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GRAM PANCHAYAT SPATIAL DEVELOPMENT PLAN

BILKISGANJ VILLAGE



Prepared and presented by
School of Planning and Architecture, Bhopal

Gram Panchayat Spatial Development Plan

Bilkisganj Gram Panchayat

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For

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योजना एवं वास्तुकला विद्यालय, भोपाल

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Executive Summary

India has been witnessing rapid spatial changes along the corridor, near Metropolitan cities along with peri-urban areas. The urban influence in the rural areas has been widespread especially after the 1991 population Census. After the introduction of Census Town in 2001 by the Census of India, urbanisation has spread to rural areas as well, especially in terms of land use conversion of rural areas from that of agriculture to non-agricultural areas. This necessitated land use plans for the rural areas of India.

The earlier 73rd Constitutional Amendment Act though brought in the XI Schedule for planning of all aspects such as social, agriculture, environment etc, but short of Land Use Plan in rural areas. The efforts brought in by the Ministry of Panchayati Raj, in 2020 to attempt to develop land use plan for the rural areas of India integrated into the Gram Panchayat Development Plan is towards the organised land use plan for the rural areas on line of urban areas.

In 2016, Ministry of Panchayat Raj (MoPR) came out with a Rural Area Development and Plan Formulation and Implementation (RADPFI) Guidelines. Mainly focussed on peri-urban areas, the RADPFI came out with details of land use plan. However, it was short of linking to GPDP in terms of land use plan. The Svamitva programme of digitalisation of villages, the RURBAN MISSION are the programmes that are all moving towards developing rural areas of India. Apart from the land use plan, School of Planning and Architecture, Bhopal has attempted to bring in convergence along with spatial plan earlier in 2018 through a model village spatial plan near Bhopal.

However, the new initiative of the MoPR that attempted for digitalisation of villages and linking it to spatial planning along with NRSC and NIC has given this task of land use plan to various educational institutions across India on selected basis. School of Planning and Architecture, Bhopal (SPAB), a national level educational institution taken up for this task.

SPAB selected Bilkisganj (in Sehore District) of Madhya Pradesh State, which is presented here in this report. Here, we present the detailed Spatial Village Development Plan for Bilkisganj in Sehore Community Block, Sehore District. Being located, not far from the Bhopal-Indore National Highway, Bilkisganj has been experiencing rapid spatial changes due to Sehore-Bhopal linkages that are being implemented, and due to the presence of high-level infrastructure.

This rapid spatial change influenced by infrastructure transformed Bilkisganj from that of pure agriculture to allied agricultural economy along with commercialisation and industrialisation. Continuous flow of people between Bilkisganj and Bhopal in terms of mobility, and flow of goods

and services further escalates the land use changes, making it towards a town in near future. Hence, we in SPA Bhopal thought being located in the corridor, and attracting so many infrastructures. Bilkisganj is a good model for the future in Madhya Pradesh for other similar villages along the corridor.

Using the various tools such as drone, remote sensing and other methods, SPAB analysed the Bilkisganj village in terms of social, spatial and economic changes and presented a vision to the villagers giving them an opportunity to have a vision for the future. Based on this participatory approach, SPAB came out with a final spatial development plan for Bilkisganj, which is presented here in this report. SPAB hopes this will give a key to do similar spatial village development plans for the rest of India.

1 Introduction

1.1 Introduction to Spatial Planning and its relevance to Rural Development

Rural development has always been an important issue in all discussions pertaining to economic development, especially of developing countries, which India is no exception. In India, rural mass comprises a substantial majority of the population, i.e., among population of 1,210,854,977 (1.2 billion), around 742,490,639 (61.32%) people are residing in rural areas, composed of 255,534 Gram Panchayats (Census of India, 2020). Although efforts have been made to improve the condition of rural areas after independence, a large majority of rural population continue to suffer from persistent poverty. With widening socio-economic disparities between rural and urban areas, tremendous pressure on the social and economic fabric has been observed. These factors, among many others, tend to highlight the importance of rural development.

Rural is an area, where the people are engaged in primary industry in the sense that they produce things directly for the first time in cooperation with nature. Development refers to growth, evolution, stage of inducement or progress. This progress or growth is gradual and had sequential phases. Rural development is the process of improving the quality of life and economic well-being of people living in rural areas. The United Nations defines Rural Development as 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. According to the Asian Centre for Development Administration (ACDA, 2004) “a process which leads to a continuous rise in the capacity of rural people to control their environment accompanied by a wider distribution of benefits resulting from such control is rural development”. Rural development designates the utilization of approaches and techniques under one single programme, which rally upon local communities as units of action. It provides a large umbrella to unite people engaged in the work of community organizations, community progress and community relation.

The term Rural development defines the process or progress involved in any rural activity over time whereas Spatial planning adds a dimension to it by distributing and allocating these activities into spaces. Traditional approach of rural development does not include spatial approach for development; rather it is based on statistics only. In the era of rapid urbanization, especially in the developing country like India, rural areas around city are highly influenced by urban areas. Apart from rural-urban-linkages in terms of functional interdependence, urban expansion beyond its urban administration limit in form of built-up growth, relocation of industrial

and commercial activities influences the rural areas. Some of the rural settlements get urban characteristics through the influence of adjacent urban area, which is figured in the statistics of 'Census Town' but fails to get an urban administration body and remains rural area in terms of administration with urban characteristics.

1.2 Classification of Rural Areas from the Spatial Perspective

With globalization, revolution in Information Technology, development of transportation and linkages, and overall development at national level, the dimension of rural areas has changed in terms of its morphology, economy, lifestyle etc. Locational factor always plays a major role in influencing any settlement in terms of its physical and economic growth, morphology, and standard of living of people. Existence of urban centre, major transport corridor plays an important role in transformation of rural settlements. Major urban centres, with its expansion beyond its administrative limit, through built-up and economic activity, influence largely its adjoining rural areas. With time, the activities of urban areas tend to expand to its periphery area, which changes the rural settlements dramatically in terms of livelihood activity, cropping pattern and land use pattern. Major transport corridor helps to expand urban influence more rapidly through urban sprawl. Apart from urban sprawl, major transport networks like National Highway and State Highway which connects several urban centres, has major impact on rural areas which are on and around it.

1.3 Rural-Urban Dichotomy

It is widely accepted that settlements can be differentiated in terms of rural and urban, but there is no consensus on what exactly defines a rural settlement and urban settlement. Although based on population size and occupational pattern, a standard for classification is there in India, but since long time it has not been updated and hence creating issues in defining urban areas. The settlements fail to fulfill the criteria to become an urban settlement, falls into category of rural settlement, although it may have few or many properties of urban settlement which may not fit into traditional approach for dealing with rural settlement. Thus, it is necessary to have modified approach to deal with the settlements having mixed characteristics, largely due to impact of major urban centers or major transport corridor.

1.4 Initiatives in Rural Development

For human development and sustenance, land is one of the very precious but limited resources. Land development and land management practices are very effectively adopted in urban areas in our country but this aspect is yet to be addressed in rural areas. Government authorities for rural development at central and state level launched several programs and schemes in last 70 years after independence, but village level spatial development and management practices are not being formally started. Panchayat system was empowered after the enactment of 73rd

Constitutional Amendment Act in 1992. As per the Article 243-G of the Act, Panchayats are responsible for preparation of plans for economic development and social justice in their jurisdiction. Spatial Planning was not explicitly mentioned in the 73rd CAA, though it found a place in 74th CAA under the District Planning.

Shyama Prasad Mukherjee National RURBAN Mission has ushered in a new thinking on rural development in which, spatial planning has become a major component in rural development, especially in transition zones. Shyama Prasad Mukherjee National RURBAN Mission (SPM-NRuM) for overall development of villages with vision of “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”. Accordingly, an integrated cluster action plan (ICAP) document is being prepared in identified clusters to ensure the time bounded scheme execution. A cluster boundary is delineated based on the process specified in the respective State/UT statutes to address the spatial planning needs under the ICAP report, but this approach is useful for regional or cluster level land allocation for various development purposes but cannot satisfy Gram Panchayat level requirement. However, the focus of RURBAN Mission is on convergence of various projects and programs, which are already in place, with minimum additions. Though the mission also says the clusters must be declared as area for development under the Town and Country Planning Act or any relevant act of the state, neither the Town and Country Planning Act nor the Panchayati Raj Act of the states except in a few states empower the Gram Panchayat to prepare a Spatial Development Plan. There is a big gap in the thinking and implementation of Spatial Development Plan at rural level in terms of concerned legal backing at various levels.

On the other hand, Gram Panchayat Development Programme (GPDP), initiated by the government covers elaborately various procedures in formulating GPDP, including for the first-time visioning and prioritization of development, still lacks spatial dimension. GPDP also details out the funding and plan implementation, monitoring etc. However, spatial planning is left out in the GPDP as well. Hence, a need to prepare spatial Development Plan at the Gram Panchayat level using various parameters outlined in GPDP and linking it with Spatial Development Planning Guidelines envisaged.

This is to support Gram Panchayats for planned and regulated development of villages for addressing the issues of local resource management and provisions of utilities and amenities within the Gram Panchayat area only. This will focus on public spaces, infrastructure provision (as per the standard given by various ministries), and how this spatial development can be linked to Cluster and District level.

'Changing Structure of Rural Economy of India Implications for Employment and Growth' – the Report of Niti Aayog (2017) states that despite of more than 50% urbanization in India, many of them still will be in rural areas. However, the population will be more towards urban lifestyle. To reduce this urban – rural divide in terms of technology, Hon. Prime Minister, Narendra Modi has prioritised radical digitalisation to induce economic inclusiveness through a host of initiatives. 'Digital India', 'Make in India' and 'Skill India' provide for impetus and opportunity to rural citizens, to ensure they are equal participants in India's growth story. Digitalisation is slowly reshaping every aspect of life in villages by introducing accessible e-Governance, banking and financial services, educational and healthcare services, mobile/DTH recharge, e-Ticketing services, even online shopping and propelled recently by Covid-19 further. 'Brick and click' centres are today evolving basis the new, emerging needs of rural population.

As quoted from The Hindu (March, 6th 2019) 'With an intent to stabilize agricultural production, the Geographic Information Systems (GIS) by Hitachi has helped improve productivity, and empowered farmers by using sustainable, economical and eco-friendly technology. GIS applications are being used to understand and manage crop yield estimates. As farming relies heavily on natural inputs, which cannot be controlled, GIS applications can be used to understand and manage crop yield estimates. In May 2017, Amnex Infotechnologies Pvt Ltd was awarded the project of 'Crop area estimation and loss assessment using remote sensing & geospatial technology for the state of Gujarat', under the purview of the Gujarat Agro Industries Corporation Ltd., a government of Gujarat undertaking. Amnex used Hitachi's GIS platform to implement government projects'. "India's digitalisation story is no longer a remote dream. A fact which led to it garnering a place among the top 100 countries in the United Nations e-Government Development Index (EGDI) for the first time in 2018' (The Hindu, 6th March, 2019).

The ambitious new framework for Implementation of **SVAMITVA** scheme, Survey of Villages and Mapping with improved technology in village areas, with a time line of 2020-2024 to cover 6.62 villages has been launched by Government of India recently in 2020. For a model, using drone of 1,01,097 villages in several states, mainly to provide an integrated property validation solution in villages (Kasra maps) especially in Abadi areas.

As discussed earlier, the present study is in the same way to come out with Model Rural Master Plan on the lines of Urban Town areas. SPA Bhopal was fortunate this initiative earlier in 2018, and came out with Gram Panchayat Spatial Development Plan and linked it to GPDP in Barkheda Salam Village near Bhopal Metropolitan Region area. The present study is more or less on the same way, except that more physical maps were used in the present study thanks to NRSC and NIC inputs.

1.5 Our Approach and Methodology

The main aim of the study is to prepare a spatial development plan for the selected gram panchayat- Bilkisganj with focus on spatial planning using participatory approach. This targets to add spatial dimensions to the perceptions, inclusive of all-farmers (small & big), labours, marginalised people, officials of Bank and Panchayat, women, children and other stakeholders received through detailed interviews and discussions. Emphasis was given to stakeholder’s perception in visualizing the development needs of the GP so as to direct the spatial growth towards making it a progressive and sustainable village in years to come. The field survey included both qualitative and quantitative approach to make an inclusive spatial development plan for gram panchayats. The methodological framework for this approach would involve following stages of work as highlighted in Figure 1.

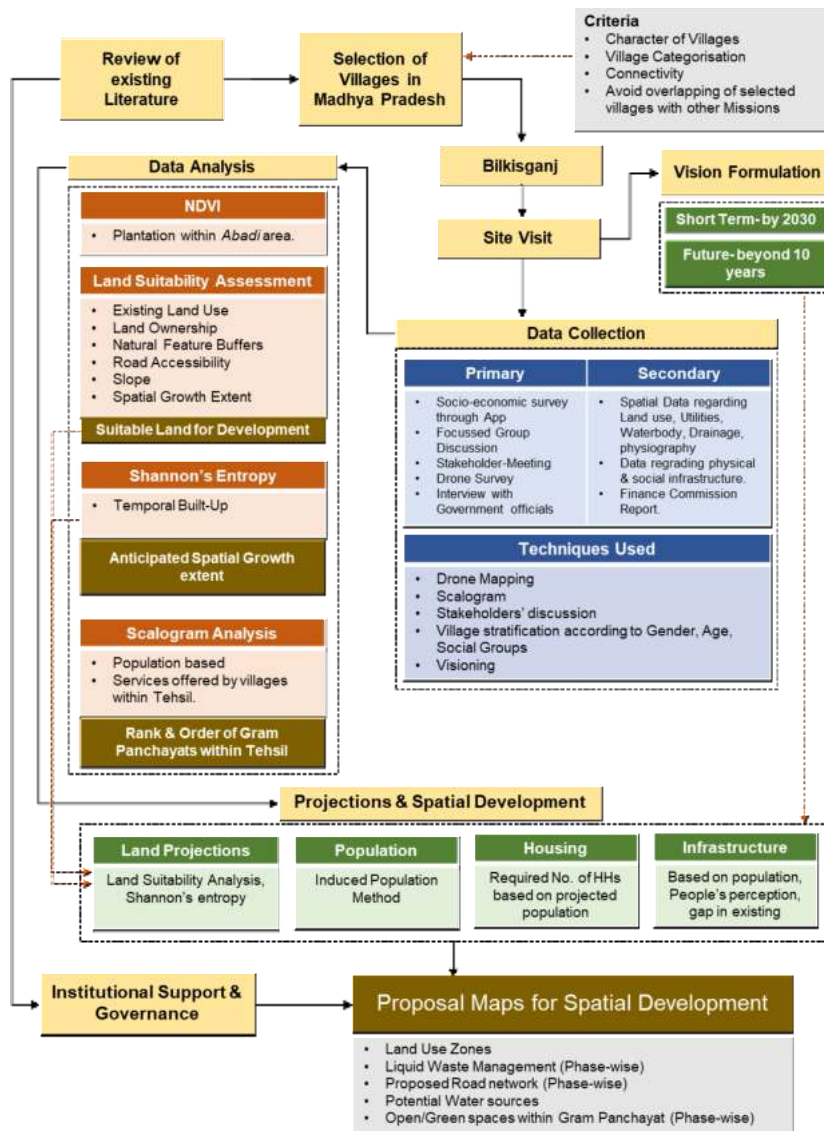


Figure 1 Methodology.

(Source: Author)

1.5.1 Review of existing literature:

This stage involves review of literature related to government policy regarding preparation of GPSDP, financial policy etc. Apart from reviewing policy documents, this stage involved study and review of standard set by different ministries and organization to analyse the situation of Gram Panchayats.

1.5.2 Data collection:

This stage involved collection of data required for analysis to bring out the ground situation of the Gram Panchayats. The data collected is grouped among two broad categories, viz. Primary Data and Secondary Data.

1.5.2.1 Primary data:

- Data regarding socio-economic status which includes information regarding demography, household assets, housing condition, economic condition, and livelihood of villagers was collected through Socio-economic survey. The survey was conducted through Android Application 'Gram Manchitra', developed by National Informatics Centre, which fully integrates with GIS environment.
- Data regarding specific issues related to specific groups was collected through Focus Group Discussion. Special attention has been given to marginalized group, women, old people, youth.



Figure 2 Stakeholder discussion in Bilkisganj Village during survey

- Data regarding specific issues of specific sectors like trade and commerce, industry, agriculture was collected through stakeholder meeting.

- Spatial data regarding land use, spatial pattern of infrastructure was collected through drone survey. Villagers were involved in identification of different land use and landcover in their own village through participatory GIS.



Figure 3 GIS Process and identifying local craft works in Bilkisganj in *Abadi* Area

- Information regarding ongoing government policies/projects at Gram Panchayat level, issues regarding government policy, projects, and financial condition of gram Panchayats will be collected through interview with government officials.



Figure 4 Interview with panchayat officials in Bilkisganj Gram Panchayat



Figure 5 Discussion with women of Bilkisganj Gram Panchayat

1.5.2.2 Secondary data:

- Spatial data at GIS platform regarding Land use and Landcover, utilities including arrangement of roads, railways, water bodies, drainage, geomorphology, soil, and satellite imagery was collected from NRSC/NIC. Additional spatial data for further reference was obtained from Google Earth.
- Data regarding financial flow to Rural Local Bodies was obtained from Finance Commission report.
- Data for both physical and social infrastructure was obtained from respective government offices.

1.5.3 Data Analysis:

A series of thematic maps are prepared to analyse the baseline scenario of village. The spatial pattern of identified issues concerning to development, opportunity and potential offered by the village are mapped. These are:

- Land use and land cover maps of different time periods to detect land use dynamics.
- Land holding size and its spatial aspect.
- Housing distribution on basis of income and social status
- Water supply, sanitation and waste disposal system prevailing in villages
- Road network, its typology, width, walkability, and availability of street furniture.
- Travel behaviour and vehicular ownership
- Health and education facilities and its accessibility
- Social Mapping
- Existing and past government schemes and its implementation.

1.5.3.1 Land Suitability Assessment

Different thematic maps at village level are prepared to find the suitable land for planned development. These thematic maps are prepared using ArcGIS software with inclusion of people's perception or other qualitative data gathered during site visit. These maps include-

- Land Ownership
- Existing Land Use Land Cover (LULC)
- Buffer from Natural features like drains, waterbodies, etc., as per standards
- Road Accessibility
- Slope
- Spatial growth extent.

1.5.3.2 Shannon's Entropy:

Shannon's entropy analysis (spatial) is used to project the direction of temporal spatial growth extent of Bilkisganj village settlement. ArcGIS software is used to conduct this analysis.

1.5.3.3 Scalogram Analysis

The analysis is used to classify the village clusters based on the level of services present and population into rank and order amongst villages in the Tehsil.

1.5.4 Projections & Spatial Development

1.5.4.1 Land Projections

The future projection of land use is based upon following factors-

- Existing land use pattern
- Analysed suitable land for development through Land Suitability Assessment.
- People's perception/need
- Existing spatial growth direction.

1.5.4.2 Population Projection

Induced Population Projection method is used to estimate future population projections to factor in the anticipated economic growth of the GP.

1.5.4.3 Housing:

Housing Projections include number of Households required according to projection population as well as typology of existing settlement.



Figure 6 Housing typology in Bilkisganj.

1.5.4.4 Infrastructure

The main targeted infrastructure is Road network for connectivity to adjoining villages, Solid Liquid waste Management, infrastructure related to Education, Health infrastructure and open spaces and recreation lacking in the Gram panchayats.

1.5.5 Institutional Support & Governance

The whole process of spatial plan development of both gram panchayats is supported with related institutions and the governance involved.

1.5.6 Proposal Map for Spatial development

The proposal maps are prepared in phase-wise implementation of spatial development of both gram Panchayats and includes

- Land use zones for future spatial growth
- Phase-wise spatial plan of Solid Liquid Waste Management
- Phase-wise spatial plan of proposed Road Network for Village connectivity

- Phase-wise spatial plan of green spaces within Gram Panchayats.

1.5.7 Techniques Used:

To prepare spatial development plan, the techniques are selected to cover diverse facets from people to technology. This includes use of scientific methods, advance technology and people's perception which are discussed further in detail.

1.5.7.1 Use of Drone for Mapping – Advantage and Disadvantages

The rise of drone technology has brought a change in the survey techniques. With the use of this technology, it is possible to carry out surveys and process and deliver data in a timely, accurate and safe way. It is a time saving technique which can complete survey in hours, collect data and process imagery on the same day. The technology reduces data acquisition cost and has low cost as compared to satellite survey and manned aircrafts. It is easier to reach areas that are otherwise difficult and impossible to access like cliffs, rugged terrains, etc. It involves high spatial resolution i.e. has data accuracy and low altitude multi-angle shooting but lacks precision. Therefore, the aerial survey of both the gram panchayats have been carried out using this technique for mapping of settlements, land use/land cover, vegetation, infrastructure, etc. Apparently, the technique is weather dependent and have short flight time accuracy. To gather high quality of data, it requires particular skillset.

1.5.7.2 Use of Scalogram for Identifying Growth Centers

A scalogram analysis is used as an indicator of services provided by an area based on a region's ability. It develops a scale inclusive of services, functions, organizations, and establishments and also rank the settlements based on the number of functions present within them. Identification of hierarchy of settlements serves as an essential tool in helping to ensure that new development should take place in the most sustainable locations. It is required to identify those settlements that are capable of accommodating and sustaining growth, and to limit development in those smaller settlements that are not sustainable. It is a tool used to create strategy for balanced regional development. It draws attention of the government and planners towards regional disparities and imbalances in distribution of services so that policies could be based upon the existing hierarchy and act as a means of reducing regional economic imbalances and distributing government services in an equitable basis (Khan and Ahmad, 2013). This technique has been used in the study to find the ranking of the selected two Gram panchayats within their blocks.

1.5.7.3 Use of Stakeholders' discussion

Stakeholder's discussions are important to identify the requirements or constraints present at ground level within an area. It helps to understand ground reality and uncover the lacuna present in the system's functioning. There were exhaustive discussions with different stakeholders,

people of all age groups specially marginalized groups of both the gram panchayats to comprehend the problems and issues faced by them. Even, the proposed plans are prepared keeping in mind their perception and are discussed with them for effective implementation.

1.5.7.4 Village Stratification according to Gender, Age, Social Groups

Stratified sampling technique is used for qualitative study of both gram panchayats. There are stratified representation of social groups and people of all age groups including both males and females within the sampling selected for qualitative survey. Both Gram Panchayats are analyzed as per their gender, age and social groups using this sampling technique.

1.5.7.5 Visioning

Visioning technique is used to develop a shared vision of future with support of group of stakeholders. It involves appraisal from the participants on where they are now and where they can realistically expect to be in the future. This technique helped in formulation of vision for the spatial development plan of both gram panchayats.

1.6 Density of Rural facilities in Madhya Pradesh

All rural facilities falling under Pradhan Mantri Gram Sadak Yojna (PMGSY) have been mapped at state level (Figure 7) to identify density and type of available Agro, Education, Medical and Transport facilities in selected study area.

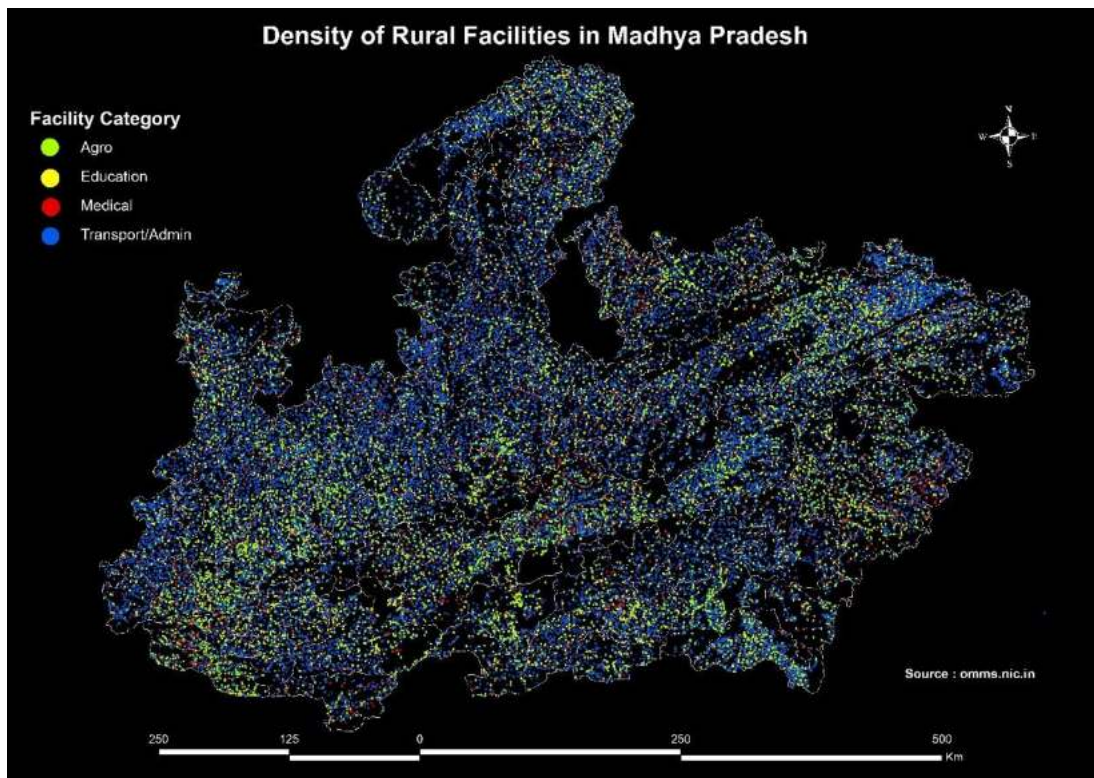


Figure 7 Spatial mapping of available rural facilities in Madhya Pradesh.

(Data Source: omms.nic.in)

1.7 Case Study and its selection in Madhya Pradesh

The case study gram panchayat is selected based on their population size (>5000), level of services & facilities and accessibility to other areas using secondary data sources. The other selection criteria included villages which were not considered under any government scheme or mission. The selected Gram Panchayat is Bilkisganj which fall under administrative division of Sehore district (Figure 8).

1.7.1 Sehore District:

Standing in the foothills of Vindhya Range in the middle of Malwa region, Sehore District is a district of Madhya Pradesh state in central India. The district headquarters lies in Sehore town. Occupying 6,578 sq.km. area, it is composed of 8 Tahsils and 5 CD Blocks. It has 8 Statutory Towns among which there is 1 class I town, 1 class II town, 1 class III town, 4 class IV towns and 1 class V town, and 1,072 villages among which 1,031 are inhabited. According to the census of India, 2011 Sehore District has a population of 1,311,332 and population density of 199 persons per square kilometer. Its population growth rate over the decade 2001-2011 was 21.5%. The district has a sex ratio of 918 females for every 1,000 males, and a literacy rate of 70.1%. About 18.9 % of total population of the district live in urban area and 44.7% of total population is engaged in economic activities (DCO D. C., 2011).

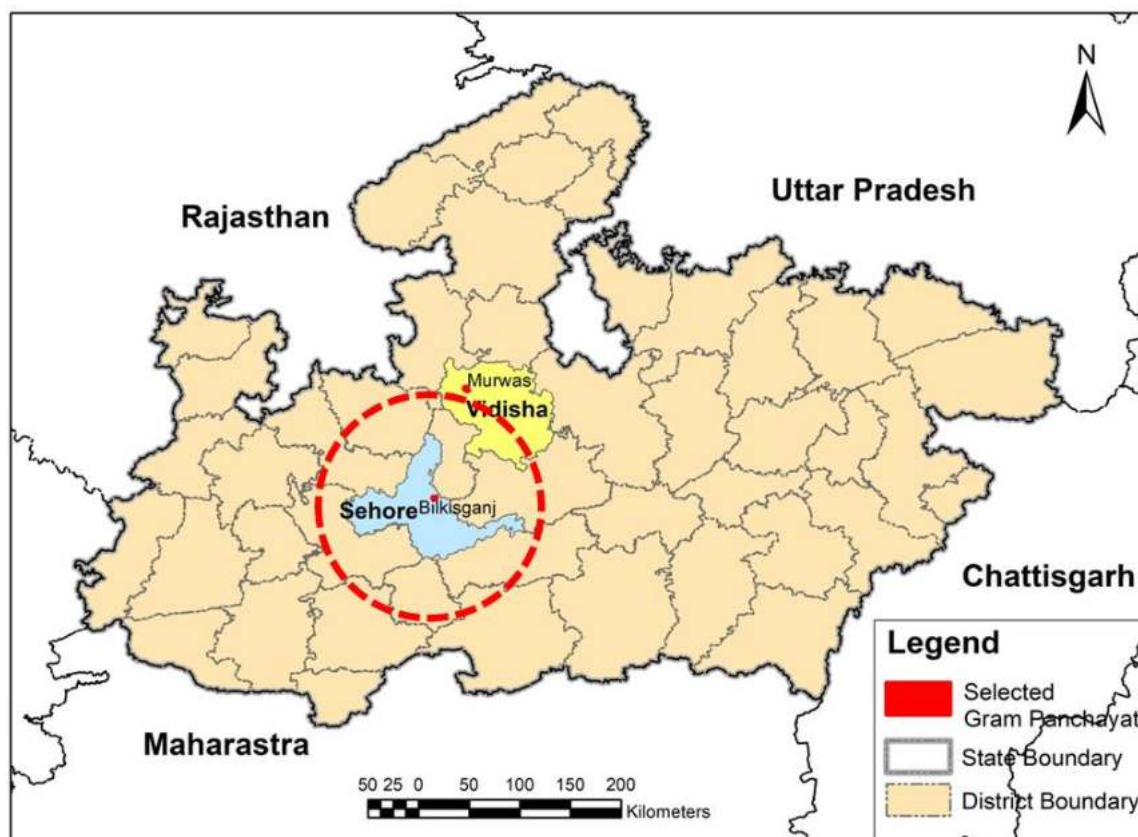


Figure 8 Location of District of both Gram Panchayats in Madhya Pradesh

1.7.2 Introduction to Study Area Gram Panchayat:

The selected Gram Panchayat is located near the state capital city Bhopal and hence subject to influenced by Bhopal city (Figure 9).

1.7.2.1 Bilkisganj Gram Panchayat:

Bilkisganj village is located in Sehore Tehsil of Sehore district in Madhya Pradesh (Figure 9 & Figure 10). It is situated 22 km away from Sehore, which is both district & sub-district headquarter. Bilkisganj is the Gram Panchayat of Bilkisganj village. It is a large village with geographical area of 1022.26 hectares and total household of 1286, with population of 6408 according to Census of India, 2011. Sex Ratio of Bilkisganj village is 719 which is much lower than Madhya Pradesh state average of 931 and Child Sex Ratio for the Bilkisganj as per census is 770, lower than Madhya Pradesh average of 918. The literacy rate of Bilkisganj village is 66.8% which is lower than state average of 70.6%. The cast composition includes 16.9 % Scheduled Caste population and 3.8% of Scheduled Tribe population (DCO D. C., 2011). About 30% of its total population is engaged in economic activity, among which 58% of total workforce is engaged in agricultural activities and rest of 42% engaged in non-agricultural activity.

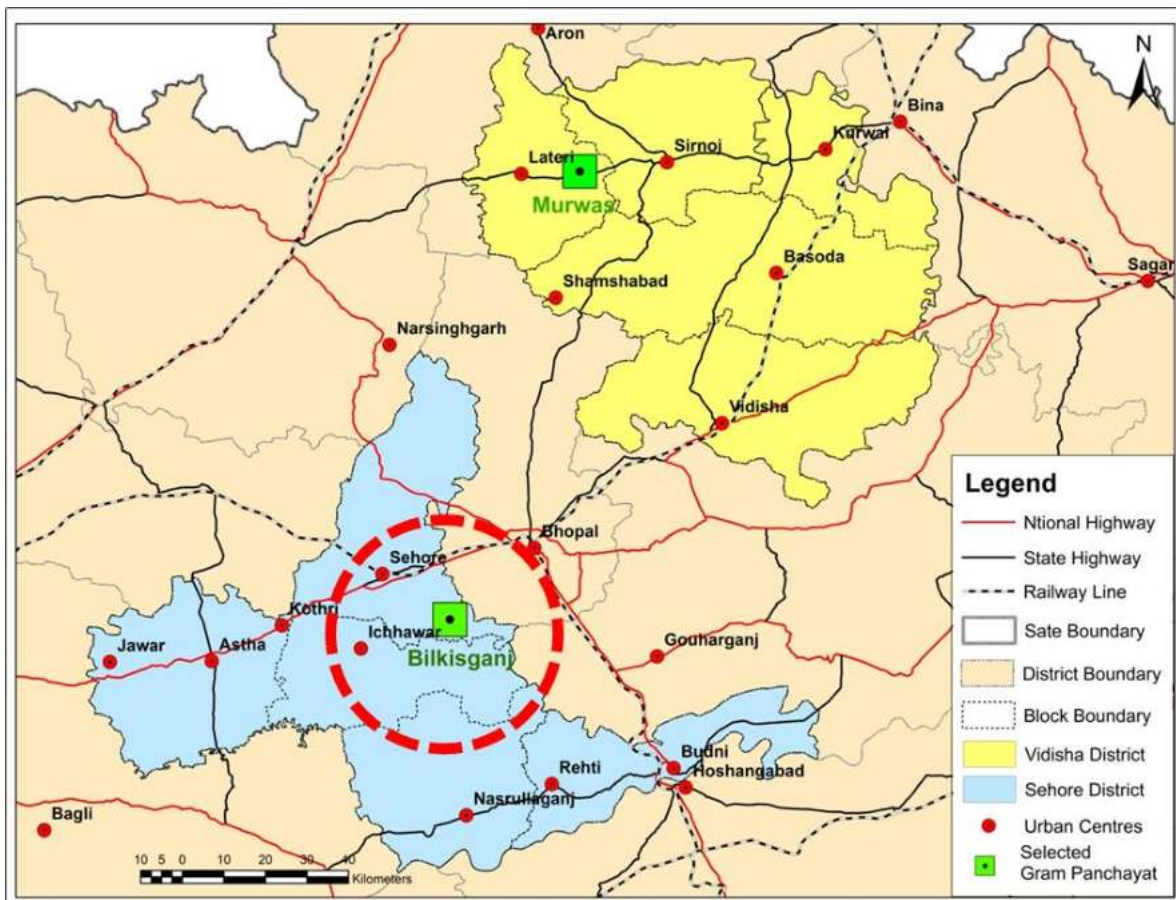


Figure 9 Location of Gram Panchayat in district

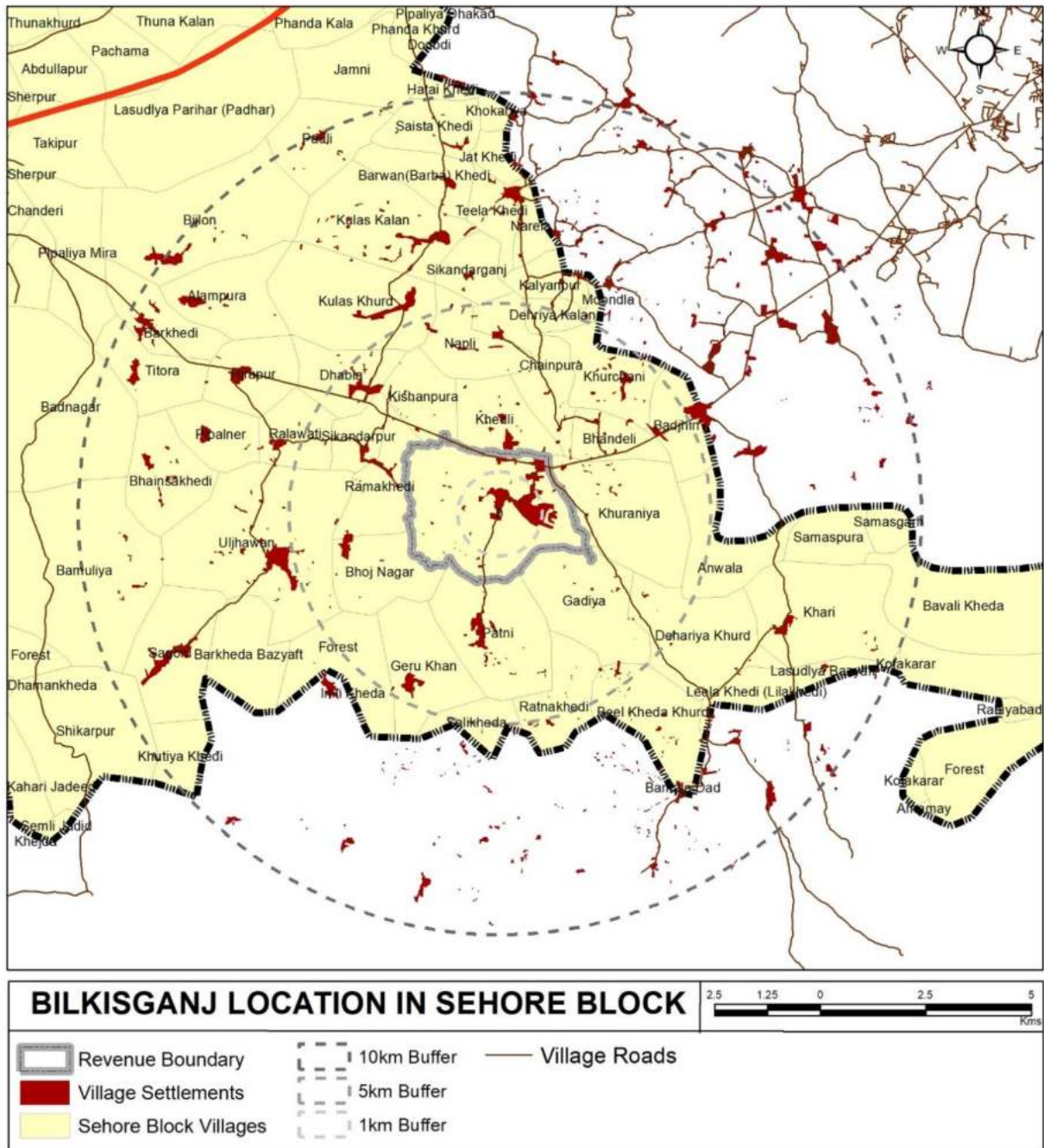


Figure 10 Location of Bilkisganj Gram panchayat.

