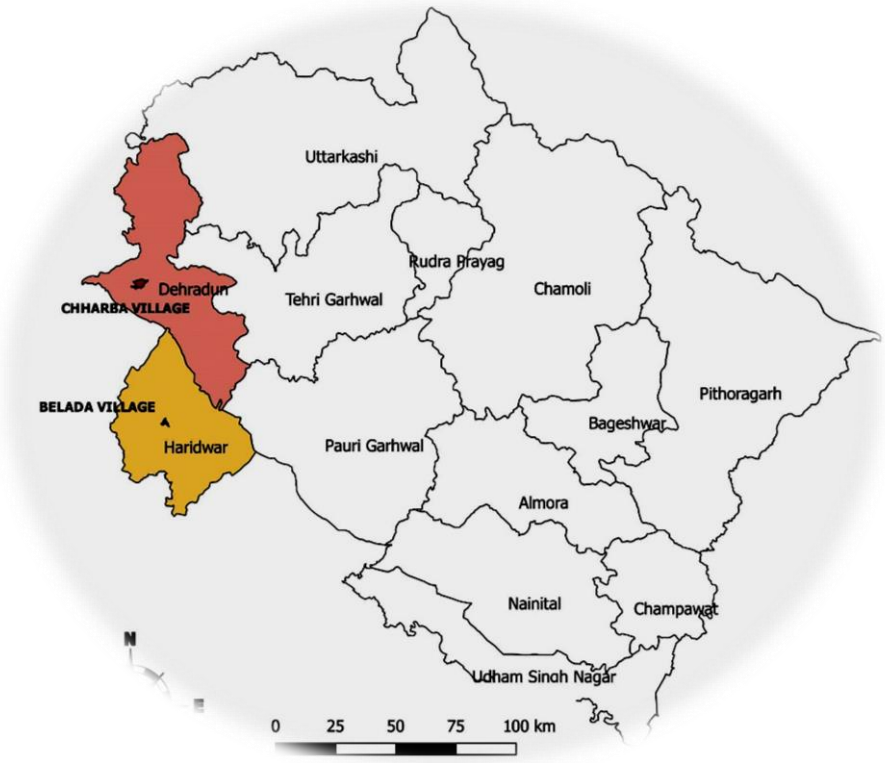
FINAL REPORT
January 2020

Spatial Planning for Rural Areas

A pilot study of Uttarakhand villages (***Belada*** and ***Chharba***)

Funded by the **Ministry of Panchayati Raj**, Government of India



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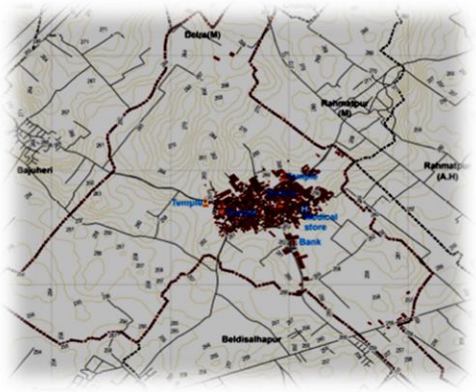

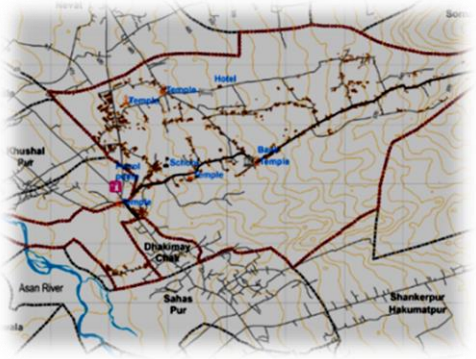

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MPR-1573-APD-20-21	01-2020-21 (Final report)	December 2020	Ankita, Kapil, Tanmoy, Amar, Mayank	Dr. SS, Dr. UKR	Dr. UKR

Department of Architecture and Planning
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The current project is distinctly facilitated by many good hearts to complete on time within a difficult time of Covid-19 pandemic particularly where in-depth primary surveys are involved.

First, we are thankful to the Ministry of Panchayati Raj (MoPR), Government of India for giving us with this opportunity and taking the initiative to shape our villages by involving the institute in a pilot basis. Besides, we are greatly benefitted by the valuable suggestions provided by Shri Sunil Kumar, Secretary, MoPR and Shri K. S Sethi, Joint Secretary, MoPR.

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We are hopeful to bring this planning exercise in to the action for the benefit of the rural people and also hopeful to contribute to the development of the other villages.

Uttam Kumar Roy (PI)
Shubhajit Sadhukhan (Co-PI)

Spatial Planning for Rural Areas

A pilot study of Uttarakhand villages (***Belada*** and ***Chharba***)

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Conceptual Basis

Contents

1. INTRODUCTION

1.1 Background

It is quite common that people migrate to cities for jobs and other reasons. Naturally, the focus on the development of infrastructure and industries is more in cities and urban centers. It is commonly said that *'cities are engines of rural growth'* since cities generate more GDP than villages. However, in India, 2/3rd of the population still lives in villages. Therefore, sustainable planning and development of villages to create jobs and decent living amenities are the need of the time. The recent pandemic breakout in 2020 due to COVID-19 and subsequent lockdowns have resulted in 'reverse migration' from urban to rural areas. This adds to the already existing unemployment issue. Moreover, this 'reverse migration' situation might have manifold effects on rural areas like increased rate of unemployed people, spatial pressure on the existing infrastructure of the rural areas, eventually leading to the unregulated conversion of agricultural lands, unregulated constructions, and disturbed distribution of supply in the rural areas. The scheme driven development agenda needs integration and convergence to have a definite outcome. The future of the village must be constructed with the aspiration and needs of the community.

1.2 Need for the study

With the growing population in cities and economic growth in urban areas in the past few years, the gap of equitable development in urban and rural areas continue to exist. Despite significant achievements in many sectors, the rural poor continue to struggle with unemployment, poor infrastructure, illiteracy, inequality, low per capita income, and low living standards. Immense migration from rural to urban areas (78 million in 2011) clearly shows people's inability to get employed in rural areas and their movements to urban areas in search of jobs. This migration situation to urban areas has been regulated through various available planning strategies, development plans, and building codes. However, the pandemic breakout in 2020 and followed lockdowns have resulted in 'reverse migration' from urban to rural areas. This adds to the already existing unemployment issue in rural areas. Moreover, this 'reverse migration' situation might have manifold effects on rural areas like the increased unemployment rate, spatial pressure on the existing infrastructure of the rural areas, eventually leading to the unregulated conversion of

agricultural lands and unregulated constructions and disturbed distribution of supply in the rural areas.

1.3 Aim and Objectives

The study aims to conduct spatial planning for villages' integrated development on a pilot basis based on the villagers' aspirations and indicate policy directions.

To address the above mentioned emerging conditions, the Government of India has taken the initiative to prepare Spatial Plan for rural areas on a pilot basis with objectives to

a) Manage growth and change;
b) Provide orderly and predictable development;
c) Protect environmental resources;
d) Set priorities for developing and maintaining infrastructure and public facilities;
e) Strengthen local identity;
f) Create a framework for future policy decisions;
g) Promote open, democratic planning;
h) Provide guidance to land-owners, developers, and Government authorities

1.4 Stakeholders

I. Ministry of Panchayati Raj: The Ministry will provide policy oversight, facilitating a common platform for bringing together different Academic/ Research Institutes and Agencies
II. National Informatics Centre (NIC)/ National Remote Sensing Centre (NRSC): Technology partners of the Ministry, with Gram Manchitra & Bhuvan platforms to be leveraged in the initiative.
III. State Panchayati Raj Departments: The department will provide the necessary guidance and oversight, along with necessary administrative assistance along with local coordination and logistical support vis-à-vis seeking access to documents and data, zorganizing interviews with officials, conducting surveys and studies, etc.

IV. State Town & Country Planning department: Provided technical advice to the respective State Governments on the formulation of policies on preparing Building Bye-Laws, Zoning Regulations for GPs.

V. Academic/ Research Institutions& Agencies: Provide Technical assistance to local authorities for the preparation of spatial plans. Mobilising students and faculty members for undertaking various activities and/ or providing research inputs viz. ground surveys, designing interventions to formulate policies, strategies, norms, standards, laws, regulations, and rules pertaining to rural/ regional planning and development matters.

VI. Gram Panchayats: Gram Panchayats are the biggest stakeholder in this exercise as they stand to benefit the most from this exercise. The concept of 'zoning' will lead to planned development in the GP and curb the tendency towards haphazard growth.

1.5 Scope and limitations

This study is based on two pilot-level Gram Panchayats in the state of Uttarakhand. Therefore, the study area's scope is limited to the two villages viz—Balada in Haridwar District and Chharba in Dehradun District of Uttarakhand.

Due to the Covid-19 pandemic breakout, household surveys' coverage was limited to 5-10% households, and the opinion survey was limited to the villages' elected representatives.

Spatial planning recommendations have been made in a broad zoning basis since land records are not available at this stage and being updated in the whole Uttarakhand state. In the later stage, the area-based plans need to be formulated.

The projects which require trans and inter-village, inter-city linkage, and coordination are indicated. However, at the village cluster-level planning, such projects can be detailed better through the RURBAN scheme or integrated planning along with the RURBAN.

2. APPROACH AND METHODOLOGY

The basic framework for the pilot planning is given by the Ministry. The tight timeline and urgency make the pilot project depend largely on secondary data. However, selective primary data was also used. Extensive consultation with the stakeholders to refine the visions and proposals was taken up. Figure 2 shows the overall methodology adopted. The consultations consisted of the following groups:

- Public representatives and village representatives
- Concerned state government functionaries
- Experts working in the field of village developments (within and outside the institute).

It is also intended to review contemporary and classical theories of sustainable village planning to evolve innovative solutions for the villages' holistic planning.

2.1 Criteria for selection of studies

The selection of the pilot villages was done based on the criteria prescribed by the Government, which are:

1) Gram Panchayat (GP) with a population size not less than 5000, and preferably within population size of 10,000,

2) Located on a National Highway or a prominent State Highway,

3) Have enough area available for future growth, and,

4) Located not very close to a large city, as in that case, the pressure for land will be a serious constraint for further planning.

Along with the above-prescribed selection criteria norms, criteria specific to Uttarakhand were also considered while selecting the villages. Uttarakhand, as a state, consists of plain lands as well as hilly areas. The total geographical area of the state (53,483 sq.km) is 1.6 % of the country's total geographical area, out of which 46,035 sq. km is hilly, which accounts to 86% of the state's area. However, the major proportion of Uttarakhand's population is densely settled in the foothills and plain areas in the southern part of the state. Therefore, the two villages were selected, one from the state's denser part (Belada) and another from the comparatively less dense part of the state (Chharba) and considering the criteria mentioned above. Belada lies in Haridwar district and has a population density of 18.18 persons per hectare (PPH), and Chharba lies in Dehradun district has

a population density of 4.63 PPH. The location of the above mentioned districts are shown in Figure 1. The main source of income of Belada is from agriculture. Farmers of Belada and surrounding areas produce wheat, rice, sugarcane and vegetables, which supply local mills and markets. Whereas, the majority of the main workers are not into cultivation but are categorized as 'Other workers' as per Census including all government servants, municipal employees, teachers, factory workers, plantation workers, those engaged in trade, commerce, business, transport, banking, mining, construction, political or social work, priests, entertainment artists, etc.

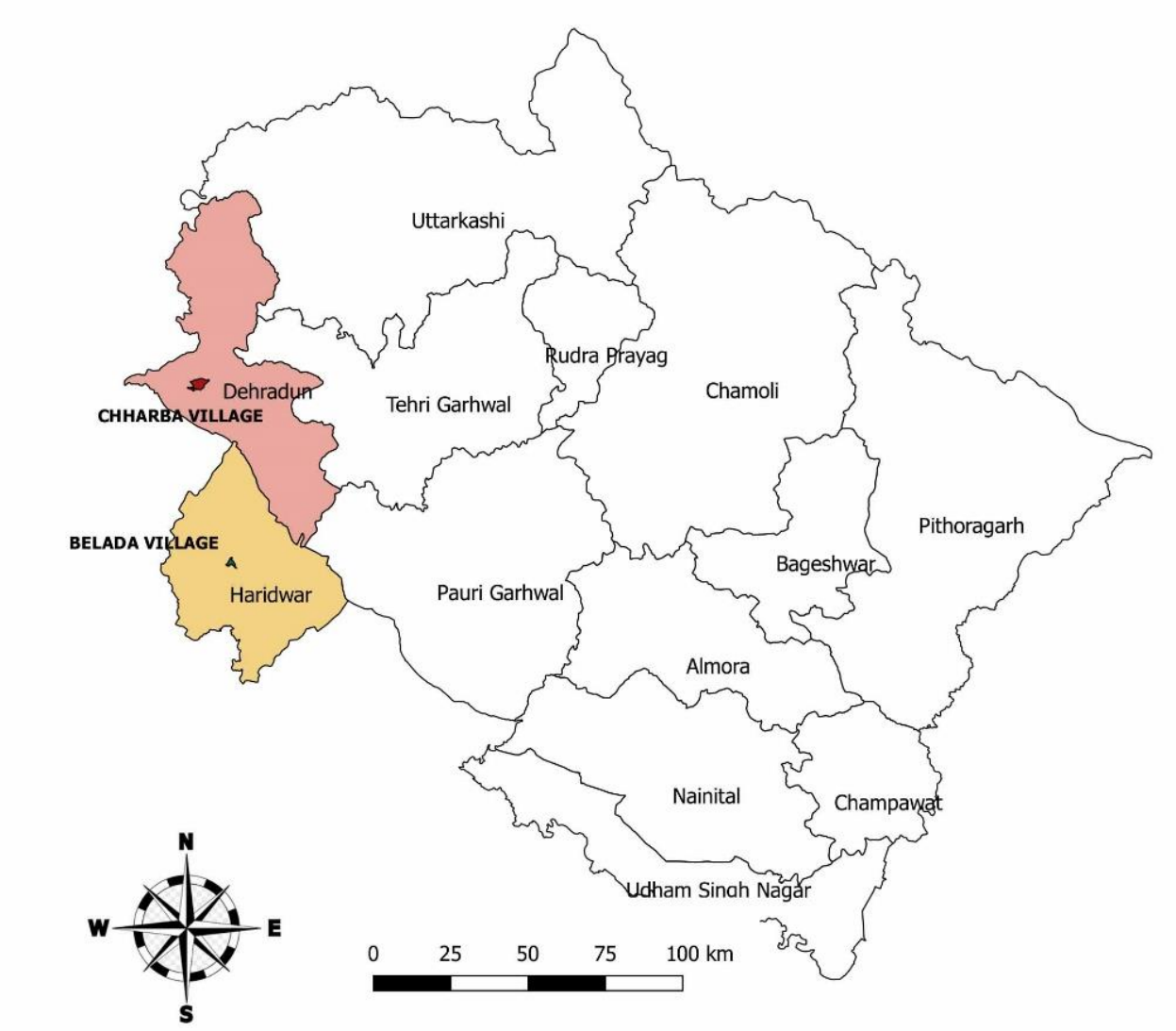


Figure 1 Map of Uttarakhand showing location of Dehradun and Haridwar districts

2.1.1 Planning significance for the villages

With the growing population in cities, and economic growth in urban areas in the past few years, the gap of equitable development in urban and rural areas continue to exist. Despite significant achievements in many sectors, the rural poor continue to struggle with unemployment, poor infrastructure, illiteracy, inequality, low per capita income, and low living standards. Immense migration from rural to urban areas (78 million in 2011) clearly shows case the inability of people to get employed in rural areas and hence their movements to urban areas in search of jobs. This migration situation to urban areas has been regulated through various available planning strategies, development plans, and building codes. However, the pandemic breakout in 2020, and followed lockdowns have resulted in 'reverse migration' from urban to rural areas. This adds to the already existing unemployment issue in rural areas. Moreover, this 'reverse migration' situation might have manifold effects on rural areas like increased unemployment rate, spatial pressure on the existing infrastructure of the rural areas, eventually leading to unregulated conversion of agricultural lands and unregulated constructions and disturbed distribution of supply in the rural areas.

2.2 Guiding principles

The following factors have been considered as guiding principles for the development of the Plan of the villages:

- Enhancement of quality of life and fulfillment of the villagers' aspiration by using the rural resources for the benefit of the village only. Preferences and priority set by the villagers are given the highest focus along with the normative requirement of infrastructures.
- Accessible essential amenities, including health, education, communication, and convenience shopping, are considered the plan's minimum benchmark. Future forecasting of the Physical Infrastructure and Social Infrastructure based on population projections
- Governance and administrative effectiveness and the possibility of strengthening with a convergence of Administrative setup in Panchayat and it's corresponding schemes and Initiatives
- Socio-Economic and socio-cultural characteristics including Caste, Literacy, Employment (agriculture, NFRE and other), Land Values, Spatial spread according to caste and income (settlement pattern), Asset possession
- Provision of decent Housing for all

- Environment and ecological sustainability in retaining natural resources and allowing urbanizations only in the less fertile land parcels using the concept of zoning
- Sustainability of present occupation and enhancement of family earning by retaining primary economic activity and indicating farmers' micro and macro-level problems are given the highest priority. The factors like the area under irrigation, Mandi /Market's availability, nearness to urban area for the market, training, and marketing are considered.

2.3 Proposed methodology

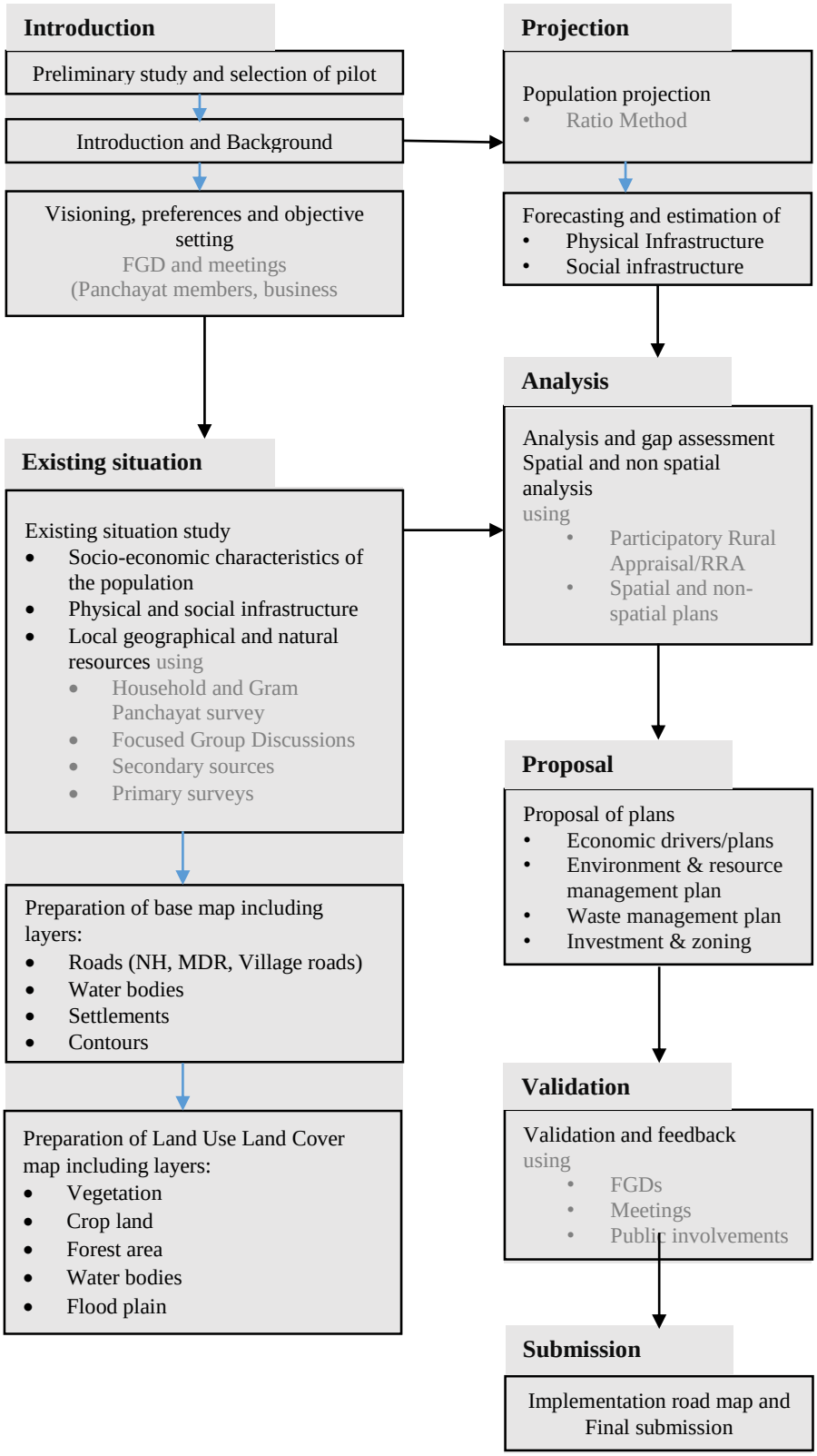


Figure 2 Proposed Methodology

2.3.1 Introduction:

This stage marks the beginning of the study, wherein the project inception is done. This stage includes, firstly, the primary study and selection of pilot villages for the project, followed by background study of the selected pilot villages and finally objectives setting in parallel to the vision laid by the Ministry of Panchayati Raj. This step included a few Focussed Group Discussions (FGDs) and meetings with members from the Ministry, Planning Authorities, District Authorities, Gram Panchayat, and Institute.

2.3.2 Existing situation study:

Once the objectives were set, the existing situation study was conducted for both villages, Belada and Chharba. The situation analysis study consists of an initial reconnaissance survey, the study of existing social and physical infrastructure, opinion survey of the Gram Pradhan members, household surveys, and infrastructure inventory surveys. The information about social and physical infrastructure was collected using secondary sources and validated during the IITR survey team's primary survey.

For the opinion survey, a bilingual questionnaire was prepared based on their aspirations for the village development and assessment of current condition of facilities in the village (refer Annexure 1). The survey was conducted using pen-paper mode. The household surveys were conducted using the GPSDP software application developed by NRSC under the agis of the Ministry of Panchayati Raj, Governement of India. The IIT Roorkee team also did the infrastructure inventory survey. Therefore, with all the three forms of survey, the perceptions of the residents of the villages, the members of the village representatives and authorities and that of the experts' team were captured and analyzed.

2.3.3 Preparation of maps:

Further, the existing conditions were mapped to analyze the villages spatially. The following maps were prepared:

- Base Map
- Landuse Land Cover Map (Provided by NRSC)
- Road Network Map

- Settlements Map
- Facilities Map
- Digital Elevation Map (Provided by NRSC)

The Base map for the existing condition was prepared using data sources and tools consisting of ArcGIS software, Landsat 8 satellite data (a collaboration between NASA and the United States Geological Survey), Google Earth (a 3D map representation utility by Google), Gram Manchitra (a geo-spatial based decision support system for Panchayats by Ministry of Panchayati Raj, Govt. Of India), Bhuvan (a map-based utility by Indian Space Research Organisation) and National Remote Sensing Centre (a centre of ISRO) and database from National Informatics Centre (NIC, India). The rest of the maps, as mentioned above, were developed from the base map using ArcGIS software.

Using world imagery in ArcGIS, village boundary, natural features, road network, and existing settlements were digitized using data from Google Earth and NIC. Contours were generated using digital elevation model (DEM) in ArcGIS.Landmarks were marked and identified by data from Gram Manchitra and also data from Gram Manchitra website and NIC was used for references. The land covers were identified using Bhuvan and Landsat 8 satellite data. Also, data provided by the National Remote Sensing Centre (NRSC) was used to study the villages' physical setting and the validation of the prepared maps.

2.3.4 Analysis:

From the opinion survey, household survey, and infrastructure inventory survey, descriptive analysis was done to identify the critical findings from the data collected from the opinion survey. The descriptive analysis helped identify the weaker parts that are to be prioritized for future development and the strengths that are to be enhanced in the future. A spatial analysis was also done on the existing maps to recognize the probable and suitable locations for future developments.

2.3.5 Projection:

Further, the population projection for the next 20 years was done for both the villages using three scenarios: current growth rate, moderate growth rate, and fast growth rates. Considering the projected population's moderate growth rate, social and physical infrastructure estimations were done according to Urban and Regional Development Plans Formulation and Implementation

(URDPFI) and Rural Area Development Plan Formulation and Implementation (RADPFI) guidelines.

2.3.6 Proposal:

The proposals and recommendations were developed based on descriptive and spatial analysis of the collected data and estimations for the projected population. The proposals were also made in consideration of the existing and ongoing Government schemes in the villages.

2.3.7 Validation:

The proposal was validated and revised through meetings, discussions, and Focussed-Group Discussions (FGDs) from different levels of authorities, including the advisory team of the Institute, the Gram Pradhan members, the District and State Government authorities, and the Ministry of Panchayati Raj. The final report was prepared after incorporating suggestions and recommendations from all the meetings held and shared before the ministry's final submission for inviting further revisions and refinement suggestions.

2.4 Literature Review

In India, rural development is a crucial factor to develop the country in a socio-economically manner. “India lives in its villages” Mahatma Gandhi mentioned the above statement more than half a century ago. Even today, the statement holds true. , The majority of the country's population, still resides in rural areas. Around 65.53% of Indian are living in villages, which makes a huge impact on Indian population share. This large share of the population suffers severe poverty, socio-economic constraints, and lack of employment and basic infrastructure. So the main direction of rural development is to bring change among rural communities from the traditional way of living to a progressive way of living. It also indicated as the movement of progress.

Rural development implies both the economic betterment of people as well as greater social transformation. In order to provide the rural people with better prospects for economic development, increased participation of people in the rural development programmes, decentralization of planning, better enforcement of land reforms and greater access to credit are needed.

As per the definition by United Nations, Rural Development is a process of change, by which the efforts of the people themselves are united, those of government authorities to improve their economic, social and cultural conditions of communities into the life of the nation and to enable them to contribute fully to national programme.

Rural development is a dynamic process, which is mainly concerned with rural areas. These include agricultural growth, putting up of economic and social infrastructure, fair wages as also housing and house sites for the landless, village planning, public health, education and functional literacy, communication etc. It also define as A Process leading to sustainable improvement in the quality of life of rural people, especially the rural poor.

Rural development in India is a national necessity and has significant importance in India because of the following reasons:

- About 3/4th of India's population live in rural areas; thus rural development is needed to develop the nation as a whole.
- Agriculture is the main occupation in India, and nearly half of the country's national income is derived from Agriculture, and around 70% of the Indian population gets employment through agriculture.
- A huge part of raw materials for industries come from agriculture and rural sector.
- Increase in the industrial population can be justified only in rural population's motivation and increasing the purchasing power to buy industrial goods.
- The growing disparity between the urban elite and the rural poor can lead to political and economic instability.
- The rural sector is lagging much behind the overall progress of the economy in India.

The main objective of the rural development program is to raise the economic and social level of the rural people. Some specific objectives are:

- To develop the farm, home, public service and village community.
- To bring improvement in improving productivity, animals living condition and the wages of rural people.
- To improve health and education condition etc. improvement in living of the rural people.
- To improve villagers with their own efforts.
- To improve village communication and increase the standard of living of the underprivileged population

- To guarantee increased and quick employment possibilities to demolish unemployment and a notable decline in underemployment.

V.K.R.V. Rao (year of publication) defines integrated rural development as "the optimum utilization of the natural and human resources of a given rural area for the enrichment of the quality of life of the population." Right direction and good policies can break this vicious wheel of disparities in rural areas. Integrated development can be the main driver to develop the rural area. As per the Agro Community Development Association (ACDA) agricultural productivity, rural employment, equitable distribution of income and wealth, public participation, literacy, and equality in rural areas are the major indicator for rural development. Public participation in decision making emerge as a key indicator for eliminating the distribution of influence and power in rural area. Rural development is a strategy to enable a specific group of people, poor rural women, and men, to gain for themselves and their children more of what they want and need.

Various theories which deal with the concept of development apply on rural development as it is the part of the development. Although no universal theory exist for the specific rural development different theories apply in different context for the rural development. These theories show different hypotheses to develop an area like classical economists which argue with the concept of circularity and interrelationship between technology, investment, and profit.

Modernization theory which direct planner to transfer of technologies to the rural area which eliminates social and ideological barriers which obstruct the way of development. Importance of use of modem technology for increasing the productivity in agriculture and Institutional change i.e. replacement of traditional obsolete institution by the new democratic body, are Some major insight of this theory in the context of rural development. However, this theory failed to predict the adverse impact of capitalist market on the environment thus making it unsustainable.

Where the Gandhian model for rural development is based on village swaraj and swadeshi moment and shows us the holistic and people-centric approach to develop rural areas. Gandhi Ji was against the exploitation of rural area by the urban dwellers and consider it as a "violence". Gandhi ji think that Human resource is inexhaustible and thus it is the only resource which can lead us to sustainable development.

Rurban model is the new model which create possibilities to develop the rural areas in the cluster. The networked model of rural development emphasis to make small clusters of settlement instead of making a large city.

Indian government continuously making efforts to develop rural areas. After setting up the planning commission in 1950 government works continuously in the rural sector from the first five-year plan to 12th Five Years Plan (FYP). Rural development covered a long journey from least developed sector to the integrated developed sector throughout these five-year plans.

Five-year plans bring various approaches and programmes for the rural development i.e.

- The multipurpose approach emphasizes the all-round development of rural areas.
- The sectoral approach focuses on the intensive development of the selected sectors.
- Target approach focuses on the targeted population or the sector like promotion of weaker section of society and deprived community.
- Area development approach enhances spatial planning and eliminating the regional imbalance
- Basic need approach leads to the equalization of the social consumption
- Employment oriented approach helps to reduce unemployment, poverty through area integration

Many welfare programmes and development schemes for poor like MGNREGA, NRLM, NRHM and PMAY etc. are currently running to develop the rural areas for reducing poverty, providing the basic amenities and to fill the widening gap between rich and poor. But lack of literacy, awareness and social inequalities are some major issues which barricading the way of these efforts.

2.5 Timeline

The following Figure 3 shows a summary of the timeline for this study.

Stage	July	August	September	October	November	December
Introduction						
Existing situation Assessment						
Analysis						
Projection and estimation						
Proposal						
Validation						
Final Submission						

Figure 3 Project timeline

Spatial Planning for Rural Areas
A pilot study of Uttarakhand villages (*Belada* and *Chharba*)

Section **B**:
Spatial Planning for Belada

Contents

SPATIAL PLANNING FOR BELADA SUMMARY

Belada is a village in the district Haridwar of Uttarakhand state of India. It is primarily in the plain region of the state and is spread over an area of 395.1 Ha. The total population of the village as per 2011 Census is 7185 with 1187 households. The major access road of this village is NH 334 and the nearest major towns are Roorkee and Haridwar. In the existing condition, the village is well connected to other towns and has good sanitation and telecommunication services. However, healthcare, educational and training and employment generating industries are prioritized for future development. With a projected population of about 52,000 in 2041, almost six times of existing built up area requirement is estimated by 2041. With multiple meetings and discussions with the village representatives, household surveys and questionnaire surveys, their aspirations and vision were identified. In accordance with their aspirations and in compliance to the objectives led by the Ministry of Panchayati Raj, five broad zones are proposed viz., U1, U2, A1, A2 and A3. Where U1 and U2 are the Urbanisation priority zones for 2031 and 2041 respectively, and A1 and A2 are agricultural priority zones followed by A3 which is Agricultural promotion zone. Widening of the major intersecting roads in the village are proposed and the urbanization priority zones are proposed along the major connecting roads.

1. STUDY AREA PROFILE

1.1 Location and setting

Uttarakhand is a newly formed state in Northern India (shown in Figure 4), which was earlier part of the state of Uttar Pradesh until 2000. The state covers an area of 53,483 sq km (about 1.6% of India's area), and has a population of 10,086,292 as per the 2011 census. It is majorly a hilly state with 86% of mountainous region on its northern part, which is a part of the mighty Himalayan range. Uttarakhand is a popular destination, especially for the Hindus, because of the numerous temples and pilgrimage centres. The state has 13 districts, grouped into two divisions called Kumaon and Garhwal. The districts are further divided into sub districts or Tehsils and Community Development (CD) Blocks. The urban areas are categorized on the basis of population into Municipal Corporations, Municipal Councils and Municipalities. The winter capital of Uttarakhand is Dehradun, the largest city of the state, and the summer capital is Gairsain, a town in Chamoli district. According to the 2011 census, Haridwar, Dehradun, and Udham Singh Nagar are the most populous districts of Uttarakhand.

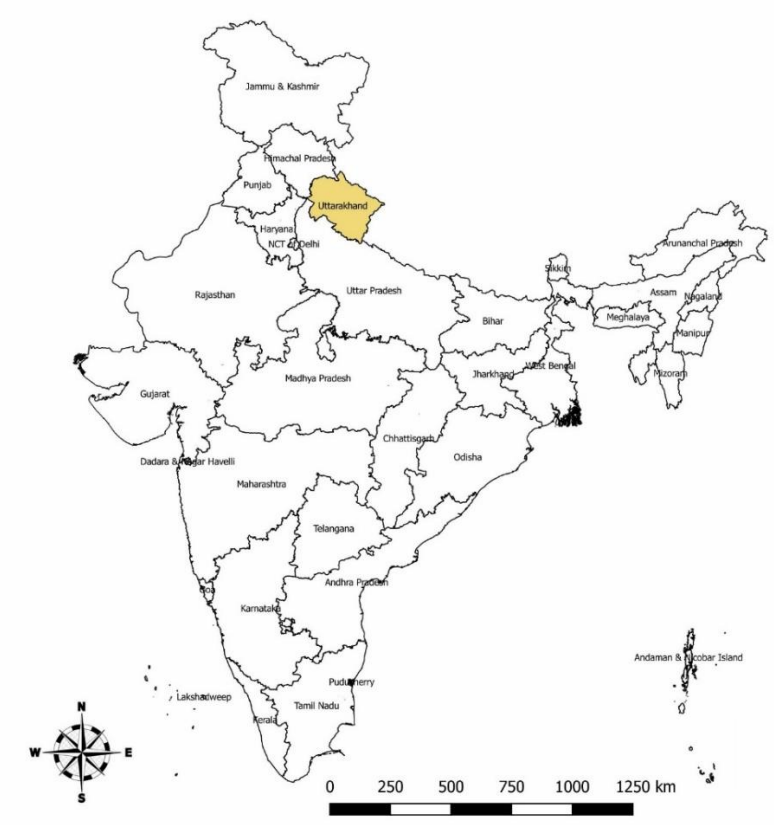


Figure 4Map of India showing Uttarakhand

Belada

Belada is a village with village code 056427 in Roorkee Community Development (C.D.) Block in Roorkee Tehsil of Haridwar District in Uttarakhand state of India. This is located at a distance of 10 km from the Tehsil headquarter at Roorkee, and about 25 km from the district headquarter at Haridwar, which is also the nearest major city to this village. The location of Belada village in Haridwar district is shown in Figure 5.

