

MASTER PLAN FOR A SPECIAL ECONOMIC ZONE IN NAGPUR CITY

A DISSERTATION

*Submitted in partial fulfillment of the
requirements for the award of the degree
of*

MASTER OF URBAN AND RURAL PLANNING

By

AMOL RAMESH GONDANE



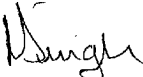
**DEPARTMENT OF ARCHITECTURE AND PLANNING
INDIAN INSTITUTE OF TECHNOLOGY ROORKEE
ROORKEE -247 667 (INDIA)
JUNE, 2009**

CERTIFICATE

Certified that this report entitled “**MASTER PLAN FOR A SPECIAL ECONOMIC ZONE IN NAGPUR CITY**”, which has been submitted by **Mr. AMOL RAMESH GONDANE**, in partial fulfillment of the requirements for the award of the degree of **MASTER OF URBAN AND RURAL PLANNING**, submitted in the Department of Architecture and Planning, Indian Institute of Technology Roorkee, Roorkee is the student’s own work carried out by him under our supervision and guidance. The matter embodied in this dissertation has not been submitted for the award of any other degree of this or any other institute.

Date: 30th June '09

Place: Roorkee



Dr. Nalini Singh

Associate Professor

Department of Architecture and Planning

Indian Institute of Technology Roorkee

Roorkee - 247667



Dr. Ashutosh Joshi

Assistant Professor

Department of Architecture and Planning

Indian Institute of Technology Roorkee

Roorkee - 247667

CANDIDATE'S DECLARATION

I hereby certify that this report entitled “**MASTER PLAN FOR A SPECIAL ECONOMIC ZONE IN NAGPUR CITY**”, which has been submitted in partial fulfillment of the requirements for the award of the degree of **MASTER OF URBAN AND RURAL PLANNING**, in the Department of Architecture and Planning, Indian Institute of Technology Roorkee, Roorkee is an authentic record of my own work carried out during the period from July 2008 to June 2009, under the supervision and guidance of **DR. NALINI SINGH** and **DR. ASHUTOSH JOSHI**, Department of Architecture and Planning, Indian Institute of Technology Roorkee, Roorkee, India.

The matter embodied in this dissertation has not been submitted by me for the award of any other degree of this or any other institute.

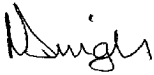
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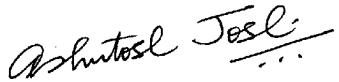
Dr. Nalini Singh

Associate Professor

Department of Architecture and Planning

Indian Institute of Technology Roorkee

Roorkee - 247667



Dr. Ashutosh Joshi

Assistant Professor

Department of Architecture and Planning

Indian Institute of Technology Roorkee

Roorkee - 247667

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ABSTRACT

India is today acknowledged as the emerging economic superpower of new millennium, riding on the crest of economic reforms, investment-friendly environment and matching initiatives on the ground level.

The MIHAN project is situated in the Nagpur in the state of Maharashtra, known as the economic powerhouse of India. It is the most developed and urbanized state of India with a per capita income of 1.5 times the national average. The state is the number one destination for foreign investment.

Development of Multi-modal International Hub Airport (MIHAN) makes Nagpur the location for potential development in terms of quality and quantity of infrastructure in and around the Special Economic Zone.

This thesis describes the process of preparation of Master Plan and determines infrastructure requirements for the Special Economic Zone in the proposed Multi-modal International Hub Airport at Nagpur (MIHAN).

For that there is need of study the SEZ in Indian and global scenario through various case studies. Norms and standards required for the land use planning and infrastructural provisions are analyzed and a land use plan is evolved.

The proposal is in form of an infrastructural development report along with a master plan and set of drawings describing the infrastructure planning of the project.

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1.1 BACKGROUND OF THE STUDY

India is today acknowledged as the emerging economic superpower of new millennium, riding on the crest of economic reforms, investment-friendly environment and matching initiatives on the ground level.

Of these, one initiative stands out as future defining, the Multi-modal International Hub Airport at Nagpur (MIHAN) with Special Economic Zone. It is an ambitious project that promises to put India firmly on the fast track of economic superstardom.

1.1.1 MAHARASHTRA – THE ECONOMIC POWER HOUSE OF INDIA

The MIHAN project is situated in the state of Maharashtra, known as the economic powerhouse of India. It is the most developed and urbanized state of India with a per capita income of 1.5 times the national average. The state is the number one destination for foreign investment.

Maharashtra is the best infrastructure provider in the country and has logged a 6.5 % development and growth rate over the last decade. The state also contributes sizably to the country's exports.

1.2 INVESTMENT FUNCTIONS

Due to proposed MIHAN project and benefits and objectives of SEZ, Nagpur is becoming a Hub of major investment from across the globe. There is increased foreign direct investment (FDI) involved in the process. The impact of an economic scheme at such a large scale needs to be analyzed. Therefore it is important to study the investment function and its role in the development process within an economy.

- i) Usually the goal of an SEZ structure is to increase foreign investment

- ii) When investment increases initially business activity increases which results in production
- iii) Due to this, trade and commerce activities take place
- iv) People's income and consumption go up
- v) Increase in income leads to increase in savings, which leads to increase in capital formation

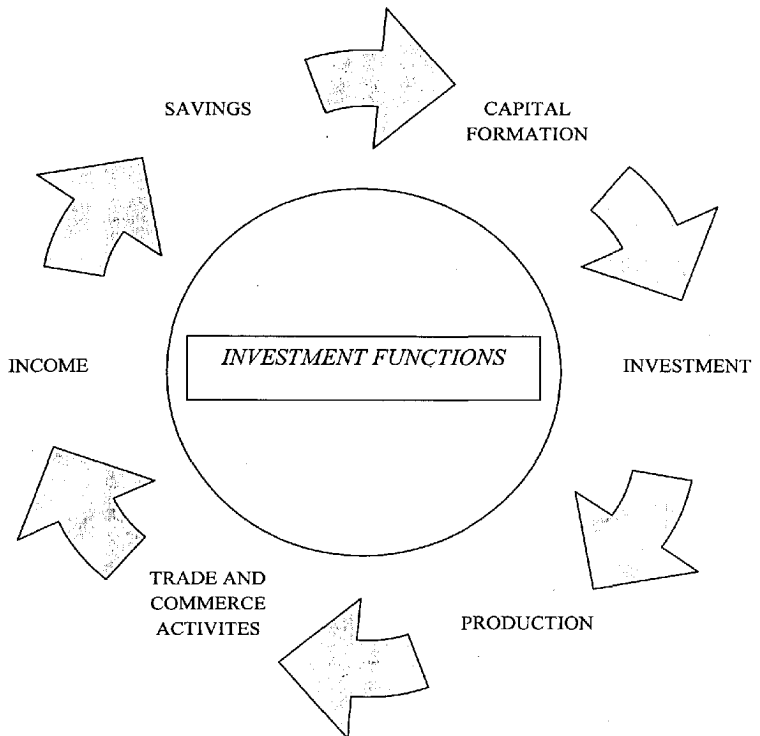


Fig. 1.1: Figure showing Investment Functions

Source: Compiled from various sources

1.3 MULTI-MODAL INTERNATIONAL CARGO HUB AND AIRPORT AT NAGPUR (MIHAN)

MIHAN is an airport project for Dr. Babasaheb Ambedkar International Airport, Nagpur. It the biggest economical development project currently underway in India in terms of investment. The project aims to exploit the central location of Nagpur and convert the present airport into a major cargo hub with integrated road and rail connectivity. Project consists of two parts namely International airport to act as a cargo hub and a Special Economic Zone with residential zone covering a total area of 40.25 sq. km on the southern end of Nagpur.



Map 1.1: Map showing location of MIHAN in Nagpur City

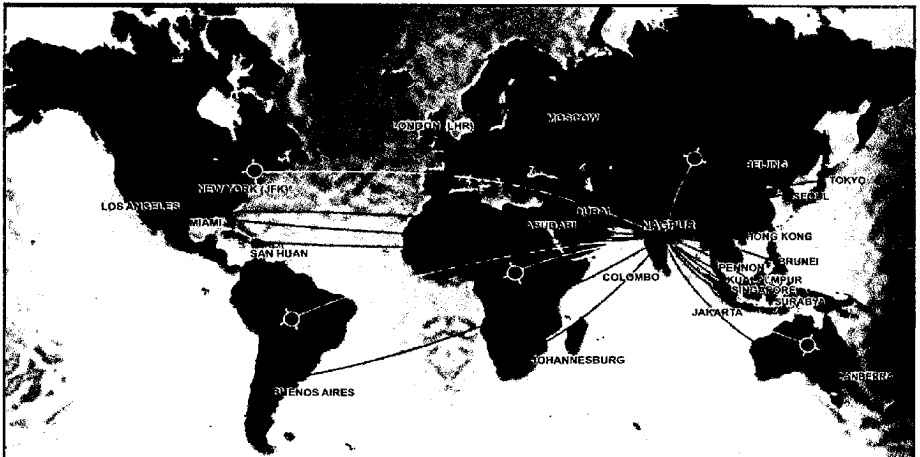
Source: Maharashtra Airport Development Co. Ltd.

The Government of Maharashtra formed a special purpose entity in the name of Maharashtra Airport Development Company (MADC) for development of MIHAN. The project is financed by multiple Indian banks with total loan amount of Rs. 3,000 million along with investment from state government and Airports Authority of India. With a projected target of serving 14 million passengers and handle 0.87 million tones of cargo this is one of largest aviation project in India. The estimated capital cost of the project is Rs. 2581 crores (by year 2035) and is supposed to generate revenues Rs. 5280 crores.

The project envisages India's first international airport with Passenger and Cargo Hub with adjacent Special Economic Zone (SEZ) in Centre of India.

For efficient planning of SEZ the physical connectivity by air, road or water is necessary for comfortable transportation of goods and easy trade & commerce activities, which can be done by proposed International Airport and Cargo Hub. Hence the project fulfills the Distribution Function of SEZ.

1.4 NEED FOR SEZ IN NAGPUR



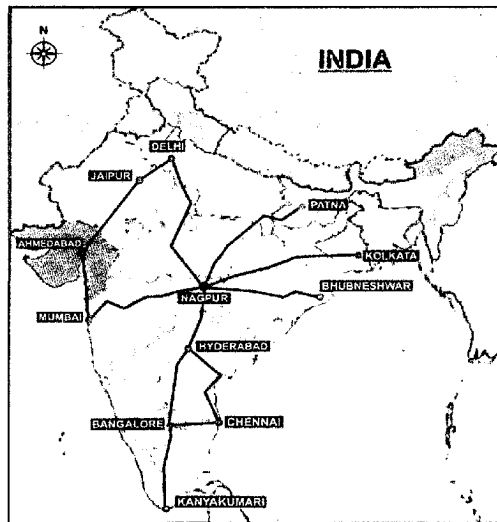
*Map 1.2: Map showing International Aviation Routes
Source: Maharashtra Airport Development Co. Ltd.*

Nagpur, the second capital of Maharashtra has a strategic geographic central location in India as well as on the international aviation routes. It has connectivity to all parts of India by National Highways as well as main trunk rail routes. It also has excellent air connectivity. The city has well planned roads, water supply, power and telecommunication infrastructures, winning the most clean and green city award.

Nagpur is a cosmopolitan city ranking second in India. The city has a population of about 3 million and is considered as the second tier two city of India.

Spread over an area of about 250 Sq. Km, it has a great agricultural and minerals rich hinterland with huge forests. Nagpur is the educational business centre of Central India with 27 engineering colleges and 13 medical colleges in and around the Nagpur churning out about 8500 Engineers and 3000 Doctors every year.

Development of Multi-modal International Hub Airport (MIHAN) makes Nagpur the location for potential development in terms of quality and quantity of infrastructure in and around the Special Economic Zone.



Map 1.3: Map showing Rail and Road connectivity of Nagpur

Source: Maharashtra Airport Development Co. Ltd.

1.5 TOPIC SELECTION

Upcoming concept of SEZ in India needs special efforts from Economists and Planners to achieve the objectives of the concept.

1.6 AIM OF THE STUDY

This thesis aims at preparing Master Plan and determining infrastructure requirements for the Special Economic Zone in the proposed Multi-modal International Hub Airport at Nagpur (MIHAN).

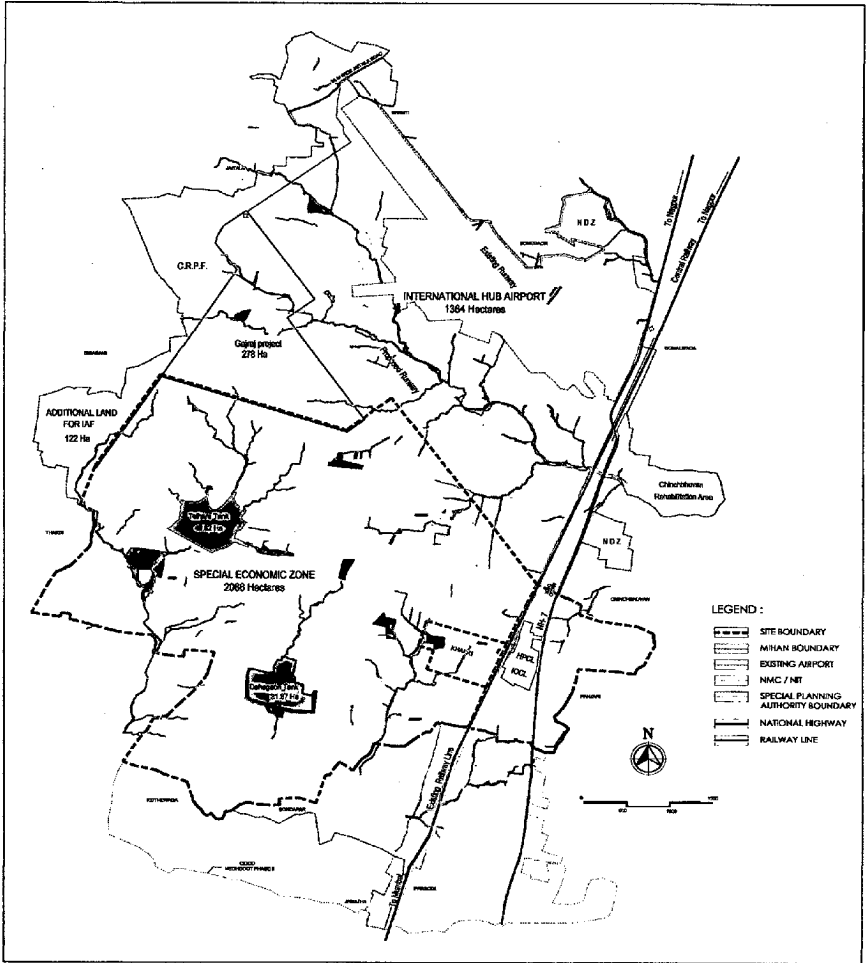
1.7 OBJECTIVES

1. To study the existing SEZ in the Indian scenario
2. To study the development of SEZ in the global context
3. To analyze the norms and standards required for land-use planning and infrastructural provisions
4. To evolve land-use plan
5. To suggest infrastructural provisions in study area
6. Finally prepare a Master Plan for the proposed SEZ.

1.8 SCOPE AND LIMITATION OF WORK

The scope of dissertation is to study and analysis of the physical infrastructure which act as 'growth pillars' for the development of Special Economic Zone in terms of quality and quantity, and to analyze the gap between the supply and demand equations, and to suggest requirements of infrastructural services and facilities.

1. The geographical area under consideration is limited to the area given by the Maharashtra Airport Development Corporation i.e. 2086 Ha.
2. The scope of this study is limited to physical and social infrastructural facilities.