2 Categorisation of Villages for Planning

2.1 Categorisation of Villages

There is no clear definition of rural areas unlike urban areas. They are only considered as the areas which do not satisfy the urban parameters. These areas possess different characteristics according to their population size, proximity to and dependence on urban centre, topography, economic activities, social customs and traditional values. Hence, (Rural Area Development Plan Formulation and Implementation Guidelines (RADPFI), 2016) categorizes the rural areas/villages based on following criteria.

2.1.1 Villages within Planning Area of the delineated Metropolitan area/city/town

This category of villages is dependent on urban centre present in vicinity, for its economic activities and growth and not only have agricultural activities but may have diverse economic activities (non-farm). They sometime have transition in their village character and are part of 'Rural Urban Fringe'. Such villages are found to be present mostly adjacent to metropolitan city within planning area boundary. They may be connected to the city/town, by either a National Highway/State Highway/Major District Road or Other District road. Therefore, they can be further categorized as-

- Along the national/state highway and within the urbanisable limit of Municipal Corporation
- Not along a national or State highway, but within the urbanisable limit of the Municipal Corporation.

The villages present in Urban-Rural Fringe (URF) face the transition in land use, social and demographic characteristics. They are non-farming dwellings and have almost complete absence of occupations and land use. There is an incomplete range and penetration of urban utility services. These areas have uncoordinated zoning or planning regulations and areal extension beyond although contiguous with the political boundary of the central city. There is an actual and potential increase in population density, with the current density above that of surrounding rural districts but lower than the central city.

As per 74th CAA, Nagar Panchayat would act as ULB to provide development in these areas whereas URDPFI guidelines, 2014 suggests that

- The development plans can be prepared by the developmental body in consultation with the village authority and implemented jointly by the village authority or developmental body

- Village bodies may prepare the plan and such plans will be compiled and made part of overall development plan of the region by developmental body.

2.1.2 Villages adjacent to corridor development

The 'Economic corridors' forms 'network influence area' while connecting economic region. They affect all urban and rural areas falling into this economic region surging the land prices. The corridor development provides opportunities to these areas to participate in economic development due to anticipated industrial and economic growth along the corridor. The villages which are in vicinity to industrial areas have interdependencies with industry in terms of provision of employment and provision of raw materials. This will generate income for labour in return. There forms a peculiar work culture and economic activities in these villages and may experience huge amount of trickle-down effect rather than only experiencing backwash effect if planned properly.

As per RADPFI guidelines, Villages near industrial city should have following criteria:

- Direct connectivity to the industrial region
- People commuting from the village to the city for daily work in industry.
- At least more than 50% of village population depended on industry in the city, either through employment or by provision of raw material.

Villages present near investment regions are categorized as fast transforming villages. These villages shall have differential characterization and degree of development which needs spatial plans. Another pull factor for village development is tourism opportunities which provides employment and serve as a centre for village tourism. There is a need to prepare a spatial development plan for such villages in accordance with economic activities under village development plan.

2.1.3 Villages in the interior

This category of village represents the purely depended village on agriculture and allied activities or fishing and mining & quarrying activities. They also require spatial plans for development of such potential activities mentioning the basic requirements for betterment of quality of life of individual and to mitigate the outward migration to urban areas. These villages are categorised on following basis:

- More than 75% of population depended on primary activity
- Isolation from urban areas in terms of distance and accessibility.

The classification of these villages is dependent on physiographical conditions of the region.

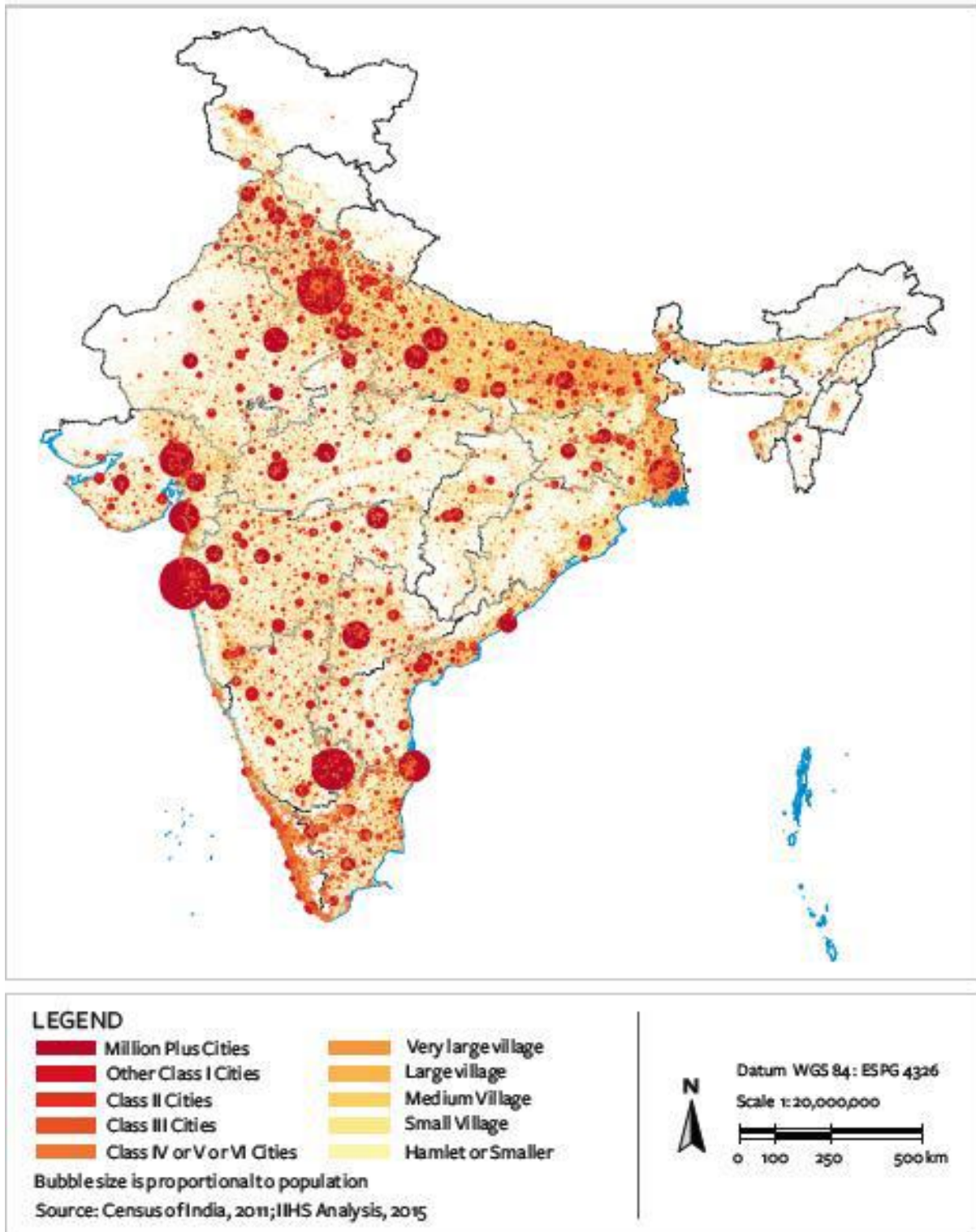


Figure 11 Population sizes in Rural and Urban India,
 Source: *Urban India 2015: Evidence*, Indian Institute of Human Settlement

2.2 Categorisation of Villages as per Population Size

The villages are also classified into seven classes based on their population size by the census of India (**Table 1**). The range includes villages with population less than 200 (Class VII) to population more than 10,000 (Class I). The Class VII villages having population less than 200 persons are preferred to make clusters due to their small size and given proper connectivity through integrated development. They are mostly located on hilly terrain, desert or tribal areas, with low density areas, such as Himalayan belt of India, North East India, tribal belt of Chhattisgarh, Jharkhand, Eastern and Western Ghats of South India. Spatial plans for cluster of such villages require socio-economic characteristics of the villages giving due consideration on the connectivity and sharing of resources amongst the villages. The spatial contiguity clusters can be formed with contiguous villages/gram panchayats within a radius of 5-10 km (or radius appropriate to the population density and geography of the region) around the identified growth center. The criteria for selection of cluster can be same as given by RURBAN guidelines for selection procedure. The initiative, Integrated Cluster Action Plan (ICAP) for clustering rural areas follows different approaches for Tribal and Non-tribal districts. It also mentions desired level of benchmark for Basic amenities, Social amenities, Economic amenities, and Digital amenities. The villages with population between 1000-5000 are ideal for preparation of Gram Panchayat Spatial Development Plan (**Table 1**) while spatial development plan for villages with population more than 5,000 are prepared based on URDPFI guidelines, 2014. The development plan for villages having population less than 1000 population shall depend on their location, physiographic conditions, and connectivity.

Table 1 Categorisation of Villages as per Population Size.

Class Size	Population Size	Total Villages	Total Population	% of rural population	Average population	Remarks
Class I	10000+	4,682	7,23,66,805	8.68	15456	Large villages which are likely to be urban in future, if near metropolitan areas. Large villages which may be purely depended on flourishing agricultural or other primary activities.
Class II	5000-9999	18,641	12,38,08,537	14.85	6642	Villages which are having population next

						to Class I village, and would also be urban, if near metropolitan areas.
Class III	2000-4999	96,388	28,86,37,987	34.63	2995	Medium sized villages which can be grouped together to form a cluster, if have geographical contiguity.
Class IV	1000-1999	1,39,136	19,74,96,806	23.70	1419	
Class V	500-999	1,41,761	1,032,91,220	12.39	729	Small sized villages where cluster plans would be feasible.
Class VI	200-499	1,14,726	39,68,3027	4.76	346	
Class VII	Less than 200	82,149	81,79,066	0.98	100	Isolated hamlet, where villages are located on hilly terrain, dessert or tribal areas, and spatial plans shall be based on connectivity and sharing of resources.
	Uninhabited	43,384	-	-		
	Total	6,40,867	83,34,63,448	100.00		

(source; RADPFI)

2.3 Need for Categorisation of Villages

There is a need for categorisation of villages due to following reasons:

- The evolution of unplanned development in vicinity of urban centers in the extended *Abadi* area of the village leads to unauthorized development which later require regularization and retrofitting.
- The interrelationship between metro cities and villages require the development plan for the provision of services and infrastructure.
- The anticipated spatial expansion of urban area makes it important to plan the rural areas in vicinity.
- The rise in real estate price leads to non-farm activities which requires infrastructural services due to connectivity of the villages to the nearby metro city.
- The planning of the activities to be permitted in the fast-transforming villages needs to be decided, for making a sustainable environment in the village.

2.4 Linking RADPFI and our Village Planning

RADPFI guidelines provide a methodological framework of spatial planning at village level to ensure integrated rural development. These guidelines focus on land use and spatial planning, formulate spatial standards for social service delivery and spatial connectivity through roads, public mode of transport and information technology. These aspects play a significant role in the process of development plan formulation while categorising the villages/cluster, spatial planning of priority areas and preparation of annual budget. The villages are selected for spatial planning based on these categorisation.

The spatial development plan prepared for Bilkisganj Gram Panchayats is based on rural spatial standards formulated in these guidelines. Moreover, land use and infrastructure facilities provided in selected villages are in accordance with the RADPFI and Rurban guidelines. This is further strengthened by adopting a participatory approach with use of advanced technology to handle dynamic data. The changing character of villages requires dynamic spatial plans that can facilitate inclusion of dynamic data instead of existing static approaches.

3 Salient Features of Rural Area Development Plan Formulation and Implementation (RADPFI) Guidelines, 2016

3.1 Spatial approach to Rural Planning

There have been guidelines for spatial planning of urban areas in existence but none for rural areas. It is RADPFI guidelines only which identified the need for spatial development of rural areas. Villages possess different characteristics based on their culture, population size, topography, economic activities, interdependency on adjacent urban area and traditional values. The villages in the vicinity of urban area or urban fringe areas face unplanned development and possess neither purely urban character nor rural. These areas are interdependent on each other and still lack many infrastructure facilities. Similarly, some rural areas present along the economic corridor experiences backwash effect if not properly planned. There are also villages which are purely rural in nature but require spatial plans to boost their economic potential for betterment of life and stop outmigration. Due to all these reasons, categorisation of villages is used as one of the spatial approaches by RADPFI guidelines for rural planning.

3.2 RURBAN Mission and Spatial Planning – Cluster Approach

Most of the rural areas in India are present in group of settlements which are contiguous to each other. Such cluster of settlements often have potential for economic growth and possess locational and competitive advantages. These clusters are recognized by the government of India as 'Rurban clusters' under the Shyama Prasad Mukherji Rurban Mission in 2016. The cluster is formed from geographically contiguous villages having 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. The aim of the mission is *to preserve and nurture the essence of the rural community life with focus on equity and inclusiveness without compromising with the facilities perceived to be essentially urban in nature* (Ministry of Rural Development, 2016). The mission focuses on simulation of economic development, provision of basic services and formation of planned clusters. This cluster approach constitutes both Socio-economic & Infrastructure planning component as well as initiation of spatial planning. As a component of spatial planning, structure plan or land use plans are prepared for the RURBAN cluster along with the mechanism for implementation. These plans are prepared based on the planning norms laid down in the State Town and Country Planning Acts/similar Central or State statutes as may be applicable for the State.

3.3 Integrated District Plan and Examples

Under 74th CAA, article 243ZD of the Indian constitution mandated the establishment of District Planning Committee (DPC) to prepare District Development Plan from integration of development plans prepared by Panchayats and Municipalities (Planning Commission of India). The Manual for Integrated District Planning', prepared by Ministry of Panchayati Raj in 2008, elucidates "District Planning as participative and multidimensional process and hence gives guidelines for preparation of any District Plan which is inclusive of both urban and rural requirements, and perceives the District as a Region." In most of the cases, DPCs undertakes panchayats/villages-level planning. Different states have adopted different provisions for integrated planning like Karnataka, Tripura, Sikkim, Rajasthan, Haryana, etc. have modified their Panchayat Act to establish DPCs while states like Gujarat, Orissa, Madhya Pradesh, Maharashtra, etc., have separate legislation for formation of DPCs. Moreover, some states have also added panchayats/village planning in their Town & Country Planning Act.

Following the handbook by (Department of Town & Country Planning, 2007-2012), Kerala, the integrated District Development Plans are prepared with the inclusion of sectoral as well as spatial analysis (Figure 12). This is explained further through an example of Kollam District, Kerala (Planning Commission of India).

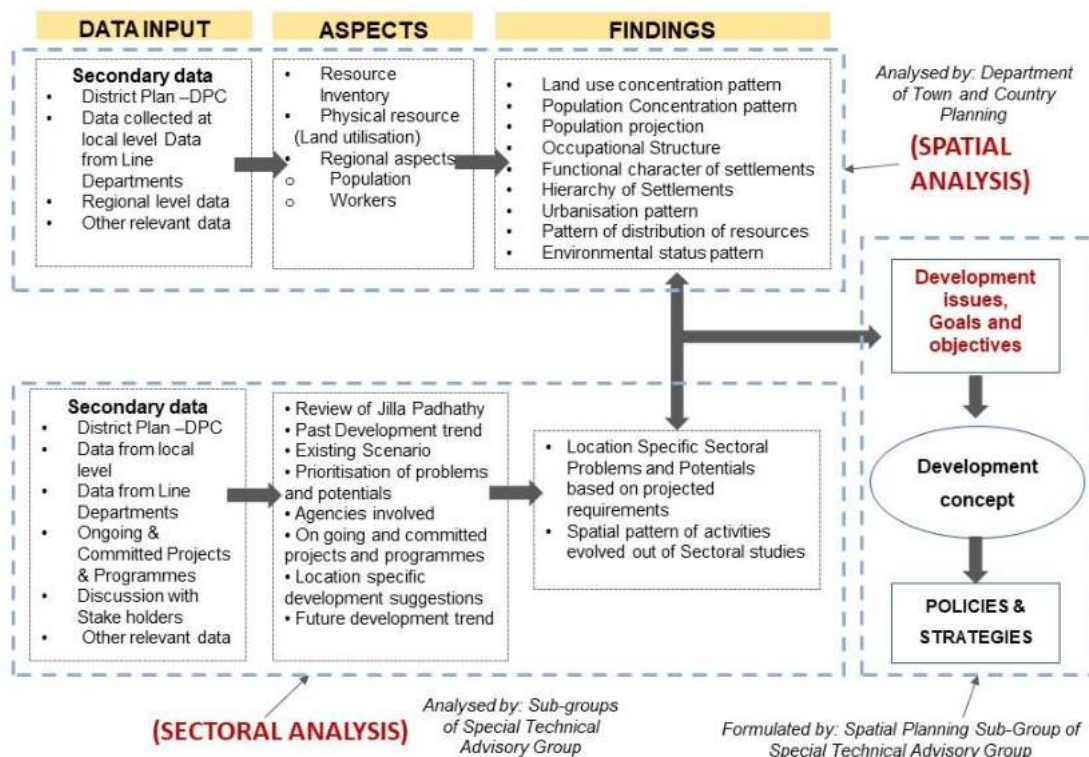


Figure 12 Integration of spatial and sectoral analysis in Integrated District Plan

Source: (Planning Commission of India)

3.3.1 Kollam District, Kerala

Kollam District Planning Committee prepared the Integrated District Development Plan of Kollam under State Planning Board, Kerala with main focus on spatial aspect. There is ecological diversity ranging from the Western Ghats to the Arabian seacoast within the district. The main objective of the plan was to integrate spatial aspect into other aspects of planning like data collection, presentation of data to decision makers in the District Planning Committee and Panchayats, and to help in visualizing and depicting the plan. All these planning activities were conducted and presented location wise with the help of Geographic Information System (GIS) technology which helped to transform all the data including cadastral data and socio-economic survey into spaces. Further, Sectoral analysis was done for 18 development sectors ranging from the primary sector, to basic services in health education, provision of water, poverty alleviation and rural development, infrastructure (roads, bridges, housing), forests, environment, mining and geology, social welfare, women and child development, power and telecommunication, tourism, culture, sports and youth affairs. As part of spatial analysis, both problems and initiatives were identified in each of these sectors and completed projects/programmes were analysed each with location specific details. In addition to this, human resource development and availability of finances were incorporated with their representation spatially. All these actions helped to incorporate stakeholder's suggestions on overall development and to take spatial decisions as part of decentralized planning process and participative planning. This integrated district development plan is a perspective plan prepared for 15-20 years for long term issues such as settlement patterns, district level policies for integrated development of urban and rural areas, best spatial strategy for optimum utilization of resources and to form long term perspective for regional infrastructure like water management, energy, transport network and tourism infrastructure. Following this, an execution plan is prepared and implemented. This approach provides opportunity to local governments, stakeholders and District Planning Committee to take decisions in accordance with spatial planning.

3.4 Integrating GPDP with RURBAN MISSION AND RADPFI

Gram Panchayat Development Plan (GPDP) is a comprehensive plan formulating a vision for a village, its goals and sets out action plan to achieve these goals. It promotes participatory planning in Gram Panchayats for socio-economic development covering 29 sectors enlisted in Eleventh schedule. The primary focus of GPDP is to identify the gaps related to development in delivery of public services, socio-economic sectors and needs of the marginalised and vulnerable population (MoPR, 2018). This extends to Economic Development and Poverty reduction, Human Development, Social Development, Sustainable Development Goals (SDGs), Ecological and Environment Development, Public Service Delivery, Good Governance, Skill

Building, Gender Responsive Governance, Child Protection and Development, Inclusion of Vulnerable Groups (such as SCs, STs, OBCs, NT-DNTs, elderly, people with disabilities, single headed women households, widow, destitute, homeless and others), Spatial Planning, E-enablement of Panchayats, Infrastructure Development and Renewable Energy. The spatial dimension of the GPDP is covered using norms and spatial standards from RADPFI guidelines whereas RURBAN mission identifies socio-economic & infrastructure planning component of the cluster and converges various government schemes at cluster level. Our study has also prepared the Gram Panchayat Spatial Development Plan (GPSDP) by integrating GPDP with spatial standards and land uses from RADPFI guidelines and also referred infrastructure facilities from RURBAN mission. The GPSDPs can be prepared using RADPFI guidelines which can further be integrated into Integrated Cluster Action Plan (ICAP) for spatial planning component.

SPA Bhopal's earlier work on integrated GPDP with that of Spatial Development Plan (GPSDP) for Bharkheda Salam, a Village at the outskirts of Bhopal City on the Bhopal-Indore Bypass highlighted various aspects of peri-urban land transformation and the need to come out with Master Plan for a village. The GPSDP earlier for Bharkheda Salam covered GPDP, Landuse Plan and RADPFI. The report at that time came out with the following aspects. This includes the detailed reference to Gram Panchayat's power in terms of aspects that they can perform: -

3.4.1 Powers of Gram Sabha as per Section 7 of Madhya Pradesh Panchayat Raj Avam Gram Swaraj Adhiniyam, 1993

Powers and functions and Annual meeting of Gram Sabha. - (1) Subject to the rules, which the State Government may make in this behalf, and subject to the general or special orders, as may be issued by the State Government from time to time, the Gram Sabha shall have the following powers and functions, namely-

- a) to lay down the principles for identification of schemes and their priority for economic development of the village;
- b) to approve all plans including Annual Plans, programmes and projects for social and economic development before such plans, programmes and projects are taken up for implementation by the Gram Panchayat;
- c) to consider the Annual Budget of the Gram Panchayat, and make recommendations thereon;
- d) to consider the report of audit and accounts of the Gram Panchayat;

- e) to ascertain and certify the proper utilization by the Gram Panchayat of the funds for plans, programmes and projects referred to in clause (b);
- f) to identify and select persons as beneficiaries under the property alleviation and other programmes;
- g) to ensure proper utilization and disbursement of funds and assets to the beneficiaries;
- h) to mobilize people for community welfare programmes;
- i) to ensure active participation of people in implementation, maintenance and equitable distribution of benefits of development schemes in the village;
- j) to promote general awareness amongst the people;
 - i. to exercise control over institutions and functionaries in social sectors transferred to or appointed by Gram Panchayat through that Panchayat;
 - ii. to manage natural resources including land, water, forests within the area of the village in accordance with provisions of the Constitution and other relevant laws for the time being in force;
 - iii. to advise the Gram Panchayat in the regulation and use of minor water bodies;
 - iv. to control local plans, resources and expenditure for such plans;]
- k) sanitation, conservancy and prevention and abatement of nuisance;]
- l) construction repair and maintenance of public wells, ponds and tanks and supply of water for domestic use;
- m) construction and maintenance of sources of water for bathing and washing and supply of water for domestic animal;
- n) construction and maintenance of village roads, culverts, bridges, bunds and other works and building of public utility;
- o) construction, maintenance and clearing of public streets, latrines, drains, tanks, wells and other public places;
- p) filling in of disused wells, unsanitary ponds, Pools ditches and pits and conversion of step wells into sanitary wells;
- q) lighting of village streets and other public places;
- r) removing of obstructions and projections in public streets and places and sites not being private property or which are open to use of public, whether such sites are vested in the Panchayat or belongs to the State Government;
- s) regulating and control over entertainment shows, shops, eating houses and vendors of drinks, sweet meats, fruits, milk and of other similar articles;
- t) regulating the construction of house, latrines, urinals, drains and water closets;
- u) management of public land and management, extension and development of village site;
- v) (i). regulating places for disposal of dead bodies, carcasses and other offensive matters;

- (ii). disposal of unclaimed corpses and carcasses;
- w) earmarking places for dumping refused;
- x) regulation of sale and preservation of meat;
- y) maintenance of Gram Sabha property;
- z) establishment and management of cattle ponds and maintenance of records relating to cattle;
- aa) maintenance of ancient and historical monuments other than those declared by or under law made by Parliament to be of national importance, grazing lands and other lands vesting in or under the control of the Gram Sabha;
- bb) maintenance of records of births, deaths and marriages;
- cc) rendering assistance in the census operation and in the surveys conducted by the State Government or Central Government or any other local authority lawfully constituted;
- dd) rendering assistance in prevention of contagious diseases;
- ee) rendering assistance in inoculation and vaccination and enforcement of other preventive measures for safety of human being and cattle prescribed by Government Department concerned;
- ff) rendering assistance to the disabled and destitutes;
- gg) promotion of youth welfare, family welfare and sports;
- hh) establishment of Raksha Samiti for:-
 - (a) safety of life and property;
 - (b) prevention of fire and extinguishing fire and safety of property during outbreak of such fires;
- ii) plantation and preservation of village forest;
- jj) removal of social evils like dowry;
- kk) granting loans for the purposes of-
 - (i) providing medical assistance to indigent persons in serious and emergency cases;
 - (ii) disposal of dead body of an indigent person or any member of his family; or
 - (iii) any other purpose for the benefit of an indigent person as may be notified by the State Government from time to time subject to such terms and conditions as may be prescribed;
- ll) (i) carrying out the directions or orders given or issued by the State Government, the Collector or any other Officer authorized by the State Government in this behalf with respect to the measures for amelioration of the condition of the Scheduled Castes and Scheduled Tribes and Other Backward Classes and in particular in regard to the removal of untouchability;

- (ii) perform such functions as may be entrusted to it by Zila Panchayat or Janpad Panchayat by general or special order;
- (iii) to exercise and perform such powers and functions as the State Government may confer on or entrust to under this Act or any other law for the time being in force in the State;
- (iv) with prior approval of Janpad Panchayat may also perform other functions as it may desire to perform;

Provided that where any such function is entrusted to the Gram Sabha, it shall act as an agent of the State Government, Zila Panchayat, as the case may be, and necessary funds and other assistance for the purpose shall be provided to it by the State Government, Zila Panchayat or Janpad Panchayat, as the case may be;

- mm) plan and manage basic amenities;
- nn) select beneficiaries under various programmes;
- oo) implement, execute and supervise development schemes and construction work within the Gram Sabha area;
- pp) control and monitor beneficiary-oriented schemes and programmes;
- qq) organize voluntary labour and contribution for community work and promote the concept of community ownership;
- rr) to plan, own and manage minor water bodies upto a specified water area situated within its territorial jurisdiction;
- ss) to lease out any minor water body upto a specified area for the purpose of fishing and other commercial purposes;
- tt) to regulate the use of water of rivers, streams, minor water bodies for irrigation purposes;
- uu) to exercise control over institutions and functionaries in all social sectors transferred to or appointed by the Gram Sabha.]

Considering these aspects, the Bharkheda Salam GPS DPI, SPA Bhopal prepared suggested the Land use Plan (Figure 13).

Once the Land use Plan was prepared, this was carried out in terms of phasing and linked to GPDP for the village. The sector wise and year wise link for the village is presented in Annexure 1.

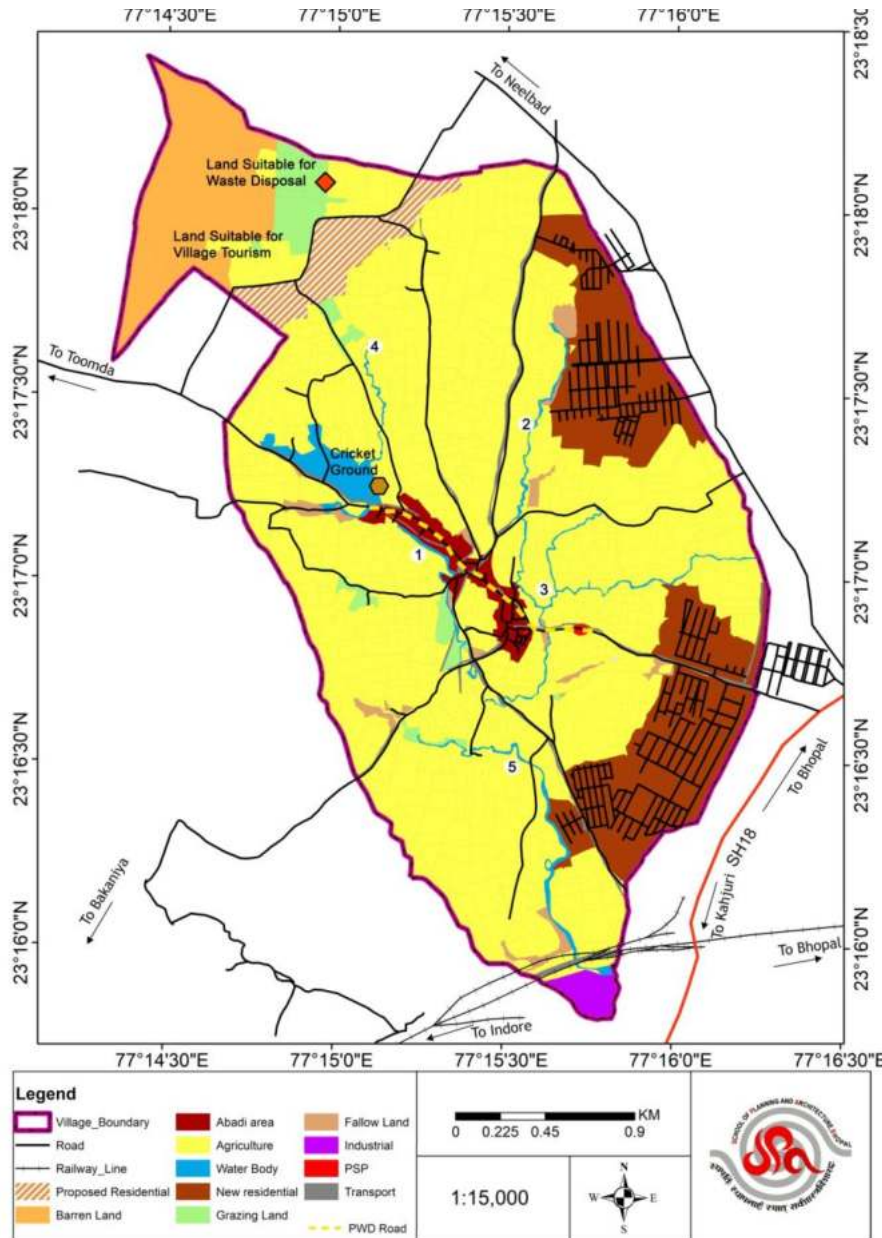


Figure 13 Proposed Land Use Plan for Bharkheda Salam Village.

3.5 Participatory Village Plans

One of the significant examples of participatory Village plans is ‘Pani Panchayat’, a model for groundwater management, formed in Naigaon village of Maharashtra (ACWADAM, 2010). The success of individual initiative to mitigate the drought situation in the village gained a representation in Village Level Pani Panchayat, upon completion. It attracted community and encouraged decentralization of decision making with public participation. This participatory planning initiative promoted equity, rights of landless, community participation, and sustainable use of water resource. Such reform in local level governance through an act, can help to make participatory plans at Panchayat level.

3.6 Norms and Standards for Spatial Planning

For the preparation of spatial development plans, RADPFI guidelines have illustrated following norms and spatial standards in rural areas.

3.6.1 Habitat Planning in Rural Areas

3.6.1.1 Norms for Low Income Housing development

Plot size	80 sq.m., Minimum
Density (Gross)	60 plots per hectare, Maximum
Minimum frontage	6 m
Ground coverage	33percent (subject to a maximum of 50 percent)
Floor area ratio (FAR)	2, Maximum
Open spaces	1.21 hectare open space for a village with 200 houses.

(Source: National Building Code, Doc: CED 46 (8064)WC, Nov 2015)

3.6.1.2 Norms for Residential development

S.No.	Plot Area in sq. m	Maximum ground coverage (in %)	FA R	No. of D/U	Max. height in metres	Setbacks (in metres)		
						Front	Side	Back
1.	Below 50	90	1.8	2	6	1.2	-	-
2	51 – 100	80	1.6	2	6	2.0	-	1.5
3.	101 – 150	75	1.5	3	9	2.0	-	2.0
4.	151 – 250	66	1.3	3	9	3.0	-	3.0
5.	251 – 500	60	1.2	3	9	4.5	1.5	3.0
6.	Above 501	50	1.0	3	9	4.5	3.0	3.0

Source: Model guidelines for Development and construction including safety provision for Natural Hazards in Rural Areas, GOI-UNDP Disaster Risk Management Programme, Ministry of Home Affairs, GOI, 2008.)

3.6.1.3 Norms for Commercial development

S. No.	Use	Ground Coverage (in %)	FAR	Maximum Height (in m)	Setbacks (in metres)	
					Front	Back
1.	Convenience Shops	75	1.0	6	2	-
2.	Local Shopping Centre	50	1.0	6	3	-
3.	Community (Gram Panchayat) Shopping Centre	40	1.2	9	4.5	-

*Minimum size of plot for above, 20 sq. metres.

(Source: pp-31, Model guidelines for Development and construction including safety provision for Natural Hazards in Rural Areas, GOI-UNDP Disaster Risk Management Programme, Ministry of Home Affairs, GOI, 2008.)

3.6.1.4 Norms for Industrial Use (Resource based cottage Industries, non-polluting industries and Non-hazardous industries except those permitted by the State/UTs)

No.	Plot Size (in sq. metres)	Ground Coverage (in percent)	FAR	Height	Setbacks (in metres)		
					Front	Side	Back
1.	100-400	60	1.2	8	3	-	3
2.	400-1000	55	1.1	8	4.5	-	3
3.	100-4000	50	1.0	8	6	3	3
4.	Above 4000	45	0.9	8	9	3	4.5

(Source: pp-31, Model guidelines for Development and construction including safety provision for Natural Hazards in Rural Areas, GOI-UNDP Disaster Risk Management Programme, Ministry of Home Affairs, GOI, 2008.)

3.6.1.5 Institutional and Community Facilities

Sl. No.	Plot Size (in sq. metres)	Ground Coverage (in %)	FAR	Height	Setbacks (in metres)		
					Front	Side	Back
1.	500-1500	40	1.2	9	4.5	3	3
2.	1001-2000	33	1.0	9	4.5	3	4.5
3.	2001-4000	30	0.9	9	6	3	4.5
4.	Above 4001	25	0.9	12	9	3	6

(Source: Adapted from Model guidelines for Development and construction including safety provision for Natural Hazards in Rural Areas, GOI-UNDP Disaster Risk Management Programme, Ministry of Home Affairs, GOI, 2008.)

3.6.1.6 Parking Norms

Sl. No.	Use	No. of ECS/EVS
1.	Residential	1 EVS for 100-200 sq.m. plot 1 ECS and 1 EVS for plots more than 201 sq.m
2.	Multi-Family Residential	1 ECS for 75-100 sq.m. built up area and 1.25 for more than 101 sq. metre built up area.
3.	Motel	1 ECS for every room
4.	Wholesale Mandi, Godown and Cold Storage	2 EVS for 550 cu. Metre storage, 2 ECS for 100 sq.m. built up area.
5.	Offices, Conference Hall, Banquet Hall	2 ECS for 100 sq.m. built up area
6.	Educational	1 ECS for 100 sq.m. built up area.
7.	Industrial	1 EVS, 0.5 ECS for 100 sq. metre built up area.

ECS stands for Equivalent car space which is 23sq.metres, if provided in open.

** EVS stands for Equivalent Vehicle Space, which is a more neutral term for the type of vehicle it proposes for parking. It is an inclusive term for Light Commercial Vehicle and tractors with trailers and non-motorised vehicles like Bullock Carts. The recommended space requirement for EVS in open is, 35 sq.m.

3.6.2 Road Infrastructure

The rural roads in India are commonly referred to:

- Other District Roads (ODR)- roads catering rural area of production and providing them with outlet to market centres, taluka/tehsil headquarters, block development headquarters or major district roads, and would serve to connect villages with population 1000 and above or cluster of villages.
- Village Roads (VR)- roads connecting villages or cluster/group of villages with each other and to the nearest road of a higher category.

Village Road type	Road Description	Minimum Road Width (in m)	Functions /remarks
R1	Link Roads	6 m	Inter village, ODR, highways connectors.
R2	Major Through Roads	7.5 m	Main village roads with drain on both sides to facilitate drainage system of the village
R3	Minor Through roads	4.5 m	Other village roads
R4	Minor Through Lanes	3.75 m	Village lanes

(Source: Draft National Building Code, Doc: CED 46 (8064) WC, Nov 2015; Rural Roads Manual, 2002, Indian Road Congress)

3.6.2.1 Control of building activities along Highways and roads

Type of Building Activity	National Highway or State Highway	Major District Roads	Village Roads (All sub categories)
Theatres, Industrial Units etc., Major Commercial Establishments	8 metre front set back	5 metre	3 metre
Residential	5 metre front setbacks	3 metre	3 metre
Institutional	8 metre front setbacks	5 metre	5 metre

(Source: pp-35, Model guidelines for Development and construction including safety provision for Natural Hazards in Rural Areas, GOI-UNDP Disaster Risk Management Programme, Ministry of Home Affairs, GOI, 2008.)

3.6.3 Social Facilities

Use	Standard/Population	Area (in hectares)	Distance from Habitation
Primary School	1 for 5000	0.4 to .6 ha	Within 500 metres
High School with Primary School	1 for 15000	1 ha	Within 1km
Dispensary/Health Centre	1 for 5000	.05 ha	Within 500 metres
Community Hall	1 for 5000	.05 ha	Within 1 km
Aanganwari	1 for 5000	.05 ha	Within 500 metres

(UNDP Disaster Risk Management Programme Ministry of Home Affairs, Govt. of India, 2008) The distance norms as well as population norms can be relaxed in case of hill areas/desert areas with low population densities/concentration.

