GRAM PANCHAYAT SPATIAL DEVELOPMENT PLAN

KANDRA GRAM PANCHAYAT BOKARO DISTRICT

for

Ministry of Panchayati Raj
Government of India

NOVEMBER 2020

DEPARTMENT OF ARCHITECTURE

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI

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Study Team

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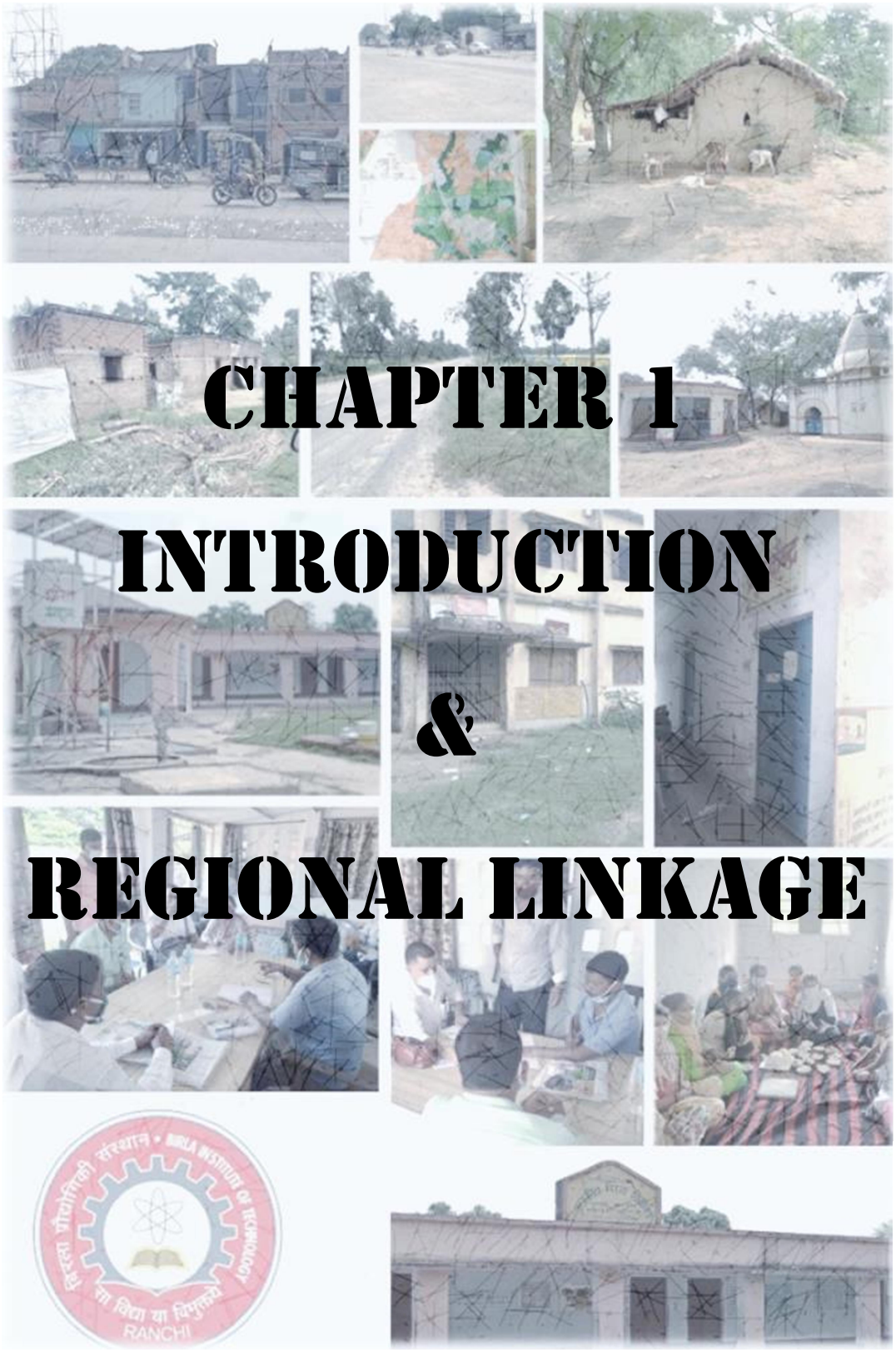


CHAPTER 1

INTRODUCTION & REGIONAL LINKAGE

CHAPTER 1: INTRODUCTION

1.1 INTRODUCTION

Panchayati Raj Institutions (PRIs) are rural local governments entrusted with the responsibilities to prepare plan and implement schemes for economic development and social justice in rural India. The Directive Principles of State Policy contained in the Constitution of India provides for the Panchayati Raj System. Following the 73rd Amendment of the Constitution, (73rd CAA), 1992 which came in to force on 24th April 1993, the three-tier Panchayati Raj Institutional (PRI) system was institutionalized through Part IX of the Constitution. Key features of this three tier basic framework, includes: three tiers of panchayats (Gram Panchayat, Intermediate Panchayat, District Panchayat), Gram Sabha, five year term, reservation for SC, ST and Women, State Election Commission, State Finance Commission. The States are required to entrust these bodies with such powers, functions and responsibilities so as to enable these institutions function as institutions of self-government. In particular, the PRIs are required to prepare plans and implement schemes for economic development and social justice including those enumerated in the Eleventh Schedule of the Constitution.

1.2 INTEGRATING SPATIAL PLANNING AND GRAM PANCHAYAT DEVELOPMENT PLAN

As per the Census, 2011, rural areas in India cover 94% of land and 69% of population while urban area holds only 6% of land and 31% of its population. The Father of the Nation, Mahatma Gandhi, had rightly suggested that independence must begin at the bottom, and that every village ought to be a republic or panchayat with the right authority and resources to realize its full potential for economic and social development. There are 6.4 lakh villages in the country. Though the problems in villages do not seem so intense in comparison to cities they cannot be ignored. Rapid rate of urbanization and growth of population in cities, the out migration of rural population for employment, disinterest of farmers towards agriculture, and changing character of villages in the vicinity of cities and declining rural poverty are some of the inevitable occurrences that India as a country is witnessing today which is very alarming.

A review of the prominent pre-independence rural development initiatives in India reveals that they were sector specific and community centric. Also, Post-

independence various rural development initiatives were taken up by Government of India during each of the Five-Year Plan periods. The 73rdamendment to the constitution has given way to democracy in rural areas. Taking it further ahead, the XIV Finance Commission award created an opportunity for responsive local governance at institutional level of the Gram Panchayat. The guidelines issued by Ministry of Finance instruct that proper plans i.e. Gram Panchayat Development Plan (GPDP) is to be prepared by the Gram Panchayat for the basic services within the functions devolved to them as per State laws. These plans must be participatory plans involving the community, particularly the Gram Sabha, in the formulation of priorities and projects and will also have to ensure the mandates of social justice and economic development mentioned in Article 243G.

The GPDP is a comprehensive plan for effective development of a village panchayat area. GPDP aims to expand governing space of a village panchayat and to empower it as a development institution. GPDP is generally aimed at:

- Improving basic amenities in a village panchayat. This includes sanitation, connectivity, drinking water, storm water drainage, burial grounds, etc.
- Improving standard of living of poor families in a panchayat area.
- Eradication of absolute and relative poverty through convergence of government programmes and policies.
- Prevention and control of communicable diseases with the support of the health department.
- Providing social security to all sections of marginalized communities.
- Effective management of natural resources and sustainable development of livelihoods.
- Conserving soil and water.
- Ensuring 100 per cent enrolment in schools.
- Ensuring gender equality and equity in all aspects of development.
- Development of governing capability of village panchayats.
- Strengthening a gram sabha and improving the quality of a gram sabha.

GPDP has a clear component addressing vulnerabilities of poor and marginalized people and their livelihood opportunities through an integrated poverty reduction plan. It allows for different local models and innovations that are locally appropriate and cost effective. It helps to transform GPs into institutions of local self-governance and to cement the GP's identity as development institution. Overall the process of participatory planning for a Gram Panchayat Development Plan is expected to improve service delivery, enhance citizenship, motivate volunteerism, create space for

an alliance of people's institutions and groups, and improve governance at the local level. The above contents mentioned only refer to the sectoral development of the villages/Gram Panchayats, but the spatial dimension is not incorporated in these programs. Today, the flagship rural programs of Government of India are utilizing IT and geo-spatial technology and have in-built convergence mechanisms; however the pressing need is to integrate these into a spatial planning framework that will take into consideration the dynamic settlement characteristics of India's villages.

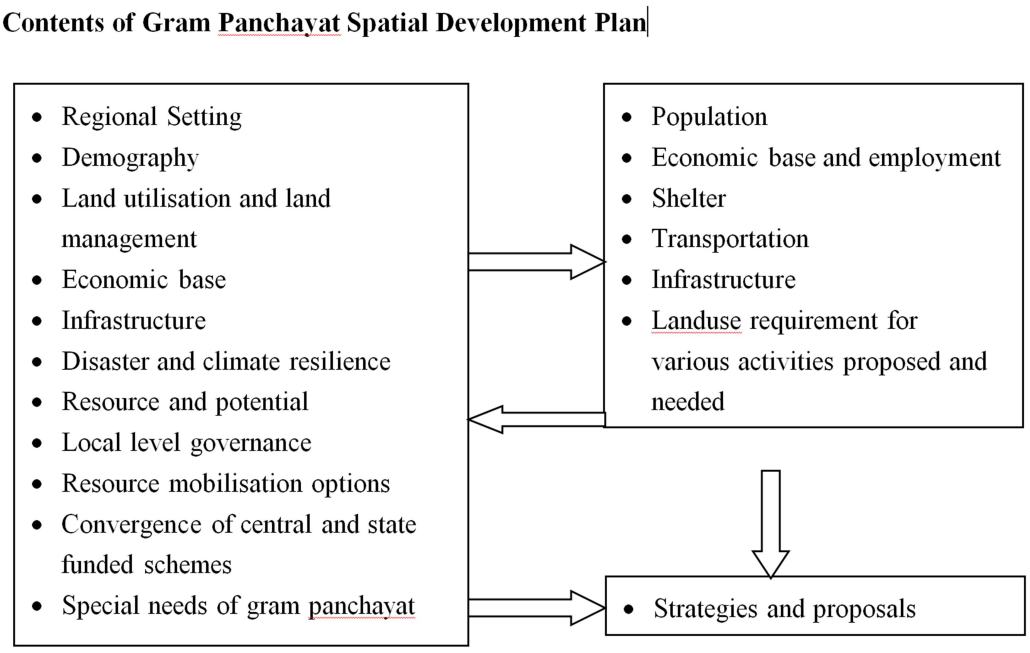


Fig. 1.1: Contents of Gram Panchayat Spatial Development Plan

Spatial plans are prepared for cities and towns popularly known as Master Plans and Development Plans and notified under the respective State Town and Country Planning Acts and Urban Development Acts. These Acts in their title include *Country Planning*, but in actual terms, there is no provision of preparing Master/Development Plans for *countryside* village, nor has much attention been given by the State Governments to prepare the same. There has been no serious attempt to prepare Spatial Plans for rural areas and considering the vast rural population of the country who have been deprived of the access to basic facilities. Herein lays the importance of preparing a template for a spatially integrated version of the GPDP, namely the GPSDP (Gram Panchayat Spatial Development Plan). Fig 1.1 presents the contents of Gram Panchayat Spatial Development Plan.

Further, the situation during the COVID-19 pandemic, the lockdown and the resultant 'reverse migration' of lakhs of daily wage labours, employed mainly in the informal sector; pose a huge socio-economic problem and challenge to government and administration. Therefore, the major challenge now is to provide gainful employment to these reverse migrants in the rural areas, provide them better infrastructure to grow and sustain.

Many governments across the country have taken various stop-gap initiatives like leverage MGNREGA to provide congenial living environment to these people but long-term planning in the need of the hour. Pockets, where tribal communities predominate, are particularly the most vulnerable in terms of food and nutritional security and require special attention. With the Government of India in these trying times under our Hon'ble Prime Minister Shri Narendra Modi launching 'Átmanirbhar Bharat' to address the situation, the seeds of it must be planted at the grass-root level. The proposed Gram Panchayat Spatial Development Plan (GPSDP) has been conceived to address the issue and make the GP a small hotspot for future migration and better work and living opportunities. By virtue of its location on NH the GPs have huge potential for economic development in near future. Proper planning of the GP will allow for rational and sustainable use of land catering to various needs, including social, economic, developmental, and environmental needs. Hence the Panchayat needs to be capacitated to take over the larger canvas of local economic development in all spheres amongst their constituent villages to elevate them to level of a growth center in near future.

1.3 MISSION OF GRAM PANCHAYAT SPATIAL DEVELOPMENT PLAN (GPSDP)

Mission of the GPSDP is to:
"To build and sustain a Panchayat of having vibrant economy and diversity through strong partnership with stakeholders to provide better Quality of Life."

1.4 VISION OF GPSDP

The vision of the Spatial Planning initiative is to create

- A rural base of diverse, vibrant, and inclusive economy;
- A panchayat characterized by sustainable infrastructure and resource management;

- A congenial place for living and growth with affordable homes and neighbourhoods;
- A panchayat having happy and healthy residents;
- An area of endearing character and local identity.

1.5 STUDY OBJECTIVES

The study objectives thus include:

- Laying down broad policies and directions for growth in the desired direction to transform the GP into a Growth node
- Determining the hierarchy of roads and access ways.
- Establishing the zoning of land use with specific zoning for lands abutting to NH.
- Determining the standards for common facilities for education, health & social needs of the resident population and planning for provision of the same;
- Identifying the social and physical infrastructure requirements of the GP and planning for the same in convergence with Central and State initiatives and schemes.
- Developing a mechanism for sustainable developments that harmonize both the needs of the environment and of development, as well as guidelines for such developments.
- Identifying the requirement of investments, finance mobilization and avenues for economic revitalization of the area.
- Suggesting policies for integrating the neighbouring cities, town, and villages so that a holistic integrated development can happen on ground.

1.6 SCOPE OF WORK

The Gram Panchayat Spatial Development Plan/Master Plan will be primarily planning for Agriculture and Farms, residential purposes, local markets and commercial, Institutional area (for Banks, Post Office, Anganwadis, PHC, Schools etc.), Parks and Gardens, Water bodies, Industries (Agro-based or MSMEs), and for making Resto or Service areas or Lay-by areas along the Highway. The salient parts of the Gram Panchayat Spatial Development Plan / Master Plan include:

- Preparation of Vision Statement
- Current state assessment & gap analysis in term of socio-economic factors, social and physical infrastructure.

- Map preparation and spatial analysis with respect to housing typology, household income, road network, infrastructure and land holding
- Spatial indices including socio-demographic indicators, housing, environmental determinants, infrastructural attributes and natural resource management;
- Analysis of the economic situation of the Panchayat and identification of drivers of economy, proposals for economic revitalization of the area;
- Investment and implementation planning for proposed activities and structures;

1.7 METHODOLOGY FOR THE PREPARATION OF GPSDP OF KANDRA GRAM PANCHAYAT

The gram panchayat of Kandra in Chas Community Development (C.D.) Block of Bokaro district in the State of Jharkhand was selected and considered for Gram Panchayat Spatial Development Plan as it exemplifies a typical peri urban character. The proximity of the gram panchayat to the largest steel plant of Asia, Bokaro Steel Plant, and its location along the National Highway 32, has propelled significant development in the gram panchayat making it prone to intense transformation due to the significant and fast approaching urbanization.

The GPSDP will incorporate the spatial layers corresponding to attributes like physical features, land holding and land ownership of revenue lands, land use in Abadi area, overall physical and social infrastructure, built environment parameters like housing typology, building height, building age, etc.; economic parameters like landholding wise cropping pattern, etc. It will also integrate the non-spatial attributes like socio-economic condition, skill level, governance dimensions, etc. The outcome is in the form of zoning system and prescriptions for rural settlements. The study was therefore intensively based on primary survey and Census data 2011. Spatial and Non-Spatial data was collected by study team comprising of faculty members of BIT Mesra, Ranchi who made necessary number of visits to the gram panchayats in question.

Fig 1.2 captures the interaction of the planning experts from BIT Mesra, Ranchi with the Panchayat Samiti Members and the youth of the village who were engaged in household survey activities.


Fig. 1.2: Interaction of Experts from BIT Mesra with Panchayat Samiti Members and the Household Survey Group
(Source: author)

The data related to demography was procured from Census 2011 but rest of the data regarding Land use, socio-economic condition of population, services, infrastructure, housing condition etc. was collected on ground. During the visit meetings were conducted with the Mukhiya, Gram Samiti members and villagers in subgroups of women, children and youth. Visit of NIRD & PR official too took place for the appraisal of the project during surveys. Comments and expectations of the focused group discussion were noted to be considered during the proposal. The data collected reflects interest of residents as most of it was procured through open ended personal interviews, questionnaire-based interviews, focus group discussion etc. Considering spatial emphasis of the project pertinent spatial data related to land use, cropping pattern, infrastructure, housing etc. was collected on ground and then transferred to map through GIS. Maps depicting combined indices have also been produced for rational approach.

Gram Panchayat Development Plan preparation exercise would thus involve the study of:

- Regional setting
- Demography
- Land Utilisation and Land management
- Economic Base
- Infrastructure
- Disaster and Climate Resilience
- Resources and Potential
- Local level governance
- Resource Mobilisation options

- Convergence of Central/State funded schemes
- Special needs of Gram Panchayat

Rural Disaster Resilience Strategy and Plan

- Resilience Assessment
- Building a resilience plan
- Plan Implementation

1.8 PANCHAYATI RAJ LEGISLATIONS IN JHARKHAND (JHARKHAND PANCHAYATI ACT, 2001)

The State Government of Jharkhand enacted the Jharkhand Panchayat Raj (JPR) Act, 2001 to establish a three-tier PRI system in the State and framed Jharkhand Panchayat Raj (Budget and Accounts) Rules, 2010, to ensure smooth functioning of PRIs. The JPR Act, 2001 was enacted in accordance with the provisions of the 73rd amendment to the Constitution and that of the Panchayat Extension to the Scheduled Areas Act (PESA) 1996 which is applicable to this state.

Following the recommendations of the Bhuria Committee, the Centre enacted PESA on 24th December 1996. PESA grants special status to adivasis in scheduled areas. Under PESA, the village council is given the right to intervene in the process of appropriation of land and Clause 4(m) of PESA endows the Gram Sabha with 'the ownership of minor forest produces. Also, all the positions at the three levels in the Panchayat system, the posts of Mukhia, President in Panchayat Samiti and Chairman in Zilla Parishad, are reserved for tribals. Since there are 32 tribal groups in Jharkhand and nine primitive tribal groups which together comprise 26 per cent of the population some districts are listed under schedule V. Thus, under PESA, 12 out of 24 districts (113 blocks in 24 districts) have been identified as scheduled areas which enjoy a minimum of 60% reservation for tribals in overall seats and full reservation, and Gram Sabhas take on more importance than Gram Panchayats and become coordinating bodies in Scheduled Areas. The following districts, blocks and panchayats of the state are completely under PESA: Ranchi, Lohardagga, Gumla, Simdega, Latehar, East-Singhbhum, West-Singhbhum, Saraikela-Kharsawan block, Sahebganj, Dumka Pakur, Jamtara, Palamu-Rabda and Bakoriya Panchayats of Satbarwa block, Godda-Sunderpahari and Boarijor blocks. However PESA is not applicable in the Bokaro district.

The Panchayati Raj Department (PRD) in Jharkhand came into existence in 1999. It mainly interacts with two ministries at the central level; the Ministry of Rural Development (MoRD) and the Ministry of Panchayati Raj (MoPR). It is considered an important department not only because of the quantum of funds that it handles but also because its activities have a direct bearing on rural development and poverty alleviation. It is also the nodal department through which an endeavor is made for grassroots democracy and decentralization of power through PRIs. PRD implements centrally sponsored schemes like the Backward Region Grant Fund (BRGF), Panchayat Mahila Evam Yuva Shakti Abhiyan (PMEYSA), and RGSY. PRD also plans and implements schemes from the state budget which include construction of Panchayat Bhawans, capacity building, special grant/prizes for PRIs, and strengthening regional offices.

The JPR Act, 2001 and Rules/byelaws made thereunder therefore provide for elected body also in addition to the Executive/Administrative body to deliver the mandate and manage administration of PRIs. Therefore, the Deputy Development Commissioner cum Chief Executive Officer (CEO) or the *Adhyaksha* is the executive head at the Zilla Parishad (ZP) or the district level. The Block Development Officer cum Executive Officer (EO) or the *Pramukh*, is the executive heads of the Panchayat Samiti (PS) at the block level, and the Panchayat Secretary or the *Mukhia* is in-charge of the office of the Gram Panchayat (GP).

The first elections of the PRIs in Jharkhand State were held in December 2010 followed by the second in December 2015. The organizational structure of PRIs is depicted in Fig. 1.3.

In Jharkhand the PRIs at the district, block and village level are the Zilla Panchayat (ZP), Panchayat Samiti (PS), and the Gram Panchayat (GP) respectively. In 1991, there were only 13 districts which increased to 18 districts in 2001. Thus in 2001, there were 18 districts and 210 C.D. Blocks in Jharkhand, that increased to 24 districts in 2011. The Census of India 2011 in Jharkhand state was undertaken on the basis of 24 districts and 5 divisions of the state. Table 1.1 presents the administrative setup and Panchayati Raj Institutions present in India and Jharkhand.

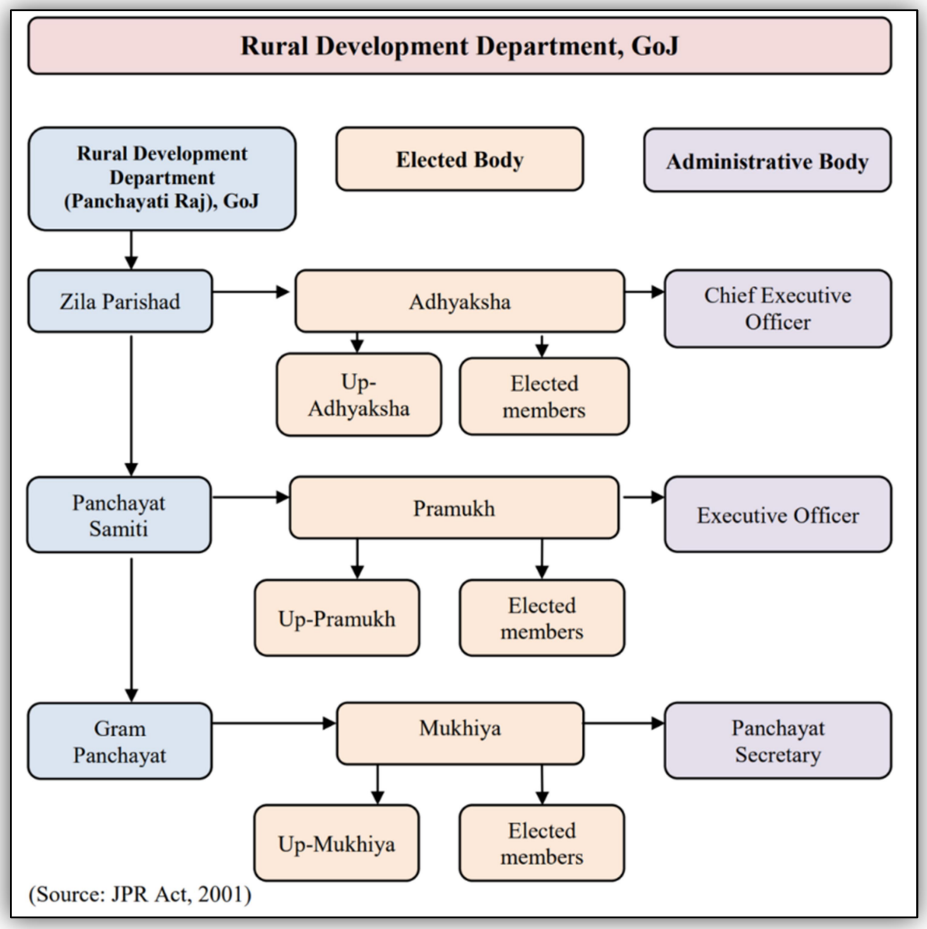


Fig. 1.3: Organizational Structure of Rural Development Department, GoJ

Source:https://cag.gov.in/sites/default/files/audit_report_files/Chapter_1_An_Overview_Of_The_Functioning%2C_Accountability_Mechanism_And_Financial_Reporting_Issues_Of_Panchayati_Raj_Institutions_of_Annual_Technic.pdf

Table 1.1: Administrative Setup and Panchayati Raj Institutions present in India and Jharkhand.

India			Jharkhand		
	2001	**2011**		**2001**	**2011**
State & UTs	35	35	**Divisions**	-	05
Districts	593	640	**Districts/** Zila Parishads	18	24
Sub-Districts	5463	5924	**Sub-Districts/ C.D. Blocks/ (**Panchayat Samitis)	210	260

Town	5161	7936	**Town**	152	228
Gram Panchayats	6374	255547	**Gram Panchayats/** (Gram Panchayats)	4118	4359
Inhabited Villages	593732	640930	**Inhabited Villages**	29354	29492
Uninhabited Villages	44856		**Uninhabited Villages**	3261	2902

Source: Report on Status of Panchayati Raj- State Profile - Jharkhand

1.9 ADMINISTRATIVE SETUP AND PRIS IN CHAS BLOCK

Chas CD Block is a sub district administrative division in Bokaro District of Jharkhand State, India, which has a total area of 577 sq. km. that includes 389.24 sq. km of rural area and 187.55 sq. km of urban area that has total 54 gram panchayats, 128 villages and 3 census towns.

The sub-district is bounded by Chandrapura CD Block and Baghmara CD Block, in Dhanbad district, on the north, Chandankiyari CD Block on the east, Purulia I and Joypur CD Blocks, in Purulia district of West Bengal, on the south, and Jaridih CD Block on the west. Bokaro Steel City, Mahila, Sector IV, Sector VI, Sector XII, Chas, Chas (M), Pindrajora, Harla and Balidih police stations are in this CD Block. Headquarters of this CD Block is at Chas Nagar Parishad.

It has a population of 8,13,402 people including 4,27,453 males and 3,85,949 females. Of the total population 564,319 is urban population while 249,083 people reside in rural areas. The sex ratio is 903 per 1000 male and the literacy rate of the C. D. block is 78.29%. There are total 1,58,059 houses in the sub-district. As per Census 2011, total families in Chas were 109,372. Fig. 1.4 presents the administrative divisions of Chas C. D. Block and Table 1.2 presents the particulars of settlements in Bokaro district and Chas C.D. Block.

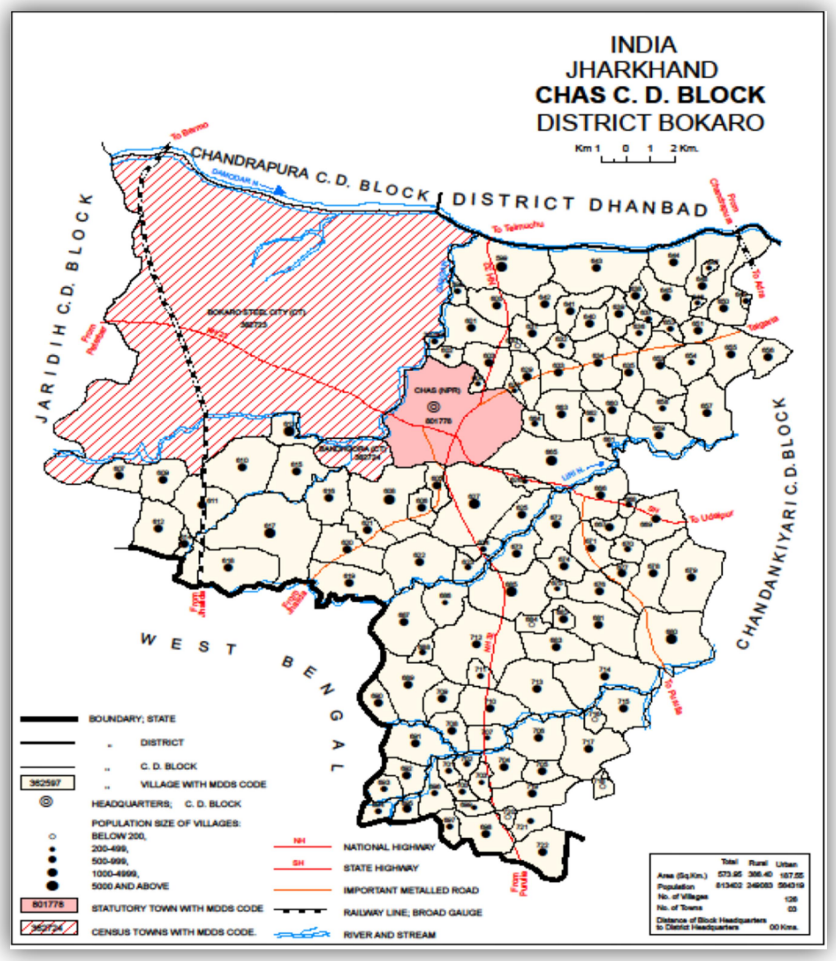


Fig. 1.4: Map showing the administrative divisions of Chas C. D. Block

Source: https://www.censusindia.gov.in/2011census/maps/atlas/20part31.pdf

Table 1.2: Particular of Settlements in Bokaro District and Chas C. D. Block

Particulars	Bokaro District		Chas C.D. Block	
	2001	2011	2001	2011
Area (in sq. Kms)	2880	2883	573.6	553.19
Number of Sub-division		02	-	-
Number of CD Blocks	08	09	-	-
Number of Towns	16	27	03	02
Statutory Towns	02	02	01	00
Census Towns	14	25	02	02
Number of Panchayats	-	241	-	54
Number of Villages	646	635	126	128
Inhabited	621	611	126	126

Un-inhabited	25	24	0	02
Total Population	1777662	20,62,330	698625	671762
Total Urban Population	804657	983,644	497780	223753
Total Rural Population	973005	1072807	200845	249083
Percentage of Rural population to total population	54.7%	52.02%	28.75%	37.08%

Source: Census 2001 & 2011

1.10 INTRODUCTION TO STUDY AREA: KANDRA GRAM PANCHAYAT, C.D. BLOCK CHAS, BOKARO DISTRICT

This section introduces the study area of Kandra Gram Panchayat which is in the Chas Community Development (C.D.) Block of Bokaro district in the State of Jharkhand.

1.10.1 LOCATION OF AND REGIONAL SETTING OF KANDRA GRAM PANCHAYAT

Kandra GP is a large gram panchayat having total geographical area of 1003.15 hectares, which is in Chas Tehsil of Bokaro district in Jharkhand, India. It is situated 7 km away from sub-district headquarter Chas and 11 km away from district headquarter Bokaro, towards the south-east direction at the confluence of National Highways 23 and 32, near ITI College in Chas. Chas is also the largest and the nearest town to Kandra GP. The National Highway 32 further crosses through the Kandra GP southwards. The nearby villages of Kandra GP are Chakalia, Jogidi Alias Raghunathdi, Dewanganj, Durgapur, Gopidi, Nishchintpur, Badhadi, Bandhpur, Chiksia, Adamdi and Bodro. Fig. 1.5 shows the location of Kandra Gram Panchayat with respect to Chas C. D. Block and the district headquarters Bokaro Steel City.

Fig. 1.6 presents map showing the regional setting of Kandra Gram Panchayat with respect to Chas C. D. Block and the district headquarter Bokaro Steel City, and Fig. 1.7 and 1.8 present the change in the settlement area since 2005 and 2013 compared to the present day, respectively.

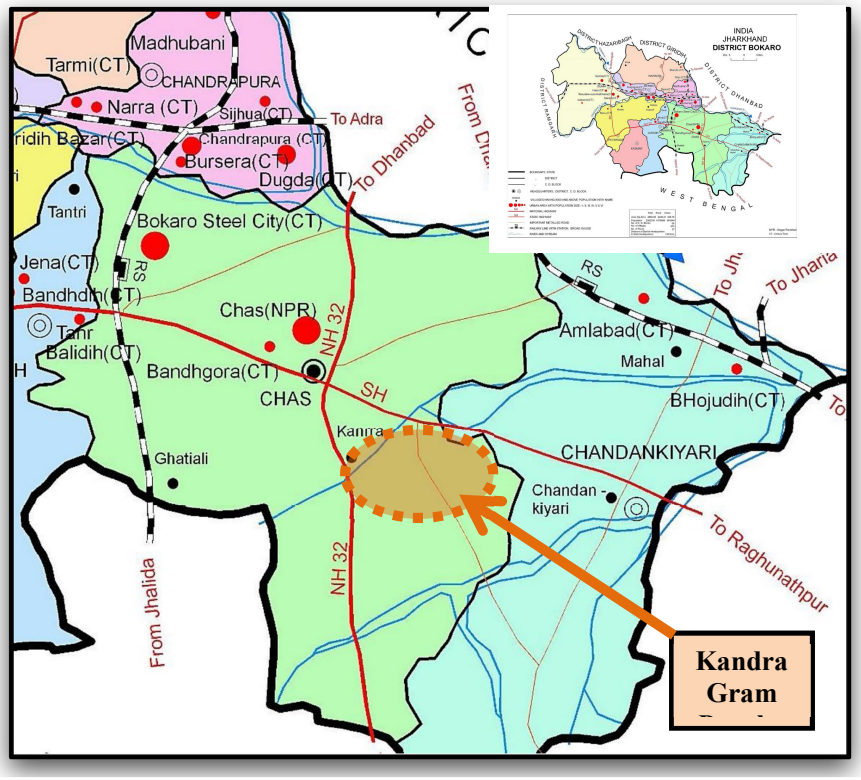


Fig. 1.5: Location of Kandra Gram Panchayat with respect to Chas C. D. Block and Bokaro Steel City (*Source: https://ranchi.nic.in/map-of-district/)*

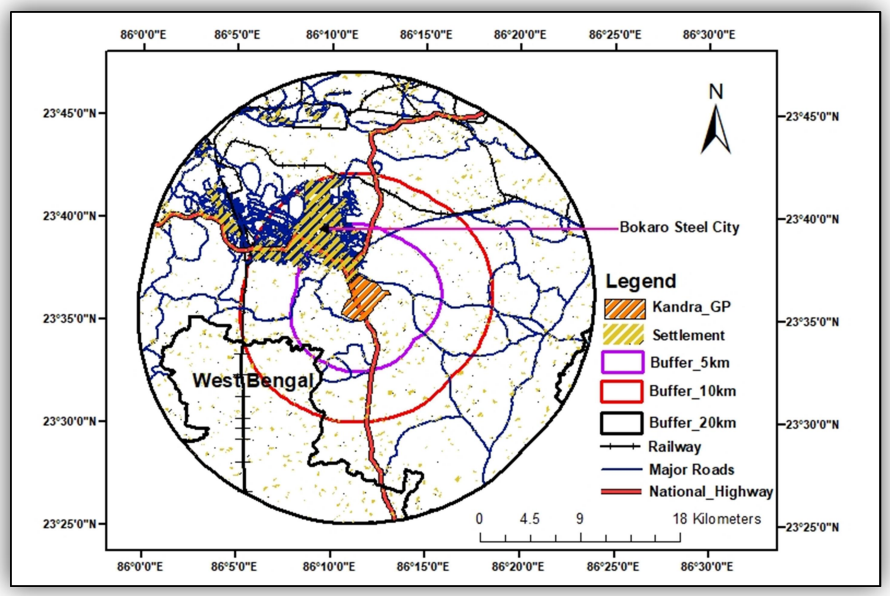


Fig. 1.6: Map showing the Regional setting of Kandra Gram Panchayat

Source – prepared by NRSC, ISRO

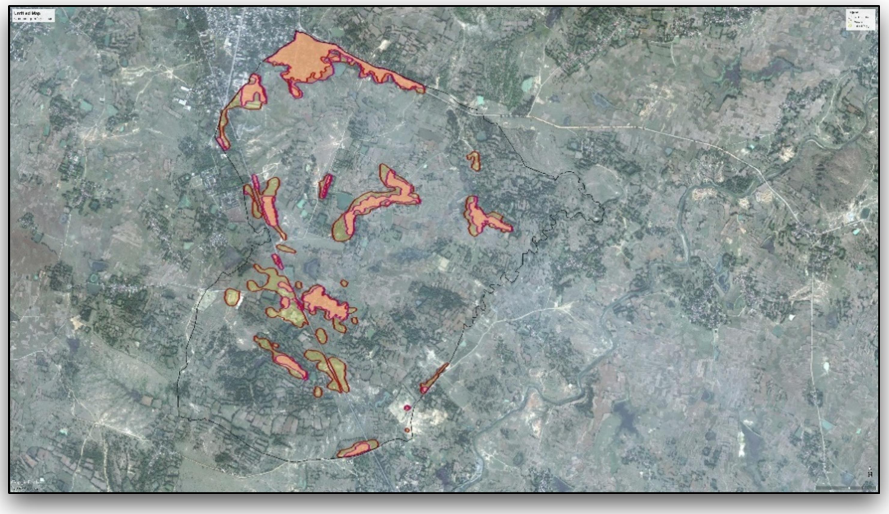


Fig. 1.7: Map showing the comparative profile of settlement area within Kandra Gram Panchayat in 2005 and 2020

Source: Google-earth

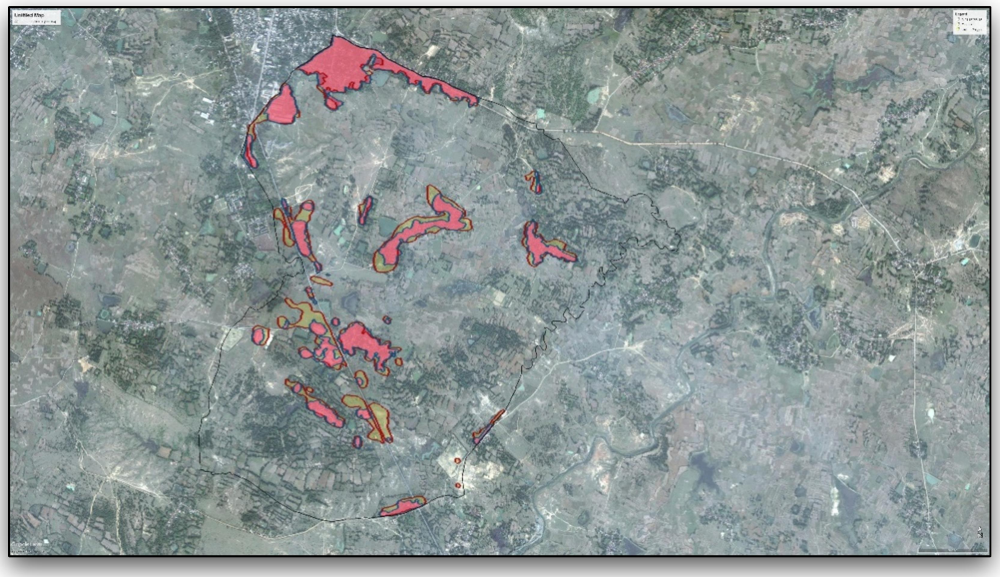


Fig. 1.8: Map showing the comparative profile of settlement area within Kandra Gram Panchayat in 2013 and 2020

Source: Google-earth

1.10.2 DEVELOPMENT INDICATORS FOR KANDRA GRAM PANCHAYAT

Kandra gram panchayat, due to its close proximity to Chas Municipal Corporation hosts a good level of social infrastructure and physical infrastructure, however there is still lot of scope of further improvement which can be aimed and focussed upon in this Gram Panchayat Spatial Development Plan exercise. This section therefore identifies and highlights some of those gaps, which the GPSDP can aim at improving. Number of indicators under different categories has been chosen to represent the status of the Kandra gram panchayat as shown in Table 1.3.

Table 1.3: Development Indicators for Kandra Gram Panchayat

Sl. No	Census Indicators		Kandra Gram Panchayat (Census 2011; Antyodaya 2017)
1	**Population**		8352
2	**Total Household**		1460
	DEMOGRAPHIC		
3	**Density (pph)**		9.3 pph (gross density)
4	**Population Growth Rate**		18%
	ECONOMIC		
5	**% households engaged exclusively in Farm activities**		60%
	% households engaged exclusively in Farm activities		40%
6	**Land holding Sizes**	Less than 5 acres in percentage	
7	**Land Values (Lakh/Ha)**	Market rates (Near Road)	
		Market Rates (away from Road)	
	SOCIAL		
8	**Literacy Rate (%)**		75.8%
9	**Male- Female differential in literacy rate (%)**		25.81%
	SPATIAL		
10	**Percentage of non-residential area**		90.38%
11	**Extent of**	Percentage area	0.23%

	Commercial Space	No. of commercial establishments	82
KEY INFRASTRUCTURAL PARAMETERS			
12	**Physical Condition**	Percentage of household having pucca houses	32%
		No. of Telephone towers	Mobile towers
		Percentage of Pucca streets	26% PCC road
		No. of streetlight	277
13	**Physical Infrastructure**	Tap water	No tap water supply
		Households with toilets	56% households with toilets
		Sewer System	No sewerage system
		Electricity	95% of households with electricity
		Drainage on streets (percentage)	3%
		No. of household using clean energy (LPG/ Bio-gas)	60%
14	**Social Infrastructure (numbers)**	Availability of Sub-centre/ PHC/CHC (Govt.)	No Sub-centre/ PHC/CHC; 01 Referral hospital in Kamladih at a distance of 2 kms.
		Medical Pvt.	No
		Veterinary Clinic Hospital	No
		Education - Govt.	03 nos. of Primary school (classes I-V);
		Education - Pvt.	02 nos. Middle school (Classes I-VIII)
		Availability of vocational educational center/ ITI.	01 Private. ITI; 01 Private. Engineering. College
		Anganwardi	06 centers
		Pragya Kendra	01

15	**Connectivity with Town**	Approach Road- Metalled/ un-metalled	Approach by National Highway which crosses through the Gram Panchayat
		Distance from Town	11 kms from District headquarter Bokaro and 7 kms from Block headquarter Chas
		Frequency of Bus/Pvt. Vehicle	No public transportation available, except buses plying from Purulia to Chas and Dhanbad
16	**No. of Banks/ Credit Societies**		02 banks and 02 ATMs
17	**Communication facilities**	Telephone exchange	No telephone exchange
		Internet Café/ Common Service Centre	No internet café or Common service center
18	**Percentage of HHs having assets**	T.V	45.4 %
		radio service	13.8%
		computer	4.4%
		Two-wheeler (scooter/moped/motorcycle)	33.1%
		Four-wheeler	3.9%
		Mobile Phones	51.4%
		LPG	53.7%
		Households having all above mentioned assets	2.8%

Of the total gram panchayat area of 1003.5 ha, only 308.3 ha were net sown area as per Census 2011 which increased to 310 ha in 2017 according to a survey conducted in the same year. However only 3.25 ha of land is considered for irrigation. Since, 60% of the households, in the gram panchayat, are engaged in farm activities, therefore, soil testing center, government seed and fertilizer shop are located to further support agricultural activities

The gram panchayat is connected to National Highway 32 which passes through the gram panchayat and bifurcates it in two sections. There are no public transportation

available, except buses plying from Purulia to Chas and Dhanbad on the National Highway. The gram panchayat has only4 to 8 hours of electricity supply for domestic purposes; however 95% of households have electricity connections. Only 22 households depend upon and use clean energy sources like LPG or Bio-gas.

With regards to health and sanitation aspects the Gram panchayat is not yet free of open defecation and thus more toilets have to be constructed at the community and household level. Also, there is no community waste disposal system, bio gas or recycle of waste for production use, drainage facility, nor availability of piped water supply in the gram panchayat. Therefore there is immense scope of development and construction of these facilities and amenities in the panchayat to provide a better quality of life in it.

Kandra gram panchayat has significant level of educational facilities. There are 03 nos. of government Primary school for classes I to V, and 02 nos. private Middle schools for classes I to VIII and one private ITI. However, the health facility is not well catered as there are no sub-centre, primary and community health centers. Also, there is no veterinary clinic hospital present in the gram panchayat. To further support the functioning of the gram panchayat, it has a Post Office, banks and ATMs, and also an internet café common service center. But the gram panchayat lacks any vocational training center. The gram panchayat has a well-functioning Public distribution system and an Aanganwadi center. There are some poverty alleviation and women empowerment programs which have been considered in the Gram Panchayat. Around 130 households have been mobilized into SHGs, however none of the households are supported by village based agricultural extension workers, and the livestock extension workers. Also, none of the households have been mobilized into producer groups.

1.10.3 Planning Framework and Existing Plans for Kandra Gram Panchayat

The Kandra Gram Panchayat of Chas C.D. Block in Bokaro District shares its north-west boundary with Chas Municipal Corporation and thus has been included in the Chas planning area as per the Chas master plan as notified by Department of Urban Development and Housing Department of Govt. of Jharkhand bearing notification number 6560 dated 20th October 2017. Fig. 1.9 presents the Map showing the administrative boundary of Kandra Gram Panchayat. Fig 1.10 shows the location of Kandra Gram Panchayat with respect to planning Area of Chas Master Plan 2031.

Following its Constitution as a separate State, Jharkhand enacted its Panchayati Raj Act. This has been done in accordance with the provisions of the 73rdAmendment to the Constitution and that of the Panchayat Extension to the Scheduled Areas) Act, 1996. As per section 10 of Chapter II of the JPR Act 2001, The Gram Sabha has the power to approve all plans including Annual Plans, programs and projects for social and economic development before such plans, programs and projects are taken up for implementation by the Gram Panchayat. It is also mentioned that it has the power to control local schemes, and over sources and expenditure of such schemes. As far as spatial planning is concerned, there is no such land use plan prepared for Kandra Gram Panchayat, and Planning is restricted to sectoral planning at present in the form of the GPDP. The current GPDP of the gram panchayat only talks about infrastructure projects, as can be seen in Table 1.1. There is no attention to the spatial expansion of the abadi area and its implications on the quality of life, or the changing spatial character caused by the recent land diversions. There is a need to relate these funds phase wise with the development priorities of the village. In dynamic peri-urban areas, these aspects are very much required to be considered and incorporated in a statutory planning framework for rural settlements. Hence there is need for a GPSDP for the gram panchayat, which may serve as a template or model GPSDP for all such rural settlements in the state of Jharkhand.

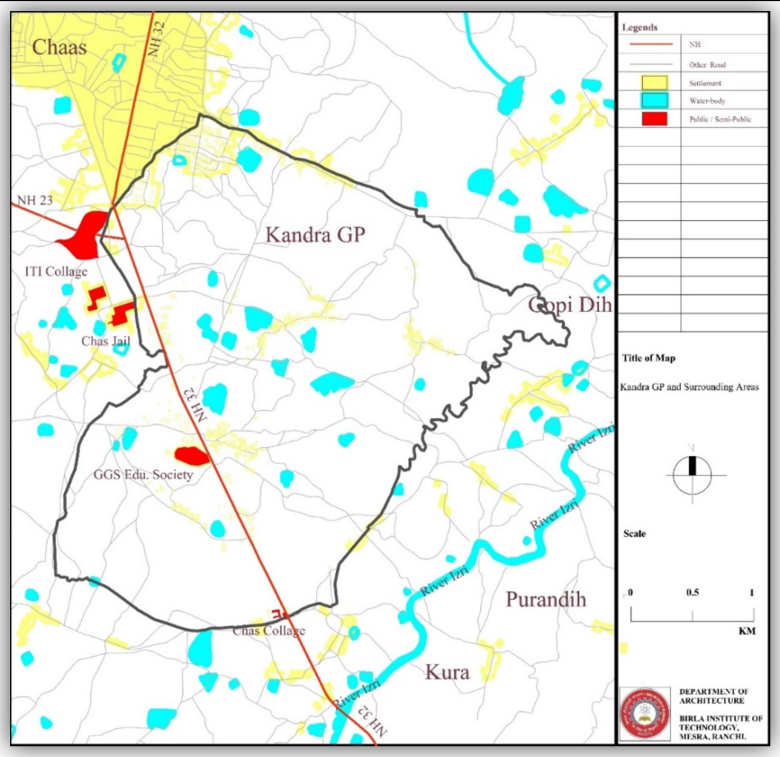


Fig: 1.9: Map of Kandra Gram Panchayat with its boundary

Source: Prepared by the BIT Mesra Team

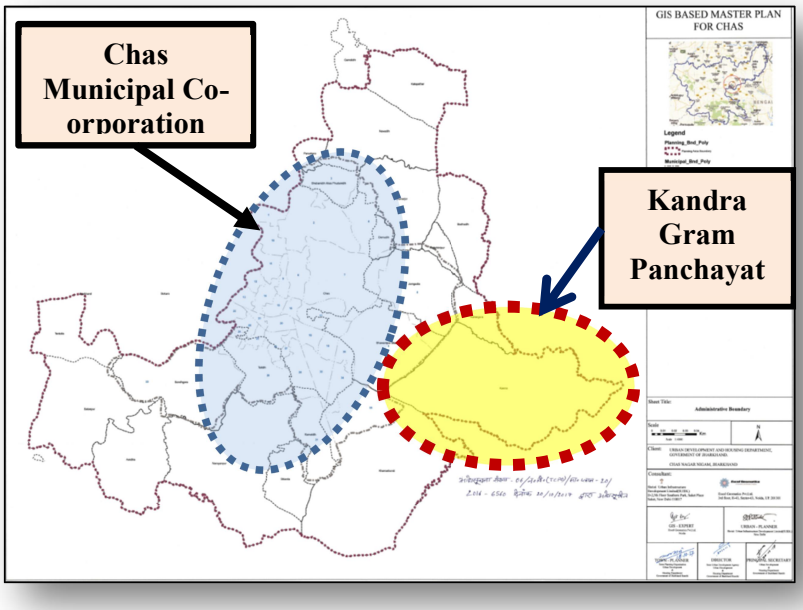


Fig. 1.10: Location of Kandra Gram Panchayat with respect to Planning Area of Bokaro. *(Source: Bokaro Master Plan)*

1.10.4 CONSTITUTION AND IDENTIFICATION OF GRAM PANCHAYAT

The three-tier panchayat elections, for the first time in the State of Jharkhand were held in the December of 2010. As per the 2015 Gram Panchayat elections the Kandra gram panchayat had five Wards or Tolas. Labudih has the largest population size of 2145 persons. The Dhandabra site having a population of 256 persons was the rehabilitation site for people who were displaced in the Bokaro Steel Plant area.

Fig. 1.11 presents the administrative boundary of Kandra Gram Panchayat and table 1.4 lists the different wards within the Kandra Gram Panchayat and their population size. The Gram Panchayat does not have identified ward sadasya or ward members elected for the individual wards. Fig. 1.12 presents the ward map.

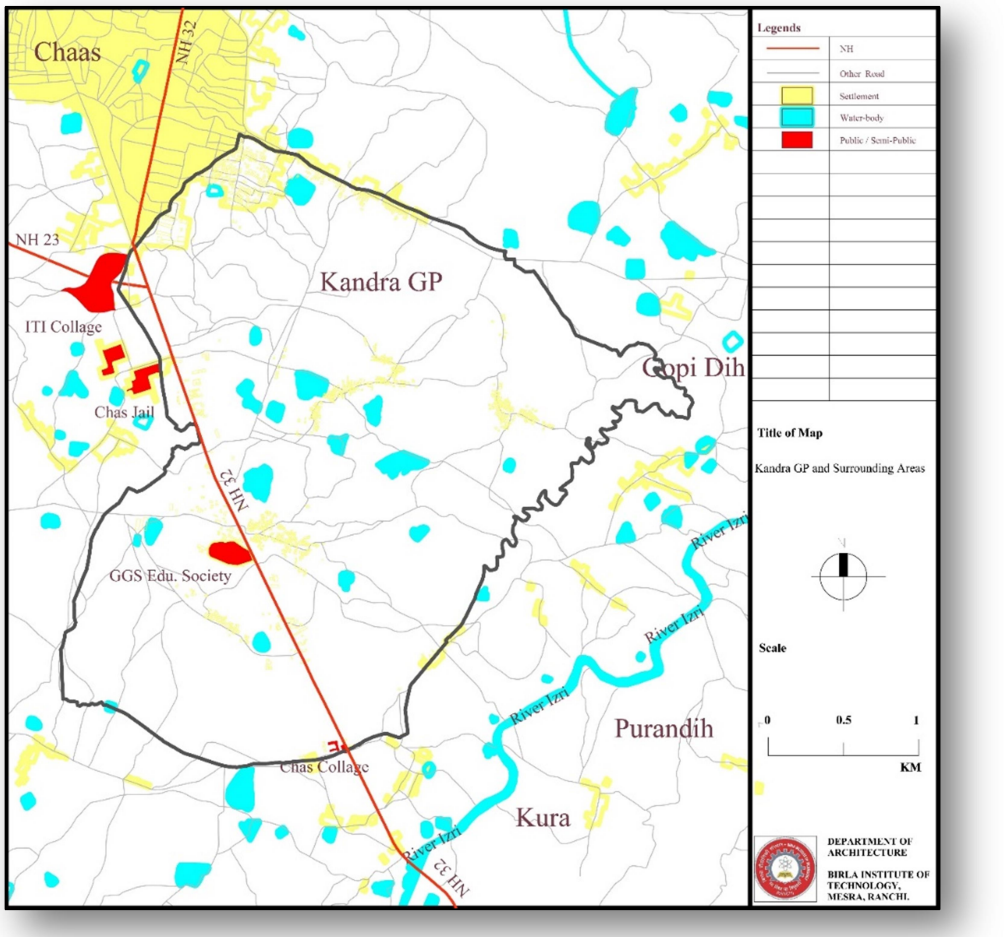


Fig. 1.11: Map showing the administrative boundary of Kandra Gram Panchayat (*Source: Prepared by the BIT Mesra Team)*

Table: 1.4: Wards/ Tolas in Kandra Gram Panchayat

S. No:	Ward Name/ Tola	Population	Ward Sadasya (Member)
1	Kandra	2145	Kandra Gram Panchayat do not have identified ward sadasya or ward members elected for the individual wards.
2	Labudih	2570	
3	Ramdih	1428	
4	Partand	670	
5	Dhandabra Site	256	

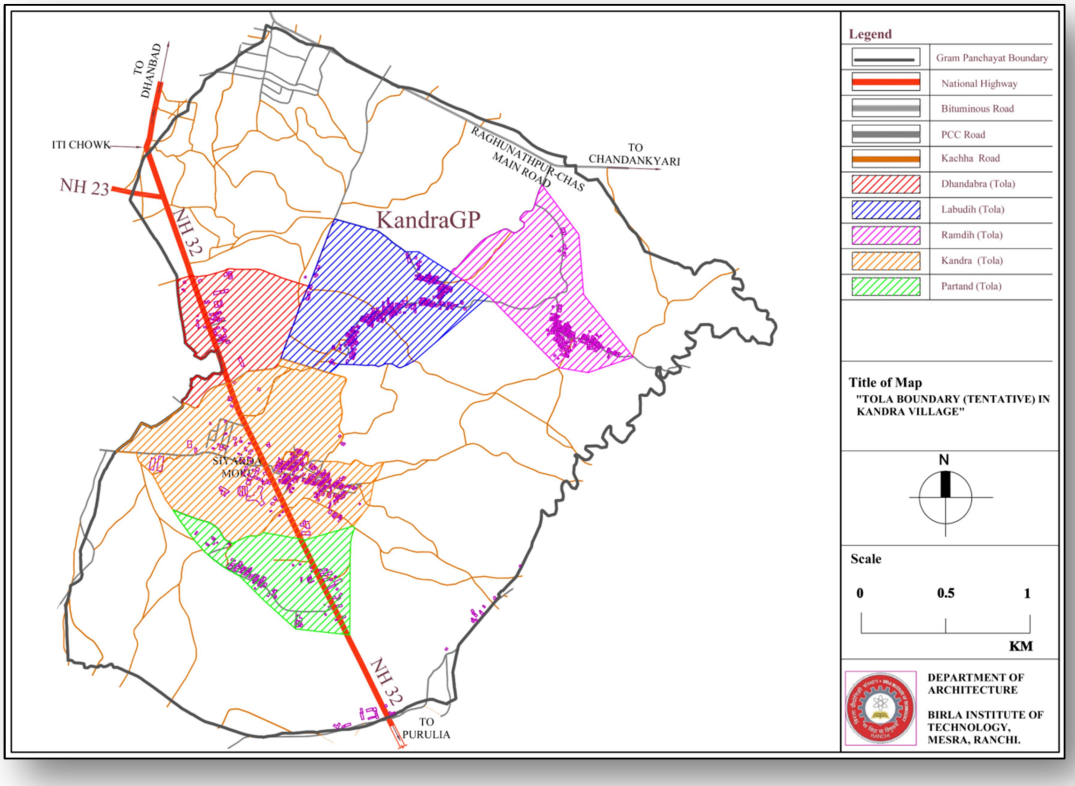


Fig. 1.12: Ward Map of Kandra Gram Panchayat

Source: Prepared by the BIT Mesra Team

1.10.5 Current Flagship Programs of Govt. of India and Govt. Jharkhand in Kandra Gram Panchayat

PRIs are implementing agencies of the Centrally ponsored Schemes.In the state of Jharkhand, the major schemes being implemented by the Panchayati Raj state department are Backward Region Grant Fund (BRGF) and Rajiv Gandhi Panchayat

Sashatrikaran Abhiyan(RGPSA, Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), Grants received under Fourteenth Finance Commission (14FC) and State Plans. Under these schemes, construction of buildings, roads, culverts, drains, ponds, wells, chapakal, chabootara etc. are done by the PRIs.

Themajor programmes being operated by the Ministry of Rural Development in rural areas are as follows:

- Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) for providing wage employment,
- DAY-NRLM
- Pradhan Manntri Aawaas Yojna-Gramin
- Pradhan Mantri Gram Sadak Yojana (PMGSY) for construction of quality roads
- National Social Assistance Programme (NSAP) for social pension
- Integrated Watershed Management Programme (IWMP) for improving the productivity of the land
- Sansad Adarsh Gram Yojna
- RuRBAN mission
- Water Conservation Stories
- Sabki Yojana Sabka Vikas
- Gram Swaraj Abhiyan
- DISHA
- Mission Antyodaya
- DDUGKY
- PMGSY
- DIKSHA
- SWACHH Gram

1.10.6 State Of Central and State Funded Schemes and Development Plans in Kandra Gram Panchayat

The Fifteenth Finance plan has allocated Rs. 4, 24,557 in 2020-21 as the first phase allotment for the Kandra GP (GP_15th FC Allotment 2020-21).

The Gram Panchayat of Kandra is supported by various Central and State Government Schemes. In 2015-16, Yojana Banao Abhiyan for the first time gave opportunity to the Gram Panchayats for preparing the holistic development plan for the panchayat. The recommendation of the 14thand 15th Finance Commission for

Gram Panchayat also became a driving force for the preparation of the plans. Thus, the State of Jharkhand was the first state to prepare Gram Panchayat Development Plan (GPDP) based on convergence in the year 2019-2020. The GPDP for Kandra GP is largely piecemeal and project based where integration of the whole GP in the developmental process has not been conceived.

For the GP of Kandra, various schemes like Pradhan Mantri Gramin Awas Yojna (PMAY), Pradhan Mantri Gram Sadak Yojana (PMGSY), Mukhya Mantri Gram Sadak Yojaya (MMGSY) National Rural Livelihoods Project (NRLP) which is a component of NRLM, Mahila Kisan Sashaktikaran Pariyojna is a sub component under NRLM, Mahatma Gandhi National Rural Employment Guarantee (MNREGA), Mukhya Mantri Samagra Gram Yojana (MMSGY), Pradhan Mantri UjjwalaYojana (PMUY), Pradhan Mantri Fasal Bima Yojana (PMFBY), Pradhan Mantri Suraksha Bima Yojana (PMSBY), Sarva Shiksha Abhiyan Pradhan Mantri Kisan Samman Nidhi (PMKSN) have been initiated. The stakeholders and residents are availing the benefit of them.

