Cotton ginning
  44. Cotton and woolen hosiery (dry processing)
  45. Cotton / silk printing (by hand)
  46. Crayons
  47. Bicycle chain
  48. Bicycle locks
  49. Dal Dehusking Unit (cottage scale)
  50. Dari and carpet weaving
  51. Data processing
  52. Detergent (without Bhatti - cottage type of industries, only mixing process)
  53. Dehydrated fruits
  54. Desiccated coconut
  55. Diamond cutting and polishing work
  56. Elastic products
  57. Electric fittings (switch, plug, pin, etc.)
  58. Electric motor parts
  59. Electric press assembling
  60. Electroplating for jewelry and engraving
  61. Embroidery
  62. Engineering works
  63. Fishing net making
  64. Fish pickles
  65. Fish products: thermal processed
  66. Flavours (blending operation)
  67. Flour mills (excluding roller mills)
  68. Fountain pens, ball pens, and felt pens
  69. Framing of pictures and mirrors
  70. Fruit processing and preservation - pickles, fruit crushers etc.
  71. Fruit and vegetable preserves and candies
  72. Fruit jam, jellies, and marmalades
  73. Fruit squashes and syrups
  74. Fruit toffees
  75. Garment making (no bleaching or dyeing)
  76. Gold and silver threads
  77. Groundnut decorticating
  78. Handloom weaving
  79. Hangers
  80. Hats, caps, including turban embroidery
  81. Hosiery products (without dyeing and bleaching)
  82. Honey-based beverages

- 
83. Ice boxes and body of the coolers
  84. Ice creams, ice candy
  85. Instant pickles
  86. Iron grills and door making
  87. Jam, jellies, and fruits preserves
  88. Jewelry items
  89. Key rings
  90. Khadi and handloom
  91. Knife making
  92. Kulfi and confectionery
  93. Kumkum, kajal, tika, etc.
  94. Lace products
  95. Lactic beverage: cereal based
  96. Laundry and dry cleaning
  97. Leather and rexene made ups
  98. Leather footwear (does not include any kind of tanning)
  99. Manjan and hair oil
  100. Manufacture of mineral water
  101. Manufacture of tooth paste, tooth powder, shampoo, nail polish, hair oil by mixing process
  102. Manufacture of biddies
  103. Manufacture of made-up textiles goods such as curtains, mosquito nets, mattress bedding material, pillow covers and bags etc.
  104. Manufacture of metal building components such as grills, gates, door and window frames, water tanks, wire net, etc. (use of coal is not permitted)
  105. Manufacture of milk products such as butter, ghee, etc.
  106. Manufacture of mirrors and photo frames
  107. Manufacture of musical instruments
  108. Manufacture of paper and card board products (pulp and paper manufacturing. excluded)
  109. Manufacturing of ice-cream
  110. Manufacturing of ink for fountain pens (formulation only)
  111. Manufacturing of office and household furniture and appliances: steel and wood
  112. Manufacturing of optical frames
  113. Manufacturing of scientific and mathematical instruments (Engineering. works & assembly).
  114. Manufacturing of surgical gauges and bandages
  115. Manufacturing of writing instruments (pens, pencils, etc.)
  116. Mushrooms: production and preservation
  117. Marble stone items
  118. Mattress and pillows without blowing process
  119. Metal lathe cutting
  120. Mini Rice Mill
  121. Motor winding works
  122. Musical instruments (including repairs)
  123. Nails, screws, rolling shutters (from finished material)
  124. Name plate making
  125. Oil ginning and expelling (no hydrogenation and no refining)
  126. Packing boxes for shirts etc.
  127. *Pan masala*(Mouth freshner)
  128. *Papad* (Papadam) making
  129. Paper bags
  130. Paper stationery items and book binding
  131. Parboiled paddy (dry heat method)
  132. Peanut *Chikki* (type of indian sweet)
  133. Pencil and pen manufacturing units

