



Planning for Sustainable Industrial Parks

environmental quality, technical quality, economic & social quality

June 2015



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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.
 - » 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.
 - » 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.
 - » Vocational training and skill development based on the German model.

Our 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. "Sustainable Industrial Development" (SID) is one of the thrust areas of the IGEP programme. The SID component has focus on three core topics: Planning of New Industrial Parks, Environment Friendly Techniques in Selected Industry Sectors, and Wastewater Management.

Foreword



Dr. Dieter Mutz
Director
Indo-German Environment Partnership (IGEP) Programme
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New Delhi

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, the present document on "Planning for Sustainable Industrial Parks – environmental quality, technical quality, economic & social quality" has been prepared. This document provides an introduction to siting and site master planning of green industrial parks in India along with two case examples of industrial parks that have taken up on pilot basis under the IGEP Programme. We are thankful to our partner organisations, the Association of Lady Entrepreneurs of Andhra Pradesh (ALEAP) and the Telangana Industrial Infrastructure Corporation Ltd. (TSIIC) of the Government of Telangana for their active role in the piloting of environment-friendly site master plans for the Green Industrial Parks being developed by them.

We hope the document helps in setting a positive tone for achieving sustainable industrial parks in India with integration of environmental considerations and having high technical quality, economic quality, social quality and process & management quality.

New Delhi
29 June 2015

(Dr. Dieter Mutz)



Chapter 1: About Industrial Parks in India

1.1 Industrial Development in India

Industrial development is one of the important drivers of economic growth in India. India is targeting industrial growth rate of 12 to 14% in the medium run and contribution of industrial sector to national GDP by 25% creating 100 million additional jobs by 2022. India seeks to create a strong economic base with a globally competitive environment and state-of-the-art infrastructure to activate local commerce, enhance investments and attain sustainable development.

Today, the industrial development in India is seen in the form of industrial estates, special economic zones, specialised industrial parks, investment zones, NIMZs (National Investment and Manufacturing Zones), special investment regions, PCPIRs (Petroleum, Chemicals and Petro Chemical Investment Regions) and industrial corridors. India is planning to build a pentagon of industrial corridors across the country to boost manufacturing and to project India as a global manufacturing destination of the world. The Delhi Mumbai Industrial Corridor (DMIC) is the first of its kind covering an overall length of 1,483 km and passing through the States of Uttar Pradesh, Haryana, Rajasthan, Madhya Pradesh, Gujarat and Maharashtra and the National Capital Region of Delhi, and will have 24 identified industrial areas and investment regions. Further, to facilitate investments, foster innovation, build best-in-class manufacturing infrastructure and enhance skills development, India has launched a major new national programme called “Make in India”.

The industrial development, if not properly planned, has potential to pose tremendous risks on natural resources, environment and the people. The key issues of concern are social conflicts due to the sites chosen for industrial development, environmental conflicts and negative impacts due to pollution and resources consumption (energy, water, materials), impacts on biodiversity (loss of ecosystem services, loss of species, changes in biodiversity etc., and issues of climate change. Also, an industrial area that does not have a proper site master plan is likely to face serious problems due to lack of provisions for environmental and other related infrastructure. Such problems include traffic congestions and accidental risks due to lack of parking provisions for the hundreds of trucks entering the industrial areas, lack of land provisions for waste and wastewater management, lack of buffer zones with surrounding areas and lack of social infrastructure for workers, including eco-efficient transportation.

A well planned and organised industrial area, defined by set of quality parameters such as economic efficiency, environmental quality and social quality, could be an answer to sustainability. Also, such an area could support sustainability of individual industries housed in them with high performance workplaces so as to enable industries strive for efficiencies and profitability, reduced environmental litigation risks and improved market image as well as public image.

The topic on “Planning of New Industrial Parks and Investment Zones” taken up under the Indo-German Environmental Partnership Programme of the Indo-German Development Cooperation has focused on proper planning of new industrial parks/investment zones integrating environment friendly aspects and sustainability concepts. The overall objective of the technical cooperation on this core topic was to demonstrate innovative planning and designing of a new industrial park or upgrading of an existing industrial park by incorporating the aspects of resource efficiency integrated environment monitoring management structures of eco-friendly production, and gender-sensitive infrastructure design, and to support the national/state level stakeholders in considering the results in new strategy paper/guidelines of the government and/or industry associations.

The present document, brought out under the Indo-German Environment Partnership (IGEP) programme, takes ALEAP Green Industrial park and Green Industrial Park (GIP) Jadcherla in the State of Telangana as live case examples to illustrate how planning of sustainable and environment-friendly industrial parks can take place.

1.2 Definition of Industrial Parks in India

In the Indian context, an “Industrial Park” means a project in which plots of developed space or built up space or a combination with common facilities and quality infrastructure facilities is developed and made available to the units for the purposes of industrial activities or commercial activities¹. The Department of Industrial Policy and Promotion (DIPP) of the Ministry of Commerce and Industry (MoC&I) of the Government of India (GoI) states the following objectives to be fulfilled by a project to be considered as an industrial park:

- An ‘Industrial Model Town’ for the development of industrial infrastructure for carrying out integrated manufacturing activities, including research and development, by providing plots or sheds and common facilities within its precincts.
- An industrial park for development of infrastructural facilities or built-up space with common facilities in any area allotted or earmarked for the purposes of industrial use.
- A ‘Growth Centre’ under the Growth Centre Scheme of the Government of India provided that the scheme referred in this clause is implemented by an undertaking and the ‘Growth Centre’ is distinctly developed as a separate profit centre.

The criteria for automatic approval for an industrial park as stated by DIPP include:

- Minimum area required to be 1,000 acres (4.047 km²) with minimum 50 units in case of ‘Industrial Model Town’ and varied area requirement with a minimum of 30 units in case of Industrial Park and ‘Growth Centre’;
- Allocated area for industrial use to be not less than 60% of total allocable area;
- Area for commercial use to be not more than 10% of total allocable area;
- Investment on infrastructure to be not less than 50% of the total project cost, in the case of an Industrial Model Town Industrial Park, or Growth Centre and 60% of the total project cost in the case of an Industrial Park or Growth Centre; and
- No single unit shall occupy more than 50% of the allocable industrial area.

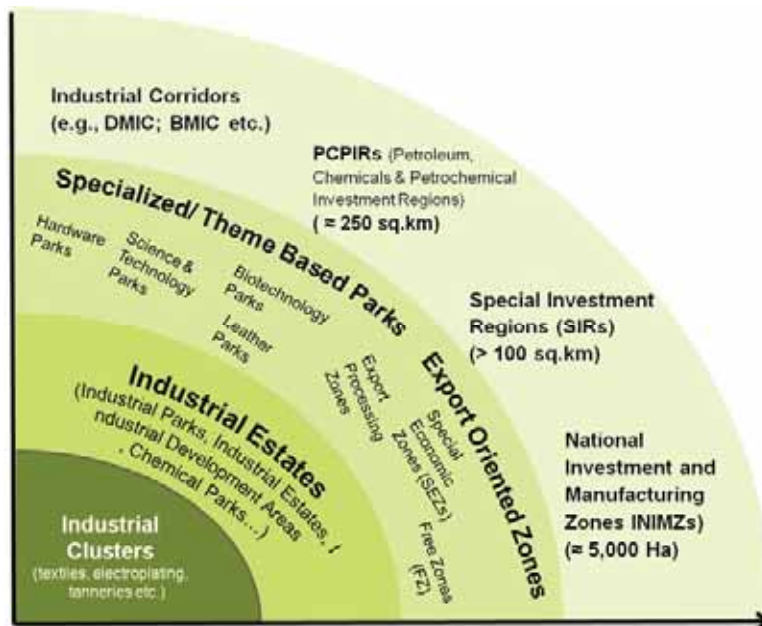


Fig. 1.1: Trends of Development of Industrial Areas in India

¹ Income Tax Department.n.d.*Industrial Park Scheme* (Gazette of India).India Retrieved from : Income tax department website: [http://www.incometaxindia.gov.in/archive/IndustrialParkScheme2008\(2\)_10012008.doc](http://www.incometaxindia.gov.in/archive/IndustrialParkScheme2008(2)_10012008.doc)

The industrial estates are meant to curb the scattered growth of industrial activity and encourage industrial growth within geographical locations centrally linked by transport communication water power supply etc. Industrial estates support the confinement of industrial activities to defined areas in order to delimit any social and environmental damage caused by the industries.

Over time, the industrial estates evolved into specialized, theme-based industrial parks and special economic zones. Today, the industrial development is heading towards a new dimension in the form of large special industrial investment regions and industrial corridors.

1.3 Policy Framework of Industrial Parks

The policies for industries in India date back to as early as 1947. Some important milestones are given below as reference.

Table 1.1: Policies for Industries/ Industrial Parks in India

August 1947	Realisation of the need to outline an industrial policy.
April 1948	First industrial policy (classification of industries into 4 broad categories).
April 1956	Second industrial policy (new classification in 3 categories).
May 1971	Transport subsidy scheme (promoted industrialisation in inaccessible areas by providing subsidy).
December 1973	Industrial policy statement (identified high-priority industries where investment from large industrial houses and foreign companies would be permitted).
March 1977	Industrial policy resolution (Emphasis on decentralisation and the role of small-scale industries).
July 1980	Industrial policy resolution (liberalization of industrial licensing, attention on the need for promoting competition in the domestic market, technological up-gradation, and modernization).
July 1991	Industrial policy resolution (up-gradation of previous liberalization scheme).
June 2002	Industrial park scheme (to provide site regulations for industrial parks (areas and setbacks) and procedure and approval guidelines for setting up of industrial parks).
February 2003	Industrial Infrastructure Up-gradation Scheme (IIUS) (to provide quality infrastructure to existing industrial clusters through PPP mode).
June 2005	SEZ Policy (promotes and facilitates setting up SEZ through incentives and exemptions; simplifies compliance procedures; and single window clearance provides approval and allotment procedure).
June 2008	National Mineral Policy (NMP) (to develop framework for R&D of efficient usage of resources that will guide the establishment of industries.)
July 2009	Agro-Industrial Policy (enhancing backward areas by way of funding/promotion through political support).
July 2011	Industrial & FDI Policy [to promote and increase the role of foreign direct investments (FDI)].
July 2011	National Manufacturing Policy (to promote and increase the role/share of the manufacturing sector in GDP digitization of land and resource maps).

1.4 Organisational Structures for Planning of Industrial Parks in India

In India, the role of the Central Government has been mainly that of laying down the guidelines for the State Governments; and coordinating review and monitoring of the industrial estate development

programmes. In addition to the Ministry of Commerce and Industry sector-specific ministries of the MSME (steel, petroleum, & natural gas chemicals, textiles, mines, etc.) were established in order to diversify and relegate policy and planning processes for meeting with national industrial development targets.

For the establishment of industrial estates, the selection of sites for development of industrial areas, and provisioning of requisite infrastructural facilities lie within the jurisdiction of the State Governments. At the state level, the industries departments are responsible for industrial development through state owned agencies, such as the industrial development corporation and the industrial infrastructure development corporations, which are mandated with industrial estate planning and development.

There are a few industrial estates owned by private companies. Also, there are some industrial estates developed through PPP mode by forming a SPV (Special Purpose Vehicle) with the State owned industrial development corporations.

The Ministry of Environment, Forest and Climate Change (MoEF&CC) of the Government of India at the national level looks into environmental standards and environmental clearances based on EIA (environmental impact assessment), while the state pollution control boards (SPCBs) at state level look into issuing consent to establish and operate under the air and water acts and enforcing pollution control. The Central Pollution Control Board, an apex body for prevention and control of pollution in India, supports MoEF&CC and the SPCBs.

The building norms that specify the requirements for a site master plan for industrial parks are broadly specified by the Town & Country Planning Departments in the states while the Urban Development Authorities and Urban Local Bodies look into land use approvals/conversions and approvals for the site master plans.





Chapter 2: Current System of Planning of Industrial Parks in India

2.1 Site Selection

The designated industrial area/zones that cater to the targeted industrial development do not exist adequately in India. The urban and regional plans do not have provisions catering to the targeted industrial development. Most of the towns and cities do not have valid master plans and regional planning is mostly absent in the country. Hence, industrial estate developers purchase a site and then make applications to the concerned authorities for land use conversion, site master plan approvals, and environmental clearances.

There are several provisions in various laws, rules and guidelines that are to be taken into consideration for siting industrial estates. These include:

- Provisions in the Environment (Protection) Act, 1986
- Provision in the Water (Prevention and Control of Pollution) Act, 1974
- Provision in the Air (Prevention and Control of Pollution) Act, 1981
- Siting guidelines by the Ministry of Environment & Forests, Government of India²
- Siting guidelines by the Central Pollution Control Board³
- Regional planning process for investment regions⁴
- Restrictions on siting in various contexts, e.g. near to airports, major settlements, defence establishments, heritage structures, eco-sensitive zones etc.

2.2 Site Master Planning

Presently, comprehensive national level guidelines and standards do not exist in the country for preparing site master plans or development plans for the industrial estates and industrial investment zones. However, the UDPFI (Urban Development Plans Formulation and Implementation) guidelines 1996 brought out by the then Ministry of Urban Affairs and Employment, Government of India and the URDPFI (Urban and Regional Development Plans Formulation and Implementation) Guidelines 2015 of the Ministry of Urban Development, Government of India provide general insights that may be relevant for industrial estates.

At the State level, as in the case of national level, there are in general no explicitly defined standards and guidelines for site master planning or development plans for industrial estates and industrial investment zones. Nevertheless some States have developed guidelines for planning of industrial areas, such as below:

- Guidelines for Planning of Industrial Parks⁵ by the Government of Gujarat.
- Guidelines for Preparing Master Plan of SEZ Areas⁶ by the Government of Gujarat.
- The Estate Management Procedures (EMP) 2011⁷ of the Haryana State Industrial & Infrastructure Development Corporation Ltd.

² Retrieved from MoEF& CC website : <http://moef.gov.in/citizen/specinfo/enguin.html>

³ Retrieved from CPCB website: : http://www.cpcb.nic.in/Env_Planning.php

⁴ Ministry of Urban Development, Government of India. (2015). *Urban and Regional Development Plans Formulation and Implementation Guidelines*. New Delhi, India.

⁵ Government of Gujarat.(n.d.). *Scheme for Financial Assistance to Industrial Park* (Ref: GR No: BJT/1008/626/Part-1/G Dated 20/10/2011)

⁶ Government of Gujarat.(n.d.). *Guidelines for preparing 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)*

⁷ Haryana State Industrial & Infrastructure Development Corporation.(2011).*Estate Management Procedures (EMP)*.

Lack of uniform site master planning procedures and processes is a key challenge. Some of the state industrial development corporations have staff with planning qualifications that can undertake site master plan preparation, but most of these corporations do not have professional planning staff.

GIZ IGEP has worked for the past 3 years on piloting innovative and financially sustainable solutions for environmental problems and promoting resource efficiency regarding sustainable industrial areas and capacity development. GIZ IGEP supported the planning of new industrial parks, as well as for retrofitting of old industrial parks, taking into consideration aspects of resource efficiency, integrated environmental monitoring, management as well as the consideration of gender issues. These experiences together with capacity development workshops with the responsible authorities have been carried out to strengthen the capacities to promote sustainable industrial development.⁸

The two pilot projects, namely Association of Lady Entrepreneurs of Andhra Pradesh (ALEAP) Green Industrial Park (A-GRIP) and the Green Industrial Park (GIP) Jadcherla are the two showcases of the successful elaboration of site master planning supported by application of GIZ standards on cooperation (stakeholder involvement), processes (for involvement of stakeholders) and a strategic approach for arriving at customised, yet high quality results.



⁸ Please find more information on the training contents following <http://www.igep.in/e48745/e49028/e61137/e61497/>



Chapter 3: Case Examples as Successful Showcase

3.1 ALEAP Green Industrial Park (A-GRIP), Nandigama

3.1.1 About A-GRIP

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.

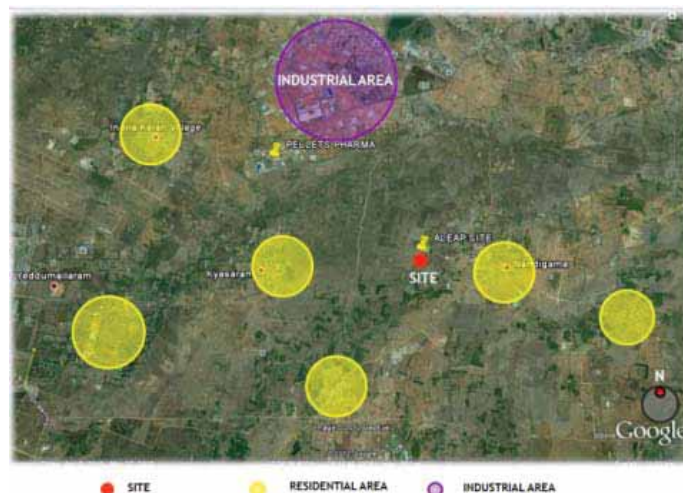
A-GRIP at Nandigama is envisioned to provide an environment conducive for women entrepreneurs and employ state-of-the-art technologies, including clean technologies, renewable energy technologies, environmental technologies and cost-effective common infrastructure.

A-GRIP is located in Nandigama village, part of Patancheru Mandal in Medak District of Telangana. A-GRIP extends over 3,34,094 m² (82.55 acres) of land area outside the settlement area of Nandigama village. (Refer Picture 3.1).



Pic. 3.1: Location of Site in Telangana

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



Pic. 3.2: Site and its Surroundings

The site has good connectivity to the Hyderabad international airport and the Vattinagulapally railway station. The site is about 5.06 km from the Outer Ring Road (ORR) of Hyderabad. It is mainly surrounded by different villages on all sides, except an industrial area located in its north-west direction. The industrial site lies outside the settlement area of Nandigama village. (Refer Picture 3.2). The nearest bus station is at Nandigama with bus route connectivity to many major cities of Telangana.

3.1.2 Process Followed

With the task in hand, it was not enough to be “doing things right” (i.e. to be efficient) but also to be careful about “doing the right things” (i.e. effective). The planning and designing of A-GRIP required robust processes. Different stakeholders were associated who had different interests and roles to play. They were identified and associated systematically into the processes to avoid conflicts at later stages and to make the outcome, which is the environment-friendly Site Master Plan for A-GRIP effective and efficient, and also to prevent the site master plan getting entangled into any complexity.

The key stakeholders were ALEAP and GIZ that played most important role in the planning of A-GRIP. The ALEAP’s consultants (Murty and Manyam Architects and Engineers) were involved in preparing the Site Master Plan of A-GRIP. GIZ provided technical support and guidance throughout the process, under its Indo-German Environment Partnership (IGEP) programme of the Indo-German Development Cooperation. GIZ engaged national experts (Auroville Consulting) to provide multi-disciplinary expertise based on many pilots demonstrated at Auroville (Tamil Nadu) and the international experts (BuroHappold Engineering, Berlin and DGNB, Stuttgart) for review, recommendation and assessment with regard to DGNB (German Sustainable Building Rating system). These and the site master planning consultants of ALEAP along with the women entrepreneurs that would set up their industries in A-GRIP were the primary stakeholders.

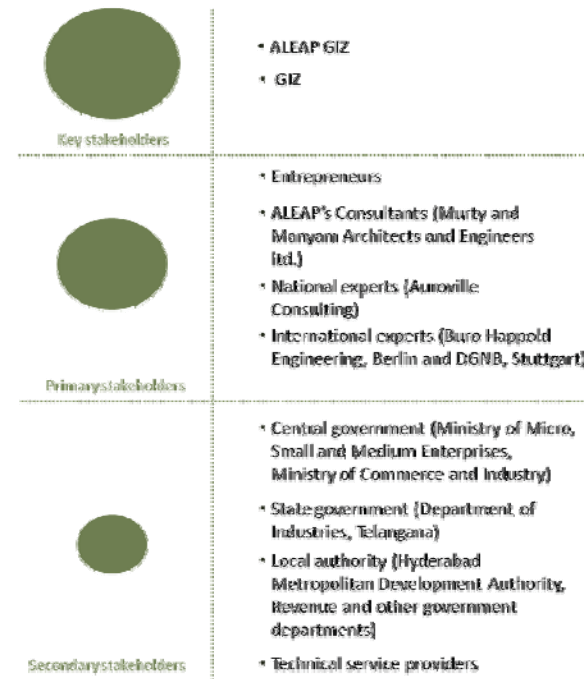


Fig. 3.1: Stakeholder Map

The industries in A-GRIP being SMEs, the Ministry of Micro, Small and Medium Enterprises in the Central Government (Government of India) had a supportive role to participate in the learning process through an international conference. The Department of Industry of the State Government of Telangana had a very important role to play to provide support to ALEAP. ALEAP’s constant interactions with them and the political setup, helped gather interest into A-GRIP that was catering to women entrepreneurs. The other secondary stakeholders included the local authorities, providers of infrastructure and services that were consulted to check the viability and accordingly decisions on making provisions in the site master plan were made.

The stakeholders map is shown in Figure 3.1. The processes followed had steering processes, core processes and auxiliary processes as shown in Figure 3.2.

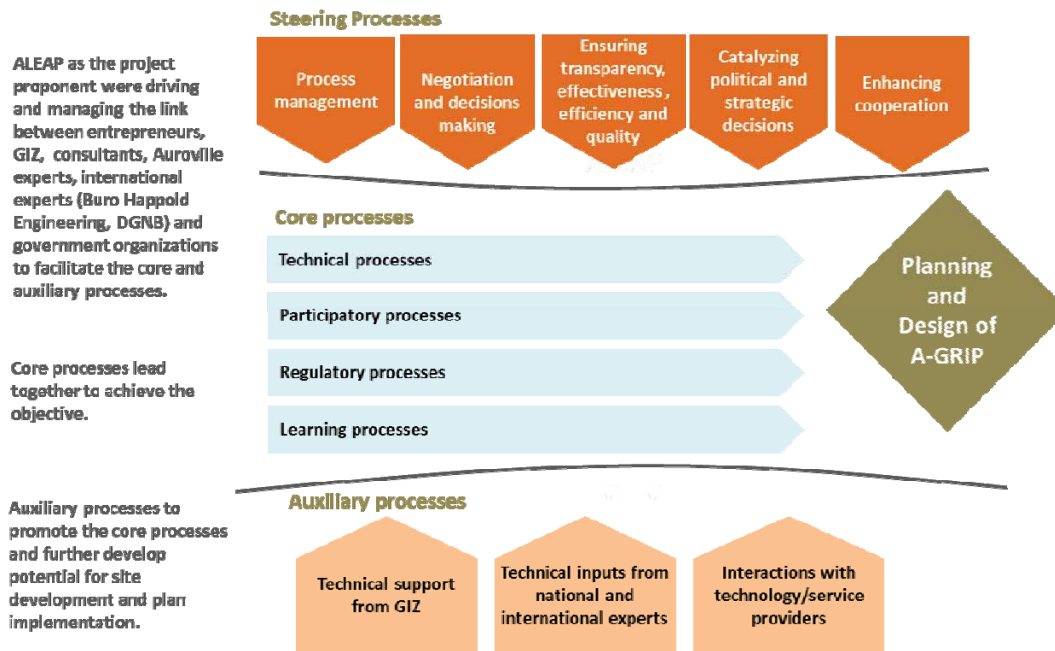


Fig. 3.2: Processes Landscape

The details of the processes followed are given below.

► Steering processes

ALEAP, with the President of the association and office bearers lead the steering processes, which mainly included:

- Process management, including support to core processes and auxiliary processes.
- Negotiating on and decisions making, including collation of different perspectives.
- Ensuring transparency, effectiveness, efficiency and quality.
- Catalysing political and strategic decisions.
- Enhancing cooperation among partners and stakeholders.

ALEAP engaged planning consultants for undertaking site master planning. ALEAP was in regular contact with political and governmental set up, due to which eventually the State Government took a decisions to have similar industrial parks for women entrepreneurs in all the districts of the State.

► Core processes

The core processes that were the essential inputs of the project to the development goal were unique in nature and delivered a direct contribution towards achieving the project objectives. The core processes included technical processes, participatory processes, regulatory and learning regulatory processes. Brief details are given below.

- **Technical processes:** The technical processes included-
 - » Development of basic concepts and their periodic revisions based on expert inputs from GIZ, statutory requirements, learning processes and stakeholder feedback.
 - » Active interactions between ALEAP, its consultants and GIZ.
 - » Review of the master plans by national and international experts engaged by GIZ and check with German Sustainable Building Council quality parameters and standards.

- **Participatory processes:** The participatory processes included roles of various stakeholders at various stages of site master plan preparation, in particular the roles of the women entrepreneurs that would set up their industries in A-GRIP. The main outcomes from the participatory process were:
 - » Visioning the industrial park and naming the industrial park as a Green Industrial Park with environment-friendly aspects integrated.
 - » Different perspectives and requirements were taken into consideration into planning so as to avoid future conflicts.
 - » Clarity on plot sizes, infrastructure and service provisioning in the industrial park.
 - » Provisioning for Green Factory Buildings, central Green Spines with hierarchical laterals, decentralised wastewater treatment and recycle/reuse, waste recycling facilities etc.



Pic. 3.3: Stakeholders Meetings at ALEAP

- **Regulatory processes:** The regulatory processes included -
 - » Seeking information on statutory requirements and plan approval procedures of the local authorities.
 - » Meetings with the authorities on the context of the site with the site master plan.
 - » Formal plan submissions and their approval.
- **Learning processes:** The learning processes helped envision the industrial park as Green Industrial Park and to make provisions of various quality parameters that meet international standards. The learning processes included:
 - » Visit cum exposure to living case examples in Auroville, the experimental city in Tamil Nadu and interactions with national and international experts. (Refer Pictures 3.4 to 3.10).
 - » Orientation programmes were conducted for ALEAP, planning consultant and the entrepreneurs providing information on environment-friendly site master planning, resource efficiency, gender aspects and national/international case examples.
 - » Training programmes were conducted for representatives of ALEAP. (Refer Picture 3.11).
 - » 2 international conferences were organised on green business and planning of industrial areas. (Refer Pictures 3.12 and 3.13).
 - » Pilot activity was implemented and demonstrated on waste recycling at ALEAP's existing industrial park with a successful business, which fostered confidence on undertaking similar measures in A-GRIP. (Refer Picture 3.14).