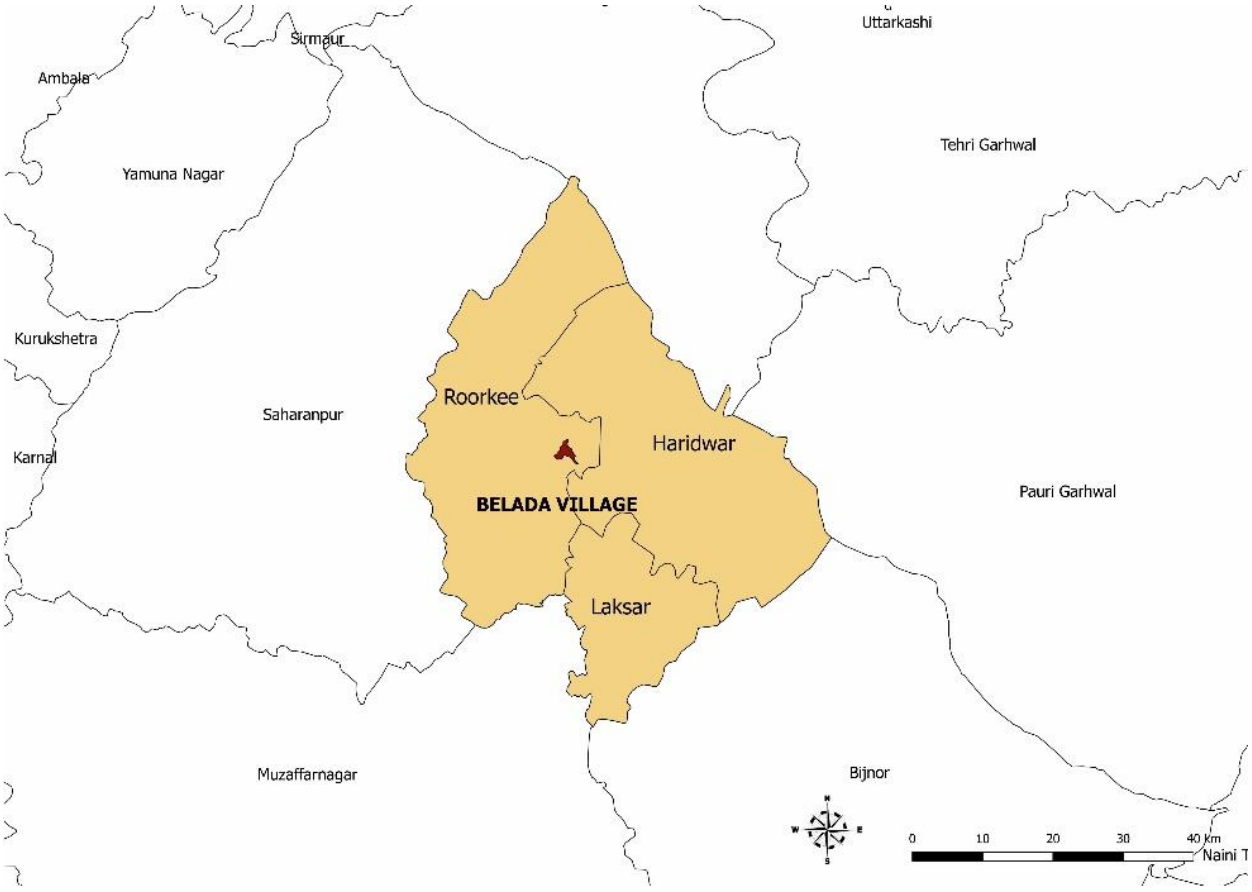


Figure 5 Map showing location of Belada in Roorkee Tehsil in Haridwar district

The village speads over an area of 395.1 Hectares with a population of 7185, has 1187 households (as per 2011 Census). The village is mainly connected and accessed by National Highway (NH) 334 locally, the stretch is called Roorkee - Haridwar road and a Major District Road (MDR) named Rahmatpur road or Piran Kaliyar Marg. The village is just 2.5 km away from the famous Dargah of Piran Kaliyar. The nearest railway station to this village is Roorkee railway station around 12 km away from Belada village and the nearest Airport being Jolly Grant Airport 70 km away.

Also, it has a history owing to the glorious past of the Haridwar district. Haridwar is traced to be existing since 2000 BC with its mention in Meghdootam by Kalidas, also by Chinese traveler Huen Tsang. It was also a part of the mighty empires of the Magadh dynasty, Gupta dynasty and Chauhan dynasty. There had also been copper coin mints during the reign of Emperor Akbar in Haridwar. This region has also seen battles with British and freedom fighters until 1857 AD. Since then, there have been a series of administrative reforms, revenue settlements, and improvements in educational and medical facilities, local self-government aspects. The place also saw many engineering marvels and also the birth of the first engineering institute (present day Indian Institute of Technology, Roorkee). At present, Haridwar is one of the most sacred places for Hindus, where lakhs of pilgrims visit every year.

1.2 Socioeconomic demographics

Table 1 below shows the socioeconomic demographic profile of the villages.

Table 1 Population and age group distribution of Belada

	Number of Household	**Total Population Including Institutional and Houseless Population**			**Population in age group 0-6**		
		Person	Male	Female	Person	Male	Female
2001	895	5536	2904	2632	1152	607	545
2011	1187	7185	3778	3407	1195	647	548

In the case of Belada, the sex ratio (female to male ratio) is 0.9, which is in accordance to the national sex ratio.

Table 2 SC/ST and Literacy population distribution of Belada

	SC/ST Population						**Literacy**		
	Scheduled caste Population			Scheduled Tribe Population					
	Person	Male	Female	Person	Male	Female	Person	Male	Female
2001	1768	925	843	17	10	7	2594	1606	988
2011	2508	1337	1171	4	2	2	4,247	2,498	1,749

In Belada, the total share of SC and ST population is almost 34% of the total population. The female literacy rate in 2011 is 51% has increased by almost 14% from 2001 to 2011, whereas, the male literacy rate in 2011 is 66% and has increased 10% from 2001 to 2011.

Table 3 Working Population distribution of Belada

Working Population						
	2001			2011		
	Person	Male	Female	Person	Male	Female
Total Workers	1472	1319	153	1884	1751	133
Main Workers						
Main Workers	1108	1039	69	1765	1643	122
Cultivators	280	276	04	296	288	8
Agriculture Workers	142	135	07	216	203	13
Household industry Workers	94	63	31	88	77	11
Other Workers	592	565	27	1165	1075	90
Marginal Workers						
Marginal Workers	364	280	84	119	108	11
Cultivators	02	01	01	-	-	-
Agriculture Labourers	184	151	33	11	09	02
Household industry Workers	44	17	27	4	4	-
Other Workers	134	11	23	104	95	09
Non Workers	4064	1585	2479	5301	2027	3274

Among the total main workers in Belada, only 7% of them are females, and share of females among marginal workers is 9%. This shows the very low labour force participation rate of females in the village.

1.3 Physical setting

Due to its location away from any major body and its proximity to the Himalayas, Belada has an extreme continental climate.

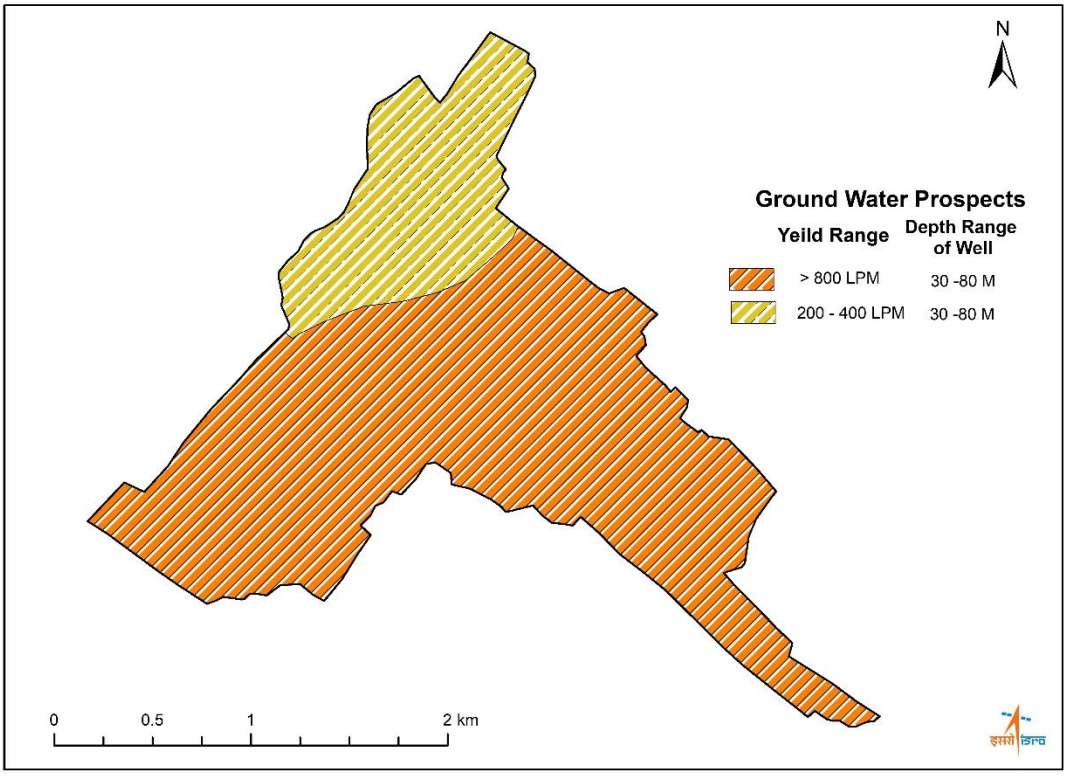
Summers starts in late March and go on until early July, with average temperature around 28 °C. The monsoon season starts in July and goes on until October, with torrential rainfall, due to the blocking of the monsoon clouds by the Himalayas. Annual rainfall varied between 770 mm - 2021 mm during the period 1979-2003 indicating high temporal variability. Further, number of rainy days along with statistics in the GP was computed for different years indicating wet, dry and normal conditions.

Rainfall analysis for Dry, Wet and Normal Conditions (1979-2003)

Meteorological Condition									
Statistics	**Dry Conditions**			**Wet Conditions**			**Normal Conditions**		
	Rainfall	Runoff	Rainy days	Rainfall	Runoff	Rainy days	Rainfall	Runoff	Rainy days
Mean	864	26	63	1848	328	81	1063	126	69
Std Dev.	99	27	1.3	97	131	8	619	100	35

The post monsoon season starts in October and goes on until late November, with average temperature sliding from 21 °C (70 °F) to 15 °C (59 °F). Winters start in December, with lows close to freezing and frequent cold waves due to the cold Katabatic winds blowing from the Himalayas. The total annual rainfall is about 2600 mm (102 in).

Groundwater potential map was categorized according to its recharge characteristics as either (i) Good – Very Good, (ii) Moderate - Good, (iii) Moderate (iv) Poor - Moderate (v) Poor. The lineaments are the surface manifestation of linear features like joints and fractures. They have been demarcated from the imagery as linear features and are ascertained after field traversing. Groundwater potentiality of a higher order is indicated where lineaments run along and across the alluvial zone (Source NRSC).



Ground water prospects of Belada (source NRSC)

2. SITUATION ANALYSIS BELADA

2.1 Existing Physical and social infrastructure

The summary of existing physical and social infrastructure as per data from Census 2011 is shown in table below. The colour codes used in the table 4 are as follows

Table 4 Colour code for status of availability of physical and social Infrastructure

Colour	Interpretation
2 No.s	There are 02 numbers of a facility present in the village
1 No.s	There is only 1 number of facility present in the village
<5 Km	The facility is not present in the village but is within a range of less than 5Kms from the village
5-10 Km	The facility is not present in the village but is within a range of 5-10Kms from the village
>10 Km	The facility is not present in the village but is within a range of more than10Kms from the village
Available/Yes	The facility is present in the village
No	The facility not present in the village

Table 5 Status of availability of physical and social infrastructure in Belada

Educational facilities	Pre-Primary school (PP)	1 No.s
	Primary school (P)	2 No.s
	Middle school (M)	<5 Km
	Secondary School (S)	5-10 Km
	Senior Secondary school (SS)	<5 Km
	Degree college of arts science & commerce (ASC)	<5 Km
	Engineering college(EC)	<5 Km
	Medical college (MC)	>10 Km
	Management Institute	>10 Km
	Polytechnic (Pt)	<5 Km
	Vocational training school /ITI	<5 Km
	Non-formal training centre (NFTC)	5-10 Km
	Special school for disabled (SSD)	5-10 Km

Medical Amenities	Community health centre (CHC)	5-10 Km
	Primary health centre	<5 Km
	Primary health sub centre (PHS)	1 No.s
	Maternity and child welfare centre (MCW)	1 No.s
	T.B. clinic (TBC)	5-10 Km
	Hospital-allopathic (HA)	5-10 Km
	Hospital-alternative medicine (HO)	5-10 Km
	Dispensary (D)	5-10 Km
	Veterinary hospital (VH)	1 No.s
	Mobile health clinic (MHC)	5-10 Km
	Family welfare centre (FWC)	1 No.s
Availability of drinking water – Yes/No	Tap water (Treated/Untreated)	No
	Well water (Covered / Uncovered well)	No
	Hand Pump	Yes
	Tube wells / Bore well	Yes
	Spring	No
	River / Canal	No
	Tank / Pond / Lake	No
	Others	No
Availability of toilet & others Yes / No	Community toilet including bath	No
	Community toilet excluding bath.	No
	Rural sanitary mart or sanitary hardware outlet available near the village.	No
	Community bio- gas or recycle of waste for productive use.	No
	Post office(PO)	5-10 Km
	Sub post office (SPO)	Available

Communication and transport facilities	Post & Telegraph office (P&TO)	5-10 Km
	Telephones (Land lines)	Available
	Public call office (PCO)	Available
	Mobile phone coverage	5-10 Km
	Internet cafes/ Common service centre (CSC)	5-10 Km
	Private courier facility	Available
	Bus service (Public & Private)	Available
	Railway stations	5-10 Km
	Auto/Modified Autos	5-10 Km
	Taxis and Vans	5-10 Km
	Tractors	Available
	Cycle-pulled rickshaws(Manual & Machine driven)	Available
	Carts driven by animals	<5 Km
	Sea /River ferry service	>10 km
Highways, village roads, banks & credit societies	Connected to national highway(NH)	Available
	Connected to state highway(SH)	Available
	Connected to major district road (MDR)	Available
	Connected to others district road	Available
	Pucca roads	Available
	Kutchcha roads	Available
	Water bounded macadam(WBM) roads	Available
	Navigable waterway (river/canal)(NW)	>10 km
	Footpaths (FP)	Available
	Banks Commercial & Co-operative	Available
	ATM	Available
	Agricultural Credit Societies	Available
Socio cultural and	Self Help Group (SHG)	Available
	Public distribution system (PDS) shop	Available
	Mandis / Regular market	5-10 km

Miscellaneous facilities	Weekly Haat	5-10 km
	Agricultural marketing society	5-10 km
	Scheme (Nutritional Centres) Integrated Child Development	Available
	Anganwadi Centre (Nutritional Centres)	Available
	Others (Nutritional Centres)	<5 km
	ASHA (Accredited Social Health Activist)	Available
	Community centre with/without TV	>10 km
	Sports Field,	>10 km
	Sports Club / Recreation Centre	>10 km
	Cinema / Video Hall	>10 km
	Public Library	>10 km
	Public Reading Room	>10 km
	Newspaper Supply	Available
	Assembly Polling station	Available
	Birth & Death Registration Office	Available
Availability of electricity (Yes/No)	Power Supply for Domestic Use (ED)	Yes
	Power Supply for Agricultural Use (EAG)	No
	Power Supply for Commercial Use (EC)	Yes
	Power Supply for All Uses (EA)	Yes

2.2 Mapping existing condition

The following maps were developed/used for the study of the existing condition of Belada village:

- Base Map
- Land Use Land Cover Map (Provided by NRSC)
- Road Network Map
- Settlements Map
- Facilities Map
- Digital Elevation Map (Provided by NRSC)

2.2.1 Base Map

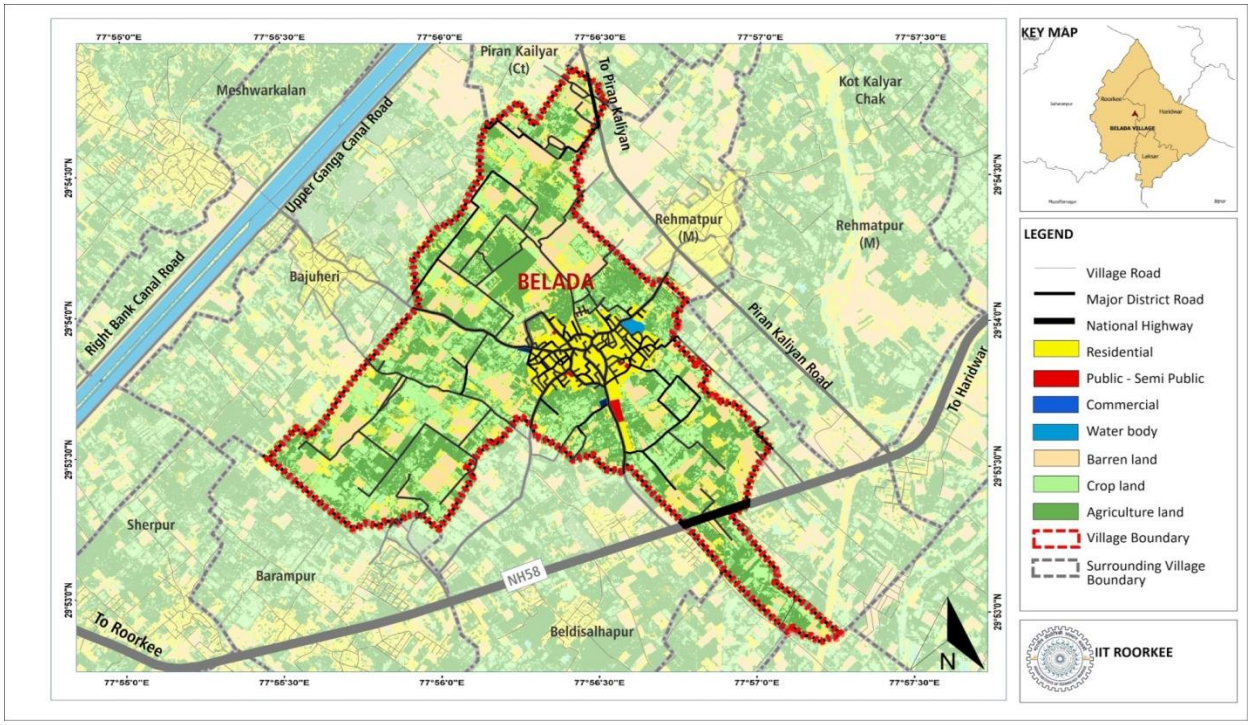


Figure 6 Base Map of Belada

2.2.2 Land Use/Land Cover distribution Map

According to the census 2011 data, the total area of Belada is 395.1 Ha. As per data from NRSC, the land use land cover distribution of the village is shown in Table 6 below.

Table 6 Land Use Land Cover distribution of Belada

Land use / Land cover Class	Area (ha)
Mixed Village Settlement	35.09
Hamlet & Dispersed Household	1.63
Other Rural Built-up Areas	3.57
Peri-Urban	3.98
Transport Network	3.45
Crop Land	371.75
Agriculture Plantation	43.14
Sparse Scrubland	42.51

Dense Scrubland	13.36
Fallow Land	14.58
Forest Plantation	5.26
Lake / Pond	1.19

The distribution of the above-mentioned land covers is shown in Figure 7.

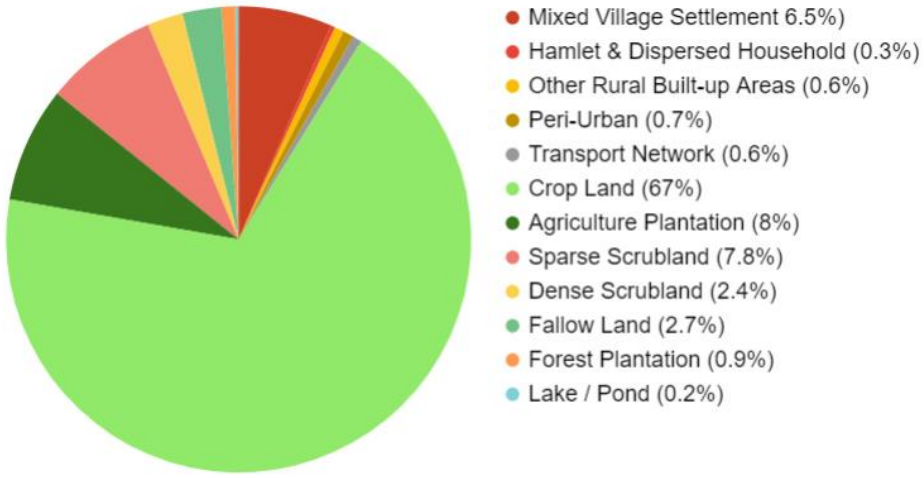


Figure 7 Land Use Land Cover distribution of Belada, ((NRSC data)

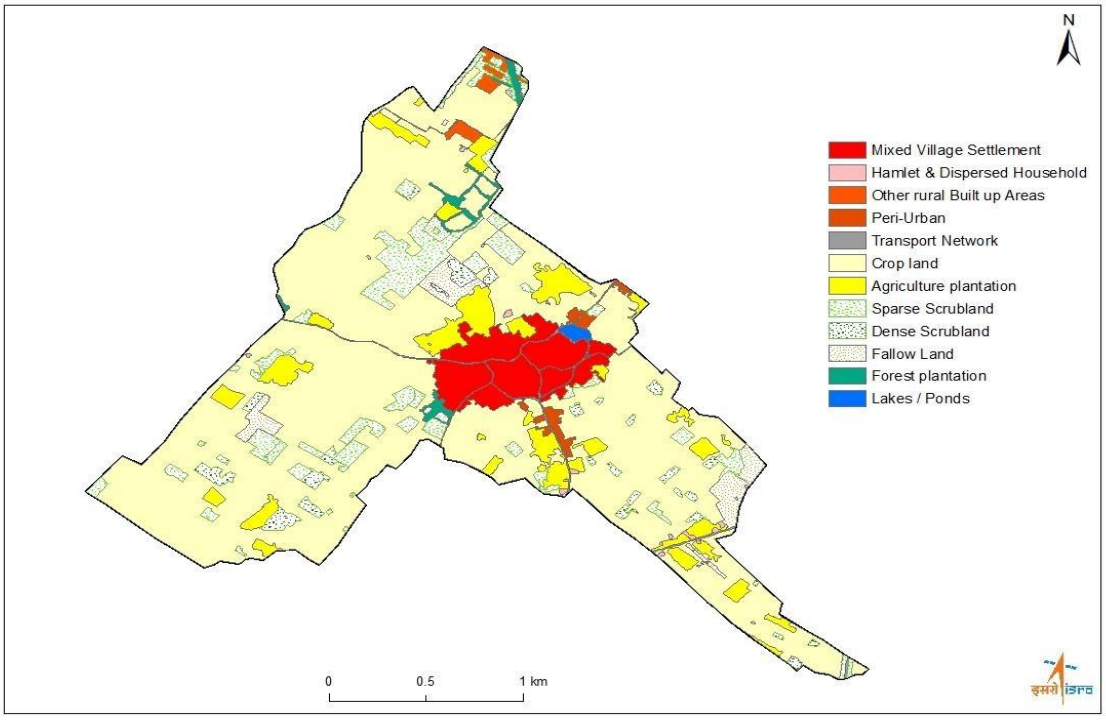


Figure 8 Land Use/Land Cover map of Belada (Source: NRSC)

2.2.3 Road Network Map

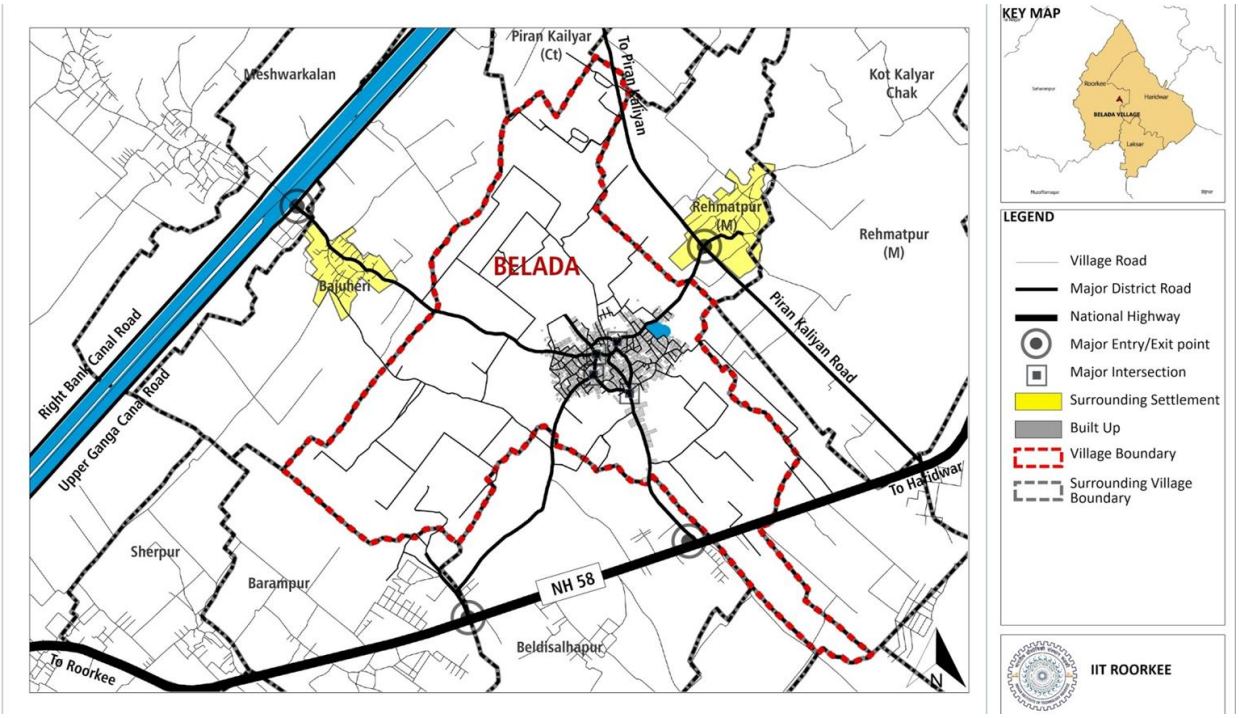


Figure 9 Road Network Map of Belada

2.2.4 Settlements Map

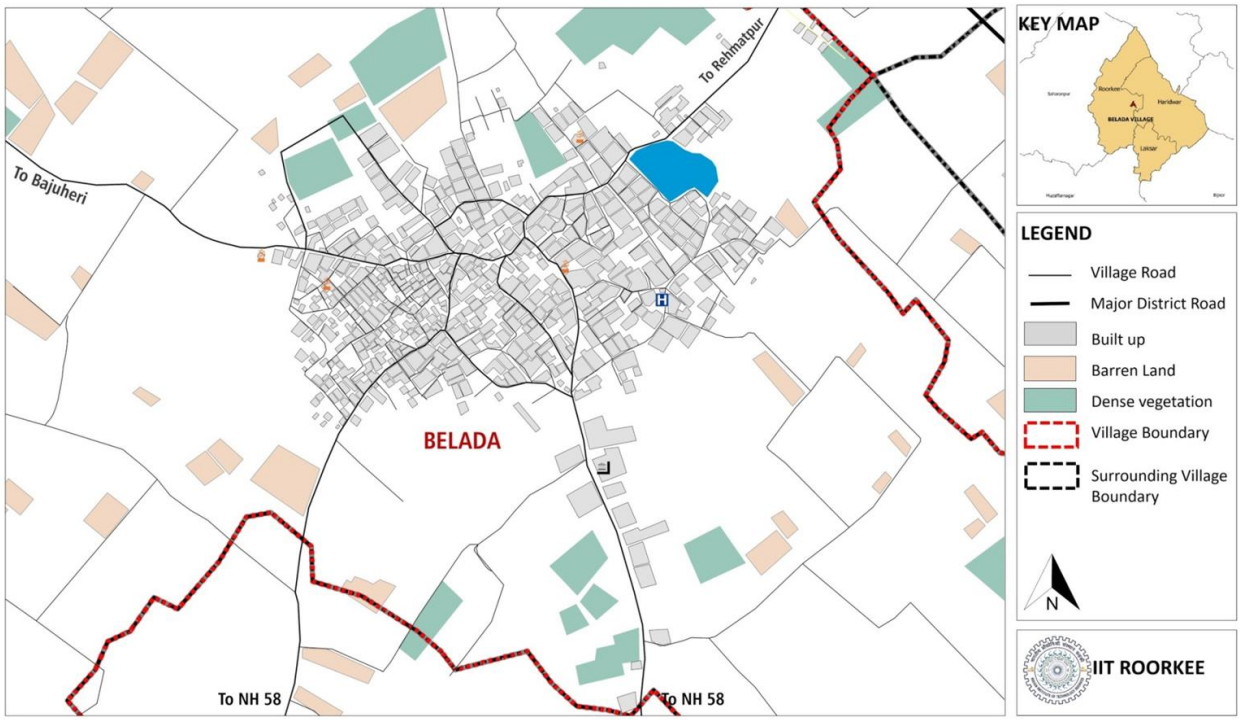


Figure 10 Settlements Map of Belada

2.2.5 Facilities Map

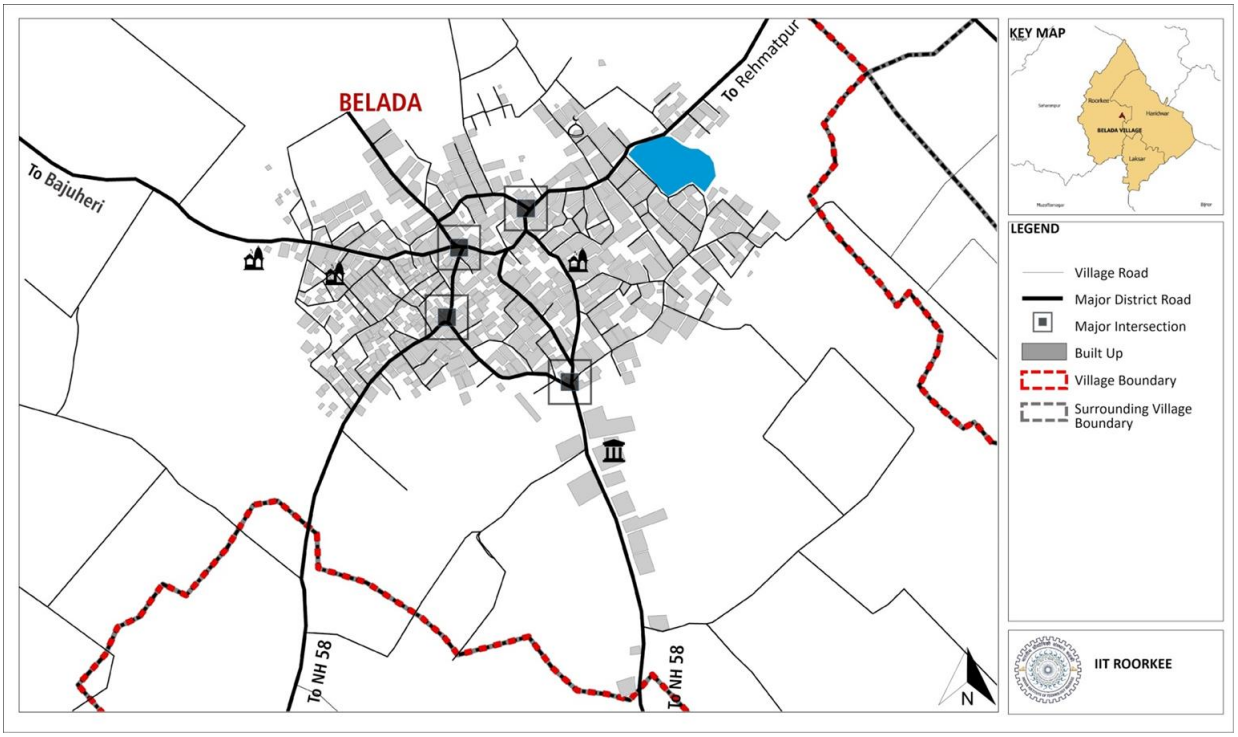


Figure 11 Facilities map of Belada

2.3 Opinion Survey to the Gram Pradhans and Gram Sabha Members

A discussion with the village representative and concerned government officials took place on 20th July 2020 through online mode. A bilingual questionnaire (Annexure 1) was prepared based on different types of infrastructure and facilities targeting the Gram Pradhan and other authoritarians. In total, 14 Gram Panchayats committee members were surveyed using pen paper mode.

