

INFRASTRUCTURE PLANNING FOR INDUSTRIALIZATION IN HARIDWAR CITY

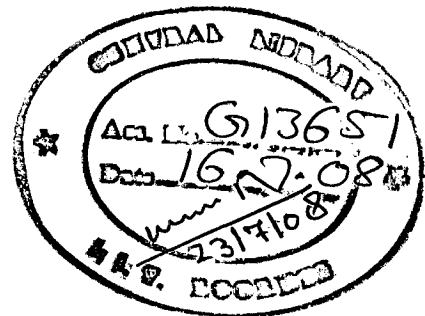
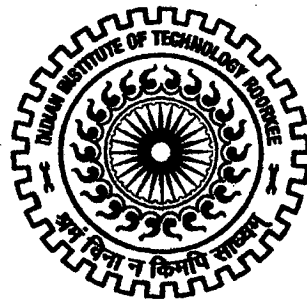
A DISSERTATION

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

MASTER OF URBAN AND RURAL PLANNING

By

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Dedicating this dissertation to my parents I thank my wife and children for their valuable moral support all the time throughout the project. Their invaluable blessings and good wishes proved to be the catalyst in boosting up the quality of this dissertation.

Last, but not the least, a special bouquet of thanks to all friends who have contributed to this work directly or indirectly.



Ar. Ashish K. Kauhsik

M.U.R.P.

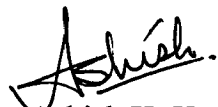
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CANDIDATE'S DECLARATION

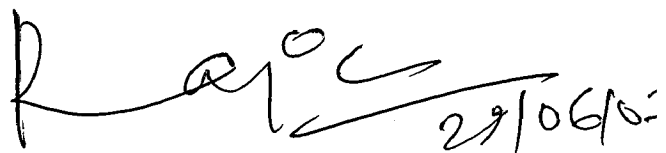
I hereby certify that the work which is being presented in this dissertation entitled "INFRASTRUCTURE PLANNING FOR INDUSTRIALIZATION IN HARIDWAR CITY" in partial fulfillment of the requirement of the award of the degree of "MASTER OF URBAN AND RURAL PLANNING" submitted in the department of Architecture and Planning, Indian Institute of Technology, Roorkee, is an authentic record of my own work (except for a few instances and statements used to describe the government policies and quotes and secondary data which is obtained from various government and non government offices and persons referenced in this dissertation) carried out during the period of Six months from January 2006 to June 2007 under the strict supervision of Professor Rajesh Chandra (Department of Architecture and Planning, I.I.T., Roorkee, India).

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

Dated 29th June, 2007


Ar. Ashish K. Kaushik

This is to certify that the above statement by the candidate is true to the best of my knowledge and belief.



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Contents:

Chapter 1: Industries in Haridwar

1...20

1.1 Introduction

1.1.1 Fiscal incentives to the industries in Uttrakhand

Development of industrial infrastructure

1.1.2 Haridwar city background

1.1.3 Regional linkages

1.1.4 Historical background of Haridwar

1.2 Industries in past

1.2.1 Tourism

1.2.2 Bharat Heavy Electricals Limited (BHEL)

1.2.3 B.H.E.L. ancillary estate

1.2.4 Haridwar industrial area

1.2.5 Bhadrabad industrial area

1.2.6 Integrated industrial estate (IIE) & industrial infrastructure development centre (IIDC)

1.3 Potentials of industrial developments in Haridwar

1.3.1 Factors affecting the potentials of new developments of new industries in Haridwar

1.3.2 Availability of alternative sites

1.3.3 Legal frameworks

1.4 Need for infrastructure planning

1.4.1 The pressure on urban infrastructure

1.5 Need to study

1.5.1 Understanding the trends and potentials

1.5.2 Data projections

Chapter 2: Aims and Objectives **21...30**

2.0 Aims and objectives

2.1 Aims

2.2 Objectives

2.2.1 Private sector involvement

2.2.2 Reforming land policies

2.2.3 Gap analysis between analysis and supply

2.2.4 Ensuring prolonged industrialization

2.2.5 Identification of growth pillars and support pillars

Chapter 3: Scope, Limitations and Assumptions **31...36**

3.0 Scope, Limitations and assumptions.

3.1 Scope

3.1.1.1 Gap analysis

3.1.2 Strategy formulation

3.1.3 Ecological sustainability

3.2 Limitations

3.2.1 The geographical area

3.2.2 Extents of industrial area

3.2.3 Infrastructural services and facilities

3.2.4 Strategy for development

3.3 Assumptions

Chapter 4: Literature review **37...48**

4.1 Office memorandum

- 4.1.1 Fiscal incentives
- 4.1.2 Development of industrial infrastructure
- 4.1.3 Other incentives
- 4.1.4 Thrust sector industries
- 4.1.5 Constitution of the nodal development agency (SIDCUL)
- 4.1.6 Opportunities of employment generation in Uttrakhand
- 4.2 Uttrakhand at a glance
- 4.3 The pressure on urban infrastructure
 - 4.3.1 The demand side management
 - 4.3.2 Alternative planning philosophy

Chapter 5: Case study of Ludhiana

49...68

- 5.1 Ludhiana – An Introduction
 - 5.1.1 Area and Population
 - 5.1.2 Location
 - 5.1.3 Connectivity
 - 5.1.4 Historic background
 - 5.1.5 Climatic conditions
 - 5.1.6 Demographic profile
 - 5.1.7 Peripheral area status
- 5.2 Status of infrastructural facilities
 - 5.2.1 Water supply
 - 5.2.2 Road network
 - 5.2.3 Sewer, MSW services
- 5.3 Planning issues in Ludhiana city
- 5.4 Demographic, economic and land use patterns

- 5.4.1 Demographic profile
- 5.4.2 Population density
- 5.4.3 Slum population
- 5.4.4 Literacy and school going children
- 5.4.5 Economic base
- 5.4.6 Proposed land use
- 5.5 Infrastructural status and proposals
 - 5.5.1 Water supply
 - 5.5.2 Sewerage
 - 5.5.3 Solid waste management
 - 5.5.4 City roads and traffic conditions
 - 5.5.4.1 Road network and hierarchy
 - 5.5.4.2 Major issues
 - 5.5.5 City public transport
 - 5.5.5.1 Issues regarding public transportation system
 - 5.5.5.2 Other modes of public transport
 - 5.5.6 Inter city public transport
 - 5.5.7 Freight transport
 - 5.5.8 Bridges, flyovers, ROB's & RUB's
 - 5.5.9 Issues regarding roads and transportation

Chapter 6: Methodology

69...72

6.1 Methodology

Chapter 7: Infrastructure Planning for

Industrialization in Haridwar Urban Agglomeration

73...128

7.1 Introduction

7.1.1 Physical growth and environmental aspects

7.1.2 Water supply

7.1.3 Sewerage

7.1.4 Storm water drainage

7.1.5 Solid waste management

7.1.6 Roads and transportation

7.1.7 Urban poor

7.1.8 Institution and governance

7.1.9 Municipal finance, HNPP finance and para-statal

7.2 Estimated cost of various infrastructural services

7.3 Demographic profile

7.3.1 Decadal population growth

7.3.2 Household size and numbers

7.3.3 Sex ratio

7.3.4 Literacy

7.3.5 Employment

7.3.6 Income and expenditures

7.3.7 Migration

7.4 Urban poverty profile

7.4.1 Poverty and vulnerability

7.4.2 Urban poverty profile of Haridwar

7.4.3 Household profile

7.4.4 Situation analysis

7.4.4.1 Water supply

7.4.4.2 Sanitation and sewerage

7.4.4.3 Solid waste management

7.4.4.4 Storm water drainage

7.4.4.5 Approach roads and street lights

7.4.4.6 Priorities

7.4.4.7 Health and hygiene

7.4.4.8 Key urban social issues

7.5 Economic development

7.5.1 Economic base of the city

7.5.2 Economic growth potential

7.6 Efforts for planned developments

7.7 Review of master plan 2001

7.8 Housing

7.9 Future growth of Haridwar

7.9.1 Physical constrains

7.9.2 Directions for future growth

7.9.3 Key issues related to future growth

7.10 Environmental quality

7.10.1 Water quality

7.10.2 Air quality

7.10.3 Key environmental management issues

7.11 Municipal infrastructure

7.11.1 Water supply

7.11.1.1 Water sources and generation of water

7.11.1.2 Treatment of water

7.11.1.3 Distribution system

7.11.1.4 Unaccounted for water

7.11.1.5 Per capita water supply

7.11.1.6 Water quality

7.11.1.7 Operation and maintenance

7.11.1.8 Summary of present status of water supply system of Haridwar.

7.11.1.9 Key issues

7.12 Sewerage and sanitation

7.12.1 Coverage area of sewerage network

7.12.2 Treatment and disposal of sewage

7.13 Storm water drainage

7.13.1 Rainfall

7.13.2 Drainage system

7.13.3 Drainage characteristics & problems

7.13.4 Issues and problems of drainage

7.13.5 Situation analysis

7.13.6 Key issues

7.14 Solid waste management

7.14.1 Municipal solid waste generation

7.14.2 Waste composition and characteristics

7.14.3 Collection, storage and transportation

7.14.4 Waste disposal

7.14.5 Key issues

7.15 Roads and transport

7.15.1 Road network, junction and traffic management- Existing situation of road network

7.15.2 Junctions existing situation

7.15.3 Existing situation of traffic flow congestion and management

7.15.4 Transport system's characteristics

7.15.5 Existing situation of public transportation system

7.15.6 Key issues

Chapter 8: "SWOT" analysis **129...136**

8.1 Introduction

8.2 SWOT analysis

8.2.1 City level SWOTR analysis

8.2.1.1 Strengths

8.2.1.2 Weakness

8.2.1.3 Opportunities

8.2.1.4 Threats

Chapter 9: Strategies for development **137...162**

9.1 Economic development

9.1.1 Economic development strategies

9.2 Physical growth and urban environment

9.3 Water supply

9.3.1 Vision

9.3.2 Strategies

9.4 Sewerage

9.4.1 Vision

9.4.2 Strategies

9.4.3 Action plan for Haridwar sewerage system

9.5 Storm water drainage

9.5.1 Vision

9.5.2 Strategies

9.6 Solid waste management

9.6.1 Vision

9.6.2 Strategies

9.7 Roads and transport

9.7.1 Vision

9.7.2 Strategies

9.7.3 Pedestrian facilities

9.7.4 Off street parking

9.7.5 Public transport system for Haridwar city

9.8 Power – Energy

9.8.1 Vision

9.8.2 Strategy

9.8.3 Distribution reforms and energy efficiency

9.9 Housing

9.9.1 Vision

9.9.2 Strategy

Chapter 1: HARIDWAR AN INTRODUCTION

1.1 Introduction:

The Hon'ble Prime Minister, during the visit to Uttrakhand from 29th to 31st March, 2002, had, inter-alia made an announcement that “Tax and Central Excise” concessions to attract

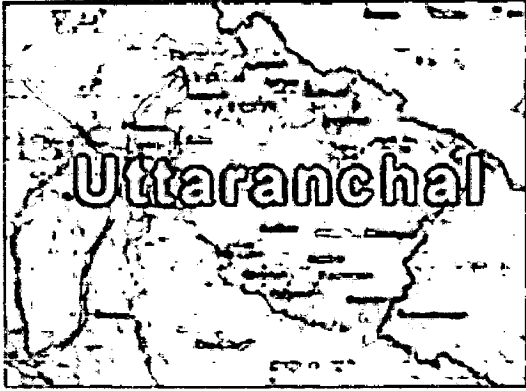


Figure 1 Satellite image of Uttrakhand

investments in the industrial sector will be worked out for the Special Category States including Uttrakhand. The industries eligible for such incentives will be environment friendly with potentials for local employment generation and use of local resources.’

In pursuance of the above announcement, discussion on Strategy and Action Plan for Development of Industries and generation of employment in the states of Uttrakhand and Himachal Pradesh were held with the various related Ministries/agencies on the issue, of infrastructure, development, financial concessions and to provide easy market access, The new initiatives would provide the required incentives as well as an enabling environment for industrial development, improve availability of capital and increase market access to provide a fillip to the private investment in the state.

Accordingly, it has been decided to provide the following package of incentives for the states of Uttrakhand and Himachal Pradesh.

1.1.1 Fiscal Incentives to new Industrial Units and to existing units on their substantial expansion:

(I). New industrial units and existing industrial units on their substantial expansion as defined, set up in Growth Centres, Industrial Infrastructure Development Centres (IIDCs), Industrial Estates, Export Processing Zones, Theme Parks (Food Processing Parks, Software

Technology Parks, etc.) as stated in and other areas as notified from time to time by the Central Government, are entitled to :

(a) 100% (hundred percent) outright excise duty exemption for a period of 10 years from the date of commencement of commercial production.

(b) 100% income tax exemption for initial period of five years and thereafter 30% for companies and 25% for other than companies for a further period of five years for the entire states of Uttarakhand and Himachal Pradesh from the date of commencement of commercial production.

(II) All New industries in the notified location would be eligible for capital investment subsidy @ 15% of their investment in plant & machinery, subject to a ceiling of Rs.30 lakh. The existing units will also be entitled to this subsidy on their substantial expansion, as defined.

(III). Thrust Sector Industries as mentioned in Annexure-II are entitled to similar concessions as mentioned in para 3(I) & (II) above in the entire state of Uttarakhand and Himachal Pradesh without any area restrictions.

1.1.2 Development of Industrial Infrastructure:

(i) The funding pattern under the Growth Centre Scheme currently envisaging a Central assistance of Rs.10 crores per centre is raised to Rs.15 crores per centre.

(ii) The financing pattern of Integrated Infrastructure Development Centres (IIDC) between Government of India and SIDBI will change from 2:3 to 4:1, and the GOI funds would be in the nature of a grant, so as to provide the required infrastructural support.

As a result of these benefits, Uttarakhand has attracted a large no of industrial houses for investment in industrial sector. To cope up with the increasing requirement the State Industrial Development Corporation of Uttarakhand Limited (SIDCUL) was constituted to regulate the industrial developments in a meticulous planned manner. Since then, S.I.D.C.U.L. is working as a nodal agency regarding the provision of necessary amenities for industrial development in Uttarakhand. SIDCUL was constituted with prime objectives of acquisition and allotment of land to the industries through planned development (development of Industrial Estates, Growth centres, Theme parks, I.I.D.C.s etc.) and secondly to channelise the fiscal benefits and subsidies to the industries as per the office memorandum No. (10)/2001-NER government of India, Ministry of Commerce and Industry (Department of Industrial Policy and Promotion) dated 7th Jan 2003, bearing the subject: “New Industrial Policy and other Concessions for the state of Uttarakhand and the state of Himachal Pradesh”.

With the rapid growth of industries, and subsequently of the urban population in Haridwar, there has been a continuous accretion in size of urban centres both demographically and spatially. Provision of necessary infrastructure has however, not kept pace with increasing size of the city. As a result, burgeoning urban residential areas and upcoming industrial developments are putting strain on already secant infrastructure leading to a point of collapse.

It is evident that the government alone, with limited budgetary resources, would not be in a position to make up with the galloping backlog in urban infrastructure services, which are also required to be improved, augmented and upgraded to meet the emerging needs of urban areas.

With liberalization of economic policies, globalization of market economics, technological advancements, de-centralization of planning and development functions, revitalization of

municipal agencies the role of private sector participation in development process would be of vital importance.

Thus, at a glance, one can easily realize the need of ever increasing efforts in the small city of Haridwar, where a large number of floating populations causes tremendous pressure on all services. This study is a step in the direction of understanding the problems and their possible solution regarding the conditions of physical Infrastructure in Haridwar City.

1.1.3 Haridwar City: Background

Haridwar had always been a religious centre and one of the most sacred pilgrims as per the Hindu Mythology. It is an established centre for Sanskrit language and Hindu religion. The temples and Ghats along the river Ganges are main attraction for

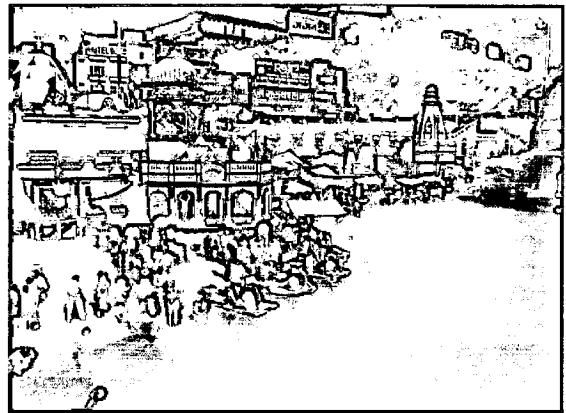


Figure 2 Har-Ki-Pauri

pilgrims and tourists.

The city is presently functioning as a centre of trade and commerce, services and educational facilities in regional context. In recent years, since 2004, Haridwar has been undergoing a fast paced industrial development as a consequence of the declaration of the fiscal benefits as mentioned earlier. Soon the city is likely to be predominantly characterized as the regional industrial hub, with tremendous potential for employment generation which in turn is likely to invite a huge in-migration from nearby and distant places.

At present, Haridwar Urban Agglomeration (HUA) covers on area of 20119 Ha. with a permanent population of 220767 (Males: 119534, Females 101533) with a sex ratio of 924 females per 1000 males. The overall literacy rate is 80.88% (males: 86.51%, Females:

74.26%). The employment situation is quite alarming with a total of 59867 people working (Males: 52298, Females: 5569).

The city has been growing at an annual rate of 2.9 %. It is situated on 29° 58' N longitudes and 78°-10' E latitude with an altitude of + 534 m from mean sea level.

1.1.4 Regional Linkages:

Airways: The nearest airport is at village Jolly-Grant (Doiwala) which is 48 km. on Rishikesh-Dehradun Road. At present only chartered air-crafts operate in light passenger capacities. The exercise to increase the passenger and aircraft capacities has been undertaken by state government. The airport will soon start functioning for domestic regular flights by the end of 2010.

Railways: Haridwar is well connected to almost all major cities in India v.i.z., Delhi, Mumbai, Howrah, Lucknow, Agra etc.

Road Network: Roads provide most important mode of communication with other parts of country, contributing to almost 80% of the total movement of goods and people. Some important distances are – Rishikesh 24 km, Dehradun – 58 km, Devprayag- 94 km., Badrinath – 324 km., Mathura- 344 km. Delhi – 200 km., Agra – 350 km.

1.1.5 Historical Background of Haridwar

Since time immemorial, Haridwar has been known as Mayapuri / Kapila / Gangesdwar / Harihar region etc. The present area of Haridwar is just a fraction of what it has been described as Mayapuri in Skand Purana which was bounded by Neela Parvat in East, Vasheya River in West, Nagtirth in South and Ratna Stambh in North.

Haridwar is known to be the worship place for priest Kapil. As per the descriptions in puranas, when Holy Ganges reached the plains of Haridwar after descending from heaven, to escape the wrath of any of the seven maharishis among Kashyap, Vashishtha, Yani, Vishwamitra, Kamdagni, Bhardwaj and Gautam, it distributed its flow into seven streams so that to flow through all the ashrams. Thus the place is still known as Saptrishi Ashram.

King Shewta also worshiped Lord Brahma at the same place and there after the king was rewarded as whosoever will take a dip in Holy Ganges at this place will have the blessings of Brahma, Vishnu and Mahesh all together. This place is presently known as Brahmakund or popularly as Har-Ki-Pauri.

Around 3000 B.C. Pandava brothers owned a place known as Bhimgowda. King Ashoka also ruled Haridwar which is evident by the presence of Ashoka Stambh.

Brathari, brother of King Vikramaditya, also worshiped here and, as a monument, king Vikramaditya constructed the kund and the holy steps (stairs). Thereafter this place was called Har-Ki-Pauri.

During the regime of king Harshvardhana the Chinese explorer Hawain- Sang visited India for around 15 years and described Haridwar as Myun city which meant for present days Mayapuri.

The Maha-Kumbh, celebrated every twelve years, has a great significance as per Hindu Mythology.

Haridwar gained to glory during the regime of king 'Akbar' when King Mansingh, friend and minister in Akbar's ruling, laid the foundation of present days Haridwar.

After descending 133 miles from Gangotri, Ganges finds the first plains in Haridwar. The holy water of Ganges is being utilized for irrigation and other purposes since 1836 in Haridwar.

1.2 INDUSTRIES IN PAST:

1.2.1 TOURISM: As an important pilgrimage, Haridwar has a developed economy due to tourist and pilgrims. Needless to say, Haridwar sufficed its economy through trade & commerce and educational services as an obvious outcome of spiritual and religious sanctity. Tourism as an industry has always been the backbone of economy at micro level.

Also for major religious activities like Kumbh Mela, Ardh Kumbh Mela etc., The city attracts a huge fund of the order of Rs. 400 crores from central government and other financial institutes for the management of such events which is utilized for the provision of temporary infrastructural facilities and services to cater to the needs of large number of floating population.

1.2.2 BHARAT HEAVY INDUSTRIES LIMITED (B.H.E.L.)

The second five year plan emphasized the establishment of heavy industries throughout the country to trigger the national economy and to improve upon the employment generation. As a consequence Bharat Heavy Industries Limited (B.H.E.L.) was established during (1964-1965) and started the production by the end of 1965. Since then B.H.E.L. is functioning successfully with a strong work force of around 14000 employees.

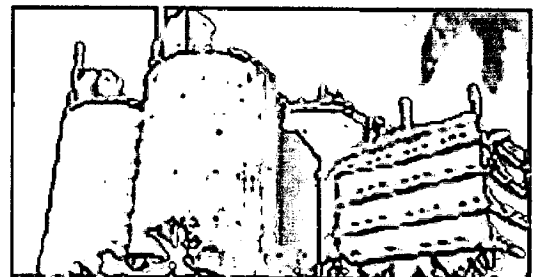


Figure 3 Industrial building, B.H.E.L

B.H.E.L. had been a key instrument in providing necessary infrastructure to its employees in physical and social terms. Almost one lakh population depends upon the infrastructural services provided by B.H.E.L.

B.H.E.L. has its own mechanism i.e., B.H.E.L. Estate department to manage and maintain the entire infrastructure in township and is not thus included in the municipal limits and is not covered under the master plan prepared by the state town-planning development authorities.

1.2.3 B.H.E.L. Ancillary Estate

An ancillary estate with a provision of involvement of small and medium sized industries to function as ancillaries to B.H.E.L. was established along with B.H.E.L. itself. Though, hardly any ancillary unit was established in this estate, so later on, the plots/land was sold/ handed over to private operators to run industries independently. Presently some odd 35 small and mid sized units operate in Ancillary Estate contributing marginally to the economy and employment of the urban agglomeration.

1.2.4 Haridwar Industrial Area

Developed by U.P.S.I.D.C. and spread over 17.65 Hectare this industrial area was developed by Uttar Pradesh State Industrial Development Corporation in 1973 to accommodate small and mid sized industries in the vicinity of Haridwar city. The development was an ambitious project but subsequently due to the predominating economy of tourism industry, this project could never attract industrial investments from the private sector, as anticipated. Presently, due to lack of political will and due to non-settlement of issues between Uttar Pradesh and Uttarakhand Governments this estate exhibits a mixed use pattern and most of the land is being used for godowns and most of the land is being used for stores for most of traders in Haridwar. 176 small and mid sized units are currently operating in this area with an

occupancy rate of 19.76% which is sarcastically low. Lack of infrastructure services in another major drawback which discourage the private sector investment in this area. Surprisingly, the land prices (market value) are much higher in this industrial estate as compared to other parts due to the real estate activities and non-permitted uses.

1.2.5 Bhadrabad Industrial Area:

Another ambitious project regarding the development of Bhadrabad Industrial area was taken up by U.P.S.I.D.C. in 1981 in collaboration with B.H.E.L., The 10.29 Ha of land was made available on lease to UPSIDC from the BHEL for the establishment of industrial area to attract the investment from privates sector industries and to generate economic momentum through employment generation at micro level. Initially this industrial area could gain a very low intensity of development, however in last few years, due to state Government's initiation and fiscal benefits this industrial area has gained a high paced and intense development by virtue of its vicinity of the dominating industrial estate I.I.E. & I.I.D.C. developed by SIDCUL.

1.2.6 Integrated Industrial Estate (I.I.E.) & Industrial Infrastructure Development Centre (I.I.D.C.)

As a consequence of the announcements made by the Honorable Prime Minister of India during his visit to Uttrakhand between 29th to 31st March 2002, regarding Tax and central excise concessions", the department of Industrial policy and promotion, Ministry of Commerce and Industry, Government India detailed out the subject vide info office memorandum No. 1 (10) / 2001 NER dated 7th Jan 2003.

This provided a base to attract large investment in industrial sector in the special category state of Uttrakhand. Thus to channelise the investment and to regulate the development in meticulously planned manner, Uttrakhand government constituted the State Industrial

Development Corporation of Uttarakhand Limited (S.D.C.U.L.) to address the issue under single window system.

S.I.D.C.U.L. a Government of Uttarakhand enterprise was incorporated as a limited company in the year 2002 with an authorized share capital of Rs. 50.00 cr. and Rs. 20.00 crores as paid up capital through government of Uttarakhand in order to promote industrial development in the state, provide financial assistance in the shape of debt, equity, venture capital, develop infrastructure, and assist private initiatives in industries and infrastructure and implement manage projects and provides specialized financial consultancy and construction and all such other activities to promote industries and develop industrial infrastructure in the state of Uttarakhand directly or through special purpose vehicles, joint ventures, assisted companies etc. Besides the state government, SIDCUL has equity participation from L.I.C., ICICI and SIDBI. Other banks are also in the process of participating in its equity. They have led to a high degree of professionalism and autonomy in the functioning of Corporation. The spate of concessions available of industrial investment has lead to move One thousand E.O.I.'S with S.I.D.C.U.L. which entail an investment of around Rs. 20,00,0.00 Cr.

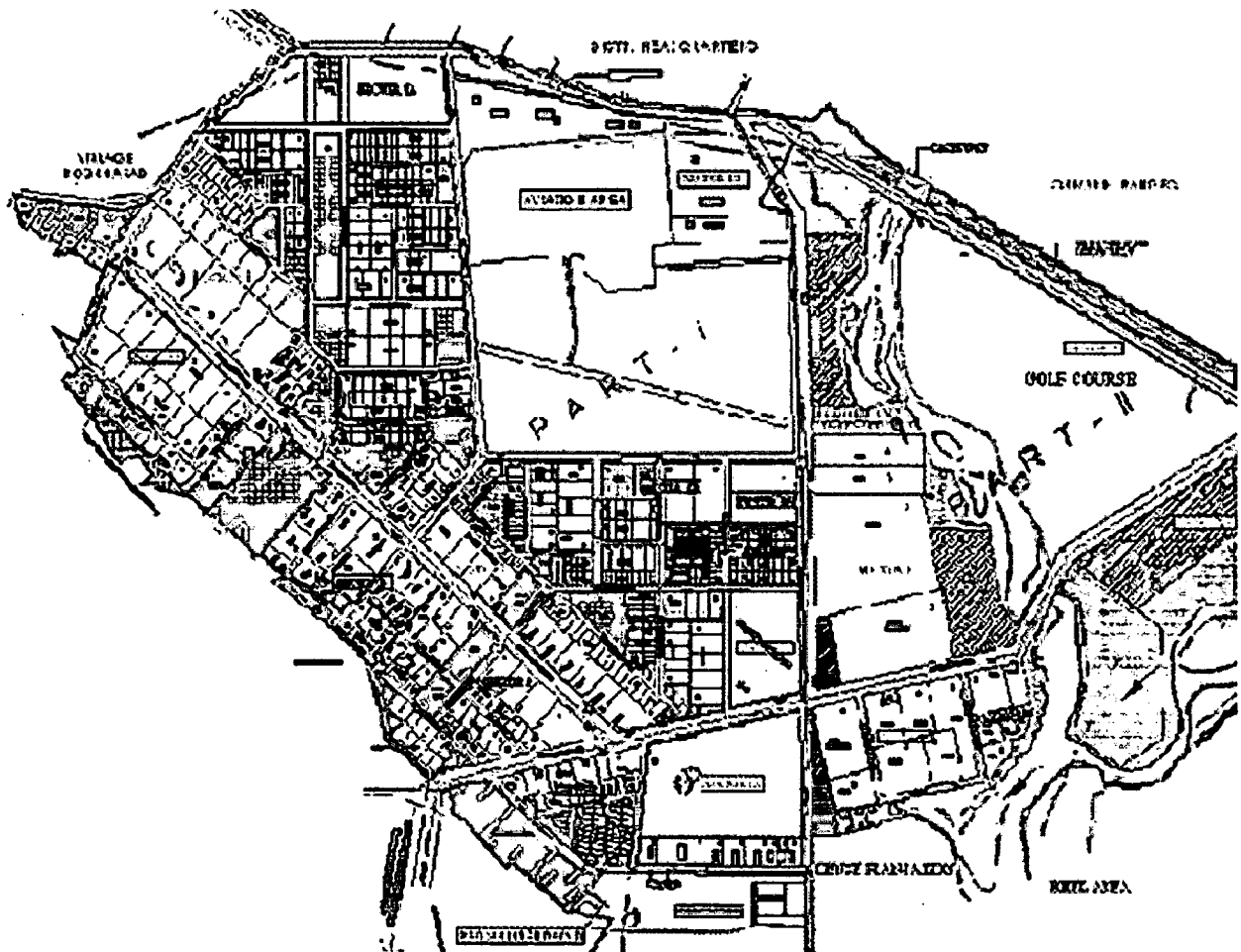


Figure 4 Layout plan IIE & IIDC, Haridwar.