Pic. 3.4: Visit to Handmade Paper Factory (Waste to High-end Stationery Products)



Pic. 3.5: Visit To Decentralised Waste Water Treatment Plant (Integration of Waste Treatment with Landscaping with Economic Benefits)



Pic. 3.6: Interaction with Sector Experts



Pic. 3.7: Live Examples of Earthen Architecture



Pic. 3.8: Visit to M/s Wellpaper (social enterprise for women empowerment through local livelihood)





Pic. 3.9: Visit to Botanical Garden
(Tropical Dry Evergreen Forest of Coromandel Coast through Biodiversity Conservation)



Pic. 3.10: Visit to Photo Voltaic Installations at Auroville



Pic. 3.11: Activities during the Training Programme on “Planning of New Green Industrial Parks and Investment Zones” organised by GIZ for the Site Master Planning Consultants, October 3-4, 2013



Pic. 3.12: International Conference on "Green Enterprises and Green Industrial Parks" organised by ALEAP at Hyderabad on July 18-20, 2013



Pic. 3.13: International Conference on “Planning of New Industrial Parks and Investment Zones”, organized by GIZ in New Delhi on October 7-8, 2013



Pic 3.14: Example of Vermi-Compost Plant at ALEAP Industrial Park, Gajularamaram

► **Auxiliary processes**

The auxiliary processes provided the back-up and support that facilitated and enabled the other processes to operate. These processes included:

- Technical support from GIZ, including suggestions on setting up of the processes, guiding through various processes and providing trusted opinions for taking decisions at various stages of site master plan preparation.
- Consultations with national and international experts for multi-sectoral inputs, benchmarks/standards, infrastructure and service provisions, areas requirements etc. and for review and feedback of the site master plan at various stages of its development. (Refer Pic. 3.15).



Pic. 3.15: Workshop on Rating of Site Master Plan Rating with DGNB, Germany

- Interactions with technology/service providers to understand the viable solutions available and their provisioning in the site master plan.

As a result of the steering processes and supportive process by GIZ, the Hon'ble Chief Minister of Andhra Pradesh (prior to State bifurcation) made an announcement on exclusive Industrial Parks for women entrepreneurs in all the Districts of the State. (Refer Pic 3.16).

POWER TO WOMEN

Exclusive industrial zones to be set up for women

DC CORRESPONDENT
HYDERABAD, MARCH 31

This move is bound to win brownie points for Chief Minister N. Kiran Kumar Reddy. The state government is gearing up to set up exclusive industrial zones for women entrepreneurs in all district headquarters.

The CM is likely to make an announcement in this regard in a couple of days. The industries department has been directed to be ready with the action plan for exclusive industrial parks for women entrepreneurs, who number less than five per cent in the industry.

Sources close to the Chief Minister said the model of Hyderabad-based Association of Lady Entrepreneurs of Andhra Pradesh (ALEAP), is likely to be extended to other

Companies owned entirely by women will be eligible for subsidy under the policy, which is getting its finishing touches

districts. The Chief Minister wants to showcase the parks as one of his government's many initiatives for women empowerment, said sources. Though the state's industrial policy 2010-2015 had envisaged reserving 10 per cent area in all industrial estates, the plan has not progressed further.

"There has been a demand to create exclu-

sive parks for women for better comfort level to the entrepreneurs and work force," a senior industries official said.

According to the industrial policy 'women entrepreneurs' are those where 100 per cent of the stake is held by women. The government will provide five per cent additional investment subsidy over and above the subsidy on fixed capital investment for micro and small enterprises. SC/ST women will get another additional five per cent. The project with an investment of ₹200 cr is promoted by Dubai-based United Polymers.

Mr Reddy is expected to lay the foundation stone for the new industrial project at Sarvepalli near Nellore, which he plans to visit during his Indira-mma Baata programme in Nellore on April 2.



Pic. 3.16: Laying of Foundation Stone for A-GRIP by the Hon'ble Chief Minister of Andhra Pradesh (prior to State bifurcation) and Announcement on Exclusive Industrial Parks for Women in all the Districts of the State

3.1.3 Methodology for Planning

The step-by-step approach followed for preparation of Site Master Plan of A-GRIP is shown in Figure 3.3. At various stages of plan preparation, stakeholder consultations and related processes were associated as briefed in the section above.

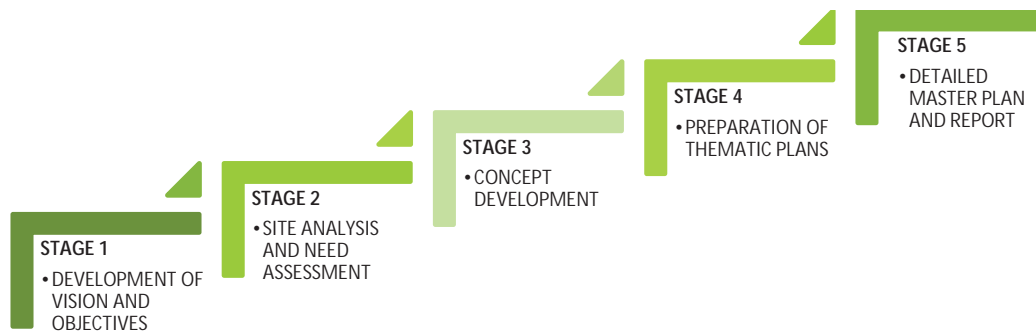


Fig. 3.3: Methodology of Planning

The main steps of this methodology adopted are mentioned below:

► **Stage 1: Development of vision and objectives**

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.”

With due course of time and auxiliary processes, this vision was further refined as below:

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

► **Stage 2: Site analysis and need assessment**

The technical team conducted a preliminary site visit to gain a better understanding of the physical conditions, transportation connections, access and nature of the surrounding uses during different seasons (pre-monsoon and monsoon). A detailed site assessment was later undertaken to understand the context of site, topography, drainage pattern, surface water, wind, radiation and rainfall to interpret the site profile and use the outputs while site design.

For assessing specific requirements of the women entrepreneurs that would invest in A-GRIP, a survey was conducted to understand their needs and aspirations. Also, informal interviews were held with residents from nearby villages. Based on preliminary data analysis, site observations and interaction with stakeholders, specific projection of demography, water demand, traffic generation etc. were done.

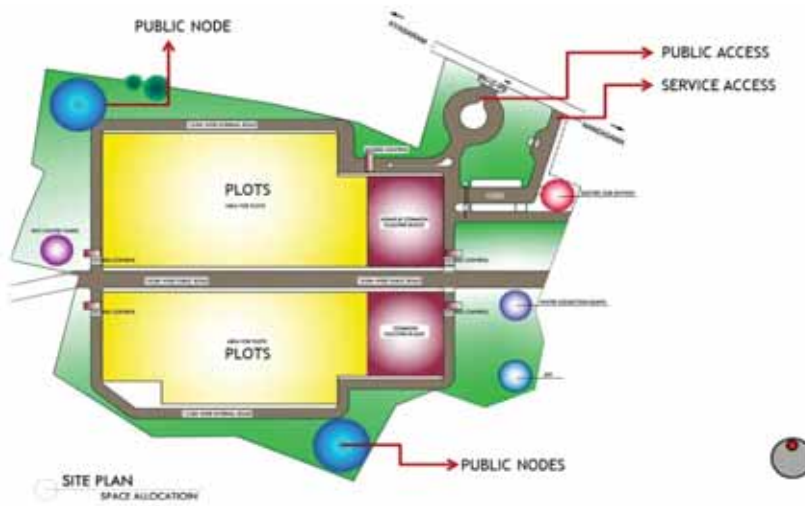
► **Stage 3: Concept development**

An integrated planning approach 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 the consultants with an objective to achieve maximum number of plots in the site area. However, after analysis the concept was modified according to natural slope so that minimum site disturbance would happen and natural drainage will be also retained. (Refer Figure 3.4).

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. The concept of green spaces was to create a network of interconnected green areas integrated with the storm water management and landscaping. A secondary network of green pathways was created to integrate the mobility with greens. Parking facilities were decentralized to ensure that

congestion. The facility clusters were positioned at strategic locations to serve as an interface of business, amenities and public.



1: First concept



2: Modified concept as per site analysis



3: Integration of green network and mobility



Fig. 3.4: Concept development
 [Source: 1,2-Murty and Manyam Architects and Engineers,
 3- GIZ-IGEP, 4-Buro Happold Engineering, Germany]

► **Stage 4: Preparation of thematic layers**

The concepts were translated into tangible design by following standards. A set of thematic plans were evolved namely: Land use plan, Zoning plan, Basic infrastructure plan, Technical infrastructure plan, Environmental infrastructure plan (including storm water and waste water management) and Social infrastructure plan.

► **Stage 5: Detailed master plan and report**

A detailed master planning report was prepared which is a comprehensive document that will guide development of A-GRIP. The key contents of the report are:

- Overview of A-GRIP – location, total area of the site, expected number of industries, expected number of service related industries supporting the main industry, project cost, expected employment generation, targeted investments etc.
- Land use break-up of the site.
- Designation of zones/sites for industries according to types and relative environmental impact etc. Elaboration of permissible industries and restricted industries.
- Basic infrastructure (road network, electricity, water supply, gas, eco-friendly transportation, security, fencing, fire and disaster management etc.).
- Technical infrastructure (green factory buildings, renewable energy/energy efficiency provisions, business centre, warehouses, training centre, design centre, incubators etc.).
- Environmental infrastructure (storm water drainage, sewerage/wastewater conveyance, wastewater treatment and disposal facilities, solid waste management facilities, green/open spaces/ landscapes, environmental monitoring etc.).
- Social infrastructure (food and beverages facilities, training/entrepreneurship development facilities, recreational facilities, gender specific infrastructure – provisions for women employees, barrier free infrastructure to enable people with disabilities, guest house, public toilets, health centre etc.

Visualizations (2D/3D drawings) of the features suggested in the Site Master Plan

- Statement on compliance with applicable standards, criteria, guidelines, procedures etc. (including environmental considerations/criteria, “green” criteria, environmental clearances etc.).
- Plans and thematic layers in the required scale.

3.1.4 Standards and Rating Systems

The site master plan of A-GRIP has adherence to the local building bye laws, norms and standards. Also, to make the site attractive for investors and in line the vision developed for A-GRIP, the existing international and national rating systems were taken into consideration.

► Standards

- **Zoning regulations for development of green layouts (HMDA)⁹**

The A-GRIP site master plan took into consideration various environmental planning and design measures for development of ‘Green Layout’ as per the norms prescribed under Section B of Zoning Regulations of Hyderabad Metropolitan Development Authority. They are:

- » Water recycling & reuse;
- » Conserving site geology;
- » Conserving site vegetation;
- » Adherence to site contours;
- » Energy efficient street lighting;
- » Water conserving landscaping;
- » Eco-friendly transportation on-site;
- » Reduction of outdoor light pollution;
- » Soil conservation and erosion control;
- » Provision for minimum local amenities;
- » Provisions for waste management on-site;
- » Provisions for rainwater harvesting on-site;
- » Layout planning & design as per solar geometry;
- » Zero discharge of waste water and storm water from site;
- » Provisions for safe disposal of unused treated waste water;
- » Operation & maintenance requirement for decentralized WWTS; and
- » Integrated approach for Sustainable Urban Drainage System (SUDS).

- **Layout and building rules**

The relevant government orders on the Andhra Pradesh Gram Panchayat Land Development (Layout and building) Rules – 2002 -G.O. no. 33, 67 and 168 and provisions in Delhi Master Plan 2021 were looked into for plan preparation and provisioning of infrastructure. These include:

- » Scale and components of drawings - A site plan of A-GRIP was drawn to scale of 1:1,000 showing all physical details of the land, boundaries of the land, the surrounding existing layouts/lands, and existing approach roads to the land where the layout is proposed.
- » Layout and subdivision regulations – A minimum width of proposed roads in A-GRIP is 12 m as it is a non-residential layout. The open spaces set apart in plan for parks and playground is more than 10% of the total site area.
- » Restriction of building activities around water bodies - No construction has been planned in the bed of the drain abutting the site.

⁹ Government of Andhra Pradesh.(2013). *Zoning and development promotion regulations, (G.O. Ms. No.33), Metropolitan Development Plan-2031 for Hyderabad Metropolitan Region*, Hyderabad: India Retrieved from: [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)

- » Social infrastructure – The needed amenities like health care, fire station etc. have been in the plan as per the space and population threshold standards.
- » Utilities - As per norms, A-GRIP will have all the utilities lines below the ground but not under the main carriage way. For example, these include power transmission lines, water conveyance, treatment, adequate storage and distribution within the park and telephone lines, and telecommunications network.
- » Distribution of land for various uses in A-GRIP was considered as per Master Plan for Delhi – 2021.

► **Rating systems**

• **International - DGNB rating system for industrial districts**

The German Sustainable Building Council (DGNB) provides a certification system for industrial locations. It is based on international codes and standards making it easy to use in various countries while at the same time providing high quality and transparency. It has a comprehensive set of indicators that are grouped into 5 main categories (Refer Figure 3.5) and a series of sub-categories that are further broken down to individual indicators.



Fig. 3.5: DGNB Main Criteria Groups for Rating of Industrial Parks
 [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 of gold (if the total score is at least 80 %), silver (if the total score is at least 65 %) or bronze (if the total score is at least 50 %) is provided which can be used in product packaging as well as marketing of the industrial park. A-GRIP plan was pre-assessed by DGNB auditor to get an idea on the extent to which the necessary provisions were made and the results show that the site could possibly qualify for “gold” rating.

• **National - IGBC Rating system for Green Factory Buildings**

The Indian Green Building Council (IGBC) has a ‘Green Factory Building Rating programme’ which enables the designer to apply green concepts and criteria in individual factory buildings. This rating system facilitates the development of energy efficiency, water efficiency, health and more productive, environmentally friendly factories. It evaluates certain credit points using a prescriptive approach and other credits on a performance based method. A-GRIP is proposed to have all factory building designed as per IGBC green factory building standards.

3.1.5 Highlights of the Site Master Plan of A-GRIP

► **Overview**

The following table gives a general overview about the A-GRIP case example.

Table 3.1: Overview of A-GRIP

Industrial park	A-GRIP, Nandigama
Total area of the site	» 82.54 acres
Expected number of enterprises	» About 170

Expected number of service related entrepreneurs catering to A-GRIP	» About 24
Project cost	» Approx. INR 37.75 cr ¹⁰ ≈ 6 million \$ (including land cost, infrastructure and services; excluding factory buildings cost)
Expected employment generation	» 12,000 (direct employment)
Targeted investments	» INR 300 cr ≈ 48 million \$
Site master plan inputs by	» Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH » Auroville Consulting » Buro Happold Engineering, Germany » German Sustainable Building Council (DGNB), Germany
Site Master Plan finalization by	» ALEAP » Murty and Manyam Architects and Engineers Ltd.

A-GRIP as a new industrial park, planning was more effective as it was taken up from a green field situation. The core processes, particularly the participatory processes were very effective due to active participation of the future industrial investors of the industrial park.

► Land use

The proposed land use distribution of A-GRIP is as below:

Table 2.2: Overview land use in A-GRIP

S.No.	Land Use	Standard ¹¹	Area (in m ² & %)
1	Industrial	55%-60%	173,377 (51.89 %)
2	Recreational: Buffer zones, parks, sports field, etc.	10%-12%	38,535 (11.53 %)
3	Commercial: Shopping Centre, petrol pumps, guest house/ budget hotels, lodging and boarding, service and repair shops, communication / telephone exchange etc.	2%-3%	3,504 (1.05%)
4	Facilities: Public and semi – public- Fire Station/ fire post, police station / police post, hospital / dispensary, day care centre etc.	8-10%	18,732
	Utilities- Electricity sub-station, CETPs, pumping station, underground reservoir / firefighting tanks and other utilities etc.		26,891
	Sub-total		45,623 (13.65%)

¹⁰ Cr stands for Crore. A Crore is a unit in the south Asian numbering system equal to ten million.

¹¹ Delhi Development Authority. (2010). *Master Plan for Delhi – 2021*. New Delhi, India; Retrieved from <https://dda.org.in/ddanew/pdf/Planning/reprint%20mpd2021.pdf>

5	Transportation: Circulation, loading/unloading area, parking, idle truck parking, goods vehicle parking etc.	18-20%	73,055 (21.88%)
	TOTAL AREA		334,094 (100%)

► **Zoning**

The division of industrial zones in A-GRIP has been done to cluster similar industries together and provide for their common infrastructure. Industries like pharmaceutical formulations, plastic products 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. (Refer Annex II, Map no. 2).

Only non-polluting “green” industries are allowed for plot allocation in A-GRIP. No Category A or B industries as per EIA Notification issued under the Environment (Protection) Act 1986 will be allowed for establishment in the Industrial Estate.

► **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 requirements expressed by women entrepreneurs. To achieve linear, viable spans of structure and optimum setbacks, the plot dimensions were standardized based on the golden ratio. The plot sizes were 38m x 22m (1000 sq yd.) and 26 x 20 (620 sq yd.).

► **Plot orientation**

Most of the plots in the A-GRIP have orientation of 30° to the North for optimum climatic comfort. (Refer Figure 3.6).

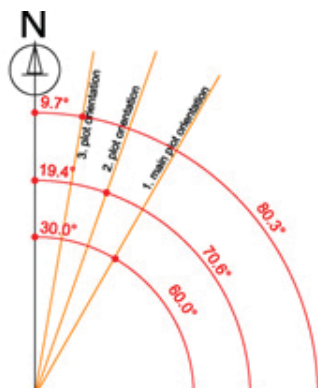


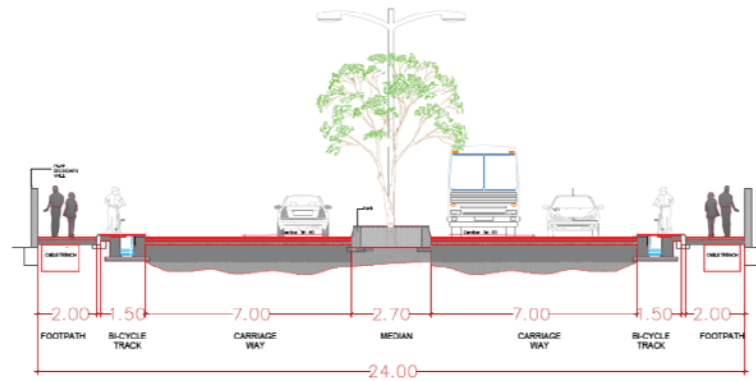
Fig. 3.6: Plot Orientation
[Source: Auroville Consulting]

► **Basic infrastructure**

- **Road network**

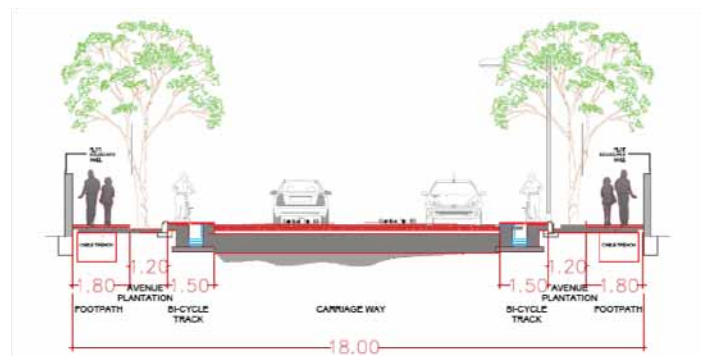
A-GRIP has hierarchical and standardized road geometry (Refer Annex I, Map no. 3). Various characteristics of roads are described below:

Level 1: 24 m R-O-W
(2+2 Motorized vehicle lanes, median, pedestrian path, street lights, bicycle track with underground utilities)



Level 2: 18 m R-O-W

(2+2 motorized vehicle lanes, median, pedestrian path, street lights, bicycle track with underground utilities)



Level 3: 12 m R-O-W

(1+1 Motorized vehicle lanes, median, pedestrian path, street lights with underground utilities)

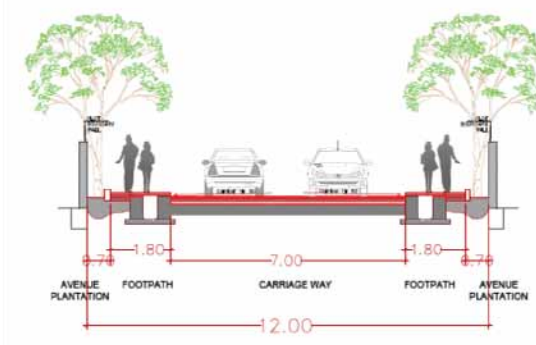


Fig. 3.7: Road Network A-GRIP

[Source: Murty and Manyam Architects and Engineers]

- **Entry/exit provisions**

For effective safety and monitoring of A-GRIP and its workers, the main entrance is proposed with access control, security cabin and CCTV control room. Also, the main gate is planned to reflect the ethos of women entrepreneurship and sustainable industrial development.

- **Eco-efficient transportation**

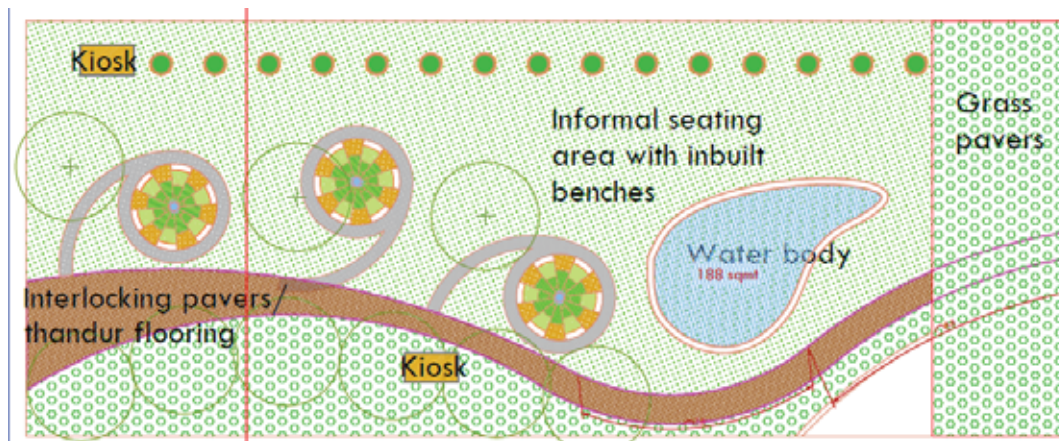
The transportation for A-GRIP is proposed to adapt walking, bicycling and use of green fuels. Hence, provisions for pedestrian paths, bicycling tracks and battery operated shuttle buses

The pedestrian paths are also integrated with the green pathways in between the plots to provide a natural, attractive and safe option of travel. Provision of amenities that encourage pedestrian movement, such as benches, street trees, waste receptacles, street lighting, shelter at public areas and curb cuts for accessibility to collector/distributor roads have been made. (Refer Images no. 17,18).



Pic. 3.17: Green Pathway Through the Row of Industrial Plots
 [Source: Murty & Manyam Architects and Engineers]

The provisions are envisaged along the walking tracks. (Refer Picture 3.17 and 3.18)



Pic. 3.18: Sitting And Interacting Amenities In Walking Zones
 [Source: Murty & Manyam Architects and Engineers]

- **Parking provisions**

Provisions for parking have been made based on hierarchy, purpose, safety accessibility and space standard. To avoid truck parking on-street in a haphazard manner, organized parking is planned at park level (overnight stay), zone/cluster level (temporary stay) and plot level (loading/unloading). (Refer Annex I, Map no. 2).

For passenger cars and motorbikes, adequate parking areas are provided close to individual plots (cars and two wheelers of employees; temporary parking for visitors). (Refer Annex I, Map no. 3).

- **Signage**

A-GRIP is proposed to have a system of signages to make it well- connected and easily manoeuvrable. The following types of signage are planned at strategic locations:

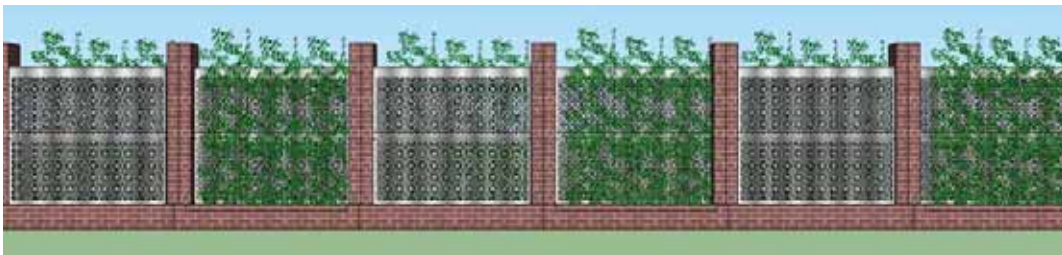
- » Directional signage along major roads, pedestrian ways, and bicycle ways;
- » Building identification signage (Refer Picture 3.19);
- » Signage on landmarks, central facilities, zonal facilities etc.;
- » Signage pertaining to names of industries;
- » Information signage; and
- » Advertisement boards/hoardings.



Pic. 3.19: Signage for Building Identification
 [Source: Murty & Manyam Architects and Engineers Ltd.]

- **Fencing**

Environment-friendly fencing is proposed for entire A-GRIP built with local materials and conforming to an elegant design. (Refer Picture 3.20).