Figure 12 IITR Team surveying the Gram Pradhans

2.3.1 Insights for Job generation and growth

The following question was asked in regard to their insights for job generation and growth in the village by 2040:

By 2040, I wish to have the following in my village for **job generation and growth** (Please put 1, 2, 3 only boxes that you wish.
(2040 तक, मैं चाहता हूँ कि मेरे गाँव में नौकरी सृजन और विकास के लिए कृपया (1, 2, 3 केवल वही रखें जो आप चाहते हैं)

i. Large industry (बड़ा उद्योग) ☐
ii. Tourism-based industry (पर्यटन आधारित उद्योग) ☐
iii. A large health facility (एक बड़ी स्वास्थ्य सुविधा) ☐
iv. University (विश्वविद्यालय) ☐
v. Government offices (सरकारी कार्यालय) ☐
vi. Micro and small industry (सूक्ष्म और लघु उद्योग) ☐
vii. Construction industry (निर्माण उद्योग) ☐
viii. Better Agriculture (बेहतर कृषि) ☐

ix. Any other (pl write) (कोई अन्य (कृपया लिखें))_____

_____

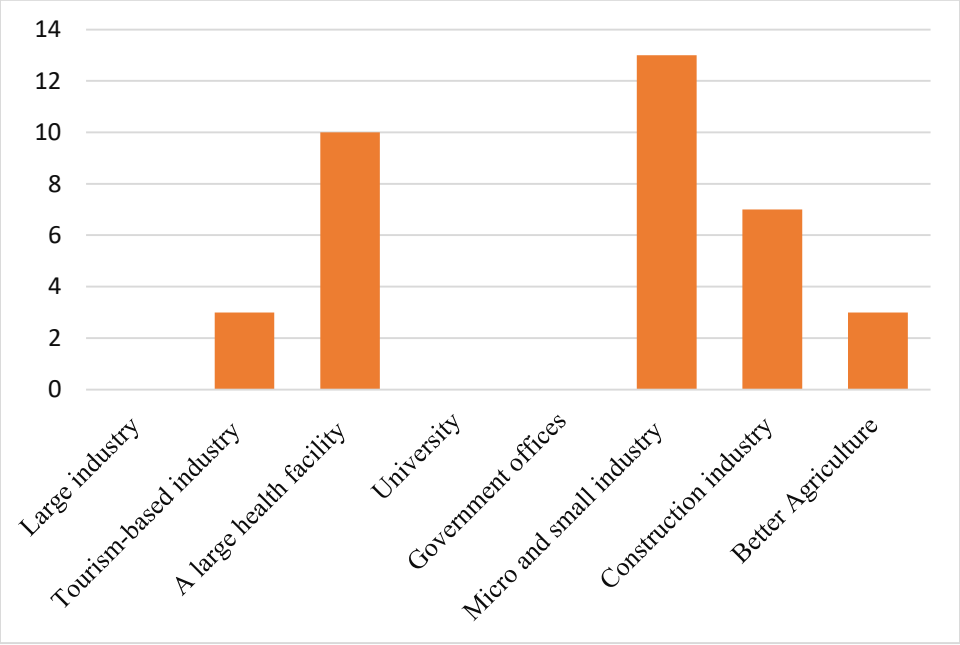


Figure 13 Frequency distribution for priority of having facilities for job generation and growth in the village by 2041

Table 7 Priority scores for employment generation in Belada

Facility	Average score (out of 3)	Total score
Large industry	0.00	**0**
Tourism-based industry	**2.33**	7
A large health facility	**2.10**	**21**
University	0.00	**0**
Government offices	0.00	**0**
Micro and small industry	**2.23**	**29**
Construction industry	1.71	**12**
Better Agriculture	1.67	5

According to the responses (Figure 13 and Table 7), the majority of the respondents opted for having a large health facility, micro and small industry, and construction industry (as per their total scores) for employment generation and growth in the village.

2.3.2 Insights for willingness to share land and compensation

The following question was asked to the respondents to get insight on the willingness to share land in lieu of the following compensation.

For future employment generation and good services, if **land** is required, we are willing to share part of our land with the exchange of (pl tick)

(भविष्य की रोजगार सृजन और अच्छी सेवाओं के लिए, यदि भूमि की आवश्यकता है, तो हम (कृपया सही का निशान लगाएं) के आदान-प्रदान के साथ अपनी जमीन का हिस्सा साझा/आदान प्रदान करने के लिए तैयार हैं।)

i. Financial compensation (आर्थिक छूट) ☐
ii. Job (रोजगार) ☐
iii. Both job and money (नौकरी और पैसा दोनों) ☐
iv. Partnership with the developer (डेवलपर के साथ साझेदारी) ☐

v. Any other (pl write) (कोई अन्य (कृपया लिखें)) _____

_____

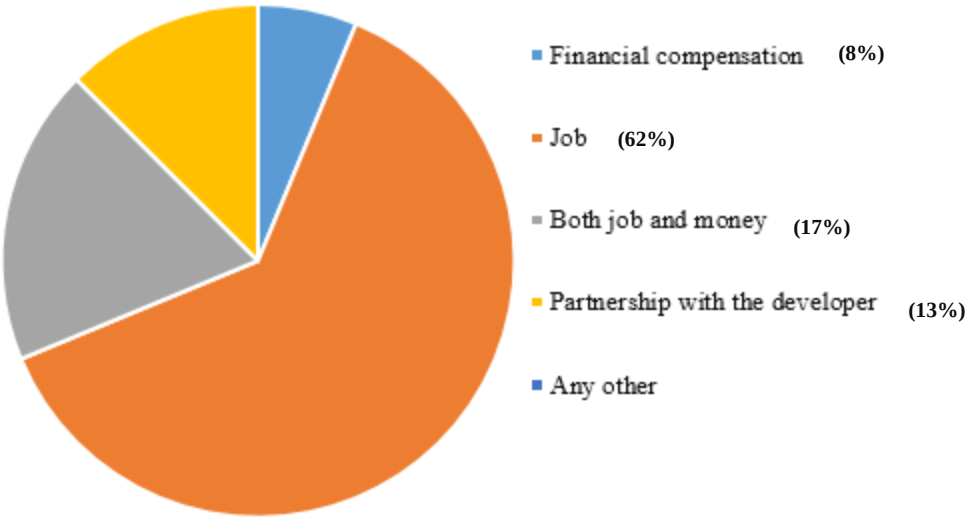


Figure 14 Distribution of Compensation for willingness for land sharing

From Figure 14, it is seen that majority of the respondents willing to share land for infrastructure development of the village want a job in compensation for land sharing.

2.3.3 Insights on Willingness to change occupation

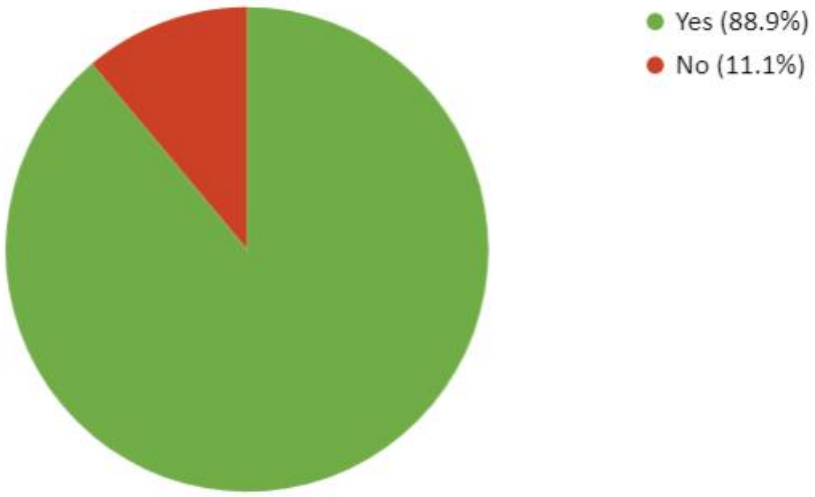


Figure 15 Distribution of respondents willing to change occupation

From Figure 15, it is seen that respondents were asked if they were willing to change their occupation if they are provided jobs in and around the village. 88.9% of the respondents are willing to change their occupation to be in and around the village.

2.3.4 Assessment for the condition of existing facilities

The respondents were asked to rate the condition of a list of facilities in the village on a scale of 1 to 5, where,

1: Absent

2: Poor condition

3: Fair condition

4: Good condition

5: Very good condition

The total scores and geometric mean for each of the facilities were calculated to find the facility(s) with best condition on the basis of the responses.

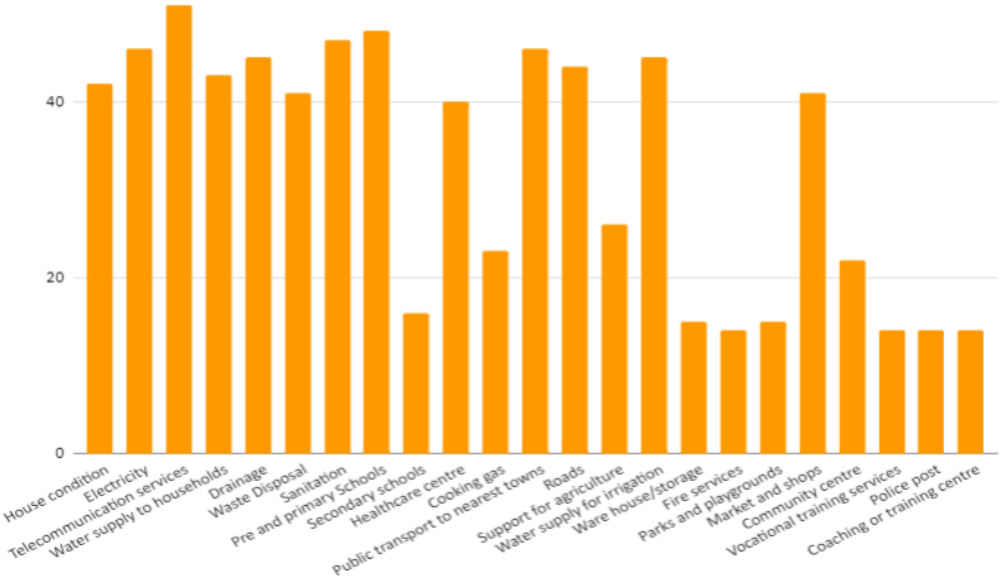


Figure 16 Bar graph showing condition of facilities on the basis of total score

Table 8 Assessment score of the facilities in Belada

Facility	Total score	Geomean (out of 5)
House condition	42	2.90
Electricity	46	3.26
Telecommunication services	**51**	**3.89**
Water supply to households	43	2.93

Drainage	45	3.16
Waste Disposal	41	2.87
Sanitation	**47**	**3.53**
Pre and primary Schools	**48**	**3.38**
Secondary schools	16	1.08
Healthcare centre	40	2.81
Cooking gas	23	1.51
Public transport to nearest towns	46	3.16
Roads	44	3.17
Support for agriculture	26	1.67
Water supply for irrigation	45	3.16
Ware house/storage	15	1.05
Fire services	**14**	**1.00**
Parks and playgrounds	15	1.05
Market and shops	41	2.78
Community centre	22	1.43
Vocational training services/ Skill Development Centre	**14**	**1.00**
Police post	**14**	**1.00**
Coaching or training centre	**14**	**1.00**

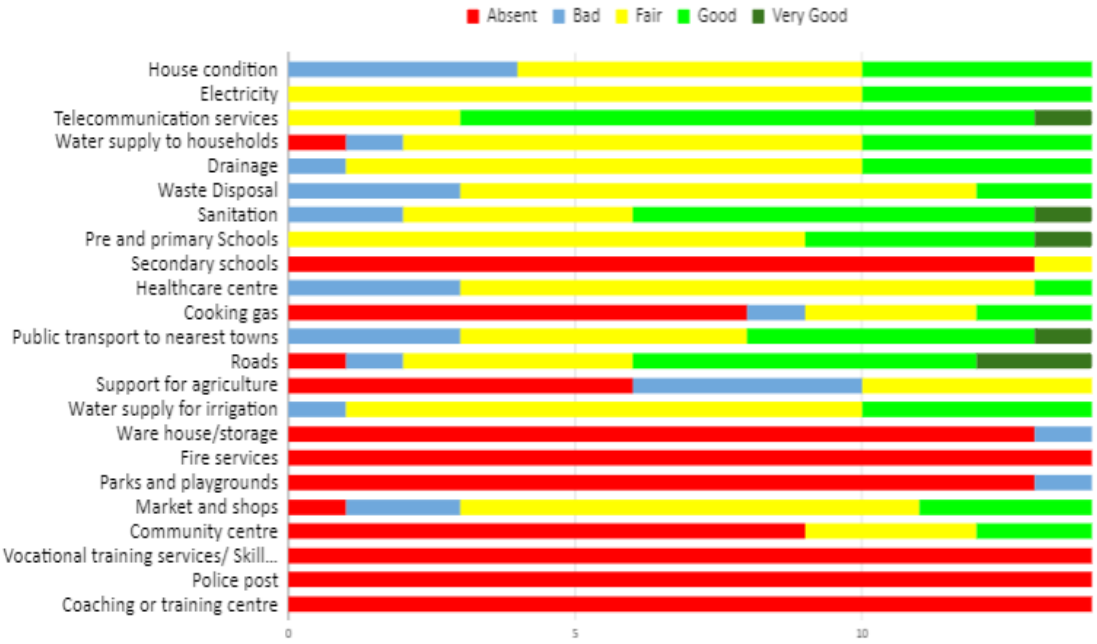


Figure 17 Distribution of rating of condition of the facilities

According to the responses (Figure 16, 17, Table 8), telecommunication services, sanitation and preprimary and primary schools are in better condition compared to other facilities and fire services, vocational training services, police post and coaching or training centre are in poorer conditions compared to other facilities.

2.3.5 Priority for improvement of conditions

The respondents were asked to rate on a scale of 1 to 5, to rate their priority for improvement of the conditions of a list of facilities, where,

1: Not required

2: Less Priority

3: Medium Priority

4: High Priority

5: Very High Priority

Table 9 Priority scores for improvement of condition of facilities in Belada

Facility	Geomean (out of 5)	Total score
Permanent House	3.085417	44
Electrification	**2.617491**	**38**
Telecommunication services	**2.199974**	**33**
Water supply to households	3.43508	49
Drainage	3.471136	52
Waste Disposal	3.945062	56
Sanitation	**4.3119**	61
Schools	**4.920938**	**69**
Healthcare centre	**4.431093**	**63**
Cooking gas	3.667424	52
Public transport	2.500344	**37**
All weather roads	3.105967	47
Support for agriculture	3.12943	48
Water supply for irrigation	3.263616	49
Ware house/storage	3.031245	47
Fire services	**2.379566**	**37**

Parks and playgrounds	4.304601	**62**
Market and shops	3.033935	44
Community centre	3.678134	53
Vocational training services/ Skill Development Centre	**4.920938**	**69**
Police post	1.10409	17
Coaching or training centre	5	70

The survey responses (Figure 18, 19, Table 9) show that facilities such as sanitation, schools, healthcare centres, training centres are highly prioritized for improvement, whereas, facilities such as fire services, public transport, electrification and telecommunication services are least prioritized for improvement.

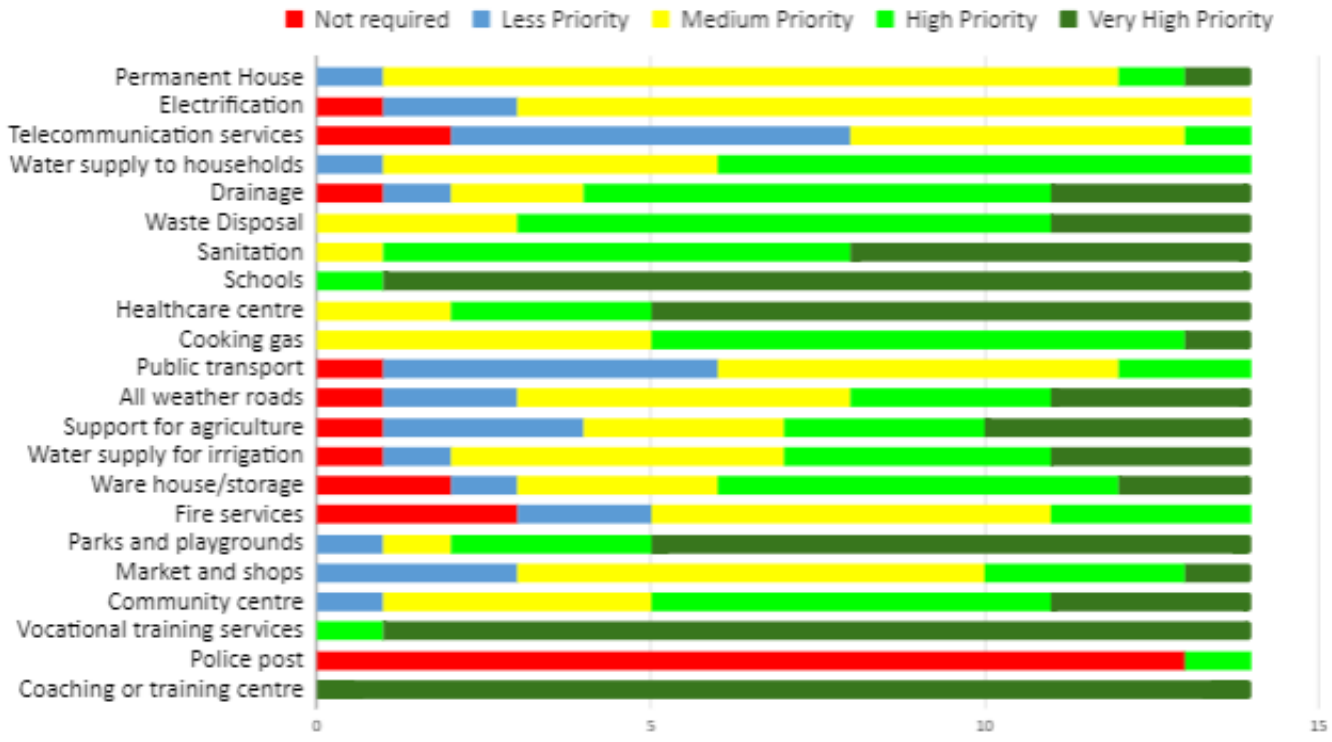


Figure 18 Distribution of rating of priority for the facilities to be improved

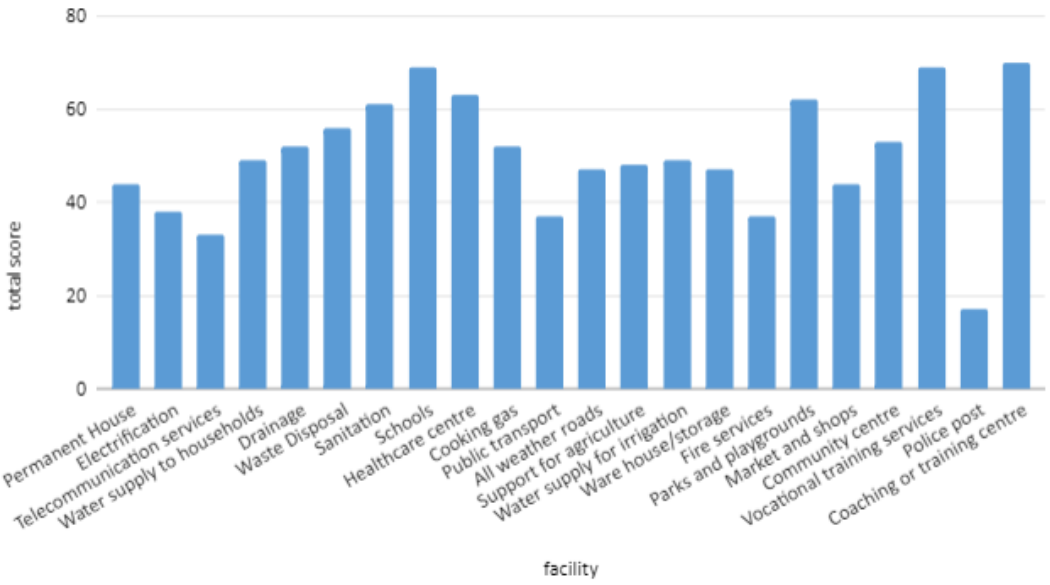


Figure 19 Distribution of priority of the respondents to improve condition of facilities on the basis of total scores

2.4 Household Surveys

A team from IIT Roorkee consisting of 6 members visited Belada village to carry out infrastructure inventory survey and household survey of the residents in the villages. The household survey was done using the GPSDP Survey smartphone application developedby National Remote Sensing Centre (NRSC), a primary centre of Indian Space Research Organisation under the agis of Ministry of Panchayati Raj in 2020.A total of 342 households (more than 15% of total households) were surveyed by the team over a span of 07 days. Along with structured survey, a systemic photographic survey was also deployed by the survey team to capture the existing scenario of the infrastructure.

2.4.1 Types of the structure of houses

Based on their type of structure, the houses were classified under 1) their type of built up i.e. Pucca, Semi Pucca or Kachcha houses, 2) material used for roofing of the houses like concrete, mud, tin, thatch, etc., and 3) height of the houses, i.e. number of storeys.

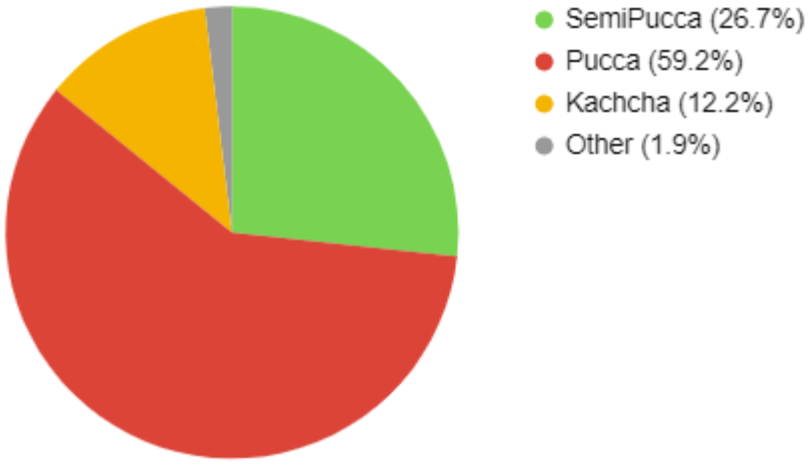


Figure 20 Distribution of types of structure of houses

As shown in the above Figure 20, majority of the houses in the village are pucca houses, followed by semi pucca and kachcha houses. Although almost 60% of the houses are pucca houses, there are still 12.2% of kachcha houses in the village.

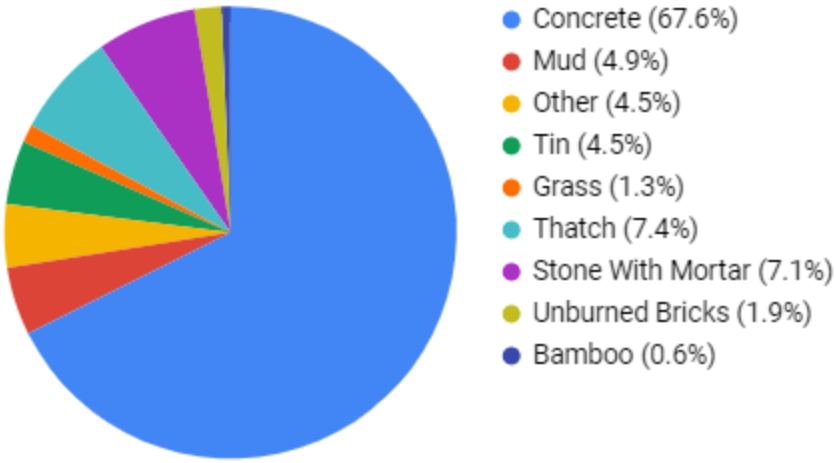


Figure 21 Distribution of houses with types of roof materials

As shown in the above Figure 21, a wide variety of materials are used for roofing the houses of the village. Concrete being the most widely used roofing material in almost 68% of the houses, which is in line with the presence of 60% of pucca houses in the village. Bamboo and grass are the least used roofing materials.

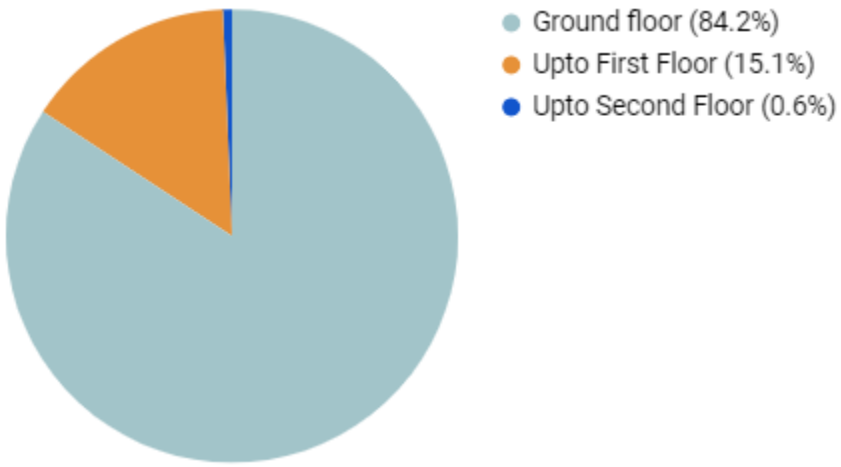


Figure 22 Distribution of heights of houses

As shown in the above Figure 22, most of the houses are either single or double storeyed. Almost 84% of the houses are single storeyed and 15% of the houses are double storeyed.

2.4.2 Physical Infrastructure

The following section describes the condition of access to physical infrastructure including water supply, electricity supply, solid waste management, and sanitation of the houses based on 1) availability of the infrastructure, 2) continuity of the available infrastructure, 3) type of facility of the infrastructure.

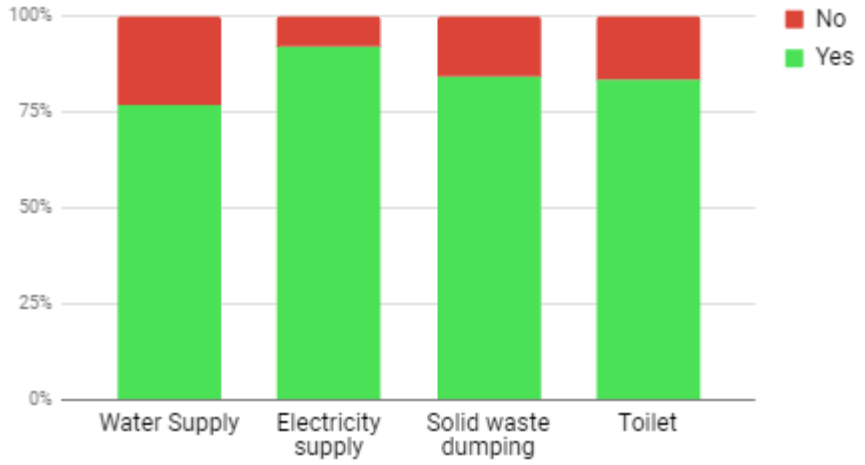


Figure 23 Distribution of availability of physical infrastructure

Figure 23 shows that more than 75% of the houses have access to the above mentioned physical infrastructure. In the village, water supply is in form of public tap, private tap, hand pump, or submersible pump. Solid waste dumping is in the form of open dumping or cart collecting.

Provision of sanitation is available in the forms of public, private, community or open defecation toilets.

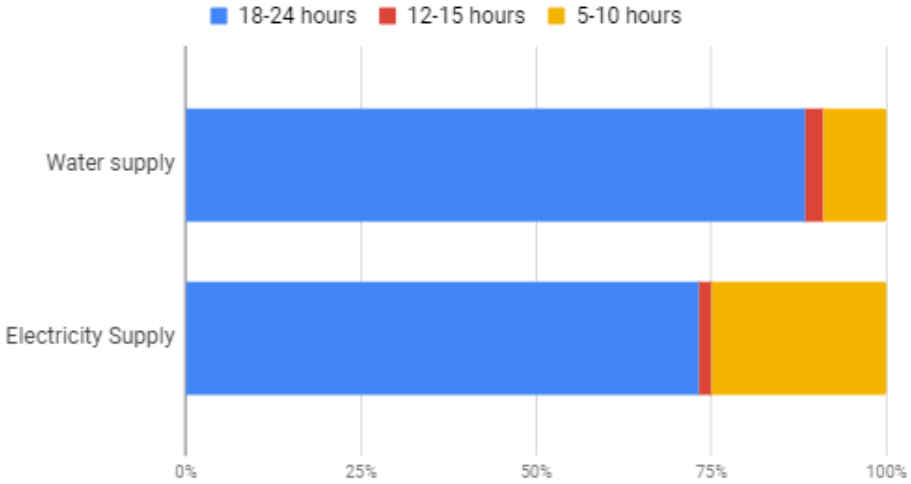


Figure 24 Status of continuity of water and electricity supply to the houses

As shown in the Figure 24, the continuity of water and electricity supply to the houses. It is seen that almost 90% of the houses have water supply for 18-24 hours a day and that less than 75% of the houses have 18-24 hours of electricity supply in a day.

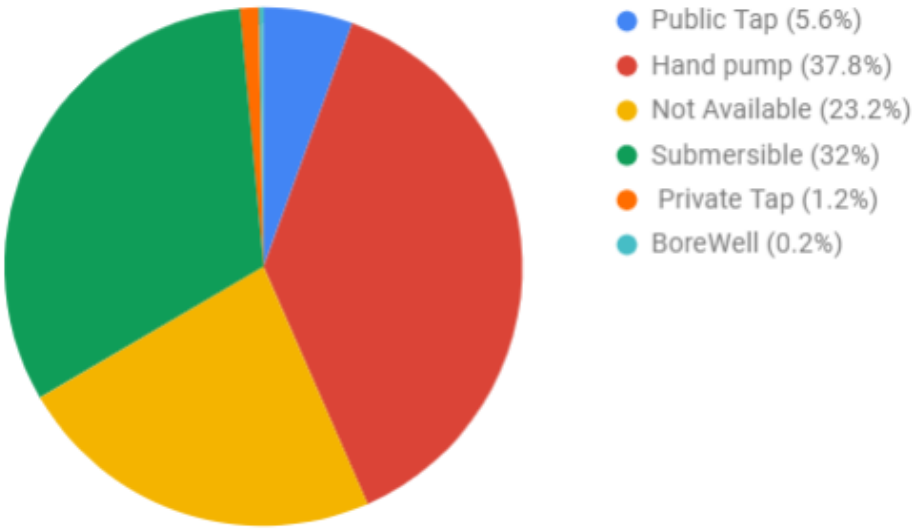


Figure 25 Distribution of types of water supply to the houses

As shown in the above Figure 26, only 1.2% of the houses have private tap for water supply and that majority of the households are dependent on hand pumps and submersible pumps for water supply.

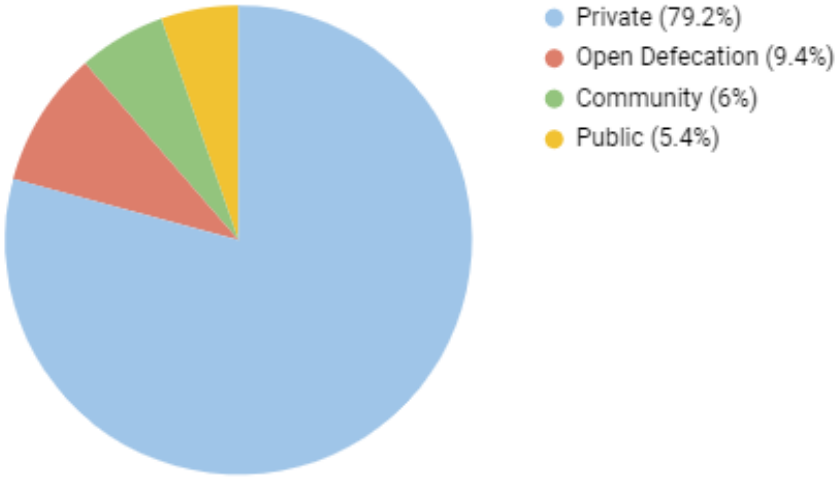


Figure 26 Distribution of types of toilets among households

As shown in the above Figure 27, almost 80% of the houses have a private toilet, however, almost 10% of the households still use open defecation which needs attention to

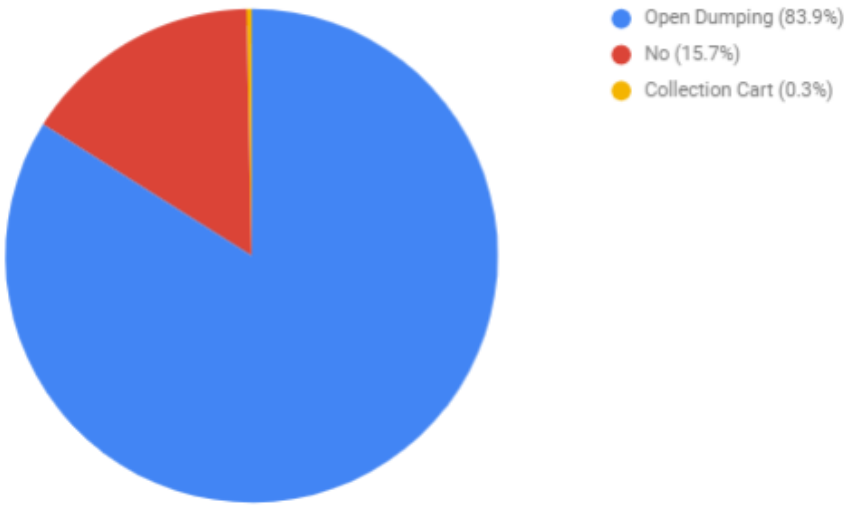


Figure 27 Distribution of types of solid waste disposal among the households

As shown in the above Figure 28, it is seen that majority of the households (83.9%) use open dumping for solid waste disposal and only 0.3% of the households have facility of collection cart of solid waste.

2.4.3 Communication and transport facility

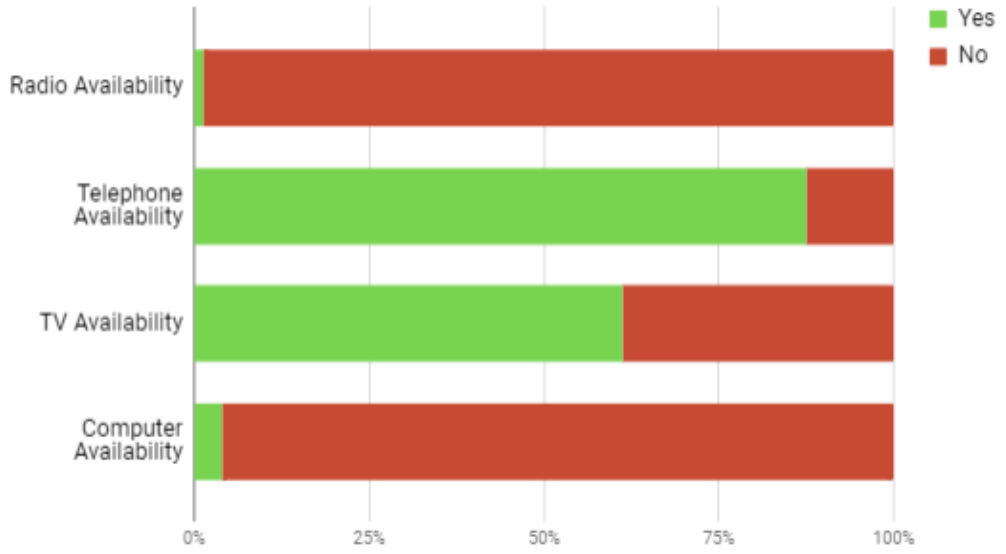


Figure 28 Distribution of communication facilities

As shown in the above Figure 29, majority of the households (almost 90%) have telephone connectivity as their medium of connection. However, the shares of households with Television and computer availability are as low as 60% and 5% respectively.

