PROLOGUE

Baddi-Barotiwala-Nalagarh Special Area is strategically located in the lap of Shiwalik foothills of the Solan District. By virtue of peculiar setting NH-21A passes through the centre of BBN Special area from south to north direction. Though entire industrial corridor starting from Parwanoo to Nalagarh along the foothills of the Shiwaliks, is emerging an urban agglomeration, yet Baddi Barotiwala Nalagarh is most important industrial belt of the State. This area is fast developing as industrial hub, and is most popular among entreneurs because of its geographical edge over other area of the State on account of nearness to **city beautiful Chandigarh**, nearness to broad gauge Rail head at Kalka, adequate developable land, better accessibility and availability of basic infrastructure.

The BBN Special area has immense potential to accommodate the thrust of Industrial pakage notified by the Govt. of India for Himachal Pradesh in June 2003. Keeping in view the State Govt extened the provisions of HP Town & Country Planning Act, 1977(Act No, 12 of 1977) to entire 318 Sqm. kms of BBN Special area. The HP Town & country Planning Act, 1977 was extended in the year1985 in Barotiwala and Nalagarh segment of this part of District Solan. The pace of development, in fact, commenced after grant industrial pakage for HP by the Govt of India. After accouncement of industrial package industries have started to be set up each nook and corner of BBN Special area with out taking care of spatial planning resulting in haphazard development, unplanned and mis-match infrastructure and chaotic development started. Accordingly, a technically viable document, acceptable to the masses is required to be prepared with consultancy services of the School of Planning, CEPT University for BBN Special aread under the HP.TCP Act, 1977.

In order to guide the physical growth of BBN Special area a comprehensive document has been prepared in the shape of **Development Plan-2025** considering or clubbing the Baddi and Nalagarh planning areas and by assessing the achievements of previous plans on one hand and perspective requirements up to 2025 on the other, encluding socio-economic and physical reguirements. The Draft Development Plan-2025 was notified vide State Government Notification dated **13-8-2008** for public objection and suggestions. The Draft Development Plan-2025 was finalised by taking objections and suggestion from the various groups of the society viz NOGs, Local Bodies, Industrial Association, and all concerned Departments and Bords/Corporation under State Govt Apart from this a series of meetings and discussions were also held by the consultant with the BBNDA team and other stakeholders wherein the scope of work and the overall spatial planning vision were discussed.

The BBN Special area has **229** revenue villages and **2** urban local bodies. It has flat topography having numerious nallahs, which flows from east to west directions as per the morphological structure of region. The entire BBN Special area has bounded by hills at east and lower hills on west side and geographically, area has a linear form.
This report incorporates the following key feature.

- Traffic studies of major corridors.
- Conclusions of focus group discussions and household surveys.
- Updated existing land use for the BBN Special area.
- Conducted a Land Potential Analysis to complement the Land Suitability Analysis and help identify the net developable areas.
- Made subsequent modifications in the Program Brief and Activity Structure.
- Refined the Development Plan-2025 as per suggestions received over the Draft Plan.

This Development Plan has been contemplated for entire BBN Special area of which 25 percent is not suitable for development purpose as it is covered by water bodies, forest and undevelopable land where in development permission shall not be allowed under provisions of HP Town & Country Planning Act, 1977. Out of this total land 15 percent has already been developed under various urban uses viz residential, commercial, industrials, public & semi-pubic and park and open space. Net developable land is 60 percent of the total land, which has been further proposed for variuos urban uses, accommodation of anticipated population as well as agriculture use up to the plan period of 2025. As per Census 2001, the population of the BBN Special area is 144564 persons. Accordingly it has been projected for the year 2025 which is likely to **430,260** persons including 150, 000 persons as floating population including laboureres & factory workers. All projections as required in Development Plan-2025 have been worked out based on scientific method as per the UDPFI and NBC guidelines and other directions/guidelines Ministry of Urban Development, GOI.

In view of potentials and propensities of BBN Special area, a sizable sector is proposed to be established there to cater to the needs of local transportation, trade, industry and modern technological requirements of the area. As the site characteristics are similar to that of City Beautiful Chandigarh which was planned and designed by renowed Town Planner, LeCorbusier. The planning of this new city revolves around the principles of living work, play and circulation. The basic concept for BBN Special area revolves around the principles of Corbusier's spatial planning.

PART I –
INTRODUCTION & PROJECT BRIEF

CHAPTER 1: BACKGROUND

1.1 Himachal Pradesh State Profile

Himachal Pradesh, a northern State of India, is spread over 55,780 square kms, with a population of 60,77,248 (2001 census) and density of 109/km². Himachal Pradesh is divided into 12 districts namely, Kangra, Hamirpur, Mandi, Bilaspur, Una, Chamba, Lahul & Spiti, Sirmaur, Kinnaur, Kullu, Solan, and Shimla.

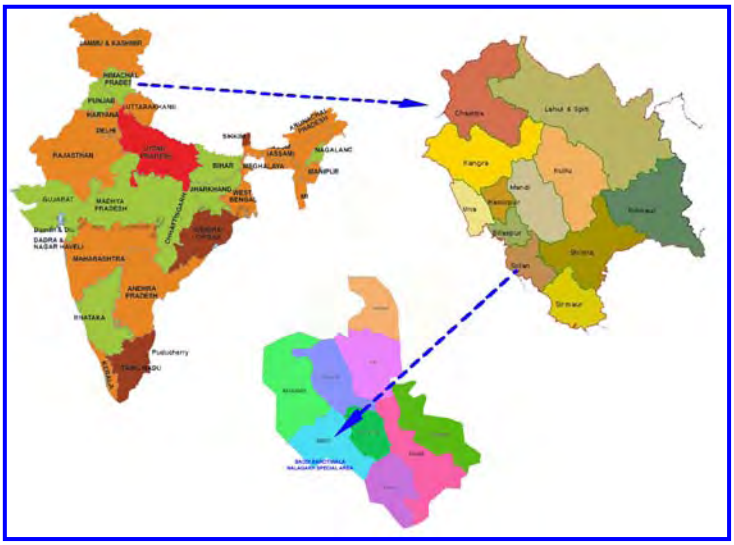


Fig.1.1.Location of Map of BBN Special area

The population of the State increased by 17.53% between 1991-2001. The sex ratio in 2001 was recorded as 970, which has declined from 976 in 1991. Himachal Pradesh has one of the highest literacy rates in India. The literacy rate increased from 63.94% in 1991 to 77.13% in 2001. There are over 10,000 primary schools, 1,000 secondary schools and more than 1,300 high schools in Himachal. In meeting the constitutional obligation to make primary education compulsory, Himachal has now became the first state in India to make elementary education accessible to every child in the state.The State has made significant progress in road connectivity in the last few decades. Himachal Pradesh at present has the highest road density among the hill states of India. There are three airports in the state, but is not very well connected by railways. Most of the important places of Himachal Pradesh (H.P.) are well connected with the roads. Eight National Highways (NH) passes through the state with a total length of 1235 km. Few of the roads get closed during winters and monsoon seasons due to snowfall and landslides respectively.

Main source of economy in Himachal Pradesh lies in agriculture, tourism and industries.Tourism plays a significant role due to the rich cultural heritage and scenic beauty of the State. Agriculture contributes nearly about 45% to the net state domestic product. It is the main source of income as well as employment in the state, providing direct employment to 71% of the population. Fruit growing in the state

fetches over Rs.300 crore annually. Industrial growth in Himachal Pradesh, until a few years ago, was limited. Lack of means of dependable transport and poor accessibility was one of the major drawbacks. Other problems faced by the state were the poor mineral resources, non-availability of infrastructure and communication facilities, shortage of capital and lack of modern skills. The only plus point of the state was the ample availability of electricity during the last three years however, industrialization has made significant progress. The share of industries and services sectors respectively have increased from 1.1 & 5.9 percent in 1950-51 to 15.9 & 17.3 percent during 2004-05. The rich natural resources of the state are ideally suited for investment in three major sectors namely industries, hydroelectric power & tourism. The grant of special package of incentives by the Central Government has acted as a catalyst in boosting industrial development in the state. Parwano, Barotiwala, Baddi, Paonta Sahib, Mehatpur, Shamshi, Nagrotu Bagwan, Bilaspur, Reckong Peo and Sansarpur terrace are some of the areas of the state with high industrial growth.

1.2 Solan District Profile

Solan became a district of Himachal Pradesh in 1972. It was carved out of Solan and Arki tehsils of the former Mahasu district, and Kandaghat and Nalagarh tehsils of the erstwhile Shimla district. Solan district is thus made up of four sub-divisions (Solan, Nalagarh, Arki and Kandaghat) and has five tehsils (Arki, Kandaghat, Kasauli, Nalagarh and Solan) and two sub-tehsils (Kuthar and Ramshehar).

Fig.1.2 Solan Distt Profile

Solan district is spread over an area of 1936 sq. km, with a total population of 4, 99,380 persons. Solan has an average elevation of 1467 metres (4812 feet) above mean sea level. The highest point is atop Mt. Karol. Blessed with a pleasant climate all year round, Solan gets light snowfall in the winters. Solan is known as the industrial and commercial district of HP. It has attracted large industrial investment with Baddi, Barotiwala, Nalagarh and Parwanoo being home to most of the industries. Solan also has the largest share of approved industries post January 2003 after the concessions were announced by the State Government.

1.3 Baddi-Barotiwala-Nalagarh Special Area

Fig-1.3 Location of BBN Special area in Solan Distt.

The Government of Himachal Pradesh has constituted Area Development Authority under section 66 of the HPTCP,1977 for comprehensive and regulated development of Baddi-Barotiwala-Nalagarh Special area under the name and style of Baddi-Barotiwala-Nalagarh Development Authority.

The special area forms part of Baddi and Nalagarh Tehsil in Solan district and falls under Nalagarh and Dharampur Development Block.

Geographically, Baddi-Barotiwala-Nalagarh region lies in the lap of outer Himalayas forming part of Shiwaliks hills. The region is characterized by undulating topography lying in the periphery of Solan district. It is bounded by Shiwalik hills in the east, low hills on the west, plains in the south, which run contiguous with the plains of Haryana State and plains of Punjab on the north. This region is well know on the map of South Asia as a pharmaceutical hub for manufacturing of drugs. By virtue of its locational aspect it has good connectivity with neighboring states; therefore, entrepreneurs have prefered to establish their manufacturing units in the region. On the other hand, Govt. of Himachal Pradesh has been made friendly industrial policy in order to boost the industrial activities and provided facilities to enterpreneures for investment.

Fig-1.4 Industrial Area Jharmajri- EPIP-I

In view of region's potential for various urban development, HPTCP Act 1977 was extended to area in the year 1985. Subsequently landuse were frozen and Interim Development Plans prepared for Barotiwala and Nalagarh Planning area.

1.4 Review of Interim Development Plan Barotiwala and Develoment Plan of Nalagarh Planning Area.

Earlier plans were prepared only for an area of 7305 hactares in which 57 revenue villages were included in the Baddi-Barotiwala and Nalagarh Planning area as HP TCP Act,1977 was first time extended to area in the year 1985 in a phased manner for physical growth. In the year 2005, 28 revenue villages, in 2006, 20 revenue village and 2007, 124 revenue villages were included. As on date 229 revenue villages and 2 municipal councils have been under the ambit of Act. However, previous plans had been contemplated with strategic suggestions for sustainable spatial planning as illustrated below :

a. To inculcate a culture for planned and regulated development of the region as a whole.

b. Stringent regulations and penalties with respect to violations in construction activities and encroachments.

c. Conservative surgery of old areas of Nalagarh town and Baddi town.

d. As 1/3rd width of the road is occupied by vehicular parking the same is required to be restored for vehicular movement by provisions of parking lots at strategic locations.

Fig-1.5 Natural profile of area.

e. The regional arterial roads taking off from the parallel roads on eastern and western side are required to be widened, improved and developed. At places, where their width is narrow, bye passes are required to be constructed in order to minimize haphazard traffic movement on NH 21A.

f. To make the area a destination for entrepreneurs at global level, by making it attractive by virtue of its peculiar setting and creating conducive environment for industries by providing infrastructure, facilities, services, marketing and transportation.

g. To avoid ribbon development along major regional roads, like Pinjore-Swarghat NH 21A, Nalagarh - Ropar SH and Nalagarh-Bharatgarh roads.

1.5 Area structure of IDP/Development Plan

The H.P Town and Country Planning Act 1977 was extended to Barotiwala and Nalagarh Planning area in the year 1985. Accordingly Interim Development Plan and Development Plan were prepared under provisons of HP TCP Act,1977for two

segment of area popularly known as Barotiwala and Nalagarh Planning Area respectively. The plan was formulated for an area of **7305 hactares**, out of which **89.86** percent of area was fall under Barotiwala Planning area and **10.13** percent Nalagarh Planning area. The detailed land use structure as worked out under IDP/DP has given at table

Table 1.1 Land Use Compositions for Barotiwala & Nalagarh Planning Area.

Sr. No.	**Land use**	**Land Use wise area (hactores)**	**% age to total area**
01.	Residential	86.75	1.19
02.	Commercial	26.1	0.36
03.	Industrial	175.36	2.40
04.	Facilities & services	14.78	0.20
05.	Parks & Open Spaces	0.31	0.00
06.	Govt. & Semi Govt. Offices	2.99	0.04
07.	Traffic & Transportation	65.69	0.90
08.	**Total area**	**371.98**	**00.00**
09.	Agriculture & Greens	6763.09	92.58
10.	Rivers/Nallah/ Water Bodies.	169.93	2.33
11.	**Grand Total**	**7305**	**100.00**

Source: Interim Development Plan for Barotiwala & Development Plan for Nalagarh Planning Area.

1.6. Proposals of Development Plan-2006 prepared for BBN Special area

Projections

a. Population of BBN Special Area is anticipated to be 4.35 lacs by the year 2021.

b. 60 percent of population shall directly be dependent on the industrial or secondary sector, 30 percent of the population on the tertiary and 10 percent on the primary activities by the year 2021.

c. As 38 percent of the total population is anticipated to be workforce, there are likely to be 1,65,565 workers by the year 2021.

1.7 Main features of Proposal

The Development plan strives to make the Baddi-Barotiwala and Nalagarh Special Area a destination for entrepreneurs at global level, by making it attractive, by virtue of its peculiar setting and creating conducive environment for industry, infrastructure, facilities, services, marketing and transportation. Some of the key features of the Plan include:

a. Incorporation of the Interim Development Plan Baddi-Barotiwala (1995), Revised Development Plan (2004), along with small alterations.
b. Incorporation of the Nalagarh Development Plan (2000) along with minor alterations.
c. Development of four major nodes, namely Baddi, Barotiwala, Nalagarh and Panjehra on northern side, with an anticipated opulation of 1.2 lacs, 0.8 lacs, 1.0 lacs, and 1.35 lacs respectively.
d. Grid-iron pattern of roads, creating sectors/ zones, with different landuses. Proposed two main arteries on the eastern and western side, parallel to the NH-21A.

Issues

a. Land constraint due to hill ranges, streams, rivulets, seasonal nallahs and reserved forests.
b. Ribbon development along major regional roads, like Pinjore-Swarghat NH 21A, Nalagarh - Ropar SH and Nalagarh-Bharatgarh roads.
c. Fragmented development of the town area, resulting in a non-coherent built environment.

It is further submitted that Development Plan 2006 prepared by the Deptt of Town & Country planning, Shimla was finally not approved by the competent authority. Morever figures and survey works were not conducted while Plan was formulated for this area. Hence its salient features are not used in new DP-2025.

1.8 Need for a Comprehensive Development Plan-2025 for Baddi-Barotiwala-Nalagarh Special Area

In order to address the spatial planning issues of this part of District Solan a comprehensive Development Plan is foremost required to be prepared under provisions of HP Town & Country Planning Act, 1977. The pace of development is very fast due to industrialization and urbanization as compared to other areas of the State. There is also high influx of prospective enterpreuners on account of availability

of developble land, better linkage with other cities of neighbouring States as well as suitable climate for industrial development. Hence a perspective plan document is foremost required and it will help in assessing the long term requirements both in physical and financial terms and shall act as a vision document for all future activities related to physical, socio-economic and built up environment as per provisions of Act.

The enire developmental activities of BBN Special area are required to be governed in accordance to HP TCP Act,1977 and Rules1978. HP TCP Act, 1977 has made mandatory to preparation of Development Plan for the local area indicating the proposed land uses, land use zoning for residential, commercial, parks and playgrounds, pubic and semi-public, industrials, agricultural, recreational, educatial and other public purposes, circulation pattern, and a set of zonal regulations. It also contemplates for Town Planning Schemes for the planning/ special areas for planned and regulated development. The Town planning schemes contains for the laying of new streets, reconstitution of plots, provisions of amenities and other facilities etc.

The BBN Special area an area of **318** sq km where in HP TCP Act,1977 has been enforced. Under the notified area other line, Departments/agencies have developed a number of industrial areas at different locations in the Baddi-Barotiwala-Nalagarh Special area. The Department of Industries has set up Industrial areas at Baddi, Barotiwala, EPIP Phase-I at Katha Bhatoli and EPIP Phase-II at Thana. The Himachal Pradesh State Industrial Development Corporation (HPSIDC) and Himachal Pradesh Housing & Urban Development Authority (HIMHUDA) have also developed industrial areas in Baddi & Barotiwala.

This area is potential for future growth so Govt. has assigned the formulation of Development Plan-2025 to the consortium of consultant CEPT School of Planning, Ahmedabad to address the requirements and balance with the location's resources and factor endowments. The State Government of Himachal Pradesh intends to have this area developed based on a detailed Development Plan and intends to spur the development in the region on Public Private Partnership (PPP) models. In order to guide it, a comprehensive Development Plan is required for regulated and planned development of regional nodes and avoid the ribbon development along the major arteries. Ribbon development along the Highways and even minor roads emanating from the town is a common feature. Increased commercial activity, unplanned physical growth and influx of migrants population along with construction labours have ruptured the fragile relationship between the built form and nature.

Development Plan is a blue print and future lay out of area. It controls the developmental activities and makes balance approach between environment and built form. Thus, Development Plan aims at controlling the future growth of town and along preconceived and predetermind paths. It is an ideal plan showing the full development of the town as well as regional level at some future date. At the same time, it should be sufficiently elastic. It is, therefore, not a fixed plan. But it is

possible to amend it from time to time to keep it in pace with and to accommodate the new developments of any revised estimate of the future growth and requirements of the town as well as regional nodes. Following are the reason which has lead to the thinking of having a Development Plan for the BBN Special area.

- To control the development of various uban uses in the systematic way;
- To discourage the growth of town in an unplanned and unscientific way;
- To give a perspective picture of a fully developed town;
- To limit to a certain extent the unprecedented flow of rural populationto the urban area and
- To offset the evils which have come up due to overcrowding of population such as acute shortage of houses, traffic congestion, inadequate open spaces and insufficiency in public amenities etc.

Development Plan -2025 revolves around features like

- Convenience and cheap means of transporation;
- Good sanitation and water supply;
- Population density control;
- Proper situation for places of workship, education and recreation;
- Rational layout and
- Width of roads.

CHAPTER 2: PROJECT BRIEF

2.1 Vision and Development Objectives

"To develop Baddi-Barotiwala-Nalagarh Special area as a modern economic region with the world class infrastructure and social amenities to address the future requirements and harmony with the ecological resources"

In order to achieve the vision perceived for the region the following objectives have been set up whose fulfillment will lead to the overall development.

- Development of BBN area as a modern economic region.
- Drawing a roadmap for provision of world class infrastructure and social facilities to enhancement of quality of life.
- Propose a Structural plan considering the growth potential and emerging requirements.
- Conservation of existing environmental sensitive areas and other natural features.

2.2 Approach and Methodology

Methodology: As part of the evolution of the Master Plan, the study framework for the project can be divided into the following stages shown in the table below:

Table 1.2 List of Tasks

List of Tasks	
Task I	Pre Design Study and Inception Report
Task II	Draft Regional Master Plan for BBN Area
Task III	Pre-final Regional Master Plan- Detail Plan for Baddi and Nalagarh Areas
Task IV	Final Regional Master Plan for BBN Area

Framework: The following framework shows a detailed break-up of the tasks mentioned in the table above. The stage includes site visits, data collection, analysis of surveys, studies, public aspirations and drawing out projections based on analysis and thereafter formulating the Development Plan for BBN Area.

2.3 Scope and Limitations

The scope of the project is detailed as under:

- Existing situation analysis of road network, water supply system, drainage pattern, and social infrastructure requirements.

- Land use assessment of the region, covering an area of 318.74 sq km falling under jurisdiction of BBNDA.
- Preparation of Development Plan for the region by considering the basic infrastructure like roads, water, housing, municipal wastewater and solid waste management.
- Review and propose appropriate institutional set up for infrastructure development and growth management in the city.

The limitations of the project can be listed as under:

- The scope of work shall be limited to the area falling under BBNDA i.e. 318.74 sq km.
- Lack of precise and inconsistent data availability is a major hurdle in the formulation of Development Plan process for BBN Area.

2.4 Data Collection Sources

2.4.1 Primary Data

1. Photo Documentation

The CEPT Team conducted a photographic documentation at various critical points such as major bottleneck areas, traffic congestion areas, intersections and unplanned areas as well of the site. Various site visits were conducted to study the physical conditions, i.e. surrounding mounds, rivers and forests, institutions and housing, slums, infrastructure, etc.

2. Focus Group Discussions & Household Surveys

The CEPT Team has carried out focus group discussions in 15 villages within the special area to take stock of the status and availability of services in the villages. In addition two urban centres within the BBN area household surveys were conducted covering 325 households altogether. Apart from this a series of informal interviews were conducted with the local residents to access the existing infrastructure conditions and analyze gaps in basic amenity provisions

3. Traffic Survey

In order to understand the existing situation and anticipate the type of traffic for BBN Special Area the CEPT Team carried out traffic surveys of the important roads junctions in the BBN area.

4. Informal meetings with officials

A series of consultation meetings were held in the office of the CEO, BBNDA regarding structural plans, augmentation of Town Planning schemes, land acquisition

mechanism and land management strategies, resource generation and provision of developmental activities in BBN area.

2.4.2 Secondary Data

This consists of data collected from various agencies useful for preparation of development plan for BBN Special Area. It includes:

1. BBNDA:

Development Plan for Nalagarh Planning Area – 1998-2001

Development Plan for Barotiwala Planning Area - 2004

Census Data – 1981, 1991 & 2001

Houses, Household Amenities and Assets - 2001

2. Survey of India office Chandigarh:

Toposheets (Scale: 1:15000)

3. Satellite Image collect from NRSA:

A total of six satellite images were procured from the NRSA Hyderabad coverning entire BBN Special Area. It is LISS IV MX geocoded image with a resolution of 5.8 mts.

4. Data and information as available from various departments

BBNDA, Revenue Dept, Municipal Council Nalagarh, DFO Nalagarh, PWD Nalagarh, NHAI Solan, HRTC Nalagarh, Dy Director, Single Window Clearance Authority, PCB Baddi, PCB Shimla, DRDA, I&PH Nalagarh, DSP Nalagarh, SEB Nalagarh, SEB Baddi, SEB Barotiwala, HIMUDA, HPSIDC, Primary & Education Dept, BMO Nalagarh, etc. (See Annexure I for a detailed list of information received).

CHAPTER 3: REGIONAL PROFILE

3.1 Delineation of BBN Special area for preparation of Development Plan-2025.

In order to ensure planned and regulated development in Baddi-Barotiwala and Nalagarh pocket, Government of Himachal Pradesh extended the H.P. Town & Country Planning Act, 1977 to this area vide Notifications No. PW (B) 15 (1)-3/84 dated 3.12.1985 and subsequently constituted the Barotiwala and Nalagarh Planning Areas vide Notification of even file No. dated 3.12.1985. The existing landuse of Barotiwala Planning Area was frozen vide Notice dated 30.3.1987 and of Nalagarh Planning Area vide Notice dated 31.3.1988 and was published in Rajpatra on 2.5.1987 & 28.5.1988 respectively. After adoption of existing landuse, change of landuse has become mandatory requirement. Interim Development Plan for Baddi-Barotiwala Planning Area was devised and notified vide Notification No. TCP-1-147/92-Vol-I dated 5.7.1994. The Development Plan for Nalagarh Planning Area was notified vide Notification No. HIM/TP/PJT/Nalagarh/93-Vol-I dated 25.9.2000 and published in Rajpatra on 4.12.2000. Vide Notification No. TCP-F (5)-16/2002 dated 9.2.2005, published in Rajpatra on 28.2.2005, 28 revenue villages were added in the Nalagarh Planning Area.

The Government vide Notification No. TCP-F (5)-8/2005 dated 21.7.2006 declared the above Planning Areas as Special Area known as “Nalagarh and Baddi-Barotiwala Special Area” which also includes the 20 revenue villages of Nalagarh Tehsil of District Solan for which the provisions of the TCP Act were extended vide Notification No. TCP-F (5)-8/2005 dated 21.7.2006. Subsequently the HP TCP Act,1977 was extended to additional 124 revenue villages of Nalagarh tehsil vide Notification dated 5.5.2007.

The Special area is well connected by national highways and state highways. It has main accessibility from NH 22(Ambala to Shimla) and NH-21 A Chandigarh to Manali. NH 21A connects NH 22 and NH 21. The project area Baddi-Barotiwala-Nalagarh lies along NH 21A. The distance from Baddi-Barotiwala-Nalagrah to Chandigarh, Kalka, and Pinjore is 56 km, 26 km and 31 km respectively. The region is also well connected by roads from Delhi, Chandigarh, Patiala, Ludhiana, Shimla, Bilaspur and Sirmour district.

This area includes the Baddi Municiple Council, Nalagarh Municipal Council along with surrounding 229 revenue villages. It has an area of total 31873 hac. The list of notified villages falling under the Special Area is given below in table # 3.1.

Table 1.3 List of Revenue Villages in BBN Special Area.

Sr. No.	Name of Revenue Village	Hadbast No.	Name of Patwar Circle
1.	Malku Majra	184	Bhud
2.	Daso Majra	185	-do-
3.	Khol	186	-do-
4.	Bhud	188	-do-
5.	Malpur	189	-do-
6.	Makhnu Majra	190	-do-
7.	Lehi	195	Thana
8.	Koli Majra	191	-do-
9.	Chak	196	-do-
10.	Karuwana	197	-do-
11	Gullerwala	194	-do-
12.	Dhakru Majra	212	Bhatoli Kalan
13.	Katha	211	-do-
14.	Bhatoli Kalan	214	-do-
15.	Jhar Majri	215	-do-
16.	Kunjhal	216	-do-
17.	Bhatoli Khurd	213	-do-
18.	Baddi (Shitalpur)	204	Baddi
19.	Suraj Majra Labana	205	-do-
20.	Suraj Majra Gujran	208	-do-
21.	Judi Khurd	209	-do-
22.	Judi Kalan	210	-do-
23.	Bhilanwali Gujran	198	-do-
24.	Sandholi	199	-do-
25.	Kainduwala	200	-do-
26.	Kalyanpur	201	-do-
27.	Landewal	202	-do-
28.	Chakjangi	203	-do-
29.	Haripur Sandholi	206	-do-

30.	**Bhilan Wali Labana**	**207**	**-do-**
31.	**Tipra**	**195**	**Barotiwala**
32.	**Barotiwala**	**196**	**-do-**
33.	**Damonwala**	**197**	**-do-**
34.	**Bather**	**200**	**-do-**
35.	**Buranwalan**	**201**	**-do-**
36.	**Balyana**	**202**	**-do-**
37.	**Kotla**	**203**	**-do-**
38.	**Katiwala**	**183**	**Mandhala**
39.	**Kalranwali**	**184**	**-do-**
40.	**Serana**	**185**	**-do-**
41.	**Kalujhanda**	**186**	**-do-**
42.	**Kotian**	**187**	**Mandhala**
43.	**Kurhawala**	**188**	**-do-**
44.	**Kambanwala**	**189**	**-do-**
45.	**Mandhala**	**190**	**-do-**
46.	**Sainsiwala**	**191**	**-do-**
47.	**Joharanpur**	**192**	**-do-**
48.	**Kalhariwala**	**193**	**-do-**
49.	**Guru Majra**	**182**	**Dhela**
50.	**Akanwali**	**181**	**-do-**
51.	**Kaundi**	**180**	**-do-**
52.	**Dhela**	**178**	**-do-**
53.	**Chanal Majra**	**177**	**-do-**
54.	**Dhawni**	**179**	**-do-**
55.	**Manakpur**	**176**	**Lodhi Majra**
56.	**Shahpur**	**171**	**-do-**
57.	**Jattimajra**	**172**	**-do-**
58.	**Rauntawala**	**166**	**-do-**
59.	**Nandpur**	**170**	**-do-**
60.	**Rajpur-Jakholi**	**168**	**-do-**
61.	**Majru**	**169**	**-do-**
62.	**Lodhi Majra**	**173**	**-do-**

63.	**Banbirpur**	**174**	**-do**
64.	**Dodowal**	**175**	**-do-**
65.	**Theda**	**165**	**Bhag Bania**
66.	**Thana**	**192**	**Thana**
67.	**Dharampur**	**193**	**-do-**
68.	**Sori**	**132**	**Radyali**
69.	**Dattowal**	**137**	**-do-**
70.	**Radyali**	**138**	**-do-**
71.	**Musewal**	**126**	**-do-**
72.	**Chuhuwal**	**136**	**Nalagarh**
73.	**New Nalagarh**	**139/2**	**-do-**
74.	**Old Nalagarh**	**139/1**	**-do-**
75	**Thanthewala**	**125**	**-do-**
76.	**Mini Secretariat**	**139/3**	**-do-**
77	**Ranguwal**	**127**	**Rajpura**
78.	**Rajpura**	**128**	**-do-**
79	**Salhewal**	**130**	**-do-**
80.	**Dhabota**	**96**	**Dhabota**
81.	**Bhatian**	**86**	**Bhatian**
82.	**Dhanna**	**85**	**-do-**
83.	**Sanerh**	**84**	**-do-**
84.	**Rakh Ram Singh**	**141**	**Kirpalpur**
85.	**Karpalpur**	**143**	**-do-**
86.	**Dadhi-Bhola**	**146**	**-do-**
87.	**Ghogarwal**	**124**	**-do-**
88.	**Nikkuwal**	**142**	**-do-**
89.	**Abhipur**	**123**	**-do-**
90.	**Gaguwal**	**122**	**-do-**
91.	**Dadhi Kanian**	**147**	**Nanowal**
92.	**Khera Nihla**	**150**	**-do-**
93.	**Khera Uperla**	**149**	**-do-**
94.	**Nanowal**	**151**	**-do-**
95.	**Chak**	**152**	**-do-**

96.	**Beli Diawar**	**153**	**-do-**
97.	**Brahman Beli**	**154**	**-do-**
98.	**Nalka**	**158**	**Beli**
99.	**Dhana**	**159**	**-do-**
100	**Tahliwala**	**160**	**-do-**
101	**Saner**	**161**	**-do-**
102	**Beli Khol**	**162**	**-do-**
103	**Kishanpura**	**163**	**Manpura**
104	**Manpura**	**164**	**Manpura**
105	**Haraipur**	**183**	**Dhela**
106	**Khokhra**	**148**	**Kripalpur**
107	**Bhumian**	**133**	**Nangal**
108	**Seri**	**134**	**-do-**
109	**Ghansot**	**135**	**-do-**
110	**Nangal Nichla**	**83**	**-do-**
111.	**Plasara Kalu**	**80**	**-do-**
112	**Nangal Uperla**	**78**	**-do-**
113.	**Plasra Gharuan**	**81**	**-do-**
114	**Plasra Nichla**	**79**	**-do-**
115.	**Plasra Ditu**	**82**	**-do-**
116	**Kalyanpur**	**76**	**Jhiriwala**
117	**Goyla Jamala**	**77**	**-do-**
118	**Rehru Jhiriwala**	**74**	**-do-**
119	**Rehru Uperla**	**75**	**-do-**
120	**Bhatoli**	**67**	**-do-**
121	**Mahadev**	**68**	**Bhogpur**
122	**Dolowal**	**69**	**-do-**
123	**Hatda**	**58**	**-do-**
124	**Bhanglan**	**72**	**-do-**
125	**Bhogpur**	**73**	**-do-**
126	**Pater-Phaloo**	**57**	**Ratyour**
127	**Nayagram**	**55**	**-do-**
128	**Majri**	**70**	**-do-**

129	**Ratyour**	**71**	**-do-**
130	**Panjehra**	**51**	**Panjehra**
131	**Kaulanwala**	**52**	**-do-**
132	**Sobhan Majra**	**54**	**-do-**
133	**Pater Bhaunkhoo**	**53**	**-do-**
134	**Pater-Miani**	**59**	**-do-**
135	**Jhajra**	**56**	**-do-**
136	**Gulabpura**	**60**	**-do-**
137	**Baglehr**	**50**	**-do-**
138	**Sauri-Gujran**	**61**	**Palli**
139	**Sauri Rajputan**	**62**	**-do-**
140	**Ambwala**	**63**	**-do-**
141	**Palli**	**64**	**-do-**
142	**Navan Nagar**	**65**	**-do-**
143	**Aduwal Jandori**	**66**	**-do-**
144	**Basowal Sultani**	**41**	**Kashmirpur**
145	**Kashmirpur Brahmna**	**40**	**-do-**
146	**Kashmirpur Gujran**	**42**	**-do-**
147	**Kathiru Majra**	**39**	**-do-**
148	**Malwala Uperli**	**43**	**-do-**
149	**Malwala Nichli**	**44**	**-do-**
150	**Malpur**	**45**	**-do-**
151	**Androla Nichla**	**46**	**-do-**
152	**Androla Uparla**	**47**	**-do-**
153	**Raiya**	**48**	**-do-**
154	**Kharuni**	**49**	**-do-**
155	**Sakedi Jagir**	**26**	**Joghon**
156	**Sakedi Khalsa**	**31**	**--do-**
157	**Jogon**	**32**	**-do-**
158	**Taprian**	**33**	**-do-**
159	**Baniala**	**34**	**-do-**
160	**Jagatpur**	**35**	**-do-**
161	**Basowal Agri**	**36**	**-do-**

162	**Nangal Kuhal**	**37**	**-do-**
163	**Kalyanpur**	**38**	**-do-**
164	**Bhoran**	**30**	**-do-**
165	**Baruna**	**10**	**Baruna**
166	**Majra**	**11**	**-do-**
167	**Kotla Kalan**	**08**	**-do-**
168	**Raipur**	**05**	**-do-**
169	**Phalahi**	**07**	**-do-**
170	**Gharoti**	**09**	**-do-**
171	**Nangal Dhakka**	**19**	**Khilian**
172	**Bairchha**	**21**	**-do-**
173	**Mastanpura**	**22**	**-do-**
174	**Khanoa**	**23**	**-do-**
175	**Khilian**	**28**	**-do-**
176	**Bhatoli**	**03**	**Karsoli (Gullarwala)**
177	**Karsoli**	**04**	**-do-**
178	**Chak**	**13**	**-do-**
179	**Deoli**	**12**	**-do-**
180	**Kawanwali**	**25**	**-do-**
181	**Baihli**	**24**	**-do-**
182	**Rampur**	**01**	**Bagheri**
183	**Abhipur**	**02**	**-do-**
184	**Gholowal**	**14**	**-do-**
185	**Kali Bari**	**15**	**-do-**
186	**Kulari**	**16**	**-do-**
187	**Tikri**	**17**	**-do-**
188	**Bagheri**	**18**	**-do-**
189	**Bhattanwala**	**129**	**Rajpura**
190	**Shabonwal**	**131**	**-do-**
191	**Bir-Palasi**	**101**	**Manjholi**
192	**Palasi Nathoo**	**102**	**-do-**
193	**Sainimajra**	**91**	**-do-**
194	**Maganpura**	**120**	**-do-**

195	**Dher-Majra**	**103**	**-do-**
196	**Manjholi**	**119**	**-do-**
197	**Barsen**	**111**	**-do-**
198	**Berampur**	**104**	**Jhirha**
199	**Teliwala**	**105**	**-do-**
200	**Ghihar**	**106**	**-do-**
201	**Mainsan tibba**	**112**	**-do-**
202	**Garjewal**	**109**	**-do-**
203	**Toranwala**	**108**	**-do-**
204	**Lakhanpur**	**114**	**-do-**
205	**Jhiran**	**113**	**-do-**
206	**Chandpur**	**110**	**-do-**
207	**Barotiwala**	**107**	**-do-**
208	**Dhang Uperli**	**89**	**Dhang**
209	**Dhang Nichli**	**90**	**-do-**
210	**Manguwal**	**87**	**-do-**
211	**Kanganwal**	**88**	**-do-**
212	**Dhundli Gopi**	**85**	**-do-**
213	**Paswalan**	**100**	**Palsi**
214	**Palasi Mangta**	**94**	**-do-**
215	**Bara Basot**	**98**	**-do-**
216	**Palsi Buttan**	**93**	**-do-**
217	**Palsi Kalan**	**92**	**-do-**
218	**Rampur**	**99**	**-do-**
219	**Kheri**	**116**	**Kirpalpur**
220	**Nahar Singh**	**117**	**-do-**
221	**Mandiarpur**	**118**	**-do-**
222	**Bela**	**121**	**-do-**
223	**Maisi Palasi**	**144**	**-do-**
224	**Dadhi Harnam**	**145**	**-do-**
225	**Kashambhowal Knaitan**	**155**	**Beli**
226	**Kashambhowal Gujran**	**157**	**-do-**
227	**Majra**	**97**	**Dahbota**

228	**Handa Kundi**	**156**	**Beli**
229	**Dolan**	**27**	**Khilian**
230	**Nagar Panchayat Baddi**	**-**	**-**
231	**M.C. Nalagarh**	**-**	**-**

Fig.3.1.1 Regional Base Map of BBN Special Area

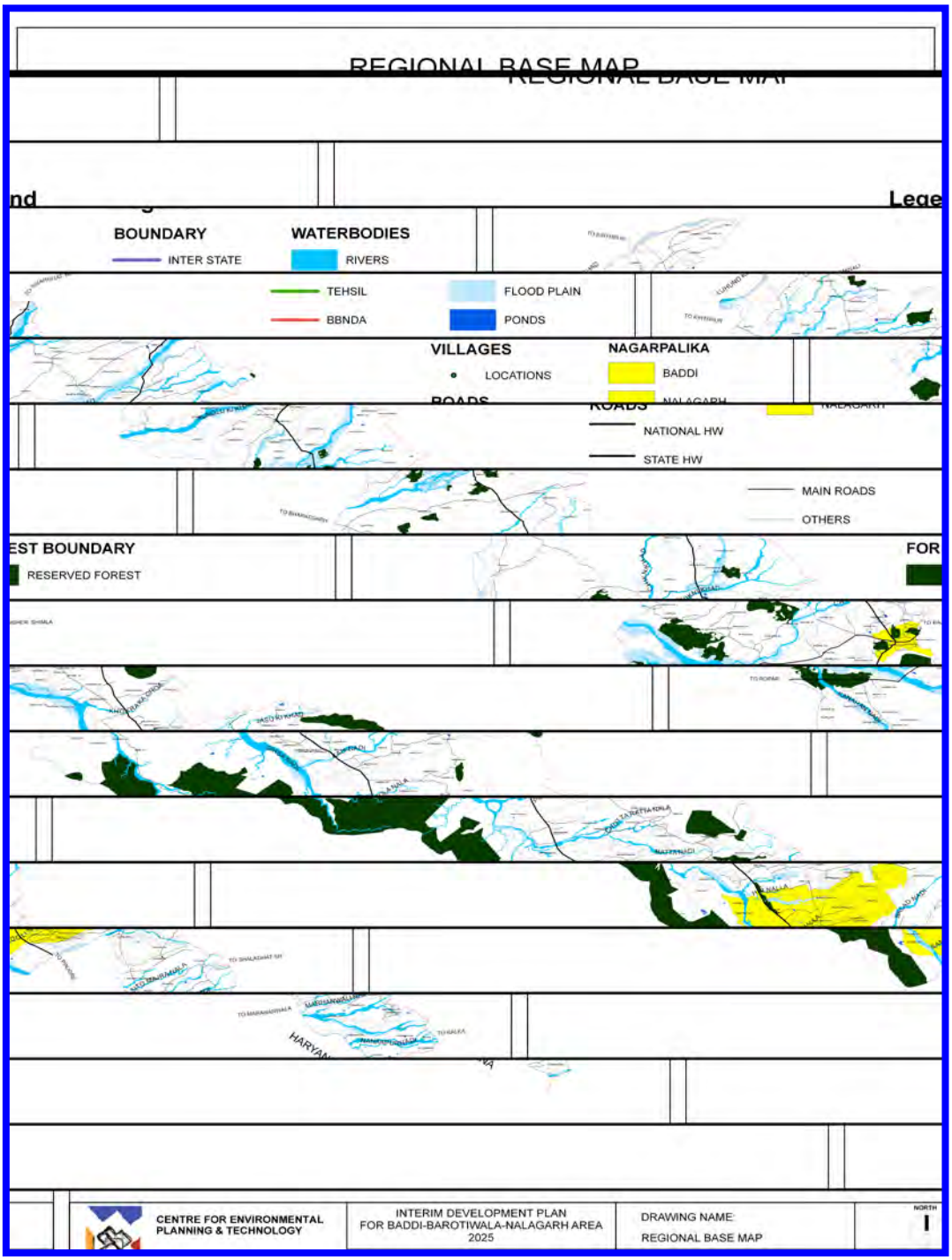


Fig 3.6 Regitional characteristics of BBN Special area is shown

Fig-3.1. Revenue village: kaundi

Fig-3.2.Growing culture of apartments in BBN Special area

Fig-3.3 BBN Special area is well known for brick kilns

Fig.3.4 Baddi-Nalagarh is the biggest truck union of the state

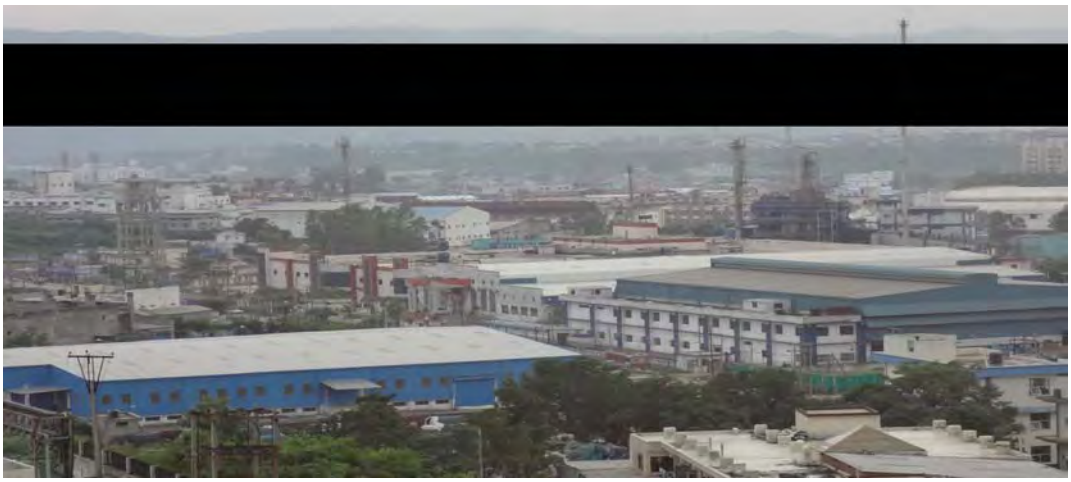


Fig 3.7 Biggest industrial hub of the State

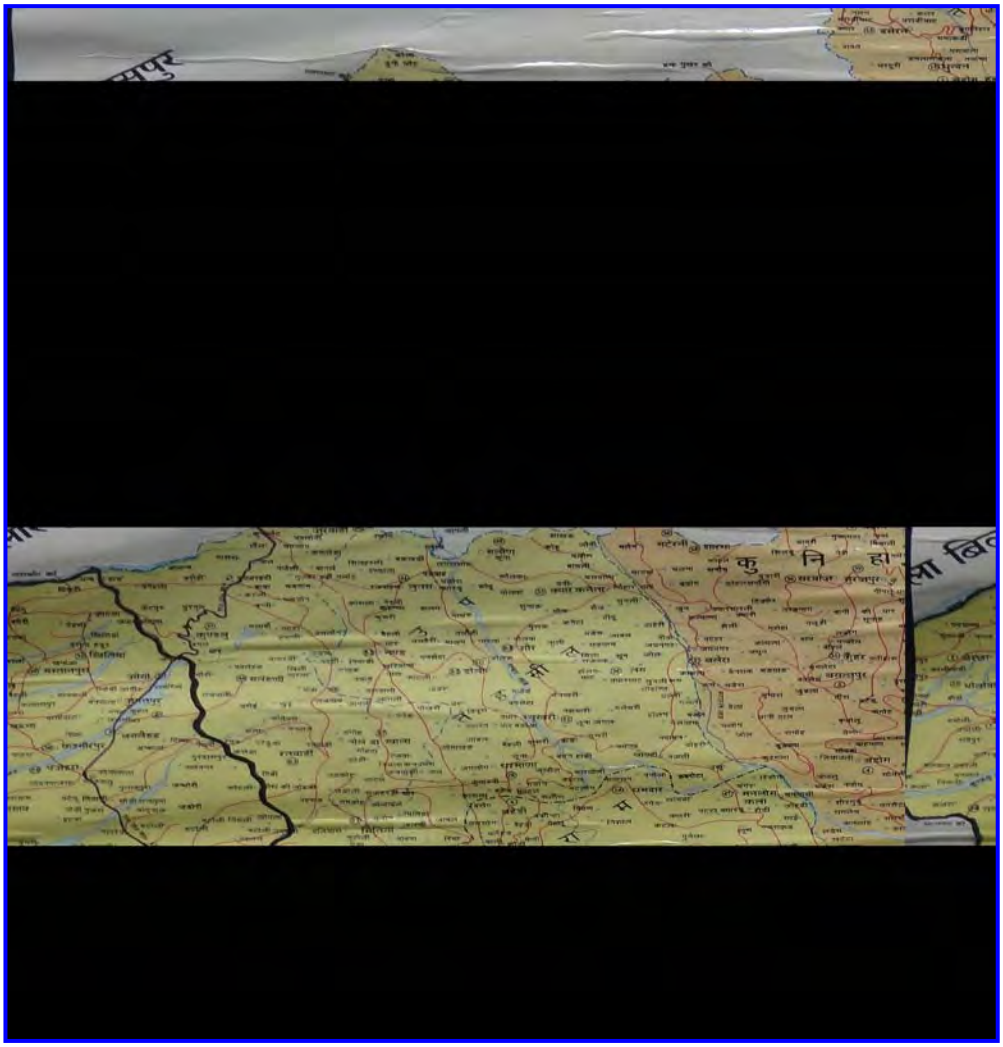


Fig 3.8. Location of 229 Revenue villages in Distt level map of BBN Special area

Fig 3.8 reveals location of revenue villages of BBN Special area in the Distt Administrative map of Solan Distt These villages are part of two constituencies namely Doon and Nalagarh. The map is placed for purpose of referencing above listed villages as per table 3.1

Baddi-Barotiwala-Nalagarh Special Area is bounded from outer side as under:-

North: Bounded by outer boundary of Hadbast No. 17 revenue village Tikri, Hadbast No.18 revenue village Bagheri, Hadbast No. 19 revenue village Nangal Dhakka, Hadbast No. 25 revenue village Kawanwali, Hadbast No. 26 revenue village Sukedi-Jagir, Hadbast No. 30 revenue village Bhoran, Hadbast No. 32 revenue village Joghon, Hadbast No. 33 revenue village Taprian, Hadbast No. 34 revenue village Baniala, Hadbast No. 35 revenue village Jagatpur, Hadbast No. 49 revenue village Kharuni, Hadbast No. 50 revenue village Baglehr, Hadbast No. 64 revenue village Palli, Hadbast No. 65 revenue village Navan Nagar, Hadbast No. 66 revenue village

Aduwal-Jandori, Hadbast No. 67 revenue village Bhatoli, Hadbast No. 75 revenue village Reru-Uperla, Hadbast No. 76 revenue village Kalayanpur, Hadbast No. 77 revenue village Goyla-Jamala, Hadbast No. 78 revenue village Nangal Uperla, Hadbast No.80 revenue village Plasra Kalu, Hadbast No. 81 revenue village Plasra Gharuan, Hadbast No. 134 revenue village Seri, Hadbast No. 135 revenue village Ghansot, Hadbast No. 136 revenue village Chuhuwal, Hadbast No. 139/2 revenue village New Nalagarh, Hadbast No. 139/1 revenue village Old Nalagarh, Hadbast No. 148 revenue village Khokhra, Hadbast No. 152 revenue village Chakk, Hadbast No. 153 revenue village Belideol, Hadbast No. 158 revenue village Nalka, Hadbast No.159 revenue village Dhana, Hadbast No. 160 revenue village Tahliwal, Hadbast No. 161 revenue village Sanehar, Hadbast No. 165 revenue village Theda, Hadbast No. 166 revenue village Rautanwala, Hadbast No. 170 revenue village Nandpur, Hadbast No. 168 revenue village Raipur-Jakholi, Hadbast No. 169 revenue village Majru, Hadbast No. 173 revenue village Lodhimajra, Hadbast No. 174 revenue village Banbirpur, Hadbast No. 192 revenue village Thana, Hadbast No. 193 revenue village Dharampur upto Jangal Bijliwala.