Further, the State Government of Jharkhand is planning to launch a new scheme called “ARYA” to attract rural youth in agriculture by making them skilled and make the state self-dependent in agriculture.

Apart from the above mentioned schemes and programs, the Government of Jharkhand has initiated many social welfare schemes for the people of the Gram Panchayat including Student Scholarship Scheme, Tribal School Scheme, Birsa Awas Yojana, and various other schemes for Scheduled Caste, Schedule Tribes and Citizen Protection Schemes which are there in practise in Kandra GP. Table 1.5 presents the details of various GPDP considered in Kandra GP over the past five years.

Table 1.5: Details of GPDP in Kandra Gram Panchayat over the past five years

S. No	Financial Period	Nature of Development Works	Status of Development Works during the Financial Year				Total Work			
			Comp. works	Ongoing/ Suspended	Approved not in progress	Expenditure in Lakhs	Comp. works	Ongoing/ Suspended	Approved not in progress	Expenditure in Lakhs
1	2015-16	Renovation of	1	0	0	0	3	7	0	4.62

		traditional water bodies								
		Rural Connectivity	0	1	0	1.35				
		Rural Sanitation	0	1	0	0				
		Water Conservation and Water Harvesting	0	0	0	0				
		Works on Individuals Land (Category IV)	2	5	0					
2	2016-17	Rural Connectivity	1	0	0	0.08	9	14	0	7.04
		Rural Drinking Water	0	0	0	0				
		Rural Sanitation	1	1	0	0				
		Water Conservation and Water Harvesting	3	5	0	4.94				
		Works on Individuals Land (Category IV)	4	8	0	2.01				
3	2017-18	Rural Sanitation	0	1	1	1.02	7	142	14	8.31
		Water Conservation and Water Harvesting	4	1	0	0				
		Works on Individuals Land (Category IV)	3	140	13	7.29				
4	2018-19	Rural Sanitation	0	1	1	0	65	98	15	6.82
		Water	1	0	0	0				

		Conservation and Water Harvesting								
		Works on Individuals Land (Category IV)	64	97	14	6.82				
5	2019-20	Rural Sanitation	0	1	1	0	45	93	17	3.27
		Works on Individuals Land (Category IV)	45	92	16	3.27				
6	2020-21	Rural Sanitation	0	1	24	0	26	97	48	3.39
		Works on Individuals Land (Category IV)	26	96	24	3.39				

Source: Review of Previous years GPDP – Kandra GP and current updates from survey.

1.10.7 Administrative Hierarchy in Kandra Gram Panchayat

Kandra Gram Panchayat as per the 2015 Gram Panchayat elections has 05 wards. Tables 1.6 and 1.7 present the administrative structure of Kandra GP and, the list of elected representatives of different wards in the GP. The gram panchayat does not have elected representatives or ward sadasyas for different wards.

Table 1.6: Administrative Structure of Kandra Gram Panchayat

Year of Panchayat Elections	Number of Wards	Nomenclature of Panchayat Administrative Structure and Heads	Number of members	Name of the Elected Representative
2010	05	Panchayat Secretary (Mukhiya)	01	Naresh Singh Choudhary
		Up Mukhiya	01	Rita Devi
		Panchayat Samiti Sadasya	01	Beheram Singh Choudhary
2015	05	Panchayat Secretary	01	Sraban Ray

		(Mukhiya)		
		Up Mukhiya	01	Amrita
		Panchayat Samiti Sadasya	01	Amavati Devi

Source: Kandra GP office records

Table 1.7: Elected Representatives (Ward Sadasya) of different Wards in Kandra Gram Panchayat

Ward No:	Ward Name/ Tola	Population	Name of Ward Sadasya (Member)
1	Kandra	2145	Kandra Gram Panchayat do not have identified ward sadasya or ward members elected for the individual blocks.
2	Laghudih	2570	
3	Ramdih	1428	
4	Partaand	670	
5	Dhandabur Site	256	

Source: Kandra GP office records

1.10.8 Status of Parallel Bodies at the Gram Panchayat Level

As per the JPR Act 2001, a GP can constitute eight Standing Committees for discharge of its functions and duties, and such committees are under general control of the GP and exercise powers as may be conferred on them by the GP.

The JPR Act of 2001 has set the provision of constituting eight standing committees (SCs) for discharging Gram Sabha functions and duties. The committees are namely: (i) Village Development committee, (ii) Government estate committee, (iii) Agriculture committee, (iv) Health Committee, (v) Gram Raksha Samiti, (vi) Infrastructure committee, (vii) Education committee and social justice committee, (viii) Vigilance committee. The Village Development Committee prepares a scheme for all-round development of the village and it is presented before the Gram Sabha for its approval.

Table 1.8 presents the list of standing committees and committee members of Kandra Gram Panchayat.

Table 1.8: Eight Standing Committees and Committee Members of Kandra Gram Panchayat

Sl. No	Name of the Committee	Name of Committee Members
1	Health Committee (Swasthya Samiti)	Dhanshyam Mahto (Chairman)
		Jeetu Bauri(Secretary)
		Nehru Lal Mahto (Member)
		Bhrigu Mahto (Member)
2	Agricultural Committee (Krishi Samiti)	Haripad Mahto(Chairman)
		Pradeep Mahto(Secretary)
		Suvesh Mahto(Member)
		Narayan Mahto(Member)
3	Government estate committee (Sarvajanik Sampada)	Ranjit Mahto (Chairman)
		Dhaltu Mahto(Secretary)
		Ramkumar Mahto(Member)
		Sitaram Mahto(Member)
4	Village Development committee (Gram Vikas Samiti)	Shatrughan Mahto(Chairman)
		Shukhlal Mahto(Secretary)
		Manoj Kumar Mahto(Member)
		Jiten Ghatwaar(Member)
5.	Vigilance committee (Nigrani Samiti)	Mahadev Mahto(Chairman)
		Sukhdev Mahto(Secretary)
		Shashikant Mahto(Member)
		Gauri Rajak(Member)
6.	Education committee and social justice committee (Siksha evam Samajik Samiti)	Dheeren Gope(Chairman)
		Shakti Pad Mahto(Secretary)
		Mukesh Bauri(Member)
		Dhananjay Bauri(Member)
7.	Infrastructure Development Committee (Aadhaar Bhoot Sanrachna Samiti)	Ratan Gope(Chairman)
		Ranpaad Gope(Secretary)
		Vasudev Bauri(Member)
		Kiran Gope(Member)

8.	Gram RakshaSamiti	Bhubaneshwar Mahto (Chairman)
		Shaktipad Mahto(Secretary)
		Srikant Mahto(Member)
		Hiten Pramanik(Member)

Also, at the village level, various committees have been are set up by departments as part of their schemes. For example, Rogi Kalyan Samitis have been set up under the National Rural Health Mission (NRHM) in every village. Sarva Shiksha Abhiyan (SSA) requires the setting up of village education committees or parent teacher committees.

Moreover, Jharkhand is the only State where the Act states that every Gram Sabha has to establish a Gram Kosh (Village fund) consisting of the following four parts: (i) Grain Fund, (ii) Labour Fund, (iii) Commodity Fund, and (iv) Cash Fund. Donations, incentive amounts, and other incomes can be deposited in this fund. Donations, incentive amounts and other incomes can be deposited in Gram Kosh.

1.10.9 Land-Use and Land-cover Distribution in Kandra Gram Panchayat

Table 1.9 presents the land-use land-cover distribution in Kandra Gram Panchayat under different categories. Of the total gram panchayat area of 1003.15 ha, 806.87 ha. and 182.24 ha. Are primarily occupied by Agricultural crop land and Agricultural plantations respectively. Fig. 1.13 presents the existing land-use/land cover map of Kandra Gram Panchayat.

Table 1.9: Land use / Land cover area statistics

Sl. No.	Land use / Land cover Class	Area (ha)
1.	Agriculture Crop land	806.87
2.	Agriculture Plantation	182.24
3.	Forest Plantation	2.28
4.	Amusement/Park	0.81
5.	Industry/ Factory	25.10
6.	Lake/Pond/Drain/Reservoir	33.86
7.	Dense Scrub Land	0.98
8.	Sparse Scrub Land	20.38

9.	Village Settlement	75.89
10.	Village Mixed Settlement	11.92
11.	Hamlet & Dispersed Household	0.35
12.	Open Space	5.52
13.	Village Orchards	43.19
14	Transport network (polygon in Hectare)	13.74
15.	Transport Network (line in Km)	55.16

Source: Computed by Team of BIT Mesra based on satellite maps

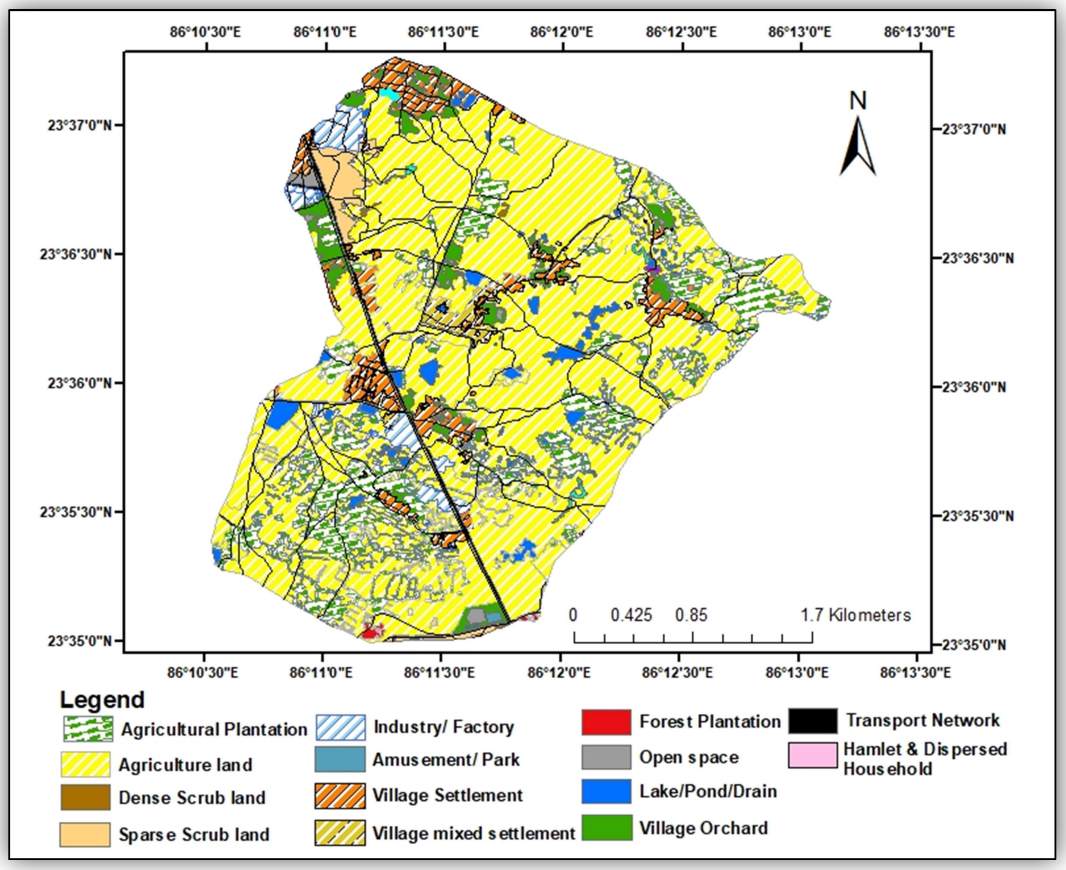


Fig. 1.13: Existing Land-use/ Land Cover Map of Kandra Gram Panchayat

(Source: Prepared by the BIT Mesra Team)

1.11 SWOT ANALYSIS FOR KANDRA GRAM PANCHAYAT

Strength	• The major strength of the GP is its locational advantage along NH 32 and close proximity to the industrial town of Bokaro. • Proximity to the industrial city identifies this GP as a source of

	casual labour for it • 57% of the population are within working age group. • Formidable percentage are employed as manual casual labour who can be redirected to thriving profession through skill development • High land value appreciation of land pockets abutting to NH 32, thereby creating opportunities for inflow of funds to individuals / groups / societies. • Availability of land for development. • Interest of stakeholders in participatory planning • Very vibrant elected members willing to bring air of development within the GP. • State government's financial support for various schemes. • The GP historically has never been affected with regular occurring natural calamities and disasters.
Weakness	• Lack of basic infrastructure at the ground level including piped potable water supply, sanitation system, solid waste management. • Electric supply to various household and institution lacks continuity and remains for less than 10 hours per day. • Lack of maintenance of basic infrastructure like roads. • Adhoc selection of street lighting schemes. • Lack of higher secondary level institutions especially for girls, colleges etc. • Large sections of the population are illiterate or have very elementary level education. • Only 5. 32 % of the population are graduates and above. • Only 3 households own more than 2.5 acres of irrigable land which signifies presence of only few affluent families. • A stunning 84% of the population earns less than Rs. 5000 a month which indicates a very high poverty index. • Inspite of close proximity to industrial town such high poverty level indicates lack of guidance for channelization of resources. • Most of the development projects taken in the last few years (Rs. 12. 36 lakh) have not started inspite of planning and fund allocation. This shows existence of gap between conceptualisation and implementation and severe lack of

	supporting machinery and apathy of line departments. • Lack of large scale development initiatives in the GP inspite of presence of NH. • Lack of use of complete ICT technologies prescribed by Government of India • Lack of implementation of all Rural India upgradation initiatives of Government of India. • The GP has sometimes been affected with cyclonic storms though of less intensity.
Opportunities	• The presence of NH 32 bisecting the GP is a large opportunity for massive development of the GP. • There are chances of high land value appreciation of lands abutting to NH due to reconstitution of Chas boundary. • It can serve as base for supply of skilled labour in future if training and skill upgradation facilities are imparted. • With increased effects of urbanisation for the city of Bokaro and Chas, the GP has opportunity to foster growth of its non-agrarian economy • High percentage of working class in the age group of 16 to 55 years can provide opportunity for starting of various entrepreneurship program to suffice the demand of NH based activities. • With so less development on records (as per Mission Antodaya data), there are opportunities to bring about integrated holistic development of the GP.
Threats	• The development scenario of the GP is largely hit with managerial apathy, fund crunch and piece-meal development. Lack of sustainable and integrated planning approaches may poses threat to the Kandra GP to fall in the category of backward GP in the country. • With the price appreciation of land pockets abutting to NH, there are threats of great economic divide between inhabitants of these land pockets and inhabitants of interiors of the GP. • High poverty index and formidable percentage of illiterates in the GP threatens appreciation of development initiatives and participatory planning specially with respect to managing of funds and resources to be made available for planning process.

CHAPTER 2

INVENTORY OF NATURAL RESOURCES USING HIGH RESOLUTION SATELLITE DATA INFORMATION SOURCES FOR DEVELOPMENTAL PLANNING

CHAPTER 2: INVENTORY OF NATURAL RESOURCES USING HIGH RESOLUTION SATELLITE DATA INFORMATION SOURCES FOR DEVELOPMENTAL PLANNING

2.1 INTRODUCTION

Developmental planning is a complex process of decision making based on the information about the status of resources, socio-economic conditions and institutional constraints. Reliability of the databases, both the spatial and non-spatial, is therefore crucial to the success of the developmental planning. Hence, it is necessary to understand various elements of Gram Panchayat and their interrelationship for ecological planning. The ability of space technology for obtaining systematic, synoptic, rapid and repetitive coverage in different windows of the electromagnetic spectrum, and over large areas from its vantage point in space, has made this technology unique and powerful. Indian Remote Sensing (IRS) satellites are providing timely information from regional level studies to farm level studies through multi sensor resolutions. Thus, Remote sensing and GIS are playing a rapidly increasing role in the field of land and water resources management and also becoming more and more important for environmental applications. There is a strong synergy between remote sensing and GIS, as remote sensing data are a major source of spatial information in GIS analysis and GIS data can be used as ancillary information to support remote sensing data interpolation. The synergy between these two technologies is a major advantage in the use of an integrated approach. Over the last two decades remote sensing and GIS have been widely used for the preparation of different types of thematic layers and integrating them for different applications that include land and water resources planning, agricultural applications, water resource management, disaster management, forestry applications, watershed management and urban applications etc. The present study focuses on the inventory and analysis of natural resources for Kandra Gram Panchayat with specific objectives as given below.

2.1.1 OBJECTIVES

1. Inventory and spatial analysis of natural resources that include thematic layers viz., infrastructure layers, LU/LC, slope, drainage network & water bodies, contours, soil etc.
2. Long term analysis of Rainfall.
3. Long term assessment of surface water potential
4. Generation of Land and Water resource development plans

2.2 INVENTORY OF NATURAL RESOURCES USING HIGH RESOLUTION SATELLITE DATA

Potential tools such as remote sensing and GIS techniques are utilized for generation of various thematic resource maps in conjunction with collateral data. Data integration and generation of development plans are carried out in Geographic Information System environment.

2.2.1 INFORMATION SOURCES FOR DEVELOPMENTAL PLANNING

Satellite data IRS -1D LISS III data, Cartosat and IRS P6 LISS IV data and other collateral data form major source for preparation of various thematic maps as spatial database. The data acquired from the multi-spectral sensors LISS IV (5.6 m resolution) and CARTOSAT (2.5 m resolution) of the Indian Remote Sensing Satellite (IRS) series are extensively used for generating spatial databases. Very high-resolution satellite data (Cartosat 2S & Komsat 3A), is analyzed at finer resolutions to update the spatial layers needed for generating the value-added Land resource and water resource development plans. The data needed for this study is studied in detail and the collected primary maps have been grouped into hydro-geomorphological, topographical, land use/land cover, hydrology and socio-economic parameters (Table 2.1). Subsequently, these primary maps are used to produce utilitarian types of maps to serve planning decisions. They are derived, in some cases, by direct translation of single thematic map and in others by combination of two or more thematic maps or chosen parameters of the different themes (Table 2.2). Natural resources data representing environmental status of the study area that were generated under various national level projects at 1:50000 scale was considered for the present study and are presented below. The database was standardized for integrated analysis under GIS environment.

Table 2.1 Information sources for development planning

Data/map	Source	Spatial/ Non-spatial	Scale
Digital Elevation Model	Cartosat Stereo data	Spatial	10 m
Contour	CARTODEM	Spatial	5m
Geological map	Rajiv Gandhi National Drinking Water Mission	Spatial	1:50K
Geomorphological map		Spatial	1:50K
Structures/Lineaments		Spatial	1:50K

Soil	JSAC	Spatial	1:50K
Land use/cover	Very high-resolution data	Spatial	1:4K/10K
Drainage map	High resolution satellite data	Spatial	1:4K/10K
Surface water bodies		Spatial	1:4K/10K
Meteorological data	IMD	Spatial	25 km grid
Settlement	High resolution satellite data	Spatial	1:4K/10K
Infrastructure		Spatial	1:4K/10K
Village boundaries	Census Directorate, NIC, NRSC	Spatial	1:50K
Population		Non-spatial	
Demography		Non-spatial	

Table 2.2 Derived spatial databases required for planning

Derived map	Theme map	Remarks
Contour/Slope	Topographical map/IRS PAN stereo data	Derived from DEM
Land capability map	Soil, slope and climate maps	Digital aggregation
Groundwater potential	Geology, Geomorphology, borewell, Lithology and yield data	Integration of thematic maps and point database
Surface water potential	Slope, soil map, land use, rainfall and micro-watershed boundary	SCS-CN technique through integration of layers

2.3 SATELLITE DATA USED

2.3.1 HIGH RESOLUTION SATELLITE DATA

Resource Sat LISS 4 satellite data acquired during 2018 was used for GPSDP planning. The LISS-4 multispectral high-resolution sensor is the prime instrument of Resource Sat-2 satellite.

2.3.2 VERY HIGH-RESOLUTION SATELLITE DATA

Resource mapping at 1:4000 scale was carried out using VHRS data at sub meter resolution acquired using Komsat 3 sensor. KOMPSAT-3A will provide panchromatic resolution of 0.55m and multispectral resolution of 2.2 m and also has an infrared sensor at 5.5m resolution. The merged product is generated with spatial resolution of 0.7m (Fig. 2.1).

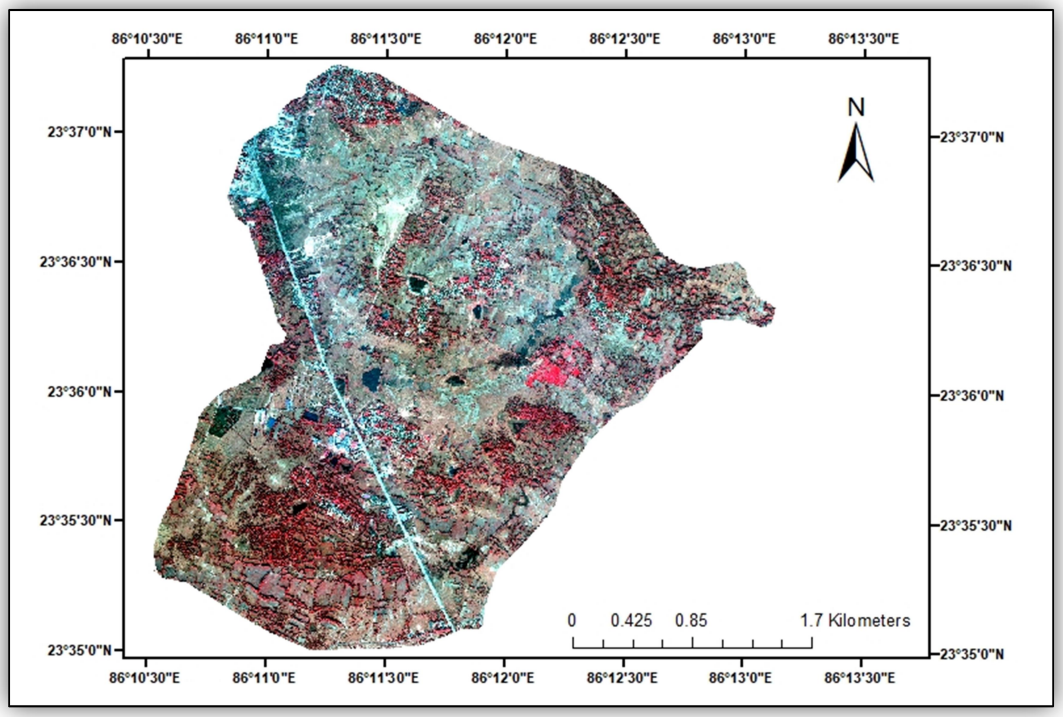


Fig. 2.1: Kandra GP as seen through Very High-Resolution Satellite data (0.7m)

Source – prepared by NRSC, ISRO

2.3.3 DIGITAL ELEVATION MODEL

DEM is one of the important parameters for developmental activities and was derived from CARTOSAT stereo data. The elevation data is very much essential for generation of slope and contour maps, which are essential requisites for spatial planning purposes. DEM of the study area is shown as Fig. 2.2.

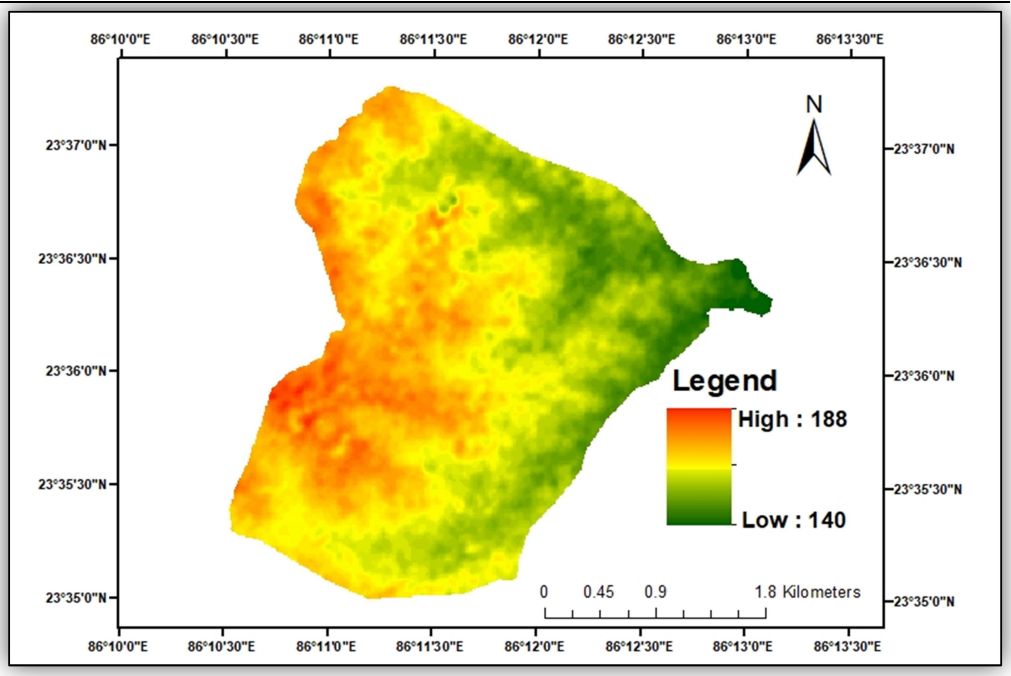


Fig. 2.2: Digital Elevation Model (DEM)

Source – prepared by NRSC, ISRO

2.4 SPATIAL LAYERS

Spatial layers representing the synoptic view of GP were generated at 1:10000 and 1:4000 scales.

2.4.1 INFRASTRUCTURE LAYER

Road and rail network delineated from very high-resolution satellite data is shown as Figure-3 Further, the road network was overlaid with zoning map (5 km,10 km, 20km) in order to analyze the nearness of the towns to GP.

2.4.2 SETTLEMENT LAYER

Growth of settlement in a particular direction can be analyzed using satellite data more explicitly. The settlement layer was generated using VHRS data.

2.4.3 LULC DATA

Land use/land cover was carried out using high resolution data at multiple scales i.e. both at 1:10000 (2010-2011) and 1:4000 (2018-19) for periodic monitoring of natural resources. Spatial distribution of land use land cover classes at 1:4K in the GP is shown as Fig. 1.13.

2.4.4 AREA UNDER CULTIVATION

Agricultural areas under Gram Panchayat were delineated from LULC layer at 1:4000 scale (Fig. 2.3).

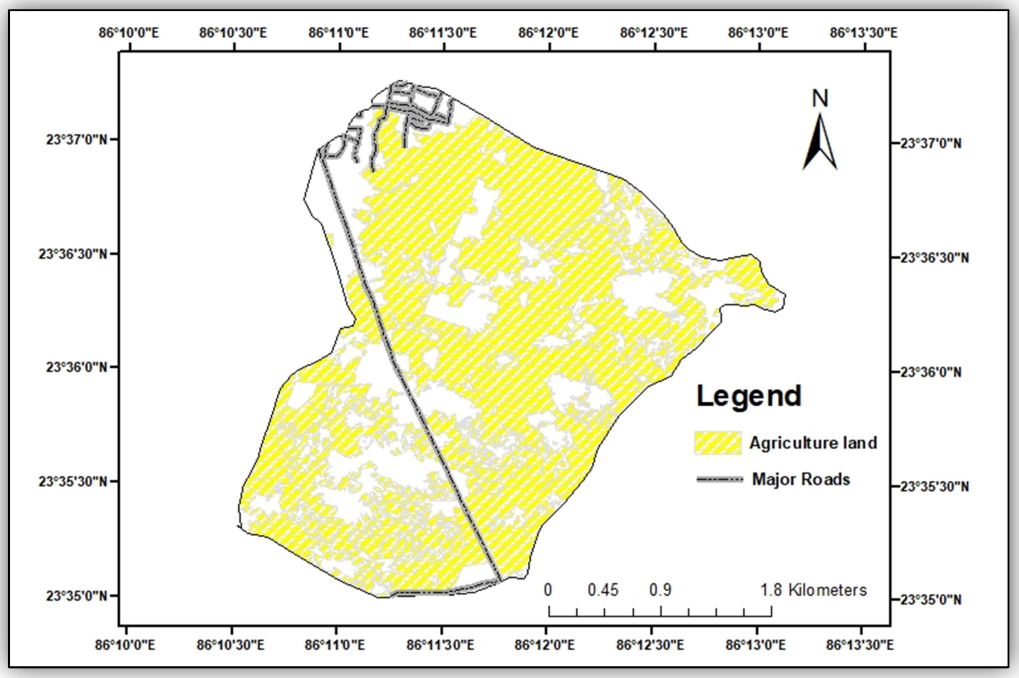


Fig. 2.3: Area under Cultivation

Source – prepared by NRSC, ISRO

2.4.5 DRAINAGE NETWORK & WATER BODIES

Rivers/streams are natural course of water flowing on the land surface along a definite channel and its spatial distribution in the GP is shown as Fig. 2.4.

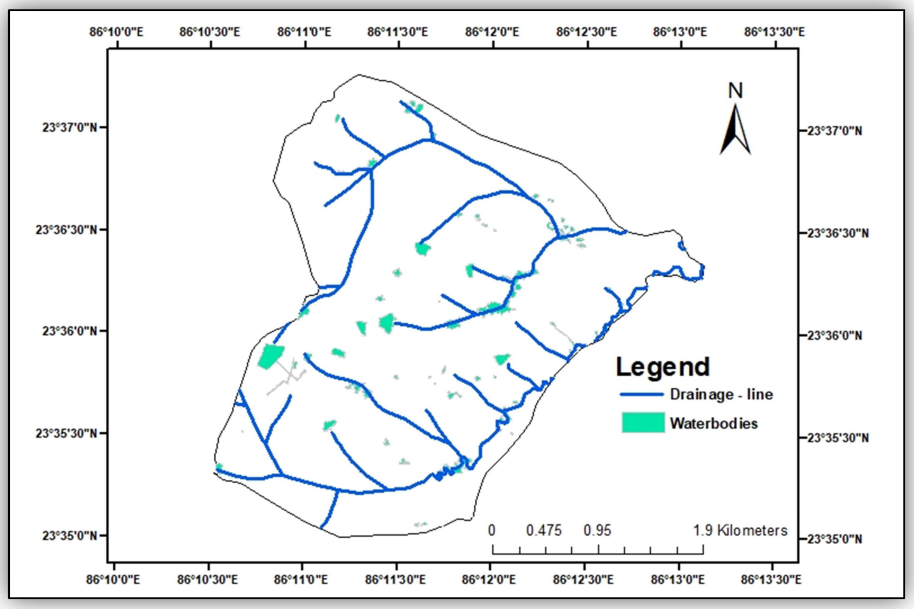


Fig. 2.4: Drainage Network and Water body map

Source – prepared by NRSC, ISRO

2.4.6 SOIL TEXTURE

Spatial distribution of soil textural information in the GP is shown as Fig. 2.5.

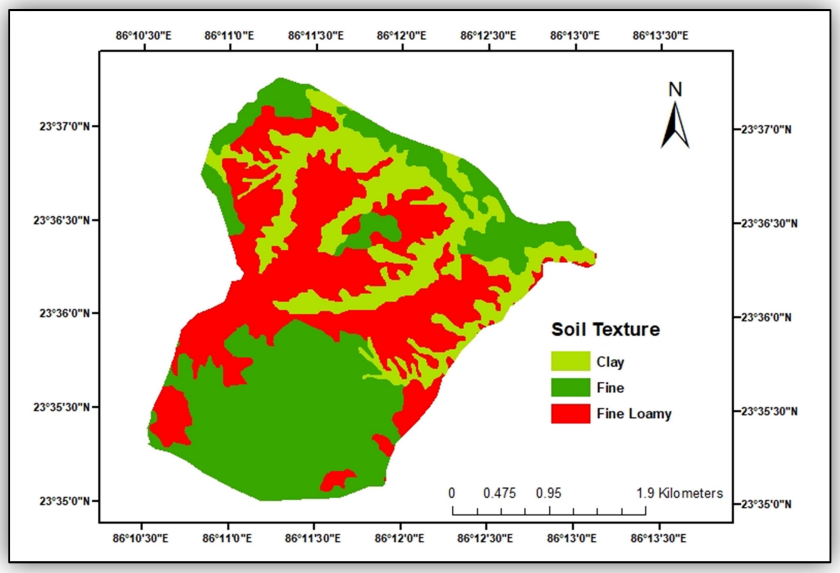


Fig. 2.5: Soil Textural map

Source – prepared by NRSC, ISRO

2.4.7 SLOPE MAP

CartoDEM is used for generation of the slope layer and plays an important role in developing the Water Resource Development Plan (Fig. 2.6).

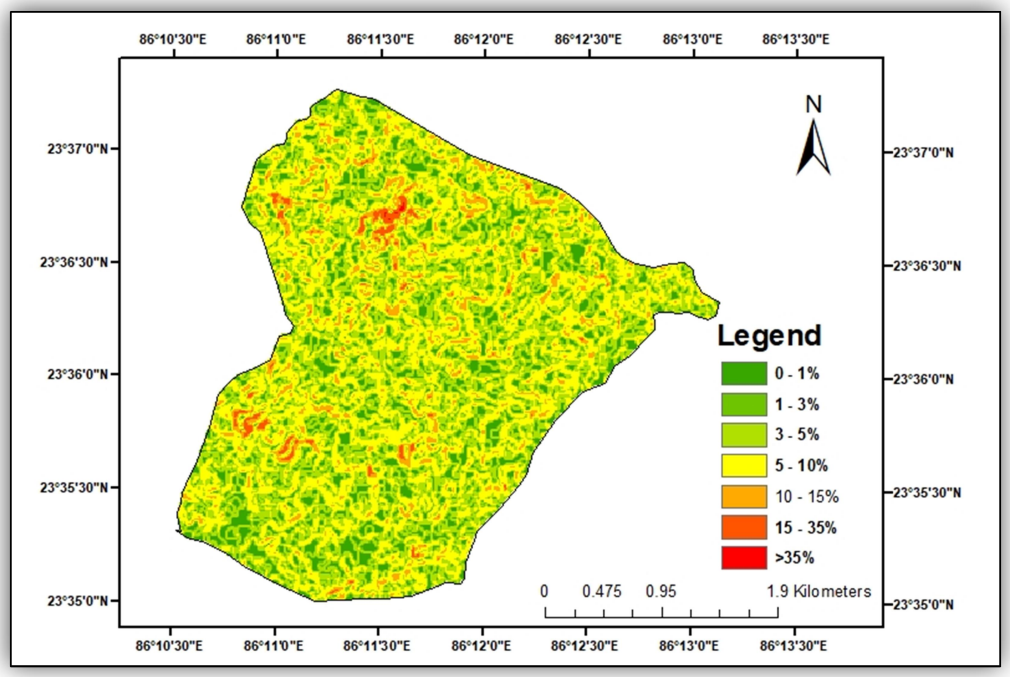


Fig. 2.6: Slope (in percentage)

Source – prepared by NRSC, ISRO

2.4.8 GEOMORPHOLOGY

Hydro-geomorphological maps depict major geomorphic units, landforms and provide an understanding of the processes relating to groundwater occurrence as well as groundwater prospects. Based on the morphological expressions in the satellite data, geomorphological map prepared at 1:50000 scale is presented in Fig. 2.7.

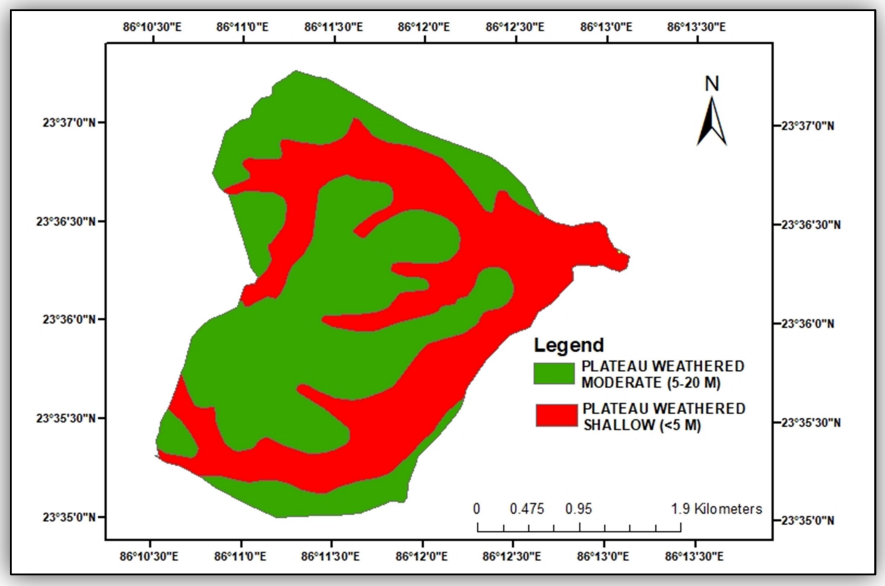


Fig. 2.7 Geomorphology map

Source – prepared by NRSC, ISRO

2.4.9 LITHOLOGY

The general physical characteristics of a rock or the rocks in a GP are derived from satellite data in form of lithology layer (Fig. 2.8). The information about the rock type is very important in generation of water resource development plans.

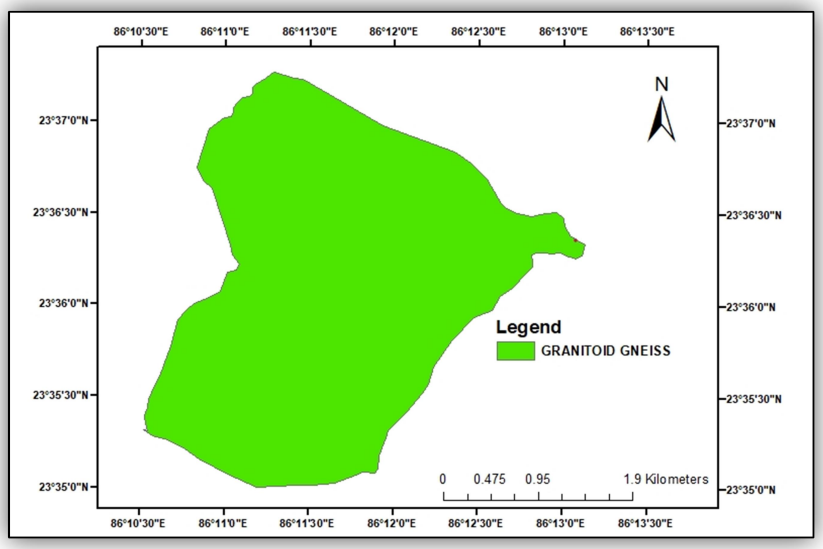


Fig. 2.8 Lithology map (*Source – prepared by NRSC, ISRO)*

2.5 HYDROGEOLOGY

The hydrogeology and recharge condition layers have to be integrated to know the depth to water table and available recharge to the aquifer. It is used to calculate the recharge from continues irrigated water source, temporarily/seasonal water source, less or no recharge sources. Its important information needed to determine the water condition in the vicinity of Gram Panchayat.

2.5.1 Contour map

Contours at 5 m contour interval generated using cartoDEM are shown in Fig. 2.9.

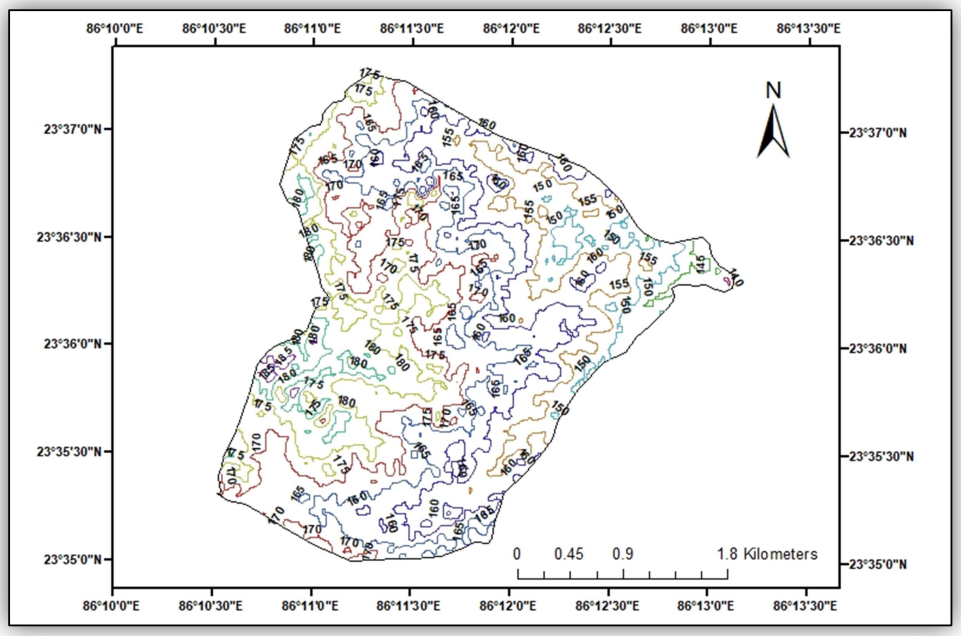


Fig. 2.9 Contour map

Source – prepared by NRSC, ISRO

2.5.2 LONG TERM RAINFALL ANALYSIS

Annual rainfall varied between 858 mm - 2100 mm during the period 1979-2003 indicating high temporal variability. Further, number of rainy days along with statistics in the GP was computed for different years indicating wet, dry and normal conditions (Table 2.3)

Table -4 Rainfall analysis for Dry, Wet and Normal Conditions (1979-2003)

	Meteorological Condition								
Statistics	Dry Conditions			Wet Conditions			Normal Conditions		
	Rain fall	Run off	Rainy days	Rain fall	Run off	Rainy days	Rain fall	Run off	Rainy days
Mean	908	386	92	1936	1193	127	1009	535	108
Standard Dev.	53.2	35.2	13	129	117	16	523	325	47

2.5.3 LONG TERM SURFACE RUNOFF ASSESSMENT

Runoff is a general term to indicate the accumulation of excess rainfall, which traverses over surface/sub surface and occurs when rainfall intensity is greater than the rate at which it is able to infiltrate the soil. In this study, one of the most widely used technique USDA Natural Resources Conservation Service (NRCS) Curve Number (CN) method was used for assessment of runoff potential for GP (USDA-SCS, 1985). The spatial distribution of runoff in the study area was computed for three meteorological conditions (wet years, dry years and normal years) and presented in Fig. 2.10, 2.11 and 2.12. Quantitative assessment of runoff serves as basic information for adopting suitable soil and water conservation measures in a watershed.

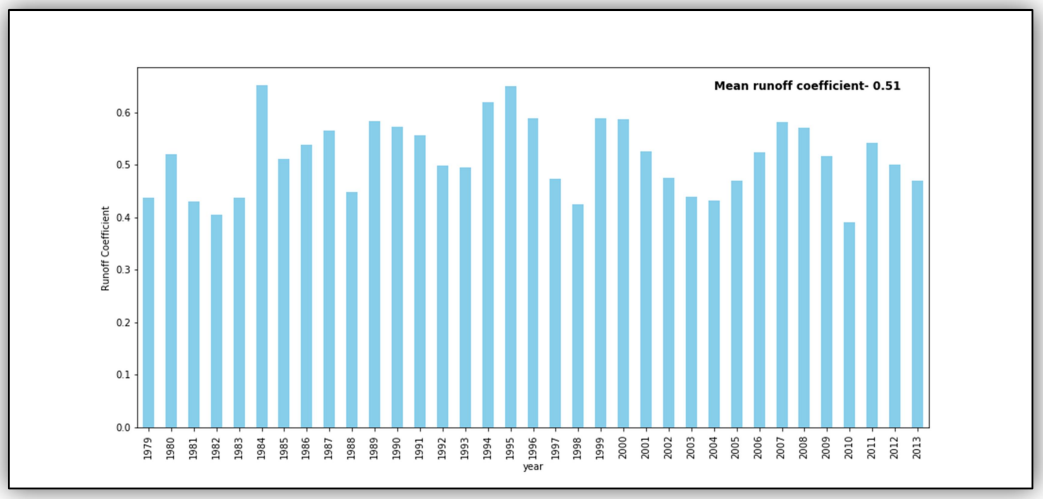


Fig. 2.10: Annual Variation of runoff Coefficient (1979-2013)

Source – prepared by NRSC, ISRO

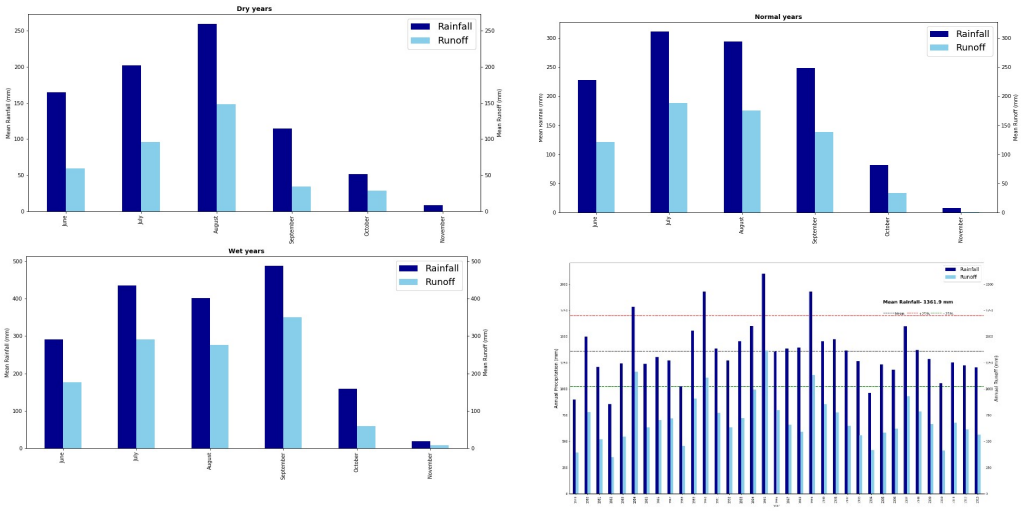


Fig. 2.11 Mean Surface Runoff (a) Dry conditions (b) Normal conditions (c) Wet conditions (d) Annual Scale (1979-2013)

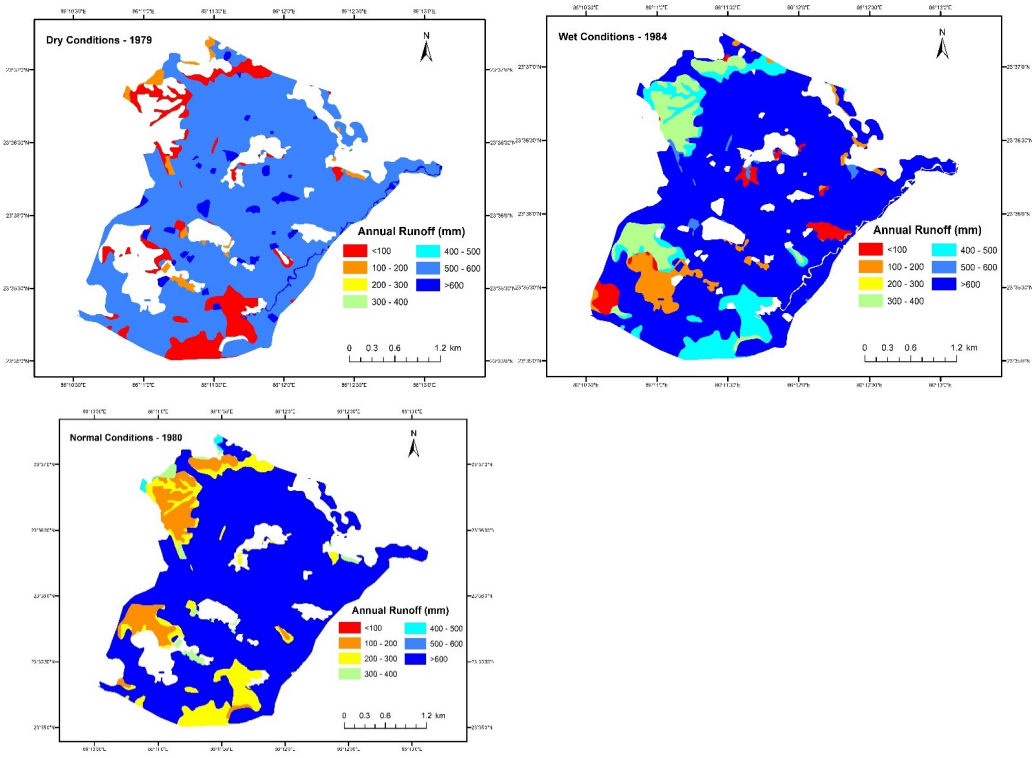


Fig. 2.12: Surface runoff assessment under different meteorological conditions

Source – prepared by NRSC, ISRO

2.5.4 GROUND WATER POTENTIAL

Groundwater cannot be seen directly from remotely sensed data hence its presence must be inferred from manifestation of surface features which act as an indicator of groundwater. Ground water potential map generated under Rajiv Gandhi Drinking Water Mission was envisaged for planning purpose (Fig. 2.13). Groundwater potential map was categorized according to its recharge characteristics as either (i) Good – Very Good, (ii) Moderate - Good, (iii) Moderate (iv) Poor - Moderate (v) Poor. The lineaments are the surface manifestation of linear features like joints and fractures. They have been demarcated from the imagery as linear features and are ascertained after field traversing. Groundwater potentiality of a higher order is indicated where lineaments run along and across the alluvial zone.

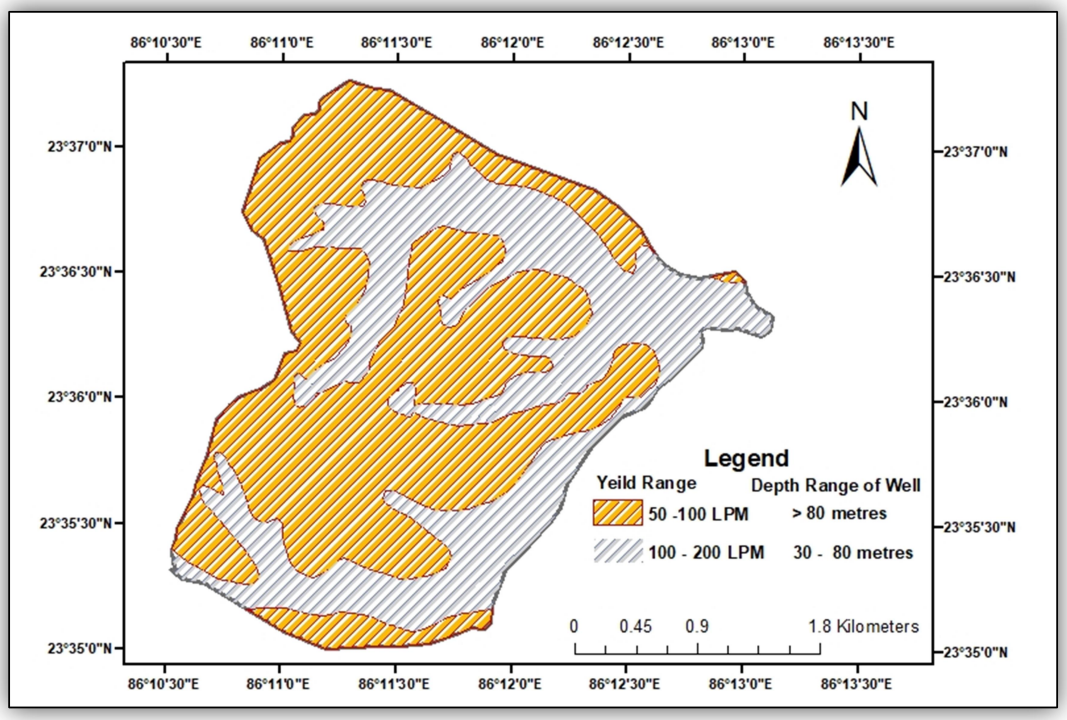


Fig. 2.13 Groundwater Prospects map (*Source: Groundwater potential map generated under Rajiv Gandhi Drinking water Mission project, NRSC*)

Groundwater quality map of the study area is shown as Fig. 2.14 and Table 2.4. Groundwater quality in the GP is potable.

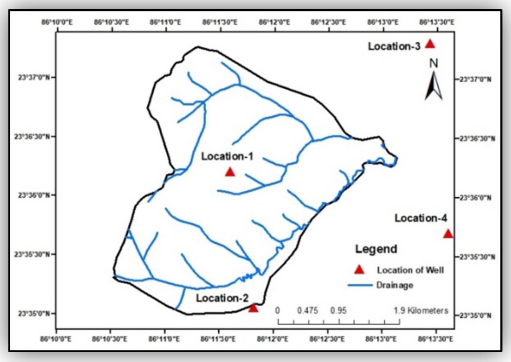


Fig. 2.14: Groundwater Quality Location map

Source – prepared by NRSC, ISRO

Parameter	Location 1	Location 2	Location 3	Location 4
pH	7.00	7.0	7.00	7.00
TDS	0	0	0	0
Hardness	220	240	320	380
Fluoride	0.92	0	0.62	0.46
Chloride	0	0	0	0
Iron	0.93	0.62	0.73	0.46
Nitrate	29	17	30	17
Alkalinity	0	0	0	0
GWQ	Potable	Potable	Potable	Potable
Data source	IMIS	IMIS	IMIS	IMIS
Year	2016	2016	2016	2016

Table 2.4 Water quality parameters for different locations

Source – prepared by NRSC, ISRO

2.6 GENERATION OF COMPREHENSIVE DEVELOPMENT PLAN FOR GP

2.6.1 WATER RESOURCES DEVELOPMENT PLAN

The water resource development plan generation using GIS includes identification of suitable zones for taking up locale specific activities in the study area. Local area specific activities are generally the areas, where certain type of water resource activity is recommended for implementation. Water conservation measures like check dam, percolation tank, underground barrier etc. fall under location specific activities. In order to identify the suitable zones for location of recharge structures, different thematic layers viz., drainage network with drainage order buffer map, soil, slope and land use/cover and runoff potential were integrated under GIS environment. Subsequently, zones in which the defined conditions of the different thematic layers were fulfilled are identified for location specific activity. The guidelines for the selection of suitable zones for planning location specific activities are adopted from literature (IMSD,1995; Chowdary et al., 2009;Chowdhury et al., 2010; Shankar and Mohan, 2005). The water resource development plan is shown in the Fig. 2.15.

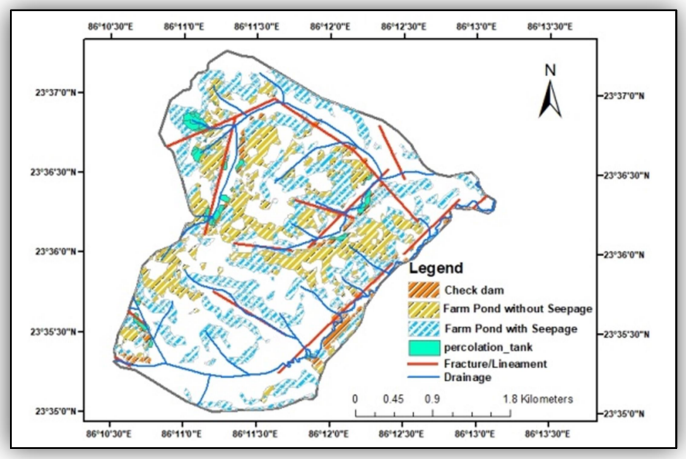


Fig. 2.15: Water resource development (*Source – prepared by NRSC, ISRO)*

2.6.2 LAND RESOURCES DEVELOPMENT PLAN

In general, erratic distribution of rainfall, poor water holding capacity, high infiltration rate, unproductive soil texture, poor fertility of soil and acidity have put a heavy stress on crop productivity and crop diversification in the district. In this study, a decision model that involves the logical combination of thematic maps resulting from the application of conditional operators was established for evaluating the suitability of a particular land use activity in the study area. For achieving this objective, essential prerequisites such as land use/cover, soil, slope and groundwater potential maps are generated using remote sensing and GIS. Integration of geomorphological, hydrogeological and land use data with geophysical investigations gives groundwater potential. This coupled with surface water potential, helps in the generation of alternate land resource development plan. Methodology adopted from the GIS based land use planning project initiated in India entitled 'Integrated Mission for Sustainable Development', which generates, analyzes and integrates natural resource thematic data in 1:50000 scale, together with satellite remote sensing data forms major basis for the present study (IMSD,

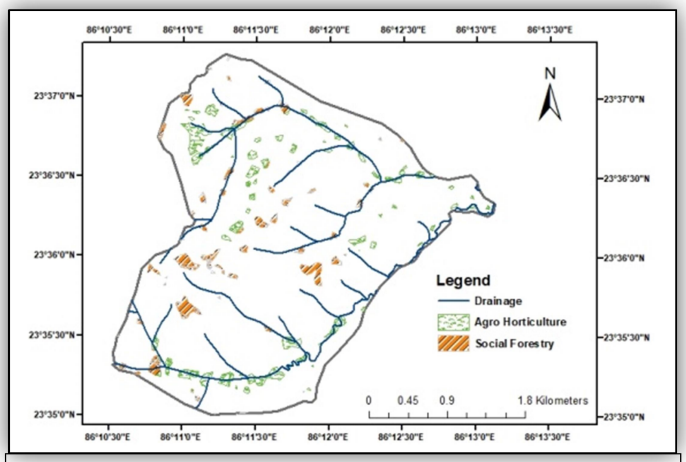


Fig. 2.16: Land Resource Development (*Source – prepared by NRSC, ISRO)*

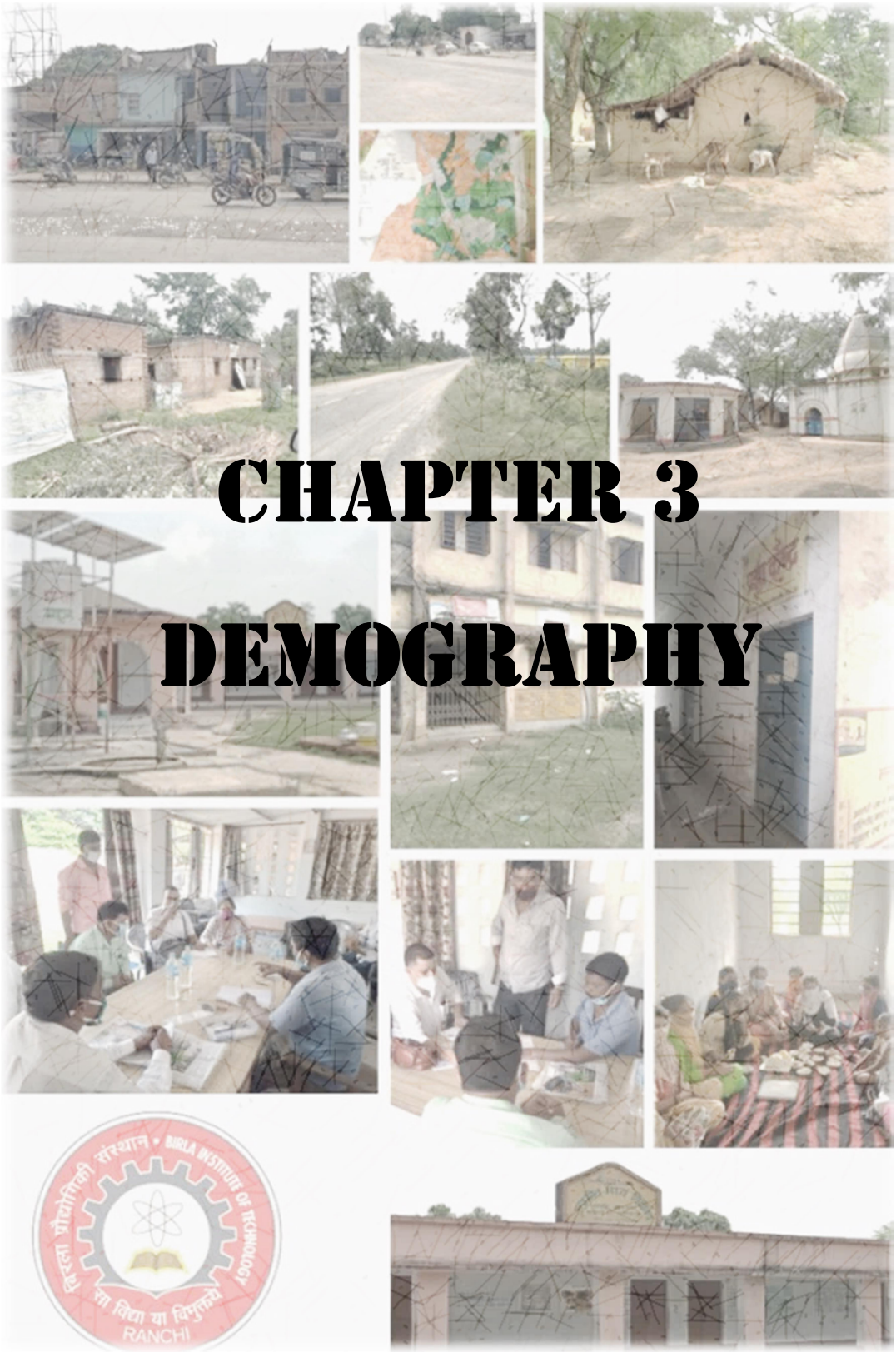
1995). The guiding factors described for land use plan generation have been presented in tabular form. Further, the information on land capability classes and recommended land treatment management practices (Stark et al., 1966; Pretall and Polius, 1981) also served as guiding tools. The land resource development plan is shown in the Fig. 2.16

2.7 RECOMMENDATIONS & SUGGESTIONS FOR IMPROVING NATURAL RESOURCES IN GP

- Rain water harvesting measures such as farm ponds, percolation tanks and check dams are suggested in the GP considering study GP characteristics, which they have significant role in rainfed and dryland farming cultivation. To minimize the cost of construction in case of farm ponds, suitable zones were identified for two soil conditions i.e. with or without seepage control. Dimensions of the pond can be evaluated on the basis of volume of water to be stored. Further, feasible locations for check dam are identified.
- Undulating topography and rain-fed agriculture have led to degradation of soil, diverse agricultural practices and low productivity. Mono-cropping system and predominantly rain-fed agriculture prevails is the district hence the cropping intensity is very low. Rainwater harvesting structures reduce runoff velocity there by minimizes erosion and secondly allow the retained water to percolate and thus results in increased recharge in the wells located downstream of the structure. Some slots should be provided in the check dam so as to allow passing through early monsoon flow that carry appreciable amounts of sediment. The late/post monsoon flow can be stored by plugging the slots with either wooden planks or similar another suitable device.
- Mean runoff coefficient estimated based on the 35 years rainfall data is nearly 0.51 that indicated that nearly 51% of rainfall is converted to runoff. Number of rainy days also varied between 92 to 127 days during the period 1979-2013, which indicates ample scope for retaining surface runoff water through adoption of suitable rainwater harvesting measures.
- Water resource development plan that include suitable areas for check dam and form pond if adopted directly address the temporal discontinuity between the availability of rainfall and crop moisture demand. Although some areas suitable for farm ponds, but it require seepage control due to higher permeability of soils. Cadastral map needs to be overlaid on the WRD plan for implementation purpose. Thus, these structures. Irrigation and water supply can be planned from the wells lying in the dam command. Thus, rainwater harvesting technique helps

in recycling water for raising double cropping system and agro-horticulture crops.