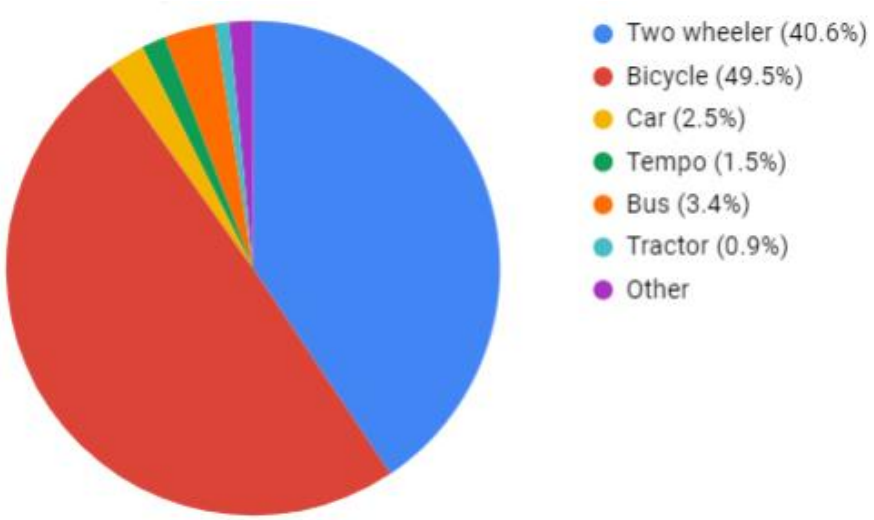


Figure 29 Distribution of access to types of transport modes

As shown in the above Figure 30, almost 50% of the households are dependent on bicycle as their mode of transportation, followed by 40% of the households depending on two wheelers. The share of public transport including bus and tempo is quite low, as low as 5%.

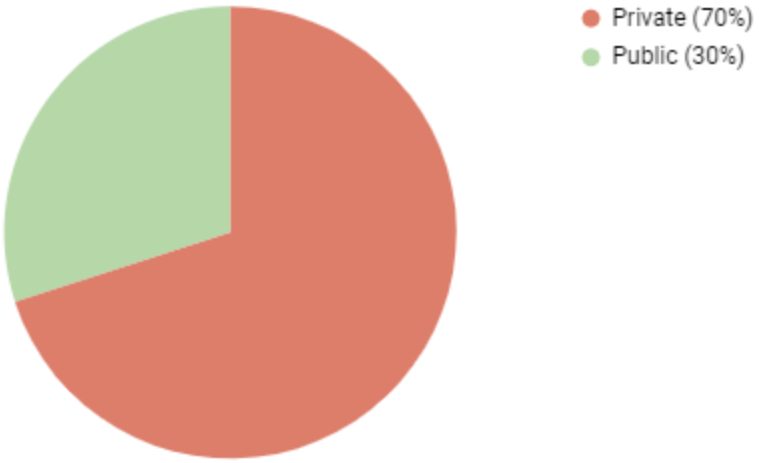


Figure 30 Distribution of Mode of Travel to hospital

Similar to previous finding this Figure 31 shows that 70% of the households depend on private transport to visit healthcare facilities.

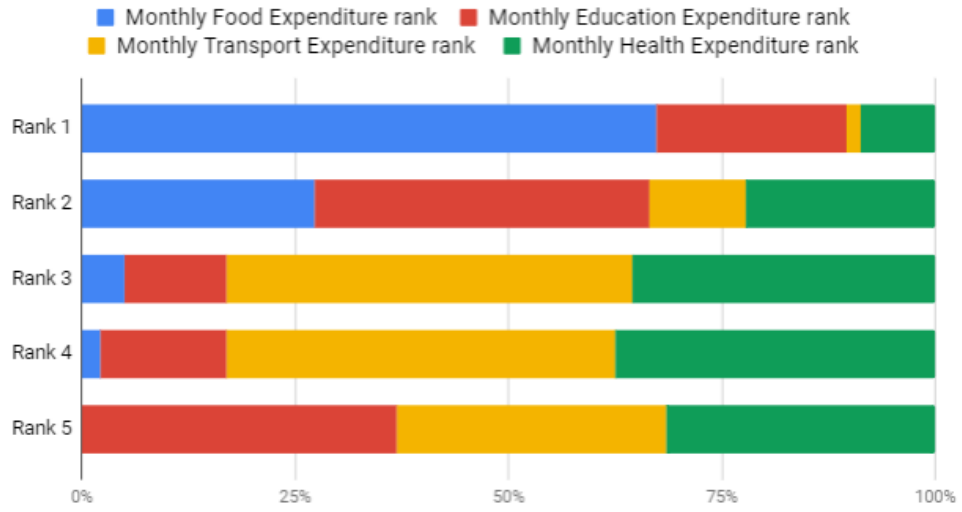


Figure 31 Ranking of monthly expenditures

It is seen from Figure 32 above that among monthly expenditure on food, education, transport and healthcare, majority of the households, almost 65%, rank first their monthly expenditure on food i.e. spend most on food, and almost 38% of the households spend on education next to food.

2.5 Infrastructure Inventory Survey

A team of IIT Roorkee did an infrastructure inventory survey of the villages. The visuals from the survey are shown below with their brief explanations.

2.5.1 Housing conditions

A mixture of pucca, semi pucca and Kachcha houses are present in the village, with a majority of pucca houses. Figure 32, Figure 33, Figure 34 and Figure 35 show the types of houses in the village.

Figure 32 Single and double storey Pucca houses in the village

Figure 33 Semi pucca houses in the village, Source- IITR survey team

Figure 34 Kuchcha houses in the village, Source- IITR survey team

Figure 35 Dilapidated housing condition of poor rural people, Source- IITR survey team

4.5.2 Drainage and sanitation conditions

The majority of the households have access to toilets. However, open drainage systems are very common in the village. Figure 36, Figure 38 and Figure 38 show the drainage and sanitation conditions of the village.

Figure 36 Uncovered drainage

Figure 37 Households with no toilet facility

Figure 38 a) Wastewater overflow on road, b) Lack of proper drains, c) uncovered drains

4.5.3 Solid Waste Management

The majority of the households use open dumping to discard solid wastes generated.

Figure 39 Open dumping as Solid Waste Management in the village

4.5.4 Road connectivity

The majority of the roads are pucca roads, with varying Right of Ways (RoW) in a hierarchal setup, usually with wider and well-maintained roads connecting the village to other villages and towns, followed by less wider roads near the major nodes of the village, followed by less wider roads to the houses. Some of the access roads to the houses are as narrow as 1m with little or no vehicular access.

Figure 40 Wide road at main node of village

CC road connecting to nearby village

Figure 41 Houses with varying accessibility

Figure 42 Cement concrete (CC) roads to the agricultural land

3. PROJECTION, ESTIMATION AND RECOMMENDATIONS FOR BELADA

3.1 Population Projections

Population is projected for 20 years i.e. until 2041, using ratio methods, considering three scenarios of growth similar as current growth rate, moderate growth and accelerated growth. The current decadal growth rate is 1.6, moderate decadal growth rate considers 20% increase in decadal growth rate and accelerated growth considers a decadal growth rate of 25%. The Table 10 below shows the projected population with three scenarios.

Table 10 Population projections for Belada

Population in 2001	5536 (Census 2001)
Population in 2011	7185 (Census 2011)
Population in 2020	11,761 (Gram Pradhan)
Scenario 1, using current growth rate	
Population in 2031	**18,818**
Population in 2041	**30,109**
Scenario 2, using moderate growth rate	
Population in 2031	**22,346**
Population in 2041	**51,396**
Scenario 3, using accelerated growth rate	
Population in 2031	**29,402**
Population in 2041	**73,506**

The calculation details of the population projection is shown in Annexure 3. With discussion with Gram Pradhan and considering a practical approach of population growth, Scenario 1 and Scenario 3 are eliminated as they are more extreme cases. Therefore, a moderate population growth rate is considered for further estimations and proposals.

3.2 Infrastructure estimations

The estimations are based on URDPFI and RADPFI Guidelines

Table 11 Infrastructure estimations for the projected population of Belada

Social infrastructure	Population served per unit	Total Requirement in 2041 (No.s) (X)	Existing No.s (Y)	Additional No.s required (X-Y)	Additional Land area required (Ha)
Education					
Pre Primary, Nursery School	2500	20	1	19	1.52
Primary School (class I to V)	5000	10	2	8	3.2
Senior Secondary School (VI to XII)	7500	7	0	7	12.6
Healthcare					
Dispensary	15000	3	0	3	0.3
Nursing home, child welfare and maternity centre	45000 to 1 lakh	1	1	0	0
Family Welfare centre	50,000	1	1	0	0
Diagnostic centre	50,000	1	0	1	0.08
Socio-cultural					
Anganwadi - Housing area/ cluster	5000	10	1	9	0.18
Community Room	5000	10	1	9	0.68
Community hall, mangalkaryayala, barat ghar/ library	15000	3	1	2	0.4
Religious Facility	5000	10	6	4	
Open spaces and Sports facilities					
Local parks	5000	10	0	10	5
Community playgrounds	15000	3	0	3	3
Residential unit play area	5000	10	0	10	5
Neighbourhood Play area	15000	3	0	3	4.5
Distribution services					

Milk distribution	5000	10	0	10	0.15
LPG Godown/ Gas godown	40000 to 50000	1	0	1	0.05
Commercial centres					
Convenience Shopping	5000	10	0	10	1.5
Local shopping including service centre	15000	3	0	3	1.38
Weekly Markets	50000	1	0	1	0.4
Communication facilities					
Post office counter without delivery (Flo or area to be provided in local shopping c entre)	15000	3	1	2	0.016
Bank with extension counters with ATM facility	15000	3	1	2	0.016
Police, Civil Defence and Home Guards					
Police Post	40000-50000	1	0	1	0.16

Physical infrastructure

Population projection for 30 years (2051): 20,522- 35,857		
Infrastructure	Unit requirement	Requirement for 2041
Water supply	Recommended maximum water supply levels (lpcd) : 70	3.6 MLD
Land requirement	0.1 Ha for upto 5MLD, 0.19 Ha for upto 10MLD	< 0.1 Ha
Sewerage and sanitation	Recommended wastewater flow: 80% of water supply	2.88 MLD
Land area requirement for sewage treatment (Sludge drying beds and waste stabilization pond)	0.8-2.3 Ha/MLD	4.5 Ha

Electricity	1 electric substation of 11KV for 15000 population	3 electric substation of 11KV
Solid Waste Management	Waste generation per capita per day: Residential : 0.3-0.6kg/capita/day + 30% of residential waste	30 TPD
Recommended solid waste treatment technique: Biomethanation		

Summary of area requirements

The Table 12 below shows the summary of area requirements based on the predicted population projection and corresponding infrastructure estimations. The area requirements for the time span of 2021-2031 is calculated using normative approach.

Table 12 Summary of area requirements nased on projections and estimations for Belada

Category	**Existing area 2021**	**Area Required 2021-2031 (Additional Population size 10,585)**	**Area Required 2031-2041 (Additional population size 29,050)**
Residential	31.21 Ha	26.4 Ha	@400 persons/Ha = 75 Ha
Social Infrastructure (Education/ institution/ healthcare/ recreation)		10 Ha	30.3 Ha
Physical Infrastructure (Electricity/Water supply/ drainage/ solid waste management as per URDPFI guidelines)		4 Ha	8 Ha
Road Network		7 Ha (@10-15% of total area)	20 Ha (@10-15% of total area)
Industrial		2-3 Ha (@5% of total area)	5 Ha
Total area requirement		**50 Ha**	**136Ha**

3.3 Recommendations

Based on the primary survey, available infrastructure setting, natural resources, and villagers' aspiration to have a better living, a spatial panning is prepared for years to come to better utilize the development potential of Belada village. Accordingly, a land suitability analysis has been performed to map agriculture and non-agriculture development down the line of 20-30 years. Not only maximize the potential of advanced agriculture and housing the future population, but also the focus was given to promote the indigenous agro-based, craft, and small-scale industry-based products to local, national, and international markets during the planning. Preservation of green open space and water bodies was one of the key considerations during the analysis. Accordingly, the development area is planned in various zones, as described below in detail (Figure 44).

3.3.1 Land suitability and availability

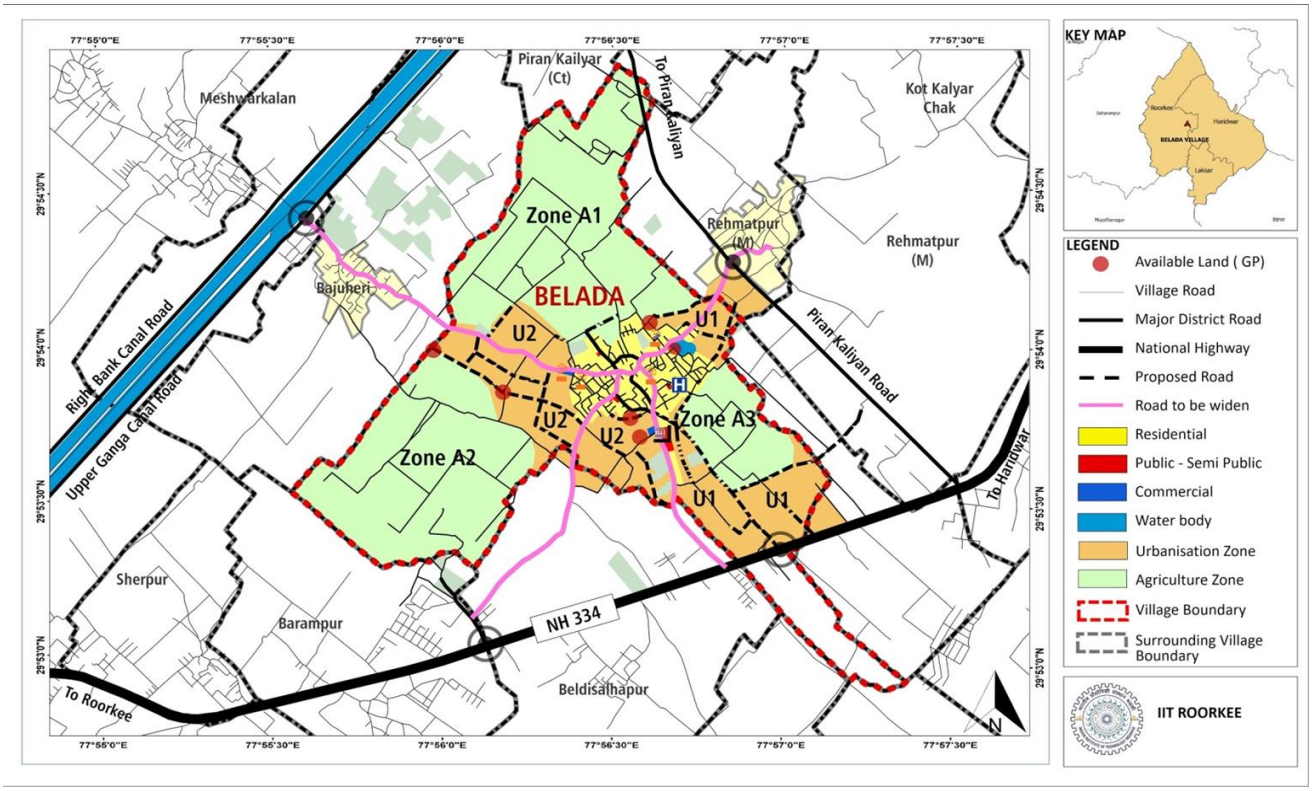


Figure 43 Proposed zoning for Belada

3.3.2 Broad zoning

- Zone A1, A2= Agriculture priority zone

These zones are primarily meant to focus and improve agricultural practices in the village. These zones are proposed to be independent zones for revamped agriculture and supporting facilities like training and skill development.A maximum of 10% non-agricultural uses is allowed only in barren land except cultivators own residence in this zone.

- Zone A3= Agriculture promotion zone

This zone is also focused on agricultural development but with primary focus on supporting facilities for promoting agriculture in the village. Uses such as agriculture promotion offices, market linking, prototyping, placement office are proposed in this zone. A maximum of 20% non-agriculturaluse is allowed including cultivators own residence in this zone.

- Zone U1= Urbanisation priority zone

Unlike zones A1, A2 and A3, this zone is focused towards non-agricultural employment generation and investment in the village. Uses such as institutional, small/medium industries, land banking, training centres, etc. are proposed in this zone. A maximum of 50-60% of urbanisation is allowed in the available pockets, mixed use for flexibility. Zone U1 is the priority zone for urbanisation in phase 1 i.e. in first 5-10 years.

- Zone U2= Urbanisation for 2041

The proposed uses for this zone is similar to that of zone U1, however to be implemented at a later phase i.e. in the next 10-20 years.

3.3.3Strategic recommendations:

- Widening of four major connecting roads to 24 m
- Development of selective new road using land readjustment
- Development four major intersections in the periphery
- Agriculture promotion in the transitional areas of zone A and zone U
- Retaining green and landscaping in the new roads
- Develop Panchayat capacity in phases to handle core services (WS/SWM/Sanitation/Road)

- Initiate a Village Celebration Day
- Consultation group with neighbouring GP Pradhans and state officials including HRDA
- New road sections suitable for flexible expansion of villages, including common parking

3.3.4 Indicative investment planning

The indicative planning for investment for the required physical and social infrastructure is shown below, where,

P1: 0-5Years (Phase 1)
P2: 5-10 Years (Phase 2)
P3: 10-15 Years (Phase 3)
P4: 15-20 Years (Phase 4);
U1: Urbanisation Priority zone
U2: Urbanisation Priority Zone for 2041
A1, A2: Agriculture priority zone
A3: Agriculture promotion zone

Table 13 Indicative investment planning for social infrastructure

Social infrastructure	Existing No.s	Additional No.s required	Suitable proposed zone	Phase	Existing Schemes/ investments	Remarks
Education						
Pre Primary, Nursery School	1	19	U1&U2	P1, P2	• Atal Adarsh Gram Yojna; • Sarva shiksha abhiyan; • Mid day meal	
Primary School (class I to V)	2	8	U1 U2	P1, P2 P3, P4		
Senior Secondary School (VI to XII)	0	7	U1 U2	P1, P2 P3, P4		
Healthcare						
Dispensary	0	3	U1	P1	• National Rural health mission; • Universal Health Insurance Scheme	
Nursing home, child welfare and maternity centre	1	0	-			
Family Welfare centre	1	0	-			
Diagnostic centre	0	1	U1	P1		

Socio-cultural						
Anganwadi - Housing area/ cluster	1	9	U1 U2	P1, P2 P3, P4	• Deen Dayal Upadhyaya Grameen Kaushalya Yojana (DDUGKY); • Poshan Abhiyaan	
Community Room	1	9	A2 U1 U2	P1, P2 P1, P2 P3, P4	• Shyama Prasad Mukherji Rurban Mission (NRuM); • Deendayal Antyodaya Yojana – National Rural Livelihoods Mission	
Community hall, mangalkaryayala, barat ghar/ library	1	2	U1	P1		
Religious Facility	6	4	U1 U2	P1, P2 P3, P4		
Open spaces and Sports facilities						
Local parks	0	10	U1 U2	P1, P2 P3, P4	• Atal Adarsh Gram Yojna; • Shyama Prasad Mukherji Rurban Mission (NRuM); • Vidhayak Nidhi (Schemes Under DDO Office); • Members of Parliament Local Area Development Scheme (MPLADS) (Schemes under DRDA Office)	
Community playgrounds	0	3	U1	P1		
Residential unit play area	0	10	U1 U2	P1, P2 P3, P4		
Neighbourhood Play area	0	3	U1	P1, P2		
Distribution services						
Milk distribution	0	10	A2	P1, P2	• External funding	
LPG Godown/ Gas godown	0	1	U1	P1		
Commercial centres						
Convenience Shopping	0	10	A2 U1 U2	P1 P1, P2 P3, P4	• Integrated Scheme for Agricultural Marketing (ISAM)	
Local shopping including service centre	0	3	A2, U1	P1		

Weekly Markets	0	1	A2	P1	• Deendayal Upadhyay SahKarita Kisan Kalyan Yojana; • Integrated Scheme for Agricultural Marketing (ISAM); • Mukhymantri swarojgar yojna (MSY)	
Communication facilities						
Post office counter without delivery(Floor area to be provided in local shopping centre)	1	2	U1	P1	• External funding	
Bank with extension counters with ATM facility	1	2	U1	P1		
Police, Civil Defence and Home Guards						
Police Post	0	1	U1	P1	• External Funding	

Table 14 Indicative investment planning for Physical infrastructure

Physical infrastructure					
Infrastructure	**Unit requirement**	**Requirement for 2041**	**Existing Schemes/ investments**	**Phase**	**Remarks**
Water supply	Recommended maximum water supply levels (lpcd) : 70	3.6 MLD	• Atal Adarsh Gram Yojna	P1	
Sewerage and sanitation	Recommended wastewater flow: 80% of water supply	2.88 MLD	• New National Biogas Organic Manure Programme (NNBOMP); • Atal Adarsh Gram Yojna; • Shyama Prasad Mukherji Rurban Mission (NRuM)	P1	

Electricity	1electric substation of 11KV for 15000 population	3 electric substation of 11KV	• Atal Adarsh Gram Yojna; • Shyama Prasad Mukherji Rurban Mission (NRuM)	P1,P2	
Solid Waste Management	Waste generation per capita per day: Residential : 0.3-0.6kg/capita/day + 30% of residential waste	30 TPD	• Atal Adarsh Gram Yojna; • Shyama Prasad Mukherji Rurban Mission (NRuM)	P1	

Table 15 Indicative investment planning for other major land uses

Other major land uses			
Land Use	**Existing Schemes/ investments**	**Phase**	**Remarks**
Residential	• State Credit Cum Subsidy Gramin Awas Yojana (CCS); • Dendayal Uttarakhand Gramin Awas Yojana; • Pradhan Mantri Awaas Yojana-Gramin(PMAY-G)	P1, P2, P3, P4	
Road Network	• Mera Gaon Meri Sadak (MGMS); • Pradhan Mantri Gramin Sadak Yojana (PMGSY)	P1	
Industrial	• Deen Dayal Upadhyaya Grameen Kaushalya Yojana (DDUGKY); • Deendayal Antyodaya Yojana – National Rural Livelihoods Mission; • Rural Self Employment Training Institutes; • Mukhymantri Swarojgar Yojna (MSY)	P1, P2, P3, P4	
Agriculture (A1,A2, A3)	• International Fund For Agriculture Development (IFAD); • Mukhymantri swarojgar yojna (MSY);	P1, P2, P3, P4	

	• Deendayal Upadhyay SahKarita Kisan Kalyan Yojana; • Integrated Scheme for Agricultural Marketing (ISAM); • Horticulture Mission for North East & Himalayan States; • Macro Management of Agriculture (MMA) Scheme; • National Food Security Mission (NFSM); • National Horticulture Mission (NHM); • Pradhan Mantri Kisan Samman Nidhi (PM-KISAN) Scheme; • Rashtriya Krishi Vikas Yojana (RSVK)		

Spatial Planning for Rural Areas
A pilot study of Uttarakhand villages (*Belada* and *Chharba*)

Section **C**:
Spatial Planning for Chharba

Contents

SPATIAL PLANNING FOR CHHARBA SUMMARY

Chharba is a village in the district Dehradun of Uttarakhand state of India. It is primarily in the foothill region of the state and is spread over an area of 1567.90 Ha. The total population of the village as per 2011 Census is 7268 with 1425 households. The major access road of this village is NH 72 and the nearest major towns are Vikasnagar and Dehradun. In the existing condition, the village has well established road network. However, a large healthcare facility, major construction industry and vocational training centres are prioritized for future development. With a projected population of about 46,000 in 2041, almost two times of existing built up area requirement is estimated by 2041. With multiple meetings and discussions with the village representatives, household surveys and questionnaire surveys, their aspirations and vision were identified. In accordance with their aspirations and in compliance to the objectives led by the Ministry of Panchayati Raj, four broad zones are proposed viz., U1, U2, A1, and A2. Where U1 and U2 are the Urbanisation priority zones for 2031 and 2041 respectively, and A1 and A2 are agricultural priority zones.

1. STUDY AREA PROFILE

1.1 Location and setting

Chharba

Chharba is a village with village code 045088 in Sahaspur CD Block in Vikasnagar Tehsil of Dehradun District in Uttarakhand state of India. The village is located at a distance of 4.5 kms from the headquarter of Sahaspur CD Block and 10 km from the Tehsil headquarter of Vikasnagar, and 30 km from the district headquarter at Dehradun. The Vikasnagar Tehsil also shares border with the state of Himachal Pradesh on its northern side and with Uttar Pradesh on its western side. The nearest major city is Dehradun and the nearest town to this village is Herbetpur which is 6 km away from Chharba. The village is relatively at a higher elevation of 648 meters above mean sea level. The location of Chharba village in Dehradun district is shown in the Figure 45 below.

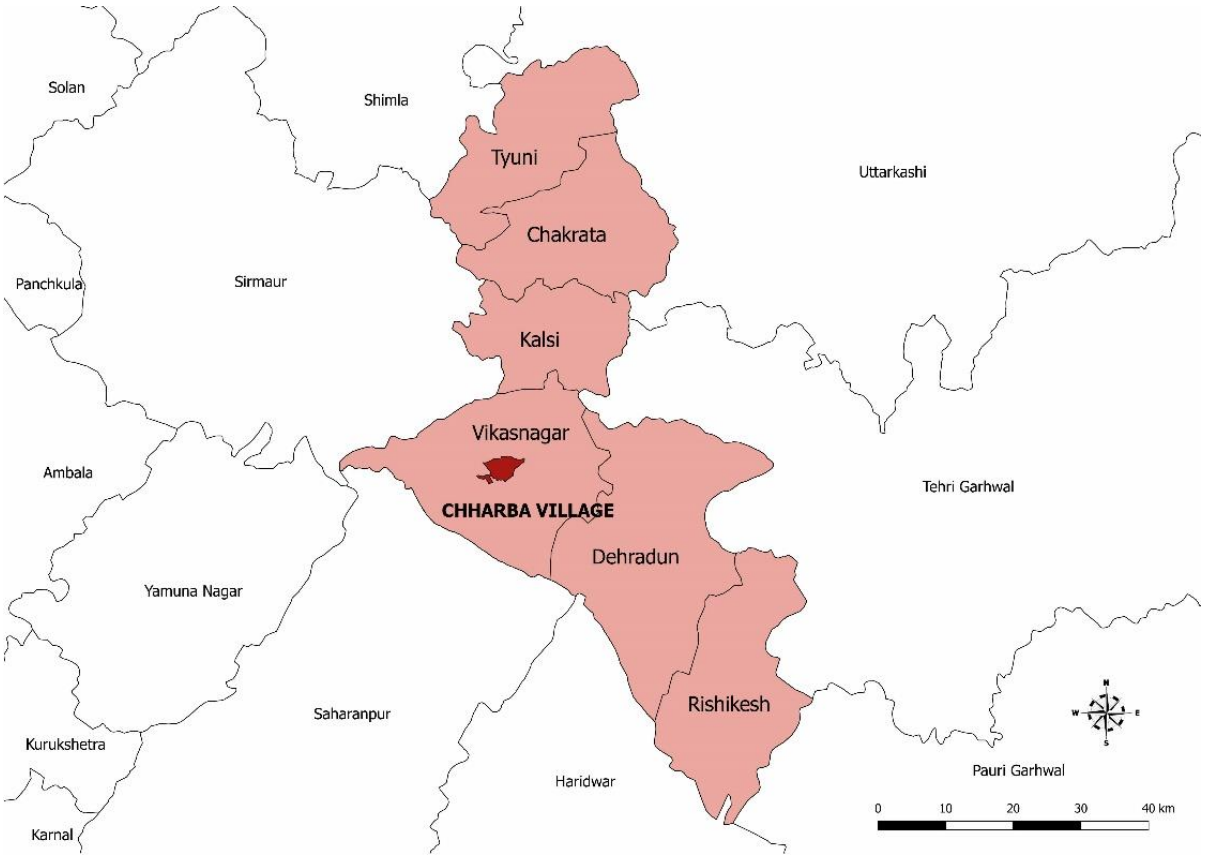


Figure 44 Map showing location of Chharba Village in Vikasnagar Tehsil in Dehradun district

The village has an area of 1567.90 Hectares with a population of 7268 and has 1425 households (as per Census 2011). The village is connected and accessed with NH 72 and another major road named Langha road connecting Chharba to Vikasnagar. The nearest railway station being Dehradun 30 km away and the nearest airport to the village is Jolly Grant Airport 60 km away.

The entire region is said to be connected to the incidents of the Hindu epic, Mahabharat. Although, with the onset of British Empire, the region saw many changes in administration. The district had earlier been a part of Saharanpur district, then was transferred to Kumaon divison, further transferred to Meerut division and finally to the later carved Garhwal Division. Recently in 2001, with the creation of the state of Uttarakhand, Dehradun became the capital of the newly formed state.

1.2 Socioeconomic demographics

Table 16 Population and age group distribution of Chharba

	Number of Households	**Total Population Including Institutional and Houseless Population**			**Population in age group 0-6**		
		Person	Male	Female	Person	Male	Female
2001	1023	5609	2888	2721	995	514	481
2011	1425	7268	3790	3478	1013	536	477

In case of Chharba, the sex ratio is 0.92, which is in accordance to the National sex ratio.

Table 17 SC/ST and Literacy population distribution of Chharba

SC/ST Population							**Literacy**		
	Scheduled caste Population			**Scheduled Tribe Population**					
	Person	Male	Female	Person	Male	Female	Person	Male	Female
2001	380	206	174	11	3	8	3163	1848	1315
2011	420	228	192	20	9	11	5581	3135	2446

The share of SC/ST population in Chharba is only 6%. The female literacy in 2011 is 70% and has increased by 12% from 2001 to 2011, whereas, the male literacy in 2011 is almost 83% and has increased by 20% from 2001 to 2011.

Table 18 Working population distribution of Chharba

Working Population						
	2001			2011		
	Person	Male	Female	Person	Male	Female
Main Workers						
Total Main Workers	1441	1064	377	1381	1244	137
Cultivators	613	405	208	410	365	45
Agriculture Workers	228	166	62	192	181	11
Household industry Workers	10	6	4	50	46	04
Other Workers	590	487	103	729	652	77
Marginal Workers						
Total Marginal Workers				554	493	61
Cultivators				12	08	04
Agriculture Labourers				260	239	21
Household industry Workers				09	07	02
Other Workers				273	239	54
Non Workers				5333	2053	3280

Among the total main workers in Chharba, only 10% of them are females, and share of females among marginal workers is 11%. This shows the very low labour force participation rate of females in the village.

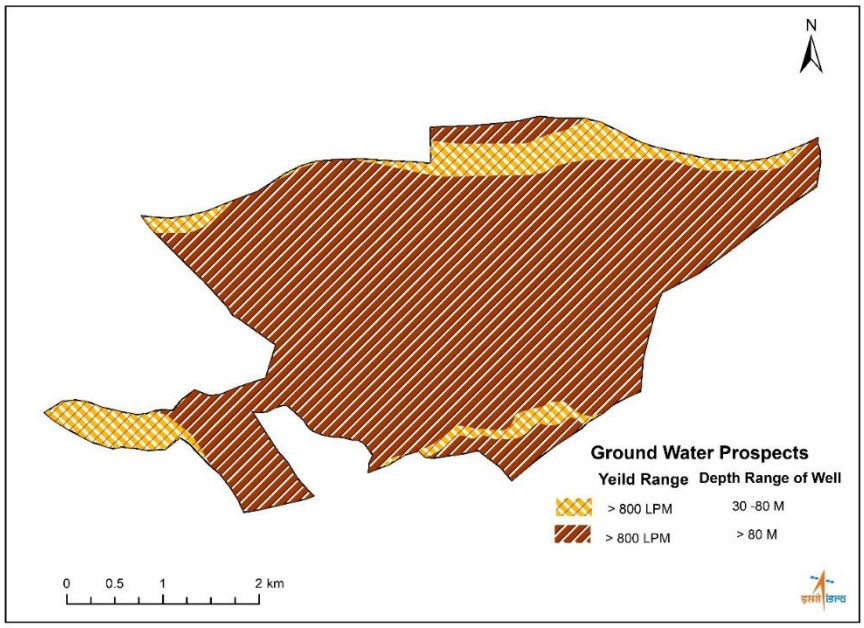
1.3 Physical setting

Annual rainfall varied between 970 mm - 2281 mm during the period 1979-2003 indicating high temporal variability. Further, number of rainy days along with statistics in the GP was computed for different years indicating wet, dry and normal conditions (source NRSC).