East: Following down wards bounded by jungle Bijliwala, Jungle Rughi Bhogpur, Jungle Haripur, Jungle Nalki, Jungle Surajpur and Jungle Dholar upto Ram Nagar Nadi.

South: Bounded by Ram Nagar Nadi, Haryana boundary upto Balad Nadi and then following Balad Naddi upto the confluence of Balad Naddi and Sirsa Naddi, further bounded by outer boundary of Hadbast No. 204 revenue village Baddi Sitalpur, Hadbast No. 201 revenue village Kalayanpur, Hadbast No. 202 revenue village Landewal, Hadbast No. 200 revenue village Kainduwala, Hadbast No. 189 revenue village Malpur, Hadbast No. 188 revenue village Bhud, Hadbast No. 186 revenue village Khol, Hadbast No. 185 revenue village Dasomajra, Hadbast No. 184 revenue village Malkumajra, Hadbast No. 183 revenue village Haraipur, Hadbast No. 163 revenue village Kishanpura, Hadbast No. 156 revenue village Handa Kundi, Hadbast No. 116 revenue village Kheri, 117 revenue village Nahar Singh, Hadbast No. 118 revenue village Mandiarpur, Hadbast No. 157 revenue village Kasmbowal Gujar, Hadbast No. 144 revenue village Maisi Plasi, Hadbast No. 145 revenue village Dadi Harnam,Hadbast No. 123 revenue village Abhipur, Hadbast No. 121 revenue village Bela, Hadbast No. 1113 revenue village Jhiran, Hadbast No. 108 revenue village Touranwala, Hadbast No. 106 revenue village Ghihar, Hadbast No. 110 revenue village Chandpur, Hadbast No. 105 revenue village Taliwala, Hadbast No. 104 revenue village Berampur, Hadbast No. 103 revenue village Dhernajra, Hadbast No. 100 revenue village Paswala, Hadbast No. 98 revenue village Barabaroi, Hadbast No.

97 revenue village Majra, Hadbast No. 96 revenue village Dabhota, Hadbast No. 71 revenue village Ratyor, Hadbast No. 55 revenue village Nayagram, Hadbast No. 45 revenue village Malpur, Hadbast No. 57 revenue village Jhajhra, Hadbast No. 8 revenue village Kotla Kalan, Hadbast No. 7 revenue village Falahi, Hadbast No. 5 revenue village Raipur, Hadbast No. 4 revenue village Karsoli, Hadbast No. 3 revenue village Bhatoli, Hadbast No. 14 revenue village Gholowal, Hadbast No. 2 revenue village Abhipur, Hadbast No. 1 revenue village Rampur

West: Further bounded by Hadbast No. 1 revenue village Rampur, Hadbast No. 21 revenue village Bairchha, Hadbast No. 16 revenue village Kulari and Hadbast No. 17 revenue village Tikri.

Situated at an altitude of 460 to 600 meter above mean sea level, Special Area lies between 30-31' degree north latitude and 76 degree 50 minutes east longitude. The Special Area is spread in an area of 318.74 Sq. km. BBN Special area has been shown in the Distt Administration map.

3.2 Regional Connectivity

Baddi-Barotiwala-Nalagarh Special area is a fast developing industrial hub due to proximity to Chandigarh, availability of flat land for development, and better accessibility in the form of Pinjore-Baddi-Nalagarh-Swarghat National highway. NH 21A passing through it forms the main transport spine of the region linking it with the surrounding growth centres like Chandigarh, Kalka, Pinjore, Swarghat etc. Another important link bisecting the region into two is the SH 16 which passes through Nalagarh and connects the region to the cities of Punjab. Other major cities around the region area are Shimla, Ludhiana and Jalandhar. BBN Special Area has industrial linkages with Ludhiana, Mohali, Chandigarh and Delhi for raw material as well for finished goods. Regional setting shows the major regional connectivity of BBN Special area with the surrounding region as shown in Map.

3.3 Physical Features

3.3.1 Regional level Roads

National highway No. 21 A is the main traffic and transportation spine for the Baddi, Barotiwala & Nalagarh Special Area. It is a 66.275 km long two lane road; it originates from NH -22 at Pinjore (in state of Haryana) and ends at the NH -21 at Swarghat. The total length of this road within the special area is **28 kms.** The region is well with connected to important cities and towns like Chandigarh, Pinjore, Solan, Shimla, Bilaspur and state of Punjab.

Another important road link is Ropar-Nalagarh-Ramshehar-Shimla SH 16 which connects Ropar in Punjab to Shimla in Himachal Pradesh passing through Nalagarh. The total length of this road within the special area is about **18 kms**.

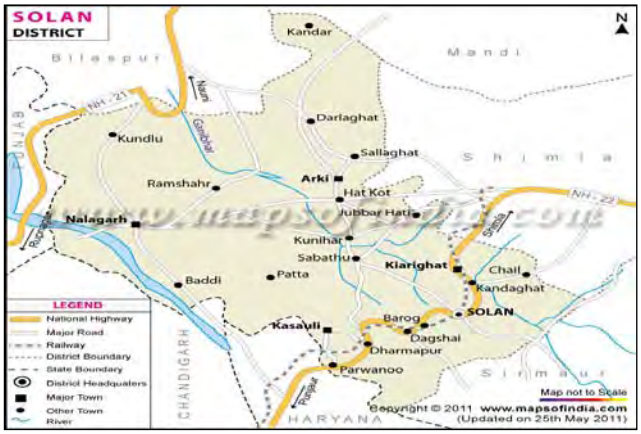


Fig 3.9 Solan District map

Besides other important links also exist which huge network of 132 roads within the BBN Special area. Other district roads connect the region with Kasuali and Parwanoo. There are two other important road links- Bharatgarh road that emanates from Nalagarh and another road which emanates from Panjhera and connects to Kirthpur, Punjab. Both the roads form an important link for regional connectivity. A map of regional linkage has shown for reference.

Fig 3.10 Regional Road

There is no direct rail connectivity to BBN Special area. The nearest railway station is at Kalka (20kms). Another important railway station is at Ghanauli (Punjab). The rail connectivity is foremost requirement of this area as well as demand of various groups of the society. Which is under active consideration of Railway Ministry Govt of India has already developed an Inland Container for this area.

3.3.2 Local Level Roads

The overall circulation pattern within the BBN special area is linear in accordance with the local topography. Its strata is formed by deposition of sediments of Shiwalik Hills. NH 21A forms the part of main connectivity with Baddi-Barotiwala and Nalagarh nodes. The entire development has taken place in ribbon pattern along the major arteries. Such a linear development is not allowable along the important lifelines. The villages along the N.H21 A is well connected by various punctures/link roads from the National Highway. Villages far away from NH-21A are also connected with kachcha roads but condition the roads are poor in view of its designed, carrying capacity and required width as per traffic

volume. The overall internal connectivity within the region is not good so the road are required to be upgraded and widen as per necessity.

3.3.3 Urban Roads

The internal circulation within the two urban areas consists of sub-arterial, collector and local roads. There is a haphazard and unplanned network of streets that often leads to chaos and congestion. The road width varies from 3.5 m to 14.5 m within the two urban centers. Informal sector's activities and street vendors have extened their shops on roads side. Conditions of these roads are very poor and these were not designed as per geometry of road specification.The 1/3rd part of existing urban roads are used by shopkeepers for exhibition of their articles along the road side, which creates congestion for smooth traffic movement. Such an unauthorized occupation by shopkeepers is required to be strictly dealt with by the concerned authorities. Development and construction is allowed after surrendering proper ROW and space for services land and utility lines. Local level roads are shown in above satellite image of Baddi town and its surrounding area.

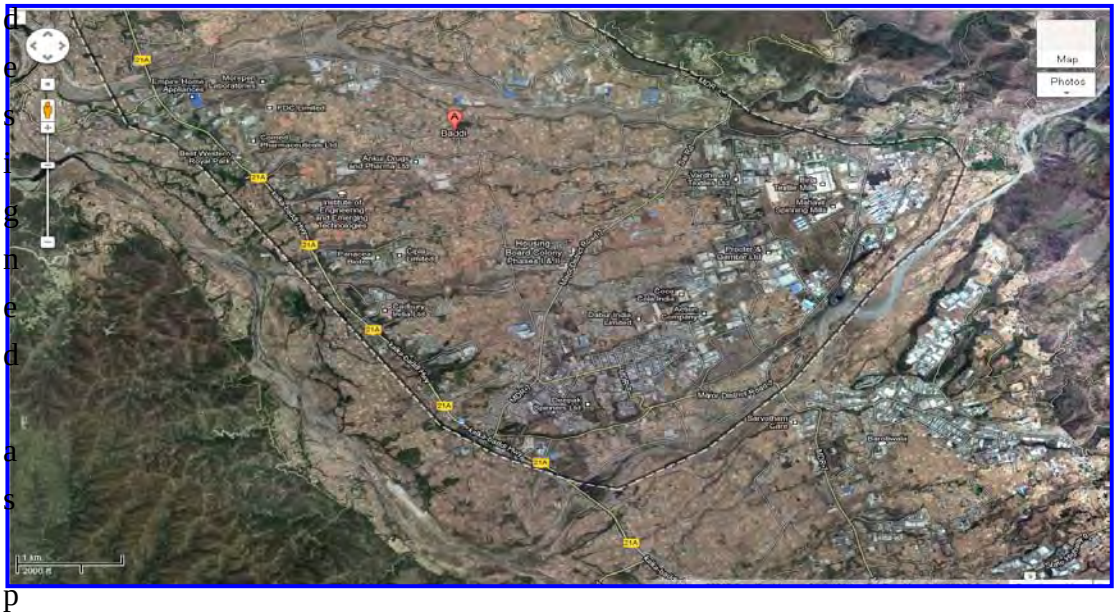


Fig 3.11: Satellite Image of Baddi Town & its surrounding area

3.3.4 Climate and Rainfall

The area experiences humid subtropican climate characterized by very hot summers and mild winters. The rainy season commences from the first week of July and continues up to the first half of September. Average yearly rainfall in the Baddi-Nalagarh area is about 105 cms with occasionally foggy weather. Winter rains generally commence from the last week of December and continue up to the end of

February. October, November and March to May are relatively dry months. Temperature varies from 8°C to 42°C.

3.3.5 Topography

The BBN Special area is geographically located at foothills of Shiwalik range. The local topography is plain, undulating and is dissected by khuds and nallahs. Generally, khuds and nallahs are formed by ersion of alluvial soils during rainy season due to steep channel gradient and very high speed discharge and flow of rainwater. Local topography formed by deposition of sediments and it is shaped like alluvial fans. It has vast range of hills and area is surrounded by Dharampur range, Surajpur-Haripur-Mandhala range and Shiwalik hills. It has an average elevation of 372 metres.

Fig 3.12 Topography of the region

3.3.6 Geology and Soil

The geological structure depends upon the tectonic and lithologic condition of region.The BBN special area consists of lower tertiary sediments (Paleocene to early Miocene) Dagshai and Kasoli formations which are marine to brackish water sendiments and the upper tertiary sediments (Middle Miocene to Middle Pleistocene) consisting of the Shiwalik group fluvial deposits, along with the late organic inter montane deposits and alluvium. Most of the lesser Himalyan zone is covered by brown hill and sub-montane soils. They are productive for agrarian use having combination of sufficient minerals for producing cereal crops, mangoes and citrus fruits etc. These soils are namely shallow black, brown and alluvial soils. The bearing capacity of soil is 15 tonne/sq m that is suitable for urban development and construction of super structures. Incentives, unscientific soil cutting is a big concern in

Fig 3.13 Soil cutting in the region

BBN Special area as shown Fig 3.12. This kind of soil cutting is being/has been undertaken at various prime locations that causing degradation to ecology and surrounding environment. As per Development Plan regulations only 3.50 mtr. Soil/slop cutting is allowable

3.3.7 Forest Areas

The BBN Special Area contains Reserved, Protected, unclassified and other forests. Popularly two ranges namely Nalagarh and Baddi fall in BBN Special area. It has area of 6507.27 hectare out of which 3360.97 hectare comes under Nalagarh Range and 3146.3 hacatare in Baddi Range. The area under Reserved Forest falling under BBN Special Area is 3120 ha and under dense forest is 8664 ha. The category wise forest area has been illustrated in Map. The diffrent kind of plant in forests are khair, kiker, neem, shisham, Mango and Babul.

In addition to this, shrubs like Vitex,

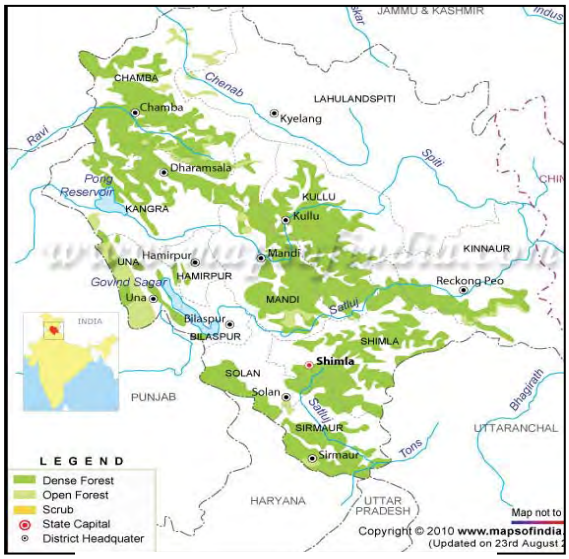


Fig 3.14 Forest cover in the region

Munj and Ber are found but quantum of tree cover is very scanty and scattered. So there is need to plant more trees in order to make the BBN area green and clean. More social forestry and eco-tourism projects should be implemented by involving public participation. No development proposals should be allowed near the forest area.

3.3.8 Rivers, Khuds and Nallahs

Local topography is dissected by numerous khuds and Nallahs. These water channels flow from east to west direction and finally join Sirsa river. The Sirsa is the main perennial river stream in BBN Special area. It has its source in the hills above Kalka and runs North West along the base of the Shiwaliks eventually joining the Sutlej at Avankot in Ropar district. Its other tributaries are non-perenial like Ratta, Ballad, Surajpur choe and Nanakpur choe, emanating from Kasauli range and etc emanting from Nalagarh ranage of Sirsa are Kundlu Ki Khad, Chikni Khad, Khokraka Choe, Kali Nadi, Pola Nallah.Most of these khuds/nallahs are seasonal so it remains dry during non rainy season. However, these khuds and nallahs are susceptible to natural calamities in form of flash floods and floods during the monsoons season. Therefore,

development permission along the river, khuds and nallah are strictly to be followed as per river front regulations laid down. Proper green buffer and channelisation need be undertaken as development of green buffer along the river belt which will serve as a kind of filter or protection against dust, sun and harmful winds.

3.4 Geo-Hazards and Environmental Pollution

3.4.1 Earthquakes

As per latest report of State Disaster Management Authority, it revealed that Solan

HAZARD VULNERABILITY OF HIMACHAL PRADESH

DISTRICT	EQ	LANDSLIDE	FLOODS	AVALANCHE	DROUGHT	CONST. TYPE & DENSITY	OVERALL VULNERABILITY
Kangra	VII	M	L	—	M	VII	II
Chamba	II	II	II	M	M	II	VII
Hamirpur	VII	L	L	—	—	II	M
Mandi	VII	M	M	—	—	II	II
Kullu	II	II	II	M	II	II	VII
Bilaspur	M	M	L	—	M	M	M
Una	M	L	II	—	II	M	II
Sirmour	M	M	L	—	II	M	M
Solan	L	L	L	—	II	M	M
Kinnaur	II	II	II	VII	II	M	VII
L&Spiti	L	M	M	VII	—	M	II
Shimla	L	M	M		II	M	II

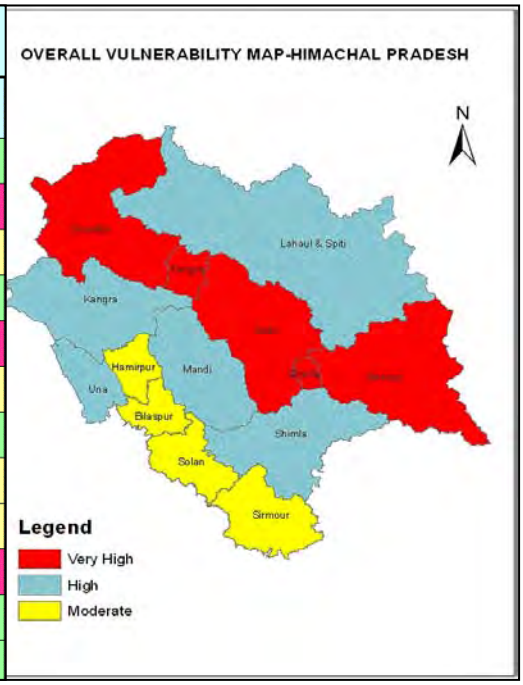


Fig 3.15 Over all vulnerability map of State.

District including BBN Special area falls in moderate vulnerable risk category on the basis of matrix devised for natural hazards. The hazard matrix and overall vulnerability map of H.P state is illustrated Fig 3.14. Seismically shiwalik foothills are less risk as per earthquake hazard map showing faults, thrusts and magnitude as compared to other districts of the state. However, BBN Special area also fall in high damage risk zone as per **MSK VIII**. So susceptibility of natural hazards are increasing due to tectonic deformation and continue strain over conventional currents. In addition to this BBN Special area is susceptible to land slides, industrial hazards, fire hazards, flash floods and construction type and density of population. BBN Special area is also very suceptible to wind hazards as it falls in wind damage risk zone-A (V=55m/s). So entire development activities including housing design, social infrastructures, and services should adhere with seismic code during designed stage in

order to reduce risk to life and loss of properties. Therefore, this Development Plan has envisaged such natural hazards and has developed guide lines for preparedness, responses etc. Disaster Management Policy of the state govt should be propley implemented at all level.

3.4.2 Flash floods

BBN Special area is more susceptible to flash floods, floods and other related natural hazards because of having numerous khuds and nallahs. It occurs only during rainy season due to heavy precipitation on saturated soil or dry soil over upper reaches. It

Fig-3.15a

Fig-3.16

is evident from Fig-3.1 that high velocity flash floods in Balad khud has damaged 10-year-old RCC bridge at Baddi in ther year 2007. The entire traffic on National High-21A traffic was diverted through khud for some time. Another RCC bridge was also collapsed over Chikni khud due high velocity of flash floods in the year 2007. The damaged bridge has been shown in above figure. Several khuds flow from north to south in the special area, which emanates from easten range of foothills and join the Sirsa river toward westen side. Magnitude as well as intensity of floods have been increasing over a period of time therefore, highest flood level, riverfront/ water bodies regulations are strictly to be adhered. No construction/urban development permissions should be allowed up to distance as specified in the highest flood level regulations laid down. River banks and khuds need to be properly channelised for beautification and conservation of natural resource.

3.4.3 Air Quality

Ambient air quality depicts the level of the pollution existing within the special area. The ambient air quality is of medium* category near Baddi industrial pocket and

Barotiwala as per Zoning Atlas devised by the H.P Pollution Control Board. This is due to the agglomeration of the various air polluting units like clusters of stone crushers, brick kilns, industries with furnaces and cement plants.

Comparing the air quality status of the region with national air quality standards as mentioned in Table 1.4 it is found that the SO2 and NOx levels are within the permissible limits at all the stations whereas SPM levels are found to be high at most of the stations due to too dusty environment, lack of green trees and open spaces.

Table 1.4: Ambient Air Quality (2000) in Baddi-Barotiwala-Nalagarh area.

Sr. No.	Place of Monitoring		Avg. SO_2 (µg/m3)	NS* (µg/m3)	Avg. NOx (µg/m3)	NS* (µg/m3)	Avg. SPM (µg/m3)	NS* (µg/m3)
1	Industrial Area Baddi	Balbir Industries	1.5	80	8.2	80	110.4	360
2		Winsome Industries	6.3	80	23.1	80	321.1	360
3		EPIP-I	0.8	80	9.3	80	110.5	360
4		EPIP-II	1.2	80	5.3	80	112.2	360
5	Nalagarh	Nalagarh Acids	–	80	8.5	80	467.3	360
6		Drish shoes industries	–	80	5.0	80	512.4	360
7		Bus stand	0.8	60	4.6	60	512.4	140
8	Barotiwala	Industrial Area	1.8	80	4.4	80	325.8	360

Source: HP State Pollution Control Board; NS - National Standard, CPCB*

3.4.4 Surface water quality.

There are numerous surface water channels, which are openly flowing/ carrying out industrial effluents like housing board nallah, gullarwala, Barotiwala,sandoli nallah and Baddi main town nallah. Along the built-up area, stretch of drains are properly channelised by different agencies in order to carry out proper runoff water during rainy

Fig 3.17 Surface water in BBN Area

season. Drains which are not properly channelised is create dirty and foil smell because of industrial effluents.

This toxic material is source of various diseases to humans and animal ecosystem disturbance and deterioating quality of water. Level of pollutants are very high than its permissible limits as per table 3.2. The pace of haphazard development also increases surface runoff, by creating more impervious surfaces such as pavement and buildings. Water logging pockets need to be channelised by filling gullies properly for development of sufficient open spaces, recreational grounds and landscaping. Proper channelisations of drains is very essential in order to make eco-friendly environment and pollution free BBN Special area.

The monitored data shows that the quality of river is quite poor as the suspended solids have crossed the permissible limits d/s Sandholi drain. The total hardness is more than the permissible limits of 100 mg/l almost at all the points. The BOD level is critical d/s Sandholi Drain where it is already 30 Mg/l there are also public complains regarding pollution problems of river. The water quality of river Sirsa monitored on 21.6.99 D/S of Barotiwala Industrial area, has been given in Table 1.5.

Table 1.5 Water quality (Jannuary 2000)

Fig 3.18

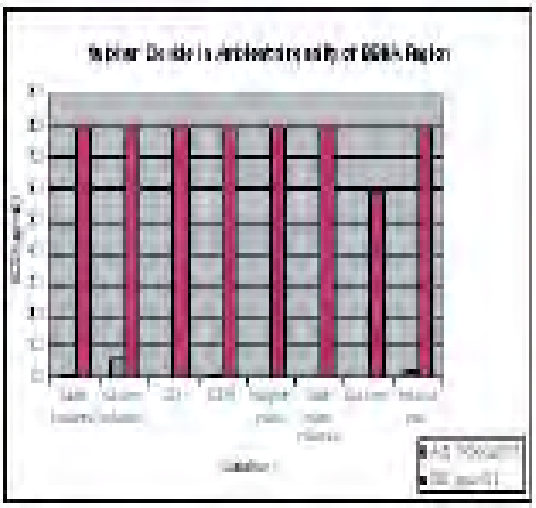


Table 3.4: Water Quality of Sirsa River

Parameters	Existing water quality	Remarks
Ph	7.8	
DO (mg/l)	2.6	Low
BOD (mg/l)	7	
TSS (mg/l)	61	
TDS (mg/l)	508	Medium
COD (mg/l)	86	
Total Colform	2,33,500	High (likely reason is high sewage discharge)

Source: CPCB, PAMS Division

Table 1.6 Water Quality (January 2000)

S. No	Location	Ph	DS	SS	COD	BOD	Sulphate	Chlorides	Nitrate	T-Hardness
01	Sito majra Nallah	7.2	8780	1	1892	575	45.2	450	12	440
02	D/S Sito Majra Nala, Sisra River	8.3	376	4	113	28	145.0	52	1.7	210
03	U/S Sito Majra Nala	8.1	193	2	16	0.7	9.1	14	0.9	158
04	Sandoli Drain	7.3	670	2	484	155	72.5	200	33.1	250
05	U/S Sandoli Drain,Sisra River	8.1	318	2	74	11	23.9	58	1.1	194
06	D/S Sandoli Drain, Sisra River	7.7	428	9	187	30	39.0	82	3.2	234
07	Permissible Limits As PCB	6.5-8.5	2100	1	250	30	1000	1000	20	100

Source : HP SPCB, Baddi

3.4.5 Ground Water

Groundwater is water that is found underground in the cracks and spaces in soil, sand and rock. The use of this water in BBN Special area is very high because it is the only water sources for various uses like industries, housing projects and for irrigation purpose. The depth of ground water table varies between 10-40 m as per information collected from the Deptt of IPH.

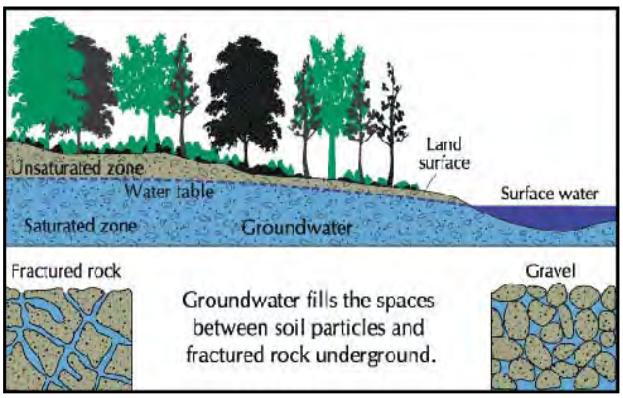


Fig. 3.19 Ground water system

Therefore water table has been rapidly going down day by day at the Special area. Being a dry region no other source and perennial river is available to have provided as sources for potable water and industrial use. Therefore, extraction of ground water through tube well is very high. Ground water is also being used for irrigation purpose

by the local rural farmers. There is no particular mechanism to recharge ground water effectively, except construction of rainwater harvesting system. This mechanism has now been made mandatory to each Govt and semi-Govt built up space under the provisions of H.P Town & Country Planning Act, 1977.However, effective ground water regulations are required to be implemented for conservation and preservation of water sources. Concerned Deptt of should be devised the water conservation schemes through public participation for augmentation of sufficient ground water. The quality of ground water as procured from concerned Deptt has illustrated below in Table 1.7

Table 1.7 Ground Water Quality (Jan -2000)

Locations	Ph	TDS (mgl)	Sulphate (mgl)	Chlorides (mgl)	T-Hardness (mgl)	Iron (mgl)	Flouride (mgl)	Nitrate- N (mgl)
Hand pump vill-Rajpura A, Nalagarh	7.1	494	33.6	50	340	0.3	0.2	0.8
Hand pump SDM Office, Nalagarh	6.8	923	66.9	140	588	0.5	0.2	0.6
Bore well M/S, Nalagarh Acid, Nalagarh	7.5	501	54.8	68	180	0.0	0.4	1.0
Hand pump vill- Manpura, Nalagarh	7.6	374	24.1	20	260	0.1	0.2	0.6
Hand pump- Gram Panchayat, Baddi	7.5	296	23.8	12	218	0.1	0.1	0.3
Hand pump HPSEB office, Nalagarh	7.3	625	20.4	146	406	0.3	0.1	1.1
Hand pump vill-Rajpura A, Nalagarh	7.2	360	12.0	20	304	3.4	0.4	0.7
Hand pump- Main bus stand, Barotiwala	7.4	288	7.9	10	304	0.6	0.2	0.5
Permissible limits as per board	6.5-8.5	500	200	50	300	0.3	1	10

The table above shows that the TDS levels, chloride levels, total hardness, and iron levels are high in some of the locations with respect to the permissible limits as per the norms.

3.4.6 Noise

Noise pollution is under controlled limits as per information gathered and presented below in Table 1.8. It revealed that noise pollution is high only during day time. It is because of vehicular traffic and commuters rush during peak hours. Main sources of noise pollution is loud music, vehicles, air-conditions, factories and amplified music construction work. Table 3.6 revealed that noise starts only during day time at the commercial and residential areas. Noise more than 50dB is not good for health so unwanted noise must be avoided. To keep sound pollution in control planned and scientific land use plan is to be devised for sustainable development of BBN special area. So that intrusion and collision of each land use category should be segregated.

Table 1.8: Noise Level Leq dB (A)

Sr. No.	Station	Category	Day time	N.S *	Night time	N.S*
1	At Hanuman Chawk	Commercial	77	65	56	55
2	At Sai Road, Near SBI Bank Baddi	Commercial	79	65	54	55
3	At Baddi Bus Stand	Traffic Junction	78		52	
4	At Malpur	Residential	58	55	42	45
5	At Barotiwala	Industrial	68	75	46	70

*Source: EIA Report, PCB Baddi; * National Standard*

3.5. Settlement Pattern

In BBN special area, 229 rural village exists and two urban settlements at Baddi and Nalagarh. These villages are dispersed; shape of settlements are linear, radial and star. They settlements are bound by agriculture fields are characterized by beautiful cultural landscape. Rural settlements are generally compact and large in size. Their population ranges from 8 persons to 2792 persons as per record of BDO Office Nalagarh. The most populated village is Dhabota and lowest is Kharuni. However the biggest land area is available at mauja Bhatolikalan and smallest is at mauja Majru/Kalranwali. The most obvious and important part of these rural settlement is use of the land. The land is flat, topography is rugged and soil is good but water availability is very poor in this part of the state. Rural farmers depend upon monsoon

rain and ground water only for agricultural activities. Present scenario of settlement pattern and its development is illustrated below.

3.5.1 Development along major roads

As per NRSA image, the entire National Highway is dotted with development along it and forms dense areas near major intersection points such as the ones leading to Baddi- Barotiwala, Nalagarh and Panjera areas. Similarly the road connecting Dhabota to the National Highway via Bhogpur (between Panjera and Nalagarh) also has ribbon like development along its length. A similar development is seen along the State Highway 16 (to Nalagarh and Shimla). Residential pockets are below Kali Nadi (joining Lodi Majra to NH via Theda). The road above Pola Nala connecting Daduwal, Dhela and Dorian to the NH have scattered residential pockets all along. A lot of development is along the road connecting State Highway 16 to Dhabola, most of it up to Dhona via Bhatian. On the norther end, development is seen on the road connecting Panjera, Barma, Padyana to the SH. The cross road connecting Bhatoli to Bagheri has some residential sectors. These are the major roads and settlements along the BBN area. A study of the region reveals this pattern for smaller/ minor internal roads also connecting the rural areas.

3.5.2 Development along streams/ drainage ways

Since several roads follow natural drainage paths, the settlements have grown parallel to the major streams/ drainage ways. The major stream south of Kundlu Khad shows a series of small clusters/ development on both edges along its length. Its tributaries display a similar settlement pattern along their entire length. Northern area of Chikni Khad has clusters all along, from Kalyampur to its confluence with the main course of Chikni Khad. Residential development is also seen along Kali Nadi and Pola Nala (on the east of the NH), along Chota Ratta Nallah from Sirsa river to Koli Majra. A series of residential clusters in the BBN area is seen along the lower elevations of the Balad Nadi.

3.5.3 Development in clusters (in more interior areas)

With the announcement of Industrial package since 2003, pace of development has increased many folds in BBN area. Development has come along the residential localities. However, villages are located in interior areas and purely depended upon the rural facilities. Even though industrial units are being setup around these localities due to low price of land value as Development Authority has so far not devised proper land use zoning map for Special area.

- Rulhari (north end)

- Bruna- Jagatpur (east)
- Soban Majra (near Panjera)
- Rehru Jhiriwala (south of Dabhota road and NH via Bhogpur)
- Dabota on west side and Kalyanpur on east
- Majra (south of Dabhota)
- Dhang Uperli
- Ranguwal
- Taprian (between Kali Nadi and Pola Nadi)
- Chhati Pura (Barotiwala)
- Seran (Baddi Tehsil)

3.6 Breakup of Existing Land Use of BBN Special area.

The land use plan consists of residential, commercial, industries, public & semi-public, parks & open space, traffic & transportation and other uses has illustrated detailed in land use map 3.1. Each land use category has its importance and regulations for spatial development. Land use is vital tool for a planning/ special area, so land use category is wisely devised in a scientific manner for planned and regulated development of area. However, BBN special area has developable spaces for urban development. As per the Development Plan around **7305** hactare area has been fully utilized for various urban use. Predominant land use is residential and industry. However, it has not come up in a planned way; there is intrusion and collision of each land uses due to lack of clear-cut policy and land use map for guiding the physical growth. Scientific land use map for socio-economic and environmental development is required to be prepared as per **UDPFI&NBC** guidelines. Challenges and complexities have been rising because of haphazard development, unprecedented explosion of population and other related issues. Fig 3.20 revealed that 26 percent of total area is not suitable for development having land cover under forest, water bodies and slopes. Only 14 percent of land has been used for various urban developments in form of residential, commercial, industries and other use. Out of total land, 60.5

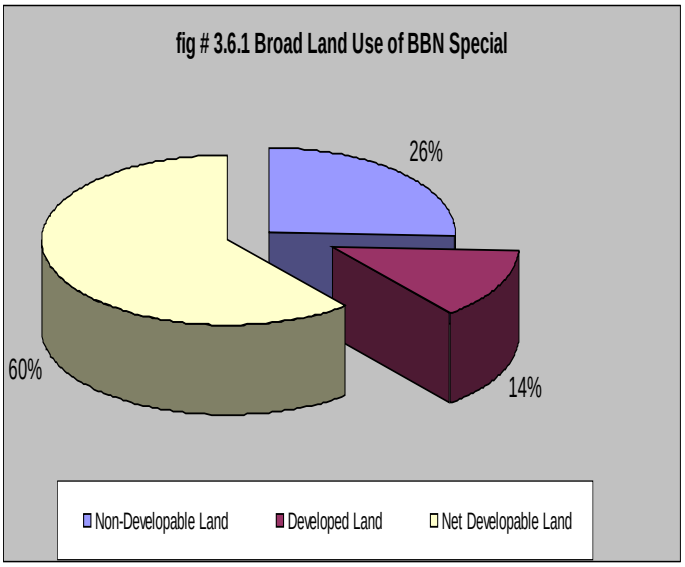
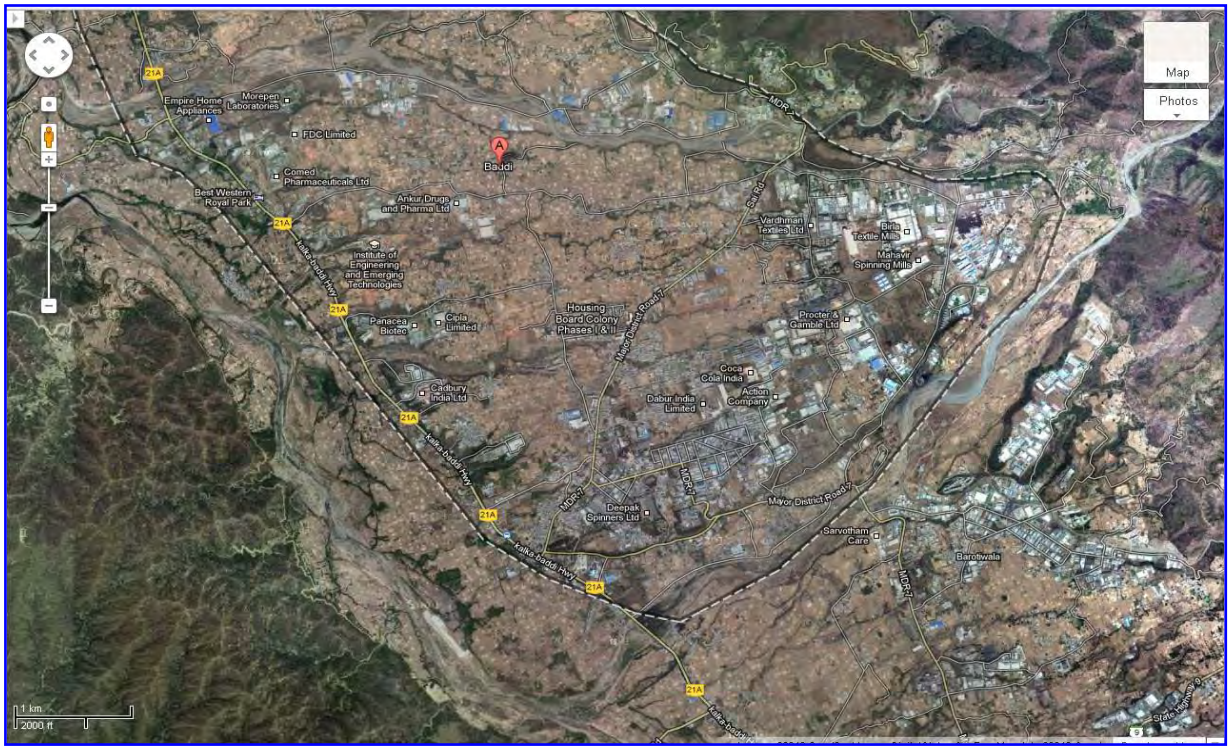


Fig 3.20 Broad Land use of BBN Special Area

percent land is still available for future development as well as to cater for various infrastructure projects and future development up to the year 2025. Present status of existing land use has shown below Fig 3.21 and map 3.6.1

