SPECIAL PLANNING AUTHORITY KEONJHAR

KEONJHAR 2030
MASTER PLAN

Directorate of Town Planning, Government of Odisha

Prepared By: Rudrabhishek Enterprises Limited

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PREFACE

Keonjhar, a statutory town of Keonjhar District, exhibits the general trend of urbanisation and its consequent socio-economic, physical, educational and many other aspects and co-related problems which needed immediate and specific attention for its solution. Keeping this persistent process of urbanisation and its effects in view, an attempt has been made for the preparation of a Master Plan for the Urban Area along with adjoining rural areas to channelize the growth in a pre-conceived and desirable manner. The process of preparation of Master Plan encompasses the studies on existing physical, socio-economic, transportation, health, sanitation and other basic services for identification of problem and specifies major policies for a compatible and harmonious distribution of land uses as per defined zonations.

The Draft Master Plan was prepared and published by Special Planning Authority Keonjhar under section 31 of OTP & IT Act 1956 vide Gazette Notification No_____ dated _____ and objections &suggestions were invited from the general public. After due consideration of the objections and suggestions, the Final Master Plan has been prepared by the consultant Rudrabhishek Enterprises Ltd. New Delhi incorporating recommended modifications which would be published under the section of 32 of OTP & IT Act 1956. It is submitted for approval from the Director of Town Planning Odisha. This planning document has a planning horizon upto the year 2030. Through implementation of various programmes of developments with projects, Keonjhar town and its adjoining planning area will grow dynamically. In course of modification, valuable suggestions from general public have been incorporated in the plan. It is felt that this document shall help the Planning Authority to accomplish the above objectives of planned development to a greater extent.

ACKNOWLEDGMENT

This Master Plan is an outcome of the statutory provision under Section-29 of the Orissa Town Planning & Improvement Trust Act,1956. Rudrabhishek Enterprises Limited (REPL) is extremely grateful to the Directorate of Town Planning, Bhubaneswar and Special Planning Authority Keonjhar for the extensive support and assistance they have provided to REPL team through the duration of the project.

The project team acknowledges and sincerely thanks the following organisations and persons, whose consistent support and active cooperation have contributed toward the completion of the Master Plan in its present form. The team also extends thanks to all those who have contributed towards completion of the report directly or indirectly whose names may or may not have been listed below:

- Honourable Chief Minister, Government of Odisha
- Honourable Minister, Housing & Urban Development, Government of Odisha
- Principal Secretary, Housing and Urban Development, Government of Odisha
- Collector, Keonjhar District
- Sub-Collector, Keonjhar District
- Director, Directorate of Town Planning, Bhubaneswar, Government of Odisha
- Project Director, Special Planning Authority Keonjhar
- Executive Engineer, Keonjhar Municipality
- Superintendent of Police, Keonjhar

Rudrabhishek Enterprises Limited Team

- Prabhakar Kumar
- Asati Gargi
- Manish Kumar Dahiya
- Bipul Nayak
- Suvankar Halder

EXECUTIVE SUMMARY

The Master Plan for Keonjhar prepared by the Rudrabhishek Enterprises Ltd. provides vision to the physical development and guides the urban growth for the target year 2030 as envisaged in OTP &IT Act, 1956. The Master Plan for Keonjhar is a statutory document which attempts to identify short, medium and long term development goals using Geographical Information System. The Master Plan has been prepared taking into account the structural frame of the available Master Plan considering the existing developments in and around the Master Plan area.

The Master Plan beings with the introductory profiles which encapsulate the urbanisation trend in Odisha and the detailed approach of the Master Plan to fulfil the stated vision focused on key sectors for a meaningful spatial development.

Studying the historical, physical growth and major economic activities along with the population growth projections, the vision is:

"To augment infrastructure including efficient mobility and utilize potentials of eco-tourism in the area, so as to give impetus to development of Keonjhar"

The second chapter briefed the Keonjhar Master Plan Area which spreads across 87.36 sq.km. consisting of 68 revenue villages including Keonjhar Municipal Limit, surrounding villages and two reserved forest. The Master Plan area exist in a flat area land locked between the mountains, hilly terrains and streams. Keonjhar Master Plan Area is located in the mineral rich belt of Odisha, which influences very good connectivity with some of the major road linkages.

The third chapter mainly depicts the demographic profile which shows the average population growth rate as 22.38% in 2011 with steady increase in population. The urban area in the Master Plan area has 60.29% of population in 2011, however, the share of population is decreasing in urban area. The projected population of the Keonjhar Master Plan Area is 1,56,110 for the year 2030 considering net growth rate of 2.61.

The forth chapter assess the economic profile such as work force distribution and existing economic activities in the master plan area. It suggests strategies to utilise the industrial potential of Keonjhar and to further enhance the economic development

in the master plan area. Key policies and strategies were suggested to promote small and medium scale industries.

The fifth chapter explains, while majority of the houses are plotted, the condition of most of these housings are semi-kutcha and in bad condition. Around 30,000 people live in slum in Keonjhar municipal area which constitute about 30% of the city population. Considering these, the future housing demand for 2030 is assessed to be around 19,244 houses for development under affordable housing schemes.

Traffic and Transportation is one of the major issues that detriment the sustainable growth of the city. Sixth chapter access the traffic and transportation scenario of Keonjhar Planning Area using various survey methods and proposes the mobility plan with specific traffic management techniques and other geometric improvements to enhance the smooth traffic flow in the area.

The successful development projects can only be assured with an accurate resource assessment and its potential in the city. Hence the seventh chapter presents the existing condition and status of existing physical infrastructure which constitutes of Water Supply, Sewerage, Storm Water Drainage, Solid Waste Management and Power. Ground survey and technical analysis has been done to identify the issues with the existing infrastructure system and chalks out strategies to address the issues as well as to augment the level and quality of infrastructure for growing population.

Social Infrastructure also forms an important component of city development to facilitate and improve the living condition of the people, therefore, the existing condition and status of existing social infrastructure were analysed in terms of Education, Health and Socio-Cultural facilities. To address the issues as well as augment the level and quality of infrastructure for growing population, policies have been framed and incorporated.

The eighth chapter explore the potential of eco-tourism in and around the Master Plan Area. Keonjhar district known for its cultural and natural heritage makes Keonjhar town the prominent centre for tourist attraction. There are a number of pilgrims centre and prominent eco-tourism sites which have the potential to attract national as well as international tourists. This chapter emphasises on various proposal to promote tourism in the district.

Keonjhar is known for its various ecologically sensitive natural sites and hence the chapter Nine stresses the importance to develop in such a way to achieve environmentally sustainable goals through rational land-use pattern. The chapter also mentions various measures to protect natural water bodies within the planning area. Disaster mitigation proposals are given in form of a plan so as to decrease the vulnerability of Keonjhar to natural disasters.

The tenth chapter shows the land utilization pattern and identifies issues with respect to suitability and compatibility of uses. Land-use distribution is proposed for 2030 considering the existing situation and vision of Master Plan. While considering the proposed land utilisation, the demand for supporting public infrastructure was estimated which are intrinsic to the city's physical and economic growth trend.

Land ownership within the planning area is an important aspect of the Master Plan to understand the feasibility of proposed projects in terms of Land acquisition. Following this, Zoning and Sub Division Regulation forms one of the most important components of the Master Plan. Zoning regulations and development control regulations proposed in the twelfth chapter will guide and regulate the physical development in the area and will help in realising the vision and proposed land use plan. Most of the proposals have been drawn over government land in respect of public utility services.

In order to guide these projects in an efficient and effective manner the thirteenth chapter presents the network of agencies responsible for planning, development and maintenance of assets in the master plan area and describes their functions and responsibilities. The roles and responsibilities of each agency are clearly defined. Lastly the action plan for implementation of Master Plan of Keonjhar is made. Implementation mechanism is described and phasing has been done for the proposals based on its priority. Sources of funding are also identified in the last chapter.

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CHAPTER-1 INTRODUCTION

1.1 Background

The process of urbanization involves spatial expansion of cities due to growth in human population as well as economic activities. Population growth is an inevitable phenomenon and happens due to natural increase as well as migration. Push as well as pull factors operating within the spatial context, influence an increasing proportion of population to migrate from rural environs to urban areas, in an attempt to satisfy their economic and social needs and desires. Economic growth, technological change, population growth and migration determine the pace of urbanization.

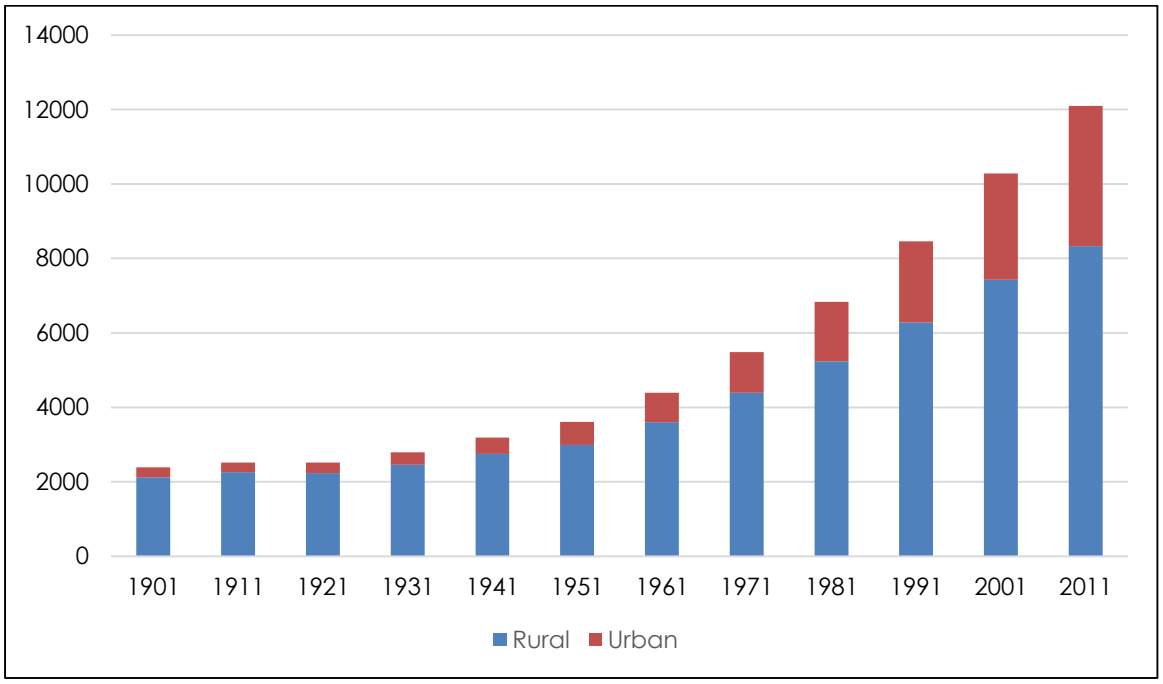
India is a fast growing economy and world's second most populous country. It experiences fast pace of urbanisation with increase in population living in urban settlements as well as percentage of the population engaged in non-agricultural activities. Importance of cities in national economy is growing and they contribute over two-thirds of gross domestic product and account for 90 percent of government revenues. This indicates a relationship between urbanization and level of economic development of a country.

1.1.1 Urbanisation Trends in India

Trend of urbanisation reveal that India has had predominantly rural character through past decades, though a few urban centres have flourished from time to time. It was only in the late nineteenth and the early twentieth centuries that industrial cities grew in India. Urban population of India has shown a ten-fold increase from 25.8 million in 1901 to 285.4 million in 2001. According to latest census, held in year 2011, around 31% of the population in India (377 million people) lives in urban areas. The latest census marks an important landmark in the urbanization trend in India, as the absolute increase in population is more in urban areas than that in rural areas.

India's urban population is likely to grow to 410 million in 2015, 468 million in 2020 and 533 million in 2025 as per the projections based on historical growth pattern of population (1901 – 2001). Further, the number of urban agglomeration /town has grown from 1827 in 1901 to 8410 in 2011. Proportion of urban population has steadily increased with increase in total population as shown in the Figure below.

Figure 1–1: Urban- Rural Population Distribution- India from 1901 to 2011



Source: (Census of India)

According to the *World Urbanisation Prospects- The 2011 Revision*[1] carried out by the United Nation Dept. of Economics and Social Affairs/ Population division, it is estimated that the percentage of population residing in urban areas will be increased to 51.7% by 2050, which implies that half of the population of the country will be residing in urban areas. The study also reveals that the number of cities with population more than 10 million plus will be increased to 6 by 2025, while those with population 5-10 million and 1-5 million will be 3 and 54 respectively by 2025.

Data Highlights-INDIA- Census 2011

- Rural- Urban Distribution: 68.84% & 31.16%
- Level of urbanization increased from 27.81% in 2001 Census to 31.16& in 2011
- For the first time since Independence, the absolute increase in population is more in urban areas than in rural areas.
- Population Growth Rate (%) from last Census Decade (1991-2001):
  India: - 3.9%
  Rural: - 5.9%
  Urban: + 0.3%

[1] The Population Division of the Dept. of Economics and Social Affairs of the United Nations is responsible for providing the international community with up-to-date and scientifically objective information on population and development.

The 2011 Revision of World Urbanisation Prospects gives the officials United Nations estimates and projections of urban and rural populations for major areas, regions and countries of the world. The estimation is basically based on the census data of respective countries/ region.

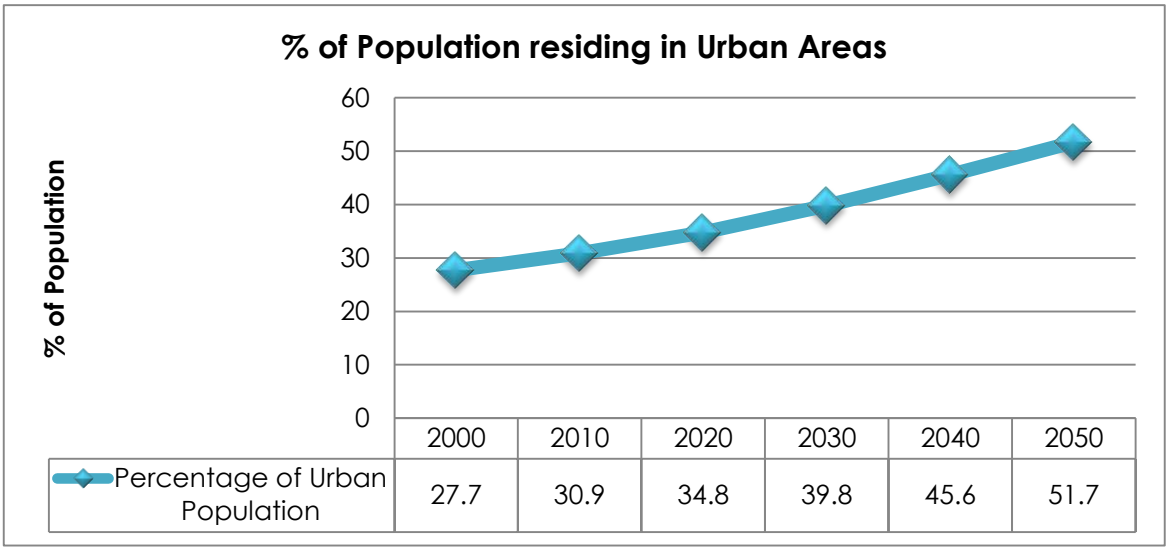


Figure 1–2: Growth of Urban Population in India - Estimates

Source: (World Urbanization prospects- The 2011 Revision)

1.1.1 Urbanisation in Odisha- An Overview

Odisha is one of the least urbanised states in India. As per the urbanisation trends of 2011 census, Odisha state is among the lowest urbanized state/ UTs in India with about 16.68 percent of urban population, which is only higher than Assam, Bihar and Himachal Pradesh among the major states. Among the districts in the state, the lowest degree of urbanisation is in the district of Baudh with 4.6% of urban population and the highest degree of urbanisation is in Khordha district.

Data Highlights-ODISHA- Census 2011

- Rural- Urban Distribution: 83.3% & 16.7%
- Decadal Change 2001-2011
  Total- 14.0 %
  Rural- 11.8%
  Urban- 26.9%
- No. of Towns (Including Statutory Towns and Census Towns)
  Census 2001- 138
  Census 2011- 223
- Density of Population (Persons per sq.km)
  State- 270
  Highest- Khordha (800 P/sq.km)
  Lowest- Kandhamal (91 P/sq.km)

The urbanisation rate in the state (16.68%) is much lower in comparison to the national average of 31.16% as per 2011 census, which is attributed primarily to the predominant agrarian base in the state. Prior to 1951, there were only 39 urban centres in the state, which has grown up to 223 in 2011. Odisha, thus has 2.8% of the total urban settlements of the country and houses 1.8 % of country's total urban population. Main urban centres in Odisha are

Bhubaneswar, Cuttack and Rourkela among Class I towns, Bhadrak, Bolangir, Baripada, Jeypore, Brajarajnagar, Jharsuguda, Sunabeda, Bargarh, Bhawanipatna and Jatani among Class II towns and Rayagada, Paradip, Dhenkanal, Barbil, Keonjhar, Rajgangapur and Parlakhemundi among Class III towns.

1.2 Need for Master Plan

The positive role of urbanization has often been over-shadowed by the deterioration in the physical environment and quality of life in the urban areas caused by widening gap between demand and supply of essential services and infrastructure. It is further associated with many problems, such as poverty, environmental stress, risks to productivity, and lack of access to basic services, such as water supply, sanitation, and housing. If urbanization, as a phenomenon has registered a steady progress among the developed nations, 'urbanization explosion' is taking place in the developing countries. Urban growth arising out of it is one of the major concerns of planners and governments all over the world.

The Housing and Urban Development Department, Govt. of Odisha, under the provision of sub-section (3) of Section-1 of the Odisha Town Planning & Improvement Trust Act- 1956 constituted the Keonjhar Special Planning Authority area, covering a total number of 43 revenue villages with an area of 87.36 sq.km. And subsequently Master Plan for Keonjhar Planning Area was prepared for a plan period of 2001. The area covered under planning area included Keonjhar Municipal limit with 18 nos. of revenue villages and surrounding 25 nos. of rural revenue villages adjoining municipal limit.

As per the statutory provision under the Odisha Town Planning and Improvement Trust Act, 1956, Master Plan is required to be prepared to translate broad implementable planning proposals along with detailed land-use plans for achieving planned development of the cities and its immediate surrounding areas. Accordingly the Master Plan for Keonjhar was prepared for a perspective year of 1986- 2006.

With the changing scenario of urbanisation and technology, the Government of Odisha has decided to prepare GIS / Remote Sensing based Master Plan for several towns of the state including Keonjhar to guide the overall development in a sustainable manner in future. In this context, the Special Planning Authority- Keonjhar intends to revise the existing master plan and prepare the Master plan of Keonjhar for

the horizon year 2030 with the objective of enhancing meaningful spatial development in a systematic and well planned manner. Looking into the urban characteristics of surrounding villages of Master Plan limit of Keonjhar, additional 25 villages are included to the previous Master Plan limit and sums up to a total of 68 villages under planning area for horizon year 2030.

In this context, the Keonjhar Special Planning Authority has engaged REPL, New Delhi to prepare the GIS/RS based Master Plan for Keonjhar which includes the previous Master Plan area and extended 25 additional villages, with a focus on planned spatial development and overall physical and economic improvement of the quality of life in the region.

The assignment of preparation of GIS/RS based Master Plan for Keonjhar aims at:

- Formulating a meaningful physical Development Plan to promote, regulate and guide the urban growth in the region by 2030 in a planned and sustainable manner
- Identifying thrust areas, phasing of development, implementation strategies, resource mobilization and prioritization of development initiatives

1.3 The Vision

Development for Keonjhar is proposed to be sustainable, both in terms of economy and natural resources. Economic growth drives change rural settlements as well as urban settlements. Thus, for promoting continuous development in an area, major focus should be on generation of economic opportunities. Taking into consideration the location, linkages and character of Keonjhar city, the following vision is proposed for its development till 2030–

"To augment infrastructure including efficient mobility and utilize potentials of eco-tourism in the area, so as to give impetus to development of Keonjhar"

This vision shall be realized through sector based proposals. Encompassing the vision is the overarching aim to conserve natural resources in the Master Plan area.

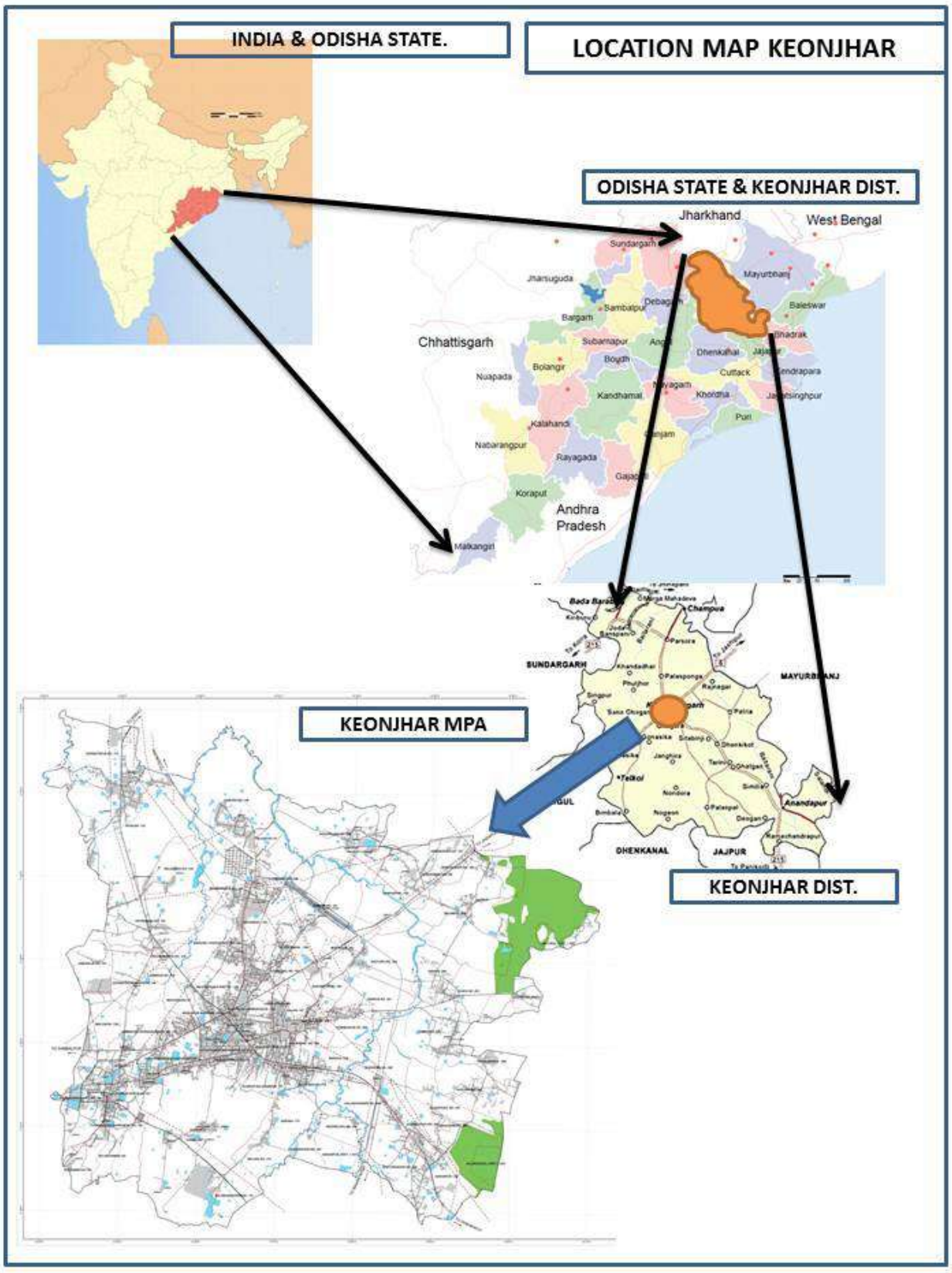


Figure 1–3: Location of Keonjhar Master Plan Area

Source: REPL

1.4 Objective

The master plan for Keonjhar planning area will provide all the aspects that are necessary for the integral development of the region. The main objectives of Master Plan are:

- To generate the up-to-date urban land use map of the area with super imposition of revenue maps and recent period satellite imageries using GIS technology
- To formulate a meaningful physical development plan to regulate and guide the urban growth in the area by 2030 in a planned and healthy manner as per the provision indicated in OTP & IT Act of 1956.

The overall focus of the master plan will be on:

- **Augmentation of existing infrastructure**
  Being the district headquarters, Keonjhar attracts population from surrounding areas to access higher-level infrastructure like Hospital, Colleges etc. Thus, city's existing infrastructure, both physical and social, needs to be augmented, so that Keonjhar can efficiently function as a District Headquarter.
- **Improving mobility within and outside the Master Plan area**
  Connectivity of the town with other towns and cities influences its economic growth. Thus, Master Plan shall aim to strengthen the inter-town connectivity for Keonjhar. In addition to this, mobility within the Master Plan area shall also be proposed to be improved.
- **Promoting Keonjhar as a Tourism node**
  Keonjhar is located near some tourism-potential spots, one of which is the Maa Tarini Temple at Ghatgaon. The natural resources-rich surrounding area also offers potential for an eco-tourism destination.
- **Conserving natural resources**
  Keonjhar has significant natural features like forest and streams. It is imperative that planning for development of the city doesn't take place at the cost of environment. Thus, none of the proposals under Master Plan shall be in contradiction to the overarching aim of conservation of natural features.

1.5 Approach and Methodology

The preparation of master plan is initiated with the assessment of existing condition of the region, its potential resources and constraints. Thereafter, developing priorities in different sectors are framed taking into consideration the future requirement for the horizon year 2030, the existing deficits/ surplus, socioeconomic need and the aspiration of the local people. Status analysis and prime issues pertaining to different sectors such as physical characteristics & natural resource, demography, economic base & employment, housing, transportation, facilities, infrastructure, environment and institutional set-up etc. are well analysed for formulation of Master Plan for the town.

The Master Plan of Keonjhar comprises of:

- Reports on physical and socio-economic aspect
- Projection and assessment of requirement
- Functional plans on Land use, Traffic and Transportation, Housing, Public utilities, Social infrastructure, Heritage and Tourism, Zoning regulation etc.
- Spatial impact assessment of development proposals
- Strategies of development and identification of priorities for the city region and phasing
- Investment Plan and Action Plan
- Proposed Land use plan translated over revenue map in GIS format

Based on the understanding of the scope of work, a detailed methodology is framed to carry out the master plan process. The execution of the assignment involves a number of inter-linked tasks which is outlined below:

- Task –A : Project Initiation
- Task – B: Digital Base Map Validation
- Task – C: Field Survey, Data Collection and Updating of GIS base map
- Task – D: Preparation of Draft Master Plan
- Task – E : Investment and Implementation Plan
- Task – F: Notification of Draft Master Plan and Finalisation of Master Plan

Accordingly, phase wise discussion thereon with the stakeholder is made to receive inputs, suggestions and comments at each stage of the master plan preparation process.