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134. Photographs, printings (including sign board painting)
  135. Photosetting
  136. Photostat and cyclostyling
  137. Pickles and *chutneys* (sauce)
  138. Garland of flowers
  139. Processing of condiments, spices, groundnuts, and dal, etc.
  140. Pulse mills
  141. *Rakhee* (decorated threads) making
  142. Ready-made garments and apparel making (dry processing)
  143. Repairs of watches and clocks
  144. Rice flakes
  145. Rubber stamps
  146. *Saree* (South Asian female garment) fall making
  147. Saw mills
  148. Scissors making
  149. Screen printing
  150. Screw and nails
  151. Shoe laces
  152. Silver foil making
  153. Small electronic components
  154. Soap making (only mixing process)
  155. Soft drink making (not excluding 500 bottles per day)
  156. Spectacles and optical frames
  157. Spice (Masala) powders
  158. Sports goods
  159. Stamp pads
  160. Stationery articles (except manufacturing of paper and inks)
  161. Steel furniture
  162. Stone engraving
  163. Stone, marble, granite cutting, polishing, and finishing
  164. Stove pipe, alpine and safety pins, aluminum buttons, (by hand process)
  165. Surgical bandages rolling and cutting
  166. Surgical instruments and equipment
  167. Table lamps and shades
  168. Tailoring
  169. Textile weaving
  170. Thread balls and cotton fillings
  171. Tin boxes and makings
  172. Toys and dolls
  173. Turmeric, salt, and spice grinding units
  174. Typewriter parts, manufacturing, and assemblage
  175. Tyre retreating
  176. Umbrella assembly
  177. Velvet embroidered shoes/shawls
  178. Vermicelli and macaroni
  179. Village oil ghani
  180. Village pottery industry (without bhatti)
  181. Water meters repairing
  182. Water tanks
  183. Welding works
  184. Wet grinding
  185. Wood carving and decorative wood wares
  186. Wooden furniture works
  187. Wool balling and lachhee making
  188. Wool knitting (with machine)
  189. Xerox and photocopying

190. *Zari* (fine thread or gold or silver) making

### Annex 3-2: Indicative List of Industries

S. No.	Industries
1.	Thermal Power Plants – Coal based $\geq$ 200/210 MW
2.	Thermal Power Plants – Coal based < 200/210 MW
3.	Thermal Power Plants – gas based
4.	Thermal Power Plants – LDO based
5.	Oil Refinery, Petroleum Refining
6.	Petrochemicals
7.	Integrated Iron and Steel
8.	Fertilizer
9.	Copper Smelter
10.	Zinc Smelter
11.	Aluminum Smelter
12.	Lead Smelting
13.	Cement – large
14.	Cement – medium
15.	Cement – small/tiny
16.	Pesticides – Technical grades
17.	Pharmaceuticals – bulk drug
18.	Nitric Acid
19.	Sulphuric Acid
20.	Phosphoric Acid
21.	Caustic Soda a) Mercury cell b) Membrane cell
22.	Dye and Dye Intermediates

S. No.	Industries
23.	Sugar
24.	Organic Chemicals
25.	Re-Heating Reverberatory Furnace, Capacity: large
26.	Foundries, Cupola, Arc Furnace, Induction Furnaces – large
27.	Paint (excluding formulation)
28.	Inorganic Chemicals
29.	Man-Made Fibres (Synthetic; Semi Synthetic)
30.	Boilers More than 15 t/hr
31.	Composite Woolen Mills - Chromium and Sulphide
32.	Glass - Soda lime, Borosilicate, and other special glasses (other than Lead) Furnace capacity - Product draw capacity more than 60 tpd
33.	Glass - Lead Glass: Furnaces of all Capacity
34.	Wood and wood products a) Ply wood manufacturing b) Fibre board manufacturing c) Furniture
35.	Leather Tannery a) Chrome Tanneries / Combined Chrome and Vegetable Tanneries b) Vegetable Tanneries
36.	Pulp and Paper a) Agro Based b) Waste Paper Based c) Paper Board without cooking operation
37.	Composite Woolen Mills - Common
38.	Fermentation (Maltries and Breweries)
39.	Asbestos manufacturing – medium/large (Including all process involving the use of Asbestos)
40.	Boilers Less than 2 t/hr 2 to 5 t/hr
41.	Slaughter House, Meat and Sea Food Industry - Slaughter House - all capacities
42.	Food and Fruit Processing a) Soft Drinks b) Fruit Based Synthetic(More than 0.4 tpd) c) Bottle and Tetra pack d) Synthetic (Less than 0.4 tpd)
43.	Food and Fruit Processing - Fruit and Vegetables
44.	Food and Fruit Processing – Bakery
45.	Food and Fruit Processing a) Bread and Biscuit, Continuous Process (More than 20tpd); Non Continuous Process (Less than 20tpd) b) Biscuit Production - all capacities
46.	Food and Fruit Processing - Confectioneries > 4 tpd Below 4 tpd
47.	Distillery (Alcohol distillery)
48.	Pesticides – formulation
49.	Pharmaceuticals – formulation
50.	Cotton Textile Industries
51.	Electroplating
52.	Stone Crushing