Fig 3.21 Status of existing land use of Baddi Town- Satellite Image



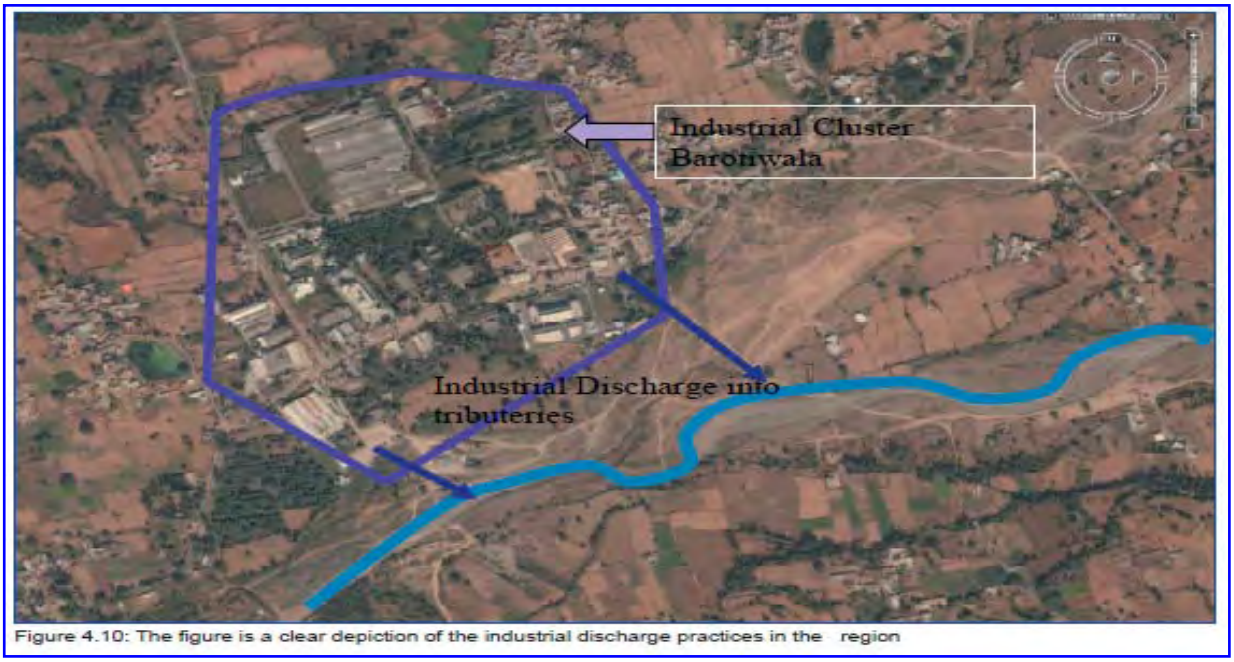
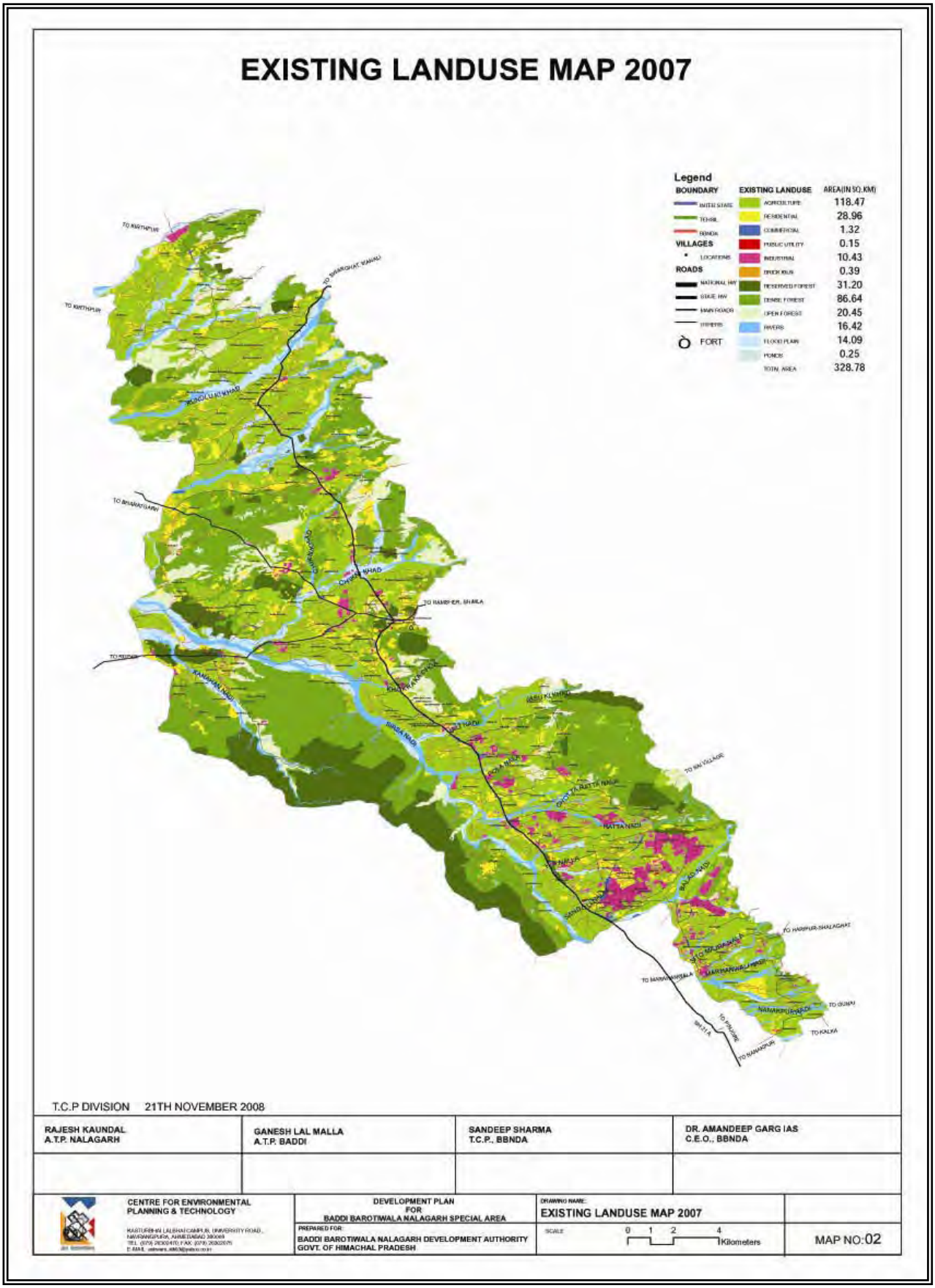


Figure 4.10: The figure is a clear depiction of the industrial discharge practices in the region

Map. 3.6.1. Existing Land Use Map



3.7 Land Market

The pace of development has come up after grant of industrial package to the State Govt. by the GOI in the year 2003. During course of development, haphazard land transition has occurred, as there was not an effective land management regulations to control the land conversion. Though HP Town & Country Planning Act, 1977 was extended but effectively could not implemented. On the other hand consumerism and real estate market was attracted at the prime level. Hence sections of land management like 16-C sub- division etc could not implemented. Property dealers/real-estate agents have performed the key role arranging sale of land and taking permission from State Govt under section 118 of HP Land Reforms Tenancy Act, 1974. During course of sale and purchase of land town planning schemes, Land sub-division and land pooling and reconstitution mechanisms have not been followed. Therefore, industrial units have been come up in every nook and corner of BBN special area without taking care of spatial planning, infrastructural arrangements and zoning planning.

In such a situation, to lay the infrastructure network was a cumbersome and big challenge to authorities. Even BBNDA could not performed up to mark in the field of physical and infrastructure planning As haphazard development had already started on various agriculture land. The gravity of development has created pressure on land resource which has lead to environmental problems. These kind of issues persisted in all four nodes of the Special area like Baddi, Barotiwala, Nalagarh and Panjhera as

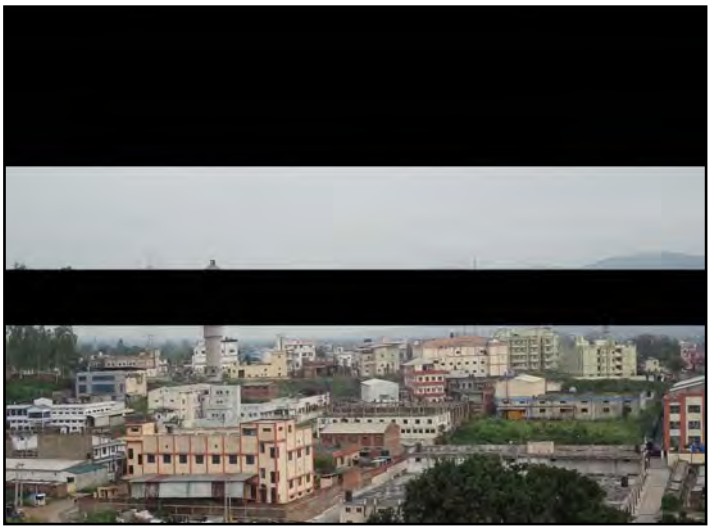


Fig 3.22 Unplanned growth - Baddi

land resourse has been used in an insenstive manner by the consumerism forces for constructions, haphazard development, unauthorized constructions, encroachments on roads and public land. Subsequently there is lack of integration between place of work and place of living, mis-match between population growth and urban infrastructure development Land, water, air, and noise pollution and vegetation loss have grossly

affected its eco-system. High rate of construction activities is damaging the natural setting as well as its scenic beauty. The process of land converting from agricultural/vacant in to other use is much more here than other area of the State.

During course of land transition no government rates for sale and purchase of lands were notified. Along the NH 21A at Baddi-Barotiwala area land value is very high. The market value of land on Baddi-Sai road is somewhere between Rs. 9000-13000 per sq meter. Even in industrial areas like Thana, Katha, Kishanpura-Manpura land prices are soaring. While in interior areas and land along the river prices are low. Nalagarh town also shows that in last 2-3 years time land prices have increased due to establishment of industries as well regional link getting stronger with the neighboring growth centres. Land prices in Rajpura-Manjholi on SH 16 on Ropar fall somewhere between Rs. 4000-6500 per sq meter. As one proceeds north towards Panjhera-Jhiriwala-Jogon area land prices drop to Rs.2000-2500 per sq meter. Nalagarh-Bharatgarh road which is fast developing as an important link also shows that land prices are under speculation in this area. This road connects to Dhabota where there are several brick-kilns. Brick kilns along the residential, commercial and industrial areas are needed to be either shifted or disbanded as they are very polluting.

3.8. Demographic and Population growth rate

The BBN region has witnessed a rapid growth of population over the past decade. Massive population growth has been recorded after grant of Industrial Package to the State by the GOI in the year 2003 for development and promotion of industries. People migrated from different states to this area for employment opportunities. The floating and migrant persons have contributed to creation of a lot of slums and unplanned development, thereby causing a lot of issues. The population of BBN area is numerated **172,270** persons consisting of **95631** males and **76659** females. Of this urban population is **40619** as per the Census 2011 report. The BBN Special area population accounts for **30** percent of the District Solan population. The growth rate of population in BBN Special area is **20** percent. During the decade 2001-2011, the BBN Special area population registered addition of **27706** persons to its 2001 population of **144564**. The BBN Special area registered a growth rate of 20 percent recording a decline of 26 percent to growth rate of 46 percent registered during the 2001 Census.

Population is a vital part of the plan document, all the future requirements, demand and supply of housing, land, goods and services are assumed on the basis of population factor. Detail of population is given below.

Table: 1.9. Population of BBN Special area to the District level. Census 2011

Sr. No.	Component	House Hold (H.H)	Population	Male	female
01.	District Solan	122425	576670	271566	102147
02	BBN special area	36664	172270	95631	76659

Source: Census 2001 & 2011

Table 1.9 reveals the population scenario at a District level as well as at the BBN Special area. There is a marginal growth in resident population as compared to the migrant/ floating population. In BBN Special area migrant population is very high on account of rapid industrialization and urbanization in the year 2003 to 2011. Decrease in resident population growth rate is owning to increase of education facilities, literacy rate, awareness of family planning and economic well being as well as societal changes.

Table. 1.10 Decadal population growth of BBN Special area (2001-2011)

Sr. No.	Year	Population	Decadal variation	% age of Decadal growth rate
01.	1981	67401	------	-------
02	1991	99019	+31618	+47
03	2001	144564	+45546	+46
04	2011	172270	-27706	-20
05	**2021**	**236009**	**+63739**	**+37**
06	**2031**	**324512**	**+88503**	**+37**

Source: Census, 2011
Note: Population for the year 2021 & 2031 has taken after projecting it from the base year population as per population projection method.

The percentage of increase of population for the BBN Special area in the year 1981 to 1991 was 47 %. It reduced to 46 % and 20% in the Census year 2001 and 2011respectively.

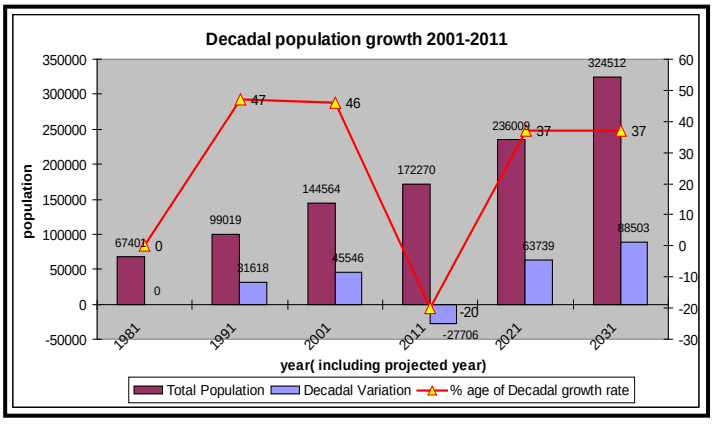


Fig : 3.23 Decadal Population growth 2001 to 2011

Though it was a peak time for industrial development but population did not increase in accordance to Table 1.10. However population has further been projected for the Census year 2021 and 2031 respectively as per population projection method which is estimated 236009 persons and 324512 persons for the year 2021 and 2031. In this projection migrant/ floating population is not added. The fig 3.23 shows that there is sharp decrease in decadal population growth in 2011.

3.8.1 Urban population

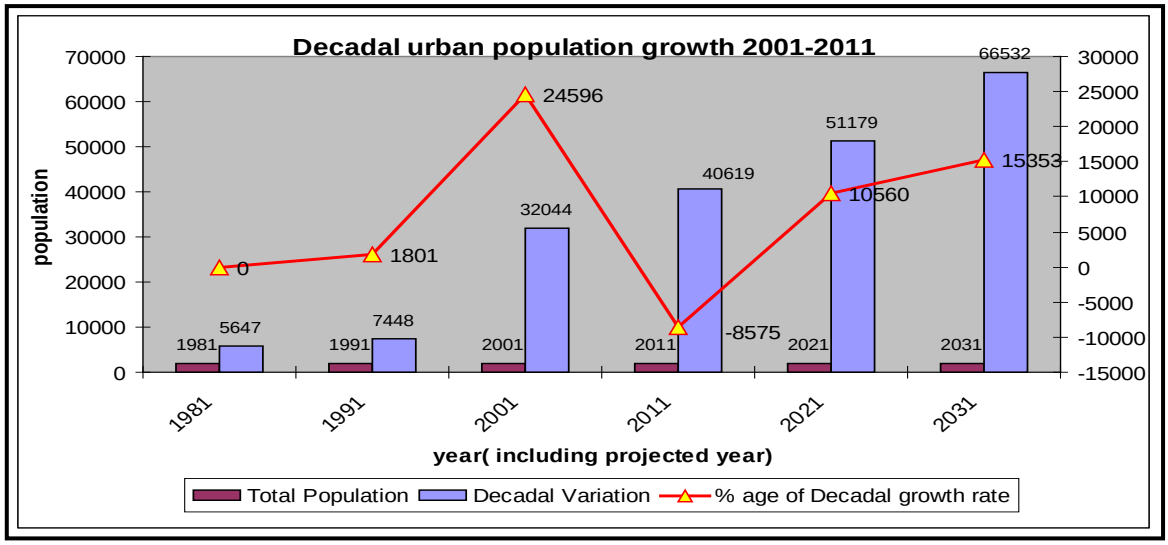
BBN Special Area has 2 urban local bodies one each at Nalagarh and Baddi. Both the local bodies have status of Municipal council and each one has 9 wards. There is total population of 40619 of which 10708 persons resides at Nalagarh urban area and 29911 persons at Baddi. It accounts for **40** percent of total District urban population. However rapid urbanization has also observed in BBN Special area due to industrialization and influx of migrant population. Detail of urban population is given below in table 1.11 & Fig 3.24.

Table. 1.11 Urban Decadal population.

Sr. No.	Year	Population	Decadal variation	% age of Decadal growth rate
01.	1981	5647	------	-------
02	1991	7448	+1801	+31
03	2001	32044	+24596	+330
04	2011	40619	-8575	-26
05	**2021**	**51179**	**10560**	**+30**
06	**2031**	**66532**	**15353**	**+30**

Source Census, 2001 & 201

Fig.3.24 Decadal population growth of BBN Special area 1981-2031.



In the year 2001 urban population was recorded very high as Baddi was declared as Municipal Council and both the MCs population were added to total urban population where it recorded 330 percent growth as shown in table as well as figure. Growth trend reveals that the future urban population is likely to grow double than present population on account of fast rural-urban migration for the want of economic well being. Urban sprawls around the Baddi and Nalagarh are likely to increase the urban areas.

3.8.2 Population Characteristics.

i) House holds Size

Household size while related to number of habitable rooms gives an idea about occupancy ratio and the degree of congestion. It has its utmost use in estimating the future housing requirements of the towns. According to 2011 Census it was found that there are 36664 households available for the population of 172270, thus the household size worked out to be 4.5 persons. A decrease in the household size was observed, which is probably due to the increasing trend of nuclear families.

ii) Density Pattern

A study of density enables us to understand various aspects such as intensity of of the use of urban land, problem of overcrowding arising out of congestion and high occupancy rate, building bulk, adequacy and inadequacy of open space. Gross density is very low due to presence of vast agriculture lands in BBN Special area. But net density is to high from the permissible limits in town and growth centre areas due to over concentration of population. It observed that average gross density of Nalagarh MC has been increasing consistently over the past three decades.The area is essentially rural in nature, except the industrial towns of Baddi-Barotiwala and Nalagarh town.

3.8.3 Sex Ratio

The table 1.12 outlines the change in sex ratio in BBN area in both rural and urban areas during the period from 1991to 2011. The increase in the sex ratio can be attributed to increased industrial activity in the surrounding areas resulting in out migration, hence bringing change in the demographic profile.

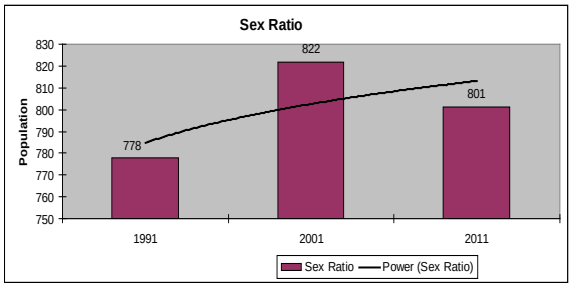


Fig: 3.25 Sex Ratio.

Table 1.12. Sex Ratio of BBN Special area

Sr. No	Year	Male	Female	Sex Ratio
01	1991	51499	40072	778
02	2001	61751	50769	822
03	2011	95651	76659	801

Source: Census 2001 & 2011

3.8.4 Literacy Rate

According to the 2001 Census, it is seen that the overall literacy rate in the BBN area is 61.76%. The total population of the BBN Special area is 144564 persons. of which 89296 persons are literate. Refer Table 1.13 showing the change in literacy rate within the BBN Special area over the last three decades.

Table 1.13: Literate Population in BBN Area

Year	Total Rural Literates		Rural Literacy Rate	Rural Female Literacy Rate	Total Urban Literates		Urban Literacy Rate	Urban Female Literacy Rate
	M	F	%	%	M	F	%	%
1981	14550	5911	33.1	28.9	2289	1409	65.5	38.1
1991	28925	12579	45.3	30.3	3027	2201	70.2	42.1
2001	40799	24463	58.0	37.5	17956	6078	75.0	25.3

Source: Census 1981, 1991, 2001

- Urban literate population of BBN region of 2001 includes Nalagarh MC & Baddi NP literate population

As observed from the Table 1.13 literacy rate in both rural and urban areas of BBN area has increased over the years. Female literacy rate in rural area has increased from 29% in the year 1981 to 37.5% in 2001. This could be a result of various awareness campaigns for girl child education. But on the other hand female literacy in urban areas has declined from 42% in 1991 to 25% in 2001. Female literacy is only 13% in Baddi MC while male literacy is 61.75%. This can be due to high rate of immigrant population in the area thereby increasing the share of male literacy.

3.8.5 Work Force Participation

Workforce participation rate refers to the percentage of worker population to the total population. It is apparent from the table below that within the BBN area WFPR in rural areas has increased from 42% in 1981 to 49% in 2001 but at the same time share

of marginal workers has also increased from 23% to 32% in 1981 to 2001 respectively. This shows that major portion of working population is engaged in work for less than six months of the year in rural areas. Table 1.14 clearly illustrates that the WFPR has increased in the Baddi-Barotiwala area from 1981 to 2001.

Table 1.14: WFPR in BBN Area

Year	Total Population (Rural)	Total Worker Population (Rural)	Total Population (Urban)	Total Worker Population (Urban)	WFPR Rural (%)	WFPR Urban (%)	Share of Marginal Workers (Rural) %	Share of Marginal Workers (Urban) %
1981	61754	26138	5647	2018	42.3	35.7	23.1	3.8
1991	91571	45787	7448	2157	50.0	29.0	21.9	0.3
2001	112520	55520	32044	17657	49.3	55.1	32.4	2.4

Source: Census 1981, 1991, 2001

While the scenario is quite different in the urban areas where we see that the share of marginal workers is declining. This implies that major proportion of the working population is engaged in work for more than six months of the year. Therefore, there is a positive shift from marginal workers to main workers. While we look at the figures for urban areas it should be borne in mind that the figures for the year 2001 include both the urban areas within BBN jurisdiction. Hence, after a sudden decline in share of marginal workers in urban areas from 3.82% to 0.32% in 1981 to 1991 respectively, there is a rise in the percentage of marginal workers in 2001. This is due to the fact that 2001 workers population is inclusive of both Nalagarh MC and Baddi NP population while figures before that are indicative of only Nalagarh urban area.

3.8.6 Urbanisation

A large portion of the regional area is rural in character; only the two local bodies namely Nalagarh and Baddi is fall under urbanized area. The size, growth and functional characteristics of urban areas have been increased too much due to influx of large quantum of migrant population including industrial labours.

Fig 3.26 Jharmajri area

Intensity of use of urban land, problem of over crowding arising out of congestion and high occupancy rate, building bulk, adequacy and inadequacy of open space have increased density of population. Gross density with in BBN Special area is 150 persons per hectare while net density may be much higher than the gross in urban areas. Haphazard growth, tremendous population influx, higher density, heavy investment, unscientific land transition and unorganized spatial development caused adversed effects to BBN Special area.

Currently there are 229 villages, most of which do not exhibit the standard characteristics of urban areas. The villages do not have population and work force to be declared as urban areas. With growing level of urbanization, the challenge of up gradation of urban infrastructure and improvement of urban environment is the call for the day. Table 3.14 illustrates the norms and standards for an urban area, and gives a comparison with the existing villages. As seen in the table most of the villages do not conform to any of the urbanisation criteria. It can be summarized that an urbanity index study of these villages would not show transformation of these villages from a rural to an urban economy. It is pertinent to mentioned that a high rate of growth in urban population during any particular period from the year 2003 to 2010 does not imply a higher rate of urbanization. Villages around the of MC area are likely to get urbanized in future on account of rapid development and converting agriculture land in to built up area. The table 1.15 shows the degree of growing urbanization in BBN area.

Table 1.15 : Degree of Urbanisation in Rural areas of the BBN Area

Sr. No.	Parameters	Urban Standards and norms	Existing village range	Existing village Average
1	Population	5000	8 to 2792	498
2	Growth Rate	20%	(-17.46) to 500	48.7
3	Density	400 P/sq. km	0.0018-0.37	3.5
4	Literacy Rate	70%	16.35-85.71	57%
5	NA Workers	90%	3.57 % to 99.1 %	40.6%

Source: Census 2001.

3.9 Stakeholders' Aspirations and Perceptions

3.9.1 Perceptions & Aspirations: Household Survey

Sampling Methodology :

The household survey was carried out in Nalagarh MC and Baddi NP falling under BBN Special Area. The sample size was 325 which were distributed between Nalagarh MC and Baddi MC taking sample of 5% of the total household number.

A pretest was first carried out to test the questionnaire in the field and enable the enumerators get acquainted to the questionnaire. The sample size covered was 325 of which 100 interviews were conducted in Nalagarh MC while 225 were administered in Baddi NP. The table below shows the distribution of sample across Nalagarh MC and Baddi NP.

Table 1.16: Distribution of sample across Nalagarh MC and Baddi NP

Towns	Ward name	Total population	Total House hold	Sample hh size
Nalagarh (MC)		**9443**	**2108**	
Ward No.1	Vauan wala	970	213	11
Ward No.2	Pathsala wala	1338	301	12
Ward No.3	Haritan wala	1313	296	12
Ward No.4	Miausahib wala	852	183	9
Ward No.5	Tainian wala	832	156	8
Ward No.6	Bassian wala	1092	215	10
Ward No.7	Vohrian wala	955	233	12
Ward No.8	Bajajan wala	1068	235	12
Ward No.9	Sitian wala	1023	276	14
				100
Baddi		**22601**	**5759**	
Ward No.1		1125	297	15
Ward No.2		1603	422	20
Ward No.3		1244	339	15
Ward No.4		2478	551	25
Ward No.5		2649	646	25
Ward No.6		1066	281	10
Ward No.7		6978	1806	60
Ward No.8		2372	630	25
Ward No.9		3086	787	30
				225

Due to the limited availability of socio – economic data, the number of households was used as a base to decide upon the sample size. Given the substantial geographical expanse of the project focus areas and non – availability of street level maps, existing Development Plan maps and sketch map of Nalagarh MC and Baddi M.C which were available, were used to determine the sample locations. On site selection of sample was done based on housing typology and income group in various wards taking reference from local people of the area.

3.10 Factors affecting growth rate

The population projection has been assumed for the year 2021 and 2031. As already noted the increasing trends of birth rate and decreasing death rate would be affect the projected population. If the migration is unchecked, no doubt, it will have its effect on the growth of population projected for the future.

3.11 Population Projection

During the decade of 1991 to 2001 the population of BBN Special area has shown rapid growth rate of 47 percent. Future population projection has been calculated by assuming 30 percent growth rate during the decade of 2021 to 2031. Hence anticipated population for these decades varying growth up to 236,009 in 2021 and **324,512** in 2031. Besides this, floating and rural-urban migrants populations have also been worked out by assuming optimum migrants population of 150,000 persons. Thus population of the BBN Special areas for all purpose has been taken as combined **430,260** persons for the year **2025**.

3.12 Perceptions and Aspirations

3.12.1 Baddi Municipal Council.

A summary of findings from household survey in Baddi Municipal council area is presented below:

Area Profile:

When looking at the socio-economic profile of the sampled households the following can be summarized. The average household size of the sampled households in Baddi NC is 4. Out of the 225 sample, 40% respondents are of migrant status. And when we look at the tenure status of the respondents it shows that 56% of the respondents stay in rented houses which is reflective that there is considerable amount of immigration in the town. The average monthly expenditure per household is about Rs.6,500 with income of about Rs.10,000.

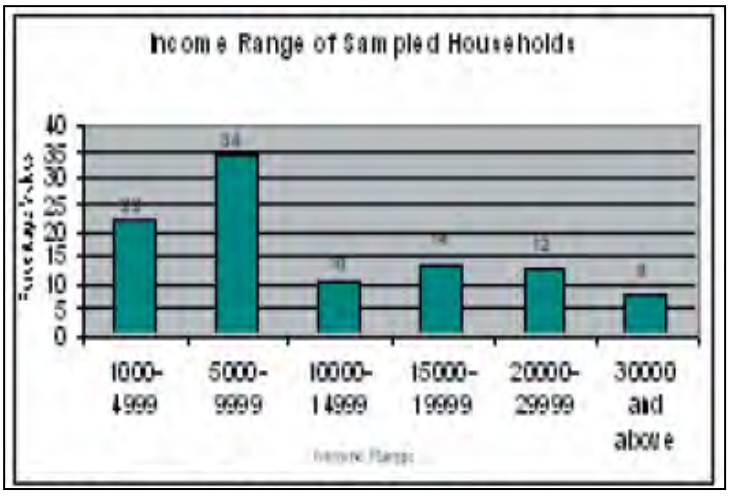


Fig: 3.27 Income Sampled Households

Looking at the educational background of the respondents it is quite evident that educational level in the town is not very high as it was found that only 18% of the

respondents have completed their college while 33% of the respondents have completed senior secondary. Around 20% of the respondents are illiterate.

3.12.2 Stake holder's Perceptions

3.12.3 Water Supply Services

- 71% of sample households surveyed in Baddi NP have piped water supply from IPH Department as their main source of water supply. Around 12% rely on private bore wells and 17% on other sources of water. Around 30% of the respondents said that they get water for 24 hours a day and contrast to it 22% of sample household get water for merely 1 to 2 hours each day. If we see the break-up it is found that ward no 3 & 7 have 24 hour water supply while ward no 8 & 9 and some parts of ward no 3 & 5 get water for less than 6 hours a day. It is these areas which need augmentation of water supply services.
- When asked about the level of satisfaction from the water supply services 68% of the respondents said they are not satisfied with their present water supply services. Around 38% of the sampled households are getting water for less than 4 hours a day which is the main cause of dissatisfaction amongst the residents. Around 85% of the respondents are satisfied with the quality of water supplied.
- Almost 50% of the respondents showed their unwillingness to pay for improved services. While 48% said they can pay a little higher amount than what they are paying presently for improved services.

3.12.4 Sanitation Facility

- Out of the 225 sample survey 52% of the respondents have soak pits, 33% said that their toilets are connected to sewerage system. These 33% are located in ward no 7 & 8 which is HIMUDA Phase I & II residential colonies. These areas have better infrastructural facilities as compared with rest of the town.
- When asked about their willingness to pay for better services, 64% of the respondents are willing to pay for improved services. 49% said that they are not satisfied with their current sanitation facility and they want improvement in their sanitation system due to the following reasons: health concerns, cleanliness and convenience.

Based on the average expenditure and income levels, one would expect that up to 5% of income could be paid for water and sanitation charges. This would mean on average about Rs500/ month. Thus people would most likely be able to afford what they are willing to pay for improved services since the figures they pay and say they are willing to pay is far less than 5% of their household expenditure.

3.12.5 Sewerage & Storm Water Drainage

- There is no proper sewerage network in the area. 41% of the sampled households are using covered drains to dispose off waste water while 13% dispose in open drains.
- Situation is no different for storm water drainage. There is no separate system for disposal of storm water. 35% of the respondents said that storm water gets drained in covered drain while 49% said that it gets drained through natural slope into the streams.

3.12.6 Solid Waste Management

- Open dumping is most prevalent in the area as 25% of respondents resort to open dumping of domestic waste. Apart from it 19% burn the waste and 32% are using two disposal methods. Only 2% throw their waste in municipal bins. This reflects that there is no efficient waste collection and disposal system in place.

3.12.7 Power Supply

- 86% of the respondents said that they have Government connection while 14% have private electric connection. These 14% respondents are from ward no 7 where Vardhaman Factory is located. Also it is observed that those having private connections get 24 hour power supply and government supplies 20 hour power supply. There is usually a cut of 3-4 hours. Along with this people have also complaint of low voltage.

3.12.8 Roads

- 50% of the households have access to metal led road. Also it is observed that these respondents are located in ward no 7, 8 & 9. When cross-checked this with the map and site survey was found that these wards have good accessibility. Along with this, these are the wards where approach road width varies between 3 to 3.5 meters unlike other areas where it varies between 1.5 to 2 meters. The rest 50% households have accessibility either through kachcha road or brick/paved road.

3.12.9 Mode of Transport

- The survey reveals that the most frequently used mode of transport is bus. The average distance traveled by respondents for work by bus is 3.4 kms. While 16% of

the respondents who are traveling 9.5 kms on an average for work per day use private mode of transport.

- Also it is observed that on an average respondents travel 23 km for availing medical facility and 38 kms for recreational purpose. Hence, for long distances around 80% to 89% of the respondents use bus.
- It is also inferred that for those respondents whose workplace and schools are located within 1 to 3 km range usually walk to the respective place. Shared auto and private auto are used by only 3% to 6% of the respondents.

3.12.10 Social Infrastructure

- It is reflected from the household survey that the respondents in the surveyed area of Baddi M.C have to travel on an average between 20 kms to 22 kms for availing facilities of higher order.
- It is apparent from the survey that primary, middle and senior secondary schools are located within a range of 1.5 to 2.5 kms but for college they go to Nalagarh.
- Based on the survey results residents are traveling 20 kms on an average to go to a hospital in case of an emergency. For first aid and any other minor ailment a PHC is available within an average range of half a kilometer.

3.12.11 Recreation

- Respondents said that they are not satisfied with the recreational facilities in their area. There is a lack of good open and green spaces in the town. More than 50% of the persons showed their displeasure with the very limited availability of recreational facilities in the town.

3.13. Nalagarh Municipal Council

Inferences from household survey in Nalagarh Municipal Council are presented below:

Area Profile:

An analysis of the household surveys shows that the average household size in Nalagarh MC is 6. The average monthly expenditure is Rs.5,800 with income of about

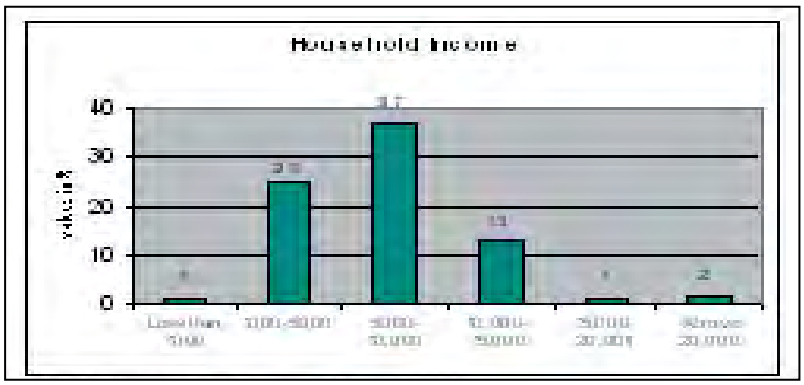


Fig 3.28 Income Range of Sampled Households

Rs.10,000 of the 100 respondents interviewed.

Nalagarh is basically a service town where 42% of the persons are in service, 31% are engaged in business and 10% are self-employed. Out of the 100 sample, 93% respondents are native of the place. The tenure status of persons shows that 58% have their own houses while 26% stay in rented houses. It is also apparent from the survey that 91% of the persons stay in pucca houses and 8% stay in kachcha house.

Looking at the educational background of the respondents it was found that 24% of the respondents have completed their college while 38% of the respondents have completed matric (Class Xth). Despite the fact that Degree College is located well within the town people going for higher studies is not quite prevalent here.

3.13.1 Stake holder's Perceptions

3.13.2 Water Supply Services

- 93% of the sample households in Nalagarh MC have piped water supply from IPH Department as their main source of water supply. Only 7% rely on other sources of water.
- Survey reveals that the duration of supply hours are very short. 53% of the total sample households get water for 2 hours a day and around 24% of the sampled households get water for less than 1 hour a day. Also it was informed by the respondents that water pressure is very low due to which they have installed pumps to uplift water in overhead storage tanks. This increases the overall cost of water as along with the water charges additional cost of electricity is also to be borne by the residents.
- It is inferred from the household survey that 71% of the respondents said they are not satisfied with their present water supply services. The main cause of dissatisfaction amongst the respondents is the short duration of water supply. Respondents have no reservations against the quality of water supplied.
- Respondents have shown their dissatisfaction against the water supply services but are not willing to pay anything extra for improved services. Merely 4% of the respondents said that they are willing to pay higher amount for improved services.

3.13.3 Sanitation Facility

- Nalagarh town has no sewerage network. As observed from the household survey 83% of the respondents have soak pits. While 9% are using community toilets and 8% have no facility.
- 45% say that they are not satisfied with their current sanitation facility and are willing to pay a little higher for improved services.

3.13.4 Sewerage & Storm Water Drainage

- There is no sewerage network and storm water drainage system in Nalagarh MC.

3.13.5 Solid Waste Management

- The survey shows that the town doesn't have any efficient waste disposal system. 44% of the respondents said that they throw their waste in municipal bins. These respondents intimated that sweepers from the Municipality come to collect waste. While almost 36% said that they have no proper waste collection and disposal system. 16% of the respondents resort to open dumping of waste which creates unhygienic conditions.

3.13.6 Power Supply

- 97% of the respondents said that Government is the main provider of power supply and all have metered connection. There are occasional power cuts otherwise they get 24 hour power supply. Only during summers they face problems sometimes.

3.1.3.7 Roads

- The survey shows that 79% of the households have access to concrete road. This reflects that internal roads within various wards are not metaled and as informed by respondents during monsoons condition of roads becomes quite pathetic.
- The approach road width of the surveyed households varies between 1 to 4.5 meters.

3.13.8 Mode of Transport

- Survey shows that the most frequently used mode of transport is bus and cycle. The average distance traveled by respondents for work by bus is 13.58 kms. Only 8% of the respondents use private mode of transport traveling 2.3 kms on an average to workplace. Cycles are also important mode of transport used by 30% to 40% of the respondents.
- It is also inferred that for those respondents whose workplace and schools/colleges are located within 1 to 3 km range usually walk to the respective place.

3.13.9 Social Infrastructure

- As inferred from the household survey social amenities are well placed within the town and respondents in the surveyed area of Nalagarh MC have to travel on an average between 0.5 kms to 3.5 kms for availing facilities of higher order.

- It is apparent from the survey that primary, middle and senior secondary schools are located within a range of 0.5 to 2.5 kms. Even the PG College for higher studies is located well within the city.
- It is also inferred from the survey that respondents travel on an average 0.5 kms to 4 kms to go to a hospital which is located within the main bazaar area.

9. Recreation

- Residents said that they are not satisfied with the recreational facilities in their area. There is a lack of good open and green spaces in the town. More than 50% of the respondents showed their displeasure with the very limited availability of recreational facilities in the town.

3.14 Village Focus Group Discussions (FGDs)

Focus group discussions were held in 15 villages within the study area to take stock of the status and availability of services in the villages and to identify major challenges faced by villagers in terms of water supply and sanitation. Table 3.16 shows the location of sample villages selected for FGD.

Table 1.17: Sample villages for FGDs

S.No	Village Name	Criteria
1	Mandhala	3
2	Bather	1
3	Sainsiwala	2
4	Koti	3
5	Katha	1
6	Khera Nichla	2
7	Rajpura	1
8	Manjholi	3
9	Dabhota	1
10	Dhang Nichli	2
11	Jagatpur	2
12	Aduwal Jandori	3
13	Padhyana	1
14	Malpur	2
15	Mastanpura	2

The sample villages for FGDs were selected based on the following 3 c riteria:

I. Proximity to any industrial area/industries
II. Nearness to NH 21A/ main road/ major junction
III. Away from influence of industries and main road

Preliminary Inferences from Focus Group Discussion

Altogether fifteen FGDs were organized in various geographical locations. The section below presents a summary of the salient points that emerged out of the FGDs:

3.14.1 Infrastructure services: Access and Adequacy

Water supply in most of the sample villages is through tube well along with handpumps and open wells. Villages like Koti which lie in the interior areas draw water from open wells. There is no house-to-house piped water supply. Except in few villages like Rajpura, Katha due to locational advantage few households in the villages which can afford to have water at their door step have installed piped water supply at their own expenses. Khera Nihla has emerged as an exception with all the houses having water connection. Villages which don't have their own water source take water from nearby Panchayat as was the case with Sainsiwala and it is not regular. Private tube wells charge Rs.25-30 per hour for water extraction. Another area of concern is depleting water table. The villages which have industrial development in their vicinity are facing water scarcity problem not only for drinking purpose but also for irrigation.

- Majority of the sample villages are lacking proper sanitation facility. Except in few areas where on personal costs people have constructed toilets with soak pits. Mandhala, Dabhota, Rajpura were an exception where every house in the village has a toilet though there is no sewerage connection but people have built septic tanks.
- The approach road to the villages lying in interior is unmetaled. As observed in Koti the approach road to this village passes from the river, monsoon rain disturbs the connection with this whole area. In contrast to this, villages lying near the main road or NH 21A have good connectivity and even the internal roads within the village are concrete.
- Organic wastes from house holds are used in the agricultural fields and the other waste is burnt as was informed during discussions.
- All sample villages have electric supply but there is a cut of 2-4 hours everyday. Villagers complained of low voltage supply because of which at times tube well also dosen't function affecting irrigation. As informed during the cuts power is supplied to industries.

- Primary schools are present in all sample villages where the pupil strength is atleast 30. In Focus Group Discussions people have shown satisfaction on availability of primary education in villages. In all surveyed village teachers are regular in schools and there is a provision of mid-day meal facility.
- In terms of medical facilities though villages have required infrastructure but dispensaries are defunct as there is no doctor. In villages where there is no healthcare facility, villagers in case of serious illness usually go to Baddi, Barotiwala, Nalagarh for medication.

3.14.2 Environmental and Ecological Degradation

- Villagers showed their concern that due to the influence of the industrial policy agricultural land is being sold for NA use (for construction of colonies and industries). Since there are no regulations as per say farmers are selling their prime agricultural land to industrialists and as a consequence industries are coming in between agricultural areas and hence, affecting agriculture.
- As an impact of industrial pollution in this area agricultural production is getting hampered. Another concern is the presence of brick kiln in the gamtal areas and surrounding agriculture fields as observed in Dabhota. This is not only affecting total crop yield but as well raises health care concerns for the people residing in the vicinity of brick kilns. As came out during the discussion around 20-25% crop yield has declined in the last 2-3 years.
- Deforestation is becoming a problem because of industrialization in this area. The power plant construction at Padhyana has been done clearing the forest area in the village. Villagers are skeptical about the ill effects of the plant when it will start producing power as lot of coal will be burnt in the plant for power generation. And even the water table will be lowered because of extraction of water for industrial use.
- Ponds are being filled up with soil to be sold to builders for construction of residential colonies which will in near future affect the natural drainage and create water logging.

  An important case came to light during discussion with the villagers at Rajpura village. They informed that the presence of leather factory in between the gamtal area was causing havoc to the villagers. The factory used to discharge the waste water through open drains of the village. This was not only causing water logging problems in certain areas of the village but also environmental and healthcare concerns. The waste water discharge from the factory was even polluting ground water. As a result some wells are closed so that nobody uses the water from them. Also as an impact of this villagers faced an epidemic few years back. Villagers suffer from diarrhea and cholera frequently.

A case was filed against the factory in the High Court as a result the High Court Judge visited the site and issued an interim order of closure of factory in February 2007 till the decision is taken. Since then the villagers have heaved a sigh of relief.

3.14.3 Migration Trends

- Seasonal migration for work in sample villages has become a frequent phenomenon. People from villages migrate to nearby towns like Nalagarh, Bade, and Kalka for labour work in non-agriculture season. No permanent migration was reported in any of the villages.

3.14.4 Villager's Concerns

- People have expressed their dissatisfaction regarding water supply and sanitation facilities.
- During monsoons cachucha roads within the villages create problems for commuting.
- The nearby ponds which are being filled up with soil may cause problem in due course of time.
- The pollution created by industries and housing complexes coming up in the vicinity of villages is the main cause of apprehension of the villagers.

Fig 3.29 FGD being conducted at Jagatpur

- Depleting ground water table and water quality also forms a cause of worry for villagers.
- Villagers feel that soaring land prices in the region will lead to land speculations and if one farmer sells his land then the adjoining farmers are forced to sell their land.
- Another reason to worry for villagers is that since main thrust is been given to industrialization hence, agriculture is getting affected in the region.