- In the Kandra GP, nearly more than 50% of the area is under agriculture. Inspite of having sufficient rainfall in the study GP, 90% of the study area is under single cropped areas. Thus, by retaining surface runoff, single cropped areas can be converted to double cropped areas.
- Further, areas suitable for agroforestry and agro-horticulture areas are identified considering the current land use, soil, slope and surface and ground water potentials of the GP. This indicates possibilities for transformation of existing single cropped areas, fallow and wastelands to intensive agriculture, agro-horticulture, horticulture, social forestry and fodder crop etc.
- Fruit trees, if suitably integrated, would add significantly to overall agricultural production including food, fuel and fodder, conservation of soil and water and stability to production and income. Dryland fruit trees, being deep rooted and hardy, can better tolerate monsoon aberrations than short duration crops, thus can utilize off-season rains and soil moisture from deeper layers.
- Adoption of policy to earmark at least 10 – 20% of land for tree farming and grass strip cultivation. The generated grass would be utilized as fodder for the livestock, while tree wood would generate assured income and fuel wood.
- Per capita availability of fish, meat, milk and egg is very low compared national averages. Poultry, commercial goat rearing and dairy development has not yet been organized and has lot of scope for improvement. Integrated rice-fish farming particularly suggested for the farmers of Eastern and North Eastern India by Water Technology Centre,
- The strategic planning is defined as the future directions for the development of land and water resources in the GP establishing the long-term objectives and mobilizing the financial resources and government policy to achieve hierarchical goals. Further, involvement of local people is quite necessary as part of education, awareness and consensus. Implementation, monitoring and maintenance of the schemes and evaluation of implemented schemes for their end benefits are also the part of strategic planning activities.
- For successful implementation of land and water resource development plan in the study GP, suitable working scale needs to be identified for data analysis and implementation within the GIS framework. Most of the implementation by the implementing authorities of the government is being carried out with cadastral maps. The large-scale cadastral maps overlaid on the action plan details would be the best format for implementation.



CHAPTER 3

DEMOGRAPHY

CHAPTER 3: DEMOGRAPHY

3.1 INTRODUCTION

Demographic profile of a habitation forms a very important segment of analysis. The present profile of Kandra GP is diversified and is characterized by proportionate distribution of people of various age, sex, religion, caste and occupation.

3.1.1 DEMOGRAPHIC ASPECTS OF THE CHAS BLOCK AND KANDRA GP

Kandra Gram Panchayat situated in Chas block of Bokaro district in Jharkhand has population density of 9 persons per hectare. As per the Census 2011, there are total 1,460 families residing in Kandra. The total population of Kandra GP is 8,352 out of which 4,355 are males and 3,997 are females. Thus, the Average Sex Ratio of Kandra is 914, which is less than that of State average (948).

The population of children of age 0-6 years in KandraVillage is 1254 which is 15% of the total population. There are 676 male children and 578 female children between the ages 0-6 years. Thus, as per the Census 2011 the Child Sex Ratio of Kandra is 855 which is lower than Average Sex Ratio (914) of Kandra village.

Schedule Caste (SC) constitutes 14.5% (1212) of the total population, whereas the Schedule Tribe (ST) comprises only 1.43% (120) of total population in Kandra GP. Table 3.1 presents the area and demographic details of the Kandra Gram Panchayat as per Census 2011 along with that of Chas Block and Bokaro District, and Figure 3.1 shows the population of Kandra Gram Panchayat and its composition.

Table 3.1 Area and Demographic details of the Kandra Gram Panchayat as per Census 2011

PRI Level/ Unit	Census Code	Area (Sq. Km)	Household	Population	Male Population	Female Population	Schedules Caste	Scheduled Tribe	Density(P/Sq. Km)	Sex Ratio	Literacy Rate (%)
Jharkhand	20	79716	6237147	32,988,134	16,930,315	16,057,819	3985644	8645042	414	948	66.41

Bokaro District	355	2883	393439	2062330	1072807	989523	299227	255626	715	922	72.01
Chas C. D. Block	25955	577	132519	671762	352726	319036	97024	64434			
Kandra Gram Panchayat	362667	10.03	1460	8352	4355	3997	1212	120		918	75.8

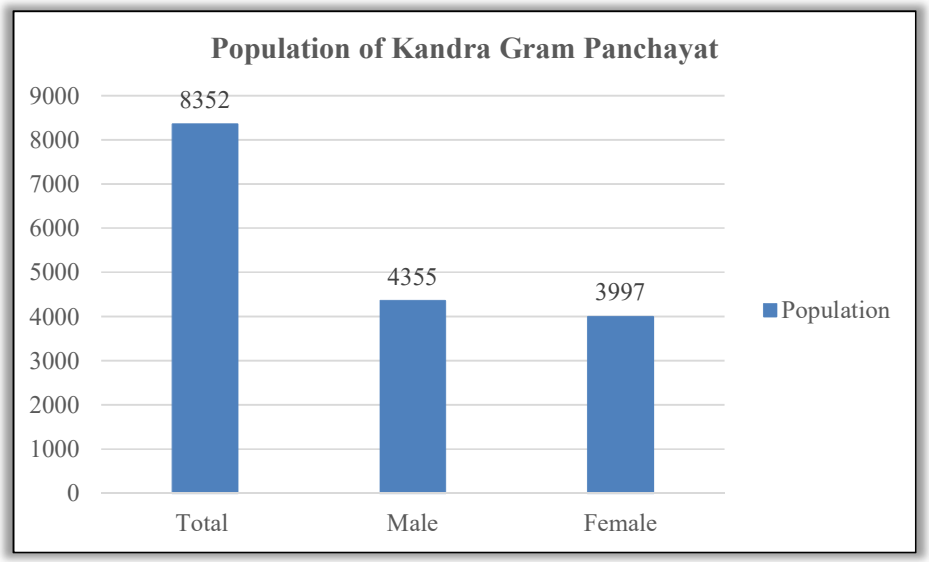


Fig. 3.1: Population and population composition of Kandra Gram Panchayat

Source: Census 2011

3.2 AGE STRUCTURE, SEX RATIO AND LITERACY

Sex Ratio in Kandra GP is 914 as per Census of India, 2011. The population below six years of age in 2011 was 1072 which constitutes to 15.01% of total population. This assumes significance, as amenities have to be planned for this age group to ensure a safe and healthy living. The general literacy rate of the village is 64.39% as per Census of India (2011). The general literacy and female literacy rate have improved for Kandra GP based on the Census of India 2001 & 2011. Literacy rate in

women is still considerably low (53.36%). This is because of the lack of awareness and adequate social infrastructure.

3.2.1 AGE STRUCTURE

The population distribution as per age specifically population below 06 years of age has declined in the last two decades as per the Census of India data. The pie-charts below as shown in Fig 3.2 shows the age structure in the village as per last two decades.

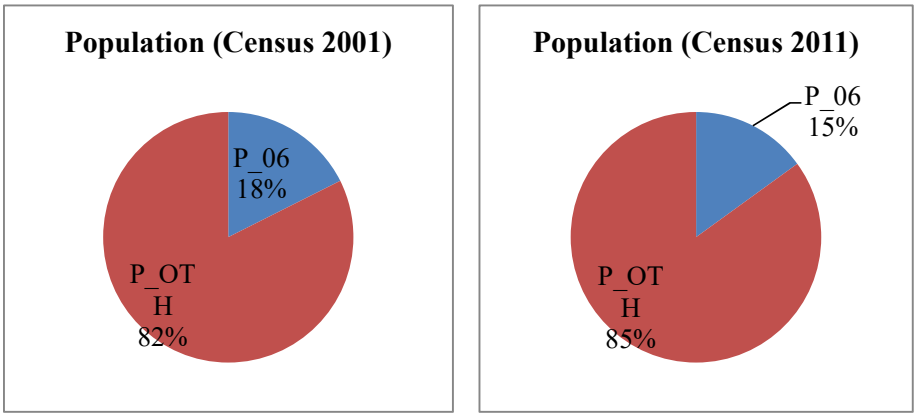


Fig. 3.2: Population Distribution of below 6 years in last two decades in Kandra GP *Source: Census of India*

3.2.2 SEX RATIO

Sex Ratio in Kandra GP is 914 as per Census of India 2011.The sex ratio in the Village has remained more or less constant in the last two decades (as shown in Fig. 3.3) but still; the proportion is not at all close to one. This gap is supposed to be filled through education and awareness in the community to promote and sustain societal balance.

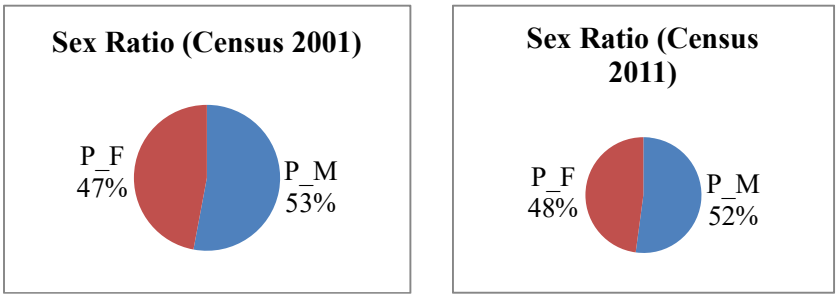


Fig. 3.3: Sex ratio of Kandra GP in last two census decades *Source: Census of India*

3.2.3 LITERACY RATE

The general Literacy Rate of the village is 63.97% as per Census of India 2011.

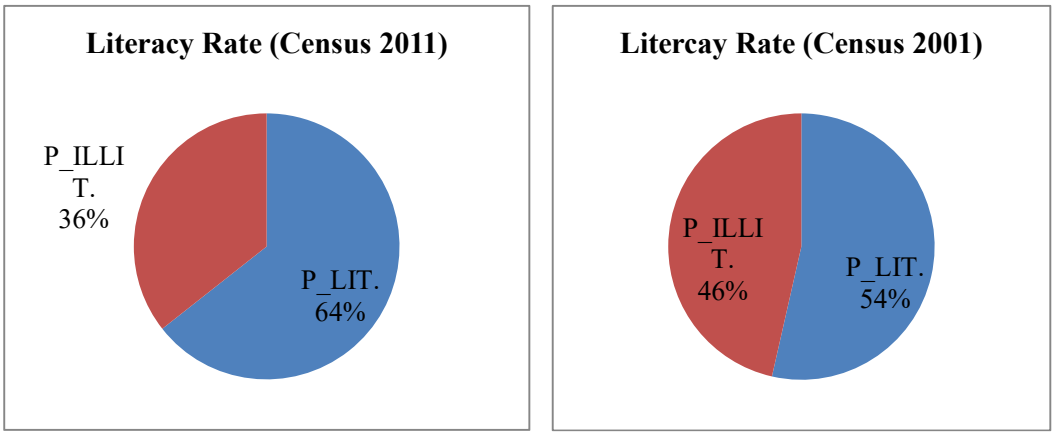


Fig. 3.4: Literacy rate of Kandra GP in two census decades

Source: Census of India

The Literacy Rate in the Village has considerably increased in the last two decades as shown in Fig. 3.4. But the overall literacy rate and specifically female literacy rate is considerably low in the Village as mentioned in Table 3.2. There is no government secondary school within the village. In this regard a secondary girl's school is one of the requirements in the Village as villagers have to travel more than 10km for the secondary school.

Table 3.2: Percentage of Female Literate Population in last two decades

Sl. No.	Census (Year)	Total Female Population	Female Literate Population	Percentage
01	2001	3327	1195	35.9
02	2011	3997	2133	53.3

(Source: Census of India)

This is basically because of the lack of awareness and absence of adequate social infrastructure. This gap is required to be filled to achieve the goals of community development and up gradation of Village.

3.3 FACTORS FOR THE GROWTH OF POPULATION

Kandra GP is approximately 10-12 km away from Bokaro Steel City. Because of this industrial town located close to the village there have been residential developments near to the village. The village has this spatial advantage of industrial infrastructure which has led to the increase in residential as well as commercial activities in the Village.

Also there is one Private Engineering College (Guru Gobind Singh Engineering College) and an ITI (Sidhu Kanhu ITI) because of which many developments have happened in the village. The growth of the Bokaro Steel city is towards the Village and major changes have been witnessed in the land use pattern of the village and surrounding areas.

It is projected that by 2031 the Population of the Village will grow by almost 31% of the total current population of the GP as mentioned in Table 3.3.So, in development plan amenities and facilities for community development has to be proposed keeping in mind the projected population growth by 2030.

Table 3.3: Population & Decadal Growth Rate

Year	Population	Growth Rate (%)
2001	7072	--
2011	8352	18%
2021 (Projected)	9630	Geometric Increase Method
2026 (Projected)	10,339	Geometric Increase Method
2030 (Projected)	11,100	Geometric Increase Method

(Source: Census of India)

3.4 IMPACT OF THE POPULATION GROWTH ON BASIC SERVICES

It is obvious with increase in Population the requirement of basic services in the village has increased rapidly. It is important to maintain the existing one, upgrade the services to the standards and provide the services in case of deficiency. The village has to withstand the impact in respect of basic services like water supply, sewerage, storm water drainage, roads & building infrastructures, employment opportunities, sanitation, educational, medical facilities, transportation, electrification and security.

This will ensure the requirements by 2030 and support healthy and prosperous community living in the Village.

3.5 ECONOMIC BASE AND OCCUPATIONAL DISTRIBUTION

The major economic activities in the last two decades has been primarily based on tertiary activities as shown in the Fig. 3.5 & Fig. 3.6 This shows that the village has potential for development of economy based on skill-based activities. The total working population in Kandra GP is 2165.

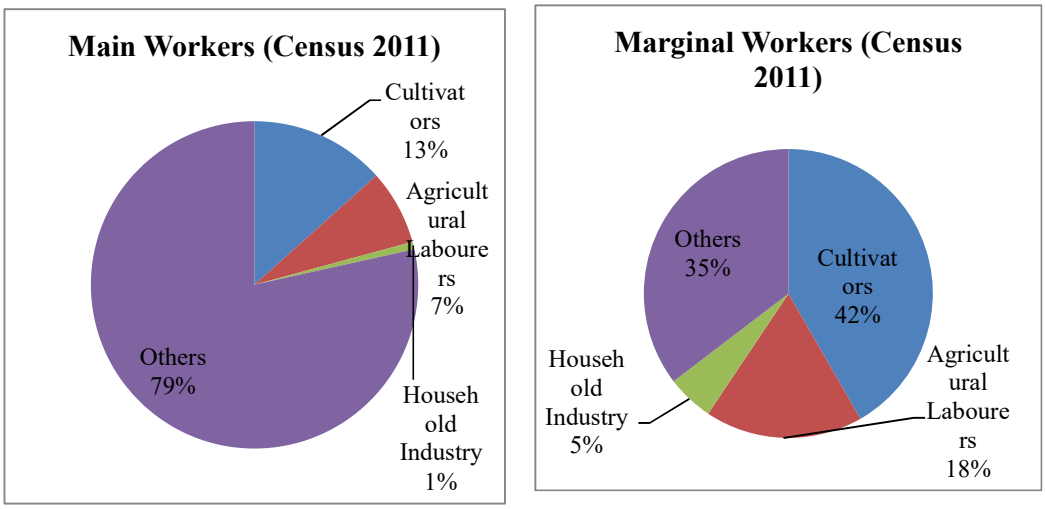


Fig. 3.5: Distribution of Main &Marginal worker in Kandra GP in 2011

Source: Census of India

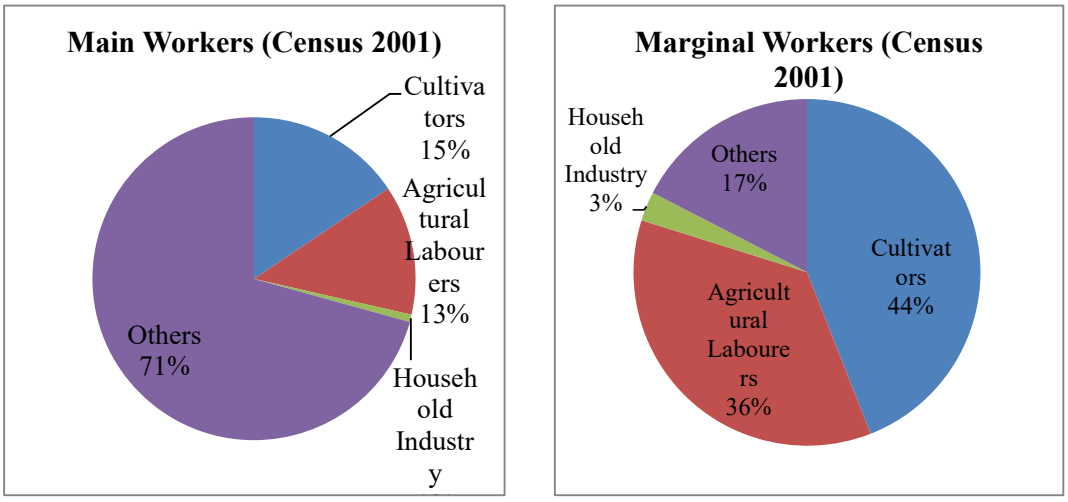


Fig. 3.6: Distribution of Main &Marginal workers in 2001 in Kandra GP

Source: Census of India

In addition to the same around 7% of total population is the marginal workforce in village which is by children below 06 years. This needs serious interventions in terms of social development, so that this percentage of the population below 06 years is not engaged in such activities.

As almost 80% of the total main working population in Village is dependent on tertiary activities, so development of skills through skill development centers can be proposed in the village. Also, in marginal workers (cultivators and agricultural laborers) almost 80% of the population is engaged in Primary activities. These activities can be developed and further upgraded, through various government schemes which will shift these workers from marginal workforce to main workforce. Almost 74% of the total population is non-working population which is again a concern for the village and there is a need for more employment opportunities in the village. Fig.3.7 shows the spatial distribution of households by Caste in Kandra GP.

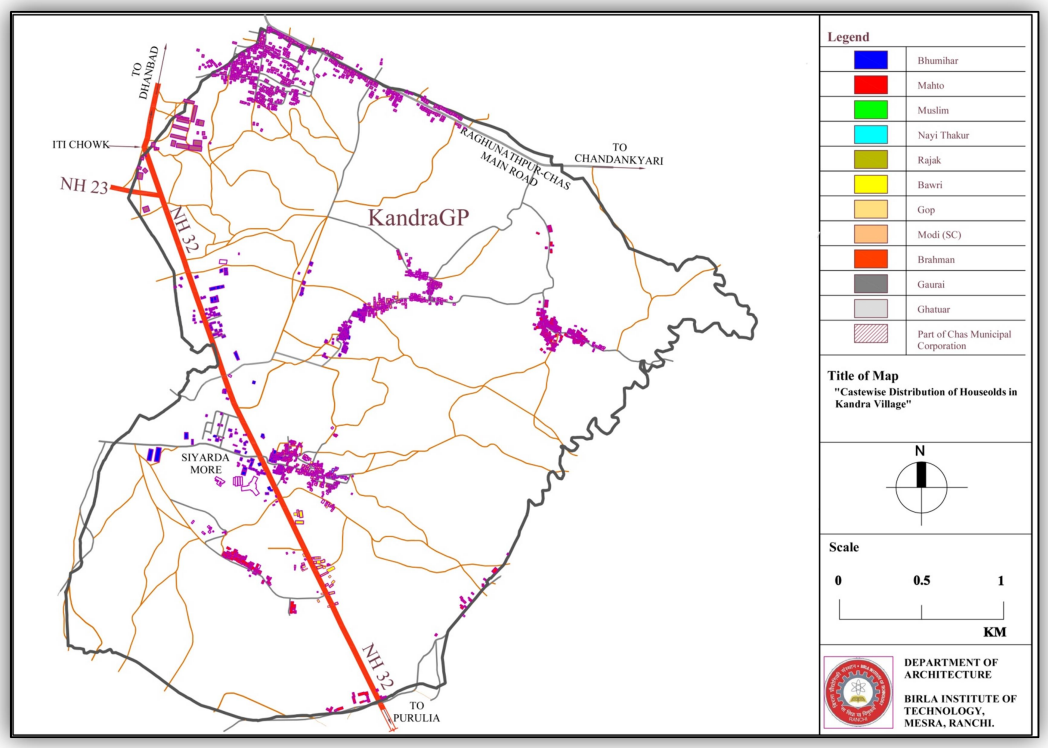
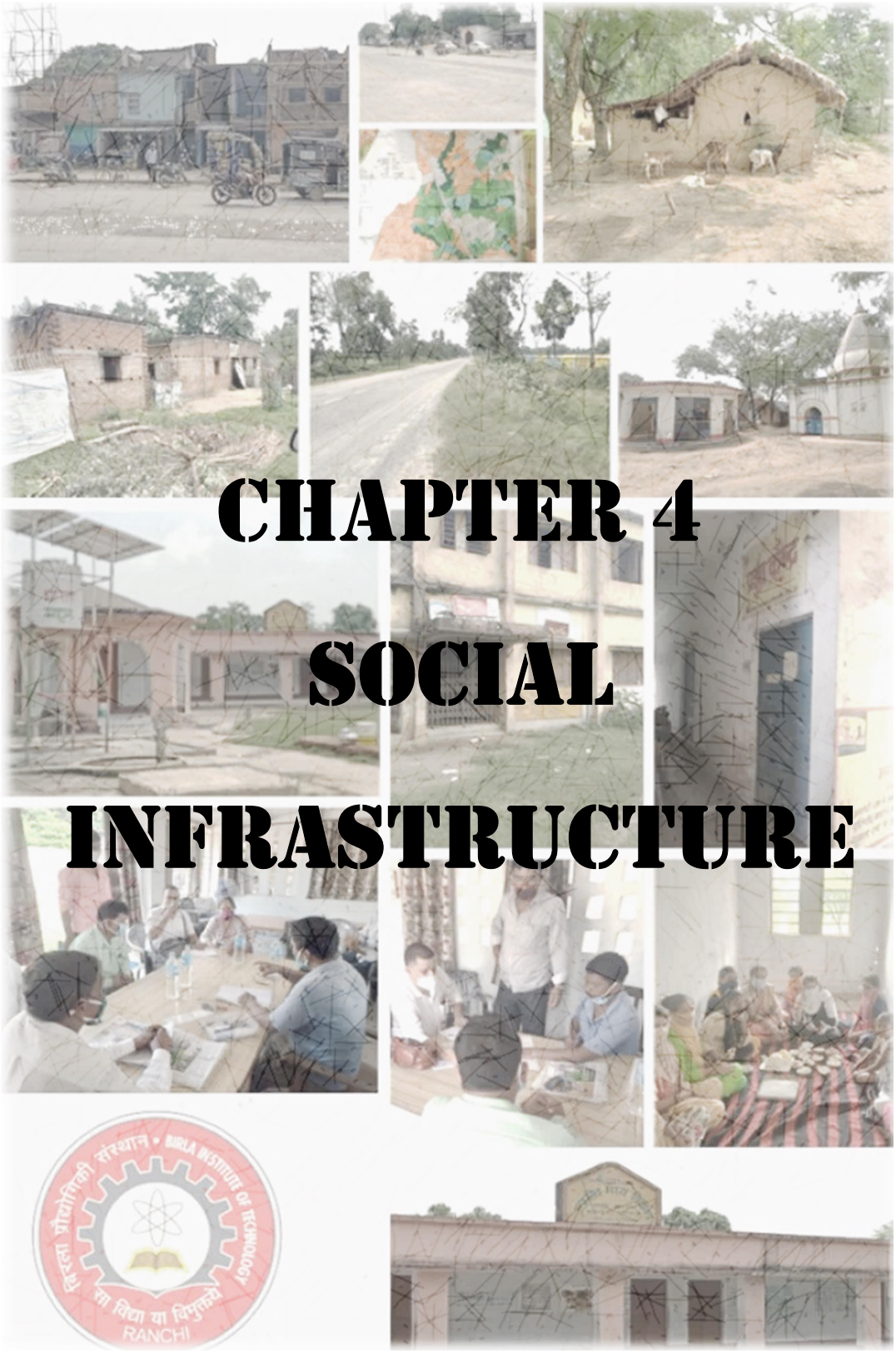


Fig. 3.7: Map showing Spatial Distribution of Households by Castes in Kandra GP

Source: based on household survey; prepared by the BIT Mesra Team



CHAPTER 4

SOCIAL INFRASTRUCTURE

CHAPTER 4: SOCIAL INFRASTRUCTURE

4.1 INTRODUCTION

Economic, physical and social infrastructures are inter-related components for a holistic and sustainable community development. Good and adequate social infrastructure is the key to achieve progressive communities.

Social infrastructure deals with the following aspects:

- Educational Facilities
- Healthcare Facilities
- Socio- Cultural Facilities
- Other Public and Semi-Public Facilities: Police, Fire & Emergency Services, Communication (Postal Facility), Banking Facility
- Recreational Facilities & Open Spaces

4.2 EDUCATIONAL FACILITIES

Education is the basic factor which makes a community aware and empowered. One of the Millennium Development goals postulated by UN is to achieve 'Universal Primary Education' and so is the goal of Sarva Shiksha Abhiyan (SSA) program of GoI. The current Kandra GP has 03 Government Primary, 02 Private Middle School, 06 Anganwadi Centers, 01 Private ITI and 01 Private Engineering College as mentioned in Table 4.1.

Table 4.1- Number of Educational Institutions in Kandra GP by Hierarchy

Sl. Nos.	Institutes	Total Numbers
01	**Schools**	
	Pre Primary School (Nursery School)	00
	Government Primary School (I to V)	03
	Private Middle School (I to VIII)	02
	Private Secondary School (I to X)	00
	Senior Secondary School (VI to XII)	00
02	Anganwadi Centre	06
03	Skill Development Centre	00
04	Industrial Training Institute (ITI)- Private	01
05	Engineering College- Privates	01
06	Customer Service Centre (Digital Infrastructure)	00
06	Sewing Centre (Closed now)	01

Source: Primary survey

Fig. 4.1: Government Primary School in Kandra GP

Source:Author

As per the primary survey not every family in the village sends their children to the schools. As per educational infrastructure the village is having sufficient facilities. But it is also said that educational facilities not only depends on the number of population but also on the characteristics of the population. Considering the fact that female literacy rate is considerably low and there is a significant percentage of population below 06 which is engaged in economic activities rather than education, it is thereby important to generate awareness and increase the type of educational facilities especially for women and children. Fig. 4.1 shows the image of a government primary school in the Kandra GP.

There can be more/up-gradation of Anganwadi Centers in the village within easy walkable distance (300-800 m). Fig.4.2 shows the image of an Anganwadi Centre in the Kandra GP. The local community should be encouraged, especially women, in management of the local level facilities to promote efficient utilization of the resources. Anganwadi is the focal point for the delivery of services at the community level, to children below six years of age, pregnant and nursing mothers, and adolescent girls. Anganwadi center also serves as the meeting place for women's groups, mothers' clubs and Mahila Mandals promoting awareness and joint action for child development and women's empowerment.

In order to achieve an overall development, it is important to create employment opportunities in the rural area. It is essential to impart vocational training and employable skills to the rural youth for promotion of sustainable rural livelihood. Kandra presently has no skill development centre. There is one vocational private industrial training institute, but that is also not working towards creating employed professionals which is required to be addressed. There is one Sewing Centre that is also closed currently.

Fig. 4.2: Anganwadi Kendra, Kandra GP

Source: Author

4.3 HEALTHCARE FACILITIES

Healthcare facilities and their easy accessibility are important for the progressive communities. It also makes an important contribution to economic progress, as healthy population live longer and is more productive. It includes a system of healthcare and protection that is available, acceptable and of good quality.

The Healthcare Services is to have referral linkage to the next level of health-care facility of Primary Health Centre (PHC) at the rate of 1 PHC per 6 H-SC. In population norm terms, PHC to be provisioned as 1 for every 20,000 population in Hilly/Tribal/Difficult Access Areas and 1 for every 30,000 population in Plain Areas, while the bed norm is 4-6 beds in each PHC as shown in Fig. 4.3.

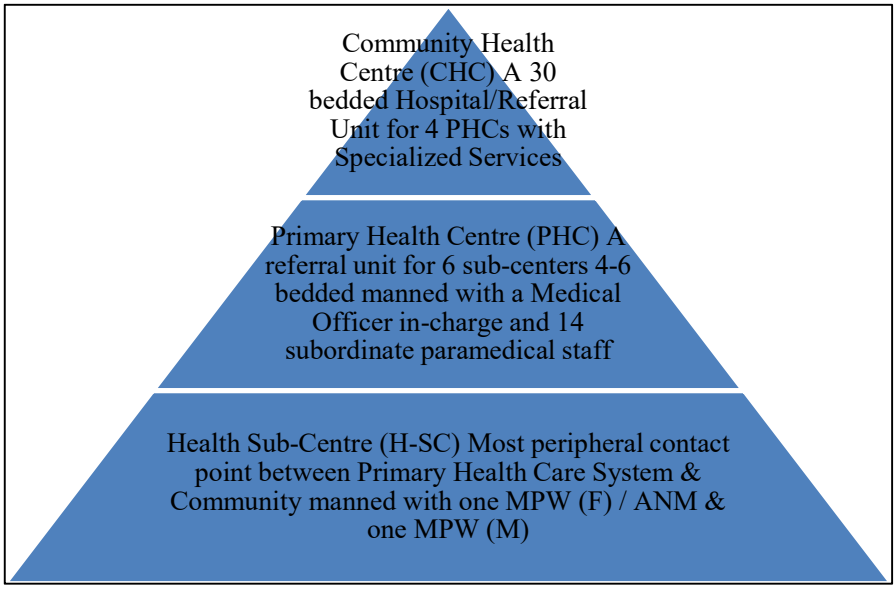


Fig. 4.3: Hierarchy of Healthcare delivery system in India prescribed by MoHFW, GoI

There is no Health Sub Centre, no Community Health Centre (CHC), no Private Clinic and no Veterinary Clinic in the village (as per Table 4.2) which is required to be provided as per the Guidelines for Rural Development.

There is one (01) 50 bedded Hospital (Referral Hospital, Chas) in Kamaldih around 02 km from the village which is currently serving the purpose. As per Primary survey people mostly travel to Chas or Bokaro Steel City (almost 20 km) for efficient health facilities. Fig. 4.4 shows the location of Social Infrastructure in Kandra GP.

Table 4.2:Number of Health Facilities in Kandra GP by Hierarchy

Sl. Nos.	Type of Health Facilities	Numbers
1.	Health Sub Centre (H-Sc)	00
2.	CHC/PHC	00
3.	Veterinary Clinic Hospital	00
4.	Private Hospital	00

Source: primary survey

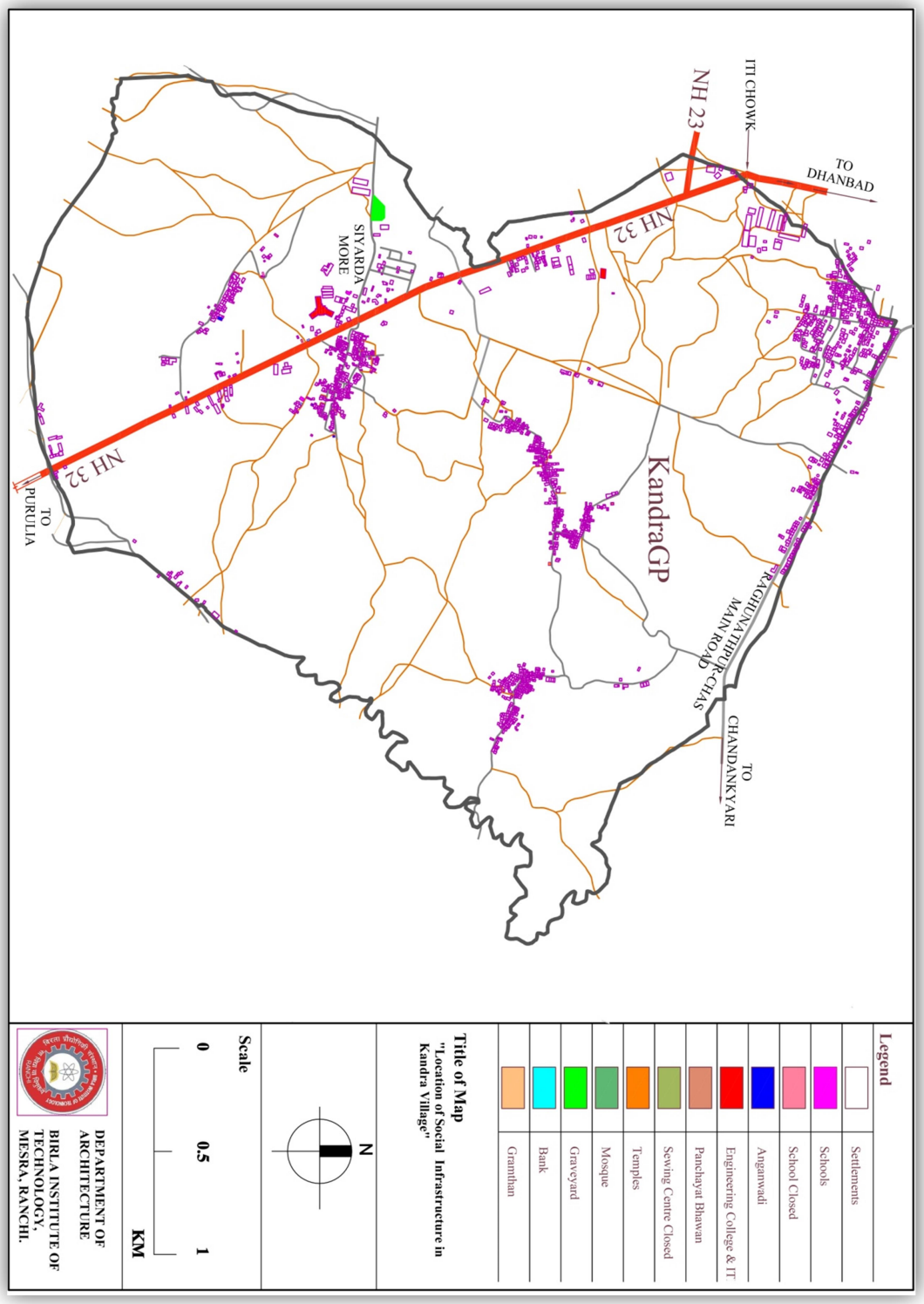


Fig. 4.4: Map showing Location of Social Infrastructure in Kandra GP

Source: based on household survey; prepared by the BIT Mesra Team

4.4 SOCIO-CULTURAL FACILITIES

The culture, traditions of tribes, stories, music, art and crafts always define the identity of a village. There is one JSLPS (Jharkhand State Livelihood Promotion Society) present in the Kandra GP. There has to be a socio-cultural center proposed in the GP comprising of Community Hall, Library, Recreational Club, Music, Dance and Drama Centre. The existing Community Hall in the GP is not used as a Community Hall which is required to be upgraded for the same purpose.

4.5 OTHER PUBLIC AND SEMI-PUBLIC FACILITIES

A well distributed network of police stations and police out posts throughout a habitable region to provide security to the residents and create a peaceful and law abiding community is essential. At present there is no police station in Kandra, it is under Pindra Joda Police Station which is 10 km from the village.

Also, Fire Services are needed for protecting people from fire hazards, building collapses, and other unforeseen emergencies / disasters. Fire is categorized as a disaster. It can spread over large area in no time and cause great damage to life and property. The nearest fire station is adjacent to the Chas Block Office which is 03 km away from the village.

The Postal Service, telephone and the internet form the communication network for any area. There is no Post Office present in the village, although there is one personnel employed for the same purpose who used to come 2-3 days in a week and do the post office activities in the Panchayat Office. Fig. 4.4 presents the spatial location of all facilities in Kandra GP.

4.6 COMMERCIAL FACILTIES

The commercial facilities in Kandra GP are largely confined to the Chas Market and Bazar Samiti, ITI More flanked along NH 32 & 23. The shops in the Chas Market (02 – 2.5 km away from the village) include clothing, daily needs, furniture, groceries, motor parts, hardwares, and some showrooms. The Bazar Samiti (1.5 km from GP) caters to the need of Rationing Items. There is no weekly market operating in the Kandra GP. Otherwise there are a very few daily need shops dispersed over the GP to meeting grocery needs of the people.

4.7 RECREATIONAL FACILITIES AND OPEN SPACES

There are no designated parks or playgrounds present in the village. Although there are government open spaces in the village, it's not developed as a Park or a Playground. As per URDPFI Guidelines, 10-12 sq.m of open space per person is desirable. In the government open space, a Park or a Playground is proposed to be provided. There is a stadium named as Vinod Bihari Mahto Stadium around 02 km from Yodhari Mod Chowk on Chas Chandan Kyari Road which is in dilapidated condition. The same has to be renovated an upgraded as a proper stadium space for the villagers.

4.8 MISCELLANEOUS FACILITIES

The following other facilities is required in the villages:

- Banks/ ATMs
- Poll Booths
- Rural Haats (Weekly Market)
- Dairy
- LPG Distribution Centre
- Common Service Centre (Digital Infrastructure)
- Fertilizer Shop
- Temples /Mosques/ Churches
- Cremation Sites/Burial Grounds
- Auto/ Rickshaw Stands

As per Primary Survey all the villagers have their account in the bank. There are 02 banks present in the Kandra GP. There are also 02 ATMs associated with the bank present in the GP but they don't function most of the time. There is no LPG Distribution Centre present in the village. Under Pradhan Mantri Ujjwala Yojna around 60% of the households have got benefitted. Currently LPG cylinders are supplied primarily from 02 Distribution Centre present in the Chas. There are 10 temples (one temple shown in Fig. 4.6), 01 mosque present in the Kandra GP. There is 01 Cremation Site (02 km away from the Village) and 01 Burial Ground is present in the GP. There is no designated space for Auto/ Rickshaw parking.

Fig. 4.5: Pragya Kendra in the Panchayat Bhawan: Kandra GP

Source: Author

At present there is no infrastructure for digital literacy in the Village. There is 01 Pragya Kendra functioning in the Panchayat Bhawan as shown in Fig.4.5. As per National Fibre Optics Network (E-DISHA), 2011 there has to be 01 Customer Service Centre, for every 5000 persons or 01 per Gram Panchayat which is at present lacking in the village. At least one person per household or atleast 20% population in the village has to be digital literate; this deficiency needs to be addressed.

Fig. 4.6: A Temple in Kandra GP

Source: Author

4.9 PROPOSALS AND RECOMMENDATIONS

Primary objective of GPSDP is to identify and formulate ways of addressing real needs of local people. Economic development of the village is one of the prime concerns and therefore supporting sources of income needs to be encouraged in the Village. GPs should be encouraged to develop and use locally relevant indicators on issues of development, including aligning actions with localizing the SDGs and take up activities which would increase local production and productivity, increase employment and employability, improve market access and marketability of the local produce, promote value addition, create productive infrastructure like markets, ponds, fisheries, livestock development, horticulture development, land development, minor irrigation facilities, dug wells, irrigation tanks etc. The GP should converge different programs for livelihood promotion through MGNREA, NRLM, PMAY, PMGSY, NSAP, RKVY etc.

GPSDP should focus on literacy, education, skill development, health, nutrition, livelihood promotion etc. It should focus on improving quality of human development services through Anganwadis, schools, hospitals and improving access to them.

GPSDP should be aimed at improving the wellbeing of vulnerable and marginalized groups like SCs, STs, Other Backward Classes including minorities, persons with disabilities, elderly people, women, children, bonded laborers, child laborers, distress migrants, manual scavengers, victims of trafficking etc.

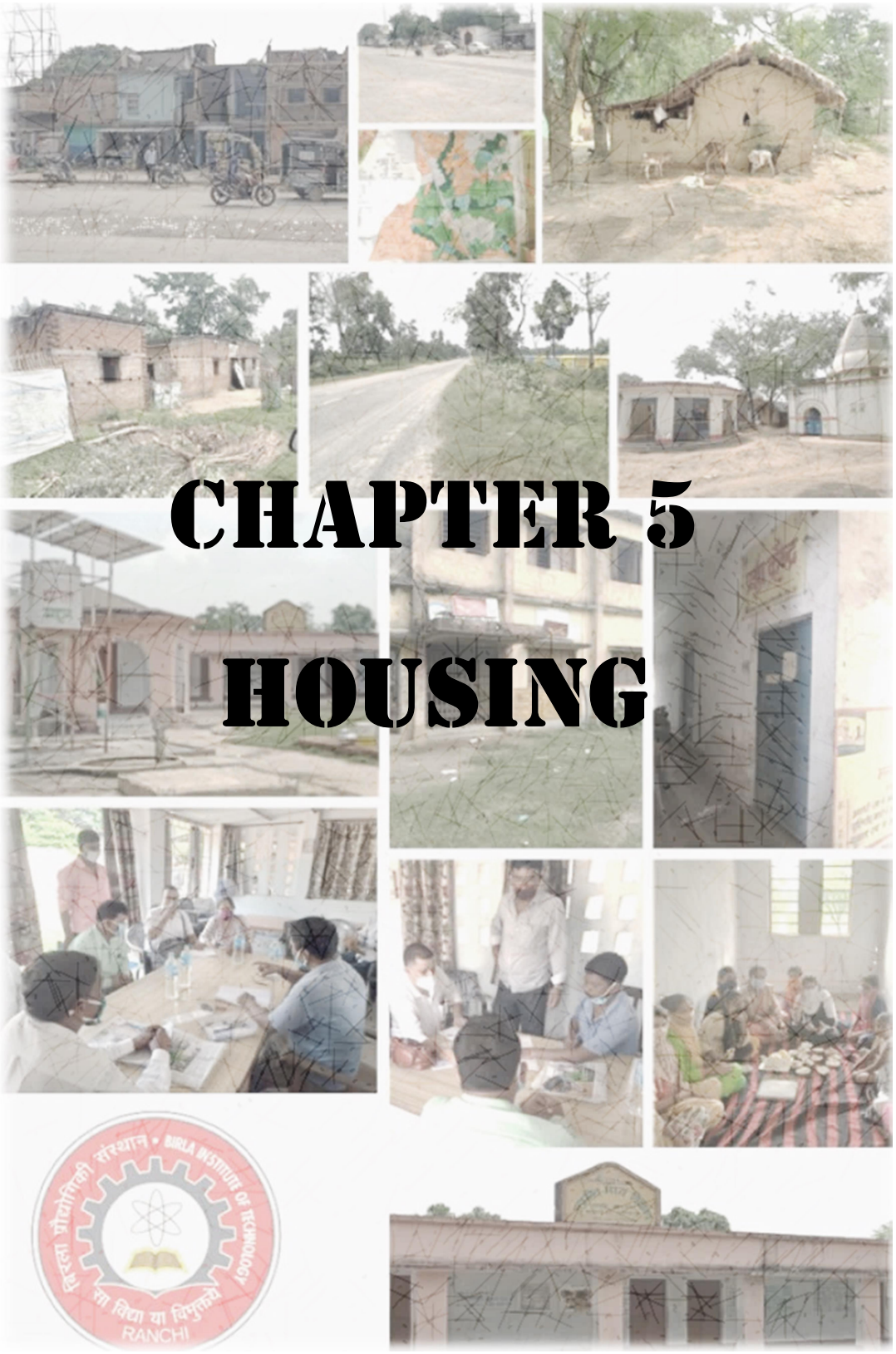
GPSDP should also focus on how Panchayats can play a major role in skill building and ensure that the most vulnerable sections, including women participate in the program. GPs have to plan for generating awareness about the skills related program, facilitating the mobilization efforts, creating databases for skill demand and placement, assist in conducting the Job mela and support the project implementing agencies in all stages of skill training.

The following proposal should be developed in the Kandra GP in different phases:

- The projected population of the Kandra GP for 2026 is 10,300 and by 2031 to be almost 11,100. Residential and infrastructure developments catering to this population has to be planned in two phases. For this land parcels suitable for development and existing infrastructure up gradation and augmentation potential has to be identified and proposed in phases.

- Under the Ministry of Rural Development and Ministry of Skill Development and Entrepreneurship self-employment skills for all eligible youths must be developed. For this there has to be a Skill Development Centre, Vocational Training Institute in the Village which provides a platform for the development of skills of villagers especially youth and women. At the same time this center or institute must focus on creation of job for the trainee at the local level within or near to the village. This can be done in the existing Panchayat Bhawan building by upgrading and extending it.
- There is also a requirement of Polytechnic Institute providing diploma degrees and creating technical professionals in the village which is the present market demand. This can be done in the existing vacant government plots near Sidhu Kanu ITI (SAIL/BSL) building in the GP.
- Under the Ministry of Human Resource Development existing government schools in the village must ensure 100% attendance and efficient learning outcomes. As in the village female literacy rate is still very low, it is because of many social and economic factors, a Government Senior Secondary School for girls (intake of 360, with a ratio of 01 teacher per 30 students) with adequate infrastructure is proposed. This school can be proposed in the existing government vacant plots (SAIL/BSL) present in front of Sidhu Kanu ITI adjacent to road connecting Labudih in the GP.
- One Primary school being closed in the Partand Village has to be reopened, reused and upgraded with all necessary infrastructure and services. All existing schools must upgrade their infrastructure, library and sports facility. A school for adult education under the scheme of Samagra Shiksha Abhiyan (SMS) providing non formal education can be proposed in the village. This can also be done in the existing Anganwadi Centers and can also work as Women and Child Development Centre.
- The tribal population has a very rich culture and culture based regeneration activities can be encouraged in the Village. For this there has to be a Community Hall or Open Space at Gram Panchayat level. Existing Community Hall (which is currently not in use) can be reused and upgraded for community gathering and celebrations. The Vinod Bihari Mahto stadium around 02 km from Yodhari Mod Chowk on Chas Chandan Kyari Road near the Village is also proposed to be renovated, upgraded and reused for the sports and recreational activities of the villagers. There is also one Community Hall (Marriage & Cultural functions) of 500 seating capacity proposed in the vacant government plots (SAIL/BSL) near Sidhu Kanu ITI building in the GP.

- As far as Health infrastructure is concerned the village is having no Health Sub Centre, Public Health Centre or a Private Nursing Home. For this there is a proposal of Health Sub Centre in the existing Sewing Centre which is not functioning currently. The same can be upgraded to a CHC/PHC. The health sub-center must be started immediately with emergency ambulance facility, 100% immunization and 100% treatment of community spread diseases. For major diseases, the residents travel to nearby Bokaro or Chas for better facilities.
- Under the Ministry of Social Justice & Empowerment and Department of Empowerment of Persons with disabilities various schemes relating to Scholarships for SCs, STs, OBCs, Minorities and differently abled people must be provided. Skill training and Social Security for differently abled persons have to be provided and can be done at existing Anganwadi center in a different time zone or can be done in proposed skill development centre. Aids and appliances to these people must be provided by the GP. Community facilities (toilets) catering to the needs of this section of society also have to be provided at suitable locations.
- One LPG Distribution center can also be proposed in the GP to facilitate better capitalization of Pradhan Mantri Ujjwala Yojna. It can be done by providing extension to the Panchayat Bhawan Building.



CHAPTER 5

HOUSING

CHAPTER 5: HOUSING

5.1 INTRODUCTION

Housing in the country has been identified as a basic human need. The housing sector has been on the priority list of the Government of India right from the first five-year plan till date. Envisaging for the promotion of housing, the Government has initiated various fiscal incentives, through large number of schemes, to fulfill both the demand and supply sides. These schemes, under various names, focus mainly on housing for the poor and are aligned to improve the housing conditions of industrial workers/ economically weaker sections and of low-income groups. The continuous effort from the Government through various programs have resulted in the positive growth in the total housing stock, which has increased from 13.30 million units in 1961 to 78.48 million units in 2011 (MoHUPA, 2013).

Housing and housing amenities are important indicators to assess human well-being of a country. The statistics on living conditions, as represented by the type of housing available, average space available to each person in the house, the basic civic amenities available to the household etc. will give a picture of the overall socio-economic progress of the society. This statistical information relating to housing condition in quantitative terms is required for an assessment of the overall housing needs and helps in the formulation of housing policies and programs along with its execution and evaluation. These housing policies and programs constitute an integral part of the overall social and economic plans of the country or part thereof.

This chapter discusses the housing situation in Kandra under three sections. The first section outlines the statistical information regarding housing characteristics based on 2011 census and the primary household survey (conducted through mobile app developed by ISRO) to portray the situation in perspective. The second section deals with the key observation and findings of existing housing condition. Finally, in the concluding section, we discuss about the proposals and recommendations which need to be taken up in two phases along with suggestions for policies for ameliorating the housing condition in Kandra Gram Panchayat.

5.2 HOUSING CHARACTERISTICS

The housing characteristics of a settlement aptly describe the socio-economic condition and highlight the aspects for which interventions in the form of physical

planning proposals and policy guidelines can be developed. This chapter compares and highlights the general characteristics of Kandra Gram Panchayat about their the ownership status, type of structure, building height, age of structure, condition of house, profile of the key housing characteristics and housing facilities based on 2011 census data and primary survey conducted during August 2020.

5.2.1 HOUSE OWNERSHIP STATUS

Home ownership has been argued to provide the most stable tenure arrangement to satisfy basic household needs and promote a sense of well-being for the residents. The home tenure status, according to census 2011 data, of Kandra GP shows that 97.7 percent of households own their house whereas 1.7 percent of household are rented. The remaining 0.6 percent of households had other arrangement (Table 5.1).

Table 5.1 Percent ownership status

	Census 2011	Primary Survey 2020
Owned	97.7	98.5
Rented	1.7	0
Any others	0.6	1.5
Number of Households	**1460**	**1491***
Total Population	**8352**	**8603***

*Mission Antyodaya Baseline Survey 2018, Kandra Gram Panchayat Score Card, Ministry of Rural Development, Govt. of India

The result from primary survey indicate increase in percent household owning house from 97.7 percent to 98.5 percent while rented households declined from 1.7 percent to 0.0 percent. The percent of household having other arrangement increased from 0.6 percent to 1.5 percent. The spatial distribution of houses in Kandra GP is shown in Fig. 5.1 below:

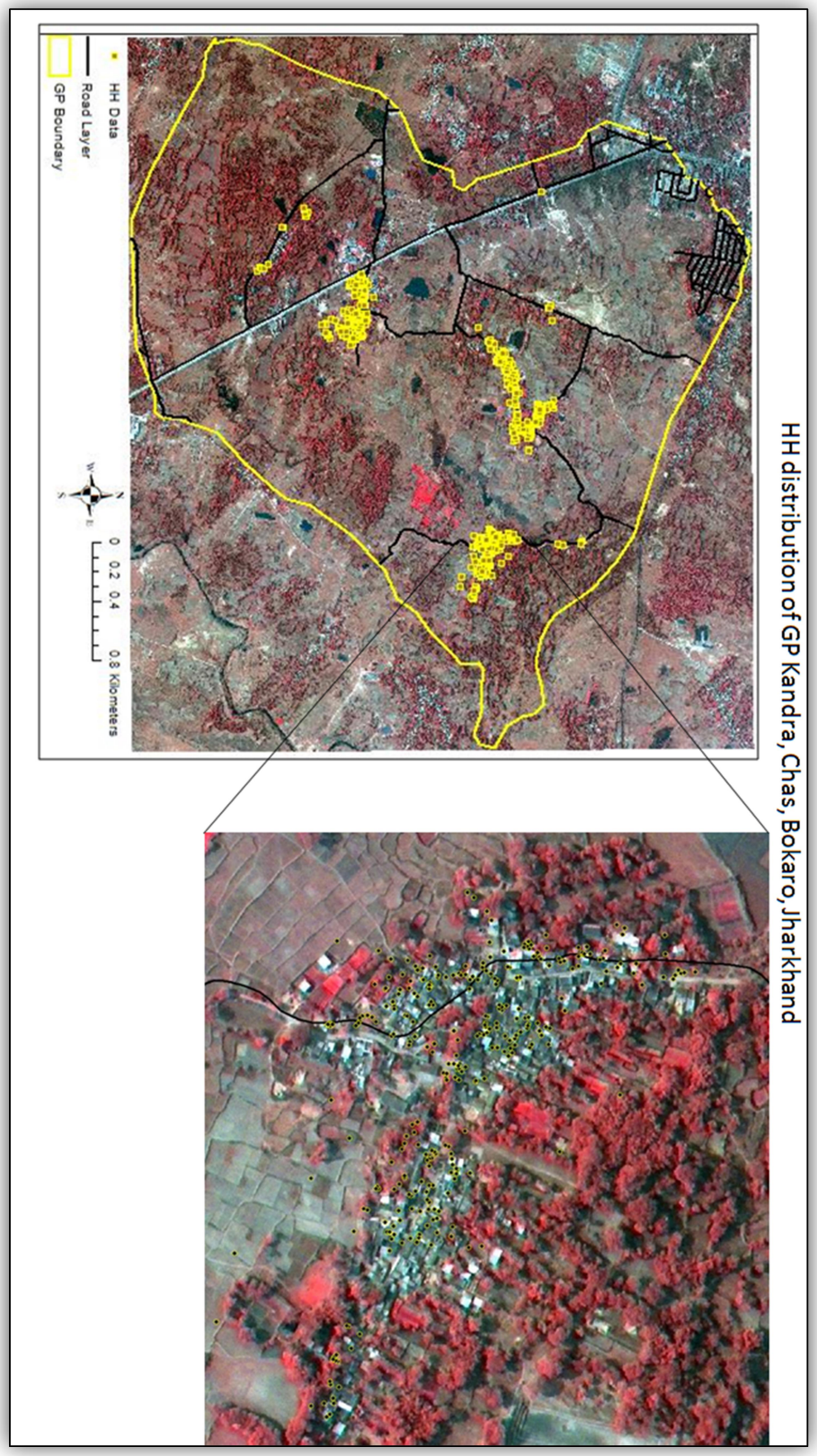


Fig. 5.1: Spatial distribution of Houses in Kandra GP

Source: Based on survey data; Prepared by NRSC/ISRO

5.2.2 HOUSES BY TYPE OF STRUCTURE

According to 2011 census, overall 6.0 percent of households live in *kachha* houses, 22.6 percent live in *semi pucca* houses, and the remaining 70.5 percent live in *pucca* houses (Table 5.2). The data from primary survey presents a complete different situation. The percent of households living in *kachha* houses increased to 57 percent from merge 6.0 percent whereas the percent of households living in *pucca* houses decreased to 32.0 percent from 70.5 percent. The percent of households living in *semi pucca* houses decreased from 22.6 percent to 10 percent.

Table 5.2 Percent Household by type of structure of census houses

	Census 2011	Primary Survey 2020
Pucca	70.5	32
Semi-pucca	22.6	10
Kachcha	6	57
Other	0.8	1

The spatial distribution of houses in Kandra GP based on house type is shown in Fig. 5.2.

5.2.3 HOUSES AND ITS CONDITION

Among the total census houses in Kandra GP, 59.3 percent occupied for residence are classified as 'good habitable condition', whereas 37.4 percent occupied houses are classified as 'livable habitable condition'. The houses in 'dilapidated condition' account for 3.3 percent (Table 5.3).

Table 5.3 Percent Household by its condition

	Census 2011	Primary Survey 2020
Good	59.3	25.7
Livable	37.4	70.1
Dilapidated	3.3	4.2

The survey result shows that there is decrease in percent of houses in 'good' condition from 59.3 percent to 25.7 percent. The houses with 'livable' condition showed significant increase from 37.4 percent to 70.1 percent whereas the houses in 'dilapidated' condition increased from 3.3 percent to 4.2 percent.