1.5.1 Task- A: Project Initiation

- Team Mobilization and Start up Meetings
- Collection of GIS database from SPA & preliminary review and data gap analysis
- Site visit and documentation
- Kick-off meeting with various stakeholders/ line departments and secondary data collection from various agencies
- Preparation of Inception Report and meetings/ interactive workshop

1.5.2 Task- B: Digital Base Map Validation

- Preparation of GIS database for validation
- Identification of methodology for conducting land use validation/ survey
- Ground verification of supplied GIS database
- Validation of base map and preparation of final base map

1.5.3 Task- C: Field Survey, Data collection

- Finalisation of survey questionnaire for socio-economic and traffic survey
- Conducting socio-economic survey for sample HH
- Conducting Traffic and transportation survey such as Total volume count, Origin- destination, Parking and speed-delay survey etc.
- Micro level study on various aspect such as land use & infrastructure, environmental feature, SWM, sewerage disposal etc., study on land with suitability analysis, study on natural resources, analysis on existing development control etc.
- Data compilation and Analysis to identify trends, potentials and problems
- Analysis and trend based projections for all sectors such as demography, housing, infrastructure etc.
- Preparation of Status Survey Report and interactive workshop/ meeting for taking feedback & views of different stakeholders

1.5.4 Task- D: Preparation of Draft Master Plan

- Based on the sector-based analysis and projection for the horizon year 2030, different developmental proposals such as proposed land use plan, housing plan, traffic & transportation plan, water resource development & drainage plan, social infrastructure plan, environmental management plan, zoning

regulation, investment plan etc. are framed with aim and objective in each sectors and proposed strategies to meet the goal.

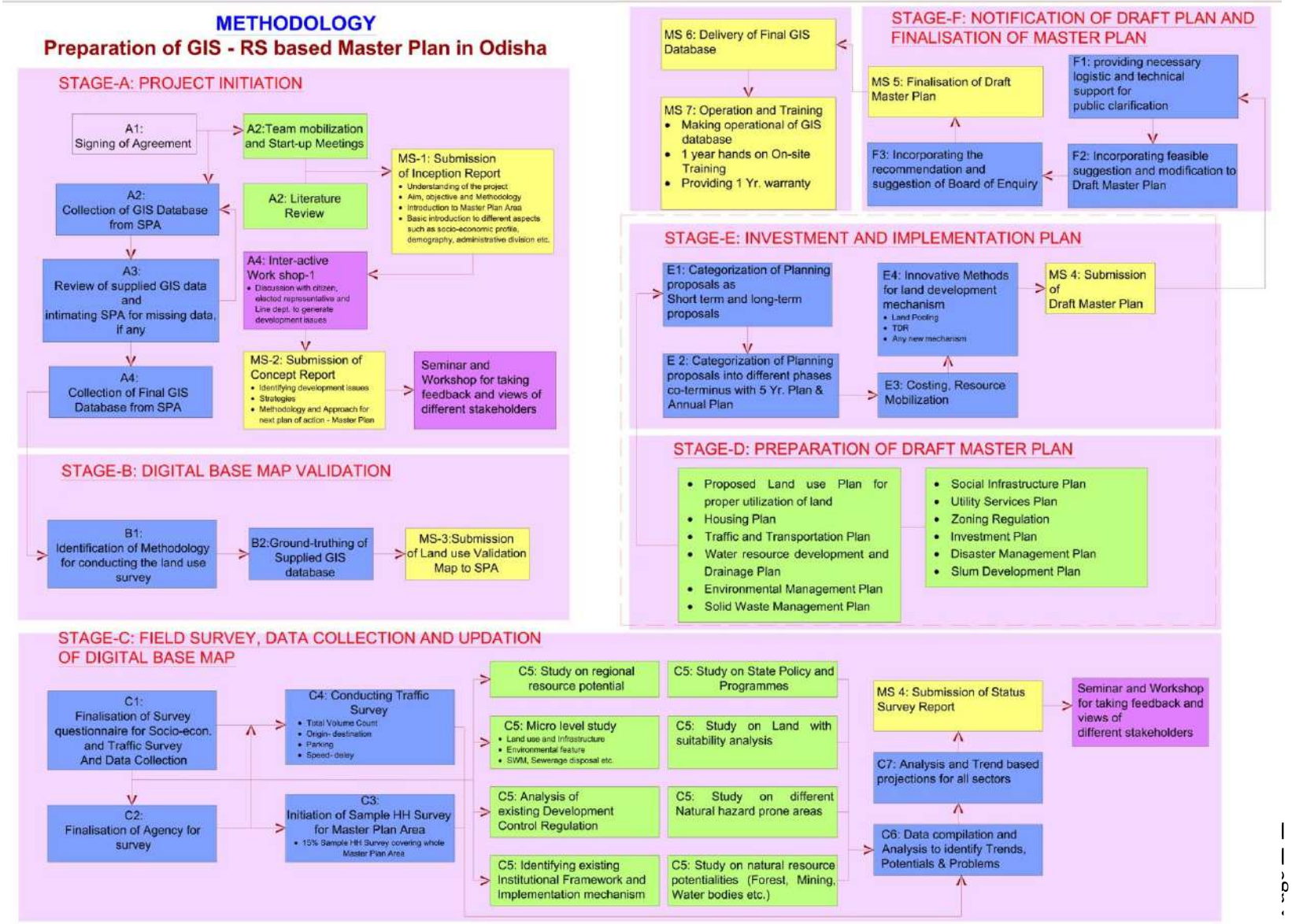
- Identification of different sector-based projects for implementing future strategies.

1.5.5 Task- E: Investment and Implementation Plan

- Categorization of planning proposals as short-term and long-term proposals
- Categorizing planning proposals into different phases dovetailing with five year plan and annual plan.
- Costing mechanism and resource mobilization
- Finalisation of draft master plan containing the draft proposals and investment & implementation plan and interactive workshop/ meeting for taking feedback & views of different stakeholders.

1.5.6 Task- F: Notification of Draft Plan and finalisation of Master Plan

- Incorporating feasible suggestion and modification to the draft master plan
- Statutory obligation of hearing by Board of Enquiry & observation, compliance
- Incorporating the recommendations and suggestions of Board of Enquiry
- Submission of Final Master plan, delivery of final GIS database and notification
- Operation and training for making operational of GIS database


METHODOLOGY
Preparation of GIS - RS based Master Plan in Odisha
STAGE-A: PROJECT INITIATION
A1: Signing of Agreement
A2:Team mobilization and Start-up Meetings
MS-1: Submission of Inception Report
Understanding of the project
Aim, objective and Methodology
Introduction to Master Plan Area
Basic introduction to different aspects such as socio-economic profile, demography, administrative division etc.
A2: Collection of GIS Database from SPA
A2: Literature Review
A3: Review of supplied GIS data and intimating SPA for missing data, if any
A4: Inter-active Work shop-1
Discussion with citizen, elected representative and Line dept. to generate development issues
A4: Collection of Final GIS Database from SPA
MS-2: Submission of Concept Report
Identifying development issues
Strategies
Methodology and Approach for next plan of action - Master Plan
Seminar and Workshop for taking feedback and views of different stakeholders
STAGE-B: DIGITAL BASE MAP VALIDATION
B1: Identification of Methodology for conducting the land use survey
B2:Ground-truthing of Supplied GIS database
MS-3:Submission of Land use Validation Map to SPA
STAGE-C: FIELD SURVEY, DATA COLLECTION AND UPDATION OF DIGITAL BASE MAP
C1: Finalisation of Survey questionnaire for Socio-econ. and Traffic Survey And Data Collection
C4: Conducting Traffic Survey
Total Volume Count
Origin- destination
Parking
Speed- delay
C2: Finalisation of Agency for survey
C3: Initiation of Sample HH Survey for Master Plan Area
15% Sample HH Survey covering whole Master Plan Area
C5: Study on regional resource potential
C5: Micro level study
Land use and Infrastructure
Environmental feature
SWM, Sewerage disposal etc.
C5: Analysis of existing Development Control Regulation
C5: Identifying existing Institutional Framework and Implementation mechanism
C5: Study on State Policy and Programmes
C5: Study on Land with suitability analysis
C5: Study on different Natural hazard prone areas
C5: Study on natural resource potentialities (Forest, Mining, Water bodies etc.)
MS 4: Submission of Status Survey Report
C7: Analysis and Trend based projections for all sectors
C6: Data compilation and Analysis to identify Trends, Potentials & Problems
Seminar and Workshop for taking feedback and views of different stakeholders
STAGE-D: PREPARATION OF DRAFT MASTER PLAN
Proposed Land use Plan for proper utilization of land
Housing Plan
Traffic and Transportation Plan
Water resource development and Drainage Plan
Environmental Management Plan
Solid Waste Management Plan
Social Infrastructure Plan
Utility Services Plan
Zoning Regulation
Investment Plan
Disaster Management Plan
Slum Development Plan
STAGE-E: INVESTMENT AND IMPLEMENTATION PLAN
E1: Categorization of Planning proposals as Short term and long-term proposals
E 2: Categorization of Planning proposals into different phases co-terminus with 5 Yr. Plan & Annual Plan
E3: Costing, Resource Mobilization
E4: Innovative Methods for land development mechanism
Land Pooling
TDR
Any new mechanism
MS 4: Submission of Draft Master Plan
STAGE-F: NOTIFICATION OF DRAFT PLAN AND FINALISATION OF MASTER PLAN
MS 6: Delivery of Final GIS Database
MS 7: Operation and Training
Making operational of GIS database
1 year hands on On-site Training
Providing 1 Yr. warranty
MS 5: Finalisation of Draft Master Plan
F1: providing necessary logistic and technical support for public clarification
F2: Incorporating feasible suggestion and modification to Draft Master Plan
F3: Incorporating the recommendation and suggestion of Board of Enquiry

1.6 Structure of Report

The Master Plan report comprises of 15 Chapters which indicates the existing situation in the town under various components, analyses for gaps in provision of services and proposes strategies for improvement as well as to achieve the vision envisaged in the Master plan. A brief of 15 chapters is shown below –

Chapter 1 – Introduction

Chapter 1 gives an overview of the urbanization trends in India and Odisha and establishes the need for preparation of a Master Plan. Vision for development of town of Keonjhar is proposed and is detailed in objectives. Approach to prepare the Master plan and its detailed methodology is also documented.

Chapter 2 – Keonjhar Master Plan Area

Chapter 2 introduces the Keonjhar Master Plan Area, its administrative jurisdiction, and its various characteristics like climate, topography, soil and water resources. Existing Master Plan is also reviewed and regional linkages are established.

Chapter 3 – Demographic Perspective

Chapter 3 shows the demographic profile of the master plan area and trend of population growth. Considering past trends and growth factors, population is projected till 2030. The town is reviewed for socio-economic factors like Work Force Participation Rate, Literacy Rate and Sex Ratio etc.

Chapter 4 – Economic Base

Chapter 4 shows identifies economic potentials of the master plan area of Keonjhar. Considering the proposed industries in the Master Plan area and work force distribution projection, key strategies and regulations were suggested for the economic development of the planning area.

Chapter 5 – Housing and Slum

Chapter 5 presents the condition of Housing, its distribution and demand existing in the town. Housing requirements are calculated for horizon year as per the demand assessment. This chapter also deals with slums existing in the city and proposes strategies for their up gradation.

Chapter 6 – Traffic and Transportation

Chapter 6 presents linkages and connectivity of the city with its surroundings as well as intra-city mobility pattern. Issues are identified based on traffic survey findings for which strategies for proposed. Road network to address issues and cater to traffic demands of 2030 is also proposed.

Chapter 7 – Urban Services

Chapter 7 presents the existing condition and status of existing physical infrastructure which constitutes of Water Supply, Sewerage, Storm Water Drainage, Solid Waste Management and Power of Keonjhar master plan area. Issues with the existing system are identified and proposals are given to address the issues as well as augment the level and quality of infrastructure for growing population. Social infrastructure are key sectors of city, so the chapter presents the existing condition and status of existing social infrastructure which constitutes of Education, Health and Socio-Cultural facilities. Issues with the existing system are identified and proposals are given to address the issues as well as augment the level and quality of infrastructure for growing population. Broad cost estimates for proposed developments is also included in the chapter. Broad cost estimates for proposed developments is also included in the chapter.

Chapter 8 – Tourism and Heritage

Chapter 8 offer insight on the tourism potential of Keonjhar by showing the existing heritage and tourism sites. Strategies are proposed for promoting tourism and conserving heritage after assessing the opportunities of tourism in the Master Plan Area and around.

Chapter 9 – Environment and Disaster profile

Chapter 9 presents an important aspect of development and planning which is disaster mitigation and environmental protection. Disaster mitigation proposals are given in form of a plan so as to decrease the vulnerability of Keonjhar to natural disasters.

Chapter 10 – Existing and Proposal Land-use

Chapter 10 shows the existing distribution of uses in the Master plan area. The land use distribution is analysed and issues with respect to suitability and conformity of uses are identified. Land use distribution is proposed for 2030 considering the existing situation and vision of Master Plan. Under this, growth nodes, growth corridors and restricted development zone are identified in the Master Plan area.

Chapter 11 – Land Ownership

This chapter presents the land ownership details of the land within the planning area boundary. And hence gives the idea of the feasibility of proposed projects in terms of Land acquisition.

Chapter 12 – Zoning and Sub Division Regulation

Chapter 12 forms one of the most important components of the Master Plan. Zoning regulations and development control regulations proposed in the chapter shall guide the physical development in the area and shall help in realising the vision and proposed land use plan.

Chapter 13 – Institutional Set-up

Chapter 13 presents the network of agencies responsible for planning, development and maintenance in the master plan area and describes their functions and responsibilities. This shall help in implementation of the master plan as roles and responsibilities of each agency are clearly defined.

Chapter 14 – Implementation strategies, Management Structure and Resource Mobilisation

Chapter 14 presents the action plan for implementation of Master Plan of Keonjhar. Implementation mechanism is described and phasing has been done for the proposals based on its priority. Sources of funding are also identified.

Chapter 15 – Investment Plan

The chapter summarises the sector wise tentative investment in each proposed sectors within the project period.

CHAPTER-2 KEONJHAR MASTER PLAN AREA

2.1 Background

Keonjhar is a medium sized town[2] with a municipality in the Keonjhar district of the state of Odisha. Being the district headquarters of the district, Keonjhar town houses a number of administrative and institutional set ups. Also being a major mineral producing district of Odisha, Keonjhar occupies a significant place in the economy of the state. It is also a major centre of collection and distribution of agro-forest products of the district.

The historical evidence of the town date backs to early 12th century when Jyoti Bhanja became the ruling chief after its separation from Khijjinga territory. The entire district of Keonjhar was a princely state before its merger with Odisha on 1 January 1948. The early history of Keonjhar is not definitely known. It was most probably a part of the old Khijjinga territory with headquarters at Khijjinga Kota, identified with modern Khiching. It became a separate state with Jyoti Bhanja as its ruling chief sometime during the first half of the 12th century A.D. The then State of Keonjhar comprised only the northern half of the modern district for a long time prior to the installation of Jyoti Bhanja as King.

During the latter part of the 15th century the southern half was occupied by King Govinda Bhanja under whose rule Keonjhar was extended from Singbhum in the north to Sukinda in the South and from Mayurbhanj in the East to the borders of the States of Bonai, Pallahara and Angul in the West. It is during the reign of Laxmisagar Bhanja, the famous Baldevjew Temple was built at Keonjhar in 1671.

Sepoy Rebellion took place in 1857, during the rule of Gadadhar Bhanj, the 35th ruling chief of Bhanja dynasty in Keonjhar. In 1861, he died without having a legitimate issue. A dispute arose and Bhuyans broke into rebellion under the leadership of Ratan Naik and Nanda Naik on the succession of Dhanurjaya Bhanja to the throne. It was surpassed by the British troops. After that a second Bhuyan rose in the year 1891 under the leadership of Dharanidhar. The responsibility of the above Bhuyan rising was fixed

[2] As per the classification of urban settlement, Urban with population 50,000 to 1 lakh can be categorised as Medium Town I, whereas urban area with population range 1 lakh to 5 lakh can be classified as Medium Town II. *Source: URDPFI Guidelines, 2015*

on the King Dhanurjaya Bhanja and Keonjhar was kept under the administration of H. Willy, the then manager of Mayurbhanj.

The administration of Keonjhar was managed by the Govt. of Odisha during 1907-28 after Gopinath Narayan Bhanja relinquished his 'gaddi'. During the rule of Balabhadra Narayan Bhanja, the last Bhanja king, Keonjhar grew in size and was ultimately merged with the State of Odisha on 1st January 1948 to be constituted as a district.

The Govt. of Odisha, feeling the necessity of a local body for controlling the development of Keonjhargarh, declared its intention to constitute a Municipality for the town in 1949, under the provision of Bihar- Odisha Municipal Act. Subsequently, the Odisha municipal Act was passed in 1950. The municipality of the town came into existence on 3rd January 1951 covering 18 revenue villages under its jurisdiction. Currently, the municipal limit of Keonjhar covers 28 revenue villages with an area of 26.53 sq.km.

2.2 Keonjhar Master Plan Area

With an aim of planned development of the urban centres, Master Plan for Keonjhar Municipality area and its adjoining villages having urban character was proposed. As a result, Keonjhar Special Planning Area was delineated under the provision of sub-section (3) of Section-1 of the Odisha Town Planning and Improvement Trust Act, 1956. This Planning Area consists of municipal limit of the town and surrounding 25 nos. of villages. Master Plan for Keonjhar was prepared for a plan period of 20 years from 1986-2006 covering all aspects of development to achieve a planned development of master plan area.

Table 2-1: List of Revenue Villages under Previous Master Plan (1986-2006)

Sl. No.	Name of Revenue Village	P.S./ Thana No.	Name of Municipality/ G.P.
1	Kimiridoli Dhangarpada	131	Keonjhar Municipality
2	Keonjhar Nijigarh	129	
3	Chakrapadhi Bandhatala	128	
4	Dhanurjayapur	127	
5	Attaupara Badapokharitala	132	
6	Bhalukipatala	133	
7	Hatiatangar Bhairabpur	134	

Sl. No.	Name of Revenue Village	P.S./ Thana No.	Name of Municipality/ G.P.
8	Madhapur Bhairabpur	135	Keonjhar Municipality
9	Magurgadia Siripur	136	
10	Baniapatta Khuntapada	143	
11	Brahamangan	144	
12	Gamharia	148	
13	Satasinga	164	
14	Pabitradiha Kamargoda	165	
15	Siluan	167	
16	Makundapur	168	
17	Jagannathpur	170	
18	Kasipur Balarampur	171	
19	Bodapalasa	149	Bodapalasa Gram Panchayat
20	Tulasipur	147	
21	Suleikhamar	125	
22	Kabitra	146	
23	Gopinathpur	117	Narayanpur Gram Panchayat
24	Gaurunibeda	139	Raisuan Gram Panchayat
25	Maligan	130	
26	Raisuan	119	
27	Baliagoda	145	
28	Dhrupada	142	
29	Laxmiposi	138	
30	Mochigan	137	
31	Govindapur	250	
32	Gumura	161	Mandua Gram Panchayat
33	Tikargumura	162	
34	Badahala	163	
35	Basantapur	252	
36	Jamuhata	166	
37	Mandua	249	
38	Kuladera	169	

Sl. No.	Name of Revenue Village	P.S./ Thana No.	Name of Municipality/ G.P.
39	Badadera	172	Mandua Gram Panchayat
40	Ranki	126	
41	Sidhamatha	124	
42	Muktapur	253	
43	Ghuturu	254	

Later on with a change in the urbanisation scenario of Keonjhar town the municipal limit extended to include more revenue villages, hence total number of revenue villages increases to 28 nos. having area of 26.53 sq.km. Subsequently, looking into the urban expansion of Keonjhar town and scrutinizing the urban character of the surrounding villages of Keonjhar municipality, additional 25 villages as listed below were included in the master plan jurisdiction in the year 2010, which sum up to a total 68 nos. of revenue villages under master plan boundary.

Table 2-2: List of Additional Revenue Villages for Master Plan 2030

Sl. No.	Name of Revenue Village	P.S./ Thana No.	Name of Municipality/ G.P.
1	Kabitra	146	Bodapalasa G.P.
2	Sankarpur	160	
3	Jamunapashi	157	
4	Bebartapashi	158	Nelungu G.P.
5	Chandapasi	159	
6	Nelungu	255	
7	Naigan	256	Dimbo G.P.
8	Dimbo	258	
9	Kholapa	261	
10	Tentulinanda	260	
11	Chaka	297	
12	Tangarpalasa	248	Naranpur G.P.
13	Haladiatangiri	244	
14	Alanapada	247	
15	Jalangadiha	245	
16	Ghutukeshari	238	

Sl. No.	Name of Revenue Village	P.S./ Thana No.	Name of Municipality/ G.P.
17	Naranpur	237	Naranpur G.P.
18	Badabil (Ka)	243	
19	Kandarapasi	242	
20	Jenagadia	246	
21	Banpar	251	Mandua G.P.
22	Sarasa	173	Sirispal G.P.
23	Belada	174	
24	Balabhadrapur	175	
25	Gopinathpur (Nuagaon)	140	Janardanpur G.P.
26	Jamunalia	141	

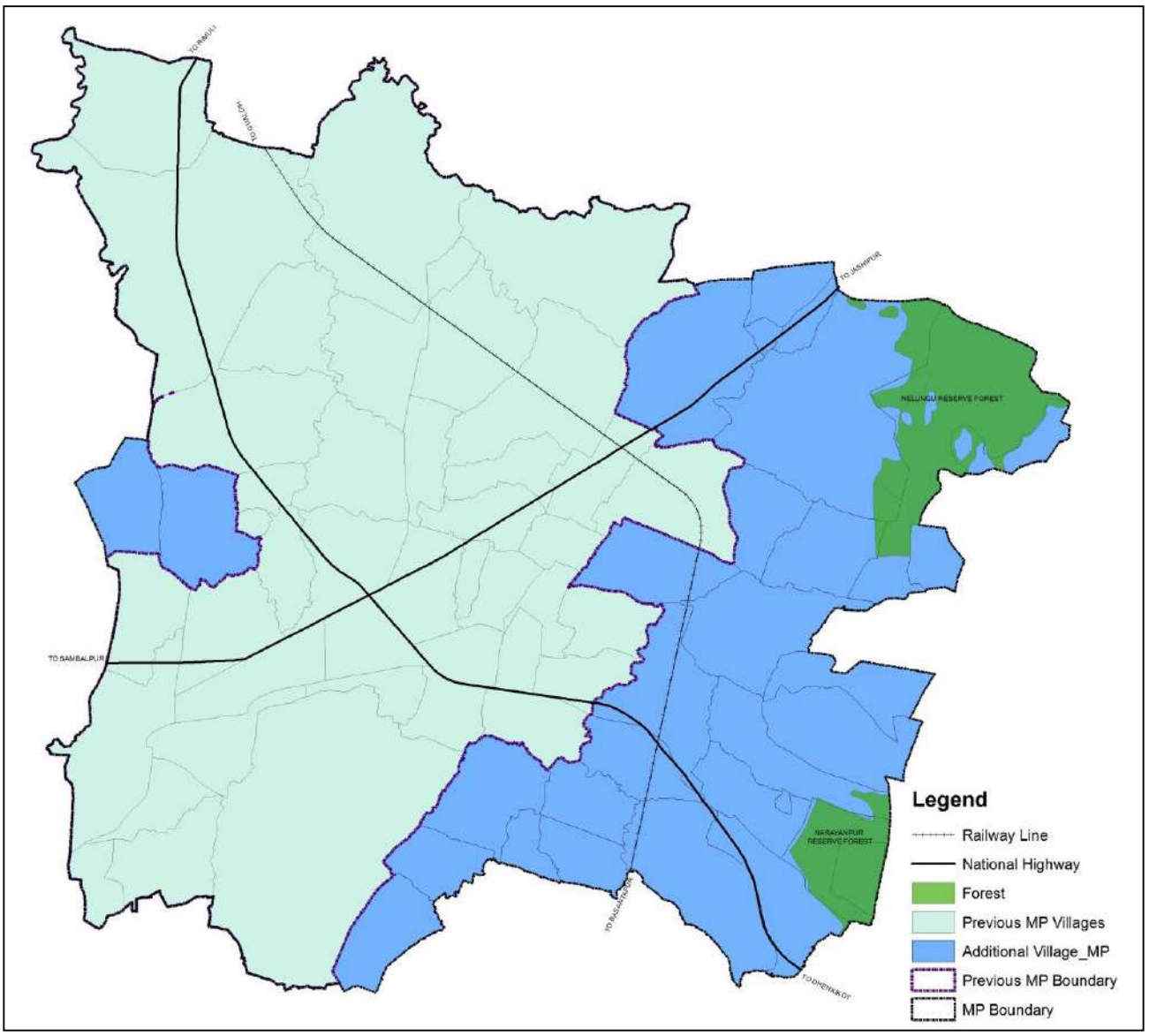
During the process of preparation of GIS based Master Plan the mauza Kabitra has been excluded from the municipal limit. The present master plan area comprises of Keonjhar Municipal limit (27 revenue villages) and 41 adjoining villages, with a population of about 1,00,501 (according to the 2011 census) and an area of 87.36 sq.km. The area also include forests such as Nelungu Reserve Forest and Naranpur Reserve Forest with an area of 3.86 sq.km.

The Mauza Kabitra has been denotified from Municipal Jurisdiction vide notification no 2217 dated 04 February 2015 of Panchayati Raj Department Government of Orisssa. (See Annexure-1, Page- 258)

Table 2-3: Total number of Revenue villages in Master Plan Area in (1986-2006 and 2030)

	Previous Master Plan (1986-2006)	**Master Plan-2030**
Total Area	53.52 Sq.km.	87.36 Sq.km.
No. of Revenue Villages under Keonjhar Urban	18 (Mainly consists of Keonjhar Municipality)	27 (Mainly consists of Keonjhar Municipal Limit)
No. of Revenue Villages under Keonjhar Rural	25 Nos. Rural Revenue Villages	41 nos. Rural Revenue Villages And 2 nos. Reserve Forest – Nelungu RF and Narayanpur RF
No. of Total Revenue Villages	43 nos.	68 nos.

Map 2-1: Map showing existing and additional Revenue Villages added to Master Plan 2030



Following are the name of the villages along the boundary of Master Plan Area in each directions:

North: Gopinathpur, Raisuan, Kabitra, Bodapalasa, Sankarpur

East: Jamunapasi, Bebartapasi, Nelungu Reserve Forest, Nelungu, Chaka, Tentulinanda, Naranpur, Narayanpur Reserve Forest

South: Ghutukeshari, Kandrapasi, Belda, Balabhadrapur, Ranki

West: Raisuan, Jamunalia, Maligaon and Keonjhar Nijigarh

2.2.1 Keonjhar Urban

'Keonjhar urban' broadly comprises of Keonjhar municipality limit only. After the inclusion of Keonjhargarh in the State of Odisha in 1948, the Government had taken initiatives to form a local body for controlling the day-to-day development as per the provision laid in Bihar- Odisha Municipal Act. Subsequently, the Odisha Municipal Act was passes in the State Legislature in 1950. The municipality of the town came into existence in 1951 covering 18 nos. of revenue villages under its jurisdiction. Subsequently, the municipal jurisdictions were extended further into the surrounding areas having urban characteristics. After exclusion of village Kabitra, the present municipal limit of Keonjhar is extended over 27 nos. of villages having 23.55 sq.km of area and is divided into 21 wards. Keonjhar Municipality is responsible for providing civic services within the municipal limit. The following table shows revenue villages which are part of the Keonjhar Municipal Area, while Map 2-3 shows the location of Keonjhar Municipal Area in the total Master Plan area. The map also shows delineation of different wards within the municipal area.