CHAPTER 4: REGIONAL ECONOMIC AND INDUSTRIAL PROFILE

The BBN special area is a well known for pharmaceutical manufacturing and related industrial production. It has position of the biggest industrial hub of the state. The industrial development has come up to this area owning to tax benefits given by the GOI for promotion of industries and employments to hill state. Besides, area is by virtue of suitability for development, due advantage of flat land, power, water and transport facilities. It has good connectivity with surrounding states for exchange of goods and materials. However, haphazard land transition has also occurred due to lack of sound and effective land management regulations while lands were purchased by prospective entrepreneurs. Hence, spatial development, indeed, has not come systematically; industries have been set up in isolation here and there with out having infrastructure networking. It ultimately had an adverse affect on the environment and ecology of BBN Special area. The major thrust of economy in BBN Special area lies upon agriculture, industries and transport.

4.1 Industrial Activity Profile

The industrial development has rapidly grown since last two decades. At Barotiwala 56 industrial plots were developed during the year 1962 -63.Industrial area Baddi was developed in the year 1982 by the department of Industries, Himachal Pradesh where 468 industrial plots have been developed (175 by Dept. of industries and 293 by HPSIDC under self financed schemes). Besides this HIMUDA has also developed 81 plots which have been allotted through open auction recently. Further, in order to promote exports in the state, Department of Industries has developed an export promotion Industrial park [EPIP phase-I] at village Jharmajri comprising of 955 bigha area in the year 1995-96 where in 229 industrial plots have been developed and have been allotted to the entrepreneurs, out of total 229 plots 129 plots have been allotted exclusively to the exporting units and remaining 100 plots to general/non exporting units. Similarly ,export promotion

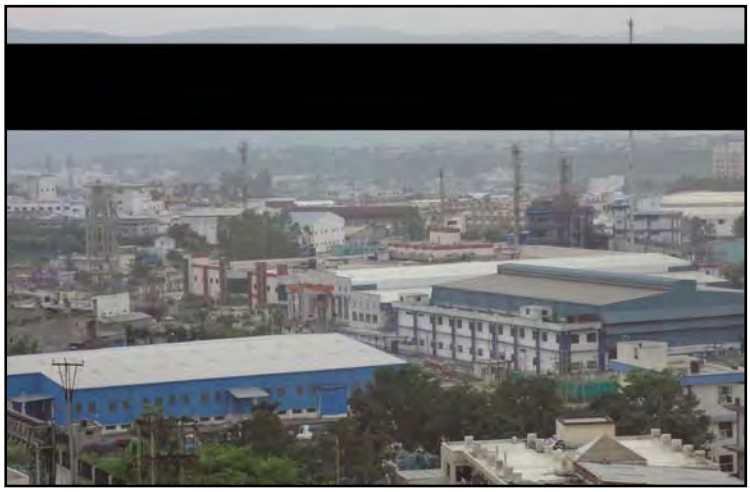


Fig 4.30 Industrailisation at BBN Special Area

industrial park [EPIP phase-II] at village Thana comprising of 885,856 Sq. tm has also been developed wherein 160 plots have been carved out so far and all the 160 industrial plots have been allotted to the interested entrepreneurs. Out of total 160 allotted plots, 141 plots have been allotted to the general/non exporting units and remaining 19 to the exporting units.

Besides, the above Industrial estate comprising of 20 sheds was constructed in year 1986-87 at Baddi and all the sheds have been rented out to different entrepreneurs to carry out industrial activities.

4.2 Present Industrial Scenario

The pace of industrialization has been accelerated to large extent and as such, industrial houses of national and international repute have established their projects in this industrial corridor. At present, the share of industrial sector in SDP (State Domestic Product) has increased to **17%** and this sector has become the second largest source of providing employment in state.

Table 1.18: Industrial Areas

Sr. No.	Name of Industrial Area	Year	Total Area (Ha)	No. of Plots carved	No. of Plots allotted	No. of vacant Plots
1	Industrial Area Baddi	1982-83	27.7	175.0	175.0	nil
2	Industrial Area Barotiwala	1962-63	22.7	56	55	01 (to be auctioned)
3	EPIP - Phase I - Jharmajri	1995-96	74.8	229.0	229.0	nil
4	EPIP - Phase I - Thana	1996-97	88.6	160.0	160.0	nil
5	HPSIDC Industrial Area Baddi	1987-88	55.6	293	293	nil
6	HIMUDA Industrial Area - Bhataulikalan	2004-05	25.5	81	81	nil

Source: Single Window Clearance, Baddi

At present 642 industrial units are functioning in Baddi & Barotiwala area. Out of which 130 industrial units are of L&M scale category and 512 units are of SSI-TINY category. Prominent among them are Vardhman Group, Birla Textiles Ltd., Dabur India Ltd., Alembic Ltd., Joyco India Ltd., Godrej Consumer Products Ltd., Cadilla Healthcare Ltd., Cipla, Cadbury India Ltd., Colgate Palmolive India Ltd., Wockhardt Ltd.,

Fig 4.31 Industries in Baddi

Indo-Farm Tractors & Motors ltd.,
Action Shoes, Havell's India Ltd., Torrent Pharmaceuticals Ltd., Ind-Swift Ltd., USV Ltd., Ayurvet Ltd., Pidilite Industries Ltd., etc. Following is the break up of industrial units functioning and permanently registered with the Department of Industries as onn 31.03.07.

In order to strengthening the state's economy the Govt of India has granted industrial package to Himachal Pradesh till March, 2010. It has become pharmaceutical hub as well as listed in the map of South Asia for production of medicine. Industrial pockets are not developed systematic way by the concerned Department. There is a lack of provisions of infrastructure like roads, sewerage, water supply and parking area for goods carriers and trucks. Built environment is full of confusion with regard to segregation in industrial units, commercial activities and housing locations. Conservative surgery, relocation of polluting units and re-planning of entire mis-match area are required to be planned for sustainable development.

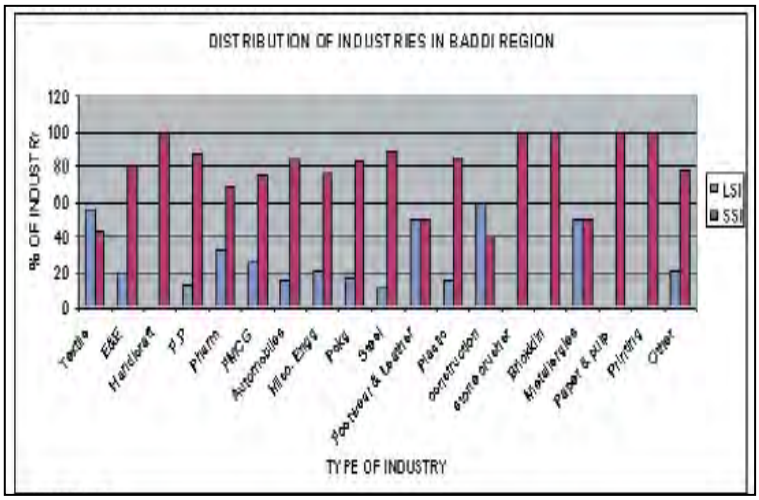


Fig : 4.32. Distribution of Industries in Baddi & Barotiwala area.

4.3 Details of Industries at Baddi

Table 1.19: Industrial establishment in BBN region

Sr. no	Category	No. of units functioning	Total Fixed Capital Investment (Crore Rs.)	Employment		
				Him	NHP	Total
1	L&M	130	1833.6	9410	11322	20732
2	SSI	552	417.3	6889	3014	9903
3	Total	642	2250.9	16299	14336	30635

Source: Single Window Clearance, Baddi

Baddi area has maximum number of industrial clusters as compared to Nalagarh and Barotiwala nodes. As per source Baddi area has 6 industrial layout area of which one Industrial layout is approved under provisions section 16-C of HP TCP Act1977. The

Baddi node is comprised of various kinds of industries. It has set up by virtue of suitable land, good inter/intra connectivity and connectivity with near by ancillaries units.

4.4 Details of Industries at Nalagarh

At Nalagarh, more than 500 industries have been established so far. The prominent are GPI Textiles, JP Cement etc. In addition to these, there are 41 footloose industries in the region. Composing of Pharmaceutical Industries. Other major industries in region are Textile, Chemical and E&E (Electrical & Electronics).To these existing industries HPSIDC is planning for an extension of industrial clusters in village Dabhni. Shown in the next few pages are glimpses of the spread of industry under the industrial Area Barotiwala.

Fig 4.33. JP Cement Plant at Bagheri

Table 1.20: Industrial Clusters of BBN Special area.

SR. No.	Industrial Cluster	No. of Industries (working)
1	Industrial area Baddi	133
2	Industrial area Barotiwala	52
3	EPIP Phase - I	214
4	EPIP Phase -II	92
5	Industrial area Katha	50
6	Himuda Industrial area	68

Source: DIC, Baddi

4.5 Industry Types

The various type of industries are food & beverages, engineering & metal, plastic, pharmaceutical, electrical & electronics. The type of industries under the classification of small, medium and large-scale production units are mentioned in the table below.

Table 1.21: Details of industries at Nalagarh

Sr.no.	Industrial Category	No of functioning units	Employment
1	Large and Medium	158	Not available
2	SSI	354	Not available
Total Industrial Units		**512**	

Industries in the region included 44 working brick kilns which are a threat to the surrounding the agricultural fields as well as village settlements.

4.6 Industrial Package and its Impact

Govt.of India, in Jan, 2003 has announced industrial package of incentive to the industrial units located or would be located in Himachal Pradesh. The pace of industrialization has increased to a great extent because of this package .The Department of industries has already approved 1940 projects in SSSI/Tiny sector for Baddi / Barotiwala after the announcement of this package (i.e w.e.f 07.01.03 to 31.03.2007) having an investment of Rs. 2045.99 cr. And these units have proposed employment to 75129 persons. Following is the activity wise breakup of SSI units registered 31.03.07 on provisional basis after the announcement of the package.

Table 1.22: Multiple Category Industrial Mix in the BBNSA Region

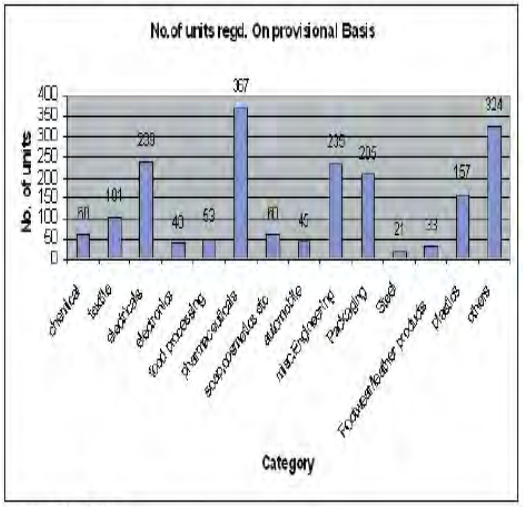
Industrial Category	Scale of Industry	
	Small	Large and Medium
Food and Beverages	Mineral water	soft drinks
Engineering	Steel fabrication	Wire drawing/ forged auto components
Plastic	Moulded products	Plastic sheets
Pharmaceuticals	formulation	Manufacturing/ complex process
Electrical & electronics	D.G sets	ESP Boilers/ watches
Misc.	Printing work	Corrugated boxes

Table 1.23: Upcoming SSI units with provisional registration. Fig 4.34 No. of Units Provisional.

Category	No. of units regd. on provisional Basis
Chemical	60
Textile	101
Electricals	239
Electronics	40
Food processing	53
Pharmaceuticals	367
Soap,cosmetics etc	60
Automobile	45
Misc.Engineering	235
Packaging	205
Steel	21
Footwear/leather products	33
Plastics	157
Others	324
Total	**1940**

Source: SWC, Baddi

Figure 4.7: Number of Units Registered on Provisional Basis



Source: SWC, Baddi

Besides this approx. 550 proposals in L&M sector have been approved /registered at the Directorate of Industries for establishment of units at Baddi-Barotiwala –Nalagarh areas. Out of above mentioned proposed units, 50 units in L&M scale category and 145 units in SSI /Tiny category have started commercial production and got permanently registered with the

Department of industries (up to 30.11.06) . Following is the breakup of new units which have started production i.e. w.e.f. 07.01.03 to 31.03.07:-

Table 1.24: Breakup of new industries in BBN Special area.

S.N	Category	No. of units started production (PMT done)	Fixed Capital Investment (Rs. In lacs)	Employment generated			%age of Himachalies to the total
				Him	N.Him	Total	
1	Large & Medium	62	83645.5	4436	1303	5739	77.3%
2	SSI/ Tny	221	34276.4	4912	1659	6571	74.8%
	Total	283	117921.9	9348	2962	12310	75.9%

Source: SWC, Baddi

This area has also emerged as Textile hub in the Himachal Pradesh. Out of total 5,04,000 spindles installed in the State , 4,26,000 spindles have been installed in Baddi –Barotiwlaa – Nalagarh itself. Shown in the next few pages are glimpses of the spread of Industry under the industrial Area Barotiwala.

4.7 Industrial Infrastructure and Amenities

4.7.1 Road Network

Although there are many modern and newly developed industrial units but the condition of roads is found to be very bad. Particularly in the case of scattered industries, they have no proper approach roads and within the industrial cluster the condition of the roads are not well. The accessibility to these industries is a major problem and it is prominent even in Industrial areas.

Fig 4.35 Water Logging

4.7.2 Water Supply and consumption

The Ground water is the main & only source of water in the whole region. The water table of extracting bore wells is found to be lower than 300m. Water logging in the region is a critical issue as there is no natural discharge facility.

4.7.3 Waste–Water Disposal

'Sirsa' is the main river within the special area and its major tributaries like Balad Nadi (Baddi) and Chinki khad (Nalagarh) and few minor Nallahs like Sandholi Nala etc are the major waste water disposal options being used by the Industries. The region having has some major large scale water polluting industries such as Birla textile mill , Deepak Bhandari paper mill etc. The septic tanks for sewerage disposal are extensively being used for the effluent disposal from the industries

Industrial Promotion Export Zones had been set up by the Industries Deptt. Under one time approval basis at Jharmajri EPIP-I, Apearel Park at Katha, EPIP-II Thana etc. These scheme areas could not be developed in accordance with TCP norms.

Fig 4.36 Industrial discharge practice in the region

The land sub-division and development strategies have not adhered properly in terms of zoning regulations, road's carrying capacity, serviced land, land scaping, sufficient green coverage and implementation of Development Plan regulations. Confusion, collision and over crowding persists at site. Hence re-planning is required as these are major industrial pockets and located in prime areas. Layout Plans of concerned areas needed to be re-plan under TCP zoning regulations. Proper serviced land required is to be developed. Non- conformities are required to be shifted from these areas as they have created overcrowding and confusion.

4.7.4 Status of Common Effluent Treatment Plant

The Common Effluent Treatment Plant is the concept of treating effluent by means of a collective effort mainly for cluster of houses, small and medium industrial units. To set up a CETP in BBN Special area, Ministry of Commerce & Industries, GOI has granted financial support as well as technical support in form of grant-in-aid at the ratio of 90:10 to this

Fig 4.37 Complete CETP Plant

area. Around 126 Bigha of State Govt. land has been allotted for setting up a project at mauja Kainduwala near by Sirsa river. Environment pollution, waste disposal and industrial effluents are main issues in BBN special area. It is a milestone project for the area. So far local bodies do not have such facilities, to manage solid waste materials. However Hon'able High Court of Himachal Pradesh has also taken cognizance and directives for speed up formalities.

The project is complete in all respect and it is likely to be functional as shown in **Fig 4.8**. Along the CETP site a green buffer comprising radius of 300mtr. has been earmarked and no construction shall be allowable in view of health hazardous.

4.7.5 Hazardous waste management

Solid/Hazardous wastes are being generated by industries, some municipal sources, hospitals, and other health care facilities. Majority of Industries in the region are hazardous waste generating units. Hazardous wastes like metal sludge, effluent treatment plant waste, fly ash from the boilers, metal slag residues and pharmaceuticals manufacturing wastes etc are disposed off without taking appropriate measures. On pursuance to the direction given by Hon'ble Supreme Court for putting up Treatment, Storage and disposal (TSDF) of Hazardous Waste Facility, Govt. land measuring 191.08 bighas at village Majra has been identified and got transferred in the name of Department of industries and is to be leased out further to the Special Purpose Vehicle (SPV) namely M/S Shiwalik Solid Waste Management Ltd .The plant will extend its services across the State. The project is being implemented under IIUS, the estimated cost of the project is 35 Crore approximately. It has been setup at mauja Majri Dhabota.

Fig 4.38 Waste disposed on vacant plots

4.7.6 Integrated Municipal Solid Waste Management Plant

For scientific management of municipal as well as industrial waste, the BBNDA has proposed a site for setting up a SWM plant near by CETP plant at Kainduwal. The land is around 30 Bigha which is State Govt land, situated near by Sirsa River toward the west side of Special area. The Govt of India and State Govt has funded for it. The project DPR has also been finalised by the State Govt. Since the project plant falls under B Category it has been forwarded to MoEF, GOI for environmental clearance as well as approval. The project has proposed facilities like segregation certification of MSW, composting and sanitary landfill etc. The proposed leachate generated is proposed to be reused for maintaining moisture and temperature. The cost of the project is Rs 953.62 lacs. The project will cover around 111 villages of BBN Special area. The project area is covered with sufficient plantation and green belts in order to control odour and pollution. Existing site of SWM has been earmarked on topo sheet in view of reference of location.

Fig 4.39 Site location for CETP & SWM

4.7.7 Setting up of Inland Container Depot

The government of India has granted fund for construction/development of an ICD. It is an essential facility, which is required for this part of the District, it being the industrial hub of the State. The land measuring 86-bighas and situated at mauza Baddi Sitalpur along the Sirsa river. The land belongs to the State Govt and is further leased out to concerned company at the tune of Rs-1/- per year. It is easily accessible by road. A link road has connected the site with NH-21A. The company will develop a multi-model logistic support for domestic containerisation and trade in BBN Special area. It contains with two warehouses, administration building, substation and bituminous plate form. This facility is yet to be connected with railway lines. A railway, line is proposed to be developed very soon in this part of region. The ICD project is complete in all respect and is functional at site as shown in Fig 4.11. It has to be connected by Railway line.


Fig 4.40 Complete project of ICD at Baddi

4.7.8 Maintenance of Basic Amenities

In order to strengthen /improve the basic amenities i.e. roads, power supply, drainage and sewerage systems etc., the Department of Industries has also undertaken the works worth Rs.25.03 cr. Under the ASIDE (Assistance to States for Developing Export Infrastructure & Other allied Activities scheme. Besides Industrial Area Development Agency (IADA) has also been constituted for maintenance of basic infrastructures in the Industrial Areas. Funds are collected on account of maintenance of roads, sewerage lines, drainage, lighting etc.

4.7.9 Imperatives.

Baddi-Barotiwala-Nalagarh Special area is well known for being the industrial corridor of the State. Tremendous economic growth has come up due to installation of various kinds of industries in this part of District. Pace of development has come up without having proper land acquisition, Town Planning Schemes and land sub division even though there are mammoth provisions in HP TCP Act for planned spatial development. Hence arrangement of infrastructure to each unplanned cluster is a big challenge to concerned authorities. The industrial units have developed here and there in isolation without taking care of spatial planning. For planned and regulated development of this region H.P Town & Country Planning Act, 1977 has been enforced to the entire area up to lower part of Swarghat. Therefore, re-planning, arrangement of infrastructure facilities and services in form of terminal, parks, market, related industries, source of raw materials, public services, overall industrial climate and transport is herculean task. Sitting of industries are not decided carefully by taking various sensitive factors as per UDPFI guidelines and NBC norms. There is intrusion and collision of industrial units in to residential/commercial resulting threat of noise, smoke, odour and pollution has increased which needs to be viewed seriously for safety and harmony of the vulnerable society.

4.8 Tourism Activity Profile

Tourism is a service industry comprising of a number of tangible and intangible components. The tangible elements include transport systems – air, rail, road, water and space, hospitality services – accommodation, foods and beverages, tours, souvenirs; and related services such as banking, insurance, safety and security. The intangible elements include: rest and relaxation, culture, escape, adventure, new and different experiences. The State of Himachal Pradesh is well known

Fig: 4.41 Tourism Route Map

for tourism and adventure activities owning to natural resources. But this part of the State as well as District do not have such tourism activities and destinations for tourists as compared to other area of State.

Tourism in Himachal Pradesh State is one of the most important economic bases. The nature of tourism is mostly leisure, adventure and visit to hill stations. Now the state is also developing its industrial and commercial base that is attracting business tourists from all over the globe. Baddi Barotiwala Nalagarh Region is experiencing an influx of business tourists due to tax exemption policies for industrial establishments, offered by the state government.

4.8.1 District Level Tourism

The nodal agency for tourism development in Himachal Pradesh state is Himachal Pradesh Tourism Development Corporation (HPTDC). As per the survey conducted by HPTDC, total 2,56,866 domestic tourists are observed annually in Solan district (2006). Out of these, 2,26,127 are the overnight stayers and the remaining 30739 are the day tourists. Foreign tourists going to Solan district for tourism purpose are 3195 annually. Out of this 1819 are overnight stayers and the remaining 1376 are day visitors. The tourist destinations in this regional are Kasuali, Parwanoo, Solan, Chail, Arki, Kunihar, Barog, Nalagarh and now Baddi also. All these sites are popular for various types of tourism.

4.8.2 Tourism BBN Special Area

Nalagarh is known for old fort of Raja Birender Singh, which is a popular tourist destination. With the onset of many industrial units due to the encouraging industrial policies, influx of many business tourists in the region has increased. So talking about tourism in this region is discussing 'Business Tourism' or 'Urban Tourism' largely. To support such an advent which is likely to grow even more due to extension of tax exemptions for industrial units, hospitality and local tourism of the area need to be improved and addressed significantly.

Fig 4.42Nalagarh Fort

4.8.3 Destinations and Circuits

rity

The most popular and the only recognized tourist site in this area is Nalagarh Fort. It has now been converted in to a heritage hotel. The

history of Nalagarh region dates back to 1100 A.D. when it was the capital of the Kingdom of Hindur founded by Raja Ajai Chand. It was ruled by the Chandela Rajputs who originated from Chanderi in the Bundelkhand region of Central India. The fort was built during the reign of Raja Bikram Chand in year 1921. The Fort is located on a hillock at the foothills of the Shiwaliks offering a panoramic view for tourists. The famous Naina Devi Temple is 60 kms from the Fort and is visible from the ramparts on a clear day. The 16th century Ramgarh Fort, only 21 kilometers from Nalagarh, is another excellent excursion point near Nalagarh.

4.8.4 Tourist Flow Details

It has been approximately estimated from the primary survey analysis that to the total tourist influx in Solan district, Nalagarh and Baddi are likely to contribute 5% and 15% respectively. The details of the calculations for tourist influx and other tourism parameters would be incorporated in the next stage report. It is also important to mention that most of the tourists coming to this area are domestic but few tourists also come from foreign countries for business purpose, who are mainly technicians. These two important tourist destinations in BBN Special area are yet not a part of the HPTDC tourism circuits.

4.8.5 Tourist Facilities and Amenities

Hotels/ Guest Houses (govt. + private)/ Paying Guest accommodation are part of facilities to be considered. There are total 26 private hotels and guest houses are available in Baddi Barotiwala Nalagarh segments. Apart from this, three Govt resthouse at Nalagarh, Baddi and Barotiwala have been identified during the field visit mainly for Govt officials and guests. There are also star category hotels namely Le Marriott, Gianz Regency, Hotel West Westen and Sarover Potico. They are having with good facilities for high-ended. Nalagarh fort is the only high-end tourist but seclusion of the fort from the industrial town, Baddi makes it difficult for the tourists to choose this as an overnight destination. Most of the high-end tourists return to Chandigarh after the day's work. A list of the registered hotels in the region is appended in Annexure II A.

The following numbers of hotels/restaurant, guesthouses have been constructed in BBN special area which are listed below:

1. Abhishek hotel, Baddi
2. Amar hotel, Baddi
3 Neelam Hotel
4 Basera guest house, Baddi
5 Ashish Hotel
19. Gianz Regency
20. Le- Marriott
21. Apex Hotel

6.	Fern hill resort, Baddi	22.	Royal Park
7.	Vimal Hotel		
8	Geetanjali, Baddi	23.	Hotel Ascent
9	Annpurna Hotel		
10.	Raj Hotel, Baddi	24.	City Look Hotel
11.	Riverview Hotel		
12	MG Regency, Baddi	25.	Dream Hotel
13	Phuhar Hotel		
14.	Akash Hotel, Nalagarh	26.	Clark's International
15.	Hotel Cross Roads	27.	Shagun Hotel
16.	Sarover Potico	28.	Hotel cross Road
17.	Hotel Jyoti.		
18.	Hotel Ornage		

- Banks / ATMs

  BBN special area being an industrial hub, has all kinds of commercial private and public banks. Most of these banks are situated only in Baddi area as it is a big commercial area. More over it falls in MC Baddi. The list of the banks is appended in Annexure II B. Looking at the number of the banking units, it is inferred that the banking facilities are adequate. However, their adequacy as per norms and standards would be assessed later.

- Recreation / Entertainment

  Baddi area has Mall-cum-Multiplex, which is the only commercial hub as well as source of entertainment for public. As far as other sources of entertainment are concerned, this area is not equipped with other public recreational facilities like a open green area, open air theater, indoor and out door statdium on so on. From the primary survey and during reconnaissance survey it has been observed that recreation and entertainment facilities are absolutely non existent in the area. There are no sports facilities, arcades and green area. Many tourists complain of lack of recreation facilities to entertain them after working hours and prolong their stay in the region as tourists.

- Restaurants / Cafeterias / Information centres

  There are many restaurants in BBN Special. Most of these restaurants are a part of hotels and very few operate independently. However, there is an absence of cafeterias and information centres, which need to be adequately provided.

- Local Conveyance / Transport

  There are very limited means of transport for local movement especially public or intermediate transport. There are very few local public buses and auto rickshaws that are operated in Baddi. These also have fixed routes and do not carry passengers over distances

larger than 10-15 kms. Another means of local movement is through private taxis which are very expensive for lower to upper middle class. Although car pool system turning out to be beneficial for the workers and frequent visitors but a more suitable and convenient mode of transport is required for the region.

- Integrated Business Complex (IBC)

  In spite of increasing industrialization and business tourism in the region, there isn't any integrated business complex with conference hall, amphitheatres, exhibition venues, clubs and convention centre. There are some hotels which have restaurants and small seminar rooms, however no large scale amenity is available in any of these hotels.

CHAPTER 5: TRAFFIC AND TRANSPORTATION

5.1 Introduction

The traffic and transportation networking in BBN Special area is exclusively road based as National Highway 21A, collector road, sub-arterials, sector and local roads. NH-21 is main life line of this area it emanates from Pinjor and connects to Swarghat. It has total length of around 28 kms. It carries out the highest number vehicular traffic. The State Highway-16 also passes through this area. Though area has good connectivity with Ropar-Bharat -Nalagarh-Ramshehar-Shimla and Pinjor Kalka and Chandigarh. The entire area is covered by total road network of 750 kms. However, drawback of this area is that does not have direct connectivity with railway lines and air services. The nearest railway station is at Kalka and Ghanauli (Punjab). For an air services Mohali is the nearest airport for getting flight. Road network of Distt Solan is shown at Fig 5.44

Fig. 5.44 Road Network of Solan Distt

5.2. System Components

The BBN Special area has grown organically over the years; hence it doesn't exhibit any road network pattern or hierarchy. The area is dissected by several streams and nallahs. Only the bridges are mean for crossing streams, khads/ nallahs. As per our inventory the important ones are across the Sirsa Nadi, Chikni Khad, Khokhra Khad, Balad Nadi, Kundlu ki Khad, Kali Nadi, Pola Nala, Ratta Nadi, Situ Majra Nala, Marhawala Nadi, and Nanakpur Nadi. There is only one signalized junction at Baddi T-junction. There is only one roundabout at Nalagarh

Fig 5.45 Road connectivity.

near by Mini-Secretariat that is also not properly developed and designed as per traffic movements.

5.3 Major Road Corridors & Intersections

Development of this area calls for good and effective connectivity in terms of a well-designed road network. It is an essential criterion for the growth of a region connecting it to the other States. Keeping in view the anticipated growth of Baddi-Barotiwala-Nalagarh as a major industrial area, it is necessary to study and analyze the existing road and traffic conditions. The growth pattern over the years shows an increase in the volume of traffic. This sudden growth has resulted in a lot of stress on infrastructure due to high utilization. An anticipated population and industrial increase will further cause much stress and strain on the existing infrastructure facilities.

Fig: 3.46 T-Junction

In order to understand the existing situation and anticipate the type of traffic for this area all possible aspects of traffic component has been analyzed. Accordingly, future requirements have been proposed. Since designed and capacity of roads are not as per prescribed norms and standard. Refer Fig. 5.1 showing major roads & intersections of this area. Table below shows the study of the major corridors identified in the BBN Special Area.

Table 1.25: Major Corridors identified in the BBN Special Area

S.No	Road Name	*Right of Way (mts)	*Carriage Way (mts)
1	Baddi-Nalagarh NH 21A	13	7
2	Baddi-Sai Road	8	7
3	Baddi-Barotiwala Road	9	7
4	Bhud-Vardhman Road	3.5	3
5	Jharmajri Road	18	10
6	EPIP Phase II Thana Road	14	10
7	NH 21A towards Panjhera	12.8	9.1
8	Ropar Road SH 16	10.9	6.4
9	Bharatgarh-Dabhota Road	11.5	10.5
10	Nalagarh-Ramshahar-Shimla SH 16	17.2	5.5
11	Barotiwala - Haripur Road	10	7.5
12	Barotiwala - Kalka Road	10	7.5
13	Annpurna - Thana Road (via Morepen)	12	7.5

14	Kishanpura - Gurumajra Dhabni Road	7.5	3.5
15	Manpura - Dabni Road	10	7.5
16	Khurni - Lodhimajra Road	10	7.5
17	Panacea - Cipla - Chakka Road	7.5	3.5
18	Kheda - Rajpura Roa	10	7.5
19	Dabota - Bhogpur Road	10	7.5
20	Penjehra - Navagoan - Bharatgarh Road	7.5	3.5
21	Panjehra - Bruna - Bhagheri Road	7.5	3.5
22	Bruna - Karrauli Road	7.5	3.5

*Source: Survey of major road sections, CEPT Team (Note: * As measured by CEPT Team intern*

Table 1.26: Major Junction of Roads and its Type

S.No.	Intersection Name	Type of Control	Junction Type
1	Baddi Chowk (nr Police Station)	Signalised	T-intersection
2	Vardhman Chowk	Uncontrolled Junction	Four Legged
3	Jharmajri Bridge (nr Busstop)	Uncontrolled Junction	T-intersection
4	Barotiwala Junction	Uncontrolled Junction	T-intersection
5	Nalagarh Mini secretariat Chowk	Traffic Police Control	T-intersection
6	Aligarh Busstand Chowk	Uncontrolled Junction	T-intersection
7	Ropar-Bharatgarh Diversion	Uncontrolled Junction	Y-intersection
8	Panjhera NH 21A	Uncontrolled Junction	T-intersection
9	Bruna	Uncontrolled Juncttion	Y-intersection
10	Manpura	Uncontrolled Juncttion	T-intersection
11	Kheda	Uncontrolled Juncttion	T-intersection
12	Bhud	Uncontrolled Juncttion	T-intersection

Traffic congestion is one of the prominent problems observed in the region during reconnaissance survey. The main reason attributing to this problem is on street parking of trucks carrying goods, private taxis and presence of bus stand at the Baddi T-junction. As per the observation of DSP office the main congestion points in area are:

•Nalagarh main bus stand – Gandhi chowk•Baddi bus stand•Toll tax barrier & excise barrier at Baddi (Baddi naka)•Toll tax barrier at Barotiwala •Dawat Chowk, Sai-Baddi road

Baddi-Pinjore-Chandigarh is one of the highly accident-prone route due to heavy movement of traffic on this route carrying both heavy and light vehicles.

Fig 5.47 Peak hour congestion at NH 21A

5.4 Traffic Studies at Major Roads

Traffic census at three points on Barotiwala–Baddi-Sai-Ramshehar road and Nalagarh-Dherowal-Ropar road have been carried out in February and March 2007 by Nalagarh PWD Division and are appended in Annexure III. As per the annexed data it is found that the roads are under utilized of their capacity to only 10% but it was clearly observed through visual survey that there is considerable traffic on these roads.

Apart from the above mentioned traffic studies, CEPT Team also carried out the traffic surveys in order to identify roads which need

Fig 5.48 Status of Roads at Baddi

further improvement or up gradation. For the purpose of traffic survey morning and evening peak hours have identified between 8:00 am to 10:00 am and 5:30 pm to 7:30 pm respectively as per the inputs received during the discussion with HPPWD officials, DSP Nalagarh.

12 important roads in the BBN Special Area have been identified for traffic survey. It was conducted for two hour each in morning and evening with an interval of 15 minutes. Accordingly one hour peak traffic survey has been conducted.

Table 1.27: Peak Hour Volume of Vehicles at Major Roads

S.No.	Road Name	Peak Hour Volume (vehicle / hr)
1	Khera NH 21A	822
2	Nalagarh Panjhera	810
3	Nalagarh Roper Road	504
4	Nalagarh Bharathgarh	316
5	Y-intersection Nalagarh-Ramshahar Rd SH 16	100
6	Panjhera to Jogon (NH 21A)	358
7	Baddi to Jharmajri	1098
8	Baddi-Sai Road (Vardhman Chowk)	628
9	Barotiwala Road	648
10	Jharmajri to Barotiwala (Bridge)	472
11	Pinjore-Barotiwala Jn (Toll naka)	1014
12	Pinjore-Barotiwala Jn NH 21A	966

Source: Traffic Survey, CEPT Team

Table 1.28. Peak Hour Modal Split of Vehicles at Major Roads for BBN Special Area

S.No.	Road Name	Peak Hour	Car,Jeeps, Vans	Two-Wheelers	Buses			2-Axle Truck	3-Axle Truck	Tempo/LCV	Tractors	Others	Non-Motorised Traffic		
					Std. Roadways	Mini Buses	Other Buses						Cycle	Cycle Rickshaw	Animal Drawn
1	Khera NH 21A	5:30 pm to 6:30 pm	23.6	46.5	0.5	1.7	2.4	13.9	0.2	4.9	2.7	0.5	2.7	0.2	0.2
2	Aligarh to Panjhera	8:00 am to 9:00 am	21.7	26.4	0.0	4.4	8.6	12.3	0.7	12.8	4.9	0.0	7.4	0.5	0.0
3	Aligarh to Ropar	8:00 am to 9:00 am	21.8	49.2	1.2	0.8	0.0	13.1	0.0	4.4	6.0	0.0	3.6	0.0	0.0
4	Aligarh to Bharatgarh	8:00 am to 9:00 am	19.0	57.6	0.6	0.0	0.0	13.3	0.0	3.2	1.3	1.3	3.8	0.0	0.0
5	Y-intersection Nalagarh-Ramshahar Rd SH 16	5:30 pm to 6:30 pm	18.0	44.0	6.0	0.0	0.0	8.0	0.0	6.0	4.0	0.0	14.0	0.0	0.0
6	Panjhera to Jogon (NH 21A)	5:30 pm to 6:30 pm	4.5	52.0	2.2	1.1	1.1	9.5	0.0	5.0	17.9	0.0	6.7	0.0	0.0
7	Baddi to Jharmajri	5:30 pm to 6:30 pm	33.5	29.9	0.0	0.2	3.5	12.8	2.2	6.4	8.9	0.0	1.6	1.1	0.0
8	Baddi-Sai Road (Vardhman Chowk)	8:00 am to 9:00 am	22.9	44.9	0.3	0.6	1.3	4.5	0.0	7.6	4.5	0.6	9.2	3.2	0.3
9	Barotiwala Road	8:00 am to 9:00 am	30.2	40.7	0.0	0.0	1.2	6.5	0.0	4.3	5.2	1.2	7.7	2.5	0.3
10	Jharmajri to Barotiwala (Bridge)	5:30 pm to 6:30 pm	30.5	43.2	0.8	0.8	0.0	13.1	0.0	3.4	0.4	0.0	6.8	0.4	0.4
11	Pinjore-Barotiwala Jn (Toll naka)	8:00 am to 9:00 am	36.3	29.8	0.0	0.0	2.0	13.0	0.8	9.9	3.2	0.0	3.7	1.4	0.0
12	Pinjore-Barotiwala Jn NH 21A	5:30 pm to 6:30 pm	43.3	33.5	0.2	2.9	0.6	16.6	1.9	0.0	0.0	1.0	0.0	0.0	0.0

Source: Traffic Survey, CEPT Team

The percentage of two-wheelers and cars/jeeps/vans is higher during peak hour traffic on major roads as observed from modal split. The percentage of goods vehicles specifically trucks shows average movement even during peak hours.

Table 1.29: PCU Counts for Each Type of Vehicle for Peak Hour

S.No.	Road Name	Peak Hour	Car,Jeeps, Vans	Two-Wheelers	Buses			2-Axle Truck	3-Axle Truck	Tempo/LCV	Tractors	Others	Non-Motorised Traffic			TOTAL PEAK HOUR PCU
					Std. Roadways	Mini Buses	Other Buses						Cycle	Cycle Rickshaw	Animal Drawn	
1	Khera NH 21A	5:30 pm to 6:30 pm	194	191	12	28	60	342	9	60	66	24	11	4	16	1017
2	Aligarh to Panjhera	8:00 am to 9:00 am	176	107	0	72	210	300	27	156	120	0	30	8	0	1206
3	Aligarh to Ropar	8:00 am to 9:00 am	110	124	18	8	0	198	0	33	90	0	9	0	0	590
4	Aligarh to Bharatgarh	8:00 am to 9:00 am	60	91	6	0	0	126	0	15	12	24	6	0	0	340
5	Y-intersection Nalagarh-Ramshahar Rd SH 16	5:30 pm to 6:30 pm	36	88	12	0	0	16	0	12	8	0	28	0	0	200
6	Panjhera to Jogon (NH 21A)	5:30 pm to 6:30 pm	16	93	24	8	12	102	0	27	192	0	12	0	0	486
7	Baddi to Jharmajri	5:30 pm to 6:30 pm	368	164	0	4	114	420	108	105	294	0	9	24	0	1610
8	Baddi-Sai Road (Vardhman Chowk)	8:00 am to 9:00 am	144	141	6	8	24	84	0	72	84	24	29	40	16	672
9	Barotiwala Road	8:00 am to 9:00 am	196	132	0	0	24	126	0	42	102	48	25	32	16	743
10	Jharmajri to Barotiwala (Bridge)	5:30 pm to 6:30 pm	144	102	12	8	0	186	0	24	6	0	16	4	16	518
11	Pinjore-Barotiwala Jn (Toll naka)	8:00 am to 9:00 am	368	151	0	0	60	396	36	150	96	0	19	28	0	1304
12	Pinjore-Barotiwala Jn NH 21A	5:30 pm to 6:30 pm	418	162	6	56	18	480	81	0	0	60	0	0	0	1281
	FACTOR FOR PCUs*		1	0.5	3	2	3	3	4.5	1.5	3	6	0.5	2	8	

*Source: Traffic Survey, CEPT Team , * As per IRC: 64-199*

As evident from the above table the following roads in the BBN Special Area are under stress –

Table 1.30: VC Ratio for Important Roads in BBN Area

S.No.	Road Name	Type	ROW (Mts)	Peak Hour PCU (V)	*Capacity (C)	V/C Ratio
1	Khera NH 21A	2 lane, 2 way	15	1017	900	1.1
2	Nalagarh Panjhera	2 lane, 2 way	12.8	1206	900	1.3
3	Nalagarh to Roper	2 lane, 2 way	10.9	590	900	0.7
4	Nalagarh to Bharatgarh	2 lane, 2 way	11.5	340	900	0.4
5	Y-intersection Nalagarh-Ramshahar Rd SH 16	2 lane, 2 way	6.5	200	900	0.2
6	Panjhera to Jogon (NH 21A)	2 lane, 2 way	8.5	486	900	0.5
7	Baddi to Jharmajri	2 lane, 2 way	18	1610	900	1.8
8	Baddi-Sai Road (Vardhman Chowk)	2 lane, 2 way	8	672	900	0.7
9	Barotiwala Road	2 lane, 2 way	9	743	900	0.8
10	Jharmajri to Barotiwala (Bridge)	2 lane, 2 way	18.5	518	900	0.6
11	Pinjore-Barotiwala Jn (Toll naka)	2 lane, 2 way	9	1304	900	1.4
12	Pinjore-Barotiwala Jn NH 21A	2 lane, 2 way	9	1281	900	1.4

Source: ROWs measured by the CEPT Team intermittently at various locations

Recommended Design Service Volume for 2-lane, two way carriageway as mentiomed in UDPFI Guidelines

As evident from the Table 5.6 the following roads in the BBN Special Area are under stress –

- NH 21A
- Gandhi Chowk Area
- Baddi Road
- Baddi-Sai Road
- Baddi-Barotiwala Road
- Barotiwala Road
- Pinjore-Barotiwala Road

Map 5.2 shows the V/C ratio of major roads in BBN Special area roads whose V/C ratio is above 1 are being utilised above their capacity and are unable to cater to the large volume of traffic leading to cogestion in certain areas.

Table 1.31: Peak Hour Passenger and Goods Vehicles at Major Road Segments in BBN Area

S.No.	Road Name	Date	Passenger Traffic	Goods Traffic
1	Khera NH 21A	18/19/07	50.5 %	49.5 %
2	Nalagarh to Panjhera	18/19/07	50.0 %	50.0 %
3	Nalagarh to Ropar	18/19/07	45.6 %	54.4 %
4	Nalagarh to Bharatgarh	18/19/07	47.9 %	52.1 %
5	Y-intersection Nalagarh-Ramshahar Rd SH 16	18/19/07	70.0 %	30.0 %
6	Panjhera to Jogon (NH 21A)	18/19/07	25.2 %	74.8 %
7	Baddi to Jharmajri	19/09/07	46.3 %	53.7 %
8	Baddi-Sai Road (Vardhman Chowk)	19/09/07	58.3 %	41.7 %
9	Barotiwala Road	19/09/07	55.0 %	45.0 %
10	Jharmajri to Barotiwala (Bridge)	19/09/07	54.2 %	45.8 %
11	Pinjore-Barotiwala Jn (Toll naka)	19/09/07	48.0 %	52.0 %
12	Pinjore-Barotiwala Jn NH 21A	19/09/07	46.6 %	53.4 %

Source: Traffic Survey, CEPT Team

Note: Passenger Vehicles include both public & private busses, private vehicles, 2-wheelers, auto-rickshaw Goods Vehicles include 2/3-axle trucks, tempo, tractors, animal drawn

5.5 Barotiwala Road

Pinjor- Baddi Road

Table 1.31shows the V/C ratio of major roads in BBN Area. The roads whose V/C ratio is above 1 are being utilised above their capacity and are unable to cater to the large volume of traffic leading to congestion in certain areas.

It is observed that the percentage of goods vehicle is higher at Ropar Road, Bharatgarh Road, Panjhera, Baddi Road and Pinjore Barotiwala Road. The percentage of passenger vehicle is higher on Nalagarh-Ramshahar road to Shimla, Vardhman-Thana Road, Barotiwala-Baddi Road.