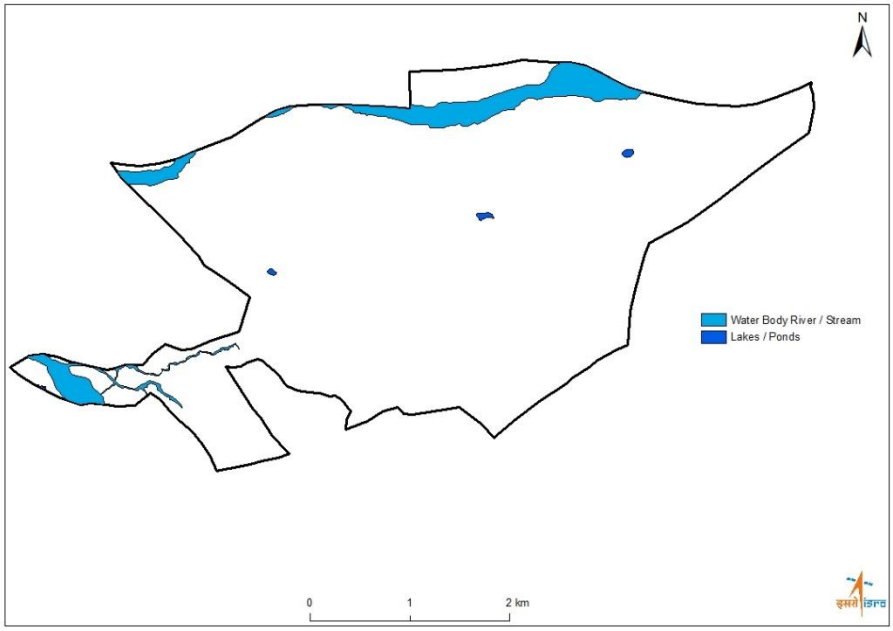
Rainfall analysis for Dry, Wet and Normal Conditions (1979-2003)

Meteorological Condition									
Statistics	**Dry Conditions**			**Wet Conditions**			**Normal Conditions**		
	Rainfall	Runoff	Rainy days	Rainfall	Runoff	Rainy days	Rainfall	Runoff	Rainy days
Mean	1080	93	110	2177	457	124	1263	218	98
Std Dev.	105	28	10	72	75	9	737	140	53

Groundwater potential map was categorized according to its recharge characteristics as either (i) Good – Very Good, (ii) Moderate - Good, (iii) Moderate (iv) Poor - Moderate (v) Poor. The lineaments are the surface manifestation of linear features like joints and fractures. They have been demarcated from the imagery as linear features and are ascertained after field traversing. Groundwater potentiality of a higher order is indicated where lineaments run along and across the alluvial zone.



Groundwater Prospects map of Chharba (Source NRSC)



Drainage Network and Waterbody map of Chharba (Source NRSC)

2. SITUATION ANALYSIS OF CHHARBA

2.1 Existing Physical and social infrastructure

The summary of existing physical and social infrastructure as per data from Census 2011 is shown in Table 19 below. The colour codes used in the table are as follows

Table 19 Colour code for status of availability of physical and social Infrastructure

Colour	Interpretation
2 No.s	There are 2 numbers of a facility present in the village
1 No.s	There is only 1 number of facility present in the village
<5 Km	The facility is not present in the village, but is within a range of less than 5Kms from the village
5-10 Km	The facility is not present in the village, but is within a range of 5-10Kms from the village
>10 Km	The facility is not present in the village, but is within a range of more than10Kms from the village
Available/Yes	The facility is present in the village
No	The facility os not present in the village

The summary of existing physical and social infrastructure as per data from Census 2011 is shown in Table 20 below. The colour codes used in the table are as follows

Table 20 Status of availability of physical and social infrastructure in Chharba

		Chharba
Educational facilities	Pre-Primary school (PP)	5-10 km
	Primary school (P)	1 No.(s)
	Middle school (M)	1No.(s)
	Secondary School (S)	1No.(s)
	Senior Secondary school (SS)	1 No.(s)
	Degree college of arts science & commerce (ASC)	>10 km
	Engineering college(EC)	>10 km
	Medical college (MC)	>10 km
	Management Institute	
	Polytechnic (Pt)	>10 km

	Vocational training school /ITI	>10 km
	Non-formal training centre (NFTC)	>10 km
	Special school for disabled (SSD)	>10 km
Medical Amenities	Community health centre (CHC)	5-10 km
	Primary health centre	5-10 km
	Primary health sub centre (PHS)	5-10 km
	Maternity and child welfare centre (MCW)	1No.(s)
	T.B. clinic (TBC)	5-10 km
	Hospital-allopathic (HA)	5-10 km
	Hospital-alternative medicine (HO)	5-10 km
	Dispensary (D)	5-10 km
	Veterinary hospital (VH)	5-10 km
	Mobile health clinic (MHC)	5-10 km
	Family welfare centre (FWC)	5-10 km
Availability of drinking water – Yes/No	Tap water (Treated/Untreated)	Yes
	Well water (Covered / Uncovered well)	No
	Hand Pump	Yes
	Tube wells / Bore well	No
	Spring	No
	River / Canal	No
	Tank / Pond / Lake	No
	Others	No
Availability of toilet & others Yes / No	Community toilet including bath	No
	Community toilet excluding bath.	No
	Rural sanitary mart or sanitary hardware outlet available near the village.	No
	Community bio- gas or recycle of waste for productive use.	No

Communication and transport facilities	Post office(PO)	5-10 km
	Sub post office (SPO)	Available
	Post & Telegraph office (P&TO)	5-10 km
	Telephones (Land lines)	Available
	Public call office (PCO)	Available
	Mobile phone coverage	Available
	Internet cafes/ Common service centre (CSC)	5-10 km
	Private courier facility	5-10 km
	Bus service (Public & Private)	Available
	Railway stations	>10 km
	Auto/Modified Autos	>10 km
	Taxis and Vans	5-10 km
	Tractors	>10 km
	Cycle-pulled rickshaws(Manual & Machine driven)	>10 km
	Carts driven by animals	> 10 km
	Sea /River ferry service	>10 km
Highways, village roads, banks & credit societies	Connected to national highway(NH)	Available
	Connected to state highway(SH)	Available
	Connected to major district road (MDR)	Available
	Connected to others district road	Available
	Pucca roads	Available
	Kutchcha roads	Available
	Water bounded macadam(WBM) roads	Available
	Navigable waterway (river/canal)(NW)	<5 km
	Footpaths (FP)	Available
	Banks Commercial & Co-operative	5-10 km
	ATM	5-10 km
	Agricultural Credit Societies	5-10 km
Socio cultural and Miscellaneous facilities	Self Help Group (SHG)	5-10 km
	Public distribution system (PDS) shop	<5 km
	Mandis / Regular market	5-10 km

	Weekly Haat	5-10 km
	Agricultural marketing society	5-10 km
	Scheme (Nutritional Centres) Integrated Child Development	5-10 km
	Anganwadi Centre (Nutritional Centres)	5-10 km
	Others (Nutritional Centres)	5-10 km
	ASHA (Accredited Social Health Activist)	<5 km
	Community centre with/without TV	>10 km
	Sports Field,	>10 km
	Sports Club / Recreation Centre	>10 km
	Cinema / Video Hall	>10 km
	Public Library	>10 km
	Public Reading Room	>10 km
	Newspaper Supply	Available
	Assembly Polling station	<5 km
	Birth & Death Registration Office	<5 km
Availability of electricity (Yes/No)	Power Supply for Domestic Use (ED)	Yes
	Power Supply for Agricultural Use (EAG)	Yes
	Power Supply for Commercial Use (EC)	Yes
	Power Supply for All Uses (EA)	Yes

2.2 Mapping existing conditions

2.2.1 Base Map

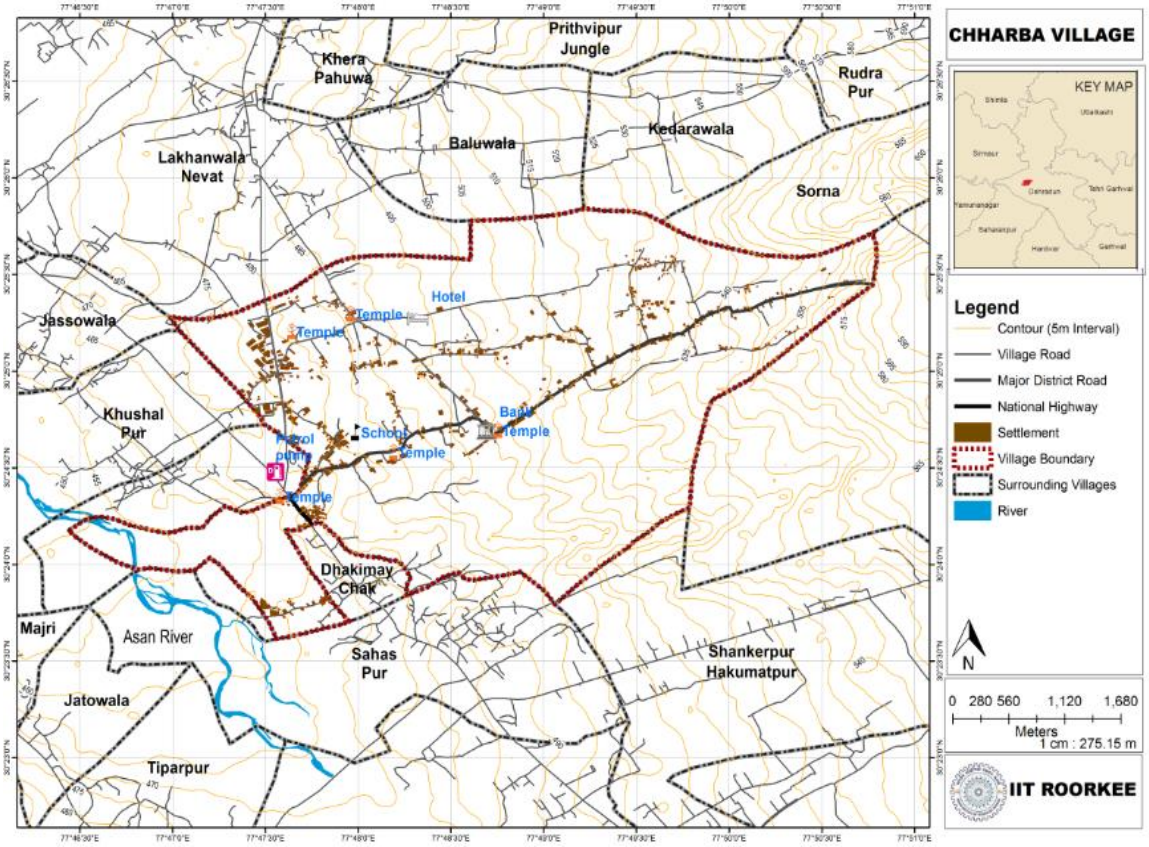


Figure 45 Base Map of Chharba

2.2.2 Land Use Land Cover distribution

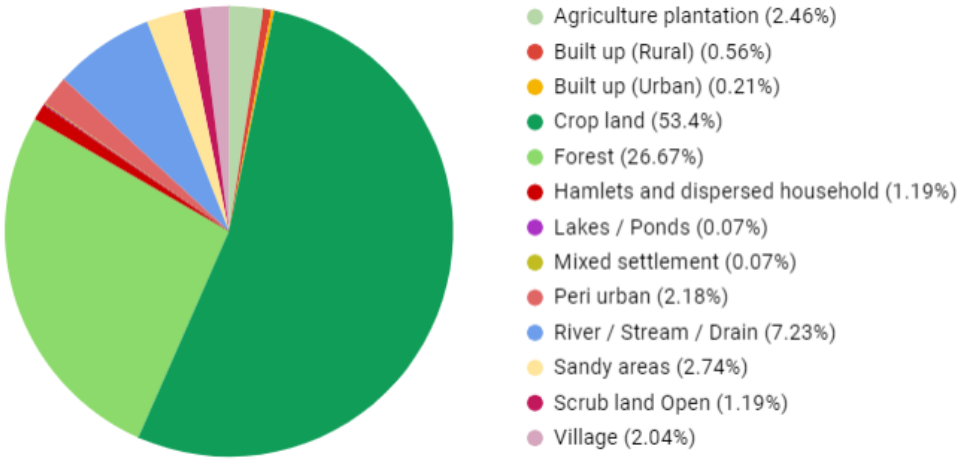


Figure 46 Land Use Land Cover distribution of Chharba, (Bhuvan data)

Land Use/Land cover distribution of Chharba is shown in the table below (source NRSC).

S.No	Land use / Land cover Class	Area (ha)
1.	Built Up Mixed settlement	0.64
2.	Built Up Village	45.69
3.	Built Up Hamlets	20.16
4.	Built Up Rural	1.64
5.	Built Up Peri-Urban	18.96
6.	Industrial Area	32.17
7.	Agriculture Crop land	628.50
8.	Agriculture Plantation	72.41
9.	Wastelands Scrub land Dense	7.21
10.	Wastelands Scrub land Open	150.34
11.	Close Forest	352.78
12.	Forest Plantation	5.36
13.	Sandy Area - Riverine	13.37
14.	Water Body River / Stream	76.42
15.	Lakes / Ponds	1.78

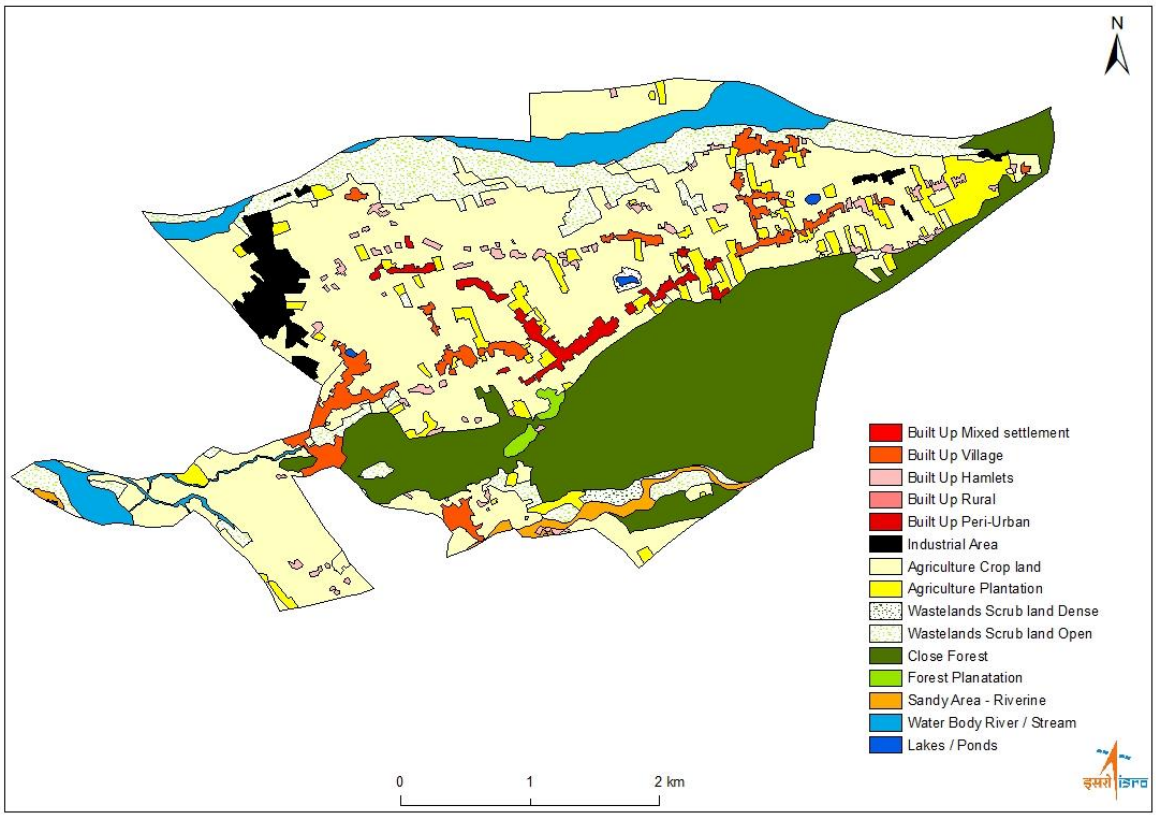


Figure 47 Land Use Land Cover Map of Chharba (Source NRSC)

2.3 Opinion Survey to Gram Pradhans and Gram Sabha members

A bilingual questionnaire (Annexure 1) was prepared based on different types of infrastructure and facilities targeting the Gram Pradhan and other authoritarians. In total 08 Gram Panchayat committee members were surveyed using pen paper mode.

2.3.1 Insights for Job generation and growth

The following question was asked in regard to their insights for job generation and growth in the village by 2040:

By 2040, I wish to have the following in my village for **job generation and growth** (Please put 1, 2, 3 only boxes that you wish.
(2040 तक, मैं चाहता हूँ कि मेरे गाँव में नौकरी सृजन और विकास के लिए कृपया (1, 2, 3 केवल वही रखें जो आप चाहते हैं)

i.	Large industry (बड़ा उद्योग)	☐
ii.	Tourism-based industry (पर्यटन आधारित उद्योग)	☐
iii.	A large health facility (एक बड़ी स्वास्थ्य सुविधा)	☐
iv.	University (विश्वविद्यालय)	☐
v.	Government offices (सरकारी कार्यालय)	☐
vi.	Micro and small industry (सूक्ष्म और लघु उद्योग)	☐
vii.	Construction industry (निर्माण उद्योग)	☐
viii.	Better Agriculture (बेहतर कृषि)	☐
ix.	Any other (pl write) (कोई अन्य (कृपया लिखें))_____	

_____

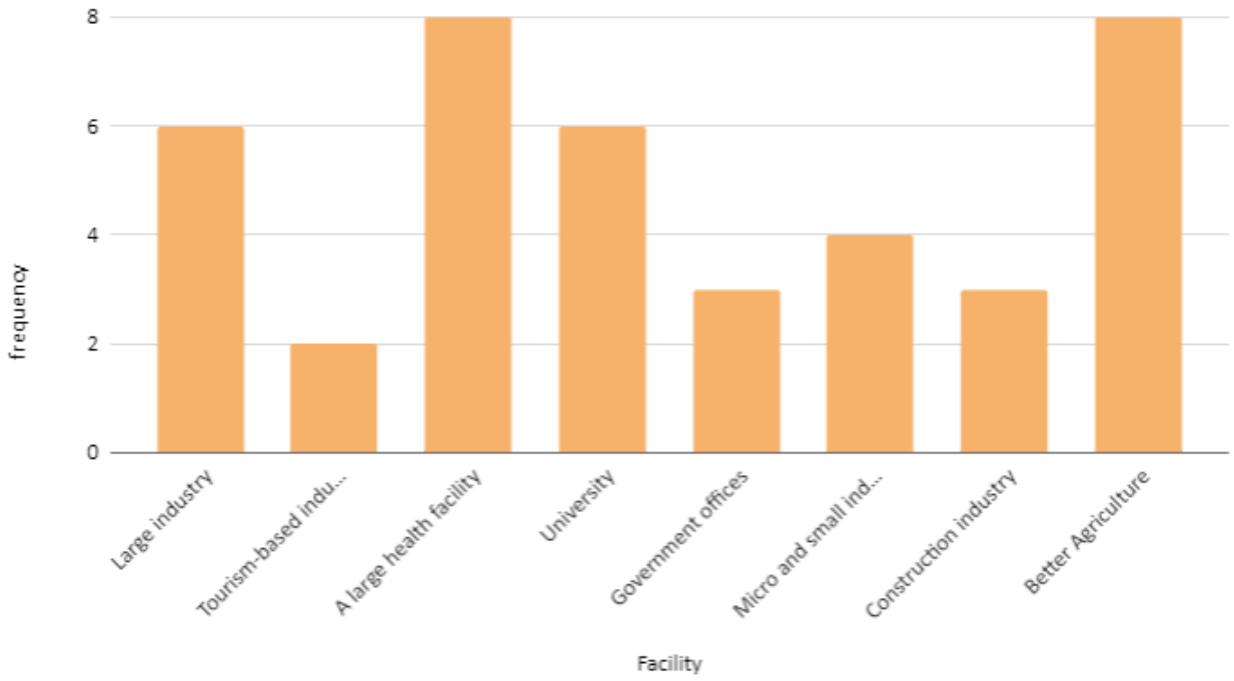


Figure 48 Frequency distribution for priority of having facilities for job generation and growth in the village by 2041

Table 21 Priority scores for employment generation in Chharba

Facility	**Average score (out of 3)**	**Total score**
Large industry	**2.50**	**15**
Tourism-based industry	**2.00**	**4**
A large health facility	**2.38**	**19**
University	2.33	14
Government offices	**1.33**	**4**
Micro and small industry	**1.75**	**7**
Construction industry	**2.67**	8
Better Agriculture	2.13	**17**

According to the responses (Figure 49, Table 21), majority of the respondents opted for having a large health facility, large industry and construction industry (as per their total scores) for employment generation and growth in the village.

2.3.2 Insights for willingness to share land and compensation

The following question was asked to the respondents to get insight on the willingness to share land in lieu of the following compensation.

For future employment generation and good services, if **land** is required, we are willing to share part of our land with the exchange of (pl tick)

(भविष्य की रोजगार सृजन और अच्छी सेवाओं के लिए, यदि भूमि की आवश्यकता है, तो हम (कृपया सही का निशान लगाएं) के आदान-प्रदान के साथ अपनी जमीन का हिस्सा साझा/आदान प्रदान करने के लिए तैयार हैं।)

i. Financial compensation (आर्थिक छूट) ☐
ii. Job (रोजगार) ☐
iii. Both job and money (नौकरी और पैसा दोनों) ☐
iv. Partnership with the developer (डेवलपर के साथ साझेदारी) ☐

v. Any other (pl write) (कोई अन्य (कृपया लिखें)) _____

_____

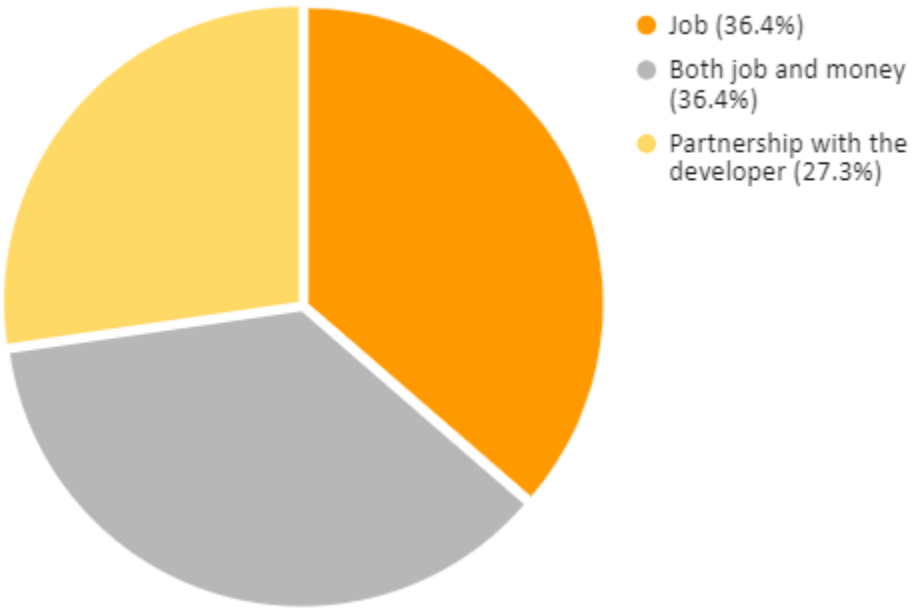


Figure 49 Distribution of Compensation for willingness for land sharing in Chhharba

As shown in Figure 30, majority of the respondents willing to share land for infrastructure development of the village want a job or combination of job and money in compensation for land sharing.

2.3.3 Insights on Willingness to change occupation

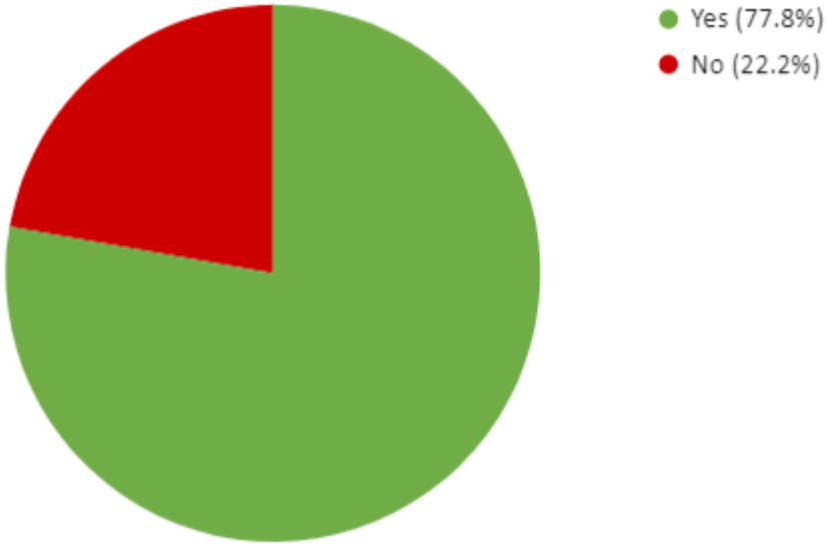


Figure 50 Distribution of respondents willing to change occupation in Chharba

As shown in Figure 51, respondents were asked if they were willing to change their occupation if they are provided jobs in and around the village. 77.8% of the respondents are willing to change their occupation to be in and around the village.

2.3.4 Assessment for condition of facilities

The respondents were asked to rate the condition of a list of facilities in the village on a scale of 1 to 5, where,

1: Absent

2: Poor condition

3: Fair condition

4: Good condition

5: Very good condition

The total scores and geometric mean for each of the facilities were calculated to find the facility(s) with best condition on the basis of the responses.

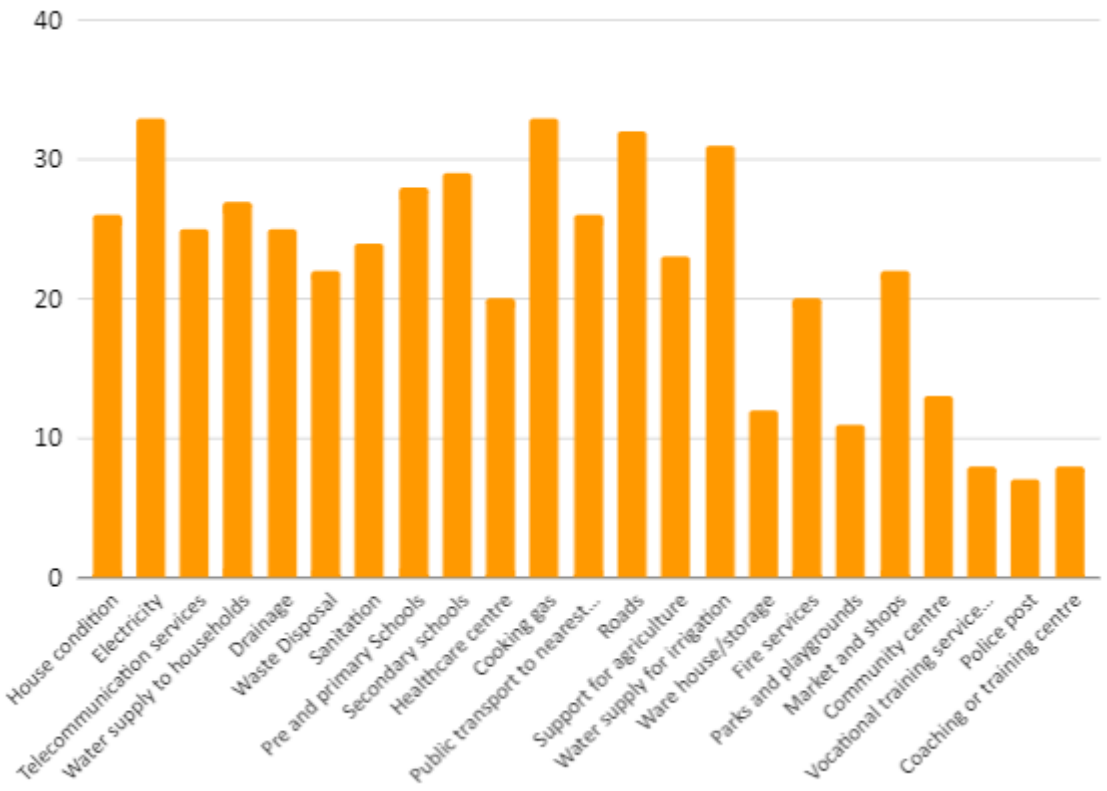


Figure 51 Bar graph showing condition of facilities on the basis of total score in Chharba

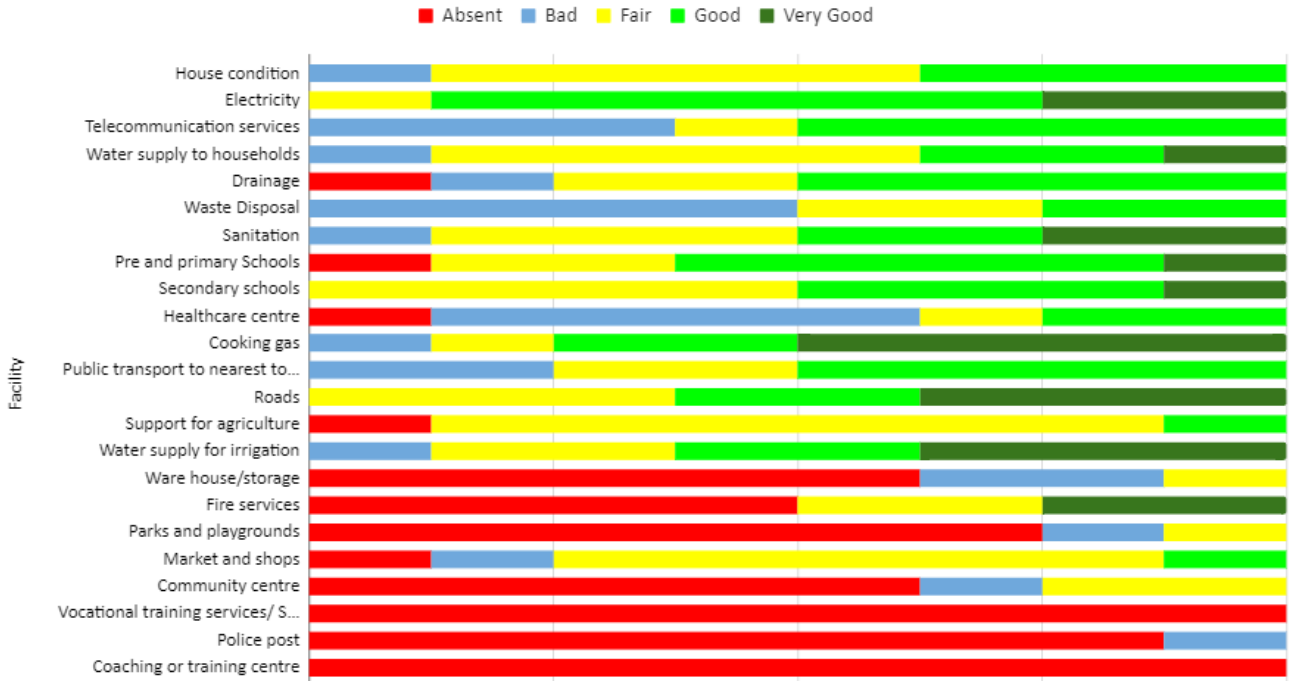


Figure 52 Distribution of rating of condition of the facilities

Table 22 Assessment score of the facilities in Chharba

Facility	Total score	Geomean (out of 5)
House condition	26	3.18
Electricity	**33**	**4.08**
Telecommunication services	25	2.98
Water supply to households	27	3.27
Drainage	25	2.87
Waste Disposal	22	2.63
Sanitation	24	3.31
Pre and primary Schools	28	3.22
Secondary schools	29	3.56
Healthcare centre	20	2.29
Cooking gas	**33**	**3.96**
Public transport to nearest towns	26	3.13
Roads	**32**	**3.90**
Support for agriculture	23	2.71
Water supply for irrigation	31	3.71
Ware house/storage	12	1.36
Fire services	20	1.97
Parks and playgrounds	11	1.25
Market and shops	22	2.58
Community centre	13	1.44
Vocational training services/ Skill Development Centre	**8**	**1.00**
Police post	**7**	**1.00**
Coaching or training centre	**8**	**1.00**

According to the responses (shown in Figure 52, 53 and Table 22), electricity service, healthcare and roads are in better condition compared to other facilities and vocational training services, police post and coaching or training centre are in poorer conditions compared to other facilities.

2.3.5 Priority for improvement of conditions

The respondents were asked to rate on a scale of 1 to 5, to rate their priority for improvement of the conditions of a list of facilities, where,

1: Not required

2: Less Priority

3: Medium Priority

4: High Priority

5: Very High Priority

Table 23 Priority scores for improvement of condition of facilities in Chhraba

Facility	**Geomean (out of 5)**	**Total score**
Permanent House	2.99	31
Electrification	3.28	30
Telecommunication services	4.28	39
Water supply to households	3.82	35
Drainage	3.58	35
Waste Disposal	3.74	35
Sanitation	3.52	32
Schools	**2.76**	**28**
Healthcare centre	3.94	36
Cooking gas	3.24	30
Public transport	3.30	31
All weather roads	3.06	26
Support for agriculture	3.97	32
Water supply for irrigation	3.55	34
Ware house/storage	3.74	35
Fire services	3.72	35
Parks and playgrounds	**4.35**	**40**
Market and shops	**2.83**	**28**
Community centre	3.65	34
Vocational training services/ Skill Development Centre	**4.76**	**43**
Police post	**2.27**	**24**
Coaching or training centre	**4.39**	**40**

The survey responses (as shown in Figure 54, 55 and Table 23) show that facilities such as parks and play grounds, vocational training centres, and coaching or training centres are highly prioritized for improvement, whereas, facilities such as schools, markets and shops and police post are least prioritized for improvement.