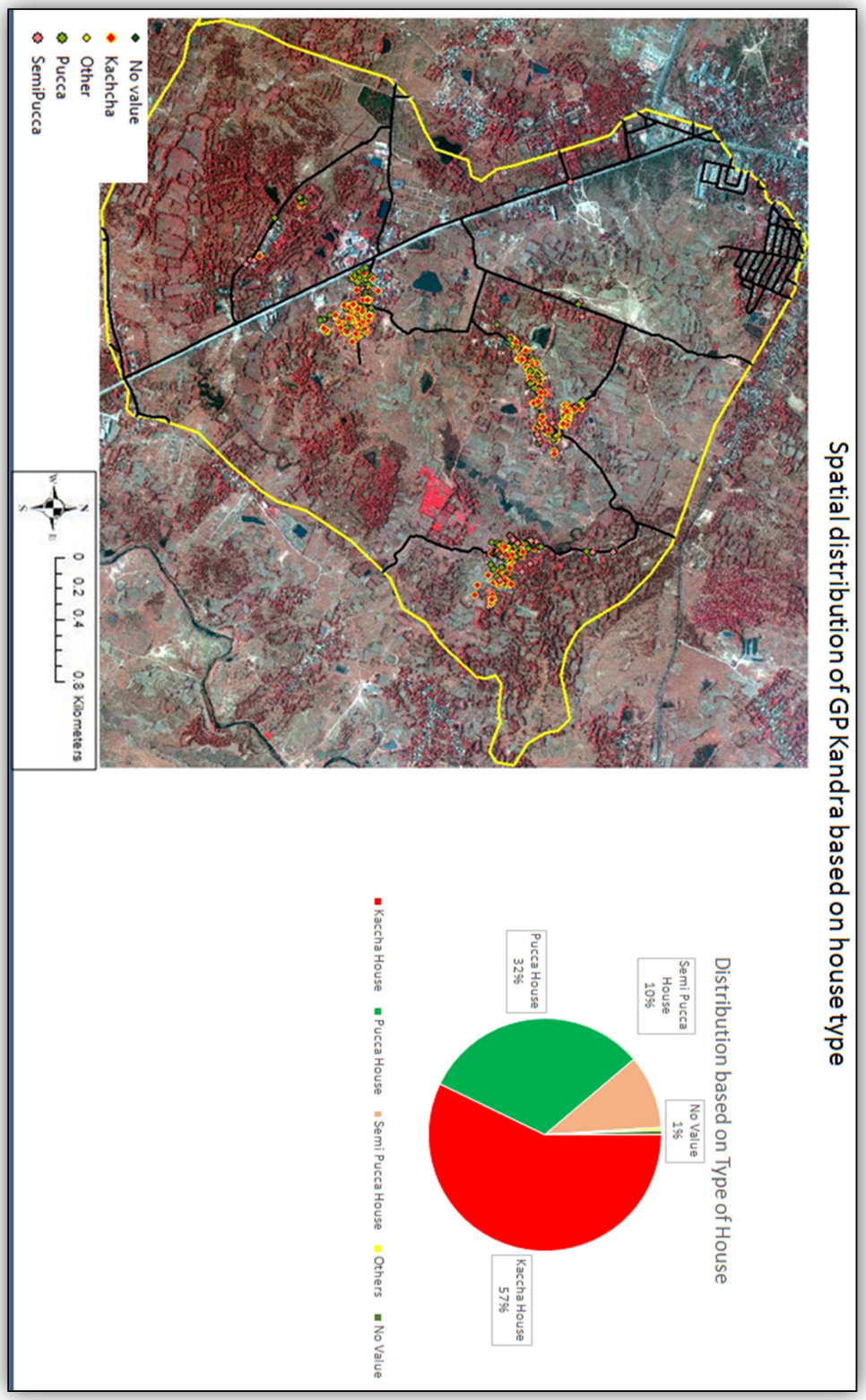


Fig. 5.2: Spatial distribution of Houses in Kandra, based on House Type

Source: Based on survey data; Prepared by NRSC/ISRO

5.2.4 HOUSES BY ITS HEIGHT

Primary survey of the Kandra GP indicates that the height of buildings is uniform to a large extent, with houses having only ground floor accounts for 38.0 percent. The houses extending up to G+1 constitute 23.0 percent whereas those with G+2 in height are only 4.0 percent of houses. The houses extending to G+3 and beyond constitute 1.2 percent (Fig. 5.3). The spatial distribution of houses based on heightis given in Fig. 5.4.

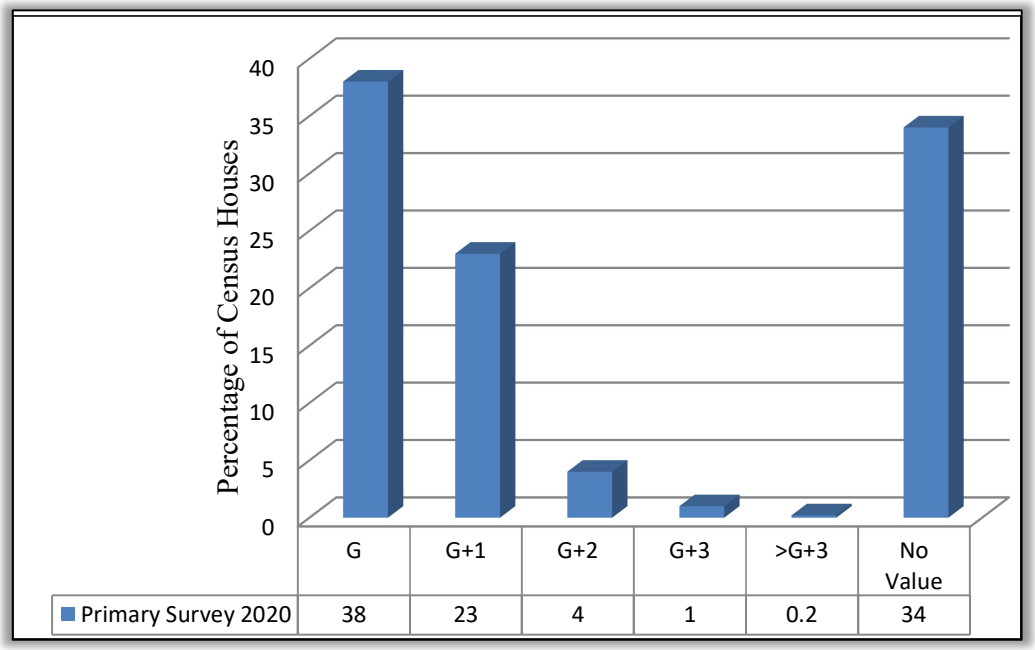


Fig. 5.3: Percent Census Houses by its height

Source: Primary survey conducted during August 2020

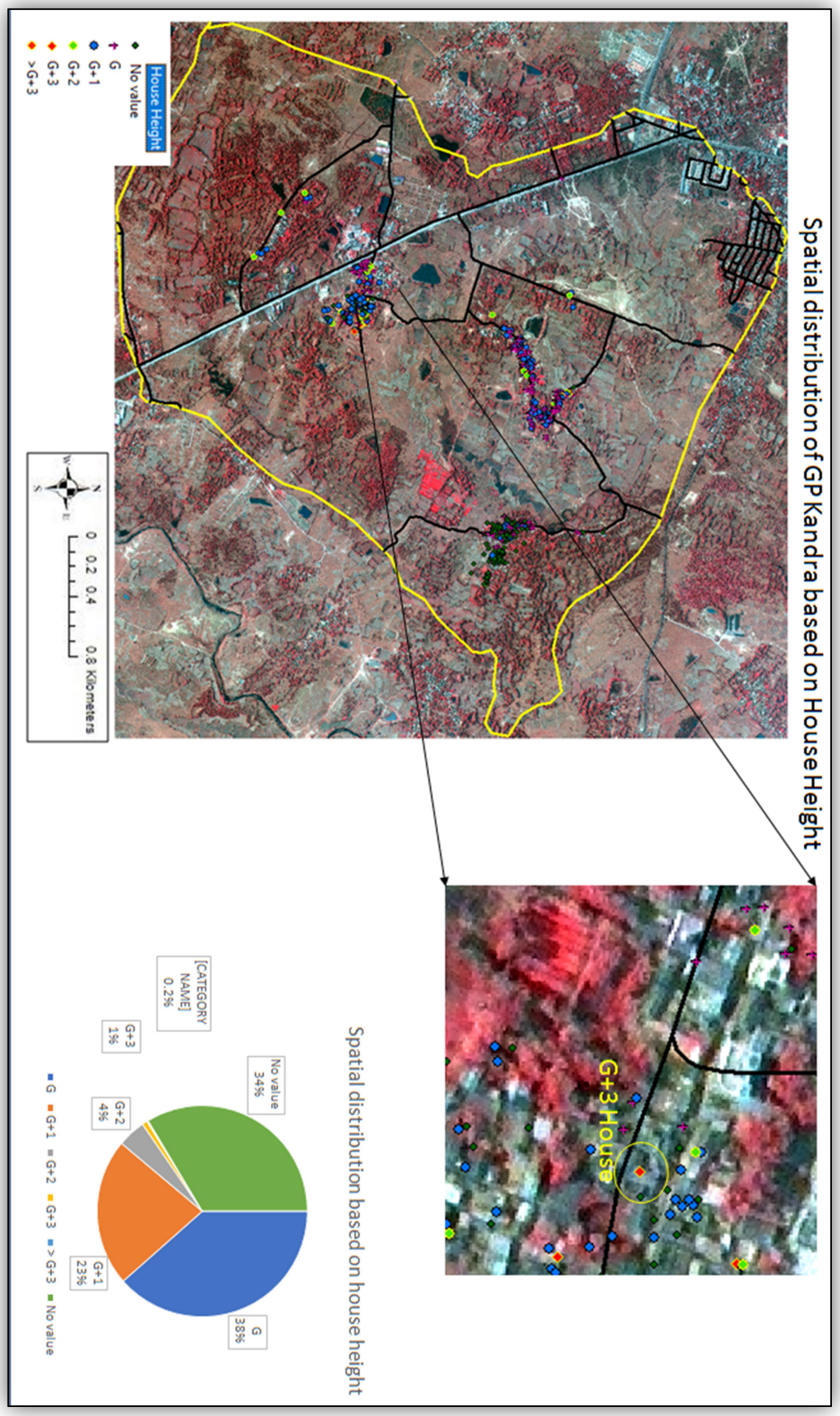


Fig. 5.4: Spatial distribution of Houses based on Height

Source: Based on survey data; Prepared by NRSC/ISRO

5.2.5 HOUSES BY AGE OF STRUCTURE

The household survey conducted in Kandra GP attempted to determine the age of structure within its boundary. Houses constructed within ten years accounted for 64.1 percent and those constructed during past 10-20 years were 11.8 percent of total houses. Houses which are 20 to 50 years old constitute 22.0 percent whereas those constructed before 50 years are significantly less accounting for 2.0 percent (Fig. 5.5). The spatial distribution of kaccha houses based on the duration of residence is shown in Fig. 5.6.

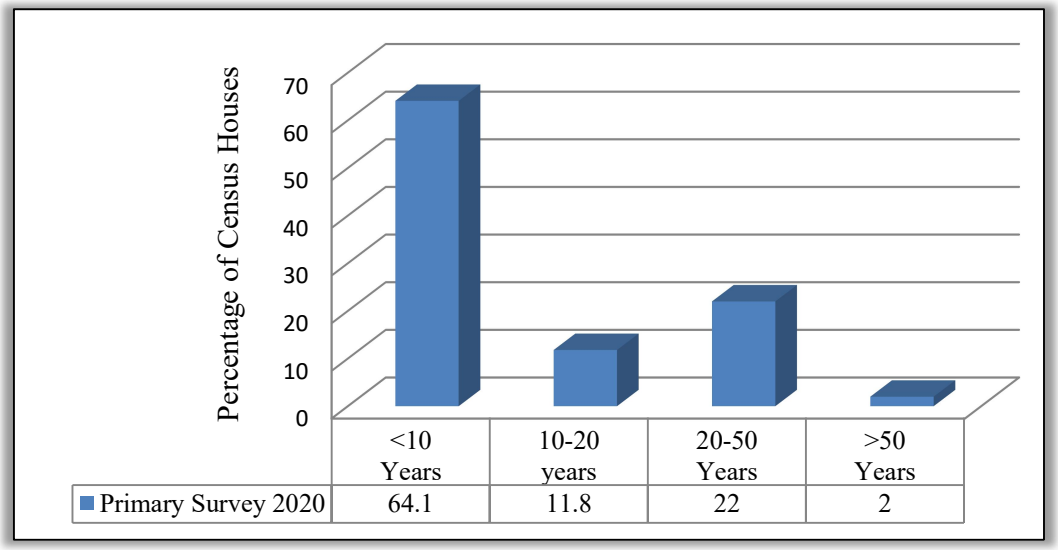


Fig. 5.5: Percent Census Houses by age of structure

Source: Primary survey conducted during August 2020

5.2.6 HOUSES BY MATERIAL OF ROOF

According to census 2011, the percent of houses in Kandra GP with grass, thatch, bamboo, wood, mud was 6.5 percent, whereas those using plastic and polythene as roof material were 0.3 percent. Houses with roof made of handmade tiles and machine made tiles were 23.2 percent and 0.8 percent respectively. Houses with roof made of burnt bricks were 1.7 percent. GI metal and asbestos sheets etc. constitute 5.0 percent of census house in Kandra GP. Houses with roof made concrete were 61.3 percent (Table 5.4). Spatial distribution of the houses is shown in Fig. 5.6.

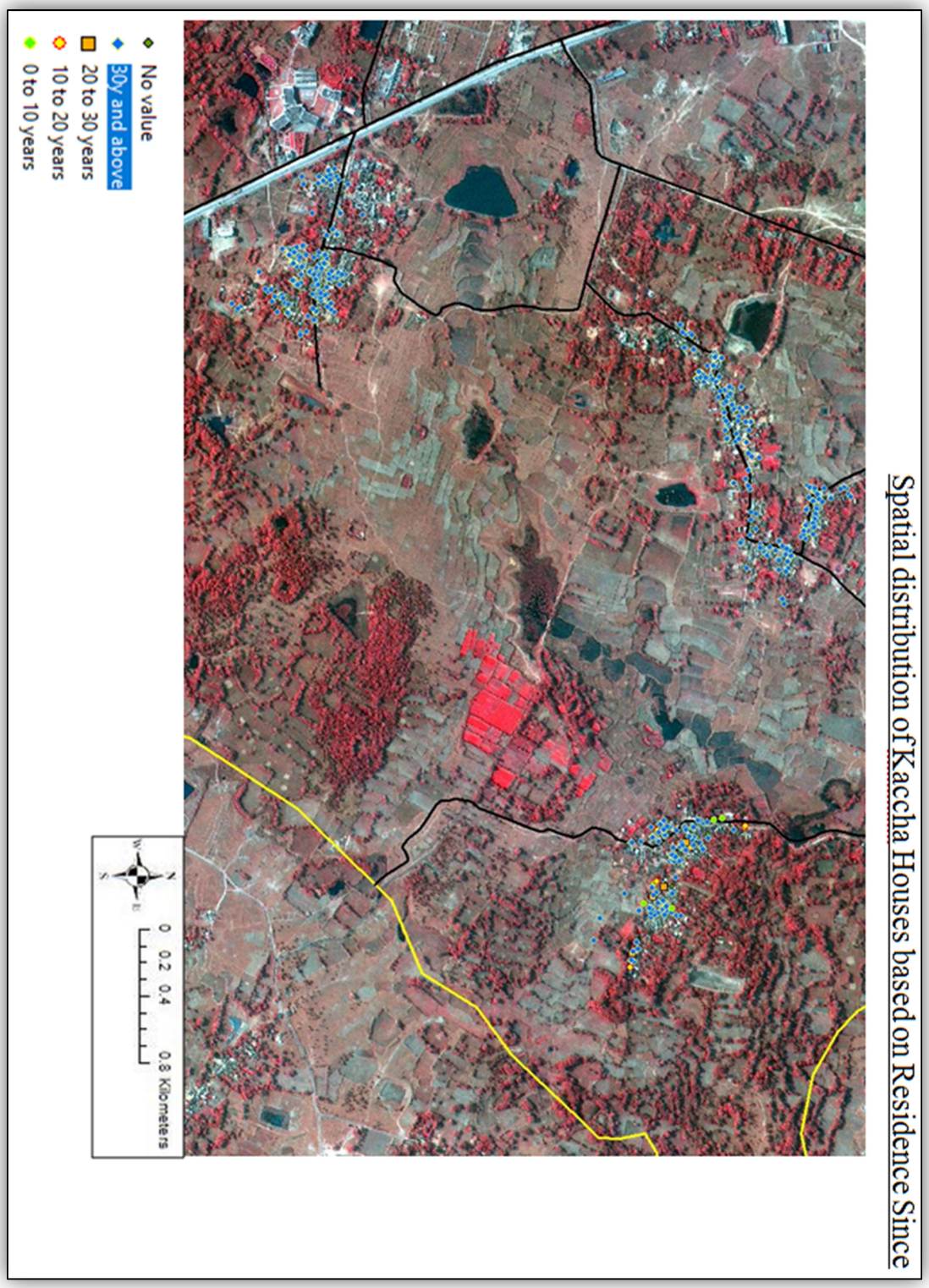


Fig. 5.6: Spatial distribution of Kaccha Houses in Kandra, based on age of residence (*Source: Based on survey data; Prepared by NRSC/ISRO)*

Table 5.4 Percent of houses by the material of roof		
	Census 2011	**Primary Survey 2020**
Grass/ Thatch/ Bamboo/ Wood/Mud etc.	6.5	44.9
Plastic/ Polythene	0.3	0
Hand made Tiles	23.2	9.6
Machine made Tiles	0.8	0
Burnt Brick	1.7	0
Stone/ Slate	0.6	20.8
G.I./Metal/ Asbestos sheets	5	0.8
Concrete	61.3	18.9
Any other material	0.8	4.8

The primary survey reveals that the percent of houses with grass, thatch, bamboo, wood, mud increased to 44.9 percent from 6.5 percent. Houses with roof made of handmade tiles decreased to 9.6percent from 23.2 percent. Use of GI metal and asbestos sheets etc. as a roof material decreased to 0.8 percent from 5.0 percent. Houses with roof made concrete decreased from 61.3 percent to 18.9 percent

5.2.7 HOUSES BY MATERIAL OF WALL

According to census 2011, the walls made of burnt bricks were prominent in Kandra GP and constituted 69.0 percent of census houses followed by mud and unburnt bricks constituting 25.3 percent of houses. Walls made up of stone packed with mortar and of stone not packed with mortar were 22.0 percent and 0.1 percent respectively.

Table 5.5 Percent of houses by the material of wall		
	Census 2011	**Primary Survey 2020**
Grass/ Thatch/ Bamboo etc.	3.2	28.6
Plastic/ Polythene	0.1	0
Mud/ un burnt bricks	25.3	25.7
Wood	0	0
Stone not packed with mortar	22	0
Stone packed with mortar	0.1	12.7
G.I./ Metal/ Asbestos sheets	0	0
Burnt brick+ Concrete	68+1	4.4
Any other material	0.1	0
Not Reported	0	22.1

The walls made of Grass, Thatch, Bamboo etc. and those made of Plastic or Polythene were 3.2 and 0.1 percent respectively. Concrete used as a wall material constituted 1.0 percent of the census houses in Kandra GP (Table 5.5). The primary survey of households indicates that the percent of houses with wall made of burnt bricks decreased from 68.0 percent to 4.4 percent whereas walls made of mud and unburnt bricks increased marginally from 25.3 percent to 25.7 percent. Walls made up of stone packed with mortar decreased from 22 percent to 0 percent. The walls made of Grass, Thatch, and Bamboo etc. also increased substantially from 3.2 to 28.6 percent.

5.2.8 HOUSEHOLD DISTRIBUTION BY DRINKING WATER SOURCE

There is limited number of households in Kandra having access to an improved source of drinking water. An improved source of drinking water includes, in addition to water piped into the dwelling, yard or plot, water available from a public tap or standpipe, a tube well or borehole, a protected dug well, a protected spring, and rainwater (Table 5.6).

Table 5.6 Household distribution by drinking water

Source	Census 2011	Source	Primary Survey 2020
Tapwater from treated source	1.5	Public Tap	17.6
Tapwater from untreated source	2.6	Private Tap	0.6
Covered well	1.4	Covered well	0
Un-covered well	20.1	Un-covered well	18.9
Hand-pump	71.4	Hand-pump	33.6
Tubewell/Borehole	2.6	Tubewell/Borehole	0.3
Spring	0	Spring	0
River/ Canal	0	River/ Canal	0
Tank/ Pond/ Lake	0	Tank/ Pond/ Lake	0
Other sources	0.4	Not Available	27.2

According to census 2011, only 1.5 percent of households in Kandra have access to treated piped water and 2.6 percent of households get tap water from untreated source. Most people obtain their drinking water from uncovered well (20.1 percent) and hand-pump (71.4 percent); however, 1.4 percent of households get water from covered well and 2.6 percent of households depend upon Tubewell/Borehole for their water requirement.

The result from primary survey shows that 17.6 percent of households have access to public tap and 0.6 percent of households have private tap in their house. Majority of household (33.6 percent) fulfill their water need from hand-pumps and 18.9 percent of households get water from well.0.3 percent of households draw water from bore-well and for 27.2 percent of households, the source was not reported.

5.2.9 HOUSEHOLD DISTRIBUTION BY TYPE OF FUEL USED FOR COOKING

Smoke from solid cooking fuels is a serious health hazard. Solid cooking fuels include coal/lignite, charcoal, wood, straw, shrubs, grass, agricultural crop waste and dung cakes. Among Kandra GP households, those using coal, lignite and charcoal were 37.5 percent and cow dung cake were used by5.8 percent of household. Crop residue as a fuel for cooking purpose was used by 2.6 percent and 48.5 percent of households used fire wood. Thus, 94.4 percent of household use solid cooking fuel. The households using LPG/PNG were at 5.1 percent. The use of Kerosene oil and biogas are abysmally low with household at 0 and 0.2 percent respectively (Table 5.7).

Table 5.7 Percent of houses by type of fuel used for cooking

Types of fuel	Census 2011	Primary Survey 2020
Fire-wood	48.5	47.9
Crop residue	2.6	0
Cowdung cake	5.8	59
Coal, Lignite,Charcoal	37.5	0
Kerosene	0	27.8
LPG/PNG	5.1	53.7
Electricity	0	0
Biogas	0.2	0.7
Any other	0.1	5.8

The result from primary survey shows that households, using coal, lignite and charcoal decreased from 37.5 percent to 0 percent whereas those using LPG increased from 5.1 percent to 53.7 percent. Fire wood as a fuel for cooking purpose decreased from 48.5 percent to 47.9 percent and use of cow-dung cake increased from 5.8 percent to 59 percent. The use of Kerosene oil increased from0 percent to 27.8 percent households. The use of biogas for households has increased from 0.2 to 0.7 percent.

5.2.10 HOUSEHOLD DISTRIBUTION BY AVAILABILITY OF TOILET FACILITIES

The primary household survey conducted in Kandra GP reveals that 49.8 percent of households are having toilet facility and 50.2 percent of household have no access to formal toilet facility. The households who use community toilet are 31.3 percent and those going for open defecation constitute 7.7 percent (Figure 5.7). Out of the households owning the toilet facility 41.6 percent of household constructed the toilet through Government sponsored schemes whereas 11.6 percent constructed the toilet by their own resources. Financial assistance ranging from Rs 10,000 to Rs 20,000 was provided to construct toilet through various schemes.

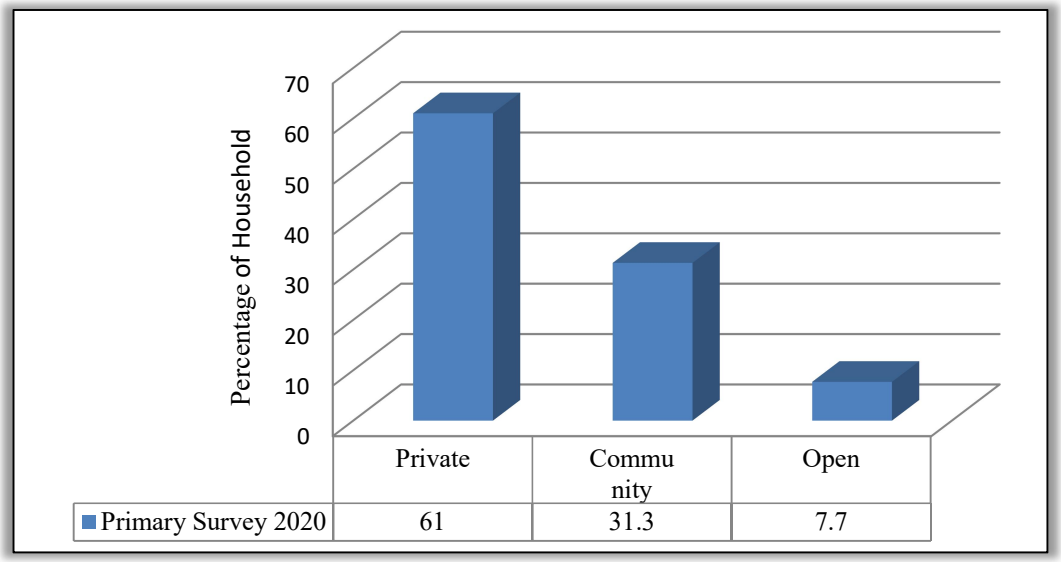


Fig. 5.7: Percent Household by availability of toilet facility

Source: Census 2011 and primary survey conducted during August 2020

The spatial distribution of Kaccha houses is shown based on availability of BPL card in Fig. 5.8 and availability of toilets are shown in Fig. 5.9 respectively.

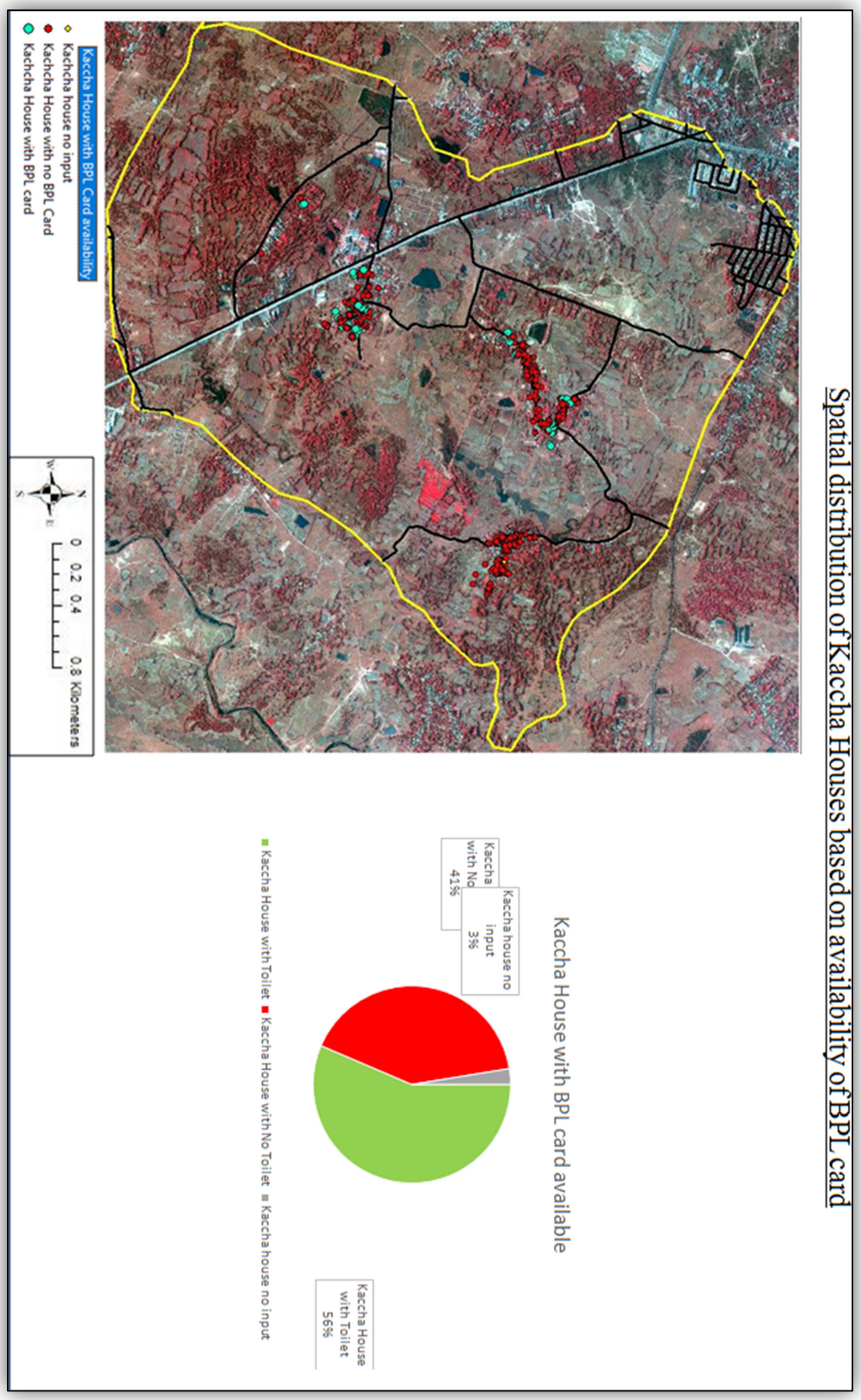


Fig. 5.8: Spatial distribution of Houses in Kandra, based on availability of BPL Card (*Source: Based on survey data; Prepared by NRSC/ISRO)*

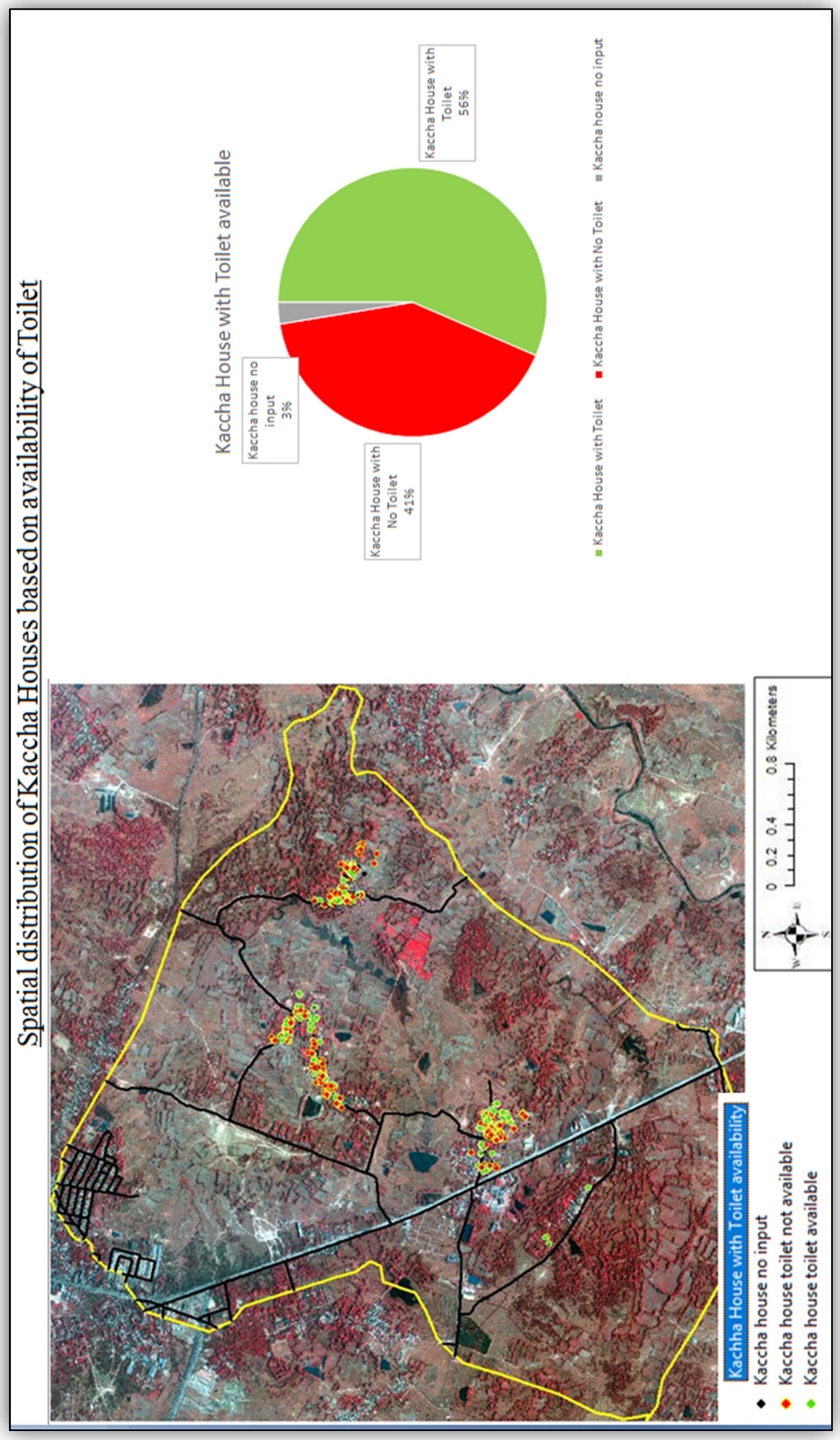


Fig. 5.9: Spatial distribution of Houses in Kandra, based on availability of Toilet

Source: Based on survey data; Prepared by NRSC/ISRO

5.3 KEY OBSERVATIONS OF EXISTING HOUSING CONDITION

The following are the key observation regarding the existing housing condition of Kandra GP:

- Though the homeownership percent has increased marginally from 97.7 percent to 98.5 percent, the conditions of houses have not shown any improvement. The percent of dilapidated houses have increased from 3.3 percent to 4.2 percent.
- The increase in home ownership can also be attributed to the increase in the construction of Kuchcha houses which escalated from 6.0 percent to 57 percent (Fig. 5.10).

Fig. 5.10: Kuchcha house in Kandra GP, *Source: Author*

- Kandra GP is characterized by houses of G and G+1 floor which accounts for 61 percent of total houses. The representation of houses in Kandra GP is shown in Fig. 5.11 and Fig. 5.12.

Fig. 5.11: Single floor houses in Kandra GP

Fig. 5.12: Houses in Kandra GP

Source: Author

- Majority of houses in Kandra GP (64.1 percent) are built within the span of 10 years. This is an indication of future growth potential of Kandra GP.
- There is a visible concern regarding materials used as roof and floor in house. In 81.1 percent of houses, roofs are made of materials other than concrete, whereas a total of 95.6 percent of houses do not have burnt bricks as the material of wall (Fig. 5.13).

Fig. 5.13: Houses in Kandra GP with temporary roof material

Source: Author

- The households having access to tap water in Kandra GP is mere 17.6 percent. The flagship scheme of "Nal se Jal" through Jal Jeevan Mission, under the newly created Jal Shakti Ministry needs to expedite the process in order to achieve the objective of providing tap water to every rural households.
- The households using LPG as fuel type for cooking purpose accounts for 54.3 percent. Under Pradhan Mantri Ujjawala Yojna, the beneficiary needs to be identified and extended with LPG facility.
- About 1 in 13 households (7.7 percent) resort to open defecation. It is observed that 30.3 percent of households have received financial assistance ranging from Rs. 10,000 to Rs. 20,000 under various schemes to construct or upgrade toilets in Kandra GP. The households having no toilet facility need to be extended financial support to achieve the objective of Open Defecation Free (ODF) Gram Panchayat.
- According to the report of MGNREGA, under the aegis of Pradhan Mantri Grameen Awas Yojna (PMGAY), during the financial year of 2019-20, construction of 79,524 houses in rural areas of Jharkhand has been sanctioned but work has not started. There are total of 22,587 projects which are ongoing and construction of 82 houses has been completed. The Panchayat office of Kandra GP has reported the construction of only 248 houses under PMGAY since its inception.

5.4 PROPOSALS AND RECOMMENDATIONS

It has been proposed to undertake the implementation of planning proposals under two distinct phases. The first phase will be for the period of 2020 to 2026 and the second phase will run through 2026 to 2030.

FIRST PHASE (2020-2026)

It has been observed that the demands for housing in Kandra GP may arise under following circumstances.

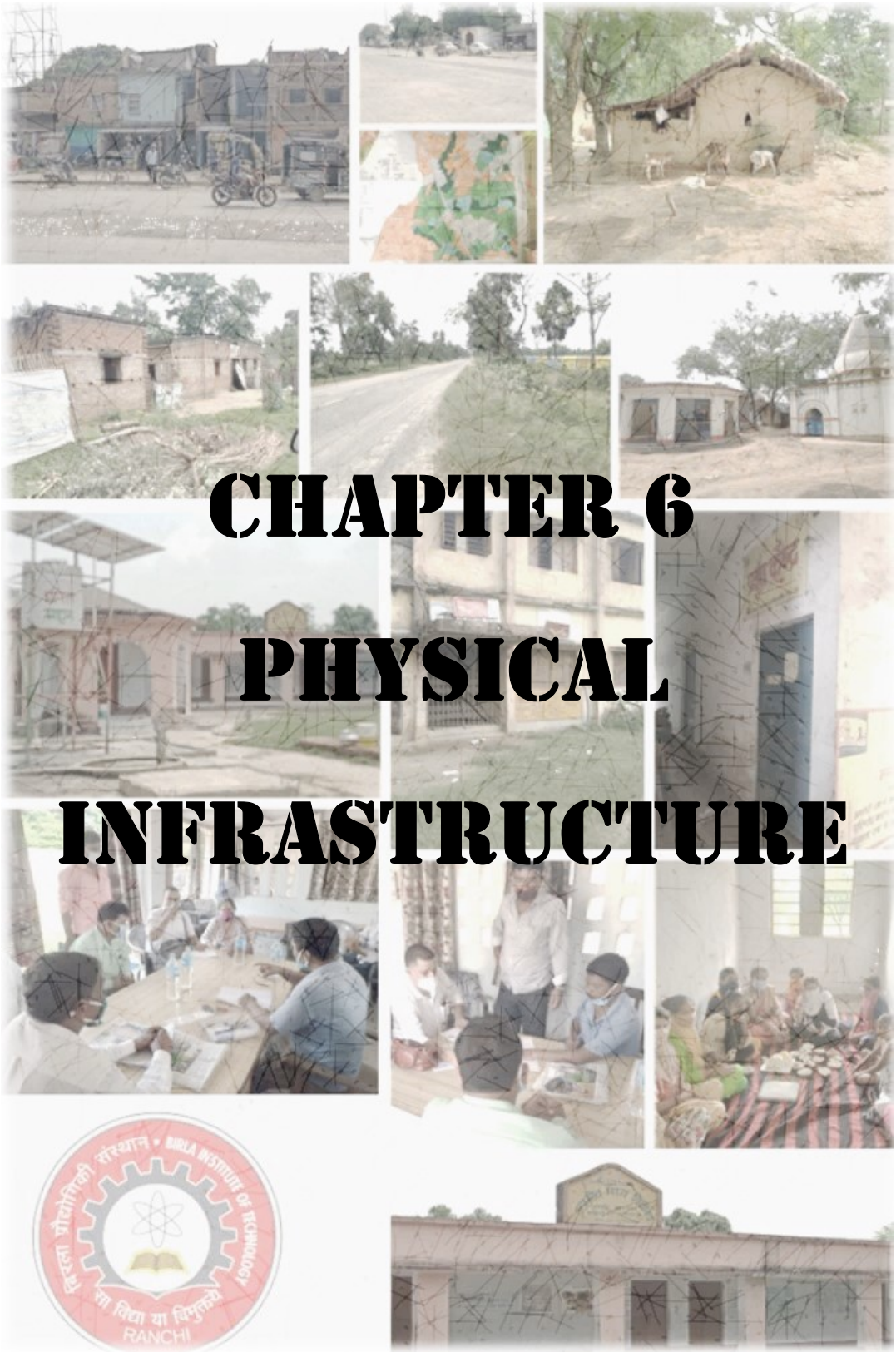
- The houses in dilapidated condition should be taken up for repairing and reconstruction in situ through PMGAY. The process can be expedited by removing bottlenecks in the identification of beneficiary and attending to the vulnerable households on priority basis. The housing delivery mechanism under this head will be government assisted. Availability of microfinance for housing needs to be promoted.

- The projected population for 2026 is 10,339, an increase of 1,987 persons. Considering the current household size of 5.72, 348 housing units will be required in the first phase. Assuming the requirement of 50 sq m plot size for each house and allowing 20 percent for access and other infrastructural facilities, total land requirement will be 20,880 sq m or 5.16 acres. The proposed site for housing development is at Par Tand tola, which is government owned land as per records of Kandra Panchayat office, is shown in the final proposed land use plan. The housing delivery mechanism will be government as well as with the initiative of government through public private partnership/joint venture. The housing requirement can also be developed as per the housing market dynamics and can be taken up by builders/developers or individual households.
- It has been proposed to extensively upgrade the social and physical infrastructure, which will boost the employment requirement in the Kandra GP. Housing will be needed in Kandra GP by persons seeking work in Kandra GP or in nearby urban areas. As Kandra GP is under the strong influence of industrial city of Bokaro, it is expected that development driven by Bokaro will take place within the planning area of Kandra GP. The presence of NH 32 within the planning area of Kandra GP will further accelerate the development process and would generate additional housing need. These housing requirements will be fulfilled entirely the housing market dynamics.

SECOND PHASE (2026-2030)

The housing requirement in second phase will be mainly due to the population growth and extent of development in the Kandra GP.

- The projected population for 2030 is 11,100, an increase of 761 persons which would require additional 133 housing units in second phase of development. Based on the previous assumption total land requirement will be 7980 sq. m. or about 2 acres. The site for development of housing is proposed to be in Par Tand tola as mentioned in the first phase. In this phase, it is proposed that group housing be delivered through public private partnership/joint venture so that government can take care of LIG and EWS section of the society.
- The housing requirement generated by accelerated development process as mentioned during the first phase will be met through individual endeavor and private builders/developers.



CHAPTER 6

PHYSICAL INFRASTRUCTURE

CHAPTER 6: PHYSICAL INFRASTRUCTURE

6.1 INTRODUCTION

For the efficient operation of a society and necessary for an economy to function with sustainability, physical infrastructures are highly required. Socio-economic growth of a town is facilitated with working on land resources and the provision of the physical infrastructures in the form of roads, water supply, waste water management, drainage networks, street lighting and solid waste management. Physical infrastructures are the most important assets of a town in terms of capital investment, provision of services and sustainable and resilient development. The impact of various physical infrastructures has been increasingly going beyond their core functions and which suggests that a wider array of stakeholders should be involved in making decisions on infrastructure development policies.

This chapter comprises of abovementioned various components of physical infrastructures and deals with them by studying the existing scenario, analyzing the demand and supply gap and accordingly propose for the future growth in an integrated manner so as to facilitate the socio-economic growth of the study area and is outlined below.

6.2 WATER SUPPLY

Planning for water supply system starts with the search of a source of water supply in the vicinity of the study area. Its capacity to serve for the planning period is of utmost importance. Storage for the further treatment of water is the next step in the process. Storage may be underground or at an elevated level. Elevated service reservoirs create the required pressure head for the distribution networks. Suitable system should then be designed to distribute the treated water through a network of distribution pipes to the individual households.

6.2.1 EXISTING STATUS

There is no provision of piped water distribution system in the entire Kandra GP area. Currently water supply in the GP consists of both ground water and surface water sources. People use water from hand pump, well and bore well. Data collected through mobile survey app. suggests that 27% of household still don’t have the

availability of water. Water is available to 34% of the households through the hand pumps. Rest of the households is dependent on Public tap water, available through the existing 7 numbers of Jal Meenars.

6.2.2 GROUND WATER

The Kandra GP is primarily being sustained by ground water sources. The existing ground water resources are dug wells and hand pumps. The data received from survey suggests that there are 182 nos. of wells with private ownership including private and government ownership. 34% of the households are dependent on Jal Meenars and Hand Pumps, and the rest is dependent on Dug Wells (refer Fig. 6.1)

Jal Meenar in School Compound at Ramdih

Hand Pump

Private Well

Fig. 6.1: Sources of underground water in Kandra GP

Source: Author

Considering the need of the people GP has installed around 7 Jal Meenars (solar operated deep tube wells) for supporting the existing supply water system through point source. A declining trend of ground water has been noticed during recent years specifically during the summer.

Jal Meenars are the only source of water for the people who doesn't own a private dug well as most of the hand pumps are not operational. The distance travelled to and fro for many households is beyond the walking distance and hence they prefer either their own well or they rely upon the nearby wells. The following Fig. 6.2 shows the location of the existing Jal Meenars in the Kandra GP.

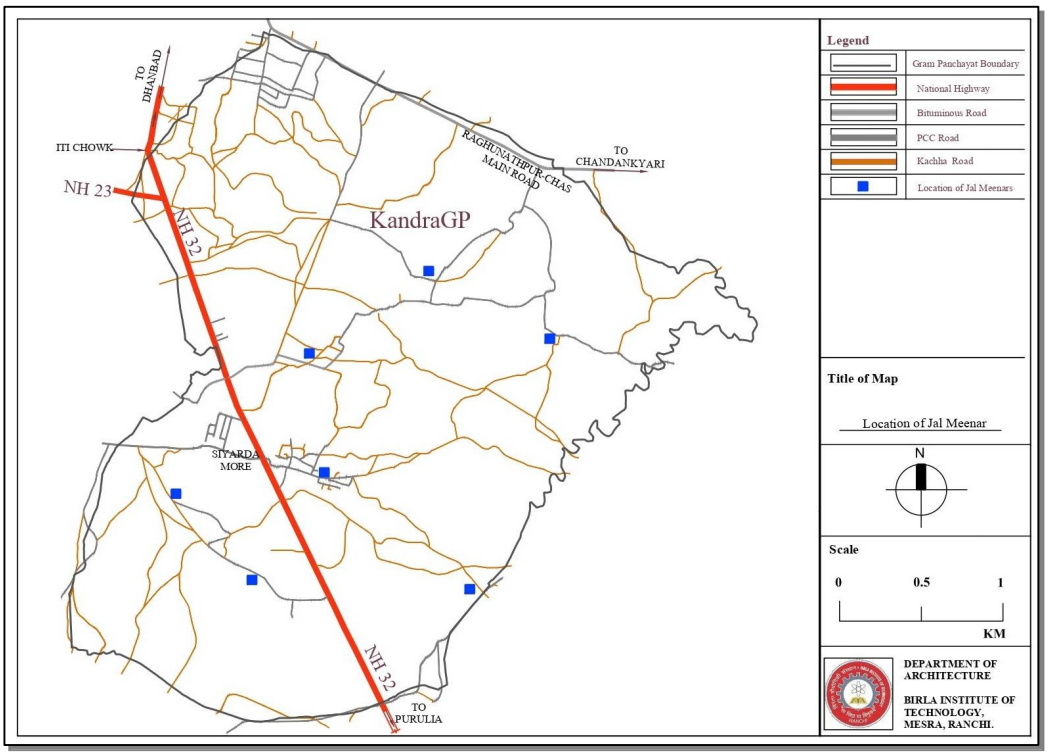


Fig. 6.2: Map showing the location of Jal Meenars in Kandra GP

Source: Based on survey; prepared by the BIT Mesra Team

6.2.3 SURFACE WATER

A large section of the Kandra GP are still dependent on local surface water resources i.e. the ponds. Fig. 6.3 shows some of the surface water sources in Kandra GP. There are 17 number of Ponds (refer Fig. 6.4)in the GP inclusive of private and govt. ownership and used for washing, bathing and other domestic purposes in the villages.

Fig. 6.3: Sources of surface water in Kandra GP

Source: Author

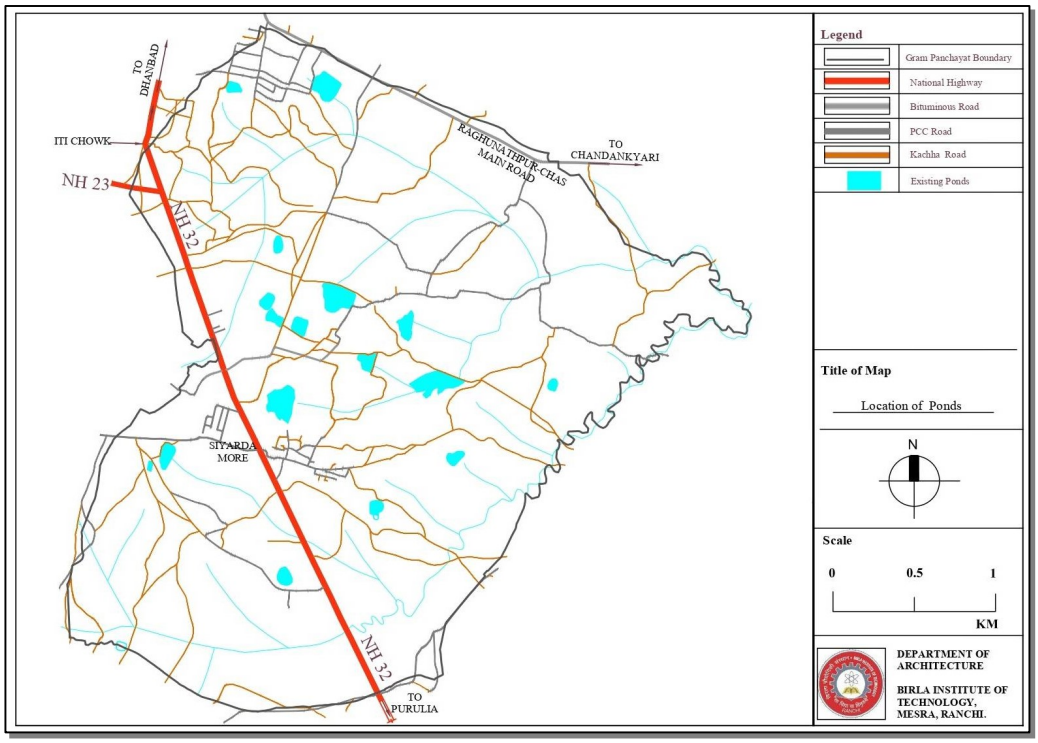


Fig. 6.4: Map showing the location of ponds in Kandra GP.

Source: Based on survey; prepared by the BIT Mesra Team

6.2.4 SERVICE LEVEL BENCHMARKING

Table 6.1 shows the service level benchmarking for the water supply in the Kandra GP.

Table 6.1: Service level benchmarking for Water Supply

Sl. No.	Water Supply Indicators	Benchmarks	Status
1	Coverage of piped water supply	100%	0%
2	Per capita supply of conduited water	135 lpcd.	no piped supply
3	Coverage of water supply by Jal Meenars		34%*
4	Extent of metering of water connection	100%	0%
5	Extent of non-revenue water	20%	0%
6	Continuity of water supply	24 hours	no piped supply

*Source: SLB report by MoUD, Govt. of Jharkhand, * As per the survey conducted.*

6.2.5 WATER QUALITY

As non conduited supply of water is too low to meet the extent and need of the populace of the Kandra GP, a significant number of people is surviving only on ground water through Jal meenars, dug wells, hand pumps etc. During the field visits and interaction with the community, it was revealed that the general quality of surface water being consumed is hard in nature with a higher concentration of iron.

6.2.6 WATER DEMAND ASSESSMENT

Water demand assessment starts with the identification of the source of water supply in the vicinity of the Kandra GP. Further the water demand is assessed based on the projected population. The storage should be designed for the ultimate design capacity keeping in view of the non-revenue water.

6.2.6.1 Source of Water Supply

The existing treated water supply distribution system under the scheme, National Rural Drinking Water Programme (NRDWP)/ Jal Jeevan Mission, has coverage till ITI chowk which is very nearby area to the boundary of Kandra GP, and the pipe laying has extended up to Jail More along the NH 32. Since this scheme will cover the all rural areas aligned along NH 32, hence this scheme is the major source of water supply to Kandra GP too. This existing water supply infrastructure is going to prove an economical facility for the Kandra GP, as there is no need to treat the tapped water. Only storage of water and further the distribution of water have to be considered for Kandra GP.

6.2.6.2 Water Demand Projections

Based on the population projections and assuming a water demand of 135 liter per capita per day including 15% of Non-Revenue Water (NRW), gross demand for water supply till the year 2031 would be 1.73 MLD. From 2021 to 2031 water demand after every five year has been given in Table 6.2.

Table 6.2: Water demand projections up to 2031				
Year	**Population**	**Per capita water supply**	**Water demand in MLD**	**Water generation including 15% of NRW, in MLD**
2021	9630	90	0.87	1.00
2026	10339	135	1.40	1.61
2031	11100	135	1.50	1.73

Source: Projections based on Calculations

6.2.6.3 Storage Demand Assessment

Based on the water demand as estimated above the capacity requirement of water storage reservoirs/ Overhead tanks (OHT) are assessed in the table below (refer Table 6.3).

Table 6.3: Storage Demand Assessment

Year	Total water demand (MLD)	Existing storage (MLD)	Storage Demand (MLD)
2021	1.00	NIL	1.00
2026	1.61	NIL	1.61
2031	1.73	NIL	1.73

Source: Based on Analysis and Calculations

Storage reservoirs store the treated water for supplying water during emergencies such as fire, breakdown and repairs etc. and also to help in absorbing the hourly fluctuations during the normal water demand.

OHT are the rectangular, circular or elliptical overhead tanks erected at a certain suitable elevation above the ground level and supported on towers. They are constructed where the pressure requirements necessitate considerable elevation above the ground surface. They are constructed in areas where the combined gravity and pumping system for water distribution is adopted. Water is pumped into these elevated tanks from the surface reservoirs and then supplied to the households through distribution networks.

6.2.7 IDENTIFICATION OF A SUITABLE DISTRIBUTION NETWORK FOR PIPED WATER SUPPLY SYSTEM IN KANDRA GP

Keeping in view of the water demand and topography of Kandra GP, out of the available various types of water distribution network, Grid Pattern with Loop is found to be most suitable water distribution system. Since water in the supply system is free to flow in more than one direction, stagnation does not occur as readily as in the branching pattern. In case of repair or break down in a pipe, the area connected to that pipe will continue to receive water, as water will flow to that area from the other side. Water reaches all points with minimum head loss. At the time of fires, by manipulating the cut-off valves, plenty of water supplies may be diverted and concentrated for fire-fighting.

6.2.7.1 Grid Supply Pattern with Loops

Since water in the supply system is free to flow in more than one direction, stagnation does not occur as readily as in the branching pattern. In case of repair or break down in a pipe, the area connected to that pipe will continue to· receive water, as water will flow to that area from the other side. Water reaches all points with minimum head loss. At the time of fires, by manipulating the cut-off valves, plenty of water supplies may be diverted and concentrated for fire-fighting. Loops may be provided in a grid pattern to improve water pressure in portions of the GP (business and commercial areas). Loops should be strategically located so that the GP develops the water pressure should be sustained.

6.2.8 WATER SUPPLY - RECOMMENDATIONS AND PROPOSALS

Currently treated water from Damodar River is being supplied till ITI Chowk, and the laying of trunk pipeline is in progress along the NH 32, and has been extended till Jail More, very near to the boundary of Kandra GP. This water supply scheme is being developed under the scheme, National Rural Drinking Water Programme (NRDWP)/ Jal Jeevan Mission. Since this scheme may find its implication in the Kandra GP too, no water treatment plant is being proposed for the water supply in Kandra GP. However an Underground Service Reservoir of capacity of total 1.73 MLD is proposed at the highest elevation level located near the junction of NH 32 and the road leading to Labudih, opposite to Sidhu-Kanhu ITI institute.

The water thus stored in the USR will be lifted through pumps to the over head tanks (OHTs). While deciding the location of USR and OHT, the water demand, the

population density and the topographical profile has been kept in mind. All the five OHTs are such located that gravity flow will facilitate the distribution for almost the entire Kandra GP.

Five OHTs are proposed, one in each Tola, to serve efficiently the entire GP. The location of OHTs is in the land available in or near the Government schools or the Temples or the land available beside the NH 32. The OHT for Kandra is proposed near the Shiva Temple, for Labudih near the Govt. school, for Ramdih near Kali temple and for Partand near the Hanuman Temple. For Dhandabra site, it is proposed beside the NH 32, in nearby area of the Flour Mill which is currently non operational.

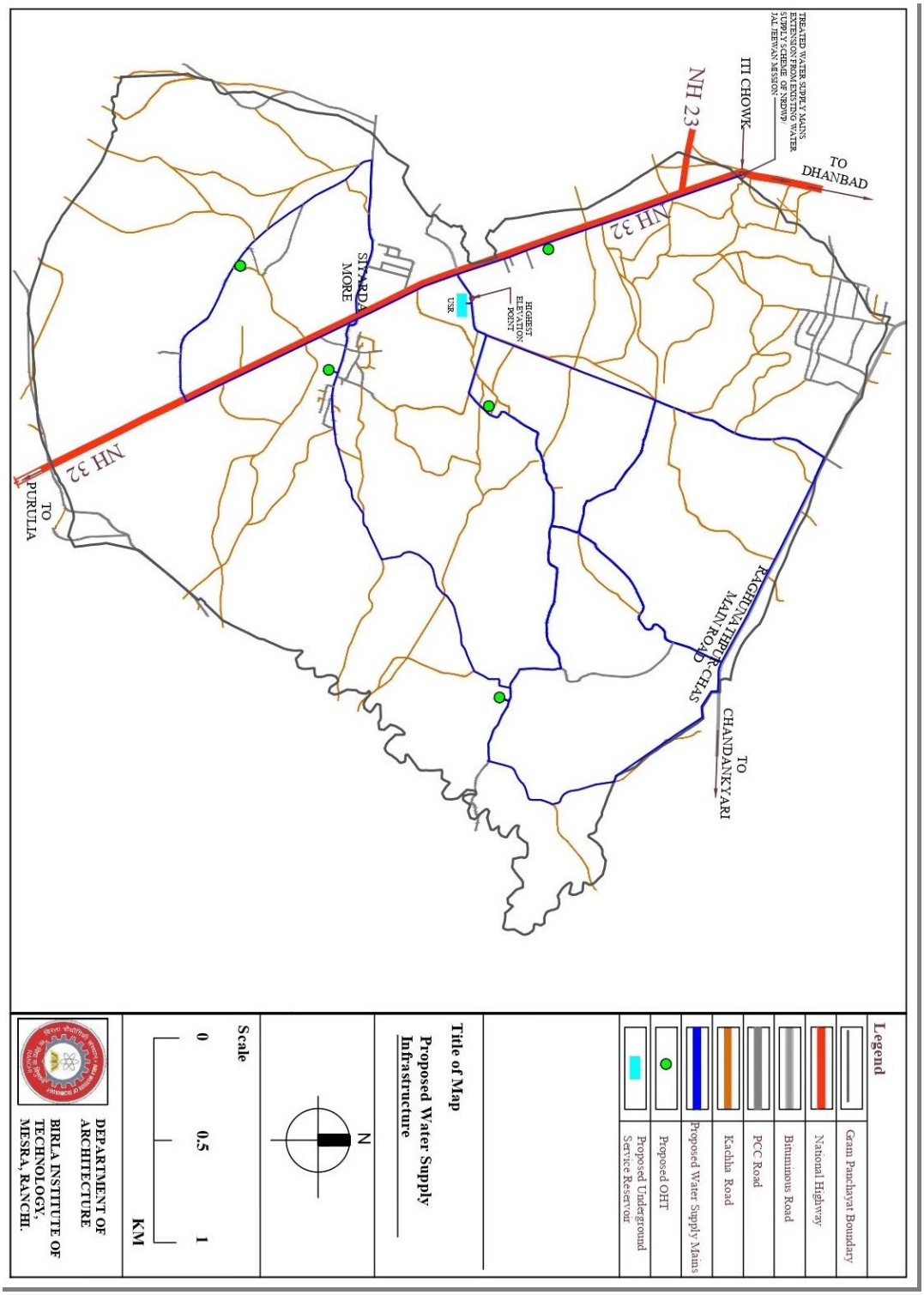
For distribution of the water from the OHT, the entire GP is provided with various water supply mains forming loops in the distribution system. All the water supply mains, branch from the trunk supply along the NH 32. These mains are connected to the sub mains and sub mains further to the household connections.

Various supply feeders are connected to the main lines and covers the entire households of Kandra GP. Various loops are formed connecting through the supply feeders and supply mains. This enables the distribution system to maintain the optimum water pressure through the entire network as the water reaches a certain section through various routes of grids and the loops.

All the pumping system, feeder main and distribution systems are proposed for the ultimate requirement. However, the pump sets will be installed for the intermediate capacity which will be replaced by suitable pump set at the end of Intermediate stage to take care of the ultimate requirement.

The detail of proposed water supply and distribution arrangements within Kandra GP is outlined in Fig. 6.5.

Fig. 6.5: Map showing proposals for water supply infrastructures in Kandra GP



Source: prepared by the BIT Mesra Team

6.2.9 PHASING

To achieve the targets and translate the vision into reality, certain goals have been marked as per water supply service level benchmarks. These goals are bifurcated within 10 years(refer Table 6.4) of time frame in three phases, i.e. short term goals till three year, medium term till five years and long term till ten years.