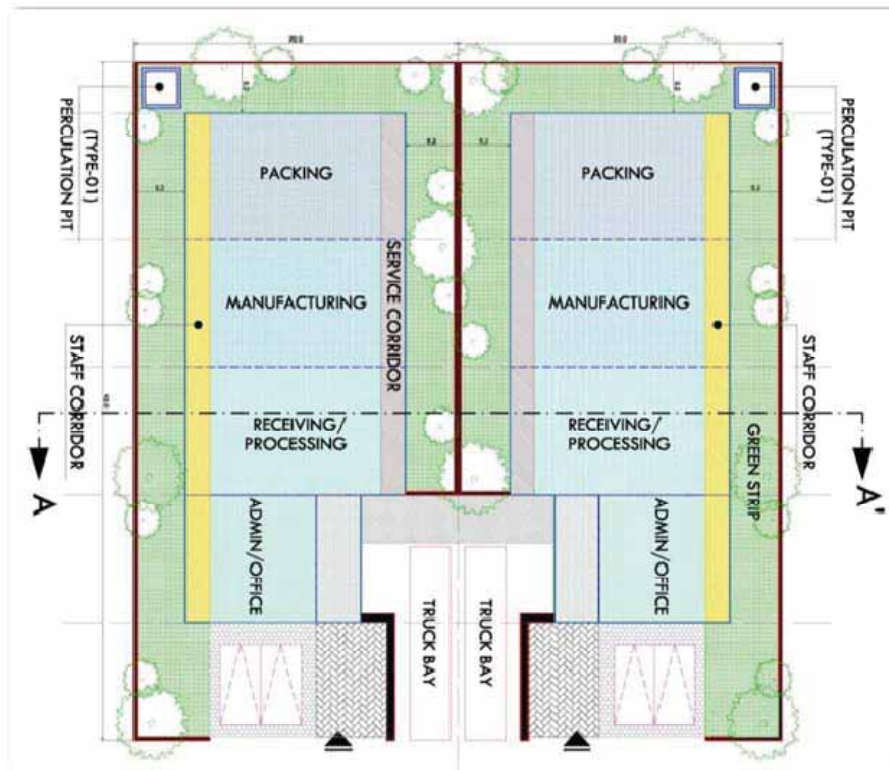
Pic. 3.20: Green Fence Design
 [Source: Murty & Manyam Architects and Engineers]

- ▶ **Technical infrastructure**

To strengthen the business opportunities, A-GRIP has provisions of all necessary logistic and business facilities like warehouses, maintenance centre, weigh bridges, business centre, space for marketing, exhibition, research and development, auditorium, training centre, visitor's information centre and incubators. (Refer Annex I, Map no. 4).

- **Building architecture**

Building design at A-GRIP is proposed to be climate suitable and responsive. A standardized internal layout is proposed for all factory buildings as per tropical wet-dry to reduce operational energy use. (Refer Picture 3.21). Local building materials that have minimum processing and pretreatment will be used for construction of the buildings.



Pic. 3.21: Standard Block Layout and Façade of Abutting Plots
 [Source: Murty & Manyam Architects and Engineers]

- **Use of renewable energy**

Solar street lighting installations with individual battery backup are proposed. A-GRIP is proposed with 'green' roof tops, combined with solar panels to reduce cooling needs as well as meet part of energy requirements through 'green' energy. (Refer Picture 3.22).



Pic. 3.22: Installations for Use of Solar Energy in Industrial Buildings
 [Source: Murty & Manyam Architects and Engineers]

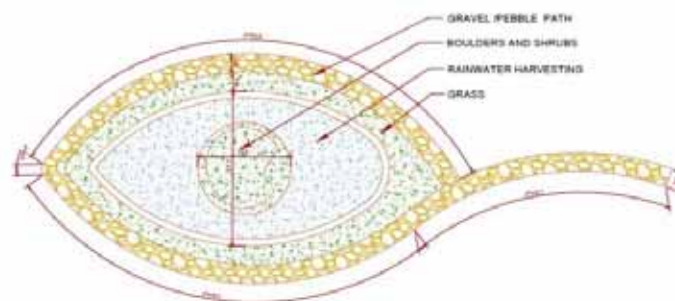
- **Energy efficiency provisions**

All buildings in the A-GRIP are required to be energy efficient as per the Energy Conservation Building Code (ECBC). Process loads for industrial buildings are excluded.

- ▶ **Environmental infrastructure**

- **Storm water management**

To prevent from contamination/pollution due to storm water runoff, A-GRIP would have storm water collection system the basis of 1 hour peak rainfall with 85% coefficient of runoff. The storm water will be collected in lined ponds in which storm water will be collected, tested and treated if required, and then sent for recycle/reuse. (Refer Picture 3.23). Storm water management system has been decentralized taking into consideration slopes/topography of the site.



Pic. 3.23: Rain Water Harvesting Pond Details
 [Source: Murty & Manyam Architects and Engineers]

- **Wastewater management**

A-GRIP has provisions for wastewater conveyance system in accordance with slopes and zoning of industries. The treated water (after complying with the required standards) shall be recycled/ reused.

- **Solid waste management**

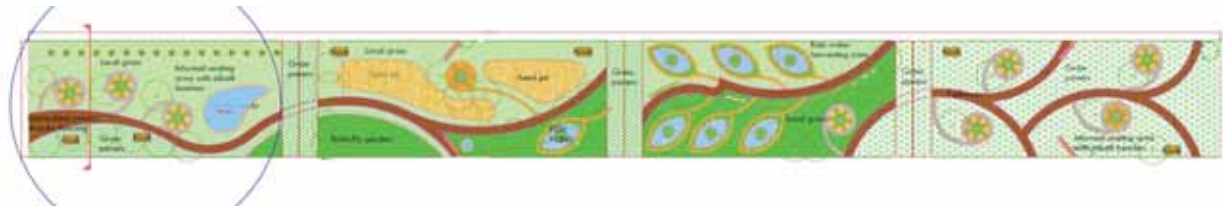
A-GRIP has provisions for solid waste management including collection, transportation, storage, and disposal of wastes. Space has been earmarked for waste recycling industries like handmade paper unit, vermicomposting etc. (Refer Picture 3.24).



Pic. 3.1: Example of Handmade Paper Unit at ALEAP Industrial Park, Gajularamaram

- **Open spaces and landscaping**

A hierarchy of interconnected green spaces is proposed in A-GRIP. There is a huge central green spine to act as a lung space for the industrial park (Refer Picture 3.25), green belts at the periphery will act as a buffer, vertical and horizontal stretches of greens spreading across the industrial park in the form of avenue plantations and green pathways and greens at the plot level. All of them will have cumulative effect of micro-climate control, pollution prevention and visually pleasing landscape. (Refer Annex I, Map no. 5). It is also proposed that as far as possible native species of trees and shrubs will be planted for conservation of local biodiversity.



Pic. 3.25: 'Green Spine' at A-GRIP

[Source: Murty and Manyam Architects and Engineers]

- ▶ **Social infrastructure**

- **Women friendly social amenities**

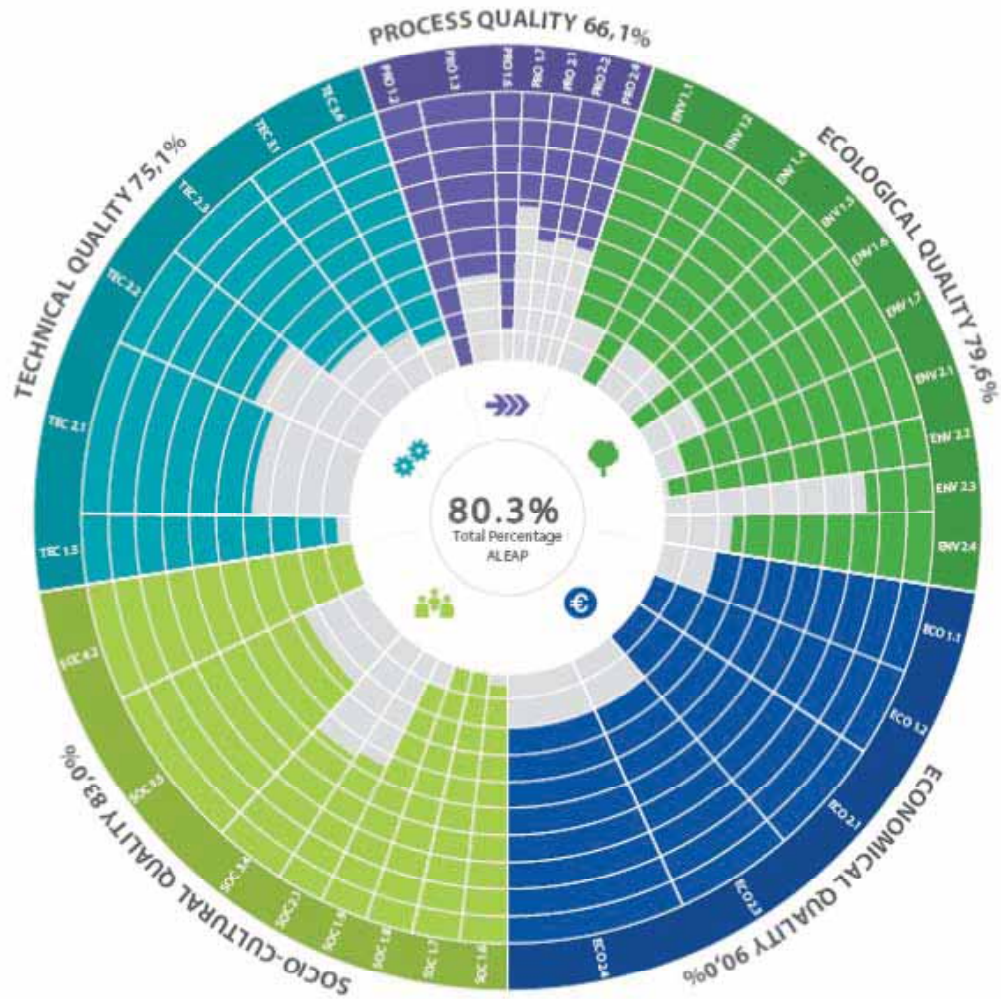
Unique services for women employees are included in the site master plan. These, for example include crèche, toilets, rest rooms for extended work, first aid, catering/canteens (centralised), kiosks, common toilets, internal shuttle service (battery operated), external connection to public transport, water dispensers, guest house, ladies room (Refer Annex II, Map no. 6).

- **Art in industrial park**

One landmark structure will 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 the 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.

3.1.6 International Rating of Site Master Plan of A-GRIP

An assessment of the site master plan of A-GRIP was done by international experts for compliance with the DGNB rating system and the results showed that the plan could comply with 'Gold' rating. (Refer Picture 3.26).



Pic. 3.26: 'Gold' Rating of A-GRIP as Preliminary DGNB Assessment
 [Source: BuroHappold Engineering, Berlin]



Mrs K Rama Devi, President, Association of Lady Enterprenerus of Andhra Pradesh (ALEAP)

1. How this idea of lady entrepreneurs in an industrial park came?

The need to set up industrial park was felt as we intend to foster Global competitiveness and growth for women entrepreneurship, by providing infrastructure.

2. How ALEAP has changed the overall IP? Did GIZ-IGEP supported in conceptualizing the park?

Various initiatives taken up by GIZ and IGEP like recycle of waste in Industrial parks, preparing vermi compost from waste and Handmade paper. Awareness created on environment- friendly techniques overview of Environment management and importance of Green Industries for sustainable development, led us to create ALEAP Green Industrial Park (AGRIP) with the support of GIZ who provider Master Plan for this Green Industrial Park in MEDAK.

3. As GIZ-IGEP, promoting gender equality within the programme was our mandate. What motivated you to start the lady entrepreneurship programme?

More importance is given to women entrepreneurs, who are encouraged to follow various techniques for recycle & reuse of materials. We are motivated to start women focussed progress because women are the vulnerable group, access to information and infrastructure is lacking in our country. ALEAP provides required facilities to encourage women entrepreneurship with objective to create inclusive growth.

4. What ALEAP has achieved so far?

ALEAP has the recognition of Best BMO in the country, and well recognised by Government and International organisations for being responsible organisation.

- a. We have our own Industrial Parks*
- b. Membership of 5000 women*
- c. Entrepreneurship development institute*
- d. International partnership with GIZ, British council, ILO*
- e. Credit Guarantee association for members*
- f. Accreditation from NABET regarding quality certification*
- g. Provided training to more than 50000 women*

5. Any challenges, any difficulties or bottlenecks that you have faced during the cooperation with GIZ?

There are no issues with GIZ and support extended gave us knowledge on various issues and good practices adopted in the International scenario. The co-operation gave us capacities to create an Eco- Industrial Park in our country.

6. Based on the challenges, experiences and working at Macro, Meso and Micro level, what were some key learning's from your end?

Key learnings are importance of manpower training in the area of environment and climatic issues, which is not sufficient in our country. Also, the importance of master plan for Industrial Estates for MSME was another key learning.

7. Your future vision for ALEAP. How this can be replicated in other industrial areas?

We want to show case our Green Industrial Park to the world, this will give visibility to various programs which we have adopted in the park like reuse of water, waste management, common facilities, Green concept for entrepreneurship. This can be replicated as model for MSME Industrial Parks. Our vision is to encourage sustainable production with mission of providing environment friendly techniques.

3.2 Green Industrial Park (GIP), JADCHERLA

3.2.1 About GIP, Jadcherla

The site is located approximately 83 km from the city of Hyderabad at Jadcherla Mandal, Mahboobnagar district in Telangana. The total area of the site is 3.31 km² with certain areas already developed with infrastructure.

GIP is being developed by the Telangana state Industrial Infrastructure Corporation Ltd. (TSIIC)¹² which is a public enterprise of the State Government of Telangana, vested with the mandate of providing industrial infrastructure and development of industrial areas.



Pic. 3.27: Location of Site in Telangana

[Source:

http://en.wikipedia.org/wiki/Mahbubnagar_district#mediaviewer/File:Telangana_Districts_Map.png]



Pic. 3.28: Map of GIP Jadcherla

[Source: © Happold Cities]

The GIP site at Jadcherla was already planned and partly developed by TSIIC. However, eventually TSIIC decided to re-plan the industrial park integrating “green” aspects. Accordingly, for re-planning, GIP at Jadcherla was envisioned to be a model “Green Industrial Park” with an environment-friendly site master plan reflecting the aspects of adequate infrastructure, resource efficiency, environmental monitoring, gender friendliness and supporting infrastructure for the employees/workers.

3.2.2 Process Followed

With the task in hand, it was not enough to be “doing things right” (i.e. to be efficient) but also to be careful about “doing the right things” (i.e. being effective). The planning and designing of GIP required concerted and consistent efforts involving national and international experts.

The key stakeholders were TSIIC and GIZ that played most important role in the re-planning of GIP. GIZ provided capacity building and technical support to TSIIC in preparing the revised Site Master Plan of GIP as a pilot activity under its Indo-German Environment Partnership (IGEP) programme of the Indo-German Development Cooperation. GIZ engaged international experts (BuroHappold Engineering, Berlin and DGNB, Stuttgart) for review, recommendation and assessment of Site Master Plan with regard to DGNB (German Sustainable Building Council) rating system. For overview of stakeholders involved, refer to Figure 9.

¹² Prior to state bifurcation of erstwhile Andhra Pradesh on June 2, 2014; GIP Jadcherla was under Andhra Pradesh Industrial Infrastructure Corporation Ltd (APIIC).

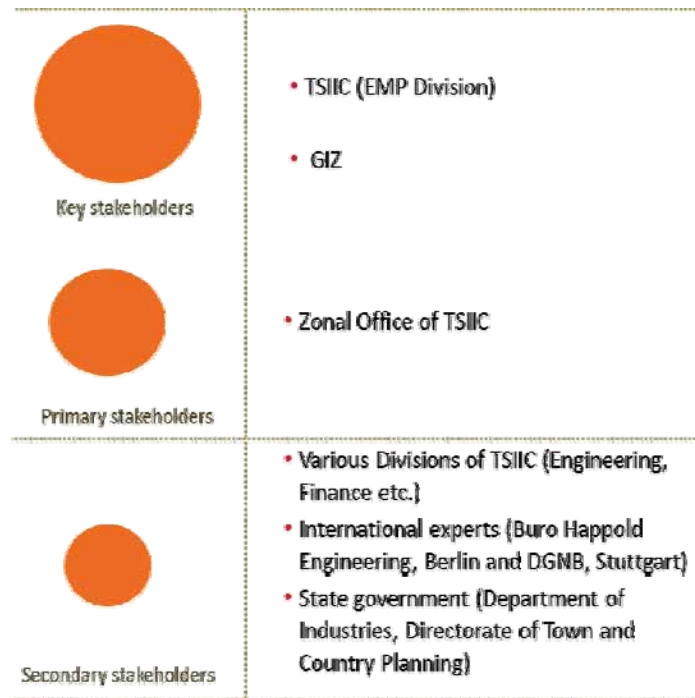


Fig. 3.8: Stakeholder Map

The processes followed had steering processes, core processes and auxiliary processes as shown in Figure no. 10.

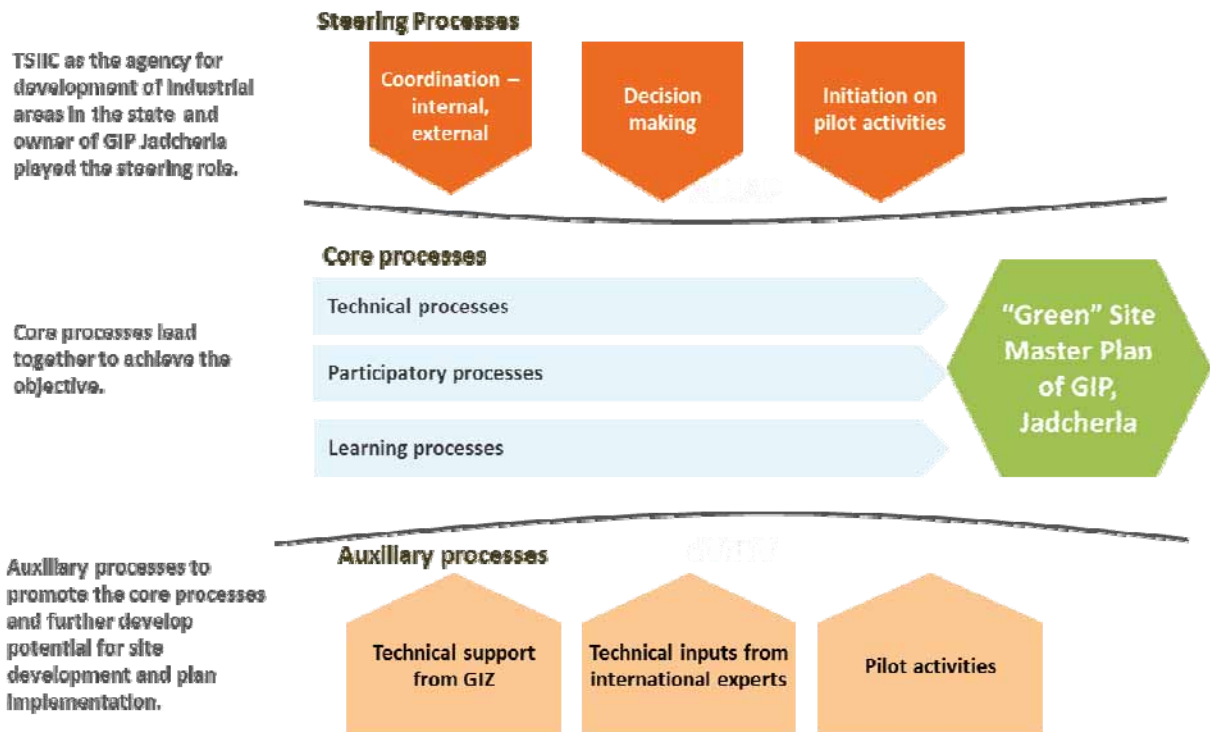


Fig. 3.9: Processes Landscape

The details of the processes followed are given below.

► **Steering processes**

TSIIC, with the Managing Director and the members of the working group from head office and zonal offices lead the steering processes, which mainly included:

- Internal co-ordination within TSIIC and external with other departments;
- Effective leadership and decision making; and
- Ensuring pro-active participation in pilot activities.

► **Core processes**

The core processes that were essential inputs for the project were unique in nature and delivered a direct contribution towards achieving the project objectives. The core processes included technical processes, participatory processes, and learning processes. Brief details are given below.

- **Technical processes** - The technical processes included:
 - » Active interactions between GIZ and TSIIC for understanding GIP Jadcherla's previous layout;
 - » Assessment of needs and revision of the previous layout by incorporating "Green" criteria and generation of thematic layers;
 - » Recommendation on the "Green" Site Master Plan of GIP Jadcherla by international experts engaged by GIZ; and
 - » Review and recommendations by German Sustainable Building Council about the quality parameters and standards for international rating.
- **Participatory processes** - The participatory processes included roles of various stakeholders, particularly various divisions of TSIIC itself, at various stages of preparation of the revised Site Master Plan. The main outcomes from the participatory process were:
 - » Identification of infrastructure requirements for incorporation in GIP Jadcherla;
 - » Compilation of applicable norms and standards; and
 - » Assessment of various infrastructure costs and their impact on the plot prices.
- **Learning processes** - The learning processes helped TSIIC to understand the technical aspects of site master planning of industrial areas and the "Green" criteria. The learning processes included:
 - Orientation programmes were organised for the officials of TSIIC on "Identification of Infrastructure Requirements in Existing Industrial Parks" and "Planning of New Industrial Parks and Investment Zones" (2013). To understand issues of concern in the existing industrial parks, potential solutions, approaches for implementation of infrastructure requirements etc. (Refer Picture 3. 29 and 3.31).
 - TSIIC, in technical cooperation with GIZ (IGEP), initiated the one month long "Industrial Environmental Improvement Drive" in various Industrial Parks spread across the State in 2012. This had a visual learning impact on the participants about the cleanliness and plantation in the industrial parks. This drive has now become a yearly activity for APIIC and TSIIC. (Refer Picture 3.30).
 - International Conference on "Planning of New Industrial Parks and Investment Zones" was organized by GIZ in New Delhi on October 7-8, 2013 for national and international perspective and knowledge sharing. (Refer Picture 3.32).
 - A 3-day training programme on "Planning of New Green Industrial Parks Investment Zones" was conducted by GIZ for APIIC during October 9-11, 2013 for providing information

on environment-friendly site master planning, resource efficiency, gender aspects and national/international case examples. (Refer Picture 3.33).

- A training programme was conducted at Auroville, the experimental city in Tamil Nadu, during which exposure to sustainable practices were given to the participants including representatives of TSIIC (Refer Picture 3.34 to 3.39).
- Hands-on training programmes were conducted for working group on site master planning at TSIIC.



Pic. 3.29: Interactions during the Orientation Programme on “Identification of Infrastructure Requirements in Existing Industrial Parks” organized by GIZ for APIIC and APPCB on May, 2013



Pic. 3.30: Environment Drive in Industrial Parks of APIIC, 2013



Pic. 3.31: Activities during the Orientation Programme on “Planning of New Green Industrial Parks Investment Zones” organised by GIZ for APIIC, October 1, 2013



Pic. 3.32: International Conference on “Planning of New Industrial Parks and Investment Zones”, organized by GIZ in New Delhi on October 7-8, 2013



Pic. 3.33: Illustrations of the Activities during the Training Programme on “Planning of New Green Industrial Parks Investment Zones” organised by GIZ for APIIC, October 9-11, 2013



Pic. 3.34: Interactive Learning Processes in National Training Programme on “Environment Friendly Siting and Site Master Planning of New Industrial Parks”, June 10-12, 2014 at Auroville



Pic. 3.35: Live examples of Earthen Architecture
[Source: Auroville Consulting]

Pic. 3.35: Visit to M/s Wellpaper



Pic. 3.37: Visit to Botanical Garden (Tropical Dry Evergreen Forest of Coromandel Coast through Biodiversity Conservation)
[Source: Auroville Consulting]

Pic. 3.38: Visit To Decentralised Waste Water Treatment Plant (Integration of Waste Treatment with Landscaping with Economic Benefits)



Pic. 3.39: Glimpses of Exposure Visit to Sustainable Practices at Auroville

► **Auxiliary processes**

The auxiliary processes provided the back-up and support that facilitated and enabled the other processes to operate. These processes included:

- Technical support from GIZ, including suggestions on setting up of the processes, guiding through various processes and providing trusted opinions for taking decisions at various stages of site master plan preparation.
- Consultations with international experts for inputs storm water management, standardization of road cross sections and planning for mobility with thin GIP.
- Preliminary review of the Site Master Plan for GIP Jadcherla based on DGNB benchmarks/standards to ensure compliance with environmental, technical, social, process and economic quality (Refer Picture 3.40).



Pic. 3.40: Site Master Plan Rating Workshop with DGNB, Germany

3.2.3 Methodology for Planning

The step-by-step approach followed for preparation of “Site Master Plan of GIP, Jadcherla” is shown in Figure no. 11. At various stages of plan preparation, consultations and related processes were associated as briefed in the section above.

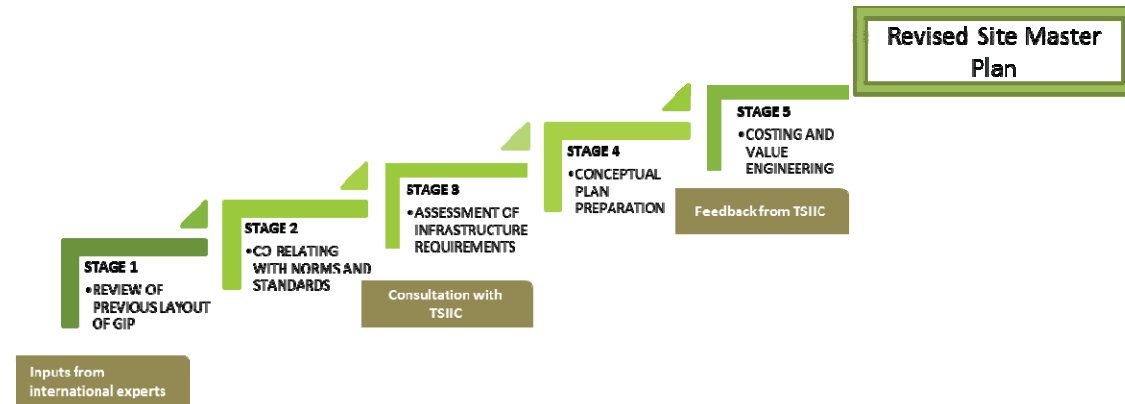


Fig. 3.10: Methodology of Replanning of GIP, Jadcherla

The main steps of this process are mentioned below:

► **Stage 1: Review of previous layout**

The previous layout of GIP (Refer Figure no. 12) was reviewed by GIZ (IGEP) and the international experts in consultation with TSIIIC.

The international experts along with officials from TSIIIC and GIZ conducted a preliminary site visit to understand the site conditions and its surroundings. Observations were made on the existing plantation, connection to nearby public transit nodes, drainage pattern on the site, and entry/ exit of the site.

It was found that the road geometry was as per the topographic characteristics and most of the metaled roads were constructed accordingly. However, integration of ‘green’ aspects in the master plan was inadequate.

► **Stage 2: Correlation with norms and standards**

GIZ-IGEP in consultation with TSIIIC officials prepared a document with specific guidelines and appropriate geometric design information for provisioning of infrastructure. Based on this document, space and location requirements were assessed for planning different facilities within GIP. Also, the scale of the Site Master Plan was fixed as per the Andhra Pradesh Building Rules 2012¹³ and other mandatory requirements were identified.