SIDUCL undertook the development of Integrated Industrial Estate (I.I.E.) and Industrial Infrastructure Development Centre (I.I.D.C.) in close proximity to the district headquarters on 2034 Acres of land provided by B.H.E.L. on lease to the state government.

Initially, 1427 Acres of land was acquired to accommodate 750 industrial plots ranging from 200 sq.m. to 4000 sq. m. plot size category, but as the demand grew more substantially and big industrial houses also took interest in establishing their industrial units. Another 607 Acres in second phase were acquired for the purchase. The project gained tremendous success and has achieved an occupancy rate of 96.6 % as on date. The government initiatives are in process to achieve 100% occupancy by March 2010. At present 541 industrial units have commenced / completed the construction activities for their premises on final 552 plots. Nearly 200 units have already entered the production phase with a work force of approximately 3700 employees.

IIE Haridwar at a Glance	
Name of Industrial Estate	Integrated Industrial Estate, Haridwar
Location	Located just 3 Km from Delhi-Haridwar National Highway. 225 Km from National Capital Delhi and 52 Km from State Capital Dehradun.
Total Area	2034 Acres
Industrial Land Rate	Rs.1500 / sq mts.
Connectivity	Nearest Rail Yard: 5 Kms Nearest National Highway: 3 Kms Nearest Domestic Airport: Jolly Grant 48 Kms Nearest International Airport: Delhi 225 Kms
Water Supply	Tube Wells: 4 No. Under Ground Storage Tank: 1 No. (Capacity 6 MLD) Over Head Tank: 1 No. (Capacity 0.5 ML) Length of Rising Main: 1.05 Km Length of Distribution Line : 46 Kms
Power Supply	Electric Sub Stations 220 KV (1 No.) 33 KV (4 No.) 11 KV (as required)
Financial Incentives	100% Central Excise exemption for 10 years 100% Income Tax exemption for first 5 years and 30 % for next 5 Years CST @1% for 5 years Capital Investment Subsidy @15% with a max. of Rs 30 Lakhs
Proposed Industries	Cosmetics & Allied Plastic & Allied Apparel & Allied Agro Food & Allied Pharma Products Electrical, Electronic & Allied Institutional, Commercial & Allied
Proposed Facilities	Hotel, Bank, School, Hospital, Petrol Pump & Golf course etc.
Present Status	Allotment Complete

Table 1 Data on I.I.E. Haridwar.

Source: Official web site of SIDCUL (www.sidcul.com)

Besides these planned and partially developed Industrial areas recently concentration of industries are being observed the fringes of Hardware city where land prices are relatively low. These concentrations are observed on Hardwar- Laksar Road, Sarai Road, village Jagjitpur etc.

1.3 Potentials of Industrial Developments in Haridwar

Since the demand for industrial development is at present, much more than the present supply, the need for establishing new industrial estates is being observed. At present, SIDCUL is not able to cope with some odd 370 E.O.I.s from large industrial houses all across the country to establish their industrial units at Haridwar. In fact Haridwar attracts more attention as compared to other industrial destinations in Utrakhand by virtue of its better connectivity & vicinity to Uttar Pradesh and also due to its religious sanctity.

The preferential sites for industrial development are identified as:-

(a) Hardwar Laksar road, mainly agriculture in nature this area exhibits tremendous potential for industrial developments. However the land and other political matters need to be addressed in due time so as to ensure the timely disbursement of fiscal benefits to the industries.

(b) Rural hinterland of village Sarai, Sitapur etc. but again with constraints as mentioned above.

(c) Expansion of I.I.E. at village Roshnabad, but the key factor will be the control of land prices which has already gained the skyrocketing heights in past five years.

1.3.1 Factors affecting the potential development of new industrial areas

Time Factor: As per the directions of the government of India the only these industrial are eligible to obtain fiscal benefits and subsidies which start the commercial production on and before 31 March 2010.

Land cost: Due to the implicit speculation and lack of state government's will power the land prices in the vicinity of the IIE have increased nearly 25 times within a short time period of

5 years. Officially the land rate is Rs. 1000.00 per Sq. m. while the market price is estimated at Rs. 5500 per Sq. m. of the industrial sectors in I.I.E.

Thus the whole process of acquisition of land, development of land, provisions of infrastructure, construction of the industrial buildings and commercial production shall be completed within a tight time frame of almost three years.

During past few years due to the implicit speculation in real estate business and due to lack of political willpower the land prices have increased many times. This needs a big amount as capital investment into land which in turn serves as a draw back for small and medium size industries.

1.3.2 Availability of Alternative Industrial Sites.

Besides Haridwar, S.I.D.C.U.L. has developed other industrial estate I.I.D.C.s and Growth Centers and Theme Parks at various locations in Uttrakhand. These are:

- a) Integrated Industrial Estate at Pantnagar.
- b) I.T. Park at Dehradun.
- c) I.I.D.C. at Dehradun.
- d) I.I.D.C. at Pantnagar.
- e) Growth Center at Kotdwar.
- f) I.I.E. at Sitarganj.

Also many industrial areas have been developed with involvement of private sector enterprises. These are:

- i) Devbhoomi Industrial Estate, Bantakhedi, Roorkee.
- ii) M/s Narayan Nagar Industrial Estate, Hempur Ismile, Kundeswary, Shivpur, Kashipur.
- iii) M/s Bheem Nagar Industrial Estate, Patti Bazar, Kashipur.
- iv) M/s Omega Industrial Estate, Dabhora, Ahetamali, Kashipur.
- v) Raipur Co- operative Industrial Area, Raipur, Bhagwanpur, Roorkee.

- vi) M/s Mool Chand Industrial Estate Pvt. Ltd.
- vii) M/s Gangespur Kashipur Industrial Area, Kashipur.
- viii) M/s Raipur Bhagwanpur Industrial Area, Bhagwanpur, Roorkee.
- ix) M/s Sara Industrial Estate Ltd., Shankarpur, Hukumatpur, Dehradun.
(Joint venture between IEL and SIDCUL)
- x) M/s Sheel Chandra Industrial Estate, Village Kotha Lalpur, U.S. Nagar.
- xi) M/s Kumar Industrial Co- operative Industrial Estate, Village Matkuta, Tehsil Kichha, U.S. Nagar.
- xii) M/s Kharmasi Industrial Estate, Kharmasi, Kashipur.
- xiii) M/s Lakeshri Industrial Area, Lakeshri, Bhagwanpur, Roorkee.
- xiv) M/s AIS Industrial Estate, Village Khasipur Kasaeli and Lathardeva Hoondth Roorkee.
- xv) M/s Nand Nagar Industrial Estate, Village Mahuakheragunj, Kashipur, U.S. Nagar.
- xvi) M/s K.I.E. Infrastructure and Projects Pvt. Ltd., Village Mudiyaktti Mangabore, Roorkee.
- xvii) M/s Uttam Industrial Park, Village Mudlyaki-Kulchandi, Khendi, Dahiyaki Mangalore, Roorkee,
- xviii) M/s Gold Plus Industrial Estate, Village Tharola, Manglore, Roorkee.
- xix) M/s Balaji Industrial Estate, Village Mahuakhedagunj, Kahipur, U.S. Nagar .
- xx) M/s Saleempur Rajputan Industrial Estate, Villate Sunehra /Saleem Rajputan, Roorkee, Haridwar.
- xxi) M/s Jai Prakash Associates Ltd., Village Nalhedi, Dehradun.
- xxii) M/s Birla Tyres Industrial Estate, Village Khedi Mubarakpur, Laksar.
- xxiii) M/s IDEB Industrial Estate, Village Mahuakhedagunj, Kahipur, U.S. Nagar.
- xxiv) M/s Ram Raj Industrial Estate, Village Vikrampur, Bazpur, U.S. Nagar.
- xxv) M/s J & G Vikrampur Industrial Estate, Village Vikrampur, Bazpur U.S. Nagar.

xxvi) M/s Dhanlaxmi Industrial Estate, Village Nandhedi, Jaspur, U.S. Nagar.

xxvii) M/s Shri Developers Industrial Estate, Village Mahuakhedegeny Kashipur, U.S. Nagar.

xxviii) M/s Buland Builtmart Industrial Estate. Village, Khedi Mubarakpur, Laksar.

(xxx) M/s Uttar Industrial Estate, Village Muhuakhedaganj, Kashipur, U.S.Nagar.

Due to availability of land at these locations, S.I.D.C.U.L. somehow, is struggling to divert new industrial establishment in these places but since most of these are not the preferred locations due to either lack of infrastructure facilities and services or accessibility, most of these industrial areas are not able to attain even 30% occupancy.

1.3.3 Legal framework

Many industrial setups have emerged out of the non ear marked industrial areas due to lower land prices or accessibility options but these units are facing a challenge because of the cumbersome legal framework regarding the change of land use and / or permission from authorities as, till date, no development authority is operative in these areas to check the intensity of development and infrastructure requirements.

Such industries start the procedure of obtaining legal permission and fiscal benefits after acquiring the land at relatively low prices and sometimes even after establishing the entire setup. The infrastructure facilities remains absent in such areas even if these units obtain the legal permissions.

1.4 Need for infrastructure planning.

Infrastructure planning is an integral and fundamental component land use planning and for the preparation of planning schemes. Better coordination and integration of infrastructure and land use is the backbone of driving forces behind any urban development. Infrastructure planning must be carried out in a way that advances the purpose of land use planning which is to seek & achieve ecological sustainability. This is described as a balance, which integrates protecting ecological processes and natural systems, economic development and maintaining

the well being of people and communities. Infrastructure planning aims at supplying infrastructure in a coordinated, efficient and orderly way including encouraging urban and industrial growth in areas where adequate infrastructure exists or can be provided efficiently. Knowledge of the existing infrastructure networks servicing in the area, including the capacities and thresholds for augmentation is an integral component to the planning process. Balancing competing outcomes is also integral to the planning process and must be carried out in consultation with state government/local governance. And in a way that respects the different jurisdictional responsibilities that exist. Land use planning and infrastructure planning are intricately inter-woven activities. Decision about the allocation of land for urban land use purposes need to be informed by the infrastructure costs and consequences of these decisions

1.4.1 The pressure on urban infrastructure

The style of urban infrastructure provision that encourages more efficient pattern of resource consumption is the basis of development of sustainable urban agglomerations. Conventional approach to urban infrastructure management was based on the premise “Facilitating Infrastructure supply”. The increased awareness towards environment and sustainable society coupled with a need to make our cities worth living, demand side interface in the precision and management of urban infrastructure is thus required. The demand side interface broadly has two aspects :-

- (a) Managing the existing demand.
- (b) Channeling/monitoring the ever increasing demand.

The process of economic development and resulting urbanization get momentum which in turn creates demand for urban services and infrastructure facilities. The gap between demand and supply of essential urban services and infrastructure deteriorates the physical environment and quality of life in urban areas.

This process of urbanization has created a huge gap between demand and supply of urban service and infrastructure. For instance :-

- (i) The ninth plan working group on housing has estimated on investment, required for housing in urban areas at Rs. 526000 Crores.
- (ii) The India Infrastructure report - 1996, estimates the annual investment need for urban water supply, sanitation and roads at about Rs. 28035 Crores for the next ten years.
- (iii) The Central Public Health Engineering Organization (CPHEEO) has estimated the requirement of funds for 100% coverage of urban population under safe water supply and sanitation services by the year 2021 at Rs. 172905 Crores.
- (iv) Estimates by Rail India Technical and Economic Services (RITES) indicate that the amount required for urban transport infrastructure placement in cities with population 100,000 or more during the next 20 year would be of the order of Rs. 207000 crores.

Such a big quantum of requisite investment for supply of urban infrastructure cannot be allocated within the budgetary resources of the Central and State Governments. Therefore, private sector participation is envisaged. Also, the demand side interference to solve the problem of quality and availability of urban services and infrastructure need to be given priority.

Both Demand and supply side should be given due considerations. As the planning so far has been supply oriented, need is to make it balanced by giving weight to demand side of the problem. On demand side account should be taken of existing as well as ever increasing demand.

Managing the existing demand asks for proper understanding of postmodern consumerism and chalking out the policy and intervention instruments accordingly.

Management of ever increasing demand is to be through monitoring and channeling the migration process. Such monitoring has to be in the broader context of regional planning.

Regional planning should address two aspects: Macro planning and integration & compatibility of various micro plans.

The guiding principle for planning should be sustainability aimed at balanced development in the economy.

1.5 Need to Study:

Infrastructure, as stated earlier, is the backbone of any urbanization and when it is accounted for developments it comes at tremendous cost. State government has been fundamental organization till date to cope up with the planning and funding of the infrastructure services and facilities in India but till date the planning and implementation of infrastructure has not been efficiently co-related. This leads to either lack of the services due to limited budgetary resources of the government and/or deterioration in the quality of services in absence of proper implementation and maintenance.

Thus, an effort in this direction is required to study the present trends and planning & to consider alternative planning philosophy to make an efficient and optimum use of the multimillion investments in infrastructure.

1.5.1 Understanding the trends and potentials

A sincere approach is required to understand the requirements of infrastructure planning for industrialization in Haridwar city for many reasons, some of them are:

i) To determine the trends and potentials of development and industrialization so as to ensure the optimum and efficient use of limited resources without making a compromise with the sensitive ecological balance of the region.

ii) To access the future requirements of infrastructural services and facilities so as to ensure the well being of the inhabitants and visitors.

iii) To be able to plan and implement policies and strategies for the development of industrial sector vis-à-vis required infrastructure.

iv) To eliminate the possibilities of collapse of the infrastructural facilities and services before it is too late.

1.5.2 Data projections

Precise quantification of the existing and potential future requirement is key instrument is accessing the quantity of the additionally required infrastructural facilities and services. Also, it needs the exact determinant and identification of the prominent land use in each specific pocket of the development area under consideration so as to ensure the most efficient distribution of the services and facilities.

Also, the infrastructure shall be designed and planned to cater to the peak loads during the toughest periods of use. This is defined as the quality of infrastructural services which, in turn, maintain the quality of life. The planning and development exercises should always confirm to the fragile ecological balance of the region.

Chapter 2: AIMS AND OBJECTIVES

2.0 AIMS AND OBJECTIVES

2.1 AIMS

- i) To study and analyze the existing infrastructure facilities with respect to their provisions, efficiency and management in context of rapid industrialization so as to access future requirements.
- ii) To identify the “growth pillars” and support “pillars” for industrialization and analyze the government initiatives in order to make optimum utilization of the same.
- iii) To ensure the attention towards demand as well as supply side of adequate quantity and appropriate quality of infrastructure service and facilities in a sustainable manner.
- iv) To ensure and safe guard the interests of the industrialists for continued functioning of the industries even often the period of fixed benefits and subsidies is over.
- v) To ensure the development of industrial sector in such a manner so as to maintain the fragile ecological balance of the region.

2.1 OBJECTIVES:

2.1.1 Private sector involvement

To enhance the development of infrastructural facilities and services by public and private sector investment on Build-Operate Transfer (B.O.T.) basis.

- Since the investments in supplying the infrastructure are huge, state and central governments shall deploy a clear and constant mechanism to evaluate the cost of the infrastructure and also the policies of involving private sector

investments shall be very transparent and clear in content and intensions. The private investors/developers may be inspired to make long term investments for developing the infrastructure facilities and services and shall be allowed to charge the cost and subsequent interests and profits in the form of levis, octroi etc., from the users for a stipulated time frame at convenient tariffs. Priority infrastructure planning may be the guiding principle of provide a clear, transparent and certain basis for the calculation of infrastructure charges.

2.2.2 Reforming land policies

To check and regulate the development of unplanned industrial areas by reforming the land policies while maintaining the individuality and autonomy of land owners.

- Most of the unplanned development of the industries is observed in predominating agricultural land use areas. The industrialists purchased the agricultural land from the farmers and pay the complete price of the land to obtain the rights of land ownership. Initially, the farmers get a good amount for the land but since it is commonly observed that instead of investing the money in alternative mode of occupations, most of the farmers have spent the entire money in his families materialistic interests like constructing/upgrading his residential building, purchasing luxury vehicles, for the marriages of their children etc., and are now on the verge of poverty or sooner are likely to be on the verge of poverty.

This phenomenon could easily be checked by enforcing specially designed land policies. For instance, instead of paying up the complete price of the land, a memorandum of understanding could be enforced by law, between the farmer and the industrialist ensuring that the farmer gets a genuine fixed amount on regular

basis as rent or, royalty for developments on his piece of land for a stipulated time while the rights of ownership shall remain in favour of the industrialist. This will provide the farmer an opportunity to meet out the requirements of his family and also a comfortable livelihood for a stipulated time period. Meanwhile the farmer may, also arrange for alternative occupational pursuits.

2.2.3 Gap analysis between demand and supply

Analysis of the existing gap between demand and supply of the infrastructure services and facilities and assessment of the future requirements and derivation of the control mechanism by continuous monitoring of the ever-increasing demand.

Conventional approach to urban infrastructure management is based on the premise “Facilitating Infrastructure Supply”. The increased awareness towards environment and a sustainable society coupled with a need to make our cities worth living, demand side interference in the provision and management of urban infrastructure is strongly advocated.

Demand side interference broadly has to aspects.

- * Managing the existing demand, &
- * Channeling/monitoring the ever increase demand covers the issues of regional planning, i.e., micro as well as macro planning covers the intricacies of rural-urban interaction.

2.2.4 Ensuring prolonged industrialization

To prepare ground for the continued functioning of industries even after the period of fiscal benefits is over.

- There is an immediate requirement to anticipate and upgrade the levels of technical skills to ensure that the local youth has a competitive edge.
- This has been observed that while allotment of land and development of industrial activities is already initiated; infrastructure development has not kept pace. The requirement of electric power is much higher than expected and availability and the establishment of power grids are taking longer time on the ground than on paper.
- Harnessing human resources to the desired technical skills levels and to prepare the grounds for more employment opportunities in private sector along with the availability of cheap, continuous and surplus power shall be the key to inspire industries to continue functioning even often the period of fiscal benefits is over.

2.2.5 Identification of “Growth pillars” and “support pillars”

Identification of infrastructural elements which act as the ‘growth pillars’ for industrial development in a sustainable manner.

- a) Roads
- b) Transportation
- c) Energy and Power
- d) e) Urban development

i) Roads:

Vision:

- Provide high speed barrier free connectivity with rest of the country.
- Provide adequate and efficient connectivity to all the demand drivers (Tourism, Industries, Agriculture and Urban centres)

- Provide connectivity to all villages/habitants through roads and bridges.
- Provide 100% all weather roads.

Strategy for development:

- Identification of core network and all future developments to be linked to the core network to ensure economics of scale in terms of traffic counts.
- Work in confirmation and co-ordination with government for development of high speed corridors especially N.H. 58.
- Minimize transaction cost and delay in transportation through integrated check posts and bye passes along core network.
- Explore spectrum of private participation construction, maintenance and management corridors through B.O.T. and other options.

b) Transport:

Vision:

- Provide adequate transport services on important transport routes.
- Increase the share of railways in cargo passenger transportation.

Strategy for development:

- Remove legal restrictions in roads transport, to free private sector response to the tourism and industrial demands.
- Railways to be positioned as an important alternative to reduce transportation cost for industrial and tourism development.

c) Energy:

Vision:

- Provide affordable and quality power to all through harnessing the surplus hydro potential of the state.
- Power to every village and household on demand.

Strategy for development:

- Follow a 'consumption driven' strategy through promotion of power intensive industries resulting in increased growth and employment opportunities.
- Remote villages to be connected by non-conventional sources of energy.

d) Urban infrastructure:**Vision:**

- Living standards, productivity and sustainability of entire urban agglomeration to be enhanced with emphasis on preservation of the heritage character and environmental health.

Strategy for development:

- Increased responsibility on urban local bodies with concurrent measures to strengthen their capacities and functional efficiency.
- Upgradation of the core arterial network of the cities to at least 10km.
- Provisions of safe and assured supply of drinking water to all towns.
- Development of underground sewerage system and treatment plants.
- Development of an integrated municipal solid waste collection and disposal system involving the local communities.

- Implement traffic management measures in key towns.

Maintaining ecological balance at minimum possible compromise through the instrument of encouraging non-polluting and environment friendly industries while discouraging the potentially polluting industries.

Central and State governments has been very cautions regarding the ecological aspect of the region while announcing the industrial policy and fiscal benefits.

The various manufacturing industries have been categorized as per the emission norms and has declared a negative list comprising of highly polluting manufacture process which shall under any condition not be permitted to operate manufacturing facilities throughout the entire state.

Chapter 3: SCOPE, LIMITATIONS AND ASSUMPTIONS

3.0 SCOPE, LIMITATIONS AND ASSUMPTIONS

3.1 Scope

3.1.1 Gap analysis

The scope of this dissertation is study and analysis of the current scenario of physical infrastructure which act as ‘growth pillars’ for the development of industries in terms of quality and quantity, and to analyze the gap between the supply and demand equations, and to project the future requirements of infrastructure services and facilities for the planning period i.e., up till 2025.

3.1.2 Strategy formation.

This dissertation aims at evolving the strategies for the induction of optimum infrastructural services and facilities in phased manner so as to maintain sustainability in financial terms.

3.1.3 Ecological sustainability.

This dissertation, aims at suggesting the use of natural processes to support the ecological sustainability of infrastructural services.

3.2 Limitations

The study is limited to the following extents:

3.2.1 The geographical area

The geographical area under consideration is limited to the area covered by the Haridwar Development Authority and further is called as the Development Area. The development area measures 20119 Hectare on ground.



Figure 5 Development Area: Haridwar.

3.2.2 Extents of Industrial developments

Extant of Industrial developments for the purpose of this dissertation is limited to the following aspects

- i) Existing quantity and sizes (small, medium or large).
- ii) Future projections for a period of 10 years in terms of expansion of existing industries and establishment of new industrial units.
- iii) Opportunities of employment in terms of skilled and unskilled work force.

3.2.3 Infrastructural services and facilities.

Although all of the infrastructural services and facilities are essential for the well being of inhabitants of the urban agglomerations but, the scope of this study

is limited to the physical and social infrastructural services and facilities which are identified as.

i) Growth pillars for industrialization, namely

- a) Roads.
- b) Transportation.
- c) Power-Energy.
- d) Skilled/trained human resource.

ii) “Support Pillars” for industrialization, namely.

- a) Water Supply System.
- b) Storm water disposal system.
- c) Sewage disposal.
- d) Solid waste management.
- e) Housing.

3.2.4 Strategy for development

The scope of this dissertation is to evolve a strategy regarding the supply of infrastructure to the optimum required levels i.e., a strategy to induct limited quantity of services and facilities in concurrence with the industrial development. The dissertation projects phase wise expected development in industrial arenas and simultaneous induction of infrastructural services.

3.3 Assumptions

The dissertation is based on the following assumptions:

i) No jurisdictional orders are implemented against the development activities in the planning period i.e., till 2025 which is the stipulated time period under the

scope of this dissertation on any account viz. Public interest litigations regarding issues of environment and/or special economic zones.

ii) The surplus hydro-electric power potentials of the state shall be available for the development area under consideration and is not hampered due to any reason what-so-ever.

iii) None other states or central government announces similar of better fiscal incentives for industries, which in turn acts as catalyst for industries to shift the production/manufacturing units.

iv) Political stability is much desired in the state throughout the stipulated time period so as the government, and ministries can provide adequate support and interest in development activities through the vehicles of local governance and various development agencies working in the region.

v) The surplus electric power potentials of the state are available to the industries and household uses without any prejudice and compulsion. The power is main ingredient to make industries able to sustain themselves.

v) The policy of the state government to have a reservation of 70% regarding employment in the private sector industries for the local youth is enforced and is implemented properly. This helps in regulating and monitoring the unwanted migration from other places. The projections regarding the future population and infrastructure requirements are based on this assumption.

Chapter 4: LITERATURE REVIEW

4.0 Literature Review:

4.1 Office memorandum:

“Published by Department of Industrial Policy and Promotion, Ministry of Commerce and Industry, Government of India, New Delhi, bearing No. 1 (10) / 2001-NER, published on 7th Jan. 2003.

Sub: - New industrial policy and other concessions for the state of Uttrakhand and Himachal Pradesh.

4.1.1 Fiscal incentives:

i) Declaration by Hon’ble Prime Minister regarding ‘Tax and Central Excise Concessions’ to attract investments in industrial sector for the special category including Uttrakhand.

ii) Fiscal incentives to new industrial units and to existing units on their substantial expansion:

1. New industrial units and existing industrial units on their substantial expansion, as defined, set up in Growth Centres, Industrial Infrastructure Development Centres (IIDC), Industrial Estates, Export Processing Zones, Theme Parks (Food processing parks, Software Technology Parks etc.), as stated and other areas as notified from time to time by the central government are entitled to :

a) 100% (hundred percent) outright excise duty exemption for a period of 10 years from the date of commencement of commercial production.

b) 100% (hundred percent) income tax exemption for an initial period of five years and thereafter 30% for companies and 25% for other than companies for a

further period of five years for the entire states of Uttarakhand and Himachal Pradesh from the date of commencement of commercial production.

2. All new industries in the notified locations would be eligible for capital investment subsidy @15% of their investment in plant and machinery, subject to a ceiling of Rs. 30.00 lakh. The existing units will also be entitled to this subsidy on their substantial expansion, as defined.

3. Thrust sector industries as mentioned in Annexure-II are entitled to similar concessions as mentioned above in the entire states of Uttarakhand and Himachal Pradesh without any area restrictions.

4.1.2 Development of Industrial Infrastructure:

i) The funding pattern under Growth Centre Scheme currently envisaging a central assistance of Rs. 10.00 Cr. per centre is raised to Rs. 15.0 Cr. per centre.

ii) The financing pattern of Integrated Infrastructure Development Centre (I.I.D.C.) between Government of India and S.I.D.B.I. will change from 2:3 to 4:1 and Government. of India funds would be in the nature of grant, so as to provide the required infrastructural support.

4.1.3 Other Incentives:

i) Deen Dayal Hathkargha Protsahan Yojna and other incentives of Ministry of Textiles: The funding pattern between Government of India and both the states would be changed from 50:50 to 90:10 under this scheme. Ministry would extend its package of incentives, as notified for North-Eastern states to the states of Uttarakhand and Himachal Pradesh also.

ii) Ministry of food processing industries would include Uttarakhand in difficult areas category. The state of Himachal Pradesh is already included in difficult areas category.

iii) Pradhan Mantri Rojgar Yojna (PMRY) : Ministry of Agro and Rural Industries would provide for states of Uttarakhand and Himachal Pradesh relaxation under PMRY with respect to age (i.e., 18-40 years from 18-35 years) and subsidy (@ 15% of the project cost subjected to a ceiling of Rs. 15,000/- per entrepreneur)

4.1.4 Thrust sector industries

This official document clearly identifies the industries eligible to be established in the states of Uttarakhand and Himachal Pradesh and has laid absolutely clear guidelines for the state government to permit only non-polluting, environment friendly manufacturing units.

The thrust sector industries have been clearly identified.

4.1.5 Constitution of nodal development agency (SIDCUL)

This document prepared the base for state government to invite the investments in the state from various industrial sectors with a lucrative offer of fiscal benefits. Also, this serve as the basis for the constitution of a nodal agency namely State Industrial Development Corporation of Uttarakhand Limited. (S.I.D.C.U.L.) to look after the issues and planning for the development of Industrial sector in Uttarakhand.

4.1.6 Opportunities of employment

This document also identifies the potential and permissible locations for the industrial establishments through out the state for efficient distribution of

industries so as to ascertain the benefits of the opportunities of employment generation gets evenly distributed.

4.2 Uttrakhand at a glance

This vision document published by the Government of Uttrakhand includes the vision of the state government regarding the comprehensive development of the state in almost all possible sectors namely, infrastructure development, power and energy, tourism, industries, irrigation, ecology, etc., This document includes carefully carved out interviews of the key persons responsible for the development activities in the state. This included the interviews with - (i) Mr. N.D. Tiwari (as Chief Minister of Uttrakhand), (ii) Mr. R.S. Tolia (as Chief Secretary of Uttrakhand), (iii) Mr. S.S. Sandhu (as Secretary PWD Uttrakhand), (iv) Mr. M.M. Ramachandran (as Additional Chief Secretary & Infrastructure Development Commissioner), (v) Mr. N.N. Prasad (as Tourism Secretary of Uttrakhand), (vi) Dr. Shekhar Raha (Director, Rai University, Dehradun Campus)

All of the above mentioned interviews focus on the multidimensional development of the industrial and infrastructural sectors to boost the process of industrialization, tourism and other allied activities.

This white paper explains the conducive government environment and initiatives regarding the vision and strategies adopted and being adopted in the state focusing on the sustainable development of industrial sector.

The detailed vision, strategies and initiatives underway are explained for the development of infrastructure like Roads, Transportation, Civil aviation, Energy, Information Technology, Urban Infrastructure, Horticulture & Floriculture, Biotechnology, Medicines & Medicinal Plants, Medical & Health Care, Forest Products (Herbs and Spices), Agro and food processing industries, Tourism etc.