Table 6.4: Phasing for proposed water supply system

Parameters	Unit	Benchmarks	Baseline	Short term 1 year (2021-2022)	Medium term 3 years (2022-2025)	Long term 6 years & beyond (2025-2031)
Coverage of water supply	%	100	5%	√		
Per capita supply of water	LPCD	135	50	√		
Extent of metering of water connection	%	100	0			√
Extent of non-revenue water	%	20	15		√	
Continuity of water supply	Hrs.	24	2		√	
Quality of water supplied	%	100	NA		√	
Efficiency in redressal of customer complaints	%	80	NA		√	√
Cost recovery in water supply services	%	100	NA			√
Efficiency in collection of water related charges	%	90	0			√

Source: SLB report by MoUD, Govt. of Jharkhand

6.3 SEWARAGE SYSTEM

6.3.1 EXISTING STATUS

Kandra GP does not have proper sewerage facility. In absence of organized sanitation facilities/ sewerage system in the Kandra GP, a major portion of waste water generated from the households, institutional and commercial area (both black and grey water) normally finds their way either directly to the roads whether kutcha or pucca without any drainage system or open fields that finally ends at lower fallow fields

Current drainage system comprises of open/ covered drains (*pucca* drain, *kutcha* drain) constructed in an unplanned manner in different parts of Kandra GP, mainly built on as and when required, and on fund availability basis. As per data provided by GP officials, approximately 3% of the GP is covered by drainage system. Most of the closed drains are along the NH 32 and the Chas Raghunathpur Main Road. Rest of the GP area has no drainage system. The brief status of the drainage system in is provided in Table 6.5.

Table 6.5: Present category wise drainage connections

Sl. No.	Category of Drain	% of HHs connected
1	Closed drainage	2.4
2	Open drainage	0.6
3	No drainage	97.0
	Total	**100%**

Source: Based on survey and Kandra GP Officials

As per the primary survey conducted through mobile survey app., households with Kacha houses having the toilet facility are 56%. Kacha houses without toilet facility are 41 %. Rest of the households either practice open defecation or has pit latrines without septic tank /soak pit facility discharging the effluent directly within their own individual plots or open plots. Households having pit latrines without septic tank /soak pit facility discharges the effluent directly within their own individual plots, nearby open plots or in few cases on the roads.

Fig. 6.6: Toilets built under Swachh Bharat Mission *Source: Author*

Fig. 6.6 shows couple of the toilets built under Swachh Bharat Mission. Most of the :septic tanks do not have soak pits, while few soak pits are found in dilapidated condition with broken top slabs and pipes. As a result, effluents from the septic tanks generally overflow and discharge within the plot or open lands.

Major drains flowing through the carrying storm water and waste water with their disposal points are given in the Table 6.6.

Table 6.6: Major drains and their discharge points

Coverage	Sewage disposal system
The entire Kandra GP	Due to poor drainage system most of the houses carrying waste water have no option left other than to have the outlets in vacant land or ponds. In all these wards water gets discharged either inside the own plot, or outside the plot into the roads, or low lands. Many of these low lands are agricultural fields.

Source: Kandra GP Officials

6.3.2 WASTE WATER GENERATION

There is no accurate estimate of per capita water consumption available with Drinking Water and Sanitation Department, Government of Jharkhand. However, based on discussion with DW&SD officials, it was assessed that approximately 50 lpcd of water is being consumed by the residents both from government and private sources. Waste water generation for the is calculated considering 80% of the water consumed (i.e. 40 lpcd), comprising of 30% black water (12 lpcd) and 70% grey water (28 lpcd). Data from secondary sources indicate that waste water generation from pour flush toilet is approximately 10-25 lpcd per day, which was further confirmed by the residents during field visit that 10-15 lpcd of water is used for flushing toilet facilities. An estimate of the total waste water being generated for the Kandra GP is presented in Table 6.7.

Table 6.7: Domestic waste water generation in Kandra GP

Year	Total Population	Total Water Supplied @ 50 lpcd[1] (m3)	Total Waste Water generated @ 40 lpcd[2] (m3)	Total Black Water transferred to the Septic Tanks @12 lpcd [2] (m3)	Total grey water generated @ 28 lpcd (m3)
2021	9630	481	385	115	270
2026	10339	931[3]	745	223	522
2031	11100	1500[4]	1200	360	840

Source: Calculation as per population projection

Note:

As per population projection

1. Waste water assumption - 80% of water supplied (@50 lpcd)
2. black water 30% of total waste water and grey water 70% of total waste water supply
3. water supply rate is assumed to be 90 lpcd in the year 2026 assuming water supply system will be functional by then
4. Water supply rate is assumed to be 135 lpcd in the year 2031 for achieving the 100% SLB.

6.3.3 SEPTAGE MANAGEMENT

Kandra GP has no suction machine for maintenance of the septic tanks as there is no system of septage management in the entire GP.

6.3.4 SERVICE LEVEL BENCHMARKS

Service level benchmarks for sewerage status for Kandra GP is provided in Table 6.8. Although the GP does not have the integrated sewerage system, the service level benchmarks have been provided to indicate the level of service expected in the long term.

Table 6.8: Sewerage and sanitation service level benchmarks in Kandra GP

Sl. No.	Sewerage and Sanitation	Benchmarks	Status
1	Coverage of toilets	100%	73%*
2	Coverage of sewage network services	100%	0%
3	Collection efficiency of the sewage network	100%	0%
4	Adequacy of sewage treatment capacity	100%	0%
5	Quality of sewage treatment	100%	0%
6	Extent of reuse and recycling of sewage	20%	0%
7	Complaint Redressal	80%	0%
8	Extent cost recovery in sewage management	100%	0%
9	Efficiency in collection of sewage related charges	90%	0%

Note: * Includes toilets constructed under SBM as well as the privately constructed by the house owners, as per Kandra GP Officials

Source: SLB report by MoUD, Govt. of Jharkhand

6.3.5 ONGOING SCHEMES AND PROPOSED INITIATIVES

Currently, there is no scheme or work for development of sewerage system at Kandra GP. However, the GP is now going to implement schemes according to SBM guidelines. Since the entire GP does not have proper sewerage facility, it has to take exclusive plan and initiative accordingly to tackle the existing sanitation problems that the GP is facing.

6.3.6 KEY ISSUES

- **Absence of sewerage system**: Though there are septic tanks constructed with individual households and public toilets, there is absence of sewerage network in resulting into discharge of waste water in open drains leading to unhygienic conditions in the town.
- **Degradation of natural water bodies**: Flowing untreated waste water into natural drains and finally to the open fields, which are both agricultural and fallow, lead to degradation of quality of water bodies and soil thus causing damage to the

overall eco system. There is threat to human health and environment due to degradation of water quality.

- **Choked drains**: Most of the drains are choked with dumped solid waste / plastic waste and causing localized water logging (mixed with waste water) and flooding like situation during the monsoon in many of the residential areas.
- **No reuse and recycling of waste water**: At present there is no reuse and recycling of waste water in Kandra GP.

6.3.7 IDENTIFICATION OF A SUITABLE SEWERAGE SYSTEM FOR KANDRA GP

Kandra GP has a very low level of non conduited water supply (approximately 50 lpcd) and high dependence on ground water. Waste water generation is low, approximately of 40 lpcd. Hence, conventional off site underground sewerage system for waste water management cannot be proposed for the as of now; and decentralized wastewater treatment system (DEWATS) seems to be the best options for in current situation. The shift from onsite to offsite will be decided based on the factors such as and when water supply @ 135 lpcd will be made available for the entire Kandra GP. In addition, other factors like availability of uninterrupted electricity, peoples' acceptability of sewerage system particularly connecting to sewer as well as high capital and operation cost and necessary institutional needs etc. will decide on the time frame for shifting from on site to an integrated sewerage system.

Currently, the electric power supply is unstable in Kandra GP, which is crucial for operation and maintenance of sewerage system. Integrated sewerage system usually involves laying of sewers at considerable depth, construction of manholes, installation of intermediate / main pumping stations and sewage treatment plant. These require stable electric power and in case of shortage of electricity, standby arrangements in the form of DG sets have to be provided, which further increases the operation and maintenance cost. Also, narrow roads and unplanned development might affect the efficiency of laying the sewer network.

In Kandra GP, the BPL population may not afford high cost of maintenance of conventional sewerage system. In addition, the majority of population having already constructed septic tank may take longer time for connection of toilets to the sewerage system. Therefore, utmost care should be taken in the decision making process to avoid any wasteful investment in the sector.

It is, therefore, necessary to consider cost effective sewerage system in the Kandra

GP, which is affordable and sustainable. Table 6.9 provides the suitability of the various types of sewerage system between conventional and low cost sewerage system:

Table 6.9: Options for waste water conveyance system

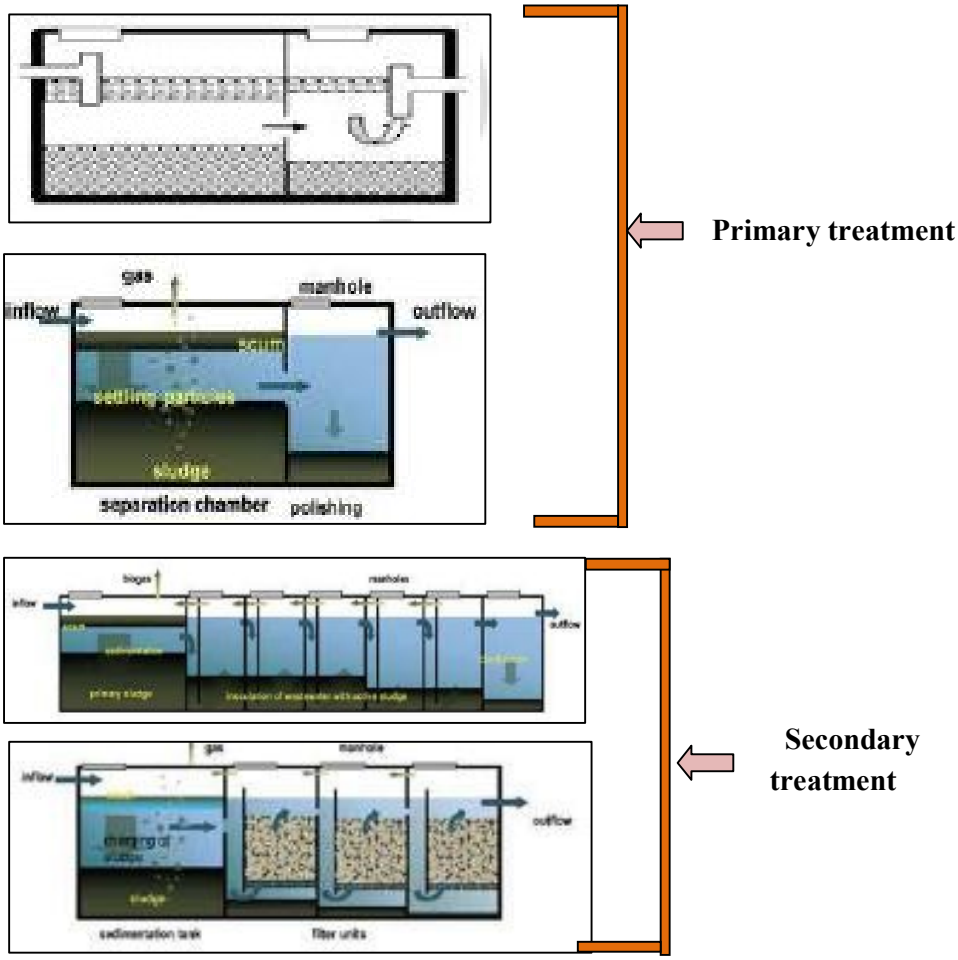
Types of system	Description
1. Conventional sewerage system	Conventional sewerage system is centralized waste water treatment system consist of closed system of pipes, manholes and pumping station. The underground sewer network conveys black and grey water from individual households to centralized treatment facility. The underground sewer line is categorized into primary, secondary and tertiary networks. The main line or primary line runs through the center of the system and all the other lines empty into it.
2.Low cost sewerage system	
2.1 Shallow Sewers	Shallow sewers are conventional sewers constructed to relaxed standards. Shallow depth made possible by low traffic loads and short connection lengths allows the use of inspection chambers rather than manholes. Since these are not designed for entry of persons, they can be much smaller and cheaper than manholes, thus considerably reducing the cost of sewerage
2.2 Decentralized wastewater treatment system (DEWATS) with Small-bore sewerage	All waste water is diverted to an on-plot septic tank. Households constructing new individual sanitation facilities should be encouraged to construct septic tanks. Some households could use pit latrines. Only black water may be connected to sewers. Septage is removed for further treatment and final disposal. Small diameter sewer pipe (100- 200 mm) is laid at a flatter gradient to carry the effluent from inceptor tanks which are similar to septic tanks.
2.3 Combined system	The combination includes both on-site sanitation arrangements and off-site sanitation systems.

Source: Author

Development of sewerage network would take a longer time frame and would depend on external factors such as availability of funds for implementation of cost intensive sewerage and wastewater treatment systems, the objective of this project component is to address the immediate need of treating the wastewater (black water) that are

discharged into the surface drains and to minimize pollution on the surface water bodies, in the interim period. Decentralized waste water treatment system (DEWATS) system is cost effective, both in terms of capital investment and maintenance needs. The system should also be capable of taking variable loads considering the proposed development of wastewater infrastructure within the that over the time will reduce the wastewater load into the drains. These DEWATS would be established in various locations of and one module would treat waste water from approximately 400 HHs. Septic tanks would be set up in the low lying area but above the flood level so that gravity flow can be maintained. Not only in the existing housing area but for the housing to be developed in future too could have this system of waste water treatment. Locally treated water can be further utilized for other purposes such as gardening, road cleaning and washing.

6.3.8 FUNCTIONING OF DEWATS SYSTEM



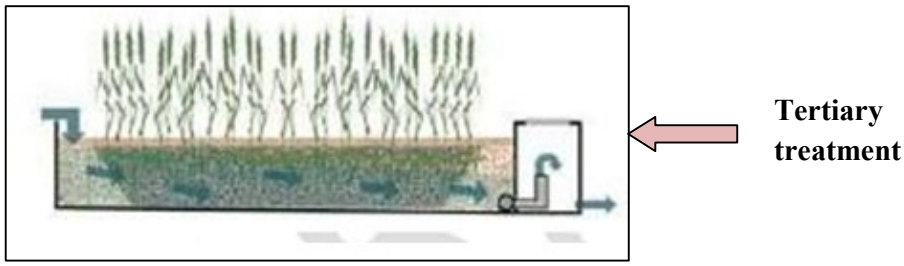


Fig. 6.7: Functioning of DEWATS system

Source: Guidelines on Solid and Liquid Waste Management (SLWM) in Rural Areas, Ministry of Drinking Water and Sanitation 2014

6.3.9 WASTE WATER CONVEYANCE BY SMALL BORE SEWER SYSTEM

For grey water, surface drain is the cheapest option for collecting such waste water. For black water, mixed with grey water, small bore sewer is the appropriate and sustainable options for collecting waste water in rural areas.

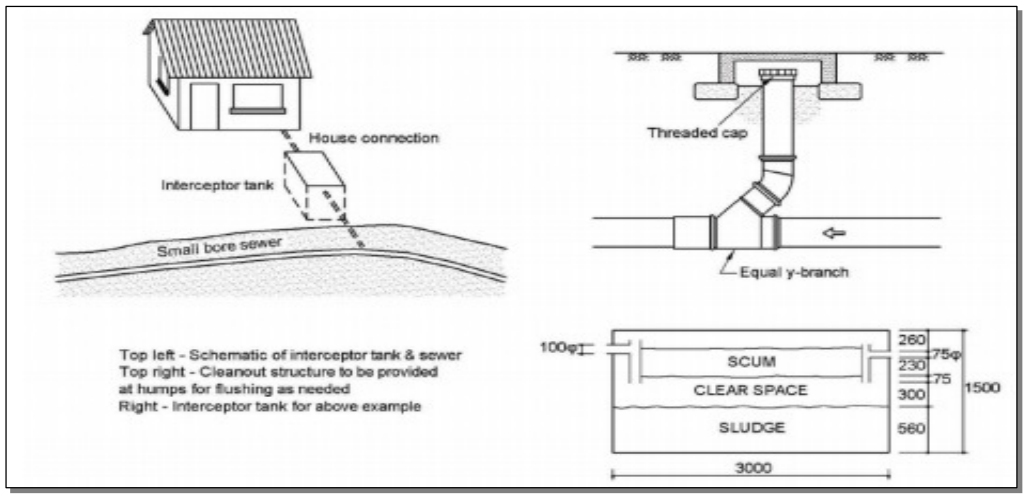


Fig. 6.8: A schematic diagram of Small bore sewer system

Source: Manual on Sewerage and Sewage Treatment Systems – 2013, Ministry of Drinking Water and Sanitation, chapter 8

Small bore sewer systems are designed to receive only the liquid portion of household wastewater for off-site treatment and disposal. Grit, grease and floating materials are separated from the waste flow in interceptor tanks similar to septic tanks. Such interceptor tanks are installed for a group of household. Depending upon the size of interceptor tanks and inflow of waste water, settled solids should be removed

periodically from the interceptor tanks. The functioning of the small bore sewer system is shown in Fig.6.8

6.3.10 COMPONENTS OF A SMALL BORE SEWER SYSTEMS

- House connection: The house connection is made at the inlet to the interceptor tank.
- Interceptor tank: It is designed to detain the liquid flow for 12 to 24 hours and to remove both floating and settleable solids from the liquid stream. Volume is also provided for storage of the solids, which are periodically removed through an access port. The design of interceptor tank is similar to conventional septic tanks
- Sewer: Sewers are small bore pipe (minimum diameter of 100 mm) which is trenched into the ground at a depth sufficient to collect the settled wastewater from most connections by gravity. Unlike conventional sewers, small bore sewers are not necessarily laid on a uniform gradient with straight alignment between manholes or cleanouts.
- Cleanout Manhole: Cleanouts and manholes provide access to the sewers for inspection and maintenance. Also, they can be easily concealed to prevent tampering. They function as flushing points during sewer cleaning operations.

6.3.10.1 The Small Bore System has the following advantages

- Reduced water requirements. It is suitable where per capita waste water generation is very low. It is more suited in rural areas where per capita water supply is low, making conventional sewer system technically unfeasible.
- Reduced excavation costs. With the troublesome solids removed, the sewers can be designed with minimum depth, required to maintain self-cleansing velocity when the slope is kept minimum, excavation costs are minimized.
- Reduced materials costs. Peak flows, for which the small bore sewers must be designed to handle, are lower than those experienced with conventional sewers because the interceptor tanks provide some surge storage. Expensive manholes are not required in case of small bore system.
- Reduced treatment requirements. Interceptor tanks arrest floating materials, oil and grease and most of the settleable solids from wastewater. Therefore, it reduces cost of the treatment, as it requires lesser hydraulic retention time for treatment of such waste water.

Thus, small bore sewer systems provide an economical way to upgrade existing sanitation facilities to a level of service comparable to conventional sewers. Because

of the lower costs of construction and maintenance and the ability to function with little water, small bore sewers can be used where supply of water is low and consequently low volume of waste water is generated per household.

6.3.11 WASTE WATER GENERATION PROJECTION

Based on the population projections and projecting water demand of 135 lpcd day (2026 onwards), net demand for water supply till the year 2031 would be 17.46 MLD. Current water demand is based on existing per capita supply of 50 lpcd. It has been assumed that by year 2026, water supply infrastructure work will be completed and per capita supply will increase to 135 lpcd.

As per CPHEEO manual on Sewerage and Sewage Treatment, waste water generation is 80% of water supply, hence total waste water generation till the year 2031 would be about 13.97 MLD, considering 15% ground water infiltration as the water table is very low in the GP. Table 6.10 and Table 6.11 provides the projected waste water generation details and projected septage generations respectively, in Kandra GP from 2021 to 2031.

Table 6.10: Waste water generation projection for Kandra GP

Year	Population	Net water demand at consumer end (MLD)	Waste water generation including 15% ground water infiltration
2021	9630	4.82[1]	4.43
2026	10339	9.31[2]	8.57
2031	11100	14.99[3]	13.80

Source: Projections based on CPHEEO Manual and Population Projections

Note: 1 Assumption being 50 lpcd, as there is no piped water supply for 2021

2 Assumption being 90 lpcd, considering that piped water supply will be augmented by 2026 and onwards

3 Assumption being 135 lpcd, considering that piped water supply will be augmented by 2031 and onwards

Table 6.11: Projected septage generation in Kandra GP

Particular	Unit	2021	2026	2031
Population	No.	9630	10,339	11,100
No of households	No.	1852	1988	2135
Households having septic tank	No.	632	1000	2135

Number of septic tank to be cleared every year – 50% of the total	No.	316	500	1068
Septage generation @ 2.5 m3 per septic tank	m^3	790	1250	2670
No of cleaning vehicles required	No.	2	4	8
Existing number of vehicle		0	0	0
Actual number of vehicle required	No.	2	4	8

Source: Calculation based on population projection

Following assumptions were made for above calculation

- Average volume of septage produced by emptying one septic tank – 2.5 m^3.
- Septic tank is cleaned once in two years. On an average 50% of the septic tank gets cleaned in a year.
- Each vacuum de-sludging vehicle will clear 4 septic tanks in a day
- After 2026, with the development of Decentralized sewerage system the septage generation will get reduced.

6.3.12 PROPOSALS AND RECOMMENDATIONS FOR SEWERAGE SYSTEM

While identifying the treatment area for DEWATS, the slope profile plays very important role, as the natural gravity flow facilitates to develop an economical and sustainable waste water management system. The location of the treatment area should be such as that it is not going to pollute the surface water or the ground water table by any means and hence it should not be located to any nearby water body, water stream or river. Based on the topographical and hydrogeological details which include soil type, ground water table and general topography of Kandra GP, Population density and available open spaces, the small bore DEWATS is proposed with the following salient points:

- The sewerage network is designed for the Ultimate requirement.
- The small bore sewer system will be provided with small bore of 100mm u-PVC pipes for the conveyance of the black water.
- The collected black water will be transferred to cluster inception tanks for further treatment. The effluent from the inception tanks would be forwarded further for the tertiary treatment by biological process (planted bed filters).
- The treated sludge would be reused as manure and the treated water will be reused for agricultural purposes.

The DEWATS treatment areas are provided in two lower level elevations, one, behind the Dhandabra Site which will cover the Labudih and Dhandabra Site. Another

DEWATS treatment area is provided near Ramdih which will cover the Partand, Kandra and Ramdih areas. All the sewer lines will be facilitated by Interceptor Chambers at a cluster level along the small bore sewer network.

6.3.13 Recycling Of Treated Waste Water For Non-Portable Applications

Recycling of wastewater is essentially, reusing treated waste water for beneficial purposes such as agricultural and landscape irrigation, toilet flushing and replenishing a ground water basin. Recycling and reusing are both aimed at conservation and reduction of wastage. Action plan for recycling and reuse of waste water should be developed along with the development of sewerage system and sewage treatment plant. Reuse is especially critical for since water supply is relatively low and high cost of getting piped water supply for the Kandra GP.

Waste water can be recycled to agricultural farms, commercial and institutional establishments. This will entail a direct saving to the consumer of water and a direct saving for the which continuously struggles to find or locate new sources of water to meet the growing demands of the population.

6.3.14 Proper Operation And Maintenance of Sanitation Infrastructure

Sewerage System need to be maintained as per the guidelines provided in CPHEEO Manual on Sewerage and Sewage treatment. Both preventive and the emergency maintenance should be done regularly for the proposed sewerage system. The waste water management system proposal is outlined in Fig. 6.9

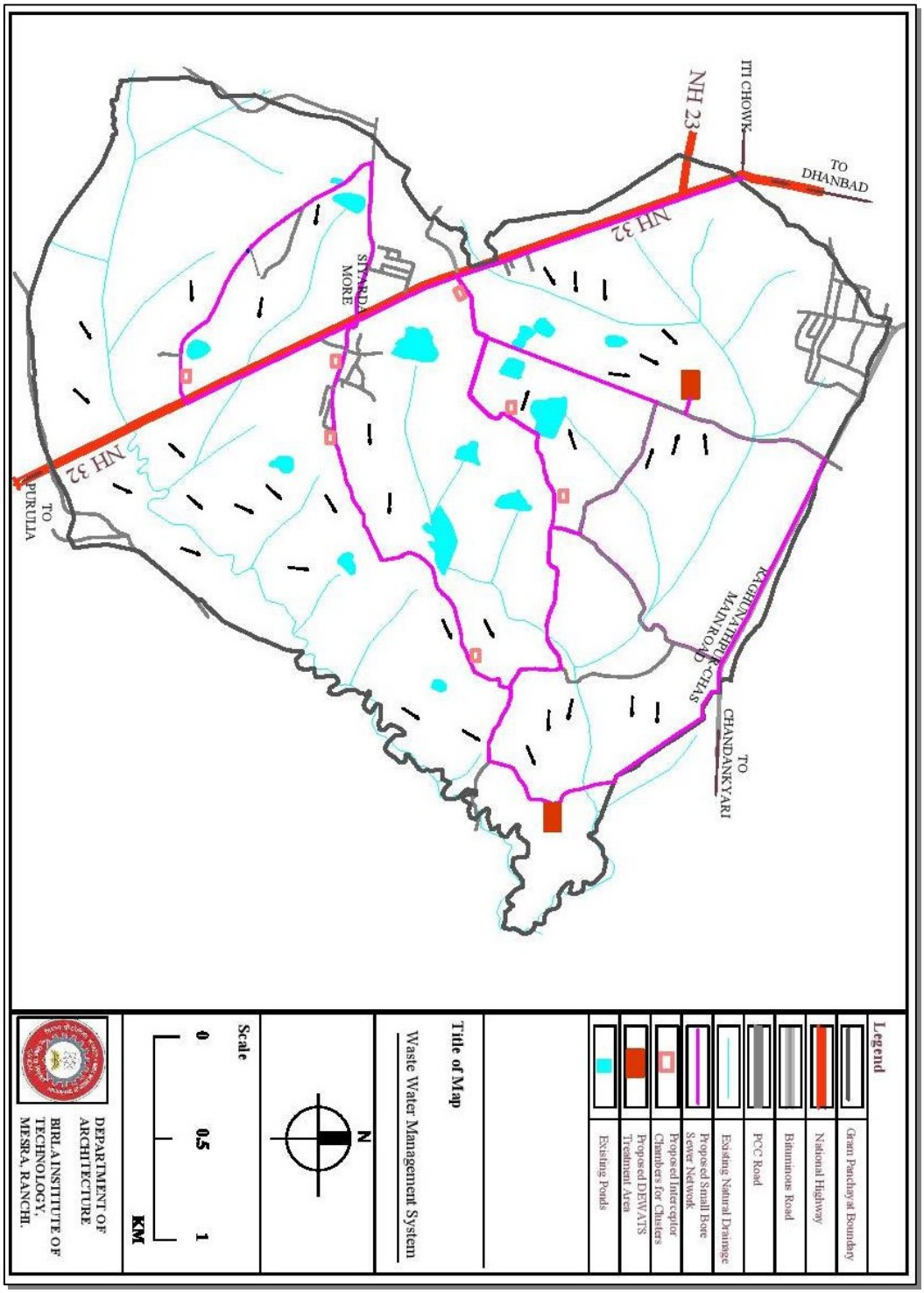


Fig. 6.9: Map showing the proposals for the waste water management system for Kandra GP

Source: prepared by the BIT Mesra Team

6.3.15 PHASING FOR WASTE WATER MANAGEMENT SYSTEM

The main goal is to develop suitable waste water collection and treatment system for Kandra GP. In the long term, all the waste water generated in Kandra GP shall be collected and conveyed through sewer network to treatment plants, treated to acceptable quality levels and disposed, recycled or reused

.

It has been proposed a three-phase approach to implement the plan in this report, namely immediate / short-term, medium-term and long-term benefits to upgrade the waste water management system for the town. Each term would be spread over a certain period of years to complete the targeted tasks. Under this, it has been adopted that financial approval of the scheme would probably be completed by the year 2021 and tenders for implementation of works would be floated.. This has been referred to as "immediate phase" having a projected time period of 1year when the project works are expected to be completed. The next phase of development over another 2 years from 2022 till 2024 is mentioned as "short-term," and the remaining works to be taken up over the remaining 7 years is referred as "medium-term (2 years) and long-term (more than 5 years).This phased approach aims to navigate through the challenges posed by the limitations in investments and funding, existing administrative framework, institutional capacities and community engagement in a proficient manner. The sewerage goals with respect to the service level benchmarks have been provided in Table 6.12.

Table 6.12: Phasing for the waste water management system in Kandra GP

Parameters	Unit	Benchmarks	Baseline	PHASING		
				Short term 1 years	Medium term 2 years	Long term 7 years
Coverage of toilets	%	100%	80% *	√		
Coverage of sewage network services	%	100%	0%		√	√
Collection efficiency of the sewage network	%	100%	0%		√	√
Adequacy of sewage	%	100%	0%		√	√

treatment capacity						
Quality of sewage treatment	%	100%	0%		√	√
Extent of reuse and recycling of sewage	%	20%	0%		√	√
Complaint redresses	%	80%	0%		√	√
Extent cost recovery in sewage management	%	100%	0%		√	√
Efficiency in collection of sewage related charges	%	90%	0%		√	√

Source: SLB report by MoUD, Govt. of Jharkhand

Note: * Includes toilets constructed under SBM as well as the privately constructed by the house owners

6.4 STORM WATER DRAINAGE SYSTEM

6.4.1 EXISTING SCENARIO

In Kandra GP, currently there is no storm water drainage system except for the Northern boundary along the Chas Raghunathpur Main Road and the NH 32 passing through the GP. The drainage system is developed by NHAI along the NH 32 and by the State Government along the Northern boundary. Fig. 6.10 shows the existing condition of drainage in Kandra GP and absence of drainage..

Fig. 6.10: Existing condition of drainage in Kandra GP

Source: Author

Table 6.13: Drains and outfall points in Kandra GP

Coverage	Drainage system
Northern boundary along Chas- Chandankiyari Road and NH 32of Kandra GP	Only this section (not completely but partial with discontinuity) is provided with covered pucca drains.
Rest part of Kandra GP	Drainage system is almost absent. Only few parts have open kutcha drains. Outlets in vacant land, agricultural land or ponds.

Source: Kandra GP Officials

6.4.2 DRAINS AND THE SLOPE PROFILE IN KANDRA GP

The existing drains and outfall points within the Kandra GP is described in Table 6.13. Partand Tola is at a higher level as compared to other tolas. The NH 32 is also having the higher elevation level, but slightly less as compared to Partand Tola. The overall slope runs from Partand, towards Kandra, Labudih and Ramdih (from West to North East). The Izri River is on the North East side almost parallel to the Eastern boundary of Kandra GP. The lower level is found to be in two areas, one behind the

Dhandabra Site and another near Ramdih Tola near the North East boundary of the GP. Fig. 6.11 shows the Map of the existing natural drains with the slope profile of the Kandra GP.

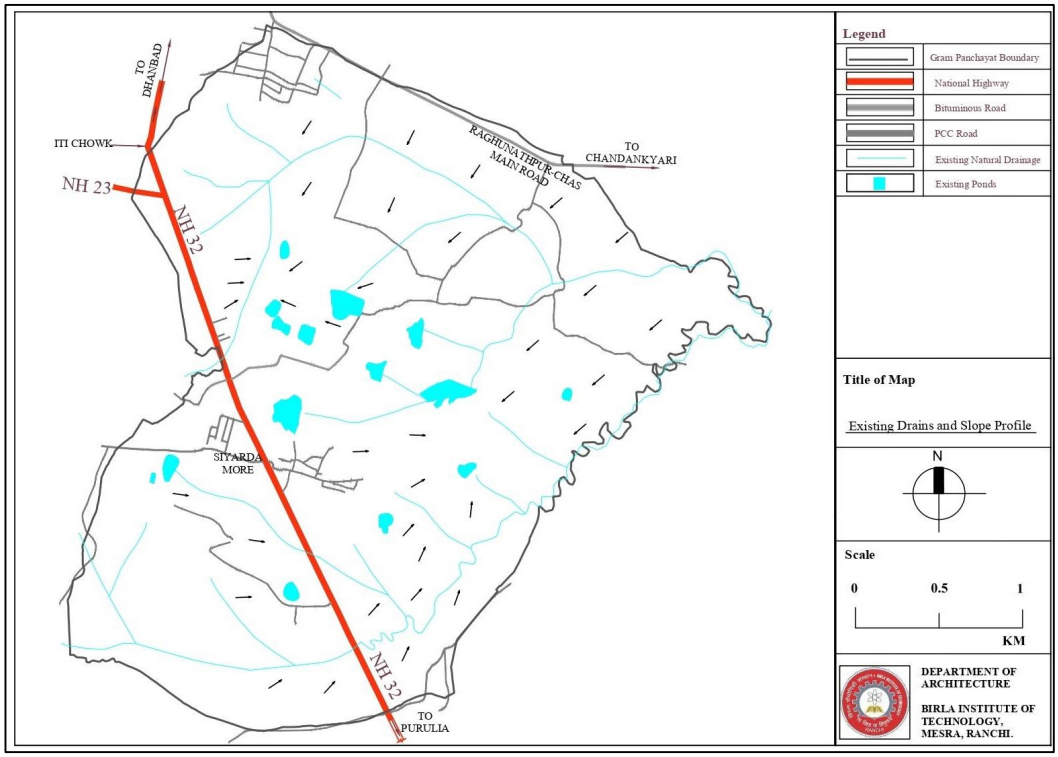


Fig. 6.11: Map showing the existing drains and the slope profile of Kandra GP

Source: prepared by the BIT Mesra Team

6.4.3 Service Level Benchmarks

Service level benchmark and its status with respect to the GP is shown in Table 6.14.

Table 6.14: SLB of drainage system in Kandra GP

Sl. No.	Drainage System	Benchmark	Status
1	Provisions of storm water drainage network	100%	NA
2	Incidents of water logging/flooding	0	6

Source: discussions with Kandra GP Officials

6.4.4 Key Issues

- **Mixing of storm water and waste water**: There is mixing of waste water and storm water in the drain. Due to absence of proper sewerage system and public

ignorance household waste water is finding way directly into the drains. Mixing of waste water and storm water drain is the major problem faced by the GP.

- **Degradation of natural water bodies**: Flow of waste water into nearby ponds leading to degradation of water quality.
- **Absence of proper storm water drainage network**: In the absence of storm water system the waste water finds its way on the roads resulting in serious water pollution in all the water bodies in the GP.
- **Choked drains:** Most of the drains are choked with solid waste / plastic waste and causing localized water logging situation in many of the residential areas.
- **Silting in drains:** Regular and proper cleaning of drains is not being done. Major drains are cleaned occasionally, only or if any complaint is lodged. Heavy silting of drains resulting into overflow of water and water logging in rainy season.

6.4.5 PROPOSALS

As per the natural drainage pattern and topography of Kandra GP, the 6(six) numbers of water logged areas of the GP, located in various tolas have been proposed to be provided with a secondary storm water drainage system leading to the major drains.
Two major drains, from NH 32 towards the north eastern part of the GP are proposed covering Labudih, Kandra and Ramdih. Since Dhandabra Site is located beside the NH 32 in a steep downfall contour, proposed drainage is along the NH 32. The Partand Tola being located at a comparable higher level, the major drainage of this area is connected to the drainage along the NH 32, which is at a slightly lower level The partial developed drainage system along the NH 32 and Chas-Chandankiyari Road needs to be developed fully as covered drains.

All the drainage system leading to nearby ponds shall be diverted in alignment with the nearby major drains. The tentative alignments of the proposed major storm water drains and construction of other secondary drains are indicated in the Fig. 6.12

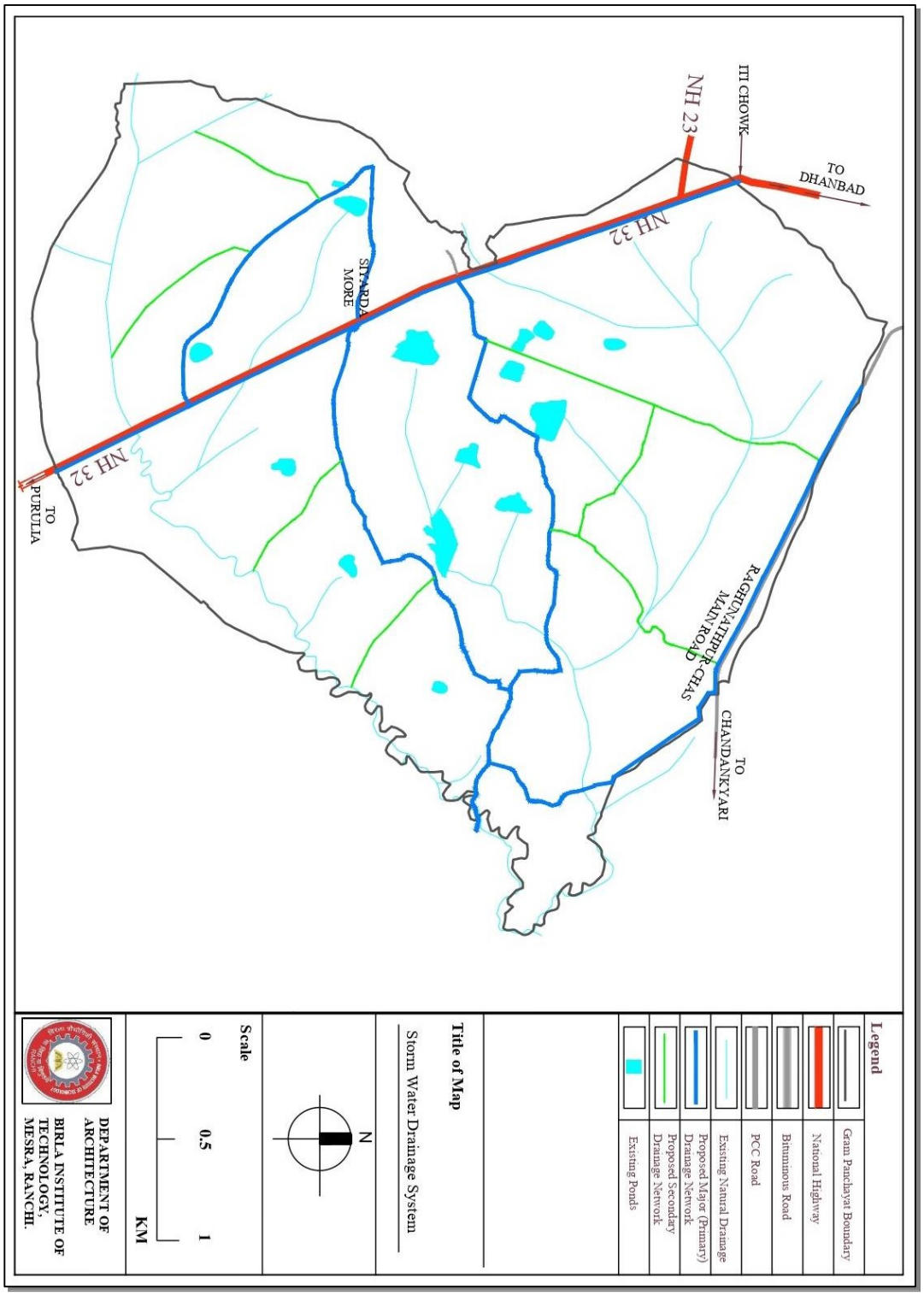


Fig. 6.12: Drainage map showing existing and proposed drains in Kandra GP

Source: prepared by the BIT Mesra Team

6.4.6 OTHER RECOMMENDATIONS

1) **Strengthening of the Existing Storm Water Network for Kandra GP:** Topography of the Kandra GP makes drainage situation relatively better in the GP. The general slope of the GP is from the western side of the GP towards the north eastern boundary of the GP, Partand being located at the highest level and Ramdih at the lowest level. However, some of the natural drains are heavily silted and thus, are inadequate to accommodate and transport the storm water. Thus strengthening of storm water drainage channel is recommended. The strengthening is primarily comprise of following activities

- De-silting of existing drains to increase the carrying capacity. To make the drain cleaning system sustainable, there is a need to undertake periodical desilting operation, which can keep the drains clean and prevent all six numbers of existing ponds water from getting polluted.
- All the natural drains flowing through need to flow freely for proper storm water discharge. All such drains will also be kept encroachment free with required de-silting / dredging from time to time.
- Appropriate plantation / beautification on the banks of the natural drains are required.

2) **Construction of New Storm Water Drainage system:** After review of the status and efficacy of the major (primary) and secondary drainage in Kandra GP, it is suggested to construct new storm water drains for almost the entire Kandra GP.

3) **Integration of existing ponds and water bodies in the town in the storm water drainage network:** Some of the drains in the Kandra GP carries storm water and waste water to the ponds and pollute the water. These drains should be rerouted and either connected to other natural drains or should be connected to prevent flow of storm water into ponds.

4) **Source Control and Ground water recharge initiatives to be developed along with storm water drains:**

Urbanization and development of hard pavement and dedicated storm water drainage system leads to high surface runoff to bigger drains and finally to nearby Nallahs / Rivers. Rain water harvesting for utilizing the primary source of water and preventing the run off from going to the storm water drains should be encouraged. Recharging of the ground water using appropriate technology should be done for Kandra GP. Central Public Works Department, Government of India has developed a technical manual for

rain water harvesting and conservation. Kandra GP can refer to the manual for design details of rain water harvesting structure (refer http://cpwd.gov.in/Publication/rain_wh.PDF).

Some of state governments has been proactive in development of legislations for rain water harvesting. Jharkhand state water policy also gives due consideration to rain water harvesting in planning water resources. However, the state of Jharkhand can look into the aspect of developing legislation for appropriate rain water harvesting in the state of Jharkhand, which shall be helpful to cater the problem of draught.

6.4.7 PHASING FOR THE DEVELOPMENT OF STORM WATER DRAINAGE SYSTEM

The development of storm water system should start with the short term goal with the conduct of the topographical survey to mark the levels which will help in identifying the alignment of the drains. The medium phase of three years should be for the development of secondary, tertiary and major drainage construction, followed by the long term last phase of five years for the development of the primary drainage network along with individual house connections. Table 6.15 outlines the phasing for the development of the entire new storm water drainage system for the Kandra GP.

Table 6.15: Phasing for storm water drainage system in Kandra GP

Sl No.	Short Description	Phasing for the proposed storm water drainage system in Kandra GP		
		Short term	Medium term	Long term
		2021-2023	2023-2026	2026-2031
1	Conduct Topographical Survey for the area to recognize the current condition of the sites etc.	√		
2	Development of new pucca main storm water drainage networking along ring road and connection of various other sub-mains to the main	√	√	
3	Development of individual house drainage Network along with the connection to it			√

Source: prepared by the BIT Mesra Team

6.5 SOLID WASTE MANAGEMENT - INTRODUCTION

The domestic solid waste generation in the rural household of India is increased, and now it is very important in the field of health management. The solid waste generated in the rural area is organic and biodegradable. These solid wastes are not handled properly, and eventually, they create problems for the entire region.

6.5.1 EXISTING STATUS

Table 6.16: Existing Solid Waste Management System in Kandra Gram Panchayat

Waste Generation	Collection and Transportation	Disposal
Total estimated Solid Waste Generated: ✓ 2-3 tonnes per day (based on an estimate of 330g per person per day) **Types of Solid Waste:** ✓ **Biodegradable:** Animalwaste, vegetable waste ✓ **Non-Biodegradable:** Plastic bags, papers, glass **Solid Waste Sources:** ✓ HH, Weekly markets, Schools/Anganwadis, Shops, etc.	Presently there is no system to collect and transport the daily generated solid waste. Every after 2 to 3 months, once the waste is collected and transported to an open area outside the settlement area. The GP contracts out this process	**Present Disposal system use** **Vegetable waste & food waste:** Given to animals and use in paddy fields **Plastics:** dump in open grounds and drains or burnt.

Source: Primary survey

The existing Solid Waste System of Kandra is shown in Table 6.16. Currently, there is no reliable waste system in Kandra GP. Generated solid waste is managed by households only. Generally, they disposed of all waste material according to their suitability. There is no segregation method; most of them disposed it on barren land. Cow dung and vegetable waste directly dump on the paddy field and convert it in compost without using any proper method. In some areas, they also dump cow dung back yard of their household.

Fig. 6.13: Existing Condition of the Solid Waste dumping system in Kandra GP

Source: Author

6.5.2 Forecasting Of Solid Waste Generation For Kandra GP

The current waste generation of Kandra is about 3 MTPD. Due to the increase in the population, waste generation will also be increased. The current waste generation rate of the GP is 0.338 kg/capita/day as shown in Table 6.17.

Table 6.17: Projected Waste Generation in Kandra GP

Year	Population	Total Waste
2021	9,630	3.25 MTPD
2026	10,339	3.49 MTPD
2030	11,100	3.75 MTPD

Source: Computed by author

6.5.3 Types And Quantity Of Waste

The types of waste generation vary as per:

- The geographical condition of the area.
- The socio-economic condition of the area
- The seasonal variation which affects the food habits
- The packaging of food items.

In general, it is observed that in those areas where the supplies of packed edibles are less, they generate less volume of waste

6.5.4 CATEGORIES OF SOLID WASTE

The various categories of solid waste generated in Kandra GP is shown in Table 6.18

Table 6.18: Categories of Solid waste generated in Kandra GP

Organic waste	Waste from the preparation of food, market places, etc.
Combustibles:	Paper, wood, dried leaves, packaging for relief items, etc. (high organic and low moisture content)
Non-combustibles:	Metal, tin cans, bottles, stones, etc.
Ashes/dust:	Residue from fires used for cooking
Bulky waste:	Tree branches, tires, etc.
Dead animals:	Carcasses of domestic animals and livestock
Hazardous waste:	Oil, battery acid, medical waste
Construction waste:	Roofing, rubble, broken concrete, etc.
Source: author	

6.5.5 INTERVENTION LEVELS

The Table 6.19 indicates general intervention strategies for the storage and disposal of solid waste in different scenarios. The same may be replicated for Kandra GP.

Table 6.19: Intervention strategies for storage and disposal

Immediate Action	Cleaning of scattered waste Burning and burial of waste on-site temporary community pits Repairing and upgrading of existing facilities	
Short term measure	community pits family pits community bins	
Long term actions		community bins family pits
		community bins repairing or upgrading of existing facilities Recycling

Table 6.19: Actors in Rural Solid Waste Management System

Level	Organization
GP	Gram Sevak/Sachiv
	Panchayat Development Office
	Community-based organizations
	SHGs
	Private sector/entrepreneurs
	Households

Source: Ministry of Drinking Water and Sanitation and Asian Development Bank (2014) Guidelines on Solid and Liquid Waste Management (SLWM) in Rural Areas. Government of India.

Different organizations mentioned in Table 6.19 are proposed to be involved in Kandra GP for the Solid Waste Management purpose.

6.5.6 PROPOSED SOLID WASTE MANAGEMENT SYSTEM

The Solid Waste Management Model is based on the sustainable hierarchy of waste management. In these entire systems, the primary focuses on Reduction to Recycling concepts. The whole process can be achieved by way of the decentralization process of solid waste management. The entire SWM operation may be worked on Public-Private Partnership (PPP) mode involving professional agencies through the Built-Operate – Transfer (BOT) platform. The private agencies may be asked to use innovative technologies and recycle agro-waste to produce manure for boosting agriculture. Such an operation may be designed to subserve a cluster comprising of few Gram panchayats. The proposed site is shown in Fig. 6.14.

The entire process will comprise of:

Segregation: Separate bins need to be installed for bio-degradable, non - biodegradable, and domestic hazardous wastes; all these are handed over to authorized agencies for further treatment.

Storage: Every household, shop, and establishment generates solid waste on a day to day basis. Generally, no bins for separate storage of garbage according to nature are kept at the source. Very few people keep personal bins for storage of waste according to its core.

Collection and transportation: Door to door and Community bin collection using the concept of Ghantagari once a day. Domestic waste is collected through the house to house collection, and all other types of garbage, i.e., institutional, commercial, etc.

have been collected through community bins. At the primary level, the public's waste in containers provided by GP will be collected through small vehicles by sanitary workers and transferred to secondary storage depots from where without segregation, it will be sent through big vehicles to dumping grounds for final disposal.

End treatment:

Incineration: Incinerators are proposed to be installed through PPP mode to treat biomedical and other infectious forms of waste.

Landfill: This treatment is proposed for non-biomedical and no-agro based waste.

Preparation of Manures: The agro-based waste may be recycled to produce manure, which may be sold at a nominal rate to the cultivators to boost cultivation. The manure production may be conceived to be a part of the PPP model. The production and sale of manure are proposed to be conducted by the organization awarded with PPP for Ten years term period up to 2030. After 2030, as per the principles of the BOT project, the entire operating system will be handed over to Kandra GP, which will further continue with the operation. The whole collection to disposal system will not be chargeable. However, it will be advised to the organization to employ the maximum number of Kandra GP residents for the entire operation through proper training to increase the locals' involvement.

6.5.6.1 Physical Sustainability of Waste management system

- A set of rules and regulations must be established concerning the disposal of waste inside the village, and every resident must be aware of them properly.
- The awareness program and information regarding waste must be supplied to them, and every resident must be educated.
- A sound monitoring system must be established, which will continuously monitor the entire process and look after complaints of GP residents.
- Documents and reports of the entire process must be released from time to time so that people can be aware of the process.

6.5.6.2 Site selection for Waste Management System

- Distance from the road- the distance of the selected site is significant away from the road to reduce transportation costs.
- The slope of the site- the slope of the selected site is normal.
- Erosion- the selected site is away from the water channel, so there are fewer chances of damage to the selected site due to erosion.
- Distance from the settlement- it should be away from settlements..
- Distance from the agricultural site- the agricultural land is not affected by the

selected solid waste management site.

- Distance from surface water- there are fewer chances of contamination of surface water due to sufficient distance between both.

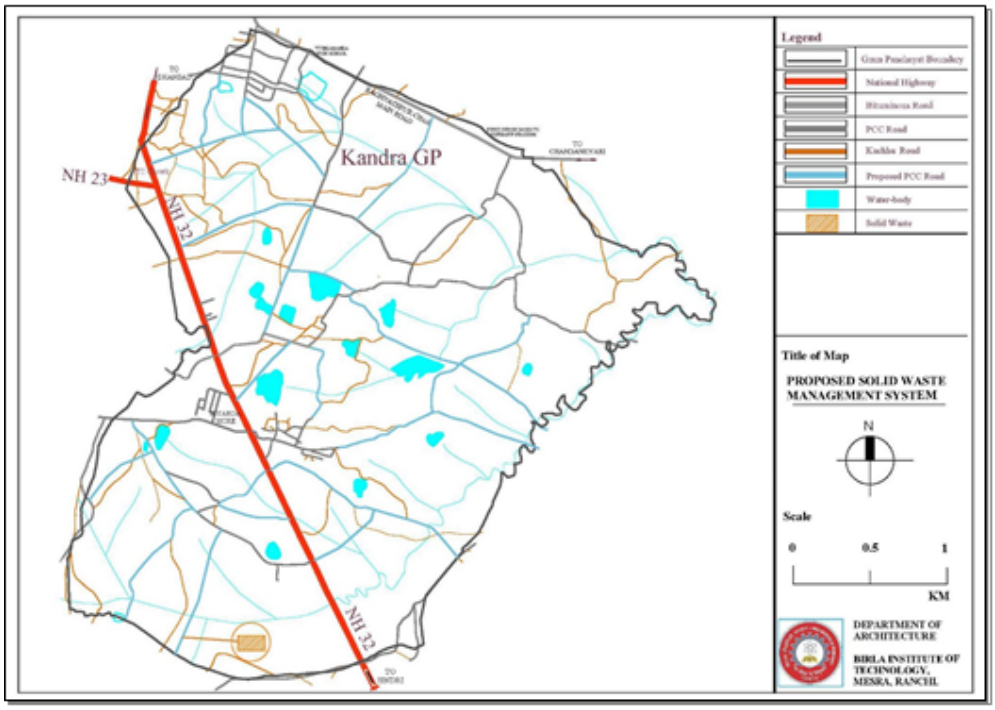


Fig. 6.14: Proposed site for Solid Waste activity in Kandra GP

Source: Prepared by the BIT Mesra Team

6.5.7 COSTING AND FINANCES

The details of the cost for the entire SWM operation are given in Table 6.21 below.

Table 6.21 – Details of cost for SWM operation

Sl .no.	Particular	Quantity	Unit price	Total Cost in Rs.
Solid Waste Management				
1.	Construction of waste collection center	2000 sq feet	Based on PWD Specification	
No. of dustbins installed				
2.	Dustbins capacity 100 kg (including School, Anganwadi and Panchayat building)	12	5000	60,000

3.	Dustbins for households and commercial green color (10 liters)	1491	150	2,23,650
4	Dustbins for households and commercial red color (15 liters)	1491	175	2,60,925
Collection system, segregation, and disposal of household garbage				
5	Waste Collection Vehicles (Battery operated vehicles)	4	200000 (approx.)	8,00,000
6	Other SWM Activities, Landscaping and Beautification	Lump-Sum		30,000
7	Construction of incinerator	1		7,50,000
8	Manure processing plant	1		4,00,000
9	Manure selling outlet	1		1,00,000

6.6 ELECTRICITY DISTRIBUTION AND PROVISION

The supply of electricity to every household, commercial, and institutional establishment is of utmost necessity in today's context. 90% of the houses are electrified, which suggests a gap of still nearly 10% of households with electrical connections. Commercial establishments all have electrical connections. The entire Kandra GP is partially facilitated with a street light. There is a total of 277 no electric pole. However, electrical connections through LED lights are present. The entire GP's electrification line is overhead, and the transformer is not installed in proper ways. Existing Condition of the lighting system in Kandra GP is shown in Fig. 6.15.

Fig. 6.15: Existing Condition of the lighting system in Kandra GP

Source: Author

6.6.1 THE CHALLENGES IN THE FIELD OF ELECTRICITY

Approximately 10% of rural Indian citizens do not have access to electricity. Long power cuts and fluctuations are more frequent in Kandra GP. This power cut leads to increased use of traditional energy sources, which are not safe for health and the environment. Reliable energy system related to economic growth, to achieve GDP growth, the power sector must be growing. The lack of reliable electricity damages the socio-economic development of a large part of the rural area. These socio-economic developments are linked with healthcare, literacy rates, and level of agricultural productivity. Industries those are located in the rural area not able to perform at maximum capacity. This leads to poor economic performance and villagers of rural areas migrating to cities searching for a better opportunity.

6.6.2 HOME SOLAR SYSTEM

The household survey data suggests a dismal state of affairs of the GP in terms of electricity. The average electric supply in the Kandra GP is between 7-8 hours, which means a large part of the day is spent in utter darkness. Even the functioning of schools and establishments gets jeopardized because of a shortage of electricity.

To overcome the crisis, it is proposed to establish a "Home Solar system" at every household, further linked with a "Grid-connected system." The main advantage of the "Grid-connected system" includes connecting every household with the primary Grid so that the excess electric power generated over and above the household usage may be fed in the Grid to be used in other essential services. A household must be installed with a rooftop PV system over a roof area of approximately 100 sq ft. It is connected with necessary accessory items that can generate 1400 units annually. This entire installation and operation process can work on government subsidy and may be executed through US-India Clean Energy Finance (USICEF).

6.6.3 PROPOSAL FOR RENEWABLE ENERGY SOLUTION

A grid-connected solar energy generator is proposed at the village level. This solar energy generator is connected with a village-level electrical system. The excess solar energy produces is also sold to the state electricity board. Renewable energy is free from load shedding. Hence the village electricity feeder supply will get a 24/7 electric supply to the village. Spatial locations of renewable solar energy in Kandra GP is shown in Fig. 6.16.

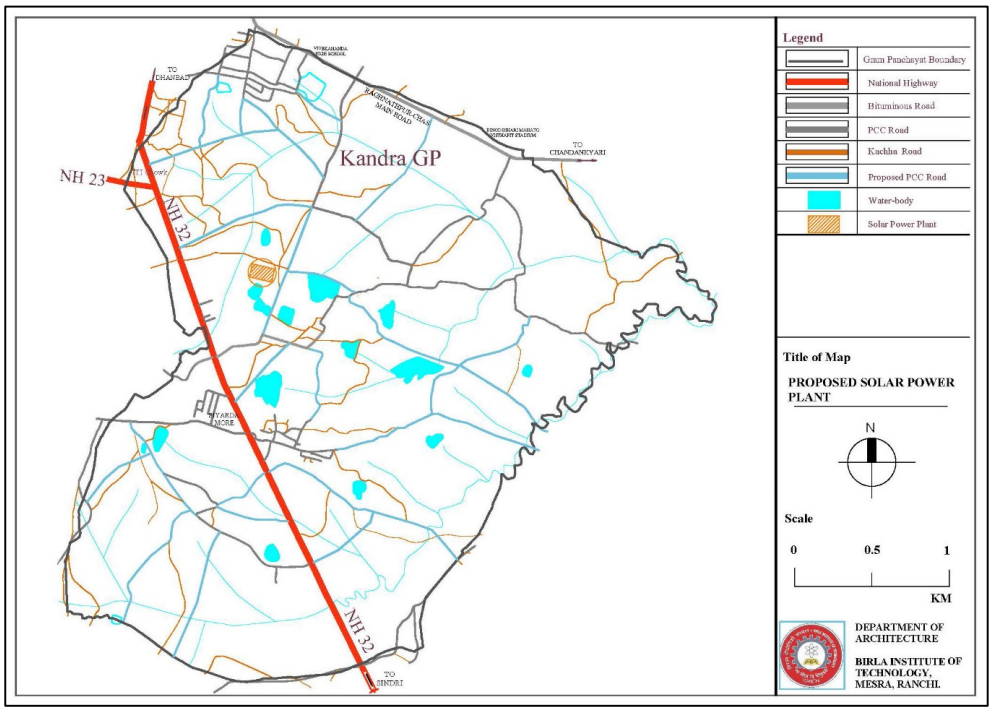


Fig. 6.16: Spatial locations of renewable solar energy in Kandra GP

Source: based on the household survey; prepared by the BIT Mesra Team

6.6.4 PROVISION OF SMART STREET LIGHT (SSL)

A smart street light system includes power generation, storage, and management device using a solar panel. Since it is essential to harness the renewable energy source for our daily use, an SSL system is proposed in the entire Kandra GP.