Fig. 3.11: Layout of GIP Jadcherla prior to Replanning
[Source: APIIC]

¹³ <http://dtcp.ap.gov.in:9090/webdtcp/G.O.Ms.No.168,Dt.07-4-2012-AP%20Building%20Rules.pdf>

► **Stage 3: Assessment of infrastructure requirements**

Based on preliminary data analysis, site observations and interaction with TSIIC officials, this stage focused on assessing the area requirements for parking of trucks, passenger vehicles, public toilets, storm water ponds, medical facility, training centre, business centre, warehouses etc. This assessment was also correlated with the projected industrial needs of GIP.

► **Stage 4: Conceptual plan preparation**

The previous layout of GIP was assessed in terms of its overall planning, distribution of facilities, location of greens, entry/exit areas etc. The contours and slopes were analysed to verify the alignment of the existing road network. The park was divided into various Industrial Zones were identified within the industrial park based on similarity of nature of industry, i.e. general engineering, special economic zone, small and medium enterprises, women’s industrial park and green industries cluster. Entrance zones and allied activities were identified for workers, trucks etc. The concept of integrated mobility and green spaces network was also applied on GIP master plan.

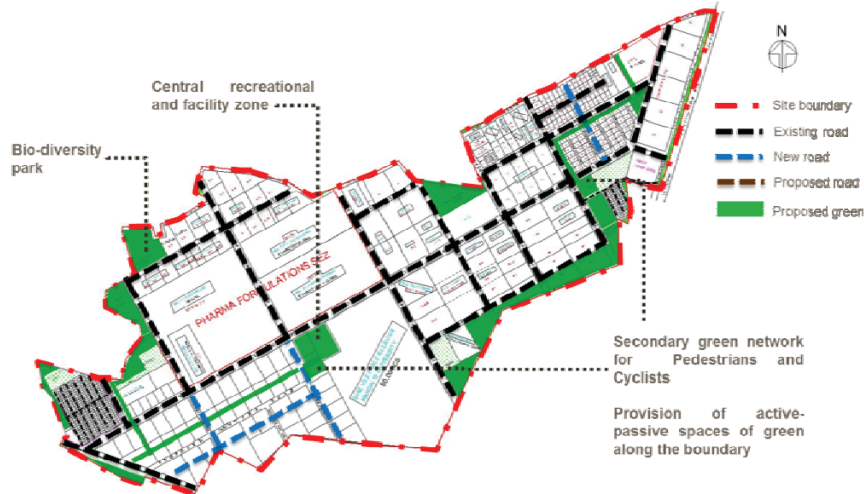
The facility zones with clustering of various facilities were meticulously located to integrate with natural landscape retained or enhanced within the industrial park. A hierarchy of facility zones was proposed wherein a centralized facility zone would be supported by zone level facility blocks. A draft list of infrastructure including all the components to be added as per requirement of GIP was prepared. The components were included in the master plan based on the norms and space standards. Different thematic plans originated as a result of concept development. These plans were then subjected to further scrutiny by APIIC teams to finalize the “Site Master Plan”.



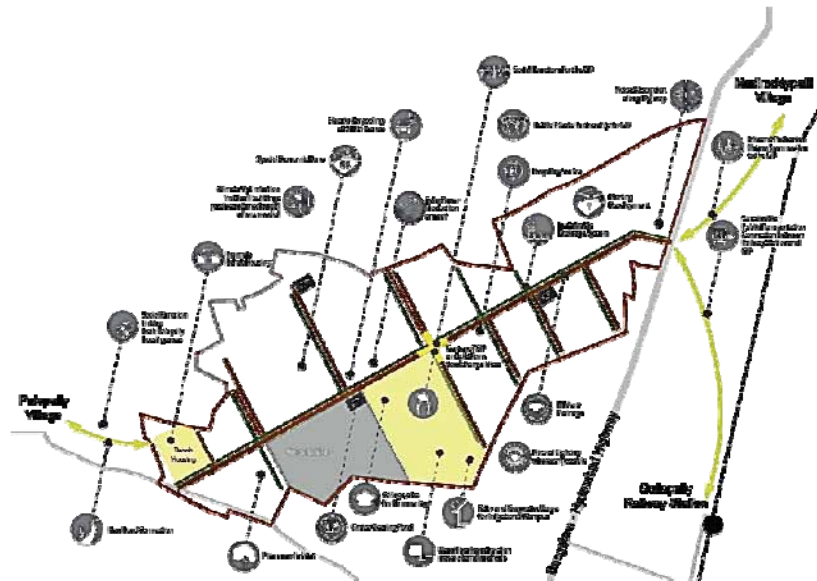
1: Analysis of previous layout



2: Contour overlay for road geometry and stream analysis



3: Integration of green network and mobility



4: Identification of locations of "Green" infrastructure

Fig. 3.12: Concept Development

[Source: 1,2,3- GIZ-IGEP; 4- Buro Happold Engineering, Germany]

► **Stage 5: Costing and value engineering**

A systematic costing system was prepared by GIZ (IGEP) in consultation with TSIC officials for assessing the cost of different components of each infrastructure plan. This was then analyzed through different scenarios to find best solution for implementation of Site Master Plan.

► **Revised Site Master Plan for GIP Jadcherla**

Based on the stakeholder consultation, a set of thematic plans were evolved namely: Land use plan, Zoning plan, Basic infrastructure plan, Technical infrastructure plan, Environmental infrastructure plan (including storm water and waste water management) and Social infrastructure plan. A detailed site master plan report was prepared that was seen as a guiding document for guiding the development of GIP. The key contents of the report are:

- Overview of GIP Jadcherla – location, total area of the site, expected number of industries, expected number of service related industries supporting the main industry, project cost, expected employment generation, targeted investments etc.
- Land use break-up of the site.
- Designation of zones/sites for industries according to types and relative environmental impact etc. Elaboration of permissible industries and restricted industries.
- Basic infrastructure (road network, electricity, water supply, gas, eco-friendly transportation, security, fencing, fire and disaster management etc.).
- Technical infrastructure (green factory buildings, renewable energy/energy efficiency provisions, business centre, warehouses, training centre, design centre, incubators etc.).
- Environmental infrastructure (storm water drainage, sewerage/wastewater conveyance, wastewater treatment and disposal facilities, solid waste management facilities, green/open spaces/ landscapes, environmental monitoring etc.).
- Social infrastructure (food and beverages facilities, training/entrepreneurship development facilities, recreational facilities, gender specific infrastructure – provisions for women employees, barrier free infrastructure to enable people with disabilities, guest house, public toilets, health centre etc.
- Visualisations (2D/3D drawings) of the features suggested in the Site Master Plan.
- Statement on compliance with applicable standards, criteria, guidelines, procedures etc. (including environmental considerations/criteria, “green” criteria, environmental clearances etc.).
- Plans and thematic layers in the required scale.

3.2.4 Standards and Rating Systems

The standards and rating systems considered are same as in the previous case example on A-GRIP.

3.2.5 Highlights of Site Master Plan of GIP Jadcherla

► Overview

The following table gives a general overview about the GIP Jadcherla case example.

Table 3.2: Overview of GIP Jadcherla

Industrial park	GIP Jadcherla
Total area of the site	» 819,64 acres
Expected number of enterprises	» About 350 to 400
Expected number of service related entrepreneurs catering to A-GRIP	» About 50
Project cost	» Approx. INR 250 cr 41 million \$ (including land cost, infrastructure and services; excluding. Factory buildings cost)
Expected employment generation	» 20,000 (direct employment)
Targeted investments	» INR 1,000 cr ≈ 165 million \$
Site master plan inputs by	» Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH » Buro Happold Engineering, Berlin, Germany » German Sustainable Building Council (DGNB), Germany
Site Master Plan finalization by	» Advisory Group of TSIC » Working Team of TSIC

► Land use

The proposed land use distribution of GIP, Jadcherla is as below:

Table 3.3: Overview land use in GIP, Jadcherla

S.No.	Land Use	Standard ¹⁴	Area (in m ² & %)
1	Industrial	55%-60%	1,990,708 (59.97%)
2	Recreational: Buffer zones, parks, sports field, etc.	10%-12%	330,861 (9.97 %)
3	Commercial: Shopping Centre, petrol pumps, guest house/ budget hotels, lodging and boarding, service and repair shops, communication / telephone exchange etc.	2%-3%	134,344 (4.05%)
4	Facilities: Public and semi – public- Fire Station/ fire post, police station / police post, hospital / dispensary, day care centre etc.	8-10%	158,669
	Utilities- Electricity sub-station, CETPs, pumping station, underground reservoir / firefighting tanks and other utilities etc.		40,440
	Sub-total		199,309 (6.00%)
5	Transportation: Circulation, loading/unloading area, parking, idle truck parking, goods vehicle parking etc.	18-20%	664,478 (20.02%)
	TOTAL AREA		3,319,701 (100%)

► Zoning

The distinction of industrial zones in GIP was done in the light of the already allotted plots to various industrial units to provide for common infrastructure and facilities; the revised Site Master Plan was divided into the following zones:

- Zone 1: Special Economic Zone (SEZ)
- Zone 2: General Engineering Zone
- Zone 3: Micro, Medium and Small Enterprises (MSME) Zone
- Zone 4: Green Industry Zone
- Zone 5: Women Entrepreneurs Industry Zone
- Zone 6: Commercial Zone
- Zone 7: University Zone
- Zone 8: Rehabilitation Zone

Only non-polluting “green” industries are allowed for plot allocation in GIP Jadcherla. No Category A or B industries as per EIA Notification issued under the Environment (Protection) Act 1986 will be allowed for establishment in the Industrial Estate. (Refer to Annex I, Map 8).

¹⁴ Delhi Development Authority. (2010). *Master Plan for Delhi – 2021*. New Delhi, India; Retrieved from <https://dda.org.in/ddanew/pdf/Planning/reprint%20mpd2021.pdf>

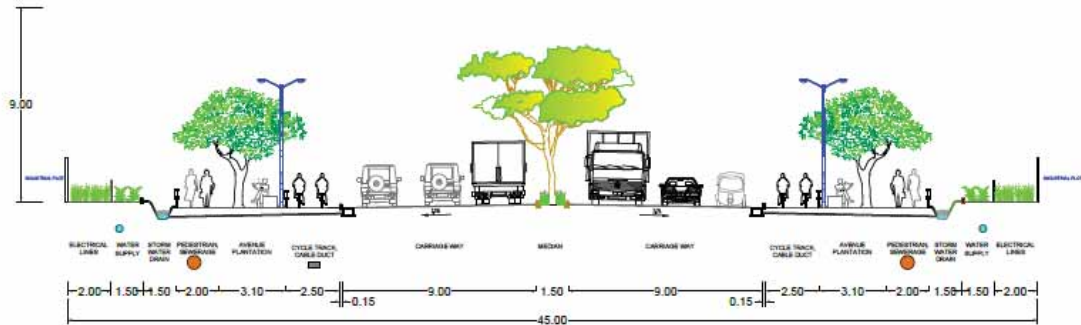
► **Basic infrastructure:**

• **Road network**

Since most of the road network was already constructed on site, minimal changes within road cross sections were done to standardize them. After replanning, following was the hierarchy of roads: (Refer to Annex I, Map 9).

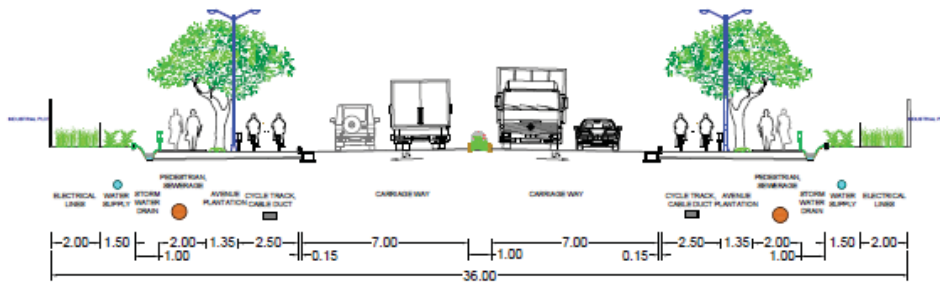
Level 1: 45 m R-O-W

(3+3 Motorized vehicle lanes, median, pedestrian path, bicycle track, avenue plantation and utility including water supply, electrical lines zone)



Level 2: 36 m R-O-W

(2+2 Motorized vehicle lanes, median, pedestrian path, bicycle track, avenue plantation and utility including water supply, electrical lines zone)



Level 3: 24 m R-O-W

(1+1 Motorized vehicle lanes, sidewalk, avenue plantation, bicycle track and utility including water supply, electrical lines zone)

- **Basic facilities**

To serve GIP efficiently, 2 service stations/workshops and weighbridges are provided - one at the central facility zone and the other at the entrance zone.

- **Signages**

Signage is integrated with road cross sections and landscaping features. A uniform system of colour, placing, and text is proposed to avoid confusion in on-goers. Advertisement boards and hoardings should be located suitably, integrating with the landscaping.

- **Security**

A centralized security office is proposed at the main entrance of the GIP. In addition, a security cabin is to be provided at the entry and exit points. The GIP Jadcherla 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.

- **Utilities**

The Site Master Plan of GIP Jadcherla has provisions for:

- Power transmission lines and a sub-station.
- Water conveyance, treatment, adequate storage and distribution within the park.
- Telephone lines, telecommunications network.

▶ **Technical infrastructure** (Refer to Annex I, Map 10)

- **Business infrastructure**

To strengthen the business opportunities, GIP has provisions of all necessary logistic and business facilities like warehouses, Product/ material testing facilities, maintenance centre, business centre, space for marketing, exhibition, research and development, auditorium, training centre, visitor's information centre and incubators.

- **Building architecture**

All the factory buildings as well as administrative buildings in the Green Industrial Park Jadcherla will be green factory buildings as per IGBC rating system.

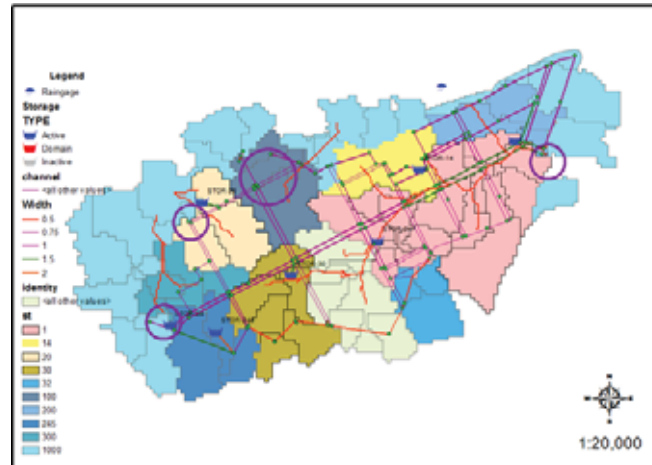
- **Renewable energy/ energy efficiency provisions**

All buildings in the Green Industrial Park Jadcherla have to be energy efficient as per the Energy Conservation Building Code (ECBC). Process loads for industrial buildings are excluded.

▶ **Environmental infrastructure** (Refer to Annex I, Map 11)

- **Storm water management**

To prevent from contamination/pollution due to storm water runoff, seven locations have been identified in GIP for storm water collection system on the basis of 1 hour peak rainfall with 85% coefficient of runoff. The storm water will be collected in lined ponds in which storm water will be collected, tested and treated if required, and then sent for recycle/reuse. (Refer Picture 3.42). Storm water management system has been decentralized taking into consideration slopes/topography of the site.



Pic. 3.42: Micro Watershed Analysis, Width of Drains and Location of Rain Water Collection Ponds

- **Wastewater management**

Seven decentralized wastewater treatment plants are suggested for the site. They will be located in the earmarked areas together with the storm water pond areas as these locations are catering to the industrial zones as well as aligned with the slopes/contours of the site. The Green Industrial Park Jadcherla will house only non-polluting industries. The wastewater quality will be of an easily biodegradable nature with COD¹⁶:BOD ratio of less than 2. Hence, decentralized wastewater treatment would be selected for waste water management which is cost effective as well as environment friendly.

- **Solid Waste Management**

For waste recycling industries, around 10,000 m² area is earmarked in the site master plan of GIP. 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.

- **Open spaces and landscaping**

Existing mango plantations on the site have been retained in the site master plan. Hierarchy of green spaces has been created in the master plan. Provisions for a prominent green spine and landscaped areas are planned in GIP. These include:

- Central green – lung space for the industrial park (Refer Picture 3.43)
- Green belts at the periphery to act as a buffer
- Vertical and horizontal stretches of greens spreading across the GIP in the form of avenue plantations and greenways
- Greens at the plot level

¹⁶ COD stands for Chemical Oxygen Demand, BOD stands for Biochemical Oxygen Demand



Pic. 3.43: Artistic Illustration of “Central Green” at GIP, Jadcherla

► **Social infrastructure** (Refer to Annex I, Map 10)

- **Education and training**

A university campus has been provided at the central location of the GIP. 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 are made within the Site Master Plan of the GIP. Special provisions have been made for crèche, rest rooms for extended work, health centre, canteens/food outlets, kiosks, internal shuttle service (battery operated), external connection to public transport, water dispensers, guest house, ladies room etc.

- **Health care**

Two dispensaries are proposed for the GIP Jadcherla; one at the central facility zone and one within the facilities for the rehabilitation zone.

- **Worker specific amenities**

Township to accommodate employees/workers housing – two housing areas (rehabilitation areas) have been planned. GIP also has facilities for visitors and service engineers like guest house, dormitories etc. Special arrangements have been made for truck drivers for their stay, repair of trucks, food and sanitation.

- **Public toilets**

Toilet facilities are suggested to be provided at the central facility zone, entrance/ exit zone, individual zone level and at road side.

- **Food facilities**

Food services are proposed for the workers, visitors, and employees at the central parking level as well as at the zone level. These include:

- Canteens that provide meals.
- Restaurants / cafeterias attached to the business centre.

- Food kiosks for quick breaks and refreshments along green ways (Refer Picture 3.44).
- Shaded food stations near the zone level greens.



Pic. 3.44: Integration of Food Facilities with Greens
 [Source: Murty & Manyam Architects and Engineers]

- **Recreational and socio-cultural infrastructure**

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

- **Summary**

Focusing on the highlights of the site master plans, it turns out clearly that the features that have been integrated in the site master planning of both the cases of the new (A-GRIP) and the revised (GIP Jadcherla) plan provide for similar features.

Exclusive provisions of basic, technical, environmental, social and functional infrastructure differentiate these two industrial parks of A-GRIP and GIP Jadcherla from several of other industrial parks in India. The elaborated planning does not only promote the idea of sustainable industrial development but also create a unique selling proposition that helps A-GRIP and GIP Jadcherla to perform strongly in a competitive environment targeting for investment and economic development.

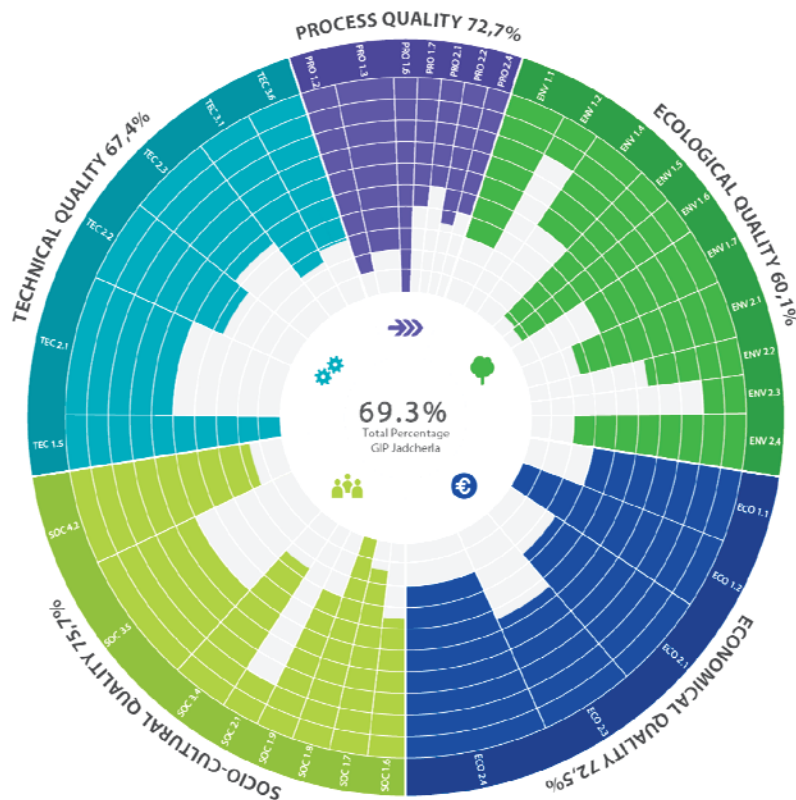
An overview of the highlights of the site master plans for A-GRIP (A) and GIP (G), summarizing the results of the two show cases in chapter 3 is given as conclusion hereafter.

- Environment Friendly Site Master Plan to qualify DGNB industrial districts
- Adequate basic and technical infrastructure
- Adequate social and environmental infrastructure
- Green buildings and Green factory buildings
- Aesthetically treated to facilitate high visual quality
- Signature architecture and elegant urban design
- Non-polluting industries
- Proper wastewater and rain water management, including recycle/reuse
- Waste management, including recycle/reuse
- Gender sensitive with provisions for women employees and entrepreneurs
- Energy efficiency and renewable energy provisions
- Eco-efficient transportation and eco-friendly mobility
- Direct employment for about 12,000 (A-GRIP), 20,000 (GIP) people
- Saleable area at Rs 1170 per m² (A-GRIP) and Rs 2555 per m² (GIP)
- Over 170 (A)/300 (G) industrial enterprises and about 24 (A)/50 (G) services
- Cost effective common infrastructure and services
- Industrial park management system (IALA)

- Bicycling-to-Work provisions
- Pedestrian pathways
- Fire, safety, and disaster risk management
- Environmental monitoring and public display of relevant environmental data
- Dedicated zones and flexible plot sizes
- Several revenue options to strengthen industrial park management
- Worker and member involvement
- Fostering Gender Equality
- Vast community facilities

3.2.6 GIP, Jadcherla on International Benchmarks

It was concluded that the site master plan of GIP was in compliance with several aspects of the DGNB rating system to reach 'Silver' rating (about 60%) and that a formal process for DGNB pre-certification could be initiated by TSIC. (Refer Picture 3.45).



Pic. 3.45: 'Silver' Rating of GIP as per Preliminary DGNB Assessment
 [Source: BuroHappold Engineering, Berlin]



**Mr E. V. Narasimha Reddy, Vice
Chairman and Managing Director,
TSIIIC**

1. What were the highlights, the experience of the cooperation with GIZ-IGEP in the industrial sector?

The cooperation with GIZ helped bring in environmental orientation to the core in the working of TSIIIC. There has been a significant change in mind set of TSIIIC officials, who have now been very consciously striving to make the industrial parks and the infrastructure sustainable.

For the new industrial parks, the pilot work on planning of Green Industrial Parks in Jadcherla and Nandigama in our State of Telangana brought in a new thinking and a new direction to TSIIIC and paved a way for TSIIIC to envision not only building of environment-friendly and resource efficient industrial infrastructure in future, but also cater the industrial areas to women entrepreneurs and women employees. The orientation programmes and training measures for TSIIIC officials were extremely useful. The environmental improvement drives brought in a lot of sensitisation amongst various stakeholders related to industrial areas and also laid

foundation to successfully launching a retrofitting activity in the Information Technology Parks in Hyderabad.

The commissioning of the Common Effluent Treatment Plant (CETP) at Nacharam and Mallapur industrial parks through a viable business model showcased the basic missing link in planning of such environmental infrastructure. The CETP is now successfully running and catering to more than 100 SMEs.

2. Did your organisation ever benefit directly or indirectly through this cooperation? Did you learn something new in the last three years? or have the in-house capacities changed for better?

GIZ (IGEP) had been the most trusted partner to TSIIIC and the cooperation had a direct benefit for TSIIIC. Due to the ongoing technical cooperation with GIZ, a number of programmes were initiated in the industrial parks by TSIIIC with emphasis on environment. TSIIIC has come very close to entrepreneurs and to the communities through the industrial environmental improvement drives that were implemented with a lot of fanfare in the last two years and the drive is currently going on with the same enthusiasm in various industrial parks of TSIIIC.

The retrofitting activity started in the already well-to-do Information Technology Parks in Hyderabad and the first results on Green Buildings with voluntary involvement of companies. This has clearly given confidence on taking a similar approach for all the other old industrial parks of TSIIIC. Over 4 million sqft of office building spaces have been converted to Green Building spaces yet. The capacity building of TSIIIC staff and their motivation towards environmental aspects has been yet another direct benefit to TSIIIC. The pioneering Green Industrial Parks planned in Telangana would surely a big image building for TSIIIC.

3. What is the impression about green Industrial development in state after GIZ-IGEP interventions?

TSIIIC was more than committed to introducing "green" concepts into the industrial parks planned and developed by it, even if the costs were higher than for the conventional industrial parks. Due to customised approaches and design concepts, while the newly planned Green Industrial Park at Jadcherla has shown the potential to be "silver" rated as per German Sustainable Building Council (DGNB) rating system due to a number of quality parameters introduced into the master plan, to the surprise of TSIIIC, the cost calculations per saleable plots turned out to lower than the normal costs.

4. What are the future plans for TSIIIC?

TSIIIC has identified about 200,000 acres of land for future industrial development. TSIIIC, with the support of GIZ, would like to get its officials trained for planning and development of sustainable industrial parks. More than 20 new industrial parks coming up in the State of Telangana will be planned on "green" concepts.

Moreover, a planning division will be created soon in TSIIIC and this will help strengthen planning capacities for delivering "green" industrial infrastructure. TSIIIC is planning to create "green" budget, which will help achieve targeted "greening" of industrial infrastructure in a systematic manner.



Chapter 4: Learnings and Replicability

Based on the learnings from the two case examples, recommendations are summarised for enabling decision makers in replicability in other new or existing industrial parks through actual site master planning or developing supportive policy instruments, viz. standards, guidelines, rules, procedures, policy etc.

4.1 Key Learnings

- ▶ **Environment-friendly Site Master Planning:** For the environment-friendly site master planning of industrial parks, application of the following quality parameters were found to bring in a number of benefits, including making use of land in the industrial park efficient as well as in provisioning several cost-effective common infrastructure & services and meeting with entrepreneur requirements to their satisfaction:

- Economic quality
- Technical quality
- Environmental quality
- Socio-functional quality
- Administrative & management quality

The Site Master Plans were environment-friendly with incorporation of “green” and resource efficiency (energy, water, materials) parameters.