Also, this document clearly identifies the infrastructural services and facilities which act as “Growth Pillars” & “Support Pillars” for processing industrialization in the state of Uttarakhand.

The document serves as an eye-opener for investors to participate in the development process with specifically carved out memorandum of understanding with the state government on long term basis. This is important packet of information regarding the guiding principles of the state government and its policies oriented towards the private sector investments regarding the sustainable development of industries, infrastructure and tourism in the state.

4.3 The Pressure on Urban Infrastructure.

Need to revamp the planning philosophy.

Research paper by J.P. Singh & S.N. Jena

4.3.1 Demand side management

In this research paper, the authors have analyzed the present scenario in the context of the pressure on urban infrastructure. The authors have identified that the style of urban infrastructure provision that encourages more efficient pattern of resource consumption is the basis of for development of sustainable cities.

The salient features of urban infrastructure planning, according of the authors, are:

i) Conventional approach to urban infrastructure management is based on the principle of constant induction in the quantity of infrastructural facilities & services i.e., “Facilitating Infrastructure Supply”

ii) Evidently, the pressure on urban infrastructure is increasing due to increase in demand as a result of on going urbanization.

iii) Instead of continuously augmenting the supply side of infrastructure management, authors have strongly recommended the demand side interference of the planning agencies.

iv) The demand side interference has two aspects:

a) The existing demand:

Consumption patterns and life styles of a particular society shape the nature of demand, may it be higher or lesser, depending upon the degree of consumption.

The availability of ‘quality consumption’ gets concentrated in hands of certain

social and spatial groups within the city because the ability to access availability is dependent on wealth, location & skill of consumers.

The phenomenon of consumerism and inequitable distribution has two implications. First, it creates pressure on existing networks and ultimately, reflects as the 'mismanaged demand' for urban infrastructure. Second, urban planning, due to philosophical foundation underlying it, becomes fragmented, pragmatically tuned to economic and political constraints and oriented towards stability rather than being committed to change through comprehensive plans. The outcome has been a disorganized approach that has led to a collage of highly differentiated spaces & settings.

b) The ever increasing demand:

The authors have used the example of establishing satellite cities to ease off the pressure on big urban centres but, instead, it has been realized that the problem of infrastructure management is actually shifted from one place to another and is not completely solved. This is due to the phenomenon of ever increasing demand.

The need is to consider the process of urbanization holistically in the light of the extent and nature of rural-urban interactions in the context of comprehensive regional planning.

Authors have identified the two facets of the ever increasing demand. First, the reproductive behaviors of the present urban masses & second, due to the multifold increase in the urban population and thus demand is directly proportional to the migration from rural to urban areas. Such unwanted migration is the result of diverse nature and type of economic activities and opportunities in rural, semi-urban and urban areas. Monitoring of such migration asks for

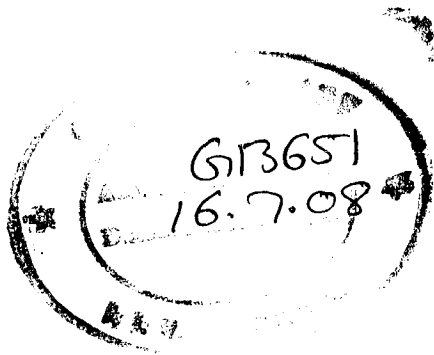
diversification and decentralization of economics activities as a part of regional planning.

4.3.2 Alternative planning philosophy

Authors has suggested an Alternative Planning Philosophy guiding that both supply and demand side should be given due considerations. As the planning so far has been supply oriented, need is to make it balanced by giving due weight to the demand aspect of the problem. On the demand side care should be taken of existing as well as ever increasing demand.

The guiding principle of above alternate philosophy should be sustainability aimed at balanced development in the economy.

Chapter 5 : CASE STUDY OF LUDHIANA CITY, PUNJAB.



5.0 Case Study of Ludhiana

Ludhiana has undergone the similar phase of rapid industrialization as Haridwar is presently facing. Both the cities have similar climatic and geological constrains and features. However both the cities differ in size and population but exhibit similar grounds for industrialization. Thus Ludhiana is considered as the suitable case study area to learn lessons regarding the infrastructure planning for industrialization in Haridwar.



Figure 6 Panoramic view of Ludhiana, Ghantaghar

5.1 Ludhiana - An introduction:

5.1.1 Area & population

Ludhiana is the largest city in Punjab, both in terms of area and population. The

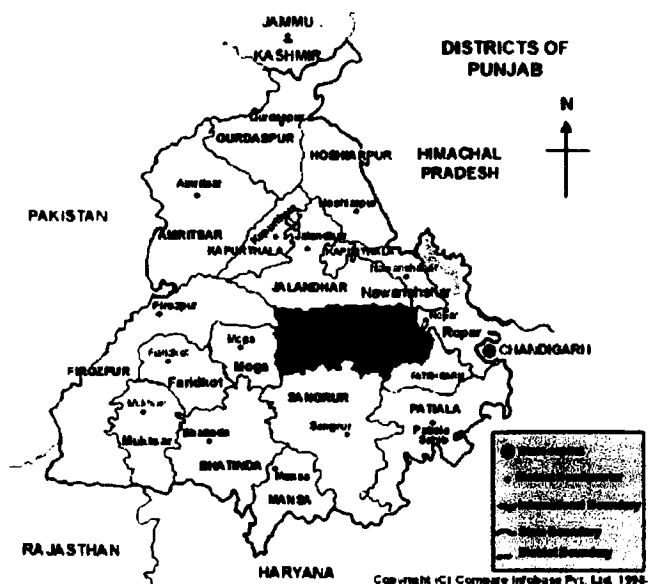


Figure 7 Political map of Punjab showing district Ludhiana

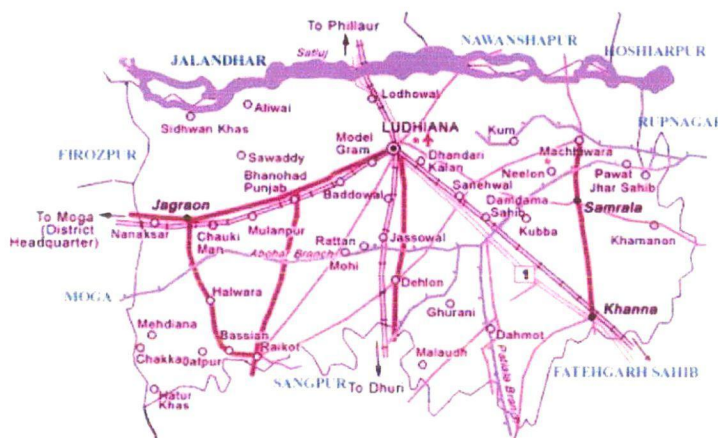
city is spread over an area of 159.37 sq. km. and accommodates approximately 14.00 lakh population. (2001 census) The city is famous for hosiery goods, woolen garments, leather items, machines and tools, dyes, cycle parts, sewing machines, motor parts etc.

5.1.2 Location

The city is located in Ludhiana district, which is most centrally located amongst the 19 districts of Punjab. It falls in Malwa region. Geographically the district lies between north latitude $30^{\circ} 34'$ and $31^{\circ} 01'$ & East longitude $75^{\circ} 18'$ and $76^{\circ} 20'$. Attitude varies between 330 m. to 273 m. from MSL.

5.1.3 Connectivity

The city is very well connected in terms of roads and rail tracks. NH-1 popularity known as Grand Trunk road passes through the



city which connects it to Delhi

Figure 8 Ludhiana connectivity by roads and railways

and other important cities of Punjab. NH-95 Ludhiana lies on main broad gauge railway line and is identified as major junction. Nearest airports are at Chandigarh and Amritsar for passenger and cargo for domestic and international flights.

5.1.4 Historical background

The origin of the city can be traced back to 1481 A.D. during the regime of Lodhi dynasty at Delhi (1451-1526 A.D.). During the regime of Maharaja Ranjit Singh, Ludhiana became an important British Cantonment in 1805. At the time of independence, i.e., by 1947, there were hardly any industries worth naming in Ludhiana. Ludhiana has witnessed enormous industrial growth in last 15 years

due to significant improvement in law and order situation, (post militancy period). A large number of industries have been established in small, medium and heavy scales.

5.1.5 Climatic Conditions

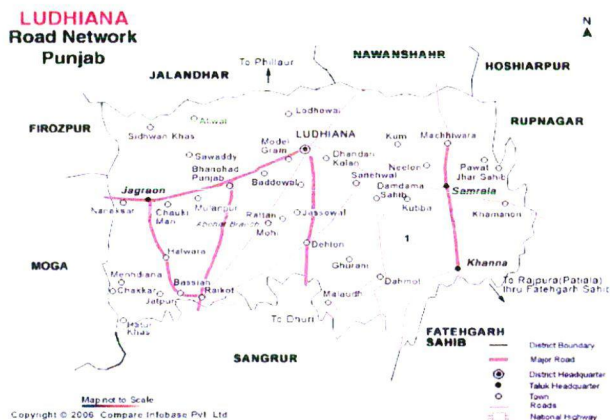
- Temperature : Max. 45°C to 46°C during summers
Min. 10°C during winters
- Wind flow : South-west monsoon winds in summers.
Western & North-western during winters.
- Rainfall : Total rainfall during the year is 600-700 cm. 70% of total rainfall occurs between July to September. 16% in December to March, and remaining months experience 14% rainfall.

5.1.6 Demographic profile

- a) Area = 159.37 sq. km.
- b) Population = 14.0 Lakh (2001 census)
- c) Rural population = 2.95 Lakh (People)
- d) Urban population = 11.05 Lakh (People)
- e) Males (no.) = 7.69 Lakh (Persons)
- f) Females (no.) = 6.31 Lakh (Persons)
- g) Literates = 13.33 Lakh (Persons)
- h) % of literacy = 95.21 %
- i) Sex ratio = 820 (females per 1000 males)
- j) Population density = 8784.5 (Per sq.km.)

5.1.7 Peripheral area status

- All villages have been connected with pucca roads and some of the old villages have been incorporated in the limits of Municipal Corporation of Ludhiana.



- The culture of farm houses/outhouses in peripheral areas has developed. On the main approach connecting the main seven roads, marriage places have been developed up to a distance of 15 Km. from the periphery of Ludhiana city.

Figure 9 Road network, Punjab

- Sewerage system is already short of the requirements.
- Water supply system is none uniformly distributed.
- Road network consumes only 9 % of open areas.
- There is no master plan for peripheral area. Thus unplanned growth of the peripheral area is destined to cause impact on the infrastructure in near future.

5.2 Status of infrastructure facilities.

5.2.1 Water supply

The Municipal Corporation of Ludhiana (MCL) is supplying more than 220 lpcd chlorinated, potable water to 85% of residents. Elevated storage system with 61 overhead storage reservoirs is inadequate in quantity and efficiency because of lowering of water table. Inclusion of additional area is a cause of concern and thus water supply system cannot be left dependent of underground water reserves. Additional arrangements for potable water have to be done possibly through Bhakra canal at a distance of 17 Km. from the city.

Deficits:

- 15% water supply.
- Unequal and non-uniform distribution of potable water.
- Mechanical / Electrical break down.

- Inadequate water storage capacities.
- Lack of water quality testing labs.

Solutions:

- 100% coverage of water supply lines.
- Demand side management by reusing waste water in toilets / Flushes / Cisterns / Gardening etc.
- 100% capacity of overhead storage reservoirs.
- Establishing water quality testing labs.
- Effective monitoring, control & coordination and standby mechanical / electrical systems.

5.2.2 Road network

The road network is rated amongst top 10 cities in the country by the C.I.I. during the year 2003. Most of the roads are constructed by various agencies including PWD / National Highway Authority of India / PUDA / PSIEC / Improvement trust / Industry department, Hosiery and Knitwear who have constructed most of the major & minor roads in the city and have transferred to MCL. Only a 20.5 km. long national highway bypass road is maintained by NHAI.

Deficits:

- Inadequate roads, mixed traffic behavior.
- Lack of advance planning.
- Lack of inter-institutional coordination.

Solutions:

- Segregation of traffic – provision of traffic separators of time barrier for heavy traffic entering the city.
- Regular maintenance
- Inter – institutional agreements.

- Formation of road planning, design and monitoring units.

5.2.3 Sewer, MSW services

Deficits:

- 67% abadies covered with sewerage system.
- Inadequate design – disposal of solid waste.
- Only 11% of abadies are covered with storm water sewer.
- Inadequate pumping through temporary pumping stallions.

Solutions:

- Adoption of storm water sewer and MSW policy.
- Completion of sewer system by laying alternation lines.
- Pumping and treatment of sewerage
- Requirement of STP and vermin composting plants of adequate capacities.

5.3 Planning issues in Ludhiana City

The city faces multifaceted problems which are basically due to heavy influx of population especially of migratory labour and also due to lack of enforcement at the local governance level. The major problems are –

- i) Unplanned and haphazard growth of the city.
- ii) Mixed traffic conditions on city roads and faulty road geometry. Encroachment by vendors, khokhas & hoardings etc.
- iii) Faulty traffic management and lack of enforcements causes accidents and environmental pollutions.
- iv) Mixed land use in old parts of the city.
- v) Lack of civic infrastructure like potable water supply and sewerage system.
- vi) Lack of open spaces, park & playgrounds in old city areas.
- vii) Lack of properly earmarked commercial area due to which mushrooming of shops in residential area has occurred.

- viii) Discharge of untreated effluents into Buddha Nala is causing pollution of underground water.

5.4 Demographic, Economic and Land use pattern

5.4.1 Demographic profile

Ludhiana city had a population of only 30000 in 1947. The city population profile indicates that during the decades of 1961-1971 and 1971-1981, it registered a growth of 51% while during 1981-1991 the growth in population touched 67%. However, during the period of 1991-2001 the growth rate came down to 37.8%. In December 2005 the city population was estimated as 16.65 Lakh (Statistical Abstract of Punjab – 2005).

Year	Population (lacs)	Decadal Growth Rate (%)	Compound Annual Growth Rate (%) CAGR
1901	0.49	-	-
1911	0.50	2.04	0.2
1921	0.52	4.0	0.39
1931	1.0	9.2	6.77
1941	1.12	12.0	1.11
1951	2.0	78.57	5.9
1961	02.51	25.5	2.29
1971	04.01	59.76	4.796
1981	06.06	51.12	4.215
1991	10.42	67.00	5.261
2001	13.95	37.84*	3.261
Dec, 2005 (projected)	16.65	19.35**	3.60
2011 (projected)	20.66	48.10	4.349
2021 (projected)	32.96	59.53	4.812

Note:

* - Lower decadal growth rate for the period of 1991-2001 is due to the migration of sizeable population to other areas due to adverse law and order situation (Terrorism)

** - 4½ years

Table 2 : Decadal Population Growth of Ludhiana

5.4.2 Population density

One out of every six urban dwellers (16.92%) living in the state of Punjab, resides in Ludhiana with an overall density of 8755 persons per Sq. Km.

5.4.3 Slum Population

There are, in all, 200 slums in the city with a population of 233,400. Around 57 slums have been upgraded with provisions of essential infrastructure facilities including water supply, sewerage, street lights, metalled roads etc.

5.4.4 Literacy and school going children

District	Literacy rate 2001			Literacy rate 1991
	Total	Rural	Urban	Total
Ludhiana	76.54%	72.88%	79.42%	67.34%

Table 3 : Literacy status of Ludhiana

School going population: -

Rural: 78.32%

Urban: 81.58%

5.4.5 Economic Base

The economy of the city is based on various areas of manufacturing industry including cycles, sewing machines, textiles, leather goods and other industries including real estate like shopping malls, and other commercial establishments, financial and other banking services, public services and places of religious importance etc.

Trends of industrialization in Ludhiana:-

- Increasing no. of industrial units and expansion of existing units.
- Increasing trend of employment.
- Increase in fixed investment.
- Increase in production.

5.4. Land use and spatial growth: -

5.4.6 Proposed land use

Presently, Ludhiana Municipal Corporation is spread over an area of 159.37 sq. km. (39364 Acres) keeping in view the projected population of the city up to 2021 it's planning

S. No.	Land use	Area in acres	%age
1	Residential	37970	50.08
2	Commercial	2393	3.16
3	Industrial	23027	30.36
4	Recreational	202	0.26
5	Traffic & transportation excluding roads	3770	7.60
6	Utilities	362	0.48
7	Government	2829	3.78
8	Public and semi public	2373	3.13
9	Reserved area for permanently prohibited for building operation.	900	1.18
	Total urbanizable area	75826 (62.37%)	100
	Area under agricultural and water bodies	45754 (37.63%)	
	Grand total area of planning area	121580 (100.00%)	

Table 4 : Present land use pattern of Ludhiana

requirements and planning standards, it is assumed that the city will grow to an extended limit of 75826 Acres.

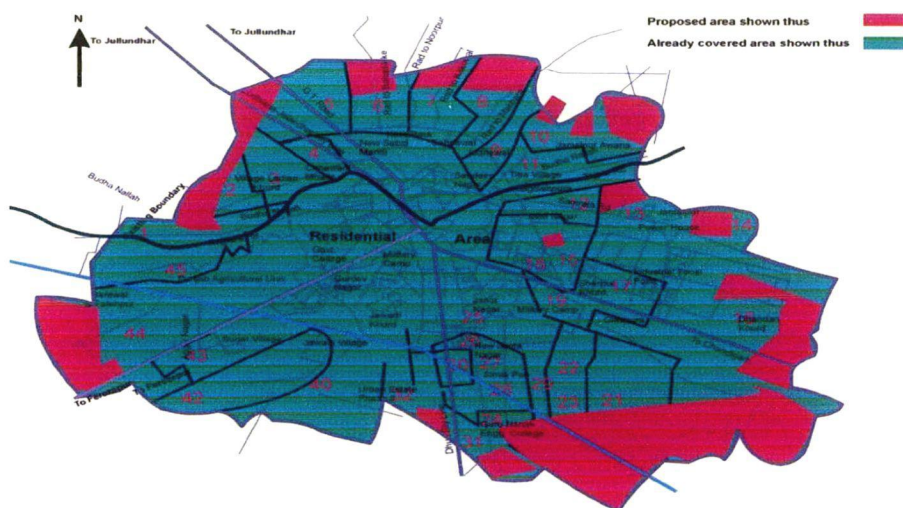
- Total area proposed under urbanization = 75826 Acres.
- Projected population (year 2021) = 32.96 Lakh.
- Projected average density = 107 person per Ha.

5.5 Infrastructural status and proposals

5.5.1 Water supply

Water supply system exists in the city of Ludhiana since October 1908. The city is completely dependent on ground water for supply of drinking water. There were 24 wells dug on the outer area of old city (presently known as rose garden) for domestic supply, water used to be drawn from these 24 wells (called Khus). The pumping was done with the help of steam boiler to fill two Mild Steel tanks (50000 gallon each). Both the steel water tanks are located in the old city area, one in Dressi ground and other in Mochpura Bazar.

Presently, water supply operation and maintenance is one of the basic services being provided by the MCL. However, Punjab Water Supply and Sewerage Board (PWSSB) is among para-statal executing agencies on behalf of the MCL. Responsibility of PWSSB is limited to the installation of tube wells: construction of reservoirs and planning, design and executing



(laying of main lines and branch lines). *Figure 10 : Coverage area under water supply*

For water supply, the corporation has divided the whole city into ‘Declared areas’ and ‘Undeclared’ areas:

The corporation supplies water to ‘Declared area’ only which is almost 100% of the city limits while the Un-declared area have their own private water system.

Gap analysis: The newly developed areas, which are not covered under MCL water supply system and are dependent on personal bore wells / tube wells. This area is around 15% of the total MCL area, housing approximately 2.8 Lakh population. Huge funds are required to fully cover these areas under water supply

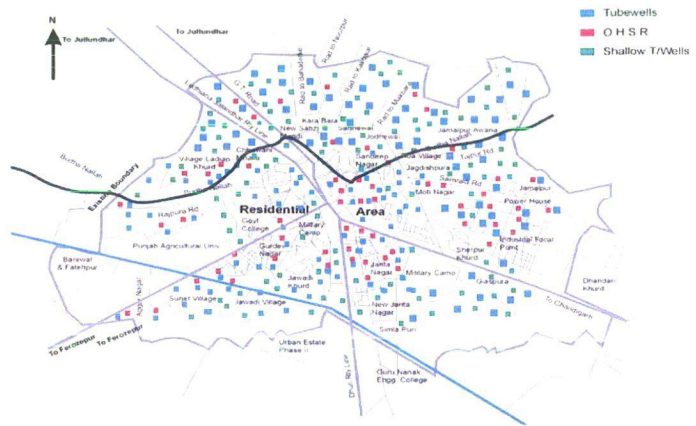


Figure 11 : Present and proposed water supply system

schemes. Gap analysis is done to understand the kind of infrastructure needed to upgrade these areas. This Gap analysis is based on the project report by Punjab Water Supply and Sewerage Board (PWSSB).

Table 5 : Water supply status and length of pipe lines

Year	Population (nos.)		Water supply (MLD)		Pipe length (km)	
	Coverage	Deficiency (in %)	Supply	Deficiency	Coverage	Deficiency
2001	13,95,053	70	280	-26.80	1200	454
2002	14,78,000	75	--	--	1327	424
2003	15,17,000	80	--	--	1467	330
2004	15,50,759	79	--	--	1476	362
2005	16,01,469	80	--	--	1482	416
2006	18,65,000 (including 12% floating population)	85	415	- 62	1600	464
2011	20,60,000 (floating population not included)	85	500	- 23	2100	500

	Year - 2006	
	Current coverage	Additional requirement
Area (sq.km)	0	23.91
Population	15,85,000	2,80,000
Total Water supply	415 MLD	62 MLD
Per capita water supply per day	> 250 litres	5.19

5.5.2 Sewerage

Provision and disposal of domestic sewerage facilities in Ludhiana is primarily done by MCL. However it is not responsible for disposal facilities related to industries and industrial establishment. The industrial area relies upon the conventional methods of septic tanks and

soaks pits in absence of the comprehensive sewerage system. The sewerage system provided by MCL is underground; however it doesn't cover the entire municipal limits.

The present sewerage system covers about 67% of the area under MCL limits accounting to 90.84 sq. km. This reflects major deficiency in terms of provision of services.

The total quantity of waste water generated in the city is 432 MLD (90% of water supply). Approximately, 57% of population is covered under sewerage network.

Presently, no sewerage treatment plant is existent in the city. Three new permanent disposal & treatment plants are under construction and are likely to start operation soon.

Gap analysis:-

(a) Sewage treatment plants:-

Total waste water generated, by the city is 432 MLD, while there is an absolute lack of treatment / disposal plants. Three new STP's are likely to be operational with the total capacity of 311 MLD. Even after all the three STP's become operational, there will be a huge gap to treat about to be constructed and installed to meet out the full collection capacities.

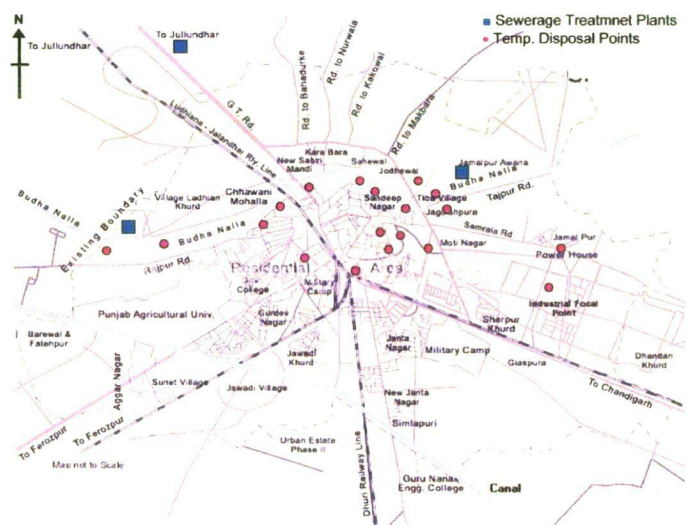


Figure 12 : Sewerage system and proposed treatment plants

Zone	Current
Current Water supply	415 MLD
Additional water supply (undeclared areas)	62 MLD
Current Waste water generated	432 MLD
Domestic (@ 80% of water supply)	332 MLD
Industries	60 MLD
Hotels, Hospitals	40 MLD
Additional Waste water that will be generated	50 MLD
Total waste water	482 MLD
Treatment facility being installed	311 MLD
GAP	171 MLD

Table 6 Gap analysis of sewerage treatment capacities

(b) Sewerage network:-

Sewerage network is spread only over 57% of the city area, thus 43% of area need immediate attention.

	Year - 2006	
	Current coverage	Additional requirement
Area (sq.km)	90.8	68.61
Pipe length - Main sewer(km)	141	110
Pipe length - distribution network (km)	1200	900

Table 7 : Lengths of sewer pipe lines

Many related issues like pollution in

Buddha Nala, ground water contamination, health hazards, and epidemic out breaks, air pollution around Buddha Nala are arising due to lack of sewerage network.

5.5.3 Solid waste management

Solid waste arising from human activities is one of the major environmental problems causing extensive pollution and threat to human health. The problems regarding management of solid waste, both domestic and industrial, have by now, taken on acute shape, size & nature in large metropolis. Due to limited disposal facilities the solid waste are dumped in a hazardous manner in various parts of Ludhiana city causing not only environmental hazards. The National Conservation Strategy and Policy Statement on environment and Development has laid stress on adopting stringent measures for prevention and control of pollution due to indiscriminate disposal of solid waste on land and into water resources.

Various types of solid waste generated at Ludhiana can be categorized in three groups:

- Municipal Solid Waste (MSW)
- Hospital Solid Waste (HSW)
- Industrial Solid Waste (ISW)

MCL adopts a 'House to house' collection system. In this system the waste generated at individual premises is segregated, manually, and is stored in standardized containers.

The solid waste is presently being dumped at

- Jainpur landfill site: Completely filled up and needs closure.
- Jamalpur & Noorpur land fill sites: Both land fill sites are operational but are not lined and needs scientific methods of disposal techniques.

5.5.4 City Roads and Traffic Conditions

Ludhiana gained the status of the Only Metropolis in Punjab in 1999. The intensity of traffic is increasing with its demographic and economic growth. The increase in number of personalized vehicles has been phenomenal due to reported increase in per capita income and also due to the prevailing consumer culture of the society.

5.5.4.1 Road network and hierarchy

The present road network covers 12.72 sq. km. of the city area which amounts to about 8% of the total municipal area. Total road length is 1356 km. and the equivalent road length is 3390 km. The city has roads ranging from 6 m width to 35m width.

The existing road network of Ludhiana is radial in pattern converging into the heart of the city. There is a circular link road on which six regional roads meet at different points.

About 31% of the road length has ROW more than 30m.

S. No.	Name of the road	Connecting to	Length (m)	Carriage way (m)	Right of Way (m)
National Highway					
1.	Grand Trunk Road (NH-1)	North Jalandhar, South - Delhi	20.5	20	25-60
2.	NH-95	Chandigarh and Firozpur	22	20	30-60
State Highway					
1	Gill Road	Sangrur and Mansa	7.35	20	65

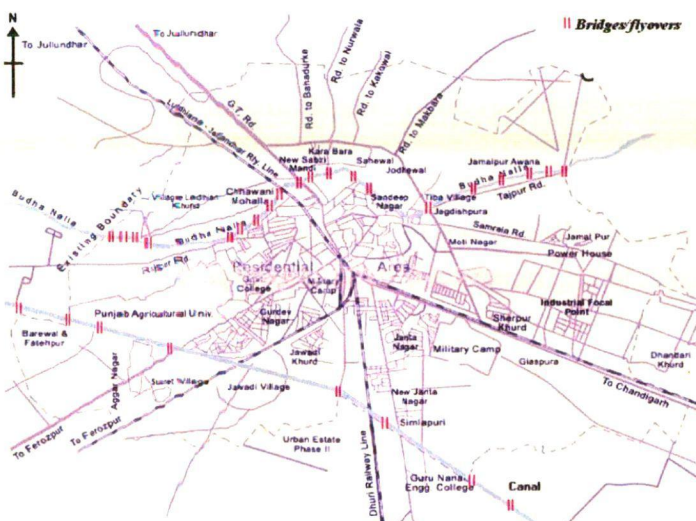
Table 8 : Connecting roads status

5.5.6 Inter city public transport

State transport: The bus terminal has a total area of 14.66 Acres and buses move to all directions of Punjab and major cities including Delhi, Jammu, Amritsar, Chandigarh, Sangrur, Ferozpur etc. Apart from the bus terminal oriented traffic, local traffic of the city from different areas also move in the areas where traffic density is very high. Total of 3060 buses (heavy traffic) enter the city through densely populated area per day.

5.5.7 Freight transport

Railways provide the main freight transport for which a special railway yard exist at Dhandari Kalan which is also called the dry port because of freight to other places. Next major transport for freight purpose is trucks, which gets Loaded and unloaded at



Transport Nagar within city limits near Samrala Chowk.

5.5.8 Bridges, Flyovers, Elevated roads, ROB's & RUB's

Bridges over Buddha Nala and Sidhwan Canal: There are only two water bodies passing through the congested areas of the city Approximately 16 km. stretch of

Figure 14 : Bridges, Flyovers, Elevated roads, ROB's & RUB's

both passes through the city and have a varying width of 60ft – 80ft. Both sides of canal and Buddha Nala are congested housing 25% of population on the outer side. Presently there are 14 bridges on Sidhwan canal. However, due to tremendous increase in population in the city, there is an immediate need to establish more no. of connecting points as people often have to travel long distances to reach their destinations across the water bodies.