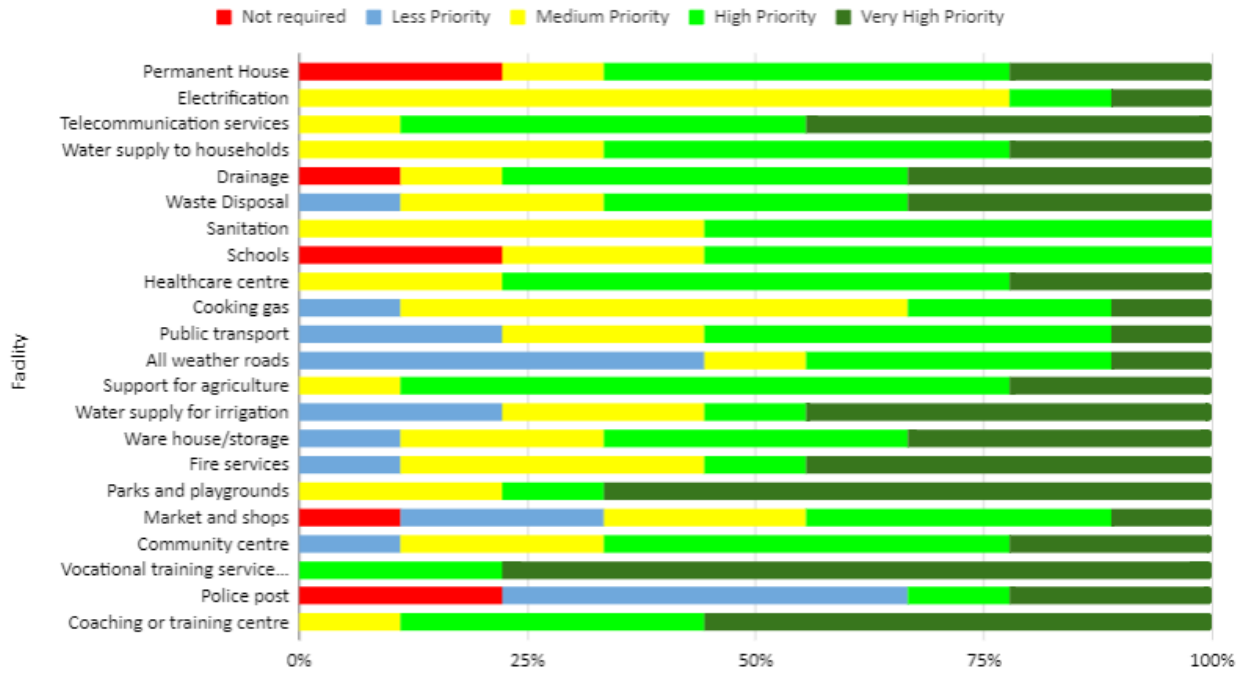


Figure 53 Distribution of rating of priority for the facilities to be improved in Chharba

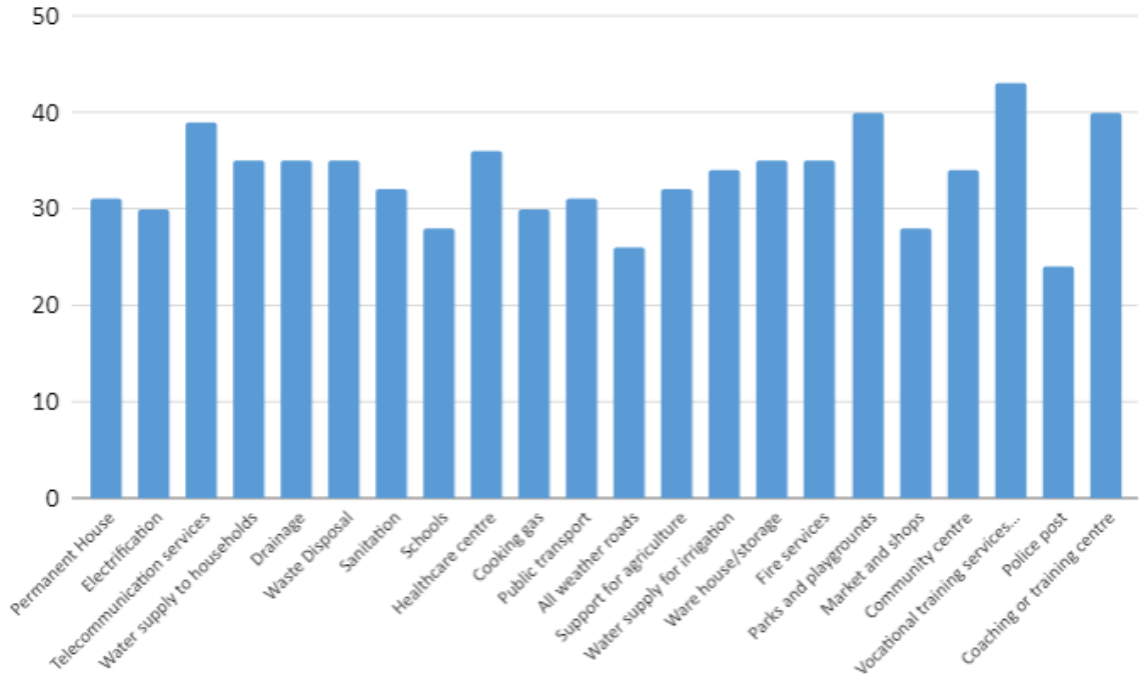


Figure 54 Distribution of priority of the respondents to improve condition of facilities on the basis of total scores in Chharba

2.4 Household Survey

A team from IIT Roorkee consisting of 4 members visited Chharba village to carry out infrastructure inventory survey and household survey of the residents in the villages. The household survey was done using the GPSDP Survey smartphone application developedby National Remote Sensing Centre (NRSC), a primary centre of Indian Space Research Organisation for under the agis of Ministry of Panchayati Raj in 2020.A total of 50 households were surveyed by the team in over a span of 02 days. Along with structured survey, a systemic photographic survey was also deployed by the survey team to capture the existing scenario of the infrastructure.

2.4.1 Housing condition

Based on their type of structure, the houses were classified under 1) their type of built up i.e. Pucca, Kachcha houses, 2) material used for roofing of the houses like concrete, mud, tin, thatch, etc., and 3) height of the houses, i.e. number of storeys.

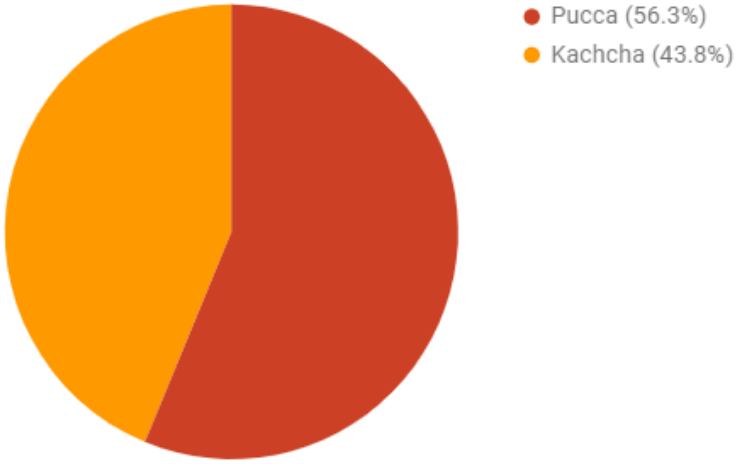


Figure 55 Distribution of types of structure of houses in Chharba

As shown in Figure 56 above, majority of the houses in the village are pucca houses, followed by kachcha houses. However, there are almost 44% of Kachcha houses in the village.

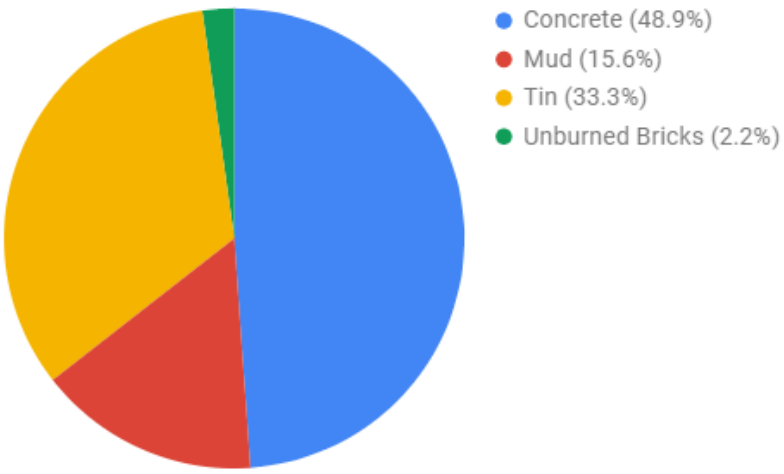


Figure 56 Distribution of houses with types of roof materials

As shown in Figure 57 above, a wide variety of materials are used for roofing the houses of the village. Concrete being the most widely used roofing material in almost 49% of the houses in the village. Other most commonly used roofing materials are tin and mud.

All of the houses surveyed, are all single storied.

2.4.2 Physical Infrastructure

The following section describes the condition of access to physical infrastructure including water supply, electricity supply, solid waste management, and sanitation of the houses based on 1) availability of the infrastructure, 2) continuity of the available infrastructure, 3) type of facility of the infrastructure.

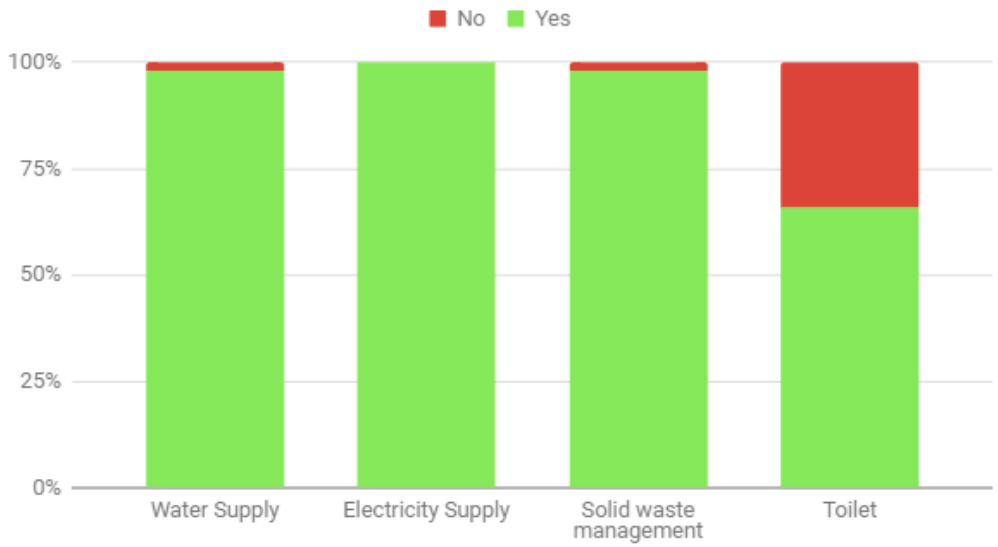


Figure 57 Distribution of availability of physical infrastructure in Chharba

The above Figure 58 shows that almost all of the houses have access to the physical infrastructure like water supply, electricity supply and solid waste management. However, only almost 60% of the houses have access to toilet. In the village, water supply is in form of public tap, private tap, or hand pump. Solid waste dumping is in the form of open dumping. Provision of sanitation is available in the forms of public, private, community or open defecation toilets.

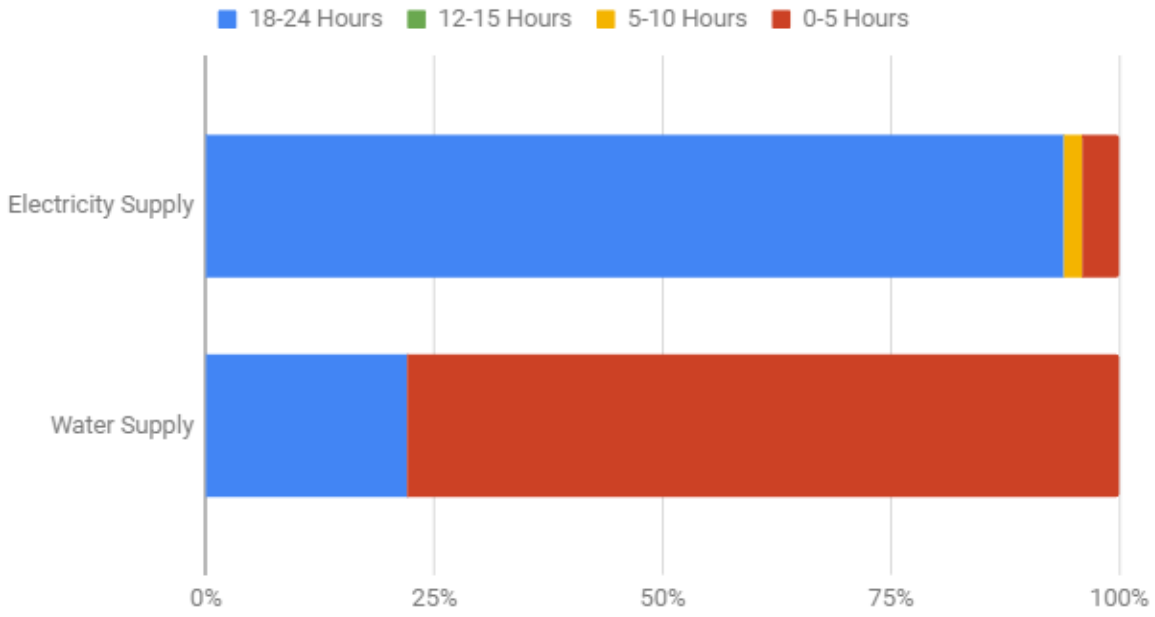


Figure 58 Status of continuity of water and electricity supply to the houses in Chharba

The above Figure 59 shows the continuity of water and electricity supply to the houses. It is seen that almost 80% of the houses have water supply for 18-24 hours a day and only 20% of the houses have 18-24 hours of electricity supply in a day. Also, almost 80% of the houses have water supply for only 0-5 hours in a day.

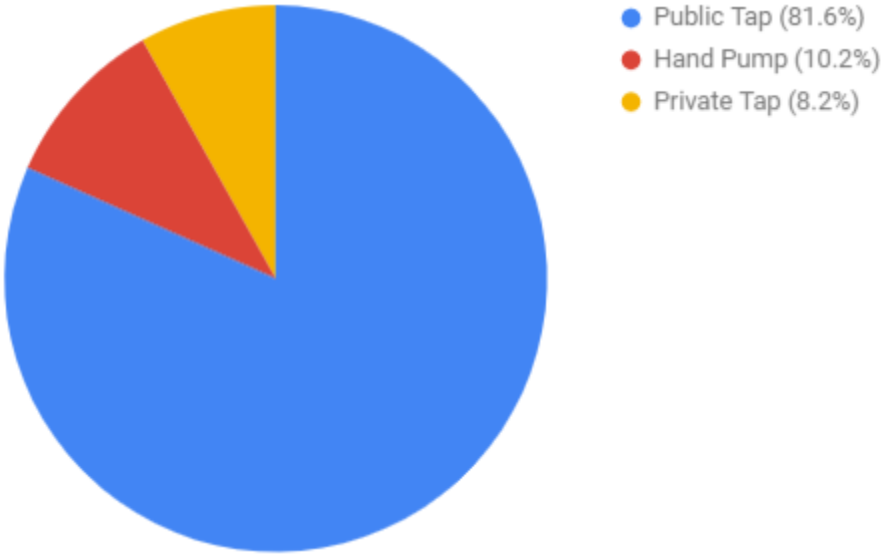


Figure 59 Distribution of types of water supply to the houses in Chharba

As shown in the above Figure 60, only 8% of the houses have private tap for water supply and that majority of the households are dependent on public taps for water supply.

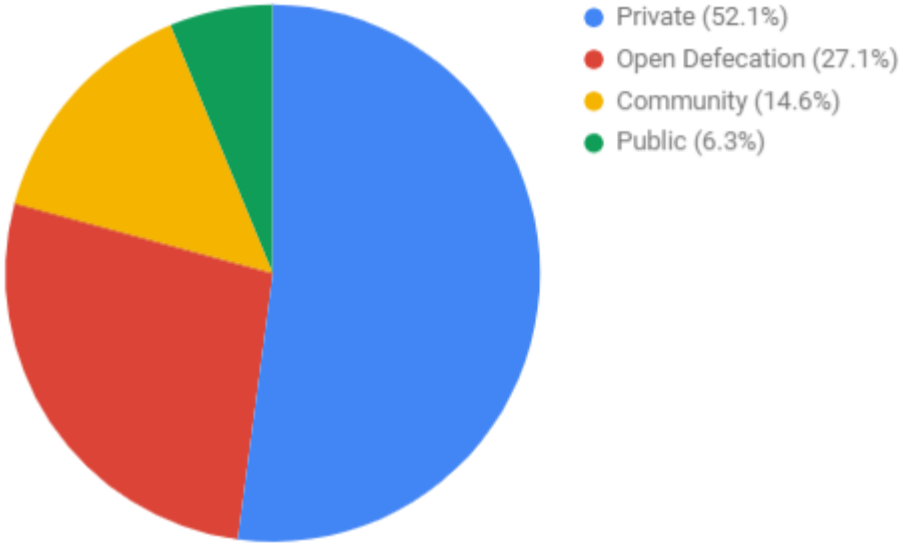


Figure 60 Distribution of types of toilets among households in Chharba

As shown in the above Figure 61, 52% of the houses have a private toilet, however, almost 27% of the households still use open defecation.

From the conducted survey, it is seen that all of the households use open dumping for solid waste disposal.

2.4.3 Communication and transport facility

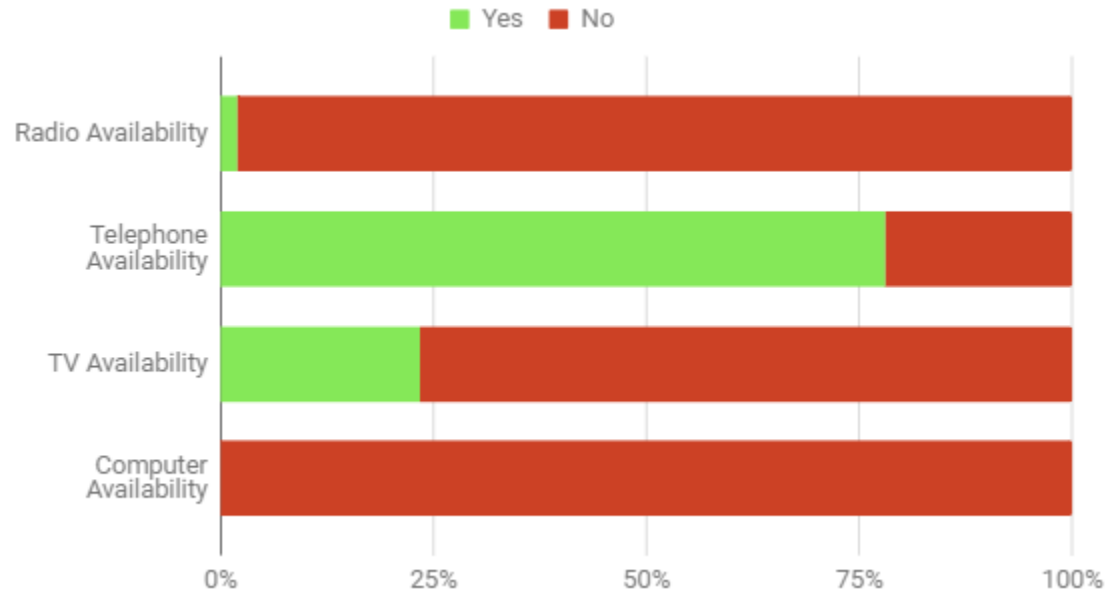


Figure 61 Distribution of communication facilities in Chharba

As shown in the previous Figure 62, majority of the households (more than 75%) have telephone connectivity as their medium of connection. However, the shares of households with radio Television availability are as low as 5% and 20% respectively. None of the surveyed households have a computer.

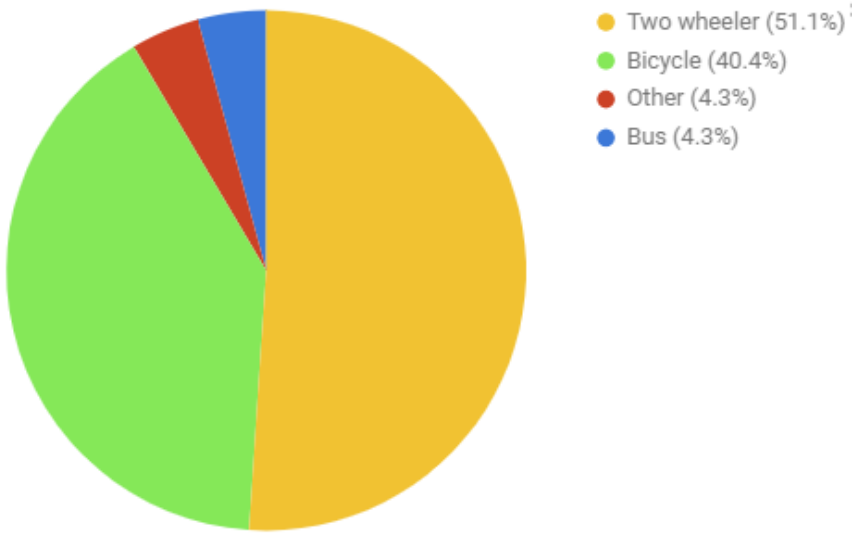


Figure 62 Distribution of access to types of transport modes in Chharba

The previous Figure 63, shows that almost 50% of the households are dependent on two wheelers and other 40% on bicycle as their mode of transportation. The share of public transport including bus and tempo is quite low, as low as 5%.

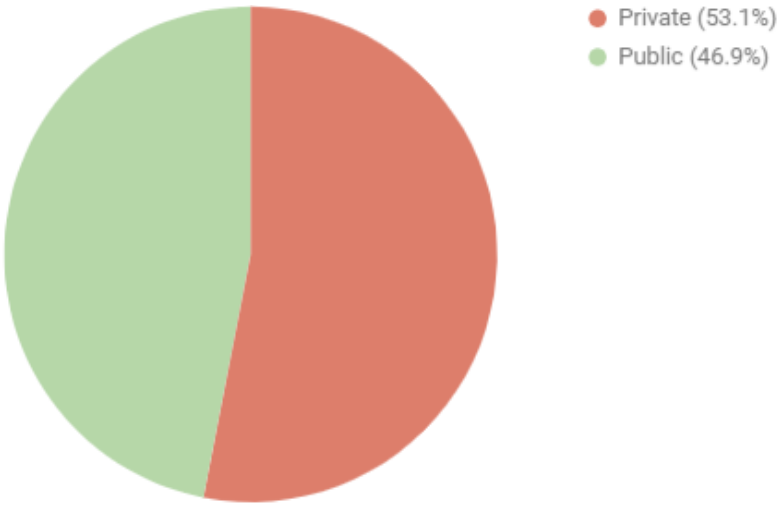


Figure 63 Distribution of Mode of Travel to hospital

Survey results (Figure 64) shows that 53% of the households depend on private transport to visit healthcare facilities.

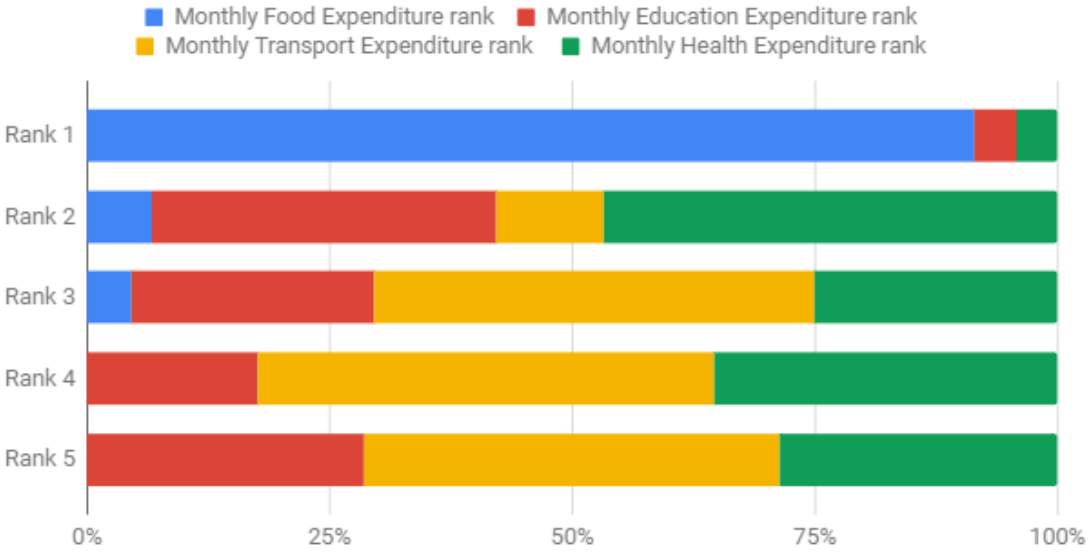


Figure 64 Ranking of monthly expenditures in Chharba

It is seen from the previous Figure 65, that among monthly expenditure on food, education, transport and healthcare, majority of the households, almost 90%, rank first their monthly expenditure on food i.e. spend most on food, and almost 45% of the households spend on healthcare next to food.

2.5 Infrastructure inventory survey

2.5.1 Housing conditions

A mixture of Pucca, and Kachcha houses are present in the village, with a majority of pucca houses (Figure 66).

Figure 65 Kachcha and Pucca houses in Chharba

2.5.2 Drainage conditions

Figure 66Open and semi open surface drains are present in the village in Chharba.

2.5.3 Street conditions

The following figures (Figure 68) show the different types of streets available in the village based on their different Right Of Ways. Almost all of the roads in Chharba are of cement concrete.

Figure 67 varying RoWs in Chharba

3. PROJECTION, ESTIMATION AND RECCOMENDATION CHHARBA

3.1 Population projection

Population is projected for 20 years i.e. until 2041, using ratio methods, considering three scenarios of growth similar as current growth rate, moderate growth and accelerated growth. The current decadal growth rate is 1.6, moderate decadal growth rate considers 20% increase in decadal growth rate and accelerated growth considers a decadal growth rate of 25%. The Table 24 below shows the projected population with three scenarios.

Table 24 Population projections for Chharba

Population in 2001	5601 (Census 2001)
Population in 2011	7268 (Census 2011)
Scenario 1, using current growth rate	
Population in 2031	**12,260**
Population in 2041	**15,938**
Scenario 2, using moderate growth rate	
Population in 2031	**21,225**
Population in 2041	**45,846**
Scenario 3, using accelerated growth rate	
Population in 2031	**23,990**
Population in 2041	**60,912**

The calculation details of the population projection is shown in Annexure 3. With discussion with Gram Pradhan and considering a practical approach of population growth, Scenarios 1 and 3 are eliminated as they are more extreme cases. Therefore, a moderate population growth rate is considered for further estimations and proposals.

3.2 Infrastructure estimations

Table 25 Infrastructure estimations for projected population of Chharba

Social infrastructure	Population served per unit	Total Requirement in 2041 (No.s) (X)	Existing No.s (Y)	Additional No.s required (X-Y)	Additional Land area required (Ha)
Education					
Pre Primary, Nursery School	2500	18	0	18	1.44
Primary School (class I to V)	5000	9	2	7	2.8
Senior Secondary School (VI to XII)	7500	6	2	4	7.2
Healthcare					
Dispensary	15000	2	0	2	2
Nursing home, child welfare and maternity centre	45000 to 1 lakh	1	0	1	1
Family Welfare Centre	50,000	1	0	1	1
Diagnostic centre	50,000	1	0	1	1
Socio-cultural					
Anganwadi - Housing area/ cluster	5000	4	0	4	0.1
Community Room	5000	4	1	3	0.225
Community hall, mangalkaryayala, barat ghar/ library	15000	2	0	2	0.4
Religious Facility	5000	4	22	0	0
Open spaces and Sports facilities					
Local parks	5000	4	0	4	2
Community playgrounds	15000	2	1	1	1
Residential unit play area	5000	4	0	4	2
Neighbourhood Play area	15000	2	0	2	3
Distribution services					
Milk distribution	5000	4	6	-	0

LPG Godown/ Gas godown	45,000	1			
Commercial centres					
Convenience Shopping	5000	4	0	4	0.6
Local shopping including service centre	15000	2	2	0	0
Weekly Markets	50000	1	0	1	0.4
Communication facilities					
Post office counter without delivery (Flo or area to be provided in local shopping c entre)	15000	2	1	1	0.0085
Bank with extension counters with ATM facility	15000	2	2	0	0
Police, Civil Defence and Home Guards					
Police Post	45,000	1			

Physical infrastructure

Infrastructure	Unit requirement	Requirement for 2041
Water supply	Recommended maximum water supply levels (lpcd) : 70	3.2 MLD
Land requirement	0.2 Ha for upto 5MLD, 0.19 Ha for upto 10MLD	< 0.1 Ha
Sewerage and sanitation	Recommended wastewater flow: 80% of water supply	2.6 MLD
Land area requirement for sewage treatment (Sludge drying beds and waste stabilizati on pond)	0.8-2.3 Ha/MLD	4 Ha
Electricity	1 electric substation of 11KV for 15000 population	3 electric substation of 11KV

Solid Waste Management	Waste generation per capita per day: Residential : 0.3-0.6kg/capita/day + 30% of residential waste	27 TPD

Summary of area requirements

The Table 26 below shows the summary of area requirements based on the predicted population projection and corresponding infrastructure estimations. The area requirements for the time span of 2021-2031 is calculated using normative approach.

Table 26 Summary of area requirements based on projections and estimations for Chharba

Category	Existing area 2021	Area Required 2021-2031 (Additional Population size 9,887)	Area Required 2031-2041 (Additional population size 24,621)
Residential	120 Ha	24 Ha	@400 persons/Ha = 61.5 Ha
Social Infrastructure (Education/ institution/ healthcare/ recreation)		10 Ha	25 Ha
Physical Infrastructure (Electricity/Water supply/ drainage/ solid waste management as per URDPFI guidelines)		3 Ha	6.6 Ha
Road Network		6 Ha (@10-15% of total area)	14 Ha (@10-15% of total area)
Industrial		2 Ha (@5% of total area)	5 Ha
Total area requirement		**45 Ha**	**112 Ha**

3.3 Recommendations

Based on the primary survey, available infrastructure setting, natural resources, and villagers' aspiration to have a better living, a spatial panning is prepared for years to come to better utilize the development potential of Chharba village. Accordingly, a land suitability analysis has been performed to map agriculture and non-agriculture development down the line of 20-30 years. Not only maximize the potential of advanced agriculture and housing the future population, but also the focus was given to promote the indigenous agro-based, craft, and small-scale industry-based products to local, national, and international markets during the planning. Preservation of green open space and water bodies was one of the key considerations during the analysis. Accordingly, the development area is planned in various zones, as described below in detail (Figure 69)00.

3.3.1 Land suitability and availability

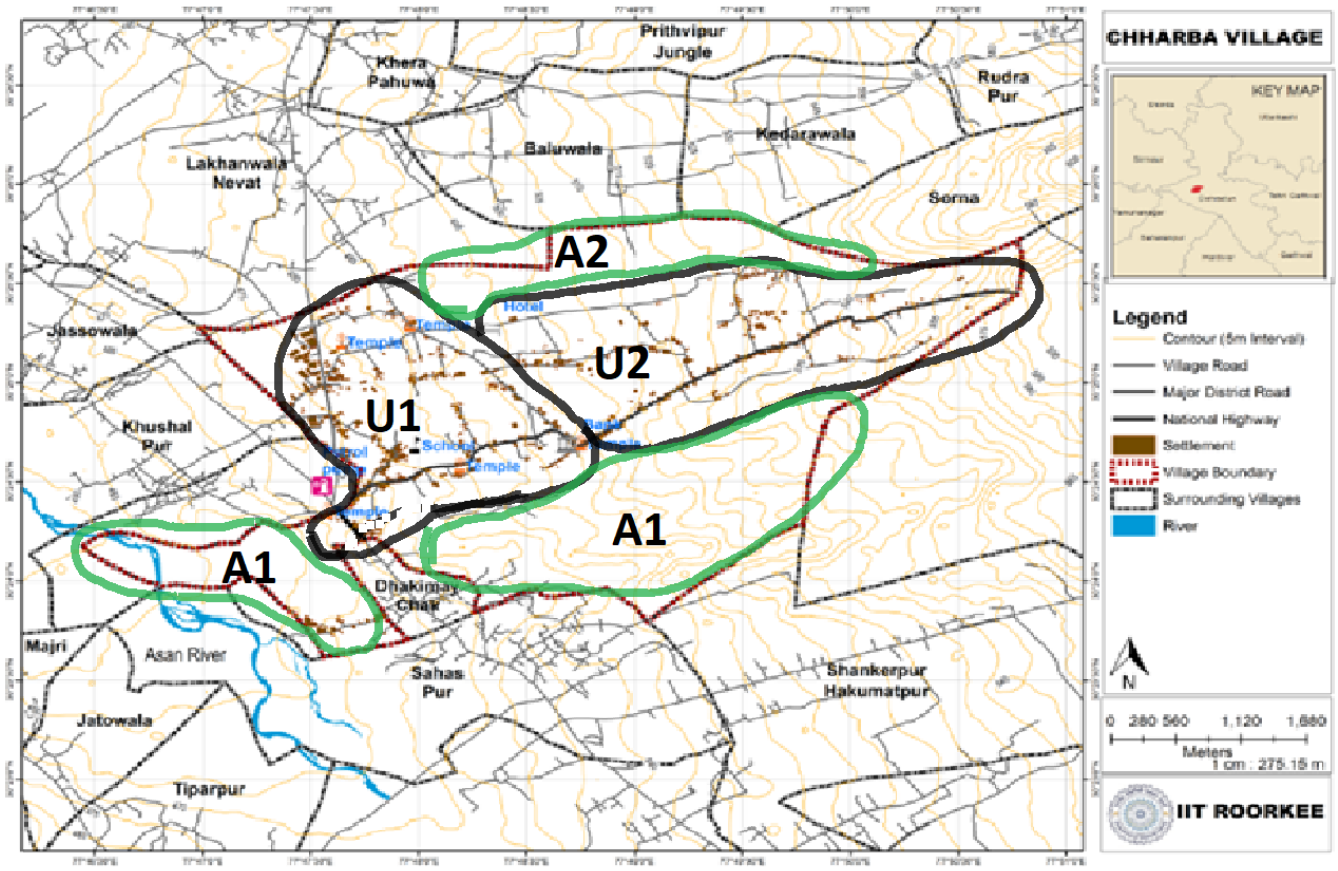


Figure 68 Proposed zoning for Chharba

3.3.2 Broad zoning

- Zone A1, A2= Agriculture priority zone

These zones are primarily meant to focus and improve agricultural practices in the village. These zones are proposed to be independent zones for revamped agriculture and supporting facilities like training and skill development.A maximum of 10% non-agricultural uses is allowed only in barren land except cultivators own residence in this zone.

- Zone U1= Urbanisation priority zone

Unlike zones A1, A2 and A3, this zone is focused towards non-agricultural employment generation and investment in the village. Uses such as institutional, small/medium industries, land banking, training centres, etc. are proposed in this zone. A maximum of 50-60% of urbanisation is allowed in the available pockets, mixed use for flexibility. Zone U1 is the priority zone for urbanisation in phase 1 i.e. in first 5-10 years.

- Zone U2= Urbanisation for 2041

The proposed uses for this zone is similar to that of zone U1, however to be implemented at a later phase i.e. in the next 10-20 years.