3.6.3.1 Site Specific Norms for Education and Health Facilities

S.No.	Use	Minimum Plot Size (in sq. m.)	Ground Coverage (in %)	FAR	Height	Setbacks (in metres)		
						Front	Side	Back
1.	Nursery School/Aanganwadi	5000-1500	33.3	1.0	10	4.5	3	3
2.	Primary School	1500-3000	30	0.9	10	6	3	6
3.	Senior Secondary	4000-10000	25	1.0	12.5	9	4.5	6
4.	Nursing Home,	250	35	0.7	6	3	-	3
5.	Dispensary	251-500	33.3	1.0	9	4.5	3	3
6.	Diagnostic centre	Above 501	30	1.0	12	6	3	4.5

(UNDP Disaster Risk Management Programme Ministry of Home Affairs, Govt. of India, 2008)

3.6.3.2 Socio Cultural Facilities

Category	Population Served per unit	Land Area Requirement (min.)
Crematorium	One per Block	0.5 ha
Cremation Ground	One per Gram Panchayat or 5000 Population	400 sq. metres
Burial Ground	5000 residents observing burial rituals in a Habitation or a Gram panchayat	500 sq. metres
Open Spaces/Parks	One housing area park per 5000 population and Neighbourhood Park for 15000.	0.50 ha and 1 ha respectively.
Playground /Ground for Fairs and Festivals	One per 5000 population	1.00 ha.
Religious Places	5000	400 sq. metres
Fire station	2 lakh population or 10 km radius	0.6 ha

(Sources: Derived from URDPFI Guidelines 2014; Green Burial Ground Project, PARD)

3.6.4 Water supply and Sanitation

3.6.4.1 Potable Drinking Water in rural Areas

As per RADPFI guidelines, 40 litres per capita per day (lpcd) is set as minimum in case of minimum supply for areas with extreme conditions of access of water resource. The division of this quantity is shown in Table 2.

Table 2 Quantity of Water use per capita.

Purpose	Quantity (lpcd)
Drinking	3
Cooking	5
Bathing	15
Washing utensils & house	7
Ablution	10

(Source: Accelerated Rural Water Supply Programme)

Moreover, 30lpcd is considered for animals in hot and cold desert/ecosystems. At the rate of 12 litres per minute, one handpump or standpost is appraised for every 250 persons. In case of an independent habitation/hamlet/Wadi/Tola/Majra/Mohra etc., one source may be provided for population below 250 persons and if there is no potable water source present in its location. A rural habitation not having any safe water source with a permanently settled population of 20 households or 100 persons, whichever is more, may be taken as the unit for coverage with funds under the Accelerated Rural Water Supply Programme. However, the State Government could cover any habitation regardless of its size/population/number of households.

The above is the minimum to be provided. Within walking distance of 50 meters, 70-100 lpcd is the recommended provision. Individual states can adopt higher norms of supplying above 100 lpcd.

3.6.4.2 Sanitation

For proper sanitation in rural areas, dwelling units with individual conveniences shall have at least the following fitments:

- One bathroom provided with a tap,
- One water closet
- One nahani or sink raised from the floor with a tap.

Similarly, community toilets (for community residing in the village) or public toilets (for floating population) shall be provided as per norms listed in Table 3.

Table 3 Standards for Toilet Facility

Types of toilets	Toilet seats	Bath Units	Urinal units	Clothes washing area
Community toilets	One seat per 50 users	One unit per 50 users	One unit per 200-300 users	4 - 5 sq. metres per 10 toilet seats; min 1.5m x 1.2 m
Public toilets near railway stations (may be used at all hours)	One seat per 100 users	One unit per 70 users	One unit per 300-500 users	4 to 5 sq. metres per 30 toilet seats; minimum 1.5m x 1.2m.
Public toilets near market place/ offices (will mostly be used during working hr)	One seat per 100 users	One unit per 50 users	One unit per 200-300 users	4 to 5 sq. metres per 10 toilet seats; minimum 1.5m x 1.2m.

(Source: BIS, Code of Basic Requirements for water Supply, Drainage and Sanitation, 1993)

3.6.4.3 Safe water standards

The recommended standards acceptable and cause for rejection for drinking water in India by WHO and BIS is as follows:

Table 4 Drinking Water Standards

Sl.No.	Characteristics	Acceptable	Cause for Rejection
1.	Turbidity (NTU)	1	10
2.	Colour (Units on Platinum Cobalt Scale)	5	25
3.	Taste and Odour	Unobjectionable	Objectionable
4.	PH	7.0 to 8.5	<6.5 or >9.2
5.	*Total Dissolved Solids (mg/l)	500	2000
6.	Total hardness (as CacCo3) (mg/l)	200	600
7.	Chlorides (Cl) (mg/l)	200	1000
8.	Sulphates (as So4) (mg/l)	200	400
9.	Fluorides (as F) (mg/l)	1.0	1.5
10.	Nitrates (as No3) (mg/l)	45	45
11.	Calcium (as Ca) (mg/l)	75	200
12.	Magnesium (as Mg) (mg/l)	30	150
13.	Iron (as Fe) (mg/l)	0.1	1.0
14.	Manganese (as Mn) (mg/l)	0.05	0.5
15.	Copper (as Cu) (mg/l)	0.05	1.5
16.	Arsenic (mg/l)	0.05	0.05

(source: RADPFI guidelines)

For determination of habitation with salinity problem, TDS limit (cause for rejection for rural areas) is fixed at present at 1500 mg/l against the recommended limit of 200 mg/l. As per the convention salinity is measured based on TDS characteristics. TDS has close co relation with salinity.

3.6.5 Solid and Liquid Waste Management

Solid and Liquid Waste Management is a major component required for improved sanitation of any area. This is a severe threat to public health and cleanliness in rural India. The rural areas have predominantly organic and biodegradable form of waste which is still a major problem in ecological balance.

3.6.5.1 Solid Waste Management

As per RADPFI guidelines, the per capita generation of solid waste in rural areas ranges between 50 gm/cap /day and 250 gm / cap / day as mentioned below:

- Rural (Peri-urban or Urban outgrowth) 150 to 250 gm / cap / day.
- Rural (Remote /Tribal) 50 to 150 gm / cap / day.

There are different methods to manage solid waste. Composting is one of the effective and preferable method for solid waste management in rural India. This can be done in various ways like Pile methods of composting, NADEP method, Bangalore method, Indore method, Coimbatore method, Vermi-Composting, Thermophilic Composting and Biogas Technology. A composting site of one hectare has capacity to handle 83.33 tonnes or waste per day. This handling capacity varies with types of methods used (Table 5). The non-biodegradable waste like paper, plastic, metal can be recycled and sold off to recycling centres. The waste which cannot be re-use or recycle and has no value left can be sent for final disposal either in landfills or incinerator.

Table 5 Area Requirement for Waste Management technology.

Bio-methanation Process	1 hectare for 125 tonnes per day
Gasification/ Pyrolysis	1 hectare for 50 tonnes per day
Incineration	1 hectare for 125 tonnes per day

(source: RADPFI)

3.6.5.2 Liquid Waste Management

There are two types of liquid waste generated within the household- Black water (wastewater from toilets containing fecal matter) and Gray water or sullage (from bathrooms or kitchen). The various techniques available for treatment of liquid waste generated in settlements is illustrated in Annexure 2 and Sewage disposal standards are enlisted in Table 6.

Table 6 Sewage Disposal standards.

Parameters	Inland Surface water	Land for Irrigation
Suspended solids (mg/l). Max.	100	200
pH value	5.5 to 9.0	5.5 to 9.0
Oil and Grease (mg/l)., Max	10	10
Total residual Chlorine(mg/l)	1.0	-
Ammoniacal Nitrogen	50	50
Total Kjeldahl Nitrogen (mg/l)	100	-
Free Ammonia, (mg/l)	5	-
Nitrate Nitrogen (mg/l)	10	-
Biological Oxygen Demand, mg/l	10	-
Biological Oxygen Demand, Mg/l	30	100
Chemical Oxygen Demand, (mg/l)	250	-
Arsenic (As) (mg/l)	0.2	0.2
Lead (Pb), mg/l	0.1	-
Dissolved Phosphate (P) (mg/l)	5.0	-
Sulphide (S) (mg/l)	2.0	-
Phenolic Compound, (mg/l)	1.0	-

(source: RADPFI guidelines)

The wastewater can be treated and reused in horticulture or irrigation. The shallow surface drain is most suitable for carrying grey water along with storm water. Small bore/shallow sewers are the cost-effective sustainable solution for black water mixed with grey matter (sewage). They are designed alongside with interceptor tanks at the sources to receive liquid portion of household waste water for off-site treatment and disposal.

3.7 Environmental Sustainability and Disaster Management

The natural resources of land, water, vegetation and mineral are an integral part of rural areas. The natural landscape so formed act as a source of livelihood and sustenance for both rural and urban economies. They possess a unique value of ecological balance when sustainably used. Mostly, these natural resources are overused or degraded due to mushrooming unplanned and unorganized growth of rural settlements. This calls a need for Sustainable Rural Planning to achieve balance between social and economic development of human habitat keeping in mind environment, equity in employment, shelter, basic services, social infrastructure and transportation. The sustainable rural planning can be achieved through Integrated Rural-Regional Planning, adoption of Sustainable agriculture practices, promotion of Renewable Energy and providing Sustainable Rural infrastructure using reuse and recycling.

Another aspect to be considered for Environment Sustainability of rural areas is **Climate Change mitigation and Adaptation**. The change in the climate pattern has direct impact on rural lives and livelihood. The changing weather phenomena and long-term climate variability has impacted agriculture and pathogens affecting rural economic base. The International Panel on Climate Change (IPCC) Working Group-II's report (2013) highlighted the need for resilience of regions due to issue of food and water security. Therefore, Regional Plans and Development Plans must mainstream the impact of climate change and developing climate resilient rural areas. Moreover, '**Climate Proofing**' can be done to identify risks originating from investment plan or development plan or from people and their assets because of climate change. The different parameters and strategy adopted for Climate proofing and Community Resilience are represented in Table 7. These parameters help to identify **Vulnerability** of rural habitats due to climate change. Disadvantaged people, Fragile living and lack of services are indicators of vulnerable population as per RADPFI guidelines. The resilience of rural areas is expected to be achieved through Rural Disaster Resilience Planning (RDRP) approach considering rural communities. The strategical representation of this approach is shown in Figure 14 and details of approach can be referred in RADPFI guidelines.

Table 7 Parameters and Strategy for Climate Proofing and Community Resilience

Parameters	Strategy
Housing	<ul style="list-style-type: none"> Guidelines for construction of buildings on slopes Structural Stability of buildings in hills for the entire Gram Panchayat. Soil Erosion and sedimentation control in Non-Hill areas.
Ecologically sensitive Rural Planning	<ul style="list-style-type: none"> Demarcate eco sensitive areas Bringing in principles of climate resilient rural development based on environmental parameters like conservation of natural ecosystems and watershed management.
Rural Infrastructure and Services	<ul style="list-style-type: none"> Augment water supply and water treatment in rural areas Water conservation and rainwater harvesting.
Disaster Resilience	<ul style="list-style-type: none"> Preventive health measures Public health management and surveillance system Emergency medical response

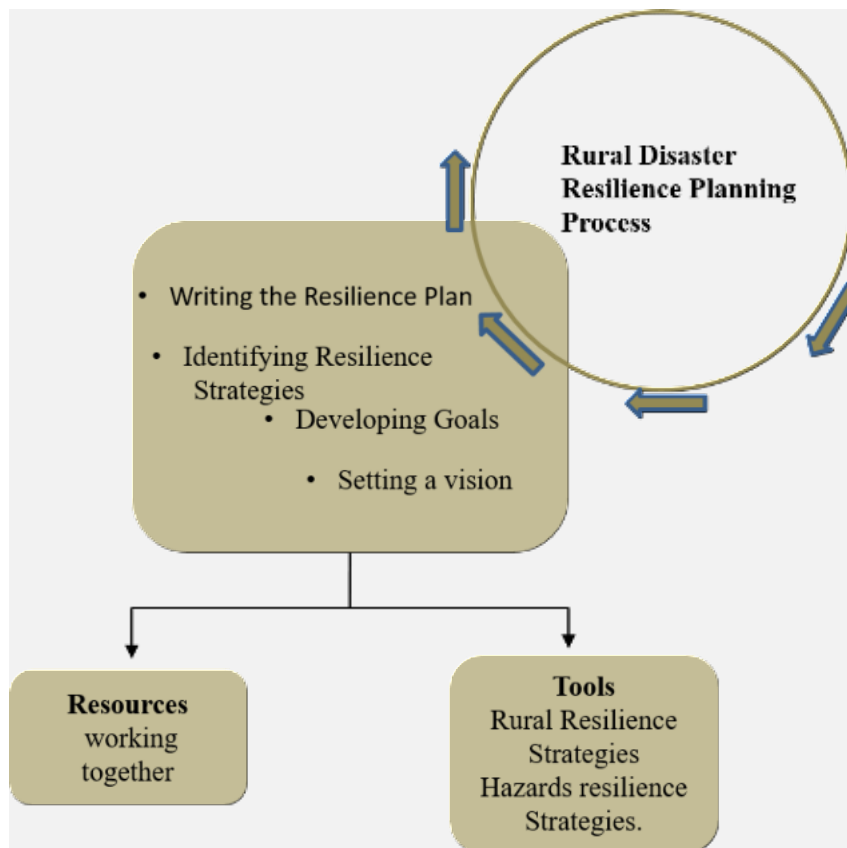


Figure 14 Rural Disaster Resilience Strategy and Plan

(Source: Rural Disaster Resilience Planning, Justice Institute of British Columbia last accessed from <https://rdrp.jibc.ca/step-3-building-a-resilience-plan> at 26.09.2016)

The Disaster Management Act, 2005 includes multi-tiered institutional system consisting of National Disaster Management Authority (NDMA), State Disaster Management Authorities (SDMAs) and District Management Authorities. The act visualizes community based and local level disaster management initiatives in accordance with district and state level disaster management authorities. For **Disaster Management**, the RADPFI guidelines defines local authorities as Panchayati Raj Institutions (PRI), Municipalities, District and Cantonment Boards, and Town Planning Authorities for controlling and managing civic services. These institutional bodies shall be responsible for capacity building of their officers and employees for managing disasters, carry out relief, rehabilitation and reconstruction activities in the affected areas. The disaster management can be at Community Level as well as there can be Gram Panchayat/Village Disaster Management Plan. **Community Based Disaster Management**, a decentralized bottom-up approach, generate confidence, knowledge, awareness, partnership and ownership for planning. The participatory nature of this type of disaster management gives equity and inclusion to marginalized section of society and brings vulnerable groups to centre stage of implementation and planning. The development of **Village Disaster Management Plan (VDMP)** plays key role in the implementation of Community Based Disaster Risk Management.

This plan includes lists of activities to follow during a disaster for the prevention of loss of life, livelihoods and property. It is further strengthened with inclusion of actions taken by individuals in the community beforehand. The suggested framework for developing SDMP, DDMP, VDMP and CDMP is represented in Figure 15. This VDMP shall be analysed spatially by carrying out Vulnerability mapping using GIS based tools, Remote sensing and Global Positioning System (GPS).

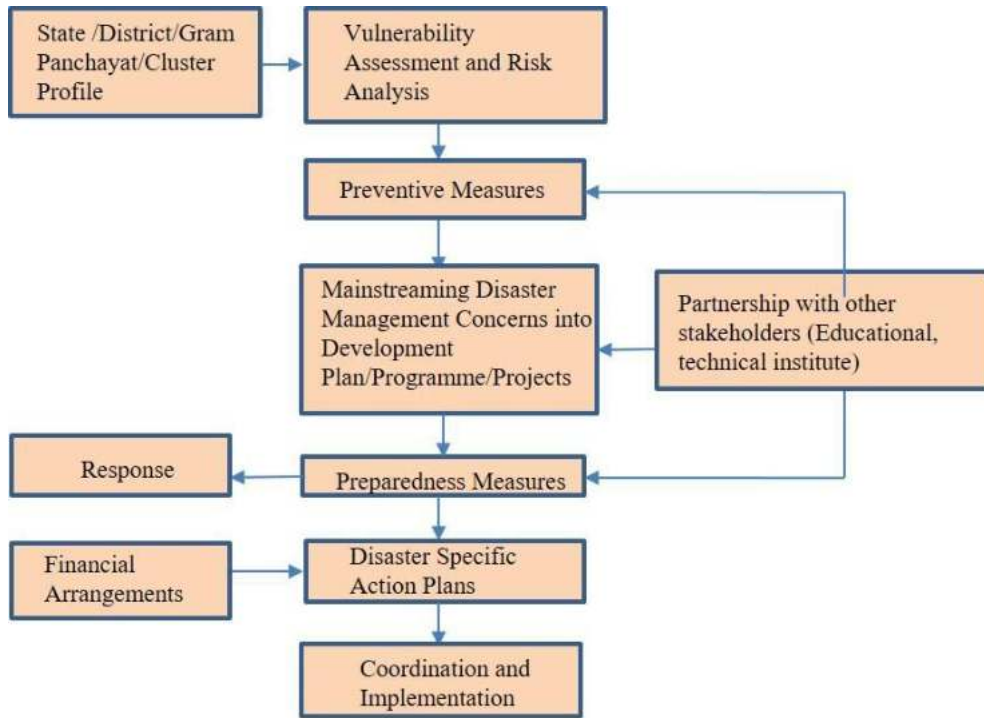


Figure 15 Suggested Framework for developing SDMP, DDMP, VDMP, CDMP

(Source: NDMA Guidelines, Preparation of State Disaster Management Plans)

4 Contents of the Gram Panchayat Spatial Development Plan

4.1 Panchayati Raj Institutional set-up in Madhya Pradesh

The enactment of 73rd Constitutional Amendment Act in 1992 devolves the governance to Panchayats in rural India to encourage participatory democracy at local level. They are the basic institution of rural local governance and are empowered to prepare development plans for social and economic growth of rural areas as per article 243G of Indian constitution. The state of Madhya Pradesh pioneered this enactment of act and passed Madhya Pradesh [Panchayat Raj Avam Gram Swaraj] Adhiniyam, 1993 institutionalizing three governing bodies- 'Panchayat' for a village, 'Janpad Panchayat' for a block and 'District Panchayat' for a district ((CHRI), 2006). There were several amendments in this act in response to the needs emerging from the field. In an amendment, M.P. Gram Sabha Adhiniyam 2001 envisages 'Gram Sabha', a constitutionally approved unit. This gives voting rights to all the major persons to elect Panch, Sarpanch, members of Janpad and members of District Panchayat. The Gram Sabha has power to approve works under annual budget of the village constituted with the elected members with a term period of five years.

Each of the governing bodies constituted at three different administrative levels perform different functions. The Village Panchayat at village level with its funds performs the execution of the disposal of discriminating articles, water supply, public works (roads, buildings, wells, tanks), market exchange, cooperation with governmental works, community health and development works. Similarly, Janpad Panchayat with its funds in its area works for community development and integration, agriculture, social, trade, cattle-breeding, fish-breeding, adult education, co-operatives, cottage industries, welfare, and employment-oriented programs (DCO D. o., 2011). The District Panchayat has the duty to supervise and control the Janpad and Village Panchayats. It also directs the development works and advises the State Government.

4.2 Panchayati Raj Institution in Sehore District

4.2.1 Sehore District

The apex body under Panchayati Raj Institution in Sehore district is Zilla Panchayat located in Sehore city. There are 5 Janpad panchayats under this apex body with a total of 497 Gram Panchayats (Table 8). The number of villages under each of the Gram Panchayats are shown in Table 9.. This institutional set up also has reservation for Schedule Caste (SC) and Schedule Tribes (ST) at all levels depending on the population ratio. Women are also given one-third reservation in the institutional set up.

Table 8 Statistics of Sehore District.

Particulars	2001	2011
Area (in sq. Kms.)	6,578.0	6,578.0
Number of Tahsils	5	8
Number of CD Blocks	5	5
Number of Towns	7	8
Statutory Towns	7	8
Census Towns	0	0
Number of Villages	1,076	1,072
Inhabited	1,019	1,031
Un-inhabited	57	41
No. of Revenue Villages	1,041	1037
No. of Forest Villages	35	35
No. of Other Villages	0	0
Total Population	1,078,912	1,311,332
Proportion of Rural population to total population	82.0	81.1

(source: District Census Handbook, DCHB)

Table 9 CD Block details of Sehore district.

Name of CD Block	Total No. of Villages	Total No. of Gram Panchayats
Sehore	304	144
Ashta	294	134
Ichhawar	159	70
Nasrullaganj	166	87
Budni	149	6

(source: DCHB)

4.3 Tehsil and Gram Panchayat and its interface/linkages

Tehsil is the geographical unit formed for the purpose of land revenue collection and levy taxes. It is headed by Tehsildar and come across both urban and rural areas. The villages within these tehsils form 'blocks' or 'Community Development blocks' for the purpose of rural development. In Madhya Pradesh, the institutional body formed at CD block level is called 'Janpad Panchayat' headed by Chief Executive Officer. The secretary of Gram Panchayat, appointed by State Government or the prescribed authority, is responsible for maintaining records of the Gram Panchayat. It is administratively responsible to the Chief Executive Officer of Janpad Panchayat. The annual plan for economic development and social justice of the Gram Panchayat area is forwarded to Janpad Panchayat after approval of the Gram Panchayat. There is also reallocation of funds transferred by Central or State Governments related to works, schemes and projects to Janpad Panchayats and Gram panchayats by the Zila Panchayats. It is also mandatory to include information related to Gram Panchayat in Janpad Panchayat's report.

5 Bilkisganj – Gram Panchayat Spatial Development Plan

5.1 Introduction

5.1.1 Location of Bilkisganj–Regional Linkages

Bilkisganj village is in Sehore Tahsil of Sehore district in Madhya Pradesh (Figure 16). It is situated 22 km away from Sehore which is both district & sub-district headquarter and 28km away from Bhopal. In terms of local administrative body, Bilkisganj is the Gram Panchayat of Bilkisganj and Gadiya village. Bilkisganj is a large village with geographical area of 1022.26 hectares and total household of 1286, with population of 6408 according to Census of India, 2011. It is connected with Sehore and Bhopal via Sehore-Bhopal road. Surrounding villages are dependent on Bilkisganj village due to availability of physical and social infrastructure (Figure 17).

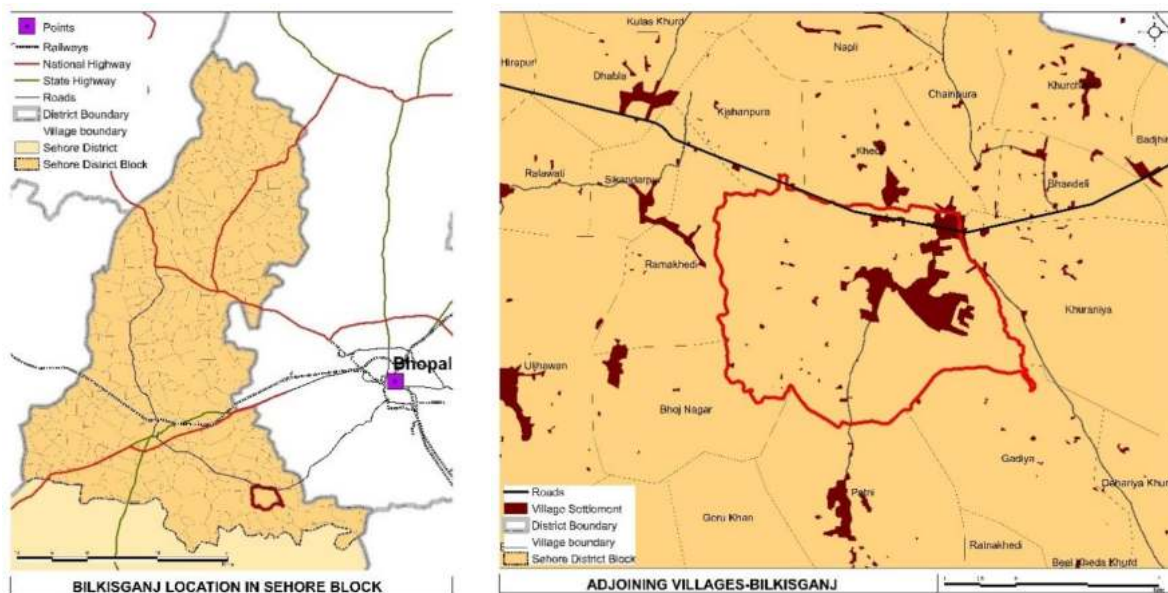


Figure 16 Location of Bilkisganj in Tehsil (left) and adjoining villages (right).

Source: Author

5.1.2 Historical Importance and National Links

The history of the village dates back to 17th century during Maratha empire. It was founded in 1587 and initially named as 'Jhaggaria'. Later, it was renamed as 'Bilkisganj' after the name of Nawab Hamidullah Khan's daughter in 1926. The village settlements started growing from Mata Mandir (temple) formed during Maratha empire adding sanctity to the place. It still attracts pilgrims from different parts of the state.

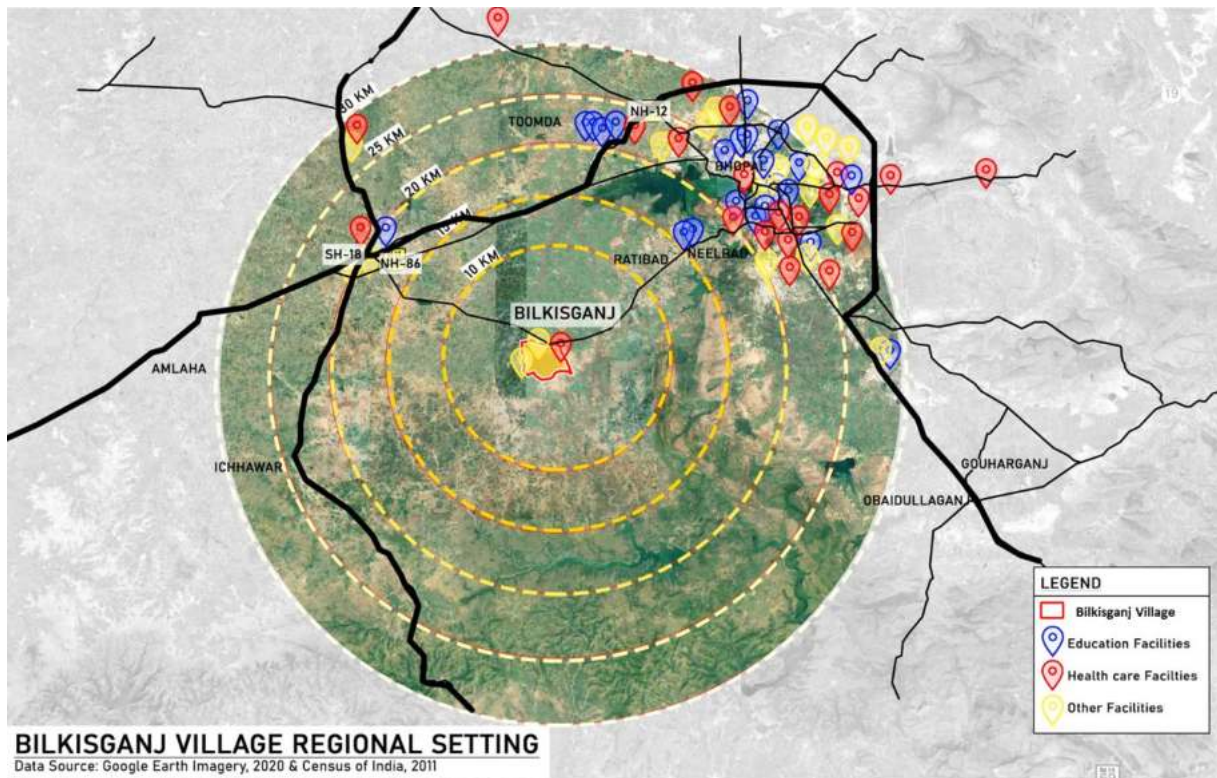


Figure 17 Bilkisganj Regional Setting.

(source: Author)

5.1.3 Environmental Significance

Bilkisganj gram panchayat lies in the catchment of Upper lake, Bhopal (Figure 18). The waste water from the Bilkisganj village drains into Kolans drains which is a stream of Upper Lake.

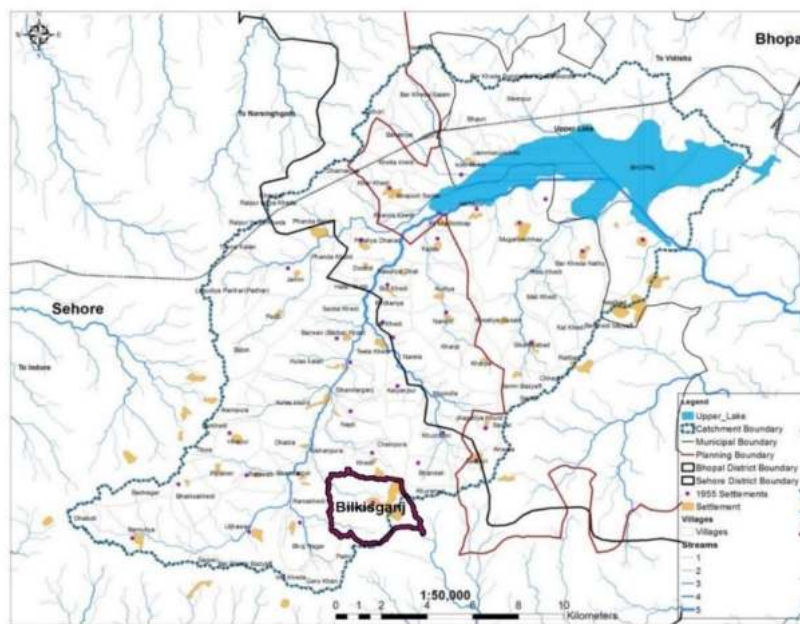


Figure 18 Location of Bilkisganj in Catchment of Upper lake.

Source: Author

Figure 19 shows the drainage network connecting Bilkisganj drains into Kolans stream.

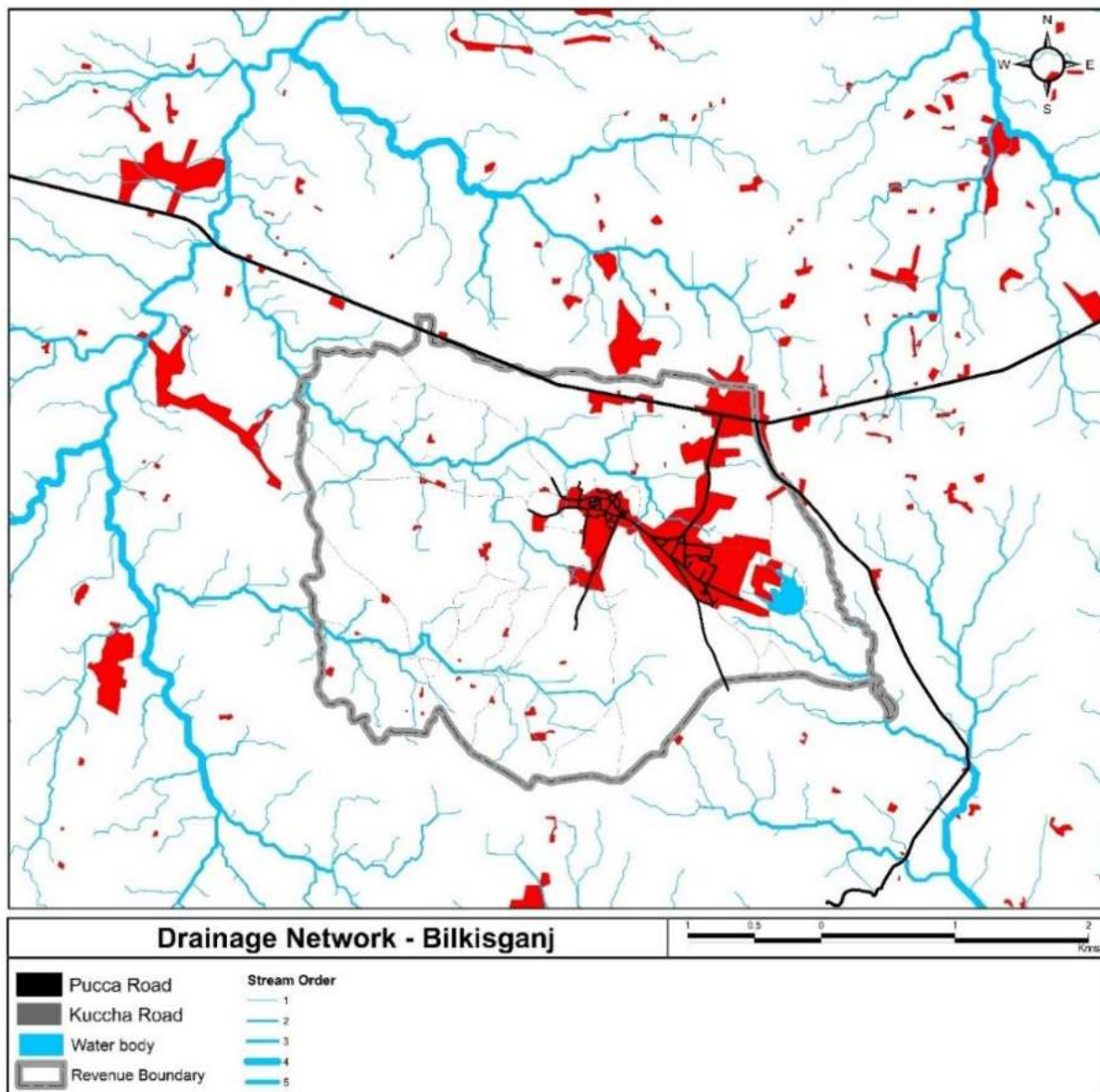


Figure 19 Drainage network of Bilkisganj Village.

(Data Source: ASTER DEM)

5.1.4 Physiography

The physiography of the village is almost a flat land. The elevation of the village varies between 457 m to 491 m. The lowest elevations of the area are towards North-West and South-East of the boundary. The *Abadi* area is spread on higher elevation zone.

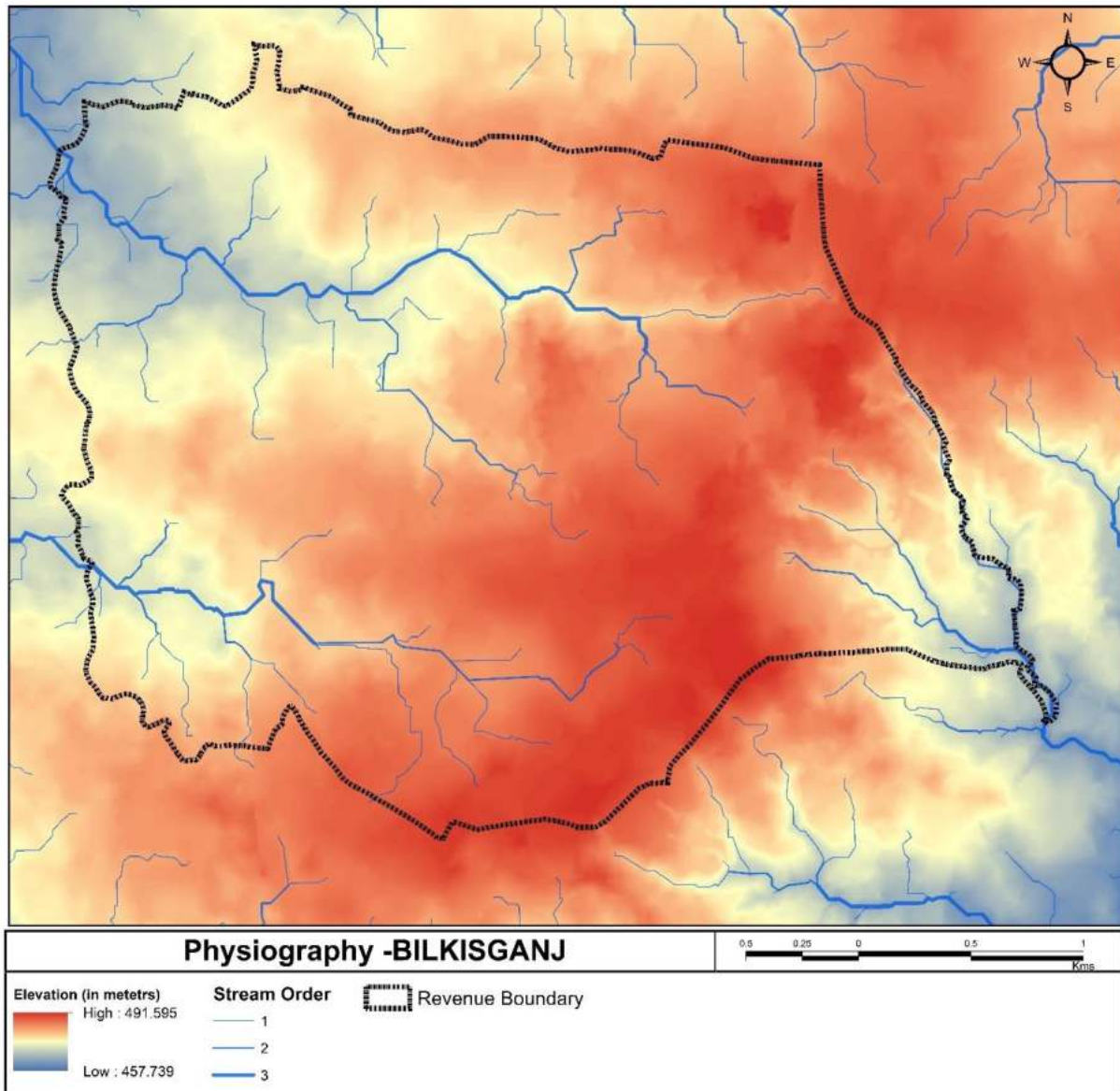


Figure 20 Physiography of Bilkisganj village

(Data source: BHUVAN)

5.1.5 Scalogram position of Bilkisganj in the Tehsil/District

Settlement Hierarchy based on population and Guttman scalogram analysis was conducted for the Sehore tehsil Figure 21. This analysis was conducted for the year 2011 based on Census of India data, and year 2041, with the projected population.