5.5.9 Issues regarding roads & transportation

Ludhiana, being the geographically centrally placed city in Punjab and situated on either side of Amritsar - Delhi Grant Trunk Road (NH-1), faces tremendous traffic pressure. City roads

are presently, being overused. Resultantly, these are omnipresent traffic congestion, frequent blockages of traffic on NH-1 and on all the six major junctions, which causes undesired delay and extension in time of travel. The major issues are:

- Increased distances of communication due to lack of non-uniformly distributed bridges and culverts on Buddha Nala and Sidhwan Canal.
- Traffic congestion mainly due heavy volumes of traffic in-efficient design of main junctions and lack of civic & traffic sense and awareness in public.
 - Increasing fatal road accidents due to improper/faulty junction designs.

5.6 Inferences drawn from case study

Ludhiana has undergone the spontaneous phase of rapid industrialization as Haridwar presently is witnessing. Though there is a considerable difference between the geographic and demographic sizes between the two cities, but the presence of similar civic infrastructure and local governance there are many good reasons to learn lessons from the case study of Ludhiana and to ascertain better results in case of Haridwar by close analysis of issues raised in Ludhiana and the possible solutions.

The major shortcomings in case of Ludhiana may be summarized as:-

- i) Lack of compressive planning and strategy regarding the development of industrial sector and subsequent growth of the city. In fact the case study clearly reflects of the fact that planning process is following the development in Ludhiana, whereas ideally, the growth must follow the planning.
- ii) The situation gets even gloomier due to lack of mutual co-ordination between the various agencies involved in the development and implementation of planning in Ludhiana. Hence, an immediate attention is much required to address the co-ordination. Also, it is much desired to clearly identify the role of the various development agencies in terms of nature of works and spatial distribution of work areas so as to avoid the overlapping of responsibilities in some areas and to cover-up the complete city area including its fringes.

iii) While it is important to fill the gap between the demand and supply of the infrastructure facilities by 'Facilitating infrastructure supply; it is equally important to have demand side interference by managing the existing demand as well as by continuous monitoring /channeling the ever-increasing demand of infrastructure. This has to be considered in a broader sense of regional planning in terms of rural-urban interaction.

iv) Ludhiana, unlike Haridwar, has invited almost all kind of Industries i.e. in scale and nature and has not prioritized the environment friendly, non-polluting manufacturing. Thus a strict policy addressing the issues of pollution of all kinds is the need of the hour. In fact, residents of Ludhiana spontaneously claim the pollution, especially air and ground water pollution, to be the first issue to be addressed.

Cautions are required at Haridwar as geographically, it is located at the foothills of sensitive Himalayan ecological system. Although, state and control governments have taken the initiatives by permitting only the non-polluting manufacturing units but efforts are required to manage the infrastructure related to sewerage disposal solid waste management, storm water disposal etc., to be done in the most judicious manner which allows minimum possible disturbances to the fragile ecosystem of Himalayas.

v) Apart from the provisions of infrastructure facilities and services, it is also required to educate the local un-employed youth with required skills and technology so as to harness the maximum possible human resource. This will have multi dimensional benefits. First, it will help in solving the evils of unemployment in the city and secondly this is certainly going to check out the migration from various other locations to the city in search of employment. And this fact is universally acknowledged that less population means less demand for infrastructure which in turn means lower levels of investments and better levels of quality of life in the city.

vi) Public awareness and induction of civic senses into the masses by propaganda and publicity shall be put in place to educate people of the city to make optimum use of available

resources like water supply, electric power, segregating solid waste into bio-degradable and non-bio degradable wastes, disposing domestic waste in proper manner etc. which in turn helps phenomenally in improving the indices of quality of life.

Use of alternative technologies in power sector, reuse of waste water into toilets / flush / cistern etc. may serve as key instruments to manage the demand side interference of infrastructure.

Chapter 6: METHODOLOGY

6.0 Methodology

- (i) General observation of the growth of industrial development (Signs of change in geographical areas, nature of development, land prices, economic growth and increase in infrastructural demands especially regarding traffic conditions, power and water supply as these are identified as the primary indices of growth.
- (ii) Identification of root-cause i.e., industrial development due to lucrative fiscal incentives.
- (iii) Collection of data regarding various elements like geographic, demographic, economic aspects, through, secondary sources. The varying patterns of these indicators of development provide the basis for planning of the urban scopes.
- (iv) Preliminary analysis of the changes in geographic, demographic and economic subjects prepare the ground to ascertain the need of studying the existing conditions with relevance to the pre-recorded data (available with district level statistical agencies) and thus enable one to project you future (stipulated time frame) with the constraints of socio-cultural setup and prevailing government policies.
- (v) After establishing the need of planning exercise, careful case studies of similar nature shall prove to be an important tool to access the behavior of development, in demographic, economic and spatial context. Also the impact on infrastructure facilities and services need due attention.
- (vi) The inferences drawn by the careful case studies shall be used as effective tools while ascertaining the study of area under consideration. The grey areas identified in case study need special attention while planning for the area under consideration.
- (vii) Collection of data for area under consideration in terms of existing situations, with reference to demography, quality & quantity existing infrastructure through secondary sources is required. Sample surveys shall be conducted in specific locations to verify the secondary data. Assimilation and analysis of the secondary data is the nest step towards

establishing the relation between the existing and projected demands with the gap between present supplies and future supply planning schemes.

(vii) The identification of data gaps will lead to the required field study-surveys, interviews to complete the information base, which in turn leads to the final analysis, descriptive, statistical and graphic.

The analysis plus the cause-effect relationship in the form of network diagrams and complex time frame matrix will provide material for the base of planning.

The area of study comprises of Haridwar municipal limits, B.H.E.L. Township, with upcoming industrial area I.I.E. & I.I. D.C. at village: Roshanabad & UPSIDC Industrial area at Bahadrabad.

Chapter 7: Haridwar – Infrastructure Planning for Industrialization.

7.0 Haridwar – Infrastructure Planning for Industrialization.

7.1 Introduction

Haridwar is a unique city in many respects. The old city area, which is home to many spiritual societies and Ashrams, has little land to grow. On the other hand, industrial development in Integrated Industrial Estate and IIDC is likely to attract large number of people to the city. The unparalleled influx of several million visitors during *Kumbh Mela* to the city creates tremendous pressure to the city and its infrastructure. The demands and challenges of development and preservation of its rich cultural and spiritual heritage and natural environment require to be met concurrently.

The sectoral key issues are:

7.1.1 Physical Growth and Environmental

Aspects:

There are major issues of:

(a) Restricted physical growth of town, due to hills, reserved forests and water bodies.

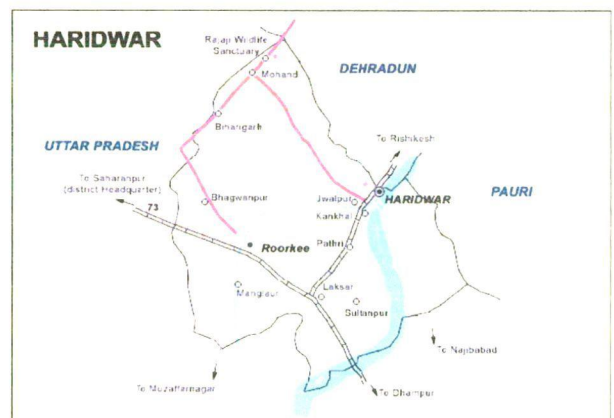


Figure 15 : Connectivity map of Haridwar.

- (b) Ribbon development along the main corridor of town, within the municipal boundary.
- (c) High density development in old Areas without proper infrastructure.
- (d) Unauthorized constructions on undeveloped open land and fringe areas: supply of serviced land is limited.
- (e) Lack of affordable housing.
- (f) Growth of slums and squatter settlements along the river and canal.
- (g) Lack of clarity on status of land ownership.
- (h) Pollution due to increased vehicular traffic.
- (i) Pollution of the Holy River Ganges, and

(j) Land slide and soil erosion from Mansa Devi Hill Degradation of riverside and lack of public open spaces, sports and recreational facilities are leading to an unsustainable situation.

7.1.2 Water Supply

Lack of adequate supply, unequal distribution of water, low pressures, old dilapidated pipelines, uncontrolled zoning and unsatisfactory operation and maintenance requires thorough reorganization and upgradation of this sector.

7.1.3 Sewerage

Inadequate coverage of area under sewerage system and unserviced new areas require immediate intervention and a careful planning with adoption of appropriate technology to take care of environmental concerns.

7.1.4 Storm water Drainage

Although the natural topography of the city helps in gravity drainage, internal collector drains are lacking; besides, major natural drainage courses require attention, as they are often choked with silt and mud coming with run-off from hills.

7.1.5 Solid Waste Management

The city has not met its mandatory obligations and is burdened with an inefficient collection system, environmentally unsound disposal practices and uncontrolled dumping at a site by a rivulet. It thus requires immediate and sustained effort to upgrade to an acceptable level.

7.1.6 Roads and Transport

This sector perhaps is the most troubled one; with annual growth of tourists reaching an unprecedented rate of 20% (2004-05) and over 16% growth rate (2005-06) of registered vehicles, congestion and lack of parking spaces during *Melas* and festival season make the citizens lives very difficult. The extremely narrow roads in the core city area, inadequate traffic management throughout the city and a general lack of proper road hierarchy requires a sustained effort over a period of time to reorganize the road sector. Public transport, which is

in a rudimentary state, also requires large scale investment to support economic activity commensurate with the growth potential.

7.1.7 Urban Poor

The city has about 20 main slums and about another 29 minor poverty pockets or slums, accommodating about 47% of total population. Approximately, 7.6% of the poor are families Below Poverty Line (BPL).

7.1.8 Institution and Governance: Haridwar Nagar Palika Parishad (HNPP) has very few functions in the municipal domain. Unlike city corporations elsewhere in India, HNPP has very limited role to play in the city's planning, development and infrastructure provision. In fact, solid waste management is the main function of HNPP. Conventional municipal functions such as water supply, sewerage, roads, etc. are in the hands of either para-statal or state agencies. Haridwar needs a strong municipal political executive as the key driver of change management.

7.1.9 Municipal Finance of HNPP and Finance of para-statals: HNPP, UJS, and HDA are the three most important agencies responsible for the urban finance in Haridwar. HNPP's revenue receipts (own) mainly comprises of Property / House tax, rentals and advertisement. UJS's revenue receipts are mainly water tax and water charges. HDA's revenue receipts mainly arise out of state government grants, followed by non-tax receipts and house tax receipts. Its revenue expenditure is due to establishment, operation and maintenance (O&M), interest and debt servicing as also due to refund of deposits. Capital expenditure has not been significant and mainly comprises of development expenditure, grants expenditure, assets, loan repayments and various refunds.

7.2 Estimates of various infrastructural works

Based on situation analysis, strategy to achieve vision and continued monitoring, projects have been identified, and costs estimated. The city needs a total investment of Rs. 4,446 crores. This investment, phasing over the next 20 years or so, needs an utmost careful

allocation of funds under various heads and works. The component-wise summary of the required investments is given in the Table below. It is seen that 63.3% of the total identified investment is proposed in the roads, traffic and transport sector followed by 20.7% in urban renewal, 5% for basic services to urban poor, 4.1% is for Drainage, 2.6% for water supply sector, 1.5% for sewerage, and 1.7% for solid waste management.

S. No.	Projects	Total Cost (Rs. Crores)
1.	Water Supply	120.2
2.	Sewerage & Sanitation	68.6
3.	Storm Water Drainage	188.3
4.	Solid Waste Management	78.5
5.	Roads and Transport	2,919.3
6.	Street Lights	18.0
7.	Urban Poor / Slums	231.2
8.	Urban Renewal and Redevelopment	954.2
9.	Heritage and Tourism	31.6
Total		<u>4,609.9</u>

Source: DPR prepared by GHK International, UK. under the scheme of JNNURM for Haridwar.

7.3 Demographic Profile

Haridwar: Development Area (Total Land Area = 20119 Hectare.)

Haridwar is the second largest city of Uttarakhand after Dehradun, both geographically and demographically. Haridwar houses the district headquarters and also serves as the gateway to the prestigious Chardham Yatra to Badrinath, Kedarnath, Gangotri & Yamunotri. Therefore the permanent as well as the floating population of the city play a vital role while planning for the infrastructure for the Development Area: Haridwar.

7.3.1 Decadal population growth:

Haridwar had a population of 25597 in 1901 which kept on growing gradually and constantly till 1941. During 1931-1941, the population growth was 22.64 % while it was recorded as 40.46 % during 1941-1951. There was a sudden decline during 1951-1961 when the % age growth was recorded at an all time low of 4.57 %. Gurukul Kangri University and Jwalapur got assimilated in the Haridwar urban agglomeration during the decade of 1961-1971 and thus a steep rise in population growth was registered at 32.22 % and during 1971-1981 the growth was registered at 45.71% due to the establishment of Bharat Heavy Industries Limited (B.H.E.L.) in 1964-1965. Again the decade of 1991 witnessed an unprecedented increase in population growth at 62.22%.

The population growth recorded the spontaneous changes due to :

- 1 Establishment of B.H.E.L. in 1964-1965.
- 2 Haridwar acclaimed the status of TEHSIL after being sliced off from the then existing Roorkee Tehsil in 1985.
- 3 Haridwar acclaimed the status of DISTRICT in 1988 after being sliced from the then existing Saharanpur district (U.P.)

S.No.	Year	Decadal population	Decadal growth	% decadal growth
1	1901	25597	N.A.	N.A.
2	1911	28682	3085	12.05
3	1920	30764	2082	7.26
4	1931	33287	2523	8.2
5	1941	40823	7536	22.64
6	1951	57338	16515	40.46
7	1961	59960	2622	4.57
8	1971	79277	19317	32.32
9	1981	115513	36236	45.71

10	1991	187392	71879	62.22
11	2001	220767	33375	17.81

Table 9 : Decadal population growth in Haridwar.
Source: Draft Master Plan for Haridwar – 2025

Haridwar hosts about 8 million religious tourists every year. For projection of population (the permanent population) of this town, the tourist arrival per season is not relevant. However, its impact on the sector activities like trade, hospitality services, transportation etc. can not be overlooked. The giant public sector unit BHEL (population 90,000 in its colony), a large industrial estate (Integrated Industrial Estate) housing some 541 small and mid sized industries together employing 18000 workers have their impact on the tertiary sector of the economy of the town. In private sector also, some large industrial units are functioning in the fringes of Haridwar, which have impact on the economy of the town; and many more units which are in the offing, will also indirectly strengthen the economy of this town. As the economy grows, the rate of in-migration of workers will grow concomitantly, which will reflect on the growth of population.

In this background it may be presumed that Haridwar’s population growth rate will gradually increase in the next couple of decades and then taper off to finally stabilize at the natural growth rate of 2.5 % per annum. As stated earlier, throughout the year, Haridwar hosts large number of religious tourists. As per official record the tourist arrivals in Haridwar in the years

2003, 2004, and 2005, was 5.5 million, 6.3 million and 7.5 million respectively. The percentage increase of tourist arrival in 2004 over 2003 was 14 %, and that in 2005 over 2004 was 20 %. Taking the number of tourist arrival of the year 2005 (7.5 million)

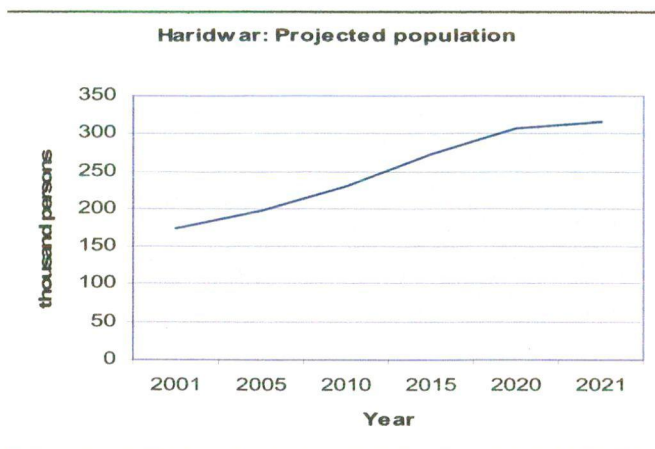


Figure 16 : Population projection

and dividing it by 365 days, the average per day tourist arrival works out to 20,548, and the average current (2006) floating population is assumed at 160,000. Assuming the number for the year 2005 as the base year, and a conservative rate of growth rate of 2.5 % per (slightly above national average of little over 2.0% per annum), the floating population has been estimated. Commuters have not been considered in this estimate. Population of 286,000 and 315,000 is projected for 2021 and 2025 respectively.

7.3.2 Household size and numbers:

The average household size in the development area was 5.60 people per household in 2001. Urban areas accounted for 5.30 people per household while the rural average was 5.90 people per household. The analysis indicates a constant increase in the average household size within the development area.

The reason behind this increase in household size is two folds, one, the non acceptance of the family planning measures, second, the existence of the joint family system.

7.3.3 Sex ratio:

The overall sex ratio in the sampled households is 924 females per thousand males, which is higher than that reported (851) in Census of India 2001. The age groups of 15-44 have highest population for both the sexes.

Table : Age sex distribution and Sex Ratio				
Age group	Male	Female	All	Sex Ratio
0-4 yrs	8.4	8.4	8.4	924
5-9 yrs	9.5	11.4	10.4	
10-14 yrs	11.9	11.8	11.8	
15-44 yrs	51.8	51.7	51.7	
45-59 yrs	12.6	11.5	12.1	
60 +	5.8	5.2	5.5	
Total	1362	1259	2621	

Table 10 : Age-Sex distribution and Sex ratio
Source: Draft Master plan of Haridwar 2025

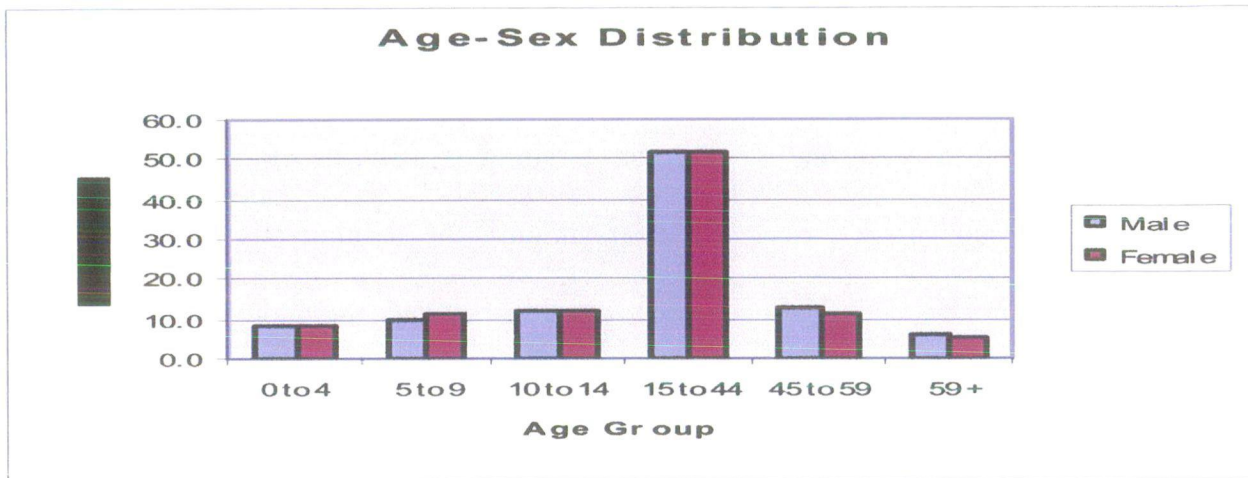


Table 11 : Age Sex Distribution of population in Development Area: Haridwar.

7.3.4 Literacy

Literacy, being an important indicator of social development, affects the demographic characteristics and participation in labour force. As per Census of India 2001 literacy rate in urban Haridwar is 84.3 % for males and 72.3 % for females, the corresponding numbers for the state-average being 87.1 % and 72.3 % respectively. The literacy rate of Haridwar is relatively low. The survey results show there are 78.7 percent literate males and 66.3 percent females. Overall literacy is 72.9 percent in the town. This data shows a gender gap of 12.4 %.

Males		Females		Total	
Illiterate	Literate	Illiterate	Literate	Illiterate	Literate
21.3	78.7	33.7	66.3	27.1	72.9

Source: DPR prepared by GHK International, UK under the JNNURM, Haridwar.

Table 12 : Literacy status of Haridwar

7.3.5 Employment

Data on employment shows that 42 percent of the workers are in service, 10 percent are self employed, 0.5 percent is unemployed. Of all 44 percent are students, 2.8 percent are housewives, 0.1 percent are farmer, 0.7 percent are retired.

Category	Age group (in Years)					Total
	< 18	18-24	25-44	45-59	60 +	
Service	2.5	36.5	67.6	76.7	63.3	41.7

Employed	0.2	7.8	18.3	16.3	20.6	10.3
Self Employed	0	0.5	0.2	1.6	1.5	0.5
Students	96.9	54.5	7.8	0	0	44
Housewives	0.2	0.5	5.7	4.9	2.9	2.8
Farmers	0	0	0	0.5	0	0.1
Retired	0	0	0.2	0	11.8	0.7

Source: DPR prepared by GHK International, UK under the JNNURM, Haridwar.
Table 13 : % distribution of occupation by age

7.3.6 Income and Expenditure

Mean per capita income of the families is Rs.2372 and mean household income is Rs.7144.

There is a considerable proportion of population in the lower expenditure group and it is evident that they spend more than their income. Families in the middle income groups have maximum savings in the sample.

	Per Capita Income	Rs.	%age	Mean Income
Per Capita Income	Below poverty line	Up to 562	47.2	Rs. 1289.7
	Poor	563-1999	34.6	
	Lower Middle	2000-3499	9.1	
	Upper Middle	3500-5999	6	
	High	6000 +	3.1	
Household income		Up to 2999	53.2	Rs. 7144.40
		3000-5999	20.4	
		6000-9999	8.4	
		10000-14999	6.4	
		15000 +	11.5	

Source: DPR prepared by GHK International, UK under the JNNURM, Haridwar.

Table 14 : Data on Income

Description	Rs.	% age
Household Income	Up to 2999	54
	3000-5999	21.1
	6000-9999	8.7
	10000-14999	8
	15000 +	8.2
	Mean Expenses	Rs. 6375.7

Household savings	Up to 2999	6.9
	3000-5999	25.9
	6000-9999	31
	10000-14999	14.7
	15000 +	21.6
	Mean Savings	Rs.4362.8

Source: DPR prepared by GHK International, UK under the JNNURM, Haridwar.

Table 15 : Data on expenditure and savings

Table shows the distribution of population by household composition and form of tenure and possession. Majority in each income group have freehold title of their land and having their own pucca house with electricity. All the high income group families own land, and have pucca house with electricity. On an average 20 percent of all the families in the slums stays with some other family; in other income groups this value ranges between 7 and 15. Seventy seven percent of the households have legal electric connection in the BPL group; among poor and lower-middle group, connection increases from 92 to 100 percent.

Around 36 and 89 percent of the BPL and poor households respectively use gas as fuel for preparing food. This increase with higher income and in upper-middle and high income groups 100 percent families has gas connection. Kerosene is used in almost all the groups, except two higher groups all others use wood as fuel; 50 percent of BPL families use wood.

Characteristics of Household (% age)	Income Group				
	B.P.L.	Poor	Lower Middle	Upper Middle	High
Land Ownership					
Freehold Title	74.6	79.5	95.1	96.3	100
Lease	8	9	2.4	0	0
Patta	0.5	0	0	0	0
Joint Patta	0	0	0	0	0
No legal rights	1.9	1.3	0	0	0
Other Legal rights	1.9	10.3	2.4	3.7	0
House Ownership					
Own	85	89.1	97.6	96.3	100
Rented	15	10.1	2.4	3.7	0
Mean rent per month	Rs.409.7	Rs.484.90	Rs.80000	Rs.600	

Type of construction					
Kutchha	28.2	17.9	2.4	0	0
Semi Pucca	25.4	10.3	0	0	0
Pucca	46.5	71.8	97.6	100	100
Access to Electricity					
Yes	75.6	88.5	100	96.3	100
No	24.4	11.5	0	3.7	0
Electric meter					
Yes	77	92	97.6	100	100
No	23	8	2.4	0	0
Fuel used					
Gas	35.7	68.6	97.6	100	100
Kerosene	14.1	14.1	0	7.4	14.3
Wood	50.2	17.9	2.4	0	0

Source: DPR prepared by GHK International, UK under the JNNURM, Haridwar.

Table 16 : Distribution of Population by Household composition and possession

7.3.7 Migration

Most of the families are residing in the town for about 12 years and about a quarter of the migrated families have moved in from another city. While tracing the migration pattern within last 5 years it was found that majority (79.5 percent) of the families are in the town for more than that period. More than 80 percent of the BPL and poor families are residing in the town for more than 5 years. Of all the households, 2.8 percent moved from another part of the town, 1.3 percent migrated from another town and 0.4 percent came from rural area. This contradicts the notion that poor settlements are created by migration from rural areas.

Migration period	Income groups					
	Total	BPL	Poor	Lower Middle	Upper Middle	High
All moved in last 5 years	25	9	12	2	2	0
From another part of the town	20	11.1	25	0	50	0
From another town	24	22.2	25	50	0	0
From rural area	8	11.1	8.3	0	0	0
Not specified	8	0	16.7	0	0	0

Source: DPR prepared by GHK International, UK under the JNNURM, Haridwar.

Table 17 : Migration of population in Haridwar

7.4 Urban Poverty Profile

7.4.1 Poverty and Vulnerability

It is important to examine poverty with reference to its various dimensions including asset ownership. Interventions need to be worked out to reduce urban poverty especially the vulnerability of the poor and to enhance their assets in terms of- labour, human capital, housing, social capital and so on.

7.4.2 Urban Poverty Profile of Haridwar

This section presents an overview of the urban poverty in Haridwar. No recent studies are available about the extent of poverty levels in the town. According to information available from the NPP and the District Urban Development Agency (DUDA) the town has 20 main slums scattered across the town. In addition to these slums there are a few smaller slums, which add up to a total 49 slums. The slum population is about 47 percent of the total population of the town.

Table: List of Slums in Haridwar

S.No.	Name of Slum Areas
1	Gosai Gali, Bhim Goda
2	Basant Gali, Balmiki Basti, Kharkahri
3	Mukhiya Gali, Bhupat wala
4	BhramPuri- above lalta rau bridge
5	New Basti, Bhimgoda, Balmiki basti
6	Ghosiyan, Jawalapur
7	Lodha Mandi jawalapur
8	Pul Jatwada, jawalapur
9	Kadachh, Jawalapur
10	Tiwidi, BHEL Road
11	Lodha Mandi, Industrial Area

- 12 Kumhar Gadha, Kankhal
- 13 Latowali, Purbiya Mandi, kankhal
- 14 Ravidas Basti, Kankhal Harijan Basti
- 15 Teliyan Kanjran, Sharifnagar, Jawalapur
- 16 Kashipura, Jogiya Mandi
- 17 Dev Nagar Basti, Hanuman Gadi Kankhal
- 18 Uttam Nagar Basti, Bhupatwala
- 19 Mayapur Balmiki Basti, Near Garage and Tank No. 6
- 20 Bairagi Camp, Chhawani

Source- Document of Haridwar Nagar Palika Parishad /DUDA (2006)

7.4.3 Household Profile

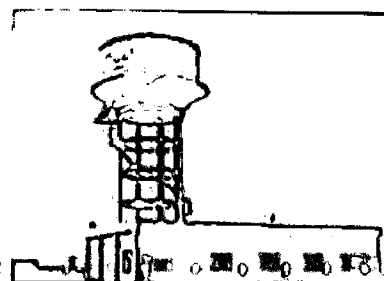
Slum population in Haridwar is 86,848. Average household size for slum households is 7.10. The slums on encroached land and on the hill slope are generally worse in comparison to other slums. Of the below poverty line (BPL) population, 15 percent households and 10 percent of the poor do not have any legal rights of the land. In the absence of ownership of land and clear policy to address their problems, the poor suffer from many inadequacies in terms of access to basic services and infrastructure. Land availability is a major constraint in the slums. On an average 20 percent of all the families in the slums stays with some other family.

7.4.4 Situation Analysis

The status of service delivery and service coverage is summarized in the following sections.

7.4.4.1 Water Supply

Majority (81%) of all the households have connection for water supply. Of the BPL households, 70 percent and 87 percent of the poor have house connection. The number of



house connection increases with higher income. In the two upper income groups all have house connection. Water supply problem exists in many slums as the supply is very irregular in some localities.

Table: Source of Drinking Water (% of Households)

Source of Drinking Water

Table : Source of drinking water (household % age)					
Source of drinking water	BPL	Poor	Lower Middle	Upper Middle	High
House connection	69.5	86.5	97.6	100	100
public stand post	25.4	10.9	2.4	0	0
Neighbor's house	3.3	1.9	0	0	0
Municipal tanker	0.9	0	0	0	0
Private vendor	0	0	0	0	0
Tube well / hand pump	0.9	0.6	0	0	0

Source: DPR prepared by GHK International, UK under the JNNURM, Haridwar.