Table 2-4: List of Revenue Villages under Keonjhar Urban, Master Plan-2030

Sl. No.	Name of Revenue Village	P.S./ Thana No.	Name of Municipality/ G.P.
1	Khimiridoli Dhangapada	131	Keonjhar Municipality
2	Keonjhar Nijigarh	129	
3	Chakrapadhi Bandhatala	128	
4	Dhanurjayapur	127	
5	Attaupara Badapokharitala	132	
6	Bhalukipatala	133	
7	Hatiatagar Bhairabpur	134	
8	Madhapur Bhairabpur	135	
9	Magurgadia Siripur	136	
10	Baniapatna Khuntapada	143	
11	Brahamangan	144	
12	Gamharia	148	
13	Satasinga	164	
14	Pabitradiha Kamargoda	165	
15	Siluan	167	
16	Makundapur	178	
17	Jagannathpur	170	
18	Kasipur Balarampur	171	
19	Tulasipur	147	
20	Suleikhamar	125	

Sl. No.	Name of Revenue Village	P.S./ Thana No.	Name of Municipality/ G.P.
21	Dhurupada	142	
22	Mochigan	137	
23	Badahala	163	
24	Jamuhata	166	
25	Kuladera	169	
26	Badadera	172	
27	Sidhamatha	124	

Source: Census data

2.2.2 Keonjhar Rural

'Keonjhar Rural' comprises of 41 revenue mauzas surrounding the municipal limit of Keonjhar which are covered under 8 Gram Panchayats namely Bodapalasa, Raisuan, Mandua, Nelungu, Dimbo, Naranpur, Sirispal and Janardanpur. The whole rural area of the master plan limit stretches over an area of 63.81 sq.km., which includes Nelungu and Narayanpur Reserve Forest with an area of 3.86 sq.km. The detail of revenue villages with GP is given below:

Table 2-5: List of Revenue Villages under Keonjhar Master Plan (Rural) – 2030

Sl. No.	Name of Revenue Village	P.S./ Thana No.	Name of Municipality/ G.P.	Name of Block
1	Bodapalasa	149	Bodapalasa G.P.	Keonjhar
2	Gopinathpur	117	Raisuan G.P.	
3	Gaurunibeda	139	Raisuan G.P.	
4	Maligan	130	Raisuan G.P.	
5	Raisuan	119	Raisuan G.P.	
6	Baliagoda	145	Raisuan G.P.	
7	Laxmiposi	138	Raisuan G.P.	
8	Govindapur	250	Mandua G.P.	
9	Gumura	161	Mandua G.P.	
10	Tikargumura	162	Mandua G.P.	
11	Basantapur	252	Mandua G.P.	
12	Mandua	249	Mandua G.P.	
13	Ranki	126	Mandua G.P.	
14	Muktapur	253	Mandua G.P.	
15	Ghuturu	254	Mandua G.P.	
16	Sankarpur	160	Bodapalasa G.P.	
17	Jamunapashi	157	Bodapalasa G.P.	
18	Kabitra	146	Bodapalasa G.P.	
19	Bebartapashi	158	Nelungu G.P.	
20	Chandapasi	159	Nelungu G.P.	

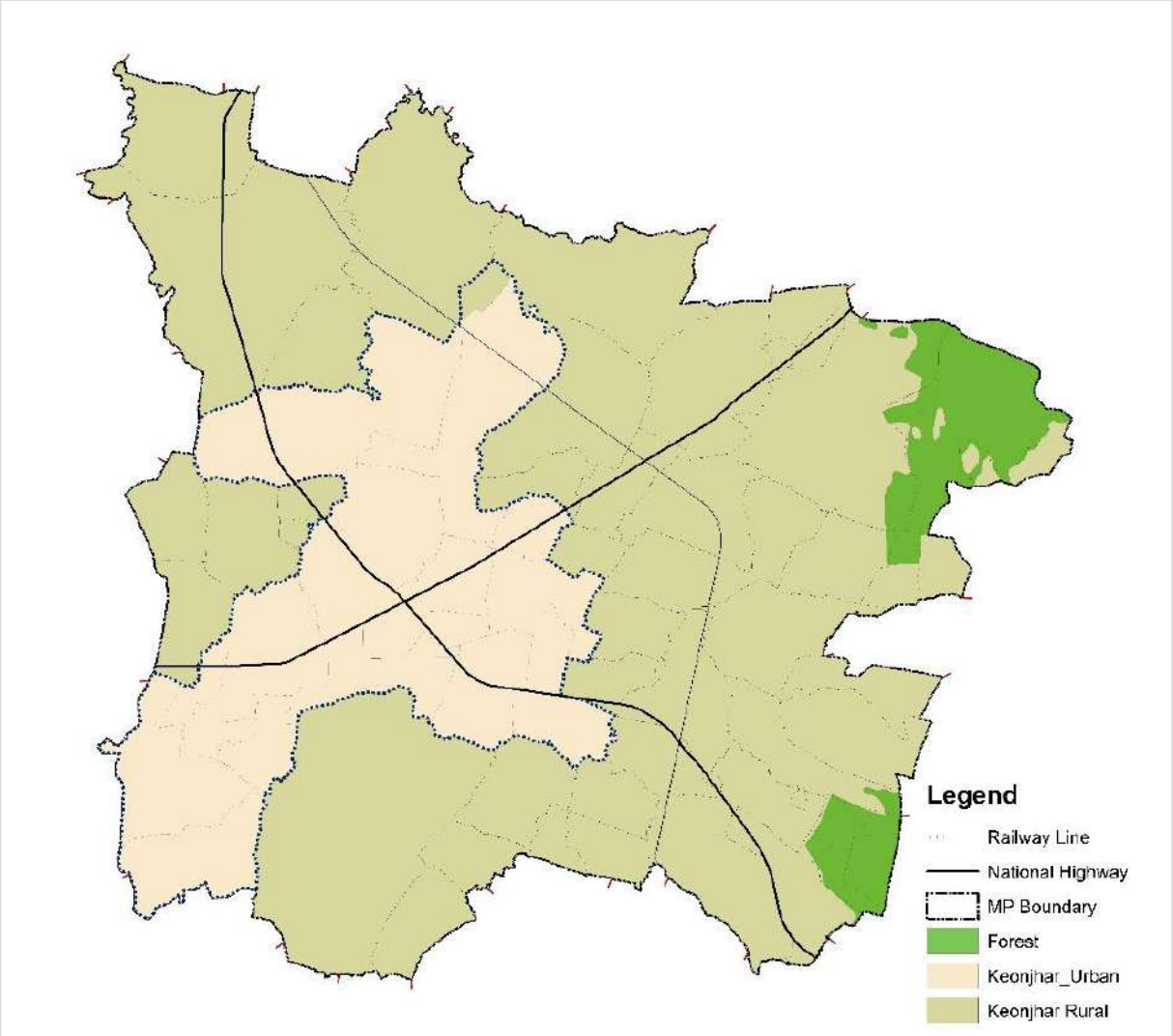
Sl. No.	Name of Revenue Village	P.S./ Thana No.	Name of Municipality/ G.P.	Name of Block
21	Nelungu	255	Nelungu G.P.	Keonjhar
22	Naigan	256	Dimbo G.P.	
23	Dimbo	258	Dimbo G.P.	
24	Kholapa	261	Dimbo G.P.	
25	Tentulinanda	260	Dimbo G.P.	
26	Chaka	297	Dimbo G.P.	
27	Tangarpalasa	248	Naranpur G.P.	
28	Halidiarangiri	244	Naranpur G.P.	
29	Alanapada	247	Naranpur G.P.	
30	Jalangadiha	245	Naranpur G.P.	
31	Ghutukeshari	238	Naranpur G.P.	
32	Naranpur	237	Naranpur G.P.	
33	Badabil (Ka)	243	Naranpur G.P.	
34	Kandarapasi	242	Naranpur G.P.	
35	Jenagadia	246	Naranpur G.P.	
36	Banpar	251	Mandua G.P.	
37	Sarasa	173	Sirispal G.P.	
38	Belada	174	Sirispal G.P.	
39	Balabhadrapur	175	Sirispal G.P.	
40	Gopinathpur Nuagaon	140	Janardanpur G.P.	
41	Jamunalia	141	Janardanpur G.P.	

Table 2-6: Overview of Keonjhar Master Plan Area- 2030

Sl. No.	Description	No. of Revenue Villages	Area in Sq.km	Remarks
1	2	3	4	5
1	Keonjhar Urban	27	23.55	Urban area comprises of Keonjhar Municipality with 21 nos. wards
2	Keonjhar Rural	41	63.81	Rural area comprises of 41 nos. of Revenue Villages surrounding the municipal limit with Nelungu and Narayanpur reserve Forest of having 3.86 sq.km of area.
Master Plan Area- Keonjhar SPA		**68**	**87.36**	

**Note : As per RFP, the total Master Plan area is 85.83 Sq.Km, However as per the Boundaries provided by ORSAC in GIS Format and through ground verification and field measurement there after it was observed that the total master plan area is 87.36 and is used for all the calculation & Proposal here after.*

Map 2-2: Keonjhar Urban & Rural Area within Master Plan Boundary



Source: REPL, 2016

The map above differentiates Keonjhar Urban area from Keonjhar Rural area within the total Master Plan area. The two Reserve Forests - Nelungu and Narayanpur are also shown in the map. National Highways 20 and 49 meet almost in the centre of the urban area and provides regional connectivity for the Master plan area.

2.3 Geographical Setting

Keonjhar Planning Area is extended between 85° 41' E - 85° 33' E longitude and 21° 35' N - 21° 41' latitude with an average altitude of 480 meter from MSL. The planning limit of Keonjhar SPA area consists of municipal limit of Keonjhar and 41 adjoining rural revenue villages/mouzas. The planning area of Keonjhar is bounded by following villages:

Table 2-7 Adjoining villages of the Keonjhar Master Plan Area 2030

Sl. No.	Direction	Village Name
1	North	Silisuan-116, Khuntapada- 111, Haraspur – 118, Jalabanga – 110, Kathakar Anjia – 108, Kempasada – 107, Kendua – 150, Sadarpada – 156, Mahuldiha – 155
2	East	Jharbelada – 154, Maidankela Reserve Forest, Baiganposi – 259, Dimirimunda – 263, Guhalchatua – 262, Naranapur Reserve Forest – 180
3	South	Jamunalia – 236, Dimiribahal – 176, Jamudiha, Balidiha – 181, Bhaliadala – 182, Notitanger – 177, Sirispal – 179, Sahadaposi - 241
4	West	Medinipur – 123, Bhaliadiha – 122, Janardanpur – 121, Singaraisuan – 120, Tikarpada – 21, Dhatika – 22

2.3.1 Topography

Keonjhar district consists of a compact land locked area and the National Highway-220 passing through Keonjhar approximately divides the district into two widely dissimilar tracts – the lower Keonjhar and the upper Keonjhar. The former i.e. to the east of the highway, is a region of valleys and low lands with planes of Anandpur and a portion of Sadar Sub-division, while the latter includes mountainous highlands with a general slope from North to South and some of the highest peaks of Odisha namely Gandhamardan, Gonasika and Thaurani. Keonjhar Planning area has similar characteristics like that of other hilly region of the district. The western side of the town is hilly vast terrain. Though there is no big river flowing through the master plan limit of Keonjhar, River Aradei flows on the eastern part of the master plan area, which formerly formed the boundary of the previous master plan area. Besides some of undulating hilly terrain and streams, vast area is covered by greens within the master plan area. The fringe areas are at a higher altitude while the central area is flat, where the existing urban extent of the town is situated.

2.3.2 Climate

Being away from the coastal belt, the region experiences a sub-tropical climate with a hot summer, chilling winter with good precipitation. The region is characterised by an oppressively hot summer with high humidity and well distributed rainfall during the monsoon season. The summer season prevails from March to May with May being the hottest month. Monsoon season is from June to September. The weather becomes more pleasant with the advent of the monsoon in June and remains as such up to the

end of October. Winter season starts from the end part of November and lasts up to February.

2.3.3 Temperature

Summer generally commences in the month of March, the effect of which is felt till the mid of June when monsoon sets in the state. May is the hottest month when the mean daily maximum temperature raises up to 41°C. With the onset of monsoon, early in the June, day temperature drops down. From the month of October, both day and night temperature begins to fall. The winter season begins in November and lasts till February with December, which is usually the coldest month. The minimum temperature falls up to 11° C in the month of December.

2.3.4 Rainfall

The average rainfall recorded in the region is 1534.5 mm. By early June, the southwest monsoon arrives in the state and lasts till October. The month of July and August receive the heaviest rainfall. The rainfall pattern over the year show that the South-West monsoon (June- September) results in higher rainfall with more rainy days than any other rainfall period. The rainfall is fairly uniform throughout the district and the variation in annual rainfall is not significant.

2.3.5 Wind

The wind velocity is light or moderate throughout the year with some increase in the month of April and May. Prevalent wind direction is between south-west and south-east in summer and south-west during monsoon season. In the post-monsoon and winter season, winds are mainly from south or south-east direction. In the month of May and post-monsoon season storms and depression over Bay of Bengal reaches the district and causes heavy rain and high winds.

2.3.6 Soil

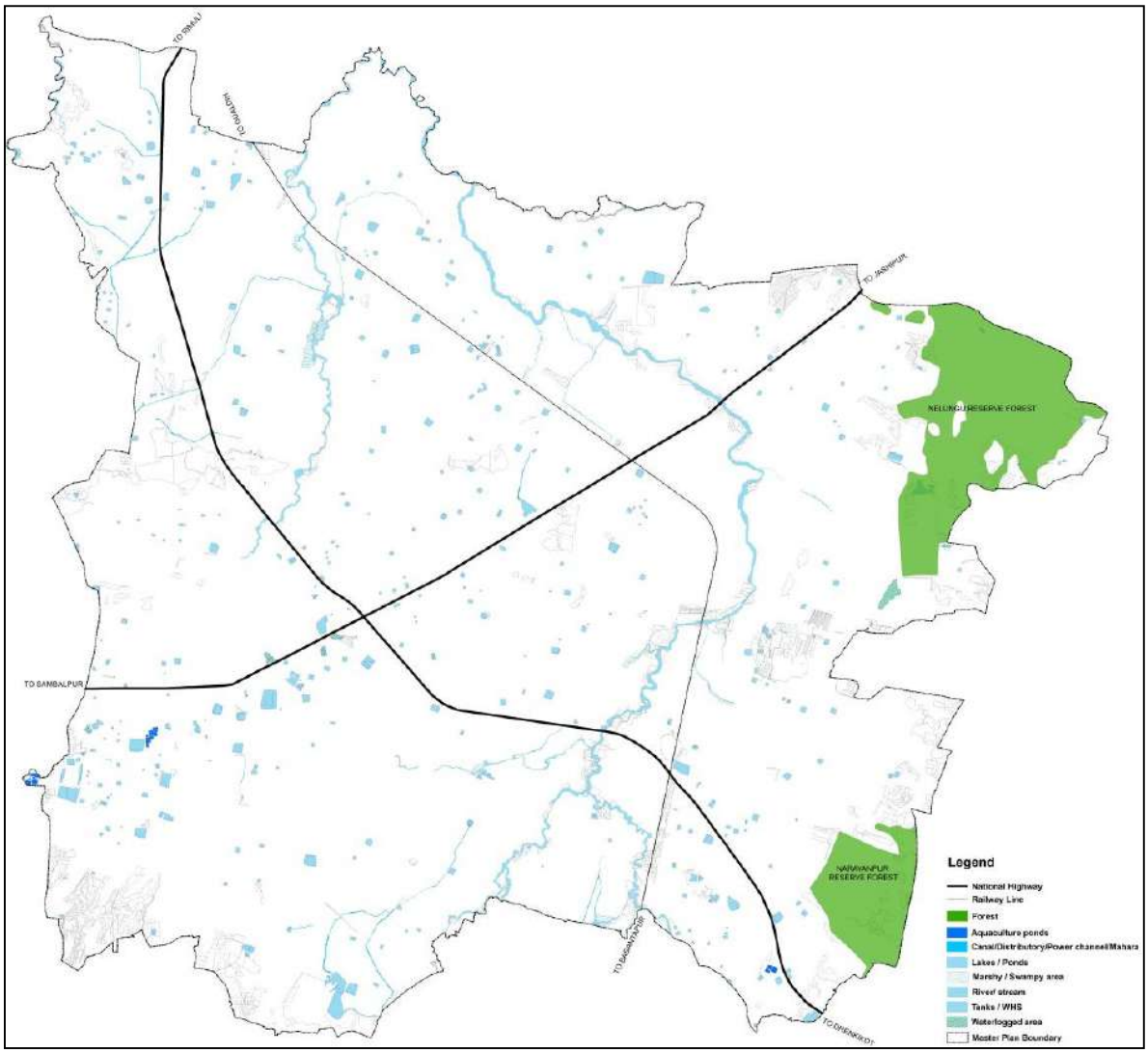
In the district, red soil is present in majority of areas whereas black soil is limited to a small patch in the southern part of the district. The district has rich deposits of iron and manganese ore, which results in red colour of the soil due to presence of iron oxides.

2.3.7 Water Resource

There are very few number of water resources in the planning area except some natural nallah, small rivers, ponds, streams. River Ardei, which is a tributary of Baitarani River, is the only river which flows on the north-eastern side of the Keonjhar town. Apart

from River Ardei, there are a number of natural waterfalls in the master plan area, which add to the tourism potential of the region. Badaghagara waterfall, situated almost 9 km. away from the district headquarter on a small river Machha Kandana, plunges from a height of 60 m. Being a perennial source of water, it acts as a major source of water supply for the town along with other ground water resources. The map below shows the presence of water bodies distributed evenly through the planning area.

Map 2-3: Water Bodies in Planning Area- Keonjhar Master Plan



Source : REPL, 2016

Apart from Badaghagara, Sanaghagara is also a significant tourist spot in the district. Sanaghagara, a perennial waterfall, is located at a distance of 6km. from Keonjhar town and is situated on the upstream of Badaghagara waterfall. The area spreads over 488 Ha of hilly tract with mixed deciduous and miscellaneous types of forest. The

area attracts a number of visitors throughout the year and occupies a position on the tourist map of Odisha.

Ponds in the region are mainly used for household activities in the rural environ. In summer season, drinking water becomes scarce in the planning area as the ground water level depletes. Therefore proper intervention needs to be taken up for augmentation of existing water supply system in the planning area.

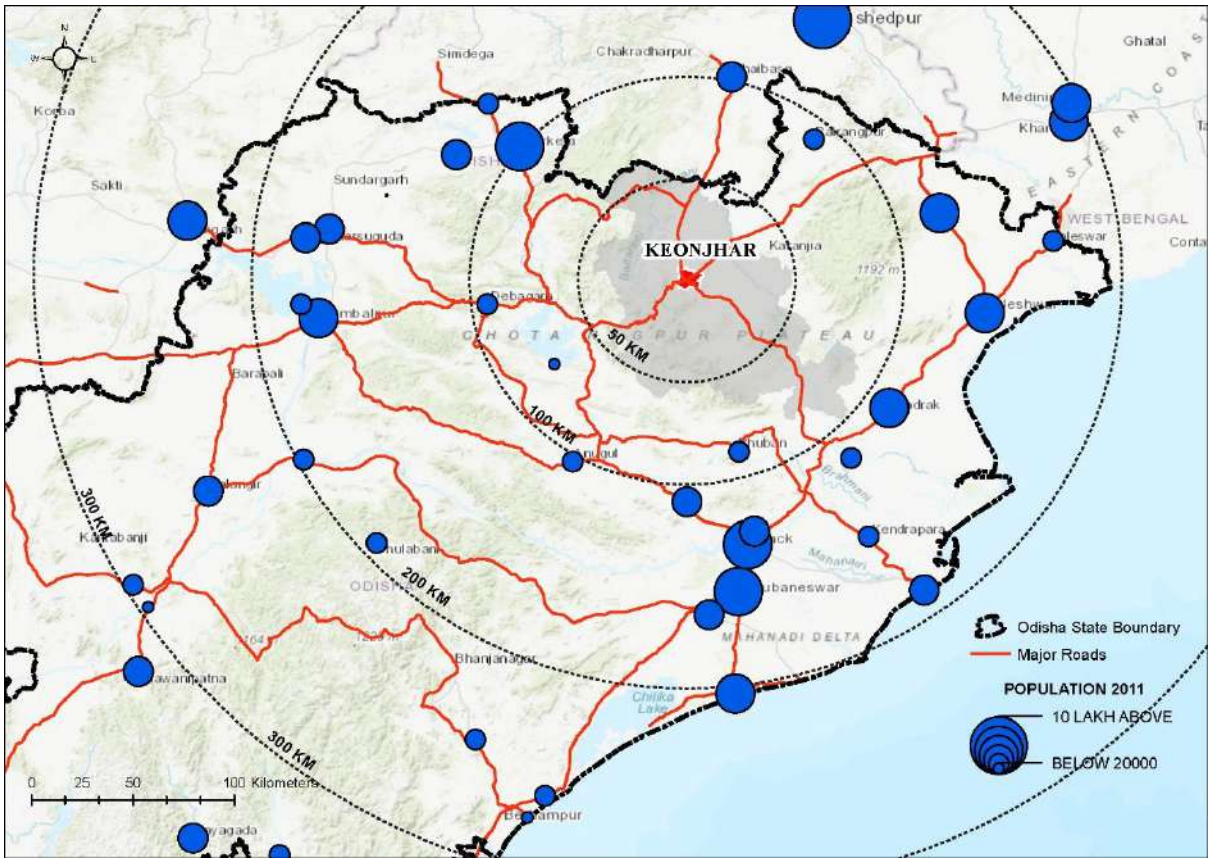
2.3.8 Flora and fauna

The origins of the word Kendujhar (another name for Keonjhar) itself means Kendu (*Diospyros melanoxylon*) forest (Jhar), which is a local species of tree found extensively throughout the area. The Keonjhar district, in general, has around 30% area covered with reserved forest where wide variety of wildlife flourishes. The most common types of vegetation in the area are found in evergreen deciduous forests and tropical semi evergreen forest both of which have Sal (*Shorea robusta*) and its allies Asan, Piasal, Kurum, Kangra and Dhawra and Daba bamboo (*Bamboosa arundinacea*) and Kendu trees in large proportions. Variety of forest-based goods like timber, paper and bidis are produced from the forests in Keonjhar.

Keonjhar provides rich habitats for a variety of animal species. Due to presence of forests and hilly terrain in the district, various wild animals like tigers, leopards, small herds of wild elephants, Sambhar deer, wild bison, wild boars, black bears and monkeys exist in the forest areas. The reserve forests in the Planning boundary also have population of monkeys and black bears. Due to deforestation, however, the habitats of these animals are being destroyed. As new human settlements come up in the vicinity of forest areas there is always a chance of conflict between wild animals and human inhabitants.

2.3.9 Regional Linkages

Map 2-4: Regional Connectivity - Keonjhar



Keonjhar master plan area is located in mineral rich northern zone of Odisha with a number of urban centres nearby. Several modes of transport connect the planning area with rest of the cities of the state and nearby states as well. The National Highway-215 from Panikoili to Rajamunda passes in the middle the town. This road connects the town with Jajpur and on the other hand to Joda. This is a busy highway for transportation of iron ore in the state. Also National Highway-49 passes through the planning area and forms junction at the town with NH-215 connecting Panikoili-Anandapur – Kendujhargarh – Rajamunda on NH 23. The road connects the town with Jasipur on the east and Sambalpur on the west.

The planning area is also connected by rail network. Keonjhar railway station is on the Padapahar- Jakhapura branch line of Tatanagar – Bilaspur section of Howrah-Nagpur- Mumbai line. Iron ore is the main good transported by the railways in the region. Also a good number of passenger trains connect Keonjhar to major towns of the country. Puri- Chakradharpur Express along with Keonjhar- Bhubaneswar Fast Passenger connects the town with the state capital, Bhubaneswar.

Biju Patnaik International Airport at Bhubaneswar is the nearest airport to Keonjhar and located at a distance of 200 km. An air strip, known as Raisuan Air Strip, is located in Gopinathpur village within the master plan boundary. At present, no service is available for general passenger operations as it is only used for Government or defence purpose.

Table 2-8: Road Connectivity to Nearest Major Settlements

Sl. No.	Name of Nearest Urban Centre	Distance (km)
	Barbil	74
1.	Bhubaneswar	215
2.	Kolkata	220
3.	Jamshedpur	180
4.	Ranchi	252

CHAPTER-3 DEMOGRAPHIC PERSPECTIVE

Demographic and economic analysis is needed in all stages of the planning process for both new and revised plans. It is required to identify problems and needs of the community, establish goals and objectives, assess alternate courses of action, allocate resources for plan implementation, and evaluate the ability of the plan to achieve goals and objectives. This chapter outlines the demographic, social and economic profile of the master plan area along with projections for master plan period.

3.1 Demographic Profile

Population growth and change has a major impact on the urban fabric of a region. To guide the physical, social and economic development of a region, study of existing demographic indicators, such as population distribution, growth trends, and density pattern along with population projection for the horizon year of 2030, is an essential step.

3.1.1 Population Growth Trends

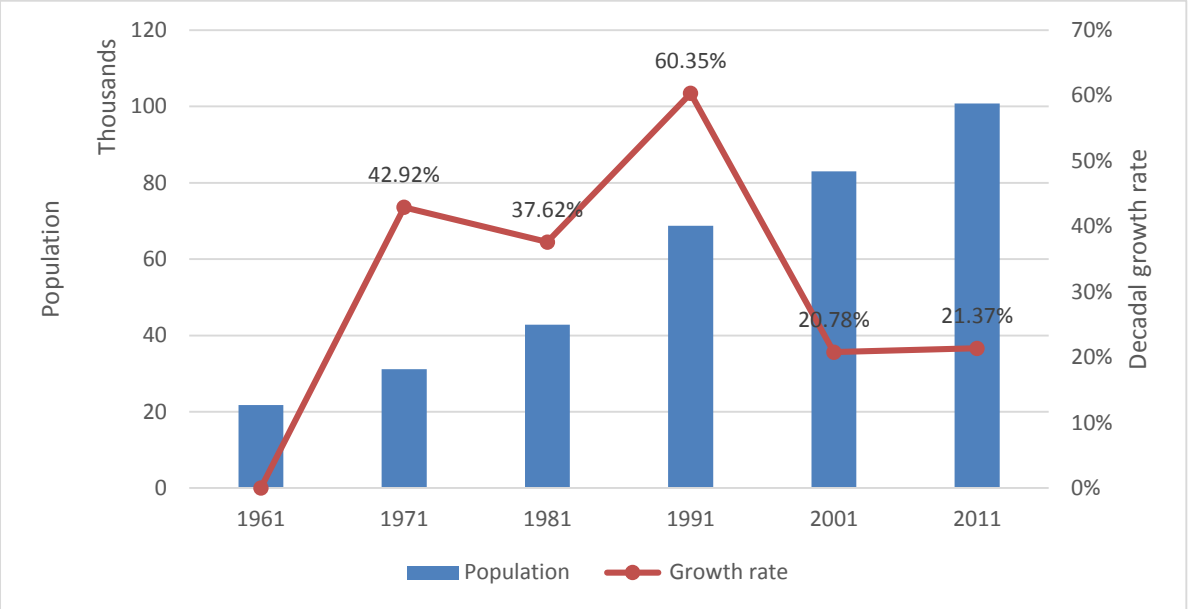
The Keonjhar planning area extends over 87.36 Sq.km, consisting of 68 revenue villages and can be divided into 2 parts. The first part is the urban area which comes under the municipal jurisdiction, henceforth, called municipal area. The remaining area, comes outside the municipal boundary and has rural characteristics. The Municipal area consists of 28 revenue villages and has an area of 25.4 Sq. km which is subdivided into 21 wards for administration. The remaining area consists of around 40 revenue villages having an area of around 62 Sq.km. The following table shows the increase in population of the Master Plan Area over last three decade (1981-2011).