Map 1.4: Map showing Study Area

Source: Compiled from various sources

1.9 METHODOLOGY

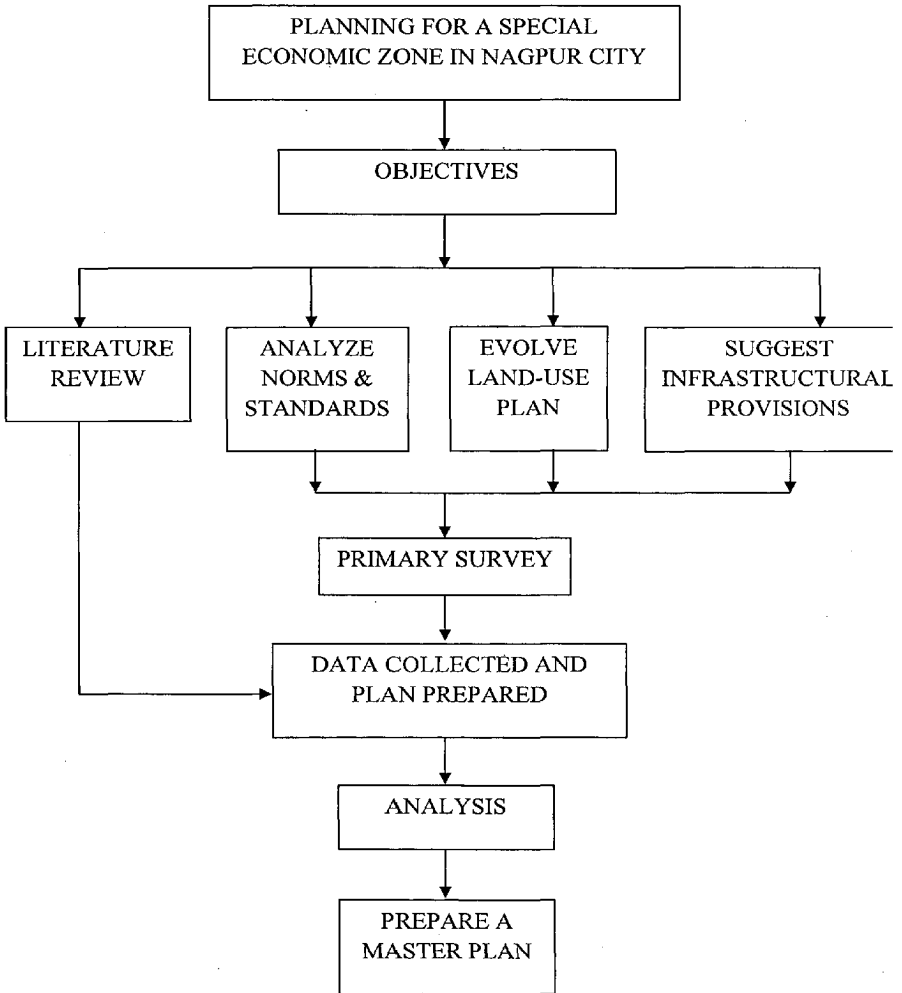


Fig. 1.2: Figure showing Methodology adopted in the thesis

2.1 INTRODUCTION

India over the past decade has progressively opened up its economy to effectively face new challenges and opportunities of the 21st Century. To compete in the global market, the Government of India (GoI) has liberalized export policies & licensing of technology and implemented tax reforms providing various incentives. Special Economic Zone (SEZ) policy is also one of the steps India has taken to boost economic growth through outward looking approach.

2.2 SPECIAL ECONOMIC ZONES (SEZ)

A Special Economic Zone (SEZ) is defined as a deemed foreign territory within a country with special rules for facilitating Foreign Direct Investment (FDI) for export-oriented production, and for purposes of trade and customs duties. These Zones (SEZs) are geographical region that have economic laws different from a country's typical economic laws. Different economic institution and government departments have defined it in different ways.

As per Ministry of Commerce and Industry they are defined as:

“Special economic zone is a specifically duty free enclave and shall be deemed to be foreign territory for the purpose of trade operations and duties and tariffs”.

SEZs are free trade zones, having completely different set of administrative and taxation laws outside the purview of customs authorities. Traditionally SEZs are created as open markets within an economy that is dominated by distortionary trade, macro and exchange regulation and other regulatory governmental controls. SEZs are believed to create a conducive environment to promote investment and exports. And hence, many developing countries are developing the SEZs with the expectation that they will provide the engines of growth for their economies to achieve industrialization.

To achieve its three-fold objectives of attracting FDI, increasing exports and accelerating the country's economic growth, the Government of India announced the introduction of SEZs in its Export-Import Policy of March 2000. The zones cannot be insulated from the broader institutional and economic context of the country and be treated as an economy within the economy. Zones are a part of the economy and require overall improvement in the investment climate to ensure success in the long run. They should not, therefore, be viewed as an alternative to the overall development model. This is perhaps the reason why SEZs failed to fulfill the role of engines of economic growth in most countries on a sustainable basis.

The concept of having free trade zones, export oriented zones and SEZs dates back to 1970. In 1979-80, China opened up its economy to foreign investment with the establishment of Shenzhen SEZ.

2.2.1 CONCEPT OF SEZ

SEZs have long been seen as a means for India to create bigger inroads into small and medium scale manufacturing. Improving the business environment on a nationwide basis, providing a competitive platform to India's entrepreneurs will take time. SEZs, however, can quickly help

- i) Create high-quality infrastructure in pockets,
- ii) Providing a liberal and supportive business environment,
- iii) Push for manufacturing exports.
- iv) They allow the government to experiment with the liberalization of labour laws.
- v) SEZs can also provide scale-related advantages via the creation of clusters, reducing manufacturing costs.
- vi) SEZs can be particularly helpful for small- and medium-scale entities that cannot afford to set up captive infrastructure facilities, but can share the costs in a large group.
- vii) Finally, they can attract foreign capital and technology.

Despite the recent pick-up, India's share in world goods exports has been very small – at 0.9% for 2005 – due to the widely known gaps in the business environment.

Although SEZs as a concept appear to be the right solution to encourage India's manufacturing exports, the government's current approach may not be the best way to achieve the much-needed push to boost India's manufacturing.

Hence, the Government SEZ policy needs to be studied thoroughly. The large tax incentives, the export import benefits to the industries and the various exemptions from indirect and direct taxes to lure industries have an impact on the revenue collection of the state government. Their impact and the consequences need to be analyzed in context of the region (study area). Further there are issues related to managerial, operational and implementation of the concept which depend on the city institutional and economic setup. How the concept behaves in a given context is a matter of extensive study and forms an objective of this dissertation.

2.2.2 OBJECTIVES OF SEZ ENVISAGED BY THE GOVERNMENT OF INDIA

The main objective of the SEZ scheme according to the finance and commerce ministries is to create delineated, duty –free zones with world class infrastructure, internationally competitive production environment and fast track clearance system for attracting private investments, especially foreign direct investment (FDI) for setting up export oriented unit.

1. The broad objectives of the SEZ policy are:
2. Attract Foreign Direct Investment (FDI)
3. Earn foreign exchange and contribute to exchange rate stability
4. Boost the export sector, particularly non traditional exports
5. Create jobs and raise standard of living
6. Transfer new skills and expertise to local human resources
7. Create backward & forward linkages to increase the output and raise the standard of local enterprise that supply goods and services to the zone
8. Introduce new technology
9. Develop backward regions by locating such zones in these areas and attracting Industries
10. Provide a stimulus to the economy
11. Test key policy reforms in these 'pilot areas'.

2.3 INFRASTRUCTURE

Infrastructure typically refers to the technical structures that support a society, such as roads, water supply, wastewater, power grids, flood management systems, communications (internet, phone lines, broadcasting), and so forth. In the past, these systems have typically been owned and managed by local or central governments. These various elements may collectively be termed civil infrastructure, municipal infrastructure, or simply public works, although they may be developed and operated as private-sector or government enterprises. A more generic definition of infrastructure is the network of assets "where the system as a whole is intended to be maintained indefinitely at a specified standard of service by the continuing replacement and refurbishment of its components.

Physical and social infrastructure services and facilities are identified as

Growth pillars

1. Roads
2. Transportation
3. Power-energy
4. Skilled/trained human resource.

Support pillars

1. Water supply system
2. Storm water disposal system
3. Sewage disposal
4. Solid waste management
5. Housing

3.1 MUNDRA SEZ PROJECT

Mundra SEZ is located in the Gulf of Kachchh, in the southern part of the Kachch peninsula. Kachchh (or Kutch) is the largest district in Gujarat (and in India) and has an area of 45,652 sq.km constituting 23% of the State. It is bound by the sea in the South and West and by the Ranns (salt marshlands) in the East and North. Kutch has 951 villages with a population of 1.5 million. In the global context, Mundra SEZ located on the Western coast of India is ideally located to access the Asian, European, American, South American and African Markets. Mundra has an attractive and large hinterland spread over Western, Northern and North Eastern India. Large Industries already exist in the vicinity.

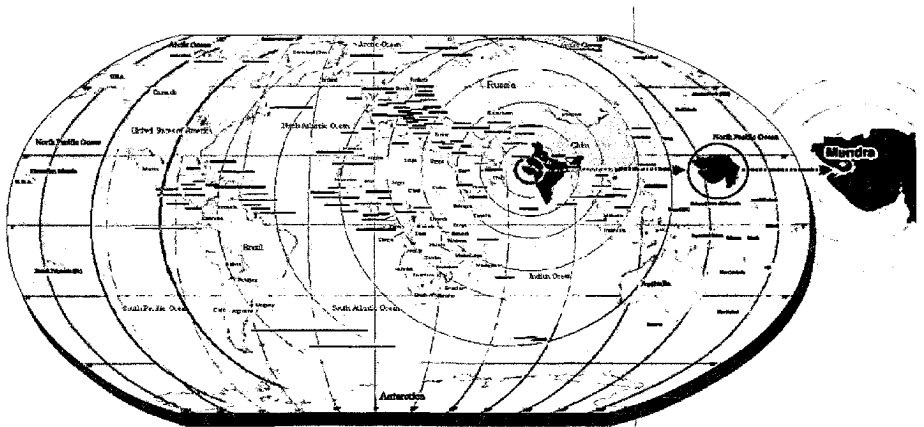


Plate 3.1: Location of Mundra SEZ

Source: Compiled from various sources

3.1.1 CHARACTER & DIMENSION

An area of 130 Sq. km has been identified for development of Mundra SEZ. Based on the Development Philosophy the planning would be done for the entire 130 Sq. km. The actual development will be taken up in three phases. Mundra SEZ is the largest Private Sector SEZ in India with an expected population of about 6 lakh people. Mundra SEZ would be built to be a self contained destination with world class Infrastructure, Utilities, Facilities and Services to meet the needs of Businesses as well as the needs associated with Living, Learning and Recreation. Mundra Port will be an integral part of the SEZ and the SEZ will be developed as a Model Urban Complex, with emphasis on Port oriented activities as a Port hub.

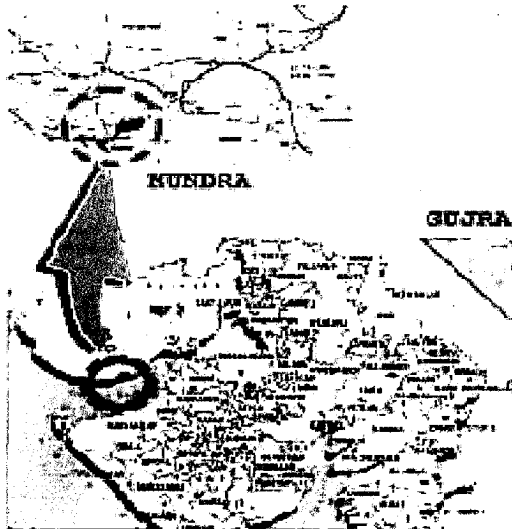
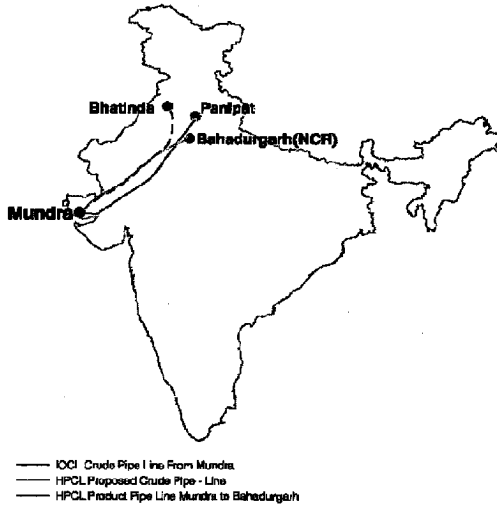


Plate 3.2: Location of Mundra SEZ in Gujarat state

Source: www.mapsofindia.com

Mundra – Major Pipe Line Network



Map 3.1: Map showing major pipe line network in Mundra SEZ

Source: www.portofmundra.com

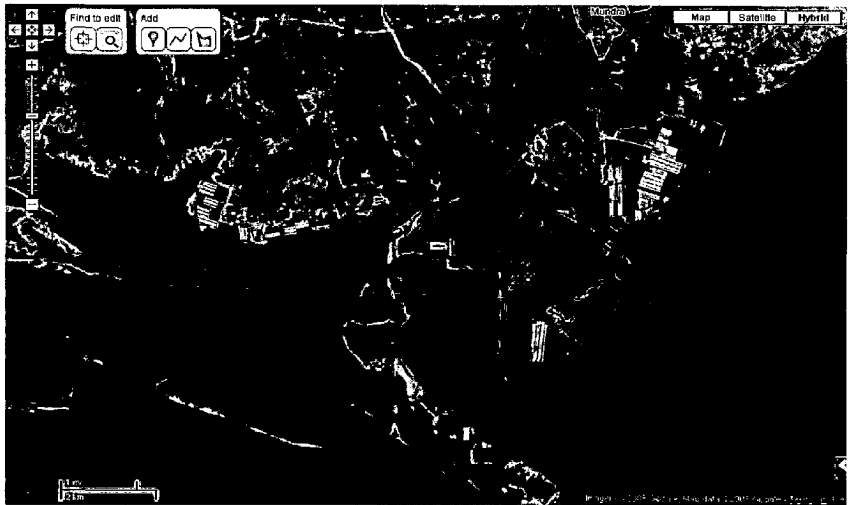


Plate 3.3: Satellite image of Mundra SEZ

Source: www.map.google.com

3.1.2 PROJECT AREA

- Area Identified: 13,000 ha (130 sq. km)
- Area to be Developed: 10,000 ha (100 sq. km)
- Notified Area: 2789.76 hectares (6893 acres)

3.1.3 DEVELOPMENTAL APPROACH

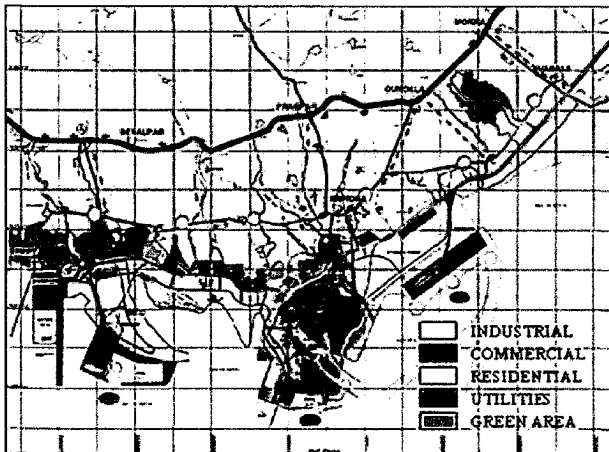
1. Phase one to offer all the components of Infrastructure
 - Developed Land with 7 Connections
 - Utilities – Power, Water, Telecom/Info-comm
 - Built-up Facilities
2. Commercial
3. Institutional
 - Residential Complexes
 - Social Infrastructure
4. Build in a modular and scalable manner
5. Each package to be of the minimum critical size for viability
6. Mundra SEZ to be a fully integrated SEZ, benchmarking against Regional SEZs
7. Product Offering - Unified Value Bundle.

3.1.4 LAND USE

Table 3.1: Land-use distribution of Mundra SEZ

Sr. no.	Activity	Areas in acres	%
1	Industrial	2,128.00	37.94
2	Warehousing	250.00	4.46
3	Commercial	50.00	0.89
4	Utilities	505.79	9.02
5	Social & Residential	2,149.54	38.32
6	Green Area	525.87	9.38
	Total	5,607.20	100.00

Source: www.portofmundra.com



Map 3.2: Land use plan of Mundra SEZ

Source: www.portofmundra.com

3.1.5 DESIGN VARIABLES

Table 3.2: Population Density in Mundra SEZ

Sr. no.	Workforce	Workforce per acre
1	Average Workforce	16.45
2	Tertiary Workforce	0.60
3	Average dependents / workforce	1.50

Source: www.portofmundra.com

Table 3.3: Categorization of Income groups in Mundra SEZ

Sr. no.	Income group	Percentage
1	High Income Group (HIG)	5%
2	Middle Income Group (MIG)	20%
3	Low Income Group (LIG)	75%

Source: www.portofmundra.com

Table 3.4: Family Composition in Mundra SEZ

Sr. no.	Dwellers	Percentage
1	Single	20%
2	With family	80%

Source: www.portofmundra.com

Table 3.5: Average size of houses for married workers (built up)

Sr. no.	Income group	Built up
1	HIG	200 sq. m.
2	MIG	125 sq. m.
3	LIG	60 sq. m.

Source: www.portofmundra.com

Table 3.6: Average living space for bachelor house

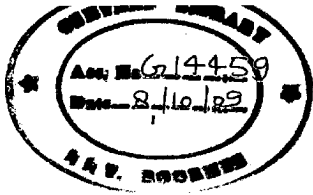
Sr. no.	Income group	Built up
1	HIG	200 sq. m.
2	MIG	62.5 sq. m.
3	LIG	12 sq. m.