3.3.3 Indicative investment planning

The indicative planning for investment for the required physical and social infrastructure is shown below, where,

P1: 0-5Years (Phase 1)
P2: 5-10 Years (Phase 2)
P3: 10-15 Years (Phase 3)
P4: 15-20 Years (Phase 4);
U1: Urbanisation Priority zone
U2: Urbanisation Priority Zone for 2041
A1, A2: Agriculture priority zone

Table 27 Indicative investment planning for social infrastructure

Social infrastructure	Existing No.s	Additional No.s required	Suitable proposed zone	Phase	Existing Schemes/ investments	Remarks
Education						
Pre Primary, Nursery School	0	18	U1&U2	P1, P2	• Atal Adarsh Gram Yojna;	

Primary School (class I to V)	2	7	U1 U2	P1, P2 P3, P4	• Sarva shiksha abhiyan; • Mid day meal	
Senior Secondary School (VI to XII)	2	4	U1 U2	P1, P2 P3, P4		
Healthcare						
Dispensary	0	2	U1	P1	• National Rural health mission; • Universal Health Insurance Scheme	
Nursing home, child welfare and maternity centre	0	1	-			
Family Welfare centre	0	1	-			
Diagnostic centre	0	1	U1	P1		
Socio-cultural						
Anganwadi - Housing area/ cluster	0	4	U1 U2	P1, P2 P3, P4	• Deen Dayal Upadhyaya Grameen Kaushalya Yojana (DDUGKY); • Poshan Abhiyaan	
Community Room	1	3	A2 U1 U2	P1, P2 P1, P2 P3, P4	• Shyama Prasad Mukherji Rurban Mission (NRuM); • Deendayal Antyodaya Yojana – National Rural Livelihoods Mission	
Community hall, mangalkaryayala, barat ghar/ library	0	2	U1	P1		
Religious Facility	22	0	U1 U2	P1, P2 P3, P4		
Open spaces and Sports facilities						
Local parks	0	4	U1 U2	P1, P2 P3, P4	• Atal Adarsh Gram Yojna; • Shyama Prasad Mukherji Rurban Mission (NRuM); • Vidhayak Nidhi (Schemes Under DDO Office); • Members of Parliament Local Area Development Scheme (MPLADS)	
Community playgrounds	1	1	U1	P1		
Residential unit play area	0	4	U1 U2	P1, P2 P3, P4		
Neighbourhood Play area	0	2	U1	P1, P2		

					(Schemes under DRDA Office)	
Distribution services						
Milk distribution	4	6	A2	P1, P2	• External funding	
LPG Godown/ Gas godown	0	1	U1	P1		
Commercial centres						
Convenience Shopping	0	4	A2 U1 U2	P1 P1, P2 P3, P4	• Integrated Scheme for Agricultural Marketing (ISAM)	
Local shopping including service centre	2	0	A2, U1	P1	• Deendayal Upadhyay SahKarita Kisan Kalyan Yojana; • Integrated Scheme for Agricultural Marketing (ISAM); • Mukhymantri swarojgar yojna (MSY)	
Weekly Markets	0	1	A2	P1		
Communication facilities						
Post office counter without delivery(Floor area to be provided in local shopping centre)	1	1	U1	P1	• External funding	
Bank with extension counters with ATM facility	2	0	U1	P1		
Police, Civil Defence and Home Guards						
Police Post	1	0	U1	P1	• External Funding	

Table 28 Indicative investment planning for Physical infrastructure

Physical infrastructure					
Infrastructure	**Unit requirement**	**Requirement for 2041**	**Existing Schemes/ investments**	**Phase**	**Remarks**

Water supply	Recommended maximum water supply levels (lpcd) : 70	3.2 MLD	• Atal Adarsh Gram Yojna	P1	
Sewerage and sanitation	Recommended w astewater flow: 80% of water supply	2.6MLD	• New National Biogas Organic Manure Programme (NNBOMP); • Atal Adarsh Gram Yojna; • Shyama Prasad Mukherji Rurban Mission (NRuM)	P1	
Electricity	1electric substatio n of 11KV for 15000 population	3 electric substati on of 11KV	• Atal Adarsh Gram Yojna; • Shyama Prasad Mukherji Rurban Mission (NRuM)	P1,P2	
Solid Waste Manageme nt	Waste generation per capita per day: Residential : 0.3-0.6kg/capita/day + 30% of residential waste	27 TPD	• Atal Adarsh Gram Yojna; • Shyama Prasad Mukherji Rurban Mission (NRuM)	P1	

Table 29 Indicative investment planning for other major land uses

Other major land uses			
Land Use	**Existing Schemes/ investments**	**Phas e**	**Remarks**
Residentia l	• State Credit Cum Subsidy Gramin Awas Yojana (CCS); • Dendayal Uttarakhand Gramin Awas Yojana; • Pradhan Mantri Awaas Yojana-Gramin(PMAY-G)	P1, P2, P3, P4	
Road Network	• Mera Gaon Meri Sadak (MGMS);	P1	

	• Pradhan Mantri Gramin Sadak Yojana (PMGSY)		
Industrial	• Deen Dayal Upadhyaya Grameen Kaushalya Yojana (DDUGKY); • Deendayal Antyodaya Yojana – National Rural Livelihoods Mission; • Rural Self Employment Training Institutes; • Mukhymantri Swarojgar Yojna (MSY)	P1, P2, P3, P4	
Agriculture (A1,A2)	• International Fund For Agriculture Development (IFAD); • Mukhymantri swarojgar yojna (MSY); • Deendayal Upadhyay SahKarita Kisan Kalyan Yojana; • Integrated Scheme for Agricultural Marketing (ISAM); • Horticulture Mission for North East & Himalayan States; • Macro Management of Agriculture (MMA) Scheme; • National Food Security Mission (NFSM); • National Horticulture Mission (NHM); • Pradhan Mantri Kisan Samman Nidhi (PM-KISAN) Scheme; • Rashtriya Krishi Vikas Yojana (RSVK)	P1, P2, P3, P4	

Spatial Planning for Rural Areas
A pilot study of Uttarakhand villages (*Belada* and *Chharba*)

Section **D**:
Policy directions and conclusion

Contents

1. Policy Directions

The study on Belada and Chharba opened multiple general aspects indicating few policy and strategic directions. For the further dissemination of such knowledge and careful consideration of the competent government four such policy briefs are written in general but using the contexts of the villages and the state context. Such four themes where the policy directions are provided are:

- Infrastructure Development
- Land Pooling
- RuRBAN clusters
- Agriculture Marketing

1.1 Infrastructure Development

Rural infrastructure is not only a key component of rural development but also a vital element to improve the rural economy and quality of life. A proper development of infrastructure in rural areas can substantially uplift the productivity, income through agriculture, opportunities for employment. Eventually, infrastructure connects goods to market; workers to industry; people to services; and broaden the opportunities to get connected to the urban growth Centres. The basic development of India Rural Infrastructure includes the following field:

1. Irrigation
2. Roads
3. Housing
4. Health and Education
5. Water Supply
6. Sanitation and Solid Waste Management
7. Electrification
8. Telecommunication Connectivity

Accordingly, in recent years a number of programs have been initiated by the Central/ State Governments of India which takes into consideration the aforementioned fields of Indian Rural infrastructure development. A few such initiatives are as follows:

- Bharat Nirman
- Accelerated Irrigation Benefit Programme
- The Rajiv Gandhi Grameen Vidyutikaran Yojna (RGGVY)
- The National Solar Mission (NSM)
- The Pradhan Mantri Gram Sadak Yojana (PMGSY)
- The Accelerated Rural Water Supply Programme (ARWSP)
- Jal Jeevan Mission (JJM) Har Ghar Nal Se Jal by 2024
- National Rural Drinking Water Programme (NRDWP)
- Indira Awaas Yojana (IAY)
- Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)
- National Rural Livelihood Mission (NRLM)
- Rural Roads Development Vision Plan (RRDPV) 2025
- BharatNet Program for Rural Area (Providing High-Speed Internet connectivity in rural areas)

In align with the Sustainable Development Goals (SDGs) set by United Nations; to develop the rural infrastructure, it is also very important to encourage and involve rural communities in decision-making; promote rural communities with their indigenous agriculture, crafts, small scale industry-based product to the local, national, and international markets; and also, empowerment and rural leadership for a sustainable development of the area for current and future years. Accordingly, there is a dire need to facilitate the people in the rural areas to get access to physical infrastructure, information technology, education, extension services and learning resources, knowledge and training to support sustainable development planning and decision-making.

In order to retain and sustain the essence of rural India, without compromising the quality of life of the inhabitants over here, it is very important to provide them a sense of better living with access to the urban amenities for upliftment of their livelihood. Thereby it is required to initiate and encourage a few measures that can significantly improve the infrastructure facilities with strategic provisions. A few such initiatives/strategies are mentioned below:

- Encourage public private partnership (PPP) for investing on infrastructure in rural areas, including roads, transport systems, storage and market facilities, livestock facilities, irrigation systems, affordable housing, water supply and sanitation services, waste management, electrification facilities, and information and communications networks
- Improvement of access to a high-quality main road and transportation systems that enables increase in agricultural productivity, proper supply chain especially for perishable agricultural and industrial products, health emergency; as well as disaster emergency evacuation.
- Encourage cost-effective construction techniques for physical infrastructure specially buildings, storage and roads to deal with probable natural calamities such as earthquake, flood, storms, fire, etc.
- Improve access to reliable and affordable energy services, including renewable and alternative sources of energy (such as Solar Energy) for sustainable rural development
- Support *improved access for all* to strengthened rural health-care services and education facilities
- Encourage Rain Water Harvesting at individual and community level for ground water recharging and irrigation purposes
- Develop and improve the access to information and communications technologies for the rural population, to support Internet access and build capacities for an effective use of these technologies such as tele-medicine, tele-education, e-Health and e-awareness, and e-entertainment, etc.
- Promote the development of rural organizations such as community-driven cooperatives to enhance investment in essential infrastructure and services, and recognize the role of urban areas in fostering rural development
- Provision for sports facilities for children and youths for health development and mindfulness
- Ensure environmental sustainability in rural areas by means of encouraging the use of land resources in a sustainable manner to prevent land degradation that is caused by unsustainable exploitation of land resources

- Encourage sustainable natural resources use and management, including ecosystem conservation through community-based programs ensuring the balance between green open space and built forms
- Promote safe and environmentally friendly waste management practices

1.2 Land Pooling and readjustment

1.2.1 Land Pooling scheme

It is an instrument for land development. The public development authorities/ agencies bring together a group of landowners to pool their land under the aegis of the state town or urban planning act. A master plan of the pooled area is prepared, laying out the roads, plots for social amenities, and sales to recover the project's cost. The remaining land is readjusted into final regular-shaped plots and returned to the original landowners. The size of the final plot is carved in proportion to the size of their original plot. The location of the final plot is tried to be kept in proximity to the original plot. A betterment/ development charge based on the cost of the proposed infrastructure is levied from the landowners. Infrastructure is laid by utilizing the funds generated through betterment charges and the sale of plots. The fundamental concept of land readjustment is the same across the world. However, conditions such as levy of betterment charges and reservation of some portion of land to recover the cost of the project, etc. may vary from place to place.

In India, the land readjustment instrument was first introduced under the Bombay Town Planning Act of 1915 as a Town Planning Scheme (TPS). Subsequently, under the Maharashtra Regional & Town Planning Act, 1966; Gujarat Town Planning and Urban Development Act (GTPUDA), 1976 and few other land policy in previous years such as the Delhi Land Pooling Policy, 2018; the Haryana Land Pooling Policy, 2019; the Andhra Pradesh Capital Region Land Pooling Policy, 2014; Uttarakhand Land Pooling Scheme, 2015 and the Rajasthan Land Pooling Act, 2016.

1.2.2 Comparative analysis of the land pooling schemes of other states, concerning the land contribution and cost recovery.

a) Uttarakhand Land Pooling Scheme

The burgeoning population of the state demands the development of land for accommodating the population. However, the study conducted for Belada and Chharba villages of uttrakhand reveals

that landowners are keen to participate in the development by surrender their land for land pooling scheme. In this scheme, the authority guarantee the return of reconstituted land and payment of benefits to the landowners who have surrendered their land under the land pooling scheme. The distribution of returnable land and other benefits shall be as under:

Table 30 Features of Uttarakhand Land Pooling Scheme

Area surrendered under LPS (in Sq.m.)		**Land holding with transferable right**		**Land holding with non-transferable right**	
		Residential	**Commercial**	**Residential**	**Commercial**
1.	250 to 5000	20%	4%	15%	2%
2.	5001 to 10000	22%	6%	17%	4%
3.	More than 10000	27%	7%	20%	5%

Other than the above returnable land, the owners of the surrendered/ pooled land will be entitled for upfront payment equivalent to 50% of the cost of land as per the circle rate on the date of pooling of the land, per year in three equal yearly instalment.

b) Gujarat Town Planning Scheme

In TPS, 50 to 65 percent (approx.) land is returned to the original land owners after the readjustment and planning, and 35 to 50 percent land is used for road network and amenities. The compensation for the land used for amenities and roads is given to the original landowners at the market rate of undeveloped land. The landowners contribute 50 percent of the incremental value of the developed land returned to the original landowners to recover the cost of the scheme.

c) Delhi Land Pooling Scheme

In this scheme, each landowner will surrender land proportionately, free of encumbrances as and when required for city level services, as needed for city level infrastructure in a sector, irrespective of land uses assigned to their original land in the ZDP. DDA and the service providing agencies will develop city level physical infrastructure, recreational and public/semi-public (PSP) facilities on minimum 40% of the pooled land on payment of EDC charges on the total pooled land. The remaining 60% land shall be returned to the original land owners for development of residential (53%) (including neighborhood level facilities), commercial (5%) and public/semi-public facilities (2%) as per sector plan, notified ZDP and prevailing Master Plan. The distribution of land uses shall be as under:

Table 31 Features of Delhi Land Pooling Scheme

Land use	**Area of Pooled Land**	
	Minimum 40 %	**Maximum 60 %**
Gross Residential	--	53%
Commercial	--	5%
Industrial	4%	--
Recreational	16%	--
PSP	8%	2%
Roads and circulation	12%	--

d) Amarawati Land Pooling Scheme

Land Pooling Scheme is intended for Land Owners volunteering to offer their land against a guaranteed return of developed and reconstituted plot and other benefits. Under land pooling scheme, landowners voluntarily sign ownership rights over to a single agency or government body. This agency develops the land by developing public infrastructure like roads, sewage lines, ICT etc. The distribution of returnable land and other benefits shall be as under:

Table 32 Features of Amravati Land pooling scheme

Returnable Land (in Sq. yards per one acre)		**Dry**		**Jareebu/ Semi Urban**	
		Residential	**Commercial**	**Residential**	**Commercial**
A. Patta B. Assigned		1000	250	1000	450
1.	Ex-Serviceman / Political Sufferer (Except POI Cases)	1000	250	1000	450
2.	Assignments before 18-06-1954 (Except POT Cases	1000	250	1000	450
3.	Assignments after 18-06-1954 (Except POT Cases)	800	150	800	200
4.	POT Resumed lands-Eligible Shivoijamadar occupation	500	50	500	100
5.	Un-Objectionable Govt. landsEligible Shivoijamadar	500	50	500	100

6.	Objectionable Govt. lands-Eligible Shivoijamadar	250	0	250	0
C. Objectionable Govt. lands-Eligible Shivoijamadar		30000		50000	
D. Yearly increase (Rs.)		3000		5000	
E. One time additional payment for gardens like lime/sapota/guava/ amla and jasmine (Malle) (Rs)		100000			

Land Pooling Scheme Social Benefits:

- To provide Rs. 2,500 /- per month for a period of 10 years to all the landless families. One time agricultural loan waiver upto Rs. 1, 50, 000 per family to farmers who are surrendering their lands under LPS.
- Providing NREGA up to 365 days a year per family. Providing housing to houseless as well as those losing houses in the course of development. Skill development trainings with sty-fund to cultivating tenants, agricultural labour and other needy persons to have alternative livelihoods.
- To provide interest free loan up to 25 Lakhs to all the poor families for self-employment. Free Education Policy for affected families
- Free Health Policy for affected families.

1.2.3 Area of improvement in Uttrakhand Land Pooling Scheme

Based on the above land pooling schemes of the other states, the following area of improvements in the Uttrakhand Land Pooling Scheme have been identified:

1. Percentage of returnable land should be attractive to landowners and workable for self-financing the scheme.
2. Land pooling scheme should be employment generative or linked with jobs in compensation package besides the monetary benefits.
3. Besides the monetary, social benefits such as education and health should be provided to the affected families or linked with the government's existing schemes.

4. Land pooling scheme should address the issues of marginal landowners and landless farmers who value land for its use rather than exchange.
5. A robust Grievance redressal mechanism is required to bring transparency in the process of the land pooling scheme.

1.2.4 Critical issue of Land Pooling Schemes

Illegal subdivision and use conversion of land in the proximity to developed area. After the implementation of the LPS, the price of the developed and land in proximity to developed areas increases, and due to this, it becomes more challenging to continue the agricultural activities on such expensive land.

In some cases, original landowners are not actual beneficiaries as the real estate agents and other parties with vested interests often take benefits out of this.

1.3 RuRBAN Cluster

A 'Rurban cluster', would be a cluster of geographically contiguous villages with a population of about 25000 to 50000 in plain and coastal areas and with a population of 5000 to 15000 in desert, hilly or tribal areas. As far as practicable, clusters of villages would follow administrative convergence units of Gram Panchayats and shall be within a single block/tehsil for administrative convenience.

1.3.1 Selection Criteria for the RuRBAN cluster

For selection of Non- Tribal clusters, the Ministry would provide a list of leading sub districts to each State, within which the clusters could be identified. The selection of these sub districts by the Ministry would be based on parameters such as

1. Decadal Growth in Rural Population
2. Decadal Growth in Non-Farm work force participation
3. Presence of Economic Clusters
4. Presence of places of Tourism and Pilgrimage significance
5. Proximity to Transport Corridors

Appropriate weightages have been given for each parameter. Thereafter, within these sub districts, so identified by the Ministry, the State Governments could select the clusters and while doing so, could include the following performance parameters:

1. Rise in Land Values.
2. Decadal Growth in Non-Farm work force participation.
3. Percentage Enrollment of girls in secondary schools.
4. Percentage Households with Bank accounts under Pradhan Mantri Jan Dhan Yojana.
5. Performance in Swachh Bharat Mission (Grameen).
6. Good Governance Initiatives by Gram Panchayats.

Any other factor which the States may consider relevant may also be included. However, a total weightage of 80% would be given for the first 4 parameters and the States will have the flexibility to choose the last three parameters, subject to a total weightage of 20%.

1.3.2 Need for the RuRBAN clusters

Enormous parts of rural areas in the country are not stand-alone settlements but part of a group of settlements, which are quite proximate to each other. These group or cluster typically indicate potential for growth, have potential economic drivers and derive locational and competitive advantages for these areas. These clusters once developed can then be classified as 'Rurban'. Hence taking cognizance of this, the Government of India, has launched the Shyama Prasad Mukherji Rurban Mission (SPMRM), aimed at developing such rural areas by provisioning of economic, social and physical infrastructure facilities. The Mission was launched on 21st February, 2016.

These clusters would be equipped with the required amenities, for which it is proposed that resources be mobilized through convergence of various schemes of the Government, over and above which a Critical Gap Funding (CGF) would be provided under this Mission, for focused development of these clusters.

Spatial planning for these cluster will help to stimulate local economic development, enhance basic services, and create well planned Rurban clusters. Vision of the NRUM for this to Development of a cluster of villages that preserve and nurture the essence of rural community life with focus on

equity and inclusiveness without compromising with the facilities perceived to be essentially urban in nature, thus creating a cluster of "Rurban Villages".

The Main outcomes envisaged under the NRuM are:

Bridging the rural-urban gap in economical, technological facilities and services. By enhancing local economic development by reducing poverty and generating employment opportunities in rural area. Creating a driver to attract in rural areas, to spread development in the rural region.

Reverse migration will be promoted due to the availability of urban amenities and employment opportunities in the locality. Reverse migration help to decrease migration load in cities. Employment will increase the Purchasing power of rural inhabitants which leads to economic development. Rurban approach also helps to utilize India's demographic dividend since rural inhabitants will have access to skill development centre's but this mission requires coordination between numerous entities-Union Rural development Ministry, State governments and private sector to succeed. These clusters also can be developed through the Private Public Partnership (PPP) model.

1.3.3 Proposed Rurban cluster for Belada

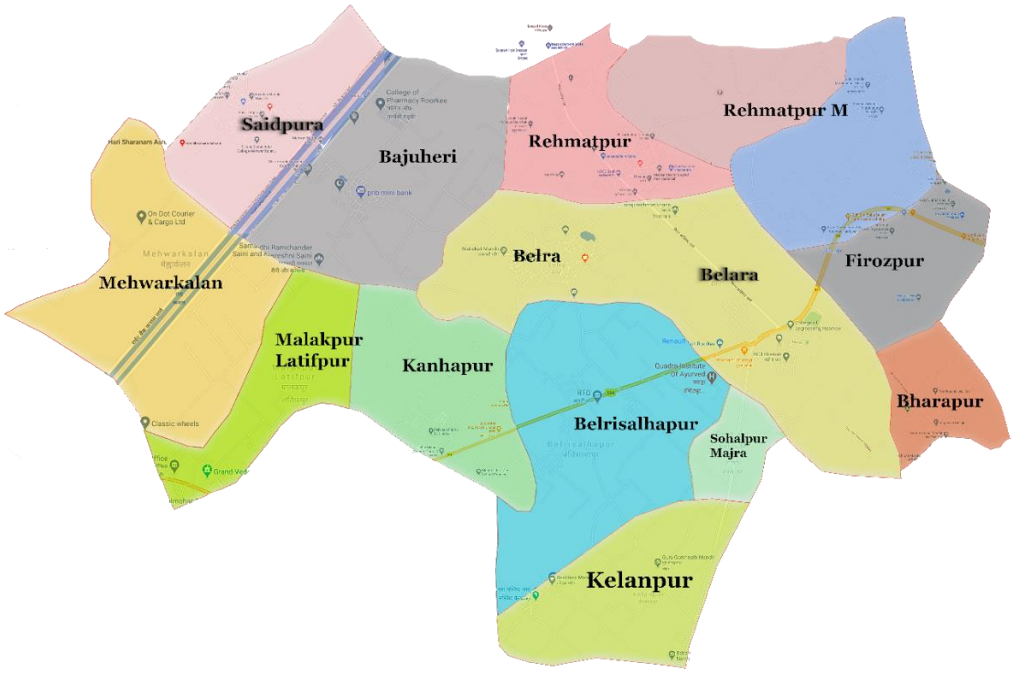
Cluster Details	**State Name : UTTARAKHAND** **District Name : HARIDWAR** **Cluster Name : Belra** **Category : Non Tribal, Plain Area**
Work Details	Component : Sub-Component : Convergence Allocation :
Need of the activity	**Spatial planning for the integrated development**
Intervention	
Impact	
Key Stakeholders	
Beneficiaries	
Activity Details	

Belra cluster is located in the Roorkee block of Haridwar district, Uttarakhand with a total of 4,402 families residing. According to Census 2011, Belra cluster covers an area of about 2,455.61 hectares with the population of 27,078 people. It is situated 12 km away from sub-district headquarter roorkee and 25 km away from district headquarter Haridwar. Roorkee is nearest town to Belra cluster. Belra cluster consist Belra ,Belara , Belra M ,Bajuheri , Rehmatpur ,Saidpura ,

Mehwarkalan ,Beldisalhapur ,Bharapur ,Kanhapur ,Malakpur latifpur ,Kot kaliyar chakMooldaspur urf Majra , and kelanpur panchayatsIn Belra cluster population of children with age 0-6 is 4,727 which makes up 17.45 % of total population of village. Overall literacy rate is 71.88% in which men and women literacy rate is 81% and 58.34 respectively.

In Belra cluster out of total population, 7,724 were engaged in work activities. (6,608) 85.55 % of workers describe their work as Main Work (Employment or Earning more than 6 Months) while 14.45 % were involved in Marginal activity providing livelihood for less than 6 months. Of 1046 workers engaged in Main Work, and 1046 as marginal worker

Schedule Caste (SC) and constitutes (8,635) Schedule Tribes (ST) 31.88 % and (17) 0.062% of total population in Belra cluster.



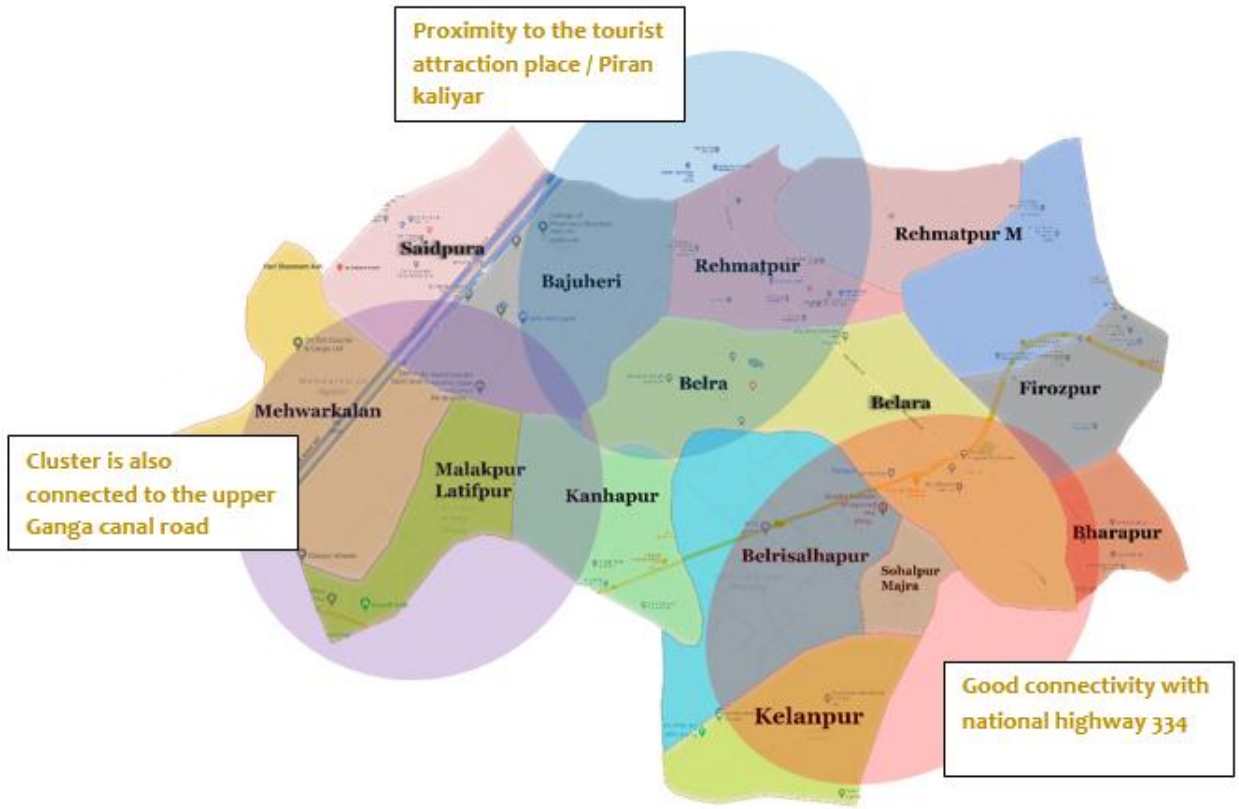


Figure 69 Proposed Belada Rurban Cluster Map

Table 33 Census profile of the villages

Village Name	Population	Area (Ha)	Household
Belra	7185	395.07	1187
Belara	16	102.01	2
Bajuheri	2490	250.62	441
Rehmatpur	4656	124.93	773
Saidpura	962	155.76	169
Mehwarkalan	527	179.21	109
Beldisalhapur	1860	248.77	340
Hasan Alipur	257	40.89	60
Bharapur	3687	146.1	564
Kanhapur	1115	123.41	-
Malakpur latifpur	936	342.88	162
Kot kaliyar chak	15	24.03	2
Mooldaspur urf Majra	2010	183.82	369
Kelanpur	1,362	138.11	224
Total	**27,078**	**2,455.61**	**4,402**

Village Name	**Kelanpur**			**Mehwarkalan**		
	Total	Male	Female	Total	Male	Female
Total No. of Houses	**224**	-	-	**109**	-	-
Population	**1,362**	719	643	**527**	282	245
Child (0-6)	**285**	155	130	**56**	28	28
Schedule Caste	**349**	170	179	**129**	66	63
Schedule Tribe	**0**	0	0	**4**	2	2
Literacy	**43.36 %**	50.18 %	35.87 %	**90.23 %**	96.06 %	83.41 %
Total Workers	**612**	375	237	**160**	140	20
Main Worker	**303**	-	-	**151**	-	-
Marginal Worker	**309**	101	208	**9**	7	2

Village Name	**Beldisalhapur**			**Rahmatpur**			**Hasan Alipur**			**Belada**		
	T	M	F	T	M	F	T	M	F	T	M	F
Total No. of Houses	**340**	-	-	**773**	-	-	**60**	-	-	**1187**	-	-
Population	**1860**	1001	859	**4656**	2430	2226	**257**	129	128	**7185**	3778	3407
Child (0-6)	**309**	172	137	**799**	417	382	**22**	12	10	**1195**	647	548
Schedule Caste	**1263**	675	588	**832**	438	394	**5**	3	2	**2508**	1337	1171
Schedule Tribe	**0**	0	0	**9**	7	2	**0**	0	0	**4**	2	2
Literacy	**72.15 %**	82.15 %	60.66 %	**69.28 %**	80.23 %	57.32 %	**96.60 %**	98.29 %	94.92 %	**70.90 %**	79.78 %	61.18 %
Total Workers	**504**	469	35	**1292**	1,162	130	**65**	59	6	**1884**	1751	133
Main Worker	**479**	-	-	**1086**	-	-	**63**	-	-	**1,765**	-	-
Marginal Worker	**25**	20	5	**206**	148	58	**2**	2	0	**119**	108	11

Village Name	**Belada**			**Bharapur**			**Malakpur Latifpurr**			**Mukarrampur Urf Kalewala**		
	Total	M	F	T	M	F	T	M	F	T	M	F
Total No. of Houses	**2**	-	-	**564**	-	-	**162**	-	-	**336**	-	-
Population	**16**	15	1	**3,687**	1,875	1,812	**936**	494	442	**2,012**	1,047	965
Child (0-6)	**0**	0	0	**800**	408	392	**158**	90	68	**404**	210	194
Schedule Caste	**0**	0	0	**504**	262	242	**824**	434	390	**419**	216	203

Schedule Tribe	**0**	0	0	**0**	0	0	**0**	0	0	**0**	0	0
Literacy	**68.75 %**	73.33 %	0.00 %	**60.96 %**	71.17 %	50.42 %	**68.89 %**	77.48 %	59.63 %	**66.17 %**	76.11 %	55.38 %
Total Workers	**16**	15	1	**915**	844	71	**249**	232	17	**528**	523	5
Main Worker	**8**	-	-	**848**	-	-	**247**	-	-	**361**	-	-
Marginal Worker	**8**	7	1	**67**	47	20	**2**	2	0	**167**	163	4

Village Name	**Saidpura**			**Kot Kaliyar Chak**			**Kanhapur**			**Bajuheri**		
	Total	M	F	T	M	F	T	M	F	T	M	F
Total No. of Houses	**169**	-	-	**2**	-	-	**178**	-	-	**441**	-	-
Population	**962**	509	453	**15**	6	9	**1,115**	607	508	**2,490**	1,305	1,185
Child (0-6)	**96**	44	52	**4**	4	0	**212**	118	94	**387**	201	186
Schedule Caste	**457**	240	217	**0**	0	0	**517**	288	229	**558**	288	270
Schedule Tribe	**0**	0	0	**0**	0	0	**0**	0	0	**0**	0	0
Literacy	**81.29 %**	91.61 %	69.33 %	**81.82 %**	100.00 %	77.78 %	**62.57 %**	74.44 %	48.55 %	**73.28 %**	83.15 %	62.36 %
Total Workers	**395**	247	148	**2**	2	0	**281**	258	23	**750**	678	72
Main Worker	**382**	-	-	**2**	-	-	**274**	-	-	**639**	-	-
Marginal Worker	**13**	11	2	**0**	0	0	**7**	2	5	**111**	72	39

1.3.4 Proposed Rurban cluster for Chharba

Cluster Details	**State Name : UTTARAKHAND** **District Name : DEHRADUN** **Cluster Name : Chharba** **Category : Non Tribal, Hilly area**
Work Details	Component : Sub-Component : Convergence Allocation :
Need of the activity	**Spatial planning for the integrated development**

Intervention	
Impact	
Key Stakeholders	
Beneficiaries	
Activity Details	

Chharba cluster is located in the Vikasnagar block of Dehradun district, Uttarakhand with a total of 2662 families residing. According to Census 2011, Chharba cluster covers an area of about 2194.99 hectares with the population of 13,745 people in which numbers of male and female are 7271 and 6474 respectively. 0 to 6 years children population is 2020 (1047 male and 973 female). It is situated 7km away from sub-district headquarter Vikasnagar and 22km away from district headquarter Dehradun. Herbertpur is nearest town to Chharba cluster which is approximately 6km away. Chharba cluster consist khusal pur, Belra, lakhanwala khash and lakhanwala newat Gram panchayats.

SC and ST population sharing the 0.93 % and 0.2 % respectively. This cluster is well equipped with the primary and other high educational institutes. Overall literacy rate is 72.02 % in which male and female literacy share 77.98% and 65.37% literacy rate respectively. 29.05% population is working population in which 75.05 % are main workers and 24.95% are marginal workers. Male and female sharing are 86.87% and 13.13% respectively. Chharba cluster, inspite of being in Uttarakhand, is devoid of tough and rocky terrains. It is in the foothills of the Himalayan Terrains. Because of this, it is fairly accessible and can be reached easily. This divide is a road branching out from NH72 passing through Chharba. After Upper Chharba , the hilly terrains of Uttarakhand take shape.