Table 3-1: Growth in Population of Keonjhar Master Plan Area

Description	Population 1981	Population 1991	Population 2001	Population 2011
Keonjhar Master Plan Area	42859	68725	82121	100501
Keonjhar Urban	28059	41945	51845	60590
Keonjhar Rural	14800	26780	30276	39911

Source: Census of India

Figure 3–1: Population Growth Trends- Keonjhar Master Plan Area



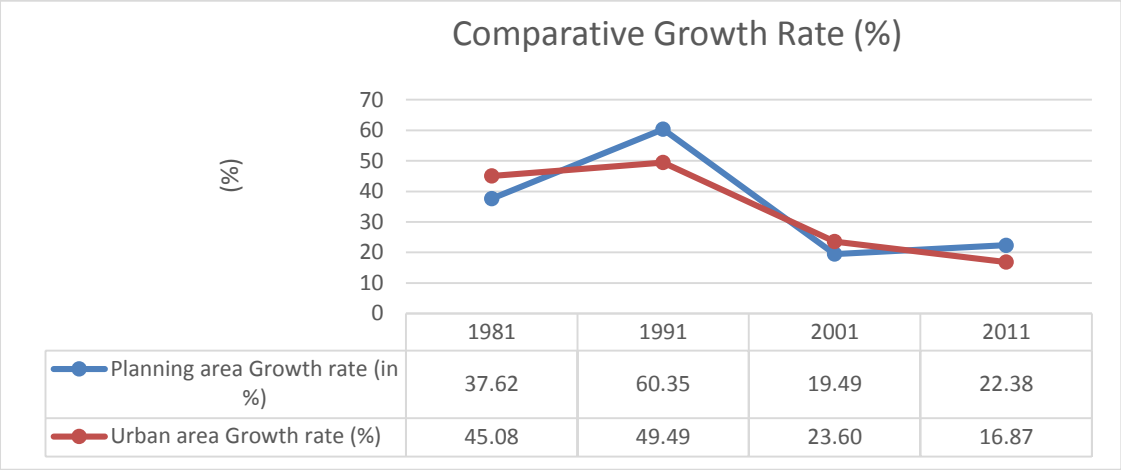
Source : Based on Census of India

Growth rate trend in last four decades clearly points out that in the period 1981-1991, the growth rate was quite high with 60.35% of decadal growth rate. Higher growth rate during this period might be attributed to the inclusion of surrounding rural villages, contiguous to Keonjhar municipality, having urban character, as out growths. However, the growth rate in last 2 census decades show that the master plan area experienced a lower population growth rate with steadily increasing population i.e. 19.49% during 2001 and 22.38% during 2011. This lower growth rate could be a result of lack of economic opportunities and associated migration. It is also very essential to analyse the growth rate of villages and urban areas to know the growth pattern within the master plan area.

Population – Keonjhar Urban

Keonjhar urban area indicates the Keonjhar Municipality whose population is 60,590 (as per census 2011) whereas in 2001, the city had population of 51,845 which shows a decadal population growth rate of 16.87% from 2001 to 2011. It is observed that, since 1991, rate of decadal population growth rate is decreasing and it is more or less on the same pattern of decadal population growth rate of master plan area. Lack of economic activities and employment opportunities in the region leading to out-migration could be the reasons for the declining growth rate.

Figure 3–2: Growth Rate- Master Plan Area vs Urban



Source: Census of India

Table 3-2: Demographic Profile of Keonjhar Municipality– 2011

Particulars	Details	Particulars	Details
Number of Households	13627	Average HH size	4.45
Total population	60590	Sex Ratio	925
Total Male population	31481	Sex Ratio (0-6 Year)	940
Total Female population	29109	Proportion of SC (in %)	13.3
Population in 0-6 years age group	6438	Proportion of ST (in %)	23.5
SC Population	8031	Literacy Rate (%)	78.0
ST Population	14217	Work Participation Rate	33.7
Literates	47238	% of Main Worker	30.0
Illiterates	13352	% of Marginal Worker	3.8
Total Worker	20441	% of Non-worker	66.3
Main Worker	18165		
Marginal Worker	2276		
Non Worker	40149		

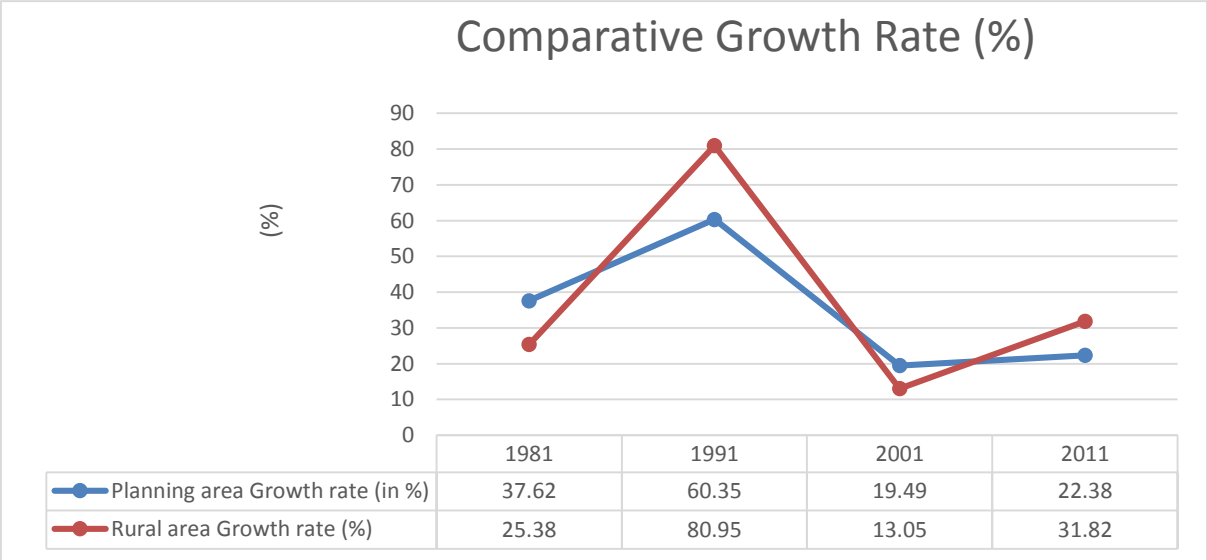
Source : Census of India, 2011

Population - Keonjhar Rural

It consists of 40 numbers of revenue villages surrounding the Keonjhar town as notified in the Master Plan. The total population of Keonjhar Rural is 39,911 as per the census 2011 which was 30,276 in 1991 showing 31.82% decadal population growth rate.

Since 1981, decadal population growth rate of rural area under the master plan area is in concurrence with growth rate of total master plan area, as shown in figure below. So, the sudden increase in rate of decadal growth rate is mainly because of inclusion of more revenue villages under master plan area.

Figure 3–3 : Growth Rate- Master Plan Area vs Rural



Source: Census of India

Table 3-3: Demographic Profile of Keonjhar Master Plan Area (Rural) - 2011

Particulars	Details	Particulars	Details
Number of Households	8835	Average HH size	4.52
Total population	39911	Sex Ratio	956
Total Male population	20400	Sex Ratio (0-6 Year)	971
Total Female population	19511	Proportion of SC (in %)	18.3
Population in 0-6 years age group	5193	Proportion of ST (in %)	42.0
SC Population	7321	Literacy Rate (%)	64.1
ST Population	16765	Work Participation Rate	36.3
Literates	25563	% of Main Worker	26.6
Illiterates	14348	% of Marginal Worker	9.7
Total Worker	14472	% of Non-worker	63.7
Main Worker	10620	Rural area includes all 40 revenue villages.	

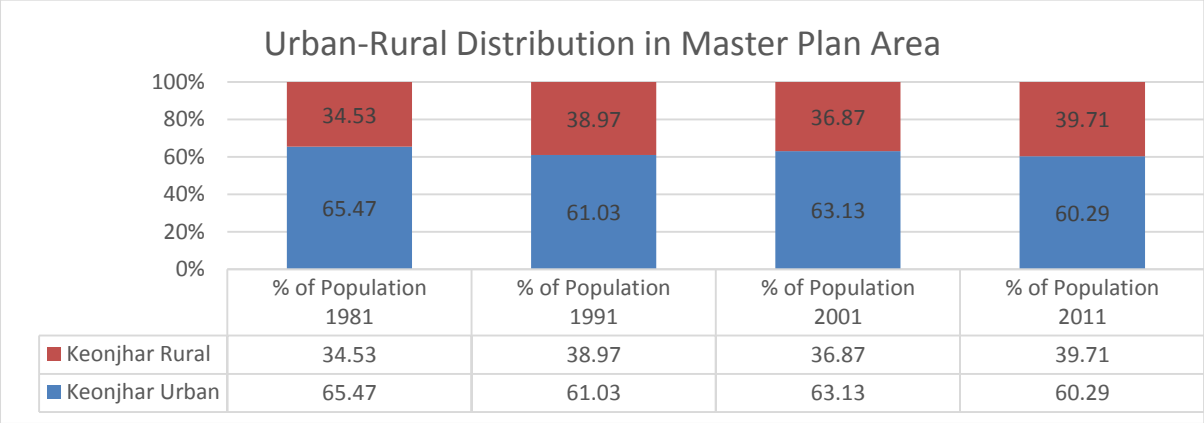
Particulars	Details	Particulars	Details
Marginal Worker	3852		
Non Worker	25439		

Source : Census of India, 2011

3.1.2 Population Distribution

The population distribution in the planning area shows that majority of population in the area is concentrated in Keonjhar Urban area (60.29%, in 2011), but since 1981 percentage share of population in urban area to the total master plan area is decreasing. This might be due to better economic opportunities available in the proximity town such as Barbil and Joda.

Figure 3–4: Share of Urban-Rural Population in Master Plan Area



Source: Census of India

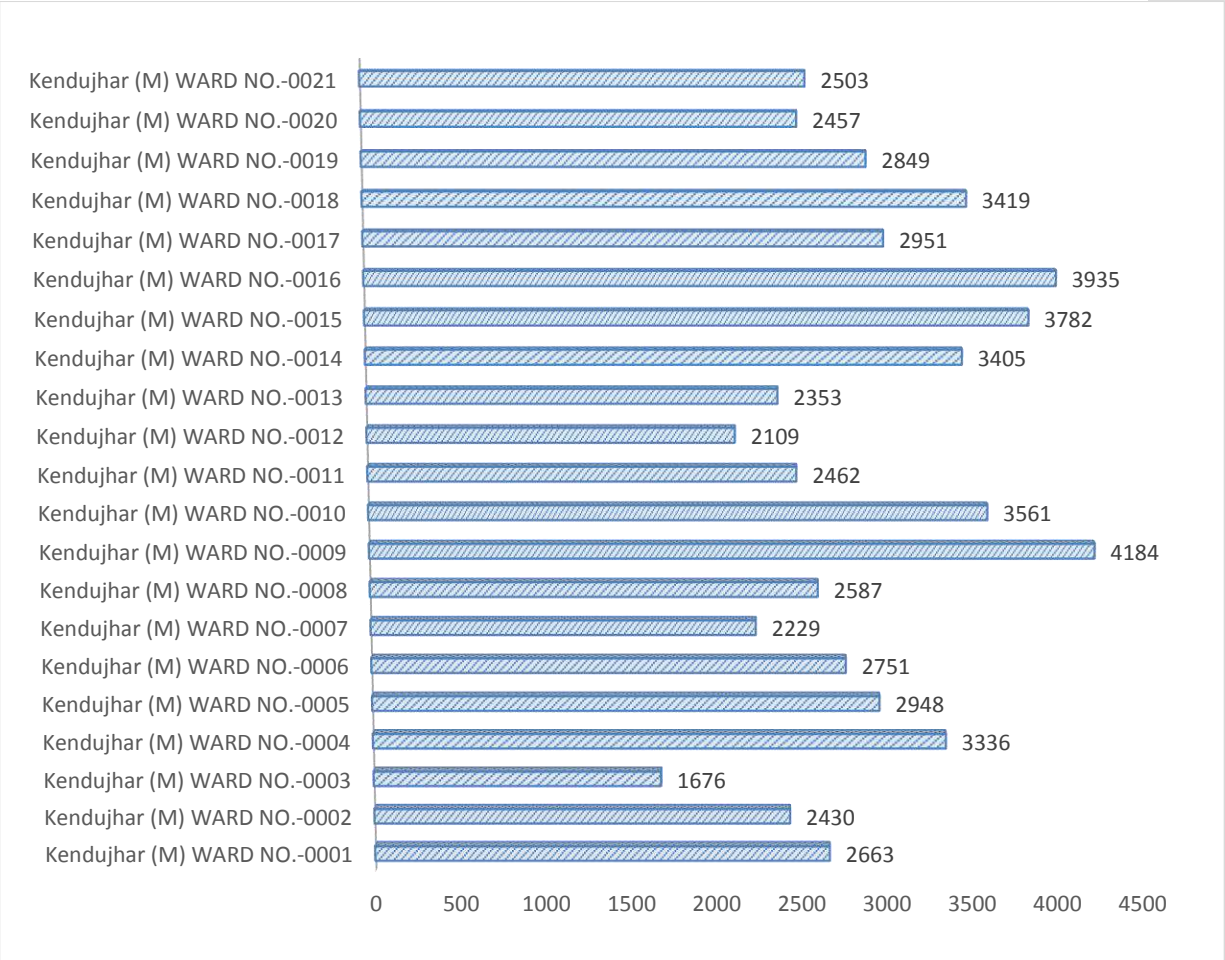
Table 3-4: Ward-wise Population Details- Keonjhar Urban- Census 2011

Name of Ward	No. HH	TOTAL NO. OF PERSONS	TOTAL NO. OF MALE	TOTAL NO.OF FEAMLE
Keonjhar (M) WARD NO.-0001	597	2663	1352	1311
Keonjhar (M) WARD NO.-0002	547	2430	1235	1195
Keonjhar (M) WARD NO.-0003	359	1676	862	814
Keonjhar (M) WARD NO.-0004	755	3336	1695	1641
Keonjhar (M) WARD NO.-0005	680	2948	1492	1456
Keonjhar (M) WARD NO.-0006	642	2751	1394	1357
Keonjhar (M) WARD NO.-0007	397	2229	1431	798
Keonjhar (M) WARD NO.-0008	597	2587	1334	1253
Keonjhar (M) WARD NO.-0009	978	4184	2228	1956
Keonjhar (M) WARD NO.-0010	820	3561	1852	1709
Keonjhar (M) WARD NO.-0011	555	2462	1275	1187
Keonjhar (M) WARD NO.-0012	473	2109	1113	996
Keonjhar (M) WARD NO.-0013	546	2353	1239	1114
Keonjhar (M) WARD NO.-0014	724	3405	1774	1631

Name of Ward	No. HH	TOTAL NO. OF PERSONS	TOTAL NO. OF MALE	TOTAL NO.OF FEAMLE
Keonjhar (M) WARD NO.-0015	860	3782	2006	1776
Keonjhar (M) WARD NO.-0016	861	3935	2065	1870
Keonjhar (M) WARD NO.-0017	699	2951	1537	1414
Keonjhar (M) WARD NO.-0018	776	3419	1668	1751
Keonjhar (M) WARD NO.-0019	652	2849	1392	1457
Keonjhar (M) WARD NO.-0020	560	2457	1281	1176
Keonjhar (M) WARD NO.-0021	549	2503	1256	1247
Total urban	**13627**	**60590**	**31481**	**29109**

Source : Census of India, 2011

Figure 3–5: Ward-wise Population Details- Keonjhar Urban- Census 2011



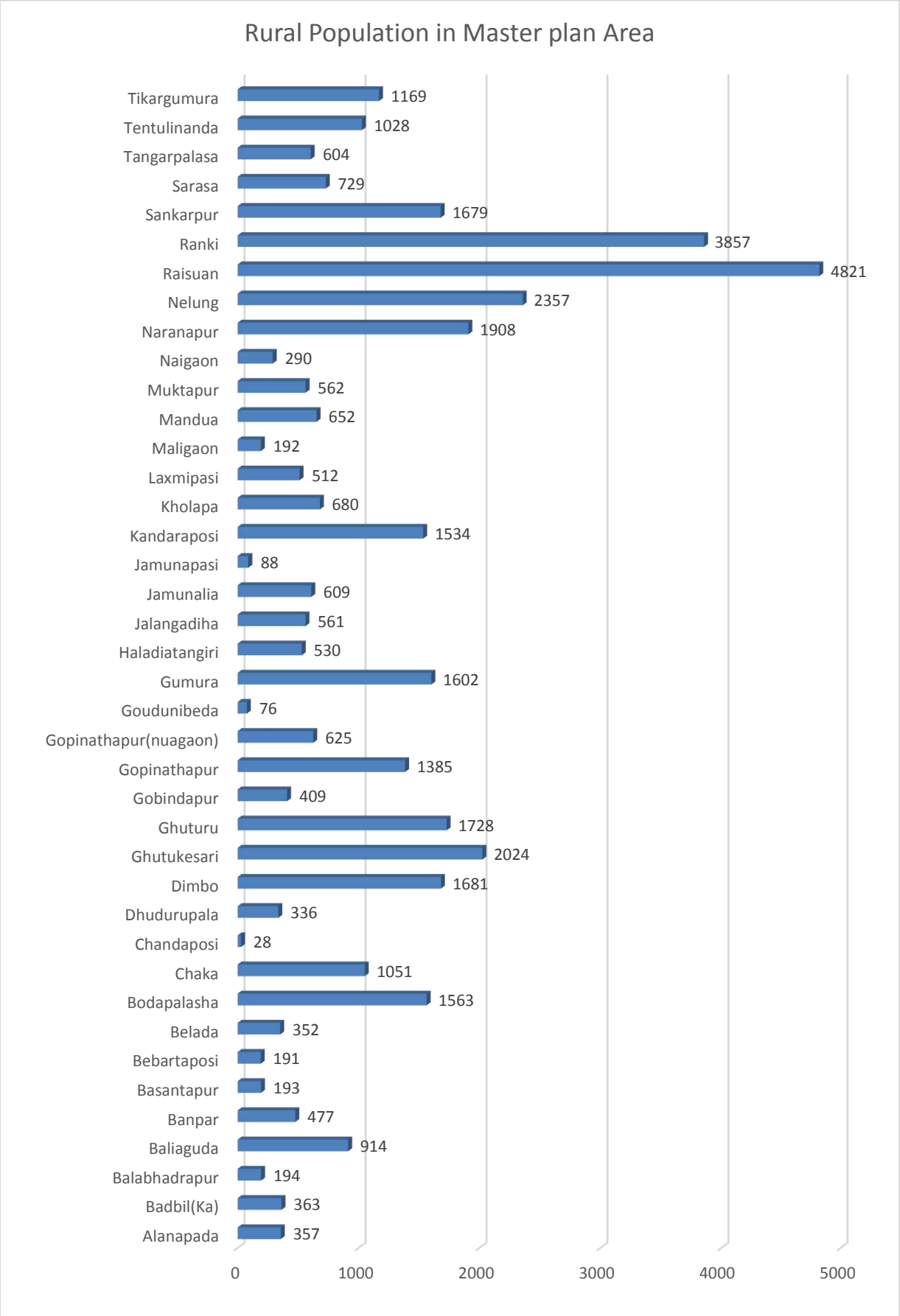
Above table shows that while population is almost evenly distributed among the wards, ward no-9 is most populated followed by ward no-16, 15 and 10. In rural areas, however, the population is not evenly distributed. Some of revenue villages like Ranki, Raisuan, Nelung and Ghutukeshari have larger areas.

Table 3-5: Village-wise Population Details- Keonjhar Rural- Census 2011

Name of Village	No_HH	TOTAL NO. OF PERSONS	TOTAL NO. OF MALE	TOTAL NO. OF FEMALE
Alanapada	87	357	175	182
Badbil(Ka)	95	363	190	173
Balabhadrapur	43	194	95	99
Baliaguda	206	914	478	436
Banpar	113	477	266	211
Basantapur	44	193	99	94
Bebartaposi	46	191	90	101
Belada	80	352	186	166
Bodapalasha	454	1563	762	801
Chaka	240	1051	537	514
Chandaposi	6	28	24	4
Dhudurupala	84	336	154	182
Dimbo	380	1681	876	805
Ghutukesari	448	2024	1012	1012
Ghuturu	412	1728	876	852
Gobindapur	100	409	212	197
Gopinathapur	278	1385	674	711
Gopinathapur(nuagaon)	142	625	331	294
Goudunibeda	16	76	42	34
Gumura	337	1602	821	781
Haladiatangiri	110	530	275	255
Jalangadiha	121	561	291	270
Jamunalia	127	609	314	295
Jamunapasi	21	88	41	47
Kandaraposi	314	1534	766	768
Kholapa	142	680	344	336
Laxmipasi	112	512	268	244
Maligaon	49	192	95	97
Mandua	145	652	323	329
Muktapur	125	562	302	260
Naigaon	74	290	146	144
Naranapur	353	1908	1000	908
Nelung	544	2357	1175	1182
Raisuan	1080	4821	2424	2397
Ranki	786	3857	1894	1963
Sankarpur	334	1679	1006	673
Sarasa	178	729	386	343
Tangarpalasa	142	604	321	283
Tentulinanda	219	1028	525	503
Tikargumura	248	1169	604	565
Total rural	**8835**	**39911**	**20400**	**19511**

Source : Census of India, 2011

Figure 3–6: Rural Population Details- Keonjhar Rural- Census 2011



3.2 Population Density

The planning area of Keonjhar stretches over an area of 87.36 sq.km with a total population of 1,00,501, which gives rise to a population density of 1,150 persons/ sq.km over the master plan area. Keonjhar urban area, consisting of municipality area, shows a higher population density of 2,385 persons per sq.km than 644 persons/ sq.km of Keonjhar rural. Thus, the municipal area is more than three times denser than the rural area.

Table 3-6: Population Density - Master Plan Area, Keonjhar

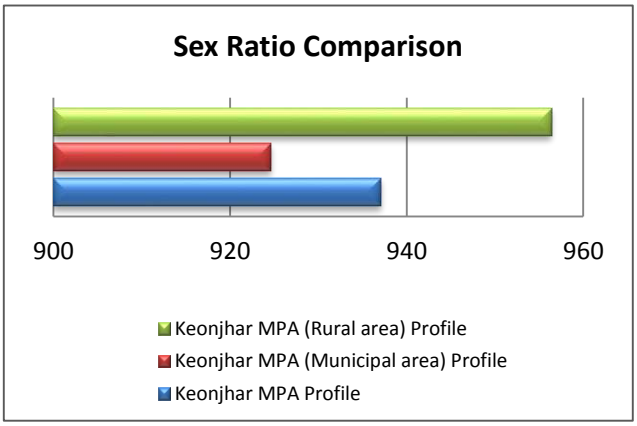
Description	Population 2011	Population Density (ppsqkm)
Keonjhar Master Plan population	100501	1150
Keonjhar Urban	60590	2385
Keonjhar Rural	39911	644

3.3 Sex Ratio

The sex ratio is an important indicator for assessment of social profile in a given area. It gives an overall distribution and ratio of male and female population. As per the 2011 census data, the sex ratio of the Master Plan Area is 937. In rural areas of MP area, the sex ratio is quite higher than the urban area. In Keonjhar urban, the sex ratio is 925 whereas it is 956 in rural areas.

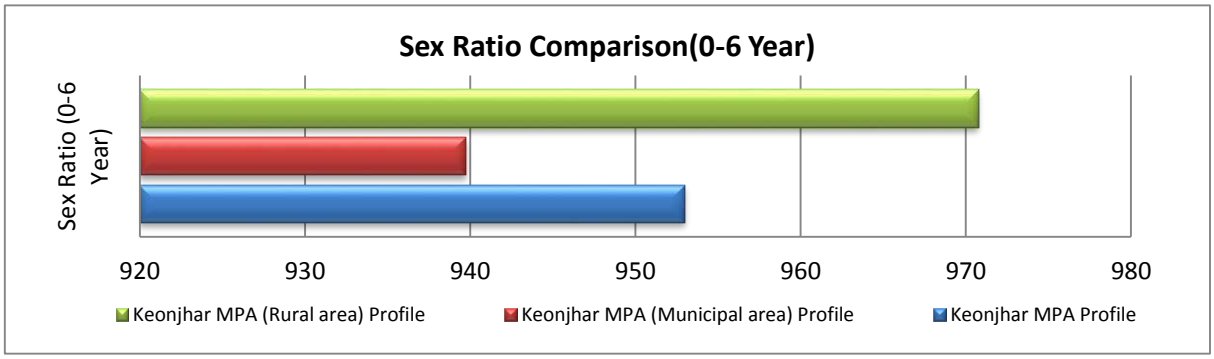
The child sex ratio (0-6 yrs.) for urban areas of the Master Plan area is lower than the rural areas. The child sex ratio is 940 in urban areas, whereas in rural areas it is as high as 971. The overall child sex ratio within the Master Plan area is 953. Better child sex ratio in the rural areas indicates that the acceptance of girl child in rural families is higher than the urban areas.

Figure 3–7: Sex Ratio- Keonjhar Master Plan Area



Source: (Census of India)-2011

Figure 3–8: Child Sex Ratio- Keonjhar Master Plan Area



Source: (Census of India)-2011

Compared to urban centres, rural areas have high sex ratio as seen in the table below which is primarily due to migration of working males into urban centres from rural places. During the last decade, sex ratio in all parts of the region has improved at a steady rate, as shown in the table below. This is probably due to rising education levels, awareness among people and change in mind set, which gives a positive note for the region.

Table 3-7: Sex Ratio- 2001 & 2011, Keonjhar MP Area

Unit	Population_2001			Sex Ratio (2001)	Population_2011			Sex Ratio (2011)
	Total	Male	Female		Total	Male	Female	
Keonjhar Urban	51845	27486	24359	886	60590	31481	29109	925
Keonjhar Rural	30276	15581	14695	943	39911	20400	19511	956
Keonjhar Master Plan Area	82121	43067	39054	907	100501	51881	48620	937

Source : Census 2001 & 2011

3.4 Literacy Rate

Literacy rate is one of the key parameters for demographic analysis. The literacy rate in the master plan area is 73 %. The overall literacy rate is almost at par with Odisha state. The municipal area, which is more urbanized as compared to the rest of the master plan area shows higher literacy rate of 78% while the rural areas outside the municipal areas have much lower literacy rate of around 66%. Providing adequate primary educational facility in the rural areas is required and it is a challenge due to the dispersed settlements and low density. Low literacy rate in the rural area can be

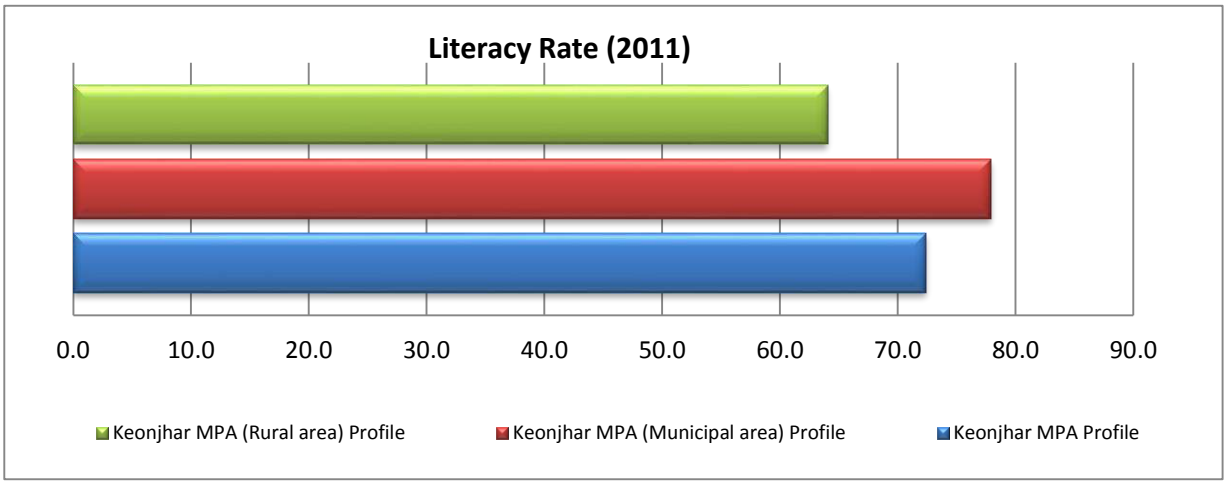
attributed to lack of public awareness, unemployment and low economic status of the people.