Source: www.portofmundra.com

Table 3.7: Population projection in Mundra SEZ

Population break-up	2007	2008	2009	2010	2011
Total population (per year)	8,163	13,547	37,342	39,311	39,311
Total population (cumulative)	8,163	21,711	59,043	98,363	137,674
Total workforce (per year)	3,711	6,158	16,974	17,868	17,868
Total workforce (cumulative)	3,711	9,869	26,843	44,711	62,579
Single population (per year)	742	1,232	3,395	3,574	3,574
Single population (cumulative)	742	1,974	5,369	8,943	12,517
With families (per year)	7,421	12,316	33,947	35,737	35,737
With families (cumulative)	7,421	19,737	53,684	89,421	125,158

Source: www.portofmundra.com



3.1.6 PHYSICAL INFRASTRUCTURE

- **Land Development**
 - i) Earth Filling
 - ii) Boundary Wall
 - iii) Street Lights
 - iv) Landscape
- **7 Connections**
 - i) Roads
 - ii) Drainage
 - iii) Water
 - iv) Sewage
 - v) Power
 - vi) Telecom (Optical Cable)
 - vii) Gas

3.1.7 UTILITIES

1. Power Generation, Transmission & Distribution
2. Water Sourcing, Generation, Supply & Recycling System
3. Telecom & Info-com Infrastructure
4. Sewage / Effluent Treatment System
5. Solid Waste Management System

3.1.8 DEMAND ESTIMATION

Table 3.8: Housing demand estimation in Mundra SEZ

Sr. no.	Housing Type	2007	2008	2009	2010	2011
1	Single (Cumulative)	490	1303	3543	5902	8260
2	With Families (Cumulative)	3320	8829	24015	40001	55987
3	Total Housing Units (Cumulative)	3809	10132	27558	45903	64248

Source: www.portofmundra.com

Table 3.9: Social Infrastructure demand estimation in Mundra SEZ

<p>At Housing Complexes level (population of 5000)</p> <p>Nursery & Primary School, Primary School, Community Room, Religious Buildings, Milk Booths, Convenience Shopping, Housing Area Park, Housing Area Playground</p>
<p>At Neighbourhoods Level (3 housing complexes per neighbourhood)</p> <p>Sr. Secondary School, Dispensary, Community Hall & Library, Electric Sub-station – 11 KV, Local Shopping, Taxi Stand, Neighbourhood Park</p>
<p>At Communities Level (7 neighbourhoods per community)</p> <p>Intermediate Hospital, Polyclinic, Nursing Home, Integrated Schools with Hostels, College, Post Office, Police Station, Recreation Club, Electric Sub-station – 66Kv, Community Centre, Petrol Pump, Bus Terminal, Green Park</p>
<p>At Districts Level (5 communities per district)</p> <p>General Hospital, Telephone Exchange, Telegraph Office, Head Post Office, Petrol Pump, Electric Sub-station (220 Kv), District Centre, Bus Depot, Recreational Club</p>

Source: www.portofmundra.com

3.1.9 BUILT-UP INFRASTRUCTURE

A) Industrial

1. Industry Specific Parks
 - i) Food & Agro Park
 - ii) Textile & Apparel Park
 - iii) Auto & Auto Components Park
 - iv) Drugs & Pharma Park
 - v) Knowledge Park
2. Standard Design Factories

B) Commercial

1. Infrastructure for
 - i) Service Sector Units
 - ii) Trading Houses
 - iii) Offshore Banking Units
 - iv) Insurance Companies
 - v) Commodity Exchanges
 - vi) Exhibition Centers

C) Global Trading Hub

1. Infrastructure for
 - i) Warehouses
 - ii) Container Freight Stations
 - iii) Silos
 - iv) Testing & Certification Labs
 - v) Cool & Cold Storages

3.1.10 UTILITIES

1. Power Generation, Transmission & Distribution
2. Water Sourcing, Generation, Supply & Recycling System
3. Telecom & Info-com Infrastructure
4. Sewage / Effluent Treatment System
5. Solid Waste Management System

1. Power Generation, Transmission & Distribution

- i) Power Plant keeping in mind the entire zone
- ii) Capacity built-up in modular and scalable manner
- iii) Activity under this
 - a) Sourcing
 - b) Generation
 - c) Transmission
 - d) Distribution
 - e) Operations & Maintenance
 - f) Billing

2. Water Sourcing, Generation, Supply & Recycling System

- i) Mundra SEZ to ensure self-sufficiency
- ii) Options for meeting water demand
 - a) Ground Water (uneven distribution)
 - b) Rain Water Harvesting
 - c) Sea Water De-salination
 - d) Narmada Water
- iii) Distribution through Cement Lined GI/DI pipes

3. Telecom & Info-com Infrastructure

- i) A converged communication infrastructure to provide Voice, Data & Video Services
- ii) Creation of high quality network infrastructure
- iii) Technology planning activities would assume 3-5 year planning horizon to ensure state-of-the-art
- iv) Architectural model to be based on analyses of tradeoffs between different technology solutions
- v) HP & Nortel Networks approached to undertake this activity

4. Sewage / Effluent Treatment System

- i) Sewage system to adequately treat and dispose the public / domestic sewage & waste generated within the Zone
- ii) Setup a common Effluent Treatment Plant

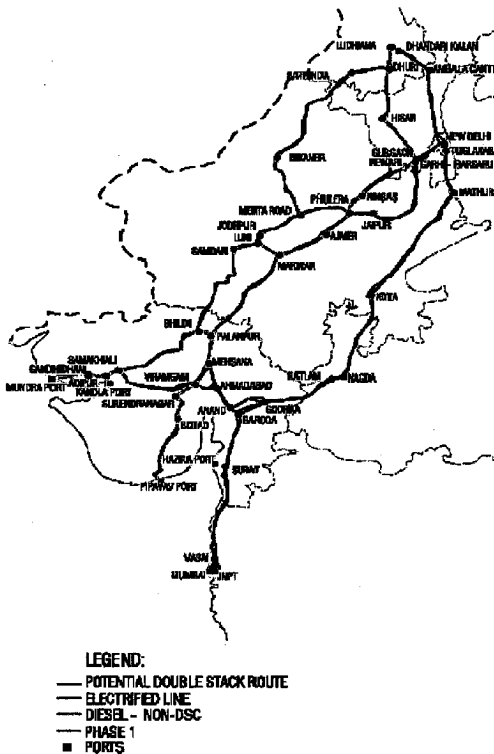
5. Solid Waste Management

- i) Provide Primary collection & storage
- ii) Provide Secondary collection & storage
- iii) Transportation & Disposal of Solid Waste in Environmentally acceptable manner
- iv) Provide adequate number of bins, pickup vans, dumpers, compactors etc.
- v) Provide Pollution free environment

3.1.11 CONNECTIVITY

1. Provide Efficient Transportation Linkages
2. Provide door-to-door services in respect of Freight, Parcel Traffic
3. Efficient Travel solution to the passenger traffic
4. Mundra SEZ already linked by Sea, Rail, Road & Air
5. Linkages to be upgraded / enhanced to serve SEZ needs and match international standards

Mundra – Major Railway Network



Map 3.3: Map showing major Railway Network - Mundra

1. Rail

- i) Existing 57 Km dedicated rail route from Adipur to Mundra to be made into a Multi-modal Logistics Corridor
- ii) Creation of exclusive Rail Infrastructure for SEZ
 - a) Dedicated Rail Sidings
 - b) Dedicated Railway Complex
 - c) Support Infrastructure
- iii) Transit Warehouse
- iv) Open Storage Space
- v) Service Equipment

2. Road

- Dedicated Road Corridors of International Standards
 - i) Separate corridor for Sea – Road
 - ii) Separate corridor for Sea – Rail
 - iii) Exclusive corridor for truck routes
 - iv) Separate corridor for non-industrial traffic, primarily be intra-zone

3. Airport Enhancement

- i) Bhuj & Kandla Airport currently serve Mundra SEZ
- ii) A temporary in-zone Airstrip in Phase I
- iii) Dedicated Airport within the Zone planned to form part of Phase II
- iv) Enhancement of existing Kandla Airport a possible temporary solution
 - a) Current airstrip of 5000 ft. can handle aircrafts with cargo load of 20T
 - b) Airstrip extendable to 6000 ft
 - c) Night landing can be made possible by providing additional lighting facility
 - d) Kandla SEZ & Mundra SEZ may sign a MOU to develop the Kandla Airport in Public-Private Partnership

3.1.12 AMENITIES

1. Housing
2. Educational Facilities
3. Healthcare Facilities
4. Social Infrastructure at
 - i) At Residential Complex Level
 - ii) At Neighbourhood Level
 - iii) Community Level
 - iv) District Level

1. Housing

- i) Ready built Residential Infrastructure
- ii) Provide affordable housing
- iii) Three Categories of accommodation to be provided
 - a) Type I – Unskilled & semi-skilled workforce
 - b) Type II – Skilled workforce

c) Type III – Managerial Workforce

2. Educational Facilities

- i) Housing Complex Level : Nursery & Primary Schools
- ii) Neighborhood Level : Secondary Schools
- iii) Community Level : Integrated Schools with Hostels
Colleges
Technical Institutes
School for Handicaps
- iv) District Level : Training Centers
Centers of Excellence

3. Healthcare

- i) Residential Complex Level : Dispensaries
- ii) Neighborhood Level : Polyclinics
Nursing Homes
- iii) Community Level : Intermediate Hospitals
Nursing Homes
- iv) District Level : General Hospital

4. Recreational Infrastructure

- i) Neighborhood Level : Neighborhood Parks
Playgrounds
Libraries
- ii) Community Level : Music Dance & Drama Centre
Meditation Centre
Community Hall
Recreational Club
Sports Centre
Eating Places
Green Park
- iii) District Level : Recreational Club

5. Social & Commercial Infrastructure

- i) Housing Complex Level : Community Rooms
Religious Building
Milk Booths
Convenience Shopping
- ii) Neighborhood Level : Local Shopping
Service Centre
Taxi Stands
- iii) Community Level : Post Office
Police Station
LPGF Godown
SKO/LDO Outlet
Petrol Pump
Bus Terminal
Organized Informal Eating Places
- iv) District Level : General Hospital
Telephone Exchange
Telegraph Office
Head Post Office
Fire Station
District Centre
Bus Depot

3.2 DAHEJ SEZ, GUJARAT

3.2.1 PROJECT PROFILE

Project : Multi-Product SEZ

Location : Dahej Industrial Estate, GIDC, Taluka - Vagra, District -Bharuch

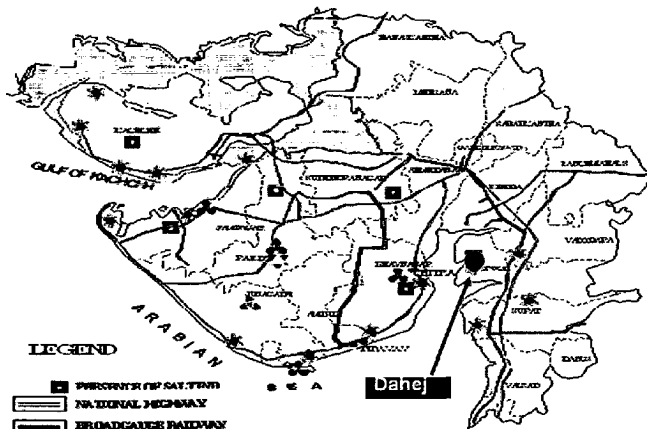
Area : 1841 hect.

Developer : Dahej SEZ Limited (DSL)(Joint Venture between GIDC and ONGC)

Project Cost : Rs. 881 Crore (Tentative)

Employment Opportunity: 1,00,000 (Direct + Indirect)

- SEZ will be Chemical and Petrochemical Industry focused.
- SEZ to cater to the specialized needs of major national and international Chemical companies.
- Residential, commercial and social infrastructure such as schools, hospitals, shopping malls, restaurants etc. also proposed to be developed to provide integrated services to the tenants.



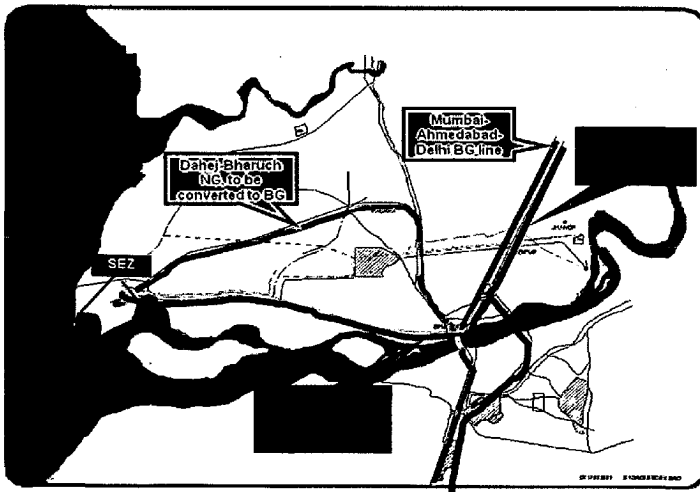
Map 3.4: Map showing location of Dahej in Gujarat State

Source: www.mapsofindia.com

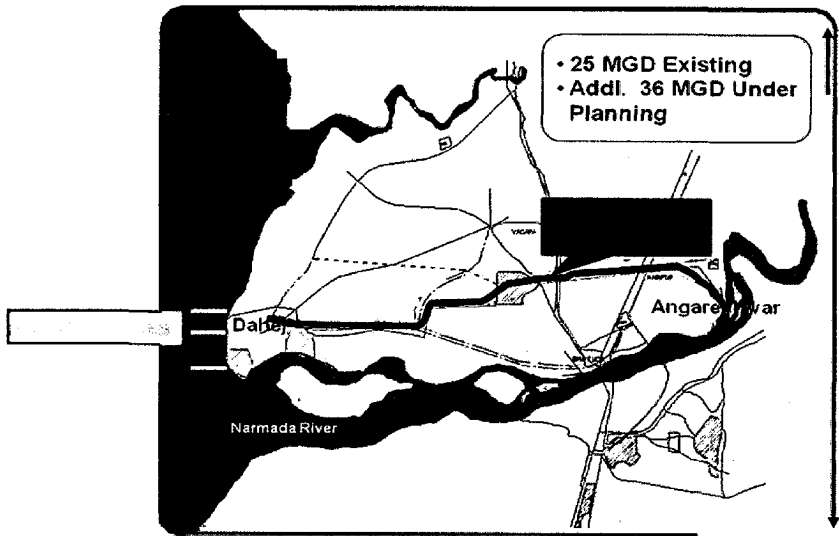
3.2.2 MAJOR LOCATIONAL ADVANTAGE

1. Ideal location for entire North West India as hinterland .
2. Located within highly industrialized region of Bharuch.
3. Comforting presence of large industrial units like IPCL, Hindalco Ltd, GACL, BASF, Petronet LNG Ltd, GCPTCL etc.
4. Excellent connectivity and logistics (Ahmedabad Airport - 220 km, Port - Dahej, Bharuch Railway Station - 55 km)
5. Social Infrastructure available within the region
6. Housing township for Dahej planned at a safe distance of 10 kms.
7. Gulf of Khambhat offers easy access to Middle East and European market.
8. Dependable water supply source and deep sea Effluent Disposal Point of permanent nature.
9. Average draft of 16 m, Gas Grid.
10. Proposed dedicated freight corridor

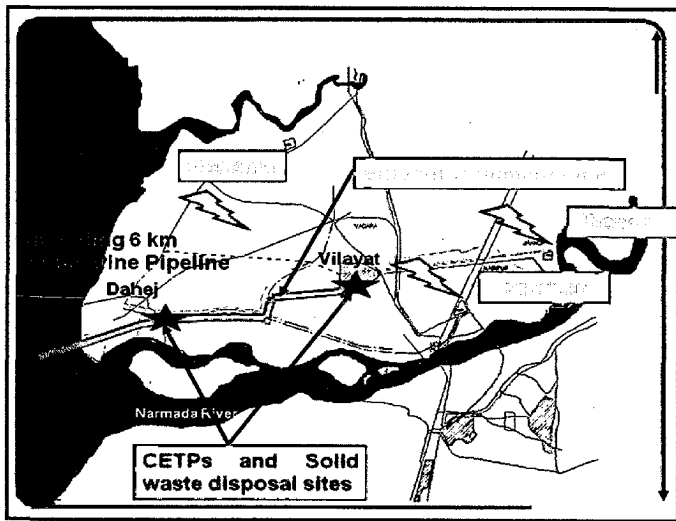
3.2.3 DAHEJ – INFRASTRUCTURE ADVANTAGE



Map 3.5: Map showing Connectivity of Dahej SEZ
Source: Gujarat Industrial Development Corporation

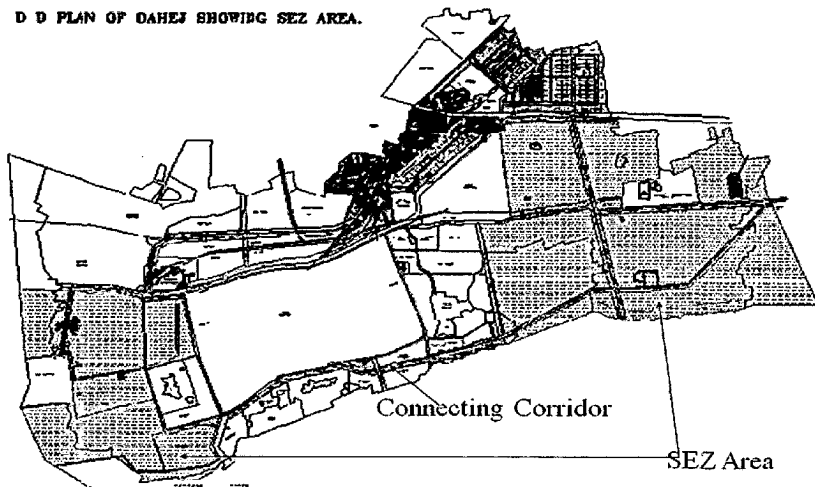


Map 3.6: Water Supply scheme for Dahej SEZ
 Source: Gujarat Industrial Development Corporation



Map 3.7: Proposed Effluent Treatment line for Dahej SEZ
 Source: Gujarat Industrial Development Corporation

D D PLAN OF DAHEJ SHOWING SEZ AREA.