6.6.5 PROPOSAL FOR STREET LIGHTING

There is an urgent need to electrify all houses, institutions, and commercial establishments as per the present condition. For better electrification of roads and create a better, safer environment, Smart electric lights are proposed to be installed in all roads, streets, and narrow lanes within Kandra GP. SSL should be installed alternatively because normal LED light is already installed on an alternative electric pole. Details of SSL installation is shown in Table 6.22. The Spatial locations of street lights in Kandra GP is shown in Fig. 6.17

Table 6.22: Details of the cost of SSL installation throughout Kandra GP

No. of SSL required	277
The unit cost of SSL	32,578
Total Cost	90,24,106

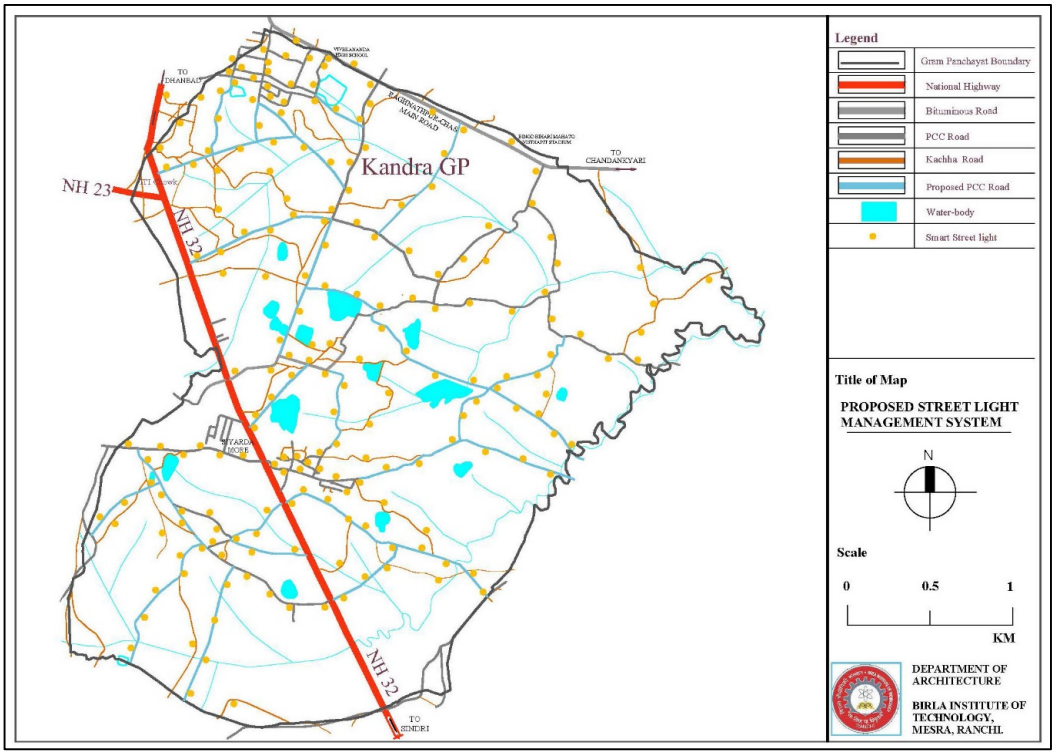
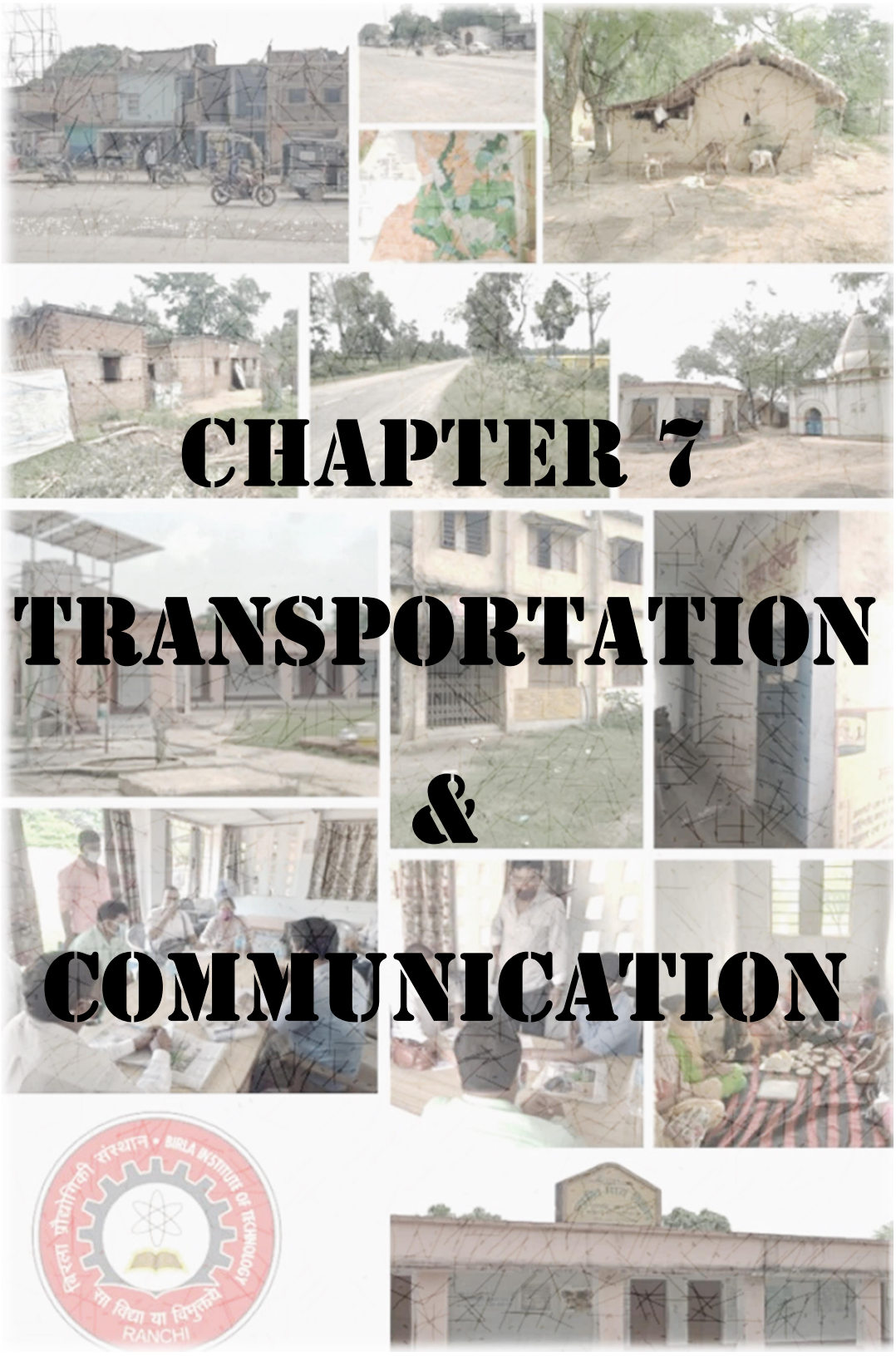


Fig. 6.17: Spatial locations of street lights in Kandra GP

Source: based on the household survey; prepared by the BIT Mesra Team



CHAPTER 7

TRANSPORTATION & COMMUNICATION

CHAPTER 7: TRANSPORTATION & COMMUNICATION

7.1. ROAD NETWORK

For rural development, the provision of rural road network is a key component to enable the rural people to have access to schools, health centers and markets. Rural roads serve as an entry point for poverty alleviation since lack of access is accepted universally as a fundamental factor in continuation of poverty. Rural roads in India account of 60% of the total roads in the nation. s. It is estimated that 20-30 percent of the agricultural, horticultural and forest produce gets wasted because of either inadequate rural road network or poor condition of roads, which creates an impedance for transporting such commodities for the user needs (2015, Pacific Business Review International, NICMAR) Rural roads act as a facilitator to promote and sustain agricultural growth, improve basic health, provide access to schools and economic opportunities and thus holds the key to accelerated poverty reduction, achievements of Millennium Development Goals (MDG), socio-economic transformation, national integration and breaking the isolation of village communities and holistic and inclusive rural development.

Kanrra is a large village located in Chas Block of Bokaro district. The village is well connected with road and rail network with major cities in the state of Jharkhand; it is located 34 km towards East from District headquarters Bokaro Steel City, 32 km from Chas, 143 km from State capital Ranchi. Simuliya (10 km), Amlabad (11 km), Chandankiyari (16 km), Barajor (16 km) are the nearby Villages.

A 6 lane National Highway 32 crosses the gram panchayat and it also connects the Gram Panchayat to Chas, Bokaro, Dhanbad to the north and to Purulia on the south. Having a very influential location the village is yet to develop along the highway as the settlements are at the inner part of the Gram panchayat and there are a few garage and shops adjacent to the road.

This chapter describes the importance of location of the village and its connectivity in the region, current system of transportation and issues and future requirements.

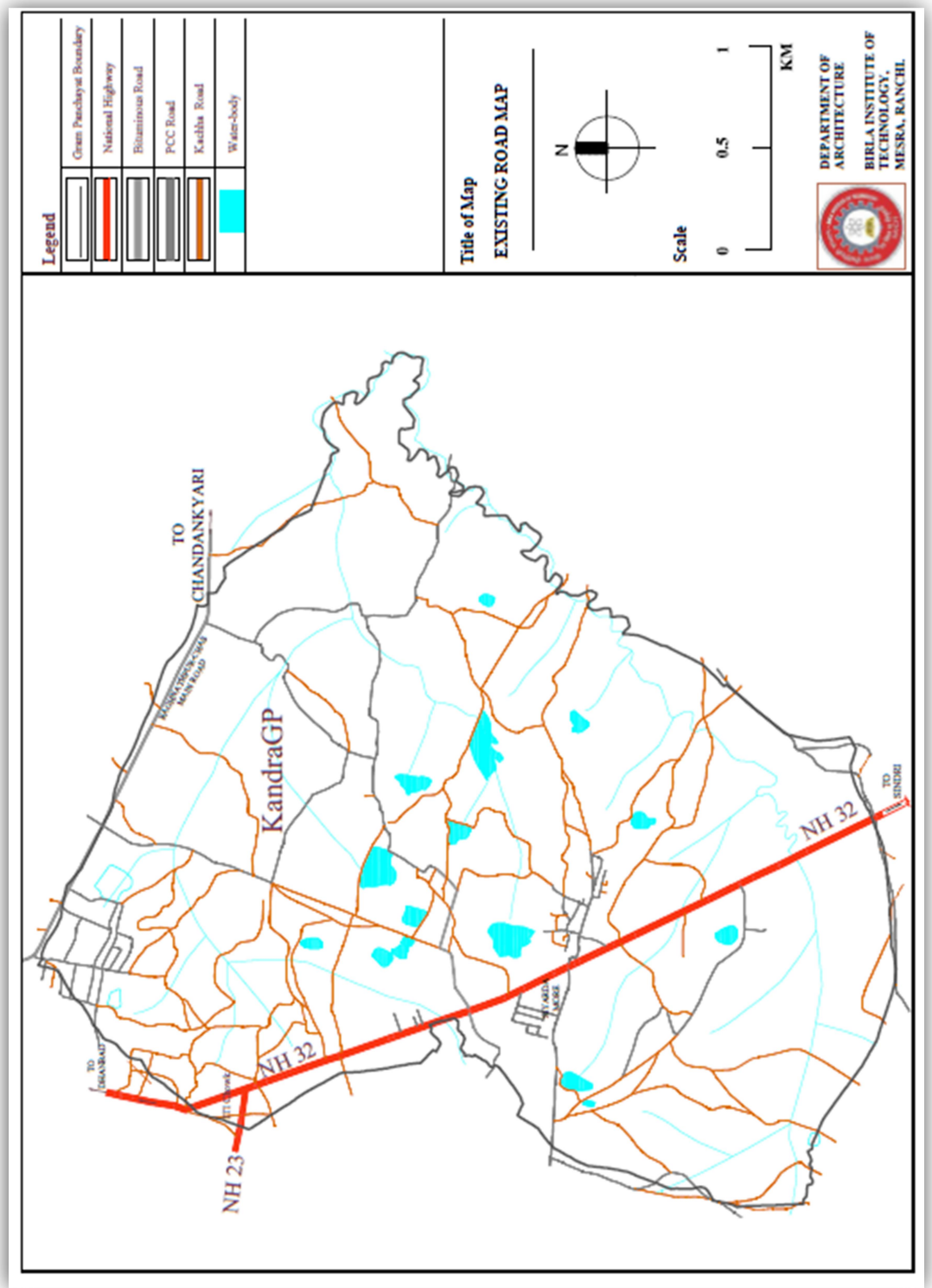


Fig.7.1: Existing Road Map of Kandra GP

Source: based on survey; prepared by the BIT Mesra Team

Fig. 7.2: National Highway 32
Source: Author

Fig. 7.3: National Highway 32
Source: Author

7.1.1. INTER- VILLAGE ROAD AND INTRA VILLAGE ROAD CONNECTIVITY

Roads play an important role within the nation's overall transport system long with its economic, social and physical development. The objective of the national road network is to provide strategic transport links between the main cities with population and employment including connectivity to other regions (Fig. 7.1). The newly constructed road of NH 32 does not have a very busy traffic but indeed has a strong connectivity (Fig 7.2 and 7.3). The internal road in the gram panchayat does not have any hierarchy but also has low traffic but there is good connectivity of all the four villages from the National Highway (Fig 7.4).

The roads in and around the village serve as feeder roads to the main network and link villages with the nearest market centers at Chas. Traffic volume on the NH 32 is not very high, comprising mainly of buses and goods carriage. It is the major road going across the village and the other road across the village is the Raghunathpur-Chas Main road. The road is narrow and connects to Chandankyari towards south with few villages on the route whereas towards the north the road goes to Chas Post office with many colonies on the route. This road connects to mostly residential area of the Chas to the village therefore we see more pedestrians, cycles, 2-wheeler and auto rickshaws. The road is narrow and busier.

There are other lower level roads also, such as paths and tracks. These are farm roads and intra-village roads. The farm roads traverse the agricultural fields and are

mainly un-surfaced linking agricultural farms with the villages. Intra-village roads connect the clusters of small size settlements in a village, known with different names in different parts of the Gram Panchayat.

7.2 EXISTING ROAD NETWORK

7.2.1. EXISTING ROAD NETWORK: ROAD TYPE, ROAD COVER

The length of road network of village is estimated to be about 58.3 km. As per the definition and classification of road system adopted in Road Development Plan of India (1981-2000), rural roads are the tertiary road system which comprises of Other District Roads (ODR) and Village Roads (MOST, 1984) (Table 7.1 and 7.2).

Table 7.1.: Road characteristics and the Right of way

Type of Road	ROW (in meters)	Carriageway
B.T. Road	30	20
B.T. Road	8	4
C.C Road	8	3.5
P.C.C. Road	3.5	3
Kutcha	2	1

Source: Primary survey

Table 7.2.: Road type and percentage distribution

Type of Road	Length (in Km)	Percentage
N.H. 32	3.9	7%
B.T. Road	5.7	10%
P.C.C Road	15.1	26%
Kuchha	33.6	57%

Source: Primary survey

As observed in village there is no systematic hierarchy of roads which is clearly seen in the Fig. 7.4 to 7.21 below.

Fig. 7.4: Internal roads of GP

Fig. 7.5: Road towards Panchayat Bhawan

Fig. 7.6: PCC road from NH 32

Fig. 7.7: Internal roads of GP

Fig. 7.8: Internal road which connects Labudih

Fig. 7.9: The unfinished PCC road which connects to Labudih

Fig 7.10: Unpaved road along the pond

Fig. 7.11: Internal roads in GP

Fig. 7.12: Road (bituminous) which connects Labudih village to NH 32

Fig. 7.13: Unpaved road connecting Labudih village

Fig. 7.14: Internal roads at Labudih

Fig. 7.15: PCC road in Labudih village

Fig. 7.16: Internal roads (PCC roads)

Fig. 7.17: Road (bituminous) which

connects Labudih village to NH 32

Fig. 7.18: Kachha roads in Partanr

Fig. 7.19: Internal roads in Partanr

Fig. 7.20: Internal roads are weathered out

Fig. 7.21: Internal roads in Partanr

Source: Author

7.2.2 CHARACTERISTICS OF ROAD NETWORK

The road inventory survey conducted along a primary road network of length 58.3 km. Indicated that about 10 percent of road is bituminous road, 26 percent of road is concrete and 57 percent is kuccha road (Table 7.2). The details of Road inventory is shown in Table 7.3 and Fig. 7.22 to 7.27.

Table 7.3: Details of road inventory survey

Road name	Length (in meters)	Carriageway (in meters)
NH 32	1140	15
Bituminous roads	1540	4-8
PCC roads	568	3.5
Kachha road	491	1

Source: Primary survey

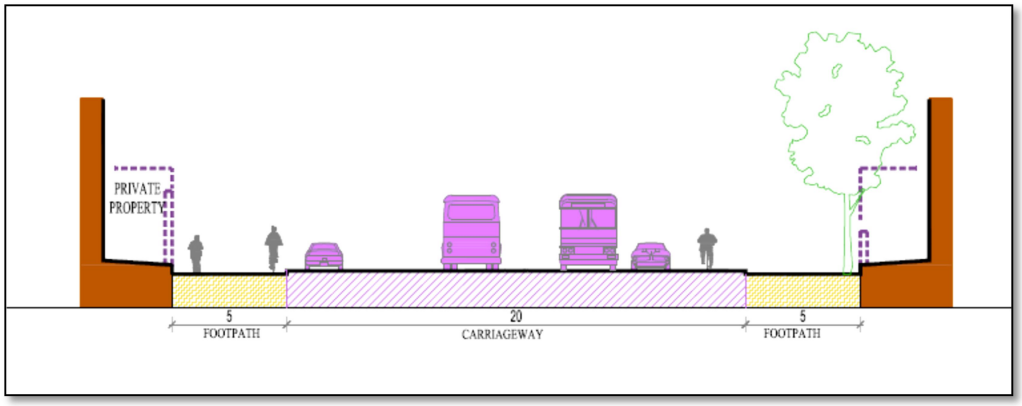


Fig. 7.22: Existing road section for NH-32, ROW 30m

Source: prepared by author

Fig. 7.23: Vehicles on NH 32

Fig. 7.24: NH 32 towards Sindri

Source: Author

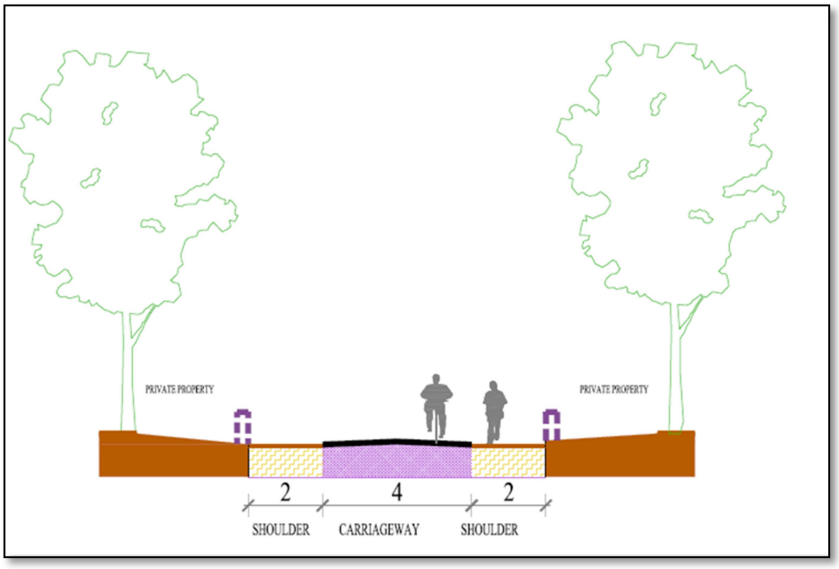


Fig. 7.25: Road section for ROW 8 m connecting Labudih

Source: prepared by author

Fig. 7.26: Internal paved roads, Partanr

Fig. 7.27: Kachha Road at Partanr from NH 32

Source: Author

7.3 STREET FURNITURE

For any site the street furniture are used for various designated purposes and create a sense of place. The street furniture comprises of elements that are used to facilitate transportation or the used of land adjacent to a street which also aims to make the street more aesthetically appealing. It also helps to distribute the crowd in the street and helps the pedestrians to move safely. Street furniture covers a vast array of equipment placed in, on, or over the road for safety and convenience on the street and including various purposes like traffic control and lighting, information and communication, relaxation and waiting, waste control and drinking, cooling and beautification, immortalization etc. These include traffic barriers, traffic lights, street lamps, advert boards, signage, post boxes, phone boxes, bus/taxi/cycle shelters, benches, brief toilets, waste bins, drinking water stands, fountains, watering troughs, planters etc.

The Gram Panchayat is intersected by two major roads, the National Highway 32 and the Raghunathpur- Chas Main road. And multiple internal roads within the Gram panchayat and it is observed that despite to multiple settlements there are very few street furniture seen in the GP.

Below is the existing street furniture which exists in the Gram Panchayat. With respect to the fact that the National Highway passes through the gram panchayat there

is a need of traffic lights, street lamps, advert boards, signage, etc. The various types of street furnitures present in Kandra GP is shown in Fig. 7.28 to 7.35

Fig. 7.28: Advertising wall

Fig. 7.29: NH 32 signboard

Fig. 7.30: Unorganized signboard

Fig. 7.31:Wall painting

Fig. 7.32: The solar street lights

Fig. 7.33: Lights and stage in the community gathering area.

Fig. 7.34: No Signboards for the bank and schools.

Fig. 7.35: Absence of proper signboard

Source: Author

7.4 TRAFFIC SURVEY AND DATA COLLECTION

The traffic count data of the national highways collected by the Road is given in the table below in fig 6.36. The survey was done at NH 32 which crosses the Gram Panchayat near the Guru Govind Singh Education Society's Technical Campus. The graphical representation of modal share presented in below Fig. 7.36:

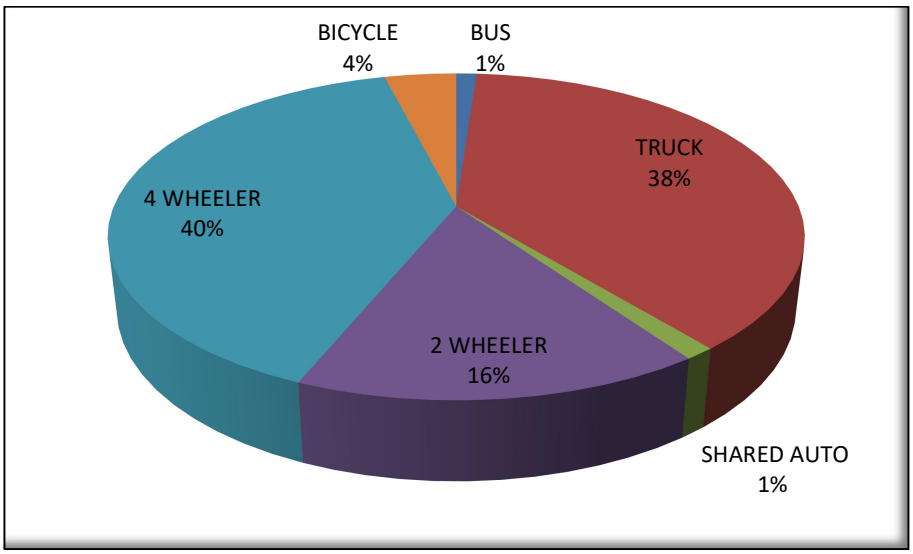


Fig. 7.36: Modal share in NH 32 at Kandra Gram Panchayat area

Source: based on survey; prepared by the BIT Mesra Team

A composition of traffic shows that major mode of transportation in this route is by 4 wheeler which forms the maximum proportion of traffic on almost all the locations. There are lot of goods carriage which runs in this highway this is because it connects Jharkhand and West Bengal where the NH 32 goes to Purulia from Chas. People in this route also use 2 wheeler to commute to other villages and nearing cities. It is also observed that very few auto rickshaws run in this route also the number of buses is also less.

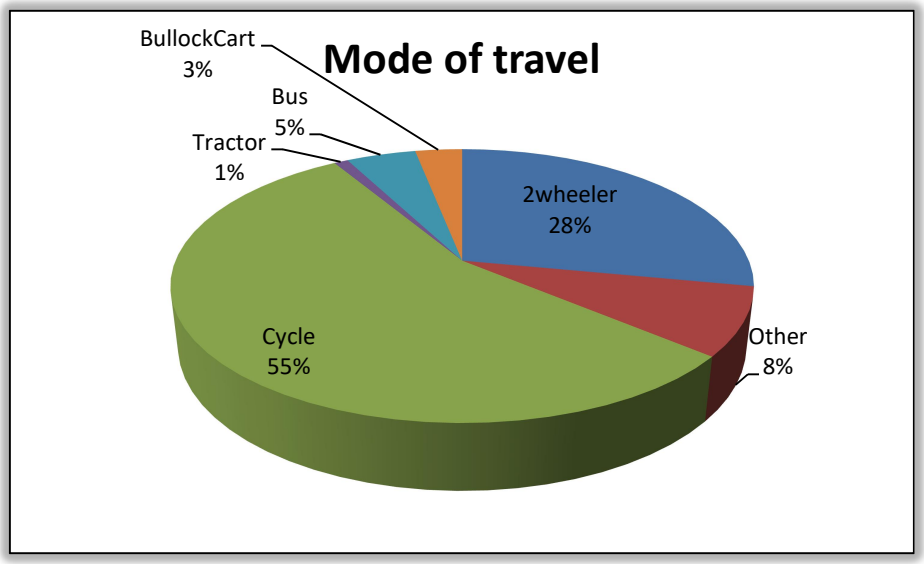


Fig. 7.37: Mode choice of the Gram Panchayat area

Source: based on survey; prepared by the BIT Mesra Team

The chart above Fig 7.37 shows that the share of mode of transportation used by the people of Gram Panchayat to commute to their work. It's observed that bicycle is used maximum to commute to their work; the people here prefer this because it is cheaper and the travel distance is also not very high. Hence we need a better infrastructure for the bicycle and also a sustainable approach for to the network for public transportation for the village. It is also observed that there are people who use bullock cart as well for movement and also carry their material to various places.

7.5 PARKING SURVEY

Parking is an important component of transport system. Parking surveys were carried out as a part of comprehensive traffic study at both off-street and on-street locations to assess the parking characteristics viz., parking demand, usage pattern of dedicated parking facilities, parking accumulation on road stretches, parking duration, composition of parked vehicles etc. Uncontrolled roadside parking is an omnipresent problem in all the area where parking space is not allotted (Fig 7.39). Parking survey was conducted for a period of total 2hrs along the National highway's identified locations/stretches. It was observed that the good carriage is lined along the NH 32. There are multiple numbers of garage and repair centers in the area hence attracting

the heavy vehicles stopping by there. Which now does not disturbs the movement of the vehicles but with rise in number of vehicles on the street it would create bottlenecks. As there are no such market area along in the Gram panchayat there is no such parking area marked. There are few banks and ATM along the NH 32 due to which there are vehicles parked from 9 am to 5 pm (Fig 7.38 and 7.39), whereas the trucks are parked from early morning 5am to late night 10 pm (Fig 7.40 to 7.43). It is observed that the vehicles are parked along the National highway on the unpaved space beside the carriageway.

Fig. 7.38: Unorganized parking near the ATM

Fig. 7.39: Unorganized parking done in front of the bank.

Fig. 7.40: Heavy vehicles parked along the street

Fig. 7.41: Commercial vehicles parked along NH32

Fig. 7.42: Vehicles parked along the street

Fig. 7.43: Heavy vehicles parked along the NH 32

Source: Author

There is huge demand for truck parking along the National highway as trucks and other goods vehicles are parked in discriminately along the NH 32 roads in the Gram panchayat area.

7.6 PEDESTRIAN COUNT SURVEY

The survey was conducted at two locations across the National Highway 32 for duration of 1 hour from 9 AM to 10 AM. The summary of pedestrian counts at all the locations is presented in the Table 7.4

Table 7.4 Number of pedestrians crossing at various points

Points	Location	Number of pedestrians crossing
A	ITI CHOWK	268
B	SIYARDA CHOWK	195
C	NEAR GGST CAMPUS	372
D	PARTANR JUNCTION	98
E	NEAR VIVEKANAD VIDYA MANDIR SCHOOL	427
F	BINOD BIHARI MAHATO VISTHAPIT STADIUM	102

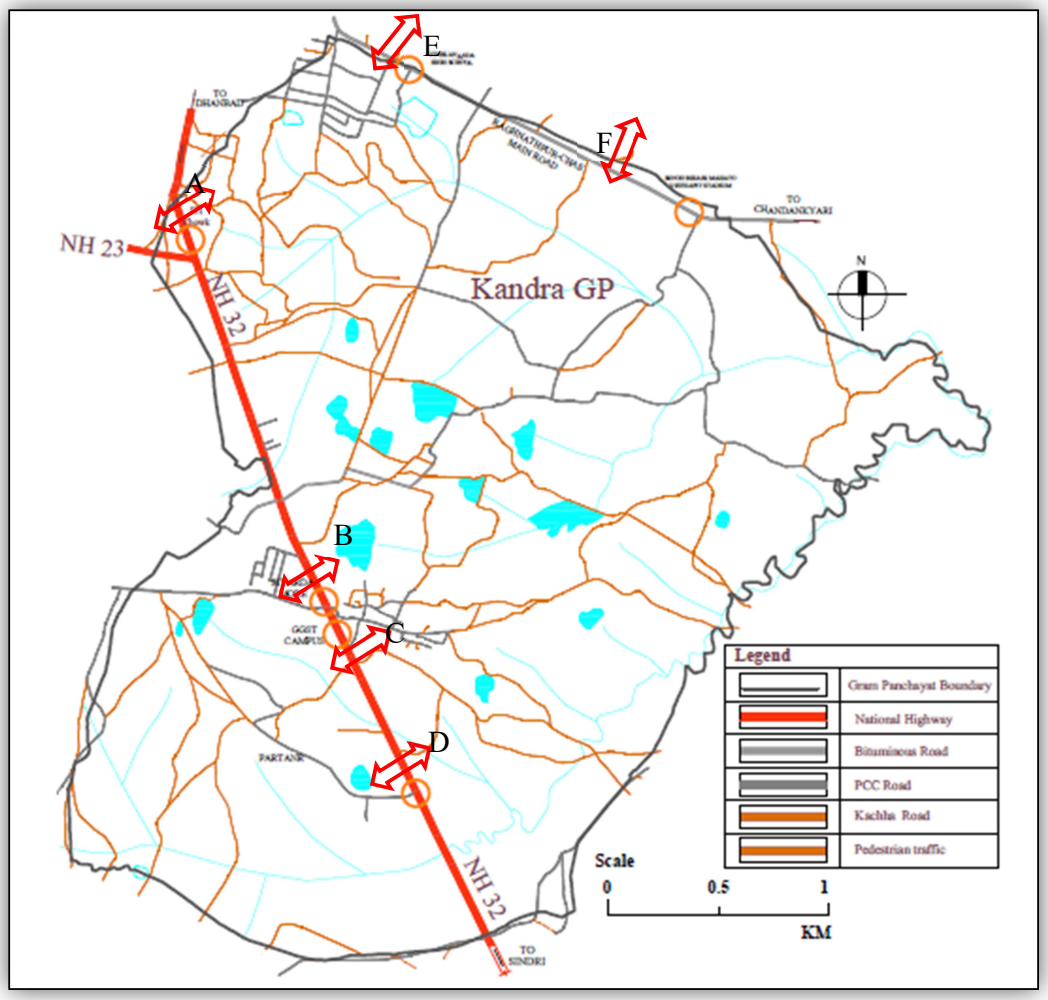


Fig. 7.44: Pedestrian movement per hour count
Source: based on survey; prepared by the BIT Mesra Team

With reference to the pedestrian movement survey done at different points the map in Fig 7.44 shown that, heavy pedestrian crossings are observed around Gurur Govind Singh Educational Society's Technical Campus and Siyarda More, especially on the weekdays when the schools and colleges are open. As there is Government Middle School and Gurur Govind Singh Educational Society's Technical Campus and a large number of pedestrians are composed of these students between the technical institute and Siyarda More. There are other points in the National Highway 32 stretch in the Gram Panchayat where the roads lead to Villages Labudih and Ramdih on the north-eastern part of the NH 32 and to Partanr. The Raghunathpur- Chas Main road has residential area along with schools, playground and some shops along the road. Due to the school there is heavy pedestrian traffic in the road during school hours.

National Highway 32 has a total ROW of 30 meters whereas the carriageway is 21 meters, there are no drains constructed along the highway instead its left unpaved where the pedestrians walk (Fig. 7.45 and 7.46). The unpaved area being at the same level as carriageway and no barricading is seen in the area. There are no footpaths in any of the streets in the village so the pedestrians are forced to walk on the carriageway which is not safe.

Fig. 7.45: Raghunathpur - Chas Main Road

Source: https://www.google.com/maps/uv?pb=!1s0x39f426ce74a304ad:0xf2a3f84afa652837!3m1!7e115!4shttps://lh5.googleusercontent.com/p/AF1QipNlhtnlFxJ323sppOTUgcIrpaxJeaRDJIXQ24hE%3Dw361-h176-k-no!5sbinod+bihari+mahato+visthapit+stadium

Fig. 7.46: College at NH 32

Source: Author

7.7 PUBLIC TRANSPORT SYSTEM

Public transportation system in comprises of buses and auto rickshaws which run regularly in the NH and it connects the Gram Panchayat to Chas, Bokaro and Dhanbad, the nearby cities. There are limited city services plying on this road. Cycle rickshaws are negligible in the village. However, there is a dependence on auto rickshaws and buses to carry the passenger population. Instead of using public transportation the people use bicycle and 2wheeler. These vehicles only ply at the NH 32 and the Raghunathpur- Chas Main road which connects the village to the Chas. Though, other Intermediate Public Transport (IPT) modes (Para transit) is known to be an important mode of transport for last point connectivity, it is absolutely absent in the internal roads of the village. There is

a need of Intermediate Public Transport (IPT) system which will play a dominant role in meeting the need of public transport within the Gram panchayat.

7.8 PROPOSAL AND RECOMMENDATIONS

Rural roads play an important role in the overall connectivity and accessibility to rural areas will provide a vital impetus to the country's economic growth. The development of rural transport infrastructure is very crucial in India which ensures access to services and opportunities and fosters sustainable poverty reduction programs as well as employment generation through industrialization in rural areas.

In an indirect way, rural roads influence the process of growth through changes in socio-economic attitudes of people by facilitating the dissemination of knowledge and reduction of inequalities leading to better quality of life. The proposals given below focus on:

a) Prioritise mobility for all socio economic groups and genders.

b) Give adequate attention to sustainable modes of transport (i.e., public transport, pedestrians and non-motorised).

c) Provide a recognised and effective platform for integrating land use and transport planning.

e) Focus on the safety.

Improvement of the roar infrastructure will lead to improves local community and market development. With this there will rise in agriculture, increase in the availability of food, improved education and medical facilities and of all a better socio-economic conditions of the rural population including the overall contribution to the nation.

7.8.1 COMPLETE STREET DESIGN

It is observed that National Highway 32 is sufficiently wide road for today’s need and the right of way is 30 m throughout. In spite of this wide road the land is not well utilized round it and the commercial spaces are in minimum, except for few small

hotels and garage there are banks and one medical store in the whole stretch. But with time there will be commercial spaces being built and more housing coming along the national highway, this street also needs to be improved and structured. The best practice is to design the streets for future need and provide the entire infrastructure considering the requirement of the people then. With that view the road must have space allotted for:

- Fast moving vehicles
- Non-motorized vehicles
- Bicycles
- Pedestrians
- Parking space
- Safe crossings
- Median/ separator
- Street Furniture

Hence a uniform width with complete street design can be the best solution for consistent and safe movement. The complete street design for the Gram Panchayat in the road cross section is given in the Fig 7.47 and Fig 7.48.

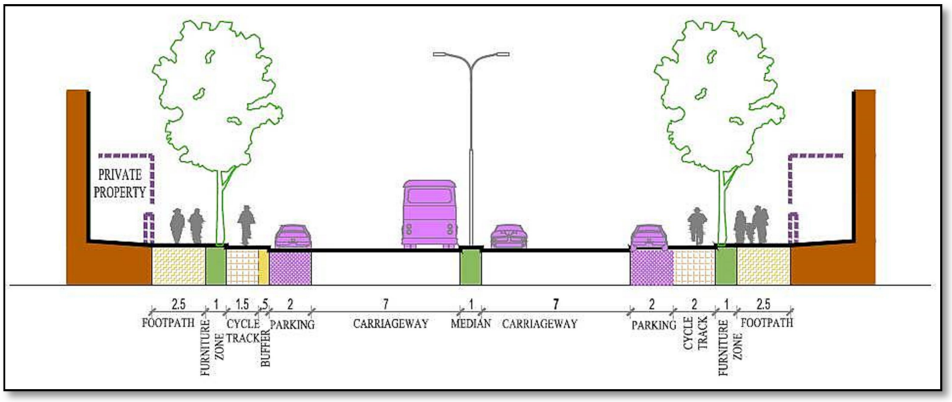


Fig. 7.47: Street design proposal for 30 m wide road with footpath, cycle track, parking space and traffic carriageway

Source – prepared by author

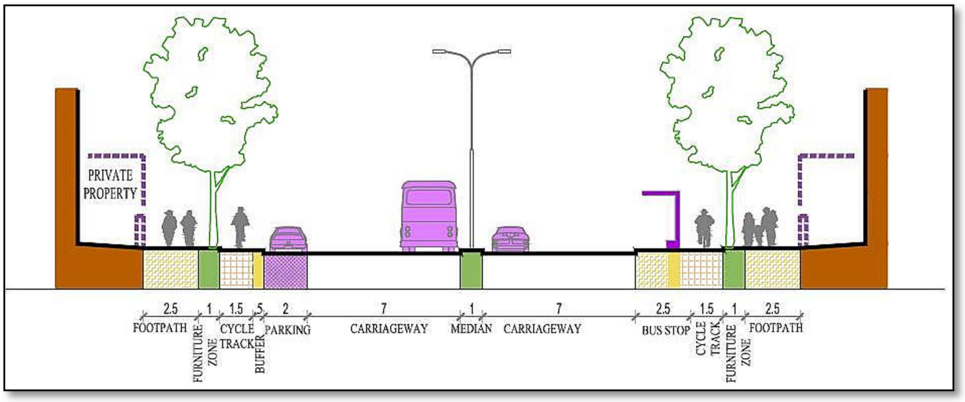


Fig. 7.48: Street design proposal for 30 m wide road with footpath, cycle track, parking, bus stop and traffic carriageway

Source – prepared by author

All the streets must follow the IRC: Standard measurements and dimension for a rural road in India which is as follows: IRC 073: 2002

A major part of the roads are unpaved which connects different villages and also reach to various houses so those paths need to be paved or a concrete road must be constructed as per the power of the government the land can be acquired and roads can be proposed. For the first phase: the bituminous roads need to be maintained and PCC roads should also be improved with proper drainage along the streets which would make the streets comfortable to walk. The roads in the village are old and weathering out hence they need to be repaired. There are unpaved roads which are used by the villagers to commute from to Labudih which need to be completed (Fig 7.49 and 7.50). That would help to easy commuting of the people. Therefore the total length of road proposed is 16.8 km in PCC which would connect all these villages and also there villages to the National Highway 32 and Raghunathpur –Chas main road (Fig 7.69).

Fig. 7.49: Partially paved road from Kandra to Labudih

Fig. 7.50: Unpaved road from Labudih to Kandra

Source: Author

Similarly there are more roads which connect the villages of the gram panchayat to each other and to the main road which have to be concreted for easy access to the people and save time. The road geometry of the proposed roads are shown in Fig. 7.51 and 7.52.

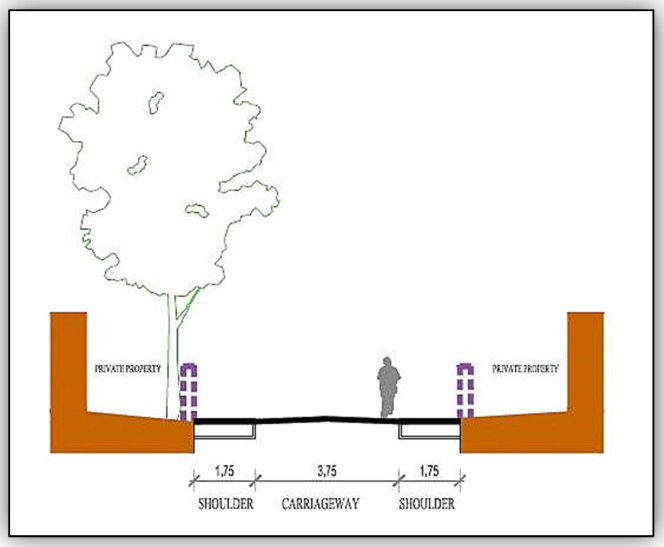


Fig. 7.51: Road geometry as proposed by IRC

Source – prepared by author

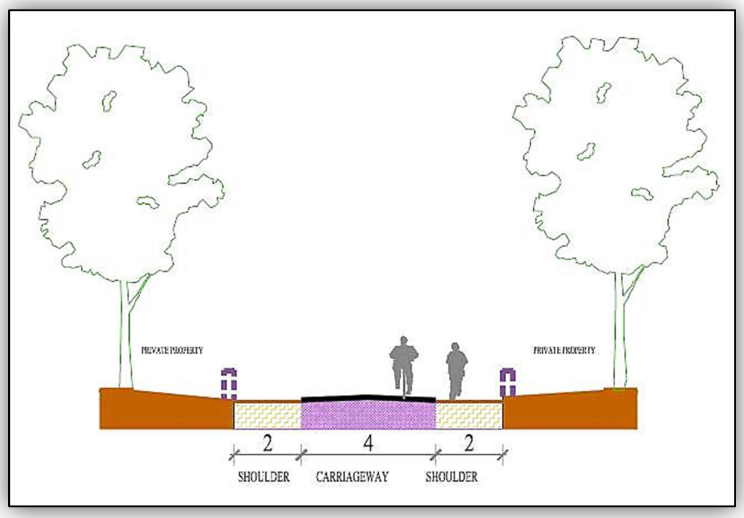


Fig. 7.52: Proposed internal road geometry

Source – prepared by author

7.8.2 DEVELOPMENT AND MAINTENANCE OF THE NATIONAL HIGHWAY

The development and maintenance of the National Highway is an important part for this Gram Panchayat. Ministry of Road Transport & Highways, Government of India, is responsible for the development and maintenance of NHs in India. For the development of NHs in the country, the National Highways Development Project (NHDP), the largest highways project ever undertaken in the country, was implemented by the National Highways Authority of India (NHAI) of the Ministry of Road Transport & Highways (Box).

7.8.3 ROAD HIERARCHY

Road hierarchy in any regions guides the people to a settlement area. A well-defined hierarchy should be followed for the development and maintenance of the internal roads in the village. Hierarchy can be defined on the basic purposes as follow:-

- Roads – to carry through traffic, serving a longer distance purpose;
- Streets – to provide access to properties and local area. (Eppell Olsen & Partners, 2001)

The Table 7.5 shows the details of the proposed road hierarchy for the GP.

Table 7.5: Proposed hierarchy of roads

Classification	Cover/top surface	Traffic volume (in vehicles per day)	Carriageway (in meters)
Collector Road	Bituminous	150	8-10
Commercial / Heavy Residential Road	Bituminous	75	5-7
Seasonal Roads	PCC	25	5-6
Local Road	PCC	25	3.5-5
Low Volume Farm Access	PCC	10	2.5-5

Source: Rural road classification definition, PWD

7.8.4 MEDIAN / SEPARATOR

The median divides the traffic moving in separate directions in a street. It is a physical barrier which stops the vehicles to travelling into opposite traffic lane and it is an essential component of safe streets (Fig 7.53). Median also acts as refuge for the pedestrians to cross the road (Fig 7.54). In the entire stretch of National Highway going through the village the median is required for separation of the traffic. Due to the presence of educational institute along the road there are students crossing the road hence the need of the median along with a refuge will work best in this stretch.

Fig. 7.53: Median divides the traffic moving in different direction

Source: http://toolkit.irap.org/default.asp?page=treatment&id=13

Fig. 7.54: Median also acts a refuge for the pedestrians

Source: : http://urbanmobilityindia.in/Upload/Conference/684f851a-00c6-48e4-a2e3-a6ade1930456.pdf

7.8.5 PEDESTRIAN PATH

While user awareness is an essential element of a holistic approach to road safety, it is only one component of an effective strategy to address road safety. There is a lack of dedicated footpath which enforces the pedestrians to walk on the carriageway. Especially along the NH 32 there is need of dedicated footpaths along with cycle tracks which will improve the safety of the users. In village cycling and walking is the most fundamental mode of mobility. A good walking environment is not only the need of the urban setting but is essential for every settlement; all of the streets need dedicated footpaths. Footpaths need to be unobstructed, continuous, shaded, and well lit. New Indian Roads Congress guidelines (IRC 103 2012) clarify that all footpaths should have three main zones:

1. Frontage zone,
2. Pedestrian zone, and
3. Furniture zone.

Per IRC guidelines, the pedestrian zone must provide a continuous clear space for walking with a minimum width of 2 m. The pedestrian zone must be free of any obstruction. This width may vary as per the adjacent land use and can be from 2.5 to 4.5 m in market areas. Street utilities such as manholes, trees, benches and other potential obstructions should be placed outside the path of travel and in the furniture zone, which should be at least 1 m wide. The frontage zone can vary between from 0.5 to 1 m (Fig. 7.55).

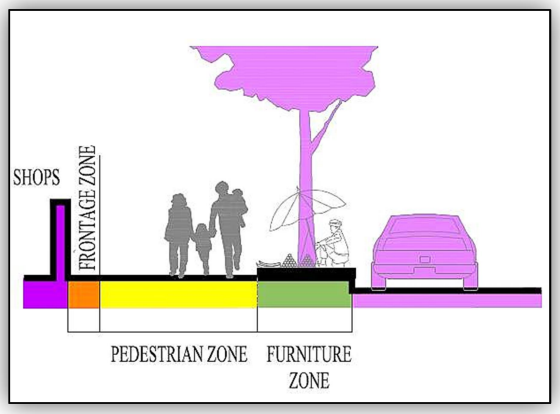


Fig. 7.55: Proposed 3 Zones of footpath

Source – prepared by author

7.8.6 PEDESTRIAN CROSSING

Good pedestrian crossing measures should be undertaken to allow pedestrians to cross busy streets safely and conveniently.

Proposals for Pedestrian safety:

1. Raised Zebra Crossing/ Table Top

Formal raised pedestrian crossing, where pedestrians remain at the same level as the footpath and vehicles pass over ramps will enable safe crossing for pedestrians (Fig. 7.56). Raised crosswalks should be located at all intersections and at major activity area as given in Fig 7.57 and 7.58. Along the NH there is Heavy pedestrian crossings are observed around Gurur Govind Singh Educational Society's Technical Campus and Siyarda More, especially when the schools and colleges are open. For the safe crossing of the students the pedestrian crossing is a priority.

Fig. 7.56: Signage for zebra crossing

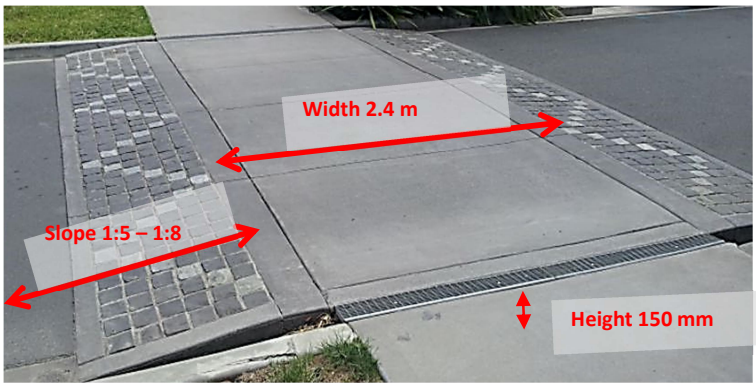


Fig. 7.57: Raised / Table top Zebra crossing

Source: https://commons.wikimedia.org/wiki

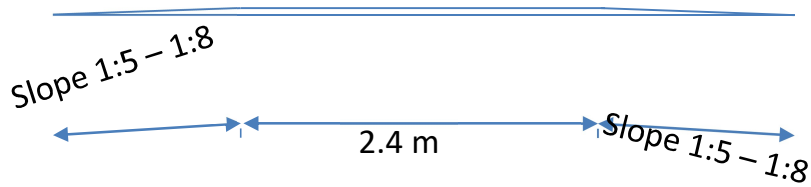


Fig.7.58: Geometry of Table top crossing

Source – prepared by author

2. Normal Zebra Crossing

The normal zebra crossing should be made at the other points in the National Highway 32 stretch in the Gram Panchayat where the roads lead to Villages Labudih and Ramdih on the north-eastern part of the NH 32 and to Partanr, which sees a good amount of pedestrian crossing. Some example and geometry is given in Fig 7.59 and Fig 7.60. The proposed location for the raised and normal zebra crossing in given in Fig 7.61.

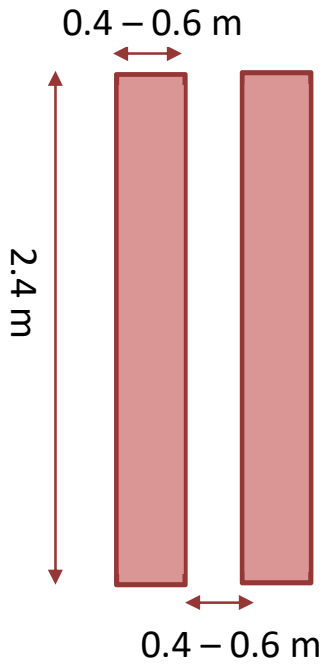


Fig. 7.59: Zebra crossing marking

Fig. 7.60: Zebra crossing at NH

Source: https://commons.wikimedia.org/wiki/File:3810Pila_National_Highway_62.jpg

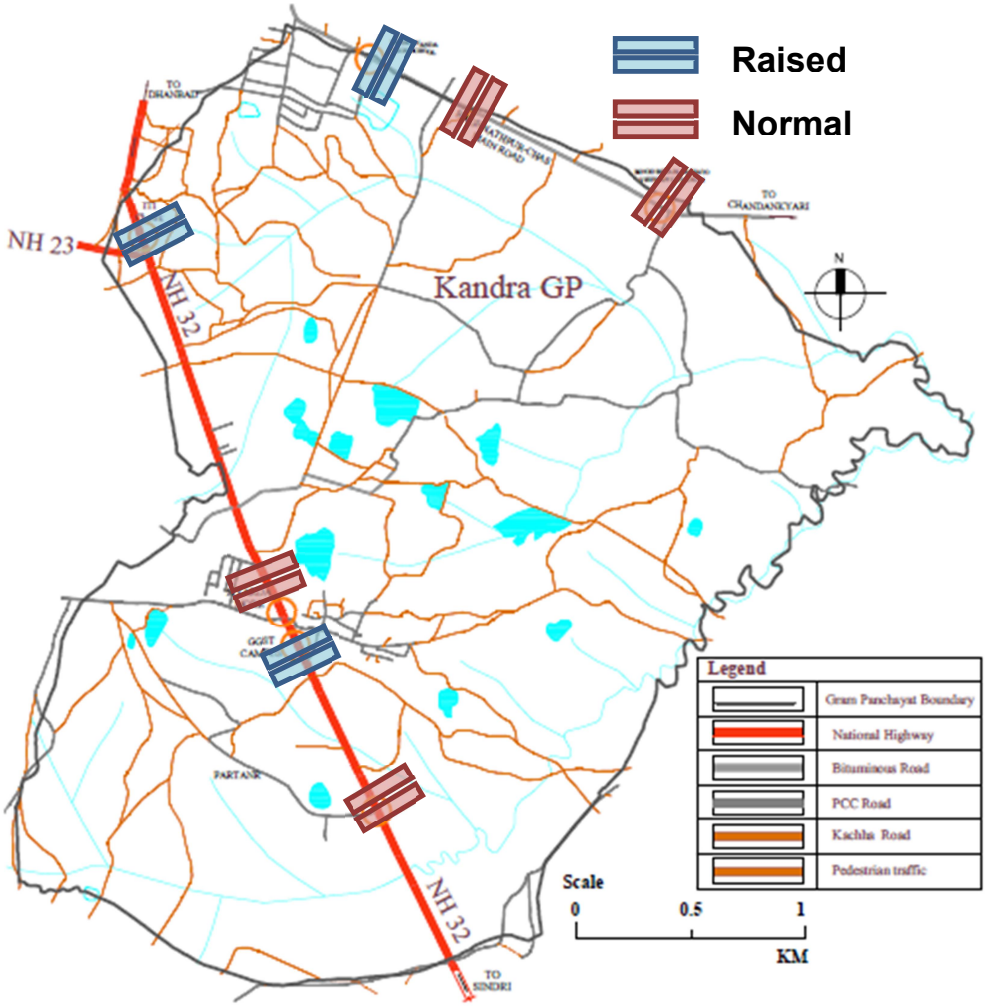


Fig. 7.61: Proposed location for pedestrian crossings

Source: based on survey; prepared by the BIT Mesra Team

3. **Signalised pedestrian crossing**

Pedestrian crossing signals are often used at intersections and are also used at points of busy roads for the safe crossing of the pedestrians (Fig 7.62). Signalized pedestrian crossing gives priority to vehicles and pedestrians are allowed to cross when at signals halt vehicle traffic on the through road. Signals must be timed to give pedestrians long enough to complete their crossing before the signals change to allow vehicle traffic to start passing through the crossing again.

Fig. 7.62: Pedestrian crossing signal

Source: https://zebrafishimages.blogspot.com/2019/08/zebra-crossing-traffic-signal.html

7.8.7 COMFORT AND SAFETY

Streets should serve as safe, shaded public open space corridors with the existing landscape, lighting, and greenery. Whereas the footpaths should serve as spaces for social and economic activity must not be ignored. Thus they must be designed with dedicated space for seating and regulated street vending besides simply walking. Tree shade makes walking comfortable and pleasing. Sufficient space should be allocated for tree pits next to the footpath.

7.8.8 STREET FURNITURE

Concept of street furniture, its application goes a long way in shaping the urban environment particularly with regards to planning and architecture in providing the needed safety, security and beauty .the street furniture give comforts to the pedestrians by adding useful information and enhance people's wellbeing and comfort, strength of neighbourhood organizations and nearby land quality. Also the proper planning, design and management of street and landscape furniture enhances the functionality, aesthetics and add value to the built environment. Therefore proper traffic lights and signage along with other street elements are to be implemented in the plan.

Fig. 7.63: Traffic and street signs proposed

Source: https://mgglobalads.com/traffic-signs-street-signs-philippines/

The street signs provide advanced information regarding the direction, give warnings, orders or guidance to the riders as shown in Fig 7.63. Here there is need for the traffic sign for pedestrian crossing at required intervals. The sign for school and way to different villages and other important spaces along the highway are proposed.

A defined and detailed design guidelines for various street elements, including footpaths, cycle tracks, pedestrian crossings, bus stops, medians, refuge islands, vending, on-street parking, and underground utilities is a major requirement.

Fig. 7.64: Traffic and street signs proposed

Source: https://www.clearchannelindia.com/street-furniture

Fig. 7.65: Bus stop

Source: http://signandpop.com/ooh/india-gate-basmati-rice-lures-audience-with-jcdecaux-street-furniture/

7.8.9 PARA TRANSIT

As a large percentage of the population commutes to nearby places for work and education and they use the public vehicles or bicycles therefore it is necessary to provide a Para transit mode for last point connectivity within the village. The existing para transit in the village in available only on Raghunathpur- Chas Main road which connects the village to the Chas which is not sufficient. There are no other modes of transport which would be connecting the NH 32 to, Labudih, Ramdih and Partanr. The most feasible mode can be proposed as auto- rickshaw and cycle sharing. Hence we see that when 30% of the village population travels to work and education and is absence of last point connectivity. They travel with their own vehicle either motor bikes or bicycles mostly. Though, other Intermediate Public Transport (IPT) modes (Para transit) is known to be an important mode of transport for last point connectivity, it is absolutely absent in the internal roads of the village. There is a need of Intermediate Public Transport (IPT) system which will play a dominant role in meeting the need of public transport within the Gram panchayat. Providing affordable mobility to people who do not have access to personalized mode and reside in rural and remote areas is an important objective of the Government. As per the policy framed by National Transport Development Policy Committee the government will endeavor to encourage participation of private operators on nonviable rural/remote routes through: (i) Auctioning of combination of routes (which are a mix of profitable and non-viable routes) to private operator(s) so as to enable them to compensate their losses on account of operation of non-viable routes; (ii). Offering non-viable routes to bidder asking for lowest subsidy/financial support; (iii) Subjecting non-viable routes to lower rates of taxation or permit fees and allowing alternate competing modes of passenger road transport. (NRTP)

The proposal map (Fig 7.66) shows the routes identified for the Intermediate Public Transport (IPT).

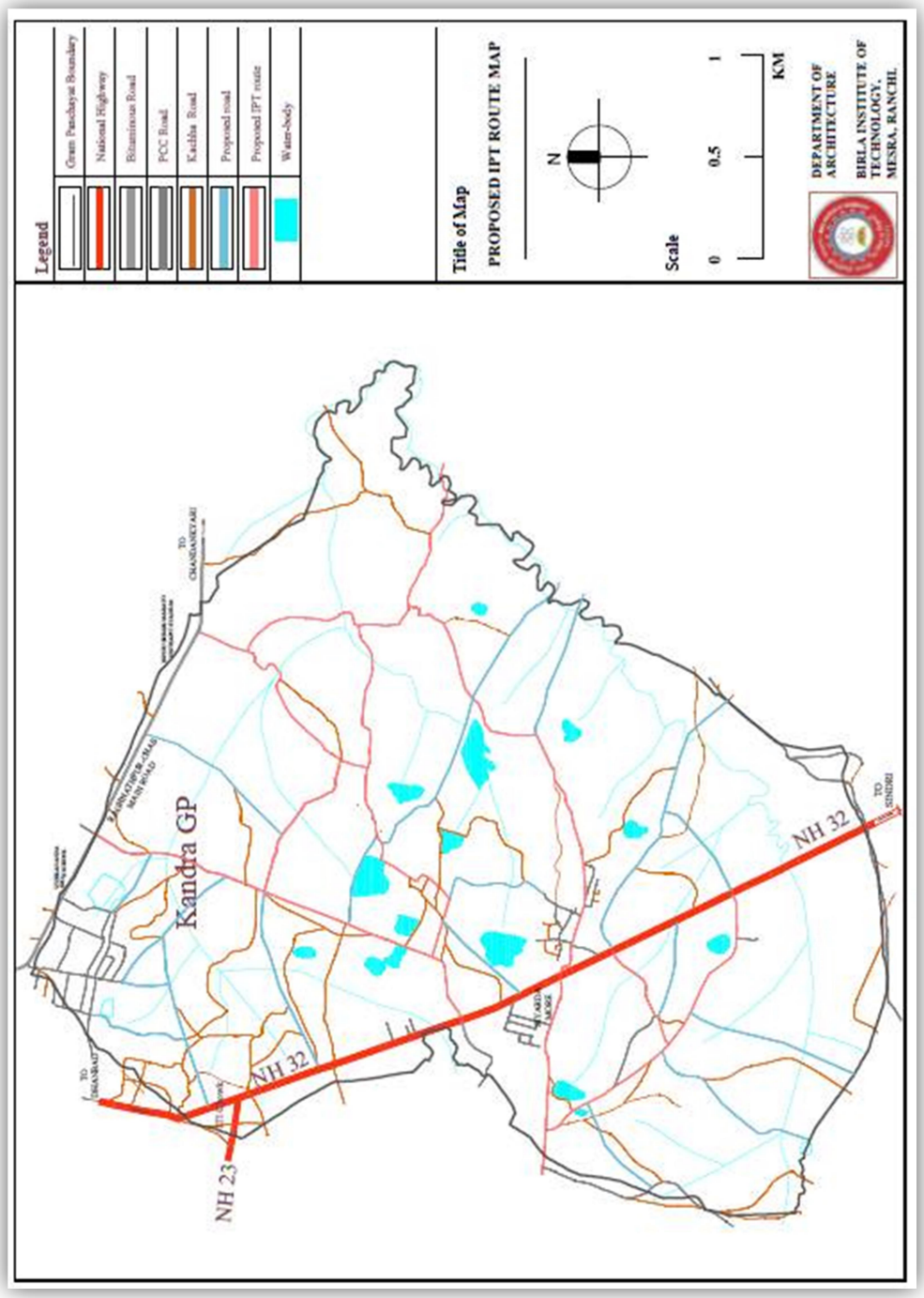


Fig. 7.66: Proposed IPT route map

Source: based on survey; prepared by the BIT Mesra Team

Fig. 7.67: E-Rickshaw is the latest entry in the Indian road transportation system

Source: https://www.openpr.com/news/1735487/india-e-rickshaw-market-growth-trends-by-company-saera-electric-auto-atul-auto-kinetic-green-terra-motors-ok-play-hero-electric-and-mahindra-mahindra.html

Fig. 7.68: Battery operated electric rickshaw

Source: https://www.indiamart.com/sky-enterprises-patna/terra-motor-electric-rickshaw.html

The electric rickshaw is cheap and more durable and as it runs on battery and hence it does not emit smoke making this vehicle more environments friendly (Fig 7.67 and 7.68). Additionally, the average energy consumption of electric rickshaw is 53.76 KJ/passenger/km which is one of the most efficient among all forms of motorized transport.