- ▶ **“Green” rating/Standards:** Application of the quality parameters helped the two case examples to qualify for high rating (Gold for A-GRIP and Silver for GIP Jadcherla) as per the German Sustainable Building Council rating system.

For “green” rating, the total score for the overall project is calculated from the five quality parameters of per DGNB. Rating is given as “Gold” (if the total score is at least 80 %), “Silver” (if the total score is at least 65 %) or “Bronze” (if the total score is at least 50 %), which can be used in product packaging as well as marketing of the industrial park. A-GRIP plan was assessed preliminarily by the DGNB certified auditor to get an idea on the extent to which the necessary provisions were made and the results show that the site could possibly qualify for “Gold” rating with 90% score. Similarly, GIP Jadcherla scored “Silver” rating (about 60%).

- ▶ **Exclusiveness:** Exclusive provisions of basic, technical, environmental, social and functional infrastructure differentiate these two industrial parks of A-GRIP and GIP Jadcherla from several of other industrial parks in India. The elaborated planning does not only promote the idea of sustainable industrial development but also create a unique selling proposition that helps A-GRIP and GIP Jadcherla to perform strongly in a competitive environment targeting for investment and economic development. Some of the unique features included:

- Environment Friendly Site Master Plan to qualify DGNB industrial districts
- Adequate basic and technical infrastructure
- Adequate social and environmental infrastructure
- Green buildings and Green factory buildings
- Aesthetically treated to facilitate high visual quality
- Signature architecture and elegant urban design
- Non-polluting industries
- Proper wastewater and rain water management, including recycle/reuse
- Waste management, including recycle/reuse
- Gender sensitive with provisions for women employees and entrepreneurs
- Energy efficiency and renewable energy provisions
- Eco-efficient transportation and eco-friendly mobility
- Cost effective common infrastructure and services
- Industrial park management system (IALA)

- Bicycling-to-Work provisions
- Pedestrian pathways
- Fire, safety, and disaster risk management
- Environmental monitoring and public display of relevant environmental data
- Dedicated zones and flexible plot sizes
- Several revenue options to strengthen industrial park management
- Worker and member involvement
- Fostering Gender Equality
- Vast community facilities

- **Effectiveness:** The two case examples had clearly shown the usage of the available site area effectively for maximising the number of enterprises that can set up their industries (over 170 industries in A-GRIP and 300 in GIP Jadcherla) as well as to bring in additionally a good number of service related entrepreneurs (24 in A-GRIP and 50 in GIP Jadcherla) that cater to the industrial park.

In the case of A-GRIP, the project cost of approximately Rs 37.75 cr \approx 6 million \$ (including land cost, infrastructure and services; excluding factory buildings cost) is expected to bring in investments of Rs 300 cr \approx 48 million \$ and create direct employment for about 12,000. About half of the land (50%) of the industrial park will be allotted to industries, 10-12% for recreational areas such as parks, buffer zones and sports field and 13.65% for facilities such as fire/police stations, hospital or day care centre and utilities such as electrical sub-stations and CETPs. The remaining 21.9% of the industrial park are exclusively reserved for basic infrastructure such as roads and parking.

In the case of GIP Jadcherla, the project cost of approximately Rs 250 cr \approx 41 million \$ (including land cost, infrastructure and services; excluding factory buildings cost) is expected to bring in investments of Rs 1,000 cr \approx 165 million \$ and to create about 20,000 direct employment. About 60% of the industrial park area will be reserved for industrial activities and 4% for commerce such as shopping centres. Recreational, green and open spaces account for 10% of the area. The remaining 26% of land is allotted to facilities and utilities (6%) such as hospitals, police stations, effluent treatment plant or electrical sub-stations on the one hand and to transportation (20%) such as road network and parking facilities.

Cost effectiveness was seen from the cost calculations that showed the net costs on saleable land was very reasonable or even lower as compared to the current prices applied by the partner (effective cost of GIP Jadcherla is about Rs 885 per m² with the “green” provisions as compared to Rs 1,000 per m² earlier priced for the same industrial park; cost of saleable area of A-GRIP is Rs 1170 per m²) and as compared to the international prices (40-100 US\$ per m²)

Also, the project cost was justifiable compared to the targeted investments and expected employment generation (direct employment of about 12,000 in A-GRIP) and 20,000 in GIP Jadcherla. Also, a good amount of tax revenues are expected to be generated from the industries as well as the supporting services.

- **“Green” criteria:** Some of the “green” aspects considered in the site master planning in the two case examples included:
- **Zoning** – proper grouping of industries was done in different zones as per their pollution potential. No-polluting industry zones were located at the boundaries of the industrial park to act as a buffer.
 - **Blocks and plot sizing** – each zone was further divided into blocks and plots. The plot sizing was done as per entrepreneurs’ requirements.
 - **Plot orientation** – the plots were oriented to take advantage of climatic and micro-climatic conditions for better natural ventilation and light.

- **Road network** – a hierarchy of roads was created to enable proper circulation of goods and passenger vehicles. The road cross sections were customised with provisions for electricity lines, water lines, sewer lines, trees, storm water drains, bicycle tracks, pedestrian pathways etc. to meet the industrial requirements. The park has entry and exit provisions with access control. Signage is integrated along the roads.
 - **Eco-efficient transportation** – provisions are made for the workers for internal transportation and external transportation from the nearest public transport node. The transport has provision for battery operated vehicles, bus shelters, bus terminus etc. Also, provisions are made for bicycle tracks and pedestrian pathways with shaded trees.
 - **Parking provision** – the parks have adequate parking provisions at park level, at zonal level and at plot level. The truck drivers have provisioning of dormitories with toilets and food facilities, automobile workshops and repairs/servicing area.
 - **Others:** security, fencing, fire provisions, signature architecture etc.
 - **Utilities** - power transmission lines and sub-station; water conveyance, treatment, adequate storage and distribution network; and telephone lines and telecommunications network.
 - **Building architecture** – green buildings, control on materials usage and on colour schemes.
 - **Energy efficiency** – provisions for use of renewable energy and energy efficiency.
 - **Environmental infrastructure** – provisions for environmental infrastructure including storm water drainage, treatment and recycle; wastewater management including conveyance, treatment and recycle; solid waste management including treatment and recycle/reuse; hierarchies of greenery including landscaping, avenue plantation and buffer zones.
 - **Social infrastructure** – provisions for social amenities catering to employees, provisions for women employees, health care, public toilets, food facilities, recreational and socio-cultural infrastructure etc.
- ▶ **Green Industrial Park is more than plots and roads:** From the two case examples, it becomes clear that the development of an industrial park does not mean by far to provide plots for industrial activities only. A site master plan has to provide for common services such as an adequate road network, energy supply and wastewater treatment plants. All these installations need to be planned and dimensioned according to the identified future needs. A proper planning is crucial to promote sustainable industrial development, protect the environment and facilitate green business.

4.2 Recommended Quality Parameters and “Green” Criteria for Environment-friendly Planning of Industrial Parks

The key quality parameters that describe the Green Industrial Parks/Estate are related to:

- ▶ Economic quality
- ▶ Technical quality
- ▶ Environmental quality
- ▶ Socio-functional quality
- ▶ Administrative & management quality

Details are given below.

Economic Quality Parameters		
1.	Land value development	<ul style="list-style-type: none"> • Development cost per unit area via-avis saleable cost of the industrial park.
2.	Efficient land use	<ul style="list-style-type: none"> • Land use break-up in accordance with applicable laws/rules/norms. • Site master plan and different thematic layers to be prepared in appropriate scales: <ul style="list-style-type: none"> » Site master plan. » Land use plan. » Transportation plan (e.g., roads, parking, service station, petrol pump, mobility plan, pedestrian pathways, bicycle tracks/stations etc.). » Storm water management plan. » Wastewater management plan. » Landscaping/green/buffer/open space plan. » Basic infrastructure plan. » Technical infrastructure plan. » Environmental infrastructure plan. » Social infrastructure plan. » Any other as may be required.
3.	Investments	<ul style="list-style-type: none"> • Value of total investments in the industrial park; number of enterprises/industries; number of support service businesses.
4.	Employment	<ul style="list-style-type: none"> • Total direct and indirect employment generation from the industrial park.
5.	Revenues	<ul style="list-style-type: none"> • Revenues generated from infrastructure and services in the industrial park. <p>E.g., Revenues from access control at entry/exit gates; revenues from parking facilities; revenues from leasing of commercial spaces; revenues from plot allotment; revenues from allotment/outsourcing of services; revenues from outsourcing social infrastructure, including kiosks, canteens, guesthouses, training centre, crèche etc.</p>

Technical Quality Parameters		
1.	Renewable energy and energy efficiency	<ul style="list-style-type: none"> • Total primary energy demand; solar and other renewable energy provisions; energy efficiency measures; provisions for heating and cooling; energy efficiency measures. <ul style="list-style-type: none"> » Solar street lamps and external lighting fixtures » Solar panels (PVs) on roof tops of factory buildings » Green Factory Buildings » Insulated rooftops » Solar energy generation in public/common areas » Renewable energy/energy efficiency fixtures (BEE star rated)

2.	Quality of transport infrastructure	<ul style="list-style-type: none"> • Presence of an overall transport system; quality of the traffic model and modal split; innovative and eco-efficient mobility offerings; quality of internal and external connectivity and their accessibility; public transport infrastructure; parking spaces; supporting infrastructure (service stations, weigh bridges; fuel stations etc.) <ul style="list-style-type: none"> » Hierarchy of roads and road cross sections as per standards. Integration of utility services [Sewers, storm water drains, drainage, water supply lines, electricity cables, lighting, telecommunication cables, optical fibre cables, gas pipelines, green belts, traffic control devices, public toilets integrated suitably, shaded pedestrian pathways, spaces for benches, street light poles, service providers (e.g., kiosks) etc.]. » Entry and exit gates with access control [provisions at the entry/exit gates (security cabin, Information centre, map of the industrial park, parking facility, public toilets, drinking water facility etc.)]. » Internal and external public transportation systems [internal transport from entry gates to discourage private vehicular movement, eco-friendly internal transport – battery operated vehicles, external transport – CNG buses, battery operated vehicles, automobile service stations, signage etc.] . » Adequate parking facilities at entry/exist. » Centralised parking, zone level parking, plot level parking. » Weigh bridges; automobile service stations; shops/stores for materials, spare parts of vehicles etc.
3.	Quality of bicycle infrastructure	<ul style="list-style-type: none"> • Provisions for bicycling; safety and comfort; parking facilities; rental system; way finding systems. <ul style="list-style-type: none"> » Bicycle tracks » Bicycle stations for renting » Bicycle parking » Way finding systems
4.	Quality of pedestrian infrastructure	<ul style="list-style-type: none"> • Provisions for pedestrians; safety and comfort; street crossing aids; way finding systems. <ul style="list-style-type: none"> » Extensive safe pedestrian pathways » Pedestrian pathways along roads » Greenways along green belts and green landscapes
7.	Quality of overall logistics concept	<ul style="list-style-type: none"> • Logistic support provisions for factories and employees. <ul style="list-style-type: none"> » Business centre, One-stop-services, Administrative building » Information centre » Warehouses/raw material depots » Training centre » Incubation centre » Design centre, product/material testing facility » Commercial zone

8.	Resource-efficient infrastructure	<ul style="list-style-type: none"> • Resource efficient infrastructure, viz. sustainable building materials, earthworks management; recycle and reuse of treated wastewater and rain water; recycle and reuse of wastes; recycle and reuse of chemicals and materials; reduced demands of fresh water use etc. <ul style="list-style-type: none"> » Green Factory Buildings and Green Buildings » Usage of eco-friendly building materials for roads, fencing, buildings etc. » Renewable energy, energy efficiency and resource efficiency fixtures/installations » Recycles/reuse of wastes, wastewater, rainwater and materials
9.	Safety & security provisions	<ul style="list-style-type: none"> • Provisions for safety and security of the industrial park and the employees. <ul style="list-style-type: none"> » Centralised security office at the main entrance. In addition, security cabins at the exit and other strategic points. » Close circuit (cc) cameras placed at al strategic locations in the industrial park. » Fencing all around the industrial park made of environment-friendly materials. » Provision for a fire station. » Provision for a police post. » Disaster management centre.
10.	Utilities	<ul style="list-style-type: none"> • Provisions for the required utilities the industrial park. <ul style="list-style-type: none"> » Power transmission lines » Power sub-station » Water conveyance, treatment, adequate storage and distribution network » Telecommunications network

Environmental Quality Parameters		
1.	Waste management	<ul style="list-style-type: none"> • Adequacy of provisions for waste management, including compostable organic wastes, hazardous wastes, plastic wastes, paper and other recyclable wastes, used containers and packaging materials etc. <ul style="list-style-type: none"> » Provisions for collection, transportation, storage and disposal of wastes. » Recycling centre for e-waste, vermi-compost plant and handmade paper plant etc. » Recycling centre for recycling of wastes » Hazardous wastes collection and temporary storage facility.
2.	Rain water management	<ul style="list-style-type: none"> • Adequacy of provisions for rain water management, including storm water drainage, collection, treatment, recycle/reuse for industrial production or cooling or for fire protection or irrigation of green spaces etc. <ul style="list-style-type: none"> » Storm water drainage network. » Collection of first rains @ 1hr peak rainfall and 80% run-off coefficient and treatment to prevent contamination risks. » Ponding of treated rainwater and integration into landscapes. » Recycle/reuse of treated rain water. » Rainwater harvesting facilities.
3.	Climate Change adaptation	<ul style="list-style-type: none"> • Provisions for climate change adaptation due to increasing

		<p>temperatures, increased flood, reduced water reserves etc.</p> <ul style="list-style-type: none"> » Assessment of heat islands and provisions for appropriate land use in such areas; » Assessment of flooding areas and provisions of appropriate land use and drainage; » Landscaping and greenery provisions; » Appropriate internal and external transportation provisions; » Provisions for micro climate control.
4.	Biodiversity, greenery	<ul style="list-style-type: none"> • Preservation and additional provisions for retaining and promoting biodiversity in the industrial park. Local habitat to be encouraged. <ul style="list-style-type: none"> » Preparation of habitat objectives, mapping of habitat functions and implementation of measures. » Conservation of existing plantation, water bodies and other natural features on site. » Provisions for greenery and buffer zones. Hierarchical greens - central greens, green belts at the periphery, vertical and horizontal stretches of greens across the industrial park, avenue plantation, plantation at plot level.
5.	Emissions and air pollution control	<ul style="list-style-type: none"> • Provisions for control of atmospheric emissions and air pollution. <ul style="list-style-type: none"> » Restrictions on unsuitable air polluting industries. » Measures for reduction of emissions, viz. eco-efficient mobility with battery operated vehicles, CNG buses for internal/external transport, bicycling tacks, pedestrian pathways that do not cause pollution, usage of clean fuels, common steam and power plants. » Online air quality monitoring station and display boards.
6.	Waste water pollution control	<ul style="list-style-type: none"> • Provisions for waste water pollution control. <ul style="list-style-type: none"> » Provisions for wastewater conveyance system in accordance with slopes and zoning of industries. » Provisions for common effluent treatment plants, sewage treatment plants. » Provisions for storage of treated waste water (guard pond) » Provisions for recycle/reuse. » Online monitoring systems to check water quality compliance with standards.
7.	Disaster risks	<ul style="list-style-type: none"> • Preparedness to natural disasters like earthquakes, storm, floods, landslides, soil subsidence.
8	Effects on global and local environment	<ul style="list-style-type: none"> • Ensuring that there are no negative effects on global and local environment. <ul style="list-style-type: none"> » Life cycle assessment of emissions due to buildings, infrastructure, traffic and open spaces. » Control of pollution of air, water and soil. » Protection from hazards to ground water » Maintenance of physical, biological and chemical water quality in compliance with standards. » Control of any negative environmental impacts.

Socio-functional Quality Parameters

1.	Social quality and infrastructure	<ul style="list-style-type: none"> • Provisioning of social infrastructure.
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		<ul style="list-style-type: none"> » Training centre to cater to vocational training, education facility, incubator for entrepreneurship promotion » Health care facilities » Public toilets, drinking water facilities » ATM, post office/courier service, bank » Information centre for customer services » Guest house, dormitories for employees/workers/visitors » Food and beverages » Recreational facilities » Residential township in the vicinity » Special arrangements for truck drivers » Transportation/mobility arrangements » Safety & security
2.	Gender considerations	<ul style="list-style-type: none"> • Special provisions for women employees. <ul style="list-style-type: none"> » Play schools and crèche for infant children of workers, ladies room and accommodation for late working » Safety and security, internal and external transportation » Health centre, canteens/ food outlets, kiosks, toilets, internal shuttle service (battery operated)
3.	Health, comfort and user satisfaction	<ul style="list-style-type: none"> • Provisions for health, comfort and user satisfaction in the industrial park. <ul style="list-style-type: none"> » Health centre. » Recreational areas, including sports fields, greenery, parks etc. » Safety provisions, including security at entry/exits, access control, fencing, CC cameras across the site, police post. » Landmark area at the centre with extensive landscaped area, amphitheatre etc. that provide ample opportunities for social interaction. » Elegantly designed green factory buildings and landscaped areas that provide visual identify and impact.
4.	Functional and design quality	<ul style="list-style-type: none"> • High functional and design quality of the industrial park. <ul style="list-style-type: none"> » Signature architecture identity and visual impact » Mobility integrated with existing transport/mobility network » Master Plan aligned with slopes/contours » Art in the design – traffic islands, landscaped areas at the entry/exist gates etc.

Administrative & Management Quality Parameters		
1.	Administrative & management infrastructure	<ul style="list-style-type: none"> • Provisioning of infrastructure for administration and management of the industrial park. <ul style="list-style-type: none"> » Administrative building » One stop service centre » Product display/exhibition and marketing centre » IT based industrial park information system
2.	Service delivery	<ul style="list-style-type: none"> • Elaboration of business and management models for common infrastructure and services.
3.	Organisational structures	<ul style="list-style-type: none"> • Staff structures for development, operation and management of the industrial park and plot allotment.

		<ul style="list-style-type: none"> » Formation of a Special Purpose Vehicle (SPV) » Industrial Area Local Authority (IALA) may be constituted with elected representatives from industries » Environmental Sub-committee under IALA
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4.3 Guidelines for Siting of Green Industrial Parks/Estates

4.3.1 Steps Involved in the Identification of a Suitable Site for Industrial Estate¹⁷

a) Pre-project survey

- A search area should be identified where suitable sites for developing Industrial Estates for targeted industries might be found.
- As per the Draft Urban and Regional Development Plans Formulation and Implementation (URDPFI) Guidelines 2014¹⁸, the delineation of an investment region should follow the steps given below:
 - » Identification of infrastructure gaps and planning for providing last mile connectivity either at regional or sub regional level as the case may be.
 - » Identification of main thrust sectors for investment.
 - » Identification of growth drivers and potential growth centres.
 - » Market assessment – primary, secondary and tertiary.
 - » Pre-feasibility of the proposals

b) Detailing environmental sensitivity of the search area and its surroundings.

c) Avoiding areas within the search area which have environmental sensitivity.

d) Identifying potential sites (so called "candidate sites") for Industrial Estates based on extent of land required infrastructure available, social considerations etc.

e) Rapid assessment of the sites or their suitability based on social, economic and environmental considerations, and shortlisting of a most suitable site meeting with the targeted industrial development, while not posing any adverse environmental or social impacts.

f) The shortlisted site is required to undergo environmental impact assessment (EIA) in accordance with the provisions of the Environmental (Protection) Act, 1986 and rules made thereunder. The Environmental impact assessment (EIA) is suggested even if the sites are smaller and do not attract provision of the Environmental (Protection) Act, 1986 and rules made thereunder.

For the purpose of undertaking EIA, a Site Master Plan would be required. Before arriving at a final Site Master Plan, alternative "Conceptual Plans" should be first prepared in the required scale, taking into consideration activity structure, estimation of land requirement for different uses and social/economic/environmental land suitability analysis. The Conceptual Plans should be evaluated for selection of the best among alternatives so as to prepare the Site Master Plan accordingly.

Based on the Environmental Impact Assessment and Environmental Clearance obtained from the regulatory authorities, the site should undergo further clearances for land use conversion etc. from the local authorities concerned.

¹⁷ http://envfor.nic.in/sites/default/files/TGM_Industrial%20Estates_010910_NK.pdf

¹⁸ Draft Urban and Regional Development Plans Formulation and Implementation (URDPFI) Guidelines 2014, Ministry of Urban Development, GoI

- g) Land acquired shall be sufficiently large to provide space for appropriate treatment of waste water still left for treatment after maximum possible reuse and recycling. Reclaimed (treated) wastewater shall be used to raise green belt and to create water bodies for aesthetics, recreation and, if possible, for aquaculture. The green belt shall be of appropriate width around the industrial park.

The Government of India or the State Government, as the case may be, may support in obtaining the required land for the site or its acquisition and procurement for the Green Industrial Parks through the State Government or its agencies.

All the sites for the industrial parks will require Environmental Impact Assessment studies and prior environmental clearance as per the EIA Notification dated 14th September, 2006 [issued by the Government of India under the Environment (Protection) Rules, 1986 of the Environment (Protection) Act, 1986].

The Government of India or the State Government, as the case may be, may support in pursuing the State Government or its agencies to prepare land use plans for upto 10 km around the Green Industrial Parks and to regulate land uses so as to avoid land use conflicts and negative impacts due to pollution, resource consumption etc.

4.3.2 Areas to be Avoided

Adequate care should be taken to minimise any adverse impact from the industries on the immediate surroundings as well as distant places. Some of the natural life sustaining systems and some specific land uses are sensitive to industrial impacts because of the nature and extent of fragility. With a view to protecting such areas, industrial sites shall maintain the following distances from the areas listed¹⁹:

i) Restrictions on siting in ecologically and/or otherwise sensitive areas:

- The industrial site should be atleast 25 km from ecologically sensitive areas. Depending on the geo-climatic conditions, the requisite distance shall be increased by the appropriate agency. Appropriate diostances should be maiantianed from 'other sensitive areas' in accordance with the pollution potential of the industries housed in the Green Industrial Park/Estate. For example, if the pollution potential of the industries is 7 km, a distance of 7 km from 'other sensitive areas'.

The ecological and/or otherwise sensitive areas include: (i) Religious and Historic Places; (ii) Archaeological Monuments (e.g. identified zone around Taj Mahal); (iii) Scenic Areas; (iv) Hill Resorts; (v) Beach Resorts; (vi) Health Resorts; (vii) Coastal Areas rich in Coral, Mangroves, Breeding Grounds of Specific Species; (viii) Estuaries rich in Mangroves, Breeding Ground of Specific Species; (ix) Gulf Areas; (x) Biosphere Reserves; (xi) National Parks and Sanctuaries; (xii) Natural Lakes, Swamps; (xiii) Seismic Zones; (xiv) Tribal Settlements; (xv) Areas of Scientific and Geological interest; (xvi) Defence Installations, especially those of security importance and sensitive to pollution; (xvii) Border Areas (International) and (xviii) Airports.

- In coastal areas, the industrial site should be atleast 1/2 km from the High Tide Line (HTL).
- In flood plains of the riverine systems, the industrial site should be atleast 1/2 km from flood plain or modified flood plain affected by dam.
- The industrial site should be atleast 1/2 km from highways and railways.
- Restrictions on siting near major settlements: At the time of siting of the industrial park or investment zone, if any major settlement's (3,00,000 population) notified limit is within 50 km, the spatial direction of growth of the settlement for at least a decade must be assessed and the industry shall be sited at least 25 km from the projected growth boundary of the settlement.
- Restrictions on forest land: No forest land shall be converted into non-forest activity for the sustenance of the industry (Ref: Forest Conservation Act, 1980).

¹⁹ Retrieved from: <http://moef.gov.in/citizen/specinfo/enguin.html>

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- Restrictions on prime agricultural land: No prime agricultural land shall be converted into industrial site. Such lands may include:
 - Areas characterised by extensive agriculture land use (includes horticulture, poultry farming, raising of crops/fruits/vegetables/ flowers/grass or trees of any kind, breeding of livestock including cattle/horses/donkeys/mules/pigs/breeding of fish/keeping of bees, the use of land for grazing cattle and for any purpose which is ancillary to its cultivation or other agricultural purpose;
 - High productivity soils, agriculture/cultivable lands, including soils classifications of Class I, II III and IV;
 - High agriculture production areas;
 - Command areas of irrigation projects; and
 - Major share of population (at least 80%) of the area is dependent on agriculture as the major source of livelihood.
- ii) Restrictions on siting adjacent to railway property:** Right of Way (RoW) of the railways is a no development Zone in itself. The distance between the Railway Property Boundary and the edge of the building shall be 30 m as per the Indian Railways Works Manual or as per No Objection Certificate (NOC) given by the Railway Authorities.
- iii) Restrictions on siting near Airport areas:**
- As per the Airport Authority of India (AAI), the heights of the buildings are regulated and hence a no objection certificate (NOC) is required from AAI for any construction activity in 20 km radius of Airports.
 - Activities such as butcheries, sewage handling and garbage storage are not allowed around airports. For building activity within the Restricted Zone/Air Funnel Zone near the airport, necessary clearance from the concerned Airport Authority shall be obtained. The building heights and other parameters shall be regulated as per the stipulations of the Airport Authority of India as notified in Gazette of India Extraordinary (S.O.1589), dated 30-06-2008 and as amended from time to time by the Ministry of Civil Aviation, Government of India.
 - Irrespective of their distance from the aerodrome, even beyond 22 km limit from the Aerodrome Reference Point, no radio masts or similar installation exceeding 152 m in height shall be erected except with the prior clearance from the Civil Aviation Authorities.
 - In respect of any land located within 1,000 m from the boundary of Military Airport, no building is allowed except with prior clearance from the concerned airport authority with regard to permissible building height.
 - No chimneys or smoke producing factories shall be constructed within a radius of 8km from the Airport Reference Point.
 - Slaughter house, butcheries, meat shops and solid waste disposal sites and other areas for activities like depositing of garbage which may encourage collection of high flying birds, like eagles and hawks, shall not be permitted within 10 km from the Airport Reference Point.
 - Within a 5 km radius of the Aerodrome Reference Point, every structure/installation/ building shall be designed so as to meet the pigeon/bird proofing requirement of the Civil Aviation Authorities. Such requirement may stipulate the prohibition of any cavity, niche, or other opening on the exterior of such building/installation/structure so as to prevent the nesting and habitation of pigeon or other birds.
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- iv) Restrictions on sites adjacent to defence establishments²⁰:** In the case of Sites within 500 m distance from the boundary of Defence Areas / Military Establishments prior clearance of Defence Authority shall be obtained. In case of Naval Science and Technological Laboratory (NSTL), Visakhapatnam, no building shall be allowed within a distance of 20 m from the boundary wall of NSTL, Visakhapatnam.
- v) Restrictions on sites adjacent to oil/gas pipelines:** In the case of sites in the vicinity of oil/gas pipelines, clearance distance and other stipulations of the Respective Authority shall be complied with. The Oil/Gas Authorities shall also specify the clearances required to Local Body.
- vi) Restrictions for petrochemical and gas industries²¹:** No gas pipeline should be located within 15 meters of any private dwelling or any industrial building or place of public assembly in which persons work, congregate or assemble, unless it is provided with at least 300 mm of cover over and minimum cover as specified by the Petroleum and Natural Gas Regulatory Board Notification, 2009.