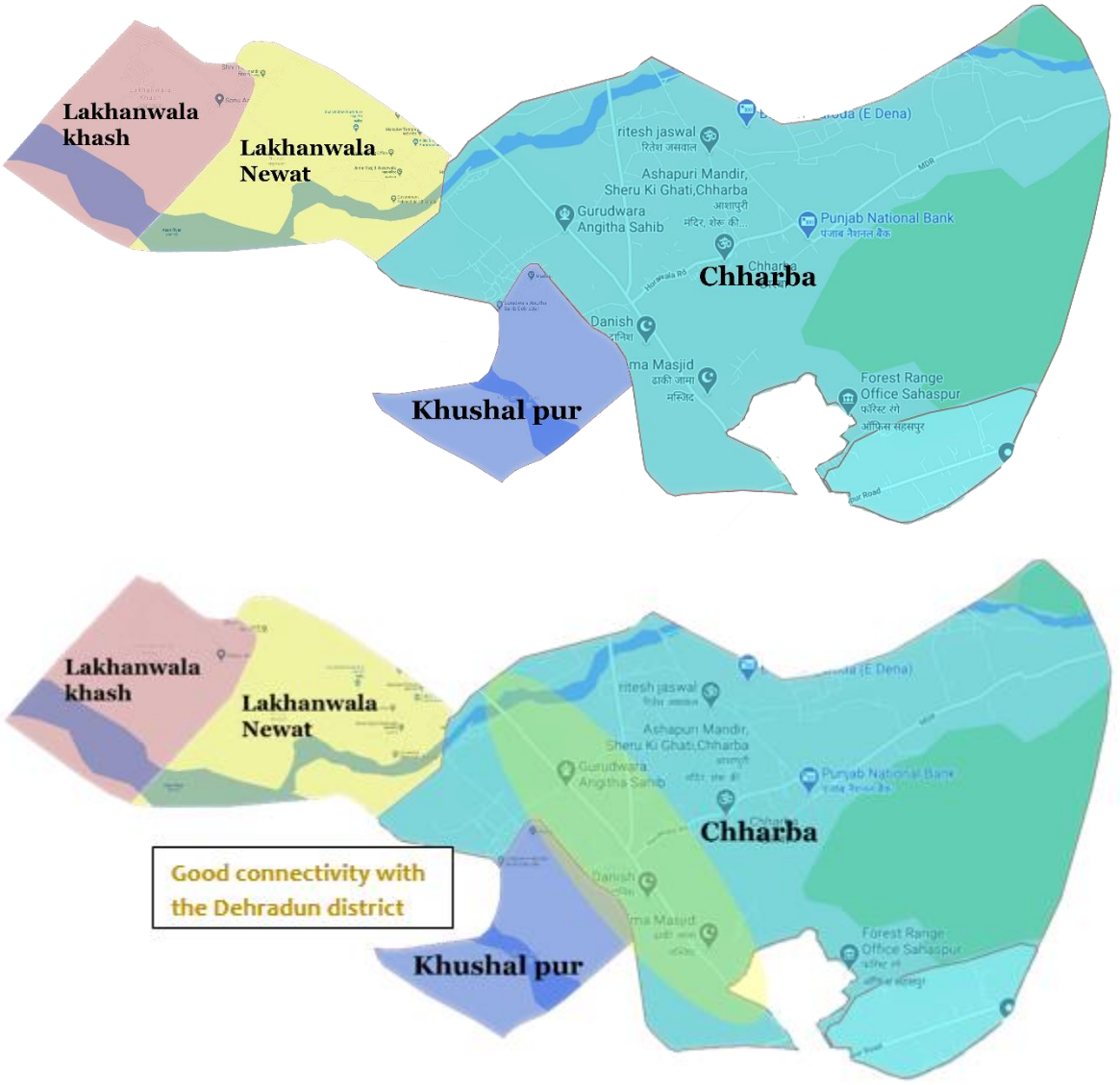


Figure 70 Proposed Chharba Rurban Cluster Map

Table 34 Census profile of the villages

Village Name	Population	Area (Ha)	Household
Khushal pur	3,963	372	725
Chharba	7,268	1567.9	1,425
Lakhanwala khas	747	154.5	150
Lakhanwala newat	1,767	100.59	362
Total	**13,745**	**2,194.99**	**2,662**

Village Name	**KHUSHAL PUR**			**CHHARBA**			**Lakhanwala Khash**			**Lakhanwala Newat**		
	Total	M	F	T	M	F	T	M	F	T	M	F
Total No. of Houses	**725**	-	-	**1,425**	-	-	**150**	-	-	**362**	-	-
Population	**3,963**	2,136	1,827	**7,268**	3,790	3,478	**747**	381	366	**1,767**	964	803
Child (0-6)	**680**	360	320	**1,013**	536	477	**91**	45	46	**236**	106	130
SC	**34 (0.86 %)**	19	15	**420**	228	192	**19**	12	7	**227**	125	102
ST	**0**	0	0	**20**	9	11	**0**	0	0	**8**	5	3
Literacy	**67.93 %**	75.00 %	59.59 %	**76.80 %**	82.73 %	70.38 %	**72.71 %**	81.25 %	63.75 %	**70.67 %**	72.96 %	67.76 %
Total Workers	**1,218**	1,075	143	**1,935**	1,737	198	**264**	178	86	**576**	479	97
Main Worker	**933**	-	-	**1,381**	-	-	**199**	-	-	**484**	-	-
Marginal Worker	**285**	199	86	**554**	493	61	**65**	2	63	**92**	39	53

1.4 Problems and strategic options for Agricultural Marketing

1.4.1 Introduction:

2020 to 2040 within twenty years, world will see a vast change in all sectors and segments of humankind, Covid 19 pandemic has initiated the change or more precisely it has triggered the evitable. Human and machine will evolve as digital sphere will become more prominent in any one's life. Health, food, life expectancy will face more challenge than ever. Now, to combat the situation of change we have to come forward with more evolving planning and execution. India, the largest democracy in total number of population of the world has the valuable role to play. As Indian economy largely dependent on agriculture sector and the contribution of rural economy has the major participatory roll in GDP, India needs to invest Its all effort to strengthen the agriculture and associate economic activities.

1.4.2 Issues & Problems:

Problems in fields

India has seen Green Revolution which compensated the hunger but it took away the soil fertilization power. From 1980 India saw green revolution which was overly dependent on Chemicals such as fertilizers, Pesticides and herbicides. This over use contaminated the soil resulting toxic production and rejection from International market

Indian farming techniques are not modernized yet. Use of Pesticides, chemicals is uprising but modern farm techniques such as Green House, Poly House, Mulching, GAP, Integrated Farming, Integrated Pest management are yet to introduced in many areas. The focus should be on quality rather than quantity. It is essential for our farmers to win the consumer confidence in open market.

Dissemination of knowledge and Information is not sufficient. The KVKs, District Agriculture Offices, ICAR are the institution who are responsible for training, implementing new technologies, inspection of the fertile areas, soil testing, crop wise training etc. last decade they have done immense efforts but their resources are sometimes not suffice to provide for huge Rural Areas of India. Also, rural literacy rate is playing huge role for the training programs. A well educated person can perceive information and implement in the field in a beneficial way.

Production and Distribution

In India we are facing this problem very significantly. The production amount is not matching with the needs, which is resulting the waste and raising the price for the consumers. The distribution problem also playing important role as farmers are not getting minimum support price. Preservation technique and procedure is not well distributed or available in all Gram panchayets. This is forcing the farmers to sell their production in low costs and they are becoming victim of the markets. It is astonishing that farmers are not getting price yet consumers are fighting with inflation.

Communication and connectivity

Indian rural areas yet to get electricity, Internet, Roads. These are valuable factors for development of sustainable agriculture and rural life. Electricity is essential for using farm machineries like water pumps, incubators, as internet can close the gap of knowledge. The online training programs and classes could be best solution to teach large number of audience. Available of sufficient electricity and Internet can educate our farmers on various aspects of farming. Roads are essential for moving the productions to the nearest markets. We are already aware of the facts that a farmer has to cross many miles to reach nearest Mandis, Bazar. Proper connection with near Urban areas will solve the problem of pricing.

Strategies and Policies

Policy making- Every policy should be made in terms of benefit of Rural peoples. Strategies by Problems needs to be made as same policy may not be beneficial across India. One of the clear example is the newly imposed farm bill. We are seeing that farmers from Punjab, Hariana, UP are protesting. This bill may be beneficial for few states where the land holding is small or there is no APMC's or state regulated Mandis. Yet the bills and policies should be crafted for the farmers as there are too many flaws in this bill from which companies can cheat, dominate the farmers.

Policy implementations – The new policies are being mage but for implementation there are huge gap. Aids benefits are not reaching to the actual victims. PMKVY, RKVY schemes are already existing but every farmer is not getting the benefit. Due to lack of monitoring, mobilization of files in government departments, farmers are not getting the benefit in time of need. The cop insurance policy of Central Government need to be implemented in an effective manner. The private and

public sector banks/ Insurance companies are unwilling to take this risk. The aid from Union government against Fasal Bima Yojona is not coming in every farmer's accounts.

1.4.3 Policy and Strategic Options:

Diversification of rural production

India has vast resources in terms of all kind of resources. It has – Most diversified land and natural resources as we can see- Tea, Coffee, spices, Rice, Paddy, vegetables all can be produce yet crop diversification is not followed by our farmers. There are certain benefits of diversifications of crops as- it will reduce the risk of over productions, getting the MSP or value for production, soil integrity, quality of production and sometimes it reduces the pest attacks.

Not only food production, Rural India also produces lively hoods like saree, Chatai, Broom, Buckets, and so on. It is our responsibility to make this production more organized. Imagine the 'tant' could be as similar with any Italian fashion brand, Khadi can match any popular garment's quality.

Training and Capacity Building of Youth

We have most percentage of youth in our total population, and these youths are mostly from the rural portion of India. The work force is ready for the development of this sector, but they only need the directions and proper training.

Sustainable agriculture and Creating profitable way

Sustainable agriculture practices ensure the long term benefit yet improve the quality of production. After Green revolution we need to find the way of sustainable agriculture production to stabilized the growth and fertility of lands. The practice of sustainable agriculture can improve the quality as it can enhance the marketability.

Below mentioned points are most important for making a sustainable agriculture pattern and practice. By implantation of these practices the sustainability and profit can be earned and which are already proved worldwide.

- GAP – Good Agricultural Practices
- Integrated farming- IAP

- Crop Diversification
- Farm Mechanization and Usage of technology
- Soil Test
- Integrated Pest Management

Agro marketing

The Indian food brands, like Amul, MDH masala, TATA tea, Basmati rice which have seen the major success in Post-Independence era, but also think that, the agriculture production of India which has spices to rice, vegetables to tea, fish to meat all are coming from rural sector but they are not well recognized in Market.

FPO and FPC

Farmers producer organization or Farmers Producer Company (FPO & FPC) will play vital role for development of organize market. The FPO concept itself created by focusing the area of marketing on farm production and it is also play pivotal role of making useful decision for the farmers listed with them. KVK, DAO are disseminating information and training through this FPO's and FPC's. For MSP to contract farming these FPCs can take their own decision and they can be the collective voice of the farmers in the given region.

SHG- Self-help groups are the idea to creating organized efforts of rural peoples and females to produce and earn. Government needs to take serious action for these efforts, they need to be observed, promoted, and improved where needed. Mushrooms, Fruit jam, Sauce, spices and also handcrafts can be produced and market worldwide. Influence these type of entrepreneurship by easily sanctioned loans, giving packaging machine and proper training government can pave the way for holistic development of framers and their housekols.

Removal or controlling of a middle man and creating direct link between farmers and consumer will create the desirable environment, by which doubling the farmer's income will become reality. The food storage, cold storages need to be built in respective zones.

Packaging and branding- This is the common traits which is missing in our rural productions. The best example **is Farm Pick apples** which is a brand of Adani Agro, a subsidiary of Adani Willmar group. Here the apples of Himachal Pradesh, uttarakhand is being marketed by Adani

group with apt packaging and distribution channels. These type of approach should be taken for the region specific productions. Government can build infrastructures and collective training through Farmers groups and the FPCs.

Quality and Standards-Most of the Indian food productions are being rejected in Europe and First world countries. Our farmers need to practice organic agriculture/ GAP and focus for quality not quantity. Our Central and state governments should implement strong policies for the productions to meet both standards and quantity and guidelines for domestic and international market.

Go digital!! Indian middle class is now prone to digital market and covid pandemic has triggered this buying pattern. As amazon, flipcart, Big basket are leading the way, the farmers need to showcase their products on these online platforms. But these websites are governed by the MNC's where the benefit of the farmers will be back seated so there is a need of our own digital platform. By involving stake holders like FPC, FAO, FCI, region wise platforms can be created as it will ensure the price to the farmers and also manage the costs for the end users.

Need of a sustainable value chain, there are very less company which are dedicatedly doing this business. Yes, the new entrepreneurship pattern has produced few but these are not sufficient. The involvement of Private and Public sector in this segment is essential.

Creation of Ideal 'Gram'

Development of roads, communication, education facilities, health care facilities will play strong roll in this futuristic model. Without proper communication channels and training programs, the practice of sustainable agriculture cannot be achieved. Improvement of lifestyle can contain the youth of Rural India on their roots.

Distribution of produced grains, vegetables, live stocks will provide the best price, and build the path of desired improvement. The proper distribution channels will also ensure the policies and aids to reach the actual persons.

Creation of Ideal 'Gram' – like smart cities, smart villages should be developed as pilot basis in all states. After creation of those smart villages statistical analysis is needed and by evaluation of those information policy and road map can be created. The main approach should be – keeping the

production in the selected gram first and market the excess amount for the development or earning extra.

1.4.4 Future Vision:

The model villages will show us the way how India could be shaped in future. The ideal village, which was the significant thought for building the modern India as mahatma Gandhi visualize, concept of India (How India should be). With vast natural resource and rich agrarian land, with apt planning and development the ideal 'Gram' can be developed which can match the feelings of so called Country side. Life of the rural India should come first and if we are looking at the evaluation of mankind we will see the city based development, but for India it should be reversed. As, rural India Should be exposed to new technologies, equipment, development. We should emphasize to build smart Gram rather than Smart city. The role of Desi Band (Indian Brand) will play a major role in this proposition, the farm equipment and technology will stand with traditional farming, producing food and products for the large Indian market.

ANNEXURES

Annexure 1 Questionnaire for Gram Panchayat

Vision and priority questionnaire: for (Tick): Belada ☐ Chharba ☐
परिकल्पना और प्राथमिकता प्रश्नावली: बेलदा ☐ छरबा ☐

Name (नाम):_____Age (आयु) _____ years (वर्ष).

Gender (लिंग) Male (पुरुष) / Female (महिला). Position (स्थिति): _____

Mobile (मोबाइल):_____ Occupation (व्यवसाय): _____

Living in the village since (गाँव में निवास) :_____ years (वर्ष): _____

Owned vehicle (स्वामित्व वाला वाहन): _____

Cycle (साइकिल)/Two Wheeler (दो पहिया वाहन)/Car (कार)/ Others (अन्य):_____

Own House (खुद का घर) / Rented house (किराए का घर)

Education level (शिक्षा स्तर):_____

Upto 10th /12th/ Graduate/Post Graduate or above (10 वीं /12 वीं / स्नातक / स्नातकोत्तर या उससे ऊपर)

1. I wish to **visualize** my village as (मैं अपने गाँव की कल्पना करना चाहता हूँ)

_____

_____

2. By 2040, I wish to have the following in my village for **job generation and growth** (Please put 1, 2, 3 only boxes that you wish.
(2040 तक, मैं चाहता हूँ कि मेरे गाँव में नौकरी सृजन और विकास के लिए कृपया (1, 2, 3 केवल वही रखें जो आप चाहते हैं)

i. Large industry (बड़ा उद्योग) ☐
ii. Tourism-based industry (पर्यटन आधारित उद्योग) ☐
iii. A large health facility (एक बड़ी स्वास्थ्य सुविधा) ☐
iv. University (विश्वविद्यालय) ☐
v. Government offices (सरकारी कार्यालय) ☐
vi. Micro and small industry (सूक्ष्म और लघु उद्योग) ☐
vii. Construction industry (निर्माण उद्योग) ☐
viii. Better Agriculture (बेहतर कृषि) ☐
ix. Any other (pl write) (कोई अन्य (कृपया लिखें))_____

_____

3. For future employment generation and good services, if **land** is required, we are willing to share part of our land with the exchange of (pl tick)

(भविष्य की रोजगार सृजन और अच्छी सेवाओं के लिए, यदि भूमि की आवश्यकता है, तो हम (कृपया सही का निशान लगाएं) के आदान-प्रदान के साथ अपनी जमीन का हिस्सा साझा/आदान प्रदान करने के लिए तैयार हैं।)

i. Financial compensation (आर्थिक छूट) ☐
ii. Job (रोजगार) ☐
iii. Both job and money (नौकरी और पैसा दोनों) ☐
iv. Partnership with the developer (डेवलपर के साथ साझेदारी) ☐

v. Any other (pl write) (कोई अन्य (कृपया लिखें)) _____

_____

4. I am willing to change my occupation if I get a good job in or around the village
(अगर मुझे गाँव में या उसके आस-पास अच्छी नौकरी मिल जाए तो मैं अपना व्यवसाय बदल सकता हूँ)

Yes (हाँ) ☐ No (नही) ☐

5. Put your **assessment for condition** of the facilities by putting 1 to 5 scale. Please tick [√] your option (1 से 5 के पैमाने पर सुविधाओं की स्थिति के लिए अपना आकलन करें। कृपया अपने विकल्प पर टिक करें [√])

Sl. No.(क्रमांक)	Infrastructure and Facilities (अवसंरचना और सुविधाएं)	**1**: Absent (अनुपस्थित) **2**: Bad (खराब) **3**: Fair (उचित/ सन्तोष जनक) **4**: Good (अच्छा) **5**: Very Good (बहुत अच्छा)					Write comments or any additional info (टिप्पणी या कोई अतिरिक्त जानकारी लिखें)
		1	**2**	**3**	**4**	**5**	
1	House condition (घर की हालत)						
2	Electricity (बिजली)						
3	Telecommunication services (दूरसंचार सेवाएं)						
4	Water supply to households (घरों में पानी की आपूर्ति)						
5	Drainage (जलनिकास)						
6	Waste Disposal (अपशिष्ट निपटान)						
7	Sanitation (स्वच्छता)						
8	Pre and primary Schools (प्री और प्राइमरी स्कूल)						
9	Secondary schools (माध्यमिक विद्यालय)						
10	Healthcare centre (स्वास्थ्य केंद्र)						
11	Cooking gas (खाना पकाने की गैस)						
12	Public transport to nearest towns (निकटतम शहरों में सार्वजनिक परिवहन)						
13	Roads (सड़कें)						
14	Support for agriculture (कृषि के लिए सहयोग)						
~~15~~	Water supply for irrigation (सिंचाई के लिए पानी की आपूर्ति)						
16	Ware house/storage (गोदाम भंडारण)						
17	Fire services (अग्निशमन सेवाएं)						
18	Parks and playgrounds (पार्क और खेल के मैदान)						
19	Market and shops (बाजार और दुकानें)						
20	Community centre (सामुदायिक केंद्र)						
21	Vocational training services/ Skill Development Centre (व्यावसायिक प्रशिक्षण सेवाएँ / कौशल विकास केंद्र)						
22	Police post (पुलिस चौकी)						
23	Coaching or training centre (कोचिंग या प्रशिक्षण केंद्र)						

6. Most critical problems of the village (सबसे महत्वपूर्ण गाँव की समस्याएं)

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7. Good things about your villages (अपने गाँव के बारे में अच्छी बातें)

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8. To improve conditions, what is your **priority**? Please tick [√] your option in1 to 5-scale
परिस्थितियों को सुधारने के लिए, आपकी प्राथमिकता क्या है? कृपया [tick] अपने विकल्प को १ से ५ पैमाने पर टिक करें

Sl. No. (क्र मांक)	Infrastructure and Facilities (अवसंरचना और सुविधाएं)	**1**: Not required (जरूरत नहीं है) **2**: Less priority (कम प्राथमिकता) **3**: Medium priority (मध्यम प्राथमिकता) **4**: High priority (उच्च प्राथमिकता) **5**: Very high priority (बहुत उच्च प्राथमिकता)					Comments, if any/ (टिप्पणियाँ, यदि कोई हो)
		1	**2**	**3**	**4**	**5**	
1	Permanent House (स्थायी सदन)						
2	Electrification (विद्युतीकरण)						
3	Telecommunication services (दूरसंचार सेवाएं)						
4	Water supply to households (घरों में पानी की आपूर्ति)						
5	Drainage (जलनिकास)						
6	Waste Disposal (अपशिष्ट निपटान)						
7	Sanitation (स्वच्छता)						
8	Schools (स्कूल)						
9	Healthcare centre (स्वास्थ्य केंद्र)						
10	Cooking gas (खाना पकाने की गैस)						
11	Public transport (सार्वजनिक परिवाहन)						
12	All weather roads (सभी मौसम सड़कों)						
13	Support for agriculture (कृषि के लिए सहयोग)						
14	Water supply for irrigation (सिंचाई के लिए पानी की आपूर्ति)						
~~15~~	Ware house/storage (गोदाम भंडारण)						
16	Fire services (अग्निशमन सेवाएं)						
17	Parks and playgrounds (पार्क और खेल के मैदान)						
18	Market and shops (बाजार और दुकानें)						
19	Community centre (सामुदायिक केंद्र)						
20	Vocational training services/ Skill Development Centre (व्यावसायिक प्रशिक्षण सेवाएँ / कौशल विकास केंद्र)						
21	Police post (पुलिस चौकी)						
22	Coaching or training centre (कोचिंग या प्रशिक्षण केंद्र)						

9. Any other **suggestions** for the future planning? (भविष्य की योजना के लिए कोई अन्य सुझाव?)

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Signature (हस्ताक्षर)

Survey team of IIT Roorkee is thankful for your time and valuable responses.

(IIT रुड़की की सर्वेक्षण टीम आपके समय और बहुमूल्य प्रतिक्रियाओं के लिए आभारी है।)

Annexure 2

Calculation details of population projection of **Belada Village**

1) **Ratio method 1,** using constant decadal population growth rate

Population in 2001	**5536**
Population in 2011	**7185**
Decadal population growth from 2001 to 2011	1.3
Population in 2020	**11,761**
Decadal population growth from 2011 to 2021	1.6
Population in 2031	**11,761*1.6 = 18,818**
Population in 2041	**18,818*1.6 = 30,109**

2) **Ratio method 2,** using increasing decadal population growth rate (moderate growth rate)

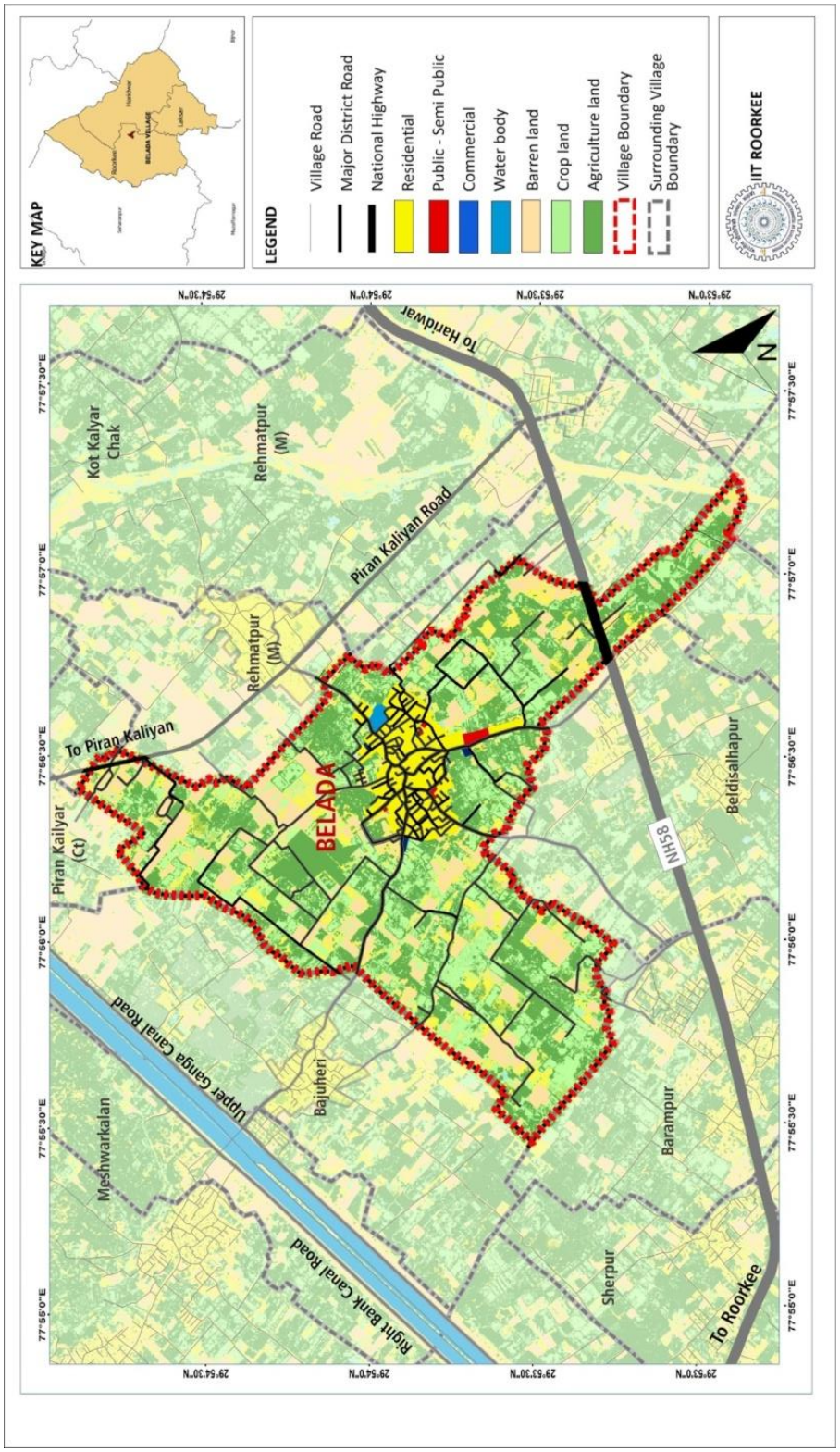
Population in 2001	**5536**
Population in 2011	**7185**
Decadal population growth from 2001 to 2011	1.3
Population in 2020	**11,761**

Decadal population growth from 2011 to 2021	1.6
Increment in decadal growth rate of population from 2001 to 2011	1.23
Expected decadal growth rate of population from 2011 to 2021	1.23*1.6 = 1.9
Population in 2031	**11,761*1.9 = 22,346**
Decadal growth rate of population from 2011 to 2021	1.23*1.9 = 2.3
Population in 2041	**22,346*2.3 = 51,396**

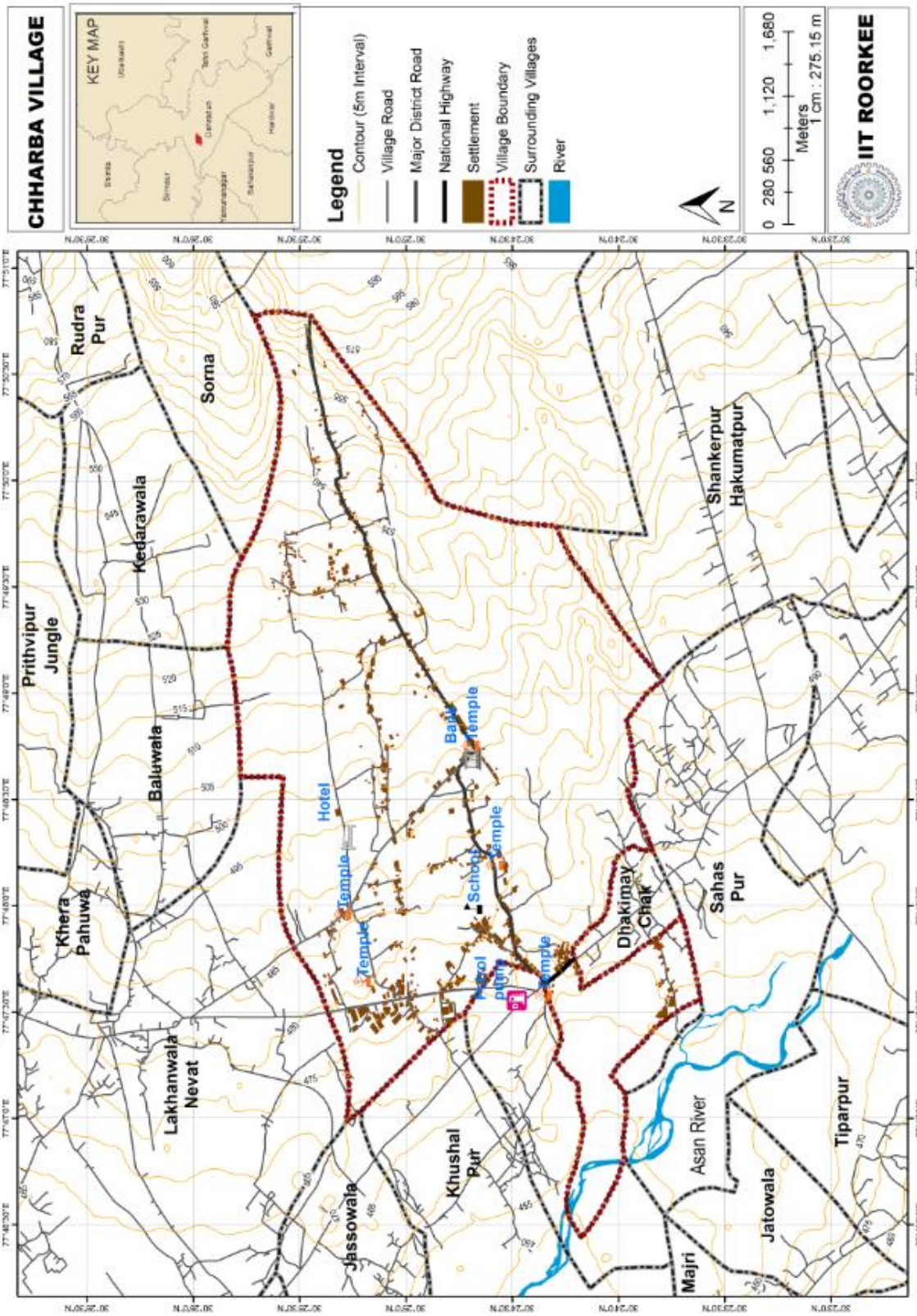
3) Ratio method 3 (accelerated growth rate)

Population in 2001	**5536**
Population in 2011	**7185**
Population in 2020	**11,761**
Accelerated decadal growth rate of population from 2020 to 2031	2.5
Population in 2031	**11,761*2.5= 29,402**
Population in 2041	**29,402*2.5 = 73,506**

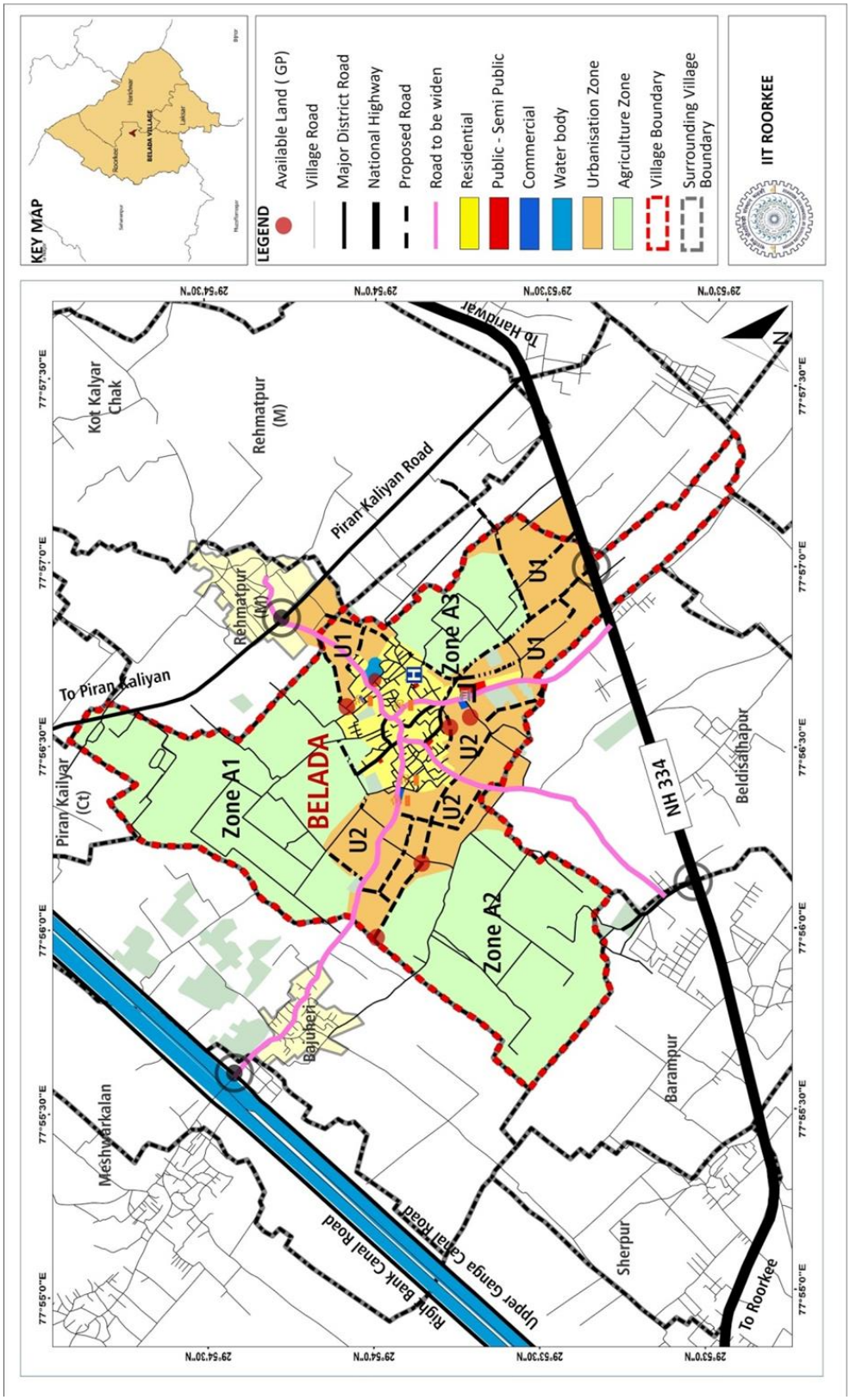
Annexure 3A) Base Map of Belada Village



Annexure 2 B) Base Map of Chharba Village



Annexure 4A) Proposed zoning of Belada Village



Annexure 4A) Proposed zoning of Chharba Village