Table 3-8: Literacy Rate- Keonjhar Master Plan Area

Particulars	Total Literates	Male Literates	Female Literates	Literacy Rate (in %)
Keonjhar Master Plan Area	72801	40604	32197	73
Keonjhar Urban	47238	25927	21311	78
Keonjhar Rural	25563	14677	10886	66

Source: (Census of India)-2011

Figure 3–9: Literacy Rate Comparison

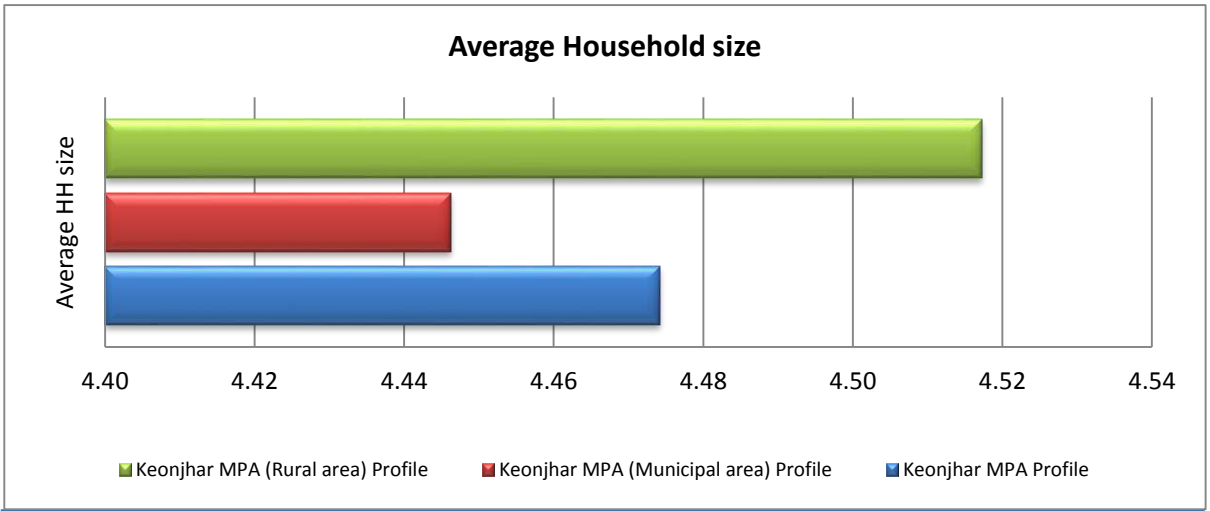


Source: (Census of India)-2011

3.5 Household size

The average household size in Odisha is around 4.8, while Keonjhar master plan area has household size around 4.47. As expected, average household size in the rural areas is more than urban area.

Figure 3–10: Average Household Size



Observations:

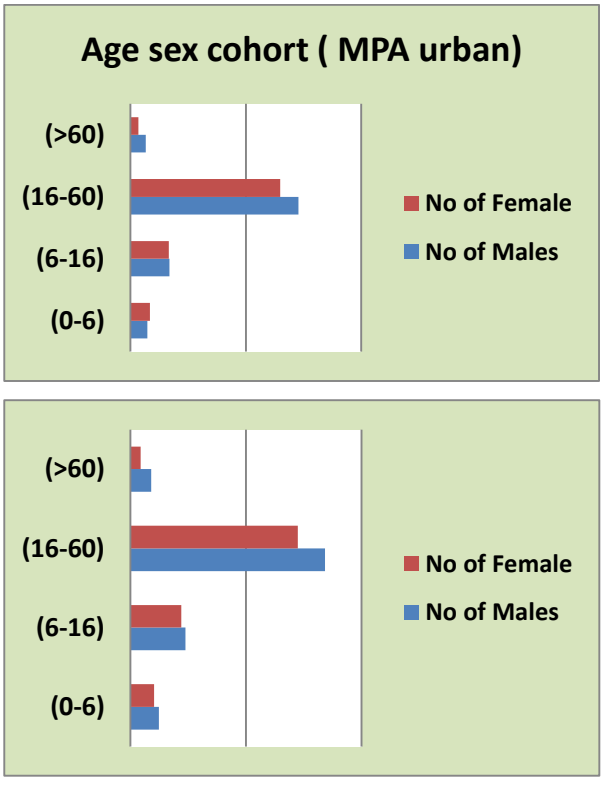
Though the area is, in general, economically stagnant with low household income, the family size is smaller. This indicates awareness of family planning.

Source: Census of india (Data)

3.6 Age-sex cohort

In both the urban and rural areas the majority of the population belongs to the working class group while the next highest group was that of young children in the age group of 6-16. The share of working males is about 65-70 % in both urban and rural areas. The children below 6 years of age constituted less than 10 percent of the population. More than 70% of the population is of lower age than 60 and thus falls in working age group. The urban area overall had a higher percentage of working population than the rural area as more number of workers are present where the jobs are located i.e. in the urban area.

Figure 3–11: Broad age sex cohort in master plan area.

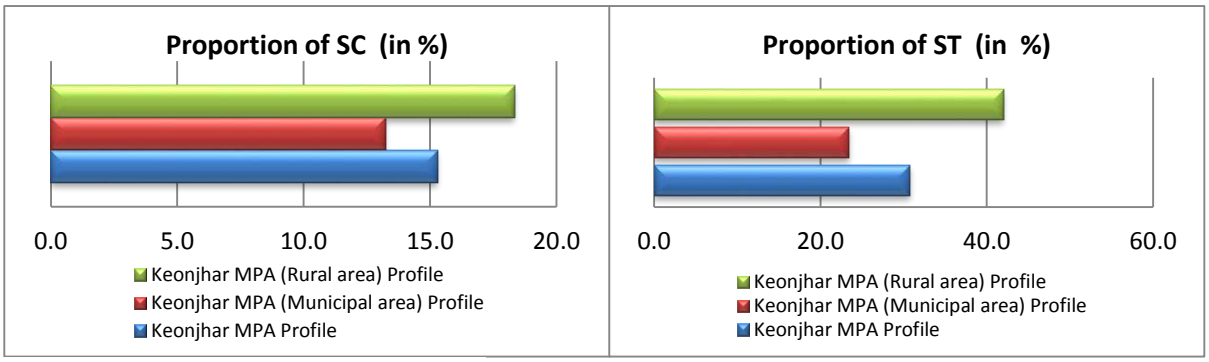


Source: Primary survey

3.7 Ethnic Population

Due to the presence of large number of tribal population in the region, percentage share of people belonging to the minority and backward section of the society is quite high in the Master Plan area. Percentage of population belonging to SC outside municipal areas is around 20% and the percentage of population belonging to ST is as high as 42%. About 62.5% of the overall population in the rural areas belong to the underprivileged sections of the society. In urban areas, the number of people belonging to the under-privileged section of the society is significant.

Figure 3–12 : Distribution of SC and ST population



Source: Census of India 2011

Observations:

Providing equal opportunities to such a large section of the population is a challenge. Govt. schemes for such minorities have to be included at the urban level.

3.8 Population Projection

Population projection is a scientific attempt to predict future population scenario, based on certain assumptions and using data from past trends so as to provide base for other proposals. Different methods such as Arithmetic Progression, Geometrical Progression, Incremental Increase, Exponential Increase and Natural Increase & Net Migration Methods are used for population projection. Further, population change is the result of different demographic factors such as increase in area, fertility mortality and migration pattern.

The projected population for urban as well as rural area of Keonjhar Master Plan is calculated in above mentioned first four mathematical methods, which is depicted in the following tables.

Table 3-9: Population Projection - Keonjhar Master Plan

Year	Particulars	Arithmetic Progression Method	Geometrical Progression Method	Incremental Increase Method	Exponential Increase Method	Average Increase Method
2015	Keonjhar Urban	64427	68169	64569	68691	66464
	Keonjhar Rural	42639	44982	43085	45188	43974
	Master Plan Area	**107067**	**113152**	**107654**	**113879**	110438
2021	Keonjhar Urban	70183	81353	70690	82917	76286
	Keonjhar Rural	46359	53321	47949	53931	50390
	Master Plan Area	**116542**	**134674**	**118639**	**136848**	126676
2030	Keonjhar Urban	78817	106059	80215	109966	93764
	Keonjhar Rural	51937	68812	56318	70308	61844
	Master Plan Area	**130754**	**174872**	**136532**	**180274**	155608

Source: Census of India- 2011 & REPL Estimation

Figure 3–13: Population projection Keonjhar Master Plan Area for the year 2030

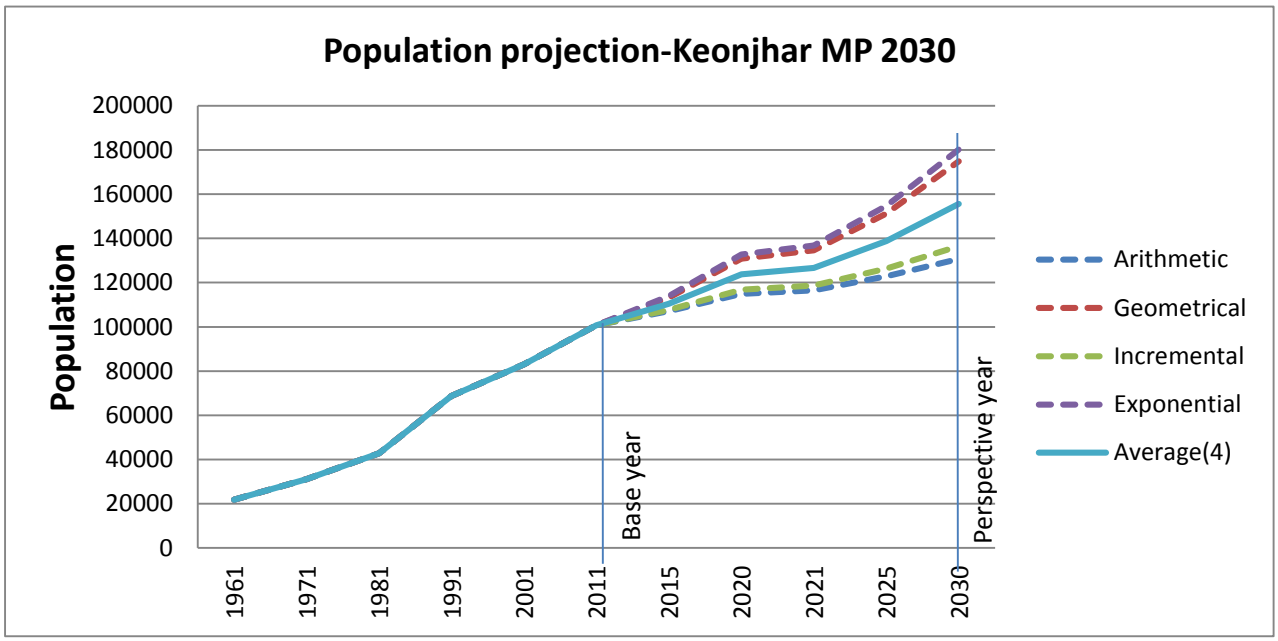
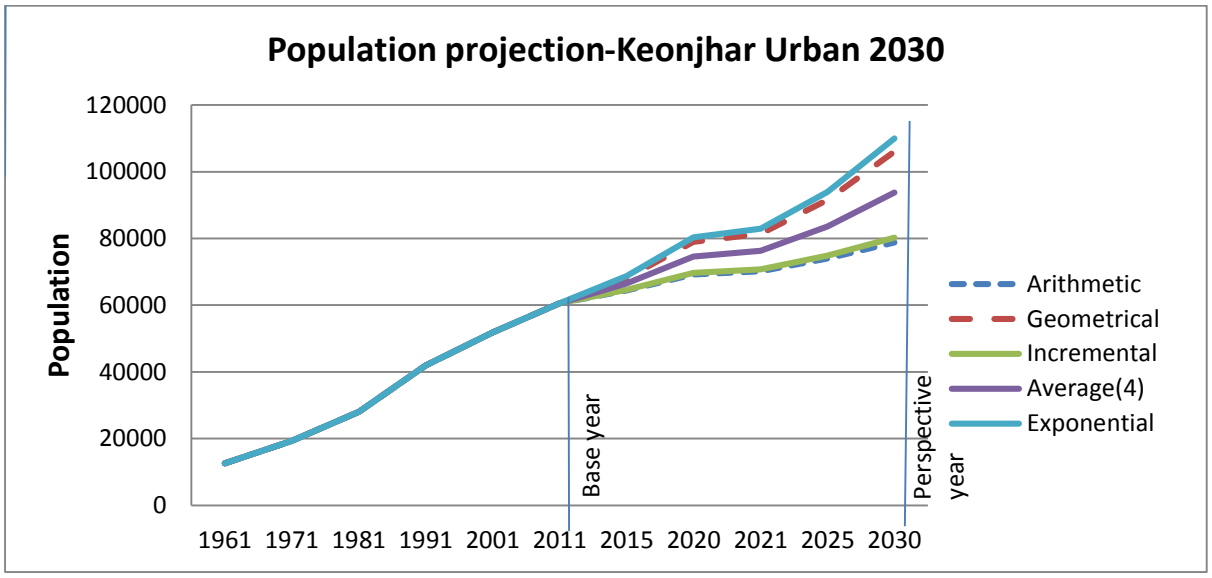


Figure 3–14: Population projection Keonjhar MPA (Municipal Area) for the year 2030



However, as none of the above four methods provide a realistic and achievable population projection, method of 'Natural increase and net migration' is used for projecting the population of Keonjhar MPA as explained in the section below.

Natural Increase & Net Migration Method:

Natural Increase and Net Migration method depends upon the factors like birth rate, death rate and the net migration rate. In this process of projection, the growth rate could be dynamic based on the socio-economic situation, the surroundings, the development possibilities etc. To calculate the growth rate, the natural increase rate has been derived by subtracting Death Rate from Birth Rate, which is also compared with the district, state, national average to derive the final figures. It is assumed that the natural growth rate will increase due to better health facilities and economic condition (affordability) than the present. Tables below compare vital statistics of the MPA with district and state and show annual natural growth rate of the area which varies between 1.12 and 1.16 (yr 2011). Therefore, for the purpose of projection, the initial natural growth rate of the Keonjhar has been taken as 1.15 in 2015.

Table 3-10: Population, Birth Rate, Death Rate, Natural Growth Rate & Migration

	1981	1991	2001	2011
Population	42,859	68,725	83,008	1,00,501
Growth Rate (Annual)		6.04	2.08	2.14
Birth Rate of State (Annual)	3.31	2.88	2.34	1.98
Death Rate of State (Annual)	1.31	1.28	1.02	0.82

	1981	1991	2001	2011
Natural Growth Rates (Annual)	**2**	**1.6**	**1.32**	**1.16**
Migration (Annual)		**4.44**	**0.76**	**0.99**

Source: Census of India

Table 3-11: Crude Birth Rate & Crude Death Rate – District Keonjhar

	2011	2012	2013
Crude Birth Rate District (per 1000 population)	20.50	20.30	20.40
Crude Death Rate District (per 1000 population)	9.40	9.30	9.20
Natural Growth (per 1000 population)	11.10	11.00	11.20
Natural Growth Rates	**1.11**	**1.10**	**1.12**

Source: Annual Health Survey, NRHM

Table 3-12: Crude Birth Rate & Crude Death Rate – State Odisha

	2011	2012	2013
Crude Birth Rate State (per 1000 population)	20.00	19.80	19.60
Crude Death Rate State (per 1000 population)	8.20	8.20	8.10
Natural Growth (per 1000 population)	11.80	11.60	11.50
Natural Growth Rate	**1.18**	**1.16**	**1.15**

Source: Annual Health Survey, NRHM

Table 3-13: Number of Migrants by Place of Last Residence – India 2001

	Category	Migrations by Place of Birth	Percentage (Decadal)
A.	Total Population	1,02,86,10,328	
B.	Total Migrations	31,45,41,350	30.58
B.1	Migrants within the state of enumeration	26,82,19,260	**26.08**
B.11	Migrants from within the districts	19,35,92,938	18.82
B.12	Migrants from other districts of the state	7,46,26,322	7.26
B.2	Migrants from other states in India	4,11,66,265	4.00
B.3	Migrants from other countries	51,55,423	0.50

Source: Census table 11: number of migrants by place of last residence – India 2001

Similarly, net migration rate of the area has been derived by subtracting Natural Growth Rate from the total growth rate of the town. It shows very high migration rate in 1991 and considerably low in 2001 (0.76) and 2011 (0.98). The average migration rate at national level is about 30%, of which 26% (decadal) is the migration within the

state (which is predominantly the migration from rural to urban and smaller town to cities). Thus, migration rate in the year 2015 is assumed as 1.12% (in reference to last two decades) for population projection. It is assumed that migration rate will increase at a slower rate as compared to the present rate due to new proposed economic activities in the planning area. Considering all the above assumptions and trends, population of the planning area for the horizon year 2030 has been proposed as-

Table 3-14: Population Projection 2030

	2011	2015	2020	2025	2030
Population	1,00,501				
State Natural Growth Rate (Annual) (Census)	1.16				
State Natural Growth Rate (Annual) (AHS)	1.18				
District Natural Growth Rate (Annual) (AHS)	1.11				
Natural Growth Rates annual	1.15	1.15	1.22	1.28	1.39
Net Migration Rate (Annual)	0.99	1.12	1.15	1.19	1.22
Net Growth Rate	2.14	**2.27**	**2.37**	**2.47**	**2.61**
Projected Population		**1,09,898**	**1,22,934**	**1,38,090**	**1,56,110**

Source: (REPL Estimation)

Out of the above explained five methods of population projection, Natural Increase and Net Migration Method appears to be most realistic and has been accepted for calculation of projected population. All the further calculations for the Master Plan Proposals will be based on the population derived by this method i.e. **1,56,110** for year 2030.

The population estimate projects the population to be around 1.5 times more than the population at present. Addition of 50% more people is going to have implication for the development of the area and will primarily affect proposals for land use planning and infrastructure like roads, community facilities and utilities. Planning proposals shall include measures to accommodate projected population in the master plan area, while increasing the level of service for different aspects of infrastructure to improve living conditions in the town.

CHAPTER-4 ECONOMIC BASE

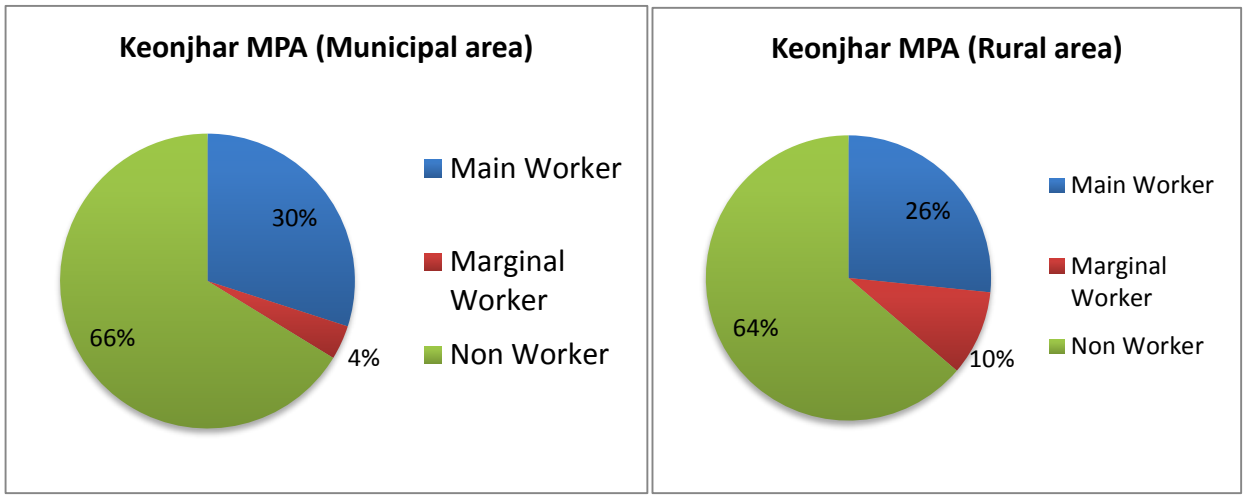
4.1 Socio-economic Perspective

Due to predominance of agriculture based activities in the region, Keonjhar is not an economically vibrant town. Even though the land is productive, along with sufficient rainfall, the agricultural activity seldom produces surplus. Tribal roots as well as widespread tribal culture in the region, influences the economic mindset of the population, who generally believe in a day to day production and consumption.

4.1.1 Work Force Participation

The work force participation in the area is quite low as compared to urban standards across the country. As much as 65% of the population does not participate in the economic activity. Even though large portion of women contribute in the agricultural activities and household chores, the official employment figures are lower as these activities do not form part of the official employment definition. Non-working population in the urban area is higher compared to the rural areas even though the literacy rate is higher, which is a peculiarity. However, it can be explained by higher family size which might consist of more number of dependent persons per family.

Figure 4–1: Details of workforce participation in Keonjhar Urban and Keonjhar Rural area



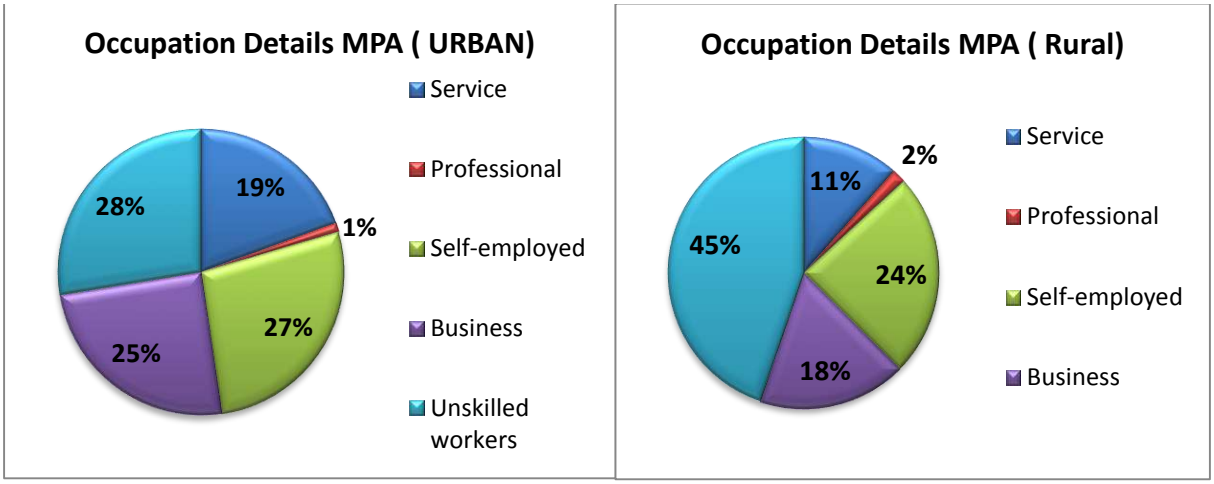
Source: Primary survey

4.1.2 Occupational structure

The overall percentage of main workers in the master plan area, according to census 2011, is around 29 percent. The numbers of main workers in urban area is comparatively higher than in rural areas. Contrary to the expectation, the overall percentage of the marginal workers is quite low at 4% in the municipal area. The

number of marginal workers in rural area is higher than that in urban area, possibly due to the greater number of agricultural laborers in the area. According to primary survey, number of unskilled labour is quite high in the area and constitute nearly half in the rural area and more than 1/4 th the Urban area.

Figure 4–2: Occupation structure in Keonjhar master plan area



Source: Primary survey

As expected, population involved in the service sector is higher in urban area (19%) as compared to rural area (11%). Around 27% of the population in the urban area are either self-employed or doing business, while in the rural areas the number of persons who are either self-employed or doing business is less than 25%. Lower entrepreneurial occupation in rural areas indicates need for promotion of self-employment, especially in rural areas. Rural areas also has a significant percentage (45%) of unskilled workers, which indicates negative influence on their employability.

4.2 Work force projections for master plan area.

Taking into account the projected population and growth in workforce, 70% of the population is assumed to be in working age category. At present the work force participation rate is round 35%. This is likely to rise to around 50% of the working population by 2030. Estimating the total population of 1,09,000 based on work force participation of around 50%, the total work force available by 2030 is estimated to be around 54,000 persons.

4.3 Primary Sector Activities

4.3.1 Agriculture

The rural part of Keonjhar Master Plan Area are primarily agrarian in nature. Around 53 percent of the total land under Keonjhar Master Plan Area is dedicated toward agriculture. Rice is the major produce in the area followed by maize and blackgram. Mango and cashew is the major fruit produce in the region. Under the vegetable category, brinjal and tomato are majorly produced in the area. The yield rate of rice is 1555 kg./ha., which comparatively low as compared to State average of 1821 Kg./ha. The spatial location of the agrarian activities spread over the master plan area is shown on the existing land use map.

4.3.2 Livestock

The cattle population in the area is 1.8 per household in Keonjhar district, which is relatively high as compared to State average of 0.5 per household in 2013-14. This indicates that there are sufficient cattle population and has scope of exporting milk and milk product to the neighbouring district. On the contrary, the Statistical profile of National Dairy Development Board shows that per capita milk availability in Keonjhar district is 67 gm./day as compared State average of 118gm/day in 2013-14.

4.4 Secondary Sector Activities

Keonjhar town is located in the industrial and minerals rich region and is the extension of the Chhotanagpur plateau. The region surrounding Keonjhar district is very rich in minerals, primarily, iron ore and manganese. The availability of these minerals has given rise to related industries such as handling, transport, processing and treatment of the minerals and metals and provides a base for the economy of the Keonjhar town as well as district.

4.4.1 Industry

Primarily all large and medium scale industries are iron ore and manganese-based and located in the northern region of the district around Barbil and Joda towns. However, not much industrial activity is located in proximity to Keonjhar town or its master plan area. Following table shows details of large and medium scale industries located within Keonjhar district.

Table 4-1: List of large and medium scale industries in Keonjhar district.