5.6 Terminal Facilities

5.6.1 Himachal Pradesh Road Transport Corporation, Nalagarh

The Himachal Pradesh Road Transport Corporation, Nalagarh node has 22 depots in HP owning 1720 buses in all. The HRTC buses (71 nos) in Nalagarh ply on NH-21 and along with about 70 private buses in this region, traversing the NH. The total coverage of HRTC buses in Nalagarh are 16,500 kms. There are total 144 operational routes of HRTC, Nalagarh. 750 trips/ day (to and fro) are made by all buses (HRTC + Private) in this region. Buses operating on Nalagarh- Chandigarh route go with 100% occupancy and even observed to be overloaded during peak hours. Frequency of buses is every 10 minutes.

There are 100 buses (HRTC + Private) which originate from Nalagarh, and 80-90 pass by. While 120 buses (HRTC + private) originate from Baddi. A main bus stand is at Nalagarh, and in Baddi, buses stop on NH near truck union parking.

The depot at Nalagarh covers an area of about 0.5 ha and a proposal to develop a new depot of 1 ha (in Nalagarh) is under consideration. There is another proposal to develop a depot in Baddi near checkpost for both Baddi-Barotiwala area.

Fig 5.49 Baddi-Nalagarh Truck Union

HRTC incurs loss due to excessive tax (state entry taxes in Punjab, Haryana, and Delhi), concessional passes (students, handicapped etc.) and unchecked travelers (local people and few govt. officials). They bear a loss of 12-13 lacs / month which annually runs in crores of rupees despite 3-3.5 lac of revenue generation per day.

Future Plans

- HRTC intend to increase 30 more trips and 9 more routes in next 2 months that will also covere to this area.
- 15 more buses to be added
- HRTC has target to Increase frequency to 5 mins from exiting 10 min in the region.
- HRTC intend to give service contract to private company in an PPP model for fleet management

5.6.2 Nalagarh Truck Operators

The Nalagarh- Baddi Cooperative Society has its head office at Nalagarh. There are total 3500 trucks in total of which 2000 are in Baddi, 1000 in Barotiwala and rest 500 in Nalagarh. There is a movement of about 100-150 trucks /day on rotation basis. Goods are transported all over India. Goods carried are mostly medicines, shoes or other leather products. Around 9-15 tonnes of load is carried by the trucks. It was told that trucks are mainly owned by Baddi people while drivers come from Baddi, Punjab and Haryana. The monthly salary of drivers is Rs. 2500 and for self owned trucks it is Rs. 3000-4000 per month.

Issues / Suggestions

- Highway should be made 4-lane and a transport nagar of about 30-40 acres should be developed.
- High congestion on NH 21 A, causing lot of delay
- Number of puncture/ link road should not be allowed from NH-21A.
- Ribbon development should not be stopped.
- No development/ construction shall be allowed on NH-21A at distance of 27.5 mtr from the centerline of road.
- Geometric designed, traffic signed and proper divider should be arranaged for smooth traffic & transportation movement

5.6.3 Tempo Operators

During the visit to the BBN Special area for data collection the team interviewed the Manager of Tempo Association at the tempo stand in Baddi. It was informed that there are 425 tempos in Baddi and 300 tempos in Nalagarh, which are being used to transport raw materials, consumer goods and finished products in smaller quantity. Goods are transported even to nearby states. The goods transportation remains high all round the year and particularly increase further in month of March due to last month of the financial year. The normal charges are Rs.10 per km which vary by type of good and distance. It was informed that on an average 70-80 tempos move per day on a rotation basis. All tempo owners are local and generally park the


5.10 Taxi Stand at Baddi

Fig 5.50 Taxi Stand at Baddi

tempos at their residence at end of the day. The property covering tempo stand is privately owned by all tempo owners.

5.6.4 Taxi Operators, Baddi

During a discussion with the taxi drivers at the taxi stand it was told that there are about 600-700 taxis which ply from Chandigarh to Baddi on daily basis. There are about 30-35 taxis in Barotiwala and about 50-55 taxis at Aligarh stand. Taxi fleet usually comprise of Indica, Qualis and Innova. For Qualis/Innova charges are Rs. 7 / km Non AC, Rs 8 / km AC and for Indica charges are Rs. 6-7 / km AC, Rs 5/ km Non AC. Earnings per month range Rs 10,000 to Rs 11000.

Fig. 5.51 Three wheeler Stand at Baddi

5.6.5 Three Wheelers Stand, Baddi

There are 105 three wheelers owned by local people at Baddi. Usually these three wheelers run on shared basis and charge Rs.5 per passenger for 7 kms. They earn Rs.4-5000 per month and can save upto Rs.2000 almost.

5.6.6 Issues / Suggestions

- Inadequacy of NH-21 A to bear the increasing traffic load. Requirement of widening / bypass.
- Various congestion points namely, Gandhi chowk (Aligarh), Baddi bus stand, toll tax points, Pinjore intersection leads to delay.
- HRTC suggested to develop Madwala (near Baddi) – Kona- Chandigarh route as an alternate to Pinjore (NH-21).

One of the major concern is lack of organized space for growing moter vehicles. They do stand their commercial vehicles wherever they get space whether it is Govt land or private for time being. It is, therefore, necessity to have an organized space.

5.6.7 Nalagarh, Baddi- Barotiwala Bus Stand.

The BBN Special area is well known for industrial hub of the State. It has so far not available with an organized Bus Stand. Even this facility not is not properly provided in Nalagarh.Since Nalagarh is a service town, tehsil HQ and part of old kingdom of Hindur.

Proposal for setting up of Bust Stand at Baddi and Nalagarh is under effective consideration of State Govt. BBNDA has already earmarked requisite land for construction and development of Bus Stand for Baddi and Nalagarh node. Funding for construction of Bus Stand is being arranaged by the Bus Adda Management Authority of State Govt under PPP model. In next financial year development of these Bus Stands is likely to be completed as per State Govt policy. It is a priority proposal of Development Plan-2025 and shall be developed in first phased of plan period. Since Bus Stand is an important facility and utmost required to be developed in order to solve problem of congestion and traffic.

It is presently being managed through small Bus stops in Baddi, Barotiwla and Nalagarh along the roadside by arranging a piece of land. However, this is not a permanent solution for this vital industrial area. Presentely Buses are stopping on roadside resulting congestion and traffic jam. Overcrowding has increased manifold on the existing roads. Susceptibility of accidents also increased due to lack of proper Bus stand.

5.6.8 Transport Nagar.

In order to regulate the growing good carriers trucks, a modern transport nagar plays the key role. BBN Special area has the highest number of trucks as well as the biggest truck operator union on the one hand, on the other it do not have an organized Transport Nagar. BBNDA has already moved a proposal to State Govt for construction and development of transport nagar under PPP model. Earlier space for it was earmarked at Bhatolikalan along the Balad khud. In due course of process, no prospective bidder were turned up for executuion of work of transport nagar under PPP model. Accordingly, BBNDA has changed its site characteristices from Bhatolikalan to Sandoli Nallah. Now space for 100 trucks has been earmarked including all possible facilities for truck owners and its employees as per norms and specification of UDPFI guidelines. Land for it pertains to State Govt. and it is yet to be transferred in to name of BBNDA. Baddi-Nalagarh Truck Union has also proposed opposite **Space-9 shopping** complex. It shall also be developed in first of plan period as proposal kept in the list of priorities proposals of Development Plan.

5.6.9 Imperatives.

Baddi- Barotiwala- Nalagarh Special area being a seat of administration, business center and industrial hub, suffer from out dated circulation pattern, which was previously designed to suitable the pedestrian and local traffic only. I order to cater to the regional nodes the National Highway Authority, Govt of India, had developed a section **NH-21A.** It passes through only this area and divides Special Area in to two

parts. In the year 2003, GOI has given industrial package to the State Govt for development this hill State. During course of package period industrialists have set up their units after purchasing suit land under section 118 of HPLRT Act, 1972 in this part of Distt to avail the incentives. Sudden growth of traffic and transportation activities have made the area chaotic and unplanned. Roads are not in a position to take load of traffic and transportation due to poor designed and less carrying capacity. Width of NH-21A is very less due to encroachements and un-authorised constructions along it. Numerous structures have been raised along the sides of NH-21A and ribbon development has come up along the roads. There is no hierarchy of roads designed or bye passes available to ease out the traffic congestion. The alarming increase in air pollution in BBN Special area can be attributed to the increase in the vehicular traffic. There are no sufficient provisions of parking facility available even at towns level. Internal road are got choked due to construction and development activities. In order to ease out such problems serious thought and meticulous planning is required. The planning and development of an alternate bye pass on the western face and a new bye pass on the eastern face is the foremost necessity. In order to shorten the distance of long curvatures and to solve the local problem a traffic management plan to be devised. Besides the said mass transit system, planning and development of inter connecting roads and sectoral roads need emphasis.

Chapter-6 Housing

6.1 Introduction

The HIMUDA a housing and land development management agency of the State Govt has developed housing colonies at Baddi, Mandala and Nalagarh pockets of this area. Besides this private colonizers have also been developed housing colonies at various suitable locations. In BBN Special area, HIMUDA has developed different housing schemes like social housing schemes and housing colonies, self-financing schemes, rental housing schemes and plotted housing colonies at Baddi. The Apartments culture was started in 2003 through out State. In order to regulate the construction and development of colonies an Act was devised, namely H.P Apartments & Property Regulations Act, 2005 to regulate the promotion of the construction, sale, transfer and management of apartments on ownership basis. Simultaneously local socities have also been constructing new houses with the boom of apartments culture as well as the industrial package to the State Govt

Fig.6.52 Housing Colonies at Baddi.

6.2 HIMUDA's role in Housing development.

It has performed as a role model in the field of housing construction and development of plotted colonies in BBN Special area as well as state as whole. It has created various housing phases in Baddi, Barotiwala and Nalagarh area. It is a State Govt. body constituteted under HIMUDA Act, 2004. It has developed 1500 bigha well planned housing colony at Mandhala and education hub at Kalujhinda. At Baddi Housing Board Phase-I, II & III, flats, rental housing apartments and commercial shops have been

Fig.6.53 Housing Colony Developed by HIMUDA

developed at various locations. It has been developing colonies at Nalagarh and Nangal/Plasra for which 305 bigha land has been purchased by the authority. Besides, the authority has developed commercial pursuits. HIMUDA was only authority to give licenses to promoters and builders for setting up of apartments through out the state under H.P Apartments & Property Regulations Act, 2005. HIMUDA has also developed housing colony at Nalagarh area in order to fulfill the housing requirements. One fresh housing colony at Bhatolikalan is under pipe line to be developed as housing colony for general public. It is quite commanding site for the housing colony.

6.3 Apartment trends and Development of flats.

As per source, the state government stand issued 57 licenses to the various promoters and builders under the provisions of Apartments & Regulations Act, 2005 through out the state. Out of these cases as many as 44 colonies fall under Distt Solan which accounts for 77 percent of total cases at the state level. In BBN Special area, it accounts to 57 percent out of which 27 percents falls in Baddi Tehsil followed by 5 percent under Nalagarh Tehsil.

Fig.6.54 Rishi Aparment at Baddi

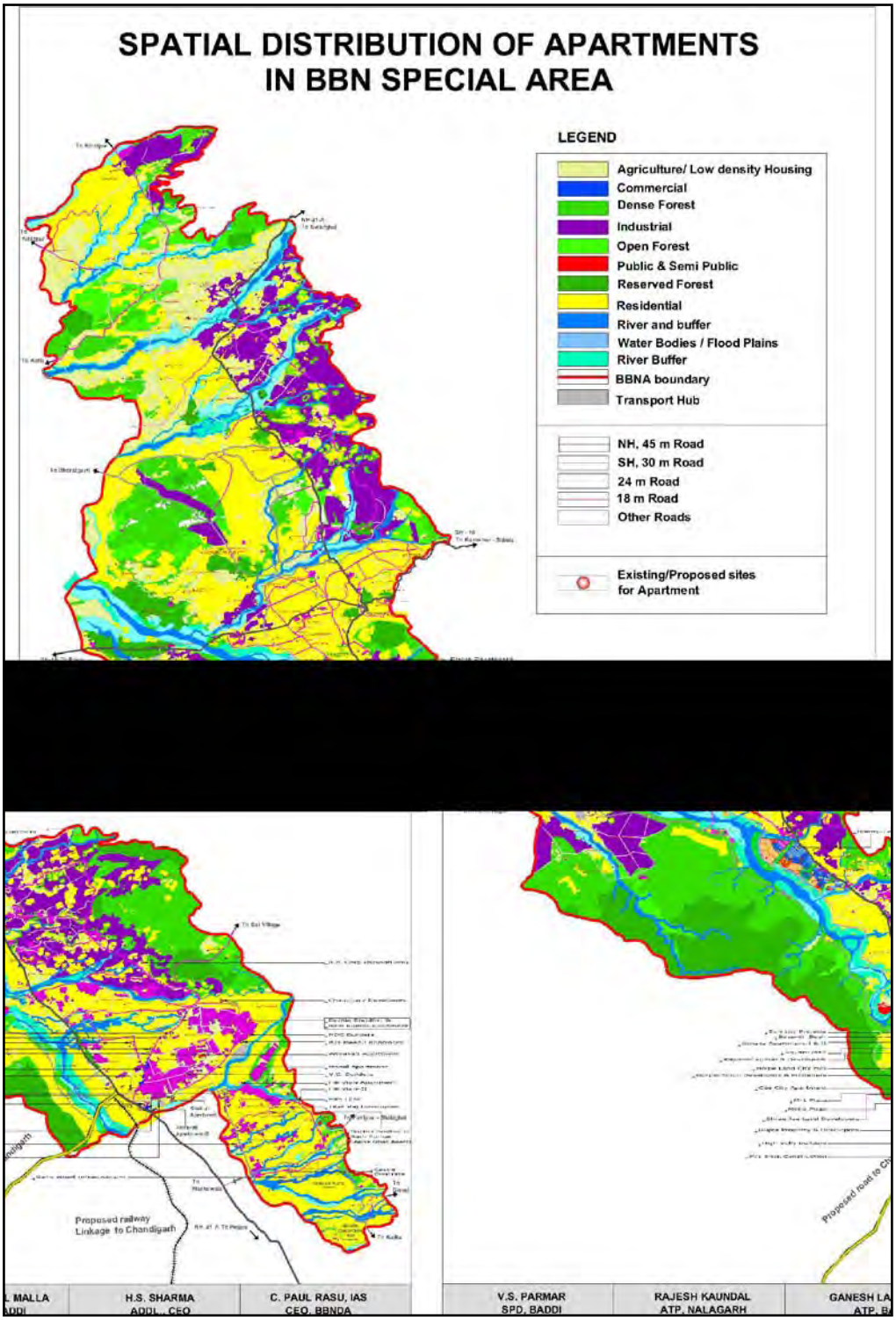
Reason for high concentration of apartments in BBN Special area is having a unique geographical positions and connectivity with Border States in form of roads. It has attracted lion's share of the industrial enterprise on account of industrial package announced by the GOI in the year 2003. Besides, the pace of industrialization and urbanization is very high in this part of the Distt compared to other parts of Distt. Spatial distribution of apartments has shown in **Map 6.1.**

6.4 Imperatives

The growing need of the land and consequently sudden shooting of price of land in BBN Special area further led to the conception of multi-storeyed buildings in form of apartments. Therefore, various promoter & developer raised numerous apartment in which height of apartments have allowed up to five storeys i.e G+5, stilt used as parking area for flat owners. Only 30-40 percent of total plot area is allowed for ground coverage. It is equipped with many facilities and services as per requirements of flat owners. It provides more open space around the buildings and these open spaces can be used for various purposes such tot-lots, tennis court, swimming pool, badminton court and recreational activities. It has installed

services such as lifts, fire fighting, staircases and ducts for ventilation. Infact promoters & builders construct these apartments for sale and profit making but the re-sale of flats directly to consumer is not possible without without taking mandatory permission of state govt u/s 118 of H.P Land Reforms & Tenancy Act, 1974 which is cumbersome process and legal hurdle for prospective buyers.

Map. 6.3.1 Spatial Distribution of Apartments in BBN Special area.



6.5. Status of Housing

The key parameters determining the housing condition are the rate of household formation and the supply response. The Housing condition parameters of Nalagarh MC and Baddi MC are as mentioned in Table 1.32.

Table 1.32: Key Housing Parameters

Parameters	Nalagarh MC	Baddi MC
Population	9,443	22,601
Households	2,133	5,238
Household Size	4	4
Census Residential Houses	2,033	5,153
Avg. No of Residents/House	5	4
Housing Deficiency	100	85

Source: Census of India, 2001 (Houses, Household Amenities & Assets)

The figures in table 6.1 show the scenario up to 2001 and it is quite understandable that after the new industrial policy was announced along with the incentives for setting up of industries in this region the existing housing stock will fall short to accommodate the increasing population. This is based on the existing information and understanding of the area and needs further corroboration before reaching to conclusions and strategies on Housing stock.

6.6 Distribution of Houses by Use

The distribution of Census houses by use in both the urban centres falling under BBN Special Area indicates a domination of residential use with 69% share as compared with the state level share of 67%. This is followed by shops and offices with a share of 15% while the state level share is 18%. This indicates that gradually trade & commerce activities are picking up pace in the city. (Figure 6.1 shows the cumulative percentage figures for Nalagarh MC & Baddi MC).

Table 1.33: Distribution of Houses by Use in Nalagarh & Baddi

Type of Use	Aligarh MC	Baddi NP	Himachal Pradesh
Total Census Houses	3462	8777	240,583
Residence	2,033	5,153	138,455
Residence-cum-other use	33	84	3,549
School/College	14	37	1,240
Hotel, Lodge, Guesthouse	20	53	1,635
Hospital, Dispensary	12	29	790
Factory, Workshop, Workshed	93	237	3,444
Place of worship	20	51	1,421
Other non-residential use	266	675	19,105

Source: Census of India, 2001 (Houses, Household Amenities & Assets)

6.7. Houses Distribution by Occupancy

It is evident from Figure 6.55 that the state's average vacancy rate for urban area is only 1% lower than both the urban centres (Baddi MC& Nalagarh MC) falling under BBN Special Area). Looking at the current development trend in the BBN region after the industrial policy was announced it is expected that the 15% vacant housing stock as per the 2001 Housing Census must have been utilized by this time.

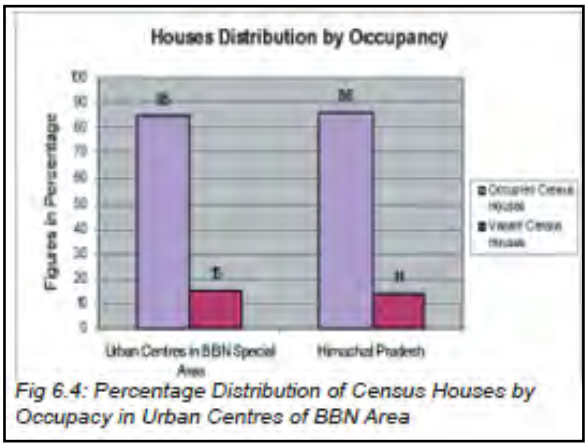


Fig 6.4: Percentage Distribution of Census Houses by Occupacy in Urban Centres of BBN Area

Fig : 6.55

Table 1.34: Distribution of Houses by Occupancy in Nalagarh MC & Baddi MC

	Nalagarh MC	Baddi MC	Himachal Pradesh
Total Census Houses	3,462	8,777	240,583
Total Vacant Census Houses	519	1,317	33,452
Total Occupied Census Houses	2,943	7,460	207,131

Source: Census of India, 2001 (Houses, Household Amenities & Assets)

6.8 Household Distribution by Type of Construction

Both the urban centres falling under BBN Special area rate well on type of construction as compared to the state. Around 87% households in Nalagarh MC and 94% households in Baddi MC are living in permanent structure that is higher than the state urban share of 85%.

Table 1.35: Distribution of Households by Type of Construction

	Nalagarh MC	Baddi MC	Himachal Pradesh
Households by Type of Construction	**2,133**	**5,238**	**143,113**
Permanent	87.00%	94.10%	85.40%
Semi-permanent	5.00%	2.70%	12.00%
Temporary (Serviceable)	3.40%	0.80%	1.40%
Temporary (Non-Serviceable)	4.60%	2.30%	1.20%

Source: Census of India, 2001 (Houses, Household Amenities & Assets)

6.9 Distribution of Houses by Type of Roof & Walls

The table 1.35 indicates that in terms of type of construction material used for roof in Aligarh MC fares well with 92% having permanent roof structures while only 75% of the census houses in Baddi NP have permanent roof structures. The same is also reflected in the construction material used for wall type where around 85% and 94% census houses in Nalagarh MC and Baddi MC respectively use bricks for building walls.

Fig 6.5: Grass & Thatched Roof constitute around 2.7% houses in Baddi NP

Fig: 6.56

Table 1.36: Distribution of Houses by Roof & Wall Type

		Roof Type			Wall Type
Type of Material	**Nalagarh MC (%)**	**Baddi MC (%)**	**Type of Material**	**Nalagarh MC (%)**	**Baddi MC (%)**
Grass, Thatched, Bamboo	8.5	2.7	Grass, Thatched, Bamboo	3.2	1.5
Plastic, Polythene	0.2	0.5	Plastic, Polythene	0.1	0.1
Tiles	2	0.2	Mud, Unburnt brick	5.3	2.9
Slate	0.2	0.1	Wood	1.8	0.6
GI, Metal, Asbestos	4.8	3.9	GI, Metal, Asbestos	2.1	0.8
Brick	7.7	0.9	Brick	85.4	93.5
Stone	0.2	0	Stone	1.8	0.1
Concrete	75.2	91.6	Concrete	0.3	0.4
Any other material	1.1	0.1	Any other material	0	0

Source: Census of India, 2001 (Houses, Household Amenities & Assets)

6.10 Distribution of Households by Location of Drinking Water

Accessibility to drinking water, safe sanitation and other minimum basic services are essential conditions for achieving good quality of life. It is quite evident from the Figure 6:4 that only 58% of the households have access to drinking water within their premises in Baddi MC which means that rest of the households are subsisting on tubewells, wells and other sources of water. While in Aligarh MC the situation is a little better as around 77% have access to drinking water within their premises which is better than the state performance at urban level where around 73% of the households have access to drinking water within their premises.

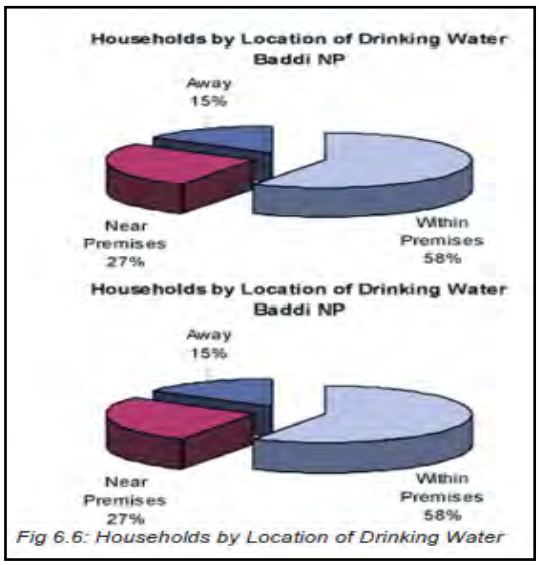


Fig 6.6: Households by Location of Drinking Water

Fig 6.57

Table 1.37: Distribution of Households by Location of Drinking Water

	Nalagarh MC	Baddi NP
Households by Location of Drinking Water	2,133	5,238
Within Premises	1,648	3,037
Near Premises	389	1,415
Away	96	786

Source: Census of India, 2001 (Houses, Household Amenities & Assets)

6.11 Distribution of Households by Source of Drinking Water

Almost 92% of households in Nalagarh MC and 88% of households in Baddi MC have taps (or piped network) as main source of drinking water with only marginal households subsisting on tubewells, wells and other sources of drinking water as shown in table 1.37.

Table 1.38: Distribution of Households by Source of Drinking Water

	Nalaarh MC	Baddi MC	Nalagarh MC	Baddi MC
Households by Source of Drinking Water	2,133	5,238	%age figures	
Tap	1,958	4,609	91.8	88
Handpump	129	108	6	2.1
Tubewell	0	511	0	9.8
Well	1	5	0.05	0.1
Tank, Pond,Lake	1	0	0.05	0
River, Canal	0	1	0	0.02
Spring	13	4	0.6	0.1
Any other	31	0	1.5	0

Source: Census of India, 2001 (Houses, Household Amenities & Assets)

6.12 Distribution of Households by Type of Latrine & Drainage

There are around 23% households in Nalagarh MC and 38% households in Baddi MC which have no access to latrines. In terms of access to drainage only 20% households in Nalagarh MC and 38% households in Baddi MC have access to closed drainage whereas 74% have access to open drainage in Nalagarh MC. Overall both the urban centres lack in adequate sanitation facilities.

Table 1.39 Distribution of Households by Type of Latrine

Components	Nalagarh MC	Baddi MC
Households by Type of Latrine	2,133	5,238
Pit latrine	433	1,478
Water closet	855	597
Other latrine	362	1,185
No latrine	483	1,978

Source: Census of India, 2001 (Houses, Household Amenities & Assets)

Table 1.40 Distribution of Households by Type of Drainage

Components	Nalagarh MC	Baddi MC
Households by Type of Drainage	2,133	5,238
Closed drainage	417	1,992
Open drainage	1,580	2,235
No drainage	136	1,011

6.13 Distribution of Households by Source of Light.

Accessibility to electricity in both the towns is significantly higher with 95% and 94% households in Nalagarh MC and Baddi MC respectively having electricity. This compares favorably with state urban figure of 97% of the households having electricity.

Table 1.41: Distribution of Households by Source of Light

	Nalagarh MC	Baddi MC	Himachal Pradesh
Households by Source of Light	2,133	5,238	143,113
Electricity	94.90%	93.80%	97.40%
Kerosene	3.00%	6.00%	2.20%
Solar energy	2.10%	0.10%	0.20%
Other oil	0.00%	0.10%	0.10%
No lighting	0.00%	0.10%	0.10%

Source: Census of India, 2001 (Houses, Household Amenities & Assets)

6.14 Imperatives

As the matter of fact, the poor class of society is not allowed the benefit of good housing from time immemorial because they are economically poor and can not efford to purchased land and building as compared to economically sound society. They are infact, migrant people and moving for want of seasonal jobs and livelihood. So they do not have permanent shelters resulting in them living on private and Govt land in form of jhunggies and jopharies and live in sub-standared condition.

The real estate builders of this area have constructed very good housing in shape of apartments/flats for commercial sale purpose under the provisions of HP. Apartments and Property Regulation Act,2005. So far around 3500 flats have been completed out of which very few flats could sold due to economic slow down in the real state market. Some of them have not even started development/construction work at site because of slow demand in market.

There is completely mis-match in demand and supply of affordable housing. More over there is no stock of such housing to be allocated to EWS. Deptt of Industries has developed labour hostels separately for men and women through the financial support of GOI that shall be allocated to low income group after completion of construction works. However BBNDA has also been trying the best to provide affordable housing/shelters to economically weaker section of this area in terms arrangement of land and lodging. Space for them has already been proposed at various periphery locations of BBN Special area. Local bodies have also proposed a few low cost housing under the Indra & Rajeev Gandhi AwasYojana scheme. It is a foremost necessity to

accommodate the weaker section because they are staying without having good shelters and basic facilities. They are mostly housed on private land and landowners are charging monthly rent from each jhunggiwala. Construction/development of private houses is in full swing because of good rental income. These rental houses are developed mostly in form of one room set.

CHAPTER-7 : INFRASTRUCTURE AND SOCIAL AMENITIES

7.1 Physical Infrastructure Status

7.1.1 Water Supply

Water supply in this area comes under the perview of Irrigation & Public Health Department. It has taped through Tube wells, Lift (other than Tube wells) and gravity schemes. Till date there are about 156 water supply schemes in this area of which 51 schemes cater to the need of water for BBN Special Area. Water supply schemes are designed for ultimate water requirement ranging from 40 lpcd to 100 lpcd. As per discussion with the Executive Engineer, sufficient water is being served by the department.

At present, these 51 water supply schemes are serving to population of 84386 persons. There are a total of 1683 public taps and 10738 private taps being served by these schemes.

Fig 7.58 Over head water storage tank

Table 1.42: Type & Number of Water Supply Schemes at Nalagarh

S.No.	Type of scheme	Total no of schemes	Remarks
1	Tube well	27	
2	Lift	55	10 schemes are based on Khad
3	Flow	74	All schemes are based on spring source
	Total	**156**	

Source: Executive Engineer, I&PH Division Nalagarh.

Nalagarh Lift Water Supply Scheme covers 3 villages. It is serving total population of 7426 persons of which 2634 persons comes under schedule caste. Barotiwala LWSS covers 4 villages. It serves a total population of 2986 persons. Baddi LWSS was completed in 1995-96 and covers two villages. A total population of 3270 persons has been covered under this scheme. Irrigation and Public Health Department has installed 18 tube wells in the Special Area. These tube wells have capacity of 6.90 MLD in addition to 1.80 MLD of HPSIDC and DIC per day.

Issues

- Excessive extraction of groundwater resource is prime concern in this part of the Distt. There is poor mechanism of recharge system available with authorities.

7.1.2 Sewerage and Storm Water Drainage

Baddi and Nalagarh towns are not well equipped with sanitation facilities. There is no underground sewerage system in the towns. Except in Baddi where new housing board area and the industrial area developed by the Government has a sewerage and drainage system. Other areas falling outside the industrial area has no sewerage system. Beyond these layout areas mostly the residents have individual septic tanks. In the Panchayat areas Government has introduced low cost sanitation scheme. Storm water drainage is through open drains running along the major roads in the city.

Fig 7.2: Open drainage along major road in Baddi.

Fig: 7.58a

7.1.3 Solid Waste Management

Solid waste can be classified into various types depending on their source. Municipal solid waste consists of household waste, construction and demolition debris, sanitation residue, and waste from streets. This garbage is generated mainly from residential and commercial complexes.

M.C Baddi is providing door-to-door domestic waste collection facility to the area falling under M.C area. A solid waste disposal site has proposed at Malpur village for disposal of solid waste. Waste is also dumped in the open at various locations in Balad Nadi and at confluence Point of Sirsa River. Though Baddi MC has placed municipal bins at various locations but as evident from Figure 7.59 they are not brought into use due to their inaccessible locations. Also due to improper waste collection and disposal process waste is seen scattered at various places in the town which creates unhygienic conditions. The situation is no different in Nalagarh town.


Fig 7.3: Municipal waste dumper lying in an inaccessible location

Fig 7.59

It was found out through focus group discussion with the villagers that there exists no systematic waste collection process by the gram panchayats. It was told that usually the domestic waste generated is either dumped in the field or burnt.

Fig 7.4: Improper Solid Waste Management in Baddi Nagar Panchayat

Fig: 7.60

Issues

- No proper site for disposal of solid waste.
- Waste is thrown untreated way at open places which is quite unhygienic.
- Solid waste management forms an obligatory function of both MCs and panchayat area as observed.

7.1.4 Power supply

Apart from the above mentioned sub-stations, there are two sub-stations in Barotiwala namely Jharmajri 132 KVA and Katha 66 KVA falling in Kasauli tehsil. The capacity of Katha sub-station is being enhanced to 220 KVA . Electrical Sub-Station No.1, HPSEB, Nalagarh serves the urban area including commercial developments and industries. It covers Nalagarh town, commercial connections are 1049 and industrial connections are 56. ESD No.1 also covers 39 villages. These villages and urban area Nalagarh are 100% electrified. The above-mentioned sub-stations in Table 1.43 in total cover 542 villages and urban area of Nalagarh tehsil. Source for table is taken from the concerned HPSEB Nalagarh. The details of category wise consumers being serviced by these sub-stations are presented in table 1.45. Network of major HT lines have shown in Map 7.1 at page 108. Most of these lines are crossing from western side of NH-21A. So land in this area has kept for green and agriculture use as well as low density housing.

Table 1.43 Electrical Sub Station

S.No	Name of Sub-Station	Capacity
1	66/33/11 KV S/st Nalagarh	73.15 MVA
2	33/11 KV S/st Manjholi	10.3 MVA
3	33/11 KV S/st Baglehar	6.30 MVA
4	66/33 LV S/st Baddi (Feeding Nalagarh area)	20 MVA
5	33/11 KV S/st Harraipur (Temporary arrangement)	6.3 MVA
	Total	**116.05 MVA**

Table 1.44 Category wise detailed consumers.

S.No	Category	No. of consumers
1	Domestic (Antodya)	Nil
2	Domestic	30256
3	NDNC	379
4	Commercial	4293
5	**Industrial**	
	Small Power (upto 20 KW)	713
	Medium Power (21 KW to 100 KW)	106
	Large Power (Above 100 KW)	97
6	Govt. Irrigation & WSS	160
7	Public Lighting	6
8	Agriculture	1259
9	Bulk	2
10	Temporary	85
	Total	37356

Source : HPSEB,Nalagarh

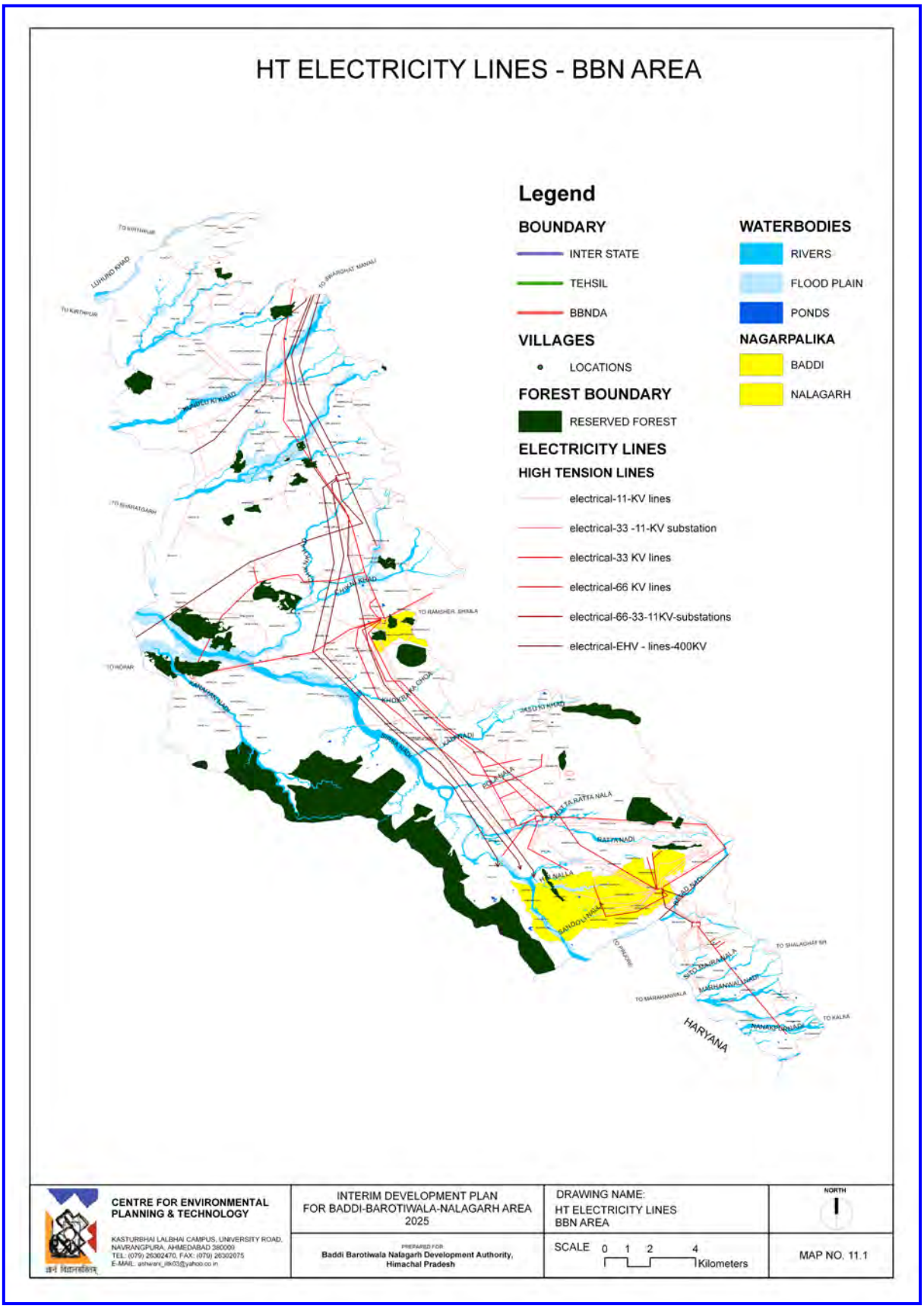
The revenue receipts for Nalagarh Sub-Stat I & II for the year 2006-07 comes to Rs. 84,59,21,941. While the revenue expenditure for the same period for Nalagarh Sub-Station I & II comes out to Rs. 4,16,21,160/-as per the table 1.45.

Table 1.45: Revenue Receipts for Nalagarh Electrical Sub-Station

S.No	Name of Sub-Station	Revenue from sale of power (Crore Rs)	Other revenue (Rs)	Total Revenue (Crore Rs)
1	ESD No.I NLG	40.5	99950	40.6
2	ESD No.II NLG	43.9	109805	43.9
	Total			**84.5**

Source: Addl. Superintending Engineer, Electrical Division HPSEB, Nalagarh

Map 7.1.4.1 Network of HT Lines in BBN Special area



Apart from the above mentioned schemes for future expansion, other projects in the pipeline are a 220 KVA sub-station near village Dabni as informed during a discussion with HPSEB, Solan. Besides the following sub-stations are under effective consideration namely Akkanwali 40MVA, Nangal Uperla 200MVA and Dhabota 12.6MVA.

It was also found out during the discussion that from April to September there is surplus power supply due to monsoons resulting more power generation at Nangal Hydro power station. The power supply is low during the period between October to March. The peak hours during summers is between 7 pm to 10 pm and during winters is between 6:30 pm to 9:30 pm.

Issues

- Almost every month 2-3 electric poles get damaged due to traffic.
- Due to haphazard development taking place within the town and undulating topography it becomes difficult for the HP SEB to provide connections to certain consumers. And hence, in such cases at times they have to set up a separate unit to provide power.
- For big industrial houses they set-up a transformer in their premises so that industries can step-up power load. The Additional Superintending Engineer, Electrical Division HPSEB, Nalagarh said that their main emphasis is to increase coverage area, introduce metering and quality improvement by way of fault detection but again this will depend on the availability of power supply.

7.1.5 Irrigation

Irrigation schemes started functioning in somewhere 1967-68. Mainly three types of irrigation schemes are functioning in this area, namely Lift, Tubewell and Flow irrigation schemes. At present total 107 number of irrigation schemes are functioning. Irrigation potential created with the help of these irrigation schemes are in the tune of 5527 hac. Out of this 5527 hac irrigation potential created in 2002-03, irrigation potential utilized in rabi season was 3222 hac and in Kharif season was 1116 hac. Irrigation potential created at 5527 hac is considerably low due to hilly terrain and forest area in the region. Following table shows scheme wise irrigation potential created and utilized for Rabi and Kharif seasons:

Table 1.46: Potential Created & Utilised for Rabi and Kharif seasons till 31-03-2003 (BBN Special area under Nalagarh Division)

Type of Scheme	No of Scheme	Potential Created (In ha)	POTENTIAL UTILISED					
			2001-01		2001-02		2002-03	
			Rabi	Kharif	Rabi	Kharif	Rabi	Kharif
Lift	29 Nos.	1897	1098	497	1258	443	1273	407
T/Well	66 Nos.	2031	1132	376	1135	374	1127	339
Flow	12 Nos.	1599	866	451	943	308	822	370
Total	**107**	**5527**	**3096**	**1324**	**3336**	**1125**	**3222**	**1116**

Source: Executive Engineer, I & PH Division, Nalagarh

Executive Engineer Irrigation & Public Health Division, Nalagarh is incharge of the above mentioned irrigation schemes. Apart from I & PH Department, Soil Conservation Sub Division (Dept of Agriculture, HP), Nalagarh has also undertaken construction of irrigation schemes in the region under RIDF (Rural Infrastructure Development Fund) which is being financed by NABARD. Soil Conservation Sub Division (Dept of Agriculture, HP), Nalagarh have undertaken 32 such schemes in this region of which 14 schemes fall under BBN special area.

Table 1.47: Irrigation Schemes undertaken by Soil Conservation Department

S.No.	Name of Scheme (Location)	Year of construction	CCA (ha)
1	Deep Tubewell Irrigation Scheme (DTW), Sukhedi, NLG	2001-02	35
2	DTW Irrigation Scheme, Kawanwali, NLG	2001-02	35
3	DTW Irrigation Scheme, Jagatpur, NLG	2001-02	35
4	DTW Irrigation Scheme, Redu, NLG	2001-02	35
5	Flow Irrigation Scheme, Kenduwal, NLG	2002-03	17.2
6	FIS Irrigation Scheme, Khol Khas, NLG	2002-03	10
7	Lift Irrigation Scheme, Rautanwala, NLG	2003-04	24.8
8	DTW Irrigation Scheme, Haled, NLG	2005-06	35
9	DTW Irrigation Scheme, Majra Panga, NLG	2005-06	35
10	FIS Irrigation Scheme, Gharoti, NLG	2005-06	10
11	FIS Irrigation Scheme, Karsoli, NLG	2005-06	24
12	DTW Irrigation Scheme, Sukhedi Khalsa, NLG	2006-07 (under construction)	35
13	DTW Irrigation Scheme, Baruna Kalan, NLG	2005-06	35
14	DTW Irrigation Scheme, Tikkari Khattiwal, NLG	2005-06	29.9

Source: Sub-Divisional Soil Conservation Officer, Nalagarh

7.2 Social Infrastructure Status

7.2.1 Education

In terms of educational facilities in the villages falling under the BBN Special area, there are 229 villages according to the 2001 Census which have primary schools, 6 villages have both primary and middle schools, while there are 4 villages which have primary, middle as well as high school. In the rest of the villages these facilities lie in the vicinity of less than 5 km distance. There are 22 centres and under each centre there are 4-6 schools. Apart from the above mentioned Govt. schools there are 29 non-Govt. schools coming under Nalagarh Education Block falling under the BBN special area. Out of these 29 non-Govt schools 7 come under Nalagarh Municipal Council. The teacher's student ratio in the primary schools is 1:10. There are 3 primary schools in Nalagarh Municipal Council, one PG college, Bhojia Dental College & Hospital and Institute of Engineering and Emerging Technologies for higher studies at Bhud. There is one ITI located in Nalagrah with strength of 300 students and staff of 27. The following are raised below:

- Lack of facilities in terms of school buildings, mid-day meal facility, and improvement in education standards and teachers are the emerging issues.
- Requirement of Technical Training Institutes/Vocational Institutes.
- Need to set-up job oriented institutes/polytechical College.