S. No.	Industries
53.	Coke Oven
54.	Synthetic Rubber
55.	Calcium Carbide
56.	Black Carbon
57.	Natural Rubber
58.	Re-Heating (Reverberatory) Furnace, Capacity: small/medium
59.	Foundries, Cupola, Arc Furnace, Induction Furnaces – small/medium
60.	Lime Kiln
61.	Jute Processing
62.	Dairy
63.	Ceramic Industry
64.	Starch and Glucose
65.	a) Pottery and Earthen Ware b) SSI and Using Furnace oil
66.	Soap (Detergent Formulation)
67.	Bone mills and allied industries

### Annex 3-3: Parking standards

**Table No. 1: Carrying Capacity of Trucks**

S.No.	Mode	Carrying capacity in tonnes
1	2 Axle trucks	16
2	3 Axle trucks	25
3	MAV	31

\*PCU stands for Passenger car unit is a metric used in Transportation Engineering to assess traffic-flow rate on a road  
Source: Notification for the specification of Maximum Gross vehicle weight and the minimum safe axle weight, Ministry of road transport and highways (MORTH), GOI

**Table No. 1: Parking Space Standards**

S.No.	Mode	Length (m)	Width (m)	Minimum Parking Space Required (m <sup>2</sup> )
1	CAR	2.5	5	25
2	2WHEELER	2.2	0.7	4
3	TAXI	—	—	25
4	AUTO RICKSHAW	—	—	5
5	CYCLE	—	—	1.2
6	TRUCKS	3.75	7.5	28
7	2-3 AXLE TRUCK	—	—	62
8	MULTI AXLE TRUCKS	—	—	165

Source: UDPFI Guidelines, Ministry of Urban Development, GoI

**Table No. 3: Parking Efficiency**

S.No.	Parking angle (degrees)	Maximum Parking Produced (%)
1	90	67



2	75	23
3	60	8
4	45	2
5	30	0

Source: Chodash I.L, 1986, 'Relative efficiencies of various parking angles', ITE journal of Transportation engineers, Washington USA; <http://www.ite.org/membersonly/itejournal/pdf/jca86a34.pdf>

### **Annex 3-4 : Questionnaire for amenity need assessment used by Technical consultants**

Service	Critical	Important	Minor importance	Not important
Safe transportation facilities				
Financial and audit services				
Legal advisory services				
HR help desk				
Affordable canteen				
Common eating spaces				
Housekeeping services				
Gardening and landscaping				
Printing and DTP				
Postage and courier				
Centralized packing and dispatching unit				
Common conference hall				
Exhibition halls				
Common security				
Information desk				

**Annex 3-5 : Questionnaire for preliminary assessment of industries used by ALEAP**

S.No.	Data title	Detail
1	Name of the Industry	
2	Name of the contact person and contact details (Ph,Mob,eMail)	
3	Size/type of Industry	
4	Products proposed to be manufactured	Product Name
		Avg. per Day
		Per Year
5	Raw materials to be used	Raw Materials
		Avg. Consumption per Day
6	Investments/turnover	Total Capital Investment (excl. land costs)
		Max. annual turnover
7	Maximum number of employees/workers	
8	Water Requirement (Kilo litre / day)	Domestic
		Industrial-Process Use
		Industrial Cooling
		Others
		Total
9	Wastewater Generation (Kilo Litre / day)	Domestic use (toilets, kitchen etc.)
		Industrial – Process use
		Industrial – Cooling
		Others (specify)
		Total waste water generation