SL. No	Name of industry	Location	Item of products	Installed capacity	Project Cost (In crores)	Employment	Remarks
1	M/s TATA Sponge Iron Ltd	Bileipada	Sponge iron, CPP, CPP	1250 TPD, &.5 MT, 18.5 MT	113, 25.45	364	Large
2	M/s Orrisa Sponge Iron Ltd.	Palaspanga	Sponge iron, PA, Billett power plant	850 TPD, 100000 MTPA, 18 MWT	100, 36	615	Closed
3	M/s Kalinga Iron works	Matkambed	Pig iron sponge, spun pipe, gramulted slag, gas based power plant.	13110, TPM, 1683 TPM, 3312 TPM, 16 MWT	97.27, 7.30	1463	Large
4	M/s Ferro alloys Plant (TISCO)	Joda	High carbon ferro manganese	3400 MT, P.A	3	391	large
5	M/S ferro manganese Plants (TISCO)	Bramhanipal	high carbon ferro chrome	50000 TPA	169.1	571	Large
6	M/s Bansaspani Iron LTD	Jaribhal (JODA)	Sized iron Ore	200 TPH	6.44	36	Large
7	M/s Sesagoa Ltd Enterprises	Dalki Barbil	Sized iron Ore	150 TPH	14	127	Large
8	M/s East India Minerals	Belkundi	Sized iron Ore	200 TPH	16	212	Closed
9	M/s N.K Bhujani pvt Ltd.	Rugudi (Barbil)	Sponge iron Ms ignots	120 TPD, 4400 TPM	5	42	Large
10	Shree Metaliks ltd	loidapada, Barbil	Sponge iron, CPP, CPP	800 TPD., 8 MWH	100	376	Large
11	Kusum powerment ltd	Kutugaon	Sponge iron	300 tpd	15	120	Closed
12	Gerewal associated (P) Ltd	Matkambed a Barbil	Sponge iron	400 tpd	15	120	Large
13	Deepak steel & power ltd	Topadihi	Sponge iron	300 tpd	5.21	129	Large
14	M/s Rungta Mines ltd.	Karakela Barbil	Sponge iron	500 tpd	6.16	60	Large
15	M/s pattanik minerals ltd	Ramachandr apur naranpur	Sponge iron	180 tpd	30	51	Large
16	M/s OMDC Sponge iron ltd.	dalki thakurani	Sponge iron	100 tpd	13.45	65	Closed

SL. No	Name of industry	Location	Item of products	Installed capacity	Project Cost (In crores)	Employment	Remarks
17	M/s Crackers india alloys ltd	Gobardhanpur	Sponge iron	200 tpd	11	110	Large
18	M/s Aditya sponge power (P) ltd.	Dubulpal Telkoi	Sponge iron	200 tpd	15.24	140	Closed
19	M/s Jagannath steel (P) Ltd.	Uliburu, Barbil	Sponge iron, Ms Ignot	300 tpd, 8000 MTw	30	141	Large
20	M/s Shreeganesh Sponge Iron LTD.	Kutugaon	Sponge iron	30000 MTPA	9.99	100	Large
21	M/s Hima ispat iron ltd.	Barapad	Sponge iron	300 tpd	30	65	Large
22	M/s Msp sponge iron ltd.	Haldiaguna	Sponge iron, Ms Ignot, Rolled ppl	180 TPD, 1600 TPM, 1850 TPM	35	265	Large
23	M/s shree jagannath metalikes ltd.	Khaparakhai	Sponge iron	200 tpd	10	100	Large
24	M/s Pttanaik steel and alloys(p) ltd.	Purunapani, Joda	Sponge iron	350 TPD	35	120	Large
25	M/s Deepak steel & Power ltd.	Ulliburu	Sponge iron	200 tpd	15.91	54	Large
26	M/s Arya Iron & steel Ltd.	Matkambeda Barbil	iron ore pillets	1.2 TPY	99	500	Large
27	M/s Sumrit metaliks(P) Ltd	Soyabali	Sponge iron	15000 MTPA	5	35	Large
28	M/s Jindal steel & power ltd.	Deojhar	Ministeel plant	2000000 MT	3850	1000	Large
29	M/s Kalinga metaliks and power ltd.	Gopalpur	Rerolling Mill	72000 MTPA	34.7	169	Medium
30	M/s ardent Steel Ltd.	Fuljhar	iron ore pillets	0.6 MT	150	265	Large
31	M/s shree metaliks ltd	Anra	Ministeel plant	1.2 million tones	947	500	Large
32	Brad Alloys Ltd.	Murusuan	sponge iron	200 TPD	18	300	Large
Total					**5694**	**8606**	

Source: DIC Keonjhar

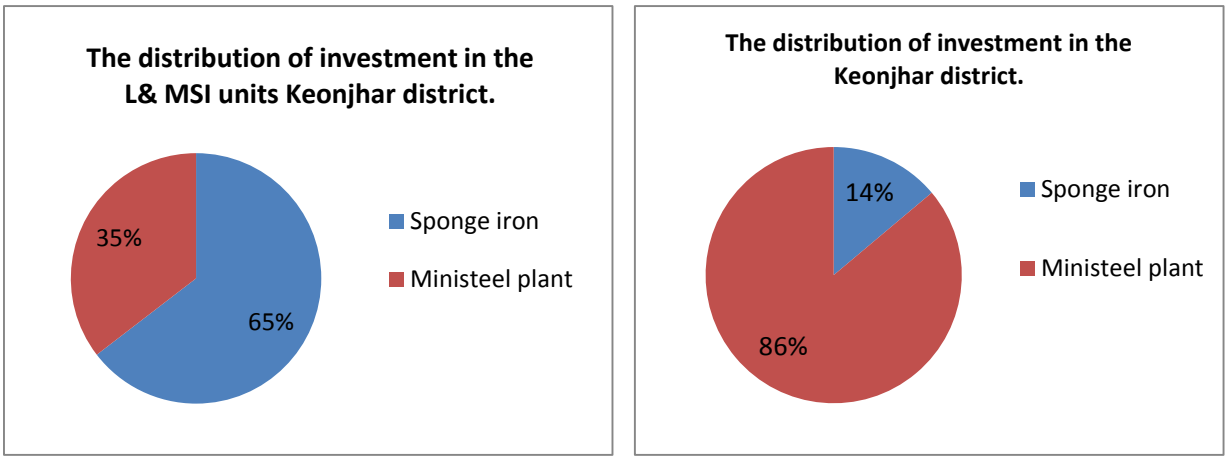


Figure 4–3: The employment and investment distribution of the Lange and medium scale industries in Keonjhar district

Source: DIC, Keonjhar data

Keonjhar master plan area only has concentration of some light and small industrial units, which are not well-organized. However, an industrial estate is located within the master plan area of an area of 9.950 acres. Details of this industrial estate are indicated in the table below.

Table 4-2: Status of existing industrial estate in Keonjhar.

I.E Keonjhar	Total	Allocable	Allotted	No of entrepreneurs	Vacant	Remarks
Land (acres)	8.65	7.3	2.8	2	4.5	3.35 acres of land under encroachment
Shed (nos.)	5	5	4	4	1	

Source: DIC Keonjhar

District Industries Centre has proposed acquisition of 11.90 acres land in tehsil Sadar, Balbhadrapur located near Keonjhar to promote industrial units in the master plan area.

4.4.2 Proposed industries

The District Industries Centre has identified number of sectors which form the backbone of industrial activity in Keonjhar district. These activities mainly include iron and steel based plants, engineering workshops, stone crushing units, fly ash brick manufacturing units etc. Following table shows number of industries under each category as proposed by DIC, Keonjhar.

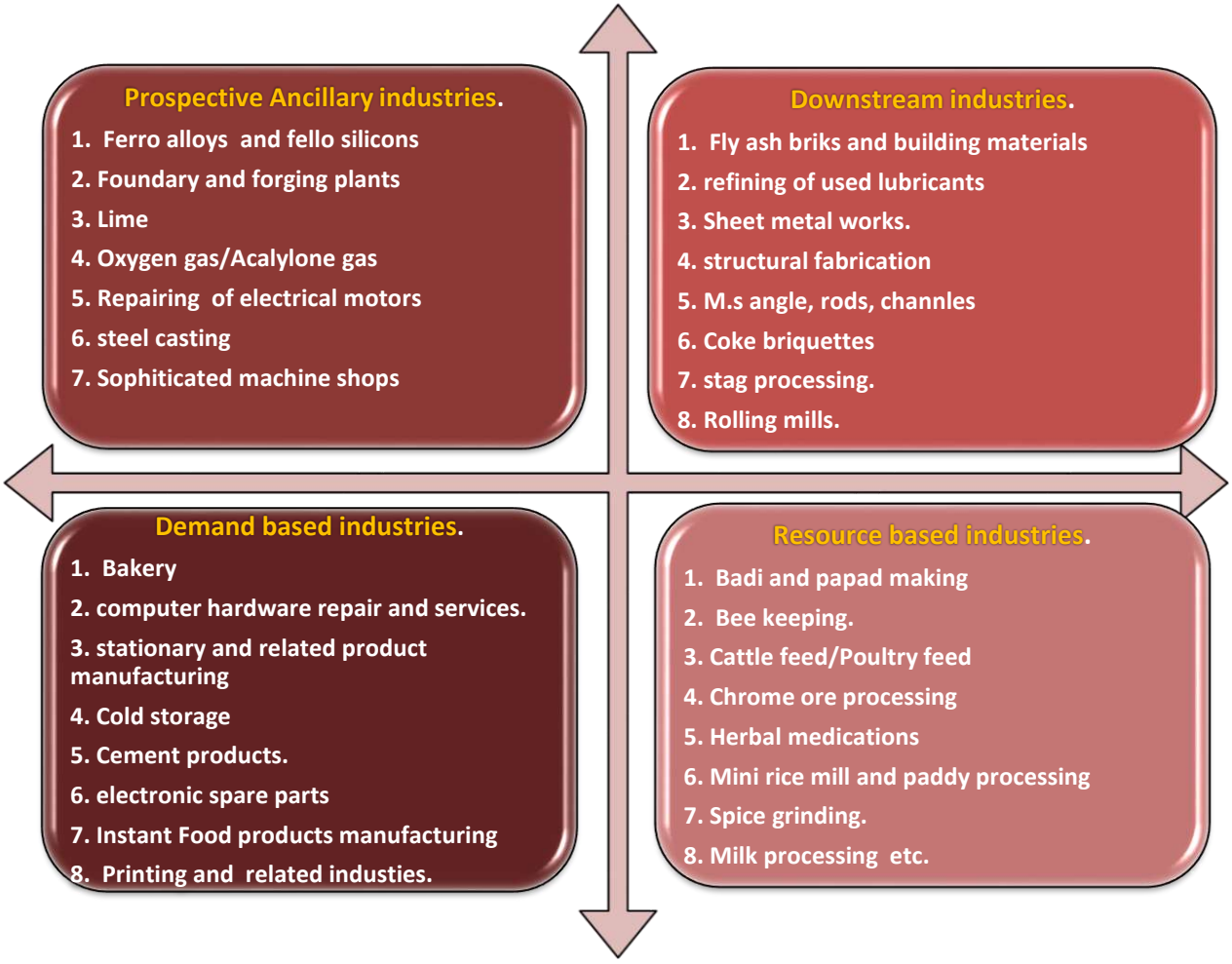
Table 4-3: Number of existing and proposed industries in pipeline as identified by DIC Keonjhar

Sl. No	Particulars	Existing	Proposed
1	Existing large and medium scale industries	32	3
2	Sponge iron plant	20	2
3	Iron crushers reg. with DIC	97	43
4	Manganese processing	6	19
5	Pyrophyllite processing	5	-
6	induction furnace	6	1
7	Stone crushers units	12	43
8	Granite tile making	-	1
9	Fly ash bricks	3	15
10	Coal Briquette	3	-
11	Hotels	6	13
12	Rice mills	6	1
13	Cashew Processing	4	1
14	Eng. workshops (Keonjhar)	34	20
15	Eng. workshops (Bhadrasahi)	37	10
16	Offset printing press	3	1
	Total units	**274**	**173**

Source: DIC Keonjhar

Apart from these specific industrial sectors identified by the DIC, 4 categories of industries also have potential to be developed in and around Keonjhar i.e. ancillary industries for iron and steel production, downstream industries for use of materials produced by iron industries, demand-based industries for meeting the demand of population present in the area and resource-based industries for processing the resources available in the area. The region is also rich in food crops like rice, maize, pulses, oilseeds, vegetables etc. apart from timber resources which can be sustainably exploited. Demand-based and other types of industries are essentially light industries, which can be easily located in Keonjhar town as it is not very land intensive or polluting. For this, land is to be demarcated within the master plan area. Potential industries that can come up in Keonjhar are indicated in the figure below.

Figure 4–4: Potential industries which can be developed in the Keonjhar town.



Source: DIC Keonjhar REPL analysis

4.4.3 Key policies and strategies

To improve industrial potential of Keonjhar, focus should be on light and medium industries, which is in accordance with the Odisha industrial resolution 2007. Major points of the resolution pertaining to development of industry in Keonjhar are as follows:

- Focus should be on micro, small and medium enterprises.
- Direct investment in thrust sector like Ancillary industries and promotion of resource based industries.
- Industrial and allied infrastructure development fund (IAIDF) with initial corpus of 1 Crore Rupees.
- Focus should be given on development of infrastructure on PPP basis.

- Time bound action plan should be prepared for the up-gradation and maintenance of the infrastructure facilities in existing industrial estates and industrial area.
- Development of roads along the Economic Corridor Mumbai - Kolkata Highway 49 (previously NH6) should be on priority basis by PPP model.
- Rail and road corridor should be constructed for the industrial area.
- Inland container depot should be demarcated at a suitable location for the industry.

Odisha MSME Development policy 2009 has been taken as a base to manage the industrial land designated under the master plan area. The salient features are mentioned below. These principal should be followed in establishment of MSME units in the industrial zone.

- Reservations of 20% of the area in industrial estate, industrial park, corridor and land bank for MSMEs only.
- All major industrial hubs to develop new industrial parks for MSMEs.
- 10% of the land (up to 200 Ac.) allocated to mega projects should be earmarked for ancillary industries.
- There should be permanent exhibition centres for the MSMEs at suitable locations.
- Priority should be given to women entrepreneurs in allotment of land to MSMEs and dedicated industrial land
- District level single window clearance authority shall assess and recommend the requirement of land from time to time.

CHAPTER-5 HOUSING AND SLUM

5.1 Introduction

Shelter is one of the three basic human needs along with food and clothing. World Health Organisation (WHO) define housing as "*an enclosed environment in which man finds protection and feels safe and secured from hostile forces and can function with comfort and satisfaction as regards privacy to the individual and his family. The environment must include all necessity services, facilities needed for physical and social well-being of the family.*"

Housing as an industry has direct impact on employment and income generation opportunities for a large number of skilled and unskilled workforce. Creation of new housing stock is an essential feature for sustained growth of an area. In this context, the existing housing status in the master plan area has been analysed for demand calculation and framing strategies.

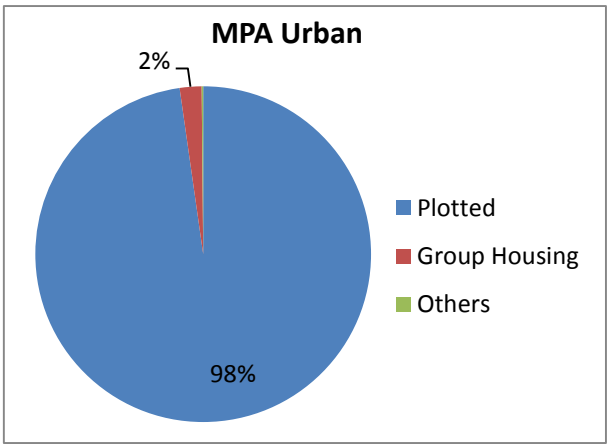
5.2 Primary Survey Findings

Assessment of housing condition in the town was done based on housing survey which formed part of the socio-economic survey. The main parameters of housing survey were – first, typology of house (semi-detached, detached or group housing) and structural status (kutcha, pucca or semi-pucca). Second parameter of study was the built-up area and the setbacks of the houses in the town. Thirdly, the condition of the building and their components were also studied to assess their habitability. To understand situation of overcrowding, information about number of rooms was also collected.

5.3 Type of Residential Property

According to the surveyed households, about 98% of the housing units in the town are individual houses, whereas group housing is almost negligent (2%) in the town.

Figure 5–1: Types of Residential Property

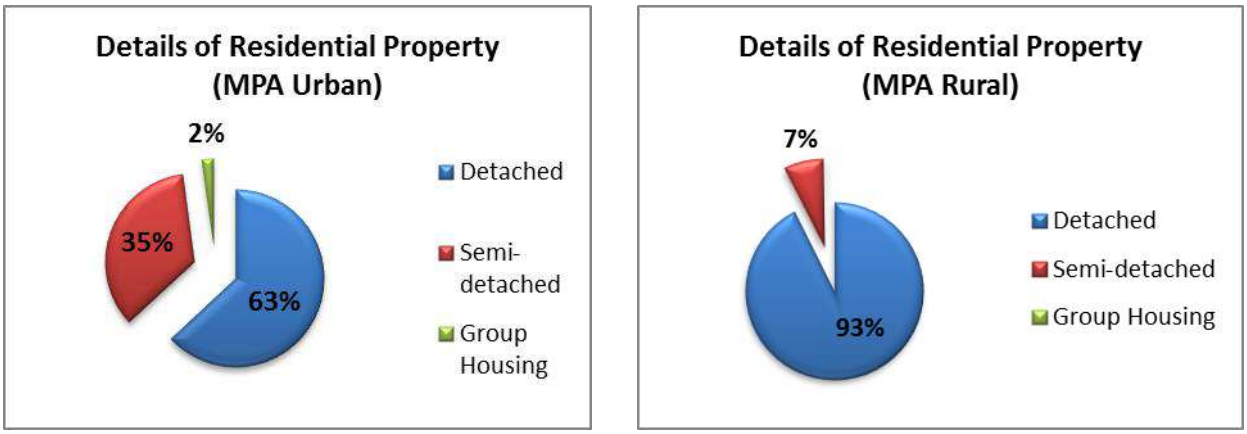


Source: Primary Survey

5.4 Details of Residential Property

Many residential areas in Keonjhar, especially in the rural areas, are relatively less dense than residential areas in towns of similar sizes. Since most of the houses are on individual plots they have (especially in central part of town) direct access to the nearby street, without any consideration for setbacks and the hierarchy of the road. As a result row housing, with negligent side setbacks have developed in many parts of Keonjhar. Most of such types of houses have their own separate exit and entrance, except a small percentage of houses that share a common entrance to the plot. According to the primary survey, about 63% of households were detached houses while 35% had common-entrance (Semi-detached) in the urban area. The percentage of semi-detached houses was quite higher in the urban areas of the town because density is higher and land is costlier than rural areas. However, percentage of detached houses was significantly higher in rural areas (93%). It is worth noting that the semi-detached housing and group housing practice puts less pressure on the services and transport infrastructure than the detached housing practice.

Figure 5–2: Percentage of Detached and Semi-Detached Houses in MPA Urban



Source: Primary survey

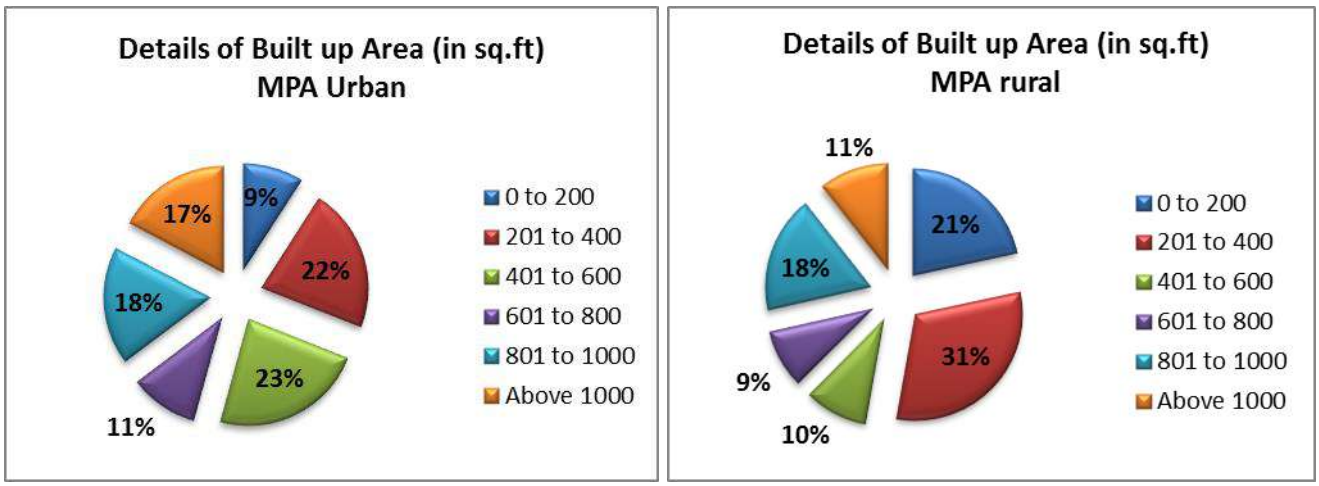
5.5 Dwelling unit details

Most of the surveyed households were of small size and the available space is utilized for many purposes. Also it is observed that many houses in the town had poor facilities for sanitation and waste water disposal. However, almost all households had separate facility for the kitchen. The details of the Individual component of the houses are given below.

5.5.1 Built up area

According to the figure below most of the houses in both rural and urban area live in dwelling units which are of the size below 600 sq ft. Around 9-21 percent households in MPA urban and rural, live in houses smaller than 200 sq ft which is not habitable as per human standards. About 22% in urban and 31% in rural area dwelling units are between the size of 200 to 400 sq.ft in size. There is also a sizeable percent (10%) of houses in both urban and rural areas which are above 1000 sq.mt in area. Surprisingly the number of such houses in urban area is higher even though the density is higher in the urban area.

Figure 5–3: Details of the built up area of the dwelling units

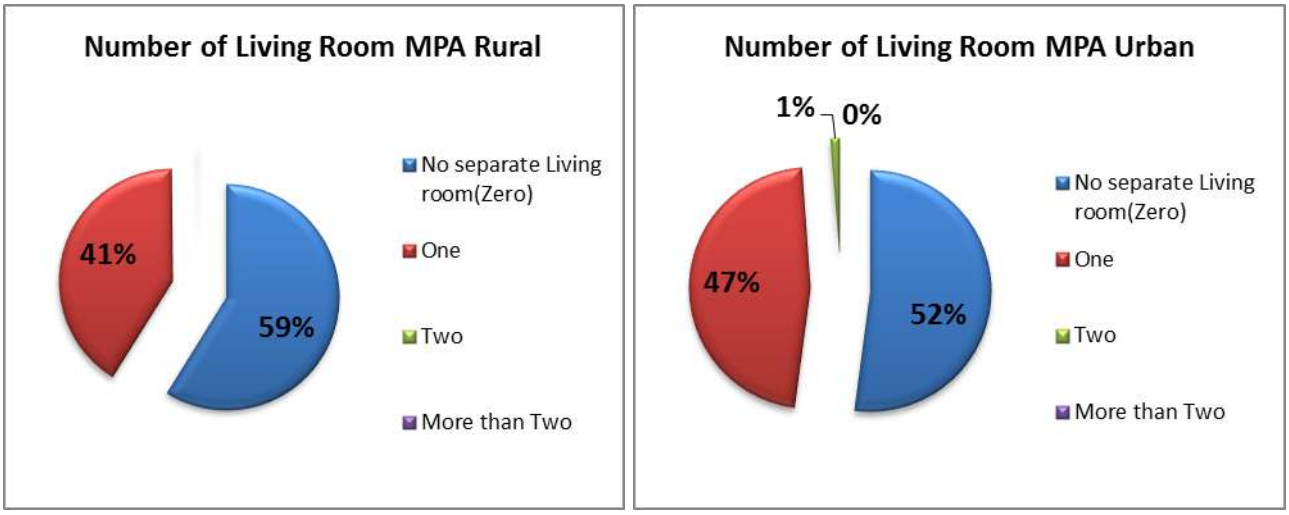


Source: Primary survey

5.5.2 Number of Living Rooms

As shown in the figure below separate living room was absent from most of the surveyed households in the town. About 52% of the houses in the urban areas and 59% of the houses in the rural areas had no separate room available for the sole purpose of a living room. However 47% of the households in the urban areas and 41% of the houses in the rural areas had at least one separate room available for the sole purpose of the living room. As it is apparent the percentage of such houses are higher in rural areas than in urban areas because of more land available for housing.

Figure 5–4: Average number of living rooms

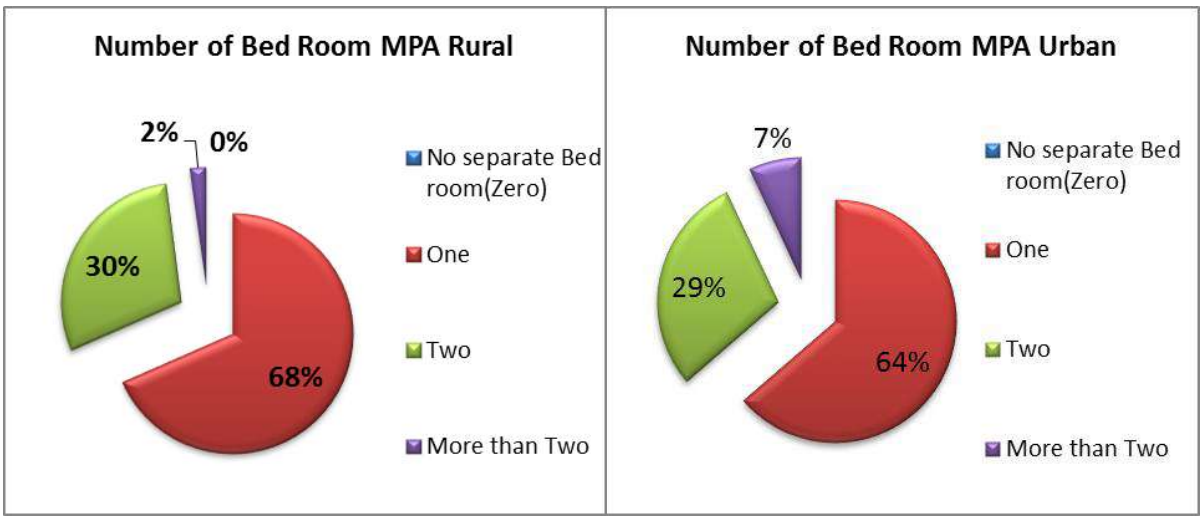


Source: Primary survey

5.5.3 Availability of Bedrooms

As shown in the figure below separate bed room was present in most of the surveyed households in the town. About 64% of the houses in the urban and 68% of the houses in rural areas had a separate room available for the sole purpose of a bedroom. Also around 29% of the households in the urban areas and 30% of the houses in the rural areas had two separate rooms available for the sole purpose of a bedroom. However, there is also a small percentage of households which had more than 2 bedrooms, such affluent households were more in the urban areas where income levels are higher.

Figure 5–5: Average number of Bedrooms

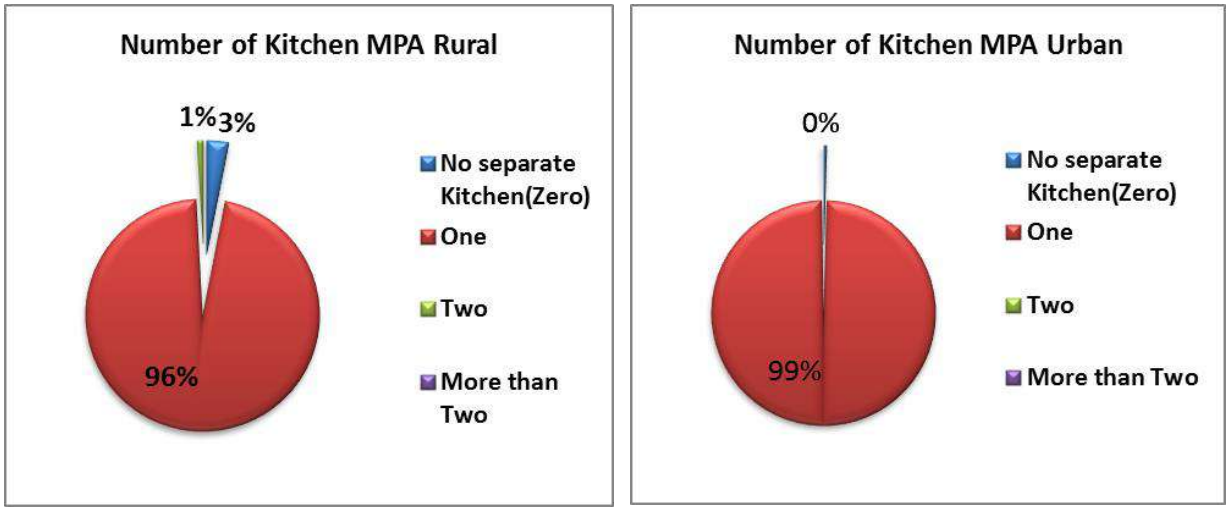


Source: Primary survey

5.5.4 Availability of Kitchen

As shown in the figure below, separate kitchen is present in most of the surveyed households in the town. More than 96% of the houses, including both urban and rural areas have a separate room available for the sole purpose of a kitchen. A small percentage of about 5% of the household surveyed in urban area had more than 1 kitchen. Surprisingly many houses which do not have toilets had a separate kitchen which was conveniently well equipped and hygienic. This shows that the presence of a kitchen is often considered necessary in the households in Keonjhar town.