Map 3.8: Lay-out Plan of Dahej SEZ

Source: Gujarat Industrial Development Corporation

3.2.4 LAND-USE

Table 3.10: Land use distribution of Dahej SEZ

Sr. no.	Particulars	Area in hectares	% of Total Area
1	Industrial Plots/Sheds	928	50.46
2	Port	570	31.03
3	Roads, Pipelines and Power lines	200	10.86
4	Corridors for pipeline/power line	85	4.60
5	Amenities	29	1.55
6	Green belt/garden	25	1.38
7	Commercial Buildings	3	0.13
Total		1840	100.00

3.2.5 INFRASTRUCTURE FACILITIES & AMENITIES

1. Well-developed road network
2. Storm water drains
3. Uninterrupted water supply
4. Sewerage and effluent treatment
5. Street lighting
6. Uninterrupted power supply
7. Telecommunication facilities
8. Port services
9. Commercial infrastructure
10. Township infrastructure

3.2.6 STATUS OF DEVELOPMENT

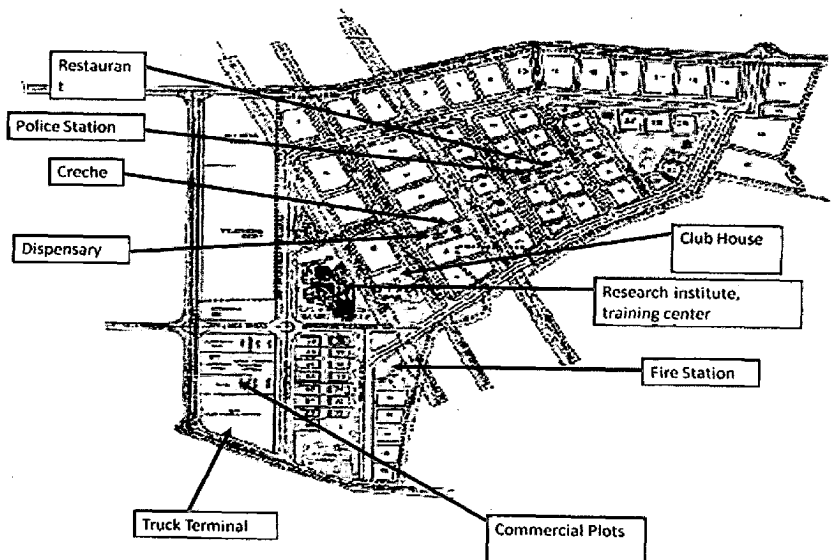
1. Principal agreement approved on 8th Aug 2003
2. Agreement for multi product SEZ approved on 21st Sep 2005
3. Formal Approval received on 7th Apr 2006 for 1768 ha. area, requested for 1811 ha. area
4. Final Notification from Ministry of Commerce & Industry (MoCI) is awaited
5. Private partner short-listed

3.3 APPAREL PARK - SURAT

3.3.1 PROJECT PROFILE

Project	: Apparel Park Surat
Location	: Sachin, Surat-Navsari-Palsana Roads
Area	: 56 ha.
Developer	: Gujarat Industrial Development Corporation
Employment Potential	: 65,000

- 100 developed plots ranging between 1,000 m² to 4,000 m²
- Generous Financial support from GoG & GoI



Map 3.9: Lay-out Plan of Apparel Park

Source: Gujarat Industrial Development Corporation

3.3.2 LAND-USE

Table 3.11: Land use distribution of Apparel Park, Surat

Sr. no.	Particulars	Area in Sq.m.	% of Total Area
1	Industrial Plot Area	2,33,638	42.51
2	Commercial Area	25,950	4.72
3	Road Area	1,05,480	19.19
4	Common Facility Centre, Training Centre etc.	13,700	2.49
5	Utility Plots, Garden, Amenities etc.	1,43,032	26.03
6	CETP	11,300	2.06
7	Truck Terminal/Parking	11,000	2.00
8	GEB Sub Station	5,500	1.00
Total		5,49,600	100

Source: Gujarat Industrial Development Corporation

3.3.3 INFRASTRUCTURE FACILITIES AND AMENITIES

1. Four/Two Lane Roads
2. Water Supply
3. Power network
4. Paved Walkways
5. Compound Wall
6. CETP/Effluent Collection
7. Bank
8. Administrative Building/Office

9. Export facilitation
10. Training Center
11. Commercial Plaza
12. Common Facility Centre - Process House
13. Common Washery etc.

3.3.4 STATUS OF DEVELOPMENT

1. Ministry of Commerce & Industry Notification - 31st Jan 2005
2. Ministry of Finance Notification - 23rd Jun 2005
3. Development Committee constituted on 28th Feb 2006
4. Allotment of plots completed

3.4 GANDHINAGAR ELECTRONICS SEZ

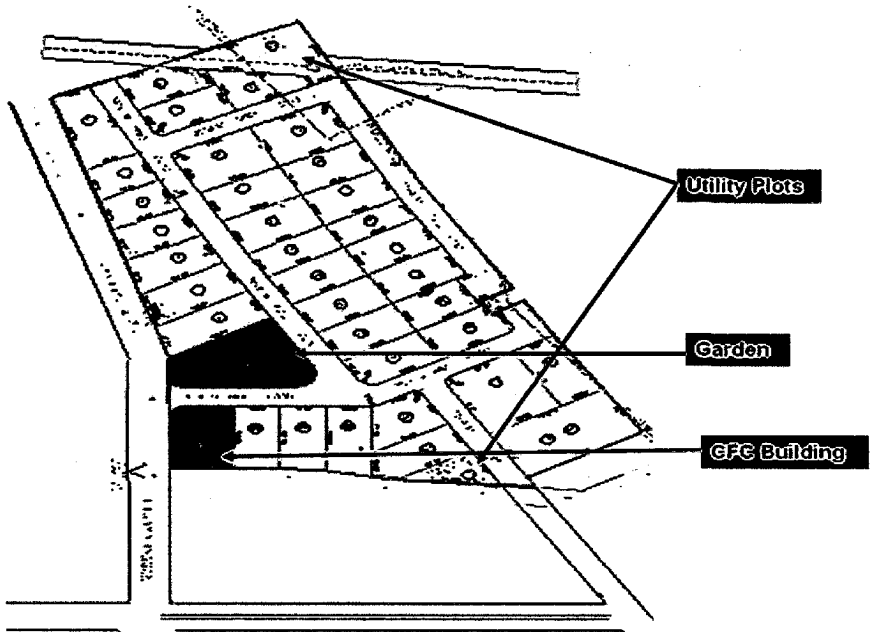
3.4.1 PROJECT PROFILE

Project	: Product Specific SEZ for Electronics
Location	: Gandhinagar Electronic Estate, Gandhinagar
Area	: 28 ha.
Developer	: Gujarat Industrial Development Corporation (GIDC)
Project Cost	: Rs. 21.40 Crore (Land Cost - 8.40 Crore, Infrastructure Development Cost - 13 Crore)

Employment Opportunity: 10,000

3.4.2 MAJOR LOCATIONAL ADVANTAGES

1. Upfront availability of land
2. Well Connectivity (Ahmedabad Airport- 25 km, Ahmedabad Railway - 25 km, Kandla- 400 km)
3. Availability of Work Force
4. Social Infrastructure
5. Availability of raw material
6. Educational institute and Research Institute network
7. Electronics & Quality Development Centre (EQDC) has been established as a society fully funded by Govt. of Gujarat with sub center at Vadodara & Surat.



Map 3.10: Lay-out Plan of Gandhinagar Electronics SEZ

Source: Gujarat Industrial Development Corporation

3.4.3 LAND USE

Table 3.12: Land use distribution of Gandhinagar Electronics SEZ

Sr. No.	Particulars	Area in sq.m.	Percentage (%)
1	Estate Area	269437.48	100.00
2	Road Area	55624.59	20.64
3	CFC Building	6981.09	2.59
4	Common Plot Area	24783.28	9.19
5	Disposable Area	182048.52	67.58

Source: Gujarat Industrial Development Corporation

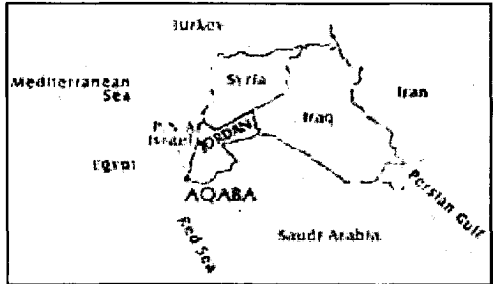
3.4.4 INFRASTRUCTURE FACILITIES & AMENITIES

1. Four/Two Lane Cement Concrete Roads.
2. Water Supply
3. Power network
4. Paved Walkways
5. Compound Wall
6. Covered Storm Water Drain
7. Common Facility Centre
8. Export facilitation
9. Canteen

3.4.5 STATUS OF DEVELOPMENT

1. Upfront availability of 28 hec. land.
2. Internal infrastructure at a cost of Rs.13 crores will be developed by GIDC. Tender approval stage
3. Completion of basic infrastructure Dec. - 2006
4. Provision of Common Facility Center.
5. In principle approval of MoCI received on 20/1/2006
6. Proposal for issue of SEZ Notification sent to MoCI on 13/4/2006

3.5 AQABA SEZ, JORDAN



Map 3.11: Location of Aqaba SEZ, Jordan

Source: www.map.google.com

The Aqaba Special Economic Zone ('ASEZ') is a 375 square kilometre area launched in 2001 as a duty-free, low tax multi-sectoral development zone encompassing the total Jordan coastline (27 kilometres), the sea ports of Jordan, King Hussein International Airport and the historic City of Aqaba (current population of 100,000 people).

The ASEZ offers global investment opportunities in a world class business environment that include tourism and recreational services, professional services, multi-modal logistics, value-added industries and light manufacturing.

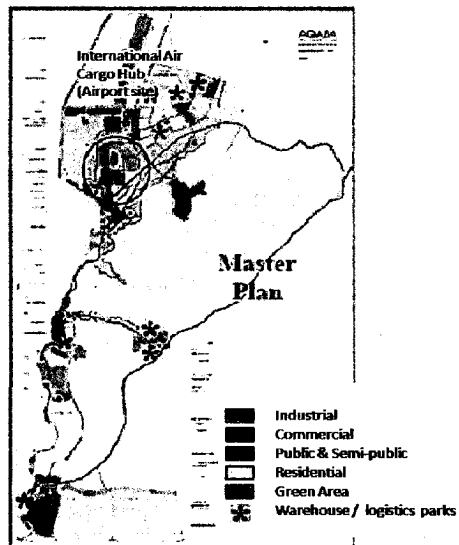
The ASEZ is regulated by the Aqaba Special Economic Zone Authority ('ASEZA') which retains authority to manage, regulate and provide municipal functions for the ASEZ. The ASEZA is an e-enabled one-stop shop and the single point of contact for all the needs of investors.

3.5.1 CHARACTERS

1. Safe, secure storage, distribution and value-added opportunities serving national and regional markets.
2. 600 hectares of logistics space available for development in the zone

3. Adjoining Aqaba Container Terminal
4. Adjoining King Hussein International Airport and Air Cargo Hub
5. Adjoining the trucking route to the north
6. In the industrial areas serviced areas available
7. Investigating pre-fab construction techniques for rapid response to demand
8. Packaging selected areas for tender to invite
9. World-class logistics services providers

3.5.2 MASTER PLAN



Map 3.12: Master Plan of Aqaba SEZ

Source: www.aqabazone.com

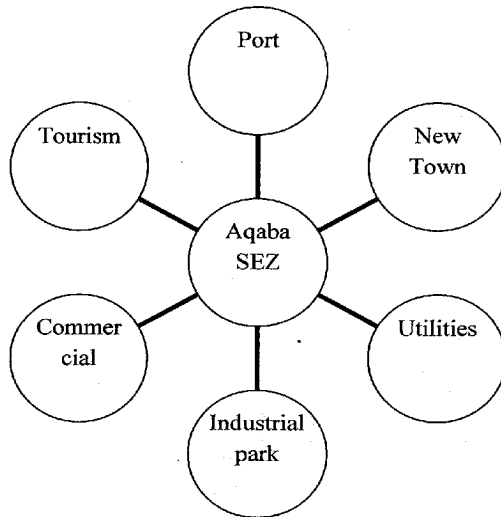


Fig. 3.1: Figure showing Development Objectives of Aqaba SEZ

Source: Compiled from various sources

THE AQABA OF TODAY AND TOMORROW

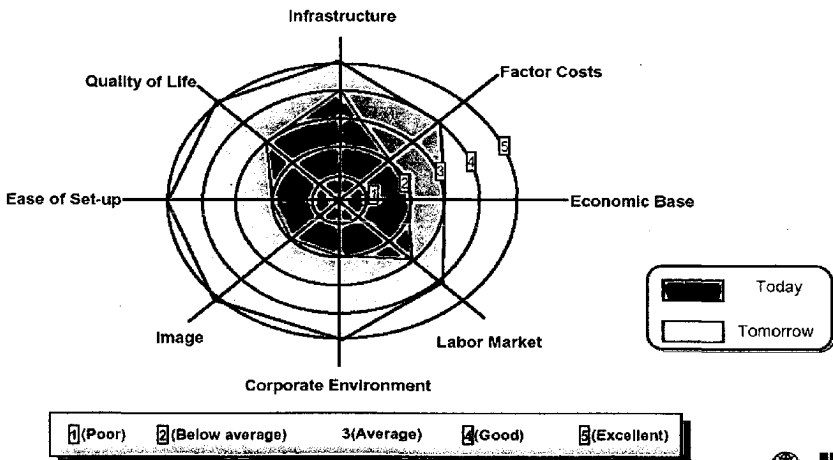


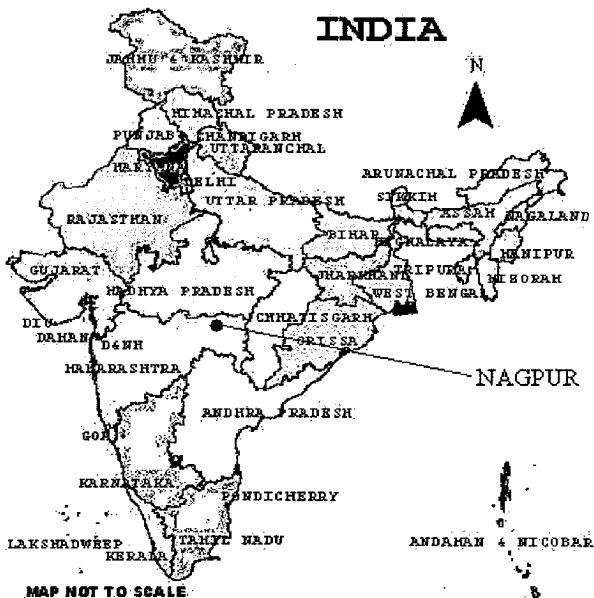
Fig. 3.2: Figure showing development forecast of Aqaba SEZ

Source: www.aqabazone.com

STUDY AREA PROFILE: NAGPUR CITY

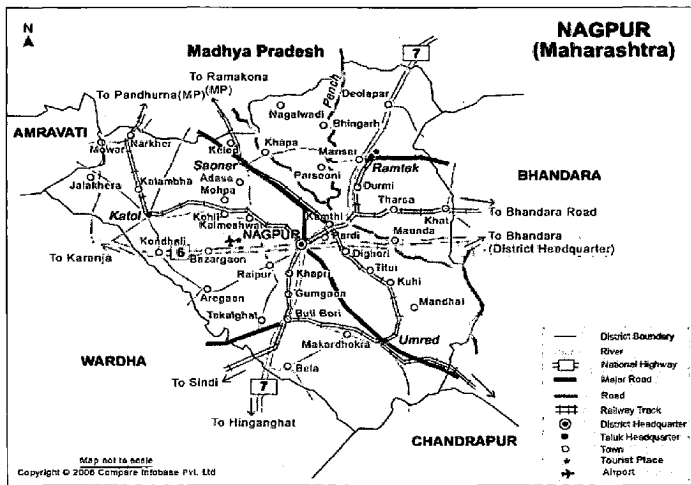
4.1 INTRODUCTION

Nagpur, the second capital of Maharashtra, is an administrative, cultural and educational centre of the resources rich Vidharba region. It is one of the major cities of central India and its importance in the country can be traced back to the 18th century when it was under the Maratha rulers. Nagpur was the capital of the central province till 1956 before reorganization of the state. The city provides a rich and balanced life full of opportunities, educational and cultural activities. Nagpur emerges as a city providing easy accessibility to basic amenities at affordable costs to all its residents. Nagpur city has a population of over 2.4 millions. (2001 censuses)

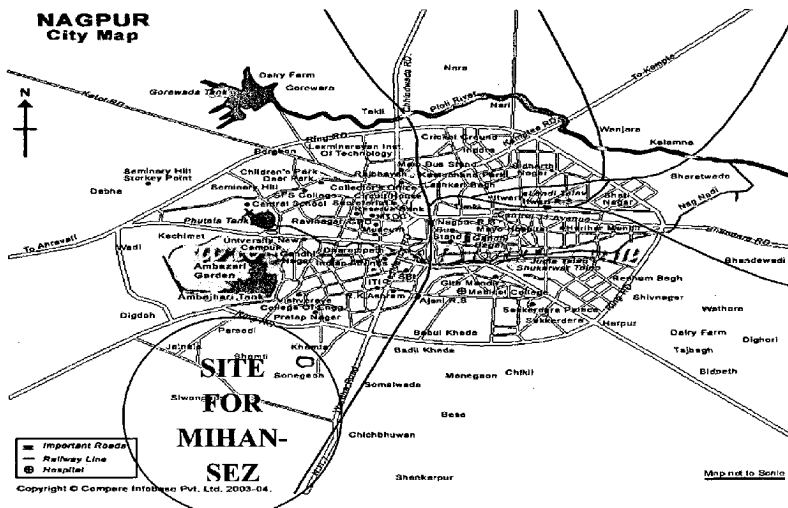


Map 4.1: Location of Nagpur city

Source: www.mapsofindia.com



Map 4.2: Map of Nagpur District
Source: www.mapsofindia.com



Map 4.3: Map of Nagpur City
Source: www.mapsofindia.com

4.2 HISTORY

The city got its name from the River Nag or Nag people and is known since prehistoric times. Nagpur and its surrounding region also find a mention in the Vedic and Mauryan scriptures.