5.1.5.1 Based on Population

Settlements have been divided into classes based on their population and arranged into groups on the basis of census of India (2011).

Table 10: classes of settlement for rural settlements

Population Classes for Rural Settlements		
CLASSES	POPULATION	Remarks
Class I	Above 10000	Large villages which are likely to be urban in future, if near metropolitan areas. Large villages which may be purely depended on flourishing agricultural or other primary activities.
Class II	5000 to 9999	Villages which are having population next to Class I village, and would also be urban, if near metropolitan areas.
Class III	2000 to 4999	Medium sized villages which can be grouped together to form a cluster, if have geographical contiguity.
Class IV	1000 to 1999	
Class V	500 to 999	Small sized villages where cluster plans would be feasible.
Class VI	200 to 499	
Class VII	Less than 200	Isolated hamlet, where villages are located on hilly terrain, dessert or tribal areas, and spatial plans shall be based on connectivity and sharing of resources.

Source: RADPFI, Gol, 2016

5.1.5.2 Based on Guttman Scalogram

A Guttman scale (also known as cumulative scaling or scalogram analysis) is an ordinal scale type where statements are arranged in a hierarchical order so that someone who agrees with one item will also agree with lower-order, easier, less extreme items.

- To identify class of settlement in terms of social, administrative, transport, commercial and other facilities.
- To find regional disparity and imbalance in development if any.

In regional analysis the items are functions- services, facilities, infrastructure, organizations, and economic activities-which give settlement (cases) centrality in the spatial system. The scale is ordinal; items are divided into “yes” or “no” i.e., 1 or 0.

Guttman scale is a relatively easy way of examining both the functional complexity of settlements and the distribution of functions among communities within Palghar region.

Steps to conduct the Guttman Analysis:

Step 1: Classify the village data available in Census with respect to the facilities and services available of a given Tehsil

Step 2: Mark the availability of services in a village in terms of available or unavailable as 1 and 0 respectively.

Step 3: Calculate the sum of these services [Guttman score] for each village in the tehsil

Step 4: Rank the villages in order of the Guttman score to identify the order of service of the villages in the particular tehsil.

Table 11: Type of facilities w.r.t class of settlement

S No.	Class of Settlement	Type of facilities
1	First Order Service	Post Head office, Commissionerate, Fire Training Institute, Municipal Corporation, Railway station, APMC, University, Connectivity by railway, Civil Hospital, District cooperative, District milk collection centre, District Industrial centre, 24 x 7 water supply
2	Second Order Service	National Highway, Police Station, supply of treated water twice in a day, Bus Depo/Sub Bus depo, Market yard/ Sub APMC, MIDC, Post office, Engineering/Medical College, Municipal Council, Community Health Centre, Fire Station
3	Third Order Service	PHC/ Maternity/ Child Welfare/Family Welfare Centre, Nationalised Bank, SH, Sub post office, Senior Colleges (BSc, BCom), Daily Market, Veterinary Hospital, Medium & Large-Scale Industry, Fire post, Police chowki/post, Nagar Panchayat/Panchayat samiti, Treated water once in a day, Bus stand
4	Fourth Order Service	Treated water once in 4 days, Junior College, Bus stop, Weekly Market, Post Branch office, Small & Micro scale Industry, Warehouse / Godown, Commercial bank, Cooperative Bank, Dispensary, Major District Roads, Circle office
5	Fifth Order Service	Pre-Primary & Primary School, Secondary School, Gram panchayat, Post Office Counter without Delivery/ Letter Box, Common (Standpost/Handpump)/Private Well, Village Roads and ODR, Private Transport (jeep, auto), Primary Health Sub-centre, SHG, Shops/Mandi, Dairy, Household Industry

Source: URDPFI Guidelines

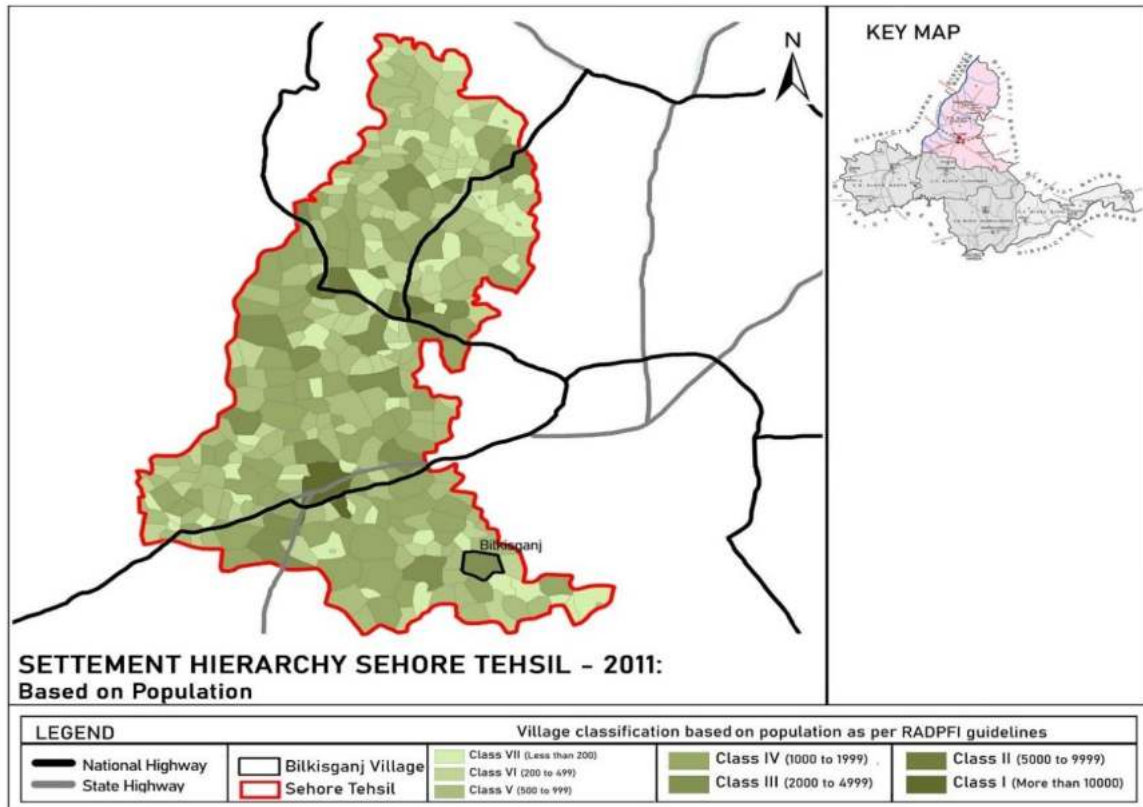


Figure 21 Settlement Hierarchy of Bilkisganj based on population.

All villages of Sehore tehsil with their Guttman score are enlisted in Annexure 3.

5.2 Spatial Analysis of Current Scene

5.2.1 Spatial Extent Validation of Bilkisganj Village

Before proceeding to spatial analysis of the Bilkisganj village, its spatial extent is validated (Figure 22).

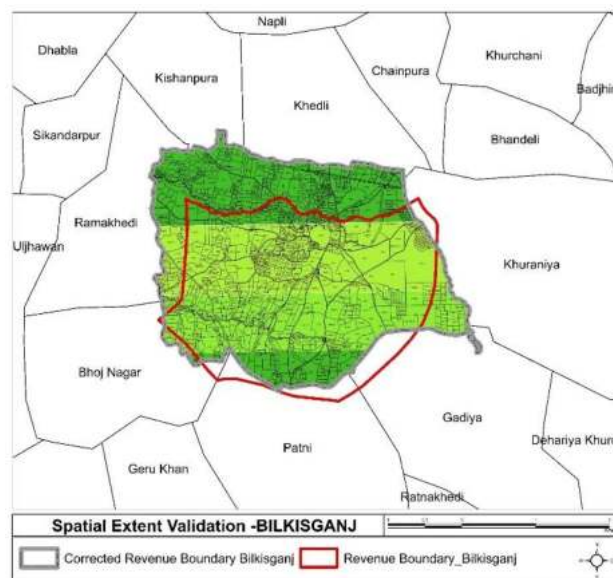


Figure 22 Spatial Extent Validation of Bilkisganj Village

There found to be a shift in the boundary which was corrected using cadastral map of Bilkisganj Village. Therefore, we are considering cadastral boundary for our spatial analysis.

5.2.2 Normalized Difference Vegetation Index (NDVI) Analysis

The normalized difference vegetation index (NDVI) is a spatial indicator which is used to analyze green vegetation based on visible and near-infrared light reflection on ground. Healthy vegetation (left) absorbs most of the visible light that hits it, and reflects a large portion of the near-infrared light. This healthy vegetation layer is used to extract plantation through indexing of Multi-Spectral imagery.

Figure 23 shows satellite imagery of Bilkisganj Village which has been used to obtain plantation within *Abadi* area.

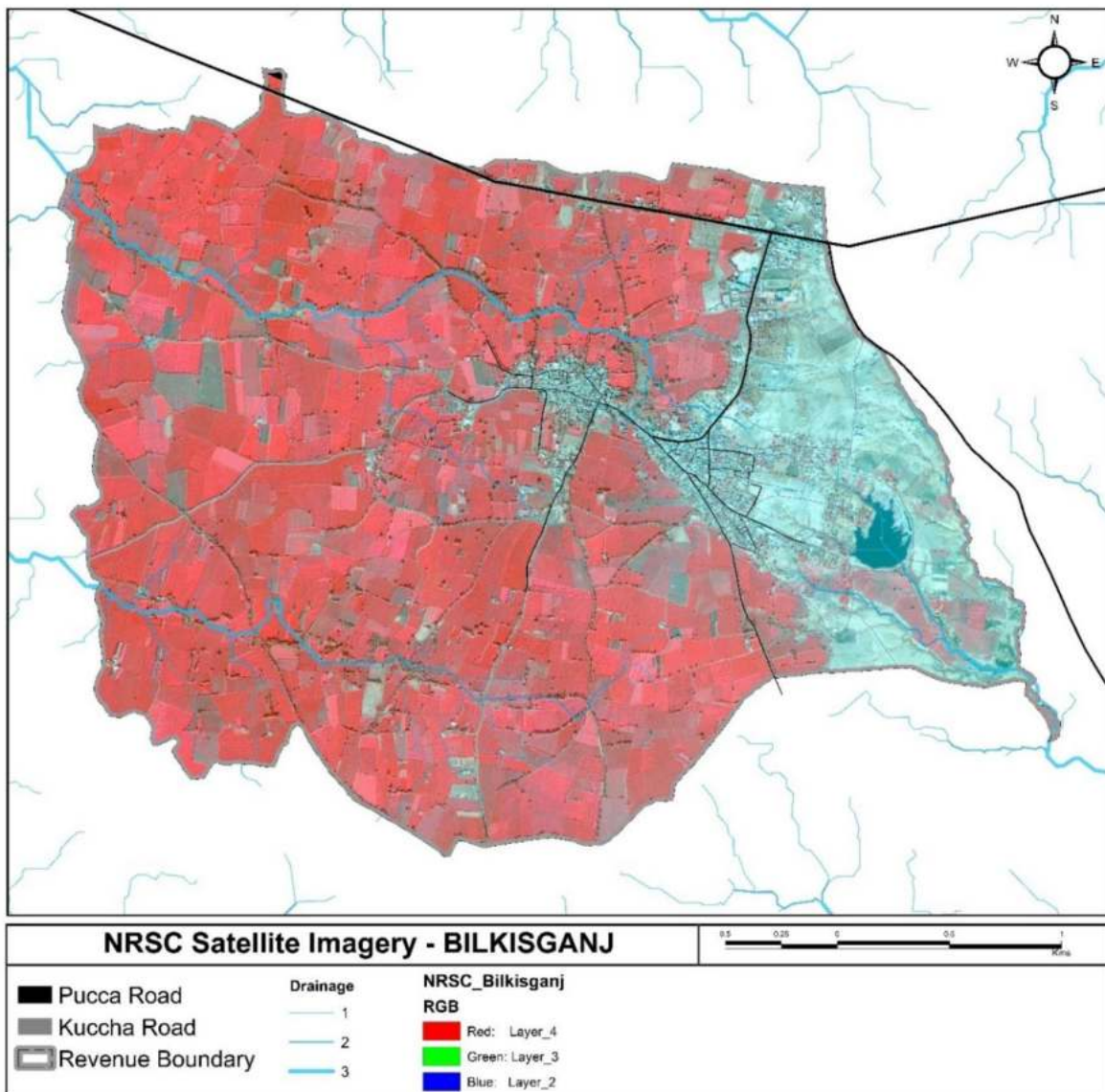


Figure 23 Input data (Satellite Imagery)

Source: NRSC.

The extracted vegetation along with plantation is represented in Figure 24.

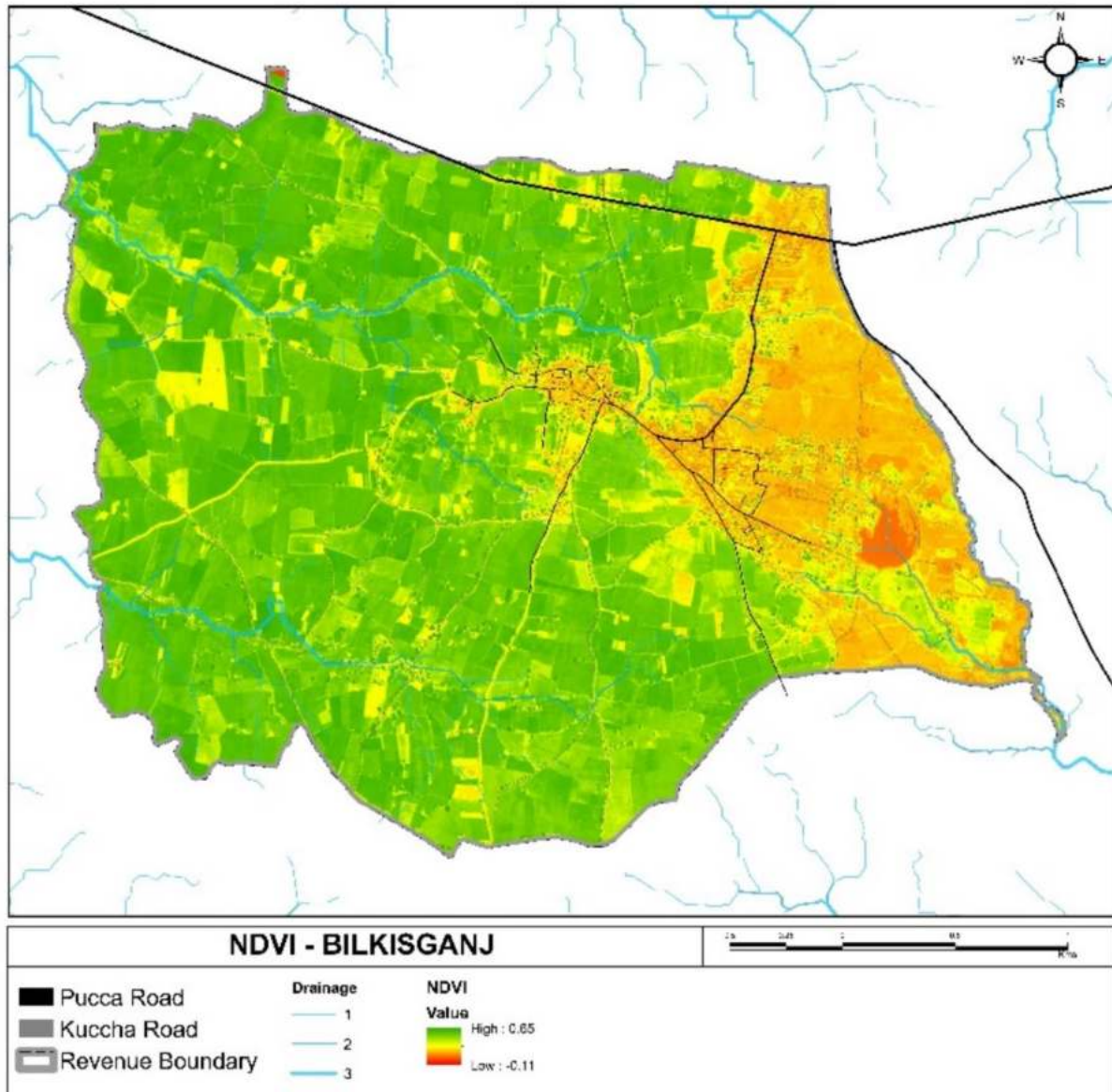


Figure 24 Vegetation Index, Bilkisganj Village.

(Imagery Source: NRSC)

5.2.3 Land Utilization

About 83% of land cover is under crop land Figure 25. There is only 6% *Abadi* area (village settlement), 10% scrub land and 1% water body of the total land area. The utilization of land areas as per census 2011 is represented in Figure 26 & Table 12

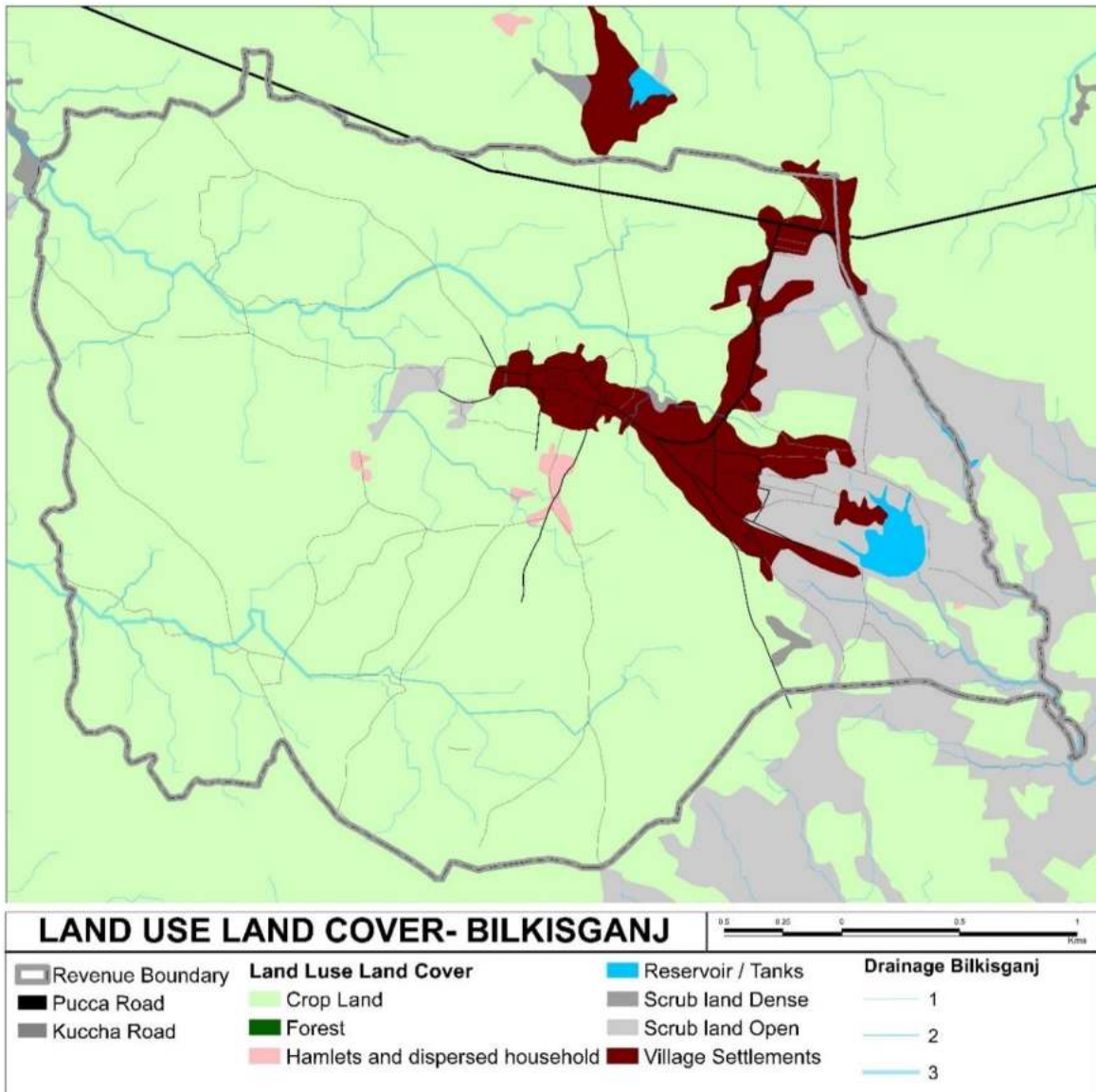


Figure 25 Land Use Land Cover of Bilkisganj Village
(source: BHUVAN)

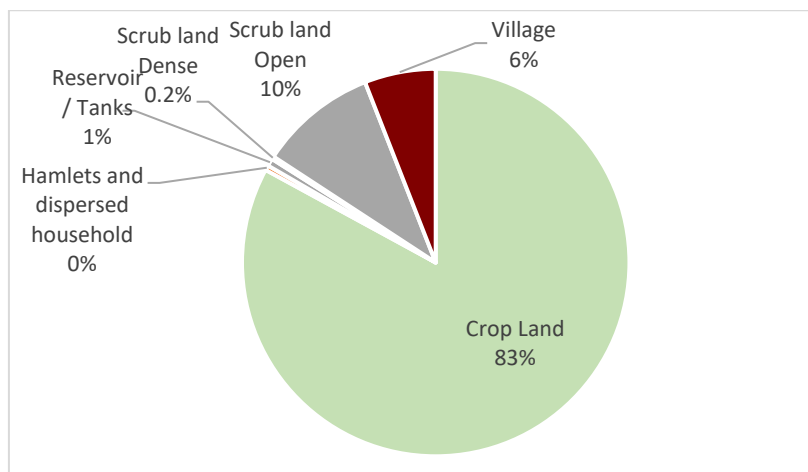


Figure 26 Percentage of Land use Land cover In Bilkisganj Village
(source: BHUVAN)

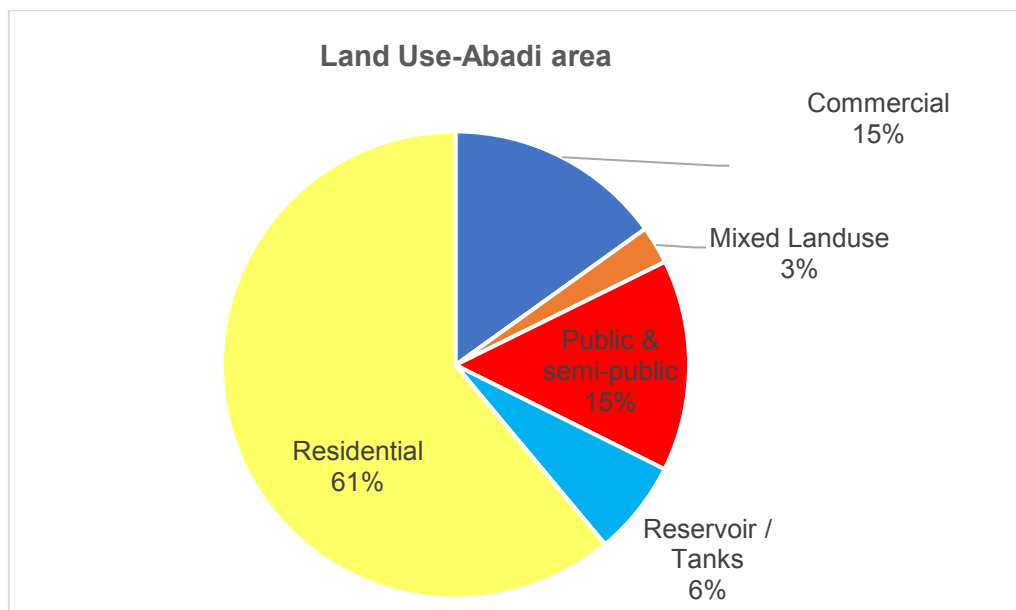
Table 12 Land Area under different uses.

Forest Area (in Hectares)	1.4
Area under Non-Agricultural Uses (in Hectares)	72.1
Barren & Un-cultivable Land Area (in Hectares)	19.1
Permanent Pastures and Other Grazing Land Area (in Hectares)	35.7
Land Under Miscellaneous Tree Crops etc.	27.2
Culturable Waste Land Area (in Hectares)	0
Fallows Land other than Current Fallows Area (in Hectares)	27.8

(source: DCHB)

5.2.4 Land use of *Abadi* Area (Human Settlement Area)

The *Abadi* area covers 6% of Bilkisganj Village and its land use is captured using drone technology. The settlement present within the *abadi* area is spread along roads having 15% of public & semi-public land use, 3% of mixed land use and 15% of commercial land use along Sehore-Bhopal Road (Figure 27). The village *Abadi* is covered with 61% of residential land use present in the interior of village and towards South East of *Abadi* area (Figure 28).

Figure 27 Percentage of Land Use of *Abadi* area.

(source: Primary Survey, 2020)

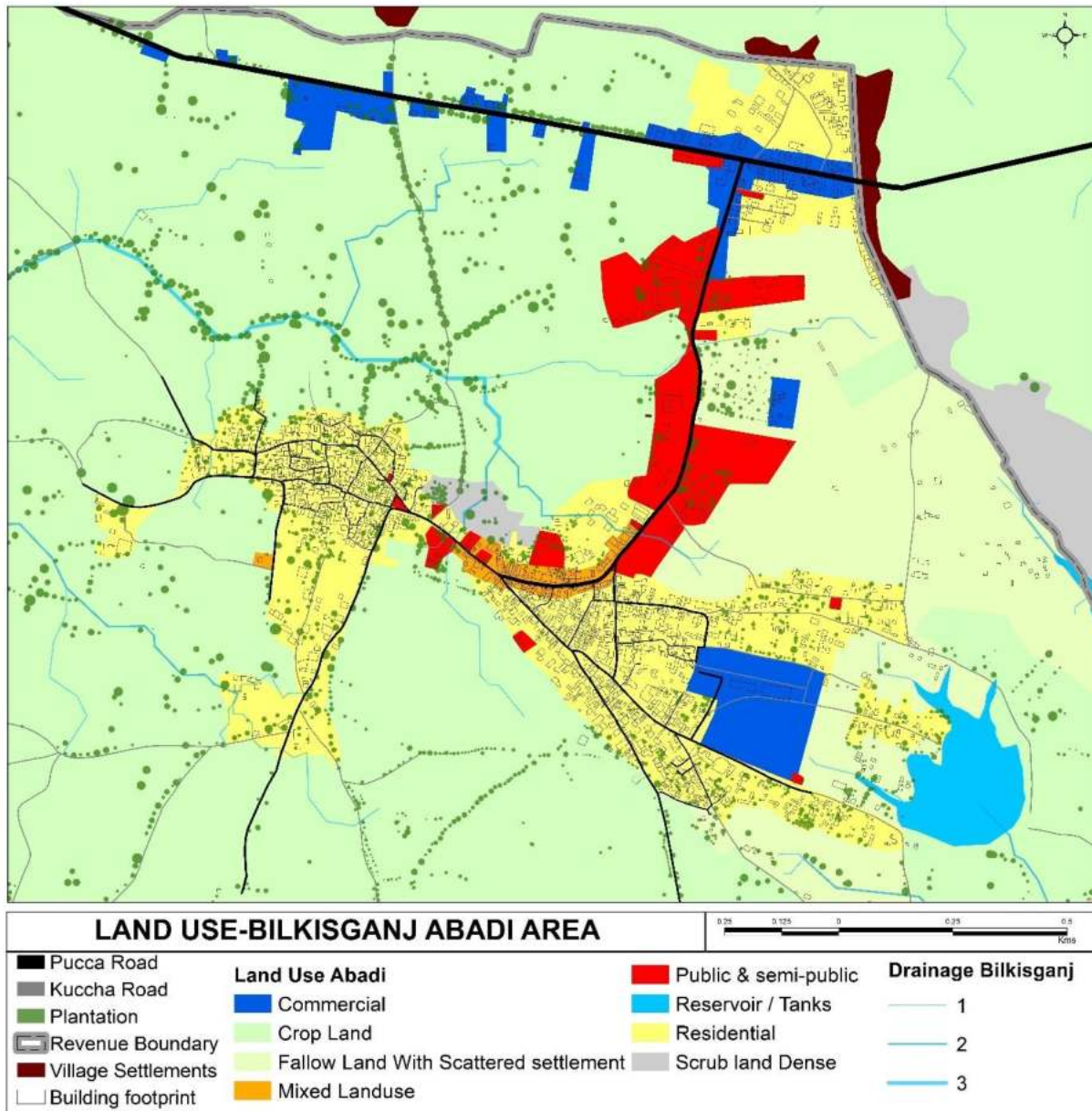


Figure 28 Land Use of Abadi Area.

(Source: Primary Survey, 2020)

5.2.5 Land Ownership

There is a 1:6.5 ratio of government land to private land in the panchayat area. Only 13% of land belongs to government while rest has private ownership (Figure 29). Maximum government land is present towards South-East of the Panchayat area. Figure 30 shows the land ownership pattern. The land ownership of each land parcel as per cadastral map was verified through the web page of ‘MP Bhulekh’ and assigned the same as attribute in GIS for mapping it spatially.

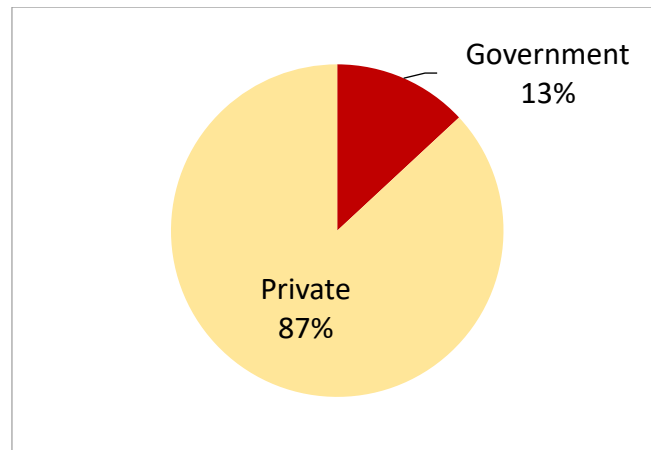


Figure 29 Land Ownership.

(source: MP Bhulekh)

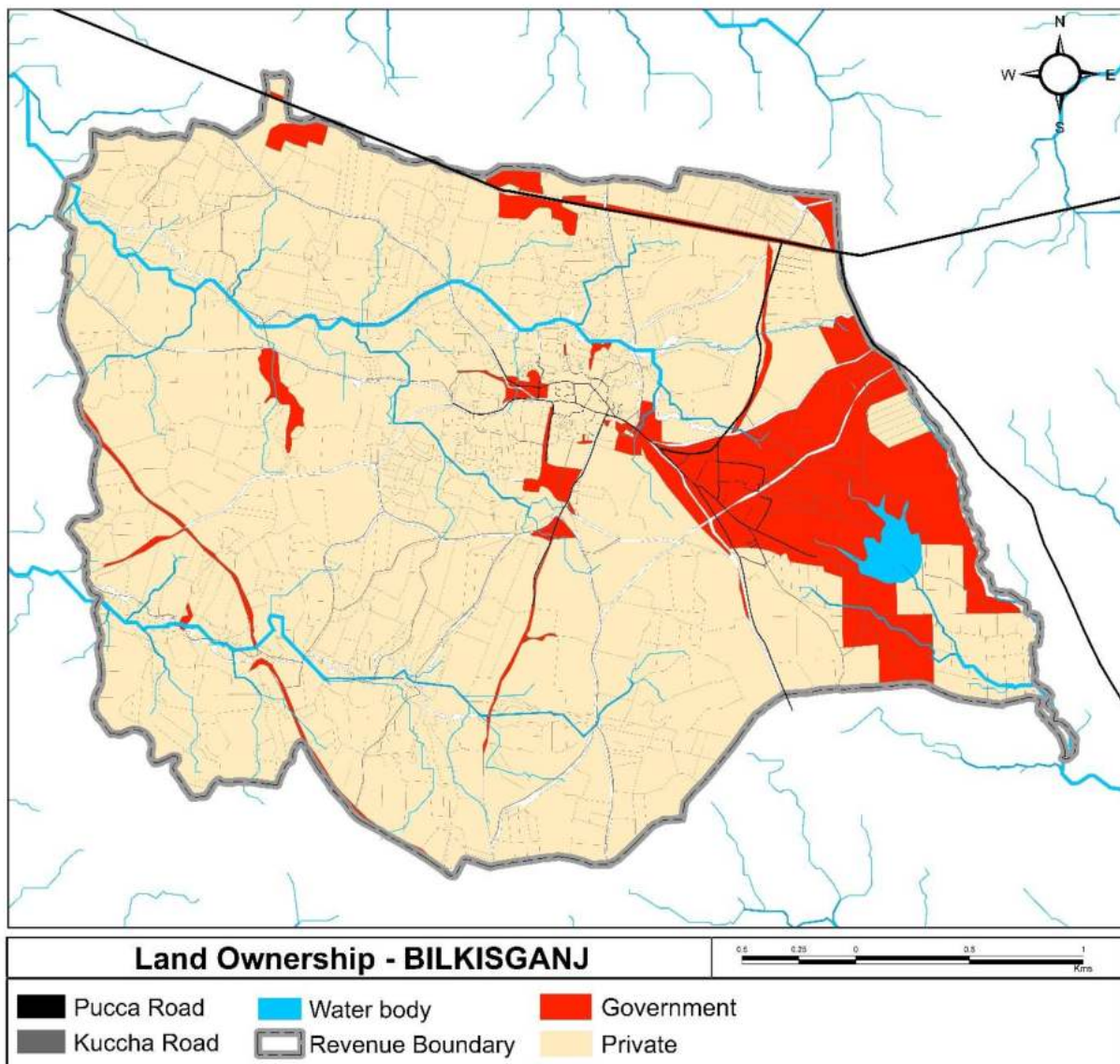


Figure 30 Spatial distribution of Land Ownership.

(source: MP Bhulekh)

5.2.6 Land Holding Pattern

The land holding pattern of Bilkisganj village is shown in Table 13. The pattern of distribution varies between 0.02 acres to 20 acres. It shows that maximum 70% of the land parcels have land less than 2 acres.

Table 13 Landholding Pattern.

Area (Acres)	No. of land parcels
0-2	758
2-4	173
4-6	72
6-8	31
8-10	13
10-12	5
12-14	11
14-16	6
16-18	3
18-20	5

(Source: MP Bhulekh)

5.2.7 Built-up area and its growth pattern

As per interaction with locals, it was noted that the growth of settlements relates to the presence of an ancient temple, Mata Mandir before 1980s. It acted as a focal point for subsequent settlement-growth. There is an increase of approx. 160 acres of built-up area from 1990s till 2020 (Figure 31). From 1990 to 2001, the settlement has grown outwards along the road from the temple present in the interior of village. From 2001 onwards, there is outward expansion of the existing built-up area Figure 32. The growth of settlements has also reduced the green cover within the *Abadi* area. Moreover, the catchment of the pond present in South East of village, is also found to be encroached by new settlements emerged in past 40 years, which require protection for water conservation.

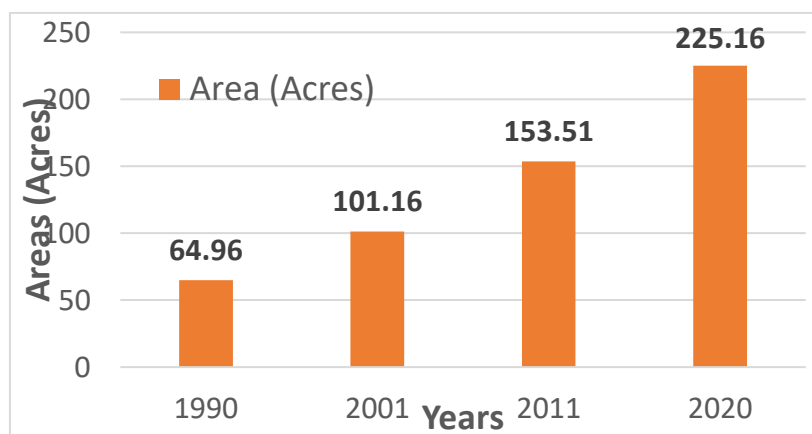


Figure 31 Temporal Built Up Area.