10	Quality of Wastewater	Easily Bio-degradable / Not easily Biodegradable / Not easily biodegradable and toxic	
11	Fuel requirements, if any	Type of Fuel	
		Quantity per day	
12	Requirements for boilers, steam, cooling towers		
13	Solid Waste Generation (Tons / day)	Domestic waste (MSW)	
		Hazardous waste	
		Industrial waste (other than haz. waste)	
		Others (specify)	
		Total	
14	Transportation Requirements	2-wheelers	
		4 - wheelers	
		incoming truck trips	
		outgoing truck trips	
15	Electricity requirements		
16	Land/plot requirements	Plot Size required	
		Size of the building/shed: No. of floors:	
17	Any special requirements for services from Ind. Park Management		
18	Any other relevant information (needed as input for preparing site master plan for industrial estate)		

### **Annex 3-6 : List of Mandatory signage**

1. Right of way signage
2. Stop
3. Give Way
4. Give way to buses exiting the bus way
5. Prohibitory Signage
6. Articulated Vehicles Movement prohibited
7. Bullock carts prohibited
8. Bullock carts and Hand carts prohibited
9. Buses prohibited
10. Caravan not allowed
11. Cycles prohibited
12. Hand carts prohibited
13. Horn prohibited
14. Horse riding prohibited
15. Left/ Right turn prohibited
16. Left turn prohibited on red signal
17. One Way
18. Overtaking Prohibited
19. Right turn / U turn prohibited
20. Straight prohibited / No Entry
21. Trucks prohibited
22. Construction vehicle prohibited
23. Tongas prohibited
24. Two wheelers prohibited
25. U turn prohibited
26. No Parking and No Stopping Signage
27. No Parking
28. No Parking, No Stopping
29. Parking not allowed on footpath
30. Parking not allowed on half footpath

- 
31. Speed Limit and Vehicle control Signage
  32. Axle Load Limit
  33. Height Limit
  34. Length Limit
  35. Load Limit
  36. Maximum Speed Limit
  37. Stop for Security Check
  38. Width Limit
  39. Restriction Ends signage
  40. Compulsory Direction Control and Other
  41. Signage
  42. Bus way / buses only
  43. Compulsory ahead
  44. Compulsory ahead or Turn Left
  45. Compulsory ahead or Turn Right
  46. Compulsory cycle track / cycles only
  47. Compulsory keep Left
  48. Compulsory cyclists and pedestrians route
  49. Compulsory sound horn
  50. Compulsory snow chain
  51. Pass either side
  52. Pedestrian only

### **Annex 3-7 : List of Cautionary / Warning Signage**

1. Cross Road
2. Cycle crossing
3. Cycle route ahead
4. Danger warning signage
5. End of dual carriageway
6. Left / Right Curve
7. Loose gravel
8. Major Road ahead
9. Men at Work
10. Merging traffic ahead
11. Narrow bridge Ahead
12. Narrow Road Ahead
13. Overhead cables
14. Pedestrian crossing
15. Playground ahead
16. Quay side or riverbank
17. Queues likely ahead
18. Reduced carriageway
19. Right / Left Hairpin Bend
20. Right / Left Reverse Bend
21. Right Hand / Left Hand Curve
22. Road widens Ahead
23. Rough Road

### **Annex 3-8 : Derived Standards for Provision of Public Toilets**

<b>S.No.</b>	<b>Use/ Activity</b>	<b>Toilet Seats</b>	<b>Baths</b>	<b>Urinal Units</b>	<b>Clothes Washing Area</b>
1	For Commercial area	1 per 50 users	Not required	1 per 20 users	Not required
2	For Industrial area	1 per 30 users	Not required	1 per 20 users	Not required
3	For Community area	1 per 20 users	1 per 30 users	1 per 50 users	1 per 40 users;; Min 1.5 m x 1.2 m
4	For roads	2 in a radius of 500 m	Not required	2 in a radius of 500 m	Not required

Note: Standards mentioned above have been derived from – GOI (1996); A compendium of Central Schemes for Urban development, Urban Transport and Public Health Engineering, from the Ministry of Urban Affairs and Employment, Government of India, 1996.