Nagpur city's foundation was laid by the Gond King of Deogad "Bakht Buland Shah" in the year 1703. Chand Sultan, successor to Bakht Buland Shah, constructed a three-mile long wall around his City by the Nag River. In 1743, it became the capital of Raghoji Rao Bhonsle's kingdom. The Bhonsle period witnessed peace with cultural and economic prosperity. Cottage and handloom industry started developing during this period. The city was annexed in 1817 by the British after the defeat of Appasaheb Bhosale in the Battle of Sitabuldi. Consciousness for planned city development was raised by Sir Patrick Geddes, who visited the city in 1915. The Nagpur Improvement Trust (N.I.T.) was established in 1936 to carry out planned development in the city. The British Government made Nagpur the capital of the new state named Central Province in mid-19th century and it remained so till 1956, after which it became the second capital of Maharashtra.

Thus Nagpur has enjoyed the status of being the administrative centre of Central India during the ancient and medieval eras. It carries a legacy of cultural and economic prosperity. Its proximity to tribal areas has also ensured the preservation of its natural resources, i.e., minerals and forests. In the modern era, though Nagpur has lost its politically prime position, natural aspects of geography, climate and location continue to position it favorably for prospering as an economic hub.

4.3 GEOGRAPHY AND CLIMATE

Nagpur lies on the Deccan plateau of the Indian Peninsula. The underlying rock strata is covered with alluvial deposits resulting from the flood plain of the Kanhan River. In some places these give rise to granular sandy soil. However, in low lying areas which are poorly drained, the soil is alluvial clay with poor permeability characteristics. In eastern part of city crystalline metamorphic rocks such as gneiss,

schist and granites are found. In the Northern part of the city, yellowish sand stones and clays of the lower Gondwana formations are found.

Nagpur city is dotted with many natural and man made lakes with Ambazari lake being the largest of all. Other natural lakes include Futala lake, Gorewada Lake and Telangkhedi lake. Sonegaon lake along with Gandhisagar lake are man-made lakes created by cities historical rulers. Nag river, Pilli nadi along with various nallas form the natural drainage pattern for city.

Nagpur has a mean altitude of 310 meters above sea level. Nagpur has a tropical wet and dry climate, with dry conditions prevailing for most of the year as it is located at centre of Indian peninsula far from Bay of Bengal and Arabian sea. Nagpur city receives an annual rainfall of 1,205 mm (47.44 in) from monsoon rains during June to September. The highest recorded rainfall was 304 mm on July 14, 1994. Summers are extremely hot lasting from March to June, with maximum temperatures in May. Winter lasts from November to January with temperatures dropping below 10°C (50°F). The highest recorded temperature in the city was 48.6 °C (119.5 °F) on 1954-05-26, while the lowest was 3 °C.

4.4 LOCATION & LINKAGES

Nagpur, being the geographical center of India, has excellent road, rail and air linkages. The national highway NH 6 and NH 7, and the rail route connecting Mumbai- Kolkata and Delhi-Chennai pass through Nagpur. The city's airport spread over an area of 525 ha provides direct air link with Delhi , Mumbai, Chennai ,Kolkata and Hyderabad.

4.5 DEMOGRAPHIC PROFILE

Marathi, official language of Maharashtra is most widely-spoken language in Nagpur. Varhadi dialect of Marathi is spoken in and around Nagpur city. Hindi is also widely spoken in Nagpur. Due to its central location Nagpur has become a cosmopolitan in nature with large amount of residents from neighboring states of

Madhya Pradesh, Chattisgarh and Andhra Pradesh. In 2001, the urban population was 2,129,500, and there were around 410,000 households in the city. 7,26,664 people lived in slums making Nagpur second most slum populated city in Maharashtra after Mumbai. Scheduled Castes and Scheduled Tribes accounted for around 25% of the population. The sex ratio was 936 females per 1000 males. Around 99.4% of the population was engaged in non-agricultural activities, attesting to the overwhelmingly urban character of Nagpur city. The city's main jail is the Nagpur Central Jail. According to 2006 survey of National Crime Record Bureau Nagpur has the highest crime rate of 470.6 in Maharashtra as compared to other mega-cities of the state. The number of migrants to Nagpur from outside Maharashtra during the 1991-2001 decade was 2.1 lakh making Nagpur 4th most favored destination in state.

4.6 CIVIC ADMINISTRATION

Nagpur is administered by Nagpur Municipal Corporation(NMC) which is democratically elected civic governing body. Nagpur Improvement Trust(NIT) works along with NMC and carries out works like development of civic infrastructure and new urban areas on behalf of NMC. The city is divided in 10 zones which are in turn divided into 136 wards. Each ward is represented by a corporator, majority of whom are elected in local elections.

4.7 LAND USE

The Nagpur Municipal Corporation today covers an area of 21756 Ha of which only 40% is developed area. Out of the total developed area approximately 42% is under residential use, 3% under industrial, 2.5% under commercial, 24% under public purpose, 7% under road, 5% is covered by railway and 9% is under open spaces and recreational use.

Table 4.1: Land use distribution of Nagpur city (Developed Area)

Sr. no.	Major land use purpose	Area in hectare	%
1	Residential	3500	41.996
2	Commercial	185	2.218
3	Industrial	225	2.697
4	Public purpose	2000	23.980
5	Public utilities	100	1.199
6	Roads	555	6.654
7	Railway	440	5.275
8	Airport	525	6.294
9	Garden & play ground	150	1.798
10	Developable vacant land	660	7.919
	Total	8340	100.00%

Source: Development Plan of Nagpur city

Density pattern

The overall density of the city as in 2006 was 11,101 /km² (28,751 /sq mi).

ANALYSIS OF PROPOSED SITE FOR SEZ

5.1 INTRODUCTION

The area notified for proposed Special Economic Zone (SEZ) by Maharashtra Airport Development Co. Ltd. (MADC) falls within jurisdiction of Nagpur Municipal Corporation (NMC) and Nagpur Improvement Trust (NIT). Additional area outside the existing NMC and NIT boundaries can accommodate for further growth of SEZ. The selected site located on the fringe of Nagpur city apparently free from significant human habitat areas.

5.2 SITE POTENTIALS

Table 5.1: Site Potentials through multi criteria analysis

Sr. No.	Parameter	Criteria
1	Distance from city centre	< 15 km
2	Terrain	Plain Not flood prone
3	Connectivity	Direct to NH-7 & Railway line
4	Power & Telecommunication	Available
5	Infrastructure development suitability	Water – Source < 5 km Aquifer yield > 5 lt/sec Drainage – Natural slope Water disposal – Suitable
6	Land and physical development at site	Least developed Population displacement – least Non-agricultural land Under Government possession

		On flight path Good for contagious development
7	Natural barrier / encroachment	Good Future expansion possibilities - good
8	Environment / Ecology	Existing level of population – low Not on mineral deposits Not on forest land
9	Security	Preferred
10	Cost of development	Moderately cost intensive

Source: Analysis by author

Various factors influencing the choice of location are classified under ten broad parameters. Each parameter is further broken down to their basic characteristic that affects choice, such as location with respect to underground and mineral deposits, resident population number, connectivity with rail, road and airport facilities, availability of power and telecom facilities, type of land etc.

Site has certain distinct advantages like

1. Scenic beauty
2. Elevation and backdrop of rocky outcrops signifying strength prominence
3. Ready availability of non-agricultural land under Government possession
4. Least displacement of population, which could be avoided to a great extent by integrating them in-situ with the proposed development.

5.3 SITE AND SURROUNDING

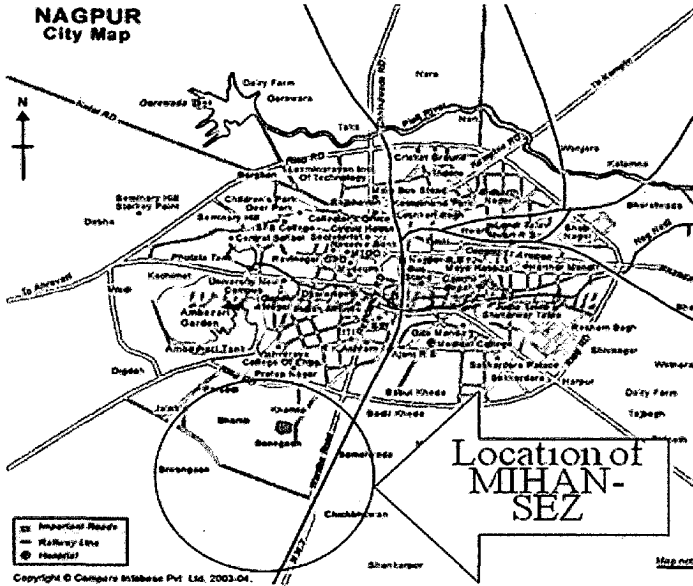


Plate 5.1: Site location in Nagpur city
 Source: Compiled from various sources

5.4 SPECIAL PLANNING AUTHORITY

Maharashtra Airport Development Company Limited appointed by the State Government as the Special Planning Authority under section 40 (1B) of the Maharashtra Regional and Town Planning Act, 1966 for the area notified for the development of MIHAN notified under section 40 (1) of the said Act, in exercise of its power under clause (d) of sub section 3 of section 40 of the Maharashtra Regional and Town Planning Act, 1966 makes Development Control Regulations as a part of its proposals for the development of land.

The developers selected by MADC shall follow Development Control Regulations for the development of the area given to them for proposal.

6.1 INTRODUCTION

MADC stated that the population in SEZ will be 1.2 lacs by the year 2015 and the indirect population / floating population will be 2 to 3 times of workforce.

Total population = 1,20,000

Assuming the size of 5 persons / family

Therefore, total no. of dwelling units = 24,000 DU

According to data provided by MADC, Land use percentage of IT parks and industrial areas will be more than compare to other land uses. Activities like IT parks and Industrial demand workgroup from middle income group, hence it will generate more employment to middle income group (MIG) than higher income group (HIG) and lower income group (LIG). Based on various case-studies, categorization of population into various income groups comprises the same. The derived categorization of population:

Table 6.1: Categorization of population in proposed SEZ

Sr. no.	Categorization	Percentage
1	High Income Group (HIG)	15%
2	Middle Income Group (MIG)	70%
3	Low Income Group (LIG)	15%

Source: Compiled by author from analysis

6.1.1 DENSITY

Population density = 55 pph or 23 ppa

Workforce participation 33% of total population i.e. 39600

Workforce density = 19 pph or 8 ppa

6.1.2 HOUSING

Table 6.2: Average size of houses (built up) in proposed SEZ

Sr. no.	Income group	Built up area
1	HIG (Type – A)	150 sq. m.
2	MIG (Type – B)	100 sq. m.
3	LIG (Type – C)	50 sq. m.

Source: Compiled by author from analysis

6.1.3 SITE ZONING

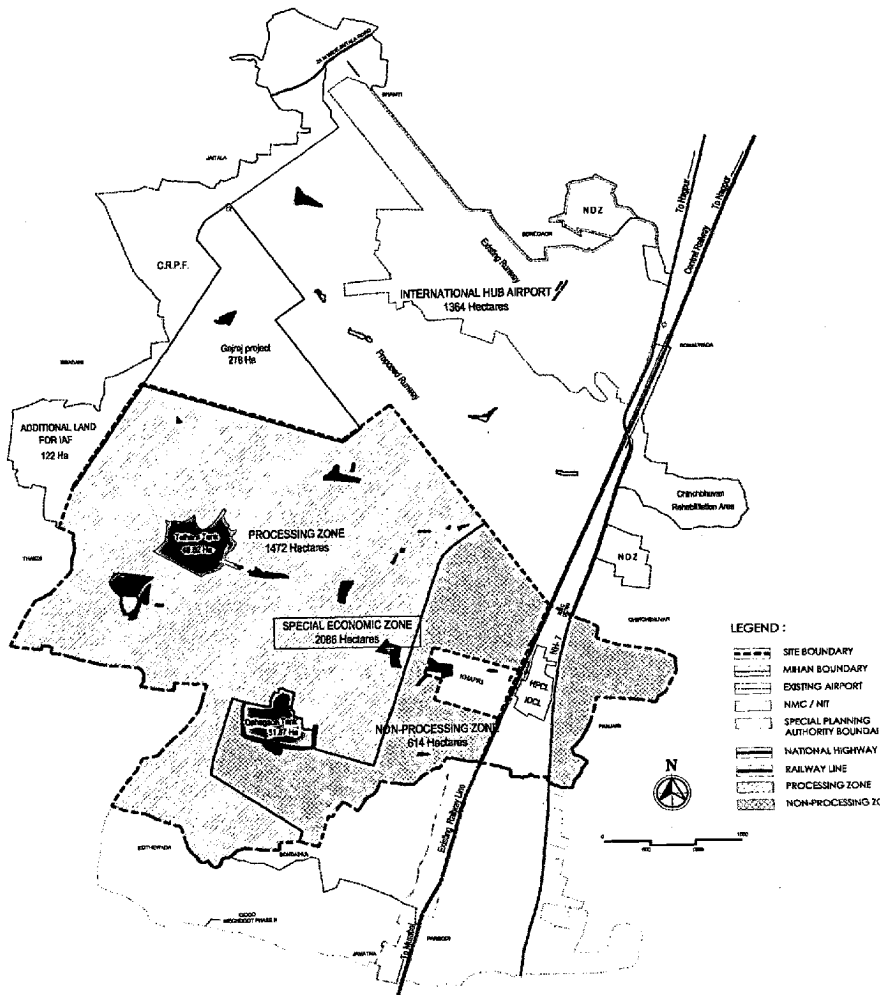
Master Plan of SEZ consists of

Processing Zone – 1472 ha

1. Maintenance, Repair & Overhauling
2. Information Technology Parks
3. Health City
4. Manufacturing & Value added Units

Non-processing Zone – 614 ha

1. Residential, Commercial & services
2. Road Terminal
3. Rail Terminal



Map 6.1: Plan showing zone wise division of site

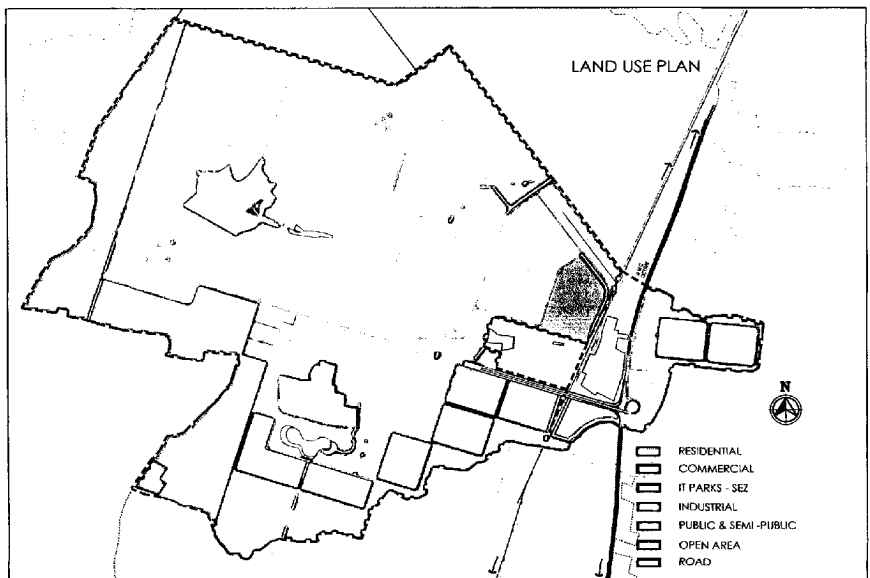
Source: Prepared by author

6.2 LAND USE

Table 6.3: Proposed land use break up for SEZ

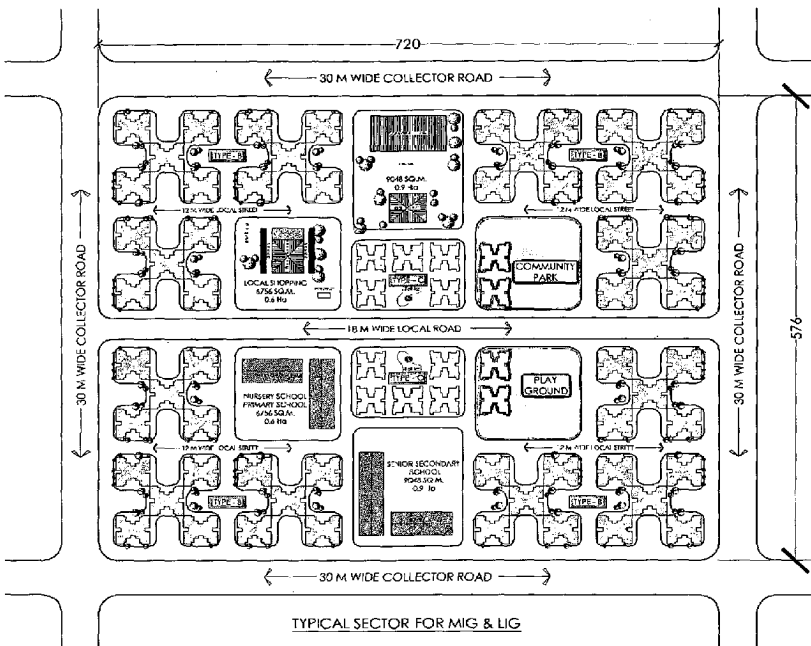
Sr. no.	Activity	Areas in hectares	%
1	Residential	225	11
2	Commercial/Non-Residential	59	2.8
3	IT parks-SEZ	854	41
4	Industrial & others-SEZ	315	15
5	Health City-SEZ	55	2.6
6	Road / Rail Terminal / Container / Warehouse area	135	6.4
7	Airport Allied Industries	88	4
8	Open area	225	11
9	Road	130	6.2
	Total	2086	100.00