(source: Satellite Imagery USGS)

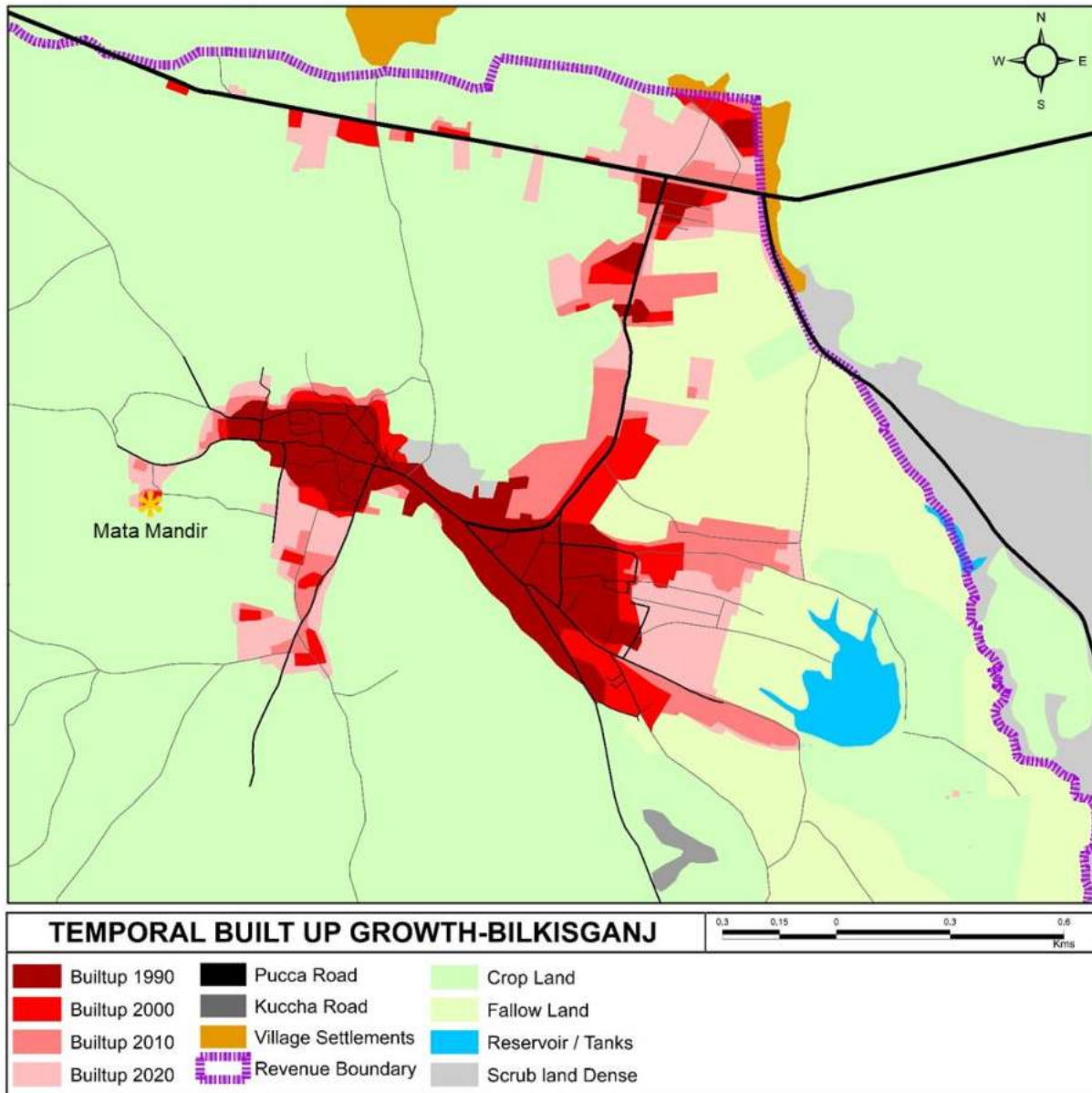


Figure 32 Spatial growth of Built-Up Area.

(source: Satellite Imagery USGS)

5.2.8 Land Value

The village has highest land value of 70 lakhs per acre along the Major road i.e., Sehore-Bhopal Road followed by 40 lakhs per acre along the road leading to Kolar Dam present in East of the village. The least agricultural land value is found to be 15-20 lakhs per acre surrounding the oldest settlements. The land within the village has also high land value of 27,000/- to 28,000/- per sq.ft. because of commercial land use.

5.3 Socio-Demographic Dimensions of Bilkisganj GP

5.3.1 Brief history of settlements

The settlement started growing from Mata mandir, an ancient temple of Bilkisganj village. This acted as an origin point for the growth of settlements adding sanctity to it. The oldest settlement is concentrated in the interior of the village expanding outward along the roads. Figure 32 illustrates the growth pattern of the settlement over time in various directions.

5.3.2 Socio-Cultural Dimension of Bilkisganj GP

As per community-based classification structure of Bilkisganj GP, there are people belonging to *Mewara, Parmar, Thakur*, 13% SC, and 3% ST population (Figure 33). Broadly, there are 95% people belonging to Hinduism, 4.9% Muslims and 0.1% Christians. Despite diverse social groups, there have been peace and harmony amongst them as informed during primary survey.

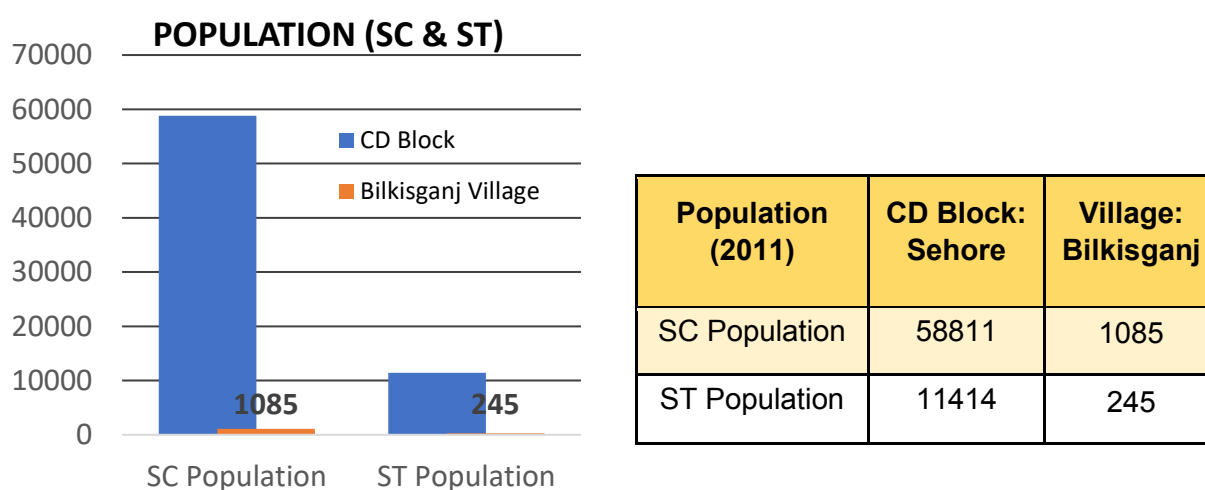


Figure 33 Population of Schedule Castes (SCs) & Schedule Tribes (STs).

(source: Census of India, 2011)

5.3.3 Spatial Distribution of social dimension

5.3.3.1 Community-based spatial distribution

From primary survey, six mohallas are identified based on the predominant community. Figure 34 illustrates the spatial distribution as per community of village residents. These mohallas are part of initial settlements while new built up are found to have mix of all communities.

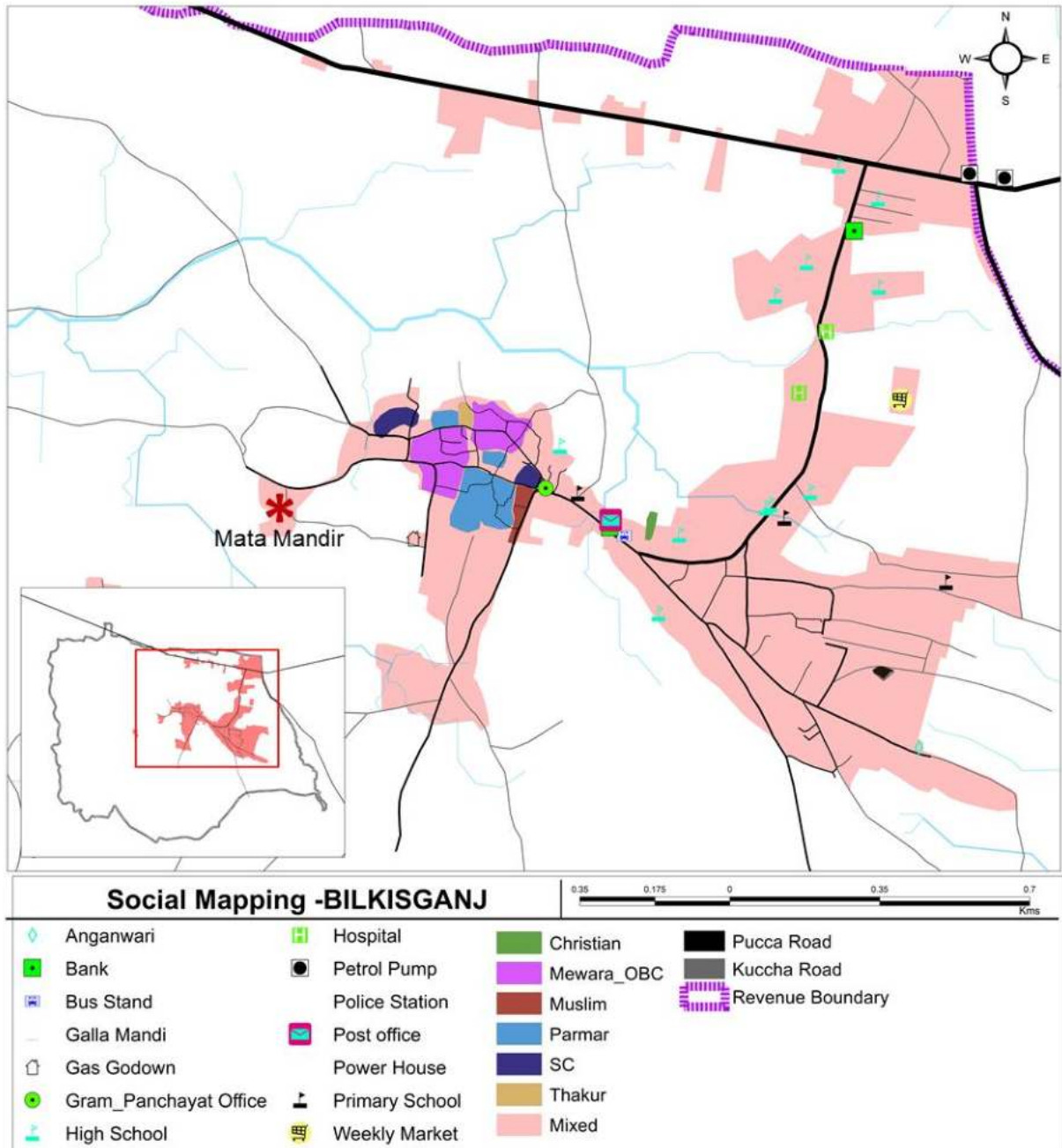


Figure 34 Spatial distribution based on religion.

(source: Google Earth & Primary Survey:2020)

5.3.3.2 Social harmony

Despite the diversity in community of village residents, people live in social harmony. It was observed during primary survey that people have a sense of shared responsibility among them and celebrate each festival with enthusiasm.

5.3.3.3 Emerging new Spatial areas

To prepare the spatial development plan, future growth of the village has been analysed using Shannon’s entropy. As per the analysis, highest growth shall occur in SEE followed by NEE Table 14. The current development trend is also towards East of village i.e., along the road leading to Kolar dam and South East of existing settlements. As per stakeholder’s discussion, the new plotted as well as industrial development is also proposed along this road where high number of buyers belong to high-rank government officials. Figure 35 illustrates the growth direction identified from Shannon’s entropy.

Table 14 Bilkisganj Village spatial growth projection.

Year	Bilkisganj Village Spatial Growth Projection (Area in Acres)								
	NEE	NNE	NNW	NWW	SEE	SSE	SSW	SWW	
1990	10.82	0.98	1.14	4.74	42.95	1.53	0.7	1.6	1990
2000	19.21	3.47	2.29	5.06	61.56	2.75	2.81	2.04	2000
2010	39.93	4.76	2.51	6.53	86.01	3.6	6.44	2.52	2010
2020	69.11	7.74	4.82	8.26	105.49	7.42	14.94	5.7	2020
2030	81.98	9.43	5.63	9.26	119.76	8.70	19.24	6.61	2030
2040	97.24	11.48	6.57	10.38	135.95	10.20	24.77	7.66	2040
2050	115.34	13.98	7.67	11.63	154.34	11.95	31.89	8.88	2050

(source: Satellite Imagery USGS)

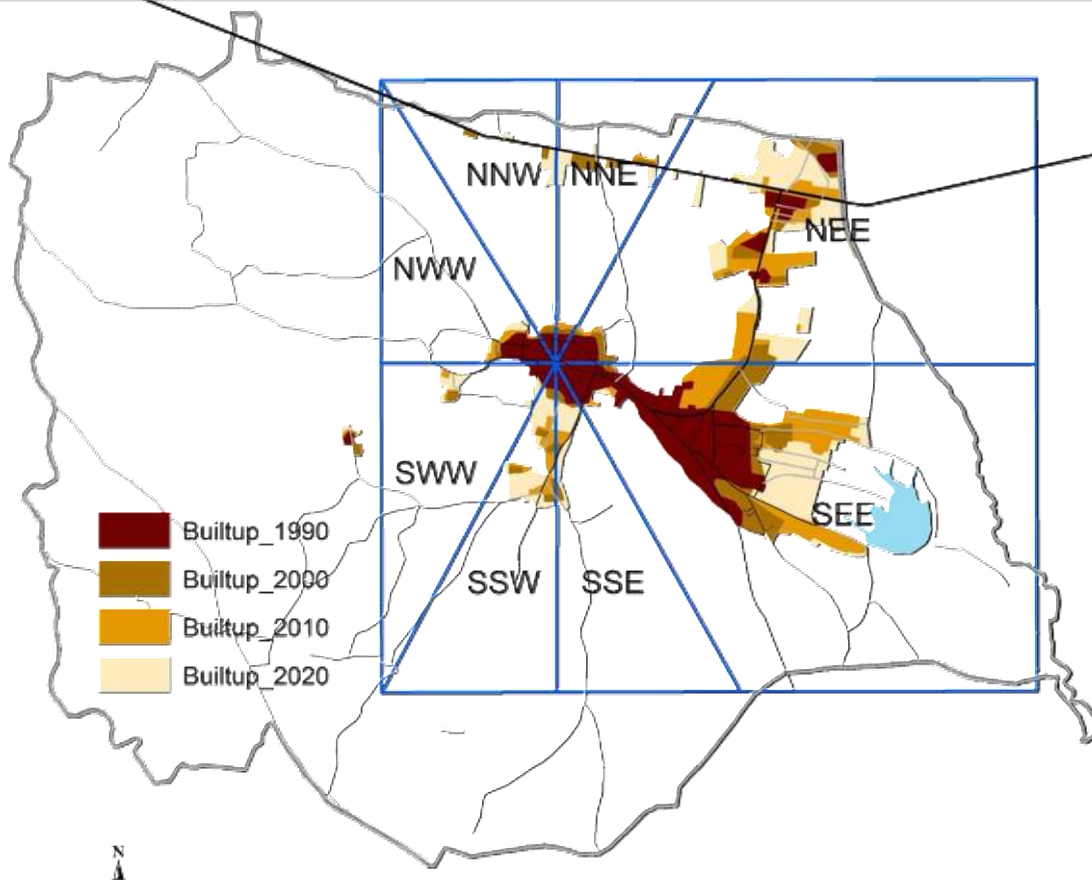


Figure 35 Spatial Growth Analysis using Shannon's Entropy.

(Source: Satellite Imagery USGS)

5.3.4 Population & its Growth Trends

The population trend and its growth rate are shown in Table 15. There is increase in growth rate from 2001 to 2011 but declines from 1991 to 2020 with the increase in population.

The total village population forms only about 2.4% of the CD block population. SC population is 13% and ST population is 3% of the total village population. Sex Ratio of Bilkisganj village is 719 which is much lower than Madhya Pradesh state average of 931. Similarly, Child Sex Ratio as per census is 770, much lower than state average of 918 (Figure 36).

Table 15 Population trend from 1991-2020.

Year	Population Trend	Growth Rate (%)					
		1991	2001	2011	2020	1991-2001	2001-2011
Bilkisganj Village	3314	4504	6408	8200	26.4	29.7	21.8

(source: Census of India)

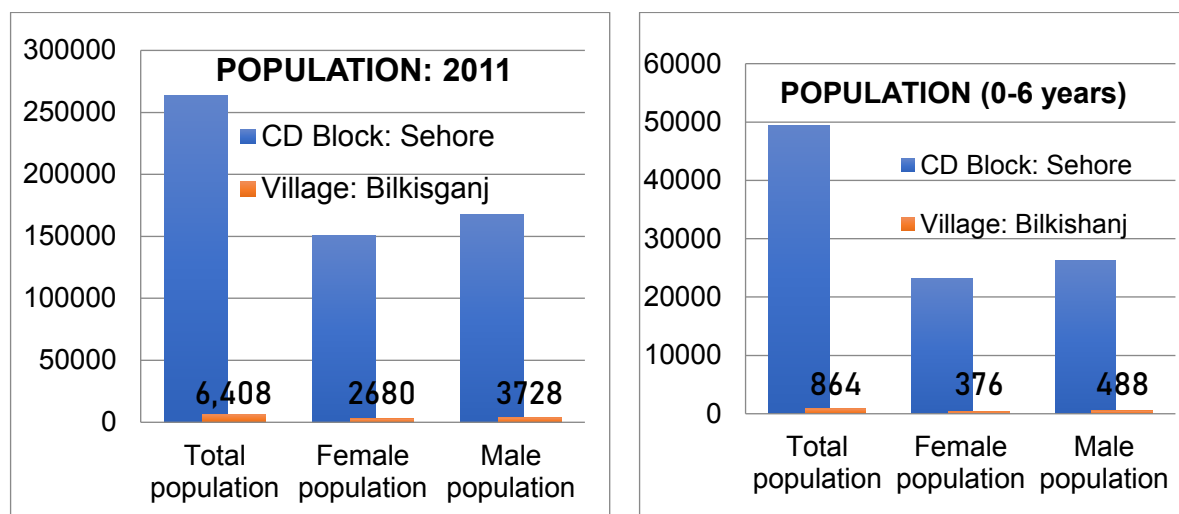


Figure 36 Share of Male, female and child (0-6 years) population in Bilkisganj and Sehore Block.

(source: Census of India)

5.3.5 Family Size and its changes

As per census 2011, the family size of households was 6 persons which has now decreased to 5.46 persons in 2020.

Table 16 Family size and Households.

	2011	2020
No. of HHs	1068	1501
Average HH size	6	5.46

(source: Census of India and GP)

5.3.6 Literacy Rate

The literacy rate of Bilkisganj village is 66.86% which is slightly lower than state average of 70.6% (Figure 37). Female literacy rate is 54.62% much less than male literacy rate of 75.67%.

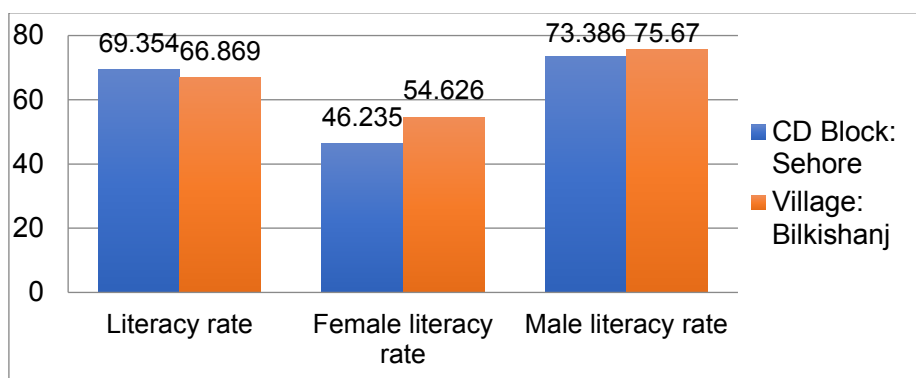


Figure 37 Literacy rate among males and females in Bilkisganj.
(source: Census of India)

5.3.7 Workforce and Skill Sets in the Village

About 30% of its total population is engaged in economic activity, among which 58% of total workforce is engaged in agricultural activities and rest of 42% engaged in non-agricultural activity. The village has maximum number of 563 other workers (Figure 38). There are 434 cultivators and 357 agricultural laborers Figure 39. This means that people have economic stability.

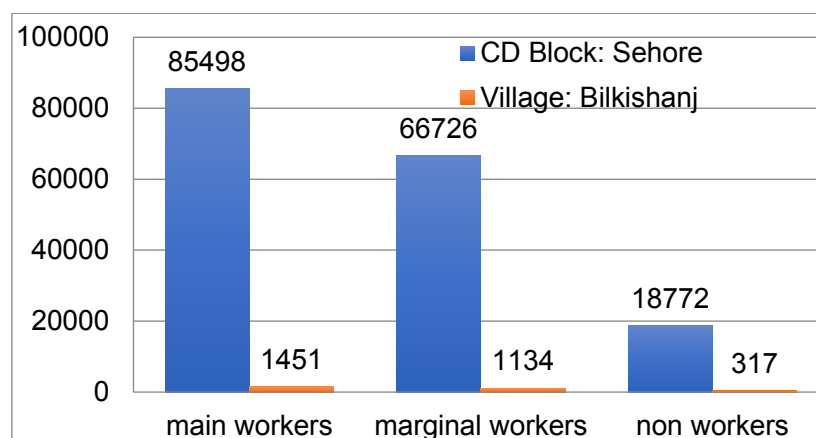


Figure 38 Workforce Participation ratio.
(source: Census of India)

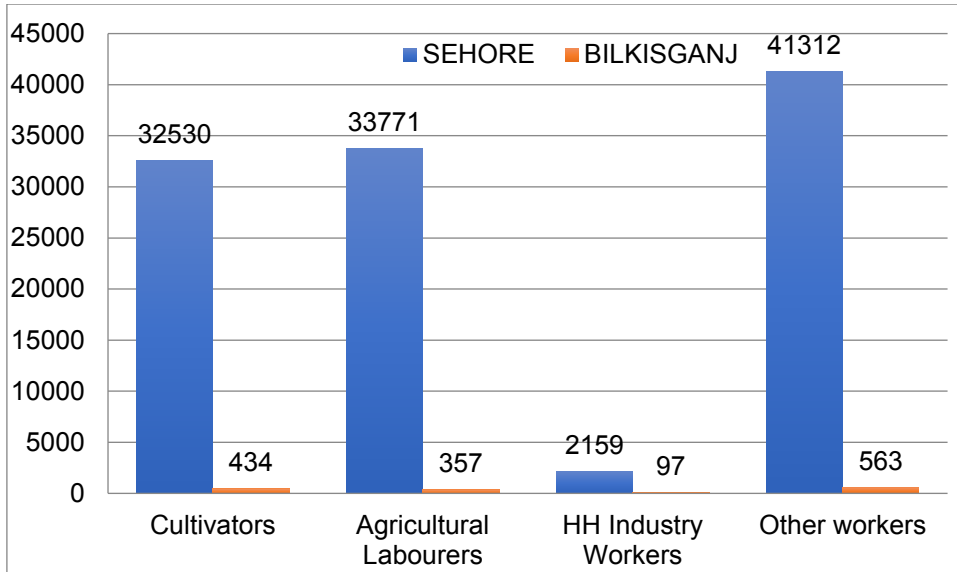


Figure 39 Category of Workers.

(source: Census of India)

5.4 Housing

5.4.1 Housing Conditions (Kuccha, Pucca and Semi-Pucca)-dilapidated

Village has maximum percentage of 55% of Pucca houses whereas only 45% households are Kuccha house (Figure 40). The Kuccha houses are mainly present in oldest settlements and South of the abadi area. The main road connecting settlements to Sehore-Bhopal road has Pucca construction (Figure 41). From visual survey, it was found that houses present in southern of *Abadi* area are dilapidated with poor sanitary conditions that they require proper drainage system.

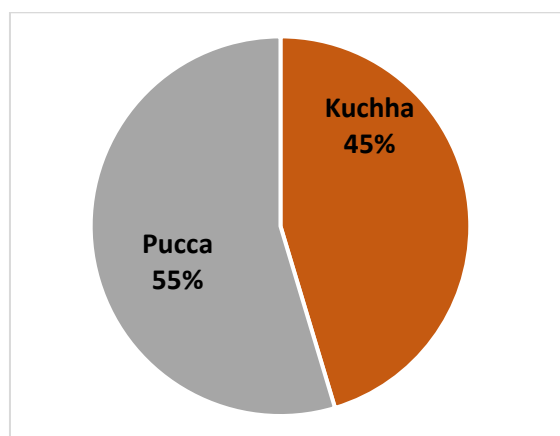


Figure 40 Percentage of Pucca & Kuccha houses.

(source: Drone Imagery:2020)

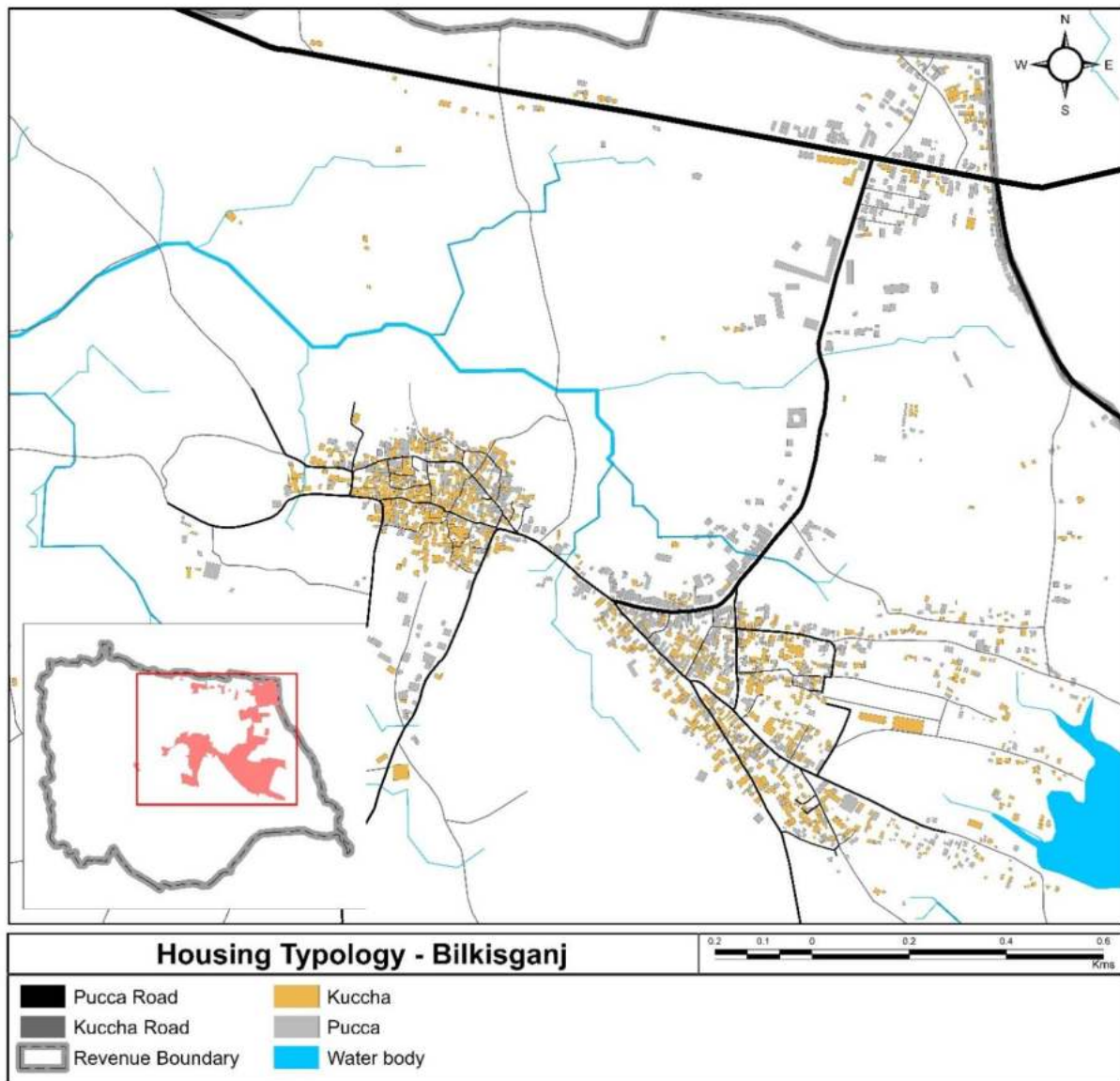


Figure 41 Spatial distribution of Housing typology.

(Source: Drone Imagery, 2020)

5.4.2 Housing Roof Typology

The maximum share of 46% of roof typology is for thatched roof followed by clay tiles with 27% and Concrete roof 23% (Figure 42). Houses with Tin roofs (4%) are seen in traces in oldest settlement (Figure 43 & Figure 44).

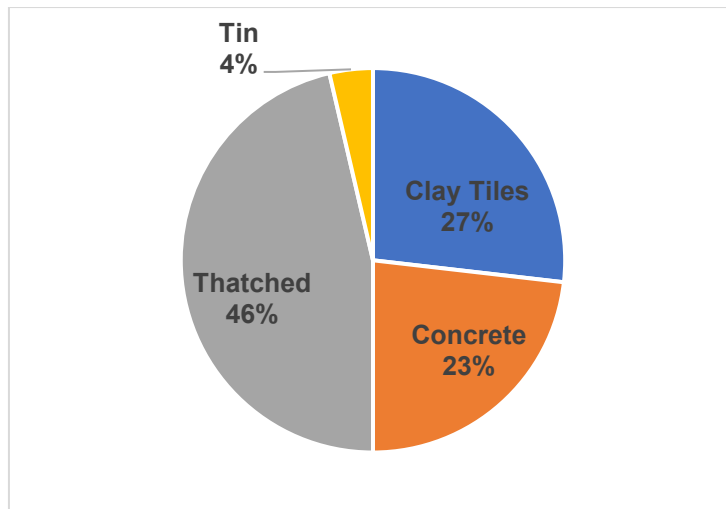


Figure 42 Percentage of Housing Roof Typology.

(source: Drone Imagery:2020)



Figure 43 Kuccha houses in oldest settlement of Bilkisganj.

(Source: Author)

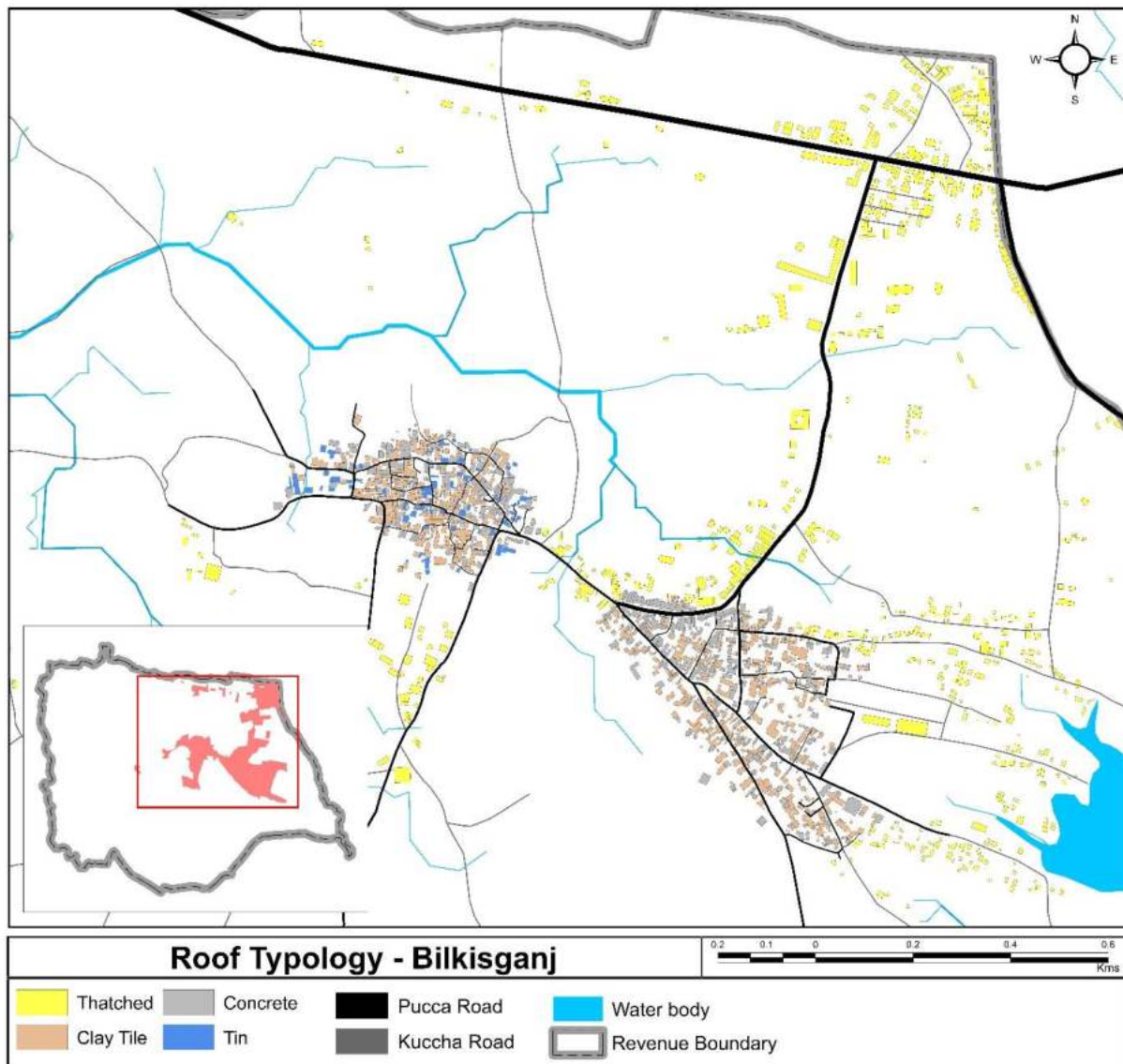


Figure 44 Spatial distribution of Housing Roof Typology.

(Source: Drone Imagery, 2020)

5.4.3 Housing Material usage in *Abadi* area

The old houses of village are built using lime mortar and mud while new construction is using bricks and cement concrete. Figure 45 shows the materials used both in Kuccha and Pucca houses.



Figure 45 Street view with Kuccha house on left and Pucca house on right.

(Source: Author)

5.4.4 Spatial Distribution of settlements

The settlement of the village is analysed with respect to slope of the area to identify low lying areas. According to slope analysis, it was found that maximum of 64% (10 acres) of built up lies in areas with low degree of slope while 18% (2.90 acres) of built up lies in each very low and high category (Figure 46). This means there is a need for proper drainage system in order to avoid water logging. Low lying zones shown in Figure 47.

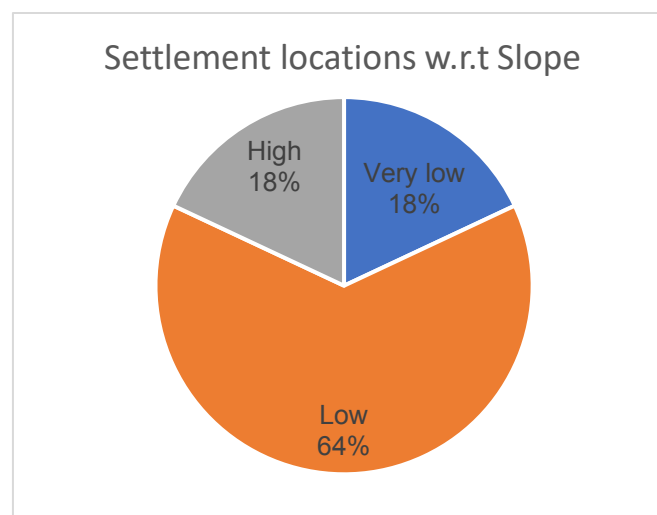


Figure 46 Percentage of settlements lying in low-lying areas.

(Source: Author)

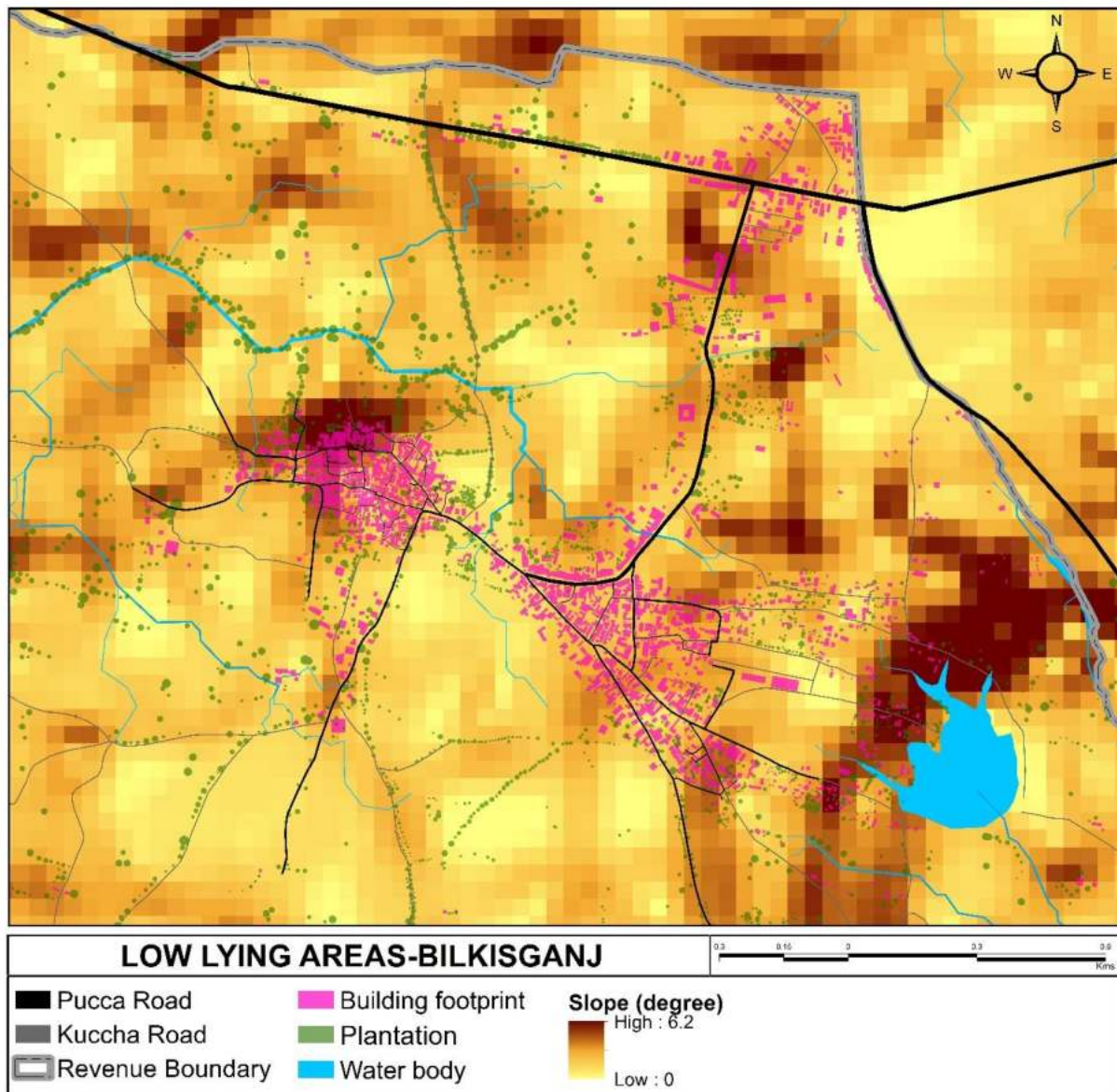


Figure 47 Settlements in Low lying areas.