No gas or oil well shall be drilled within a minimum distance (to be prescribed by the Central Government) of any railway, pipeline or other right of way, surveyed road, dwellings, industrial plant, air-craft runway, buildings used for military or public purposes, or within three kilometres of any mine, whether active or abandoned, unless the special permission of the Central Government is obtained in advance. About a 90m x 90m buffer is to be maintained along the active oil wells, petroleum storage tanks, encompassing all the safety norms for precautions against fire²².

- vii) Restrictions in natural hazard zones²³:** Areas prone to natural disasters include areas with high-risks of floods, tsunami, earthquakes, etc. There are siting restrictions in natural hazard zones such as river flood plains and water bodies, including wetlands, to restrict the damage caused by floods. The flood plain can be identified based on last 50 or 100 year flooded area of water bodies or river. There can be different considerations for regulations. For example, the area likely to be affected by floods up to a 10-year frequency should be kept reserved only for gardens, parks, playgrounds, etc. Residential or public buildings, or any commercial buildings, industries, and public utilities should be prohibited in this zone.
- viii) Restrictions in Eco Sensitive Zones²⁴:** As per the National Wildlife Action Plan (NWAP) 2002-2016, "All identified areas around protected areas and wildlife corridors are to be declared as ecologically fragile under the Environment (Protection) Act, 1986". As a general principle, the width of the eco-sensitive zone could go upto 10 km around a protected area as provided in the Wildlife Conservation Strategy, 2002. In case where sensitive corridors, connectivity and ecologically important patches are even beyond 10 km width, these should be included in the Eco-sensitive zones. Further, even in the context of a particular protected area, the distribution of an area of Eco-sensitive Zone and the extent of regulation may not be uniform all around and it could be of variable width and extent.

No Special Economic Zones²⁵ may be planned in the sensitive areas such as the forests, mangroves, coral reefs, archeologically important sites, sensitive ecosystems, etc. A buffer zone of 1,000 m shall be maintained from such sensitive areas and a greenbelt with tree density of 1,000 trees per acre shall be developed in the said buffer zone.

Further, all such areas that have ecological sensitivity should be avoided for siting of industrial parks. These include environmentally sensitive/fragile areas such as reserved/protected forests, biosphere reserves, national parks, wild life sanctuaries and coastal regulation zones etc. that are protected by various environments and forest Acts. These areas may also include natural resource areas, both renewable and non-renewable, including water bodies (rivers, creeks, lakes etc.), forests, fisheries and marine resources, areas with potential for renewable energy generation etc. These areas may further include areas that provide ecosystem services such as:

²⁰ Andhra Pradesh Building Rules, 2012 issued by the Government of Andhra Pradesh

²¹ Model Building Byelaws, TCPO

²² Ancient Monuments and Archaeological Sites and Remains Act, 2010 (AMASR)

²³ National Disaster Management Guidelines Management of Floods, NDMA

²⁴ Guidelines for Declaration of Eco-Sensitive Zones around national parks and wild life sanctuaries, MoEF&CC, 2011

²⁵ SEZ Guidelines, Industries Commissionerate, Government of Gujarat

- production of food, water, pharmaceuticals, industrial products, wind/wave/hydro-power, biomass;
- support purification of water/air, nutrient cycles, crop pollination, seed dispersal and disease control;
- spiritual and recreational benefits (e.g., ecotourism);
- carbon sequestration, climate regulation, waste decomposition and detoxification; and
- areas with genetic and species diversity that need to be preserved for future generations.

ix) Restrictions on siting near religious places²⁶: In the case of sites located within a radius of 100 m from the notified religious structure, the construction is only allowed up to 10 m height only. For the Sites located within a radius of above 100 m and up to 300m from the notified religious structures, only non-high rise structures are allowed.

x) Restrictions on siting adjacent to heritage structures²⁷: In the case of sites located within a distance upto 100 m from protected monuments as notified under Archaeological Monuments and Ancient Sites and Remains Act 1955 and as amended, no construction is allowed.

Every area, beginning from the limit of the protected area/monument²⁷ and extending to a distance of 100 meters in all directions shall be the protected areas and extending upto a distance of 200 meters in all directions shall be regulated area. The protected zone is a no construction zone.

For sites located within distance of above 100 m and up to 200 m from the protected monuments, construction is allowed only after obtaining prior permission from the National Monuments Authority. For the sites located within the vicinity of any Heritage Structure notified as per the respective law, the prior clearance from the concerned authority shall be obtained.

Industrial sites should be avoided in tourism areas and heritage areas, which include, amongst others, areas with a high share of attractive landscapes and scenic beauty, historic areas, places of religious importance, areas with monuments (both protected and un-protected) of national/state/local level importance, areas declared as world heritage sites etc.

xi) Restrictions on sites protected by legal provisions: No industrial park should be located in areas which are restricted by legal provisions, including forest lands, national parks etc.

In exercise of the powers under the Environment (Protection) Act, 1986 [Ref. Section (3)(2)(v)], the Central Government, in consultation with the state governments (for the purpose of protecting and improving the quality of the environment and preventing, controlling and abating environmental pollution), should identify all such areas in each District/State in which any industries, operations or processes or class of industries, operations or processes shall not be carried out or carried out subject to certain safeguards.

Added to the list of such areas as identified under the Environment (Protection) Act, 1986, the other areas that fall under various other criteria as listed above should also be identified and notified. This will help avoid accepting unsuitable areas for the siting of industrial parks and investment zones.

4.3.3 Inclusive Parameters for Site Selection

- » Waste lands: The wastelands could be preferred for developing industrial parks, infrastructure etc. The wasteland²⁸ categories include gullied/ ravenous land, scrub forest (underutilized notified forest land), scrubland (land with or without scrub), waterlogged and marshy land, land affected by salinity/alkalinity, shifting cultivation, sands (coastal/desert /riverine) and mining/industrial wastelands.
- » Designated industrial areas: The designated industrial areas in urban area master plans, regional plans and district plans should be preferred. However the restrictions on siting near

²⁶ Andhra Pradesh Building Rules, 2012 issued by the Government of Andhra Pradesh

²⁷ Ancient Monuments and Archaeological Sites and Remains Act, 2010 (AMASR)

²⁸ Wastelands Atlas of India, 2010, Department of Land Resources, Ministry of Rural Development, Govt. of India, New Delhi

- major settlements (25 km from the projected growth boundary of the settlement of 300,000 population and above) should be followed.
- » Proximity²⁹ to railway stations / state highways to facilitate transport of raw material to, and finished material from the Project.
 - » Availability of water supply and adequate source of power supply and telecommunication facilities.
 - » Availability of residential area for the workers in the project in proximity so that they should not be made to travel for more than 8-10 kilometres.
 - » Flat land (<21% slope).
 - » Potential zones for industrial siting as per 'Zoning Atlas for Siting of Industries: based on environmental considerations" of the Central Pollution Control Board³⁰, prepared District-wise in 1:250,000 scale for several districts in the country. These Atlases show ecologically sensitive areas and other unsuitable areas for siting of industries and industrial estates. Also, the Atlases show alternate sites/zones that may be considered for identifying alternate sites for industries or industrial estates.

4.3.4 Environmental Clearances for Siting of Industrial Parks

As per the provisions laid out under the EIA Notification S.O.1533, Dt.14.9.2006 and its amendment dated 01.12.2009 and Notifications issued from time to time by the Ministry of Environment & Forests, GOI under the Environmental (Protection) Rules 1986 of the Environment (Protection) Act, 1986, Industrial estates/parks/ complexes/ areas, export processing Zones (EPZs), Special Economic Zones (SEZs), Biotech Parks, Leather Complexes, based on the set threshold limit, will require to undertake Environmental Impact Assessment (EIA) and obtain prior Environmental Clearance (EC). Refer to table below.

Table 4.1: Threshold Limits for Environmental Clearances

Project or Activity	Category with threshold limit		Conditions	
	A	B		
7	Physical Infrastructure including Environmental Services			
7(c)	Industrial estates/parks/ complexes/areas, export processing Zones (EPZs), Special Economic Zones (SEZs), Biotech Parks, Leather complexes.	If at least one industry in the proposed industrial estate falls under the Category A, the entire industrial area shall be treated as Category A, irrespective of the area. Industrial estates with area greater than 500 ha and housing at least one Category B industry.	Industrial estates housing at least one Category B industry and area < 500 ha. Industrial estates of area > 500 ha. and not housing any industry belonging to Category A or B.	Special condition shall apply Note: Industrial Estate of area below 500 ha and not housing any industry of category A or B does not require clearance.
8	Building /Construction projects/Area Development projects and Townships			
8(a)	Building and Construction projects		≥20,000 m ² and <1,50,000 m ² of built-up area	built up area for covered construction; in the case of facilities open to the sky, it will be the activity area
8(b)	Townships and Area development projects.		Covering an area ≥ 50 ha and or built up area ≥150,000 m ² .	All projects under Item 8(b) shall be appraised as Category B1

²⁹ Modified Guidelines of MSE-CDP; Ministry of Micro, Small and Medium Enterprises (MSME), Government of India (GoI)

³⁰ Retrieved from: http://www.cpcb.nic.in/Env_Planning.php

Note:

- **General Condition (GC):** Any project or activity specified in Category “B” will be treated as Category A, if located in whole or in part within 10 km from the boundary of: (i) Protected Areas notified under the Wild Life (Protection) Act, 1972, (ii) Critically Polluted areas as notified by the Central Pollution Control Board from time to time, (iii) Notified Eco-sensitive areas, (iv) inter-State boundaries and international boundaries.
- **Specific Condition (SC):** If any Industrial Estate/Complex / Export processing Zones /Special Economic Zones/Biotech Parks / Leather Complex with homogeneous type of industries such as Items 4(d), 4(f), 5(e), 5(f), or those Industrial estates with pre –defined set of activities (not necessarily homogeneous, obtains prior environmental clearance, individual industries including proposed housing within such estates /complexes will not be required to take prior environmental clearance, so long as the Terms and Conditions for the industrial estate/complex are complied with (Such estates/complexes must have a clearly identified management with the legal responsibility of ensuring adherence to the Terms and Conditions of prior environmental clearance, who may be held responsible for violation of the same throughout the life of the complex/estate).

For the procedure on carrying out EIA, refer to “Technical EIA Guidance Manual for Industrial Estates”³¹ (Aug 2010).

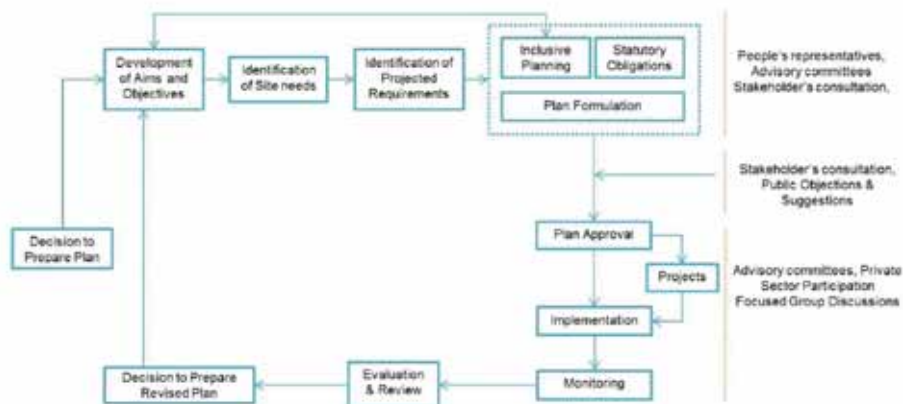
4.4 Guidelines for Site Master Planning of Industrial Parks

4.4.1 Site Master Plan Preparation

The site master plan for the Green Industrial Parks provides guidance for the development of the industrial park. It should be environment-friendly and supportive to the foundry operations. The ‘guiding criteria’ on Technical Quality, Economic Quality, Environmental Quality, Social & Functional Quality and Administration & Management Quality should be integrated into the Site Master Plan of a Green Industrial Park.

4.4.2 Planning Process for Green Industrial Parks

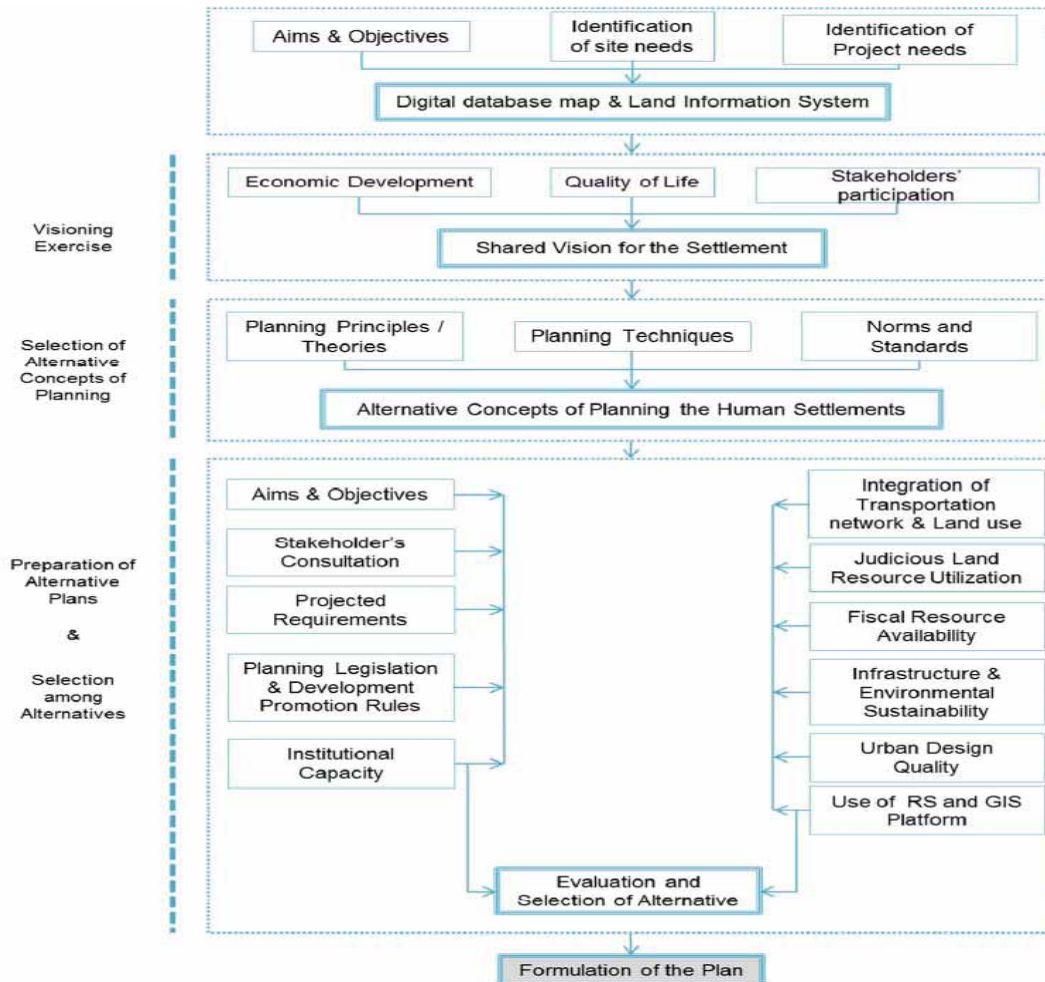
The ‘general process of planning’ and ‘plan formation process’ as suggested by the Urban and Regional Development Plan Formulation and Implementation Guidelines (URDPFI Guidelines)³² is shown in the flow sheets below.



Pic. 4.1: General process of planning
[Source: URDPFI,2015]

³¹ Retrieved from: http://envfor.nic.in/sites/default/files/TGM_Industrial%20Estates_010910_NK.pdf

³² Ministry of Urban Development, Government of India. (2015). *Urban and Regional Development Plans Formulation and Implementation Guidelines*. New Delhi, India.



Pic. 4.2: Plan Formulation Process
 [Source: URDPFI,2015]

4.4.3 Contents of a Site Master Plan

As referred earlier, a Site Master Plan is a comprehensive document that guides development of the industrial estate. These plans are to be integrated with urban/regional plans and ensure continuity with infrastructure and services provisioned in these plans. These site master plans should be reviewed every 5 years or as and when necessary, and statutory approvals obtained.

The key contents of a Site Master Plan report of an industrial park are:

- Overview of the Industrial Park – location, total area of the site, expected number of industries, expected number of service related industries supporting the main industry, project cost, expected employment generation, targeted investments etc.
- Land use break-up of the site.
- Designation of zones/sites for industries according to types, including service industries, general industries, obnoxious and hazardous industries, etc. Elaboration of permissible industries and restricted industries.
- Basic infrastructure (road network, electricity, water supply, gas, eco-friendly transportation, security, fencing, fire and disaster management etc.).

- Technical infrastructure (green factory buildings, renewable energy/energy efficiency provisions, business centre, warehouses, training centre, design centre, incubators etc.).
- Environmental infrastructure (storm water drainage, sewerage/wastewater conveyance, wastewater treatment and disposal facilities, solid waste management facilities, green/open spaces/landscapes, environmental monitoring etc.).
- Social infrastructure (food and beverages facilities, training/entrepreneurship development facilities, recreational facilities, gender specific infrastructure – provisions for women employees, barrier free infrastructure to enable people with disabilities, guest house, public toilets, health centre etc.
- General development control regulation for controlling and regulating the use and development of land within the industrial park, 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 density of built up area allowed in specified area etc.
- Visualisations (2D/3D drawings) of (atleast some of) the features suggested in the Site Master Plan.
- Statement on compliance with applicable standards, criteria, guidelines, procedures etc. (including environmental considerations/criteria, “green” criteria, environmental clearances etc.).
- Plans and thematic layers in the required scale:
 - » site master plan
 - » land use plan
 - » transportation plan (e.g., roads, parking, service station, petrol pump, mobility plan, pedestrian pathways, bicycle tracks/stations etc.)
 - » storm water management plan
 - » wastewater management plan
 - » landscaping/green/buffer/open space plan
 - » basic infrastructure plan
 - » technical infrastructure plan
 - » environmental infrastructure plan
 - » social infrastructure plan

4.4.4 Scale of a Site Master Plan

The Site Plan, Site Master Plan and various thematic layers of the Site Master Plan should be in appropriate scales as below:

- » A Site Plan should be drawn at a scale of not less than 1:1,000 showing all physical details of the land, boundaries of the land, the surrounding existing layouts/lands, and existing approach road to the land where the layout is proposed.
- » A Site Master Plan (or sometimes called as Layout Plan) should be 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, alignment and width of the proposed streets/roads, dimensions and areas of open space/green areas provided, infrastructure provided etc. and all the other uses of land.

If the plan approving authority prescribes a scale more detailed than the above, then the same should be adopted. The plans should be in digital form so that optical reductions (and not enlargement) of size of maps can be done as per requirement.

4.4.5 Land Use Break-up

The suggested distribution of the land use within the Green Industrial Park is:

» Industrial (plots)	:	55 - 60%
» Parks and open spaces	:	10%
» Common infrastructure zones	:	10 - 17%
» Roads and circulation	:	18 - 20%
Total site area	:	100%

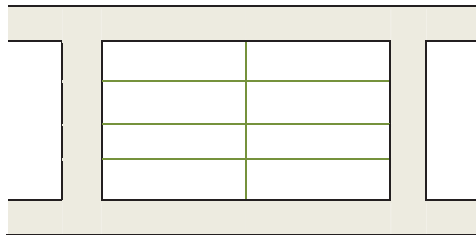
The industrial plots include the areas that can be allotted to industries for the purpose of industrial or commercial activity. The common infrastructure zones include areas for basic infrastructure (excluding roads, transportation), environmental infrastructure, social infrastructure and relevant technical infrastructure. The roads and transportation areas include roads, railway, parking areas, pedestrian pathways, bicycle tracks, petrol pumps, weighbridge, service stations, etc.

4.4.6 Industrial Zones/Plots

The industrial zones should be earmarked based on homogeneity of function of the industrial activity and their inter-relationship to get the best use of land. The examples of such zones are:

- » General Engineering Zone
- » Chemical industry Zone
- » Micro, Medium, and Small Enterprises (MSME) Zone
- » Green Industry Zone
- » Women Entrepreneurs Industry Zone
- » Commercial Zone

Each zone should be divided into blocks of appropriate size, which can be subdivided into plots. Depending on demand for size of the plot, smaller plots could be clubbed together. Also, in the future, without changing infrastructure, the plots could be combined or sub-divided as per demands persisting then.



The minimum plot size for layout & sub division of land for industrial uses shall be minimum 500 sq. m. The suggested plot sizes are:

- » Plot of more than 500 m² and up to 1,000 m²
- » Plot of more than 1,000 m² and up to 2,500 m²
- » Plots of 2,500 m² to 5,000 m²
- » Plots above 5,000 m²

Plots should be aligned to orient buildings for maximum ventilation and natural light.

4.4.7 Provisioning of Basic Infrastructure

a) Road network:

The road network includes hierarchies of roads as per site size and requirements. The suggestive road hierarchies³³ are:

³³ Code of Practice (part 1) Cross Section, Institute of Urban transport (India) and Ministry of Urban Development, Gol

Table 4.2: Hierarchy of Roads

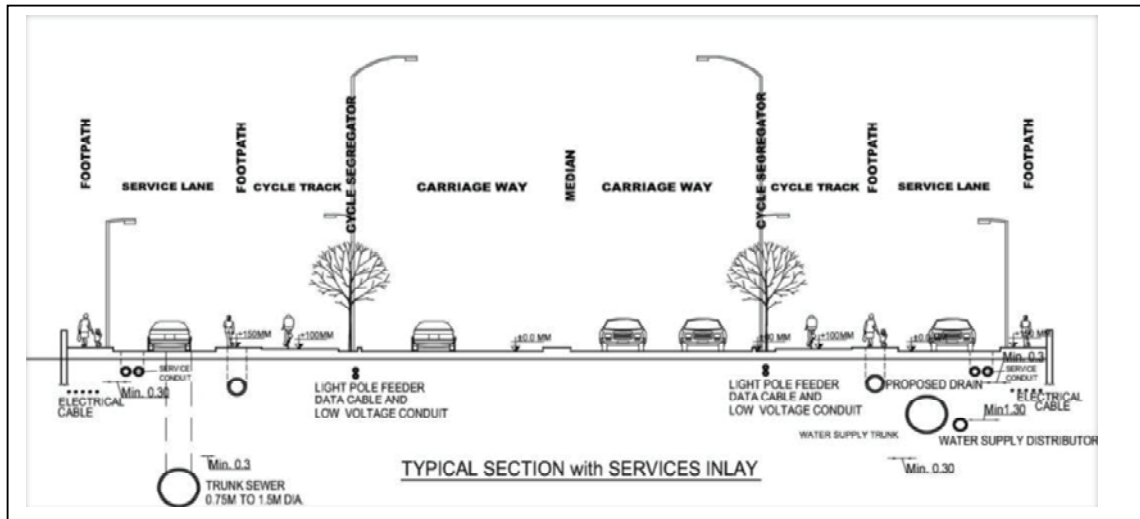
Arterial Roads ROW of 50-80 m	They are the primary roads for ensuring the mobility function. They carry the largest volumes of traffic and longest trips in the industrial park. They cater to a speed limit of 50-60 km/h. These roads have no frontage access, no standing vehicle and very little cross traffic and minimum roadway intersection spacing of 500 m.
Sub Arterial Roads ROW of 30-50 m	These categories of road follow all the functions of an Arterial Urban road and are characterized by mobility, and cater to through traffic with restricted access from carriageway to the side. It carries same traffic volumes as the arterial roads. Due to its overlapping nature, Sub arterial roads can act as arterials. This category caters to a speed limit of 50 km/h. These are roads for intra-urban through traffic with frontage access but no standing vehicles having high cross traffic, high capacity intersections and minimum roadway inter-section spacing 300 m.
Distributor/Collector Roads ROW of 20-30 m	These are connector roads which distribute the traffic from access streets to arterial and sub arterial roads. They cater to a speed of 30km/h. These roads have free frontage access but no parked vehicles and have heavy cross traffic and minimum roadway inter-section spacing of 150 m.
Access Streets ROW of 15-30 m	These are used for access functions to adjoining properties and areas. They carry relatively lower volumes of traffic at low speeds.
Local Street ROW of 10-20 m	Street for access to residence, business or other abutting property, having necessary parking and pedestrian movement. They have free Access.