Source: Compiled by author from analysis



Map 6.2: Proposed land use plan of SEZ

Source: Prepared by author



Map 6.3: Plan showing typical sector for MIG & LIG

Source: Prepared by author

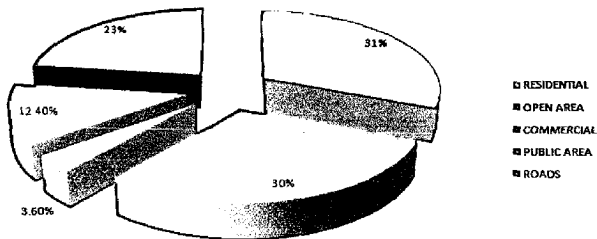


Fig. 6.2: Figure showing land use break up in a residential sector

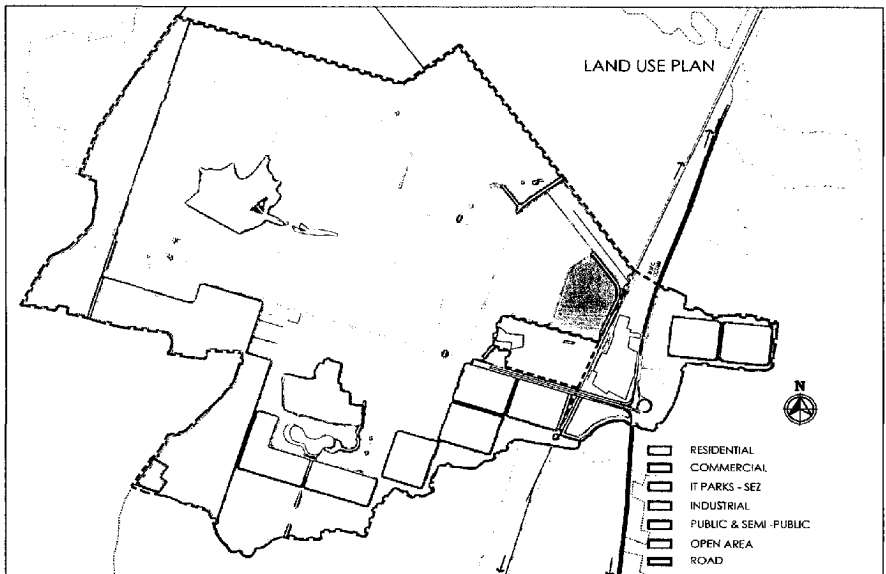
Source: Prepared by author

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	Total	2086	100.00

Source: Compiled by author from analysis



Map 6.2: Proposed land use plan of SEZ

Source: Prepared by author

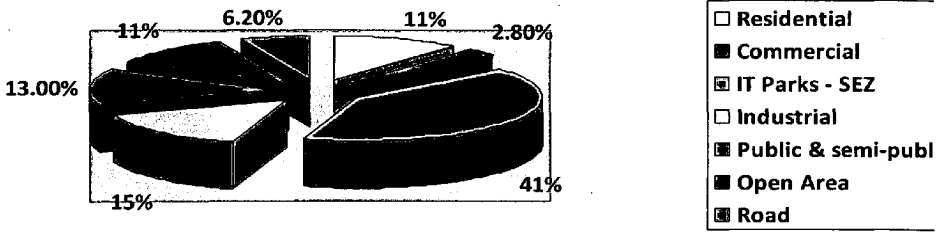


Fig 6.1: Figure showing land use break up in proposed SEZ

Source: Prepared by author

6.3 RESIDENTIAL FACILITIES

To provide the residential facilities for the 1,20,000 population it is proposed to develop residential pockets based on the neighborhood concept, with a sector with middle and lower income group having population of 17,480, whereas, a sector with higher income group has population of 15,120. There are 6 sectors for MIG and LIG population and 1 sector for HIG population. The total area falling under residential sector is 225 hectares i.e. 11% of total land use.

Complete segregation of pedestrian and vehicular traffic has been done in the residential sectors. Through traffic eliminated from residential sectors. No direct access within sector from the peripheral major roads has been allowed.

From the table 6.8 it is seen that the total water requirement for the SEZ is 110 MLD.

6.7.5 WATER STORAGE CAPACITIES

1. It is proposed to provide a one-day storage capacity to meet the daily water requirements of the master plan area.
2. The Underground water storage tank shall be provided to meet a total 70% of the daily water requirements.
3. The Overhead water storage tank shall be provided to meet a total of 30% of the daily water requirements.

Table 6.9: Details of Storage Tanks for Water Supply System

Sr. no.	Storage tank	Capacity of storage in MLD
1	Zone I	40.5
2	Zone II	64
3	Zone III	8.5
	TOTAL	113

Source: Compiled by author by analysis

Table 6.10: Details of Storage Tanks for Fire Static Purposes

Sr. no.	Storage Tank	Capacity in m ³
1	Fire Tank (Zone I)	200
2	Fire Tank (Zone II)	200
3	Fire Tank (Zone III)	200

Source: Compiled by author by analysis

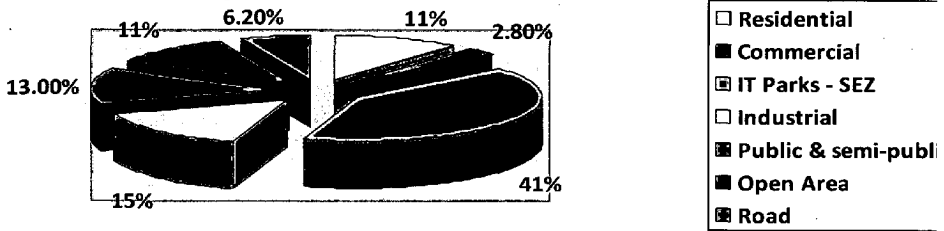


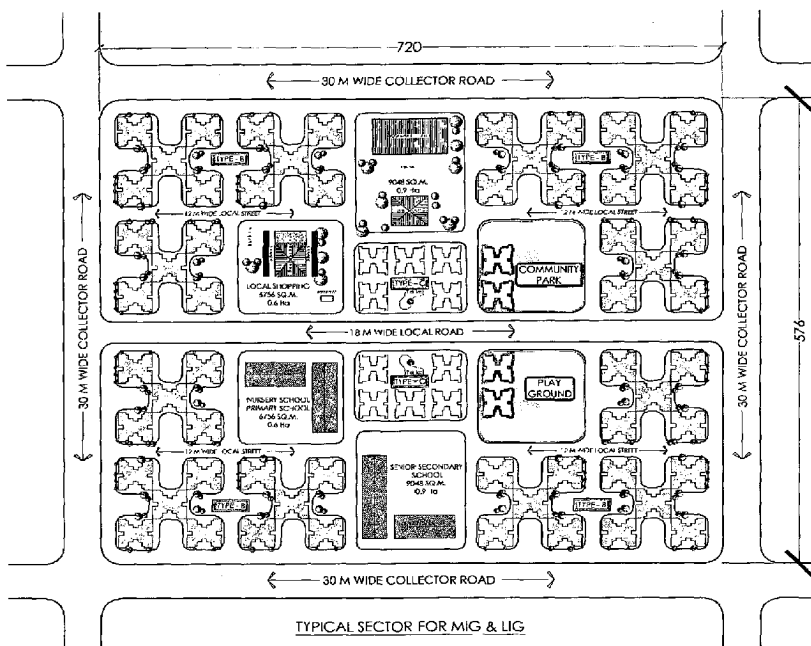
Fig 6.1: Figure showing land use break up in proposed SEZ

Source: Prepared by author

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Map 6.3: Plan showing typical sector for MIG & LIG

Source: Prepared by author

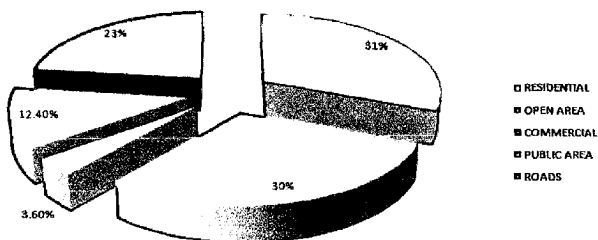


Fig. 6.2: Figure showing land use break up in a residential sector

Source: Prepared by author

6.3.1 AREA STATEMENT

Total sector area = 200000 sq.m
= 20 hectares
Total built area = 199405 sq.m.
= 36.92 %

TYPE - B [MIG]

Number of units - 60
Ground coverage - 530 sq.m
Floors - 12 + stilt (g.floor)
TOTAL AREA = 31800 SQ.M.

TYPE - C [LIG]

Number of units - 14
Ground coverage - 390 sq.m
Floors - 11 + stilt (g.floor)
TOTAL AREA = 5460 SQ.M.

RESIDENTIAL AREA

= 31800+ 5460+24480
= 61740 SQ.M.
= 31 %

OPEN AREA

= 59948 SQ.M.
= 30 %

COMMERCIAL AREA

= 6756 SQ.M.
= 3.6 %

PUBLIC AREA

= 24852 SQ.M.
= 12.4 %

AREA OF ROADS

= 46704 SQ. M
= 23 %

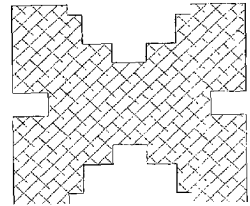


Fig. 6.3: Plan showing MIG unit

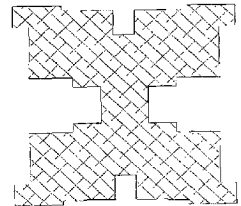
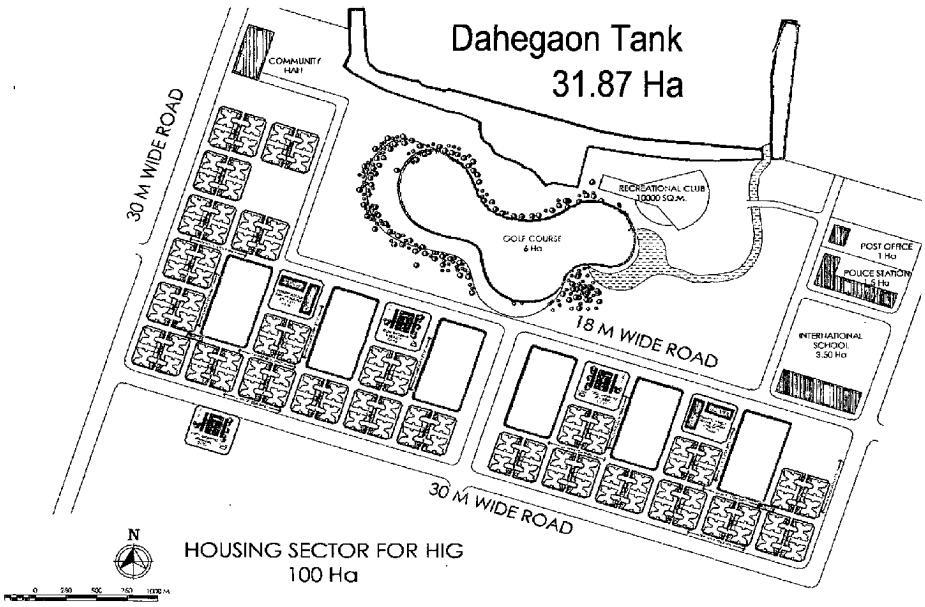


Fig. 6.4: Plan showing LIG unit



Map 6.4: Plan showing typical sector for HIG

Source: Prepared by author

6.4 TRANSPORTATION

The project site is accessible from NH-7. Railway line on the east side connects the site to all trunk routes. Thus, the site has very good connectivity in the regional context. The road connection from the Highway to Nagpur city through the site is not only being maintained but also will be significantly improved in road width, alignment and physical quality.

6.4.1 ROAD HIERARCHY

Road hierarchy is designed keeping in view of the convenience of the residents and vehicles. The proposed categories are:

1. Arterial roads
2. Sub-arterial roads
3. Collector roads
4. Local Access roads

1. ARTERIAL ROADS

The Arterial Roads will be of 60 m. wide. This road is directly connected to NH-7. The road is also connected to the main arteries of the site. These are 3 + 3 lane c/s roads having speed limit between 50 to 60 kmph. It has 6 m wide service road on either side to provide access to properties. Water System will run along this network. These roads have 10.5 m wide carriage way, with 2.5 m pedestrian refuge, 6.0 m service road & 3.0 to 4.0 m side walks.

2. SUB-ARTERIAL ROADS

The Sub-arterial Roads will be of 45m. The sub-arterial roads shall connect the IT parks, the various residential sectors and also industrial area. The sub-arterial roads are planned in such a way so that, no property has direct access to it. The accessibility of the properties with the arterial road is through service lane only. There are 3 lanes on each direction with speed limit between 40 to 50 kmph. These roads have 10.5 m wide carriage way, 6.0 m service road, 2.0 to 3.0 m side walks/ foot path on either side of 2.0 m wide central median.

3. COLLECTOR ROADS

The Collector Roads will be 30 m. These roads run within the sector connecting the various land uses within the site. These are four lane divided carriage way roads with speed limit between 35 to 45 kmph.

4. SUB COLLECTOR/FEEDER ROADS

The Sub Collector Roads will be 24 m. These roads run internally within the sector connecting the various land uses within the sector. These are four lane carriage way roads with speed limit between 35 to 45 kmph.

5. LOCAL ACCESS ROADS

The width of Local Access Roads will be between 12 to 18 m. wide providing accessibility to individual plots/ apartments in the residential/ industrial sectors. The road network shall be laid forming loops or cul-de-sacs for easy circulation of traffic. These are two lane roads having speed limit below 30 kmph.