Figure 5–6: Average number of Kitchens per Dwelling Unit

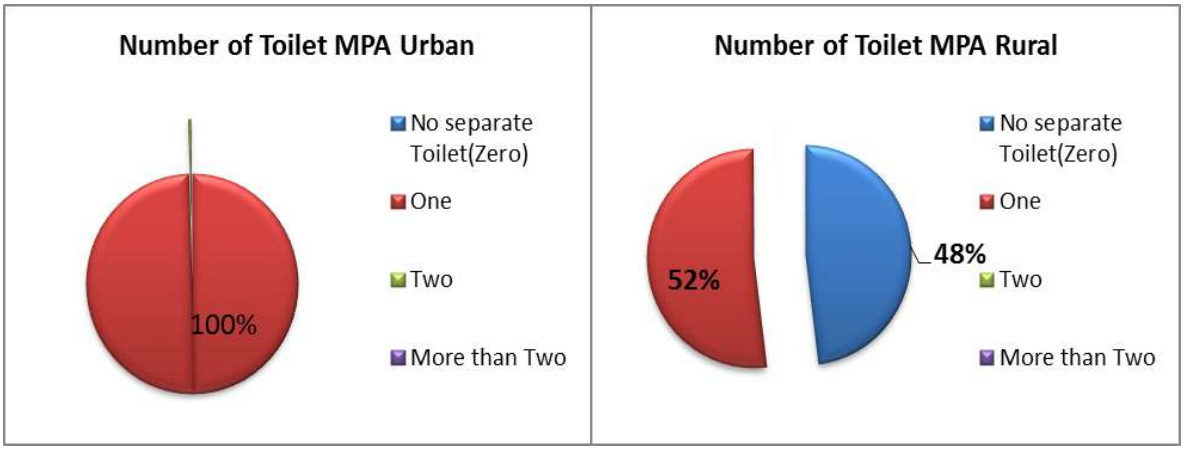


Source: Primary survey

5.5.5 Availability of Toilet

The town has a problem of open defecation in the rural areas as is evident from the surveyed households. As shown in the figure below, separate toilet was absent in 48% of the rural households.

Figure 5–7: Availability of Toilets

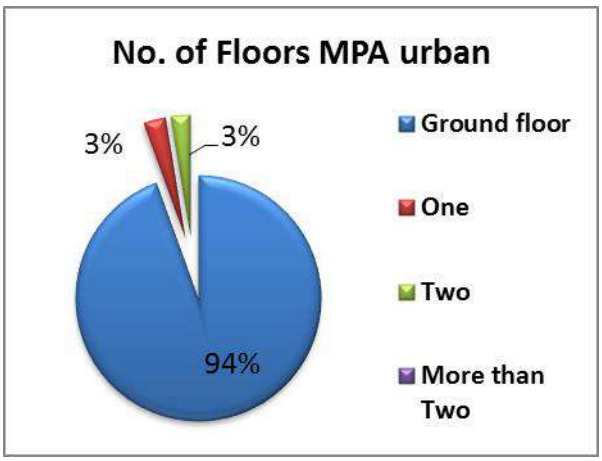


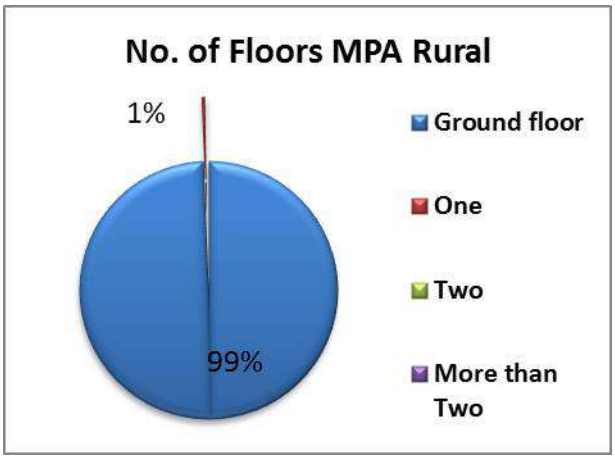
Source: Primary survey

5.5.6 Average number of floors in houses

Most of the houses in the town are single-storeyed while there are few houses which are double-storeyed in urban areas. The percentage of these houses is even less in the rural areas.

Figure 5–8: Figure showing average number of floors in the urban and rural area



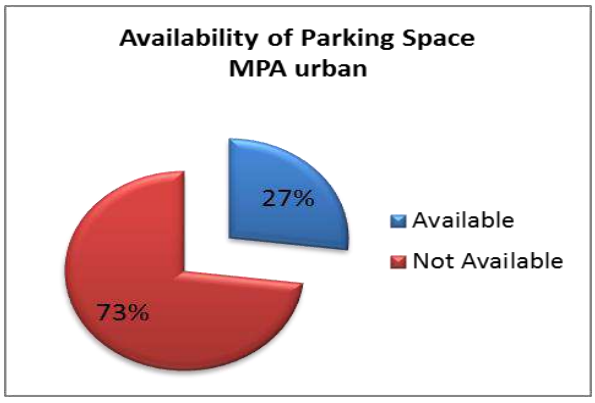


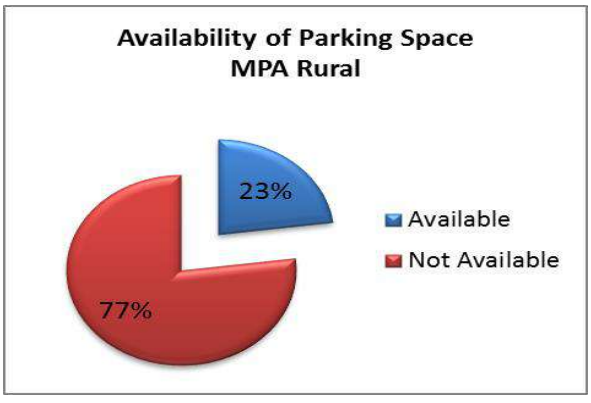
Source: Primary survey

5.5.7 Availability of parking space

Majority of houses have small area with little or no setback at all, hence parking within the plots is almost negligible, as shown in the figure below. About 73% of the houses in the urban areas and 77% of the houses in the rural areas have no separate space available for parking, so these households prefer to park their vehicles, if they own any, on the street outside their houses. About 27% of the households in the urban areas and 23% of the houses in the rural areas have separate space available for parking within the premises. Since the vehicle ownership is higher in the urban areas with less available parking spots, higher numbers of households make arrangement for parking within their premises.

Figure 5–9: Availability of Parking Space





Source: Primary survey

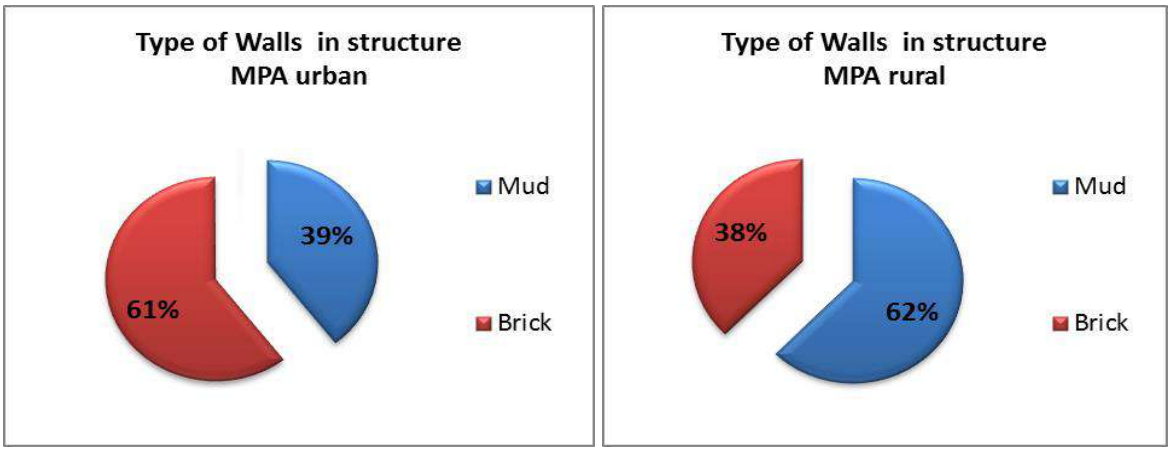
5.6 Details of Structure

Majority of the houses are either kutcha or semi-pucca in nature. Main construction materials used are mud, tile and thatch. Houses in rural areas in Keonjhar are generally built in traditional style. Sections below explain the details of various structural components of a house.

5.6.1 Details of Walls

As shown in the figure below, 61% of the houses in the urban areas have building walls made up of bricks while only 39% of the walls are made up of mud. These two materials constitute the main building material used for wall construction. Though the predominant construction material for wall construction in the town are bricks, in the rural area the reverse happens, where due to various reasons the predominant material used is mud.

Figure 5–10: Materials Used in Walls



Source: Primary survey

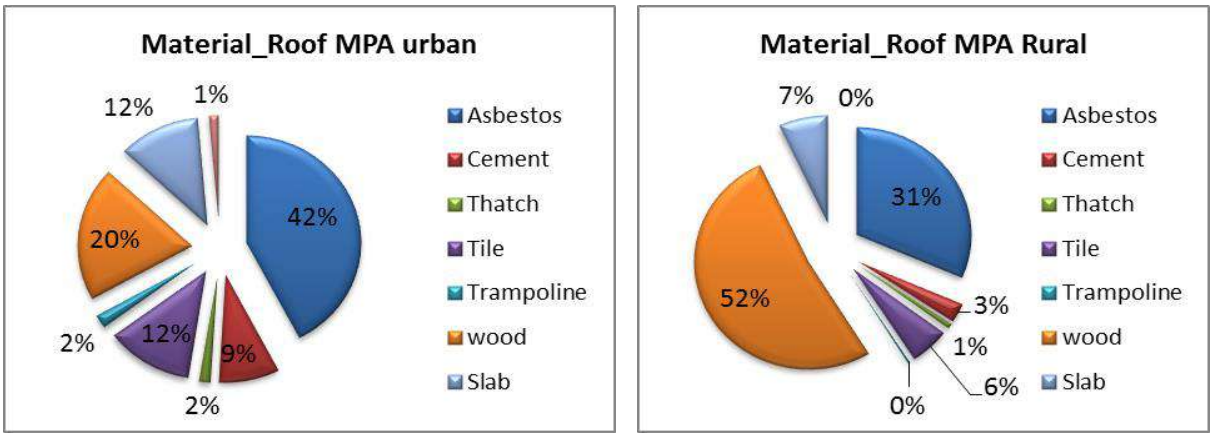
This is due to the fact that the construction techniques in rural areas are still quite primitive and people use mud instead of brick which is not only cheaper but also easily available.

5.6.2 Details of Roof

Majority of the houses have roof of non-concrete, semi-permanent structures. As shown in the figure, in the urban areas about 42% of the house roofs are made of asbestos sheet while about 2% were made up of trampoline material. Permanent material such as cement and slab is used in only about 20% of the structures. The situation is not much different in the rural areas where the use of thatch and wood is

even more prevalent. One of the commonly used materials in roof construction in both urban and rural areas is asbestos.

Figure 5–11: Material Used for Roof

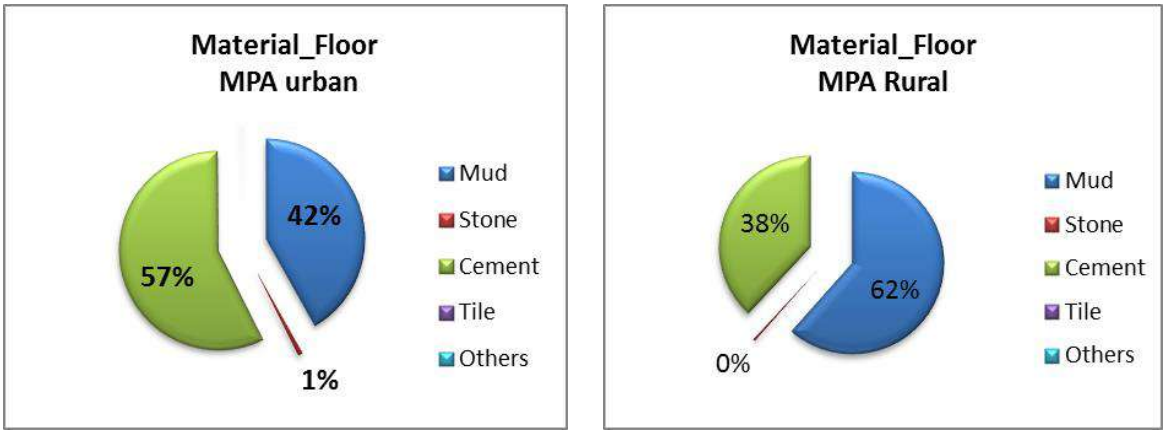


Source: Primary survey

5.6.3 Details of Floor

In the case of floor construction in the town, the situation is quite different in urban and rural areas. As shown in the figure about 57% of the house floors in the urban areas were constructed of concrete while about 42% were made up of mud. In rural areas, use of mud was even more prevalent wherein 62% of the surveyed households had floors made up of mud. It is worth noting that though many houses had no permanent roof they had a floor constructed of cement because of the fact that the cement floor is far cheaper to construct and maintain. Some of the other materials used for construction of floors was stone and bricks and, in case of urban areas, tiles as well.

Figure 5–12: Materials Used for Floor

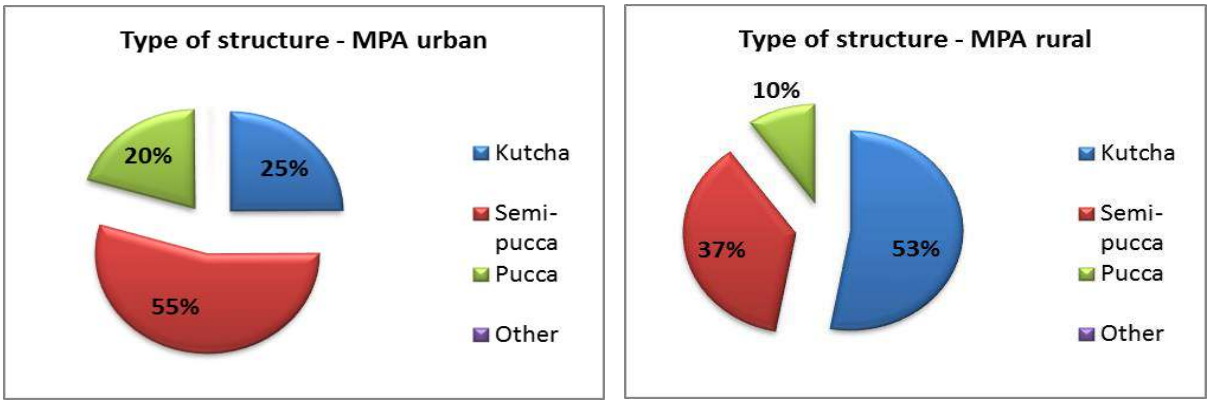


Source: Primary survey

5.6.4 Type of Structure

As mentioned in the preceding section, majority of the structures in the town and surrounding areas are kutcha and semi-pucca in nature. Though in case of urban area the amount of semi-pucca structures are higher, the percentages of pucca structure in the rural and urban area are almost similar. The figure below shows that about 53% of the households in rural areas live in kutcha structures while this percentage is only 25% in urban areas. Considering the climatic situation in the area kutcha structures are often dangerous, and offer little protection from natural agents.

Figure 5–13: Type of Structures



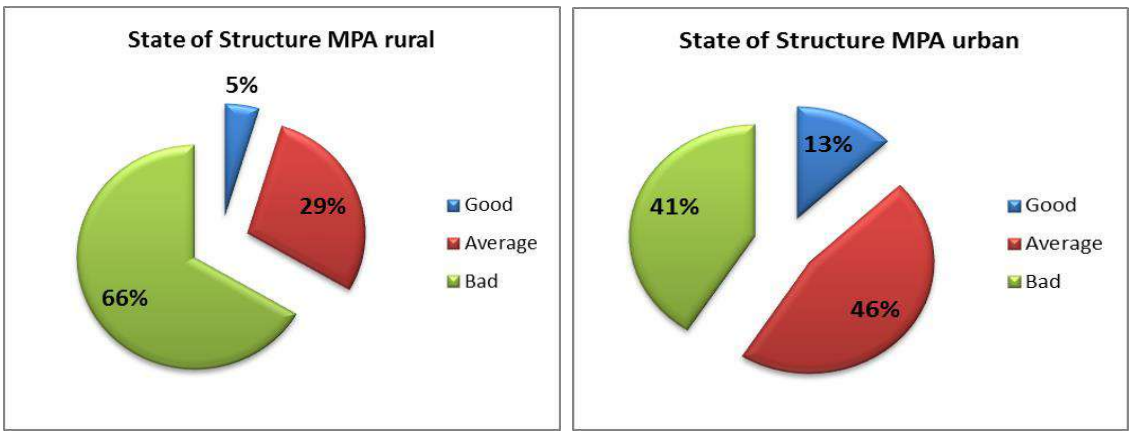
Source: Primary survey

5.6.5 State of Structure

According to the housing survey, the state of structure was evaluated in which the respondents were living. Majority of the respondents rated their structure as average in the urban areas and bad in rural the urban area.

About 41% of the respondents in the urban areas and 66% respondents in the rural areas were living in a structure which was rated bad by the respondents. As expected, percentage of houses rated bad is higher in rural areas than urban areas.

Figure 5–14: State of Existing Structures

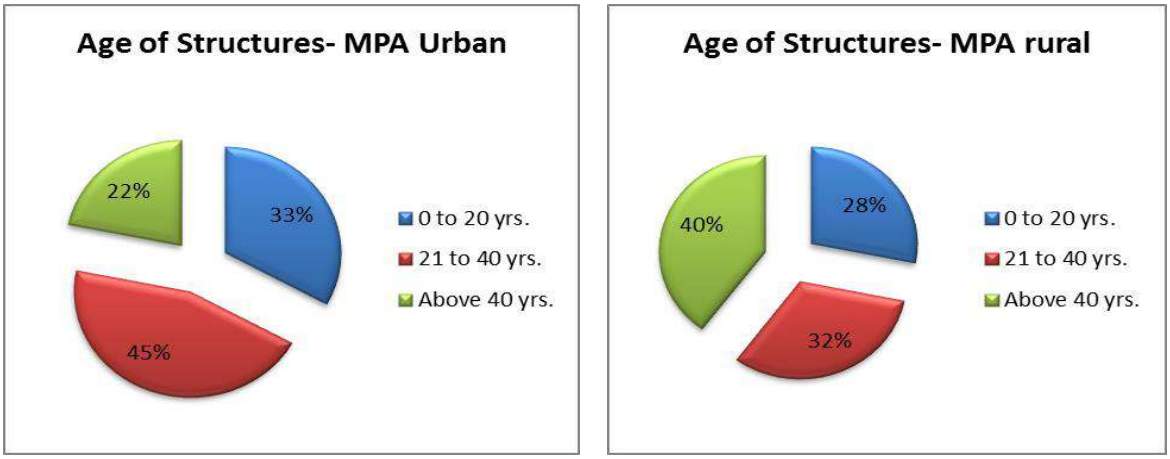


Source: Primary Survey

5.6.6 Age of Existing Structures

As per the surveyed household, majority of houses in Keonjhar are between 20-40 years old. These also include houses which have been constructed post Cyclone Phailin in 2013. About 33% of the houses are less than 20 years old in urban area. In rural areas, there are many old age structures which are 20-40 years old and beyond 40 years old. While in urban areas there are about 22% structures which are more than 40 years of age.

Figure 5–15: Age of the Existing Structures



Source: Primary survey

5.7 Existing Scenario and Housing Trends

5.7.1 Use of Houses

As per Census 2011, about 75% (21,593 houses) of the census houses are utilised for residential and residential cum other purposes in Keonjhar town. This percentage is 72% in urban and 79% in rural areas. Remaining census houses are used for other purposes such as, shops, clinics, guest house, workshop etc.

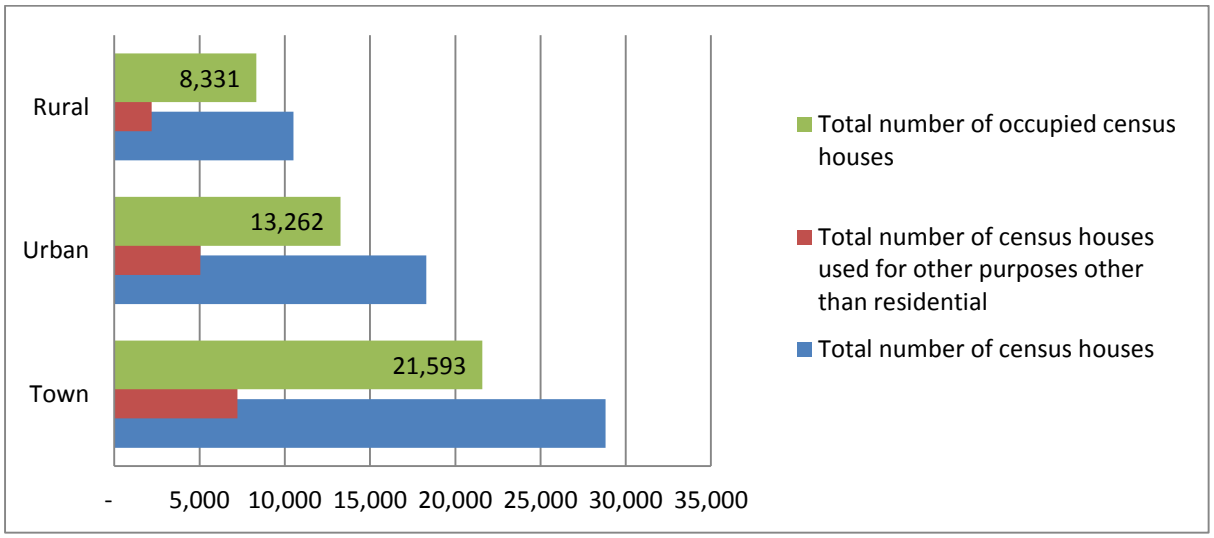
The table below shows the distribution of census houses and their distribution as residential and residential-cum-other use.

Table 5-1: Census Houses Detail

	Total number of census houses	Total number of census houses used for other purposes other than residential	Number of census houses used as residence and residence-cum-other use
Town	28,810	7,217	21,593
Urban	18,300	5,038	13,262
Rural	10,510	2,179	8,331

Source: (Census of India), 2011

Figure 5–16 Details of Census Houses

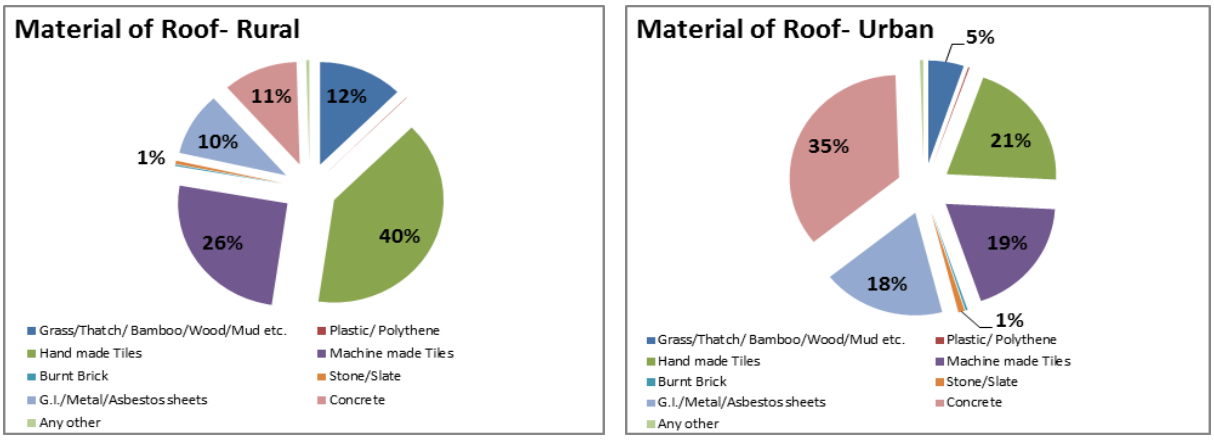


Source: (Census of India), 2011

5.7.2 Material of Roof

As per census 2011, 39.8% of households in rural areas are living in census houses with roof made of handmade tiles. Percentage of houses with roof made up of asbestos sheets and grass/thatch/ bamboo is 22.4%. From the stated figure, it could be noted that a lot of households are residing in houses that are structurally not good. Proper intervention need to be taken in the future housing strategies to tackle this issue. In Keonjhar urban area, most of the households are residing in census houses that are made up of concrete, handmade tiles and machine made tiles, accounting about 74.6%.

Figure 5–17: Material of Roof

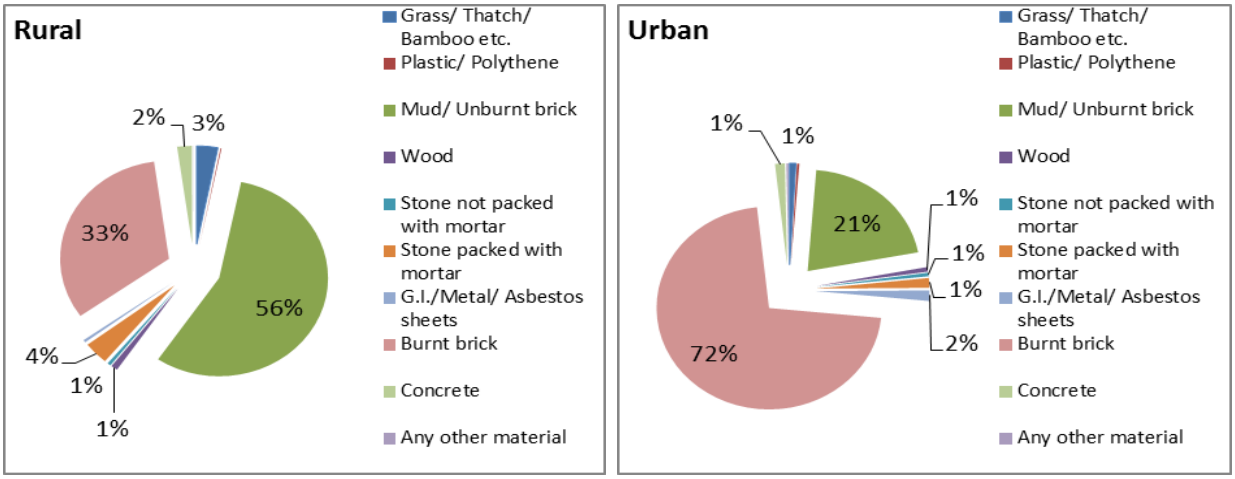


Source: Census of India 2011

5.7.3 Material of Wall

As per the census 2011, 65% households in Keonjhar urban area reside in census houses with walls made up of burnt bricks. Houses with walls made up of mud/ unburnt bricks account to be 72% of the total households in urban area. In Keonjhar rural area which mainly comprises of the rural revenue villages notified in Master Plan, it is found that most of the households reside in houses with walls made up of mud/ unburnt bricks while those made of burnt bricks are 56%.