Table 18 : Source of drinking water

7.4.4.2 Sanitation and Sewerage

Almost 77 percent of the households have a latrine in the house. Only 3.6 percent BPL families and 3.8 percent of the poor families have pit latrines. Rest has sanitary latrines. Those who do not have a latrine in the house go for open defecation. Seventy seven percent of all households have sewer connection. Cleaning and maintenance of latrines are mostly done by the respective family.

Table : Data on sanitation and sewerage disposal					
Characteristics	BPL	Poor	Lower middle	Upper middle	High
Defection sites for males					
Latrine in household	64.8	83.3	97.6	100	100
Neighbor's house	0.5	0.6	0	0	0
Public toilets	0.5	0.6	0	0	0
Pay and use toilets	0.5	0	0	0	0
Open defecation	33.8	15.4	2.4	0	0
Defection sites for females					
Latrine in household	64.8	83.3	97.6	100	100
Neighbor's house	0.5	0.6	0	0	0
Public toilets	0.5	0.6	0	0	0
Pay and use toilets	0.5	0	0	0	0
Open defecation	33.8	15.4	2.4	0	0

Defection sites for children					
Latrine in household	64.8	82.7	97.6	100	100
Neighbor's house	0.5	0.6	0	0	0
Public toilets	0.5	0.6	0	0	0
Pay and use toilets	0.5	0	0	0	0
Open defecation	33.8	15.4	2.4	0	0
Not specified	0	0.6	0	0	0
Water in latrines					
Yes	70.9	85.3	97.6	96.3	100
No	29.1	14.7	2.4	3.7	0
Latrine discharges					
Sewer	88	93.3	97.5	88.9	100
Drain	6	5.2	2.5	11.1	0
River	0	0	0	0	0
Open land	0	1.5	0	0	0
Septic tank / Soak pit	6	0	0	0	0
<i>Note :- Data show household in % age</i>					
<i>Source : Nagar Palika document, 2003</i>					

Table 19 : Data on sanitation and sewerage disposal

Sewer line is absent in many areas, people have septic tank or soak pit with their latrines.

7.4.4.3 Solid Waste Management

Sweeping and Solid Waste Management (SWM) are done by HNP. The service is irregular and overall primary collection is poor (43 percent of population dispose garbage in the open). Many appoint private scavengers for cleaning against a monthly payment. Covered waste bins are required in the localities. The drains and streets in slums are either irregularly cleaned or not cleaned at all.

Only about 16 percent segregate solid waste at source, this number is higher with higher income groups. Municipal collection is not uniform in the town. All in high income group have appointed private worker for solid waste collection and they pay for this monthly. Burning waste is practiced in the locality. Burning is mainly done by the NPP workers. 4 percent of the households sell old news paper, plastic, glass, bottles, etc. and 33 percent dispose them with other wastes.

7.4.4.4 Storm Water Drainage

A storm water drainage system exists in the town. Drains are mostly pucca and open. Proper drains are absent in some areas. It has been noticed that these drains are clogged in many localities. Water logging is not very frequent and generally of short duration. In some areas drains are damaged and in many localities those are clogged as they are not cleaned regularly. Street side drains are not continuous and broken at some places.

Table : Data on Drainage and water Logging					
Characteristics	BPL	Poor	Lower Middle	Upper Middle	High
Water logging / Flooding problems	213	156	41	27	14
Yes	12.7	1.3	0	3.7	0
No	87.3	98.7	100	96.3	100
Frequency	27	2	0	1	0
< five times in a year	74.1	100	0	100	0
5-10 times in a year	18.5	0	0	0	0
> 10 times in a year	7.4	0	0	0	0
Duration	27	2	0	1	0
< one week in a year	96.3	100	0	100	0
1 week to 1 month in a year	3.7	0	0	0	0
Damage due to flooding					
All those suffer	27	2	0	1	0
No	48.1	100	0	100	0
< Five times in a year	40.7	0	0	0	0
5-10 times in a year	11.1	0	0	0	0
Average cost of damage					
All those suffer	30	27.5	2	0	1
No cost	60	55.6	100	0	100
< Rs. 500	13.3	14.8	0	0	0
Rs. 500 - Rs. 1000	23.3	25.9	0	0	0
Rs. 1000- 5000	3.3	3.7	0	0	0
<i>Data shows % age of households within the Development Area : Haridwar</i>					
<i>Source: DPR prepared by GHK International, UK under the JNNURM, Haridwar.</i>					

Table 20 : Data on drainage and water logging frequency

It has been noticed that water logging is not a major problem but some localities remain under water for long (at least 1 week in a year). Most of the affected families are from PBL

households, but they do not suffer any major damage due to flooding and water logging.

7.4.4.5 Approach Road and Street Light

Ten percent of city dwellers do not have paved approach road. Most of other colonies have proper approach road. Streets are in bad condition in the old city areas and street lights are inadequate and many are not well maintained. Light bulbs are non-functional often.

7.4.4.6 Priorities

74.5 percent households have express that their first priority is water supply. Second priority of 56.3 percent is sanitation and 43.2 percent placed drainage in their second priority. Solid waste collection is of fourth priority to some (33.5%) families.

S.No.	Services	Priority 1	Priority 2	Priority 3	Priority 4	Priority 5	Priority 6
1	Water supply	74.5					
2	Sanitation		56.3				
3	Drainage			43.2			
4	Solid waste collection				33.5		
5	Roads / street lighting					38.6	
6	Proximity to public transportation system						70.7

Source : DPR prepared by GHK International, UK under the JNNURM, Haridwar.

Table 21 : Priority of infrastructural services

Some (38.6%) of the families put emphasis on roads and street lighting as their 5th priority. They felt that the streetlights is important for residents especially women. A large number (70%) has considered proximity to public transport as their 6th priority.

7.4.4.7 Health and Hygiene

It has been found that hygienic practices of citizens are good. Use of soap is high, 91-100 percent of the people, who go for open defecation uses footwear. Reported cases of diarrhea and ARI are very rare.

Table : Data on mortality in the year 2006 (% age households)					
Characteristics	BPL	Poor	Lower Middle	Upper Middle	High
Death in last year					
Children under 5 years of age	0.5	0	0	0	0
Others	0.5	0.6	0	0	0
No	99.1	99.4	100	100	100
Probable cause of death					
Households having death cases					
Road accidents	50				
T.B.	50				
Gastric		100			
Average cost of treatment for the family per month					
Nothing	6.1	7.7	0	7.4	7.1
Less than Rs. 50	14.6	15.4	12.2	7.4	0
Rs. 50 -100	31.5	21.8	4.9	3.7	0
Rs. 100-200	10.3	22.4	7.3	3.7	0
More than Rs. 200	37.1	32.1	75.6	77.8	92.9
Not specified	0.5	0.6	0	0	0

Source: Document of the Nagar Palika Parishad, Haridwar.

Table 22 : Data on mortality in 2006 due to bad sanitation conditions

Total reported death occurred in the last year was 3, the causes are presented below. A death due to TB was reported from the BPL group and a case of death due to gastric problem was from poor group.

7.4.4.8 Key Urban Social Issues.

The key issues identified during community consultation and by situation analysis are:

- Drinking water supply in the development area is not adequate.
- Practice of open defecation exists in some old areas.
- Absence of sewer in many areas.
- Solid waste is poorly managed in most of the old areas.
- Drains are mostly open and as a result often blocked as solid waste is dumped in them.

- Community infrastructure is not sufficient

The specific needs in the old city areas are:

- Providing sufficient, timely and uniform supply of potable water.
- Installing public stand post.
- Laying of new sewer connection or connecting independent latrines to existing sewer line.
- Initiating solid waste management, especially segregation at source.
- Construction of side drains.
- Paving approach roads.
- Maintenance of street lights.
- Organizing residents in the participatory process
- Involvement of Community Based Organizations (CBOs)/Non-Government Organizations (NGOs) in the whole process.
- Utilization of existing community centres as base offices of community based complaint redress system.
- Establishing a community development cell in the NPP and deploying an officer, who could be a link between the NPP and the base offices.
- Launching awareness program.
- Securing land tenure to the residents and providing low cost housing. EWS housing schemes should be targeted at registered slum dwellers. In-situ upgradation should be given priority within such schemes.
- Convergence of various poverty alleviation programs.

7.5 Economic Development.

7.5.1 Economic Base of City

Haridwar is the hub of religious tourism in the State of Uttrakhand. Among several religious tourist destinations in this State, Haridwar attracts largest number of visitors, the impact of which on the service sector is quite significant, particularly in the small trade, hotel business,

transport and such other activities. Haridwar is also growing as the industrial hub of the State. The public sector unit BHEL, although having its own colony of 90,000 persons, has indirect impact on the economy of the town. Besides, a number of medium and large scale industrial units are already operating within and in the fringe areas of the town and many others are in the offing. An Integrated Industrial Estate is also operational in the area.

It can be conjectured that the dominant sector of the economy of Haridwar is the tertiary sector. This is substantiated by the fact that in most of the years since 1996-97, tertiary sector's contribution to the NSDP of Utrakhand was the highest (43% in 2003-04), and that of the secondary sector the lowest. With the growth of tourist population, which has already recorded as 7.5 million (2005), the tertiary sector will continue to grow, particularly the activities like transport and storage, communication; trade, hotel and restaurant; real estate and bus services. Besides being a tourist hub, Haridwar, in relative terms, is the most industrialized area of Utrakhand. 21,742 workers are engaged in industrial units in the Haridwar development area; 14,000 are employed by the BHEL and its ancillary units alone. Outside the city limit, there are 19 functioning industrial units together employing 2600 workers.

Table : Industries and workforce relationship in the Development Area : Haridwar						
Type of units	Within Urban Areas		Outside Urban Areas		Total No.	
	No. of workers	No. of Industrial units	No. of workers	No. of Industrial units	No. of workers	No. of Industrial units
Pharmaceuticals and chemicals	1841	47	310	17	2151	64
Engineering and automotives	3107	53	117	3	3224	56
Electricals (including BHEL)	15552	21	621	37	16173	58
Food Processing	2761	23	215	11	2976	34
Iron and Steel	321	7	175	4	496	11
Plastics	111	8	23	3	134	11

Others	1704	51	541	12	2245	63
Total	25397	210	2002	87	27399	297
<i>Source: Government of Uttarakhand, Directorate of Industries, (Directory) 2007.</i>						

Table 23 : Industries and workforce relationship

Haridwar's economic structure is quite complex. The relative impact of the incredibly high number of religious tourist arrivals on the economy of the city on the one hand, and relatively heavy concentration of industries on the other, accentuate the complexity. In the absence of data, sector-wise contribution of Haridwar city to the NSDP can not be assessed. It can only be conjectured that notwithstanding relatively more concentration of industries in this city, its tertiary sector is still a major player in its over all economy. This contention is based on the fact that given the huge tourist arrivals; there are strong service sector activities like transport, hotel, eating places, small trade etc. in this city.

7.5.2 Economic Growth potential

As it stands now, Haridwar is one of the focal areas for industrial development and growth in Uttarakhand. As the New Industrial Policy is implemented, Haridwar will experience an accelerated growth in secondary sector. The present pattern of concentration of industrial units indicates that Haridwar is a preferred destination for industrial investments in Uttarakhand. Being closer to the National Capital Region and having very good rail and road connectivity, Haridwar offers locational advantage for industries. It is understood that Haridwar is the focus area of the State for industrial development. A large Industrial Estate is already in operation in this area and a few are planned to be located here. There is lot of optimism about faster rate of industrialization of Haridwar.

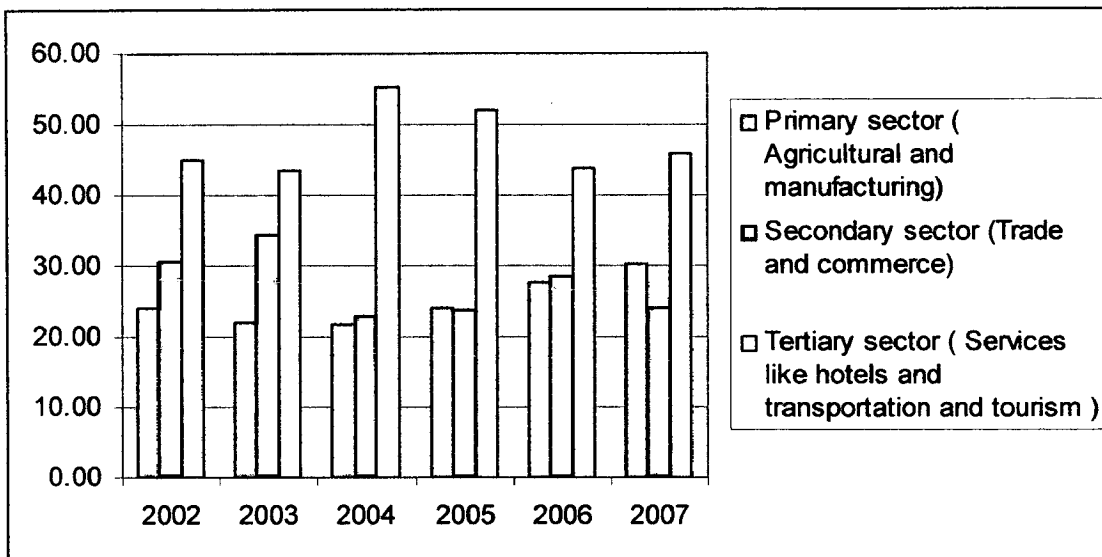


Figure 17 : Workforce %age in various sectors of economy.

Haridwar is already showing the sign of restructuring its economic base, and emerging as an urban center with industrial base. Some 500 industries have already signed on to set up their units in two integrated industrial estates (I.I.E.s) in Haridwar, envisaging an investment of Rs. 4000 crores. In addition to the public sector unit of BHEL, a number of medium and large scale industrial units are already operating within and in the fringe areas of the town and many others are in the offing. In consonance with the growth of the secondary (industrial) sector, the tertiary sector will also grow, may be at a much faster rate. Growth of these two sectors together will create more employment opportunities in this town in the mid and long term periods with their impact on the growth of population, both in terms of natural growth and in-migration. As in the case of Dehradun, the impact of two factors viz. large investments in industries which are expected to be made in the coming years; the planned infrastructure and institutional improvement with financial assistance of the ADB and the Infrastructure Development Fund; and the proposed overall development of the town under the Jawaharlal Nehru Urban Renewal Mission will widen employment opportunities both in secondary and tertiary sectors.

7.6 Efforts for Planned Development

The sudden increase in population from 57,338 in 1951 to 145,946 in 1981 due to establishment of BHEL led to rapid and unplanned growth of Haridwar town resulting in infrastructure deficiencies. In order to ensure planned and controlled growth of Haridwar town and the neighboring rural areas, the first master plan of Haridwar was prepared by the Town and Country Planning Division Office (located at Meerut). The first Master Plan prepared for the time horizon of 1985- 2001, still continues to be the legal document. A new Master Plan for 2025 is under preparation by the Town and Country Planning Department, Uttarakhand and the draft plan has been published inviting objections and suggestions from the public.

Review of Master Plan 2001

The Master Plan 2001 was prepared for a projected population of 3.06 lakh which included 2.13 lakh population in Haridwar NPP area, 71,440 rural population and 21,370 migrants. The Master Plan covers all the sectors such as housing, commerce, industries, public utilities, transport, government offices, and tourism.

The issues and the proposed initiatives outlined in the Master Plan. The key reasons for unplanned growth of town as identified in the Master Plan are as follows:

- Linear development as a result of mountains in the north and river Ganges in the south.
- Unauthorized housing construction on un-developed land within the municipal boundary.
- Lack of recreational facilities and open spaces.
- Mixed land use in core congested city areas.
- Heterogeneous traffic (including hand carts) on main roads, lack of proper parking areas, narrow roads, unplanned traffic junctions, etc causing severe traffic problems and danger to pedestrians.

Table: Issues and proposals of the Master Plan 2001 for Haridwar Urban Agglomeration.

Component	Issues Identified in Master Plan 2001	Proposals in Master Plan 2001
Residential	Lack of adequate housing led to encroachments on open undeveloped areas. High density housing areas – very small houses, inadequate and deteriorating services, congested narrow streets, lack of open and green spaces, mixed land use. In 1981, there was a shortfall of 998 houses.	Additional housing need of 42,084 units was estimated for 2001. It was estimated that 40% of population will fall in the EWS category, 30% in LIG, 25% in MIG and 5% in HIG category.
Industrial	Industrial development took place at a slow to medium pace till 1981.	Industrial development was mainly proposed in the following categories:- Agriculture based, timber, pharmaceuticals and BHEL related. 275 ha was proposed for small and medium sized industries for projected 20,600 workers, but 147.5 ha of land was proposed for industries in proposed land use for 2001.
Roads and Transportation	Heterogeneous traffic, commercial establishments along main roads, narrow streets, encroachments, lack of parking for trucks, wholesale markets along national highway. Location of bus stand in the city centre led to traffic congestion.	Transport Nagar was proposed. Shifting of the existing bus stand to outer city area was proposed. Road widening was proposed from Jatwara Pull to Dudadhari Temple, Tulsi Chowk to Shiv Murti, Bypass to Pawandham, Hill bypass, Jwalapur Overhead Bridge to Ranipur Road, Shankaracharya to Damkothi. New roads – Bridge between Dam Kothi and Singhdwar and road to connect Kankhal with BHEL
Recreational Facilities,	Lack of parks and recreational facilities for residents. Large area had	462.5 ha. of land was proposed for parks, gardens and open spaces in the

Parks and Open Spaces	to be kept open for Kumbh and Ardh <i>Kumbh Melas</i> .	master plan against the estimated need for 540 Ha for parks and recreational facilities.
Tourism	Inadequate transport facilities, traffic management mechanisms and proper sanitation facilities during religious fairs as primary concerns	Open area of 575 ha was delineated for <i>Kumbh Mela</i> in the Master Plan.

Table 24 : Issues and proposals in Master Plan 2001

7.8 Housing

Haridwar Development Authority, private developers and religious trusts are the primary institutions providing housing in Haridwar. The religious trusts build ashrams and dharamshalas to provide temporary housing for the devotees for a few days extended to a few months. The devotees coming to Haridwar constitute a considerable proportion of floating population.

Table: Household size and number within Development Area: Haridwar.

Year	No. of households		Total no, of households	Size of Household		Average size of household
	Urban	Rural		Urban	Rural	
1981	22771	9682	32453	5.07	5.78	5.42
1991	36430	14184	50614	5.14	5.81	5.48
2001	41693	19163	60856	5.30	5.90	5.60
*2011	60000	30000	90000	5.00	5.50	5.25
*2021	83000	44600	127600	4.80	5.00	4.90
*2025	105111	54583	159694	4.50	5.80	4.60

* Projected household size and numbers.

Table 25 : Household analysis in development area

Housing Board has not become fully functional in the new state, however, there are a few housing colonies/units in Haridwar which were developed by the Housing Board before 2000. HDA has developed eight housing schemes since 1986, which covers an area of 51.15 acres (20 ha). About 1,519 housing units were developed by the HDA. Additional requirement of 40,084 housing units was proposed in the Master Plan 2001 against which HDA has been able to construct 1,519 housing units.

Table : Housings planned by Haridwar development Authority				
S.No.	Name of project	No. of Housing units	Area in Acres	Year
1	Shivlok I	205	5.45	1988-1999
2	Shivlok II	263	4.56	1990-1991
3	Shivlok III	191	6.95	1993-1994
4	Rishikesh Colony	174	4.08	1988-1989
5	Harilok Colony	552	19.05	1996-1997
6	Shymlok Colony	93	8.81	1999-2000
7	Shivlok III Extention	38	3.25	1999-2000
8	Gyatriloc	3	2.25	1999-2000
9	Indralok Colony	551	21.51	2005-2007
	Total	2070	75.91	

Source : Haridwar Development Authority (H.D.A.)

Table 26 : Housings planned by Haridwar development Authority

During the preparation of Master Plan 2001 it was observed that due to shortage of housing, there was high incidence of unauthorized construction activities on undeveloped land. This issue still remains critical.

Table: Status of available housing stock in Development Area: Haridwar.			
S.No.	Description		% age households
1	Ownership status	Privately owned	79
		Rented	17
		Government / Public buildings	4
2	Age of the buildings	more than 50 years	13
		10 - 50 years	63
		Less than 10 years	24
3	Condition of the buildings	Fairly good	90
		Good	9
		Dilapidated	1
4	No. of stories	G + 1	73
		G + 2	26
		G + 3 and above	1
5	Available facilities	Water supply	97
		Electric power	96
		Kitchen	84
		Bathing facilities	90
		Lavatory	94
		Telephone	58

Source: Haridwar development Authority (H.D.A.)

Table 27 : Status of available housing stock in Development Area: Haridwar

There is a clear need to increase the supply of affordable housing for all. Land should also be made available for private developers with strict enforcement of norm of 20-25% housing for EWS in the housing project. Overall, the housing situation today presents a complex picture in Haridwar. Discussions with stakeholders indicated that there are many houses which are not physically occupied. On the other side citizens expressed that there are lack of housing availability. This creates a false scarcity of housing in Haridwar. Recently HDA has received some 250,000 applications against about 550 plots for their upcoming Indralok housing scheme. One of the reasons for this kind of situation could be the fact that increasingly people in the northern region wish to buy their second residence/summer homes in Haridwar. Housing Department with the help of T&CP is in the process of preparing Housing Policy for the State.

7.9 Future Growth of Haridwar

In the context of increasing urban population and industrial development around Haridwar, it is deemed necessary to expand the boundaries of Haridwar NPP to include the fringe areas. The issue of expanding the present municipal boundary of Haridwar NPP and upgrading it to Haridwar Nagar Nigam (Municipal Corporation) is under consideration by the GoU.

7.9.1 Physical Constraints

Haridwar has Shivalik mountain range in the north and northeast and river Ganges in the south which restricts its growth in these directions. The reserved forests along Najibabad Road restrict development along this corridor.

7.9.2 Directions of Future Growth

Since the last few decades, Haridwar is experiencing physical growth mainly towards the west due to suitable terrain. Future growth is also expected to be in the same direction along



Roorkee road, Laksar road and towards Roshnabad. Development of IIE by SIDCUL in Roshnabad is likely to trigger rapid urban growth in this area to support the industrial development. HDA has proposed Harilok Phase II and Indralok housing schemes on Roorkee Road and near BHEL area respectively. Areas along Roorkee road are expected to have higher rate of growth in future. Area along Laksar road is having scattered development on agricultural fields. This is a potential direction of growth but future development must be regulated to preserve the rich agricultural belt.

7.9.3 Key Issues relating to Physical Growth and Built Environment

- **Topography:** Physical urban growth is constrained by Shivalik in the north and north-east and river Ganges in south and this has resulted in linear growth of town. Growth is also restricted along Najibabad Highway due to reserved forests and water bodies.
- **Ribbon Development:** Linear growth has resulted in ribbon development along the main corridor of town, the Delhi-Niti Pass highway, known as DN Road/ Upper Road within the municipal boundary. DN road has high density commercial development creating traffic congestion during religious fairs and festivals. Increasing number of tourists every year has further accentuated the need for additional flyovers, dedicated pedestrian ways, widening of existing roads, development of parking places, etc.
- **High Density Development in Old Areas without Proper Infrastructure:**
High density development in Kankhal and Jwalapur are putting more pressure on existing network of services.
- **Unauthorized Constructions on Undeveloped Land and Fringe Areas:**
Supply of serviced land is limited and this has led to unauthorized development on undeveloped land and fringe areas. Main roads in the town also have encroachment which has reduced the clear road width available for movement of traffic. The ghat areas have also been encroached by commercial establishments.

- **Lack of Affordable Housing:** The issue of lack of availability of affordable housing is the false scarcity of housing created due to the general trend of people from the northern regions to buy their second residence in Haridwar. There is need to provide serviced land and access to affordable housing for all.
- **Slums and Squatters:** Growth of slums and squatter settlements along the river and canals is contributing to water polluting in Ganges. This needs to be controlled on priority basis.
- **Land Ownership:** Lack of clarity on status of land ownership and its use is an issue in Haridwar for future development.
- **Undeveloped Open Spaces:** Open spaces measuring upto 575 ha is earmarked for Kumbh and Ardh Kumbh Mela which are used for camping, parking, exhibition and other community facilities. These open areas should be developed with parking, community facilities and landscaping which will increase the scenic beauty of the town, serve as tourist attractions and at the same time prevent encroachment in these areas.
- **Large Scale Industrial Development by SIDCUL:** Integrated Industrial Estate (IIE) proposed on 2034 acres of land is being developed by SIDCUL located at a distance of about 7 km. from Haridwar. IIE is likely to put pressure on the existing infrastructure services.

7.10 Environmental Quality

7.10.1 Water Quality

The recent characteristics of water quality of river Ganges is furnished in Table below. Uttrakhand Environment Protection and Pollution Control Board (UEPPCB) under the “Monitoring of National Aquatic Resources (MINARS)” Program have been monitoring the water quality of river Ganges on a monthly basis at 11 stations in Haridwar.

Month	Temp.°C	pH	DO mg/l	BOD mg/l	Fecal coliform MPL/100ml	Total coliform MPL/100ml
Apr-05	21	7.5	6.8	-	21	1600
May-05	22	7.5	6	-	17	1600
Jun-05	20	7.5	6.4	-	17	1600

Jul-05	22	7.5	7	-	23	1600
Aug-05	22	7.5	6.9	-	-	1600
Sep-05	23	7.5	7.2	-	17	1600
Oct-05	20	7.5	7	4.4	17	1600
Nov-05	20	7.5	7.4	4.1	17	1600
Dec-05	13	7.5	6.1	4.2	23	1600
Jan-06	13	7.5	7	4.1	17	1600
Feb-06	20	7.5	6.9	-	17	1600
Mar-06	22	7.5	6.5	-	23	1600
<i>Source : Uttrakhand Environment Protection and Control Board (UEPPCB)</i>						

Table 28 : Characteristics of the Water Quality of River Ganges at Haridwar

A study of Table above clearly shows that the stretch of the river Ganges at Haridwar satisfies the criteria for Class C for most of the year but does not fulfill the requirement for Class B. The critical parameter is “Total Coliform”. The high level of coliform is attributed to mass bathing by thousand and lakhs of pilgrims in Haridwar. The desired River Water Quality at Haridwar is at least Class B. Apart from mass bathing pollution is also contributed by several nallas discharging into the river. Although most of the 19-odd nallas have been intercepted and dry weather flows diverted to sewers in various phases of the “Ganges Action Plan”, a few nallas still remain to be intercepted and diverted to stop any wastewater reaching the rivers.

7.10.2 Air Quality

There has been increasing motorized vehicular traffic, particularly during holy seasons and dates, contributing to air pollutants. Although recent data were not available, it is generally believed that there is deterioration of air quality due to such activity.

7.10.3 Key Environmental Management Issues

Based on the above situation analysis, major environmental concerns and management issues of the city is summarized as under:

- **Pollution Due To Increased Vehicular Traffic:** There is a significant increase in vehicular traffic in the city during the last few years. This includes public, private and other vehicles.

Total number of vehicles on road has increased from 118,713 to 137,016 during last one year. Emission from these vehicles contributes significantly to the air pollution of the city.

- **Pollution of the Holy River Ganges:** The River is polluted due to various manmade activities. These include discharge of untreated wastewater into the river, waste disposal from the cremation grounds close to the bank of the river, bathing and washing and disposal of solid wastes, and pollution from upland catchments. Recently UEPPCB and Ganges Pollution Control Unit, a section of the Utrakhand Jal Nigam has taken initiatives to divert 19 drains to the existing Sewage treatment Plant and augment the capacity of the plant. These drains otherwise is discharging wastewater into the river. Thousand of pilgrims come to Haridwar for having holy bath at the river Ganges. The River Water Quality at Haridwar should conform at least to Class B criteria.
- **Collection, Transportation and Safe Disposal of Solid waste:** The city has failed to comply “Municipal Solid Wastes (Management & Handling) Rules, 2000” under the umbrella act “The Environment (Protection) Act, 1986”.
- **Monitoring of Air and Noise Levels:** No monitoring is done on a routine basis with respect to the quality of air and level of noise pollution for the city. Under the National Ambient Air Quality Monitoring Program, regular monitoring of air quality of the city is necessary. Regular monitoring of the noise level is also required to regulate the noise level as per Noise Pollution (Regulation and Control) Rules, 2000.
- **Land Slide from Mansa Devi Hill:** Land slides of the Mansa Devi Hill takes place at a regular intervals, mainly during rainy seasons. Huge quantity of boulders and soil from the hill get deposited near the congested town area. Some of the silt finds its way into the River Ganges upstream of Har-Ki-Pauri.

7.11 Municipal Infrastructure

7.11.1 Water Supply

Piped water supply was first introduced in Haridwar in 1927 with a tube well at Teebdi, which is now lying defunct. Since then the town has expanded significantly and the water supply system has been augmented and reorganized in manifolds. The water supply of Haridwar is operated and maintained by Uttarakhand Jal Sansthan (UJS), an institution working under Department of Drinking Water, Government of Uttarakhand (GoU), which also undertakes some of the low budget works. Large capital works and overall planning are carried out by another institution, Uttarakhand Pai Jal Nigam (UPJN), also working under Department of Drinking Water. Although a municipal function, the Haridwar Nagar Palika Parishad (NPP) is not involved in the planning, design, construction, operation, maintenance and service delivery of this important Urban service. This section deals with the analysis of current situation of water supply, its problems, key issues and the likely scenario of water supply with respect to water demand, resources, system requirements and related aspects.