(source: Google Earth 2020 elevation data)

5.5 Economy Sector

5.5.1 Agriculture and Allied Sector

The Village has availability of Agriculture Society, as mentioned in the Census 2001 and 2011, as well as Public Distribution System Shop as per census 2011. The Village holds 1-day Weekly Market since 1981 catering adjoining villages within radius of 20-25km, and is more than 10km away from nearest Mandi as per Census 2011.

The village has 836 Ha of Net Area Sown, with 86.9 % area irrigated by source (Table 17). There is an increase of 20 ha of this area from 2001 to 2011 with 55% increase in irrigated land (Figure 48). The village has separate facility of Power Supply for Agriculture Use. As per 2011

census, the first Agriculture commodity of the village is *Soyabean*, while the second is *Wheat* followed by *Chana*.

Table 17 Temporal variation in Irrigated Area.

Year	Net Area Sown (Ha)	Irrigated (Ha)	Unirrigated (Ha)	Percentage Irrigated Area (%)	Irrigated Area -Growth rate (%)
2011	836.48	726.65	109.83	86.87	113.5118
2001	816	332	484	40.69	192.8723
1991	841.41	116.89	724.52	13.89	22.55571
1981	771.39	87.44	644.56	11.34	-

Source: District Census Handbook

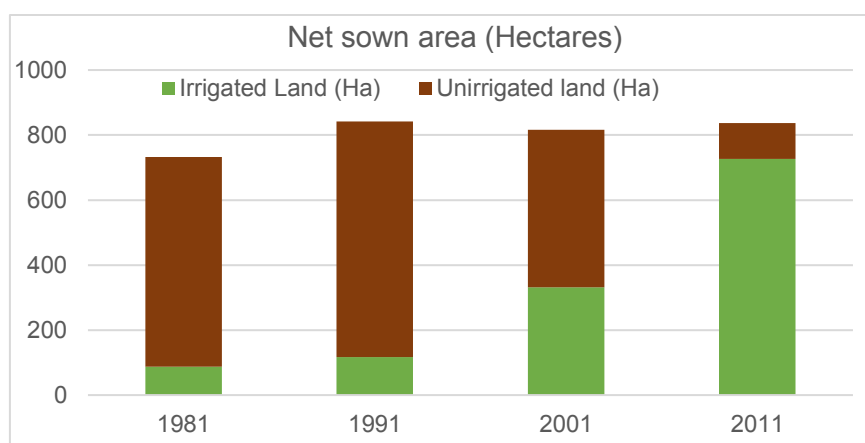


Figure 48 Temporal Net sown area in Bilkisganj village

Source: DCHB

An increase in net sown area can be seen from 1981 to 1991 and a decrease in it from 1991 in 2001. This trend reverses in Uncultivable land area where there is decrease from 1991 to 2001, an indicator of increased fertility, and 90% decrease from 1981 to 2011 (Figure 49).

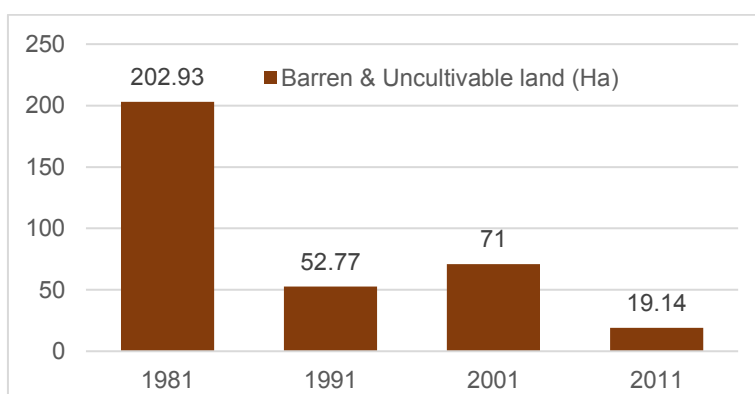


Figure 49 Temporal variation of cultivable land.

(Source: DCHB)

5.5.1.1 Cropping Pattern and Intensity

The village mainly practices double cropping system except Soyabean, which is cultivated as single crop. It is the main crop of the village sown in 90% of the cultivated area during Kharif season. Other crops sown in the same season are corn (10%) and groundnut (20%). During Rabi season, Wheat crop is cultivated in 80% of net sown area followed by *Chana* and *Masoor* (Table 18).

There is a significant change in cropping pattern of village from past four decades. Before 1980s, main crops were *Millets*, *Corn*, *Groundnut* and *Urad* with minimal quantity of *Cotton* and *Sugarcane*. But, *Urad* got completely replaced after the introduction of Soyabean in 1980. The sugarcane cultivation got affected due to shut down of Sugar mill present in the Sehore town in 2003. Moreover, the good yield of soyabean has again declined due to pests during the last decade and observed rise in cultivation of corn in the past four years.

Table 18 Types of crop sown.

Crops sown	Cultivable Land Area (Ha)
Kharif Season	
Soyabean	752.85 (90%)
Corn	83.65 (10%)
Groundnut	167.3 (20%)
Rabi Season	
Wheat	669.2 (80%)
Chana & Masoor	167.3 (20%)

(source: GP)

5.5.1.2 Productivity changes

The productivity of agriculture in the village has initially increased till 2010 as observed in census data. But the changing cropping pattern has decreased the yield of soil. Due to loss of soil quality and pests, there has been loss of nutrients too resulting in infertile land and poor crop yields as informed during stakeholder's discussion. Earlier, an acre of land used to produce 10 quintals of grains but has reduced to 6 quintals presently.

5.5.1.3 Livestock and Dairy Farming

As per gram panchayat officials, the village has a total of 3500 livestock among which Jersey cows have the highest number of 2000 followed by 1500 buffaloes (Table 19). But as per online census data, there are approximately 5000-6000 livestock in the village. There are 7 dairies (Figure 50) supplying milk to Bhopal, Sanchi dairy and other private dairies. In an interaction with stakeholders, milk production from these livestock is not less than 2000 Litre per day and contribute significantly in the village economic activities. The only need highlighted by them is to unite these dairies and provision of cold storage at village level. There is also a *Gaushala*

(Figure 51) of 100 capacity of cows providing livelihood to specially women in the form of making dung cakes out of excreta waste generated from it under National Urban Livelihood Mission.

Table 19 Livestock Population, 2020 (source: GP)

Livestock	Nos.
Buffalo	1500
Jersey Cow	2000



Figure 50 Dairy Shop.
(Source: Author)



Figure 51 Gaushala (Cowshed).
(Source: Author)

5.5.1.4 Poultry, etc.

There are six poultry farms with a total of 6000 birds, each having 1000 nos. They also contribute to economy of the village as some are sold for meat and eggs to Bhopal and in weekly markets.

5.5.2 Industrial Sector

Currently, some of the village residents practice the idol making (Figure 52), pottery, manufacturing of *Lac bangles*, *Papad* and *Achaar* to be sold in weekly markets and in Fairs. Apart from these household industries, however, one of the healthcare factories, '*Inline Medicare Factory*' manufacturing equipment for healthcare facilities, is also coming up within the village in next two months.



Figure 52 Idols made by Village residents.

(source: Author)

5.5.3 Tertiary Sector

5.5.3.1 Banking

The village avail all the infrastructure facilities viz. ATM, Cooperative and Commercial banks related to banking sector. Table 20 enlists status of such banking facilities.

Table 20 Availability of Bank & Credit Societies in Village

BANKS & CREDIT SOCIETIES	
ATM (Status)	Available
Commercial Bank (Status)	Available
Cooperative Bank (Status)	Available
Agricultural Credit Societies (Status)	Available
Self Help Group (Status)	Available
Public Distribution System (PDS) Shop (Status)	Available
Agricultural Marketing Society (Status)	Available

(Source: DCHB)

5.5.3.2 Co-operative Federations

There is a Service Cooperative Society (*Sewa Sahkari Samiti*) providing seeds, cash/loan for purchasing fertilizers and also runs five ration shops within the village.

5.5.3.3 Shops and Establishments

There are approximately 250 shops present within the settlement. Maximum shops are located along the road connecting to Sehore-Bhopal Road. The village hosts almost every kind of shop establishments from wholesale, jewellers to agricultural equipment. Figure 53 shows transection of the commercial road.



Figure 53 Shops along Market road.

(Source: Author)

5.5.3.4 Special Weekly Markets and its reach

The village holds weekly market every Sunday attracting visitors from adjoining villages present within the radius of 20-25 km.

5.6 Infrastructure

The different types of infrastructure facilities-Physical, Social & Economic, available in Bilkisganj village are shown in Figure 54.

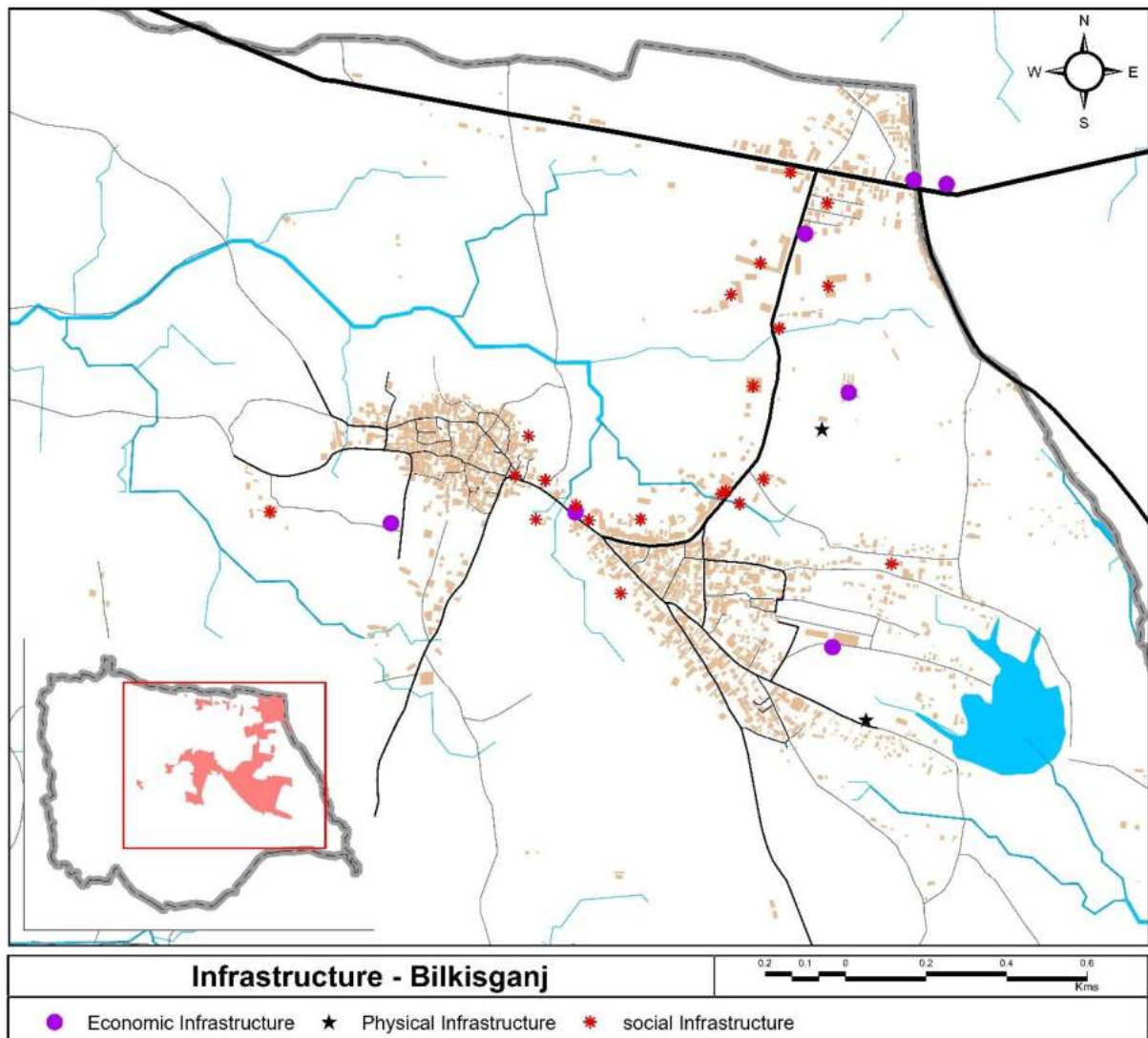


Figure 54 Spatial locations of Infrastructure within village

(source: Google Earth & Primary Survey:2020)

5.6.1 Economy related Infrastructure

5.6.1.1 Market Yards and linkages

There is a market yard, *Galla Mandi* in the village, also serving neighboring villages. It is mainly operational during months of April-May at the time of wheat and Chana harvest and in October-November. The onion and garlic farming of the village is mainly sold in Bhopal followed by Sehore.



Figure 55 Discussion with stakeholder outside Galla Mandi.

Source: Author

5.6.1.2 Irrigation network and other sources for agriculture

The village has 836.48 hectares of Net Sown area out of which 86% of area is irrigated by source whereas 14% is unirrigated land Table 21. Groundwater is the only source of irrigation in the village. The total irrigated land area is irrigated using tubewells and wells.

Table 21 Details of Irrigated Area.

Net Area Sown (in Hectares)	836.48
Total Unirrigated Land Area (in Hectares)	109.83
Area Irrigated by Source (in Hectares)	726.65

(Source: Author)

5.6.2 Social Infrastructure

5.6.2.1 Educational Services

Bilkisganj village has all educational facilities from Pre-primary school till Senior Secondary school. There are six primary schools, 12 Middle school, 2 Secondary school and Senior

secondary school. The higher education facilities are located beyond 10 kms from the village. The village also avail coaching facility for girls as per stakeholder discussion.

Table 22 Education Services in Bilkisganj.

Pre - Primary School	6
Primary School	12
Middle School	8
Secondary School	2
Senior Secondary School	2
Degree School	>10 Km
Engineering Colleges	>10 Km
Medical college	>10 Km
Management Institute	>10 Km
Polytechnic (Pt)	>10 Km
Vocational Training School/ITI	>10 Km
Non-Formal Training Centre	>10 Km
Special School for Disabled	>10 Km
Others	>10 Km

(Source: DCHB)

5.6.2.2 Health Services

Bilkisganj village has all health infrastructure-Community health centre, Primary health centre, Maternity and child welfare centre, T.B. clinic and Family welfare centre except Primary Health Sub Centre and hospitals which are located 10 Kms away from the village (Table 23). There is even a morgue, which facilitates even adjoining villages as informed during interaction with locals and stakeholders.

Table 23 Available Health facilities.

Medical Amenities	Community health centre (CHC)	1
	Primary health centre (PHC)	1
	Primary health sub centre (PHS)	NA
	Maternity and child welfare centre (MCW)	1
	T.B. clinic (TBC)	1
	Hospital-allopathic (HA)	>10 km
	Hospital-alternative medicine (HO)	>10 km
	Dispensary (D)	NA

	Veterinary hospital (VH)	1
	Mobile health clinic (MHC)	>10 km
	Family welfare centre (FWC)	1
Non-Government Medical facilities	Charitable non-Govt. hospital/Nursing home.	0
	Medical practitioner with MBBS Degree	0
	Medical practitioner with other degree	2
	Medical practitioner with no degree	0
	Traditional practitioner and faith healer	5
	Medicine Shop	0

(Source: DCHB, 2011)

5.6.2.3 Physical Infrastructure

5.6.2.3.1 Regional Linkages

Bilkisganj Gram panchayat is linked with two urban centres-Bhopal (towards East) and Sehore (towards West) via Sehore-Bhopal Road located 28 kms and 22 kms away from it. One 4 lane highway is also proposed to be built along this village connecting Bhopal to Indore via Sehore and Dewas by government. The village has good connectivity with neighboring urban and rural areas (Table 24).

5.6.2.3.2 Road network within the Village

All the roads within the settlement and Major Roads are Pucca (Table 24). It is covered with 52% of Kuccha roads and 48% of Pucca roads (Figure 56).

Table 24 Connectivity in Bilkisganj

Roads	National Highway (Status)	>10 Km
	State Highway (Status)	>10 Km
	Major District Road (Status)	Available
	Other District Road (Status)	Available
	Black Topped (pucca) Road (Status)	Available
	Gravel (Kuccha) Roads (Status)	Available
	Water Bounded Macadam (Status)	Available
	All Weather Road (Status)	Available
	Navigable Waterways (River/Canal) (Status)	NA

(Source: DCHB, 2011)

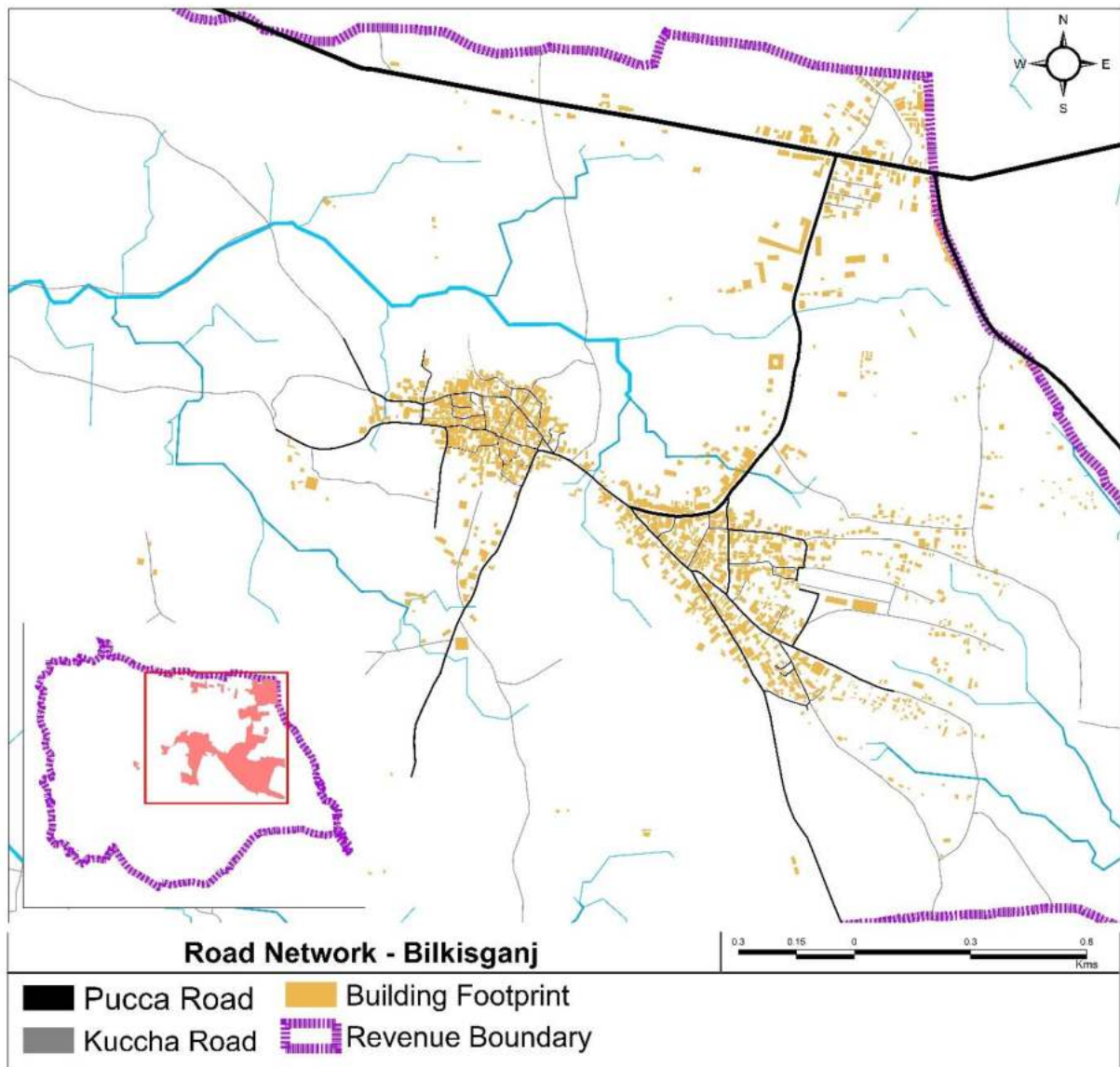


Figure 56 Road Network within settlements.

(Source: Drone Survey, 2020)

5.6.2.3.3 Travel Behavior from and to GP

Most of the people own private vehicles. There is also public bus facility available four times a day connecting Sehore to Bhopal via Bilkisganj.

5.6.2.3.4 Transport network and vehicle ownership in GP

The village is connected with nearby two urban centres present in East and West direction through Major road. Presence of good transport network has resulted in the dependency of neighboring villages on Bilkisganj. However, only railway station and auto facility is located more than 10 kms from the village (Table 25).

The maximum of 92% village population owns two-wheelers while only 5% of residents have 4 Wheelers. About 3% of people also owns tractor which is mainly used in transporting commodities.

Table 25 Mode of transport as per census 2011.

Mode of transport	Public Bus Service (Status)	Available
	Private Bus Service (Status)	Available
	Railway Station (Status)	> 10 Kms
	Auto/Modified Autos (Status)	> 10 Kms
	Taxi (Status) & Vans (Status)	Available
	Tractors (Status)	Available
	Cycle-pulled Rickshaws (manual driven) (Status)	Available
	Cycle-pulled Rickshaws (machine driven) (Status)	Available
	Carts Driven by Animals (Status)	5-10 Kms
	Sea/River/Ferry Service (Status)	> 10 Kms
	Footpath (Status)	Available

(Source: DCHB, 2020)

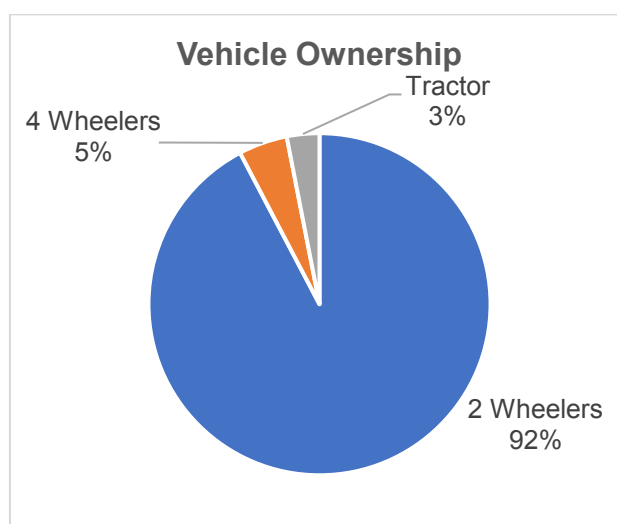


Figure 57 Vehicle Ownership in Village

(Source: Primary survey, 2020)

5.6.2.4 Environmental Services

5.6.2.4.1 Water Resources and Water Supply

Village has wells, handpump, tap water and tube wells/borewells as the available sources of water (Table 26). As per census 2011, there is minimal variation in the use of these available

water sources. The maximum of 23% of village population use unimproved source of water i.e., uncovered well for drinking purposes followed by 22% of tap water from untreated source. There is only 54% availability of water within the premise (Figure 58).

As per interaction with locals and stakeholders, it was brought to the notice about acute shortages of water prevailing there. People have to visit nearby premises to fetch water from uncovered wells (Figure 59). Apparently, these wells run dry during the month of February and March creating water crisis. Such situation was even observed during site visit in the month of August where women were storing water in Cans either from private water tankers or from nearby premises. The village needs to tap different water sources to mitigate this water shortages.

Table 26 Available Water Resources.

Tap Water			NA
Well	Covered Well	Covered Well (Status)	Available
	Uncovered Well	Uncovered Well (Status)	Available
Hand Pump		Hand Pump (Status)	Available
Tube Wells/ Bore Wells		Tube Wells/ Bore Wells (Status)	Available
Springs		Springs (Status)	NA
River/Canals		Rivers/Canals (Status)	NA
Tanks/Pond/Lake		Tanks/Pond/Lake (Status)	Available

(Source: DCHB, 2011)

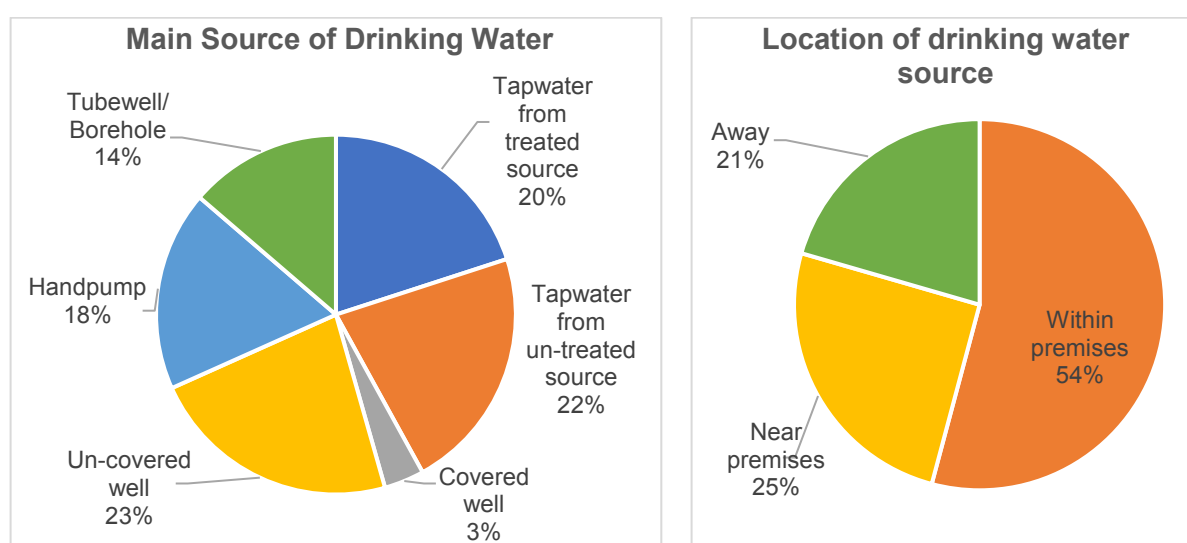


Figure 58 Sources of drinking Water.
(Source: Census of India, 2011)



Figure 59 Interaction with locals about water scarcity

(Source: Author)

5.6.2.4.2 Solid Waste Management

As per census 2011 and our primary survey, Bilkisganj village do not have solid waste management system (Table 27). The drains were found to be clogged with solid waste during site visit (Figure 60). However, recently the gram panchayat collaborated with Pune-based consultants 'Greeny the Great', with efforts of Chief Minister to make the village green and waste-free. The amount of waste generated from different sources is enlisted in Table 28. As a pilot survey, the village has already proposed Composting site using Bio-culture technology for solid waste management initiating with IEC & BCC¹ activities and door to door collection.

Table 27 Available Sanitation facilities

Sanitation	Community Toilet Complex (including Bath) for General Public (Status)	NA
	Community Toilet Complex (excluding Bath) for General Public (Status)	NA
	Rural Production mart or Sanitary hardware outlet availability near the village (Status)	NA

¹ IEC- Information, Education & Communication and BCC- Behavioural Change Communication

Disposal	Community waste disposal system after house-to-house collection (Status)	NA
	Community Bio-gas or recycle of waste for production use (Status)	NA
	No System (Garbage on road/street) (Status)	Available

(Source: DCHB, 2011)

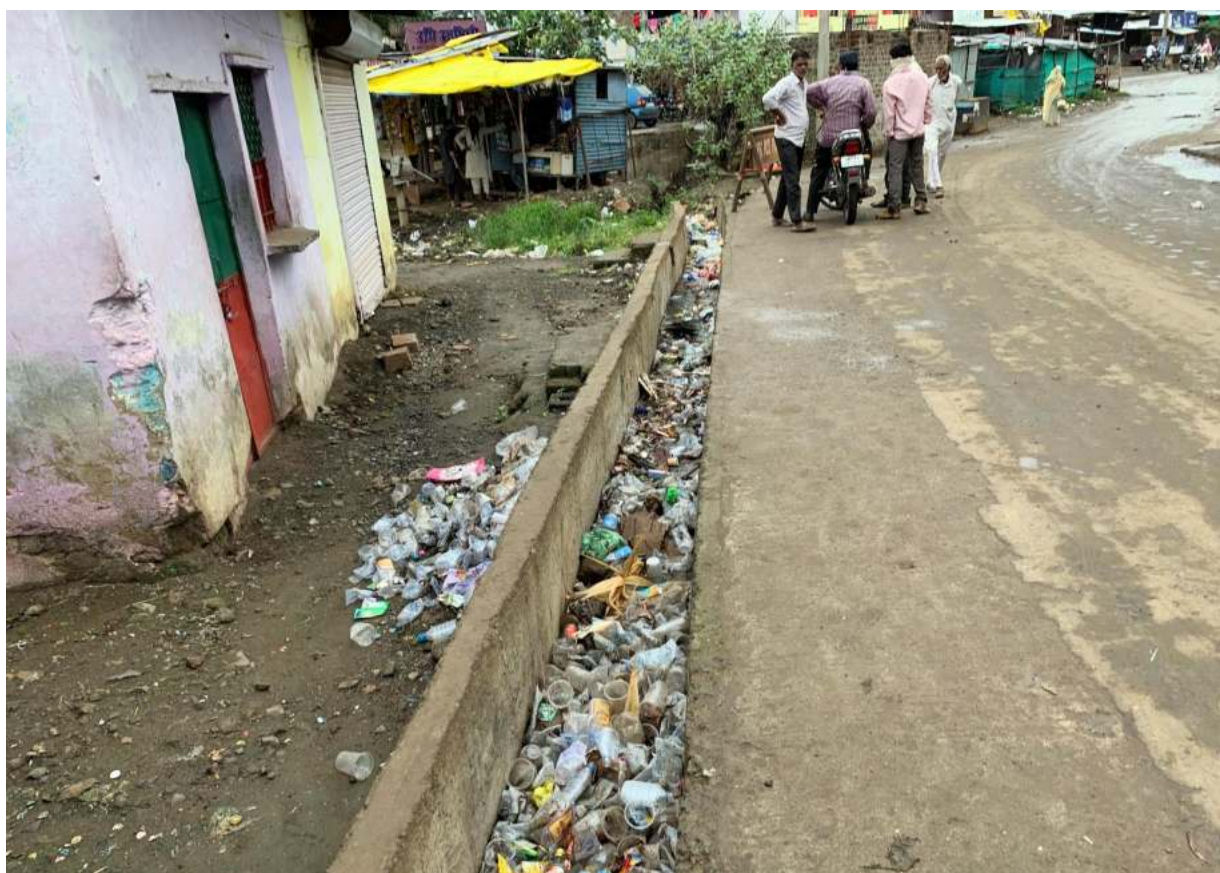


Figure 60 Drain clogged with Solid Waste.

(Source: Author)

Table 28 Quantity of Solid Waste in Bilkisganj.

Sources of Waste generation	Amount of Wet Waste (Kg/day)	Amount of Dry Waste (Kg/day)
Houses	750-1000	300-450
Shops	-	75-100
Government Offices	6-8	4-5
Temple	5-7	2-3
Other	760-1000	400-500

(Source: Gram panchayat)

About 54% of the village has flush/pour flush latrine which is connected to 90% of septic tank and 10% of piped sewer system. This provides an opportunity to convert existing septic tank into sewer system in future for improved sanitation.

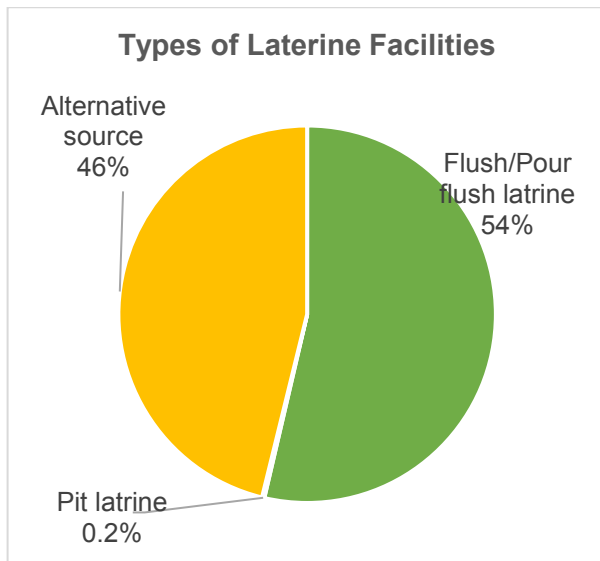


Figure 61 Types of Latrine facilities.
(Source: DCHB, 2011)

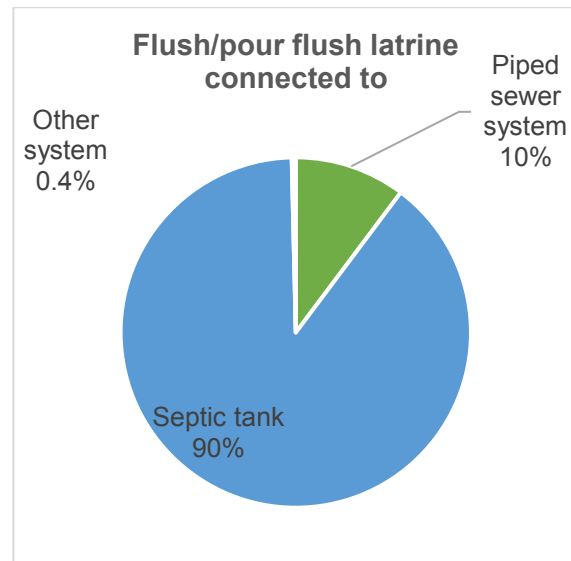


Figure 62 Type of Sewage disposal used.
(source: DCHB, 2011)

5.6.2.4.3 Liquid Waste Management

The village lacks liquid waste management system. But there is a potential for liquid waste management system as the treated water can be put to agriculture use.

5.6.2.4.4 Drainage

There are 57% of households with connection to open drains while only 6% have closed drainage system. About 37% of households do not have any connection to drainage system (Figure 63). This results in unhygienic locality and Clogging of drains as noted during primary survey.

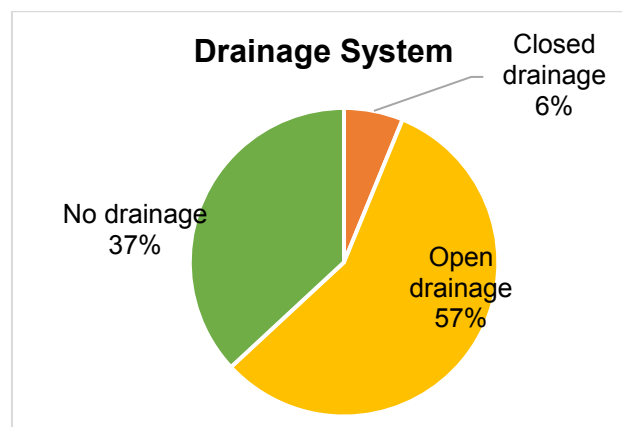


Figure 63 Drainage system.
(Source: DCHB, 2011)



Figure 64 Presence of Open drain on both sides of road within *Abadi* area.

(Source: Author)



Figure 65 Open drain on one side.

(Source: Author)

5.7 Peoples' Perception

Based on the interaction with stakeholders, locals and primary survey, the findings from their perception can be summarized into-

5.7.1 Infrastructure

5.7.1.1 Transportation

- Many people talked about congestion of road along the main road. It requires decongestion with widening of road.
- Connectivity to Mandi is congesting.

5.7.1.2 Water Resource

- Women collecting water have specifically expressed their concern for lack of drinking water sources within the village.
- There is supply of treated water but is limited.
- Drinking water dependency on ground water without bill.

5.7.1.3 Social Infrastructure

- There is no provision for liquid waste water management within the village.
- There are good healthcare facilities.

5.7.2 Economy

- Milk exported to Bhopal and Sanchi dairy along with other private dairies. Around 2000 litres of milk is produced every day which can be united through one single dairy plant at village level.
- It is evident that most people prefer to live within the village.
- There is no cheap labour for MNREGA.
- Women are empowered and willing to work.
- People are involved in agriculture and fishing.
- Small fraction of people is involved in Household industries like manufacturing of lac bangles, Pot making, etc.

5.7.3 Education

- Many people said about promotion of girl education and provision of coaching facilities.

5.7.4 Social & Cultural Harmony

- People have sense of shared responsibility.

5.8 Inferences from Stakeholders' Discussion

The comprehensive interaction with stakeholders helped to identify concerns, potential and opportunities available in the village for its spatial development which are listed in Table 29

Table 29 Identified Concerns, Potential and Opportunities from Stakeholders' discussions.