It is necessary to accommodate utility services along and across the roads. The design of utilities has to be done to ease maintenance and operations but keep in mind that it will affect the traffic flow and conflict with other services. Location should be taken up so that minor or no adjustments are required with road works taken up later. These utility services include the following:

- Sewers
- Storm water drains, drainage
- Water supply lines
- Electricity cables
- Telecommunication cables
- Gas pipelines
- Cross conduit ducts
- Lighting
- Drainage
- Optical fibre cables

The road cross sections should also provide for:

- Green belts - Tree belt should have a minimum width of 0.7m and a desirable width of 1.5m or more.
- Traffic control devices
- Public toilets integrated suitably
- Shaded pedestrian pathways - The minimum width should be 1.2m in order to accommodate wheelchair users. Comfortable minimum width is 1.8m.
- Spaces of benches, street light poles, service providers (e.g. kiosks)



Pic. 4.3: Typical road cross section with typical service inlay

[Source: Code of Practice, 2011]

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.

b) Entry/exit provisions:

The entry/exit gates could have signature architecture to reflect the unique identity of the Industrial Park as well as integrate local architectural elements. The infrastructure to be provided with entry/exit includes:

- Security cabin.
- Information centre.
- Map of the Industrial Park.
- Parking facility - to provide for adequate parking/standing to avoid queuing at the entry/exit; to provide for parking for those who want to use bicycles or battery operated vehicles.
- Bus parking for external transport.
- Bus parking for internal transport.
- Adequate front space (in front of gate) for landscaping and aesthetic treatment.
- Public toilets.
- Drinking water facility.

c) Mobility - eco efficient transportation

▪ External linkages:

- » External road linkages to nearby settlements or housing areas where from the workers/employees will travel to the Industrial Park and to the railway station, bus station, etc. in a time bound manner.
- » Bus stops and pedestrian access points near the entrance gates.
- » Eco-friendly public transportation such as battery operated vehicles, CNG buses to operate from the Industrial Park to the nearby settlement, housing areas, railway station, bus station etc.
- » Bicycle and pedestrian network from surrounding settlements to the Industrial Park.

- **Internal mobility:**
 - » Battery operated vehicles for internal transport.
 - » Provisions for bus stops/shelters throughout the Industrial Park.
 - » Bicycle tracks, spaces for bicycle stations and bicycle parking.
 - » For private vehicles, adequate parking facilities to be provided at the entry/exit points, at central level and at zonal level in the Industrial Park.
 - » Pedestrian network: Extensive pedestrian network consisting of sidewalks along roads and pathways in the green belts (greenways) to create a system of safe and convenient pedestrian movement.
- d) **Automobile Service Station** - service stations/ workshops are to be provided, particularly to cater to trucks.
- e) **Signage** – appropriate signage should be provided as per standards (IRC). Signage includes:
 - Directional signage along major roads, pedestrian ways and bicycle ways.
 - Signage on landmarks, central facilities, zonal facilities etc.
 - Signage pertaining to names of industries should be uniform.
 - Information signage.
 - Advertisement boards/hoardings.
- f) **Weigh Bridges** – to be located at entry points.
- g) **Safety & Security** – to provide for security measures, fencing, and for fire & disaster management. These include:
 - Centralised security office at the main entrance. In addition, security cabins at the exit and other strategic points.
 - Close circuit (cc) cameras placed at all strategic locations in the industrial park.
 - Fencing all around the industrial park made of environment-friendly materials.
 - Provision for a fire station.
 - Provision for a police post.
 - Disaster management centre that will be run with pool of experts from industries.
- h) **Utilities** – include power transmission lines and a sub-station; water conveyance, treatment, adequate storage and distribution network; and telephone lines, telecommunications network.

4.4.8 Provisioning of Technical Infrastructure

- a) Warehouses/raw material depots – space for suitable numbers to be provided as per requirements.
- b) Renewable Energy/Energy Efficiency Provisions - All buildings would have to be energy efficient as per the Energy Conservation Building Code (ECBC). Process loads for industrial buildings are excluded. At least 25% of the installed external lighting load should be solar powered. 100% of internal & external lighting fixtures should be BEE star rated. The usage of incandescent lamps is not allowed. All common spaces, including street lights (where there is no use of light of light for reading purposes), shall use “LED”.
- c) Provisions for solar street lamps, solar panels (PVs) on roof tops of factory buildings (Green Factory Buildings) and insulated rooftops, solar energy generation in public/common area should be done.
- d) Business Centre (One Stop Service Centre) – provisions for Administrative Building, Information Centre and Product Display Centre.
- e) Product/Material Testing Facility – provisions to be made to cater to the requirements of the industries in the industrial park.

- f) Training Centre/Design Centre/Incubators - training centre to undertake training needs, including vocational training, entrepreneurship development etc.; design Centre to provide AutoCAD services, drawing and design services; and incubators for entrepreneurship promotion.
- g) Commercial Zone - provisions for commercial activities including warehouse, shopping complex, petrol pump, etc.
- h) Green Factory Buildings – preferably, every factory building should be a Green Factory Building in accordance with ratings of the Indian Green Building Council.
- i) Soft targets for inclusion in the site master plan in figure below.

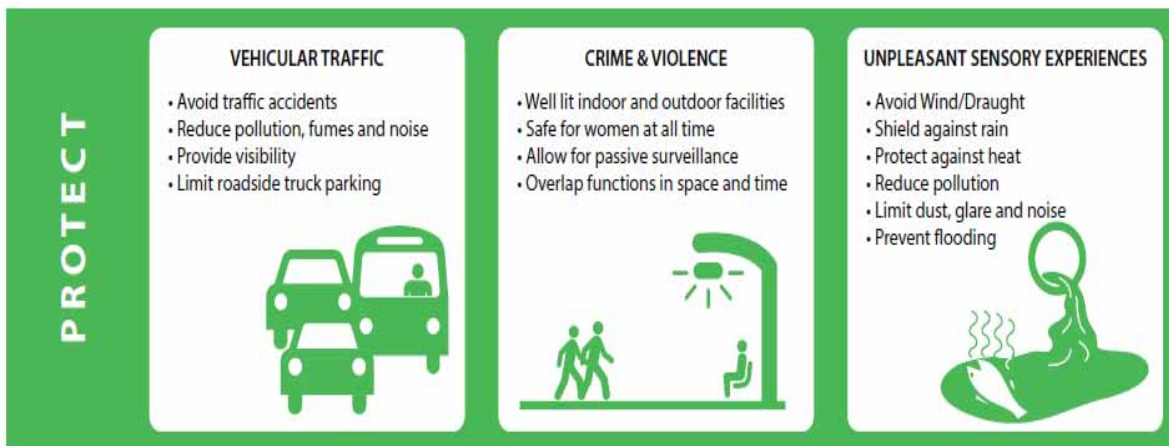
4.4.8 Provisioning of Environmental Infrastructure

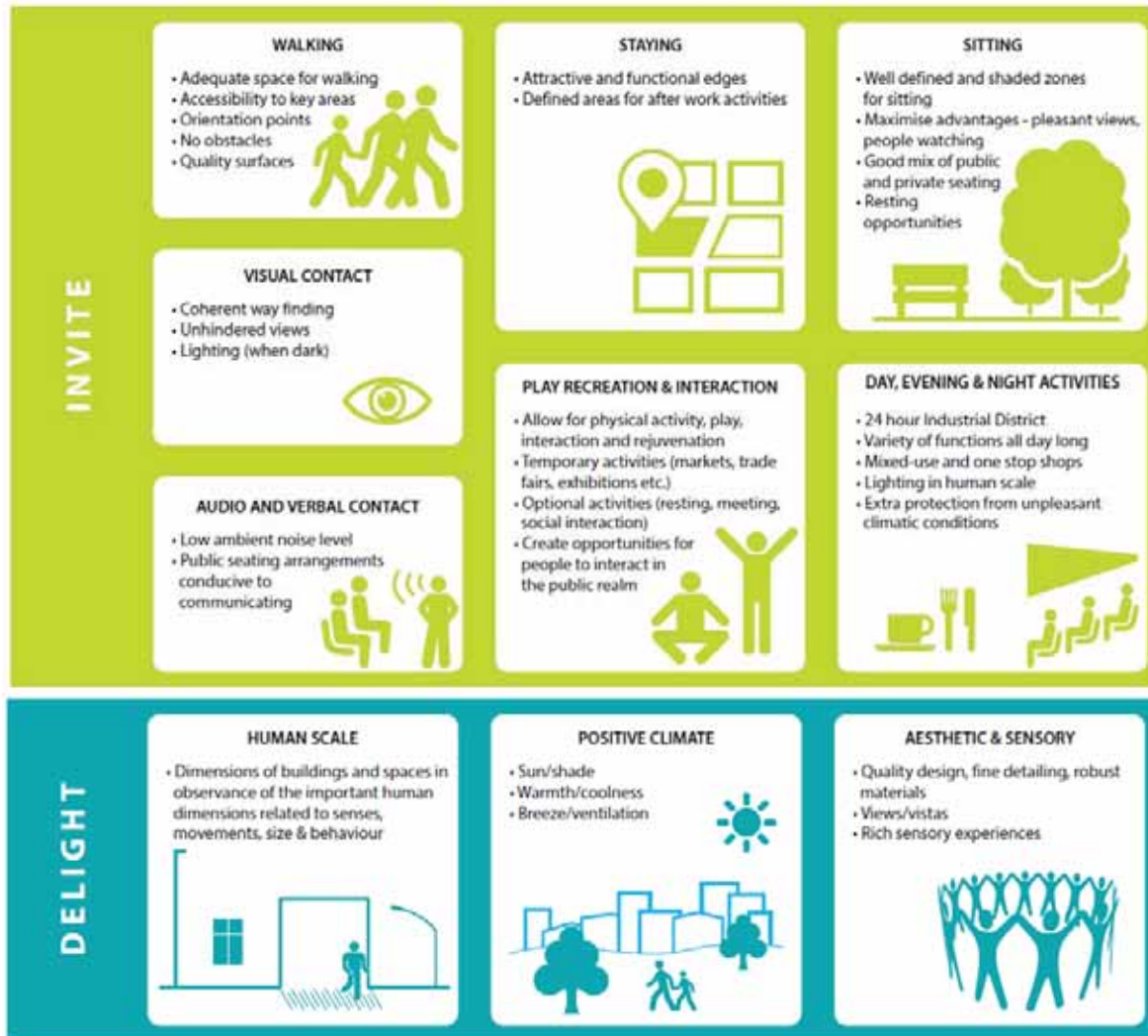
a) Storm Water Management – to include:

- Storm water drains all across the industrial park in accordance with terrain and drainage.
- Decentralized storm water management system for cost effectiveness.
- Collection and treatment of run-off of first rains at the rate of 1 hour peak rainfall and 80% run-off coefficient to avoid any contamination risks.
- Rainwater harvesting facilities.
- Ponding and integration into green landscapes.
- Recycle/reuse provisions for industrial, horticulture/irrigation uses.

b) Wastewater Management – to include:

- Provisions for wastewater conveyance system in accordance with slopes and zoning of industries.
- Provisions for common effluent treatment plants, sewage treatment plants.
- Provisions for storage of treated waste water (guard pond) and provisions for recycle/reuse.





Pic. 4.4: Soft targets for inclusion in Site Master Plans
 [Source: Buro Happold Engineering, Germany]

c) Solid Waste Management – to include:

- Provisions for collection, transportation, storage and disposal of wastes.
- Recycling centre for e-waste, vermi-compost plant and handmade paper plant etc.
- Waste management systems
- Hazardous wastes collection and temporary storage facility.

d) Green/Open Spaces/ Landscapes – to include:

- Central green – lungs for the Industrial park
- Green belts at the periphery- to act as buffer
- Vertical and horizontal stretches of greens spreading across the GIP in the form of avenue plantation and greenways
- Greens at the plot level

e) Resource Efficiency – to include:

- Provisions for rainwater harvesting, recycle/reuse of water.
- Provisions for recycle/reuse of treated wastewater.
- Provisions of renewable energy.

- Provisions in Green Factory Buildings.
 - Provisions for use of environment friendly materials.
- f) Provisions for Micro-Climate Control - open spaces, landscaped and hierarchical green areas that are crisscrossing the industrial estate site, integrated with water bodies (of treated rainwater and wastewater) provide for ventilation and micro climate control.
 - g) Environmental Monitoring – to include provisions for online monitoring of air quality in the industrial park; data display inside the industrial park as well as at the entry/exit points and data display via internet.
 - h) Biodiversity Protection or Enhancement on Site - existing plantation, water bodies and other natural features on site with ecosystem services to be conserved; extensive greenery and plantation will encourage local habitat.

4.4.9 Provisioning of Social Infrastructure

- a) Facilities for food and beverages – canteens, kiosks, tea/coffee shops, restaurants
- b) Public toilets
- c) Accommodation/dormitory for workers and truck drivers
- d) Education and training facilities, entrepreneurship development facilities, incubators etc.
- e) Recreational facilities - sports fields, amphitheatre/auditorium, landmark area with signature architecture, green/landscaped areas
- f) Guest House for visitors and service engineers etc.
- g) Special arrangements for truck drivers - dormitories for stay repair of their trucks, cooking, and wash & change.
- h) Transportation/mobility arrangements - parking facilities for vehicles, eco-friendly internal public transport, external transport to bus terminus & railway station, bicycle tracks, bicycle stations, bicycle parking areas, pedestrian pathways along roads, greenways along green landscaped areas.
- i) Safety & security provisions - CC cameras, fencing around the industrial park, security office and security cabins, police post.
- j) Gender aspects: provisions for women employees, including
 - Play schools, Crèche for infant children of workers
 - Ladies room, accommodation for late working
 - Provisions for strengthening of safety and security
 - Provisions for internal and external transportation
 - Provisions for health centre, canteens/ food outlets, kiosks, toilets, internal shuttle service (battery operated)
- k) Other provisions - ATM, post office, bank, internet centre, medical facilities, dispensary/health centre, shops for convenience goods, crèche, public toilets, water dispensers etc.

4.4.10 Provisioning for Administrative and Management Aspects

a) Administrative and management aspects:

- **Overall Structure**

The pre-clearances, site selection, site master planning, and development of a new Green Industrial Park may be taken up by a Special Purpose Vehicle (SPV) to be set up for this purpose by the public bodies such as the state industrial development corporations or state industrial infrastructure

development corporations, or private agencies. To enable the Green Industrial Park to function as a self-governing and autonomous body, it may be declared by the State Government as an Industrial Township under Art 243 Q(c) of the Constitution. The key functions of SPV, amongst others, may include:

- » Site Master Planning of the industrial estate/park.
 - » Preparation of a strategy for development of the Green Industrial Park and an action plan for self-regulation, and approval by the Board of the SPV.
 - » Selection of Developer/Co-developers for the development and maintenance of common infrastructure and services at the Green Industrial Park. SPV can take up the work of development on its own through various agencies/contractors or take up the development in partnership with a developer who shall be selected through a transparent process. Development can be in stages.
 - » Formulation of rules and procedures for development, operation, regulation and management of the Green Industrial Park and its enforcement.
 - » Obtaining prior environmental clearance under the provisions of EIA Notification 2006, as applicable.
 - » Working out an arrangement with the State Governments regarding revenue streams including levy of user or service charges, fees or rent for the use of infrastructure/properties in the Green Industrial Park and creation of specific mechanisms for specialised services.
 - » Promotion of investments into the Green Industrial Park.
- **Management**
 - » Industrial Area Local Authority (IALA) may be constituted with elected representatives from industries to manage the Green Industrial Park. IALA will be functioning under the purview of SPV.
 - » An Environmental Sub-committee of the IALA will look into environmental matters.
 - **Site development**
 - » Site development would be undertaken by SPV.
 - **Services**
 - » Services such as waste management and wastewater management may be tendered out by SPV based on appropriate business models (BOOT etc.) following Green Procurement principles.
 - » Services such as manning entry/exits, security etc. could be outsourced by the SPV.
 - » Infrastructure such as weigh-bridge, warehouses, commercial areas, and parking areas could be leased out through tender process by the SPV.
 - **Plot allotment**
 - » Plot allotment will be undertaken by the SPV (industrial estate developer), in consultation with IALA. Only those industries that are suitable will be allowed in each industrial zone.
 - » While allotting plots, conditions should be clearly laid and agreements made with plot allottees on adherence to Green Building norms, rainwater harvesting etc. for which “plot allotment guidelines” should be prepared by the industrial park developer.
 - » Plots should not be allotted to those industries that will not utilize the common infrastructure and services in the industrial park, as otherwise the common infrastructure and services will become unviable.
 - **Costing**

The costs of development could be calculated based on essential infrastructure to be developed at the site by the industrial park developer, including roads, lighting, drainage, sewerage, greenery, entry/exit gates, buffer zones, rainwater harvesting, waste management etc. The allocable area will be calculated and the total costs divided to the allocable area.

Costs towards common services would be payable by the allottees as per business case.

b) Provisioning in Site Master Plan

Provisions should be made in the Site Master Plan for:

- Office buildings for administration and management
- Office buildings for service providers
- Stores and materials for construction and maintenance








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LAND USE

LEGEND

-  SITE BOUNDARY
-  WATER BODY
-  INDUSTRIAL (ABOVE 1000 SQ YD)
-  INDUSTRIAL (620 SQ YD)
-  PARKS AND OPEN SPACES
-  BUFFER ZONE
-  COMMON FACILITIES
-  SERVICES
-  ROADS AND CIRCULATION


NOTE:

LAND USE DISTRIBUTION

S.No.	Land Use	Residual	Area (Sq. Ft.)	Percentage
1	Industrial	60%-65%	12,52,171	61.50%
2	Common	2%-5%	264	1.32%
3	Recreational	5%-10%	14,537	15.52%
4	Services	8-10%	1,67,732	13.66%
5	Transportation	15-20%	7,16,655	21.88%
TOTAL AREA				1,99,464



ALEP GREEN INDUSTRIAL PARK NANDIGAMA

SCALE		DATE OF PREPARATION		DATE OF REVISION	
		31.03.2018		31.03.2018	
DRAWING NO.	SHEET SIZE	MANAGER	SANCTIONING AUTHORITY		
3-1	A-2				
DEALING OFFICER					

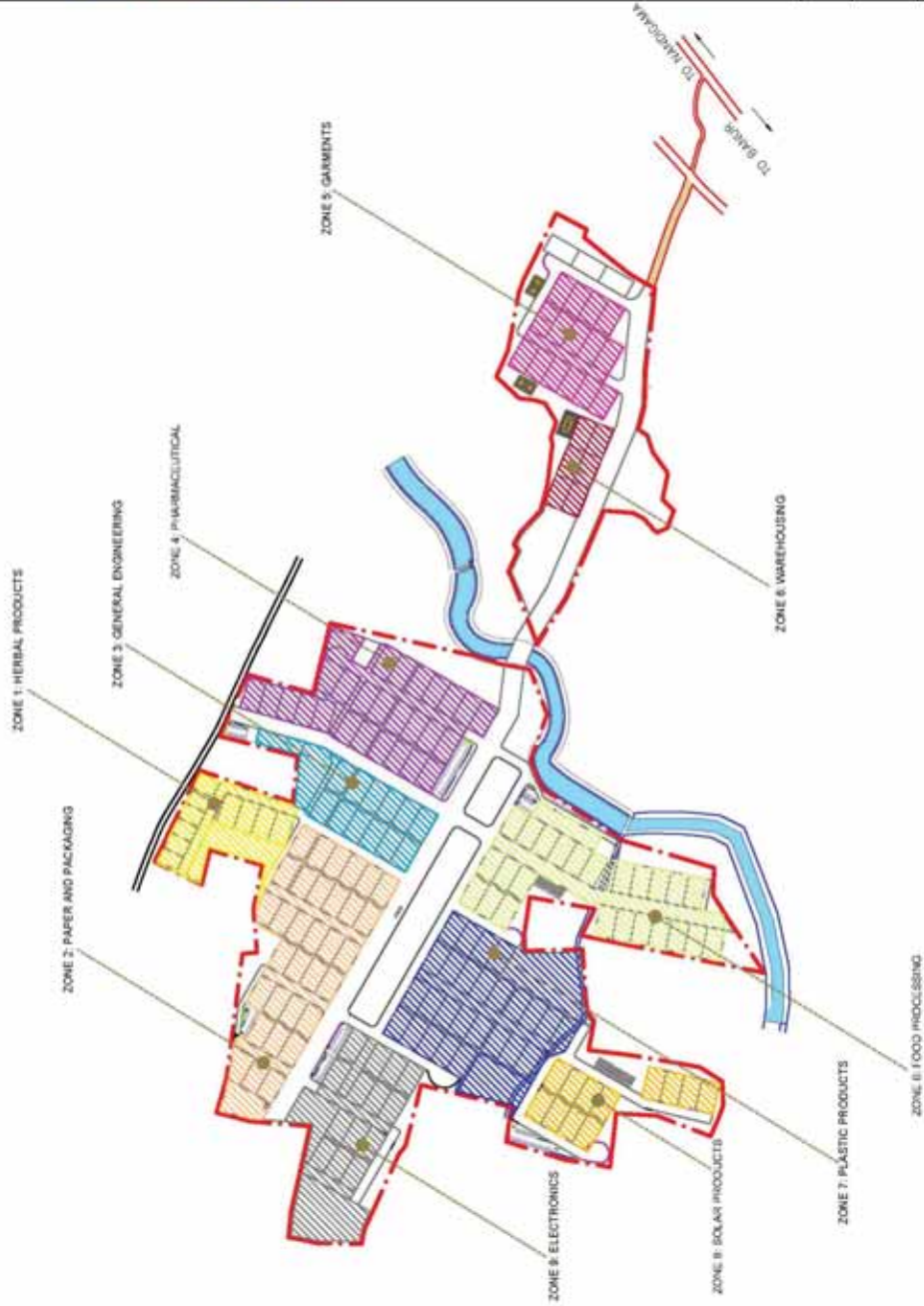
Map no. 1: Land-use of A-GRIP

Annexure 1



ZONING

LEGEND

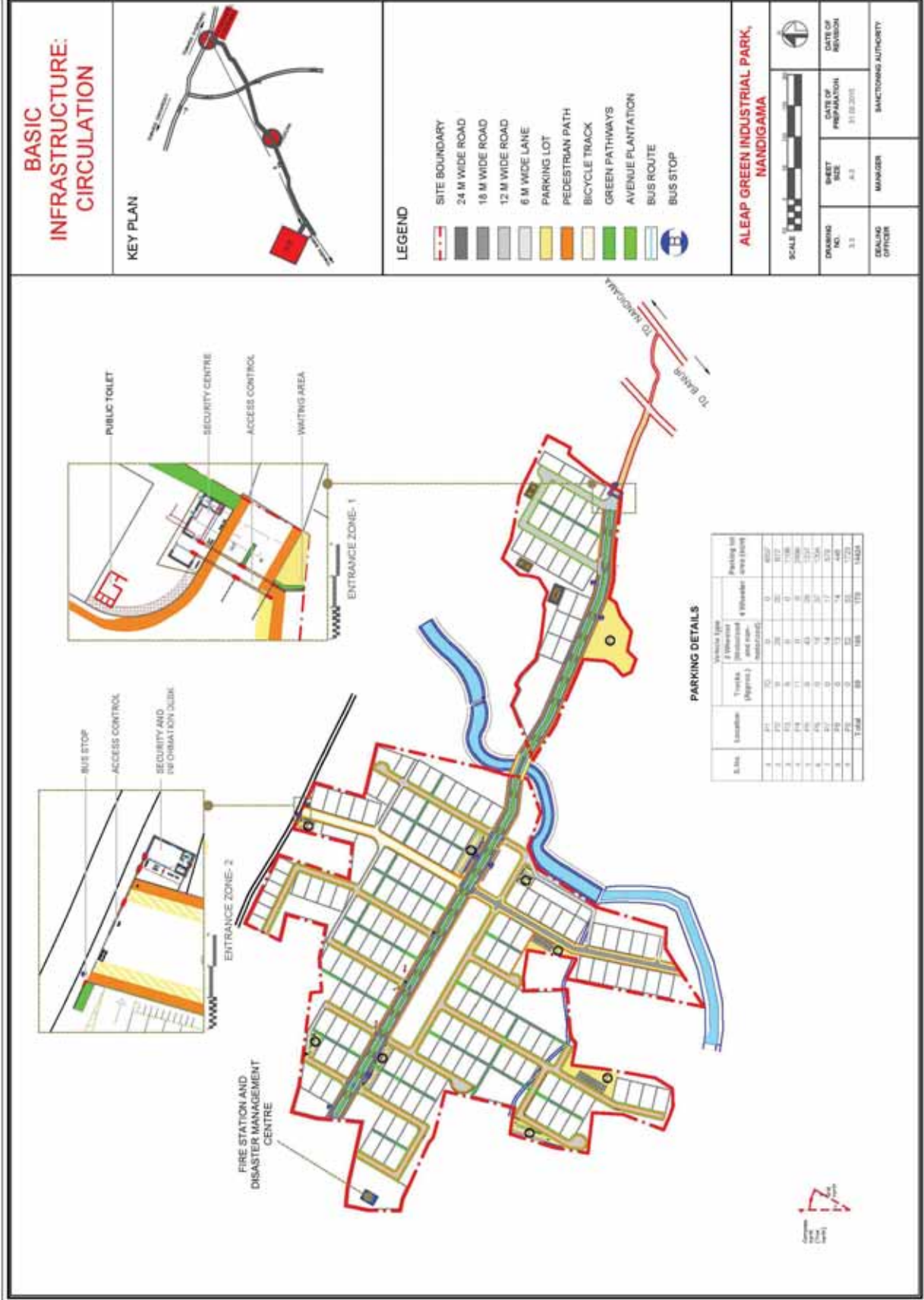
-  SITE BOUNDARY
-  ZONE 1: HERBAL PRODUCTS
-  ZONE 2: PAPER AND PACKAGING
-  ZONE 3: GENERAL ENGINEERING
-  ZONE 4: PHARMACEUTICAL
-  ZONE 5: GARMENTS
-  ZONE 6: FOOD PROCESSING
-  ZONE 7: PLASTIC PRODUCTS
-  ZONE 8: SOLAR PRODUCTS
-  ZONE 9: ELECTRONICS
-  ZONE 10: WAREHOUSING