7.11.1.1 Water Sources and Generation of Water

Haridwar is situated on the bank of river Ganges, the largest perennial river of India. The town therefore enjoys water of this river as source infiltrated through soil and collected in large diameter wells. However, availability of this water is limited to the areas close to the river. For the areas little away from the river the infiltration becomes ineffective due to increase in the width of natural soil media in between and ground water is proved to be the most techno-economically suitable source. Both these sources are in abundance in Haridwar. Situated by the side of a large river, and recipient of plenty of rainfall, the region possesses large potential for ground water recharge. Presently about 60 mld of water is abstracted from these sources through 44 wells of different kind as shown in the following Table.

Table : Present availability of water from various sources			
S.No.	Name of the source	Nos.	Approximate quantity of available (mld)
1	Infiltration wells	16	25
2	Tube wells (200m.m. - 300 m.m. dia.)	23	32
3	Mini tube wells (150 m.m. dia)	2	2
4	Open wells	3	1
	Total	44	60

Source : Uttrakhand Pai Jal Sansthan

Table 29 : availability of water from various sources

7.11.1.2 Treatment of Water

The quality of water from the sources is quite good and does not need sedimentation or filtration. As such, it is directly pumped to the distribution system after disinfection by liquid sodium hypo chloride or gaseous chlorine.

7.11.7.3 Distribution System

For ease of operation and rational distribution of water, Haridwar town has been divided into six water supply zones on the basis of area, population, nature of requirement and ground elevations. The zones and the areas served are given in Table

Table: Zones and Areas Served

S. No.	Zone	Area served
1	A	Bhopat wala
2	B	Bhim goda & Har-Ki-Pauri area
3	C	Mayapur
4	D	Kankhal
5	E1	Jwalapur (part-I)
6	E2	Jwalapur (part-II)

Har-Ki-Pauri area is a surplus water supply zone by virtue of it being low lying and also due to the special care taken for its religious importance. Availability of water in this zone is

almost 24 hours. Parts of Jwalapur, Kankhal and Bhopatwala areas are comparatively scarcity zones where water supply is restricted to 1 to 4 hours daily.

There are 12 Over Head Tanks (OHT)/Clear Water Reservoirs (CWR). Out of which 11 OHT serve the area within the municipal limits. One CWR is not functioning for want of feeder main. The combined storage capacity of these OHT and CWRs is 14,030 kl against a total supply of 60 mld i.e. about 23% of the total supply which is insufficient. The locations of the storage tanks also need to be examined during detailed engineering stage to achieve appropriate hydraulic efficiency of the distribution network. In the absence of pipeline network map, exact length of distribution network in the town can not be assessed correctly, however, as discussed with Jal Sansthan, Jal Nigam and HNPP it is reported to be more than 200 kms in addition to 8 km of feeder mains from infiltration wells, tube wells, mini tube wells and open wells. In several cases the distribution lines are buried under the road arising out of road widening programs. The old and dilapidated pipes in the old city area also give rise to frequent problems in service. Repairing of these pipelines also poses various problems to the traffic system of the town. Some pipelines have been laid along the sewers in such a manner that at many points they are crossing the manholes. Even some house connections have been provided through these manholes. At many places there is potential danger that leaking joints of pipelines may suck sewage water and get polluted. These pipelines are needed to be shifted immediately.

There are about 24,000 domestic water connections in Haridwar. In addition there are 2,389 commercial connections and 450 community public stand posts. To strengthen the water supply system, 105 India mark-II hand pumps have been provided by Jal Sansthan (81), DUDA (20) and NPP (4). The actual number of households in Haridwar municipal area is being updated by Haridwar NPP. However, it is estimated that there are about 32,000 households with an average household size townwide of 5.8, slightly above the 2001 census figure of 5.4. The socio-economic survey revealed that about 47% of the town population

(86,500) lives in slums. Households belonging to the economically weaker section use stand post supply in a ratio of about 20 houses per stand post.

Table : Source of drinking water (household % age)					
Source of drinking water	BPL	Poor	Lower Middle	Upper Middle	High
House connection	69.5	86.5	97.6	100	100
public stand post	25.4	10.9	2.4	0	0
Neighbour's house	3.3	1.9	0	0	0
Municipal tanker	0.9	0	0	0	0
Private vendor	0	0	0	0	0
Tubewell / hand pump	0.9	0.6	0	0	0
<i>Source : DPR prepared by GHK International, UK under the JNNURM, Haridwar.</i>					

Table 30 : Source of drinking water (household % age)

Accordingly, the present piped water supply coverage to the population of Haridwar can be presumed to be about 85%. The balance population meets their requirement from the tube wells with hand pumps and additional community stand posts. The level of service in Haridwar town water supply in respect of quantity, supply hours and pressure can be well identified in three distinct characters. About 42% of town area demarcated under Zone A, B and C enjoys 24 hrs supply, in surplus quantity (> 135 lpcd), while 30% of the area demarcated under Zone E2 and some parts of the foothill situated at higher altitude including the industrial area faces scarcity in supply both in terms of quantity and pressure. The supply hours in these areas are also intermittent, 1-4 hrs a day. In the remaining area demarcated under Zone D and E1 the supply is reasonably normal although is slightly less than 135 lpcd in workable pressure with 4-6 hrs of supply a day.

7.11.1.4 Unaccounted for Water

No proper investigation and study have been conducted to determine a reasonable figure of unaccounted for water (UFW) in Haridwar water supply system. The UPJN/UJS generally agree that line and production losses of water are about 30%. The actual UFW may however be more. Some of the major reasons for high UFW are:

- Undetected leakages due to construction of metallised roads over the pipeline.

- Open zone boundaries allowing water to flow free from high pressure zones to low pressure zones resulting in some areas getting water supply for long hours beyond supply period developing a tendency of wastage and misuse of water.
- Some of the existing pipelines in old city area have outlived its utility leading to frequent breakdown and leakages.
- General leakage from joints and valves in the distribution system.
- Production losses due to reduction in efficiencies of old aging equipment and filter beds in the water works.
- Unauthorized tapping and connections.
- Wastage through the stand posts by removal of taps.
- Non recording of connections and consumption

7.11.1.5 Per Capita Water Supply

Considering 30% UFW the total quantity of water reaching to 344,000 population of the town (including a floating population of about 160,000) is about 42 mld. The average per capita supply rate may therefore be assumed as 122 liter/day which is slightly below the norm of 135 lpcd prescribed by the Central Public Health and Environmental Engineering Organization (CPHEEO), Government of India to support an effective sewerage system.

7.11.1.6 Water Quality

There is sometimes deterioration in the quality of water due to malfunctioning of the treatment plants. Many of the old pipes buried under the road in the course of their widening develop leakages and remain undetected. It results in sucking back the outside water/sewage when supply is closed, consequently polluting the water.

7.11.1.7 Operation and Maintenance

- Uttrakhand Jal Sansthan is responsible for operation and maintenance of water supply system in Haridwar. During the study field visits detailed discussion were held with

consumers (primarily citizen of Haridwar Nagar Palika Parishad area) and the officials of both UJS and UPJN. The findings related to Operation & Maintenance are:

- Lack of standby power generation system to make up frequent interruptions in power supply.
- Low efficiency of old pumping machineries requiring replacement.
- Lack of adequate data base of transmission & distribution system. Drawing / map of distribution system, which is the basic information needed are not available.
- Many rising mains are tapped and used as distribution main leading to large scale drop in pressure, wastage of energy and disruption in supply.
- The UFW is high, resulting in large revenue losses.
- Low water tariff and absence of metering contribute to large scale wastage; UJS has little or no means to control such wastage.
- Zones are generally interconnected with each other, resulting in uncontrolled transfer of water from zones in higher ground elevation to those in lower ground deviation.

7.11.1.8 Summary of present status of water supply system of Haridwar

Table summarizes the present status of water supply system in Haridwar.

Table : Present status of water supply in Haridwar		
S.No.	Description	Quantity
1	Total permanent population in Municipal area (Permanent Population = 184000 + Floating population = 160000)	344000
2	Estimated no of households	32200
3	Total no. of domestic connections	24000
4	Total no. of commercial connections	2389
5	Total no of stand posts	450
6	Total length of pipeline	168 k.m.
7	Total no. of storage tanks (OHT/CWR)	12
8	Total capacity of storage tanks (OHT/CWR)	14030 kl.
9	Total no. of wells (Infiltration well , Tube well & open wells)	44
10	Total water production capacity	60 mld
11	Estimated line and production losses	30%
12	Total water available	42 mld
13	Average rate of per capita water supply	122 lit. per day

Table 31 : status of water supply in Haridwar

7.11.1.9 Key Issues

Based on the above situation analysis, the following emerge as the key issues facing water supply system in Haridwar:

- Lack of adequate data base and maps on transmission & distribution system network.
- With open zones water freely travels to other zones.
- Unequal distribution of water resulting in acute shortage in certain areas.
- Lack of pressure in the scarcity areas.
- Deterioration in quality of water at times.
- Inefficient network hydraulics with respect to tapping, pumping and balancing storage tanks.
- In the intermittent supply system the tendency of the consumer is to keep the taps open throughout the supply increasing the peak factor and raising the chances of wastage of water
- The old and dilapidated network develops leakages most of which are buried under roads and remain undetected. This result in sucking back the outside water when supply is closed, consequently polluting the water supply
- Lack of standby power generation system at head-works as interruptions in power supply is frequent.
- Low efficiency of old pumping plants
- Many feeder mains are tapped and used as distribution main leading to drop in pressure, wastage of energy and disruption in supply.
- Abnormal growth in high density areas raising water demand with which the existing diameters of pipeline cannot cope.
- The water tariff recovered is many much lower than its cost of production.

7.12 Sewerage & Sanitation

7.12.1 Coverage of Sewerage Network

Sewerage system was introduced in Haridwar in 1938. Since then it has been extended to various parts of the town. At present, more than 80% of the population is covered with sewerage system. Presently, one 18 MLD and another 8 MLD STP are taking care of treatment of collected sewage. The city is located at an altitude of 292.7 meters above the Mean Sea Level. The spread of Haridwar from foothills is generally levelled with 3-7 meters of undulation. The area at the foothills on the bank is excessively populated with Dharamshala, Hotels and Shops etc. The soil here is generally sand mixed with boulders and rocks.

Based on the topography of the town and the need of STP's, city is divided into 3 zones:

Zone I: Bhopatwala zone (lies on the northern side of Haridwar).

Zone II: Haridwar, New Haridwar and Kankhal.

Zone III: B.H.E.L. & Jwalapur Zone

7.12.2 Service Levels of Sewerage Systems

Service levels for sewerage collection and treatment are satisfactory. Out of the total 33 mld sewage generated by 184,000 permanent population and 160,000 floating population almost 80% collected by sewerage system and 20% at drain interceptions. Present capacity of sewage treatment is 26 mld with a gap in treatment capacity of 7 mld.

Description	Units	Remarks
Water supply	51.3 mld	
Actual water reached to consumers	36 mld	30 % distribution losses
Sewerage generated	33 mld	15 % infiltration and 80 % water consumption
Sewerage collected	33 mld	80 % sewerage and rest 20% intercepted at drains and diverted to STP
Gap in treatment capacities	7 mld	Existing 26 mld treatment capacity

Source : Nagar Palika Parishad, Haridwar.

Table 32 : Service levels of sewerage system

It excludes special occasions such as Kumbh, Kanwar and other exigencies.

7.12.3 Treatment and Disposal of Sewage

The first sewage treatment plant was constructed under Ganges Action Plan Phase 1 in 1992 at Kankhal area of Haridwar. The capacity of STP is 18 mld and it is based on the Activated Sludge Process. Recently, a new STP of 8 mld was constructed based on Karnal Technology (Agro Forestry) to treat sewage from Jwalapur area of Haridwar. Presently, total sewage generated is 33 mld, out of which 7 mld is left untreated under normal conditions. But in special occasions the sewage generation increases to 40-45 mld. Due to relatively flat topography and prohibition of discharge of treated sewage at the upstream of Har Ki Pauri (Important Religious Bathing Place), the town needs excessive pumping of sewage. There are about 15 working sewage pumping stations for lifting and carrying sewage to downstream for treatment and irrigation. New sewerage schemes for augmenting 18 mld STP to 45 mld and construction of new 9 mld STP at Bhopatwala were already approved by the Government of India and will be implemented through NRCD. After the implementation of these schemes the total capacity will be enhanced from 26 mld to 62mld. These schemes will cater to the need of sewage treatment until 2023 as per analysis of UPJN.

However, additional funds are needed for the implementation of:

- New sewerage schemes to increase the sewerage coverage to 100 %.
- Capacity augmentation of rising mains,
- Modification and augmentation of 8 mld STP and
- Rehabilitation of 18 mld STP and Sewage Pumping stations.

7.12.4 Key Issues

- There is no mapping information available on the existing sewerage i.e., length and diameters and profile of the existing sewerage system. Therefore, a GIS and CAD software assisted database of the existing system is needed. The mapping database built on GIS based

town map prepared by the GoU would be very useful in implementing proposed schemes for sewerage.

- At present, sewer clogging is observed in some areas, the most common reason is the dumping of municipal solid waste in manhole chambers, therefore a comprehensive solid waste management plan should be prepared for the prevention of entering municipal solid waste in the sewer line. Another reason for sewer clogging is the deposition of silt into the sewers. During rains eroded heavy silt came from near by hills. A plan for the prevention of silt should be undertaken on the priority basis.
- Community should be encouraged to pay and use category of public conveniences with community involvement in the maintenance of the sewerage system. It is observed that currently sewerage is not covered by way of user charges; only sewerage service charges are collected as part of property tax.

7.13 Storm Water Drainage

7.13.1 Rainfall

Haridwar receives an average annual rainfall of about 2300 mm. The maximum rainfall occurs in July and August amounting to around 1200 mm.

7.13.2 Drainage System

Practically the whole town, wherever roads or brick paved lanes/paths exist, have some kind of side drains leading to storm water drains, except in slums or some parts of peripheral areas. Most of the drains need cleaning, remodeling and repairs. In addition to this, there are lanes and roads in the town which are still *kutchha*. The total length of *kutchha* roads is about 28 km. There is a total of 214 km of roads maintained by HNPP and about 45 km roads maintained by PWD.

7.13.3 Drainage Characteristics and Problems:

Most of the area of Haridwar City is situated on the right bank of River Ganges while the Ganges Canal divides the city in two parts. Shivalik hill ranges in the north have restricted

the growth of the town in that direction. Naturally the slope of the ground is from hills towards the river i.e. from north to south which is also the main direction of flow of storm water drains. All these drains have varying quantities of deposits - silt, gravel and boulders. Soil erosion from the hill slides on the northern side, particularly Mansa Devi hill causes these deposits during rains. Due to steep slopes and large catchment areas, run off is high causing water logging and back flow in many areas. Old Ranipur turning is one of the worst affected areas. The drain below Mansa Devi Temple has large silt chambers. The section is large at the head but suddenly reduces to a smaller section as it enters the main market. Natural drains have been encroached upon at many places. Gully pits are broken and side drains are connected to sewers which itself need cleaning. The storm drains carry, as in most towns, illicit sewage in the form of dry weather flow draining into the R. Ganges. About 19 such nallas have been intercepted and dry weather flows diverted to sewers.

7.13.4 Issues and problems of storm water drainage.

The main problems of this natural drainage system are man made. These are listed below.

- Dumping of garbage and all kind of solid waste in to the drains.
- Unauthorised cutting of slopes near the foot hills for construction of houses, creating a danger to the stability of the hills (back of Bhimgoda)
- Obstruction to the natural flow by encroaching sides of the drains by construction of houses.

Diversion of one drains into another as in the case of the drain across Rishikesh road.

- Non-cleaning of the drains as can be seen at Bhimgoda colony near the kund Bhopatwala and RTO. Crossing Nala which are heavily silted

7.13.5 Situation Analysis

To accommodate increased storm water run-off due to growing urbanization, some parts of these drains were lined with stone or brick masonry. It is observed that the main drainage channels are heavily silted because garbage is routinely thrown into these channels often packed in polythene bags. This causes a formidable problem as the polythene slows down the

disintegration of the degradable material packed inside. Most of the main drains are in a bad shape at present and need repairs, reconstruction and other works in nearly 60 percent of their lengths.

Although large part of the town is well drained, there are certain localized problems of insufficient drainage and water logging during heavy rains. Some of the spots prone to flooding and water logging are as follows:

1. Chandra Charya Chowk (Ranipur turn).
2. Old Ranipur Area.
3. Bhimgoda Nai Basti.
4. Along Rishikesh road.
5. Laton wali.
6. Nath Nagar before Railway station Jwalapur.

Considerable length of drains in commercial areas has been encroached upon by the construction of shops, or the other building covering the drains completely at some points. The minimum that can be done to facilitate cleaning and maintenance of such drains is to provide bigger sized manholes 900mm.dia at 30 m Intervals, besides lining and reconstruction in necessary stretches.

7.13.7 Key Issues

- Due to faster growth of population and rapid increase in the land prices, habitation has extended to the low lying areas which do not have proper drainage outlets.
- Dumping of garbage, particularly plastics, causes serious reduction in waterways of main drainage channels
- Encroachments by poor as well as other sections of society have resulted not only in constriction of waterway but also have led to problems of access for repair & maintenance activities.
- In the old city areas, space for construction of roadside drains is a major problem

- 15% to 20% of the houses which do not have a sewer connection or a Septic tank are discharging their domestic sewage into the existing drains, causing serious environmental problems.
- Decrease in green areas i.e., parks and gardens and increase in built up areas has increased the runoff inside the town.
- Due to natural degradation of rocks, deforestation, leading to loss of top soil, accumulation of silt in the nallas causes over flow and back flow of water in certain densely populated areas.

7.14 Solid Waste Management

7.14.1 Municipal Solid Waste Generation

The city generates, on an average, about 190 MT of MSW per day. The major sources of MSW generation of the city are domestic, shops and commercial establishments, hotels, restaurants, dharamsalas and fruit and vegetable markets. Number of registered hotels, restaurants and dharamsalas in the city are 270, 250 and 280 respectively. In addition there are 3 fruit and vegetable markets. Quantity of waste generated from various sources are presented in Table below.

Table : Solid waste generation from various sources	
Source	Quantity (Tons / Day)
Domestic	155
Fruits and vegetable markets	5
Shops and commercial establishments	12
Hotels. Restaurants and dharamshalas	4
Construction / demolition activities	2
Others	12
Total	190

Source : Nagar Palika Parishad, Haridwar.

Table 33 : Solid waste generation from various sources

7.14.2 Waste Composition and Characteristics

The MSW of the city mainly comprises of organic, inert and recyclable wastes such as paper, plastics, glass etc. No data is available to determine the composition and characteristics of the MSW for the city.

7.14.3 Collection, Storage and Transportation

There is practically no primary collection system in the city except in few localities where the Mohalla Swachhata Samities (MSS) recently have started door-to-door primary collection by engaging private sweepers. Waste is mostly collected through community bins/containers and road sweeping. HNPP sweepers and sanitary workers engaged by the MSS sweep the streets. They accumulate the collected waste into small heaps and subsequently loaded manually or mechanically onto the community containers/bins or directly loaded onto the solid waste transportation vehicles for onward transportation to the disposal site. The present collection and transportation system involves multiple handling of solid waste. About 60 open handcarts and 20 cycle-rickshaws are used for collection of waste including wastes generated from street sweeping and cleaning of drains. Both long and short brooms are used for street sweeping. Recently, the MSS, comprising of a group of residents, has been formed to engage private sweepers for door-to-door primary collection of waste from the area and to keep the area clean. About 55 such MSS have been formed to cover different areas of the city. All MSS are not functional. Some of them are functioning satisfactorily whereas others performance is irregular and unsatisfactory.

A private agency called “Dry Waste Recycling & Resource Centre, Haridwar” is presently segregating recyclable wastes from the various waste collection points by organizing the rag pickers for further process. Private agencies called “Signet” and “Pahal BMW” are involved in collection of bio-medical wastes from various hospitals and other medical establishments

of the city and transports it to the Bharat Heavy Electrical Ltd (BHEL) complex situated at the outskirts of the city for incineration.

Secondary storage of solid waste is done by means of community containers and bins having capacities of 0.5 m³, 1m³ and 4.5 m³. 220 such containers and bins are placed at different locations (also called collection points) of the city for secondary storage of solid waste. Although most of these containers and bins are of closed type but these are often left open attracting animals.

In addition to the above mentioned containers and bins, there are about 15 numbers of open collection points and 2 Dhalaos (Constructed enclosures) located in different locations of the city.

7.14.4 Waste Disposal

At present HNPP disposes the solid waste of the city to two sites - one located at Jwalapur, about 7 km from the city and the other by the side of the National Highway-74 at a distance of about 8km from the city. In both the sites, waste disposal is done by uncontrolled dumping. HNPP owns about 14.50 hectare of land at Sarai Village, located at a distance of about 12 km from the city for future solid waste disposal.

7.14.5 Key Issues

The major issue of the SWM is non-compliance of the Municipal Solid Waste (Management & Handling) Rules, 2000 by the HNPP. HNPP has failed to comply with the rules in all aspects of SWM i.e. Collection, Storage, Transportation, Processing, Disposal of MSW of the city and Institutional Reform. Other important issues along with the deficiencies in the present SWM system are enumerated as follows:

- Solid waste quantification and characterization: HNPP has not conducted any city wide study for determining the composition and characteristics of the solid waste. Proper quantification of waste is an important factor for assessment of equipment, vehicles and

manpower. Representative characterization of the city waste is essential for determining appropriate waste processing and disposal methods.

- Segregation of waste at source: At present, there is no segregation of waste at source. Source segregation of waste reduces the waste load at the disposal site. This also reduces the cost of transportation of solid waste considerably.

- Primary Collection of waste: Present collection system is irregular, ineffective and inefficient. A significant part of the waste is left unattended. This waste not only degrades the environment but also block storm water drains.

- Community and Private Participation: Although HNPP has initiated community involvement and private participation by forming MSS for primary collection of waste, a lot of improvement is necessary in the level of services. The Mahalla Swachhata Samities are in the inception stage. The long term sustainability of MSS needs to be ensured.

- Improvement in SW Transportation system: The present SW transportation system lacks the following:

- Proper routing of vehicles for transportation of waste to the disposal site.

- Waste Transfer Station to minimize time and distance of travel of the solid waste transport vehicles. This will reduce cost of transportation and increase efficiency of the vehicles.

- Inadequate and upgraded vehicle and equipment

- Modern record keeping and communication facilities

- Safe Disposal of Waste: The present state of solid waste disposal is poor and unsatisfactory.

A major part of the solid waste generated is disposed into open lands, streets, surface drains, river etc and sometimes burnt in open causing health hazards, public nuisance and degradation of environment and aesthetics. The existing disposal site at Jwalapur has been abandoned. The other solid waste disposal site located by the side of NH-74 is the only site where HNPP is presently disposing the solid waste of the city by open dumping.

- The HNPP owned land identified at Sarai Village as proposed solid waste disposal site is located away from the city limit. The present access road to the site is narrow and not suitable for movement of heavy solid waste transportation vehicles. Widening of the access road is therefore, essential.

There is no alternative route that leads to the site from the city. Necessary environmental approval is required for this site before its final selection as a solid waste disposal site. No environmentally approved site has so far been selected as future solid waste disposal site.

- Health and Hygiene of Sanitary Workers: Under the present SWM activities manual handling of waste is involved starting from collection up to the disposal of waste. During the process, the sanitary workers are exposed to the waste. No protective measures have been taken for safety, health and hygiene of these workers who are vulnerable to the health hazards.

- Public Awareness: No major initiatives have been taken so far by the HNPP to educate people on the ill-effects of haphazard disposal of solid waste.

7.15 Roads and Transport

7.15.1 Road network, Junctions and Traffic Management

Existing situation – Road Network

The city is connected by road to other parts of the state with Delhi – Niti pass road, Rishikesh road, Nazibabad road and NH- 58 forming the major travel corridors. This city is also connected by rail with other parts of the country. Haridwar city comprises of 246 km of roads of which 214.10 km are maintained by HNPP and 31.90 km (including 13 km of National Highway) are maintained by PWD. The traffic carrying capacities of city roads are low due to limited widths, intense land use and encroachments.

There are about 1686 no. of roads in 25 wards under Nagar Palika Parishad.

As may be observed from the above table and figure that more than 60% road under HNPP is concrete roads, whereas 13% roads are kutcha. The core networks of the roads within city consist of following main roads, which are under the maintenance of PWD.

7.15.2 Junctions

It has been observed that junctions has not been designed properly, i.e.

- No proper channelization for free left turn.
- Lack of footpath on approaches of the junctions.
- No planned pedestrian zebra crossing.
- Haphazard parking on the approaches of the junction.
- Lack of proper signalization system to ensure smooth traffic movement.

On the basis of field observations, discussion with Traffic Police personnel, HNPP and PWD, following junctions have short-comings:

1. Chandi ghat junction(on NH 58)
2. Shankaracharya chowk
3. Tulsi chowk
4. Deshrakchak T- junction
5. Ranipur Morh Chowk

Table: length of various category roads

Type of road	Length (km)
Kutcha road	28.41
Kharanja road	1.44
Cement concrete	133.11
Black top	21.54
Black top (with BM/SDC)	29.60
Total	214.10

7.15.3 Existing Situation - Traffic Flow, Congestion and Management

Following parameters which are observed causing congestion of traffic.

- Inadequate width of the road.
- Encroachments.
- Street hawkers.
- Unplanned on-street parking.
- Heterogeneity of traffic.
- Pedestrian flow.
- Improper turning of traffic.
- Lack of median on important roads.
- More no. of median gaps on upper roads.
- Lack of traffic signage, road markings, guard rails etc.,
- Lack of enforcement of traffic rules.

Mostly all roads have 2-way traffic movement barring a few exemptions. There is a large tempo attraction in the Upper road area due to the presence of commercial establishments at Har-Ki-Pauri,. The tempos stop wherever passengers board/alight, thereby causing congestion and delay to other vehicles. It has been observed that areas like Har-Ki-Pauri have heavy pedestrian traffic due to pilgrims from various parts of the country. During mela periods in the city, a special management for pedestrians and traffic is enforced by the authority.

On the basis of observation, discussion with Traffic Police personnel, HNPP and PWD Engineers, following stretches have above short-comings:

- Hill bypass road (Pul Jatwara to Laltarao).
- Delhi – Niti pass road (From near Pul Jatwara to Dudhadhari junction via Har-Ki-Pauri)

Around the Jwalapur area, the traffic condition is poor. Most of the roads within the area have less than single lane, and also encroached by the local shop keepers, hawkers, haphazard on-street parking by mainly two- wheelers and cycles.

7.15.4 Transport System Characteristics

Existing situation - Registered motor vehicles in the city (2006). The no. of registered motor vehicles in the city for the year 2005 and 2006 are given in Table below.

Table : No. of vehicles registered in Development Area : Haridwar.					
S.No.		Category of Vehicles	No. of vehicles	Category wise %age of vehicles	Total %age
1		Heavy Vehicles			
	1	Multi Axle Trucks	1	0.01	0.001
	2	Trucks	822	12.30	0.923
	3	Mini Trucks	217	3.25	0.244
	4	Buses	189	2.83	0.212
	5	Tractors	5310	79.43	5.959
	6	Tankers	49	0.73	0.055
	7	Others	97	1.45	0.108
Total Heavy Vehicles			6685	100.00	7.502
2		Light Vehicles			
	1	Cars	4807	5.83	5.395
	2	Jeep	405	0.49	0.455
	3	Taxi	414	0.50	0.465
	4	Maxi Cab	177	0.21	0.198
	5	Ambulances	21	0.03	0.024
	6	Omni Bus / Van	64	0.08	0.072
	7	Motor Cycles	35763	43.39	40.138
	8	Scoters	28877	35.05	32.41
	9	Auto Rikshaw / Vikram	1653	2.01	1.855
	10	Mopeds	10130	12.29	11.369
	11	Trollies	91	0.11	0.103
12	Others	12	0.01	92.498	
Total Light Vehicles			82414	100.00	100
Grand Total no. of Vehicles			89099		

Table 34 : Vehicles registered in Development Area

There are about 1.37 lakh registered motor vehicles in Haridwar city in the year 2005-2006. It is observed from the above figure that Cars and motorized two-wheelers constitute more than 7% and 85% of the total vehicles respectively in the city. During the year 2005-2006, the growth of vehicles is around 15.5%.

7.15.5 Existing Situation – Public Transport system

Uttarakhand Transport Corporation buses mainly serve long distance inter-city trips and medium distance shuttle services from the old bus terminal. Insufficient and lack of Public Transport has led to operation of Intermediate Public Transport (Pvt. Vehicles) which operate from different parts in the city. IPT consists of 930 Tempos / Vikrams and 746 Auto rickshaws. Tempos/Vikrams operate on a fixed route and fixed fare basis (by RTO) for short distance intra-city trips within the city, while auto rickshaws operate on free route pattern without any fixed rate. Minibuses and tempos do not have proper terminal facilities or amenities for passengers. The city also lacks designated stops for public transport operation. Besides these, 706 taxis and maxis operate within the city for intra and inter city trips.