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## **ANNEXURE II (MAPS)**

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# LAND USE

## LEGEND

- SITE BOUNDARY
- WATER BODY
- INDUSTRIAL (ABOVE 1000 SQ YD)
- INDUSTRIAL (1000 SQ YD)
- PARKS AND OPEN SPACES
- BUFFER ZONE
- COMMON FACILITIES
- SERVICES
- ROADS AND CIRCULATION

NOTE:

LAND USE DISTRIBUTION

S.No.	Land Use	Area (Sq. M)	Percentage
1	Industrial	112071	81.5%
2	Water Body	1007	0.7%
3	Parks and Open Spaces	2000	1.4%
4	Common Facilities	1000	0.7%
5	Services	1000	0.7%
6	Roads and Circulation	1000	0.7%
7	Buffer Zone	1000	0.7%
8	Other	1000	0.7%
9	Total	137000	100%



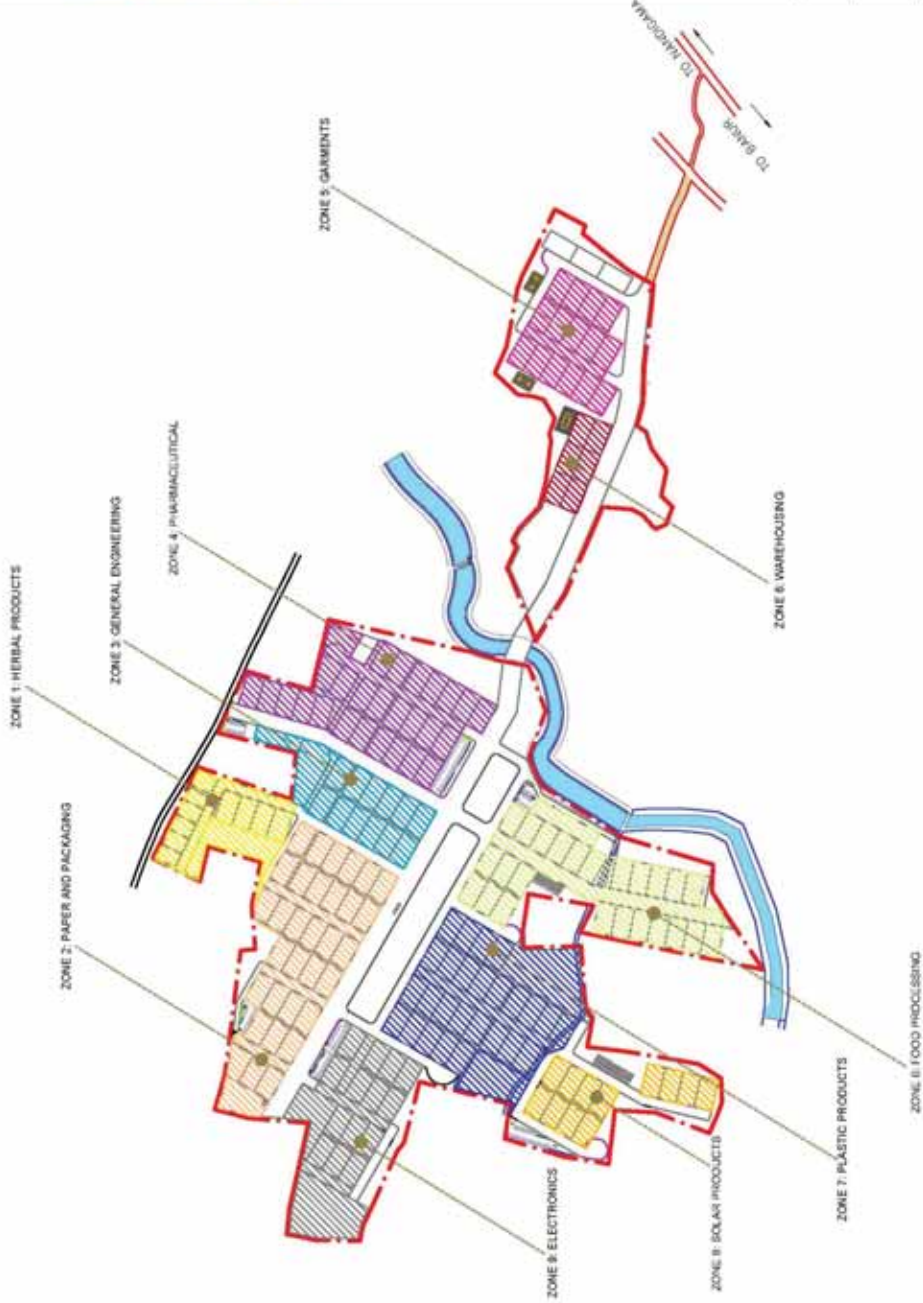
## ALEAP GREEN INDUSTRIAL PARK NANDIGAMA