CONCERNS	POTENTIAL	OPPORTUNITIES
Congestion along main road	Better agricultural produce by provision road for accessibility to farms	Consistent efforts by Panchayat for Village development
Lack of Water Resources for drinking purposes	Training/ Vocational center to develop skill set of youth	People involvement in Public sector.
Lack of Liquid Waste Management (Open drains)	Women Entrepreneurship	Food processing and dairy farming
Depleting groundwater (The level has gone down from 40' to 400')	Recreational facilities such as play area and park	Scope for Pisciculture
Lack of green spaces within the <i>Abadi</i> area	Waste Water recycling and use in Agriculture	Scope for Household Industries
		Agro-based economy

(Source: Qualitative survey)

6 Spatial Development of Bilkisganj Gram Panchayat

6.1 Vision

The formulated vision for spatial development plan of Bilkisganj Gram Panchayat is to make *Growth center of the region with sustainable built-environment through economy and infrastructure.*

6.1.1 Short term Vision- By 2030

The short-term goal for Bilkisganj Gram Panchayat Spatial Development Plan is to improve connectivity within the settlement with decongestion, provide Affordable Low-cost Housing with less waste produce and more Recycle and Re-Use by 2030, Self-sustaining Solar powered Infrastructures, use of renewable energy source, strengthen Women Entrepreneurship, Upliftment of Skills, and to make Natural features and Green spaces an opportunity to harvest Rainwater and to achieve Zero waste with people's participation.

6.1.2 Future Vision – Beyond 10 Years

Bilkisganj is expected to be growth-centre of the region due to development that is emerging in the area as a result of special attention by the government. Even other village of gram panchayat, Gadiya village having 21 households (Census, 2011), will merge with Bilkisganj as the existing residents have already started shifting their residence to the village. Considering the development and our proposed infrastructure services, the gram panchayat shall offer first order services (Figure 66). This will empower Bilkisganj to move into the status of Nagar Panchayat.

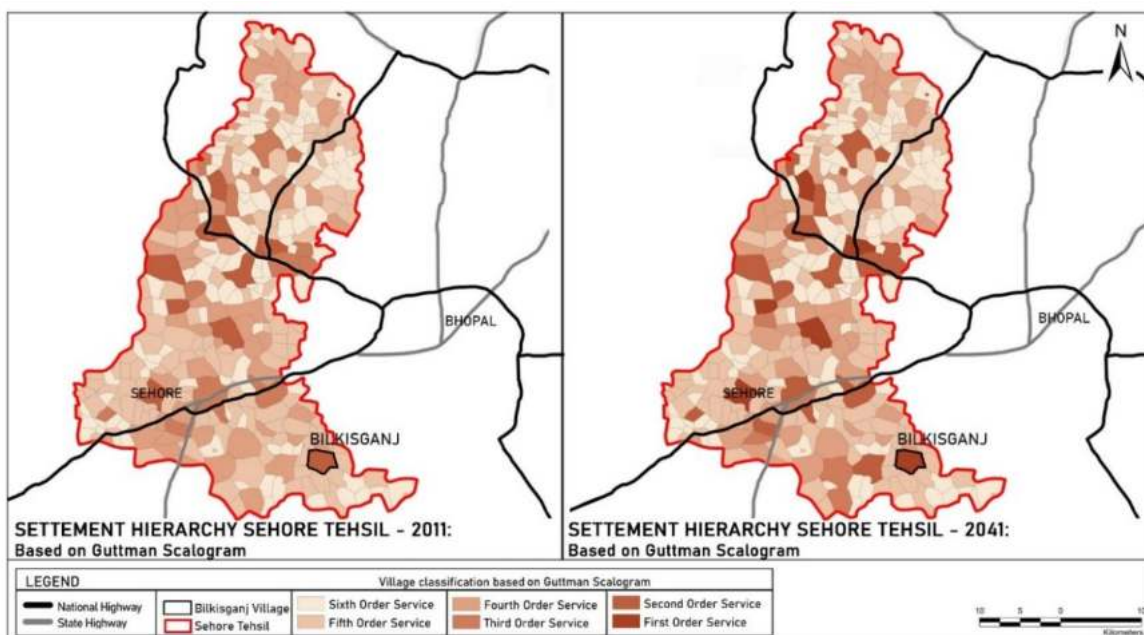


Figure 66 Scalogram position of Bilkisganj in 2041.

Source: Author

6.2 Projection & Future Spatial Development

6.2.1 Population

The Bilkisganj village population is projected till 2050 using Induced Population Projection method. The existing population has already reached beyond the upper limit of rural area definition and has potential of becoming a census town. It shows the growth of population reaching to 18000 by 2050 (Figure 67) hence, transformation to more urban characteristic.

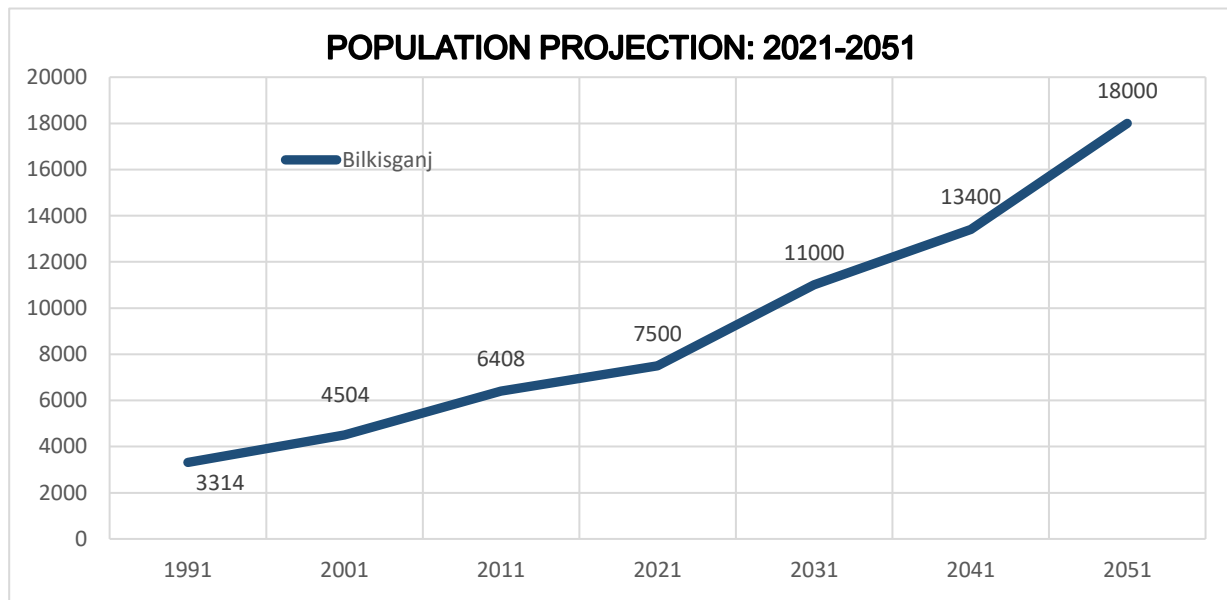


Figure 67 Population Projection till 2050.

(Source: Author)

6.2.2 Land Capability and where to locate?

The land capability of Bilkisganj for its anticipated spatial growth is identified using Land suitability assessment. The selection of suitable land is based upon the process of understanding existing quality and factors of land, which determine the activities of particular land. The characteristics of a land depends upon the relationship of various factors, like location of available sites, extent of the land, road accessibility, ownership etc., and site associated factors like slope.

The appropriate base data required for suitability analysis was gathered from satellite data, thematic maps, field data and topographic data. The weighted overlay technique, a weighting and scoring method, has been used and applied to the various aspects of suitability. Suitable sites are identified by overlaying all the layers which influence suitability assessment.

Following parameters have been considered for the suitability analysis.

- i. **Existing land use:** Land use land cover with six-fold classification of Agriculture, Rural Built-up, waste land, water bodies, Fellow Land and Hamlet's (Figure 68). This map

has been extracted from Bhuvan portal. Table 30 highlights the weightage assigned to each of the land use as per their significance for assessing land suitability.

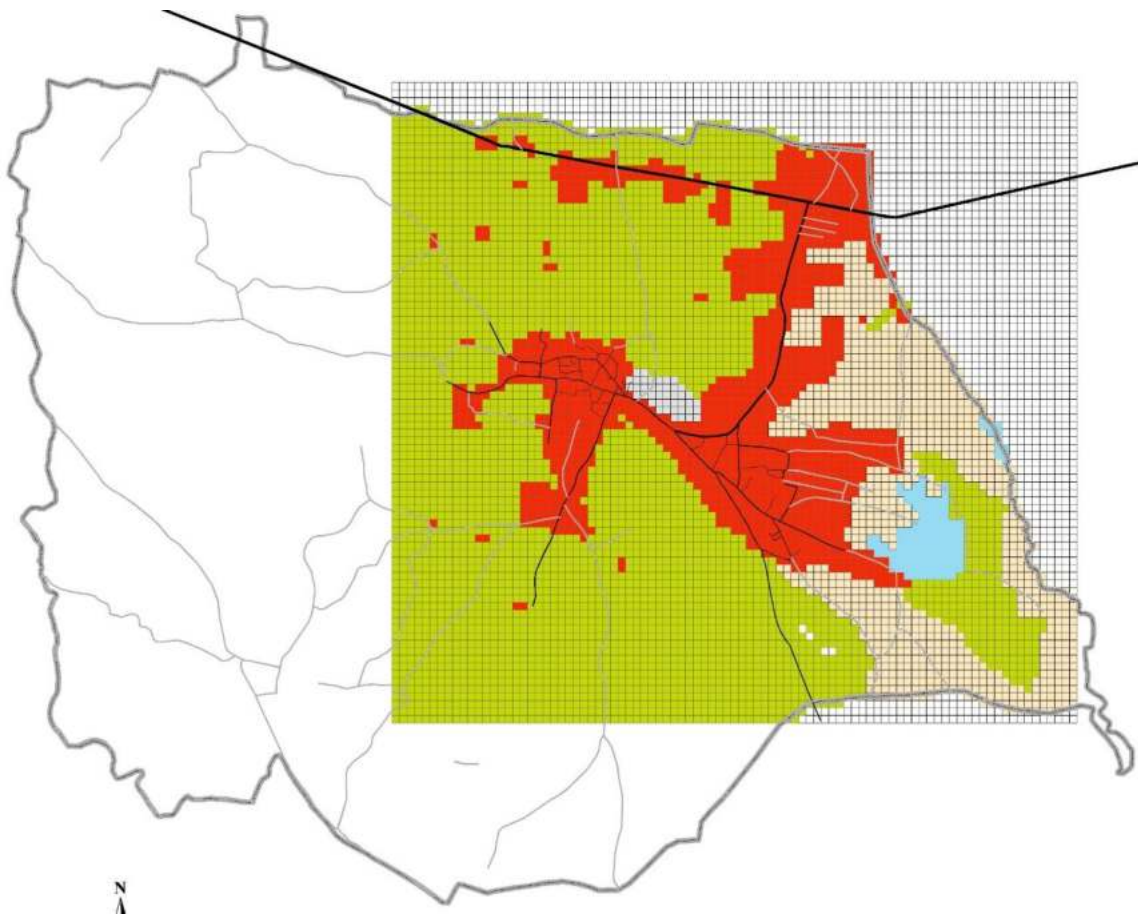


Figure 68 Pixel-based Land Use for Land Suitability Assessment. (Data source: BUVAN portal)

Table 30 Weightage given to each Land use for the Land Suitability Assessment.

Layer	Influence %	Field	Scale	Suitability	Area (in Acres)
LULC	16	scrub land	9	High	212
		Agriculture	1	Very Low	2066
		Settlement	1	Low	225
		Lakes/Ponds	0	Restricted	16

- ii. **Land ownership:** Government and private land has been spatially mapped (Figure 69) using Land records web site MP BhuLekh and validated by Field data. The weightage assigned is given in Table 31.

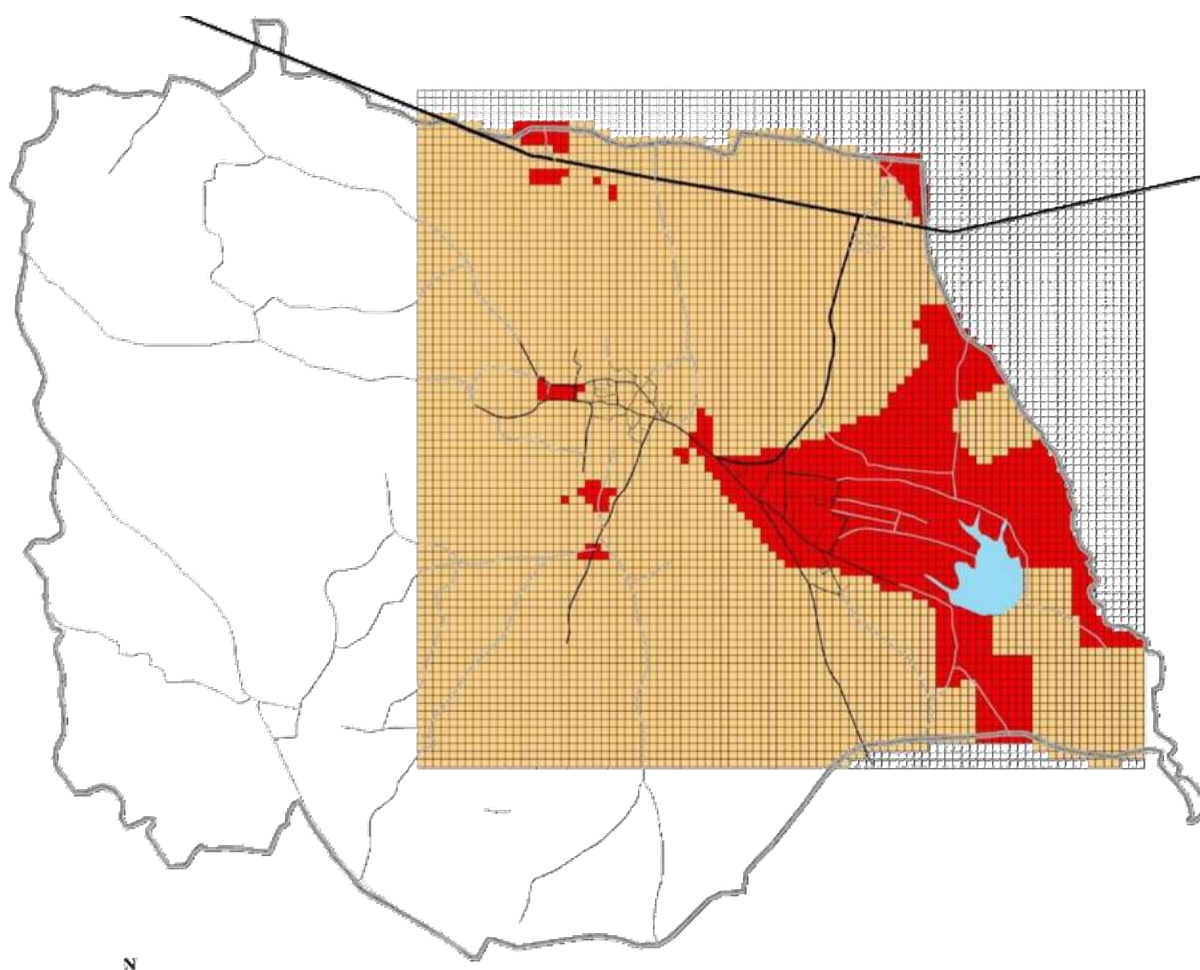


Figure 69 Pixel-based Land Ownership for analysis.

Table 31 Weightage given to each type of Land ownership for the Land Suitability Assessment.

Layer	% Influence	Field	Scale value	Suitability	Area (in Acres)
Landownership	16	Private	0	Restricted	922.71
		Government	9	High	358.27

- iii. **Natural Buffers:** All the Natural Features which includes Forest, water Bodies and Natural Streams are considered with buffer of 30m (Figure 70) for Highest order streams (riparian restricted and management guidelines). Weightages are assigned as given in the Table 32.

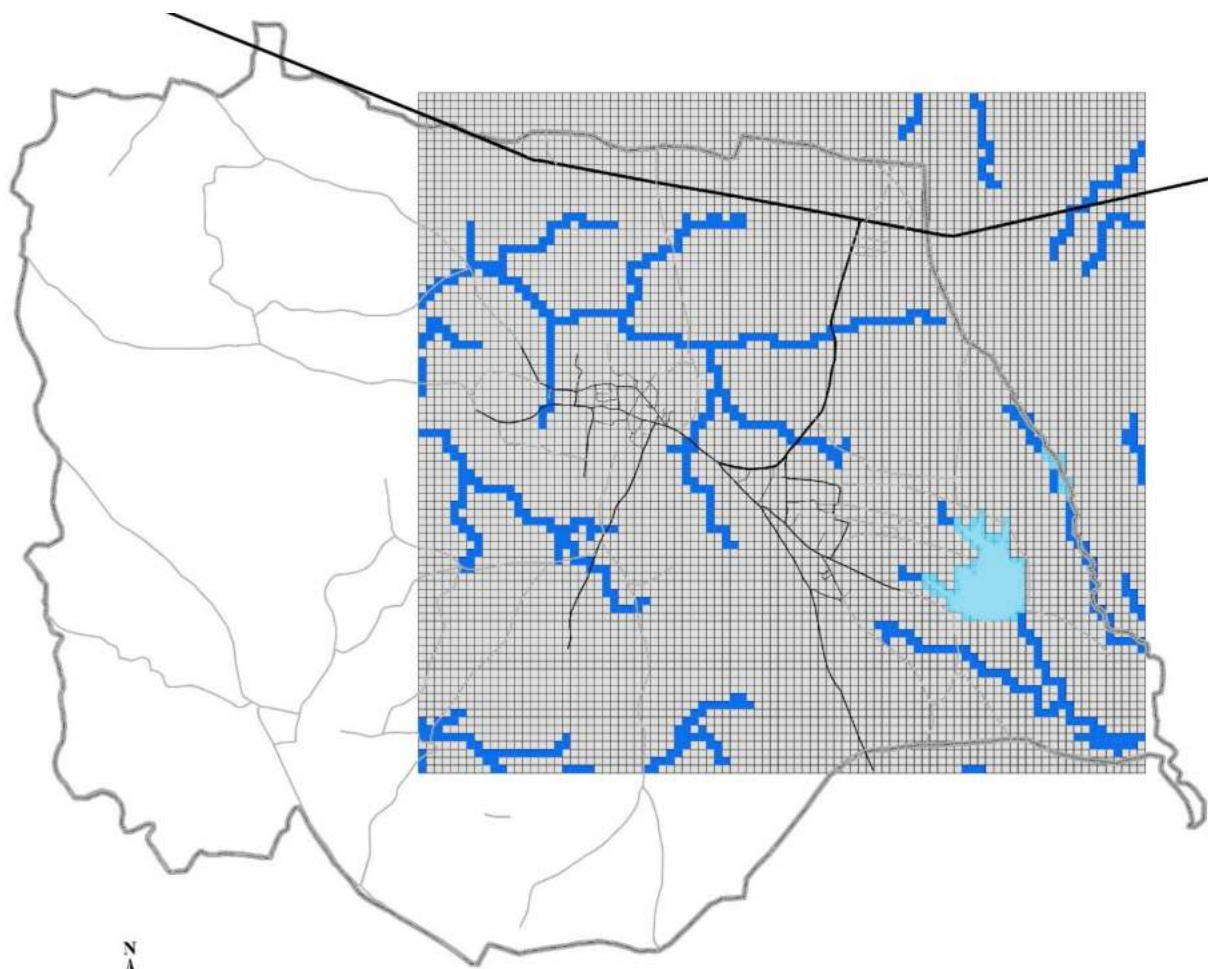


Figure 70 Pixel-based Natural Buffers for GIS based analysis.

Table 32 Weightage for Natural feature layer for Land Suitability Assessment.

Layer	% Influence	Field	Scale	Suitability	Area
Natural Features	16	Stream	0	Restricted	136.55
		water Body	0	Restricted	29.8
		Other Area	9	High	1114.64

- iv. **Road Accessibility:** To identify the accessibility towards the proposed Landuse, road type is classified into two types pucca which is considered as Highly accessible and kuccha as low accessible as shown in Figure 71. Weightages assigned for land suitability is given in Table 33.



Figure 71 Pixel based map of Road Accessibility for Analysis.

Table 33 Weightage for Road Accessibility layer for Land Suitability Assessment.

Layer	% Influence	Field	Scale	Suitability	Area
Road	16	More Accessibility	9	High	75
		Less Accessibility	5		138
		Very Less Accessibility	0	Restricted	1067.27

- v. **Slope:** Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER-DEM) is used to generate Elevation model and classified into five categories (Figure 72), where moderate slope lands are considered as suitable lands (Table 34).

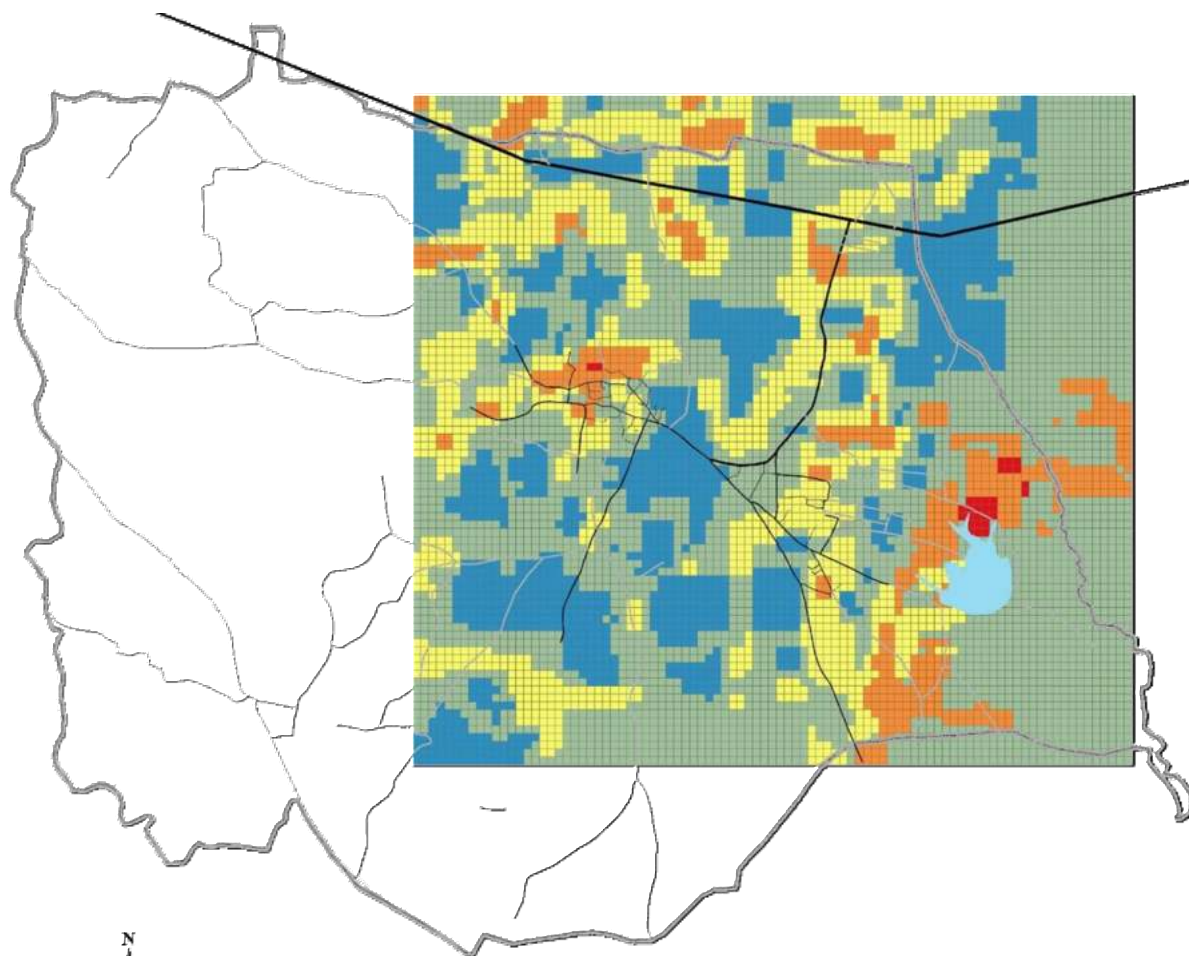


Figure 72 Pixel based Slope for Land Suitability Assessment.

Table 34 Weightage for Slope layer for Land Suitability Assessment.

Layer	% Influence	Field	Scale value	Suitability	Area (in Acres)
Slope	16	Very Low	0	Restricted	168
		Low	5	Very Low	415
		Moderate	9	High	459
		High	3		226
		Very High	1	Very Low	10.89

- vi. **Growth direction:** Spatial growth extent is projected based on Shannon's entropy method (Figure 73). In this method based on the past trends of growth pattern and other

factors are considered to project the growth. Table 35 highlights the weightages assigned for computing land suitability.

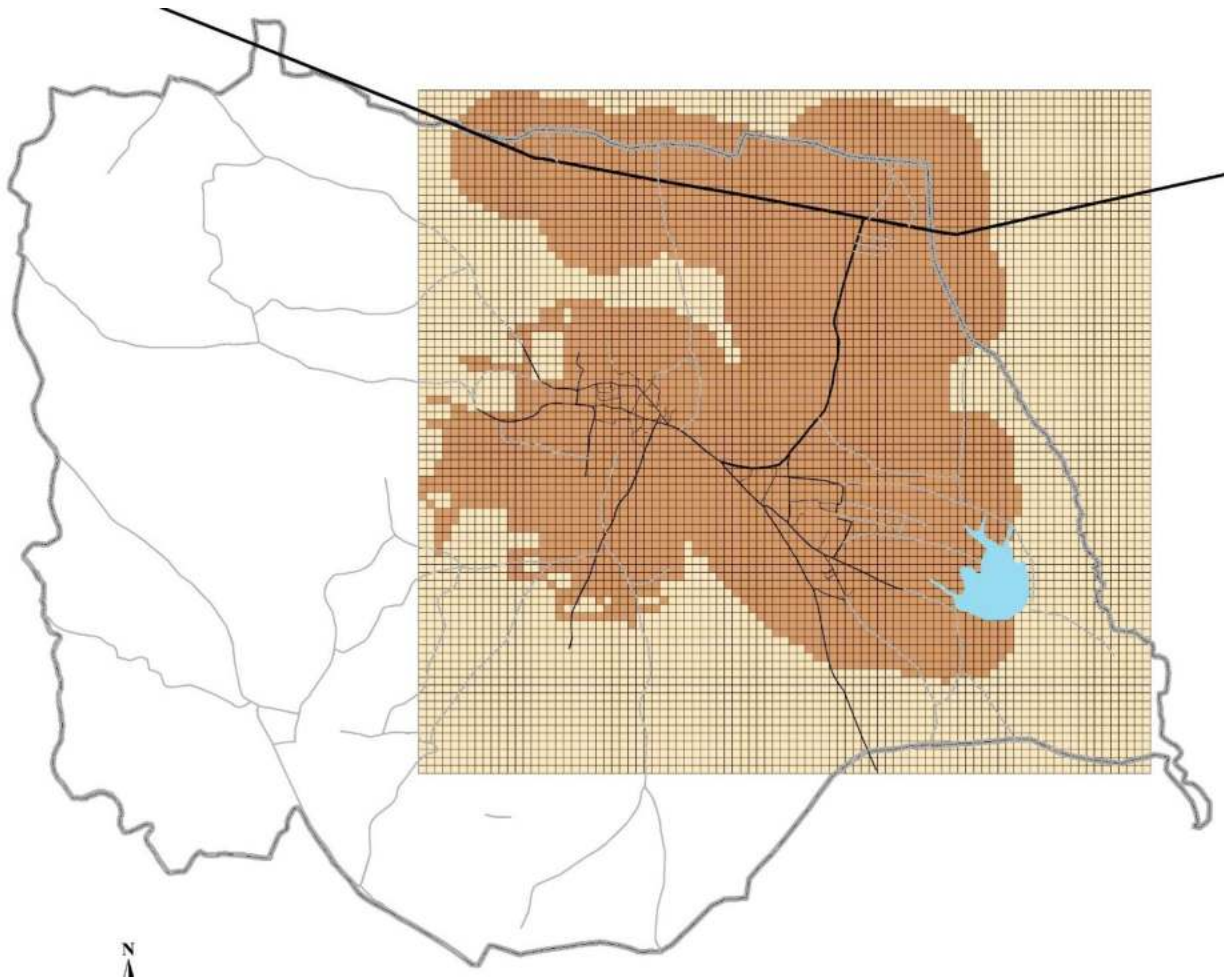


Figure 73 Pixel based spatial growth extent for Land Suitability Assessment.

Table 35 Weightage for Spatial extent layer for Land Suitability Assessment.

Layer	% Influence	Field	Scale value	Suitability	Area (in Acres)
spatial Extent	16	Projected	9	High	429
		Other Area	0	Restricted	851

6.2.3 Land use Projections

A total of 58 acres of land is found to be suitable towards South-East of the *Abadi* area as shown in Figure 74 for future spatial growth based on Land suitability assessment.

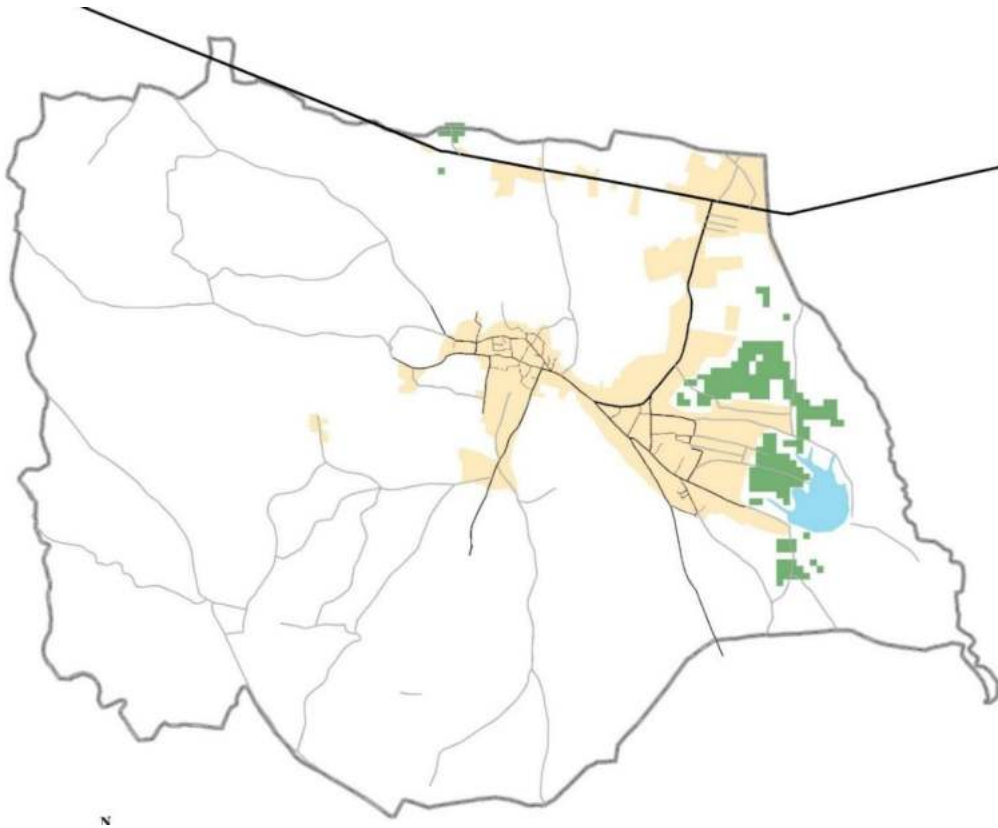


Figure 74 Suitable Land as per Land Suitability Assessment.

(Source: Author)

6.2.4 Housing

The housing requirement is calculated based on projected population. There is a need of 2150 households to accommodate the population of 14000 by 2050 (Figure 75). The total housing requirement till 2050 is 24.15 ha (60 acres) as calculated based on 75 sq.m. per household area from RADPFI guidelines.

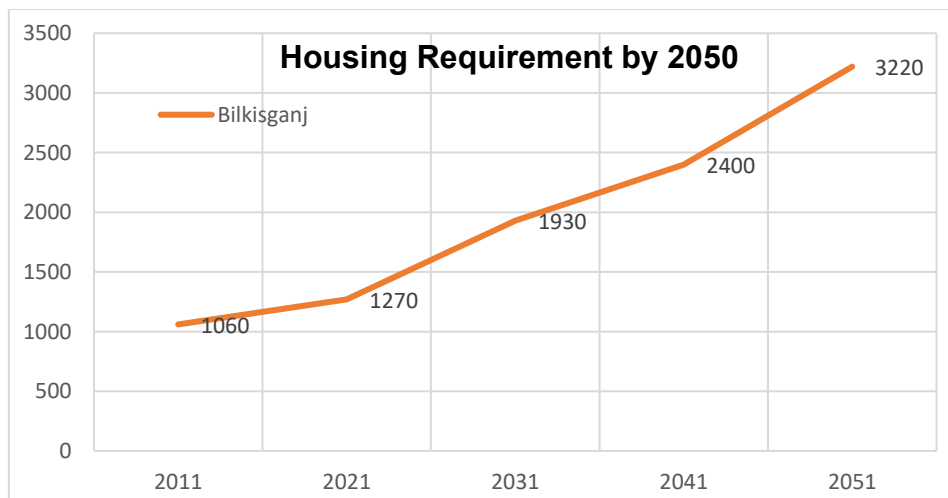


Figure 75 Projected Housing Requirement till 2051.

(Source: Author)

6.2.5 Proposed Land Use Zones for Spatial Development of Bilkisganj

With the help of technology, people participation and stakeholder's discussion, the land use zones for anticipated spatial development of Bilkisganj Gram Panchayat are allocated and shown in Figure 76. The proposed land use category includes 75% Commercial, 5.5% Residential, 4% Industrial, 4.5% Mixed, 6% Public & Semi-public and 4% Green space.

Table 36 Proposed Land Use Category with area.

S.No.	Land Use category	Existing Area (Ha)	Proposed Area (Ha)
1.	Commercial	14.91	70.75
2.	Residential	63.5	5.26
3.	Industrial	-	3.70
4.	Mixed	2.6	4.30
5.	Green Space	-	3.94
6.	Public & Semi-Public	14.4	5.6

(Source: Author)

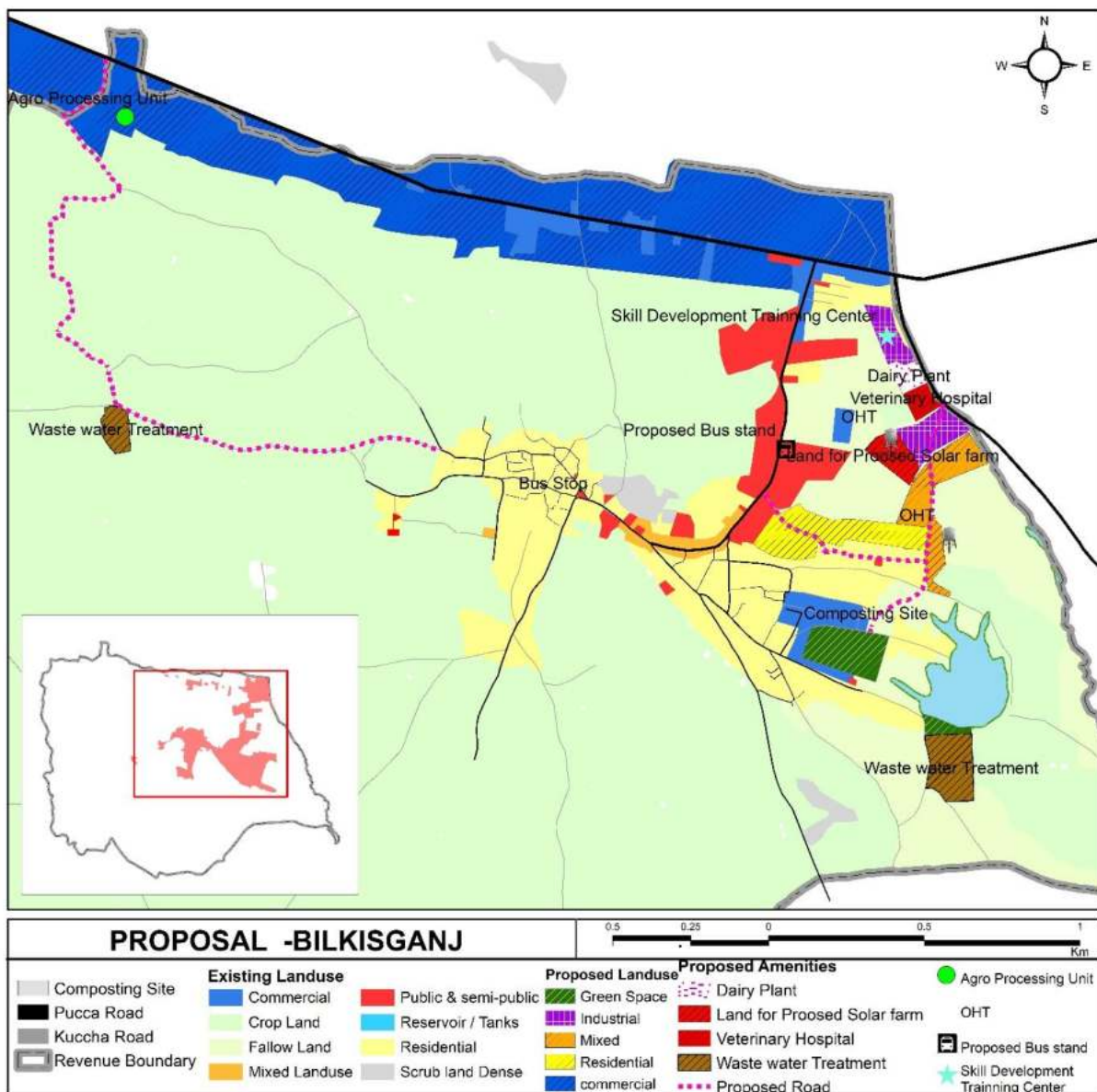


Figure 76 Proposed Spatial Development Plan.