7.8.10 INFRASTRUCTURE FOR HEAVY COMMERCIAL VEHICLE

It is observed that along the NH 32 in the Gram panchayat there are many heavy commercial vehicles parked along the road this is because of the hotels and garage located in the stretch. The hotels provide resting space for the drivers and the garage there helps in the maintenance of the heavy vehicle. The roads here must be designed to minimize the bottleneck due to these heavy vehicles parked and to ensure better traffic flow, as well as reducing roadside hazards.

Cleverly-designed infrastructure that encourages sensible, attentive driving will also reduce accidents. There are policies framed for the national road safety and economic development of the road infrastructure. One key infrastructure component impacting

truck efficiency and safety is truck parking. Truck drivers must rest for 10 hours between on-duty periods and rely on public and private parking facilities to take these rest periods (Short, 2016). Thus, these locations should be marked and regularized for truck parking. This parking facility will be supported by other ancillary services which would lead to generation of employment and accessibility. While these spaces develop and the gram panchayat gets well connected and also well-equipped in transport infrastructure the land value will increase.

The land that is adjacent or serviced by good transport services generally has greater value due to the utility it offers. Consumers can have access to a wider range of services. On the other side the residents can have better accessibility to employment, services, and social networks, all of which transcribes in higher land value. An efficient transport system with modern infrastructures favors many economic changes, most of them positive. Transport also contributes to economic development through job creation and its derived economic activities.

7.8.11 LAND USE TRANSPORTATION INTEGRATION DEVELOPMENT

The land use transportation integration development is required for the area along the national highway as it will be based on the nature of interaction between spatial and transport development. The allocation of land uses impact demand for travel as people need to access different activities; transport infrastructure adds to the attractiveness of a location by improving accessibility and leads to change in land values. With improved accessibility, the locations become attractive for investments and it results in further development of these locations. There should be high density development around the transit station and the mixed land should be encouraged on the transit corridor for which the land should be identified by the government.

The road network will focus around transit nodes and easy accessibility to all the adjacent places. A safe and competent transit network will lead to the safety and strategic development of the gram panchayat.

With reference to the strategic goals for the Gram panchayat, the focus is to improve local economic development through various sectors. For any part of the gram panchayat to be growing it is the most important need to be connected to the main streets through road network. Considering each part of the development aspect the transportation network has to be strengthened.

Industries and transportation:

- The proposal of the small industrial area as innovation and training center are proposed which should be directly linked with the National highway 32. This will generate employment to the people of as well as people from the nearby villages. These industries need to be adjacent to the main road for easy access of the raw materials and to dispatch the finished goods to nearby market.
- Since there is a proposal for the multi commodity cold storage and also for fruits and vegetables in the Gram Panchayat, it should be located such that it is easily accessible and close to market hubs and/or produce collection point.
- Because of its intensive use of infrastructures, the transport sector is an important component of the economy and a common tool used for development. The building construction has always been a growing industry in developing areas and with the various residential, commercial and industrial areas to be built in future. Promoting and allotting the space for the various sectors elated to building construction like welding services, carpentry, plumbing, electrical fixtures etc. along the main roads would connect the potential customers to the suppliers. This would enable the people of to supply to the market near and further afield. This would open a wider area of employment in the labour market.

Agriculture and transportation:

- The agricultural commodities go through several operations before they reach the market, transportation being one of them. it is identified that transport costs has critical role in recognizing the link between accessibility and agricultural development hence a proper transport system is important to competent agricultural marketing as it would lead to distribution of agriculture produce from the farms to the market and also to various urban communities.

- Thus Transport creates market for agricultural produce, improves interaction among geographical and economic regions and opens up new areas to economic focus.
- Gram Panchayat being the agriculture based village and National Highway 32 as well as the ring road crossing through the gram panchayat will play a crucial role in the connectivity of the agricultural produce to the market and a strategic location of the storage, processing plant and its connectivity to the market has to be along these two major roads and various facilities in it.
- There are two aspects of transport facility, first being the link between farms and market second transport equipment carry agriculture produce. So the internal roads in the gram panchayat which connect to the farms have to be constructed as mentioned in IRC: Standard measurements and dimension for a rural road in India which is as follows: IRC 073: 2002 so the heavy equipment required for agricultural activities could be carried out.

7.8.12 SOCIAL SUSTAINABILITY

According to the National Road Transport Policy In rural areas, the poor are mainly dependent for their livelihood on their ability to produce and market agricultural products. Poor accessibility necessitates head loading of the goods to be moved. Also poor incur high costs in terms of time and money to gain access to employment, health services, education and other amenities. Increasing access to traded inputs (for example, fertilizers, seeds and equipment) and making it possible to transport agricultural products to distant markets is the means whereby productivity and income of those dependent on agriculture can be enhanced. This transformation will also facilitate the development of non-agricultural activities in rural areas. In urban areas, the principal resource of the poor is their labor. Adequate and affordable transport to work is therefore critical.

Increased auto dependence tends to displace non-motorized transport and reduce the variety of public transport means available to the poor. The balance between modes of transport depends very heavily on income. In low income regions, both rural and urban transport is largely non-motorized. The dominant mode of transport in small

towns of low income is the cycle or cycle rickshaws. Facilitating non-motorized transport not only fulfills the socially desirable objective of serving the cause of economically weaker segment of the society but is also environmentally friendly.

One of the best ways to help the low income groups is to facilitate and improve non-motorized transport. The security and convenience of pedestrian should be protected and enhanced. Cycling can also act as an efficient complement as a local distributor, allowing wider stop spacing and higher corridor speeds and flows. Proposed road network map is shown in Fig. 7.69.

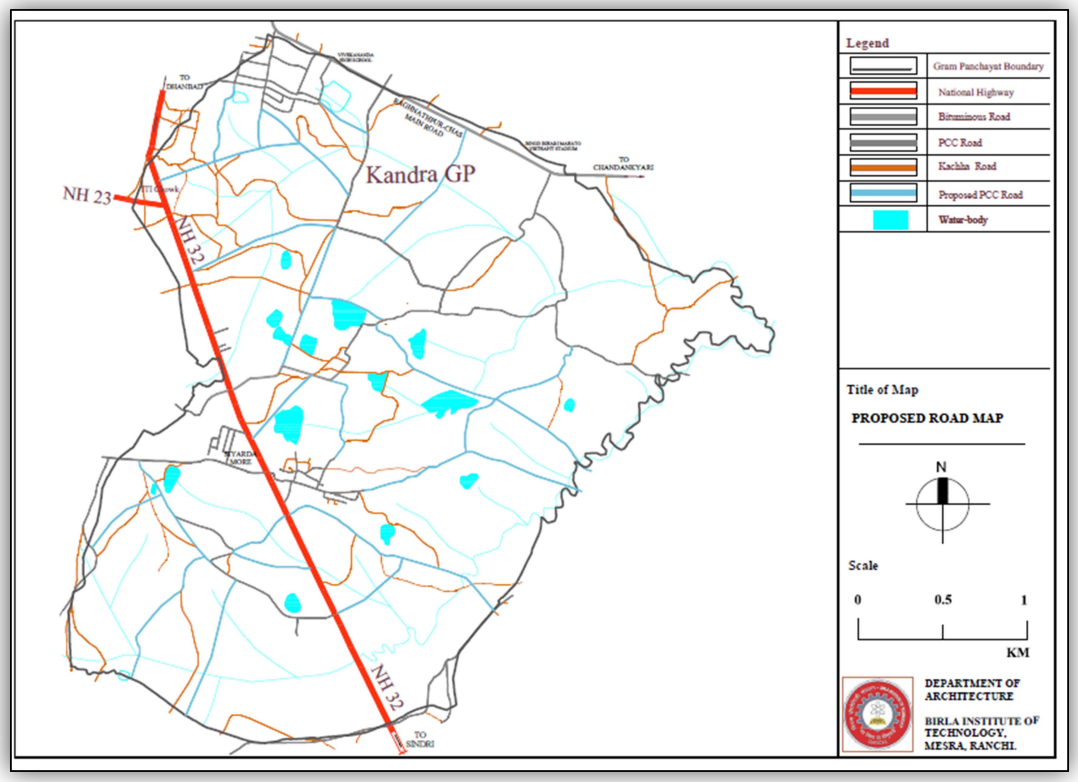
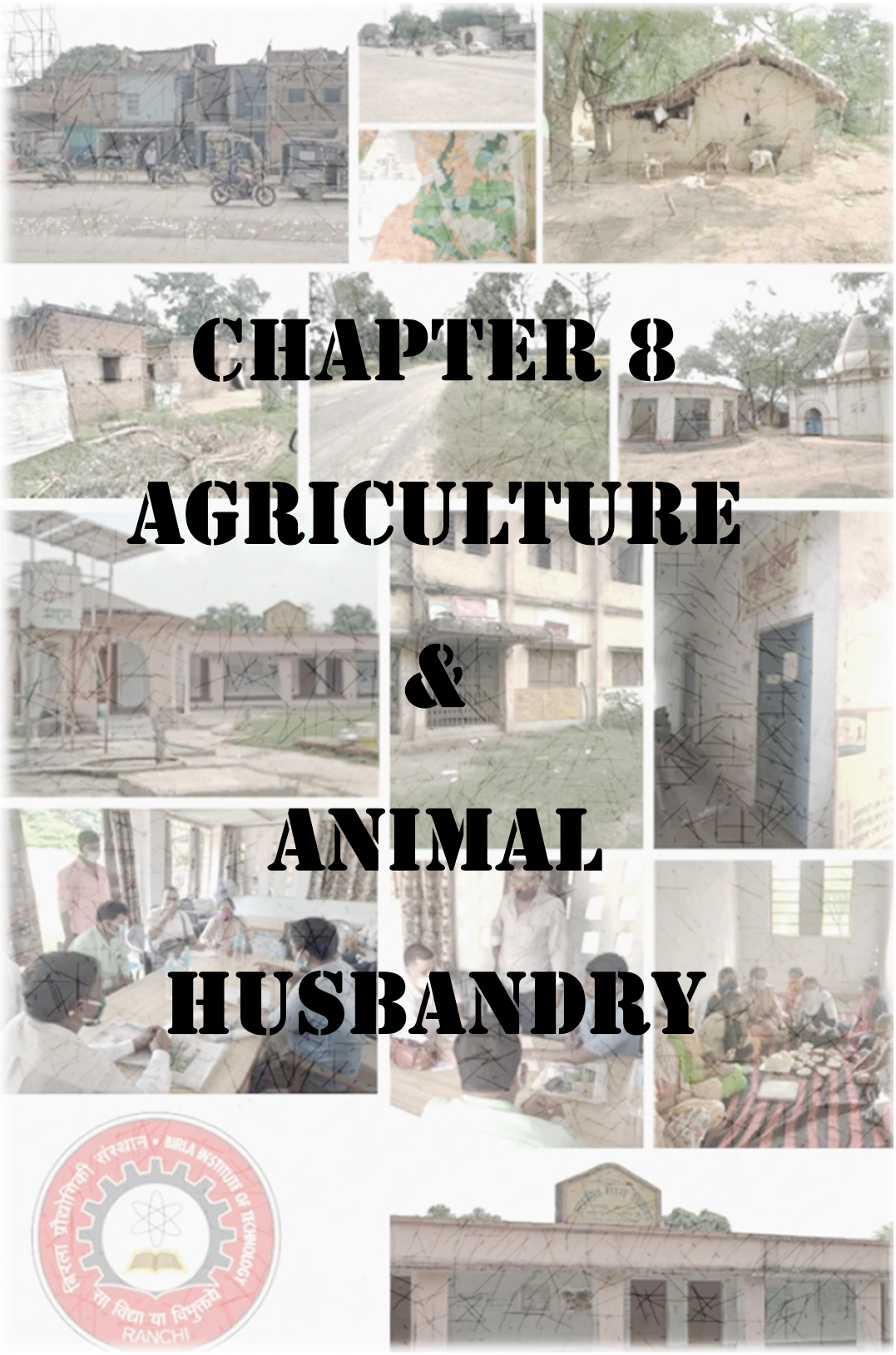


Fig. 7.69: Proposed Road Network map of Kandra GP

Source: based on survey; prepared by the BIT Mesra Team



CHAPTER 8

AGRICULTURE

&

ANIMAL

HUSBANDRY

CHAPTER 8: AGRICULTURE & ANIMAL HUSBANDRY

8.1 AGRICULTURE AND ANIMAL HUSBANDRY

Kandra GP is bifurcated diagonally by NH 32. On the North West it extends till Chas. Izri River is located at around 2 km from GP on the south east. The presence of National Highway and close proximity to Chas has resulted in growth of commercial and institutional activities along National Highway with a direct impact on the land value.

8.2 LAND

8.2.1 LAND CLASSIFICATION

Land is the basis for agriculture and other rural land uses, encompassing soils, climate, vegetation, topography and other natural resources. Land in Jharkhand has been classified as per the usage in the agricultural sector as - Forest Area, Area under Non-Agricultural Uses, Barren & Uncultivable Land Area, Permanent Pastures and Other Grazing Land Area, Land under Miscellaneous Tree Crops etc. Area, Culturable Waste Land Area, Fallows Land other than Current Fallows Area, and Fallows Area. In Kandra Panchayat, of the total area of 1003.5 hectares, the Net Sown Area is 310 hectares. Fig. 8.1 shows the agriculture and fallow lands in Kandra.

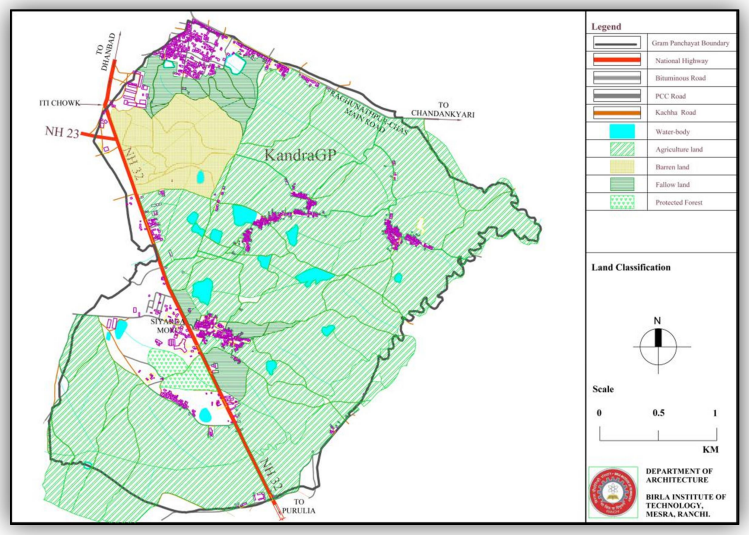


Fig. 8.1: Agriculture and Fallow Lands.

Source: Based on household survey; prepared by the BIT Mesra Team

8.2.2 LAND VALUE

The existence of NH 32 on either side of the GP has affected an increase in the land value. The Table 8.1 clearly depicts the difference in the circle rates and market rates.

Table 8.1: Land Value

S. No.	Land Value	Rate in Rupees (Lakhs/Decimal)	
1	Circle Rates	Agricultural	0.075
		Residential	1.55
		Commercial	2.35
2	Market Rates (Near NH 32)	2.5 - 3.0	
3	Market Rates (Along Main Road)	0.3 – 1.0	

Source: Circle rate from the Circle Office, Chas, Bokaro, and the current market rates from interview from Mukhiya and his team

8.2.3 LAND HOLDING SIZE AND PATTERN

Land holding size varies between 0.01 acre and 12 acre. As per household survey in the GP, 62 households had 0.05 acre, 12 households had 0.02 acre, 0.04 acre and 0.1 acre each; while 9 households had 5 acres and only one family had 12 acres. More than 70% households have land less than 1.2 acres, increasing the agricultural production cost and underlining the need for enhancing the potential for rural non-farm employment. As per SECC data, in the context of land owned – the total unir1`rigated land in the GP is 498.44 hectares, whereas total irrigated land is 31.94 hectares and other irrigated land is 610.77 hectare.

8.3 AGRICULTURE

Jharkhand, the 28th State of the Indian Union is best known for its rich mineral resources. However, 78% of the total population of 2.69 crore live in rural areas, largely dependent only on agriculture and allied activities. The total cultivable land in the State compares well at 52% of the total geographical area with 55% in the country. But, unfortunately while 76% of the total cultivable area is under net sown area in the country, only 43% is cultivated in Jharkhand. The state suffers from several critical gaps in the agricultural and allied sectors.

8.3.1 AGRO-CLIMATIC SUBZONES

Jharkhand forms a part of agro-climatic Zone VII of the country known as Eastern Plateau and Hill Region. The state has been further been divided into three agro-climatic regions i.e. Central and North-eastern Plateau (Region-I), Western Plateau (Region-II) and South-eastern Plateau (Region-III) as shown in the Table 8.2 and Fig. 8.2.

Table 8.2: Agro-climatic Regions of Jharkhand

Region No.	Agro-climatic Region	District	Cropped area (00 ha)	Percent irrigated area	Characteristic features
Region-I	Central North-eastern Plateau	Chatra, Koderma, Hazaribag, Ramgarh*, Bokaro, Dhanbad, Dumka, Pakur, Godda, Jamtara, Sahebganj and Ranchi	851.05	11.40	Erratic and uneven distribution of rainfall, Coarse textured soils, Crust formation on the soil surface. Low water retention capacity of the soils. Lack of safe runoff disposal and drying of the tanks.
Region-II	Western Plateau	Garhwa, Palamau, Latehar, Lohardaga, Simdega, Gumla and Khunti*	670.03	12.60	Erratic and uneven distribution of rainfall, Low water retention capacity of the soils. Lack of safe runoff disposal and drying of the tanks.
Region--III	South-eastern Plateau	East Singhbhum, West Singhbhum, Sarikela-Kharsawan	289.05	7.80	Uneven distribution of rainfall. Low water holding capacity, eroded soils. Shallow soil depth. Poor soil fertility.

Source: Economic Survey, 2007-08, Government of Jharkhand

**Newly created districts*

Fig. 8.2: Agro-climatic region-wise districts of Jharkhand

Source: Environmental Assessment and Environmental Management Framework for Jharkhand Opportunities for Harnessing Rural Growth (JOHAR)

Table 8.3: Rainfall pattern in Bokaro District

Rainfall	Normal RF (mm)	Normal Onset (specify week and month)	Normal Cessation(specify week and month)
SW monsoon (June-Sep)	912.7	2nd week of June	1st week of September
NE monsoon (Oct-Dec)	64.42	2nd week of October	3rd week of December
Winter (Jan-Feb)	21.47	-	-
Summer (Mar-May)	75.16	-	-
Annual	1073.8	-	-

Source: Agriculture Contingency Plan for District: Bokaro

Bokaro district falls under agro-climatic Zone VII (Eastern Plateau and hill region) and subzone Region-I (Central North eastern Plateau) as depicted in Table 8.2 and Table 8.3. The average annual rainfall received is 1073.8 mm.

Bokaro district is part of Chotanagpur Plateau. It is highly undulating and hilly all over the district. The regional slope of the district is towards east and controlled by the alignment of the tributaries of Damodar River. The hill ranges trending WNW – ESE. The average elevation of the undulating pediplain ranges from 200 – 350 m above MSL (Mean Sea Level). The highest hill prominent block is Gomia. The northern and western part of the district is having hilly ranges. Chas and Chandankiyari are low upland where cultivation is practiced.

8.3.2 Land Use and Cropped area

The distribution of land under different uses is as listed in Table 8.4 below. Almost 30.9% of the total area comes under net sown area, while 7% is fallow land and another 7.9% is barren and uncultivable land. The non-agricultural use land comprises another 13.1% of the total land utilized under agriculture and the culturable waste land is 18%.

Table 8.4: Land Use Distribution

Land Use	Area (Ha)
Non – Agriculture Use	131.5
Forests	22.4
Barren and Uncultivable land	79.7
Permanent Pastures and Grazing Fields	0
Land Under miscellaneous trees and crops	83
Culturable waste land	180.9
Current Fallows	70.5
Fallow Land and Other Fallows	125.5
Net Sown Area	310
Total Land	**1003.5**

Source: Department of Agriculture, Government of Jharkhand, 2020

8.3.3 Cropping intensity

Cropping intensity is expressed as the ratio of gross cropped area to Net cropped area. In Kandra GP mostly single crop i.e. Paddy is cultivated in most of the agriculture

lands. Few people cultivate Grams and Maize in backyard farms. Due to unavailability of water during Rabi season, Wheat is scarcely cultivated in Kandra.

8.3.4 CROPPING PATTERN

The lower lying area provides suitable condition for paddy cultivation. The higher elevations provide condition for orchards and cultivation of pulse and vegetables. During the monsoon season, paddy is cultivated in most of the agriculture lands. Vegetables and fruits are cultivated in the backyard farms. Due to shortage of water during Rabi season, the agriculture lands are left unutilized. Few farmers grow grams, maize and other vegetables in their backyard farms sufficient enough for personal use only. As per the primary study conducted, 310 Ha of agriculture land is utilized for the cultivation of Paddy. The Fig. 8.3 shows the agriculture lands used for paddy cultivation.

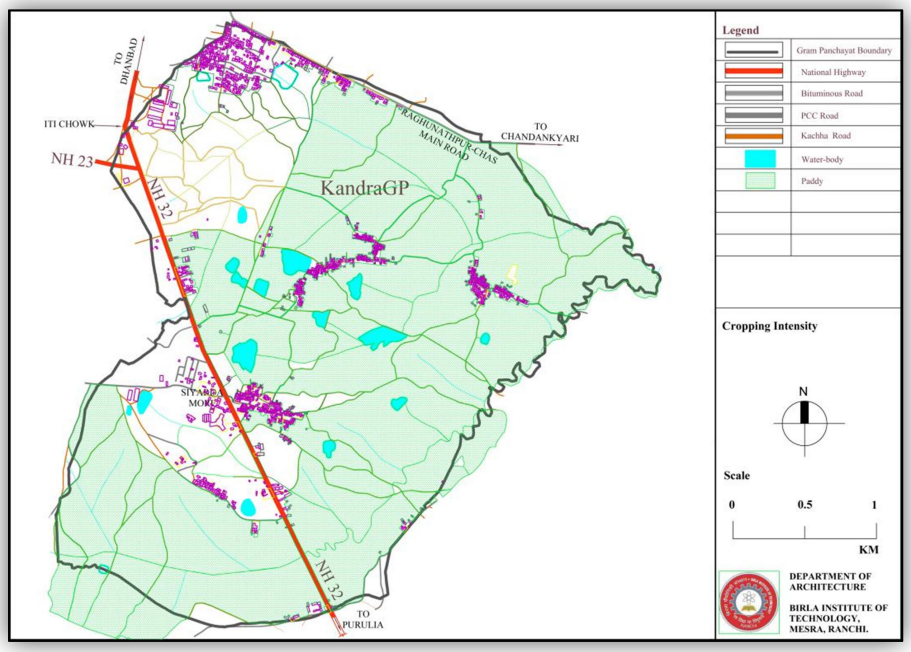


Fig. 8.3: Agriculture lands used for Paddy Cultivation

Source: Based on survey; prepared by the BIT Mesra Team

8.3.5 YIELD RATE OF PRINCIPAL CROP

In Kandra Gram Panchayat, mostly Paddy is cultivated with the crop yield of 2500 Kg/Ha. The yield rate of paddy in Jharkhand in 2017-2018 was 2957 Kg/Ha *(Source:*

Agriculture Department, Ranchi, State Agricultural Management & Extension Training Institute, SAMETI, Jharkhand).

8.3.6 PRODUCTION OF FRUITS, VEGETABLES AND FLOWERS

The major fruits, vegetables produced in the GP are Tomato, Chili, Cabbage, Ridge gourd, Brinjal, Okra, Potato and Bitter gourd. Most of the vegetables are produced in backyard farms (locally known as *Baadi*). There are a few Mango trees in the village and some households have guava trees in the courtyard.

Most of the vegetables produced are sold in the local market in the GP. There is lack of cold storage space in the GP and Chas, resulting in rotting of vegetables which are not sold in the local market.

8.4 IRRIGATION

8.4.1 PERCENTAGE OF IRRIGATED AND UN-IRRIGATED LAND

As per the data collected by primary and secondary sources, only 3 % of the total land in Kandra Gram Panchayat is irrigated. The total cultivated land area is 310 hectares which mostly dependent on monsoon water for agriculture as shown in the Table 8.5.

Table 8.5: Land under Irrigation

Irrigated Land/ Un-irrigated land	Area (Ha)
Total Irrigated Land	31.94
Total Un-irrigated land	498.44
Other Irrigated Land	473.12
Total area	**1003.5**

Source: SECC Kandra, GP records

The percentage of Irrigated to Cultivated Land is 10.3%.

8.4.2 SOURCE OF IRRIGATION

Agriculture is mostly dependent on monsoon rain, hence numerous ponds have been excavated across GP to collect rain water. Groundwater extracted from open wells and hand pumps are mostly used for farming in backyard farms. During summers

most of the well and handpumps run dry. The numbers and land dependency percentage are as shown in Table 8.6.

Table 8.6: Irrigation Sources

Source of Irrigation	Numbers	Dependency of agricultural land in percentage
Well	-	Nil
Ponds	-	5-10% (lower lying areas)
Hand Pump	-	Nil

8.4.3 MINOR IRRIGATION SCHEME AND IRRIGATION

Potential Created & Potential Utilized in GP

The government schemes for agriculture, benefitting the farmers in GP are listed below

- Pradhan Mantri Kissan Samman Nidhi, which has been availed by 1-2% of the population.
- Kissan Credit Card availed by most of the farmers.
- Fasal Beema Yojana, but there has been no dispersal of any fund since last 5 years.
- No specific Scheme related to Irrigation has been availed yet.

8.4.4 LOCATION OF PONDS

There are many small and medium sized ponds across the Gram panchayat. These ponds are used for socio-cultural activities and agriculture. The location of ponds is shown below in Fig. 8.4. As these ponds play a very important role in sustaining agriculture in the GP, hence protection and retrofitting are needed.

Some recommendations for retrofitting of ponds are

- Desilting of existing ponds.
- Enlargement of 3 ponds, as shown in Fig. 8.7 to increase the water storing capacity.
- Construction of bunds around the ponds.
- Construction of steps around ponds used for socio-cultural activities.
- Connecting all the ponds with channels for efficient collection and storage of rain water.

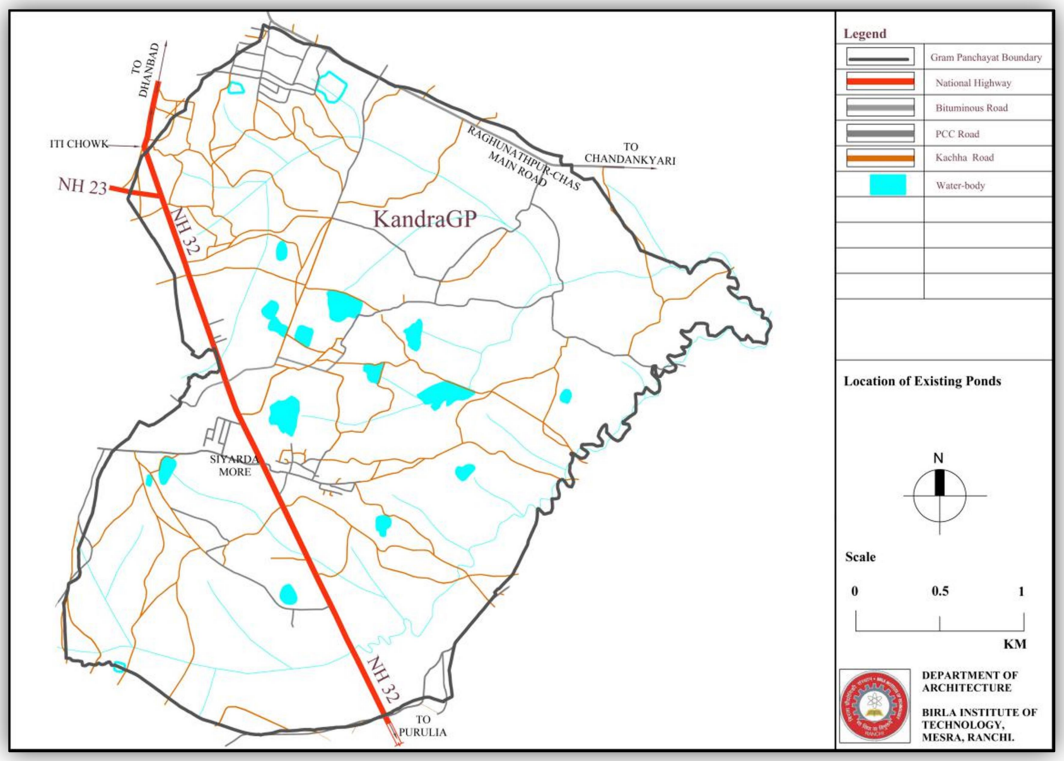


Fig. 8.4: Location of Ponds

Source: Based on survey; prepared by the BIT Mesra Team

8.5 LIVESTOCK

As per the primary survey, 18% HHs in Kandra GP possess cows and buffaloes, while 78% (785 respondents) do not own cattle. The number of livestock is 811. 48% households have at least one kind of livestock and only 1.0% people use their livestock – ox, chicken and goat only, for commercial purpose. The primary study also indicates that other animals owned by the families in the GP are dog and sheep. None of the household owns horse and donkey. The type of livestock available is shown in Table 8.7.

Table 8.7: Number of Livestock

Livestock	Number
Cow/ Buffalo	320
Chicken	262
Goat	141
Ox	83
Other animals	05

Total	**811**

Source: Primary survey

In the context of commercial use of livestock, only 9 households have chicken, while 13 families use goats for business. A total of 21 families use cow milk for selling. Most of the milk produced is sold in the village itself. The Table 8.8 elaborates the number of HHs using livestock for commercial purposes.

Table 8.8: Number of Livestock for Commercial Purposes

Livestock	Number of Households
Cow milk used for selling	21
Ox	22
Chicken	9
Goat	13

Source: Primary survey

8.6 PROGRESS AND STATUTORY AND MODIFIED RATION SHOPS IN THE VILLAGE

The Kandra GP has ample number of ration shops - a total of 3 statutory ration shops are presently located in the residential pockets. The location of statutory ration shops is marked in the Fig. 8.5 below.

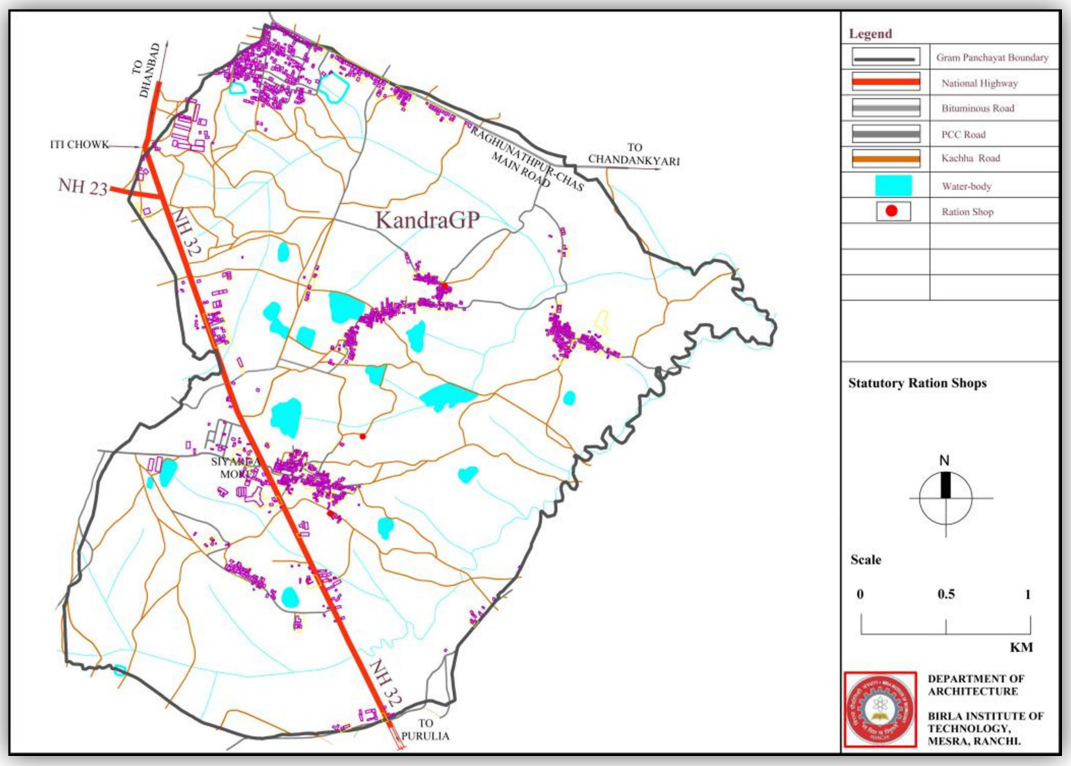


Fig. 8.5: Location of Statutory Ration Shops

Source: Based on survey; prepared by the BIT Mesra Team

8.7 LAND RECLAMATION & LAND CONSERVATION DATA IN GP

The various projects under different schemes and programs and its impact area under various headings towards land reclamation and conservation is listed below in Table 8.9.

Table 8.9: Schemes and Programs in Kandra GP

Drought Proofing	No infrastructure, but farmers can avail an insurance scheme under which, during droughts, insured farmers will receive Rs 21,945/acre (2016-2020)
Flood Control and Protection	Not required
Land Development	Nil
Rural Connectivity	15.1 km
Water Conservation & Water Harvesting	*Doba* or small ponds have been excavated
Works on Individual land, IAY houses etc.	248

Source: Kandra GP office records

8.8 MAJOR CONTINGENCIES GP IS PRONE TO

Bokaro district is prone to droughts as evident from the Table 8.10. Most of the Kharif produce are dependent on Monsoon rain, whereas Rabi produce are minimal and dependent on groundwater mostly extracted through open wells. Even though the district receives ample amount of rainwater, there is lack of any provision for rainwater harvesting.

Table 8.10: Major Contingencies

Major Contingencies GP is prone to	Regular	Occasional	None
Drought	√		
Flood			√
Cyclone			√
Hail storm			√
Heat wave		√	
Cold wave		√	
Frost		√	
Sea water intrusion			√
Pests and disease outbreak		√	

Source: Agriculture Contingency Plan for District: Bokaro

8.9 RECOMMENDATIONS

- As the cropping pattern is dominated by paddy, the crop diversification will consider less water intensive crops (or efficient irrigation methods), keeping in view the soil characteristics and nutrient status. Crop rotation with pulse crops should be promoted to the extent possible.

- Majority of the production happens in kharif as 82% of rainfall is from monsoon. Despite of good amount of rainfall, the surface water is not available for irrigation in crucial periods due to inadequate storage facilities.

- As discussed above, the GP is majorly dependent on rainfall for agriculture. As the district receives ample rainfall, provisions should be made to conserve rainwater during monsoon and utilize it during dry seasons. The rainwater can be harvested by
    - Ground water recharge
    - Retention ponds.

- A number of ponds already exist in the GP which can be utilized efficiently for storing rain water received during Monsoons.

- The existing ponds need to be desilted and enlarged to increase the water storage capacity.

- Retention ponds to be constructed at intersection point of multiple channels (Fig. 8.6).

- The location of retention ponds as shown in Fig. 8.6 has been deduced from the elevation map, suitable rain water harvesting zone map and existing agricultural land use.

- All the ponds should be connected with cascading channels for efficient rain water harvesting system. Through these channels, the surcharge water in one pond can be transferred to other ponds.

- Drip irrigation should be promoted to conserve wastage of water.

- Farmers need to be encouraged to conserve rainwater in their own fields.

- Construction of open wells to be promoted as it will help in ground water recharge.

- Izri River is in close vicinity, water from the river can be used in the GP for irrigation. Lift irrigation can be employed to pump the water from river to GP.

- Construction of Green Houses should be promoted in the GP along with provision of subsidies.

- Agro-industries should be promoted for employment creation, socio-economic development and income generation. Agro Processing Industries has been proposed as described here under:
  - Primary Food Processing Units:
    Paddy being the main food crop of Kandra grown in largest area (310 ha). For food processing activity, a few rice mills are proposed. Products from rice like rice flakes, puffed rice, popped rice, canned rice and other products can be encouraged.

Maize is also grown seasonally, so provisions can be provided for maize products like cornflakes, corn starch, corn flour, cornmeal, Corn gluten, etc.

- Spices Processing Enterprise: Turmeric, Ginger, Garlic and Chilies plantation can be promoted to produce spices.
- Livestock Based Processing Activity: Poultry and Cattle Farming.

The Milk based processing activity (viz., khoa, paneer and butter) is missing in the GP. The entire milk is sold in the GP or nearby Chas town. The provision of Milk Chilling Centers would positively contribute in greater concentration of milk based processing activities under unorganized manufacturing sector in the GP. Poultry farming does exist and can be encouraged with adequate provisions.

- A Cold storage for vegetables and milk need to be proposed as shown in Fig. 8.7, which can be used by the farmers from Kandra and surrounding villages as well.

For a 10 MT cold storage unit, the room dimensions required would be 5.5m x 3.5m x 3.5m. The refrigeration capacity shall be 30000 Btu/hr.

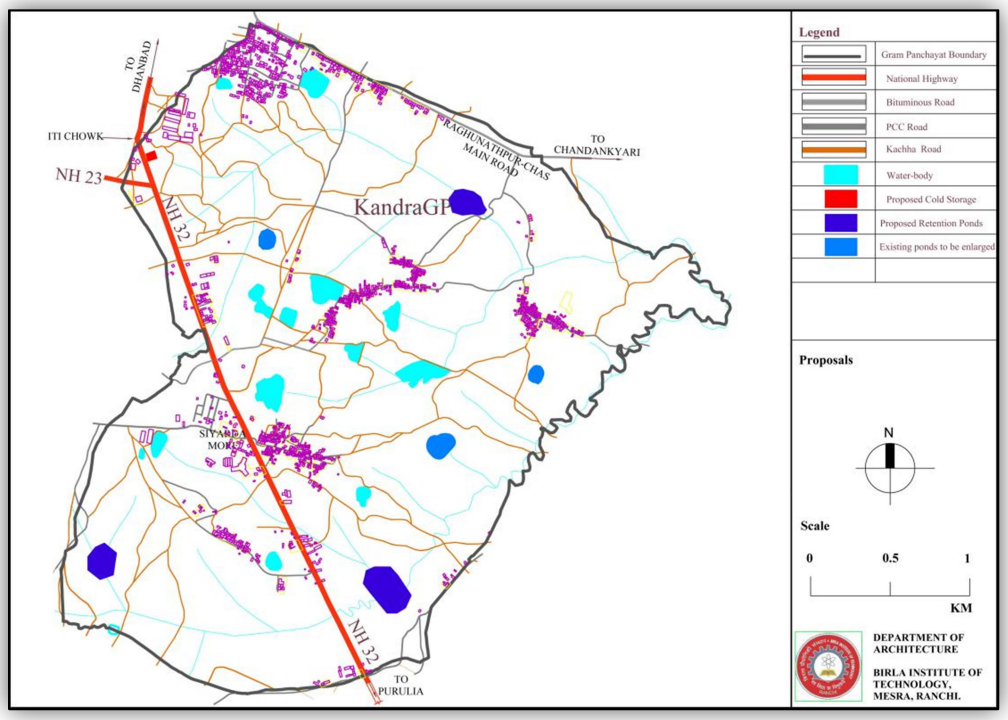


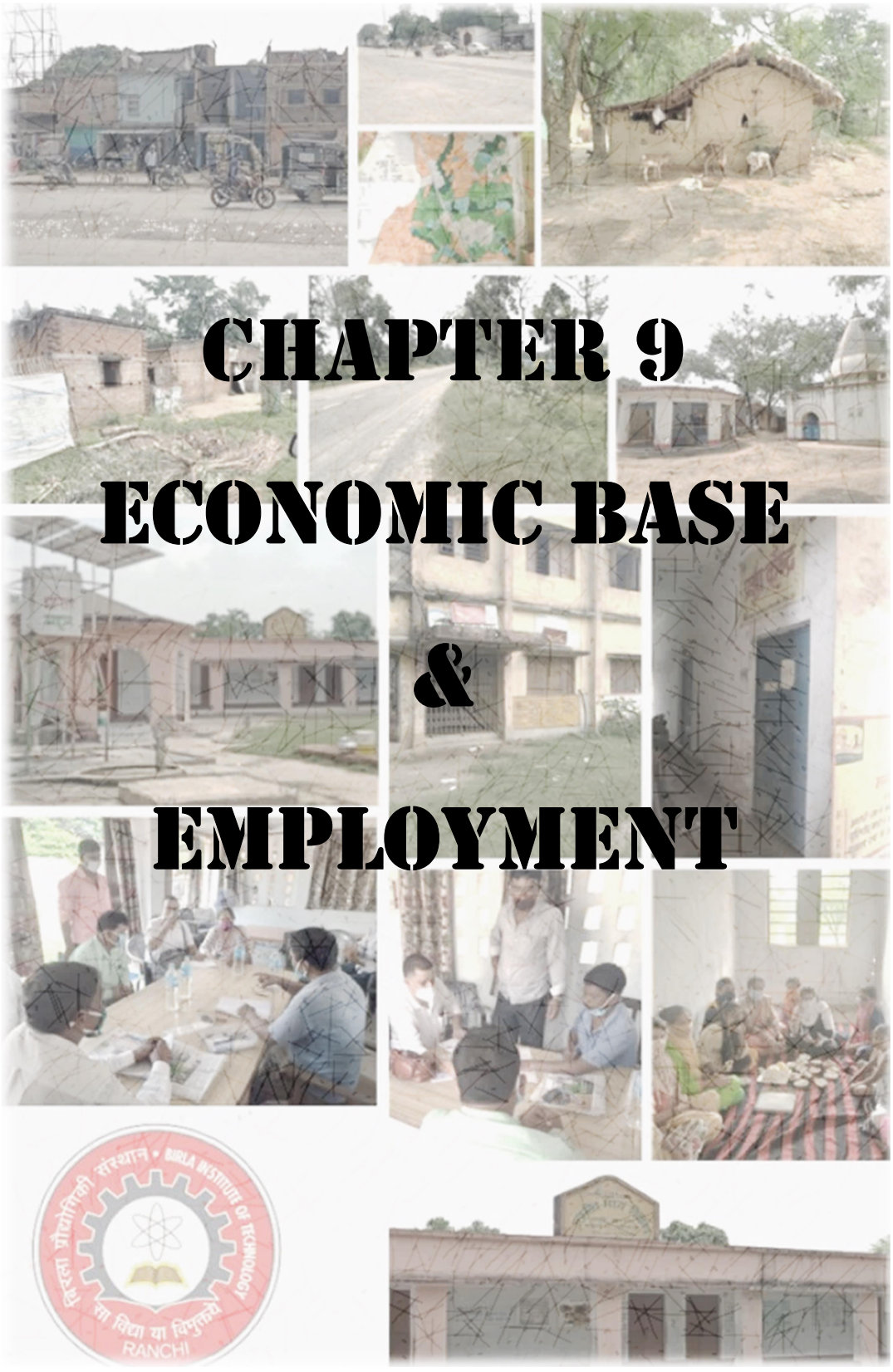
Fig. 8.6: Proposed location of Retention Ponds and Cold Storage

Source: based on survey; prepared by the BIT Mesra Team

The produce from agriculture and industries would be categorized into groups of fruits and vegetables; meat and fish products; milk and milk products; and other products of the kind. The cost of a 10 MT cold storage varies depending upon the location, the availability and demand of materials in the market. The investment shown here is for a 10 MT cold storage which as per norms is estimated to cost nearly Rs.15,00,000/- except the cost of land.

(*Source:https://www.agrifarming.in/cold-storage-project-report-cost-and-subsidy#:~:text=The%20cold%20storage%20room%20basic,to%20be%3A%2043%CB%9AC.)*

The assistance provided by the government could be such that 60% of the expenses should be borne by the beneficiary and 40% of the expenses would be given as subsidy to the beneficiary.



CHAPTER 9

ECONOMIC BASE

&

EMPLOYMENT

CHAPTER 9: ECONOMIC BASE & EMPLOYMENT

9.1 INTRODUCTION

9.1.1 ECONOMIC ASPECT OF PANCHAYATI RAJ

For Panchayati Raj system, devolution of funds has often been questioned as transfers made through the State Finance Commissions were meager in most States. Hence the local bodies in the Panchayati Raj system have faced problems to undergo development process due to lack of funds. Moreover ground survey suggests common reason for low utilization was with respect to delay of funds trickling down from the Centre to State and finally to Panchayats. Further, the administrative difficulties to obtain sanctions and approvals add to the delay. Limited capacity and shortage of staff at various tiers in the PRI delays the sanctioning and approval. The inordinate delay in many funding schemes increases project cost which ultimately remains incomplete.The Fourteenth Finance Commission (FFC) took note of it and substantially increased the grants to the local bodies for the period year 2015-16 to 2019-20 (Table 9.1). The grants provided are intended to be used to support and strengthen the delivery of important basic public services. The 15th Finance Commission has further increased the grants in its interim report for year 2020-21 for rural and urban bodies.

To respond to these long standing crises, Centre for Policy Research, Delhi in its report on Devolution of Union Finance Commission Grant to Panchayats, published in 2019, proposed a Transparency Portal to address monitoring release of grant, budgeting, planning, maintaining time series information, providing updates and monitoring outcomes. This proposal may ease all bottlenecks of development at GP.

Table 9.1 Trends in Fourteenth Finance Commission (FFC) Grants to Rural Local Bodies for the State of Jharkhand (all figures in crore)

	2016-17	2017-18	2018-19	2019-20	Total grant
Total grant	1022.53	1178.63	1360.62	1382.12	6046.74
Basic grant	903.36	1044.45	1208.24	1632.59	5442.07
Performance grant	118.57	134.18	152.38	199.53	604.67

Source: Basic Statistics of Panchayati Raj Institutions, 2019, MoPR, Government of India

9.2 FINANCIAL POSITION OF KANDRA GRAM PANCHAYAT (GP)

The financial trends of income and expenditure is shown in Table 9.2

Table 9.2 Trends in the Structure and Growth of Kandra GP Income and Expenditure (Rs.)

	2016-17	2017-18	2018-19	2019-20	Total
Total receipt	1635211	1627189	815598	2993122	7071220
Total expenditure	1250370	1471723	1436578	1918980	6077651

Source: Kandra GP panchayat office records

9.3 STATUS OF CENTRAL AND STATE FUNDED SCHEMES IN KANDRA

In 2015-16, Yojana Banao Abhiyan for the first time gave opportunity to the Gram Panchayats for preparing the holistic development plan for the panchayats. The recommendation of the 14th Finance Commission for Gram Panchayats also became a driving force for the preparation of the plans. Last year, Jharkhand was the first state to prepare Gram Panchayat Development Plan (GPDP) based on convergence. To make GPDP a success in the state, a massive media campaign was launched at the state level followed by mid media activities in the districts, block and panchayat level.

Under Pradhan Mantri Gramin Awas Yojna (PMAY), the Kandra Gram Panchayat witnessed an increase in both- the scale of the program in terms of the physical target and increase in the allocated amount of money for building each unit of housing. For the year 2016- 19, the number of houses completed in Kandra GP under the scheme is 248for which Rs. 2,72,80,000/- has been disbursed.

Pradhan Mantri Gram Sadak Yojana (PMGSY) aims to provide connectivity by way of all-weather roads (with necessary culverts and cross-drainage structures, which are operable throughout the year), to the eligible unconnected habitations in the rural areas. In the first phase habitation with a population of 1000 and more and a population of 500 and more were to be connected. In the second phase, realizing the presence of the sparse population in the hilly and forest areas, special provisions were made to connect habitations with 250 plus population. Under this scheme over the last five years the Kandra GP has experienced a total construction of nearly 8 km of metalled road. Under Mukhya Matri Gram Sadak Yojaya (MMGSY) 580 feet of PCC road has been constructed in Kandra GP.

National Rural Livelihoods Project (NRLP) is a component of NRLM which is carried out in some selected intensive blocks. Till now, a total of 31415 villages have been targeted at the state level under NRLP, in which a total of 2, 24,793 SHGs are actively working. In Kandra GP, 12 SGH with 144 members are working.

Number of households having Jan-Dhan bank account is 20. Number of Households registered for health insurance services under Pradhan Mantri Jan Arogya Yojana (PMJAY)/State specific Health Insurance Schemes is 15. Total number of eligible beneficiaries under Aayushman Bharat-Pradhan Mantri Jan Arogya Yojana or any State Government Health schemeis 10. Total number of eligible households under National Food Security Act (NFSA) is also 10. Total number of farmers registered under Pradhan Mantri Kisan Pension Yojana (PMKPY) is 10. Total number of households receiving food grains from Fair Price Shops is also 10. (http://missionantyodaya.nic.in).

Mahila Kisan Sashaktikaran Pariyojna is a sub component under NRLM, which identifies women worker as an integral part of the agricultural sector. Under the ambit of this program, 8 project proposals covering 27,630 households of 22 blocks in the 10 districts of Jharkhand have been sanctioned since its inception. Under the same in Kandra GP has not been benefitted as no projects have been conceived in Chas block of which Kandra Gram Panchayat is a part.

The MGNREGS seeks to enhance the livelihood security of the households in the rural areas by guaranteeing at least 100 days of wage employment in a year to every household whose adult members volunteer to do unskilled manual work. This scheme works have been undertaken in almost all the gram panchayats across the state. In the current financial year, 56,960 workers have been provided with employment, generating about 31.08 lakh mandays. In this period a total of 52.99 lakh active job cardholders and 91.48 lakhs worked under the program. For Kandra GP, MNREGS have employed 997individual with 755 job cards. (http://nregasp2.nic.in/netnrega/homedist.aspx)

Apart from generating employment, this program also aims at creating valuable rural assets which can provide recursive livelihood opportunities for the rural populace. Since its inception, a total of 175 assets have been already completed, while, the construction of 120 assets are in the on-going process in Chas block of which Kandra Gram Panchayat is a part((http://nregasp2.nic.in/netnrega/homedist.aspx).

Under Swachh Bharat Aviyan, 631 families have been provided with toilets since inception of the project, however over 400 families are yet to be facilitated with toilets.

Mukhya Mantra Samagra Gram Yojana (MMSGY) was initiated in the year 2016-17 in Jharkhand to bridge the differences of development in the urban and rural areas of the state by creating urban like infrastructure, so that the urban services, amenities and opportunities can be easily reached at the door step of the rural households. The program targets to strengthen almost all the sectors like rural governance, sustainable energy, rural industry and market, production system, skill development, education and healthcare through technology led innovations like ICT, smart grid, digitized marketing and web connect. Some of the good practices that have been tried in this financial year are shifting of post office accounts to bank accounts and DBT, expediting Aadhaar seeding process, SHG women mate, GeoMGNREGA, NREGA Sahayata Kendra and digitization of the department.

The State Government of Jharkhand is planning to launch a new scheme called "ARYA" to attract rural youth in agriculture. The objective of the ARYA scheme will be to promote the green revolution in the state. Under the ARYA scheme, the state government will attract rural youth in agriculture by making them skilled and make the state self-dependent in agriculture.

The Government of Jharkhand has initiated many welfare schemes for the people of the Gram Panchayat including Student Scholarship Scheme, Tribal School Scheme, Birsa Awas Yojana, and various other schemes for Scheduled Caste, Schedule Tribes and Citizen Protection Schemes.

The 15th Finance plan has allocated Rs. 4, 24,557 in 2020-21 as the first phase allotment for the Kandra GP (GP_15th FC Allotment 2020-21).

Table 9.3- Development works planned in Kandra GP over the last five years

Sr. no.	Sector	Work Name	Work status	Planned budget (Rs)
1	Drinking water	Jal Minar nirman at 03 identified points	Completed	7,49,865
2	PCC road	Road at 04 identified location	Completed	4,86,800
3	Nali nirman	Nali nirman at 05	Completed	2,40,100

		identified locations		
Total allotment				**12,36,665/-**

Source: Review of Previous years GPDP – Kandra GP and current updates from survey.

The Table 9.3 above shows around 12 development projects planned by the Gram Panchayat of Kandra in support of the State Government through Gram Panchayat Development Plan (GPDP). This further establishes the urge of the local self-government to bring about changes in the infrastructure and improving the Quality of Life of the people here.

9.4 EMPLOYMENT SCENARIO OF KANDRA GP

The employment scenario of the Gram Panchayat is lopsided with nearly 92.3 per cent of household involved in non-agricultural activity. This is due to the influence of capital city in the proximity. In Kandra GP out of total population, 2165are engaged in work activities. 1594 workers describe their work as Main Work (Employment or Earning more than 6 Months) while 571 are involved in Marginal activity providing livelihood for less than 6 months (as per 2011 Census). Total workers in the village are 2165 out of which 1819 are male and 346 are female (Table 9.4). Total main workers are 1594 out of which female main workers are 107 and male main workers are 1487. Total non-working population is 6187 (Census 2011). The maximum main earning member of the household is involved with casual manual services of various kinds and serves as one of the main labour bases of the city. Hence nearly 15.5 per cent of the household has a recorded income of more than Rs. 10,000 as per government records.

There exists no cottage and small scale units (Fabrication/Construction material/Dairy based/Textile etc.) units in the GP.

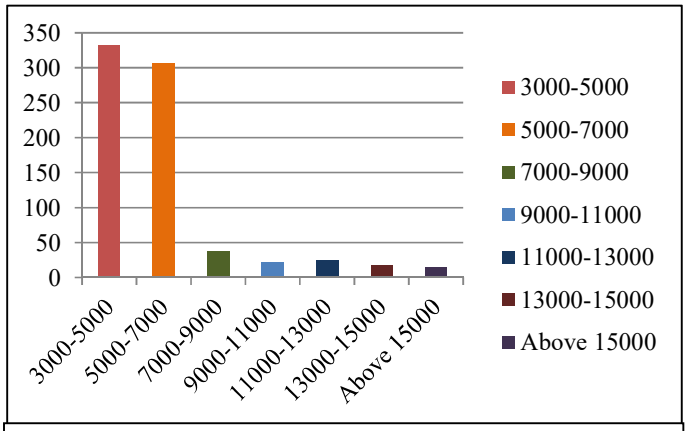
Table 9.4- Kandra Working Population - Census 2011

	Total	Male	Female
Total Workers	2165	1819	346
Main Workers	1594	1487	107
Main Workers Cultivators	213	203	10
Agriculture Labourer	118	110	8

	Total	Male	Female
Household Industries	12	9	3
Other Workers	1251	1165	86
Marginal Workers	571	332	239
Non working Persons	**6187**	**2536**	**3651**

Source: PCA 2011

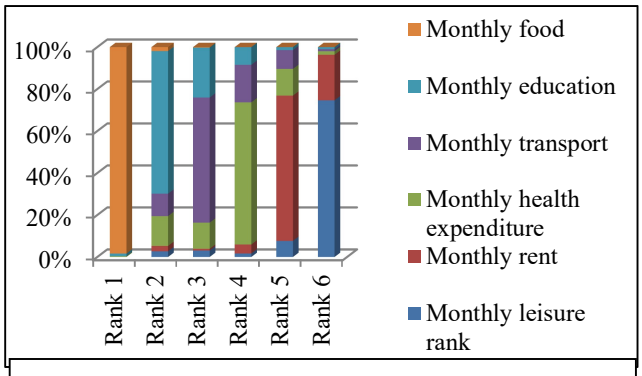
Fig. 9.1: Showing monthly expenditure of households in (Rs.)



Source: Household survey 2020 carried out by BIT Mesra

The survey of households carried out clearly shows the picture of utter poverty where largest chunk of over 65% population has a monthly household expenditure ranging between Rs. 5000 to below Rs. 7000 (Fig. 9.1). Considering an average household size to be around 5, average expenditure per person in these households is a somewhere around Rs. 1000/- which is much below the national average of Rs. 1,446 (NSO 2017-18).

Fig. 9.2: Distribution of monthly expenditure amongst households as per actual spending under different heads



Source: Household survey 2020 carried out by BIT Mesra

The Fig. 9.2 shows 95% of the households have Food expenses as main means of expenditure, 58% of household has monthly education as second highest means of expenditure. 52% households have transport expenditure as third highest means of expenditure and 57% households has substantial

expenditure in health related issues. Considering more than 65 % of the population has a mere Rupees One thousand as monthly expenditure, and 70 % has food as the main source of expenditure, it establishes the fact that more than half of the population is not able to meet two ends meet. The poverty index hence is presumed to be high in this GP (Table 9.5 to 9.8).

Table 9.5 - Distribution of Household based on monthly income of the highest earning member

GP	Less than Rs 5000 per month	Between Rs. 5,000 and 10,000	Rs. 10,000 or more
Kandra	1163	97	231

Source: SECC data of Kandra GP [114696]of MoRD

Table 9.6 - Distribution of Household based on main source of income

GP	Cultivation	Manual casual labour	Part-time / full time domestic service	Ragpicking	Non-agricultural own account enterprises	Begging / charity / Alms	Others (Business etc.)
Kandra	109	910	6	0	0	18	448

Source: SECC data of Kandra GP [114696] of MoRD

Table 9.7 – Distribution of Household by high landholding

GP	Household owning 2.5 acre or more of irrigated land with atleast one irrigation equipment	Household owning 5 acres or more of land irrigated for two or more crop seasons	Household owning 7.5 acre or more of irrigated land with atleast one irrigation equipment	Household having kisan card with a credit limit of Rs.50,000 and above
Kandra	2	0	1	8

Source: SECC data of Kandra GP [114696]of MoRD

Table 9.8 – Number of households and persons registered under National Rural Employment Guarantee Act

Village	Number of registered		SCs		STs		Others		Male	Female
	House	Per	House	Per	House	Per	House	Per		

	hold	sons	hold	sons	hold	sons	hold	sons		
Kandra	965	1583	158	255	15	29	792	1299	1006	577

Source:

http://nregasp2.nic.in/Netnrega/writereaddata/state_out/RegCatvill_3420001027_local.html

9.4.1 Academic qualification of the inhabitants of Kandra GP

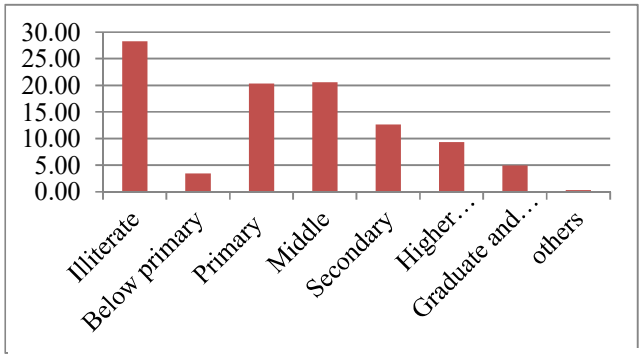


Fig. 9.3 Percentage of academic attainment

Source: SECC data of Kandra GP of MoRD

As per 2011 Census, a large section of population is non-working. The academic attainment of the Kandra GP residents presents a sordid state of affair (Fig. 9.3). The Sarva Shikha Abhiyan of Government of India has also not reached to nearly 28.3% people in the GP. The segment of people with no education, below primary, primary, middle, secondary and higher secondary educational attainment is nearly 94.68 %.This segment contributes to manual and casual labour for the city and its suburbs having monthly income of zero to Rs. 10,000/-.