SCALE		DATE OF PREPARATION	21.10.2015
DRAWING NO.	3.1	DATE OF REVISION	
DESIGNING OFFICER		MANAGER	
		SANCTIONING AUTHORITY	



# ZONING

## LEGEND

-  SITE BOUNDARY
-  ZONE 1: HERBAL PRODUCTS
-  ZONE 2: PAPER AND PACKAGING
-  ZONE 3: GENERAL ENGINEERING
-  ZONE 4: PHARMACEUTICAL
-  ZONE 5: GARMENTS
-  ZONE 6: FOOD PROCESSING
-  ZONE 7: PLASTIC PRODUCTS
-  ZONE 8: SOLAR PRODUCTS
-  ZONE 9: ELECTRONICS
-  ZONE 10: WAREHOUSING



## ALEAP GREEN INDUSTRIAL PARK, NANDIGAMA

 SCALE	 DATE OF PREPARATION 31.03.2017	DATE OF REVISION
	SHEET NO. 3.2 SIZE A3	MANAGER







# TECHNICAL INFRASTRUCTURE

## LEGEND

-  SITE BOUNDARY
-  WATER BODY
-  TECHNICAL INFRASTRUCTURE
-  PARKS AND GREEN PATHWAYS
-  GREEN BELT (BUFFER ZONE)

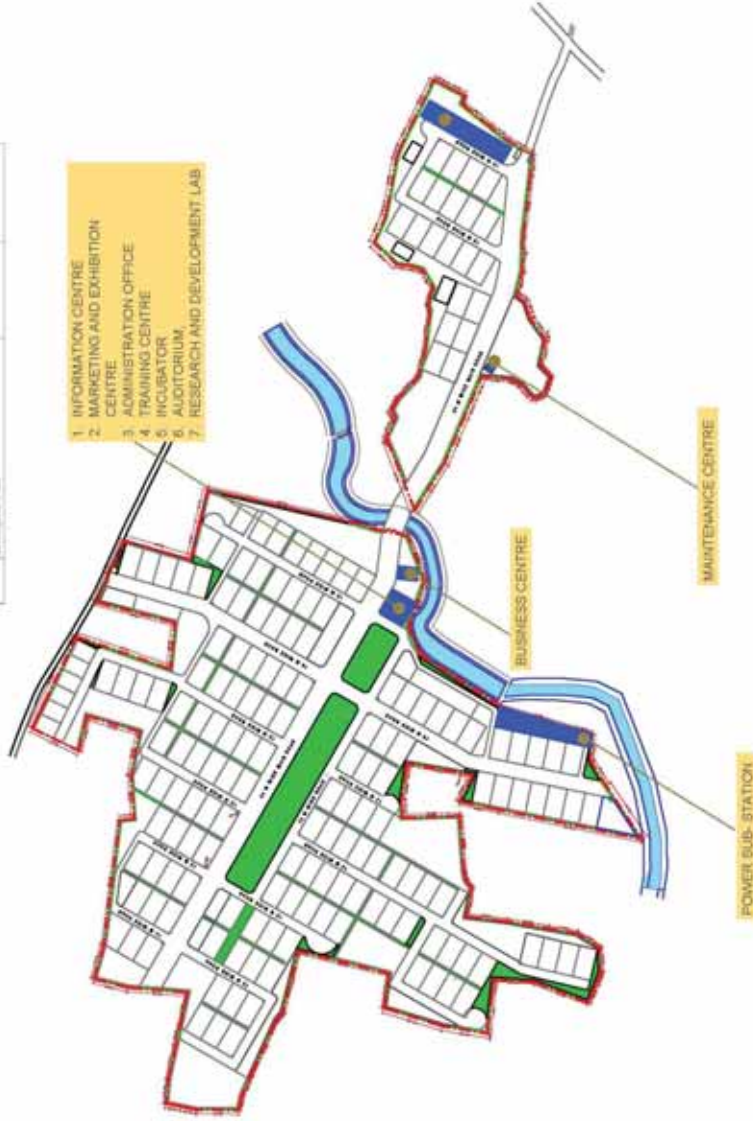
NOTE:

## ALEAP GREEN INDUSTRIAL PARK NANDIGAMA

SCALE		DATE OF REVISION	
DRAWING NO.	3-4	DATE OF PREPARATION	21.10.2016
DESIGNING OFFICER		MANAGER	
			SANCTUARY AUTHORITY










### TECHNICAL INFRASTRUCTURE

S.No.	Facility	Units	Area (m <sup>2</sup> )
1	Storage (wastewater plant (1000))	1	1000
2	(Wastewater) Raw material storage	1	2000
3	Manufacturing building	1	500
4	Automobile service station	1	500
5	Power sub-station	1	2000
6	7.5MVA and 110KV substation	1	400
7	Business centre	1	10000 sq ft of luxury complete
8	Information centre, Warehousing and exhibition centre, Administration office, Training centre, Incubator, Auditorium, Research and Development lab	1	10000 sq ft of luxury complete




# ENVIRONMENTAL INFRASTRUCTURE

## LEGEND

-  SITE BOUNDARY
-  WATER BODY
-  PARKS AND OPEN SPACES
-  BUFFER ZONE
-  GREEN PATHWAYS
-  AVENUE PLANTATION
-  SPORTS GROUND
-  PUBLIC TOILET
-  ENVIRONMENT MONITORING STATION

NOTE:

## ALEAP GREEN INDUSTRIAL PARK NANDIGAMA

SCALE		DATE OF PREPARATION	21.10.2015	DATE OF REVISION	
DRAWING NO.	3-8	SHEET SIZE	A3	MANAGER	SANCTIONING AUTHORITY

### DETAILS OF FACILITIES

S. No.	Facility	Units	Area (m <sup>2</sup> )
1	Decentralised waste water treatment system	1	1500
2	Public toilet	7	105 (14m <sup>2</sup> each)
3	Crack pavement technology	28	
4	CRACK TREATMENT COAT	1	13670
5	Buffer zone		10450
6	Green pathways		10450
7	STP	1	8700



# SOCIAL INFRASTRUCTURE

## LEGEND

-  SITE BOUNDARY
-  WATER BODY
-  SOCIAL INFRASTRUCTURE
-  PARKS AND GREEN PATHWAYS
-  GREEN BELT (BUFFER ZONE)
-  FOOD KIOSK
-  PUBLIC TOILET

NOTE:

## ALEAP GREEN INDUSTRIAL PARK NAINDIGAMA



SCALE	
DRAWING NO.	3-6
SHEET NO.	A-3
DATE OF PREPARATION	27.03.2018
DATE OF REVISION	
DEALING OFFICER	
MANAGER	
SANCTIONING AUTHORITY	

### SOCIAL INFRASTRUCTURE

S.No	Facility	Units	Area (Sq'ft)
1	Complex A: High 2 units, Restaurant, Bank, and office, Business centre, Concess premises	1 (03-1)	400
2	Complex B: Micro-entrepreneurship, Skill development, Business and incubator laboratory, Training centre, Incubator and Auditorium	1 (02-2)	3440
3	Complex C: Dormitory, Guest house, Canteen	1 (03-1)	1650
4	Supermarket and ATM	1	200
5	Garbage	1 (02-2)	2152





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