7.2.2 Health Facilities

There is one Community Health Centre at Nalagarh town having capacity of 100 beds and an Ayurvedic Health Centre having capacity of 10 beds. There are total of 12 PHCs in Nalagarh tehsil of which 5 primary health centres fall in the BBN Special area which are located at Baddi, Joghon, Dabhota, Kalibari, and Baruna. Manjholi, Baddi and Barotiwala also have a 100 bedded ESI Hospital and dispensary. There is one regional hospital at Solan. Health facilities also include 12 Ayurvedic health centres in the following areas- Baddi, Lodimajra, Landewal, Hari Raipur, Kharuni, Haripur Sandoli, Sakedi, Jhira, Nangal, Palli, Gujjarhatti, Sainimajra, Khera.

There are 34 Health sub-centres falling under the BBN Special area in various rural settlements, which are managed by male / female health worker. As per the information obtained from Block Medical Officer, Nalagarh there are 25 allopathic doctors and 15 Ayurvedic medical officers working in various Govt. health centres in the BBN special area.

There are 2 private Institution (training) cum hospital in Nalagarh tehsil. There are 17 private clinics cum laboratories / ultrasound centres in the tehsil. Out of which, 6 are in Baddi and 11 in Nalagarh. Prevalent seasonal diseases are diarrhea, gastroenteritis,

dysentery. In addition to these, skin diseases, tuberculosis, leprosy, asthema, hypertension, snakebite and anaemia are also common in this area. The State Govt has made special provisions as given below:

- Free services to BPL / IRDP families.
- Financial Aid provided by the Red Cross Society on request made by the patient other than BPL.
- National Rural Health Mission implemented to grass root level.
- Revised National TB Control Programme, based on WHO standards is implemented which has a provision for free of cost TB treatment.

Under NRHM scheme vehicle in name and style of 108 has also introduced for emergency services. The issues related health services area given below.

- Lack of government medical facilities in spite of rapid industrial development.
- Catering to migratory / floating population is essential which is not happening now.
- Up gradation or new ESI are required because of increasing factory workers.
- Emergency and Trauma Centre is required to deal with any industrial disaster.

7.2.3 Civic Amenities

Police and Security

There are four police stations in BBN Special Area – Nalagarh, Baddi, Barotiwala and Nikoowal and two police posts at Dabhota and Jogon.

Post and Communication: There are two post and telegraph office, 8 telephone exchange are functional.

Banking and Financial: There are 20 banks both public and private in the special area. Apart from these there are agricultural credit societies also.

Cremation Ground: There are two cremation sites.

Community Places and Clubs: There is a lack of community places and clubs in this area.

Libraries: There is no library other then a reading room in the region.

7.2.4 Fire services:

There are two fire stations in BBN Special Area – one each at Baddi and Nalagarh. Fire station at Baddi also serves Barotiwala area and some parts of Haryana. Around 90% of the fire incidents happen in the industries. Rest 10% includes domestic and forest fires. Most of such incidents are reported from spinning mills. There have been 6 major fire incidents in the past 5-6 years. During such incidences additional help is sorted from Parwanoo, Pinjore, Chandigarh and Panchkula fire stations. No industrial house in Baddi area has there own water tenders in case of a fire.

BBNDA has also arranged one fire tender for Fire Deptt. Since concerned Deptt has lack of sufficient fire tenders as per the increase in demand. It was donated by the GAIL India to BBNDA and the same has been hand over to the concerned Deptt. It is quite necessary to have a lot of fire tenders as this area is susceptible to fire hazards due to chemical and textile industries. Besides there is a lack of trained man power and scientific equivements in order to tackle fire accidents. The table below reveals that maximum fire accidents was occured in the year 2006. It is because that GOI has granted industrial package for the HP Govt. During this particular period maximum quantum of units were set up in this area.

Apart from handling fire cases the Fire Department also renders its support during floods and rescue operations.

Table 1.48: No. of fire incidents in Baddi & adjoining areas

Year	No. of cases of fire
2000	89
2001	78
2002	107
2003	119
2004	129
2005	143
2006	149
2007 (till May 25th)	36
Source : Fire Offce Baddi	

Before induction of fire servicemen in the service they undergo training program at Training Centre Shimla. Apart from this Government runs refresher courses every year for the employees in service. The following issues are raised below:

- Need for provision of more vehicles as well the staff.
- Infrastructure at fire station needs to be upgraded.
- Staff members should be provided with necessary safety gears and other equipments.

Fire susceptibility is very high in industrial areas due to storage of flamble and non flamble materials.

7.3 Rural Infrastructure Status Assessment

Based on Census information, existing social amenities and physical infrastructure in the villages have been mapped in the form of a scalogram in order to identify gaps. Annexure VI shows detailed availability of social and physical infrastructure present in the villages in BBN Special area. As per source it revealed that 12% of the villages have a population of more than 1000 persons where availability of social amenities are highly uneven. But it can be clearly distinguished from the scalogram that social amenities in terms of schools and health care centres are distributed unevenly over the region.

Table 1.49 Educational Amenities

Population Range	Villages in each range	Primary School	Middle School	Sec School	Sen Sec School	College
751 above	47	40	20	8	2	1
601-750	22	18	5	3	2	0
451-600	25	13	2	1	0	0
301-450	35	24	2	0	0	0
151-300	55	19	4	1	0	0
0-150	45	10	0	0	0	0
Total	**229**	**124**	**33**	**13**	**4**	**1**

Source: Census 2001 (derived from Scalogram)

Most of the higher order services as mentioned above are clustered in few villages. While in terms of physiacl infrastructure-electricity, water supply and pucca road villages are better placed.

Table 1.49 shows detailed availability of educational amenities viz. primary, middle, secondary and senior secondary schools in the villages within BBN Special area. It is evident from the table that most of the educational amenities are located in villages with a population size of 600 persons and above. There is a lack of higher order services in rural area with only 15%, 6% and 2% of the villages having middle, secondary and senior secondary schools respectively. According to the Sarva Siksha Abhiyan there should be a school or an alternative schooling facility within 1 km of every habitation. There is a provision for opening of new schools as per State norms or for setting up Education Guarantee Scheme like schools in unserved habitations.

The delivery of primary health care through preventive, curative and promotive medical and health services is the foundation of rural health care system and forms an integral part of the National Health scheme. It is observed that the healthcare services in rural areas of Baddi, Barotiwala and Nalagarh fall short in reaching out to the rural population. According to the healthcare norms for rural areas there should be a Referal Unit/PHC for 6 Sub Centres 4-6 beded manned with a Medical Officer Incharge and 14 subordinate paramedifcal staff. But it is quite apparent from Table 7.9 that there are only 3 PHCs in this area catering to the requirement of 34 sub-centres thereby, putting extra load on them. It is important to bridge these gaps for an efficient and effective delivery of healthcare services.

Table 1.50: Medical facilities in rural area of BBN Special area.

Population Range	Villages in each range	Disp.	CWC/ FWC	PHSC	PHC	Maternity/Nursing Home
751 above	47	8	3	18	1	1
601-750	22	3	0	1	1	0
451-600	25	9	3	7	0	1
301-450	35	1	1	4	0	0
151-300	55	1	0	2	1	0
0-150	45	0	0	2	0	0
Total	**229**	**22**	**7**	**34**	**3**	**2**

Source: Census 2001 (derived from Scalogram)

The gaps identified from the scalogram within amenities and infrastructure in the villages needs to be reduced by incorporating them in the proposals so as to reduce disparity within the area. Future growth and development of the region would require access to basic social and physical infrastructure and public services, including schools, healthcare facilities, water supply, sewerage, solid waste disposal, etc. In view of this, it is desirable that special care should be taken to include them in future planning schemes.

7.4 Imperatives.

It is observed that there is absolute lack of proper road network on one hand and isolated approach of services infrastructure network authorities for providing basic services like accessibility water supply, sewerage drainage, and electricity and telephone, haphazard development is taking place. The piecemeal registration of zig-zag Khasra plots by the revenue authorities without approval of land is chaotic and is making the service infrastructure Department to pave way for planned provisioning of services infrastructure network.

BBN Special area being an industrial hub of the State, it has lack of quality schools and health facilities as compared to other part of State. No quality hospital is available in private and Govt. sector for emergency services. People have to rush to Chandigarh and Mohali for medical services in case of emergency. Hence there is dire need of a quality hospital in order to cater the entire during emergency. Similarly, there is no quality education facility available with this part of the Distt. People prefer to avail child education from Chandigarh, Panchkula and Mohali. Though the Development Plan proposals have incorporated by such proposals to pave the way for a better schools and health facilities in order to fulfill the requirement up to ther year 2025.

Women, children, down trodden, and handicapped are proposed to be given due care so that they don't fall pray to evils of modern urbanization. As BBN Special area is likely to emerge as a pretigious indusrial town of the State, higher order facilities including, tele-communication complex, auditorium, inter state bus stand terminal, zoologicaland botanical parks and water dams are proposed to be developed there. All the necessary requirements of life in terms of services, infrastructure including vehicular road, water supply, sewerage line, drainage, electric supply, telephone etc shall be made available at door steps, of each dwelling unit utmost public convenience/ satisfaction is ensured.

All day to day facilities including health, education, shopping, post and teleghraph, telephone/ communication parks and open spaces, libraries/ reading rooms, recreation etc. are proposed in each cluster of houses/ building so that quality of life is fully maintained.

CHAPTER 8: LANDUSE AND LAND SUITABILITY ANALYSIS

8.1 Introduction

Urban growth and development are largely dependent upon the availability of buildable land. As part of the planning process, one of the key steps in determining future land uses and land form is to conduct land suitability analysis. This helps in determining the actual amount of land that will be available for future growth and hence determine if the carrying capacity of the land will be able to meet the projected population needs.

In addtion to the land suitability analysis, the SWOT analysis supports the future landuse planning. SWOT analysis consists of a detailed investigation regarding the strengths, weaknesses, opportunities and threats of the site. This process helps in gaining a deeper insight about the needs and assets of a region, which can then be explored further for development of the structure plan.

SWOT Analysis and Land Suitability Analysis, along with knowledge of the existing morphology, help in the creation of a structure plan that is both visionary and implementable.

8.2 SWOT Analysis

8.2.1 Strengths

- Proximity to Chandigarh, Ropar and Shimla
- Growing fast because of industrial influence
- Vast land is available for development
- Connectivity to major roads and highways

Vast scope of town planning scheme and land reconstitutuion and management due to availability of developable land.

8.2.2 Weaknesses

- Not all land is under BBNDA – there may be need for some land acquisition and town planning schemes.
- Along with increase in industrial labours Slum development/ encroachment is also mushrooming.
- Increase in migrant industrial labours across the site.
- Rivers are non-perinial and mining along the river beds.

8.2.8 Opportunities

- Opportunity to develop the region as a major node serving as additional industrial growth center for the state

- Develop and enhance the IT -Bio technology sector, Agrobased units which are already under the thrust industries of the State Govt.
- Provide a suitable environment for the growth of high-density service industry, with adequate green open space and recreational opportunities
- Develop institutions for higher studies and technical training to serve the industrial growth in the region and form a part of holistic development of the native residents.
- Availability of educated population
- Nearness to several tourist spots in HP.

8.2.4 Threats

- Absence of waste management system for the region.
- Slum development spreading across the site can cause future problems of land
- Absence of sewerage & Drainage system in the urban/ industrial centers
- High dependence on Ground water.
- Large chunk of land under agriculture

8.3 Land Suitability Analysis

This study helps in identification of land that is suitable for construction/development, in other words suitable for development for various land uses. The entire exercise has been carried out on a grid of 500 mts by 500 mts. There are two components of the land suitability analysis namely Environmental Sutability Analysis & Land Potential Analysis.

8.3.1 Environmental Sutability Analysis,

There are several factors that determine land suitability, but the most influential and governing are the environmental factors, like as slopes, soil & geology, flood & erosion prone areas, expanse of vegetation, etc. These environmental determinants have been studied for the entire **318.74 sq.km** of BBN Special area to see the lands that are environmentally sensitive and not suitable for development.

8.3.2 Slopes and Elevation

Sloping land may or may not be suitable for development, depending upon the steepness of slopes. Slope analysis helps in determining the steepness of slopes throughout the site, using contour data. The slope of an area is the ratio of the difference between the highest and lowest altitude points of the place (rise) to the horizontal distance measured between the points (run). The slope angle or degree of

slope is determined by: tanØ=rise/run. The larger the rise and the shorter the run, the steeper is the slope. Slope is also represented in terms of the slope percentage (%) The slope percentage is determined by the formula:
slope %=(rise/run)x100.

The slope analysis for BBN Special area and its environs clearly shows the hilly area on the outer periphery of the site. Most of the site on the inner side in the northern part of the region has buildable slopes, only pockets of hillocks within the eastern periphery, Northeastern periphery show up as unbuildable. Here, the slopes are classified into four categories: Flat terrains (0–10%), Gradual slopes (10-25%), Moderate slopes (25-40%), and Steep slopes (> 40%). It is evident that the steeper the slope, the less suitable the land will be for urban development. Such lands are environmentally sensitive and hence should not be disturbed.
Similarly for Elevation, the altitude scale was classified into five categories: Flat (0-410 km), Moderate (410-781 km), High (781-8 50 km), very High (> 850 km). It is evident that higher the elevation it will be more inconvinient to develop the area.

8.3.3 Water bodies and Green Buffer Areas

Table 1.51: Land Suitability Determinant: Slope (0 degree)

Category	Weightage	Ranking								
		High			Medium			Low		
		9	8	7	6	5	4	3	2	1
Slope	9	0-5°	5-10 °	10-15 °	15-20 °	20-25 °	25-30 °	30-35 °	35-40 °	40-45 °

Table 1.52: Land Suitability Determinant: Elevation (in mts)

Category	Weightage	Ranking								
		High			Medium			Low		
		9	8	7	6	5	4	3	2	1
Elevation	9	–	781-860	696-781	612-696	530-612	464-530	410-464	355-410	270-355

As seen in chapter 2 the area has several small and large drainage ways and water bodies. The drainage ways are categorized into three divisions – primary, secondary and tertiary. The drainage pattern also results into formation of many small ponds.

Environmental sensitivity of primary drainage ways is high, as any development in or near them can alter the local hydrology and water flow paths. It can also lead to damage to local ecology as the water-gathering areas would be lost to construction. Hence a buffer area (or 'no development' zone) is reserved on either side of drainage ways – this buffer area is 25mts for primary, 15mts for secondary and 9mts for tertiary drainage channels. Based on these buffer areas, sensitivity of land is mapped. Lands falling within the primary buffer zones are considered least suitable for development, those within secondary or tertiary buffer zones are moderately suitable, and those outside of any buffer areas are considered most suitable for development.

8.3.4 Vegetation Cover

Table 1.53: Land Suitability Determinant: Water bodies

Category	Weightage	Ranking								
		High			Medium			Low		
		9	8	7	6	5	4	3	2	1
Water bodies	9	0	0	>250 m from primary / sec. stream	0	0	<=250 mts from Primary/Secondary stream	Secondary stream present	–	Primary stream present

As mentioned earlier, the BBN Special area has several forest reserve areas . These forest reserves should be conserved completely and not utilized for future development. These areas as most environmentally sensitive and hence not buildable. Besides the Reserved forest areas, the survey map for BBN Special area also shows some unlocated forest, which need not be conserved, but should incorporate into its layout the trees existing on site. These areas show up in the map as moderately suitable. It is possible to build in these areas with certain restrictions that may be implemented at policy level. Areas with sparse or no environmentally sensitive vegetation areas may be considered most suitable for development since they require no or little cutting down of trees.

8.3.5 Geomorphology

Table 1.54: Land Suitability Determinant: Vegetation

Category	Weightage	Ranking								
		High			Medium			Low		
		9	8	7	6	5	4	3	2	1
Forest	9	0	0	>1km	0	>500 m	<500 m	<50% coverage	>50% coverage	100% coverage

The BBN Special area has important geo-morphological units of fluvial origin. Out of all the three units (Ravinous Lands, Residual Hills, Flood Plains) are considered to be highly influential in this area and hence considered for Environmental suitabity analysis in depth. The flood plains are mainly found downstream of Baddi and form a narrow strip bordering river Sirsa at locations where the slope varies from 2-8% and subjected to periodic flooding during monsoons. The flood plains generally have good reserves of groundwater and thus needs to be protected from pollution and development. Such lands are environmentally sensitive and hence should not be touched upon.

8.3.6 Land Potential Determinants

Table 1.55: Land Suitability Determinant: Hydrogeomorphy

Category	Weightage	Ranking								
		High			Medium			Low		
		9	8	7	6	5	4	3	2	1
Hydrogeomorphology	9	>2 km	-	-	1-2 km	-	-	100% grid coverage	-	-

A land potential analysis was conducted to determine the land most suitable for development in terms of land use and buildability. Based on different factors as proximity to national highways, state highways, district roads, urban settlements and industrial developments, land potential maps were prepared. These factors brought out the potential for the most developable areas for building. For example, development around the National Highways is more than the further inner parts. The industrial areas , owing to its ease in provision of infrastructure and due to demand of supporting industries it has high potential for development for new industrial areas . On these lines, the other factors were similarly analysed for potential for buildability. The various parameters were weighed and studied at the regional level for the 318.74

sq.kms. This was done by giving weightage to each criteria and then overlapping all the individual potential maps. The weightage was assigned on a scale of 1 to 10, where 1 is the least potential and 10 is the most suitable for building.

8.3.7 Composite Land Suitability Index

Table 1.56: Land Suitability Determinant: Accessibility

Category	Weightage	Ranking							
		High			Medium			Low	
		9	8	7	6	5	4	3	2
Accecibility	8	Present NH	Present SH	Present ODR	Nr NH 250 mts	Nr SH 250 mts	Nr OR 250 mts	Beyond 250 mts	

Table 1.57: Land Suitability Determinant: Urban Development

Category	Weightage	Ranking							
		High			Medium			Low	
		9	8	7	6	5	4	3	2
Urban Development	8	Present	Upto 500 mts	1 km	1.5 km	2 km	2.5 km	3 km	3.5 km

Based on the different criteria of environmental land suitability and land potential, a composite land suitability map was prepared to determine land most suitable for development. This was done by giving weightage to each criteria and then overlapping all the individual suitability maps for both environment and land potential. The weightage was assigned on a scale of 1 to 10, where 1 is least influential and 10 is most influential; for example since slopes are a very crucial criteria for development, slope analysis was given high weightage. Thereafter a composite of all the environmental factors was prepared which suggested the most sensitive land and hence not suitable for building. Similarly, a composite of all land potential factors was made that suggested the potential area for development.

The next step involved juxtaposing the composite environmental determinant map and the composite land potential map. The composite map created by juxtaposing the two criteria is shown in the Map. It can be seen that flat and gradually sloping land is ideal for development, and the suitability decreases as one moves outwards to steeper slopes and/or dense vegetation. In general it is observed that since the entire region has several water bodies, drainage ways, forest reserves and undulating land with steep slopes in some cases, most of the region falls within the moderately suitable zone. It also reflects that the most suitable for development is the area along the NH

and SH owing to its immediate proximity to the region. Most of the region shows up as moderately suitable for development with few pockets that are sensitive to development, mostly in ths area.

8.4 Land Use Statement

The Fig 8.61 shows the land use statement of the BBN Special Area. As per this figure **26** percent land is not suitable for development except for small reclaimation and seasonal activities. Because land is under forest cover, water bodies and undulating slope. Such land is not used for infrastructure development as per National Building Code and UDPFI guidelines.

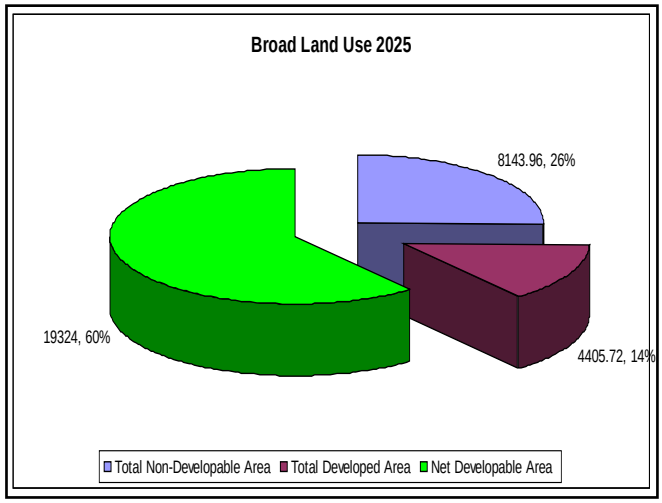


Fig 8.61 Broad Land Use

Out of total **14** percent has developed for various urban uses over which Baddi, Barotiwala and Nalagarh node as well as abadi deh have been come up over the period. For future development, still **60** percent land is available in BBN Special area for urban development. All the future requirements up to the year 2025, planning and development proposals are to be formulated on the basis of availability of developable land. The left out land is to be developed in accordance to premire city of Chandigarh.

CHAPTER 9: PLANNING STRATEGY & DEVELOPMENT PROPOSALS

PART II – ISSUES AND PLANNING NORMS AND STANDARD

9.1 Emerging Issues

Based on the preliminary understanding of area through field observations and discussions with several stakeholders such as Government officials, rural population (through FGDs), slum population, BBNDA officials, Municipal council members, individual industries, various association office bearers/members (BBNI Association, truck, taxi, tempo, hotels) the following main issues have been identified.

9.2 Industrial Growth Management

- Haphazard Industrial Development.
- Massive conversion of productive agricultural land for industrialisation and urbanisation.
- Loss of agriculture and contamination of soil due to industrial emissions and environmental pollution.

9.3 Regional Economy

9.3.1 Agriculture

- Availability of fertile land for good agriculture production
- High land conversion rate of prime agriculture land

9.3.2 Employment

- Unavailability of local labour for Industries.

9.3.3. Development/ Urbanization

Housing and Commercial

- Lack of good quality housing stock
- Concerns related to migrant workers and their housing
- Suitable construction quality to area
- Lack of good commercial areas.

9.3.4. Institutional

- Lack of any institutional areas for higher education, high skill development and vocational training centre
- Lack of service sector related training such as computer, IT etc.

9.3.5 Tourism and Recreational Facility

- Lack of open green spaces or landscaped areas
- Lack of recreational facility in the region like clubs, theatres
- Low level of Tourism activities due to lack of any strong attraction.

9.4 Infrastructure and Services

9.4.1 Road and Transportation

- On-street parking causes bottlenecks in flow of traffic.
- Lack of proper approach roads to the industrial clusters.
- Existing internal roads in the industrial clusters are in bad condition.
- Traffic congestion on NH-21A halts the transportation of Industrial Goods.

9.4.2 Water Source and its contamination

- Ground water is the main & only source of water supply in the region and water table of extracting bore wells are lower than 300m.
- Tributaries of Sirsa River polluted by major waste water disposal source.
- Water logging is a critical issue, no natural discharge facility.
- Septic tanks for sewerage disposal are being extensively used for treated effluent disposal.
- Many industrial units discharge wastewater into road side drains.

9.4.3 Solid Waste

- Solid waste disposal is one of the major problems in the region.
- Open dumping on the road sides.
- No facility for disposal of hazardous waste is available at the moment though there is a proposal under pipeline at Dabhota village for the same.

9.5 Environment

- Physiography posses constrain for waste water collection
- Industrial Wastes leachates during flash flood.
- Being bounded by hill on two side Air quality is an issue.
- Ground water withdrawal for industrial and domestic purposes results in lowering the ground water table.
- Preservation of good quality landscape and vegetation.

- Lack of green belts around industrial estates and residential areas
- Risk of conflict between industrial and residential areas due to relative physiographic location.
- Noise in main town areas and along Highway

9.6. Planning Principles

All the different alternatives of the Structure Plan that have been evolved are based on some common planning principles. These remain constant and guide the conceptual developments. These include response to natural features and existing development as well as issues such as traffic and the built environment. They all aim for maximum economic growth of the region in a manner that has least impact on the natural environment. The planning principles are briefly described below:

9.6.1 Response to natural features

The proposed Structure Plan shall respect the natural features such as major streams as well as minor drainage ways. Buffer areas on either side of such water features will be earmarked as a **'no-development zone'** and developed as open green spaces. Besides this, existing slopes shall be respected and not altered, to the maximum extent possible. The drainage patterns shall follow natural slopes. Since the entire region is intersected with several streams hence, it will be taken care that the development should not clog the natural path of the drains and create water-logging and other problems.

9.6.2 Response to existing development

A large portion of the site does not have any development on it. There are patches of land used for dry or wet cultivation, which have orchard plantations. Much of the good agricultural land has been converted to non-agricultural use. Baddi and Nalagarh have been the major development centers, and there is some development in the area joining the two urban centers. Other than this, the site is mostly vacant. In recent years, slums dwellers have encroached on a lot of land, which shall have to be tackled appropriately. The concept plan shall integrate the existing development as part of the plan as well try to limit further conversion of agricultural land into non-agricultural use. It shall also incorporate various services and infrastructure needs of the existing development, if lacking.

9.6.3 Response to climate

Energy efficiency will be given due importance in the concept plans. The proposals for solar street lighting and generating energy from waste can be taken into consideration.

9.6.4 Traffic Concerns

The main aim of the Structure Plan will be to propose a rational and efficient road network that wards off through traffic and avoids congestion. There are a number of village roads which have the possibility of being upgraded into major district and neighbourhood roads. The proposed master plan explores the possibility of looking into this option.Surface parking lots and parking garages for short-term and long-term parking respectively should be integrated within the layout to ensure that adequate parking is made available. The plan will also identify drop-off points of public transportation for the area, along with taxi/ autorickshaw stands. The pedestrian corridors will also connect to these nodes throughout the area.

9.6.5. Built Environment

The built form must integrate with the continuous green corridors, facilitating views of the open spaces from the various sectors within. The central spines of the institutional and commercial belts will not have compound walls in order to achieve positive spaces between buildings. Basement parking would be encouraged as opposed to stilted ground floors for parking as they create barriers between the building and the landscape. To this effect, podium, tower and courtyard building profile should be encouraged. Arcaded building edges to provide shaded walkways will be built in to the commercial areas.

9.6.6. Harmony with nature

The built environment will be integrated with the natural surroundings, in sync with the call for conservation of natural surroundings. The attempt will be to cause minimum impact to the natural environment and ecology of the region.

9.7 Planning Standards and Norms

The following table 9.1 shows the requirement for social facilities and civic amenities as per UDPFI guidelines. This will help in finding out the gap in the existing network of social and civic amenities. The scalogram seen earlier in chapter three, seen in

conjunction with this table will help identify these gaps, so that they can be incorporated in the Plan.

9.8 Potential Activities in BBN Special Area

During the last three years, industrialization in the state of Himachal Pradesh (H.P.) has made significant progress. The share of industries and services sectors respectively has increased from 1.1 & 5.9 percent in 1950-51 to 15.9 & 17.3 percent during 2004-05. District Solan has attracted the largest number of industrial investment and Baddi, Barotiwala, Nalagarh and Parwanoo are home to most of the industries. In view of the industrial boom that the region has witnessed in the past, BBN Special Area has become a focal point for industrial growth. There is immense scope of development of the region with such pro-industrial policies, pleasant climate and pro-active Government accompanied with good physical and social infrastructure.

- Industries
- IT/Bio-Tech Park
- CBD
- Recreational activities on existing seasonal nallahs.
- Eco-Tourism

Table 1.58: Activity Structure as per norms

S/No.	Population	Nature Facility	Land Use Category	Land Area(Sq.m)	Built up area	No. of Nodes	Total Land Area
1	**Community level 5000**	Primary school	Institutional	4000	550	3	12000
		Community hall	Institutional	1000	250		3000
		convinience shopping (@3 shops per 1000 person at 15sq.m each.	Commercial	550	225		1650
		Decentralized waste water treatment syste		1500			4500
		Open Space @ 3sq. M per cap. Incl. play ground	Open Space	15000			45000
		Sub Total		**22150**			**66450**
2	**Neighbourhood Level 7500 persons**	Sr. Secondary School incl. playground,sports field.	Institutional	25000	8000	2	50000
		Religious Building	Institutional	500	250		1000
		Dispensary	Institutional	500	250		1000
		Petrol Pump	Commercial	1200	100		2400
		Retail Commercial@ 5 shops per 1000 of 15 sqm each	Commercial	1000	565		2000

		Water Resviors and distribution systems		250			500
		Open space @3sqm per cap. Incl.parks,jogging tracks	Open space	22500			45000
		Sub Total		**50950**			**101900**
3	**Town Level 15000**	Hospital	Institutional	14000	3000		14000
		Police Station	Institutional	500	150		500
		Community hall	Institutional	2200	1000		2200
		Museum and Art gallery	Institutional	2500	1250		2500
		Music, drama and dance centre	Institutional	1350	750		1350
		Head Post office	Institutional	1275	500		1275
		Crematorium and Burial Ground	Institutional	5000			5000
		Fire station	Institutional	13580	300		1350
		Convention hall	Institutional	1800	1000		1800
		Sports Complex	Institutional	4500	2000		4500
		Banks with ATM	Commercial	500	250		500
		LPG Godowns	Commercial	1750	550		1750
		Telephone Exchange	Commercial	3800	800	1	3800
		Bus terminal with depot.	Commercial	4500	600		4500
		Dry Port and Transportation Hub	Commercial	45000	6000		45000
		Reatil Commercial @5 shops per 1000 of20 sqm each	Commercial	4000	1500		4000
		Cinema hall	Commercial	1350	1000		1350
		Electric Receiving Substation		1000			1000
		Central sewage treatment plant		3000			3000
		Water reserviors and Distribution Systems		1000			1000
		Sports Ground		3100			3100
		Open Space @4sqm/cap incl. parks exhibition grounds,Tradefairs	Open Space	60000			60000
		sub total		163475			163475
		TOTAL		**236575**			**331825**

CHAPTER 10: ACTIVITY STRUCTURE

10.1 Growth Potential of the Region

Over the years proximity to Chandigarh and Shimla and the important transportation linkage in the form of NH-21-A has boosted the industrial growth in the BBN Special area which stretches from Baddi to Nalagarh. In addition to the locational advantage, the government subsidies for promoting the industrial development also proved to be a catalyst in the growth of this region into an industrial zone.

A number of infrastructure facilities such as Airport, railway etc. located in the megacity Chandigarh have been used by the industrial sector for easy transportation of the raw and finished products. Also the proximity to Chandigarh facilitates easy availability of manpower required for the industrial sector. Low cost power availability and large chunks of land available for development proved to be the best bargain for the growth of the Industrial corridor in the region. The farmers got higher prices selling their land to industrial sectors. The existing industrial estates development needs to be regulated to have guided and organized development in the future. Improvement in existing infrastructure in these estates will be a starting point and further development can take off from there.

10.2 Vision Statement

Based on the studies of the existing conditions and considering the growth opportunities and potential of the site, the following vision statement was arrived at:

"To develop a Baddi-Barotiwala-Nalagarh Special area as a modern economic region with world class infrastructure and social amenities to address the future requirements and harmony with the ecological resources"

Economic growth should be the key word for the development of the BBN Special Area. Simultaneously ecological sustainability should also be considered as a major design criteria. The development also implies good education, health, and provision of adequate and good infrastructure and civic amenities to the residents of this area. The following would be the guiding factors/ principles in the course of designing the Development Plan for the region in order to achieve the above stated vision:

10.3 Balance between Resource Conservation & Quality Of Life

The site has considerable amount of green cover in the form of reserve forests and farms and dotted with water bodies through the site. Certain rocky outcrops within the site offer lovely sculptural elements that need to be integrated with the landscape. A balance between the built and un-built should to be established to provide a good quality of life to the people inhabiting the region.

10.4 Mobility, Accessibility and Connectivity

An efficient road network is a primary requirement for this area being an industrial hub of the State. Keeping in syncronisation with the envisaged industrial environment, easy accessibility and connectivity of various areas within the locality it is an important requirement. Private and public intracity transportation networks is required to be enhanced for sustainable development. The ring roads, flyovers bye-passes are required to be designed and developed for smooth traffic movement and decongestion of choked area. Since this area is lacking with proper traffic and transportation plan. There is no planned aroundabouts for diversion of traffic movement during peak and lean period. Apart from this, roads are not designed as per existing load of traffic and its carrying capacity as well as gradient for movement of heavy vehicles. There is no provision of drain along the major roads so during rainy season water flows over these roads and it creates potholes and bigger crackes in roads, which becomes part of hurdle for development of this area.

10.5 Energy and Ecology

Energy conservation is a major issue to be tackled while planning the development of new areas. Adoption of efficient measures to conserve the natural surroundings will be a guiding factor. Striking a balance between the natural and man made surroundings will enhance the quality of life of the people and endow a better working environment for the otherwise formal corporate sector. So in order to bring an harmony and to build balanced approach between man and environment is prime necessity sustainable enviornent development.

10.6 World Class Infrastructure

Provision of basic and effective infrastructure is a necessity for any area to grow and develop effectively as envisaged. The industrial as well corporate sector calls for world-class facilities and civic amenities as an effective element for development.

10.7 Efficient Management and Maintenance

An efficient management and maintenance will be a requirement to take care of the facilities provided. Urban design controls will guide such development and help achieve the proposed massing and urban form.

• An equitable environment: where people can aspire, grow and have choices

Providing the people an environment for growth and sustenance will be the ultimate goal of the project, which will be in conformance with the vision stated above.

• Propose a phase-wise development plan in contemplation with growth potential & future trends of the region

10.8 Projections

10.8.1 Population Projections

Criteria for the population projection:

- Past population growth rates (decadal/ annual growth rate)
- Existing and envisaged industrial development
- Accessibility
- Close proximity to the major cities Chandigarh, Mohali, Panchkula and Punjab and Shimla.

The population growth in any region is generally dependent on the economic opportunity that region offers. The BBN Special area does not have a consistent pattern of population growth; hence, here it would be prudent to project population considering, because of proposed future economic scenarios, along with the past growth trends.

It is suggested that population projection could be best done through building activity based scenario. These activity based scenario for the region are Industrial development in this region and provision of better infrastructure facilities.

Since the effect of these development would tend to be limited to specific pockets (zone) with in the region and the population has been projected on the basis of coming development of industrial activities. From the above methodology we also tried to find out the worker's population that has to be provided with housing facility in our special area. Population projection is having two components:

- Natural growth projection for urban and rural areas.
- In-migration projection for the urban and rural areas.

Natural growth for the native population was projected using a medium growth rate. The population projection has been done for all the three scenarios assuming varying growth rates. The additional population attributed to industrial development will be in the form of direct employment generated by proposed industries, the multiplier effect in the form of service sectors employment and dependants on these workers.

Migrant population projection was done by using a model, which generated an employment scenario based upon the existing work participation ratio and the expected change. This population and employment model takes into account the participation of Chandigarh and other urban centers around the region. Along with the in-migration due to economic activities, based to non-based jobs were also projected. While employment generation and balanced regional development will continue to be one of the objectives of the Regional Development Plan for this area of the State, it is necessary in the present context to have wider focus while determining the objectives in view of concerns expressed. Investment in industry has a multiplier effect on

employment generation as rapid industrialization can create large scale employment directly and indirectly and this can absorb the under - employed of primary sector as also provide employment to the educated unemployed.

From the above methodology we also tried to find out the worker's population that has to be provided with housing facility in in this area.

- As stated above, the total area for industries have been divided into percentage share, 25%-IT-Bio-tech industries ,20 % large scale industries and 55% small scale industries.
- On the basis of the standards, we arrived at employment estimation for each scale of industries. This was further bifurcated into 40% for executive class and 60% for non-executive class.
- The non-executive class is further divided into three groups i.e. 40% non skilled, 30% skilled and rest 30% for service sector.

From the above calculation, total worker's population comes out to be 371910 persons in secondary sector and 145214 persons in tertiary sector.

10.9. Population Projection and Programme Brief

The additional population (in-migration and base to non based) be 1,50,000 persons which is 34% of the total projected population in 2025. Majority of the worker population will be in the secondary sector i.e. 58% and the remaining 32% in the tertiary sector.

The residential population for the 229 villages and two urban centers in this area as well as the based to non- based jobs in this area. The village settlements and the two urban centers are anticipated to grow to a population of 430,260 persons by 2025, while the immigration is anticipated to bring in additional population. Thus the total projected population for the area is estimated at 430,260 persons. Assuming gross density of 150 per person per hectare area, the total residential area requirement comes out to be 9660 hactare. The detailed population projection has also been made at Chapter-3.

As seen in the table below BBN Special area will be the main node for development in the near future attracting a large amount of population as well as employment.The Population will raise due to growth in the secondary and tertiary sector. Baddi-barotiwala and Nalagarh nodes and another growth center of land near Panjhera are identified as the major magnets, which will absorb the balance population and jobs.

CHAPTER 11: DEVELOPMENT PLAN CONCEPT

11.1 Introduction

The Development Plan of BBN Special area primarily aims at containing the regional growth, reducing congestion, overcrowding, and bringing comprehensive regional development through dispersal of sizabe population and economic activities across the Special area.

This area being in linear shape growth is taking place along the transport corridors resulting in ribbon mushrooming development every where. Such kind of development is required to be disbanded in order to control the unplanned and haphazard development. Future all development proposals are required to be contemplated along the periphery of existing urban centres as well as the transport corridors in a planned and compact manner so that proper infrastructures can be arranaged. Apart from this proper green belts are required to be proposed for the upkeep of ecology and environment around the proposed development area.

11.2 Design Parameters

11.2.1 Connectivity

Transportation infrastructure is one of the key importance in determining the land use patterns. Transportation and land use is two sides of the same coin. Physical growth of any area depends upon meticulous planning of land use and Transportation planning. Efficient transport provides mobility to citizens that are essential for development. Currently the BBN Special area experiences huge Industrial traffic movement on the NH 21A. Considering the heavy volume of traffic and bottlenecks at various critical junctions within existing industrial and urban development, town entry points and the potential of industrial development in the region, it is necessary to widen the whole section and provide service lanes. This will not only control entry and exist on the NH but will also provide free flow of traffic on this important transport link.
Besides the NH 21A, the State Highway 16 and District roads need to be strengthened to support the regional transport linkages. At present Ropar-Shimla is the major State Highway links to this area. Additional ring roads and other linkages will prove beneficial in distribution of the traffic load. In view of present volume of local industrial traffic and the through traffic of Parwanoo to Swarghat it is essential to have specialized facilities for transport and logistics hub to this area.

At present there is a clutter of junctions in the urban areas of Baddi and Nalagarh. These can grow into major bottlenecks in the area. The Development Plan proposes

bypass cutting across the region like two parallel roads in order to take care of the future load on the NH-21-A, without mixing the industrial traffic with the town's internal traffic.

11.2.2 Industrial Zoning & Infrastructure

The Concept plan of BBN Special Area proposes separate Industrial clusters/zones in the region. Industrial Zoning is conceived as an ensemble of specific industries. These industrial clusters are linked together by major road network, acting as the transportation link and integrated infrastructure service corridors.

The Industrial clusters are proposed to be segregated by commercial and other special functions in order to balance the distribution of facilities. The separate zones of industrial clusters will enable control over the spread of the industries across the region and regulate the environment of the same. At present the industrial infrastructure needs up gradation and hence better infrastructure augmentation within the existing Industrial Estates is required to be planned and implemented, specially like roads for better accessibility, effluent conveyance and disposal and storm water drainage.

11.2.3 Infrastructure in Rural Areas

The primary survey and secondary data reveals that the existing infrastructure in the villages located within the Development Plan area is found to be insufficient and inadequate. The proposed Development Plan, thus, envisages to upgrade these amenities so as to cater to the needs of the villagers and estimated future population growth.

The Development Plan proposes to provide for urban level of facilities and infrastructure within existing rural areas on the periphery of the urban centers and newly proposed township areas. These facilities include road network for better connectivity, basic facilities like water supply and drainage, sanitation, solid waste management, street lighting and power.

11.2.4 Social Amenities

With the rapid development expected in the region the level of the social facilities in the Special area villages needs to be augmented to an urban level in the peripheral urban centers. These facilities range from educational facilities, health facilities, banks, commercial establishments, playgrounds etc. These provisions are proposed as per the UDPFI Guidelines and the standards of open space and road widths and lengths is also provided under the proposed planning norms.

11.2.5 Environmentally Sensitive Areas

Care has been taken to protect and conserve the environmentally sensitive areas like the rivers, streams, ponds and the good agricultural areas.Special consideration is to be given while deciding the land use zoning for the protection of the good agricultural land which has been vanishing with the rapid industrialization in this area.

11.3. Development Plan Concept

The concept plan for BBN region evolves from the elementary aspiration to connect and keep pace with regional opportunities and transaction. The concept plan for BBN region seeks to respond simultaneously to many actions, easing the stress of multiple accesses to opportunity where the place of work, place of living, recreation and culture are amalgamated and compliment each other, so that accessibility is almost instantaneous.

Based on the programme brief and with the design principles in perspective, a few concept plan studies were quickly made to test the workability and feasibility of achieving the project objectives. These alternatives help arrive at some physical manifestations of the vision and programme brief proposed in the previous chapter. Four alternative Concept Plan proposals were drawn up. The main goal was to create a logical and efficient road network and a complimentry landuse plan.

Each of the initial proposals aims at developing the region with urban centers spread out in the region accommodating the residential and other related requirements. The conceptual designs have been very useful in verifying feasibility of design, area designated for roads and open spaces, green buffers and industrial zoning / clusters, etc. in the proposed programme brief. All plans runs along two major spines – one being the National Highway 21-A (north-South) and other is the State Highway -16 in the east-west direction.

11.3.1 Preferred Concept Plan

The initial concept studies were presented and discussed with the BBNDA officials. And other stakeholders based on their comments and feedback, a preferred Concept Plan was prepared. All plans shows growth along two major spines – one being the National Highway 21-A (north-South) and other is the State Highway -16 the east-west direction. The concept is to develop the vertical spine as the main industrial spine, with high density landuses. In contrast to this, the horizontal spine would be developed as residential belt. The internal areas of the broad landuse zoning will mainly house residential and mixed use areas. For the conceptual plan of the region the total land requirements for various activities was approximately estimated based on the population and employment estimates for the special area.

11.3.2 Land Use Plan Concept.

While doing the Landuse Zoning exercise due consideration has been given to the prevailing site conditions and various ecological features of the region. Prior to that four Landuse Zoning alternatives various options were tried for the possible landuse zoning. Though with different themes and varied objectives the key factors governing these alternatives were consistent.

Keeping in view the existing constraints at the site the following considerations are kept in mind while formulating the Development Plan for the area:

Table 1.59: Existing and Proposed Land Use Statement

Land Use -2007-2025		**Distribution**
Components	***Area(in hac)***	***Percentage***
Total BBN Area	**31874.00**	**100.0**
Non Developable Area	***8143.88***	***26.0***
Water Bodies	**3120.00**	**9.8**
Rivers & Flood Plains	**510.08**	**6.26**
River buffer	**3051.00**	**9.6**
Slope (1:5)	**1462.88**	**4.6**
Total Developed Area	***4406***	***14.0***
Industrial	**1043**	**3.3**
Commercial	**132**	**0.4**
P&SP	**15**	**0.0**
Residential	**2896**	**9.1**
Transportation	**320**	**1.0**
Net Developable Area Proposed land use	***19324***	***60.0***
Residential	**7048.69**	**22.11**
Inudstrial	**5072.34**	**15.91**
Commercial	**134**	**0.42**
P&SP	**881.61**	**2.81**
Parks & Open Space	**546.96**	**1.72**
Traffic & Transportation	**1593.07**	**5.00**
Vacant	**4047.83**	**12.69**

Source: As per landuse calculations & projections by CEPT team

Since the area is industrial dominant therefore land use of industries has been increased to 5072.69 hectores from 3726 hectares which has been met out from the proposed vacant land.