About 57% of this population is within the age group of 16 to 55 years. Survey and discussion with stakeholders suggests that majority of this population has an intention to learn new skills and engage in good-income practices. Since a significant percentage of this population is talented and are willing to learn if resources are available, specialised training to these may pave the path for better economy infiltration to the GP. For this, Skill Development Centres and Agricultural Processing Centres are proposed to be open in the GP level to make these stakeholders “Atmanirbhar”.

9.4.2 Interdependency of hinterlands and Kandra GP for economic activities

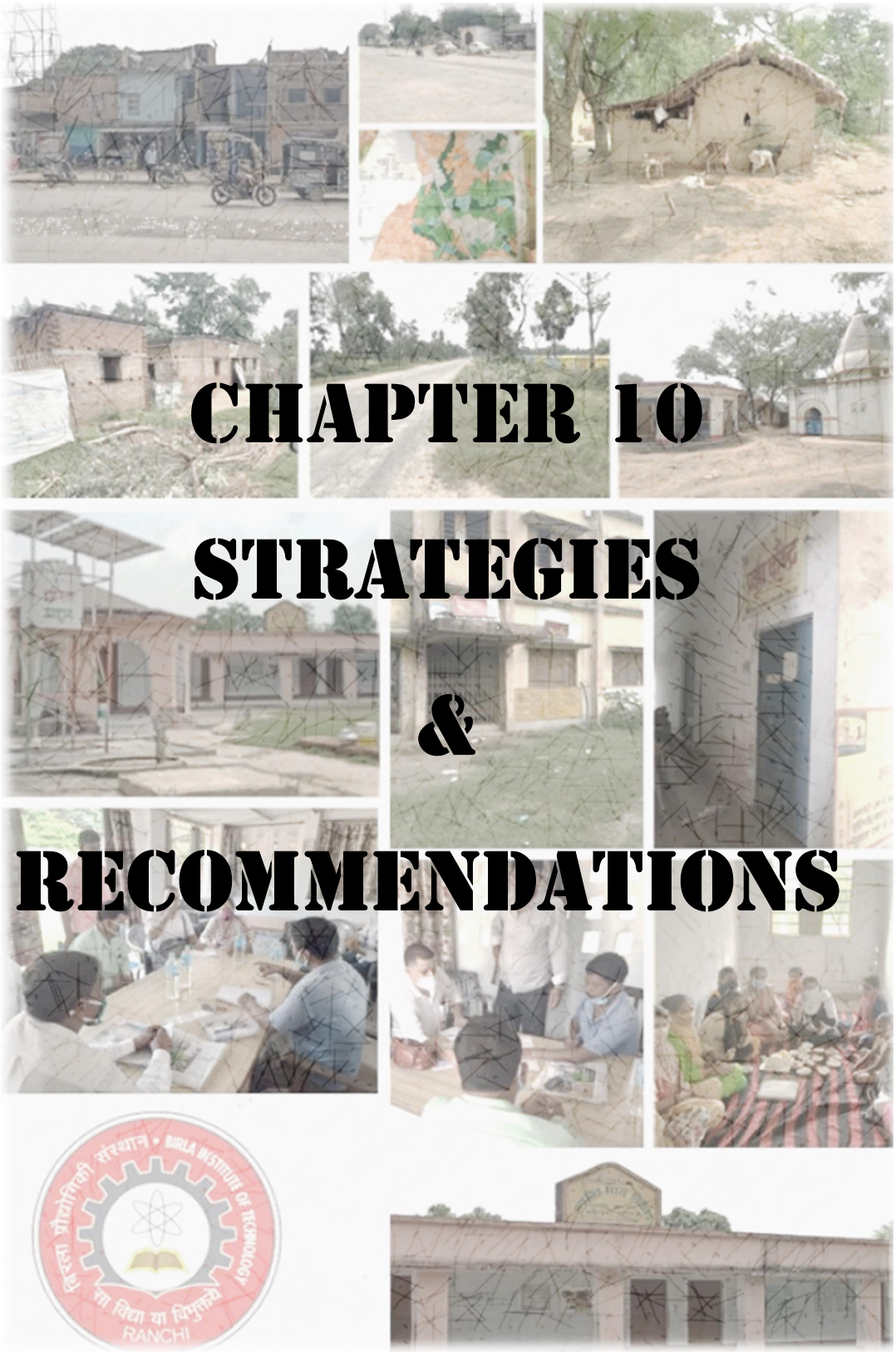
The block of Chas housing Kandra GP has 126 villages with a rural population of 2,49,083. The Kandra GP is surrounded by the villages of Labudih, Partand, Ramdih and Dhandabra along its vicinity. The GP of Kandra has no major commercial

establishments and due to proximity of such establishments in nearby Chas, people avail the facilities. A small section of labours, working in commercial establishment in nearby Chas, travel from these villages. With the formulation and implementation of Gram panchayat Spatial Development Plan for Kandra GP, there are possibilities of economic and physical migration to the GP from its hinterlands. With subsequent creation of work opportunities, survey of many families will travel to settle in the GP for better livelihood opportunities from hinterlands which are spaced beyond 50 km from the GP. Survey of commuting labours in Bokaro suggests that a large section travelling on bicycles comfortably ride upto 50 kms for search of livelihood and they are more of landless labours willing to relocate.

9.5 CONCLUSIONS OF ECONOMIC AND EMPLOYMENT SCENARIO IN KANDRA GP

The state of affairs in Kandra GP in terms of Economy and employment is grim and needs immediate attention for a holistic development. The key findings include:

- The economic condition of the Kandra GP is extremely fragile and maximum percentages of the population are well below economic level.Inhabitants need to be exposed to multiple source of income.
- The educational attainment level is extremely low which leads to maximum inhabitants being employed as labours and casual workers. This needs attention and hence needs to create a base for skilled personnel in the GP.
- During unforeseen circumstances like lockdown, the labours in tertiary sectors are left without any source of income.
- Very few opportunities exist within the GP for families to earn better living and quality of life which needs to be addressed and create a congenial environment to earn and sustain.
- Capitalisation from Government grants and schemes is low and hence needs consorted effort from PRIs to allow development through available schemes.
- Ratio of successful utilisation and completion of government projects is low as is seen from number of projects being planned and sanctioned but not implemented.
- Physical and social infrastructure exhibits a miserable state of affair and needs immediate attention to improve the Quality of Life.
- Panchayat's own source of revenue is nil and has to depend completely on government's grants for its sustenance and development. Hence the Panchayat should be empowered with own revenue apart from government grants to promote development of the GP in desired direction.



CHAPTER 10

STRATEGIES & RECOMMENDATIONS

CHAPTER 10: STRATEGIES & RECOMMENDATIONS

10.1 THE GRAM PANCHAYAT VISION AND STRATEGIC GOALS

The 73rd and 74th Constitutional Amendment Acts, 1992, gave Constitutional status to the third tier of government at the sub-State level, thereby creating the legal conditions for local self-rule or Panchayati Raj. These Amendments sought to bring about greater decentralization, increasing the involvement of the community in planning and implementing schemes and, thereby, increasing accountability. The 73rd Constitution (Amendment) Act 1993 was enacted to promote economic and social development in the rural rectors in India laying emphasis on Panchayati Raj Institutions (PRIs) as institutions of local governance. The decision tree for the process starts at Gram Sabha (GS) which discusses the development work plans of the GP which ultimately manifests through Gram Panchayat Spatial Development Plan (GPSDP). Formulation of GPDP improves efficiency of public services as projects get executed through the elected representatives.

Gram Panchayat Spatial Development Strategy helps to give direction, to identify and create opportunities, to create consensus, to mobilise resources, and finally, to achieve results. Keeping in mind of preparing Kandra Gram Panchayat (GP) competitive and at par with the national level Gram Panchayats, a vision needs to be created and achieved by 2030. In order to gear up the development process of Kandra, strategies needs to be made both at block level and sectoral level.

10.1.1 TOWARDS 2030

The next 10 years will see significant growth of the panchayat in terms of population and infrastructure. The benefits of this growth must be fairly distributed and must adhere to directions obtained from analysis. Through this, goals forstrengthening the development process of the GP may be met and Kandra GP by 2030may be:

- Spatially distributed and equipped physically and infrastructurally to accommodate future growth.
- Planned for the future thereby promoting integration through sustainable access to panchayat resources of all kinds.
- Integrated industrial, commercial and social sectors which provide access to a range of panchayat resources.
- Model GP for others to take the path
- Economically competitive on both district and statearena.

10.1.2 STRATEGIC GOALS

The panchayatvision mandates five main goals for the Spatial Development Strategy which may be listed below as:

- **To promote planned growth of all the villages under Kandra GP in an integrated approach**: This includes promoting growth in the GP so as to accommodate future migration from the hinterlands.
- **To create more efficient and productive rural areas through the growth and development of agriculture**: The aims to consolidate and promote futureagriculture based opportunities.
- **To rapidly reduce existing disparities in infrastructure and facilities**: This aim is to improve infrastructure servicesat GP level with an aim towards 2030.
- **To improve the overall quality of the rural environment through best practices**: This aims at judicious and sustainable use of rural resources so as to improve local economic development.
- **To address the issue of employment through creation of opportunities**: This aims to create avenues for employment and making the inhabitants of the GP 'Atmanirbhar'.

10.2 DEVELOPING KANDRA AS AN INTEGRATED GP

To formulate 'Gram Panchayat Spatial Development Strategy' for Kandra GP, first step would be to strengthen the different sectors through minimising the critical backlogs found through analysis. The broad strategies in this regard may be:

- To foster development at the regional level by strengtheningthe GP;
- To strengthen the panchayat level infrastructure in terms of basic services and sustainability;
- To integrate policies of central government withthese strategies so as to achieve national objectives;
- To create more economic opportunities for the current residents and the future so that the GP grows up as an important growth node.

10.3 STRENGTHENING INDUSTRIAL SECTOR

The general strategies to reinforce the above sector may be enumerated below as:

- To establish small industrial area as innovation and incubation center withbasic industrial infrastructure like connectivity, uninterrupted power, water, therein;

- To encourage private sector participation in infrastructure upgrading;
- To provide special incentives to encourage establishment of small scale industries and household industries specially related to agro-processing ;

➢ To create an eco-system for supporting rural-nano and growth-nano enterprises;
➢ To provide special package necessary for startups of household industries;

10.4 STRENGTHENING OF PHYSICAL INFRASTRUCTURE

As has been clarified in the analysis water supply, power supply, sanitation facilities, solid waste management and education needs augmentation of resources in Kandra GP. Strategies for strengthening of these sectors which also induce developmentinclude:

➢ To convert all kutcha houses into pucca houses with permanent roof;
➢ To convert all roads in the GP to all-weather roads up to access points of individual houses and establishments;
➢ To provide LED street lighting throughout all metaled roads of Kandra GP at a spacing of 25 m;
➢ To augment all possible resources to supply tapped water to households, establishments of proper purification plant for the same and regulating the same by use of water-meter.
➢ To augment all possible resources to supply uninterrupted power to householdsand establishments. Electrification of all houses and establishmentsneeds to be taken up immediately.
➢ To augment all possible resources for improving sanitation facilities of every household in the GP along with commercial and public establishments through appointment of Green Ambassadors focusing on overall environmental development and improved personal hygiene thereby arresting cases of Diarrhoea, malaria and dengue. This can be achieved through construction of IHHL under Government of India's Swachh Bharat Mission (SBM-Gramin);
➢ To create awareness amongst the community about sanitation and its importance for a healthy life, especially the areas that needed the toilets most, so as to promote healthy sanitation practices. For the same, the school children may be educated to reach out to their family.An intensive campaign is proposed to be launched in schools for this purpose.

- To ensure recycling of bathroom water (through its reuse in kitchen gardens), separation of biodegradable and non-biodegradable waste at source and transportation of only the remaining waste to the waste disposal system;
- To make proper waste disposal mandatory for public premises, small stalls, etc.;
- To declare the Kandra GP as Open Defecation Free (ODF) after successful completion of sanitation program;
- To discourage use of plastic and promote 'plastic free Gram Panchayats' by phasing out plastics;
- To encourage shop owners to use paper bags rather than plastic bags, for packing consumables;
- To make it mandatory for landlords to construct separate bathing and toilet facilities for their tenants;
- To make provision for management of waste by construction of Solid Waste Processing Centre (SWPC) along with maintenance of organic vermin-compost unit. This will help in providing employment to a portion of unskilled labors;
- To provide designated parking zone in large congregation areas like market, religious assemble places, playgrounds / social gathering space;
- To upkeep Panchayat infrastructure with proper annual maintenance and cleaning;
- To make provision for drainage cleaning in the GP area once in six months.
- To plan for leadership for evening and morning nazardari (Vigilance/Patrolling);
- To rehouse the existing road-side vegetable market into a proper permanent market at selected location;
- To propose an LPG distribution center integrating it with Common Service Center;
- To plan for creating future competitive environment and enhanced ICT applications by providing free Wi-Fi facilities to the residents of the Panchayat.

10.5 STRENGTHENING OF SOCIAL INFRASTRUCTURE

The GP of Kandra is extremely deficient in terms of academic attainment and related infrastructure. Moreover, the healthcare facilities have very weak infrastructure. Hence, strategies for strengthening of these sectors which also induce development include:

- To plan for adequate level of basic health facilities for 24 hours in Primary health center and to provide ambulance services for the residents;
- To plan for upkeep and maintenance of all religious places and create ample spaces for congregation;
- To plan for adequate tree plantations along all roads within GP;
- To create four children park amongst settlements at different locations in GP;
- To identify and provide infrastructural strengthening of an open space to convert it to a public playground with proper furniture in the GP area. A stage may be created at the end to the open space to provide for social functions;
- To create library and computer training center within the proposed common service center so as to benefit the future generation;
- To improve literacy of all the inhabitants of the Kandra GP through Sarva Shiksha Aviyan. For the same, intermediate camps of short duration has to be organized in school buildings / Anganwadi beyond working hours to make 100 % of population literate;
- To open a Girls Higher Secondary School within the GP for facilitating academic attainment of girls students;
- To open a Diploma level Engineering College to impart engineering education to the residents of Kandra GP and areas around;
- To plan for alternate routes of resource generation for government school including donations from local donors, builders and CSR initiatives for provision of school furniture, school uniform and school kids achievement.
- To strengthen educational institutions and promote education at Panchayat level so as to improve the educational attainment level of all stakeholders along with creation skill development and training center so as to develop a pool of skilled workforce;
- To utilize state government schemes like Student Scholarship Scheme, Tribal School Scheme for establishing schools and supporting meritorious students;
- To plan for compulsory implementation of midday meal schemes;
- To plan for provision of every household with Pradhan Matri Ujjwala Yojana so as to ensure that 100 % of the households, Anganwadis have LPG gas connection;
- To upgrade the incomplete sports facility abutting to Kandra GP into a complete arena having district level facilities;
- To plan for provision of Anganwadiwith a model kitchen, storeroom, utensils, toilets, water filters, electric connection and wall paintings and to organize regular visits of field supervisors so as to maintain the standards.

- To plan for celebration of birthdays of children whose birthdays fall within a particular month, so as to attract the children community.
- To plan for Child-friendly Gram Panchayat through
    - Vaccination and immunization program,
    - Making mandatory school enrolment,
    - Attendance of teachers and students in school,
    - Reducing dropout rates in school
    - Distributing free sanitary pads to improve girl child hygiene,
    - Maintaining good nutrition level of children.

10.6 STRENGTHENING OF AGRICULTURAL AND ANIMAL HUSBANDRY SECTOR

The future revitalization of Kandra GP largely depends on benefaction of resources in agricultural sector. The analysis reveals that there is large agricultural production of paddy, maize, wheat, ground nut gram and mustard in the GP. To capitalize on this production and channelize these resources, the following strategies are proposed:

- To adopt micro planning and project development in agriculture to convert single agricultural land into double;
- To convert un-irrigable land area to irrigable land to boost agricultural production;
- To provide more source of irrigation so as to increase cropping intensity;
- To add to value addition, fodder development, market linkage infrastructure at Panchayat level through linking of SGH entrepreneurs;
- To give 100 % farmers coverage under Pradhan Mantri Fasal Bima Yojna;
- To mobilize formation of a Federation of Farmers at Panchayat level so as to increase household income from enterprise activity;
- To develop Agricultural Service and Processing Center, Ware house for cold and dry storage, Sorting and Grading centers;
- To provide government grants and technical support for projects supporting poultry development, goatary development and other livestock extension services in individual plots;
- To provide milk collection centers, milking routes and chilling center for supporting residents with cattle breeding. The “Chilling Center” is proposed to be integrated with the Cold Storage.

10.7 FUTURE LANDUSE CONTROL AND DEVELOPMENT STRATEGY

The GP of Kandra because of its close proximity to Bokaro city and NH 32is already experiencing unorganized growth of residential and commercial establishments without proper provision of infrastructure. Some complexes are propping up as isolated developments showing signs of future trajectories of growth. Hence there needs to be a strict plan for abiding by landuse control, sanctioning process and byelaws so as to control future developments. The GP with the support of government should also start and implement SWAMITVA which will provide the residents of Kandra GP with ownership of their residential houses so as to empower them and open up opportunities.

Construction in Kandra GP Area

Any plot of above100 sq. m and a subdivision plan above 1000 sq. m area, needs approval from sanctioning authority before construction on site. The plan should strictly abide by development control and building regulations as laid down by Jharkhand Building Byelaws 2016 and should have signature of a registered Architect having Council of Architecture (COA) active membership and a structural engineer. The Mukhiya of the Kandra GP may be delegated powers to release the plans duly signed by him / her, but only after the approval of the Chas BDO in respect of any building plan on The Architect and Junior Engineer from Rural Engineering Department of the State Government shall on technical matters assist Kandra GP. This segment will be reviewed in 2030 relooking into the development scenario and fresh mechanism of sanctions maybe relaid if necessary.

10.8 FUTURE ECONOMIC REVITALISATION OF PANCHAYAT

Analysis of the current situation, leads us to the path of strengthening development in the GP. The development initiatives are required to start at the grass-root level and should be meant to serve and benefit the entire GP population. Kandra panchayat should provide all kinds of inputs and services for establishment of social enterprise and create opportunities for employment of rural youth, farmers and women. Since the strength of the GP lies largely in work force participation through supply of semi-skilled and unskilled labour as well as agricultural activities in some pockets, there is a need to orient these two sectors for better performance and orientation towards skilled development. As a step towards “Atmanirbhar” Panchayats, Kandra GP needs to plan for:

- Capacity building of PRI representatives and recruitment at village level;

- Establish incubators to potential enterprises for employment generation;
- Revenue generation at Panchayat through earning, training and rentals;
- Provision of civic services to the people and employing people there-in;
- Providing job opportunities to the resident through Green Ambassador program and Solid waste management program;
- Providing jobs in incubation center, small scale startups, Agricultural service and processing center, Ware house for cold and dry storage, Sorting and grading centers.
- Providing and installing 'Solar still' units at every Below Poverty Level (BPL) household for production of distilled water for commercial uses. The provision can be made through Government subsidy through which a BPL family can produce upto 1.5 liter distilled water which may be sold commercially @ Rs. 20 per liter.
- To convert adjoining lands on NH 32 to Highway service providing uses and employ inhabitants in service related jobs.

There is a need for continuous source of funds for development of Kandra GP. This is made possible by leveraging financial autonomy to fulfill their new functional obligations along with the funding obtained for implementing various government projects. In order to become financially more independent, Kandra GP should raise local resources along with seeking grants from government.Possible earning areas for Panchayat are:

- Earnings from Agricultural service and processing center at Panchayat
- Training and skilling of identified youth,
- Rent from common infrastructure for village like micro cold storages and food processing units.
- The Own Source Revenue (OSR) of the Panchayat should be permitted and proposed to make the areas affluent and amenable for business. The OSR may be shared with the state revenue and a considerable percentage transferred to state exchequer. OSR will include House tax, Professional tax, Business Tax, Sales tax, Income from rights of agricultural products sold, Bank interest, Sale of items, Building regulatory fees and Birth and death control fees. For the same an elaborate system is proposed consisting of staff employed for collection, accounts maintaining, disbursement, leveraging in proper hierarchy as prescribed by the government;
- Connecting with NGOs for development funds and disaster relief is also proposed as it will help in generating funds for other aspects beyond schedule

like school kid development, awareness campaign, GP advertisement, ease of living etc.

By leveraging agriculture and allied sector infrastructure creation at Gram Panchayats, monetary support will be obtained to run an institution which will create further job opportunities. With able guidance from resource person at Block or District level, these offices can help in disseminating knowledge and skill to the deserving within the Gram Panchayat. This is proposed to be done through Deendayal Upadhaya Grameen Kaushalya Yojana which aims at gainful employment and career progression of candidates after skilling. The Central Government aims to mobilize 50 lakh candidates by 2024 and the same is proposed to benefit youths of Kandra GP.

Table 10.1 List of new structures required to be constructed in the Kandra GP

Sl. no	Amenities at GP level	No. required	Land area requirement	Minimum width of abutting road	Estimated cost (Rs.)
1	Skill development centre	01	500 sqm	9 m	1 crore
2	Agricultural service and processing centre	01	500 sqm	9m	1 crore
3	Ware house for cold and dry storage	01	500 sqm to be added to existing	9m	0.80 crore
4	Decentralized waste water treatment system (passive technology)	01	1000 sqm	9m	0.50 crore
5	Decentralized solid waste dumping and processing plant for manure production	01	1000 sqm	9m	0.50 crore
6	Water treatment plant and distribution network	01	1000 sqm	6m	1.50 crore
7	Common service centre	01	1000 sqm	6m	1.50 crore
8	High Secondary Girls	01		9m	1.50 crore

	School				
9	Diploma Engineering College	01		9m	5 crore
10	Upgradation of Sports complex	01		9m	1 crore
13	Black top road	2.7 km	NA	NA	14 crore
14	Metalled road	2 km	NA	100 ft wide	3 crore
15	Children's park	4 nos.	NA	NA	0.20 crore

Source: Source: Framing Guidelines for Model Land Uses, Development Controls, and Service Level Benchmarks with Appropriate Enforcement Mechanisms for Rurban Clusters, Ministry of Rural Development, Government of India 2019

10.9 THE PROPOSED LANDUSE PLAN

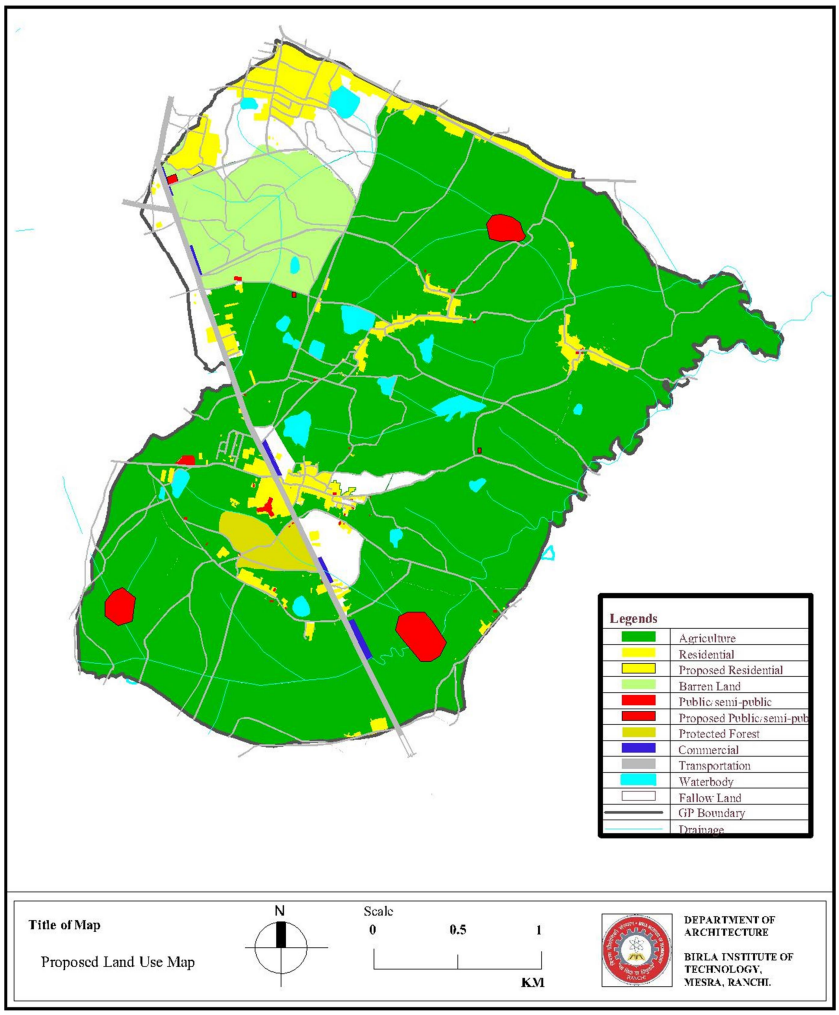


Fig. 10.1: Proposed Landuse plan of Kandra GP

Source: Prepared by Team of BIT Mesra

The proposed landuse of Kandra GP is shown in Fig. 10.1 and Table 10.2

Table 10.2: Break-up of proposed landuse of Kandra GP

Use	Proposed Area: Sq. m	Percentage
Residential	563739.6	6.3147
Commercial	23457.6	0.262
Public/semi-public	16586	76.236
Waterbody	181494.1	5.8422
Barren land	682954	1.4725
Transportation	236550	0.0026
Agriculture	6805907	2.0330
Vacant/Fallow land	521563.3	0.1857
Forest	131462	7.6501

Source: Prepared by Team BIT Mesra

10.10 CAPACITY BUILDING INITIATIVES OF GOVERNMENT

Formulation of a comprehensive and holistic GPSDP calls for interaction amongst stakeholders by understanding the processes, identification of the problem and earmarking the priority areas, projectisation, implementation etc. Capacity Building & Training (CB&T) of the stakeholders is an utmost necessary step for smooth functioning of the process. UNDP defines "Capacity Building as the process through which individuals, organizations and societies obtain, strengthen and maintain the capabilities to set and achieve their own development objectives over time".Government of India has launched restructured Centrally Sponsored Scheme (CSS) of Rashtriya Gram Swaraj Abhiyan (RGSA) for implementation from 01.04.2018 to 31.03.2022 with the primary aim of strengthening Panchayati Raj Institutions (PRIs) for achieving Sustainable Development Goals (SDGs) with main thrust on convergence with Mission Antyodaya and emphasis on strengthening PRIs *(Basic Statistics of Panchayati Raj Institutions, 2019, MoPR, Government of India).*The Government of Jharkhand has released Rs. 98.24 crore during 2014 - 19 for Rashtriya Gram Swaraj Abhiyan with an aim for capacity building. The Government of Jharkhand through this process has outreached 2,61,084 Elected Representatives, Panchayat Functionaries and other Stake holders for Capacity Building.

10.10.1 CAPACITY BUILDING AT KANDRA GP

The Capacity Building Program of Kandra GP should aim to:

- Form and consolidate an efficient team of the major stakeholders at various levels to launch and implement the GPSDP precisely;
- Orient towards basic training for the Elected Representatives of Panchayats;
- Raise community awareness for proposed initiatives and motivate them towards participatory planning;
- Mobilize community effectively and call for greater public ownership of flagship programs of the Government;
- Create a vision for the GP, so as to utilize the allocated funds under various schemes and create opportunities for additional resource mobilization;
- Channelize Sustainable Development Goals within the Kandra GP through identification of priority areas of interventions for achieving socio-economic goals;
- Equip the GP with strong leadership marked by efficient partnership with line departments for quick implementation of the developmental schemes and program;
- Strive for better service delivery through use of e-governance and technology driven solutions at Panchayat level so as to attain administrative efficiency, improved service delivery, and greater accountability while implementing GPSDP;
- Enable GPs to come out as strong institutions of local government with all round development of their people and to empower them to provide skilled human resources for the state.

To develop an efficient Capacity Building mechanism at the Gram Panchayat level, the State Institute of Rural Development & Panchayati Raj (SIRD&PR) or designated Jharkhand State Nodal Institution should provide Training and Capacity Building of Panchayat Raj and Rural Development Functionaries at State level for the selected GPSDP. To improvise the process, the state of Jharkhand should coordinate action-oriented training and field based practices of the members including the elected representatives, functionaries of GPs, community leaders and employees of the line departments operating at the GP level for organized planning, implementation and monitoring of GPSDP. A District Level Monitoring Cell should be constituted in Bokaro district with officers / Panchayat leaders selected from District administration / Kandra Panchayat level and Block/Intermediate Panchayat level. This will help to develop an appropriate strategy and action plan for implementing various schemes of the center and state government through convergence in the GP. Taking directions from the National Capacity Building Framework (NCBF) initiated by the Ministry of

Panchayati Raj, Government of India, and the following strategies are prescribed for Kandra GP:

- To prepare a self-realization report to understand capacity assets and needs and define a vision and mandate;
- To engage stakeholders on every initiative of capacity development;
- To create opportunities for Panchayat elected representatives to upgrade their knowledge and skills for better performance;
- To orient key officials associated with the devolved functions to (a) better function as technical advisors and trainers and (b) respect, be more receptive and learn from the ground-level experience of elected Panchayat representatives;
- To develop mechanism to respond to the situation based on availability of budget, and managerial capability;
- To adoptfor Information and Communication Technology (ICT) through incorporation of DISHA –dashboard, MGNREGS-NREGASoft, SBM Rural, Gram Sanvad Mobile App, PRIASoft-PFMS and integrating them to daily governance integration;
- To leverage Smart Governance Services through Common Service Center;
- To improve the Gram Sabah functioning;
- To evaluate capacity development;
- To sensitize the media, political parties, representatives in the legislatures, civil society organizations and citizen.

As a step towards enabling public information of the activities of the panchayat, it is advised that the Panchayat may have its own website or link up with government website to disseminate year round information. Publication of an Annual Administrative Report every year in the local language is recommended which should contain details of meetings held, members who attended them, honorarium paid, total funds received (plan and non-plan) and corresponding expenditure, job vacancies announced and filled, the number of elected members and officials who have attended the training programs, number and kinds of grievances addressed, departmental progress, developmental works progress, etc. The Panchayat is also required to publish the action plan for the forthcoming year in the website.

10.11 BEYOND 2030

With the strengthening of Kandra GP, the surrounding regions of GP by 2030 are also going to be benefitted in the due course of time.The next strategies would revolve

around consolidating the position in the national forefront and becoming the model for GP development in the country. The strategies may be:

- To keep pace with national development including reforms in varied sectors;
- To create spatially distributed rural township to curb migration;
- To create an aura of sustainable development based on longevity of resources present and their reserves.

10.12 PHASING

The entire planning proposals cannot take place at a time. The desirable development is that which takes place in phases as per the varying demand of the area.So the phasing plan may incorporate:

Phase I (2020-2025)

For existing areas:

- Conversion of all kuchha houses into pucca houses;
- Completion of all-weather roads along main spines,
- Completion of sanitation layout and construction along main spine including construction of Decentralized waste water treatment system;
- Completion of street lighting along main spines;
- Completion of piped water supply connection along the main spine including installation of water treatment plant;
- Construction of processing plant for manure production at identified location and commencement of decentralized solid waste management system;
- Construction of toilets for 100 % households, schools, Anganwadi;
- Completion of Higher Secondary Girls School;
- Completion of Diploma Engineering College;
- Completion of construction of Skill development center, Agricultural service processing center, Ware house for cold and dry storage (extension), Common Service Center and starting their respective operations.
- Identification and provision of playground / social gathering space for the GP with required furniture and facilities;
- Upgradation of Sports facility in identified area;
- Setting up of LPG distribution center;
- Construction of market place to rehouse existing market;
- Construction of parking space associated to large gathering space.

- Initiation of the process of collection and expenditure through Own Source Revenue and setting up of adequate system for proper functioning of the same.

Phase II (2026-2030)

For existing areas and newly developed areas:

- Completion of all-weather roads extending it from the main spine to individual entry points.
- Extension of sanitation layout and construction of it from the main spine to individual use points.
- Completion of street lighting extending it from the main spine to individual entry points.
- Completion of piped water supply connection extending it from the main spine to individual entry points.
- Extension of solid waste management system to new households.
- Provision of Wi-Fi facility for the entire GP.

10.13 SUMMARY AND CONCLUSION

The recommendations set forward through this research will prepare Kandra GP for future growth on a scale higher than present one. The future of the Kandra GP begins now. The investment and development activities to be made in the region over the next ten years will crucially determine their structure and functioning as well as their capacity to accommodate and manage the inevitable future growth.

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ANNEXURE

Annexure 1 – GPDP report for Kandra GP

REVIEW OF PREVIOUS YEAR GPDP
JHARKHAND >BOKARO>CHAS>KANDRA(111215)

S.No.	Sector	Works Completed	Works OnGoing	Works Not Started	Works Abandoned	Planned Budget	Expenditur

S.No.	Sector	Work Name	Work Description	Work Status	Planned Budget (Rs)	Expenditur
1	Drinking water	योजना संख्या -07, मध्य विद्यालय कांड्रा में सोलर आधारित मिनी जलमिनार	योजना संख्या -07, मध्य विद्यालय कांड्रा में सोलर आधारित मिनी जलमिनार	On Going	2,49,955	0
2	Drinking water	योजना संख्या -08, प्राथमिक विद्यालय लाबुदिह में सोलर आधारित मिनी जल मीनार	योजना संख्या -08, प्राथमिक विद्यालय लाबुदिह में सोलर आधारित मिनी जल मीनार	On Going	2,49,955	0
3	Drinking water	योजना संख्या -09, मध्य विधालय रामडीह में सोलर आधारित मिनी जल मीनार	योजना संख्या -09, मध्य विधालय रामडीह में सोलर आधारित मिनी जल मीनार	On Going	2,49,955	0
4	Roads	योजना संख्या - 02 , N.H रोड से बद्री राय के घर तक पीसीसी पथ निर्माण	योजना संख्या - 02 , N.H रोड से बद्री राय के घर तक पीसीसी पथ निर्माण	On Going	1,13,000	0
5	Roads	योजना संख्या -03, पांडव सिंह के घर से दुर्योधन सिंह के घर तक पीसीसी पथ निर्माण (लुबिदिह)	योजना संख्या -03, पांडव सिंह के घर से दुर्योधन सिंह के घर तक पीसीसी पथ निर्माण (लुबिदिह)	On Going	90,400	0
6	Roads	योजना संख्या -05, M.L.A. रोड से सागर सिंह के मेड तक पि सी सी पथ निर्माण (लाबुदिह)	योजना संख्या -05, M.L.A. रोड से सागर सिंह के मेड तक पि सी सी पथ निर्माण (लाबुदिह)	On Going	77,900	0
7	Roads	योजना संख्या -06, बाबु गोराई के घर से सागर सिंह चौधरी के घर तक पीसीसी पथ निर्माण	योजना संख्या -06,बाबु गोराई के घर से सागर सिंह चौधरी के घर तक पीसीसी पथ निर्माण	On Going	2,05,500	0
8		योजना संख्या -01,पीसीसी पथ से आदर लाल गोप के घर तक पक्का नाली निर्माण	योजना संख्या -01,पीसीसी पथ से आदर लाल गोप के घर तक पक्का नाली निर्माण	On Going	81,500	0
9		योजना संख्या -04, सुरेन्द्र महतो के घर से कलि मंदिर तक नाली निर्माण (रामडीह)	योजना संख्या -04,सुरेन्द्र महतो के घर से कलि मंदिर तक नाली निर्माण(रामडीह)	On Going	1,58,600	0

Annexure II – Kandra GP. Mission Antodaya Report

सत्यमेव जयते

Ministry of Panchayati Raj

Gram Panchayat Development Plan

STATE: JHARKHAND > DISTRICT: BOKARO > DEVELOPMENT BLOCK: CHAS
GRAM PANCHAYAT: KANDRA [111215]

पंचायती राज

Villages:Kandra [362627]

Strength | Moderate Gap | Critical Gap

Domain	Parameter Description	Village Status	GP Status		Suggestions
Health and Sanitation	Is the village Open Defecation Free	No	No		Build and use toilet. Gram Sabha should penalise those who make GP unclean.
	Community Waste Disposal System	No	No		MGNREGA can be used to create waste disposal system.
	Availability of Community bio gas or recycle of waste for production use	No	No		
	Availability of drainage facilities	None	None		Village drain planning. MGNREGA can be used .
	Availability of PHC/CHC Sub Centre	None	None		
	Availability of Veterinary Clinic Hospital	No	No		
Agriculture, allied and livelihood	Availability of Govt. Seed Centre	Yes	Yes		
	% households engaged exclusively in Non-Farm activities	40	40.00		Contact the Block Mission Manager, National Rural Liveihood Mission of your state.
	Availability of markets	None	None		Farmer groups can be created to build access to markets.
Housing	% of household with kuccha wall and kuccha roof	8.67	8.67		Check the waiting list for PMAY-G.
Land Improvement	% of Area irrigated	1.05	1.05		Call Kisan call centre 1800-180-1551.
	Availability of soil testing centres	Yes	Yes		Anyone from the village can open soil testing centre.
	Availability of Fertiliser Shop	Yes	Yes		
Animal Husbandry	% of households supported by village based Livestock Extension Workers	0.00	0.00		Call agriculture helpline 1094 for details
Drinking Water	Availability of Piped tap water	None	None		
Roads	Whether the village is connected to All weather road	Yes	Yes		
	Whether village has an internal cc/ brick road	Yes	Yes		MGNREGA can be used to create internal cc/brick road.
	Availability of Public Transport	None	None		
Rural Electrification	Availability of electricity for domestic use	4-8 Hrs	4-8 Hrs		Renewable electricity equipments can be used at susidized rates.
Non-conventional energy	% of Household using clean energy (LPG/Bio gas)	7.33	7.33		
Poverty alleviation programme	% of households mobilized into SHGs	43.33	43.33		Contact the Block Mission Manager, National Rural Liveihood Mission of your state.
	% of SHGs accessed bank loans	0	0		Contact the Block Mission Manager, National Rural Liveihood Mission of your state.
	% of households mobilized into Producer Groups (PGs)	0.00	0.00		Contact the Block Mission Manager, National Rural Liveihood Mission of your state.

ગ્રામ સંવાદ GRAM SAMVAAD | MGNREGA | PMAYG | NRLM | PMGSY | NSAP | SAGY

सत्यमेव जयते

Ministry of Panchayati Raj

Gram Panchayat Development Plan

STATE: JHARKHAND > DISTRICT: BOKARO > DEVELOPMENT BLOCK: CHAS
GRAM PANCHAYAT: KANDRA [111215]

पंचायती राज

Poverty alleviation programme	% of households supported by village based Agricultural Extension Workers	0.00	0.00		Call agriculture helpline 1094 for details
	% of SHGs Promoted	10	10		
Vocational education	Availability of Vocational Educational Centre	No	No		
Women & Child Development	Availability of Aanganwadi Centre	Yes	Yes		Contact the District Magistrate.
	% of children aged 0-3 years registered under Aanganwadi	100.00	100.00		Register and send children to Aanganwadi.
	% of children aged 0-3 years immunised	43.75	43.75		
	% of children categorized as Non-Stunted as per ICDS record	0.00	0.00		Take your child to Village Health and Nutrition Day.
Social Welfare	Availability of Post Office	Yes	Yes		
	Telephone Services	Mobile	Mobile		
	Availability of Internet Cafe/Common Service Centre	Yes	Yes		Anyone from the village can open the internet café/common service centre.
	Availability of Banks	Yes	Yes		
	Availability of ATM	Yes	Yes		
Education	Availability of School	Middle School	Middle School		
Public Distribution System	Availability of Public Distribution System (PDS)	Yes	Yes		

ગ્રામ સંવાદ GRAM SAMVAAD | MGNREGA | PMAYG | NRLM | PMGSY | NSAP | SAGY

Ministry of Rural Development, Govt of India

MISSION ANTYODAYA BASELINE SURVEY 2018

Gram Panchayat Score Card

STATE:	JHARKHAND(20)	**DISTIRCT:**	BOKARO(322)
Sub District:	Chas(2595)	**DEVELOPMENT BLOCK :**	CHAS(3066)
GRAM PANCHAYAT :	KANDRA(111215)	**GRAM PANCHAYAT SCORE :**	41

LGD CODE : 111215

Villages	Basic Parameters	Key Infrastructure Parameters	Economic Development and Livelihood	Health, Nutrition and Sanitation	Women Empowerment	Financial Inclusion	Total Score
Max Score	4	64	4	18	7	3	100
Kandra (362627)	0	33	4	3	1	0	41
Average Score of GP	0	33	4	3	1	0	41

BASIC PARAMETERS

Villages	Total Population	Male Population	Female Population	Total Households	Total No. Of SHGs Promoted	Total Area(in ha)	Net sown Area (in ha)	Total Un-irrigated Land (in ha)	Total Irrigated Area (in ha)
Kandra (362627)	3600	1800	1800	300	10	1003.5	310	310	3.25
Total	3600	1800	1800	300	10	1003.5	310	310	3.25

MISSION ANTYODAYA SURVEY 2019

1. Location Parameters

State:	JHARKHAND (20)	**District :**	BOKARO (322)
Sub District :	Chas (2595)	**Development Block :**	CHAS (3066)
Gram Panchayat :	KANDRA (111215)	**Village :**	Kandra (362627)
PIN :	827013	**Parliament Constituency :**	Dhanbad(260)
Assembly Constituency :	Chandankyari(2147)	**Other Assembly Constituency :**	
Serial No/Total Village :	1/1		

Part A

Basic Parameters

S.NO	Question	MA 2017 Status	Survey 2019 Status	Max Score	Score Obtained
1	Total Population	3600	994		
2	Male	1800	510		
3	Female	1800	484		
4	Total Household	300	160		
Agriculture					
5	Number of households engaged majorly in Farm activities	NA	50	2	0
6	Number of households engaged majorly in Non-Farm activities	NA	10		
7	Availability of government seed centres	Yes	No (Nearest facility2-5 kms)	2	0.5
8	Whether this village is a part of the Watershed Development Project	NA	No	1	0
9	Availability of Community Rain Water Harvesting System/Pond/Dam/Check Dam etc.	NA	Yes		
10	Does the village has any Farmers Collective	NA	Primary Agriculture Cooperative Society(PACS)	1	1
11	Availability of warehouse for Food Grain Storage	NA	No (Nearest facility2-5 kms)		
12	Availability of Primary Processing facilities at the village level	NA	Yes	1	1
13	Does the village have access to Custom Hiring Centre (Agri-equipments)	NA	No		
Land Improvement					
14	Total Cultivable Area (in hectares), If in acres divide by 2.47	NA	3		
15	Net sown Area (In hectares) , If in acres divide by 2.47	Total Net sown Area 310 Kharif :NA Rabi :NA Other :NA	Total Net sown Area :1 Kharif :1 Rabi :0.5 Other :0.5		
16	Availability of soil testing centres	Yes	No (Nearest facility5-10 kms)	2	0.5
17	Availability of fertilizer shop	Yes	No (Nearest facility5-10 kms)	2	0.5
18	Main Source of irrigation	NA	Ground water (tube well/well/pump)	2	0.5
19	Number of farmers using drip/sprinkler irrigation	NA	0	1	0
20	Total area irrigated (in hectare), If in acres divide by 2.47	3.25	1	2	2
21	Total Unirrigated land area (in hectares), If in acres divide by 2.47	310	1		
Animal Husbandry					

22	Does the village have Livestock Extension services	NA	Not Available	1	0
23	Availability of Milk Collection Centre /Milk routes / Chilling Centres	NA	No	1	0
24	Any Project supporting Poultry Development	NA	No	1	0
25	Any Project supporting Goatary Development	NA	No	1	0
26	Any Project supporting Pigery Development	NA	No		
27	Availability of Veterinary Clinic or Hospital	No (Nearest facility2-5 kms)	No (Nearest facility2-5 kms)	2	0.5
Fisheries					
28	Pisciculture - InLand Fishery/Coastal Fishery/Any Other	NA	No	1	0
29	Community Ponds Used for Fisheries	NA	No		
30	Extension facilities for Aquaculture	NA	No (Nearest facility2-5 kms)	1	0
Rural Housing					
31	No of household with kuccha wall and kuccha roof (Kutcha Wall is 1-Grass/thatch/bamboo etc 2-Plastic/polythene 3-Mud/unburnt brick 4-Wood 5-Stone not packed with mortar, Kutcha Roof is 1-Grass/thatch/bamboo/wood/mud etc 2-Plastic/polythene 3-Hand made tiles	26	60	4	3
32	No of Households who have got a PMAY House (completed or sanctioned)	NA	16		
33	No of Households who are in the Permanent Wait List	NA	10		
34	No of Households who got benefit from any State Specific Housing Scheme?	NA	0		
35	No of Households who are in the Permanent Wait List of State Specific Housing Scheme?	NA	0		
Drinking Water					
36	Availability of Piped tap water	None (Nearest facility5-10 kms)	None (Nearest facility1-2 kms)	3	0
Roads					
37	Whether the village is connected to All weather road	Yes	Yes	3	3
38	Whether village has internal pucca roads (cc/ brick road)	NA	Partially covered	1	1
39	Availability of Public Transport	None (Nearest facility5-10 kms)	Auto	2	2
40	Availability of Railway Station	NA	No (Nearest facility10-20 kms)	2	0
Rural Electrification					
41	Availability of electricity for domestic use	4-8 Hrs	4-8 Hrs	3	1
42	Number of Households availing the benefits under Saubhagya Scheme	NA	10		
43	Availability of Electricity Supply to MSME Units	NA	No		
Non-Conventional Energy					
44	Use of Solar Energy/Wind Energy for electrification of the house	NA	No	1	0
Maintenance of Community Assets					
45	Availability of Panchayat Bhawan	NA	Yes	1	1
46	Is there a Common Service Centre (CSC) in the village	NA	Colocated with Panchayat Bhawan		
47	Availability of Public Information Board under People's Plan Campaign	NA	Available and updated		
Fuel & Fodder					
48	Common pastures as per revenue records	NA	No	1	0

49	Number of Households availing benefits of Pradhan Mantri Ujjwala Yojana (PMUY)	NA	10		
Libraries					
50	Availability of Public Library	NA	No (Nearest facility5-10 kms)	1	0
Cultural Activities					
51	Availability of recreational centre/Sports Playground etc	NA	None	1	0
Financial & Communication Infrastructure					
52	Availability of banks	Yes	No (Nearest facility1-2 kms)	2	1
53	Availability of Business Correspondent with internet connectivity?	–	No	1 (if 'No' in Q.no 52)	0
54	Availability of ATM	Yes	No (Nearest facility1-2 kms)	2	1
55	Number of households having Jan-Dhan bank account	NA	20		
56	Availability of Post office/Sub-Post office	Yes	No (Nearest facility2-5 kms)	2	0.5
57	Availability of telephone services	Mobile	Mobile	1	1
58	Availability of Internet/BroadBand Facility	NA	No	2	0
Public Distribution System					
59	Availability of Public Distribution System (PDS)	Yes	Yes	2	2
60	Number of Households having BPL ration cards	NA	NA		
Education					
Maximum weightage for Q61 to Q64 is 4 and highest weightage will be used only for scoring					
61	Availability of Primary School	NA	Yes Electricity:Yes Toilet:Both Computer Lab:No Play Ground:No Drinking Water:Yes Mid Day Meal Scheme:Yes Primary School Students:450 Primary School Teachers:8	1	
62	Availability of Middle School	NA	Yes	2	
63	Availability of High School	NA	No (Nearest facility5-10 kms)	3	2
64	Availability of Higher/Senior Secondary School	NA	No (Nearest facility5-10 kms)	4	
65	No.of Children not attending the school	NA	10		
66	Availability of Degree College	NA	No (Nearest facility5-10 kms)	2	0.5
67	Number of Graduates/Post Graduates in the Village	NA	10		
Vocational Education					
68	Availability of Vocational Training Centre/Polytechnic/ITI/RSETI /DDU-GKY	No (Nearest facility1-2 kms)	No (Nearest facility5-10 kms)	2	0.5
69	Number of trainees trained under any Skill Development Program	NA	5		
Markets & Fairs					
70	Availability of markets	None (Nearest facility5-10 kms)	None (Nearest facility5-10 kms)	3	0.5
Health & Sanitation					
71	Availability of Sub centre PHC/CHC	None (Nearest facility5-10 kms)	None (Nearest facility5-10 kms)	2	0.5
72	Availability of Jan Aushadhi Kendra	NA	No	1	0

73	No. of Households registered for health insurance services under Pradhan Mantri Jan Arogya Yojana (PMJAY)/State specific Health Insurance Schemes	NA	15 Distance of nearest empaneled hospital under PMJAY (Nearest facility5-10 kms)		
74	Availability of drainage facilities	None	None	3	0
75	Community waste disposal system	No	No	1	0
76	Total no of households using clean energy (LPG/Bio gas)	22	20	2	0.5
77	Community bio gas or recycle of waste	No	No	1	0
Women & Child Development					
79	Availability of Aanganwadi Centre	Yes	Yes	2	1
80	Is Early Childhood Education provided in the Anganwadi	NA	Yes		
81	Total no of children in the age group of 0-3 years in the village	80	99		
82	Total no of children aged 0-3 years registered in Aanganwadi	80	99	2	2
83	Total no of children aged 3-6 years registered in Aanganwadi	NA	99		
84	No of children aged 0-3 years immunized	35	99	1	1
85	No of children categorized as Non-Stunted as per ICDS record	0	99	2	2
86	No. of Anaemic Pregnant Women	NA	48		
87	No. of Anaemic Adolescent Girls	NA	10		
88	No. of children under the age of 6 years who are underweight	NA	9		
89	No of Male Children (0-6 Years)	NA	60		
90	No of Female Children (0-6 Years)	NA	40		
Social Welfare					
91	Number of SC/ST/OBC/Minority Children getting Scholarship	NA	120		
92	Number of SC/ST/OBC/Minority households which received bank Loans	NA	0		
93	No of physically challenged persons who received implants and appliances	NA	0		
Family Welfare					
94	Number of Households with more than 2 Children	NA	90		
95	Availability of Mother and Child Health facilities	NA	No (Nearest facility2-5 kms)	1	0
Welfare of the Weaker Sections					
96	Number of Households getting pensions under National Social Assistance Programme (NSAP) (Old Age/Disability/Widow/National Family Benefit Scheme (NFBS)	NA	12		
Poverty Alleviation Programme					
97	Number of Self Help Groups (SHGs)	NA	12		
98	Number of households mobilized into SHGs	130	144	2	2
99	Number of SHGs federated into Village Organisations (VOs)	10	9	1	1
100	Number of households mobilized into Producer Groups (PGs)	0	0	1	0
101	No of SHGs which accessed bank loans	0	0	2	0
Khadi, Village & Cottage Industries					
102	Bee Keeping	NA	No	1	0
103	Sericulture (Silk Production)	NA	No	1	0

104	Handloom	NA	No	1	0
105	Handicrafts	NA	No		
Social Forestry					
106	Availability of Community Forest	NA	No	1	0
Minor Forest Produce					
107	Availability of minor forest production	NA	No		
108	Number of Households where only source of livelihood is minor forest production	NA	0		
Small Scale Industries					
109	Availability of cottage and small scale units (Fabrication/Construction material/Dairy based/Textile etc.) units	NA	No	1	0
Adult & Non-Formal Education					
110	Availability of Adult Education Centre	NA	No (Nearest facilityMore than 10 kms)	1	0
		Part B			
Health & Nutrition					
111	Total number of registered children in Anganwadi	NA	99		
112	Total number of children (0-6 years) immunized under ICDS	NA	99		
113	Total number of Pregnant women	NA	48		
114	No of pregnant women receiving services under ICDS	NA	48		
115	Total number of lactating mothers	NA	60		
116	No of lactating mothers receiving services under ICDS	NA	60		
117	Total no of women delivered babies at the hospitals who are registered with ASHA Anganwadi workers	NA	48		
118	Total no of children in ICDS Common Application Software	NA	99		
119	No of young anaemic children in ICDS Common Application Software (6-59 months)	NA	99		
120	Total number of newly born children during the year 2018-19	NA	89		
121	No of newly born children underweight during the year 2018-19	NA	89		
122	No of households not having sanitary latrines	NA	10		
Social Security					
123	Total no of eligible beneficiaries under Pradhan Mantri Matru Vandana Yojana	NA	0		
124	No of beneficiaries receiving benefits under Pradhan Mantri Matru Vandana Yojana	NA	0		
125	Total no. of eligible beneficiaries under Aayushman Bharat-Pradhan Mantri Jan Arogya Yojana or any State Govt Health scheme	NA	10		
126	No. of beneficiaries receiving benefits under Aayushman Bharat-Pradhan Mantri Jan Arogya Yojana or any State Govt Health scheme	NA	10		
127	Total number of eligible households under National Food Security Act (NFSA)	NA	10		
128	Total no of households receiving food grains from Fair Price Shops	NA	10		
129	Total number of farmers registered under Pradhan Mantri Kisan Pension Yojana (PMKPY)	NA	10		

130	Total number of farmers in the age of 18-40 years subscribed to Pradhan Mantri Kisan Pension Yojana (PMKPY)	NA	10		
Agriculture & Livelihoods					
131	Total no of farmers	NA	90		
132	No of farmers received benefits under PMFBY (Pradhan Mantri Fasal Bima Yojana)	NA	15		
133	No of farmers adopted organic farming during 2018-19	NA	0		
134	Number of farmers received the soil testing report	NA	0		
Good Governance					
135	Total no of elected representatives	NA	2		
136	No of elected representatives oriented under Rashtriya Gram Swaraj Abhiyan	NA	2		
137	No of elected representatives undergone refresher training under Rashtriya Gram Swaraj Abhiyan	NA	2		
138	Total approved Labour Budget for the year 2018-19	NA	112		
139	Total expenditure approved under NRM in the Labour Budget for the year 2018-19)	NA	112		
140	Total area covered under irrigation (drip, sprinkler), If in acres divide by 2.47	NA	0		
141	No of households having piped water connection	NA	0		

Disclaimer: The uploaded data is yet to be verified by the Gram Sabha/Block. The data shown here is as uploaded by the enumerator authorised by the state. MoRD is not responsible for any discrepency in data reported here and the user may verify the information from other sources also if required.

Annexure III – SECC data of Kandra GP

Ministry of Rural Development

Socio Economic and Caste Census

STATE: JHARKHAND > DISTRICT: Bokaro > DEVELOPMENT BLOCK: CHAS
GRAM PANCHAYAT: KANDRA [111215]

SECC ABSTRACT

Village	Sex Ratio	Total Household	Excluded Household	Included household	Deprived Household	Zero Deprived Household	Household Owing Land
Kandra	919	1491	656	13	570	252	1094
Total	**919**	**1491**	**656**	**13**	**570**	**252**	**1094**

EXCLUDED HOUSEHOLDS

Village	Households with any member earning more than Rs. 10,000 p.m	Households with three or more rooms with pucca walls and pucca roof	Households owning 2.5 acres or more irrigated land with at least one irrigation equipment	Household owning 5 acres or more land irrigated for two or more crop seasons	Households owning 7.5 acres or more land with at least one irrigation equipment	Households having Kisan credit card with the credit limit of Rs.50,000 and above
Kandra	231	460	2	0	1	8
Total	**231**	**460**	**2**	**0**	**1**	**8**

INCLUDED HOUSEHOLDS

Village	HH without shelter	Destitute/ living on alms	Manual scavengers	Primitive tribal groups	Legally released bonded labourers
Kandra	0	13	0	0	0
Total	**0**	**13**	**0**	**0**	**0**

DEPRIVED HOUSEHOLDS

Village	Only one room with kucha walls and kucha roof	No adult member between age 16 to 59	Female headed households with no adult male member between age 16 to 59	Disabled member and no able bodied adult member	SC/ST households	No literate adult above 25 years	Landless households deriving major part of their income from manual casual labour
Kandra	207	16	17	2	310	262	108
Total	**207**	**16**	**17**	**2**	**310**	**262**	**108**

Ministry of Rural Development

Socio Economic and Caste Census

STATE: JHARKHAND > DISTRICT: Bokaro > DEVELOPMENT BLOCK: CHAS
GRAM PANCHAYAT: KANDRA [111215]

HOUSE OWNERSHIP, LAND OWNERSHIP, MONTHLY INCOME

	House Ownership			Land Owned			Households with Highest Earning member Income as		
Village	Owned	Rented	Any Other	Total unirrigated land (in hectares)	Total irrigated land (in hectares)	Total other irrigated land (in hectares)	Less than Rs. 5,000	Between Rs. 5,000 and Rs 10,000	Rs. 10,000 or more
Kandra	1465	23	3	498.44	31.94	610.77	1163	97	231
Total	**1465**	**23**	**3**	**498.44**	**31.94**	**610.77**	**1163**	**97**	**231**

MAIN SOURCE OF HOUSEHOLD INCOME

Village	Cultivation	Manual Casual Labour	Part-time or Full-Time Domestic Service	Foraging Rag Picking	Non-agricultural Own Account Enterprise	Begging/Charity/ Alms collection	Others
Kandra	109	910	6	0	0	18	448
Total	**109**	**910**	**6**	**0**	**0**	**18**	**448**

POPULATION

Village	Total Population	SC Population	ST Population	Male	Female	Transgender
Kandra	8603	1426	934	4482	4121	0
Total	**8603**	**1426**	**934**	**4482**	**4121**	**0**

DISTRIBUTION OF POPULATION BY AGE

Village	0-5 Yrs	6-15 Yrs	16-25 Yrs	26-35 Yrs	36-45 Yrs	46-55 Yrs	56-65 Yrs	66-75 Yrs	Above 76 Yrs
Kandra	878	1972	1779	1539	959	620	530	268	58
Total	**878**	**1972**	**1779**	**1539**	**959**	**620**	**530**	**268**	**58**

POPULATION BY MARITAL STATUS

Village	Never Married	Currently Married	Widowed	Separated	Divorced
Kandra	4025	4145	295	33	4
Total	**4025**	**4145**	**295**	**33**	**4**

Ministry of Rural Development

Socio Economic and Caste Census

STATE: JHARKHAND > DISTRICT: Bokaro > DEVELOPMENT BLOCK: CHAS
GRAM PANCHAYAT: KANDRA [111215]

POPULATION BY HIGHEST EDUCATION LEVEL COMPLETED

Village	Illiterate	Below Primary	Primary	Middle	Secondary	Higher Secondary	Graduate or Above	Other
Kandra	2435	296	1747	1773	1089	806	428	29
Total	**2435**	**296**	**1747**	**1773**	**1089**	**806**	**428**	**29**

POPULATION BY DISABILITY

Village	In Seeing	In Hearing	In Speech	In Movement	Mental Retardation	Mental Illness	Other Disability	Multipls Disability	No Disability
Kandra	25	15	10	46	11	5	22	24	8445
Total	**25**	**15**	**10**	**46**	**11**	**5**	**22**	**24**	**8445**

Annexure IV – 15th Finance Commission allotment to Kandra GP

क्र0	जिला का नाम	पंचायत समिति का नाम	पंचायत का नाम	जनसंख्या	क्षेत्रफल (वर्ग कि0मी0)	जनसंख्या के आधार पर (90%)	क्षेत्रफल के आधार पर (10%)	कुल आवंटित राशि (7+8)
1	2	3	4	5	6	7	8	9
177			कुम्हरी	4885	7.25	519,287	30,144	549,431
178			बेलूजा	6422	9.06	682,674	37,670	720,344
179			बिजुलिया	6553	11.61	696,599	48,272	744,871
180			चंदाहा	7961	13.87	846,273	57,669	903,942
181			मधुनियाँ	6486	12.60	689,477	52,388	741,865
182			अलकुषा	6261	10.67	665,559	44,364	709,923
183			ब्राह्मण द्वारिका	6048	7.37	642,917	30,643	673,560
184			बाघाडीह	6513	9.61	692,347	39,957	732,304
185			खमारबेदी	6325	11.47	672,362	47,690	720,052
186			काण्डा	3600	10.07	382,688	41,869	424,557
187			कुर्रा	6350	7.19	675,020	29,895	704,915