6.4.2 PARKING POLICIES AND PROVISIONS

The Equivalent Car Space (ECS), shall be 100 sq.m per one car space and it may vary as per the land uses. The ECS is calculated as follows:

Table 6.4: Parking space for Different Land uses

Sr. No.	Items	For every 100 sq.m.
1	Commercial	1.5
	IT parks	1.5
2	Group Housing	1.25
	Community centre	1.25
	Bank, convenient shopping area	1.25
	Hospital	1.25
	Office	1.25
	Club	1.25
3	College, university	0.5
	Industries	0.5

Source: Compiled by author

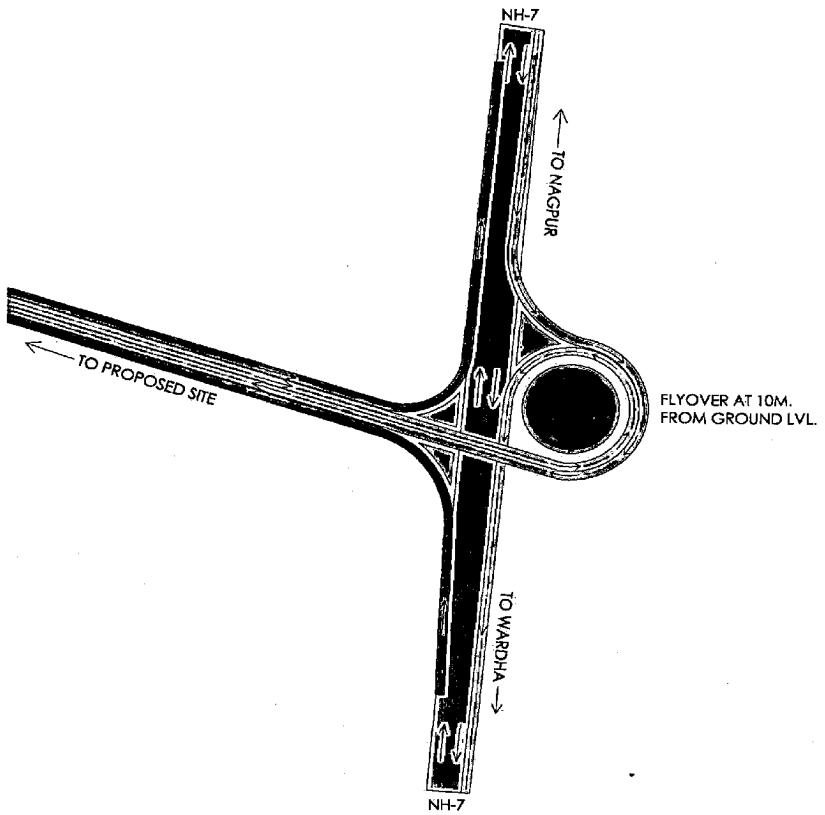


Fig. 6.5: Plan of Fly-over connecting SEZ and NH-7

Source: Prepared by author

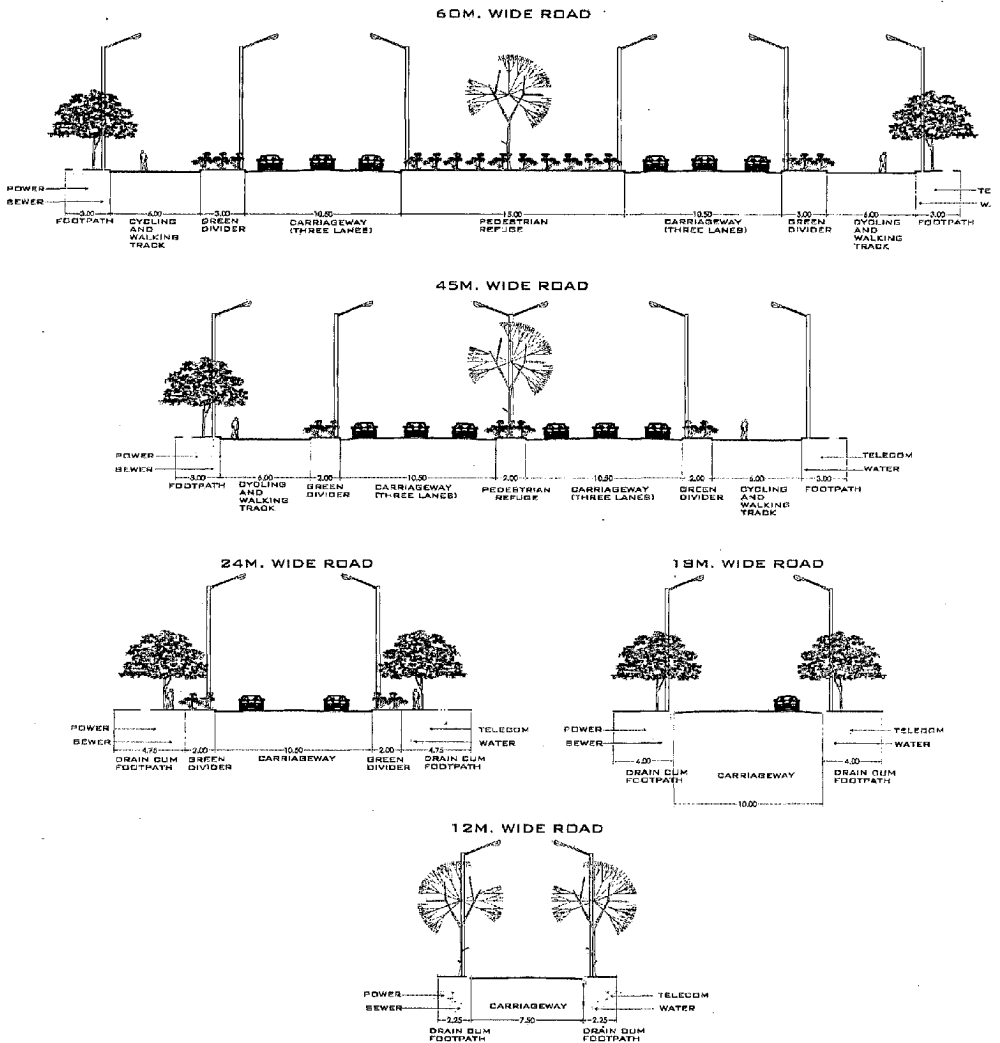


Plate 6.1: Road Sections in proposed SEZ

Source: Prepared by author

6.5 SOCIAL INFRASTRUCTURE

Social Infrastructure includes all the basic amenities at a city level such as schools, colleges, hospital, recreational facilities, etc. The requirements, standards and norms have been followed according to guidelines and norms of Urban Development Planning Formulation & Implementation (UDPFI) and Development Control Regulations for MIHAN Notified Area.

Table 6.5: Requirements for Social Infrastructure

Items	Minimum area required as per norms	Required (in numbers)	Area provided
Education			
Nursery school	0.05 ha @ 1 per 4000 ppl	30	1.5 ha
Primary school	0.3 ha @ 1 per 4000 ppl	30	1.5 ha
High school	1 ha @ 1 per 10000 ppl	12	12 ha
Total			15 ha
Health			
Health centre	0.8 ha @ 1 per 16000 ppl	7	5.6 ha
Hospital	2 -4 ha @ 1 per 1 lakh ppl	1	4 ha
Total			11.6 ha
Distribution facilities			
Sub post office	100 sq.m. @ 1 per 10000 ppl	12	0.12 ha
Post office	1 per 1 lakh ppl	1	0.4 ha
Police station	0.8 ha @ 1 per 50000 ppl	2	1.6 ha
Petrol pump	500 sq.m.	1	0.05 ha
Total			2.17 ha
Social and cultural facilities			
Community hall	0.3 ha @ 1 per 25000 ppl	4	1.2 ha

Safety			
Fire station	0.8 ha		0.8 ha
Utilities (power sub-stations, sewerage treatment plant, telephone exchange, SW collection pts., water works, etc.)	1.2% of total area		25 ha
Miscellaneous			1 ha
Grand total			56.77 ha

Source: Compiled by author by analysis

6.6 POWER SUPPLY SYSTEM

6.6.1 DESIGN PARAMETERS

Electrical Load Calculation is based on the following unit loads:

I. Residential:

200 sq.m. Dwelling unit : 9 KW

150 sq.m. Dwelling unit : 8 KW

100 sq.m. Dwelling unit : 7 KW

Demand Factor: 60%

II. Commercial and Offices (IT park):

1 sq.ft. : 10W

Demand Factor: 85%

III. Public and Semi-Public:

1 sq.ft. : 5W

Demand Factor: 85%

IV. Industrial:

1 sq. ft. : 5W

Demand Factor: 85%

Overall Diversity for transformer sizing has been considered as 80%

Note:

1. A/C load for Commercial and Public and Semi Public areas are covered in the above.
2. In case of residential window / split A/C units have been considered.

6.6.2 PROJECT LOAD REQUIREMENT

Based on the design parameters enumerated above, the project load requirement shall be as follows:

Table 6.6: Project load requirement

Sr. No.	Area	Connected load	Demand load	Diversified demand load	Transformer capacity
1)	Residential	192 MW	115.2 MW	92.16 MW	127549.44 KV
2)	Commercial, IT park Public & Semi-public Industrial	100 MW	85 MW	73 MW	101380.56 KV
3)	Water Supply	2 MW	1.60 MW	1.28 MW	1600 KVA
4)	Street lighting	3 MW	2.40 MW	1.92 MW	2370 KVA
	GRAND TOTAL	297 KW	204.2 KW	168.36 KW	222,900.00 KV
		Say 298 MW	Say 204 MW	Say 168 MW	Say 220 MVA

Source: Compiled by author by analysis

6.6.3 SOURCE OF POWER

It is proposed to obtain power (168 MW) at 230 KV through double circuit overhead line.

220 KV GRID Sub-station will be a conventional outdoor Switchyard.

Space requirement for outdoor switchyard would be 275 m X 110 m.

33/11 KV Substation

1. To distribute 168 MW power to scale of economy it is proposed to have 6 Nos. 33 / 11 KV Substations located at centre of gravity of loads.
2. Each substation would comprise 33 KV switchgear, 2 Nos. 33 / 11 KV, 15 MVA / 20 MVA transformers and 11 KV switchgear as required.
3. Space requirement for each 33 / 11 KV substation would be of the order of 20 M x 17.5 M (350sq. m).

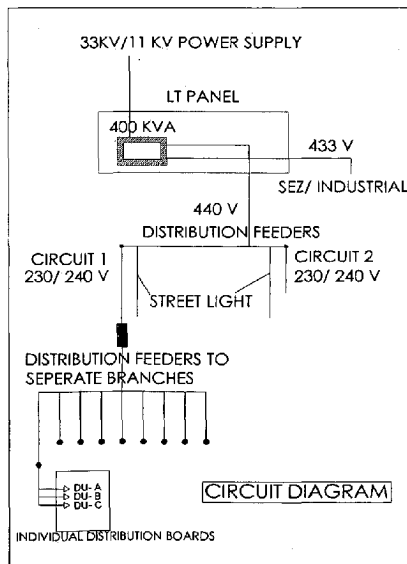


Fig. 6.6: Circuit Diagram

Source: Compiled by author by analysis

6.6.4 METERING SYSTEM

For this type of Residential development LT metering shall be provided by the developer for each apartment individually. In this case, the Sub-Station shall be designed as per Electricity authority norms and the Sub-Station shall be maintained by the developer, as it is a bulk metering. In this case the electricity charges have to be collected from the apartment owners by the developer and paid to Electricity board.

6.6.5 HT / LT POWER DISTRIBUTION

1. 33 KV / 11 KV and 1100 V grade cable distribution shall be underground.
2. Power from the L.T. Panel of each substation shall be distributed through 1100V grade cables laid underground to required number of feeder pillars for each substation.

6.6.6 EXTERNAL LIGHTING

It is proposed that lighting of 60 m and 45m wide road shall be done with Metal Halide fixtures.

Collector roads 30 meters wide within the project shall be illuminated with Metal Halide lamps fixture. Sub collector and local Access road of 24 meters wide and below shall be illuminated with HPSV lamps fixture.

6.6.7 OPERATION & MAINTENANCE

The street-lighting shall be operated with timers located in the MCB distribution boards / feeder pillars and shall operate as follows:

- | | | |
|--------------|---|----------------|
| 6PM to 10PM | - | 100% Lights on |
| 10PM to 2 AM | - | 66% Lights on |
| 2 AM to 6 AM | - | 33% Lights on |

This system shall facilitate the energy saving, and there would be no need to switch on the lights throughout the night. This shall also facilitate control of level of illumination with reference to the density of traffic. The distribution of street-lighting has been done on 3 phase system.

6.7 WATER SUPPLY AND DISTRIBUTION

The two qualities of water are proposed to be domestic / drinking water and non-domestic / process water.

6.7.1 SCOPE OF WORK

1. Source Development
2. Treatment
3. Storages
4. Distribution system as per supply and demand

6.7.2 APPROACH FOR PLANNING

Considering the nature of activities to be conducted and the type of buildings to be developed within the master plan, our efforts in the approach for the planning of various systems, shall include the following considerations:

1. There shall be enough safe, clean and potable domestic water on a continuous basis to every user all the buildings.
2. To plan the systems in such a way as to minimize the energy requirements.
3. To make the entire system efficient and cost effective.
4. To have proper operation and maintenance system, this could be controlled centrally and efficiently.
5. To create minimum nuisance and disturbance to the environment.
6. To assist in the development and aesthetic value of the environment and landscaping of the project.
7. To use Standard Engineering Practices.

6.7.3 POPULATION AND WATER DEMAND CALCULATIONS

Table 6.7: Parameters for Population and Water consumption for different types of Land-Use

Sr. no.	Application or Usage	No. of Persons / Unit	Domestic Water requirement(lpcd)
1	Residential	12.5 Sq.mt. /person	
(i)	For HIG & MIG	5 Persons per Unit	200
(ii)	For LIG	5 Persons per Unit	135
2	Commercial & IT parks	100 Sq.ft. / person or 10 sq. mt. / person	45
3	Educational		
(i)	For International School	4 Sq.mt/person	135
(ii)	For Schools etc.	4 Sq.mt/person	45
4	Public & semi-public	15 Sq.mt/person	45
5	Industrial	10 Sq.mt/person	45
6	Hospital	180 Sq.mt./bed	400
7	Recreational	1.5 Sq.mt/person	15

Source: Compiled by author by analysis

The entire master plan has been sub-divided into 3 zones from a water supply planning point of view, each zone being inter-connected for redundancy.

6.7.4 TOTAL WATER DEMAND

Table 6.8: Total water demand in proposed SEZ

Total Domestic Water Requirement	72140
Add Horticultural Water Requirement	19725
Add for Industrial Sector Water Requirement	18135
Grand Total of Water Demand (in m ³ /day)	110000
SAY (in MLD)	110

From the table 6.8 it is seen that the total water requirement for the SEZ is 110 MLD.

6.7.5 WATER STORAGE CAPACITIES

1. It is proposed to provide a one-day storage capacity to meet the daily water requirements of the master plan area.
2. The Underground water storage tank shall be provided to meet a total 70% of the daily water requirements.
3. The Overhead water storage tank shall be provided to meet a total of 30% of the daily water requirements.

Table 6.9: Details of Storage Tanks for Water Supply System

Sr. no.	Storage tank	Capacity of storage in MLD
1	Zone I	40.5
2	Zone II	64
3	Zone III	8.5
	TOTAL	113

Source: Compiled by author by analysis

Table 6.10: Details of Storage Tanks for Fire Static Purposes

Sr. no.	Storage Tank	Capacity in m ³
1	Fire Tank (Zone I)	200
2	Fire Tank (Zone II)	200
3	Fire Tank (Zone III)	200

Source: Compiled by author by analysis

6.7.6 WATER TREATMENT

Depending upon the actual quality of water from the various available sources, the exact treatment units shall be provided. However generally the water treatment shall consist of Filtration and Chlorination Units.

6.7.7 WATER SUPPLY DISTRIBUTION SYSTEM

Following criteria's have been considered while designing the height of overhead tank and the distribution system:

1. For the High-Rise Buildings/Units within the master plan, local storages and booster pumps shall be required.
2. The overhead tank on the required staging shall be the main source of water supply and distribution by gravity
3. No intermediate boosting in the distribution system will be provided.
4. Network of distribution system is planned on the basis of closed loops, so that a specific pocket gets water from two or three points, incase one pipe is under repair entire distribution system will not be affected.
5. Zones shall be provided with necessary provisions of inter-connection.
6. The water requirements in various loops are calculated on the basis of norms and guidelines for different sectors. The diameters of pipes are then calculated keeping the velocity within permissible limits of 1 m/s to 2 m/s.
7. The network consists of a main Core loop supplying the main water to various laterals, sub-laterals and branch loops of various zones as per requirement.
8. Head loss is calculated on the basis of Hazen and William's formula.

6.7.8 FIRE HYDRANT

External fire hydrant, double outlet, stand post type, as per IS 908 have been provided on main water supply distribution lines at strategic locations as per requirement and as 60 to 90 M center to center as per requirement. Fire brigade inlet/outlet connections shall be provided on each fire static water tank.

6.8 SEWAGE SYSTEM

The entire township has been divided into three zones to economize the design of the sewage collection system with the provision to have a common treatment plant. The main components of the sewage systems to be designed are:-

1. Domestic effluent collection system
2. Common treatment plant for treatment for all types of sewage/effluent.

6.8.1 SCOPE OF WORK

1. Collection and conveyance network
2. Sewage Treatment Plant
3. Re-use and disposal (Treated Sewage Effluent network for Landscaping & Irrigation)

6.8.2 APPROACH FOR PLANNING

Considering the nature of activities to be conducted and the type of buildings to be developed within the master plan, our efforts in the approach for the planning of various systems, shall include the following considerations:

1. Efficient disposal from of sewage from each plot/unit/building.
2. To plan the systems in such a way as to minimize the energy requirements.
3. To make the entire system efficient and cost effective.
4. To have proper operation and maintenance system, which could be controlled centrally and efficiently.
5. To create minimum nuisance and disturbance to the environment.
6. To assist in the development and aesthetic value of the environment and landscaping of the project.
7. To recycle and reuse the products as maximum as possible

6.7.9 MATERIALS

Considering the geological formation of soil as salty silt and/or murrum and steep slopes at certain places, the pipes of following materials are suggested:

1. For rising main and for pipes of main distribution core, loops etc having dia 100mm and above.
 - i) D.I pipes as per I.S:8329-1.994
 - ii) C.I. class-LA pipes with pre-molded rubber tighten joints **as per IS: 1536 -1976**
 - iii) Vertically C.I. double flanged pipes as per IS:1537 -1976
 - iv) C.I. S/S fittings as per IS: 1538 -1976
2. For pipes 80mm dia and below G.I pipes medium class as per IS:1239 -1982
3. PVC pipes for 90mm outer dia (O.D) and lesser in distribution system with proper protection and of pressure rating 4 Kg/cm² - 10Kg/cm² as per IS:4985 -1988
4. Double flange gate valves of dia 80mm and above as per IS: 780 -1984
5. Full way valves up to 60mm dia as per IS: 778 -1984
6. CI Pipe for Rising Main
7. Mainly Butterfly valves in the distribution system
8. Non return Valve in rising main

8. To use Standard Engineering Practices.

6.8.3 DESIGN PARAMETERS

Table 6.11: Design Parameters for Sewerage System

Sr. no.	Parameters	Norms Used
1	Sewage	80% of Domestic Water Supply
2	Peak Flow	3 x Average flow
3	Min. velocity of flow in pipes flowing half full	0.60 m/sec
4	Max. velocity of flow	3.00 m/sec
5	Flow conditions in pipes up to 400 mm	0.50 full running
6	Flow conditions in pipes from 450-900 mm	0.80 full running
7	Minimum depth of Sewer <ul style="list-style-type: none"> • For Branches • For laterals, mains and truck sewer As per site conditions, the pipe may be laid on concrete anchor blocks	1.5 M 1.5 M
8	Infiltration Factor	Add 8.33% of Average discharge (for surface run off, subsoil water conditions etc.)
9	Formula for calculation for design of sewer lines	Manning's formula

Source: Compiled by author by analysis

6.8.4 CALCULATIONS OF SEWAGE GENERATED

Norms used for the domestic sewage is 80% of the water for domestic consumption.