11.3.3 Village Settlement Areas

The Development Plan Area consists of 229 villages with their Gamtal areas being protected taking care of their future growth requirements and 2 urban centers. If required village Gamtal area should be planned as it is derterioting due to conegestion and haphazard construction. More over abadi area is got over due to expansion of construction and population growth.

11.3.4 Exisiting Industrial Setup

Existing industrial areas are not in planned way. It has been developed in un planned manner due to lack of serviced land and proper facilities to each industrial area. Though there is a madatroy provision of Act, Rules and Regulations for spatial planning. It was observed in each and every nock and corner of special area that the investors have purchased land to set up industry where ever they got cheap land through property dealers. Spreads of existing Industries in the region are considered for proposed industrial area, accordingly space has been allocated in proposed Land Use Map -2025.

11.3.5 Surface Water Bodies & Ponds

The region is has a dense drainage network which is considered while developing the plan for the region. In order to maintain the environmental stability of the region the major river, streams and major nallas & vllage ponds within the area are proposed to be conserved.

11.3.6 Higher Slopes and Elevation

As the region has high slopes (> 1:5), certain areas are considered to be non-developable areas. Simillarly many parcels of land are at a very high elevation and are excluded from the available land for development considering the inconvenience in infrastructure provision at these heights.

11.3.7 HT Lines:

The High Tension lines of 66 KV & 33 KV (as shown in Map 11.1) cutting across the region are provided with a green buffer for safety reasons. All the substations connecting these lines 66KV which further distribute electricity to various villages through 11 KV lines. A few of the EHV Lines passing through the region are also considered and provided with green buffers.

11.3.8 Low Lying & Flood Prone Area

The Development Plan area many low lying areas along Sirsa river therefore certain parts of the special area fall into moderate to high flood prone areas. And many portions of the area are ravine land which are taken into consideration while preparing the Development Plan.

11.3.9 Exisiting Road network

The whole special area is very well connected with roads at all level. NH 21-A is the major transport spine in for the region along with the SH-16 which divides the area superficially into two parts and connects the region with the neighbouring areas. Some of these roads, however, would need upgradation, widening, realignment to take care of the existing & future traffic and be in coherence with the proposed Development Plan. There are also a number of village roads which have the possibility of being upgraded into neighbourhood roads. The proposed Development Plan explores the possibility of looking into this option.

11.3.10 Proposed Landuse Zoning

As per the land use table 60 percent land is available for urban development and future requirements up to plan period of 2025. All the future developmental proposals have been proposed on this land in accordance to proposal-II which was finalised by BBN Development Authority from out of four alternative proposal of land use zoning plan.

With the above mentioned land use zoning considerations a basic landuse concept was prepared. Under this concept the landuse zoning is developed in three major zones.

A. The Northern Development Zone node is consisting of a mix of industrial, residential & open spaces zones. In this the Industrial zone is reserved on the eastern side along the National Highway, forming an industrial belt from top till the urban development fringes around Nalagarh, thereby taking care of the new industrial spread in the region. The residential zone is in the form of discontinuous residential clusters proposed on the western side along the NH-21-A, supporting the residential needs of the industrial development envisaged in the zone.

B. Central development zone is mainly developed along the SH-16 having a mix of industrial, open spaces, public & semi public, commercial node and residential areas. In this zone the residential zone is proposed particularly inside and all around the existing Nalagarh urban development creating a form of greater Nalagarh.

Four Major Industrial nodes area proposed along the SH 16. First node is a small industrial cluster proposed in the southern Nalagarh around the area from Dadhi Kanian, Tahliwala to Nalka. Another small industrial node is proposed on both sides of the Chikni Khud in the western part of the region around Ranguwal to Dhang-Upereli in addition to the existing Industrial footprints. Third major Industrial Node is proposed at the south-west tip (towards Ropar) of the SH 16 in BBN region. In order to support the proposed industrial nodes some residential area is proposed on the opposite direction, along the SH. Sirsa river forms a natural buffer separating both Industrial and residential development. Fourth Indestrial node has been proposed along Bharatgarh road.

A commercial centre is proposed along the Sirsa river down south of Nalagarh. The strategic location of the commercial centre compliments the proposed development of the Nalagarh and Baddi-Barowtiala urban centers.

The Southern development node is consisting of major development on the western side of the NH-21-A with a mix of industrial and residential zones inside it. The industrial zone is located in the Northern Part of this development zone. And the inner area of Baddi-Barotiwala region is proposed with a mix of new Residential areas, Mixed use zone, Commercial belts and Institutional pockets. Some institutional development is proposed in the form of a thin belt on the western side of the Sirsa river. A small residential node is proposed in between the Sirsa river and Reserved Forest in the south-western tip of the region.

- In all three development nodes the existing settlements within the proposed industrial area have been given a 50 m buffer all around them for future expansion.
- No new industrial development is proposed within the existing urban areas of Nalagarh & Baddi-Barotiwala.
- The surface water bodies across the area are protected with green buffer with flexibility for green space development.

Further keeping the basic landuse zoning structure the same various zoning options within the region were tried.

11.3.11 Proposed Landuse Statement

The proposals have been finalised in view of community aspirations, effective role of local bodies guidelines series of deliberations with professional experts and by

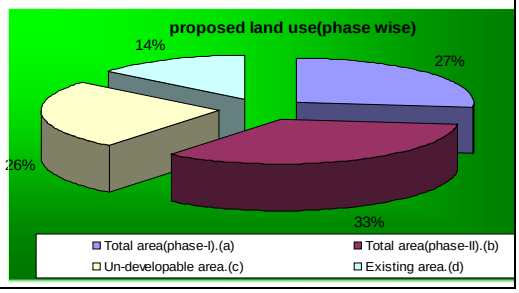
inculcating the participatory approach of private and public sectors. The Development Plan-2025 is contemplated as a document of comman man, a document of the public/community and that of the local bodies, authorities and the Government.

Allocation of developable land for different uses to meetwith requirement for the next 20 years i.e up to the year 2025 is made and proposed land use structure devised accordingly. The various land use have been proposed keeping in view the availability of developable land in each sector, holding capacity in terms of population, amenity, convenience and health.

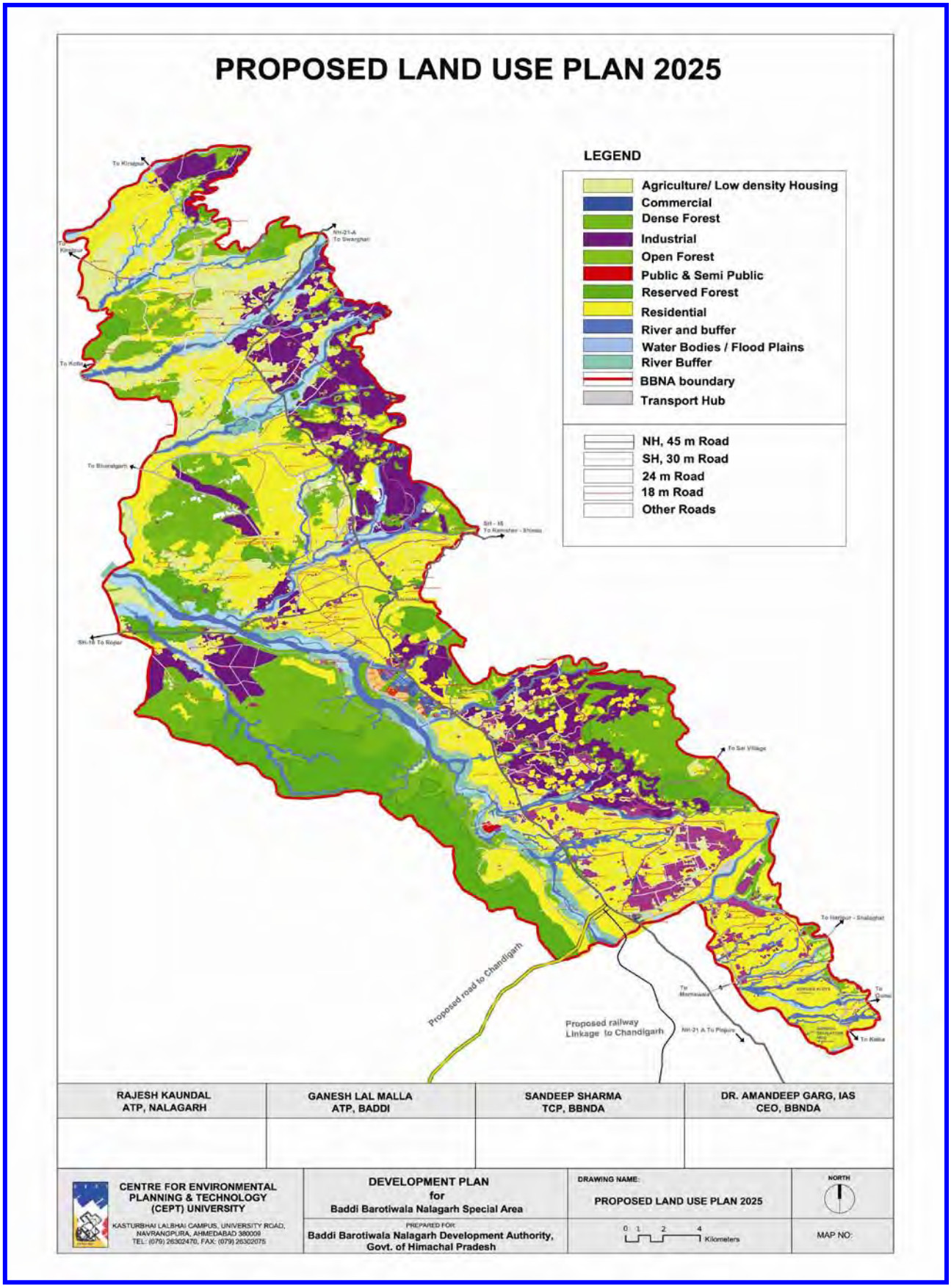
The proposed landuse statement for BBN Special area for year 2025 is as given in table 1.60.

Table 1.60: Proposed Landuse Statement

PROPOSED LANDUSE STATEMENT				
	Phase-I (2007-2015)		Phase-II (2015-2025)	
CATEGORY	AREA (in hac)	% age	AREA (in hac)	% age
Industrial	2500	29.41	2572.34	23.76
Residential	3000	35.29	4048.69	37.40
Commercial	50	0.5	84	0.77
Traffic & Transportation	576	6.77	1017.07	9.39
P&SP	200	2.35	681.61	6.29
Parks & Open spaces	150	1.76	396.96	3.66
Vacant Land	2023.91	23.81	2023.91	18.69
Total proposed area	*8499.91*	*100.00*	*10824.58*	100.00
Total area(phase-I).(a)	8499.91			
Total area(phase-II).(b)	10824.58			
Un-developable area.(c)	8143.96			
Existing area.(d)	4406			
Grand total. (a+b+c+d)	31874.0			



With the projected population of 430,260 persons the density in the region remains the same as in alternative one. Reduction in the Industrial and residential development is targeted in order to prevent loss of good agriculture land in the region to some extent.



Map 11.3.11.1. Proposed Land Use Map-2025

The proposed landuse plan suggested by the TCP Department in year 2006 shows that most of the residential zones are proposed on the peripheral boundary of the BBN region which are not suitable as per the land suitabilty analysis. Major P&SP landuse is proposed along in the northern part of the region and will lead to unbalanced availability of amenmities & facilities. A big chunk of land along the Nalagarh-Dhabota road is proposed over good agricultural land and can be harming the ecology of the place. Major portion of the land is under forest and there are proposals for development of residential and transporation zones around these which may further intensif y the ecological imbalance in the future.total shift of exisiting industrial clusters is clear from TCP's proposed master plan. A special commercial zone is provided near Nalagarh along NH-21-A. Land around the surface bodies have been extensively used for several uses other than recreational which may aggravate the environmental deterioration of the region in near future.

A comparison between the two landuse statements reveal that the industrial land uses between the two area comparable, since the CEPT Proposal will also have a industrial requirement of **2572.34** Hactor by year 2025 as compared to 2215 (ha) according to TCP proposal. But the location of the the industrial zone provided along the SH-16 towards Ropar in CEPT proposal is also different from Dhabota- Nalagarh road in TCP proposal. The allocation of green buffer areas around the surface water bodies in CEPT plan are missing from conceptual stage itself in the TCP proposal. Another major difference in the landuse proposal is the allocation of residential zones and the area requirement across the region. While CEPT proposal shows the residential zones to be developed in 3 major nodes, the residential areas proposed in TCP proposal area major along the periphery of the region. The land area allocated under residential landuse in CEPT proposal is almost double that of the TCP proposal.

11.4 Road and Transportation proposal

11.4.1 Proposed Road Hierarchy

The Development Plan for BBN Special area exhibits a definitive hierarchy of roads. The proposed Road Hierarchy consists of 45 m, 30m, 24m and 18 m wide roads. Based on the plan, the road network can be seen as made up of the two major spines i.e National Highway 21-A & the State Highway -16, ring Roads ,the loop roads parallel to the NH-21-A and the other sector roads. The proposed road network would improve the connectivity within the region, simultaneously helping the alleviate traffic problems.

The following road hierarchy is hereby proposed for ensuring smooth movement of traffic in BBN area:-

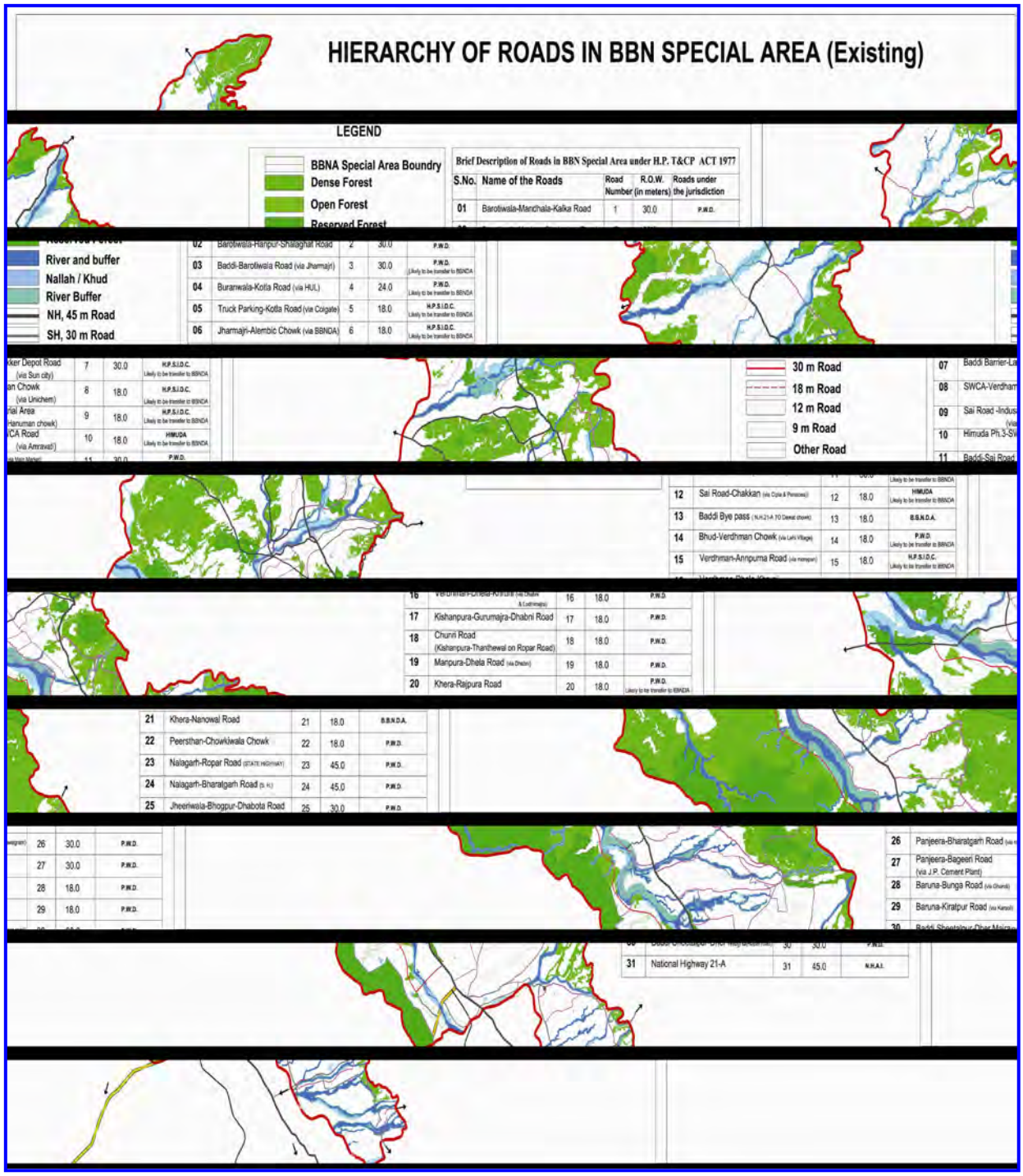
i) NH 21-A is of proposed R.O.W of 45 mts. A minimum setback of 5m shall be compulsory on both sides from the edge of the proposed R.O.W.

ii) SH 16 is of proposed R.O.W of 45 mts as it is likely to be upgraded as a national highway. a minimum set back of 5m shall be compulsory on both sides from the edge of the proposed R.O.W

iii) Following roads are proposed as entirely new roads or existing roads proposed to be widened:-

i. Bye pass to NH 21-A from Baddi to Manjholi and it shall have an R.O.W of 30mts
ii. Baddi - Barotiwala via Jharmajri. It shall have an R.O.W of 30mts.
iii. Barotiwala - Mandhala - Kalka road with a R.O.W of 30mts.
iv. Barotiwala - Haripur road with a R.O.W of 30mts.
v. Baddi - Sai road with a R.O.W of 30mts.
vi. Nalagarh - Bharatgarh road with a R.O.W of 45mts.
vii. Dabhota - Bhogpur road with a R.O.W of 30mts.
viii. Panjehra to Bagheri road with a R.O.W of 30mts.
ix. Baddi barrier to Baddi - Barotiwala road via suncity with a R.O.W of 30 mts
x. Ring road linking Ropar road to Ramshahar road via Souri with a R.O.W 30 mts
xi. Buranwala to Kotla road with a R.O.W of 24mts.
xii. Bhud - Vardhman road with a R.O.W of 18 mts.
xiii. Lakkar Depot to Kotla (via EPIP phase-I) to truckunion at Barotiwala with a R.O.W of 18mts.
xiv. From Jharmajri to Ballad bridge via BBNDA office road with a R.O.W of 18mts.
xv. From Vardhman chowk to Single Window Office via M/s. Unichem road with a R.O.W of 18mts.
xvi. From Cipla Panacea to Chakkan via Malpur with a R.O.W of 18mts.
xvii. From Baddi - Sai road to Chakkan via Malpur with a R.O.W of 18mts.
xviii. From Annpurna to Thana via Morepen with a R.O.W of 18mts.
xix. Kishanpura - Gurumajra - Thana road with a R.O.W of 18mts.

Map 11.4.1.1 Hierarchy of Roads in BBN Special area



xx. Manpura - Dhela - Dabni road with a R.O.W of 18mts

xxi. Khruni - Lodhimajra - Dabni road with a R.O.W of 18mts

xxii. Kishanpura - Ropar road via Handa Kundi road with a R.O.W of 18mts

xxiii. Khera - Rajpura road with a R.O.W of 18mts

xxiv. From Peersthan to Khokhra chowk via upper Khera road with a R.O.W of 18mts

xxv. Chowkiwala - Sallewal to NH 21A via upper Khera road with a R.O.W of 18mts

xxvi. Gol Jamala to NH 21A via Aduwal Janderi road with a R.O.W of 18mts

xxvii. From NH 21 A to Ramshahar road via Nangal uperla road with a R.O.W of 18mts

xxviii. From Panjehra to Bharatgarh via Navagram road with a R.O.W of 18mts

xxix. Baruna - Karsoli - Kiratpur road with a R.O.W of 18mts

xxx. Baruna - Bunga via Gharati road with a R.O.W of 18mts

The required land for road widening or new roads is recommended to be acquired by the authority after compensating to the land owners for the land area acquired following a suitable mechanism.

11.4.2. Parking facilities:

Parking facilites for buses and trucks are also proposed to be planned as per requirement.

11.4.3 Bus stands.

BBN Special area has so far not even single organized Inter Bus Stand space. HRTC and private operator buses are stand to be any unorganized area on major schedule roads due lack of such urban facilities.Keeping in this view, suitable locations are as per UDPFI guidelines has been proposed at Nalagah opposite to the HRTC workshop on Nalagarh Ropar road and at Baddi on Suncity bye road near SunCity housing apartment at Judi Khurd. A newly organized transit Bus Stop with capacity 10 buses of has been constructed on National High way-21A at Baddi opposite to Sagar Ratana restuarant

11.4.4 Truck Termials

Truck parking or Transportnagar are proposed at :-

i) Proposed Transport Nagar with capacity of 100 truck at Sandoli Nallah

ii) Bagheri.

iii) Manjholi

iv) At the junction of Jharmajri road with Baddi Barotiwale road.

v) Baddi Sheetalpur near Container Depot

vi) At Souri.

vii) At Khera.

viii) At Jagatkhera.

A transport hub is a highly specialized facility, designed for a specific function and operating plan in terms of the service standards it must meet, the area it serves and the volumes to be handled. Three transport hub are proposed in the region. two transport hubs are proposed at southern and northern tip of the region and a third transport hub is proposed along the western tip of SH-16 in the region. The major objectives are:

- To organize office and godown space of transport companies
- To provide for expansion of companies
- To reduce parking, loading/unloading instances in CBD
- To locate the facilities for vehicle repairs, servicing, rest places, shops, etc.
- To cater to intercity movements destined to operator's godown and provide for idle parking for trucks waiting for return load.
- To function as a rest and halting place for through traffic.

11.5 Proposed Open Space Network

Open space also features as a major component, formed mostly due to the green buffer areas around natural drainage ways. This will result in an integrated open space network that would include the commercial green, the institutional belt and the green around the natural drainage ways. This green spine can be integrated with a pedestrian pathway as well as public transportation facilities. Certain parcels of land out of these can be developed as commercial green spines which will be a dynamic and active belt complemented with surrounding land development. An integrated green and open space network will simultaneously offer an aesthetically pleasing built environment for the residents of this area.

11.6 Proposed Central Business Disrict

The proposed 'Central Business Disctrict (CBD)' is recommended to be developed after the consensus with the majority of land owners is arrived on the issue of land acqistion. However, till such time the land may be contintued be used for agriclututral purposes.

CHAPTER 12: PRELIMINARY INFRASTRUCTURE DEMAND

This chapter deals with the various utilities and infrastructure requirements including water supply, sewerage system, storm water drainage, power demand, etc. At this stage of the project, only preliminary estimates are given, which will later be refined and detailed out in the subsequent stages of the sector and annual plan.

12.1 Water Supply

An urban water supply system should be able to deliver adequate quantity of water with reliable quality. Presently, BBN Area has both quantity and quality related issues. The area depends on piped water supply, tube wells and bore wells for its water supply. The Irrigation & Public Health Department is in charge of providing and maintaining water supply and sewerage system within municipal limits. Till date there are about 156 water supply schemes in the region, of which 51 schemes cater to the need of water in BBN Special Area. At present these 51 water supply schemes are serving 84386 population. There are a total of 1683 public taps and 10738 private taps being served by these schemes.

An accurate and detailed water supply distribution system can be designed after the following information is available.

- Detailed survey of levels of the area/zones/sectors.
- The Urban Centres and their individual water requirements.
- Detailed internal layout of some sectors.
- Internal road networks inside the sectors.

These shall be available at the next stage of the Plan Preparation, at which time a detailed water supply distribution system shall be proposed.

12.2 Present and Projected Population:

The population figures considered for this project indicate the proposed land-use pattern and water consumption pattern for activities resulting out of proposed land use. The population as per census 2001 of this area is having 1,44,564 persons. The projected immigration for the year 2035 has been estimated at 3,11,961. The total population including immigration and growth of the village settlements is estimated at 9,73,894 persons.

12.3 Design period

Water supply projects may be designed to meet the requirements over a thirty five year period after their completion. The time lag between design and completion of the project should also be taken into account; this should not exceed a duration ranging from two years to five years depending upon the size of the project. Table 12.1 provides details of design periods for different water supply components.

12.4. Water Supply Norms

Water demand for any area depends upon on the land use pattern of the area and type of living standards of the population residing in the area. The establishment of minimum quality standards for public water supply is of fundamental importance in achieving the objective of Water Works Management. The objective of Water Works Management is ensuring that the water supplied is free from pathogenic organisms, clear, palatable and free from undesirable taste and odour, of reasonable temperature, neither corrosive nor scale forming and free from minerals which could produce undesirable physiological effects.

Table 1.61: Design Period: Water Supply

Sr. No.	Items	Design Period (in years)
1	Storage by dams	50
2	Infiltration works	30
3	Pumping (i) Pump house (ii) Electric motors and pumps	30-15
4	Water Treatment Units	15
5	Pipe connection to several treatment units and other small appurtenances	30
6	Raw water and water conveying mains	30
7	Clear water reservoirs at the head works, balancing tanks and service reservoirs	15
8	Distribution System	30

Source: CPHEEO 1999

12.5 Basic Needs

Piped water supplies for communities should provide adequately for the following purposes/ requirements as applicable:

- Domestic needs such as drinking, cooking, bathing, washing, flushing of toilets, gardening and individual air conditioning
- Institutional needs
- Public purposes such as watering of public parks and other landscaped areas
- Industrial and commercial uses
- Fire fighting
- Minimum permissible Unaccounted for water (UFW)

12.6 Institutional Needs

The water requirements for institutions(individual) such as offices, factories, schools, hotels, restaurants, hospitals, railway station, airports and cinema halls and theatres need to be provided in addition to the domestic provisions, where required, if they are of considerable magnitude and not covered in the provisions already made.

12.7 Industrial Needs

While the per capita rates of supply recommended will ordinarily include the requirement of small industries (other than factories) distributed within a town, separate provisions would be required to be included for meeting the demands likely to be made by specific industries located within the urban areas. The forecast of this demand would be based on the nature and magnitude of each such industry and also on the quantity of water required per unit of production.

12.8 Fire Fighting Demand

In designing water supply schemes, it is usual to provide for fire fighting demand as a coincident draft on the distribution system along with the normal water supply to the consumers as assumed. A provision in kilolitres per day based on the formula of 100 under root p where, p = population in thousands can be adopted for communities larger than 50,000. One third of the fire-fighting requirements should desirably form part of the service storage. The balance requirement can be distributed in several static tanks at strategic locations/points. These static tanks may be filled from the nearby water sources (if available) such as ponds, streams or canals by water tankers wherever feasible.

12.9 Estimated Water Requirement for BBN Area (318.74 sq km)

12.9.1 Baddi – Barotiwala

Baddi Lift Water Supply Scheme was completed in 1995-96 and covers two villages. A total of 3270 population is being served under this scheme. Barotiwala LWSS covers 4 villages. It serves a total of 2986 population.

12.9.2 Nalagarh

Nalagarh Lift Water Supply Scheme covers 3 villages. It is serving the present 7426 population.

12.9.3 Rural Area

The rural area referred to in the subsequent tables covers the 229 villages in the BBN Area apart from Baddi Nagar Panchayat and the Nalagarh Municipal Corporation. Based on the present scenario, as per the projected population for the year 2035 the following estimates have been made for future water demand. The following table gives the water demand for Baddi- Barotiwala region, Nalagarh region and Rural areas. Water requirement in rural areas has been worked and the same has shown in table 1.64c The subsequent part gives an overview of the total water demand for 2035 in the BBN Area, (the calculation include both Baddi, Nalagarh and the Rural areas):

Table 1.62 : Projected Water Demand for 2035 – Nalagarh

S.no.	Area of use	Nalagarh					
		2015		2025		2035	
		Water Demand (inltrs)	Water Demand (in MLD)	Water Demand (inltrs)	Water Demand (in MLD)	Water Demand (inltrs)	Water Demand (in MLD)
1	Domestic Demand	8646783	8.65	20727385	20.73	47875759	47.88
	visitor	960753.717	1.0	2303042.784	2.3	5319528.732	5.3
2	Commercial + Offices + Institutional	652148	0.7	1243849	1.2	2083934	2.1
	visitor-tertiary sector	0	0.00	248770	0.25	520983	0.52
3	Industrial demand	40000000	40	40000000	40	40000000	40
4	Open spaces	270	0.00	360	0.000	612	0.000
5	Fire fighting demands	24009	0.02	37173	0.04	56495	0.06
	TOTAL	**50402537**	**50**	**64809350**	**65**	**96378296**	**96**

Table 1.63: Projected Water Demand for 2035

S.no.	Area of use	Baddi					
		2015		2025		2035	
		Water Demand (in ltrs)	Water Demand (in MLD)	Water Demand (in ltrs)	Water Demand (in MLD)	Water Demand (in ltrs)	Water Demand (in MLD)
1	Domestic Demand	24325427	24.33	42526251	43	62871512	63
	visitor	2702825	2.70	4725139	4.7	6985723.519	7.0
2	Commercial+ Offices + Institutional	2229294	2.23	4639018	4.64	8564263	8.6
	visitor-secondary sector	177859	0.18	248770	0.25	223279	0.22
	visitor-tertiary sector	714465	0.71	1527826	1.53	2709222	2.71
3	Industrial demand	46000000	46.00	46000000	46.00	46000000	46.00
4	Open spaces	0.000	20.25	123.3	0.000	207.99	0.000
5	Fire fighting demands	40270	0.04	53246	0.053	64741	0.06
	TOTAL	**76190140**	**76.19**	**99720372**	**99.72**	**127418948**	**127.42**
S.no.	**Area of use**	**Baddi**					
		2015		**2025**		**2035**	
		Water Demand (in ltrs)	**Water Demand (in MLD)**	**Water Demand (in ltrs)**	**Water Demand (in MLD)**	**Water Demand (in ltrs)**	**Water Demand (in MLD)**
1	Domestic Demand	24325427	24.33	42526251	43	62871512	63
	visitor	2702825	2.70	4725139	4.7	6985723.519	7.0
2	Commercial+ Offices + Institutional	2229294	2.23	4639018	4.64	8564263	8.6
	visitor-secondary sector	177859	0.18	248770	0.25	223279	0.22
	visitor-tertiary sector	714465	0.71	1527826	1.53	2709222	2.71
3	Industrial demand	46000000	46.00	46000000	46.00	46000000	46.00
4	Open spaces	0.000	20.25	123.3	0.000	207.99	0.000
5	Fire fighting demands	40270	0.04	53246	0.053	64741	0.06
	TOTAL	**76190140**	**76.19**	**99720372**	**99.72**	**127418948**	**127.42**

Table 1.64 C: Projected Water Demand for 2035 - Rural Areas (229 villages in BBN Area

S. no.	Area of use	Rural					
		2015		2025		2035	
		Water Demand (inltrs)	Water Demand (in MLD)	Water Demand (inltrs)	Water Demand (in MLD)	Water Demand (inltrs)	Water Demand (in MLD)
1	Domestic Demand	9336784	9.34	12378842	12.38	16490505	16.49
	visitor	1111521.911	1.1	1473671.610	1.5	1963155.405	2.0
2	Commercial + Offices + Institutional	85809	0.1	130931	0.1	137101	0.1
	visitor-tertiary sector	15602	0.02	26186	0.03	39172	0.04
3	Industrial demand	34715000	34.72	65240000	65.24	144230000	144.23
4	Open spaces	126	0.000	297	0.000	648	0.000648
5	Fire fighting demands	36522	0.04	42052	0.04	48536	0.05
	TOTAL	**45316966**	**45**	**79318167**	**79**	**162948290**	**163**

Source: As per CEPT PLU proposal

Table 1.65: Projected Water Demand for 2035- BBN Area

S.no.	Area of use	2015		2025		2035	
		Water Demand (inltrs)	**Water Demand (in MLD)**	**Water Demand (inltrs)**	**Water Demand (in MLD)**	**Water Demand (inltrs)**	**Water Demand (in MLD)**
1	Domestic Demand	42308994.56	42.31	75632477.42	75.63	127237775.68	127.24
	visitor	4775100.9	4.8	8501853.4	8.50	14268407.7	14.3
2	Commercial+ Offices + Institutional	2967250.98	2.97	6013798.17	6.01	10785297.84	10.79
	visitor-secondary sector	312032.6	0.3	523726.0	0.52	783433.8	0.8
	visitor-tertiary sector	730066.79	0.73	1802781.88	1.55	3269376.86	3.27
3	Industrial demand	120715000.0	120.7	151240000.0	151.24	230230000.0	230.2
4	Open spaces	396.00	20.25	780.30	0.00	1467.99	0.00
5	Fire fighting demands	100801.3	0.1	132470.8	0.13	169773.0	0.2
	TOTAL	**171909643.07**	**192.16**	**243847887.95**	**243.60**	**386745532.86**	**386.75**

Thus total Water Demand projected for the year 2035 = **386.75 MLD.**

12.10. Storage

Normal one day storage is proposed for the water supply scheme and as the storage of Fire Demand is a provision and not a supply made on a day-to-day basis, provision for this quantity is kept in mind while planning the system. The total storage capacity should be the total water demand for one day, excluding the fire fighting and other demands.

Thus the total capacity for the year 2035 is proposed to be **127.07 MLD**. Generally the required storage is divided in two parts – elevated service reservoir, and underground tanks. The underground storage accounts for two-thirds of the storage, while the elevated storage accounts for the balance one-third requirement.

12.11. Sewerage and Sanitation

The objective of a public waste water collection and disposal system is to ensure that sewage or excreta and sullage discharged from communities is properly collected, transported, treated to the required degree and finally disposed off without causing any health or environmental problems. Waste water disposal systems can be either the on-site type or the kind where water-borne wastes are disposed off-site into a water body or on land. To keep overall costs down, most urban systems today are planned as an optimum mix of the two types depending on various factors. Both the towns i.e. Baddi and Nalagarh, under study are not well equipped with sanitation facilities. There is no underground sewerage system in the towns. Other areas falling outside the industrial area has no sewerage system. But in rest of the areas most of the residential units have individual septic tanks.

12.12. Design Period/Year

The length of time up to which the capacity of a sewer will be adequate is referred to as the design period. Sewerage projects may be designed normally to meet the requirements over a thirty year period after their completion. The period between design and completion should also be taken into account which should be between three to six years, depending on the type and size of the project. The project components may be designed to meet the periods mentioned in table 12.5.

12.13. Estimated Sewage Collection

The total sewerage flow is generally 80% of the total water demand with 5% of this as infiltration. The sewerage flows have been calculated on this basis. While planning for the proposed sewerage system, consideration is given to the natural drainage pattern. The sewerage system is planned in such a way that there will be minimum pumping involved in collection and conveyance of sewage. The total water requirement for BBN Area, including domestic, commercial, institutional and all other requirements adds up to 386.75 MLD. Assuming that 80% of this water requirement gets converted into sewage, the total sewage generated in BBN Area in the year 2035 is = **309.40 MLD**.

This is the total sewage generated in the entire region. For treatment purposes, the region will be later divided into zones of various populations and land uses. The sewage within each zone shall be calculated and an appropriate treatment plant suggested. The sewage may be treated in decentralized waste water treatment plants

or common effluent treatment plants, depending on the quantum of waste and the overall sewerage system. This shall be detailed out in the next phase of the Project. However, following are some salient features of the two different sewage treatment methods.

Table 1.66: Design Period: Sewarage Projects

S.NO.	COMPONENT	RECOMMENDED DESIGN PERIOD (IN YEARS)	CLARIFICATION
1	Collection System i.e. Server Network	30	The system should be designed for the prospective population of 30 years as its replacement is not possible during its use.
2	Pumping Stations (Civil Works)	30	Duplicating machinery within the pumping station would be easier/cost of civil works will be economical for full design period.
3	Pumping Machinery	15	Life of pumping machinery is generally 15 years.
4	Sewage Treatment Plant	30	The construction may be in a phased manner as initially the flows may not reach the designed levels and it will be uneconomical to build the full capacity plant initially.
5	Effluent Disposal and Utilization	30	Provision of design capacities in the initial stages itself is economical.

12.14 Decentralized Waste Water Treatment System (DEWATS)

This is applicable for smaller population areas, ideally less than 1000 people. DEWATS application is based on low cost of operation and maintenance. DEWATS is applied in smaller areas where a conventional sewage system can prove less efficient and expensive. It is a convenient treatment for domestic and institutional waste with low costs of operation and maintenance. The salient features of a DEWATS include:

- Fulfilment of National Standard of WWTP Effluent
- 90% contaminant removal
- Able to treat wastewater up to 1000 m3/day
- Tolerant to inflow and loading fluctuation

- Low maintenance and long interval of de-sludging
- Low operation cost
- Efficient

12.15 DEWATS Modules and Technology

- Bio-Digester (to treat high organics concentration wastewater, energy source to produce biogas for lighting and cooking)
- Septic Tank (system with two simple compartments, sludge stabilizing)
- Anaerobic Baffle Reactor (wastewater flows through activated sludge and contaminants are removed by contact with microorganism, BOD/COD removal to 90%, integrated sedimentation to avoid solid particles get into baffles)
- Anaerobic Filter (wastewater flows to layer of filter media and reach 90% of contaminant removal, no space consuming due to underground construction)
- Horizontal Sand Filter (aerobic treatment for pre-treated wastewater, able to remove phosphate to 80%, reduce pathogen bacteria effectively)
- Aerobic Pond (advance treatment to reduce organic loading and increase oxygen supply, easy in construction) Refer Figure above.

12.16 Conventional Sewage Treatment Plant (STP)

The problem of conventional sewerage systems is the mixing of the food and water cycles. Central sewerage systems not only consume high amount of freshwater but also dilute nutrients (phosphorus, nitrogen) and organic substances to such an extent that only a small part can be reclaimed for agricultural use. The nutrients are washed away with the purified wastewater and are emitted to rivers where they are extremely harmful (eutrophication). In turn, more nutrients have to be produced for agriculture, causing depletion of fossil resources and high energy demand.

The purpose of sustainable sanitation systems is the closing of the water and nutrient cycles, taking into account that the main task of sanitation to assure highest hygienic standards in a cost- effective, environmental sustainable way, saving both water and energy and keeping soils fertile. This can be achieved by separating different qualities of waste from human settlements: Blackwater (toilet wastewater), greywater (washing, cleaning), stormwater runoff, biodegradable and non- biodegradable waste.

Such sanitation reduces the freshwater consumption considerably and produces fertilizer for agriculture instead of waste. Maximum recycling of nutrients is the basis of sustainable food production and sanitation systems. Advanced systems with source control can avoid many problems of the conventional end-of-pipe technology by respecting different qualities of wastewater and waste and by treating them for reuse.

12.17 Storm Water Drainage

The purpose of providing storm water drains is to carry the rainfall (storm) runoff from the terraces, paved courtyards, footpaths, roads etc. in the developed area, such that flooding does not occur. The estimation of such runoff reaching the storm water drains therefore is dependent on the intensity and duration of rainfall, characteristics of the drainage area and time required for such flow to reach the storm water drains. Storm water drains are not designed for the peak flow of rare occurrence of rainfall such as once in 20 years or more; but it is necessary to provide sufficient capacity to avoid frequent flooding. At present, storm water drainage is through open drains running along the major roads in the city.

12.18 Estimation of Storm water collection

Storm water can be calculated based on the following equation:

50% of catchment area x average annual rainfall x runoff factor

318.74sq km x 0.5 x 10^6 x 1.05 x .6

100403100 Cum/year

275.08 MLD

New covered storm water channels are proposed all along the major and minor roads (on both sides of the road) and are designed as per the natural slope of the area. Catch pits, outlet structures are also proposed at various locations to collect and discharge the storm water in the drainage system. As per the requirements, suitable sized drains have to be constructed to take the natural drainage flow of the precipitation from the entire catchment area. The cross-section of the drain should be V-shaped with the depth of at least 0.75 mt for the minor channel and 2 meters for the major channels. The same shall be lined with concrete lining. The natural slope and topography has to be maintained to design the storm water drainage channels.

12.19 Solid Waste Management (SWM) System

The concept of disposing solid waste might not be new but some percentage of general masses is still oblivious to the processes required. Thus, the concept of Solid Waste Management (SWM) and its proper disposal needs to be introduced and cultivated amongst them with appropriate strategy. This is important as it would require some change in the daily lifestyle and habits of the people. In this respect, it becomes crucial for the administration to make the masses aware of the change in their daily practices. Rather than throwing the waste just like that, the people will need to be habituated to collect the waste in segregated form (organic and inorganic) and dispose it accordingly to the waste collection vehicle when it comes to their

house. It is suggested that an organized awareness campaign be conducted to explain the process explicitly and convince the people to willingly contribute their part for a cleaner environment.

12.20 Awareness Campaign

The awareness campaign can be executed with various steps:

Step1: Posters can be put in commercial areas, educational institutes, public and religious buildings. These posters will explain the need for Solid Waste Management and how to get a cleaner environment. The posters will be illustrated with the steps that need to be taken and the "dos" and "don'ts" for a healthier environment.

Step 2: These can be given to the youth/ self help groups/ school teachers/ or other respected professions like doctors, to be distributed to each household.

Step 3: Introduction of at least one week long "Clean Region" campaign.

The awareness campaign has to be complemented with proper infrastructure for a segregation-at-source system for waste collection.

12.21 Collection

A door to door collection system is proposed to collect the household waste. This will ensure cleaner streets, change of waste disposal habits and thus a cleaner and better living environment. The waste collected from households, commercial establishments and institutions is proposed to be disposed directly to the secondary disposal sites/containers placed at critical locations for wet waste and/ or dry waste. The sizes of these containers are decided as per the surplus quantity of waste.

12.22 Disposal system

The figure 12.1 below illustrates the waste disposal system. The wet and dry wastes are to be disposed separately. The wet or organic waste has various methods to be recycled to produce fuel, manure, biogas etc. It is observed that waste generated is not very high in quantity and thus putting up a bio-gas plant is viable in such a situation. Thus it is proposed that the wet/ organic waste be disposed off to a vermin-composting site, which enables the local people to produce some amount of manure that can be used in their fields or sold in the market (as per their requirement). The refuse from the composting is to be transported to the land-fill site. The dry/ inorganic waste includes some recyclable/ reusable stuff like plastic, metal cans, bottles, paper and paper products, etc. which should be collected by scrap dealers/ waste recycling plants. The other non-recyclable dry waste should be transported at the disposal site identified outside the region.

12.23 Suggested Treatments of Waste

The waste will be treated in the following ways, as per the waste type:

1. Recylcing of reusable dry waste
2. Composting
3. Incineration: for toxic and hospital waste
4. Landfill Site: for the remaining waste

12.23.1 Estimate of Solid Waste Generated

It is calculated as number of households/ population in the area.

One Person generates waste of about 500 gms per day.

Therefore waste generated in 2035 = **487 MT**

Segregate waste: 60% Wet and 40% Dry

Wet waste = 292.2 MT, Dry Waste = 194.8 MT

1 truck can take upto 2500 kg (2.5 Metric Tonne) waste

Thus, trips of truck = 487000 / 2500 = **195 trips**

A total of 195 truck trips are required per day to transport the total waste.