7.15.6 Key Issues

- Absence of road hierarchy and traffic carrying corridors. Most of the internal city roads are 1-2 lanes. Rapid growth in vehicles and population (both permanent as well as floating) have resulted in exceedence of the carrying capacity on the road network.
- Lack of enforcement measures has further deteriorated the situation. Encroachment on streets by shop owners and vendors further reduce the width of carriageway.
- Hindrance to pedestrian movement because of absence of foot paths.
- Ineffective traffic control and management measures.
- Absence of adequate parking lots leading to haphazard on-street parking reducing road capacity thereby causing traffic congestion.
- The mode split of two-wheelers is about 85% of the total motorised vehicles on the roads. Corresponding vehicle density is 557 vehicles per km of the road which is very high.

- Lack of public transport system in the city has resulted in improper operation of Intermediate Public Transport vehicles causing traffic congestion and pollution.
- Inadequate Road Infrastructure and Safety Issues.
- Absence of pedestrian footpaths.

Chapter 9: CITY “SWOT” ANALYSIS

8.0 City “SWOT” Analysis

8.1 Introduction

Haridwar, in its journey through the last two centuries, has evolved from a small settlement of saints and hermits on the bank of a sacred river to a bustling town with a complex mix of activities ranging from hardcore industrial and economic activities to the practice and propagation of yoga, meditation and ayurveda. This complexity is further heightened by an unparalleled influx of pilgrims, with no less momentum and magnitude of a storm surge in an Ocean of humanity. This happens every year with unflinching punctuality. Haridwar is thus unique, so much so, that every six years, the city is practically besieged, if not overrun, by tens of millions of pilgrims, who are purely outsiders to the city. This periodicity acts like a natural phenomenon, forcing the residents to simply bear it.

Given this dynamic behaviour of rising and falling tides of visitors, the city struggles to remain in working order. Notwithstanding, the citizens like to live, work and prosper in this unique city. The city, in order to remain home to its growing number of citizens certainly needs a vision. Clearly, before proceeding to prepare the vision, it is imperative to examine the strength, weakness, opportunities and threats of the city and various elements of infrastructure and urban services that support the city.

8.2 SWOT Analysis

Based on the existing situational analysis, City’s strengths, weaknesses, opportunities and threats have been assessed. The SWOT analysis of Haridwar city is presented below:

8.2.1 City Level SWOT Analysis

STRENGTHS

- * One of the seven sacred cities of India.
- * One of the four locations in India for Kumbh Mela
- * Gateway to Chardham, the four main pilgrimage centres in the North,
- * Surrounded by scenic beauty

- * Proximity to Delhi
- * Well connected by rail and road
- * Industrial development in close proximity

WEAKNESSES

- * Lack of developable land
- * Lack of better tourism infrastructure
- * Inability to tap tourism potential other than pilgrimage
- * Poor connectivity by Air
- * Difficult to balance the interests of various groups for redevelopment activities
- * Increased pressure on existing infrastructure services

OPPORTUNITIES

- * Rapid industrial development close to the city area
- * Emerging destination for ayurvedic treatment, yoga and spiritual pursuits
- * Strategic location for tapping tourism potential other than pilgrimage such as eco tourism and adventure tourism
- * Open spaces for development of tourist attractions

THREATS

- * Ecologically sensitive areas Soil erosion from Bilwa Parvat
- * Disaster prone area
- * Increasing water pollution in Ganges
- * Increased possibilities of accidents and health hazards due to massive crowd during occasions such as Kumbh Mela.

Table: Analysis of the Strengths & Weaknesses, regarding planning Issues in Development Area: Haridwar.

Sectors	Strengths	Weaknesses
Physical Growth and Urban Environment	BHEL and Integrated Industrial Estate developed by SIDCUL contributing to urban growth	Physical growth constraints of hills, forests and water bodies Ribbon development along Delhi-

	<p>Scenic beauty of surrounding hills, mountains, river and green areas</p> <p>Better connectivity with other important cities</p> <p>Good weather and religious character of the place attracts people</p> <p>Good potential for development of eco tourism and adventure tourism activities on Najibabad Road</p>	<p>Niti Pass leading to traffic congestion</p> <p>Rapid and unplanned development in the last two decades</p> <p>Deterioration of infrastructure services in congested city areas</p> <p>Encroachments in the old city areas and Ghats</p> <p>Lack of developed land for affordable housing</p> <p>Scattered development in peri urban areas without proper infrastructure facilities</p>
Water Supply	<p>Good quality water available from tubewells and infiltration wells.</p> <p>Savings in treatment cost – tubewells and infiltration wells provide clean water.</p> <p>Water supply Master Plan already prepared</p>	<p>Huge Unaccounted for water</p> <p>Water charges too low considering the higher cost of production</p> <p>Some of the tube wells and Pumping plants are old need replacement.</p> <p>Zones being open – cause unequal distribution.</p> <p>No stand by Power Supply</p>
Sewerage	<p>More than 80 % Sewerage collection.</p> <p>Highly aware and sensitive public on River Ganges Pollution.</p> <p>Highly skilled and promising staff for effective maintenance of sewage pumping stations and STP.</p>	<p>Only 60 % sewage is treated.</p> <p>Clogging of sewer lines due to solid waste.</p> <p>No revenue from this sector</p>
Drainage	<p>Adequate natural gradients available for achieving self cleansing velocities for open and under ground drainage</p> <p>Good soil strength to provide foundation for rectangular drains</p>	<p>Local habits of discharging wastewater into drains</p> <p>dumping garbage into drains</p> <p>uncontrolled encroachment of waterways, even on slopes of rivers</p>
Solid Waste Management	<p>Support available from GoU</p> <p>Desire of citizens for a clean city</p>	<p>Non availability of suitable disposal site in close proximity to city</p> <p>Little segregation at source</p> <p>Poor primary collection</p> <p>Indiscriminate dumping of waste in Stormwater river, drains and nallas</p> <p>Inability of civic authorities to handle SWM during fairs and festivals</p> <p>Lack of awareness and motivation</p>

Roads, Parking and Public Transportation	Availability of construction material such as ballast, boulders, sand, etc from river beds Road construction activity from funds available for Kumbh and Ardh Kumbh Mela	Very high cost of land Removal of encroachments from roadside Non availability of labour Very high floating population
Governance and Institutional	Initiative of the state to bring about reforms in the present institutional structure to improve urban governance	Civic administration is thrown out of gear during religious fairs and festivals especially during Kumbh Mela Major municipal functions have not been devolved to HNPP Multiplicity of development authorities Lack of coordination among authorities Poor Institutional capacity

Table 35 : Strengths and weakness analysis

Table: Analysis of the Opportunities and Threats regarding planning Issues in Development Area : Haridwar.		
Sectors	Opportunities	Threats
Physical Growth and Urban Environment	preparation by TCPD Suitable terrain and better accessibility towards west for future development Opportunity to enforce development controls to ensure environmental friendly urban growth	Unauthorized construction on parks & open spaces, Kumbh Mela areas Conversion of rich agriculture land including orchards for developmental purposes in peri urban areas Soil erosion from Bilwa Parvat (Mansa Devi Parvat) Disaster prone area Unplanned growth could lead to degradation of eco-system
Water Supply	Stakeholders have shown a willingness to pay more for better services State Govt., Institutions and Individuals have shown a strong commitment to improve the town during vision exercise	Water tariff revision may face some opposition from Commercial Consumers and individuals. Tampering with the sanctioned connection by some consumers.

Sewerage	Better Environment for residents and tourists. Re-use of treated sewage and sludge for agriculture Use of biogas from STP as a fuel for Dual-Fuel Generating sets.	Complete dependence on grant from GoU for O & M expenditure
Drainage	Willingness of the stakeholders to bring about positive change in the system and ready to bear some of its responsibility	Opposition from encroachers, and industrial and commercial quarters The present momentum getting lost due to undue delay in implementation
Solid Waste Management	Scope for segregation of bio degradable waste Scope for decentralization of waste collection and treatment Collect and treat organic waste from the decentralized fruit and vegetable markets and slaughter houses	Present disposal of waste along Najibabad Road in close proximity to reserved forests Widespread use of polythene Sudden swell of pilgrims during religious occasions disrupts the solid waste management
Roads, Parking and Public Transportation	GoU is focused about need for providing improved and adequate facilities Interest to introduce MRTS	Removal of encroachment from Roadside Public resistance towards acquisition of land for construction of bypass and off street parking
Governance and Institutional	New Municipal drafted by GoU is expected to empower the ULBs in conformity with the provisions of 74th CAA Uttarakhand being a new and a special category state, lot of scope for innovative approaches for streamlining development process	Gradual narrowing of the role of Haridwar NPP due to increasing number of parastatal bodies and special committees like Mela Committee Capacity building of all the government organizations if inadequate would result in non implementation of several reforms Continuation of centralized approach

Table 36 : Opportunities and Threats analysis

Chapter 9: STRATEGIES FOR DEVELOPMENT

9.0 Strategies for Development

9.1 Economic Development

Haridwar will emerge as a unique city with rapid economic growth and promotion of pilgrimage by restoring its cultural heritage. The impact of two factors viz. large investments in industries which are expected to be made in the coming years; the planned infrastructure and institutional improvement with financial assistance of the ADB and the Infrastructure Development Fund will widen employment opportunities both in secondary and tertiary sectors. Consequently, an economic development strategy for the city ought to be in place. This must be balanced against: (i) the need for conservation and enhancement of the existing cultural, historic and religious assets of the town, and (ii) the expressed desire of citizens to retain 'clean and green' new city areas.

9.1.1 Economic Development Strategy

The city economic development strategy may include:

- Acquire and develop land for creating industrial estates, for meeting the demand of individual industries, and for housing complexes in tune with the Physical Growth Initiatives and zoning control.
- Provide for uninterrupted power supply.
- Install an earth station at Haridwar.
- Promote public-private partnership in the development of infrastructure.
- Provide a truck terminal, perhaps in joint venture with private sector, and promote shopping complexes.
- Upgrade connectivity, road, rail, other communication.
- Create warehousing facilities.
- Prepare and activate Disaster Management System to be in readiness at all times.
- Develop satellite townships and relocate Government Offices away from hustle bustle of old religious overcrowded city areas.

- Upgrade infrastructure for pilgrims and high end tourists.

9.2 Physical Growth and Urban Environment

To restore the character of each area and maintain a balance between various activities areas, the growing city of Haridwar should be perceived as different zones for future development.

The present city area is identified and classified in two zones for future development:

I. Areas of historical significance -

- Old Town Area of Haridwar – primarily religious/spiritual in character – Temples, Dharamshalas, Gurukul Kangri, Kankhal, Har-Ki-Pauri and other Ghats

II. New City areas -

- Newly developed area – residential, commercial, institutional and support services
- Fringe areas – Upcoming townships due to industrialisation

The vision, strategies and action plans related to urban physical growth and urban environment are presented in Table below.

Table : Physical Growth Environmental aspects		
Vision and Goals	Issues	Strategies
Vision:	Physical urban growth is constrained by Shivalik mountain range in the North and Northeast and river Ganges in the South. Ribbon development along the main corridor of town creating traffic congestion Mixed land use in old areas Deteriorating environmental quality in old areas Encroachments along roads and on ghats Slums and squatter settlements along the river and canal	Old Town
To promote ecologically sustainable and planned development for citizens and the tourists		Area around Har-Ki-Pauri to be declared as a “Special Zone” and should have controlled development. In the long term, this zone should have only public transport and pedestrian ways which entails provision of proper parking areas at suitable nodes.
Goals:		Conservation/ preservation of heritage buildings Remove encroachments from heritage precincts Identify and develop norms for ecologically fragile areas and preparation of natural disaster mitigation plan
To restore the historical character of the old town		Widening of Upper road as well as development of alternate routes to Har-Ki-Pauri.
To integrate development in the peri urban areas		Strict enforcement of development controls to restrict construction activities in old town areas Revision of byelaws to include appropriate controls and architectural guidelines for built structures to enhance aesthetics
To preserve and conserve the environmental and		Improve old congested areas of Jwalapur and Kankhal New town areas Urban Growth Directions

<p>ecologically sensitive areas</p>	<p>Acute congestion in Jwalapur due to unorganized growth Unauthorised construction on undeveloped land Lack of affordable housing. Encroachments on undeveloped open spaces Lack of recreational facilities. Increased pressure due to large scale industrial development by SIDCUL in Roshanabad</p>	<p>Promote Growth in areas with good connectivity, availability of land for expansion and suitable terrain for development. Future development should be promoted towards west Future development on Laksar road should be regulated to preserve the rich agricultural fields Restrict development on Najibabad Road. Eco-tourism based activities should be encouraged on Najibabad Road Strict enforcement of development controls to preserve hills, forests and rivers Housing and Built Environment Provision of affordable housing and serviced land for residential development Revision of byelaws to promote inclusive and adequate built infrastructure in the new city areas. Promote architecture which respects the status of Haridwar town and is compatible with the surroundings while effectively meeting the demand for future growth Prepare land management policy to check encroachments and unauthorised construction especially on open spaces Preserve and enhance the green areas, parks, gardens, river-side plantation and Islands Identified open spaces to be developed with parking, community facilities and landscaping Industrialisation Master Plan should include land use provisions and zoning regulation for environment friendly industrial development Strict enforcement of zoning regulations to ensure planned development particularly in respect of location of industrial units</p>
	<p>Environment Pollution due to increased vehicular traffic Pollution of the the River Ganges Monitoring of air and noise pollution Collection, Transportation and Safe Disposal of Solid waste</p>	<p>Provide adequate provisions for parks, green belts and plantation of trees at the planning stage for development of an area. Protection of environmental resources such as forest, land and water body Plantation of appropriate tree species on the existing roadsides and conducting regular tree census Adequate protective measures to prevent landslide from the Mansa Devi Hill. Framing bye laws to incorporate environment protection at city level. City greening by involvement of private sector, NGOs</p>

	Land Slide from Mansa Devi Hill	<p>and citizens groups</p> <p>The new master plan should address Environmental aspects e.g., river pollution, prevention of soil erosion from the surrounding hills and natural hazards</p> <p>Necessary measures to make it mandatory for use of alternative fuels (i.e. CNG)and improve traffic management system of the city</p> <p>Compliance of the MSW (Management & Handling) Rules, 2000 including identification and selection of alternative landfill sites and composting for safe disposal of MSW of the city.</p> <p>Wider coverage of the city by sewerage network and house connections and providing treatment facilities of the sewage for its safe disposal.</p> <p>Proper maintenance of the existing sewers and water supply pipelines to ensure minimum leakage.</p>
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Table 37 : Physical Growth Environmental aspects

9.3 Water Supply

9.3.1 Vision

The vision of this sector is “a clean and green city with integrated services for residents and floating Population and improved basic services in slums”

9.3.2 Strategies

In order to prepare a strategy to achieve the sector vision it may be advisable to refer to the National and State Policies on water. The National Policy emphasizes on:

- Drinking water must get the top most priority on water allocation.
- Adequate Safe drinking water must be provided to the entire population.
- Need to ensure that water charges must cover at least the operation & maintenance cost part of the capital cost subsequently.
- Private Sector participation in planning and management should be encouraged where ever feasible.

The strategies to achieve the vision of assured, good quality water supply to all citizens of Haridwar are:

1. Create computerized database of entire system built on GIS based mapping done by GoU and update continuously.
2. Reduce UFW in a progressive manner to achieve 15% UFW over the short term
3. Provide additional sourceworks to satisfy the demand of population.
4. Replace old and dilapidated pipelines including those that have come under roads due to road widening
5. Separate Zones to achieve control on distribution parameters and achieve equitable distribution
6. Achieve assured quality of supplied water by introducing routine water quality monitoring and disseminate information at municipal ward level; Enhance testing capability
7. Achieve Least Cost of production and distribution to consumers
8. Achieve at least 50% cost recovery over short term and maximum / full recovery over medium to long term.

9.4 Sewerage

9.4.1 Vision

The sector vision states that *“Haridwar will be a Clean and Green City and Pollution free”*.

The GoU is aware of this sector goal to have a pollution free sewerage system in the whole of the town.

9.4.2 Strategies

The strategies to achieve this vision are as follows:

- 100 % treatment of sewage.
- Sludge reuse for agriculture, horticulture, and ornamental purposes such as recreational parks.
- New technologies such as intermittent cyclic or sequencing batch reactor activated sludge process are needed to achieve high effluent quality, low land requirement, no odor, vector or nuisance and competitive operation and maintenance cost.

9.4.3 Action Plan for Haridwar Sewerage System

To cater to the current service gap as well as needs of the estimated population by 2025, following actions are required.

- Creation of Database of the existing sewerage system by GIS & sewer design software based mapping
- An additional 74.4 Km of sewerage network is proposed to be put in place in the by 2011-2012
- Rehabilitation of existing sewage pumping stations and 18 mld STP.
- Capacity augmentation and rehabilitation of rising mains
- Modification of 8 mld STP to 12 mld Sequencing Batch Reactor process

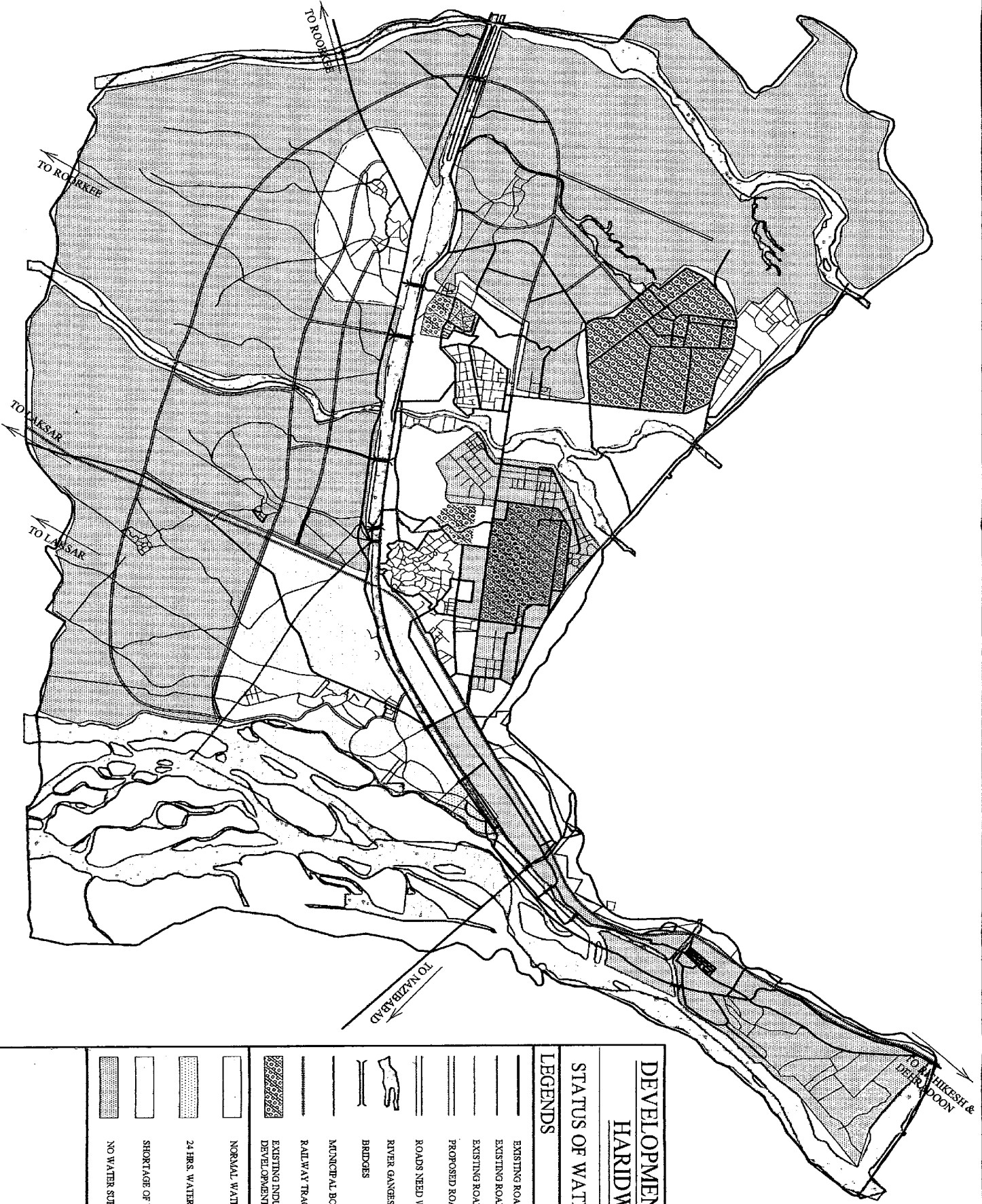
Other action plans and initiatives may be taken up concurrently. They are as follows:

- Prevention of entering municipal solid waste and silt in the sewer line.
- Keep sewer at reasonable distance from water line to avoid contamination.
- Improve and ensure access to sanitary services for the urban poor and slum dwellers.
- SCADA control system for sewage pumping station operations.
- Encourage pay and use category of public conveniences with community involvement in the maintenance of the same
- Cost recovery on service through the introduction of sewerage charges directly or in the form of tax or introduction of sewerage surcharge in the water bills from local residents, hotels and Dharamshalas. This however needs political will.

9.5 Storm Water Drainage

9.5.1 Vision

The sector vision states that “*Haridwar will emerge as a fast growing urban centre of the new state*”. Provision of Integrated Services for residents and floating population is the mainstay of this sector vision. The GoU is aware of this sector goal to have a problem free storm water drainage system in the whole of the town.

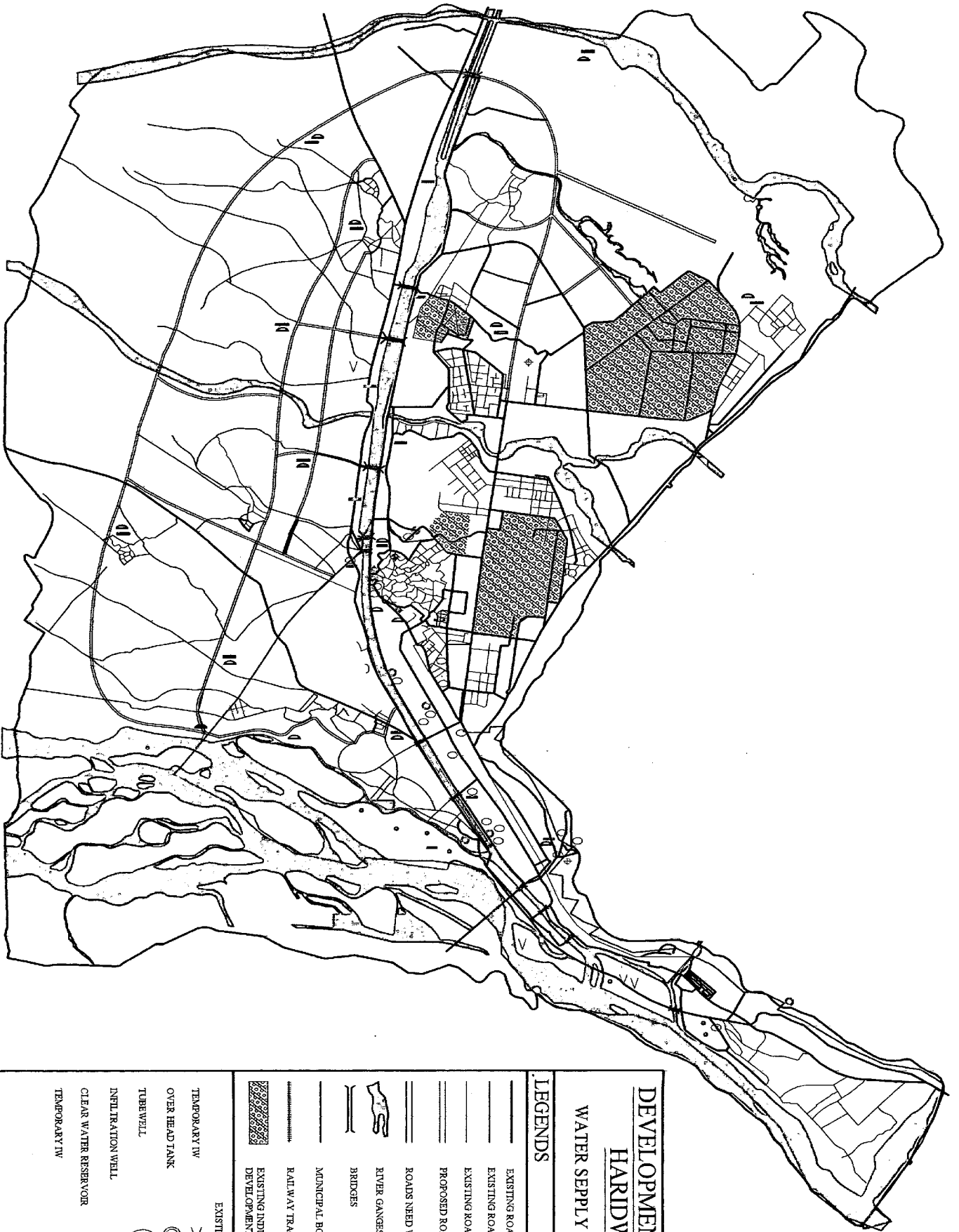


**DEVELOPMENT AREA :
HARIDWAR**

STATUS OF WATER SUPPLY.

LEGENDS

	EXISTING ROADS - ROW > 30M
	EXISTING ROADS - 15M < ROW < 30M
	EXISTING ROADS - ROW < 15M
	PROPOSED ROADS - ROW > 30M
	ROADS NEED WIDENING - ROW > 30M
	RIVER GANGES
	BRIDGES
	MUNICIPAL BOUNDARY
	RAILWAY TRACK
	EXISTING INDUSTRIAL AREA / DEVELOPMENT
	NORMAL WATER SUPPLY
	24 HRS. WATER SUPPLY
	SHORTAGE OF WATER
	NO WATER SUPPLY



DEVELOPMENT AREA :

HARIDWAR

WATER SUPPLY PLAN

LEGENDS

- EXISTING ROADS - ROW > 30M
- EXISTING ROADS - 15M - ROW < 30M
- EXISTING ROADS - ROW < 15M
- PROPOSED ROADS - ROW > 30M
- ROADS NEED WIDENING - ROW > 30M
- RIVER GANGERS
- BRIDGES
- MUNICIPAL BOUNDARY
- RAILWAY TRACK
- EXISTING INDUSTRIAL AREA / DEVELOPMENT
- EXISTING TEMPORARY IW
- PROPOSED TEMPORARY IW
- OVER HEAD TANK
- TUBEWELL
- INFILTRATION WELL
- CLEAR WATER RESERVOIR
- TEMPORARY IW

9.5.2 Strategies

The strategies proposed to achieve the above sectoral vision are as follows:

- Strict control against Dumping of Garbage in the drains.
- Awareness Campaign to educate the masses.
- Regular Cleaning and maintenance of drains.
- Banning the use of plastic bags (as achieved in other tourist towns).
- Discontinue the practice of connecting the Toilet outlets to the drains.
- Implementation of the comprehensive plan for Remodeling of the drainage system, starting from the tail ends and not from head or middle as is the adopted strategy some times.
- The practice of Diversion of surface drains in to sewers should be stopped.

9.6 Solid Waste Management

9.6.1 Vision

The sector vision states that *“Haridwar will be a Clean and Green City and Pollution free”*.

Solid waste management is one of the most crucial elements to achieve the vision. The sector vision and strategies are presented in Table.