Table 6.12: Summary of Capacity for Sewerage System

Total Daily Domestic Water Requirements	110 MLD
Total Daily Domestic Sewage Generated	88 MLD
Proposed Capacity of Domestic STP	88 MLD

8. To use Standard Engineering Practices.

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6	Flow conditions in pipes from 450-900 mm	0.80 full running
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6.8.5 COLLECTION AND CONVEYANCE SYSTEM

From the study of the contours of the site, it has been observed that the terrain is sloping gently and from North to South - East, with minimal variation of ground levels. Efforts have been made in planning the sewerage system in such a way, to utilize the natural slopes, to provide an economical system, and that the entire sewage should flow due to gravity as maximum as possible. Intermediate pumping may be required at certain locations as per final detailing.

Sewage generated by individual units are conveyed by branch lines which falls into the nearest sub-lateral, and then is conveyed to the lateral lines and finally to the main trunk lines, These trunk sewer lines finally carry the entire sewage to the Sewage Treatment Plant.

6.8.6 MATERIALS

1. Pipes

- i) R.C.C. Pipes Class NP2 : For dia 200mm and above as per IS:458, for normal slopes and good soil conditions
- ii) R.C.C. Pipes Class NP3 : For dia 300mm and above as per IS:458 for heavy loading and bad soil condition.
- iii) R.C.C. Pipes Class NP4 : For dia 1000mm and above as per IS:458 for heavy loading and bad soil and on 60m wide road.
- iv) All RCC pipes to be laid as per LS: 873-1985 and as stipulated in Manual on Sewerage and Sewage Treatment.
- v) C.I. Pipes Class LA as per I.S: 1536 : For exposed pipes and for crossings as per site requirements according to provision in IS: 1536

2. Manholes

- i) Size
 - a) Rectangular manhole of size 900X800 mm up to 1 M depth
 - b) Rectangular manhole of size 1200X900 mm up to 1.5 M depth

- c) Circular of size 1400 mm dia. for depth 1.5m and above or as may be required.
- ii) Depth
On trunk, lateral, sub-lateral branch line = 1.5m (minimum)
- iii) Manhole Spacing
Distance of 30-60 metres on sewer lines, depending on dia of pipe and plot sizes.
- iv) Manhole covers
 - a) Medium duty for manholes on service roads, having approximate total weight of frame and cover as 116 Kg.
 - b) Heavy duty for manholes on main roads, having frequent heavy traffic, with approximate total weight of frame and cover 170-208 Kg.

3. Vent Pipes

Vent pipes are provided at the first manhole on every branch and at places where found necessary.

4. Drop Connections

Drop connections for branch sewer lines upto 300mm dia, to be provided for difference of invert levels of 600mm in main sewer lines and branch sewer lines. For pipes above 300mm dia, the drop can be avoided by giving steps/ramps in the successive manholes.

6.8.7 LAYING & JOINTING OF PIPE

The pipe shall be laid as stipulated in 1.5:783-1983. After setting out the pipes the collars shall be centered over the joint and filled in with tarred gaskin, so that sufficient space is left on either side of the collar to receive the mortar. The space shall then be filled with cement mortar 1:2 (1 cement: 2 fine sand) and caulked by means of proper tools. All joints shall be finished at an angle of 45 degree to the longitudinal axis of the pipe on both side of the collars neatly.

6.8.8 PIPE BEDDING

All pipes laid in underground trenches shall be provided with proper bedding. The bedding shall be decided on site conditions such as type of soil and its extent of water contents, super imposed load etc.

6.8.9 SEWAGE TREATMENT PLANT

Capacity of Sewage Treatment Plant	:	88 MLD
Space Requirements	:	5.3 ha Approx.
Available for recycling	:	18.4 MLD (Approx.)

6.8.10 PROCESS DESCRIPTION

The main criteria for treatment of domestic effluent is its bio degradability, made possible by the existence of a balance of nutrients for the bacteria and characterized by its biological oxygen demand (BOD),

Treatment of the effluent is proposed to be performed by aerobic biological process. The process is designed to induce the growth of bacteria, which by physical and physicochemical action retain the organic pollution and live on it. This growth is obtained by putting a bacterial culture disposal as a flock in suspension in the effluent inside a stirrer, i.e. aeration tank. Stirring in the aeration tank is required to avoid settlement of the aeration tank is required to avoid homogenous the mixture of the bacterial floc and the effluent called mixed liquor.

Wastewater will be collected in raw effluent collection sump. Manually cleaned bar screen will be installed to screen any large pieces within the sump. From the sump the wastewater will be pumped via two submersible solids handling pumps (1 working + 1 standby) into adjoining equalization tank on a controlled rate via a flow-regulating box.

From equalization tank effluent flow by gravity into adjoining aeration tank on a controlled rate via a flow-regulating box. Grit collected at the bottom of sump is removed by pumps.

In the aeration tank wastewater will be mixed with microorganisms in presence of dissolved oxygen. Microorganisms will assimilate organic impurities. The mixed liquor suspended solids will be maintained at levels of 3500 mg/lit to 4000 mg/lit. The bottom of the aeration tank will be supplied through two positive displacement (roots type) air blowers located out side the tank. Submerged air diffusers will provide mixing and oxygen for the needs of microorganisms. The blowers will be sized to maintain dissolved oxygen level in the aeration tank of approximately 2 mg/lit.

From the aeration tank mixed liquor will flow by gravity into adjoining clarifier tank. The solids will settle in the clarifier tank. A sludge return pump will provide for pump the settled sludge from the clarifier tank back to the aeration tank. Clarifier tank will also be provided with skimmer system to pump floating scum back to the aeration tank to keep the clarifier surface clean.

An overflow weir with scum baffle will be provided in the clarifier to take treated wastewater out of the clarifier. From the clarifier treated wastewater will flow by gravity into adjoining chlorine contact tank/clarified water tank. In this tank chlorine will be added in the form of calcium or sodium chlorinator. A free residual chlorine level of 1 ppm will be maintained.

Treated water after chlorine contact tank will be clear, odorless, low BOD (20mg/15t), low suspend solids and can be used for many non potable applications like gardening/horticulture purpose etc. or can be disposed directly to public/natural drain.

It is further filtered through Pressure sand filter and activated carbon filter for further reduction of suspended solids to make it suitable for recycling for irrigation purpose.

Excess sludge from the clarifier tank will be taken periodically into sludge holding tank. In this tank sludge will be aerated for self-stabilization. Air will be shut off periodically and superannuate water will be transferred to the aeration tank creating stabilized sludge. This stabilized sludge is dried on sludge drying beds and disposed off profitably by selling in the market or using as manure to the horticulture purpose.

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AREA STATEMENT

TOTAL SECTOR AREA
= 200000 sq.m
= 20 hectares
TOTAL BUILT AREA
= 199405 SQ.M.
= 36.92 %

TYPE - B [MIG]



Number of units - 60
Ground coverage - 530 sq.m
Floors - 12 + still (g.floor)
TOTAL AREA = 31800 SQ.M.

TYPE - C [LIG]



Number of units - 14
Ground coverage - 390 sq.m
Floors - 11 + still (g.floor)
TOTAL AREA = 5460 SQ.M.

RESIDENTIAL AREA

= 31800 + 5460 + 24480
= 61740 SQ.M.
= 31 %

OPEN AREA

= 59948 SQ.M.
= 30 %

COMMERCIAL AREA

= 6756 SQ.M.
= 3.6 %

PUBLIC AREA

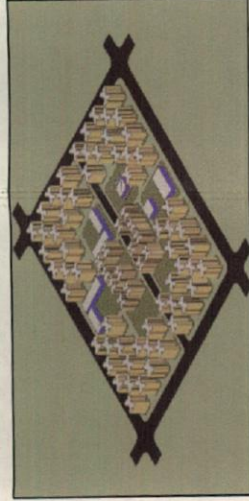
= 24852 SQ.M.
= 12.4 %

AREA OF ROADS

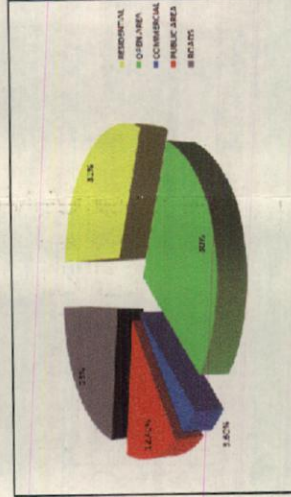
= 46704 SQ. M
= 23 %

CATEGORIZATION
TOTAL POPULATION = 120000
GROUP HOUSING = 24000 DU

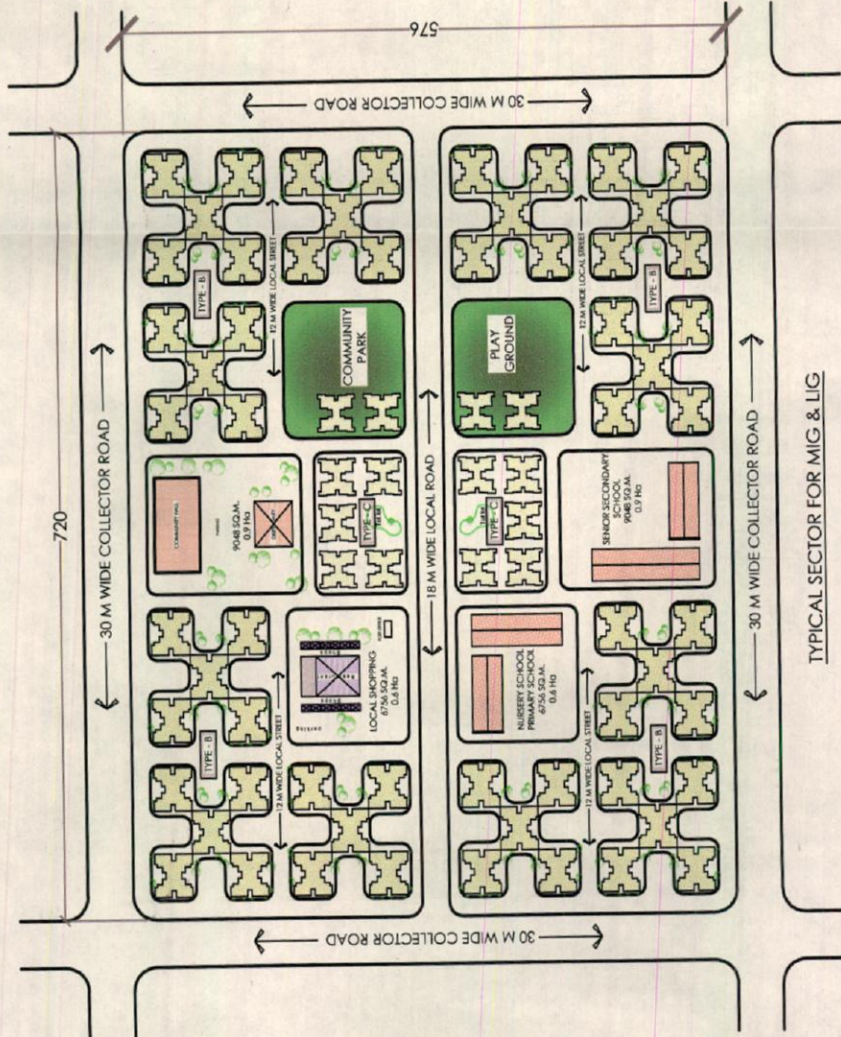
TYPE	AREA	%	TOTAL NO. OF DWELLING UNITS IN A SECTOR
TYPE - A	150 SQ.M.	15%	3600
TYPE - B	100 SQ.M.	70%	16800
TYPE - C	50 SQ.M.	15%	3600
TOTAL		100%	24000



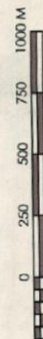
VIEW OF A SECTOR



LAND USE BREAK-UP



TYPICAL SECTOR FOR MIG & LIG



HOUSING SECTOR (LAY-OUT PLAN)

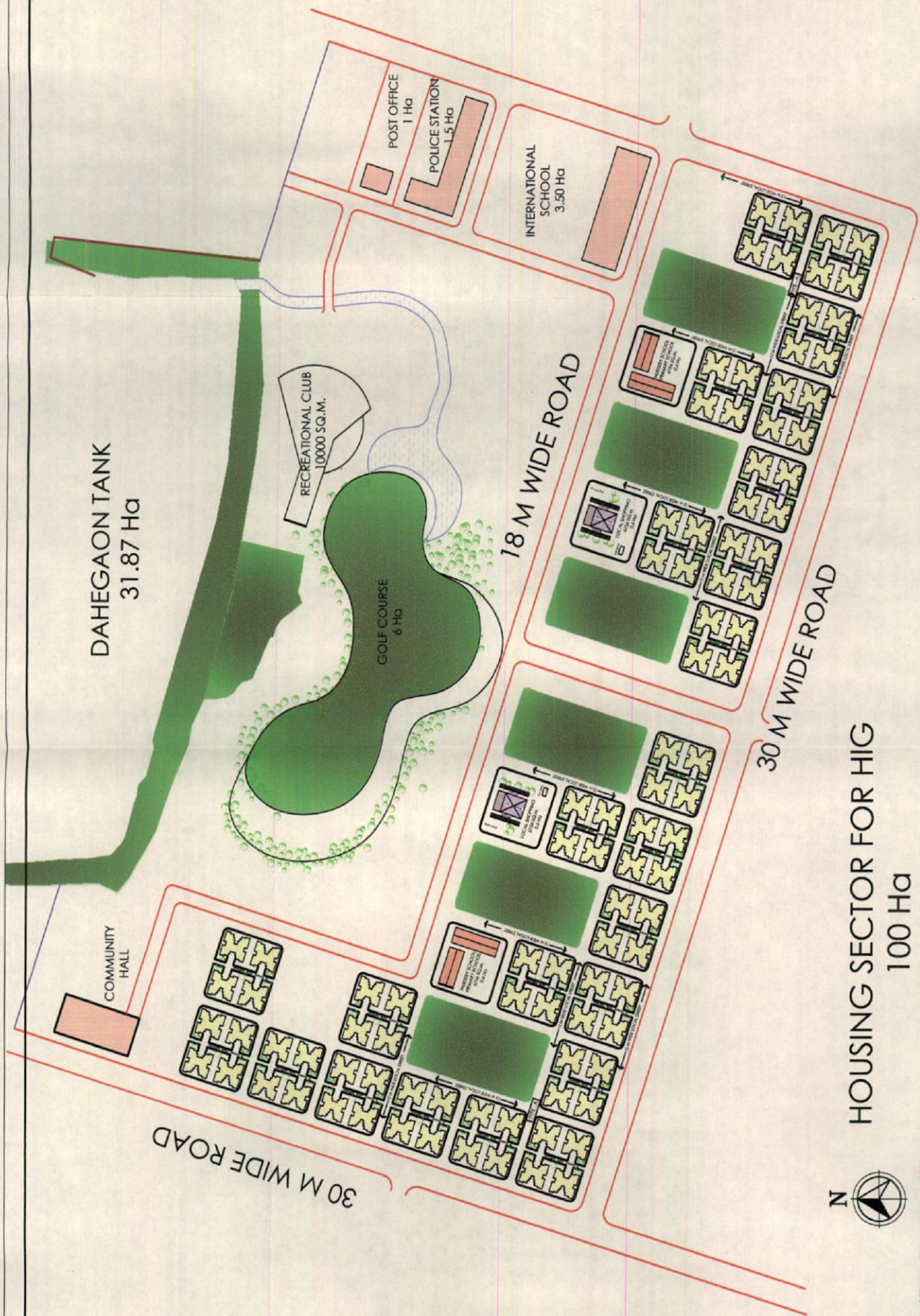
GUIDED BY:-

DR. NALINI SINGH
DR. ASHUTOSH JOSHI

DEPARTMENT OF ARCHITECTURE & PLANNING,
IIT ROORKEE

PREPARED BY:-

AMOL GONDANE
(072201)



DAHEGAON TANK
31.87 Ha

RECREATIONAL CLUB
10,000 SQ.M.

GOLF COURSE
6 Ha

POST OFFICE
1 Ha

POLICE STATION
1.5 Ha

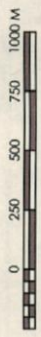
INTERNATIONAL
SCHOOL
3.50 Ha

18 M WIDE ROAD

30 M WIDE ROAD

30 M WIDE ROAD

HOUSING SECTOR FOR HIG
100 Ha



HOUSING SECTOR (LAYOUT PLAN)

GUIDED BY:-
DR. NALINI SINGH
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IIT ROORKEE

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