Table 1.67: Projected Solid Waste Generation

BADDI	**2015**	**2025**	**2035**
Total Population	162170	283508	419143
Solid waste generated per day (gms)	81084757	141754169	209571706
kg	81085	141754	209572
MT	81.08	141.75	209.57
DRY WASTE (MT)	**32.43**	**56.70**	**83.83**
WET WASTE (MT)	**48.65**	**85.05**	**125.74**
Tractor capacity (in kg)	2500	2500	2500
total tractor trips	32	57	84
Nalagarh	**2015**	**2025**	**2035**
Total Population	57645	138183	319172
Solid waste generated per day (gms)	28822612	69091284	159585862
MT	28.82	69.09	159.59
DRY WASTE (MT)	**11.53**	**27.64**	**63.83**
WET WASTE (MT)	**17.29**	**41.45**	**95.75**
Tractor capacity (in kg)	2500	2500	2500

total tractor trips	12	28	64
Rural	**2015**	**2025**	**2035**
Total Population	133383	176841	235579
Solid waste generated per day (gms)	66691315	88420297	117789324
kg	66691	88420	117789
MT	66.69	88.42	117.79
DRY WASTE (MT)	**26.68**	**35.37**	**47.12**
WET WASTE (MT)	**40.01**	**53.05**	**70.67**
Tractor capacity (in kg)	2500	2500	2500
total tractor trips	27	35	47
TOTAL	**177**	**299**	**487**

12.23.2 Proposals for solid waste disposal site

Nagar Panchayat Baddi is providing door-to-door domestic waste collection facility to the area falling under Nagar Panchayat. A solid waste disposal site was acquired at Malpur village for disposal of solid waste, but due to health hazards, an alternative this site is to be proposed for the disposal of the wastes generated. Waste is also dumped in the open at various locations in Balad Nadi and at confluence point of Sirsa river. This calls for an organized and systematic solid waste disposal system.

12.24 Alternative Water Harvesting System

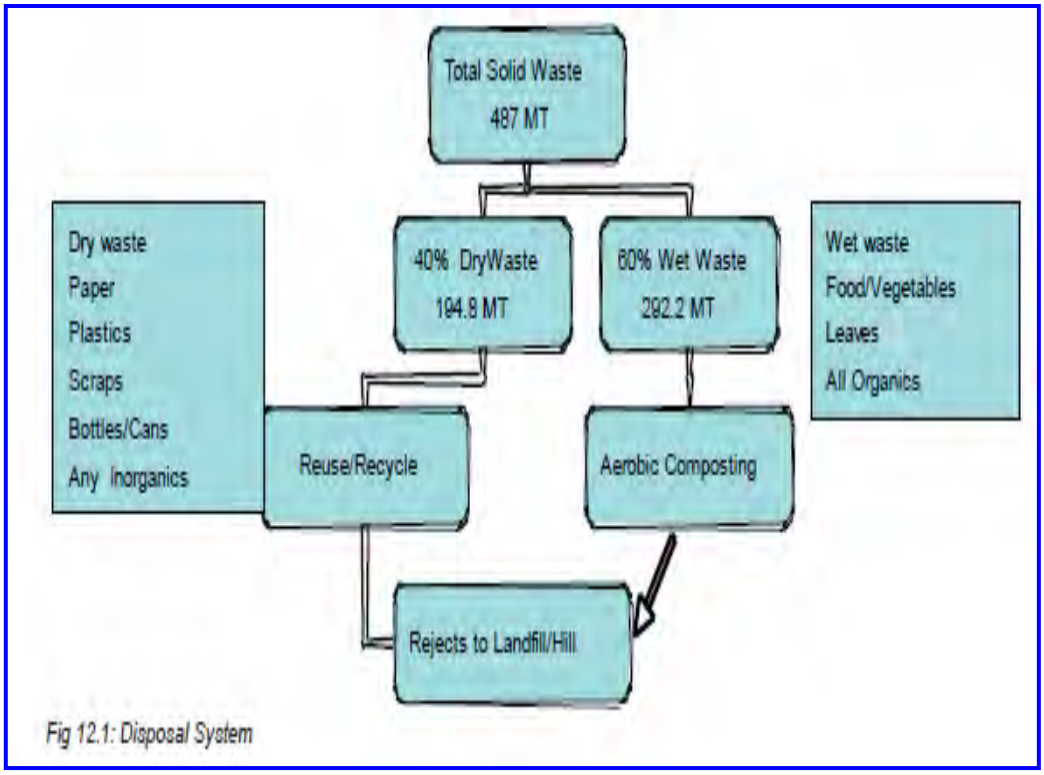


Fig 12.1: Disposal System

12.25. Rain Water Harvesting

The term "Water harvesting" can be been explained as collection/storage of rainwater and other activities aimed at harvesting surface and groundwater, prevention of losses through evaporation/seepage and all other hydrological studies/ engineering interventions, aimed at conservation and efficient utilization of limited water endowment of physiographic unit such as watershed.

Fig 12.62 Rain water harvesting tank - Underground

Need for rain water harvesting

1. Short spells of high intensity/ heavy runoff/ low ground water recharging.
2. Acute shortage of drinking water.
3. Importance to tapping of rainwater by harvesting it for recharging or direct use.

12.25.1 Components of Rain Water Harvesting

1. Catchment: surface (paved/ unpaved) contributing water to a system by directly receiving rainfall; eg. Terrace, courtyard, lawn or open ground.
2. Conduits: pipelines or drains (PVC/ Asbestos/ GI etc) carrying rainwater from catchment to harvesting system.
3. Filters: tank with different layers of stand/ pebbles for filtering water before reaching tank.

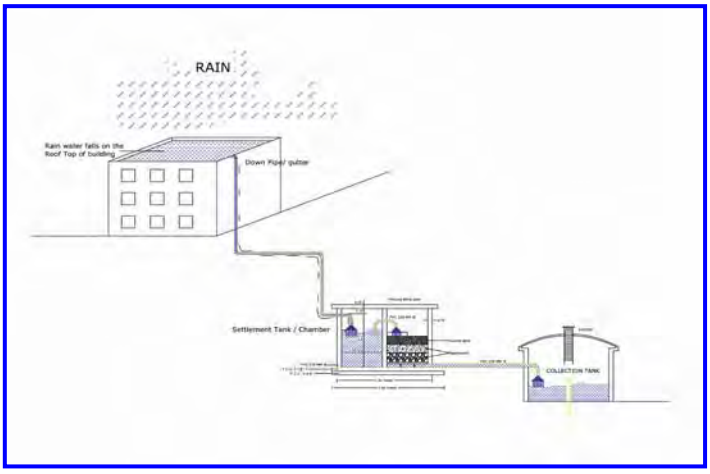


Fig 12.63 Schematic Diagram of RWH

4. Storage Facility: Commonly used storage containers (RCC/ Masonry/ plastic etc) maintenance measures (cleaning/ disinfection etc) required for ensuring quality of water.
5. Recharge Facility: rainwater charged directly to aquifers through bore well, dug wells, recharge trenches and recharge pits.

12.25.2How much water can be harvested

The total amount of water that is received in the form of rainfall over an area is called rainwater endowment of that area. Out of this, the amount that can be effectively harvested is called water harvesting potential.

Water harvesting potential = Rainfall (mm) x collection efficiency.

For example,

Clear terrace area of plot = 80 sq m

Rainfall = 700 mm (0.7 m)

Volume of rainfall = 80 x 0.7 = 56 cu m i.e. 56,000 lit

The above cited water harvesting options can be integrated within the Development Plan and proposed as part of the building bye-laws of BBN Special area. Govt of HP has made mandatory construction of Rain Water Sytem for all kind of uses.

CHAPTER 13: INSTITUTIONAL FRAMEWORK AND LAND MANAGEMENT STRATEGIES

13.1 BACKGROUND

The area under the delineated BBN Special area is governed by BBNDA (Baddi Barotiwala Nalagarh Development Authority) a premier development authority constituted under Section 66 of Himachal Pradesh Town and Country Planning Act, 1977 as a Special Area Development Authority (SADA). As a SADA, BBNDA performs obligatory and discretionary functions as incorporated in the HPTCP Act 1977.

In this context, the various Institutional Frameworks availed under HPTCPAct, 1977, HP Municipal Council Act, 1994, HP Panchayat Raj Act, 1994 and 74th Consitutional Amendment Act, 1992 that can be explored for the governance of the delineated Region are presented in this chapter. Also the Options of Land Management Strategies under HPTCPA, 1977 with pros and cons are assessed in this chapter.

13.2 Institutional Framework

As mentioned, BBNDA is established under HPTCPA, 1977 as a SADA. The relevant sections of the Act regarding the constitution, functions and powers of SADA are as under :

Special areas (Constitution)

66 (1) If any area , town or township is designated as a special area in the regional plan or if the State Government is otherwise satisfied that its expedient in the public interest that any area, town or township should be developed as a special area it may, by notification designate the area as a special area, which shall be know by such name as may be specified therein.

(2) Such notification shall define the limits of special area.

(3) The state government may by notification:

- Alter the limits of special area so as to include therein or exclude there from such are as may be specified in the notification.
- Declare that the special area shall cease to be so.

(4) Notwithstanding anything contained in the Himachal Pradesh **municipal corporation,act 1994, the himachal Pradesh municipal act,1994,and the Himachal Pradesh panchayat raj act,1994; the municipal corporation, municipal council, nagar panchayat or a gram anchayat, as the case may be, shall, in relation to the special area and as from the date the special area developmentauthority undertakes the functions under clause v or clause vi of section 70 cease to exercise the powers and perform the functions and duties which the special area development authority is competent to exercise and perform under this act.

Special Areas Development Authority (Functions)

70 The function of the special area development authority shall be :

i. To prepare if required to do so, the development plan for the special area

ii. To implement the development plan after its approval by the state government

iii. For the purpose of implementation of the plan, to acqurire, hold, develop, manage and dispose of land and other property.

iv. To carry out construction activity and to provide such utilities and amenities as water, electricity, drainage and the like

v. Provide municipal services as specified in the himachal Pradesh municipal act 1994

vi. To provide for the municipal management of the special area in the same manner as is provided in the Himachal Pradesh Municipal Act, 1994.

vii. To perform all such functions with regard to the special area as the state government may, from time to time direct.

Provided that the functions specified in clauses v and vi shall not be performed unless so required by the state government.

Special areas Development Authority (Powers)

71. The special area development authority shall :

a) For the purpose of acquisition of land, exercise the powers and follow the procedure which a town and country development authority have to follow under this act.

b) For the purpose of planning, exercise the powers which the director has under this act, and

c) For this purpose the municipal administration shall have its own funds and receipts of that authority shall be credited thereto and all payment of that authority shall be made there from.

Presently, BBNDA has been assigned all the functions U/S 70 except (v) and (vi) pertaining to municipal management and services provision.

In this context, BBNDA will continue to function as a spatial Planning and Regulatory Authority in the two Municipal Council namely Baddi and Nalagarh. However, the Government of H.P. is required to be assigned more to BBNDA being a single development authority under HP TCP Act, 1977 for planned and regulated development of BBN Special area.

13.3 Land Management Strategies

For the purpose of mobilizing Land for public purposes the two prevalent models can be considered i.e Land Acquisition under Land Acquisition Act, 1894 or Land Reconstitution through Town Development Scheme U/S 52 of HPTCP Act, 1977.
The relevant sections of the HPTCPA, 1977 pertaining to preparation of TDS, public purpose of TDS, levying of Development Charges etc. are as under :

13.3.1 Preparation of town development scheme

52 (1) The Town and Country Development Authority may at any time declare its intention to prepare a town development scheme.
(2) Not later than thirty days from the date of such declaration of intention to make a scheme, the Town and Country Development Authority shall publish the declaration in the official gazette and in such other manner as may be prescribed.
(3) Not later than two years from the date of publication of the declaration under subsection2 the town and country development authority shall prepare a town development scheme in draft form and publish it in such form and manner as may be prescribed together with a notice inviting objections and suggestions from any person with respect to the said draft development scheme before such date as may be specified therein, such date not being earlier than thirty days from the date of publication of such notice.
(4) The Town and Country Development Authority shall consider all the objections and suggestions as may be received within the period specified in the notice under sub section 3 and shall, after giving a reasonable opportunity to such persons affected thereby as are desirous of being heard or after considering the report of the committee constituted under sub section 5, approve the draft scheme as published or make such modifications therein as it may deem fit.
(5) Where the town development scheme relates to reconstitution of plots, the Town and Country Development Authority shall notwithstanding anything contained in sub section 4, constitute a committee consisting of the *chief administrator of the said authority and two other members of whom one shall be representative of the Himachal Pradesh housing board and the other shall be an officer of the Public Works department not below the rank of an executive engineer nominated by the chief engineer, public works department for the purpose of hearing objections and suggestions received under sub section 3.

(6) The committee constituted under sub section 5 shall consider the objections and suggestions and give hearing to such persons as are desirous of being heard and shall submit its report to town and country development authority within such time as it may fix along with proposals to:

- Demarcate the reconstituted plots.
- Evaluate the value of the original and the constituted plots.
- Estimate and apportion the compensation to or contribute from the beneficiaries of the scheme on account of the reconstitution of the plot and reservation of portions for public purpose.

Provided that the contribution shall not exceed half the accrued increment value.

- Evaluate the reduction in value of any reconstituted plot and assess the amount payable therefore.

13.3.2 Lapse of town development scheme

56 If the Town and Country Development Authority fails to implement the town development scheme within a period of three years from the date of publication of the final scheme under section 52 it shall, on the expiration of the said period, lapse.

13.3.3 Public purpose of town development scheme

57 Land needed for the purpose of town development scheme shall be deemed to be a land needed for a public purpose within the meaning of the land acquisition act, 1984.

13.3.4 Development Charges

61 (1) Where as a result of the implementation of town development schemes there is in the opinion of the Town and Country Development Authority, an appreciation in the market values of lands adjacent to and affected by a scheme the Town and Country Development Authority may, in lieu for providing of the acquisition of such land levy development charges on owners of such land.

(2) The development charges shall be an amount equal to not less than one fourth and not more than one third of the difference between the value of the land on the date of publication of the intention to prepare a town development scheme and the date of completion of the scheme.

13.3.5 Mode of Levy

62 (1) On completion of the town development scheme, the Town and Country Development Authority shall by a notice in such form and published in such manner as may be prescribed, declare the fact of such completion and of its intention to levy development charges in the area covered by the scheme, calling upon owners of land liable to pay development charges to submit objection, if any, within such period which shall not be less than thirty days from the date of publication of the notice.

In this context, it is recommended as follows:

- The land under major roads (Arterial and Sub Arterial as notified in the Development Plan), nodal open spaces (CBD&Zonal level)and nodal amenities (CBD & Zonal level) be acquired with consensual approach.
- The other public realm i.e Minor Road Network, Nodal open spaces (Sector and Neighbourhood level) and Nodal Amenities (Sector and Neighbourhood level) as well land for EWS housing and BBNDA's Land Bank for Commercial Sale be mobilized through plot reconstitution under TDS in ratio, which is to be decided time to time.
- As an avenue of value capture of urban development for BBNDA, area under designated Industrial zones (whole or part) can be acquired, developed and disposed after in phased manner to generate resources for implementing the Plan.

13.4 Govt. Level institutional structure for BBN Special area.

The State Govt has constituted a development authority under the name and style of Baddi-Barotiwala- Nalagarh Development Authority (BBNDA). The State Government has created a governing body under the chairmanship of Hon'ble Chief Minister of GoHP vide Government Notification No. GAD-C-(F)-5-1/2006 dated 30th November, 2006 as below.

1.	**Chief Minister**	**-Chairman**
2.	Urban Development Minister	-Member
3.	Town & Country Planning Minister	-Member
4.	Industries Minister	-Member
5.	Chief Secretary	-Member
6.	Pr. Secretary/Secretary (GAD)	-Member
7.	Pr. Secretary/Secretary (TCP)	-Member
8.	Pr. Secretary/Secretary (PWD)	-Member
9.	Pr. Secretary/Secretary (Industries)	-Member

10.	Pr. Secretary/Secretary (Urban Dev.)	-Member
11.	Pr. Secretary/Secretary (Finance)	-Member
12.	Pr. Secretary/Secretary (I&PH)	-Member
13.	Chairman, HP State Electricity Board	-Member
14.	Director, Industries, H.P.	-Member
15.	Director, Town & Country Planning Department	-Member
16.	Managing Director, HPSIDC	-Member
17.	CEO-cum-Secretary, HIMUDA	-Member
18.	Member Secretary, HPEPCB	-Member
19.	Deputy Commissioner, Solan	-Member
20.	Superintendent of Police, Solan	-Member
21.	President, Nagar Panchayat, Baddi	-Member
22.	President, Municipal Council, Nalagar	-Member
23.	**Chief Executive Officer, BBNDA**	**-Member Secretary**
24.	Five (5) Non-Official Members from BBN Association.	

Apart from this State Govt has also constituted a committee under chairmanship of Chief Secretary to the GoHP vide the Government Notification No. GAD-B(A)1-3/2007 dated 4th August, 2007 for spatial planning and developmental works of BBNDA and take up various issues requiring intervention of State Govt. It shall also help in removal of bottlenecks between Govt Departments and BBNDA, clearance of important issues pending general body meeting of authority, review of progress of BBNDA. The committee comprising of following members.

1.	**Chief Secretary to the Govt. of HP**	**-Chairman**
2.	Addl. Chief Secretary (Inds.)	-Member
3.	Addl. Chief Secretary (MPP & Power)	-Member
4.	Pr. Secretary (PWD)	-Member
5.	Finance Commissioner (Rev.)	-Member
6.	Pr. Secretary (I&PH)	-Member
7.	Pr. Secretary (GAD)	-Member
8.	Secretary (Finance)	-Member
9.	Secretary (TCP)	-Member
10.	Director Industries	-Member

11.	Member Secretary (HPE&PCB)	-Member
12.	D.C. Solan	-Member
13.	**CEO, BBNDA**	**-Member Secretary.**

Being an important Special Area, the State Govt has constituted a local level committee under chairmanship of Chief Executive Officer,BBNDA for cooperation and coordination in development works vide Government Notification No. GAD-B(A)1-2/2007 dated 20th June, 2007. The committee comprising of the following members.

1.	**Chief Executive Officer, BBNDA**	**-Chairman**
2.	S.D.M. Nalagarh	-Member
3.	Dy. S.P., Nalagarh	-Member
4.	XEN, PWD, Nalagarh	-Member
5.	XEN, PWD, Kasauli	-Member
6.	XEN, National Highway, Solan	-Member
7.	XEN, IPH, Nalagarh	-Member
8.	XEN, HPSEB, Parwanoo	-Member
9.	XEN, HPSEB, Nalagarh	-Member
10.	XEN, HPSIDC at Baddi	-Member
11.	XEN, HIMUDA at Parwanoo	-Member
12.	D.F.O., Nalagarh	-Member
13.	XEN, HP Pollution Control Board	-Member
14.	Member Secretary, SWCA (Ind. Deptt.)	-Member
15.	E.O MC, Baddi	-Member
16.	E.O., M.C., Nalagarh	-Member
17.	2 Members of BBNIA to be nominated by State Govt.	-Member
18.	2 Local representatives to be nominated by State Govt.	-Member
19.	**Town & Country Palnner/**	**Member Secretary**

Besides, land owners, MC, UD Nagar Panchayat, other line Development, Authorities, Govt Deptts shall be responsible for creation of service land. However, overall control on implementation of proposals of development in terms of land use zoing and sub-division, regulation and over development of BBN Special area shall be vested with Chief

Executive Officer, BBNDA. In order to ensure co-coordination, monitoring and effective implementation of Development Plan-2025 aforsaid committee shall be responsible.

CHAPTER 14: ENVIRONMENTAL IMPACT

The Development Plan exercise has an important objective to propose the development on harmony with local environmental conditions. This shall ensure the reduction in pollution and enhancement of environmental quality in the area. In absence of such component the development will pose serious threats in term of delayed/restricted clearances, wastage of efforts to remediate rather avoid, un-attractiveness due to excessive pollution. This may defeat the basic purpose of whole exercise. The environmental management for BBN area has the following objectives:

I. Create an environmental information base for region,
II. Identify the broad environmental concerns for incorporation in plan implementation process,
III. Identify the environmentally sensitive and protection/conservation areas,
IV. Identify the environmentally degraded and polluted streches,
V. Identify the required environmental infrastructure and Services needed for region, and
VI. To ensure the preparation of a list of Industries that are not damaging natural environment in the region.

14.1 Environmental Information Base

The Environmental Information Base for area was prepared for all important components of physical environment including air, water and soil/land and as well as the related aspects such as landscape, natural hazards etc. As the environment is multi disciplinary subject and several sectors/ departments have significant role in creation of environmental information and contribution towards environmental enhancement. In BBN area, it is understood that information base on environmental aspects is weak and only few agencies such as HPEP&PCB, SWC and Dept. of Forest have some information on the related aspects, which is not sufficient for full assessment and recommendations. The present exercise if based on the information as provided by the concerned agencies as follows, which have been incorporated in making of Environmental Management Plan

a) Zoning Atlas for Siting of Industries Solan District (HP)
b) Industrial Estate Planning for Baddi-Nalagah Area
c) Industrial Siting Guidelines (Draft)
d) Criteria for Siting Industries and Identification of new Environmentally Acceptable Industrial Sites
e) Environmental Monitoring Data (Air and Water)
f) CSRTC, Chandigarh
g) Information sheet from Forest Division, Nalagarh

14.1.1 Physical Environment – Air

The air environment is a dynamic system incorporating various variations in climatic conditions. In order to assess the air quality, it is important to look into the climatic factors, polluting sources and the dispersion phenomenon prevailing locally.

14.1.2 Climatic Factors

Table : 1.68 Climate data

Type of Cilamte	Semi- Arid
Temperature	5-40° C
Avg Precipitation	1000 mm
Avg Humidity	75%
Wind Velocity	6.8 km/hr
Evaporation	6.2 mm/d
Solar Radiation	447.4 gm cal/cm2

Source: CWRTC, Chandigarh Report

The data on climatic condition for BBN region is not being monitored in comprehensive manner by any agency, thus the data as provided by CWRTC for Chandigarh, which is nearest available metrology station to concerned region has been presumed to be applicable for area. The annual average rainfall in region is 1000-1100 mm out of which more than 60% falls between June to Spetember.

14.1.3 Ambient Air Quality

The ambient air quality of an area represent the level of of the pollution existing. There is no Ambient Air quality-monitoring station located in BBN Region under NAAQS programme and nearest station is at Parwanoo. The compilation of ambient air near Baddi-Barotiwala area by HPSEP&PCB (Ref: Section 3.4.4) under Zoning Atlas (Solan) is only source providing the air quality data in region and in this AAQ was categorised as 'medium' air quality. Additionally, the data on daily average concentration at Baddi Station (categorized as Industrial) obtained from HPSEP&PCB. The information on monitored value of SPM, SO2 and NOx on daily average has been summarized below:

Fig 14.64 Air Pollution at Baddi

As indicated in Table 1.69 above the air quality status of the region, in comparision with national air quality standards, SO2 and NOx levels are well within the permissible limits, while the SPM levels are found to be highest during certain period. The monitored data do not provide the comprehensive information and thus to conclude on air quality is difficult except that the air quality is deteriorating fast due

Table 1.69: Ambient AIr Quality (2006-07) at Baddi Station

Sr. No.		Daily Avg Range SO_2 (µg/m3)	NS* (µg/m3)	Daily Avg Range NOX (µg/m3)	NS* (µg/m3)	Range SPM (µg/m3)	NS* (µg/m3)
1	May, 2006	2-6.8	80	4.5-21.4	80	289-971	360
2	June , 2006	2	80	4.5-14.88	80	-	360
3	July, 2006	-	80	-	80	-	360
4	August, 2006	2.0-5.17	80	9.7-19.45	80	-	360
5	September, 2006	2.0-6.23	80	11.07-17.06	80	-	360
6	October, 2006	2.0-5.9	80	12.2-24.0	80	-	360
7	November, 2006	2-5.61	80	13.8-21.54	80	-	360
8	December, 2006	2-6.2	80	13.9-18.7	80	-	360
9	Jan-07	2.0-6.0	80	9.8-19.3	80	-	360
Source: H.P State Pollution Control Board							
NS- National statandard ,CPCB*							

to increasing number of emmision sources such as industries, vehicles and low income colonies in the region.

14.1.4 Noise

The status of noise levels in the region are given in section 3.4.7 and generally found within permissible levels at the monitored location. This is concluded that major source of noise pollution in the region is vehicles and all those areas under heavy traffic are having high level of noise. The noise levels sharply drop to very low during night indicating the impact of industrial development during daytime.

The main identified sources of noise in the region are DG sets, engineering operation, traffic (movement and pressure horns) etc. Occasionally the loudspeaker installed at certain festive seasons, music at high level and firecrackers add-up to noise levels. Thus the noise high levels are expected to lead to hearing impairment and long term effects on human health.

14.1.5 Physical Environment – Water

A) Drainage and Watersheds

The area is drained through small nalla (creeks) namely Sitomajri, Housing board nalla, Ratta khad, into river Sirsa and other important drainage constitute of Gullarwala nala, Mallarhwala, Chikni khad and various smaller streams.

B) River Flows

The River Sirsa is a perennial river, while all other rivers/drains are non- perennial. These natural seasonal drains bring the runoff from the mountains into the region, where it gets spread quickly and thus lot of sediment get deposited along these drains. Also, the big boulders are carried down by these fast flowing water. These most of the nalas carry water only during the monsoons and during the lean period they are drains of industrial effluents from the adjacent industrial clusters. As per estimated the sirasa river has very low assimilative capacity about 0.068 m3/sec (2004). while it carried a significant quantity of waste water about 0.396 m3/sec from industries along with sewage. This may cause serious constraints on aquatic bio-divestity of river sirsa.

D) Surface Water Quality

The surface quality of the drains/ nalas and Sirsa River is being monitored by the HSPCB and monitored data is given in section Environmental Profile in Chapter 3. The suspended solids in Sandholi drain, total hardness, BOD in d/s Sandholi Drain are main issue due to industrial development in Baddi-Barotiwala Industrial area.

14.1.6 Groundwater

As river Sirsa is not carrying the water of drinking quality and has high variations in term of quantity during different seasonal, it use is not much reliable in quantity and quality. As the result the ground water use within the study area which was earlier for irrigation purposes now being extensively used for industrial, commercial and drinking purposes. There are more than 60 of bore wells along with various open dug wells indicating the widespread use of ground water. The ground water table depth has been observer to vary between 10-40 m. The soil is largely classified as clay-loan with sparse gravel and sandy loam with fractured rocks. The infiltration rate is high in the valley floor, as there are deposits of sand, silt, clay and alluvial carried from upper reaches. These places are generally good for ground water recharge. There is no record to indicate the ground water pollution in any part of the region.

14.1.7 Soils & Hydro-geomorphology

As most of the area falls under the intermone valley of Shiwalik hills, the soils are primarily of sand and loamy type. These soils are suitable for cultivation of cereals, fruits, vegetables and other cash crops.

14.2. Natural Environment

14.2.1 Flora:

Forests: The broad classification and distribution of forests in Districts is given in Chapter 3. The region has Nalagarh and Baddi ranges of forests spread in hilly part. The study region has protected and reserved forests primarily scattered throughout along northerner and southere hill ranges. There few patches of protected/reserved forest also along bharatgarh road, ropar road and near Panjera. The flora of region is classified in three categories namely, reserved/protected forest, dense forest and open forest. The forests in lower montane zone (i.e. upto 1000 m) are basically dry scrub forests and in middle reaches it is mixed decidous forest consisits of species of common names sucha s Baboo, Chil Oak, Deodar, Fi, spruce etc.Vegetation: Other than forests there are stretches of vegetation as scrubs and shrubs along most of the drains and streams and on the sand dunes in river mostly consists of chil, khair, kikar, mango, neem, shisham. The forest department has strong presence and working for conservation of forests and alos involved in palnation of trees on waste lands and vegetation felling is restricted. The forest department planting many medicinal plants in the above mentioned area including bheda, amla, arjan, aloevera, mentha. Apart from this there is also a proposal to develop 25 hectares of land per annum for eco tourism. There is no endangered floral specie in the region.

Fig 14.65 Insentive eco-fragile hill cutting in BBN area

Insentive eco-fragile hill cutting in BBN area

14.2.2 Fauna

The Solan district has several wildlife sanctuaries (Chail, Shilli, Darlaghat, Majathal eec.), but the study region do not have any sanctuary located within. There is no endangered faunal species in the study region. Main faunal species found in the region

are hare, fox, monkeys, chakor, Quil and jackals other that normal Indian species such as variety of birds, squirrels, etc.

C) Sensitive Areas: Following environmentally sensitive areas have been identified in the region:

a) Flood Prone Areas
b) GW Recharge Areas
c) Critically polluted area/ stretches

14.3 Environmental Assessment

The purpose of Environmental Assessment is to identify the environmentally polluted and degraded areas, in order to workout the appropriate management measures.

14.3.1 Air

A) Air Emission Inventory: In the BBN Region the Air pollution is expected from the industries, vehicle and domestic sources.

Industrial Emission: The Air pollutants of different nature are from industrial stacks, open incineration of waste, gaseous/ vaporous emissions from chemicals, fugitive emissions and from combustion of fuels in Boilers etc. The result of recent inventory of Air pollution potential industries done by HPSEP & PCB is given below:

Table 1.70: Inventory on Air Polluting Industries in BBN Area.

Area	No. of Industries under Air Act, 1981 (as on 15.09.2007)	No. of Industries with APS	Industries without APS (Boiler/ Fugitive emissions)	Main type of industries
Baddi-Brotowala	965	369	596	Steel casting, forging, sponge iron
Nalagarh	667	118	549	
Source: HPSPCB				

The HPSPCB's inventory of Air pollution potential industries show that Baddi–Barotiwala has 965 and Nalagrah has 667 industries under Air Act, 1981.

In Baddi Barotowala 369 industries have specific pollution control measures while rest 596 have small boilers aor fugitive emissions from non-point sources. The main air polluting industries are steel casting and forging units in Baddi or Barotiwala region. Similarly Nalagarh has

Air pollution industries which are more spread all over region that in Baddi-Brotowala, where they are located in more clustered manner. As recorded 5 units in Nalagarh using risk husk/ cal as boiler fuel have considerable pollution levels.

Further the stone crushers do add to pollution load significantly and Brick kilns of 42 number are also located in the region, which are effecting the air quality significantly.

Domestic: While most of the household in towns of region use LPG or coal as domestic fuel. The Villages population and the slums dwellers are mainly dependent on the fuels such as kerosene, coal, wood, agriculture waste/biomass etc. which has high potential of air pollution specially during the winters when temperature drops upto 25oC creating the inversion conditions.

14.3.2 Vehicular Pollution:

Due to increased Industrial activities the vehicular movement in the region have increased many fold in last few years. As per recent survey on one of road (Sai-Nlahgarh) by HSPCB show about 5721 vehicles (2811 light and 2910 heavy) ply in a day. As there were no reliable data on traffic in region, as attempt was made to capture the image of peak time traffic levels at various location (12 no.) as part of this study, the detail of which are given in chapter 5. However it is noted that peak hour traffic is in range of 350-1100 vehicles. The composition of traffic in term of light/passenger and heavy/good vehicles is 51% to 49%. The vehicular pollution is further get aggravated due to narrow carriage way (5-10m) available on most of the roads, while the RoW is in range of 8-18m. As estimated by HSPCB the air pollution contribution due to traffic on Sai-Nalagrh road is for SPM 11-744 µg/cum, SO2 0.6-5.7 µg/cum and NOx 8.3 – 19.5 µg/cum.

14.3.3 Other Sources:

During the visit it was also felt that the few of the drains which are carrying the sewage/ industrial wastewater are emitting the mal odor and gases. Also the unpaved roads in the region create the air borne dust due to movement of vehicles and thus add up to the air pollution.

14.3.4 Dispersion

The BBNA area is at foot hills and thus the funnel effect of air flow is expected, which is not in predominant wind direction. This situation generally created the calm condition in area and thus the dispersion of the pollutants are expected to be low. Further as area is bounded by hills on two sides i.e. north-east and south- west the air ventilation is expected to be low. This limits the air pollution assimilation capacity of the atmosphere and thus may pose limit on further encouraging the high air pollution industries.

14.3.5 Water

The following main sources have been identified in the region

Domestic:

- Due to lack of sewerage system and Sewage treatment plants the waste water from following domestic sources flows into the river Sirsa untreated.
- Residential areas from private dwelling units
- HIMUDA colonies
- Colonies (34 no. in Baddi-Barotiwala) developed by Private builders
- Colonies developed by industries units
- Slums/ open defecations

The pollution load on river Sirsa is already beyond its assimilative capacity. Only few Industrial colonies and private builder's colony have installed the STPs in Nalagarh area and those under construction have proposed to have their own STP.

Table 1.71: Inventory on Water Polluting Industries in BBN Area

Area	No. of Industries under Water Act, 1974 (as on 15.09.2007)	No. of Indutries with TPs	Industies without ETPs	Main type of industries
Baddi-Brotowala	985	173 (additional 43 under installation making total 216)	769 (only cooling water or sewage)	Textile, dyeing, pharma (bulk drug and formulation), chemicals formulation. Pulp & paper, pesticides
Nalagarh	667	124 (additional 61 under installation making total 185)		Textile dyeing, pharma (formulation), chemicals formulation. Distillery and engineering.
Total	1652	401	769	
Source: HPSPCB				

The ETPs installed are generally designed for primary and secondary treatment and only few are of tertiary level. The efficacy of ETP is not yet fully satisfactory.

The units having more than 150 worker are to install their own STP and so far 25 units in Baddi-Barotiwala and 48 in Nalagarh have constructed the STPs

The situation in Nalagarg is different as industrial spread is vast and sparse thus the discharges are in smaller quantity in each stream but in drain larger spread. The main river getting effected is Chikni Khad and ultimately leads to Sirsa river.

14.4 Emerging Environmental Concerns

Any development plan has an important objective of enhancement of environmental quality and thus various discussion with relevant stake holders have been carried out

time to time to understand environmental concerns and their role in environmental management framework. The list of such relevant stake holders and departments are as given below:

a) BBNDA
b) HPSEP & PCB
c) Forest Department
d) Agriculture Department
e) HP State Industrial Development Authority
f) HP Urban development Authority
g) Public Work Department
h) Ground Water Board
i) State water resource Department
j) Integrated Public Health Department
k) Municipal Council

The environmental issues were identified based on the discussion with some of the above stakeholders, filed observations and interaction with general public.

- Proper zoning for segregation of residential, commercial and industrial areas with buffers zones between the landuses.
- High expected gaseous emissions from industries may add-up to green house gases (Global issue) and thus higher open spaces with plantations of Neem to counter the effect.
- Clustering of Industries based on the type of water pollution expected and to installed the decentralized and specialized treatment in these local clusters.
- Facilitation for common waste-water management facilities along with proper collection and conveyance system
- Establishment of Sewage Treatment plants to treat the wastewater from Baddi , Barotiwala & Nalagarh towns as well as all future residential areas.
- Control of Pollution from Brick kilns
- Creation of stone crushing zones and shift all stone crushing units at those specified locations.
- Eco-Parks to conserve the existing important flora and fauna in region
- Incorporating water recycle and re-use concept
- Properly locating and design of landfill sites for disposal of Municipal and Industrial solid waste as per requirements of rules.

14.5 Environmentally Suitable Development

14.6 Contamination and Pollution Risk

14.6.1 Air Pollution:

The areas in and around Baddi carry the risk of air pollution due to industrial emissions, high dust/dirt due to heavy traffic movement and also may have noise pollution risk. It is important to note that the present industrial development is intermingled with residential areas to the extent that some of the industry and residential plots share the common wall or have same access road. The topography of area needs special consideration as few of the industries located in lower elevation have their stacks at the level of first floor of newly coming multistory residential areas.

14.6.2 Water Pollution:

The agriculture productivity, human health and aquatic life can be under risk of contamination from waste water being generated from residential or industrial areas if passed on untreated to natural water bodies. In past the incidence of fish diying have been come to the notice. The stretches of Sandoli nala, Housing Board and Sijo majri nalla are such identified streches.

14.7 Hazard Area

Following type of Hazards have been identified in the region, which needs special attention and detailed 'Disaster Management Plan needs to be developed in order to response to emergency situation in the region.

14.8. Natural Hazards:

14.8.1 Land slides:

The landslides within the study region is not noticed as a significant hazards. However, the middle and upper reaches in the hills in north-east and south west part of region landslides have been found. This may effect the water flowing into the region and also quality (turbidity) of water reaches in region. The sediments generated from loose soil of landslide material is carried to the region and such deposition have been observed along the Sirsa river, Chikni Khad, Kundlu ki Khar rivers.

14.8.2 Flood:

the areas south-west to NH 21 and low lying area falls in this category, where presently agriculture is prevalent land-use or their stretches are lying vacant under natural vegetation. These stretches already identified as flood prone areas and needs to be kept vacant.

14.8.3 Man-Made:

Industrial Hazards: The industrial development will always associated with risk of failure of technology, process conditions violation or leakages. Any such event may lead to accident, explosion, fire or toxic release. As industries use various chemicals of varying toxic, flammable, explosive, contaminant characteristics and It is a specialized task to evaluate and prepare a industrial disaster management plan.

14.8.4 Fire:

As the industrial and residential development is progressing the fires due to wood burning, Oil/Fuel storage, transport and usage areas, Electric short circuiting etc. may also increase.

14.8.5 Forest fire:

Although there is no incident in past of major forest fire due to natural reason as the vegetation do not become very dry during summer and temperature also generally do not rise above 45oC. However due to fast industrial and residential development, the possibilities of man-made fire leading to forest fire can not be ruled out. The forest stretches with human access needs to be guarded in this reference. Also the practice of clearing the grass by burning to be avoided.

14.9. Suitable Industries

i) Location: However the decision on location of Industries has to take into account several aspects including infrastructure development potential, availability of developable land, nearness to market/consumption centers, land value, environment etc.

Infrastructure Development potential: The areas relatively flat, along the main access roads have better suited for industrial development.

Environmental Suitability: The Environmental suitability analysis has been carried out as described in chapter 8. The region was evaluated in term of location of forests, water bodies (river/streams), soil/geomorphologic units, flood prone areas etc. Thus the various locations proposed in regional master pan already incorporates the environmental suitability of sites.

ii) Type: The decision on type of Industries has to take into account State thrust industries, scale of economy envisages/versioned, infrastructure requirement, land requirement, market/consumption, land value, environment etc.

Environment Aspects: Although the individual industrial clearance require a separate consideration though EIA process, the need of broad list of industries were felt for the Baddi region. The HSPCB has been working for long to prepare a list of industries

can be best suitable for this region keeping in view of the environmental characteristics of region. The studies of 'Zoning Atlas for Siting of Industries', 'Siting Guidelines' and 'Industrial Estate Planning for Baddi area have been prepared.

As per the Zoning Atlas for Solan District the study region can have 'Z4Wh' category (i.e. High/medium or low air polluting and/or Low water polluting) of industries on right (north-east) of the Sirsa river. The stretches along Balad Nadi and south-west of Sirsa rive may be suitable for Z4Wm (i.e. High/medium/low air and/or water polluting) as better water dilution may be available. The areas around towns of Baddi and Nalagarh are suitable for Z2Wh (i.e. medium/ low air and water polluting industries). HSPCB has also prescribe the list of industries with different pollution potential.

14.10 Environmental Infrastructure and Services

14.10.1 Air Quality Management

Controlled Development: The industries with high air pollution potential should not be cleared by HSPCB for locating around the towns.

Residential areas also needs to be allowed to develop only in designated area under this Master plan. The development of slums restricted and in existing slums the mechanism needs to be evolved to provide access to cleaner cooking fuel.

Industries using highly polluting fuels are to be shifted to low polluting fuels. An inventory of industrial process and toxic gases, chemicals being used needs to be prepared in order to keep ready fro any leakage etc. Acoustic Enclosures to Industrial D.G sets and green belt around such industries to restrict the noise pollution.

Transportation and traffic: Widening of roads and regular repair to be under taken. Traffic management plan to regulate and segregate traffic to be implemented. Augmentation of road network with new roads and developing missing links in road to streamline the traffic flow and distribution at the same time creating better accessibility in the region. Transport related terminal facilities to be developed to de-congest the roads, which other wise being used for parking, repairs and washing etc. Restriction on use of pressure horns and other noise generating devices.

Green belt development: the major corridors of movement already present of proposed needs to have a green buffer to protect the resident population from air and noise pollution. The maximum areas to be brought under the vegetative cover to minimize the loose dust becoming air borne during summer.

14.10.2 Conservation

Protection and Conservation Areas: As per HPSEP&PCB about 1 km buffer zones may be kept between industrial and residential zones. Increasing the vegetative cover: More sink as per HPSEP&PCB about 40 % of BBNDA areas should be under green cover with trees of high CO2 absorption capacities (ex Neem).

14.11. Landscape Management

The landscape is and result of complex evolution due to various governing factors including climate, soil, water, air, plants, animals and their ecological relationships. They also present the historical cross section of an area. They represent the capacity of ecosystem, natural resources, bio-diversity, aesthetic character, beauty and also has medicinal values. Thus these areas are needed to be protected and preserved to enhance the living and recreating value of whole region. This requires the careful landscape planning in very detailed manner incorporating the aspiration of master plan. Based on the preliminary assessment the following important landscape component has been found in the region:

- Cultivated fields: The agriculture areas in region are mainly on north-east to the NH 21 covering vast area and only this area is available, which is physically suitable for development. Further due to lack of various support in from of irrigation, farm equipments, quality seeds, labour and ready market the farmers are generally inclined to sell their lands for other uses. It is difficult to protect and preserve such landscape however, the starches along the Sirsa River may be considered for preservation as they are unsuitable for development and food prone.
- Grass/Scrub lands: There are stretches along rivers and scattered other places, where the grass and reeds have grown naturally and a unique habitat has developed.
- Wooded areas: There are scattered stretches of wooded areas all over region they can be considered for preservation as they can provide relief from heat and act as buffer for air and nose pollution, in addition to giving pleasing aesthetics.
- Dense Forests: These are generally in hilly part and are under strict control of forest department as protected and reserved forests. These are already protected.
- Un-dulating landscape: A unique landscape has developed due to erosional action of water on loamy soil and exists between ‘Ropar road’ and ‘Bharatgarh road’.
- Steep Hill slopes: The steep slopes with vegetation are at locations gave way to landslides, while at some places they have thick vegetation.The exposed soils along these slopes create a special landscape now and soil mixed with boulders needs to be conserved and stabilized to enhance the aesthetics and increase the safety.
- High Altitude Areas: the region is bounded by two hill ranges in north-east and south-west. These areas are nay way are not suitable for development and also provide

beauty to region, even few points provide good view of entire stretches and can be developed as sun-set points. But these needs to be developed carefully for recreation purpose as otherwise it may lead to degradation of upper reaches of hills.

- Small hills and steep contours: There are numerous some hills in the region, which are being flattened and being cut to make way for industrial, commercial or residential development. These needs to be preserved and may be used for specific purpose.
- Flood plains/ Recharge Areas: These are located along the river Sirsa and are also recharge areas for ground water. As whole region is primarily depended on ground water, in order to maintain the good quality of ground water, these area needs to be preserved and to be kept free from waste dumping, waste water discharges, use/spillage of chemicals, sewage discharges, etc.
- Water bodies (Dry stretches/ running water): The numerous nallas flowing in their region provide a kid of landscape to region and even some locations development of standing water (reservoir, lakes) ,may be possible, which can be sued for supply of surface water to increasing demand of region as well as can act as entertainment centers.