9.6.2 Strategies

Table : Vision and Strategies for the Solid Waste Management		
Vision	Key Issues	Strategies
One of the most ‘Clean & Green’ Cities of the Country	<p>Non-compliance of the Municipal Solid Waste (Management & Handling) Rules, 2000</p> <p>No proper citywide solid waste quantification and Characterization</p> <p>No Segregation of waste at Source</p> <p>Primary Collection of waste is almost absent</p> <p>Less involvement of community and private agencies</p> <p>Improvement in SW</p>	<p>Prepare a comprehensive Solid Waste Management Master Plan</p> <p>Conduct long term campaign for waste segregation and minimization at the household level</p> <p>Improve t the primary waste collection by extension of door-to-door waste collection system including the slums.</p> <p>Improve present solid waste transportation system by efficient route planning and waste handling</p> <p>outsource part of the transportation activities to private agencies.</p> <p>Identify, select and develop alternative disposal sites to fulfill long term needs and safe waste disposal</p> <p>Decentralize SWM Circle office.</p>

<p>Transportation system</p> <p>Safe Disposal of Waste</p> <p>Health and Hygiene of Sanitary Workers</p> <p>Lack of Public Awareness</p>	<p>Set up separate cell in DNN for exclusive SWM purpose.</p> <p>Train and upgrade the knowledge and skill of the DNN staff.</p> <p>Frame bye-laws to comply with the MSW (Handling & Management) Rules, 2000 and empower the DNN to strictly implement the same</p> <p>Provide protective clothing to the workers</p>
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Table 38 : Vision and Strategies for the Solid Waste Management

9.7 Roads and Transport

9.7.1 Vision

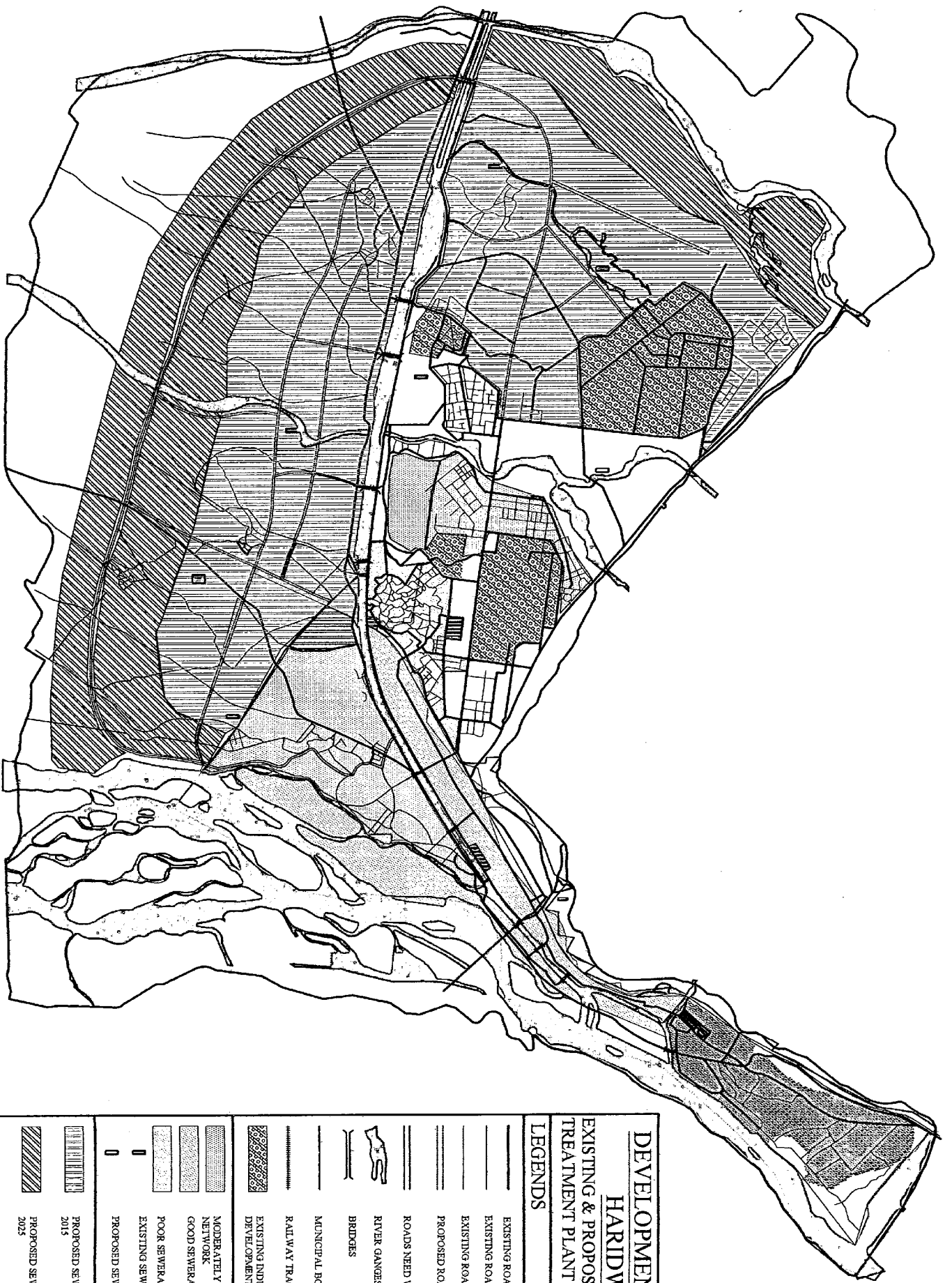
Efficient, Safe and Eco friendly Transport system.

The vision of the Roads and Transport sector for Haridwar city is to provide the citizens and tourists with a safe and comfortable transport system that is sustainable and environment friendly and to significantly improve the share and quality of public transport service that would improve the quality of life.

9.7.2 Strategies

Arising from the above sectoral vision, the following strategies are adopted:

- Ensure free flow of traffic through junction improvement, and providing sufficient off-street parking for both city traffic as well as floating traffic.
- To provide alternate routes, elevated roads, water ways and widened bridges for decongesting the traffic on the major traffic corridors in the city.
- To provide better and affordable public transport system.
- To improve the facilities for pedestrians and thus public safety. Intersections must be designed and operated for simplicity and uniformity. The design must keep the capabilities and limitations of drivers, pedestrians, and vehicles using intersections. It should be based on knowledge of what a driver will do rather than what he should do. All the traffic informations on road signs and markings should be considered in the design stage prior to taking up construction work. Any locations having merging diverging or crossing maneuvers of two



DEVELOPMENT AREA :

HARIDWAR

EXISTING & PROPOSED SEWERAGE TREATMENT PLANT

LEGENDS

- EXISTING ROADS - ROW > 30M
- EXISTING ROADS - 15M < ROW < 30M
- EXISTING ROADS - ROW ≤ 15M
- PROPOSED ROADS - ROW > 30M
- PROPOSED ROADS - ROW > 30M
- ROADS NEED WIDENING - ROW > 30M
- RIVER GANGES
- BRIDGES
- MUNICIPAL BOUNDARY
- RAILWAY TRACK
- EXISTING INDUSTRIAL AREA / DEVELOPMENT
- MODERATELY GOOD SEWERAGE NETWORK
- GOOD SEWERAGE NETWORK
- POOR SEWERAGE NETWORK
- EXISTING SEWAGE TREATMENT PLANT
- PROPOSED SEWAGE TREATMENT PLANT
- PROPOSED SEWAGE NETWORK UPTILL 2015
- PROPOSED SEWAGE NETWORK UPTILL 2025

vehicles are a potential conflict point. The main objective of the intersection design should be minimizing conflict points. The improvements measures normally include:

- Proper channelisation for the free left turn
- Footpath on approaches of the junctions
- Planned pedestrian zebra crossing
- Shifting of electric poles and cutting of trees (where absolutely necessary)
- Land acquisition/removing structures
- No parking on the approaches of the junction for at least 50m.

9.7.3 Pedestrian Facilities

Pedestrians are most vulnerable road users in cities. It is therefore necessary to provide better facilities for pedestrian movement in areas where pedestrian movement is predominant. Pedestrian facilities in terms of providing footpaths free of encroachment, pedestrian guard rails along footpaths in order to segregate them from the traffic on the road.

9.7.4 Off Street Parking

The phenomenal growth of vehicles has led to increased demand for parking. Being a religious city, there is a sudden increase of floating population on weekend and during Melas and hence there is sudden huge demand of parking to accommodate them. The problem has been further aggravated by the absence of adequate off-street parking facility in the proximity of traffic.

9.7.5 Public Transport System for Haridwar City

Presently Intermediate Public Transport (IPT) system of the city is providing services except for a small share by city buses for short and medium distance trips. With the expansion of the city and increasing of its population, it becomes difficult for IPT alone to meet the demand. There is a need to gradually eliminate the IPT mode and replace them with the better public transport systems; better quality buses which are affordable and also sufficient to meet the

city's travel demand. Minimum infrastructure such as bus bays, bus stands, terminals etc should be provided.

9.8 Power - Energy

It is a matter of concern that the annual per capita consumption, at about 350 kWh is among the lowest in the world and there are widespread shortages of power in almost all parts of the country. A large number of villages have no access to electricity at all. Households, farmers, commercial establishments, industries etc. are confronted with frequent power cuts, both scheduled and unscheduled. Power cuts, erratic voltage levels and wide fluctuations in the frequency are common. The consumers are resorting to captive power supply arrangements.

To mitigate the acute shortage of power in the country, we are faced with the challenge to enhance end-use efficiency and manage the power demands of the country for sustainable and environment-friendly development.

The total energy shortage today is roughly 8 per cent of the total demand and the peak shortage is roughly 13 per cent of peak demand.

S.No.	Existing 33 / 11 K.V. electric substation in Development Area: Haridwar.	No. of Electric sub stations	Capacity (M.V.A.)
1	33 / 11 K.V.A. substation, Laljiwala	1	2 x 5 = 10
2	33 / 11 K.V.A. substation, Bhoopatwala	1	3 + 5 = 8
3	33 / 11 K.V.A. substation, industrial Area, Haridwar	1	2 x 5 = 10
4	33 / 11 K.V.A. substation, Mayapur.	1	1 x 5 = 5
5	33 / 11 K.V.A. substation, Kankhal	1	3 + 5 = 8
6	33 / 11 K.V.A. substation, Shivalik Nagar	1	1 x 3 = 3
7	33 / 11 K.V.A. substation, Roshnabad	1	1 x 3 = 3
8	33 / 11 K.V.A. substation, Jwalapur	1	1 x 3 = 3



DEVELOPMENT AREA :
HARDWAR
LOCATION OF SOLID WASTE
DISPOSAL SITE

LEGENDS

- EXISTING ROADS - ROW > 30M
- EXISTING ROADS - 15M < ROW < 30M
- EXISTING ROADS - ROW < 15M
- PROPOSED ROADS - ROW > 30M
- ROADS NEED WIDENING - ROW > 30M
- RIVER GANGES
- BRIDGES
- MUNICIPAL BOUNDARY
- RAILWAY TRACK
- EXISTING INDUSTRIAL AREA / DEVELOPMENT
- EXISTING SOLID WASTE DISPOSAL SITE
- PROPOSED SOLID WASTE DISPOSAL SITE

	Total	8	50 M.V.A
<i>Source: Office of Executive Engineer, Electricity Distribution Division, Haridwar.</i>			
<i>Note :- An additional 132 K.v. substation is working in the boundaries of the Development Area : Haridwar but its coverage area is restricted to the industrial unit of Bharat Heavy Electricals Limited (B.H.E.L.) for industrial uses and supplies electricity to the B.H.e.L. township.</i>			

Table 39 : Existing electric substations in Development Area Haridwar

The major reasons for inadequate, erratic and unreliable power supply are:

1. Inadequate power generation capacity
2. Lack of optimum utilization of the existing generation capacity
3. Inadequate inter-regional transmission links
4. Inadequate and ageing sub-transmission & distribution network
5. Large scale theft and skewed tariff structure
6. Slow pace of power reforms
7. Inefficient use of electricity by the end consumer

9.8.1 Vision:

1. To provide 'Power for all by 2012'
2. To provide reliable and quality power at an economic price
3. To achieve economically and environmentally sustainable power development
4. To promote general awareness to achieve consensus on power reforms

A comprehensive and integrated strategy is required after realistic assessment of our strengths and challenges facing the power sector. The strategy must integrate the supply side imperatives with demand side management, short and medium term measures with long-term action plans and operational measures with institutional and structural changes

The captive power capacity in the state is estimated at about 2,000 MW. One of the options available to increase generation in the short term is to enable surplus captive power capacity to flow into the Grid. Accordingly, a comprehensive captive power generation policy needs to be adopted with facilities for purchase of power and wheeling of surplus power from captive generating plants.

9.8.2 Strategy

Capacity creation through Energy Efficiency & Demand Side Management

In order to minimize the overall requirement and cost of power, energy conservation and DSM have been accorded high priority. Some of the steps that could be taken to implement an effective programme in end-use energy efficiency and DSM are:

1. Installation of energy-efficient bulbs (CFL), tube lights and agricultural pumpsets
2. Installation of shunt capacitors in all DTs for power factor correction
3. Time of the day metering and differential tariff for peak and off peak hours

(Introduction of time-of-the day tariff will induce industries to shift production from peak to off peak period)

4. Strengthening of sub-transmission and distribution network through R&M
5. Energy audit, accounting and load flow studies
6. Suitable mass awareness in energy conservation programmes

9.8.3 Distribution reforms and Energy efficiency

The inability of state power utilities to pay has been the basic reason for poor private

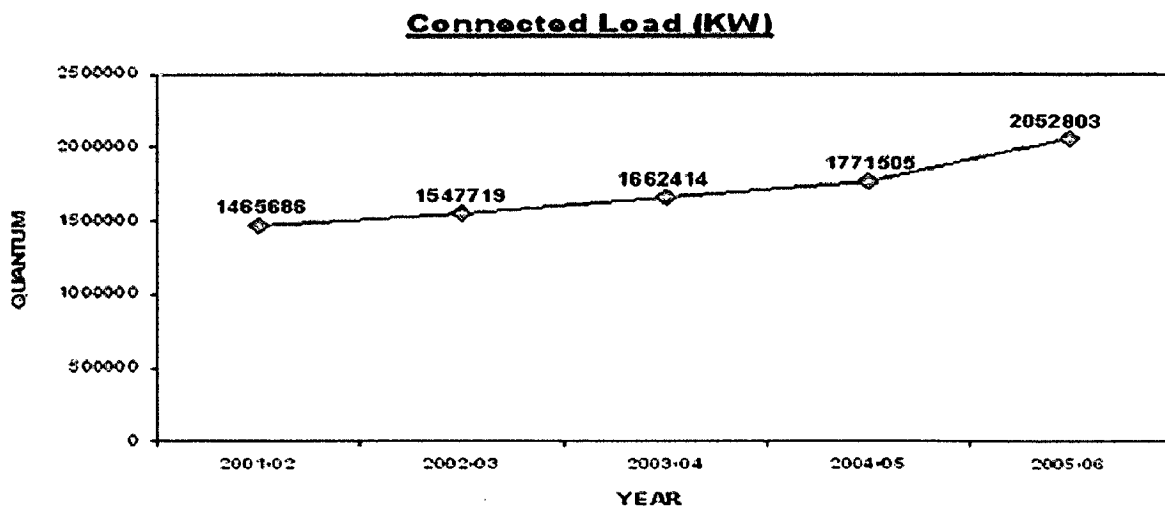


Figure 18 : Year wise connected loads at Haridwar.

investment, both domestic and foreign, in spite of liberalization of policies at Central Government level. Till the health of the state utilities improves, major investment from the private sector cannot be expected. The poor financial health of state utilities seriously affects their ability to invest in new generation capacity, to upgrade their T & D network and to undertake system improvement.

Distribution is the weakest link in the chain of power supply. Hence distribution reforms have been identified as the key area of focus in the power sector reform process. Huge T&D losses are a major cause of concern. A closer examination reveals that actual losses including theft and wrong classification could be in the range of 40-45%.

Distribution reforms and Energy efficiency are inter-linked processes. In order to reduce the T&D losses, and thereby

improving energy efficiency, the following measures have to be taken in right earnest:

1. 100% metering and AMR:
Installation of meters at all the transformation stages and in the premises of consumers, with the provision for accurate meter reading, will help to operate on the concept of “cost and profit centre”.

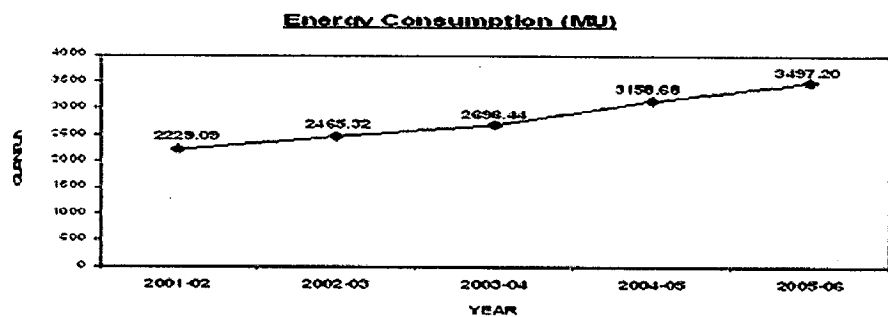


Figure 19 : Year wise electric consumption at Haridwar

2. Static (electronic) meters:

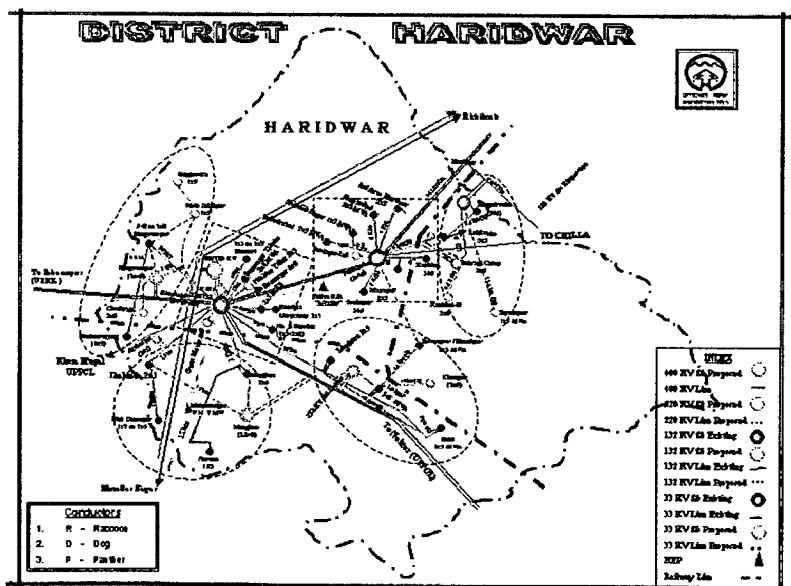


Figure 20 : Power grid map of Haridwar.

Installation of static meters on all 11 KV out-going feeders and distribution transformers (DTs)

3. Effective Management Information System (MIS): Both feeder and DT static meters will record active energy, power factor and load information. The data recorded in the static meters can be down loaded to a computer network and software packages will be effectively utilized to process the data for meaningful management of the distribution system. An effective MIS ensures effective flow of information to facilitate quick decision-making and to improve the operation and management of the distribution system.

4. Total energy accounting: The energy received in each 11 kV sub-station and 11 kV out-going feeders; energy billed and T&D losses at each of the distribution transformer shall be accurately accounted for. The implementation of energy audit and accounting system, with billing unit at subdivision level as the nodal point, the problem of commercial losses can be solved. This will help fix proper responsibility at the sub-divisional, divisional, circle and zonal levels.

5. Installation of capacitor banks & network reconfiguration:

Installation of capacitors at all levels; reconfiguration of feeder

lines & distribution transformers in such a way as to reduce the length of LT lines (to reduce technical and commercial losses) and make the system less LT oriented.

6. High Voltage Distribution System & re-conductoring: Installation of smaller size energy efficient distribution transformers so that each transformer supplies power to 10 to 15 households only; re-conductoring of over loaded sections.

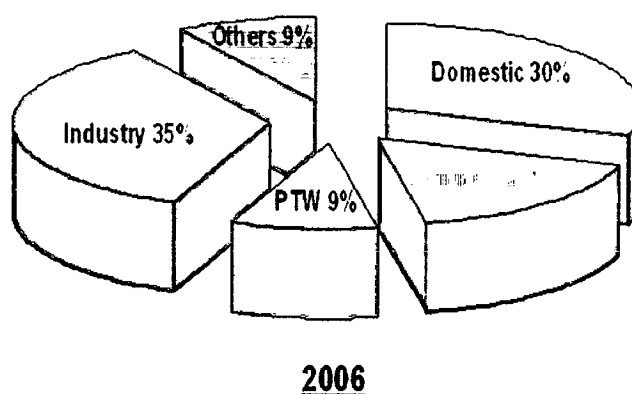


Figure 21 : Sector wise power consumption at Haridwar.

7. Development of digital mapping of the entire distribution system and load flow studies for better energy management.

9.9 Housing

9.9.1 Vision

“Affordable and accessible houses for all”

It was observed that due to shortage of housing, there was high incidence of unauthorized construction activities on undeveloped land. This issue still remains critical. There is a clear need to increase the supply of affordable housing for all. Land should also be made available for private developers with strict enforcement of norm of 20-25% housing for EWS in the housing project.

9.9.2 Strategy

There is a critical need of housing stock within the Development area: Haridwar as the concentration of the industrial developments is likely to be followed by the sudden influx of the migrating population which is estimated to be 35000 people by 2010.

The existing residential areas, namely Shivalik Nagar, Bhadrabad, Villages Rawli Mahdood, Roshnabad etc., are facing a tremendous pressure on the existing infrastructure like water supply, Sewerage system. Roads and transportation system etc.,

S.No.	Description	% age households	
1	Ownership status	Privately owned	79
		Rented	17
		Government / Public buildings	4
2	Age of the buildings	more than 50 years	13
		10 - 50 years	63
		Less than 10 years	24
3	Condition of the buildings	Fairly good	90
		Good	9

		Dilapidated	1
4	No. of stories	G + 1	73
		G + 2	26
		G + 3 and above	1
5	Available facilities	Water supply	97
		Electric power	96
		Kitchen	84
		Bathing facilities	90
		Lavatory	94
		Telephone	58
<i>Source: Haridwar development Authority (H.D.A.)</i>			

Table 40 : Status of available housing stock at Haridwar

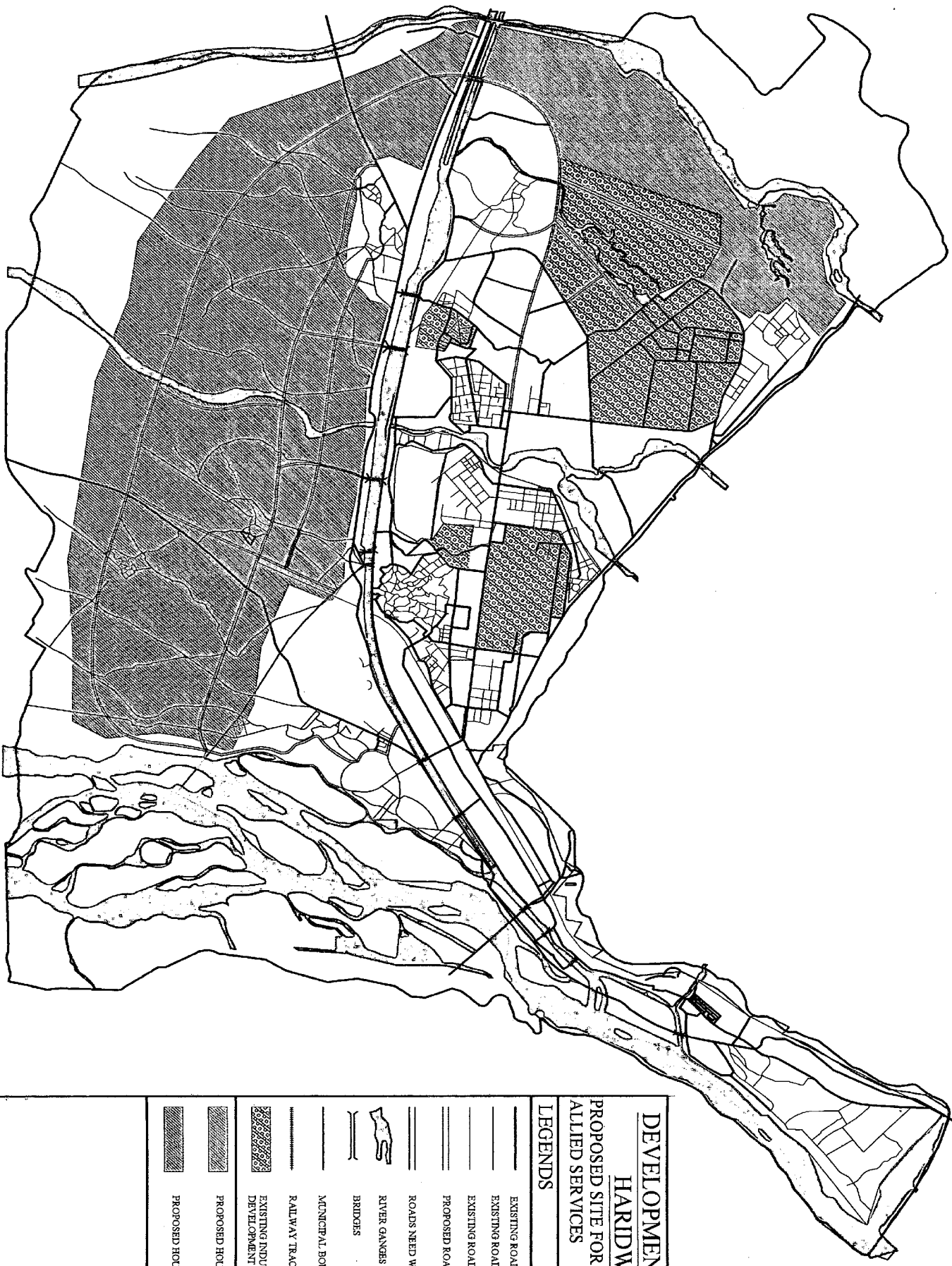
Table : Data on housing status on Urban areas of Haridwar (Existing and projected)				
Urban areas				
Year	No. of families	Available no. of Houses	Deficiency (No. of Houses)	Available houses per family
1981	22771	21773	998	0.96
1991	36430	36430	0	1
2001	40620	38952	1668	0.96
*2011	60000	60000	0	1
*2021	83958	83958	0	1
*2025	105111	105111	0	1
<i>Source: Census handbook departmental projections</i>				

Table 41 : Data on Housing in Urban areas

Careful selection and distribution of the residential sectors, comfortably augmented infrastructure and financial management coupled with the efficient operation and maintenance shall be the key to successful planning.

The following points must be considered:

- a) **Accessibility:** Easy and hassle free movement patterns from the source to the destination.
- b) **Scope for future expansions:** The design and site selection should be done so that it allows the future expansions of the residential sectors and also it accommodated the various economic classes of the society.



DEVELOPMENT AREA :

HARDWAR

PROPOSED SITE FOR HOUSING AND ALLIED SERVICES

LEGENDS

- EXISTING ROADS - ROW > 30M
- EXISTING ROADS - 15M < ROW < 30M
- EXISTING ROADS - ROW < 15M
- PROPOSED ROADS - ROW > 30M
- ROADS NEED WIDENING - ROW > 30M
- RIVER GANGGES
- BRIDGES
- MUNICIPAL BOUNDARY
- RAILWAY TRACK
- EXISTING INDUSTRIAL AREA / DEVELOPMENT
- PROPOSED HOUSING SITE UPTILL 2015
- PROPOSED HOUSING SITE UPTILL 2025

Table : Data on housing status on Rural areas of Haridwar (Existing and projected)				
	Urban areas			
Year	No. of families	Available no. of Houses	Deficiency (No. of Houses)	Available houses per family
1981	9682	9484	198	0.96
1991	14184	14184	0	1
2001	19163	19081	82	0.96
*2011	30000	30000	0	1
*2021	44600	44600	0	1
*2025	54889	54889	0	1

Source: Census handbook departmental projections

Table 42 : Data on housing status in rural areas

It is estimated that nearly 160000 houses will be required in the Development area: Haridwar covering an area of approximately 1280 Hectare of land for R-3 residential zone requirements. This big piece of land shall be and will be arranged by acquiring the Agricultural land only, since there is no other place available to capture in the vicinity of the industries.

Table 1 Data on I.I.E. Haridwar.....	12
Table 43 : Decadal population growth of Ludhiana.....	57
Table 3 : Literacy status of Ludhiana.....	58
Table 44 : Present land use pattern of Ludhiana.....	58
Table 5 : Water supply status and length of pipe lines.....	60
Table 6 Gap analysis of sewerage treatment capacities.....	62
Table 7 Lengths of sewerpipe lines.....	62
Table 8 Cost details of various projects.....	78
Table 9 : Decadal population growth in Haridwar.....	80
Table 10 : Age-Sex distribution and Sex ratio.....	81
Table 11: Age Sex Distribution of population in Development Area: Haridwar.....	82
Table 12 : Literacy status of Haridwar.....	82
Table 13 : % distribution of occupation by age.....	83
Table 14 : Data on Income.....	83
Table 15 : Data on expenditure and savings.....	84
Table 16 : Distribution of Population by Household composition and possession.....	85
Table 17 : Migration of population in Haridwar.....	85
Table 18 : Source of drinking water.....	88
Table 19 : Data on sanitation and sewerage disposal.....	89
Table 20 : Data on drainage and water logging frequency.....	90
Table 21 : Priority of infrastructural services.....	91
Table 22 : Data on mortality in 2006 due to bad sanitation conditions.....	92
Table 23 : Industries and workforce relationship.....	95
Table 24 : Issues and proposals in Master Plan 2001.....	99
Table 25 : Household analysis in development area.....	99
Table 26 : Housings planned by Haridwar development Authority.....	100
Table 27 : Status of available housing stock in Development Area: Haridwar.....	100
Table 28 : Characteristics of the Water Quality of River Ganges at Haridwar.....	104
Table 29 : availability of water from various sources.....	107
Table 30 : Source of drinking water (household % age.....	109
Table 31 : status of water supply in Haridwar.....	111
Table 32 : Service levels of sewerage system.....	113
Table 33 : Solid waste generation from various sources.....	118
Table 34 : Vehicles registered in Development Area.....	125
Table 35 : Strengths and weakness analysis.....	134
Table 36 : Opportunities and Threats analysis.....	135
Table 37 : Physical Growth Environmental aspects.....	142
Table 38 : Vision and Strategies for the Solid Waste Management.....	146
Table 39 : Existing electric substations in Development Area Haridwar.....	149
Table 40 : Status of available housing stock at Haridwar.....	154
Table 41 : Data on Housing in Urban areas.....	154
Table 42 : Data on housing status in rural areas.....	155

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