(Source: Author)

6.2.6 Proposed Interventions

The spatial interventions for anticipated population growth are proposed based on the interaction with stakeholders, locals, spatial analysis, and, visioning technique. The details of each interventions are explained further. All of them are proposed phase-wise; spatial allocation of which is represented in Figure 77, Figure 78, and Figure 79. The vision till 2030 have been presented in two phases as detailed out as in Annexure 4 and also presented here in Figure 80.

6.2.6.1 Road Network within Gram Panchayat

The spatial organization of the existing settlement and width of roads lead to congestion in *Abadi* area, especially along market road. Moreover, connectivity to *Galla Mandi* also passes through congested settlement. Therefore, it is proposed to increase width of existing 6m wide Market road to 12m to ease out the commercial load as well as a new road of 1.5km is proposed connecting Kolar Road to *Galla Mandi* from periphery of gram panchayat towards East. The Market road shall have smart street light and plantation for walkability. Another road of 2.5km is proposed towards West of gram panchayat connecting Sehore-Bhopal Road to oldest settlements to provide access to the Waste Water treatment site as well as alternate route to main road for residence. Similarly, access to proposed residential land use with connectivity to market road is provided through 600m long road. The proposed road network in phase-wise manner is shown in Figure 77.

6.2.6.2 Infrastructure facilities

The proposed infrastructure includes Solar Farm, Dairy Plant and Processing unit, Veterinary Hospital, Skill Development Centre, Agro-Processing Unit, Bust stop and relocation of bus stand. Because of congestion in existing *Abadi* area, the bus stand has been relocated along market road and a new bus stop is proposed next to Panchayat office. Phase-wise implementation of these infrastructure facilities are shown in Figure 77. The land for Solar farm has been proposed keeping mind existing 500kW power consumption including street light and future requirement.

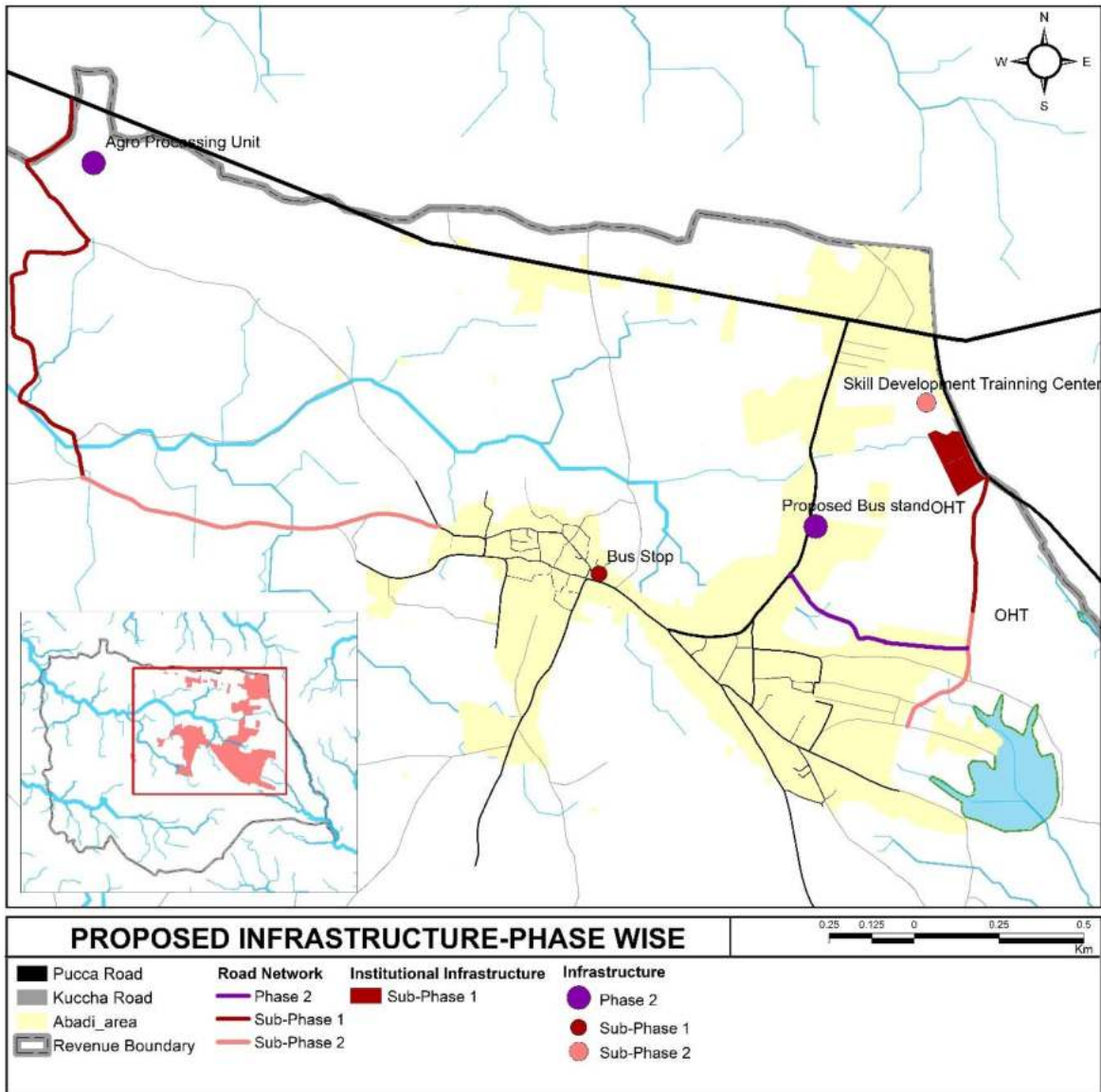


Figure 77 Phase-wise spatial representation of Proposed Infrastructure.

6.2.6.3 Potential Water sources

There is severe water crisis in Bilkisganj village, especially during summer season. The village lack sources of drinking water and require alternate sources to meet the demand. The water demand shall reach 1.89 MLD by 2050 as per projected population. Therefore, it is proposed to increase quantity of OHTs through engineering design, Construction of pond as per natural drainage system connecting new with older one and Water supply from Kolar reservoir through lift irrigation. The pond is proposed outside the panchayat boundary since there is no space in existing settlements and has natural slope (Figure 78).

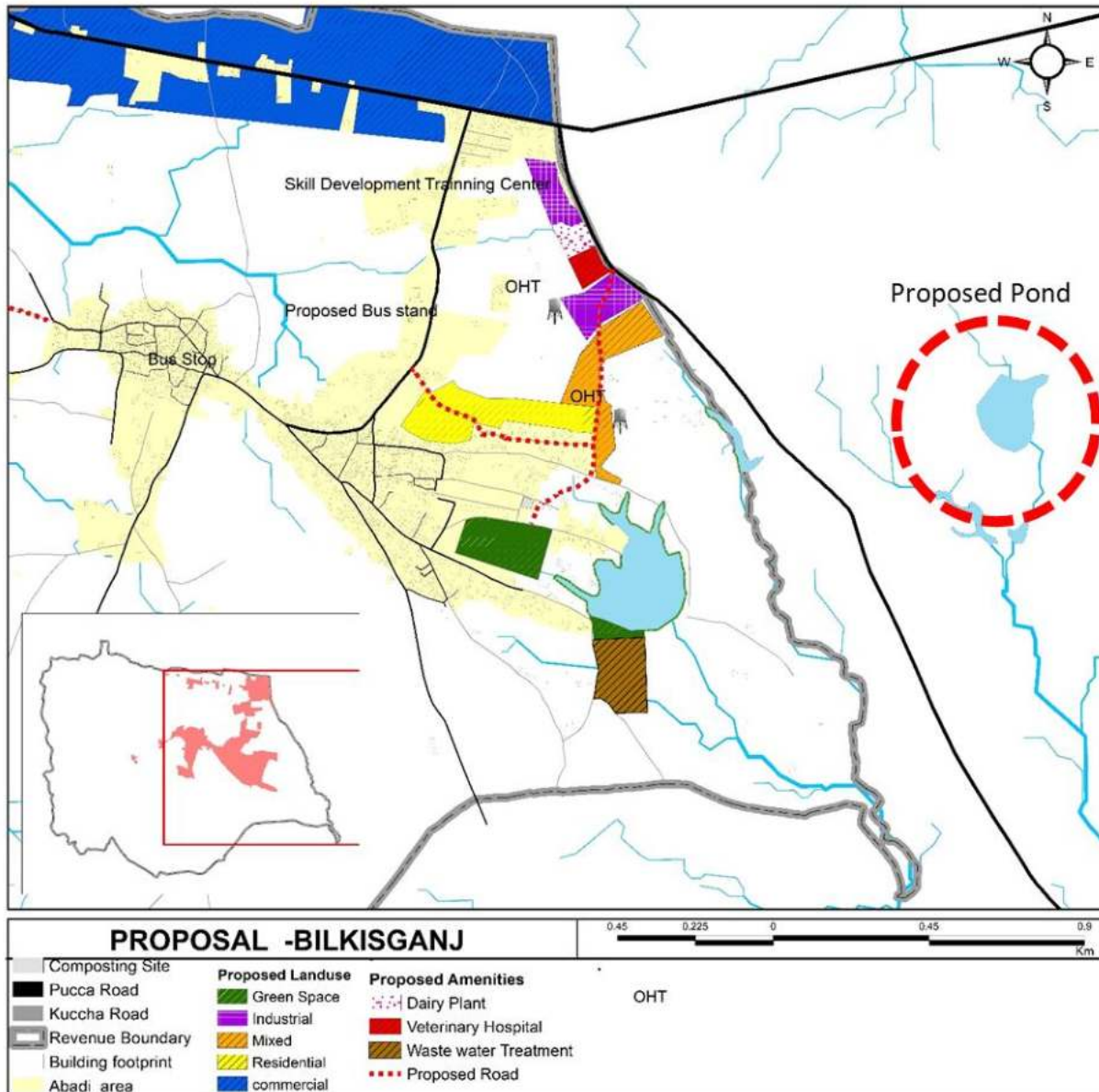


Figure 78 Proposed Water sources.

6.2.6.4 Liquid Waste Management

The existing Kuccha drains are unhygienic and require engineering design. All the existing open drains are proposed to be converted into covered drains with 100% connection of each household, the network of which terminates to waste water treatment site i.e., into Duckweed & Fishpond system. This system shall include grey water. The treated water can either be used in agriculture or stored in Pond (a reservoir tank) present in South East of panchayat. This technology serves dual purpose-treatment of water by duckweeds and income generation through fish farming. The phase-wise spatial implementation of this system is shown in Figure 79.

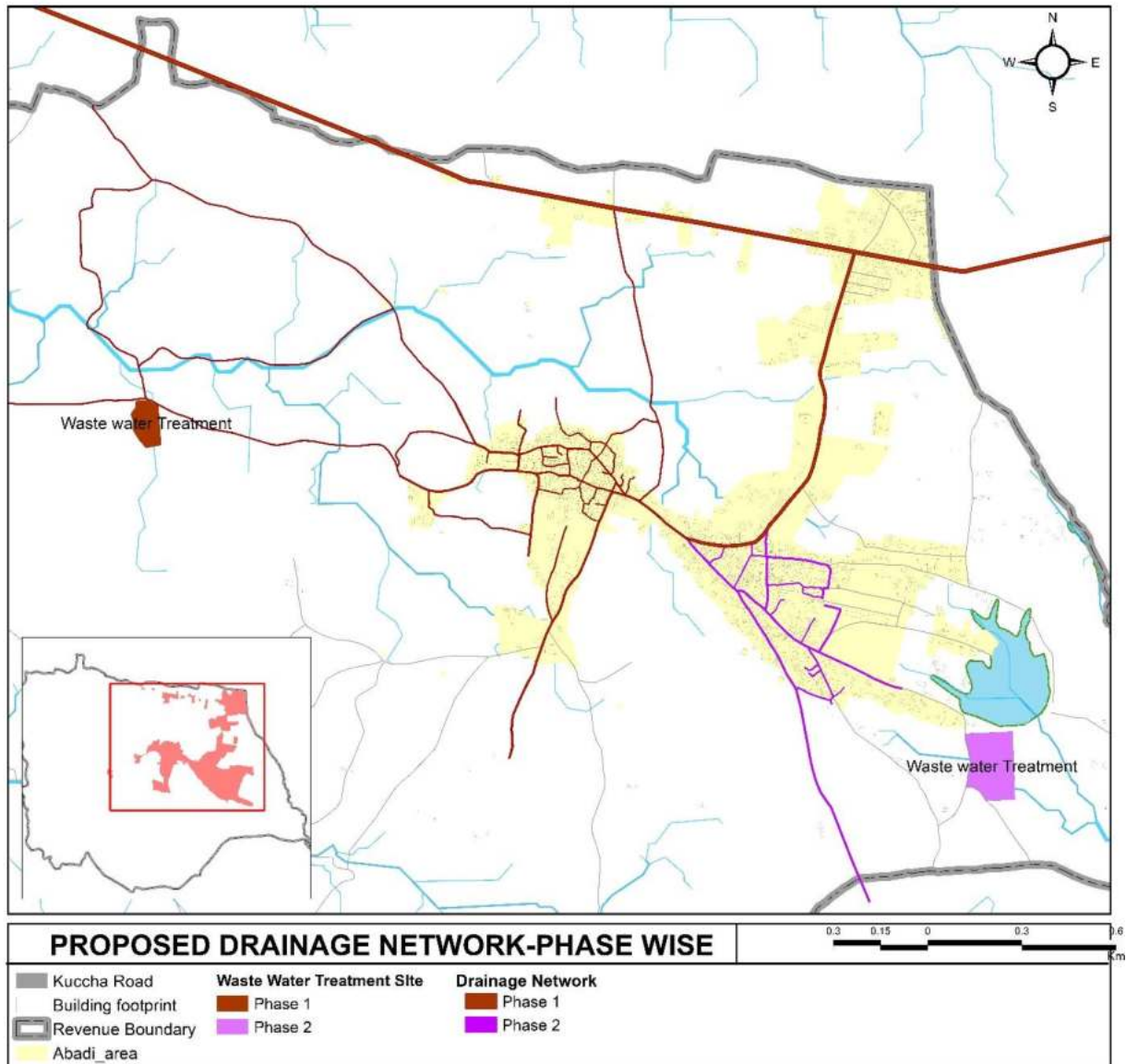


Figure 79 Phase-wise proposed Drainage network

6.2.6.5 Affordable Low-Cost housing

The affordable housing under PMAY is proposed towards East of the existing *Abadi* area. They are to be constructed using locally available recyclable materials with provision of rainwater harvesting and solar power. This shall reduce the overall cost with minimal environmental impact.

6.2.6.6 Green Spaces

The proposed green spaces are allocated in front of *Galla Mandi*, along the pond and in between Waste water treatment site. The proposed pond shall also revive the bio-diversity and recharge ground water.

Table 37 Proposed interventions.

S.No.	Activity type	Spatial Requirement	Source
1.	Road Connectivity to <i>Galla Mandi</i> , <i>Waste Water Treatment site</i> and proposed Residential land use	-	
2.	Water sources	OHT- 2 Nos. Pond- 1 Lift Irrigation from Kolar dam	
3.	Agro-Processing Unit	4 ha	Ministry of Food Processing Industries
4.	Dairy Plant with Processing unit (10000L per day capacity)	0.8 ha	National bank for Agriculture & Rural development (NABARD)
5.	Veterinary Hospital	0.8 ha	Case studies based
6.	Skill Development Centre	0.02 ha	
7.	Waste Water treatment sites (Duckweed Pond system)	4 ha (2 Nos., 3 ha + 1 ha)	RADPFI
8.	Bus Stand and Bus stop		-
9.	Solar Farm	1ha land to cater to need of Gram panchayat	-

7 Institutional Support and Governance

7.1 District Town and Country Planning – Interface

The town and Country Planning at district level mainly focus on planning of urban areas with its region. There is no inclusion of country side as well as block at district level in its functioning. However, Madhya Pradesh has included Janpad Panchayat at block level under Panchayati Raj institution. It is the regulating body acting as an intermediary between gram panchayats at lower level and Zila panchayat at district level. Hence, there is a need for intermediary governing body for integration of village level planning with district level planning.

7.2 Rural Land Use Changes – 73RD CAA AND AMENDMENT/RULES

Since rural areas are not identified for land use planning under T & CP act, there is a continuous conversion of agricultural or fertile land into built spaces in rural areas. Though, 73rd CAA and 74th CAA decentralized governance and form District Planning Committee for integration of Urban and Rural level development plans but it still lacks to encourage spatial planning of rural areas. The only identified solution to this problem is formation of spatial planning department through an act.

7.3 Spatial and Sectoral Convergence: District and Below

The decentralized governance empowers development from grassroots level to District level. There should spatial or sectoral planning at each level for an integrated development. Though, plans are prepared on the basis of sectors at each level but lack spatial plans at grassroots level. There should be convergence of spatial planning with sectoral planning to reduce the disparities. Spatial plans can be prepared in the form of land use plans, infrastructure plan, spatial distribution of demographics and economies, etc. both for urban and rural areas. They can be integrated at district level for the preparation of District Development plan. These plans can be integrated with 29 sectors identified in Eleventh schedule for preparation of Gram Panchayat Development plan.

7.4 Capacity Building: People's Community Power- GP

As discussed earlier, village participatory plans have a significant role to play for the effective implementation of development plans. This can be achieved with building capacity at all levels. The training strategy should be adopted for building capacities of all stakeholders, institutions, etc., simultaneously to reduce the time.

7.5 Monitoring of the Spatial Development Plan: GP/Ward Level

The most important aspect for the implementation of Gram Panchayat Spatial Development plan is its monitoring every year. This will ensure the rural areas development on the same pace with urban areas without any lag.

7.6 Linking/Integration of Schemes and Spatial Planning

For the effective implementation of GPSDP, all the schemes falling in same sector needs to identified first and integrated with spatial planning. The similar strategy is adopted in the spatial development plan of both gram panchayats (Figure 81)

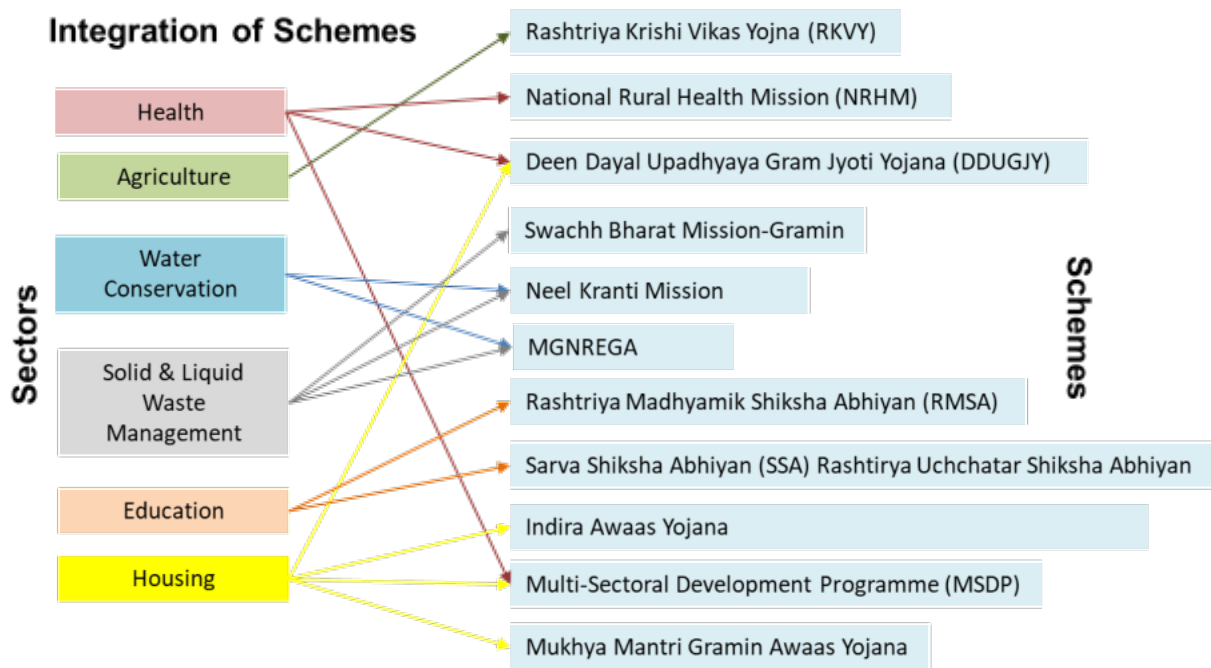


Figure 81 Integration of Schemes and Spatial Planning

References

- (ACWADAM), A. C. (2010, August 25). *Pani Panchayat: A model of groundwater management – A presentation by ACWADAM*. Retrieved from India water Portal: <https://www.indiawaterportal.org/articles/pani-panchayat-model-groundwater-management-presentation-acwadam>
- (CHRI), C. H. (2006). *The Right to Information and Panchayati Raj Institutions: Madhya Pradesh as a case study*. New Delhi: Matrix.
- Census of India. (2020). *Census Digital Library*. Retrieved from Census of India: https://censusindia.gov.in/DigitalLibrary/Archive_home.aspx
- DCO, D. C. (2011). *District Census Handbook Sehore*. Bhopal: District Census Operations.
- DCO, D. o. (2011). *District Census Handbook Vidisha*. Bhopal: Directorate of Census Operations.
- Department of Town & Country Planning, L. S. (2007-2012). *Integrated District Development Plan, Local Development Plan*. Government of Kerala.
- Ministry of Panchayati Raj, M. (2016). *Rural Area Development Plan Formulation and Implementation (RADPFI) Guidelines*. MoPR.
- Ministry of Rural development (MoRD), G. o. (2016). *Shyam Prasad Mukherji Rurban Misison, Integrated Cluster Action Plan (ICAP)*. Government of India.
- Planning Commission of India. (n.d.). *Manual for Integrated District Planning*. Planning Commission of India.

Annexure 1

Table 4- 2 Linking GPDP to Spatial Plan

Sector	Phase 1 (2018-19)		Phase 2 (2019-20)		Phase 3		Phase 4		Phase 5	
	Location	Funding Source	Location	Funding Source	Location	Funding Source	Location	Funding Source	Location	Funding Source
Desilting of water channels	From large water body to Railway line (2km) (A)	Sarpanch Nidhi/ MNREGS	Sham-A-khal to Land of Mr. Jagannath (1 km) (B)	Sarpanch Nidhi/ MNREGS	Sham-A-khal to Land of Mr Kisan Rathore (1/2 km) (C)	Sarpanch Nidhi/ MNREGS	Lower Drain Towards Railway line (1km) (D)	Sarpanch Nidhi/ MNREGS	water body	Sarpanch Nidhi/ MNREGS
Street lights	On all roads in village (3km length)	Sarpanch/ Nidhi, CSR from Reliance company on village land	Internal lanes in old gaathan area	Sarpanch/ Nidhi						
Drainage	From house of Mr. Narayan to Cremation Ground	Panch Parmeshwar Scheme	Sham-A-khal to Cricket Ground		Cremation Ground to DP					
Waste Disposal	Placing of dustbins on five major road junctions	Performance Grant- Janpad Level	Placing of dustbins locality wise on internal roads	Performance Grant- Janpad Level	Placing of dustbins locality wise on internal roads	Performance Grant- Janpad Level	Placing of dustbins locality wise on internal roads		Placing of dustbins locality wise on internal roads	
PVC pipe drainage system for household	Maintenance of Cricket Ground	Performance Grant- Zilla Level	From each residence to stabilisation pond	Self help	From each residence to stabilisation pond	Performance Grant- Zilla Level	From each residence to stabilisation pond	Performance Grant- Zilla Level		Performance Grant- Zilla Level

Source: Based on discussion with Panchayat

Annexure 2

No	Recycling/ Treatment Technique	Applicability	Land Requirement (per MLD in Hectares)	Capital Cost (per MLD in INR)	O&M cost Million/ year/MLD
1	Activated Sludge Process	The most widely used option for treatment of domestic wastewater for medium to large towns where land is scarce.	0.15-0.25	2-4	0.3-0.5
2	Stabilisation Pond Systems (SPS)	<ul style="list-style-type: none"> • In warm conditions • Easy land availability • Where power supply is expensive, low or unreliable. • Where social preference is for aquaculture 	0.8-2.3	1.5-4.5	0.06-0.1
3.	Duckweed Pond System	<ul style="list-style-type: none"> • Low strength domestic wastewater after sedimentation of influent • Biological Oxygen Demand (BOD)<80mg/L 	2-6	1.5-4.5	0.18
4.	Root Zone Treatment System	<ul style="list-style-type: none"> • Suitable for treatment of small quantities of waste water (250 gm BOD per day) • Maximum 50 kf BOD per day. 			low
5.	Anaerobic Decentralise d wastewater treatment system (DEWATS)	<ul style="list-style-type: none"> • Modified septic tank system • Takes total waste water , both grey and black. • Effluent has much less BOD, suitable for reuse in agriculture and horticulture., • Can be designed to handle waste water flow of 1- 1000 m3 per day. 			
6.	Soakage pit	<ul style="list-style-type: none"> • Simplest method of construction and use for grey water. • Household level, low volume handling • Suitable for sandy or sandy clay soil, for clay and black soil size of the pit would need to be larger. 			
7.	Up flow anaerobic	The suitability of this technology may be doubtful as	0.2-0.3	2.5-3.6	0.08-0.17

	Sludge Blanket Process (UASB)	a standalone secondary treatment option may be needed.			
8.	Facultative Aerate Lagoon (FAL)	<ul style="list-style-type: none"> • Standalone system • As a pre-treatment unit for WSP. • As an upgradation option for overloaded WSPs. 	0.27-0.4	2.2-2.9	0.15-0.2
9.	Biological Filtration and Oxygenated Reactor (BIOFOR) technology	<ul style="list-style-type: none"> • Adaptability to flow and load variations • Deep reactors enabling low land requirements • Very limited odour production • High energy/power requirement (220-335 kwh/ML treated). 	0.04	6.5-8.1	0.86
10.	High Rate Activated Sludge Biofor-F Technology	<ul style="list-style-type: none"> • Compact layout • Higher aeration efficiency • Compliance with strict discharge standards • Absence of odour and aerosol in the working area. 	0.08	5.2	0.18
11.	Trickling Filters	<ul style="list-style-type: none"> • Standalone system if operated at slow rates • As a high-rate roughing filter. <i>For high BOD waste water</i> • In combination with ASP. 	0.25-0.65		
12.	Fluidized Aerated Bed (FAB)	<ul style="list-style-type: none"> • Small to medium flows in congested locations • Sensitive locations • Decentralized approach • Relieving existing overloaded STPs. 	0.06	3-5	0.6-0.75
13.	Submerged Aeration Fixed film (SAFF) Technology	<ul style="list-style-type: none"> • Small to medium flows in congested locations • Sensitive locations • Decentralized approach • Relieving existing overloaded trickling filters 	0.05	7	1.14
14.	Cyclic Activated Sludge Process (CASP)	<ul style="list-style-type: none"> • Small to medium flows in congested locations • Sensitive locations • Decentralized approach • Relieving existing overloaded trickling filters 	0.1-0.15		

(Source: Compendium of Sewage Treatment Technologies, National River Conservation Directorate, MOEF, 2009 ; Technical options for Solid and Liquid Waste Management in Rural Areas, Ministry of Drinking water and Sanitation., 2013)

Annexure 3

Guttman Scalogram Analysis for Sehore Tehsil: Year 2011

Villages in Sehore Tehsil- Year:2011			
Village Name	Sum	Total Population	Order of Service
Bilkisganj	23	6408	Second
Mungaoli	18	2688	Second
Dhankhedi	14	2613	Second
Mograram	14	3039	Second
Uljhawan	14	3293	Second
Bamuliya	13	2591	Second
Mahodiya	13	1919	Second
Gudbhela	11	2497	Second
Lasudlya Parihar (Padhar)	11	1638	Second
Muskara	11	747	Second
Nipaniya Kalan	11	1949	Second
Pachama	10	1177	Third
Shikarpur	10	1770	Third
Jatakheda	9	2006	Third
Kulas Kalan	9	1811	Third
Badnagar	8	2097	Third
Barkhedi	8	1321	Third
Bijauri	8	2550	Third
Dhabla	8	1078	Third
Dhaboti	8	1916	Third
Dobra	8	727	Third
Janpur Bawadiya	8	2038	Third
Naplakhedi	8	1203	Third
Raipura	8	715	Third
Semra Dangi	8	2784	Third
Sonda	8	925	Third
Thuna Kalan	8	2457	Third
Amajhir	7	2442	Third
Hasnabad	7	1300	Third
Khamaliya	7	1977	Third
Khedli	7	1000	Third
Mugispur	7	1730	Third
Muhali	7	1640	Third
Noni Khedi Gusain	7	1183	Third

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Rafiqueganj	7	1625	Third
Rola	7	1530	Third
Sewaniya	7	1373	Third
Alahada Khedi	6	954	Third
Baktal	6	916	Third
Barwan(Barba) Khedi	6	668	Third
Bijaura	6	857	Third
Bijlon	6	2141	Third
Chanderi	6	377	Third
Chaundi	6	858	Third
Dupadiya Bhil	6	943	Third
Jahangirpura	6	1875	Third
Jamonya Kalan	6	1845	Third
Khari	6	1705	Third
Kulas Khurd	6	1203	Third
Mundla Khurd	6	1334	Third
Satpipaliya	6	1859	Third
Shahpur Kodiya	6	803	Third
Sikandarganj	6	168	Third
Bhainsakhedi	5	812	Fourth
Chainpura	5	315	Fourth
Chhapri Kalan	5	705	Fourth
Develi	5	1457	Fourth
Dondi (Dodi)	5	1394	Fourth
Geru Khan	5	667	Fourth
Haidarganj	5	1673	Fourth
Hirapur	5	943	Fourth
Imli Kheda	5	745	Fourth
Kalyanpura	5	124	Fourth
Kharpa	5	700	Fourth
Kodiya Chhitu	5	1330	Fourth
Lala Khedi	5	1432	Fourth
Mographool	5	1578	Fourth
Mullani	5	984	Fourth
Mundla Kalan	5	3107	Fourth
Napli	5	366	Fourth
Pach Pipalya	5	1228	Fourth
Padli	5	896	Fourth
Patni	5	2009	Fourth
Raipur Nayakheda	5	1350	Fourth
Sangrampur	5	1026	Fourth
Semali Khurd	5	729	Fourth
Shekhpura	5	1476	Fourth
Taj	5	605	Fourth
Titora	5	863	Fourth
Alampura	4	798	Fourth

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Amamay	4	622	Fourth
Amrod	4	835	Fourth
Anwali Kheda	4	750	Fourth
Bhandeli	4	687	Fourth
Bhatoni	4	490	Fourth
Bhoj Nagar	4	950	Fourth
Chitodiya Hema	4	629	Fourth
Chitodiya Lakha	4	757	Fourth
Chitodiya Van	4	934	Fourth
Dhamankheda	4	1563	Fourth
Didakhedi	4	192	Fourth
Gadiya	4	115	Fourth
Hasanpura	4	288	Fourth
Jakhakhedi	4	584	Fourth
Kachnariya	4	718	Fourth
Kahari Jadeed	4	826	Fourth
Kahari Kadeem	4	733	Fourth
Kapuri	4	760	Fourth
Karadiya Ata	4	507	Fourth
Khuraniya	4	649	Fourth
Kishanpura	4	100	Fourth
Konajhir	4	433	Fourth
Lasudiya Dhakad	4	1049	Fourth
Manakheda	4	1198	Fourth
Manpura	4	497	Fourth
Narela	4	272	Fourth
Pipaliya Mira	4	1460	Fourth
Rabiyabad	4	871	Fourth
Raju Khedi	4	745	Fourth
Ramakhedi	4	988	Fourth
Ramkhedi	4	504	Fourth
Rati Kheda (Rata Kheda)	4	369	Fourth
Ratnakhedi	4	630	Fourth
Saranga Khedi	4	484	Fourth
Semali Kalan	4	504	Fourth
Sherpur (Part)	4	1825	Fourth
Shivpuri	4	131	Fourth
Takipur	4	1018	Fourth
Abdullapur	3	442	Fifth
Amla	3	779	Fifth
Barkheda Sukal	3	27	Fifth
Beel Kheda Khurd	3	1110	Fifth
Bhagwanpura	3	76	Fifth
Bhimpura	3	106	Fifth
Chhapari Baramad Ashta	3	268	Fifth
Chhapri Khurd	3	575	Fifth

GRAM PANCHAYAT SPATIAL DEVELOPMENT PLAN BILKISGANJ GRAM PANCHAYAT, 2020

Dehariya Khurd	3	96	Fifth
Dendi	3	686	Fifth
Gokalpura	3	293	Fifth
Jamni	3	794	Fifth
Kala Pahad	3	1127	Fifth
Karadiya Bhil	3	875	Fifth
Khurshedpur	3	5	Fifth
Khutiya Khedi	3	318	Fifth
Lasudiya Khas	3	989	Fifth
Lasudlya Bazyaft	3	84	Fifth
Leela Khedi (Lilakhedi)	3	777	Fifth
Londiya	3	618	Fifth
Molga	3	426	Fifth
Pipalner	3	303	Fifth
Ralawati	3	506	Fifth
Rolu Khedi	3	268	Fifth
Sagoni	3	1355	Fifth
Salikherda	3	974	Fifth
Thunakhurd	3	834	Fifth
Udpura	3	426	Fifth
Usmaniya	3	118	Fifth
Vishan Kheda (Bishan Kheda)	3	328	Fifth
Waheedganj	3	406	Fifth
Awantipura	2	312	Fifth
Khokhari	2	747	Fifth
Kotakarar	2	38	Fifth
Menikhedi	2	140	Fifth
Murali	1	19	Sixth
Barkheda Bazyaft	0	0	Sixth
Rasalpura (Rasulpur)	0	0	Sixth
Sikandarpur	0	0	Sixth

Annexure 4

FOCUS AREA	ACTIVITY TYPE	PHASE 1 (2021-2025)					PHASE 2 (2026-2030)					SOURCE OF FUND	RELATED GOVERNMENT SCHEMES
		2021	2022	2023	2024	2025	2026	2027	2028	2029	2030		
Road Infrastructure	Road link to Waste Water Treatment Plant	Construction of 1.5 km proposed concrete road linking main road to WWTP		Construction of remaining 1.0 km proposed concrete road linking WWTP to oldest settlement								<ul style="list-style-type: none"> Finance commission PMGSY MGNREGA 	<ul style="list-style-type: none"> Pradhan Mantri Gram Sadak Yojana (PMGSY) MGNREGA
	Road link to Mandi	Construction of 500 m proposed concrete road linking Kolar to Mandi		Construction of remaining 500m proposed concrete road linking Kolar road to Mandi									
						Construction of 600 m proposed concrete road linking Mandi Road to Market road							
Drainage System	Drainage Network	Construction of Covered Pucca drains in cluster 1	Construction of Covered Pucca drains in cluster 2			Construction of Covered Pucca drains in 50% of cluster 3	Construction of Covered Pucca drains in remaining 50% of cluster 3					<ul style="list-style-type: none"> Finance Commission Swachh Bharat Kosh, MGNREGA 	<ul style="list-style-type: none"> Swachh Bharat Mission-Gramin Neel Kranti Mission MGNREGA
Liquid Waste Management	Waste water treatment site (Duck Weed system)			Construction of three ponds - Anaerobic, facultative and duckweed & fish pond near oldest settlement		Treatment system becomes Operational	Construction of three ponds - Anaerobic, facultative and duckweed & fish pond towards South-East		Treatment system becomes Operational			<ul style="list-style-type: none"> Finance Commission Swachh Bharat Kosh, MGNREGA 	<ul style="list-style-type: none"> Swachh Bharat Mission-Gramin Neel Kranti Mission MGNREGA
Health Infrastructure	Veterinary Hospital	Construction of Self-sustaining solar powered one Veterinary hospital along Kolar Road with involvement of locals using recyclable material										Finance Commission and NABARD	Dairy Entrepreneurship Development Scheme (DEDS)
Institutional Infrastructure	Dairy Plant	Construction of self-sustaining Solar powered cold storage along Kolar road										<ul style="list-style-type: none"> MP State Cooperative Dairy Federation Related schemes 	<ul style="list-style-type: none"> National Programme for Dairy Development Dairy Entrepreneurship Development Scheme
	Skill Development Centre			Construction of Self-sustaining solar powered Skill Development centre									India Innovation, Entrepreneurship and Agro-Industry Fund
	Agro-Processing Unit						Construction of Self-sustaining Solar Powered Agro-processing unit						Deen Dayal Upadhyaya Gram Kaushalya Yojana (DDU GKY)
Green Spaces		5m wide Plantation buffer along the pond		Formation of green space in front of Mandi to protect catchment of pond			Formation of green space between Waste water treatment site and Pond				<ul style="list-style-type: none"> MGNREGA Related Schemes 	<ul style="list-style-type: none"> National Service Scheme for tree plantation MGNREGA 	
Water Resources	OHTs	Construction of one OHT near Proposed Industrial area along Kolar road					Construction of one OHT near Proposed Mixed land use along Kolar road					Related Schemes	National Rural Drinking Water Programme (NRDWP)
	Pond	Construction of Pond at the other side of the Kolar road											Pradhan Mantri Krishi Sinchai Yojana
Housing		Construction of 50% of required Low-cost Affordable housing in proposed residential land use with provision of Solar Power & Rain water Harvesting using recycled material					Construction of remaining 50% of required Low-cost Affordable housing in proposed residential land use with provision of Solar Power & Rain water Harvesting using recycled material					MGNREGA	<ul style="list-style-type: none"> Mukhya Mantri Gramin Awaas Yojana and Mukhya Mantri Antyodaya Awaas Yojana Multi-Sectoral Development Programme (MSDP) for minority



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