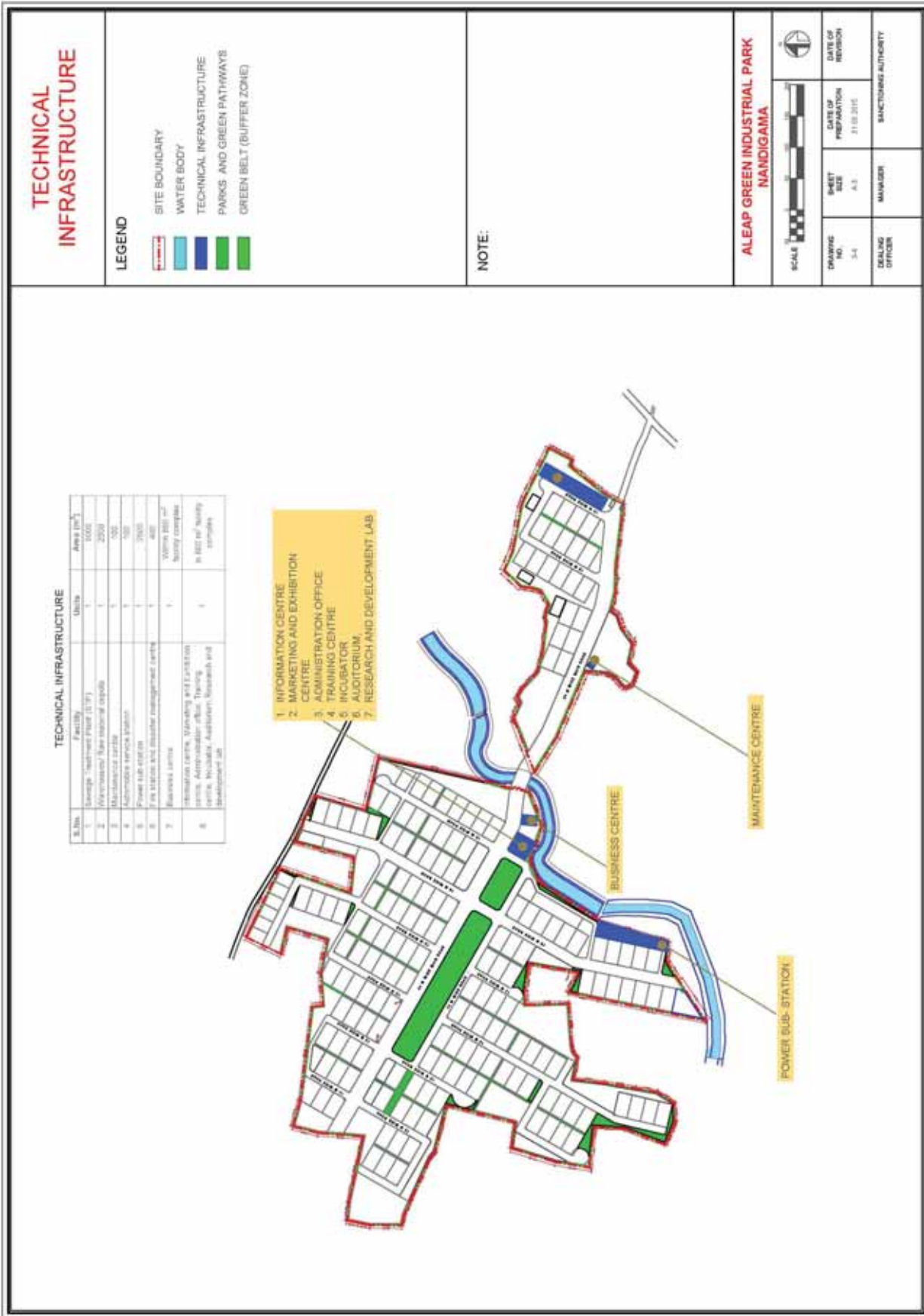
ALEAP GREEN INDUSTRIAL PARK, NANDIGAMA

			
DRAWING NO.	SHEET SIZE	DATE OF PREPARATION	DATE OF REVISION
3-2	A3	21.02.2015	
DEALING OFFICER	MANAGER	SANCTIONING AUTHORITY	

Map no. 2: Zoning of A-GRIP



Map no. 3: Basic Infrastructure Circulation of A-GRIP



Map no. 4: Technical Infrastructure of A-GRIP

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 PREPARATION 21.08.2015	DATE OF REVISION
	DRAWING NO. 54		
DRAWING OFFICER	MANAGER	SANCTIONING AUTHORITY	

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:

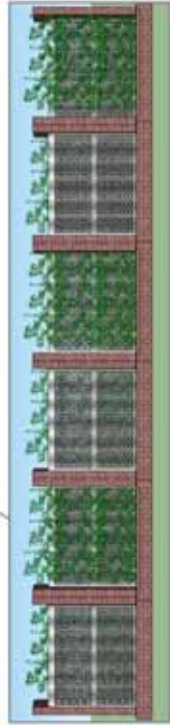
ALEAP GREEN INDUSTRIAL PARK NANDIGAMA



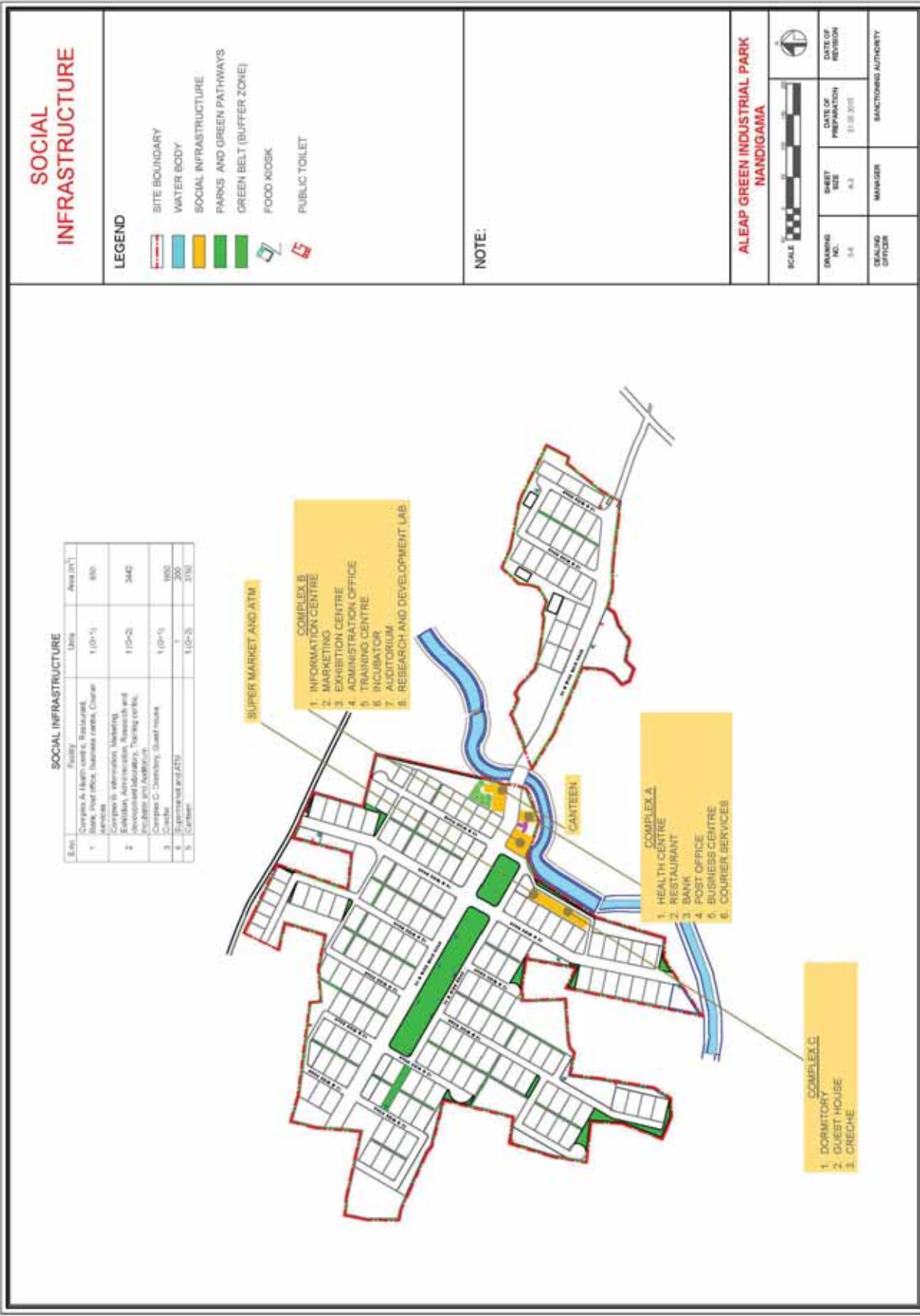
SCALE	DATE OF PREPARATION	DATE OF REVISION
DRAWING NO. 3-5	21.03.2015	
SHEET SIZE A3	MANAGER	MANAGING AUTHORITY

DETAILS OF FACILITIES

S. No.	Facility	Units	Area (m ²)
1	Decentralised waste water treatment system	1	1500
2	Public park	7	102 (11 m ² each)
3	Food wastewater treatment	26	
4	CRMS (rainwater) open	1	13000
5	Public zone		12000
6	Green pathways		8750



Map no. 5: Environmental Infrastructure of A-GRIP



SOCIAL INFRASTRUCTURE

Item	Facility	Units	Area (m ²)
1	Complex A: Multi-story office, Restaurant, bank, retail outlets, hospital centre, Courage services	1 (00-1)	850
2	Complex B: Information, Marketing, Exhibition, Administration, Research and development laboratory, Training works, Incubator and Auditorium	1 (00-2)	3442
3	Complex C: Dormitory, Guest house	1 (00-3)	1850
4	Creche	1	1000
5	Guest house and ATM	1 (00-3)	2100

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 NANDIGAMA

SCALE 	DATE OF PREPARATION	DATE OF REVISION
	11.08.2015	
DRAWING NO.	SHEET NO.	MANAGER
3-8	A.2	
DEALING OFFICER		SANCTIONING AUTHORITY

Map no. 6: Social Infrastructure of A-GRIP

REVISED LAYOUT PLAN OF GREEN INDUSTRIAL PARK IN SY. NOS. 408 TO 412 , 418 TO 435, 437 TO 445, 452 TO 459 OF POLEPALLY VILLAGE , JEDCHERLA MANDAL , AND 5888 TO 630 OF RAJAPUR VILLAGE , BALANAGAR MANDAL, MAHABOONNAGAR DISTRICT

LAND USE

LEGEND

- SITE BOUNDARY
- BEZ BOUNDARY
- RESIDENTIAL
- COMMERCIAL
- INDUSTRIAL
- PUBLIC/ SEMI-PUBLIC USE
- PARKS AND WATER BODIES
- MIX USE- FACILITY ZONES
- ZONE 4 : GREEN INDUSTRY
- ZONE 5 : WOMEN ENTREPRENEURS INDUSTRY
- ROADS

AREA DISTRIBUTION

TOTAL AREA (AS PER DRAWING)	= 956.54 Acs
REHABILITATION AREA (S.B.S+ S.O)	= 31.90 Acs
AREA COVERED FOR GRAVEYARD	= 5.98 Acs
AREA COVERED BY TANDA	= 8.87 Acs
AREA ALLOTTED TO UNIVERSITY	= 88.42 Acs
NET AREA	= 829.37 Acs
PLOTTED AREA (INDUSTRIAL)	= 491.90 Acs (60%)
PLOTTED AREA (COMMERCIAL PLOTS)	= 33.20 Acs (4%)
ROADS AREA	= 154.18 Acs (20%)
OPEN SPACE	= 68.87 Acs (10%)
FACILITY AREA	= 48.22 Acs (6%)

Note:

1. ACS means in acres where is equal to 0.084478 sq. km.
2. Area allotted to BEZ is industrial area by function. Hence added in the net area.
3. All area are per calculation from actual boundary in the drawing.
4. Area reserved under 'Industrial Highways' is entering to only part of site boundary.

Notes: 1. Not valid for subdivision.

GREENING OF GIP JADCHERLA

TELANGANA STATE INDUSTRIAL INFRASTRUCTURE CORPORATION LTD.

REF: 1/2000
SCALE: 1:5000

DATE OF PREPARATION: 14/08/2018
SHEET NO: 49
DESIGN OFFICER: GANAPATHI
CHECKING AUTHORITY:

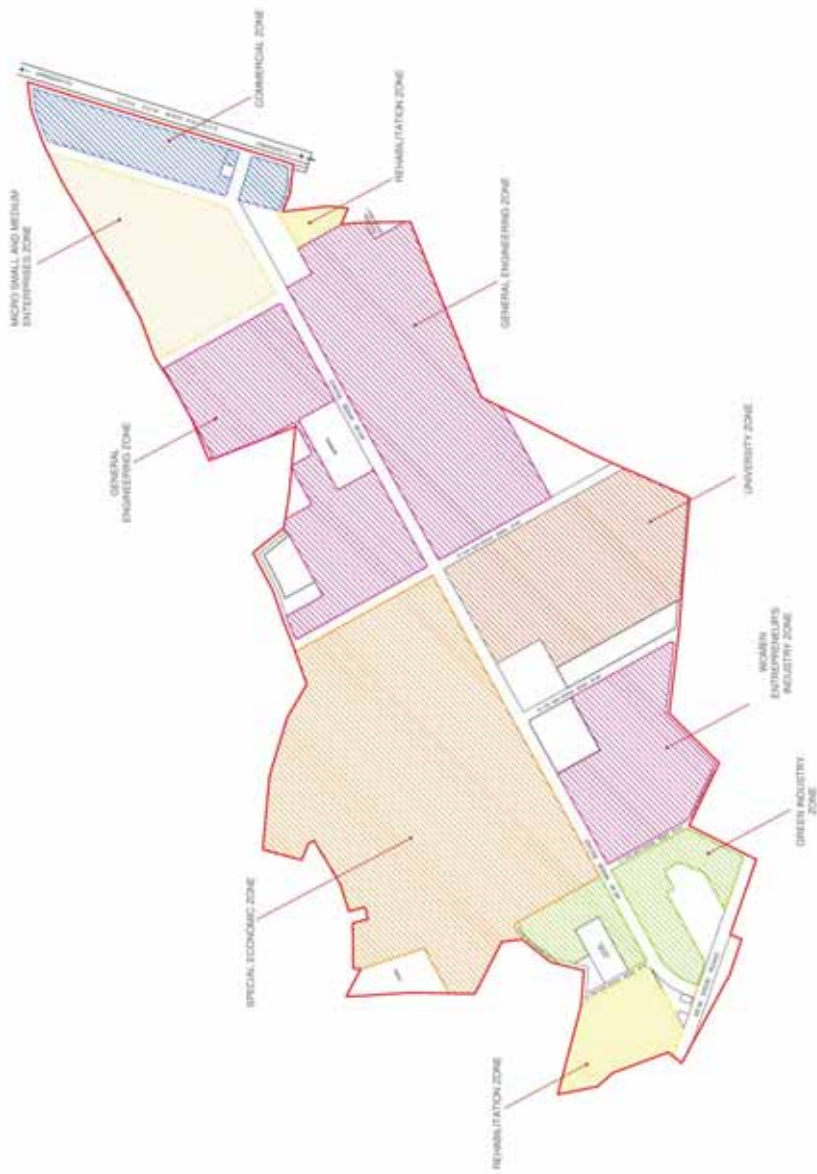


LAND USE DISTRIBUTION IN GIP JADCHERLA

S.No.	Land Use	Percentage	Area (in Acres) as per drawing	Area (in Acres) as per master plan
1	Rehabilitated plots (Per plots)	3.34%	31.90	31.90
2	Public graves, Parks, Water bodies, Street vendor (S.B.S+ S.O)	0.62%	5.98	5.98
3	Shopping Centre, Food Courts, Guard House, Police Station, Fire Station, Community Centre, Health Centre, Club House, Cinema, and other public uses	0.93%	8.87	8.87
4	UNIVERSITY	10.58%	88.42	88.42
5	Greening (Landscape/Planting, Parks, Water bodies, Green belts, etc.)	7.23%	68.87	68.87
6	ROADS	18.82%	154.18	154.18
7	INDUSTRIAL	59.45%	491.90	491.90
8	COMMERCIAL	3.52%	33.20	33.20
9	OPEN SPACE	8.31%	68.87	68.87
10	FACILITY	5.77%	48.22	48.22
11	TOTAL AREA	100%	956.54	956.54

Map no. 7: Land use of GIP Jadhcherla

REVISED LAYOUT PLAN OF GREEN INDUSTRIAL PARK IN SY. NOS. 408 TO 412 , 418 TO 435, 437 TO 445, 452 TO 459 OF POLEPALLY VILLAGE , JEDCHERLA MANDAL , AND 5888 TO 630 OF RAJAPUR VILLAGE , BALANAGAR MANDAL, MAHABOBNAGAR DISTRICT



ZONING PLAN

- LEGEND**
- SITE BOUNDARY
 - ZONE 1 : SPECIAL ECONOMIC ZONE
 - ZONE 2 : GENERAL ENGINEERING ZONE
 - ZONE 3 : MICRO, SMALL AND MEDIUM INDUSTRY ZONE
 - ZONE 4 : GREEN INDUSTRY ZONE
 - ZONE 5 : WOMEN ENTREPRENEURS INDUSTRY ZONE
 - ZONE 6 : COMMERCIAL ZONE
 - ZONE 7 : UNIVERSITY ZONE
 - ZONE 8 : REHABILITATION ZONE

AREA UNDER ZONES

ZONE 1 : SPECIAL ECONOMIC ZONE	= 245.88 acres
ZONE 2 : GENERAL ENGINEERING	= 211.81 acres
ZONE 3 : MICRO MEDIUM AND SMALL ENTERPRISES (MSME) ZONE	= 65.98 acres
ZONE 4 : GREEN INDUSTRY ZONE	= 41.21 acres
ZONE 5 : WOMEN ENTREPRENEURS INDUSTRY ZONE	= 56.54 acres
ZONE 6 : COMMERCIAL ZONE	= 33.25 acres
ZONE 7 : UNIVERSITY ZONE	= 89.53 acres
ZONE 8 : REHABILITATION ZONE	= 31.50 acres

GREENING OF GIP JADCHERLA

TELANGANA STATE INDUSTRIAL INFRASTRUCTURE CORPORATION LTD

W/F : 1/2000

SCALE : 1:1000

PROJECT NO: 18415 OF 18415

DATE OF PREPARED: 18/03/2023

DRAWN BY: SURESH

CHECKED BY: MANOJ

APPROVED BY: (Signature)

Map no. 8: Zoning of GIP Jadcherla

REVISED LAYOUT PLAN OF GREEN INDUSTRIAL PARK IN SY. NOS. 408 TO 412 , 418 TO 435, 437 TO 445, 452 TO 459 OF POLEPALLY VILLAGE , JEDCHERLA MANDAL , AND 5888 TO 630 OF RAJAPUR VILLAGE , BALANAGAR MANDAL, MAHABOONNAGAR DISTRICT



ARTISTIC IMPRESSION OF MAIN ENTRANCE



BASIC INFRASTRUCTURE: CIRCULATION

- LEGEND**
- SITE BOUNDARY
 - SEZ BOUNDARY
 - 45 M R.O.W
 - 30 M R.O.W
 - 24 M R.O.W
 - LESS THAN 24 M R.O.W
 - GREEN PATHWAY

GREENING OF GIP-JADCHERLA
 TELANGANA STATE INDUSTRIAL INFRASTRUCTURE CORPORATION LTD.

R/F : 1/30/2
 SCALE : 1:1000

DRAWING NO : 1/1
 SHEET NO : 04

DATE OF PREPARATION :
 DATE OF APPROVAL :
 DRAWING OFFICER :
 CHECKER :
 SUPERVISING AUTHORITY :

Map no. 9: Basic Infrastructure of GIP Jadcherla

REVISED LAYOUT PLAN OF GREEN INDUSTRIAL PARK IN SY. NOS. 408 TO 412 , 418 TO 435, 437 TO 445, 452 TO 459 OF POLEPALLY VILLAGE , JEDCHERLA MANDAL , AND 5888 TO 630 OF RAJAPUR VILLAGE , BALANAGAR MANDAL, MAHABOBNAGAR DISTRICT

TECHNICAL AND SOCIAL INFRASTRUCTURE

LEGEND

- SITE BOUNDARY
- SEZ BOUNDARY
- AMENITY ZONE
- HIGH TENSION LINE
- FOOD KIOSK
- PARK
- GREEN WAY



GREENING OF GIP JADCHERLA

TELANGANA STATE INDUSTRIAL INFRASTRUCTURE CORPORATION LTD

BY	1/2020	DATE OF REVISION	
SCALE	1:1000	DATE OF PREPARATION	
PROJECT NO.	100	REVISION	
DRAWING SHEET NO.	100/001	APPROVED BY	

Map no. 10: Technical and Social Infrastructure of GIP Jadcherla

REVISED LAYOUT PLAN OF GREEN INDUSTRIAL PARK IN SY. NOS. 408 TO 412 , 418 TO 435, 437 TO 445, 452 TO 459 OF POLEPALLY VILLAGE , JEDCHERLA MANDAL , AND 5888 TO 630 OF RAJAPUR VILLAGE , BALANAGAR MANDAL, MAHABOBNAGAR DISTRICT

DETAIL OF STORM WATER PONDS

S.No.	Name	Length (m)	Breadth (m)	Depth (m)
1	Pond no. 1 (N.G.-8)	60	50	4
2	Pond no. 2 (J.O.S.-188)	50	45	2.5
3	Pond no. 3 (N.G.-7)	50	45	2.5
4	Pond no. 4 (N.G.-2)	50	35	2.5
5	Pond no. 5 (N.G.-11)	35	35	2.5
6	Pond no. 6 (J.O.S.-4)	50	35	2.5
7	Pond no. 7 (J.O.S.-7)	40	35	2.5

Note:
 1 Above locations and capacities of the storm water storage ponds have been derived from watershed analysis of the area and rainfall data of last 5 years.
 2 Proposed ponds have capacity retain 100% peak rainfall water.



EXAMPLE VIEW OF VERMIL COMPOSTING PLANT AT AMENTY (2024)



EXAMPLE OF LANDSCAPE PROPOSED AROUND STORM WATER COLLECTION PONDS



ARTISTIC IMPRESSION OF CENTRAL GREEN

ENVIRONMENTAL INFRASTRUCTURE

- LEGEND
- SITE BOUNDARY
 - SEZ BOUNDARY
 - PARK
 - GREEN PATHWAY
 - PUBLIC TOILET
 - FOOD KIOSK
 - STORM WATER POND
 - WASTE WATER TREATMENT POND

NOTE:

1. PUBLIC TOILETS AND KIOSKS HAVE BEEN SYMBOLICALLY SHOWN IN THE MAP FOR ACTUAL AREA, REFER TO CHAPTER 3 OF THE REPORT
2. DECENTRALIZED WASTE WATER TREATMENT SYSTEMS ARE ALSO SHOWN ONLY IN TERMS OF LOCATION ONLY

GREENING OF GIP, JADCHERLA
 TELANGANA STATE INDUSTRIAL INFRASTRUCTURE CORPORATION LTD.

RF 1:5000

SCALE

DATE OF PREPARATION

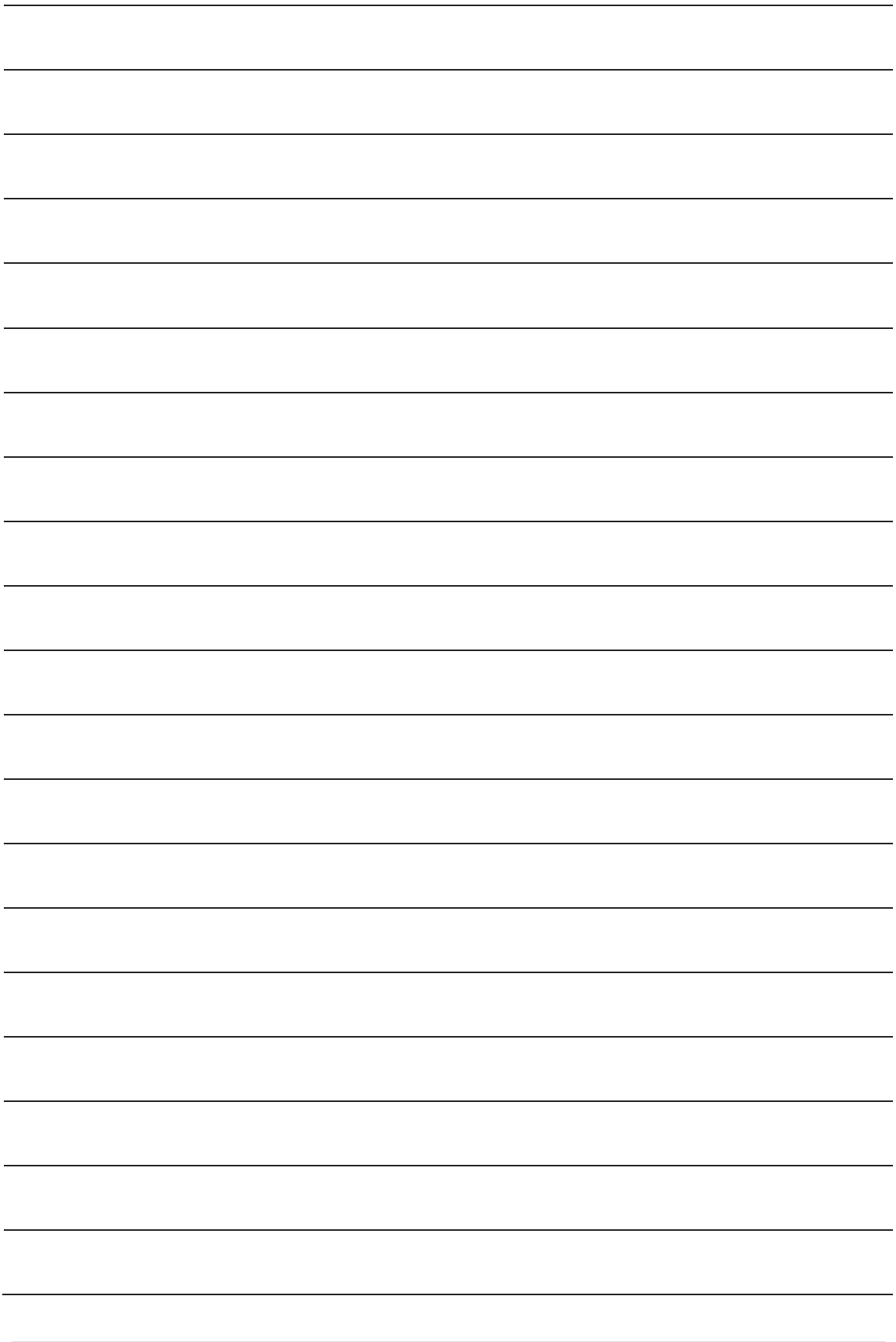
DATE OF REVISION

DESIGNED BY

MANAGER

SAC/CONTR. AUTHORITY

Map no. 11: Environmental Infrastructure of GIP Jadcherla



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Maps

The geographical maps are for informational purposes only and do not constitute recognition of international boundaries or regions; GIZ makes no claims concerning the validity, accuracy or completeness of the maps nor assumes any liability resulting from the use of the information therein.

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