Figure 5–18: Material of Wall

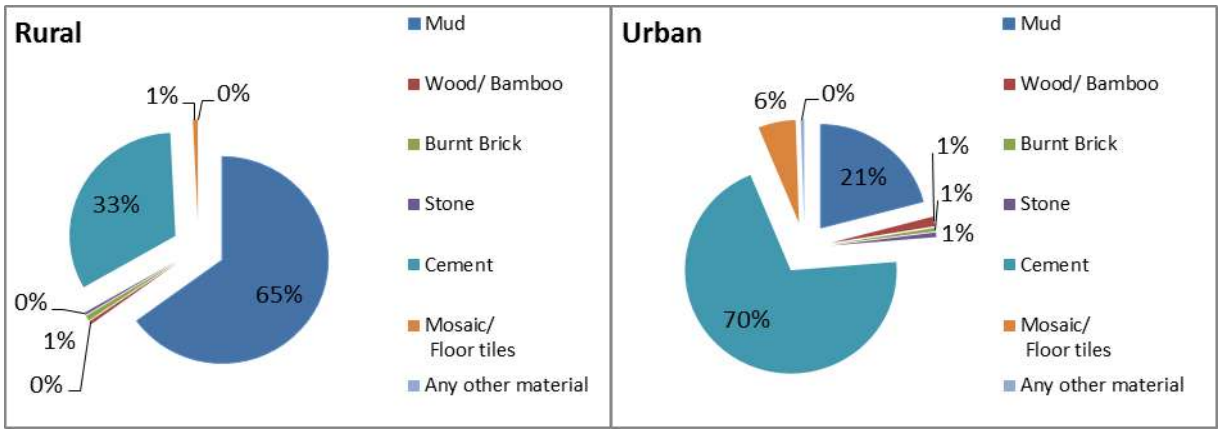


Source: Census of India 2011

5.7.4 Material of Floor

As per the census 2011, 70% households residing in Keonjhar urban area with floor of made up of cement while that made of mud accounts to 21%. In Keonjhar rural area the situation is almost reverse wherein the percentage of households with mud floor is 65% and that of cement is 33%.

Figure 5–19: Material of Floor



Source: Census of India 2011

Figures presented previously can be summarized as:

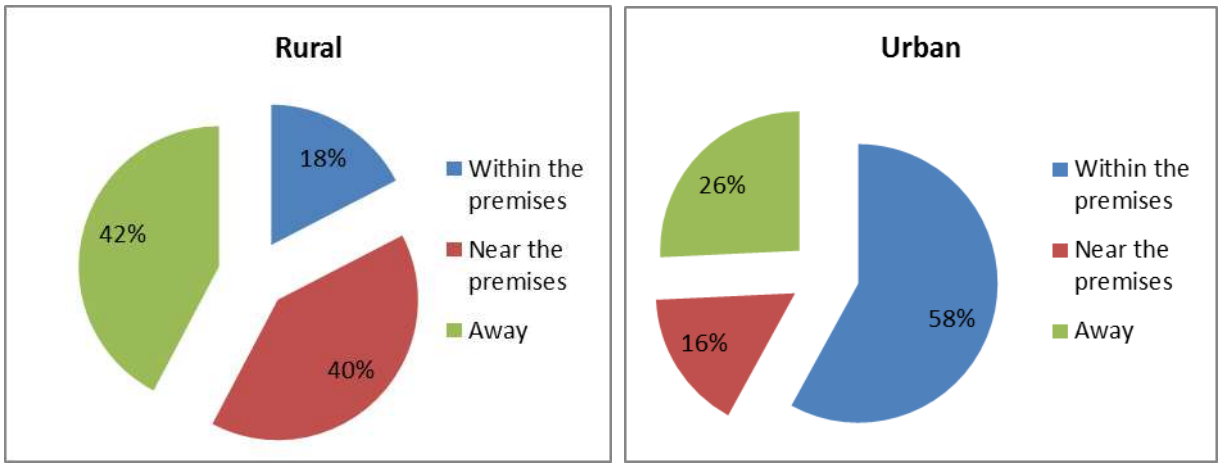
- The material used for roofs and walls show that mud/ unburnt bricks are predominately used in rural areas as compared to urban areas. This can be attributed to lack of stable economic activity and dependence on agriculture especially in rural areas.
- Both rural and urban areas show lack of infrastructure facilities. This lack has to be addressed in an efficient way for comprehensive development of the town.
- Percentage of households living in dilapidated structure is more in rural areas as compared to urban areas which needs to be taken care of while framing future housing strategy for 2030.

5.7.5 Source and Location of Drinking Water

Tube-well, hand pumps, uncovered wells are the main sources of drinking water in the rural areas while tap water from treated source is available to only 3%of the households. In urban areas, however, 37% of the population has access to treated water. Other sources are covered wells, tube-wells and bore-wells.

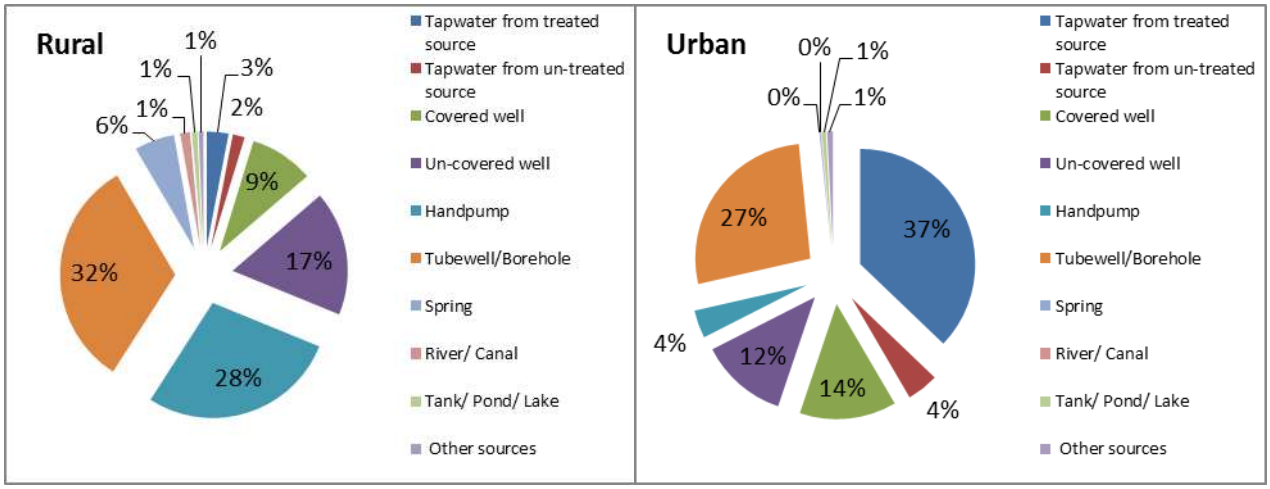
In rural areas only 18% HHs have source of drinking water within their premise while 42% have the source far away. In urban areas although the households having source of drinking water within their premise is 58%, still 26% households have the source far away.

Figure 5–20: Location of Source of Drinking Water



Source: Census of India 2011

Figure 5–21: Main Source of Drinking Water



Source: Census of India 2011

5.8 Housing Providers

In Keonjhar master plan area, self- built individual houses have a major share in the housing stock. With negligible share of private developer/ builder in the region, most of the houses are constructed by individuals through self-financing or assistance from financial institutions. The individual housing supply has almost 100% share in the rural areas within the master plan limit, as there is no choice available with the residents in those areas. In these areas, the houses are constructed primarily using locally available materials like brick, mud, thatch, tiles etc.

Private developers play an insignificant role as housing providers in the master plan area even though some colonizers are engaged in small plotted housing schemes in the urban area. It is expected that this situation shall change in the future and demand for private developers in the housing market shall rise.

Public authorities also have limited role as housing providers in the master plan area. The existing public housing is limited to institutional housing/ staff quarters which are meant for government employees. Public housing for other people, thus, should be taken as a priority and treated as a form of affordable housing in the master plan area.

5.9 Slum

5.9.1 Introduction

Increasing urbanisation is one of the most dominant phenomenon universally, which can be viewed both as a challenge and as an opportunity. Cities and towns are

centres of agglomeration economies, investments, technology, innovation, economic growth and tertiary jobs, and attract migrants from surrounding areas, intensifying pressure on existing resources of the city. Negative consequences of rapid urbanisation, such as polarisation of population in large urban areas, high density, acute shortage of housing and basic amenities, degradation of environment, poverty, unemployment and slums & squatters settlements etc are often seen in Indian cities. As per the Report of the committee on Slum Statistics, MoHUPA, GoI an estimated 13.70% of urban population (531.25 lakh in 2011-12) still lives on income that is below the poverty line. Eighty percent of their major earnings go towards food and energy, leaving very little for meeting the cost of living in an increasingly monetized society, which force them to live in slum and squatter settlements.

The concept of slum and its definition vary from country to country depending upon the socio-economic conditions of each society. Physically, an area of the city with inadequate housing, deficient facilities, overcrowding and congestion is categorized as slum. As per the 2011 Census of India, "a slum is a compact area of at least 300 persons population or about 60-70 households of poorly built congested tenements, in an unhygienic environment usually with inadequate infrastructure and lacking in proper sanitary and drinking water facilities".

Government of Odisha has the following definition of slum area. "Slum area" means any predominantly residential area, where the dwellings which by reasons of dilapidation, overcrowding faulty arrangements or designs, lack of ventilation, light or sanitary facilities or any combination of these factors, are detrimental to safety and health of the inhabitants or others and which is defined by development plan as a slum area.

5.10 Existing Slums in Keonjhar Urban

The growth of slums and squatters in Keonjhar is mainly due to absence of affordable housing. Most of the slums in the city are located on unutilised government land and railway area. These slums also have a high concentration of SC and ST population. Basic characteristics of these slums are dilapidated housing structure with poor ventilation, overcrowding, inadequate facilities such as portable water, sanitation facility etc.

As per the 2011 Census, 30,193 people live in slums in Keonjhar municipal area, which constituted about 30% of the city's population.

Figure 5–22: Slum areas of Keonjhar

Source: REPL

Table 5-2: Details of slums in Keonjhar urban area

Particulars	Keonjhar Urban Area	Slum
Household	18,300	8,287
Population	98,880	30,193
Average Household Size	4.5	3.6
Proportion of SC Population	15.3	19.6
Proportion of ST Population	33.4	50.4

Source: Census of India and REPL Estimation

Keonjhar Municipality has identified 77 slums based on the criteria framed under Govt. of Odisha and Census of India in the year 2014-15. The list of slums along with their location and population details is given below:

Table 5-3: Population Distribution in Slums of Keonjhar

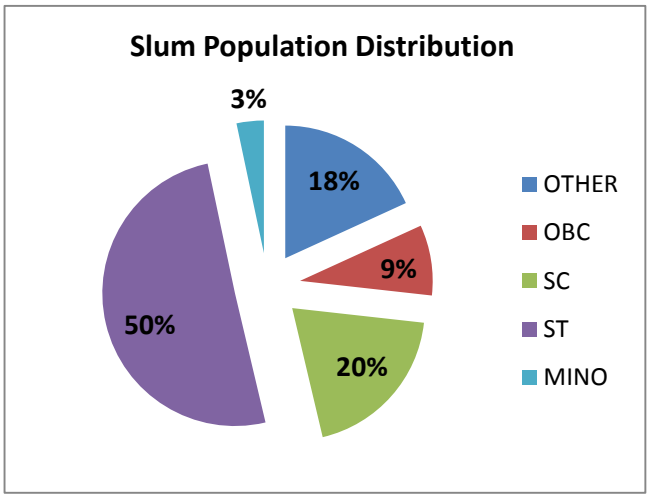
Sl. No.	WARD NO	SLUM CODE	NAME OF THE SLUM	OTHER	OBC	SC	ST	MINO.	Total
1	WARD NO 1	001	BHUMIJA SAHI	12	41	86	162	38	339
2		002	GUNDICHASAHI 1	20	61	160	36	9	286
3		003	GUNDICHASAHI 2	58	89	124	4	0	275
4		004	HADBANDHSAHI	98	0	0	156	0	254
5		005	INDUKHOLI SAHI	6	0	17	375	38	436
6		006	MAGHUSAHI	6	0	17	327	0	350
7		007	NALAGHATA SAHI	33	21	9	198	0	261
8		008	PODAUASA	10	0	8	32	0	50
9		009	SAMADHISAHI	2	0	3	201	0	206
10		010	SIBANARAYANPURSAHI	28	35	0	0	0	63
11		011	SULEIKHAMAR	21	2	5	381	0	409
12	WARD NO 2	012	BAIDYARAJ SAHI	250	1	8	189	139	587
13		013	GADASAHI 1	177	11	0	4	0	192
14		014	GADASAHI 2	112	32	0	4	0	148
15		015	HUNDADWARA SAHI	238	68	10	213	0	529
16		016	KARANA SAHI	8	4	2	26	0	40
17		017	KEUTASAHI	22	0	4	285	0	311
18		018	SATHIGHAR SAHI	63	12	12	114	35	236
19	WARD NO 3	019	BEDASAHI	39	0	167	4	33	243
20		020	JHARASAHI	47	74	67	47	37	272
21		021	LAXMINARAYAN PUR SAHI	332	225	94	46	65	762
22	WARD NO 4	022	BHATA SAHI	55	6	0	22	0	83
23		023	DHAKUNIASAHI	39	9	6	91	0	145
24		024	DHANURJAYA PUR	52	51	48	350	0	501
25		025	HUDCO COLONY	46	6	326	683	82	1143
26		026	MADANMOHANPUR PATNA	18	103	9	144	18	292
27		027	MAHADEIPUR PATNA	9	15	725	0	0	749
28	WARD NO 5	028	ATO PUR	49	81	81	43	0	234
29		029	DHIPASAHI	34	58	62	261	0	415
30		030	JANARDHANPUR	123	34	144	834	0	1135
31		031	JANASTANGANJ	136	38	54	15	18	261

Sl. No.	WARD NO	SLUM CODE	NAME OF THE SLUM	OTHER	OBC	SC	ST	MINO.	Total
32		032	KIMRIDOLI	8	0	5	228	0	241
33		033	RANGAPATASAHI	69	0	0	111	0	180
34	WARD NO 6	034	BADDHANGAR PADA	38	3	155	447	0	643
35		035	BIRABARAPUR PATNA	144	26	65	11	0	246
36		036	DHANGARPADA	5	7	32	34	26	104
37		037	KANSARI SAHI	52	37	3	47	0	139
38	WARD NO 7	038	SANTRAPUR	22	12	0	190	0	224
39	WARD NO 8	039	BHULIKIPATALA	3	12	16	62	0	93
40		040	GOURATOTA SAHI	92	71	110	347	0	620
41	WARD NO 9	041	JAGANATHPUR	14	0	20	459	0	493
42		042	KASHIPUR (NAIKSAHI)	44	6	238	555	0	843
43		043	KASHIPUR(JENASAHI)	23	8	152	7	0	190
44		044	MUNDASAHI	12	0	0	50	6	68
45	WARD NO 10	045	BADDERA SAHI 1	22	141	13	205	0	381
46		046	BADDERA SAHI 2	16	0	10	305	0	331
47	WARD NO 11	047	MUKUNDPUR (SILUAN)	12	41	86	199	0	338
48		048	SILUAN	24	46	116	257	39	482
49	WARD NO 12	049	JOMAHATA	220	114	62	32	0	428
50	WARD NO 13	050	JAGANATHPUR (MINING ROAD)	12	36	58	173	0	279
51		051	MOCHIBANDH SAHI	60	60	134	18	0	272
52		052	PABITRADIHA(WARD 12, WARD NO-13)	175	8	26	54	15	278
53	WARD NO 14	053	BABULAL COLONY	198	136	80	33	117	564
54		054	BULADWARD SAHI	90	4	63	829	0	986
55		055	HATIATANGAR	12	2	6	0	0	20
56	WARD NO 15	056	BHAIRABPUR SAHI	98	0	23	202	0	323
57		057	MADHAPUR SAHI	323	226	208	300	24	1081
58		058	NUASAHI	127	73	273	264	0	737
59	WARD NO 16	059	DHOBADIHA (MAJHI SAHI)	187	62	87	180	39	555

Sl. No.	WARD NO	SLUM CODE	NAME OF THE SLUM	OTHER	OBC	SC	ST	MINO.	Total
60		060	MAGURAGADIA	21	29	10	647	39	746
61	WARD NO 17	061	BADAHALA (JENASAHI)	86	53	181	4	0	324
62		062	BADAHALA 2 (NAIK SAHI)	16	14	211	50	16	307
63	WARD NO 18	063	KAMARGODA	23	6	0	154	0	183
64		064	SATASINGHA SAHI	52	44	48	303	15	462
65	WARD NO 19	065	BANIAPAT 1(MUNDASAHI)	34	33	43	224	0	334
66		066	BANIAPAT 1(NAIKSAHI)	30	0	6	321	0	357
67		067	SIRIPUR (MUNDATAL SAHI)	6	0	24	354	0	384
68		068	SIRIPUR (UPER SAHI)	15	0	12	247	0	274
69	WARD NO 20	069	DHRUPADA(MUNDA SAHI)	282	0	281	115	43	721
70		070	DHRUPADA(NAIK SAHI)	95	8	70	807	53	1033
71	WARD NO 21	071	BRAHMANIGAON 1	289	0	290	115	38	732
72		072	BRAHMANIGAON 2	21	22	10	539	20	612
73		073	GHMBHARIA 1 (COLONY SAHI)	47	91	63	45	0	246
74		074	GHMBHARIA 1 (UPAR SAHI)	16	12	212	50	0	290
75		075	GHMBHARIA 2 (MAJHI SAHI)	21	2	4	367	0	394
76		076	GHMBHARIA 2 (TALA SAHI)	10	59	130	30	0	229
77		077	TULASIPUR (MUNDASAHI)	182	14	19	4	0	219
	Grand Total			**5,491**	**2,595**	**5,903**	**15,222**	**1,002**	**30,193**

Source: Census of India – PCA Slum

Figure 5–23 Caste-wise Slum Population Distribution



82% of the population belongs to special social categories like Scheduled Caste, Scheduled Tribe, Other Backward Classes and Minorities wherein, half of the population living in slums belongs to Scheduled Tribe category. Other major group of people belong to the SC category as shown in Figure 5-23.

Source: Census of India 2011

Details of households with respect to social categories in slums of Keonjhar are as follows:

Table 5-4: H/Hs Distribution in Slums of Keonjhar

Sl. No.	WARD NO	NAME OF THE SLUM	OTHER	OBC	SC	ST	MINO	Total
1	WARD NO 1	BHUMIJA SAHI	4	11	23	50	9	97
2		GUNDICHASAHI 1	4	20	51	7	3	85
3		GUNDICHASAHI 2	17	24	32	1	0	74
4		HADBANDHSAHI	31	0	0	39	0	70
5		INDUKHOLI SAHI	2	0	5	77	6	90
6		MAGHUSAHI	2	0	5	88	0	95
7		NALAGHATA SAHI	10	8	2	50	0	70
8		PODAUASA	3	0	3	14	0	20
9		SAMADHISAHI	1	0	1	47	0	49
10		SIBANARAYANPURSAHI	10	11	0	0	0	21
11		SULEIKHAMAR	6	1	3	104	0	114
12	WARD NO 2	BAIDYARAJ SAHI	62	1	5	47	32	147
13		GADASAHI 1	51	3	0	1	0	55
14		GADASAHI 2	44	8	0	4	0	56
15		HUNDADWARA SAHI	56	19	2	42	0	119
16		KARANA SAHI	1	1	1	6	0	9
17		KEUTASAHI	7	0	2	75	0	84
18		SATHIGHAR SAHI	11	2	2	20	5	40
19		BEDASAHI	14	0	55	2	13	84

Sl. No.	WARD NO	NAME OF THE SLUM	OTHER	OBC	SC	ST	MINO	Total
20	WARD NO 3	JHARASAHI	14	18	18	18	9	77
21		LAXMINARAYAN PUR SAHI	80	55	28	17	19	199
22	WARD NO 4	BHATA SAHI	12	1	0	4	0	17
23		DHAKUNIASAHI	11	2	2	27	0	42
24		DHANURJAYA PUR	16	16	13	110	0	155
25		HUDCO COLONY	10	2	60	123	15	210
26		MADANMOHANPUR PATNA	5	32	4	47	7	95
27		MAHADEIPUR PATNA	3	6	192	0	0	201
28	WARD NO 5	ATO PUR	11	20	16	12	0	59
29		DHIPASAHI	11	12	17	72	0	112
30		JANARDHANPUR	39	17	40	252	0	348
31		JANASTANGANJ	48	10	17	4	5	84
32		KIMRIDOLI	3	0	1	65	0	69
33		RANGAPATASAHI	20	0	0	28	0	48
34	WARD NO 6	BADDHANGAR PADA	8	1	40	114	0	163
35		BIRABARAPUR PATNA	48	7	22	3	0	80
36		DHANGARPADA	3	2	7	10	6	28
37		KANSARI SAHI	17	9	1	11	0	38
38	WARD NO 7	SANTRAPUR	8	4	0	58	0	70
39	WARD NO 8	BHULIKIPATALA	2	4	6	18	0	30
40		GOURATOTA SAHI	26	24	33	106	0	189
41	WARD NO 9	JAGANATHPUR	2	0	6	90	0	98
42		KASHIPUR (NAIKSAHI)	10	2	60	138	0	210
43		KASHIPUR(JENASAHI)	6	2	43	2	0	53
44		MUNDASAHI	3	0	0	14	2	19
45	WARD NO 10	BADDERA SAHI 1	6	43	6	71	0	126
46		BADDERA SAHI 2	6	0	2	90	0	98
47	WARD NO 11	MUKUNDPUR (SILUAN)	4	11	23	60	0	98
48		SILUAN	8	12	32	78	10	140
49	WARD NO 12	JOMAHATA	68	32	23	10	0	133
50	WARD NO 13	JAGANATHPUR (MINING ROAD)	4	6	16	44	0	70
51		MOCHIBANDH SAHI	14	14	37	5	0	70

Sl. No.	WARD NO	NAME OF THE SLUM	OTHER	OBC	SC	ST	MINO	Total
52		PABITRADIHA(WARD 12, WARD NO-13)	45	3	6	19	4	77
53	WARD NO 14	BABULAL COLONY	50	34	25	13	32	154
54		BULADWARD SAHI	25	1	24	258	0	308
55		HATIATANGAR	4	1	2	0	0	7
56	WARD NO 15	BHAIRABPUR SAHI	24	0	5	55	0	84
57		MADHAPUR SAHI	94	64	72	87	7	324
58		NUASAHI	41	25	77	82	0	225
59	WARD NO 16	DHOBADIHA (MAJHI SAHI)	42	15	27	51	12	147
60		MAGURAGADIA	6	5	5	142	10	168
61	WARD NO 17	BADAHALA (JENASAHI)	21	12	43	1	0	77
62		BADAHALA 2 (NAIK SAHI)	4	5	59	11	5	84
63	WARD NO 18	KAMARGODA	5	2	0	37	0	44
64		SATASINGHA SAHI	16	14	13	96	5	144
65	WARD NO 19	BANIAPAT 1(MUNDASAHI)	11	7	11	64	0	93
66		BANIAPAT 1(NAIKSAHI)	9	0	3	86	0	98
67		SIRIPUR (MUNDATAL SAHI)	2	0	7	96	0	105
68		SIRIPUR (UPER SAHI)	5	0	4	61	0	70
69	WARD NO 20	DHRUPADA(MUNDASAHI)	67	0	83	32	11	193
70		DHRUPADA(NAIK SAHI)	26	2	26	253	15	322
71	WARD NO 21	BRAHMANIGAON 1	69	0	85	32	10	196
72		BRAHMANIGAON 2	6	5	5	148	4	168
73		GHMBHARIA 1 (COLONY SAHI)	14	22	17	17	0	70
74		GHMBHARIA 1 (UPAR SAHI)	4	4	60	11	0	79
75		GHMBHARIA 2 (MAJHI SAHI)	6	1	2	100	0	109
76		GHMBHARIA 2 (TALA SAHI)	2	19	43	6	0	70
77		TULASIPUR (MUNDASAHI)	52	4	6	1	0	63
	Grand Total		**1,512**	**718**	**1,667**	**4,134**	**256**	**8,287**

Source: Census of India (PCA Slum)

5.10.1 Socio-economic Characteristics

Slums in Keonjhar are similar to slums in other Indian towns and their main characteristics can be summarized as -

- The average household size in slums is 3.6, which is lower than that of the city (4.5) average. The reason for this may be migration of working age population in urban centers, which also resulted in higher sex ratio in slum areas than that of the Keonjhar urban.
- Most of the slums in Keonjhar is characterised with dilapidated structures with lack of basic amenities such as water supply, sewerage and sanitation.

The prevailing socio-economic characteristics and housing condition of the slum population indicates potential for bringing them into the main stream of the city with provision of adequate housing and infrastructural facilities.

5.10.2 Slum upgrading/ development initiatives

A review of past and on-going slum improvement programmes indicate that improving basic infrastructure and access to municipal services leads to significant improvement in quality of life of slum residents. To alleviate problems of slum dwellers and to reduce urban poverty, a number of programs are initiated by Keonjhar Municipality with assistance from the State and Central government.

Integrated Housing and Slum Development Programmes (IHSDP) programme of the central government was implemented in 12 slums of Keonjhar municipal area. The basic objective of the scheme was to strive for holistic slum development with a healthy and enabling urban environment by providing adequate shelter and basic infrastructure facilities to the slum dwellers of the identified urban areas. The components for assistance under IHSDP included all slum improvement/up gradation/relocation projects including up gradation/new construction of houses and infrastructural facilities, like, water supply and sewerage.

Urban Statistics for HR and Assessments (USHA) is a Central sector scheme implemented by The Ministry of Housing and Urban Poverty Alleviation. The scheme supports National Resource Centre on data base, MIS, surveys, monitoring, impact assessment, action research and capacity building relating to urban poverty, slums, housing, building construction and other urban statistics.

5.11 Slum Upgrading/ Development Approaches

5.11.1 Objectives for Redevelopment Strategies

Access to secure land tenure-

Slum formation takes place because access to affordable land is denied to the slums. Due to inaccessibility to the formal housing, slum dwellers rely on informal housing. Improving the availability of affordable land and housing units can lead to eventual decrease in slum formation.

5.11.2 Reduction of Housing Poverty

Housing poverty refers to the people who are denied housing because its supply does not match the demand and the right kind of affordable housing is not available. Housing poverty is a problem arising out of economic distress. Inflow of housing stock, therefore, must be regulated in a planned way.

5.11.3 Shelter Improvement

The strategy not only aims at reduction of housing poverty but also towards improvement of the existing shelters. The shelter condition can also be upgraded by renovation through construction programmes.

5.11.4 Access to Basic Infrastructure

Basic urban services that are considered bare minimum for a healthy living like water supply, sanitation, garbage disposal, etc. should be made accessible. Improved access to social services would help in empowering the slum population to improve their own living condition and quality of life.

5.11.5 Employment Security

One of the objectives of the strategy is to ensure Employment security for all. This shall be achieved by conducting various skills up gradation programmes, providing loans, etc.

The previous attempt of slum redevelopment with provision of housing & infrastructure has not able to cover much on ground due to the piecemeal approaches of the schemes. Therefore for the holistic development of the slums Rajiv Awas Yojna was launched with a vision of "Slum free India" in selected cities of India with a total of 116 no. of mission cities. The criteria laid in the guidelines made Keonjhar out-reached of the slum redevelopment programme.

As per the Technical Group on Housing Shortage, there was a housing shortage of 18.78 million in 2012, which mainly because of increased urbanisation and migration. More than 95% housing shortage is for EWS/LIG houses and the slum growth is an indicator of the same. A multi focused approach is therefore necessary to answer the problems and improving the life in slums.

5.11.6 Housing for All

In 2015, the central government has launched "Housing for All" with an objective to provide decent pucca house to every family with necessary infrastructure facilities such as water connection, toilet facility, electricity supply and access. The mission seeks to address the housing requirement for urban poor including slum dwellers through following approaches:

- Slum rehabilitation of slum dwellers with participation of private developer
- Promotion of affordable housing for weaker section through credit linked subsidy
- Affordable housing in partnership with public & private sector
- Subsidy for beneficiary-led individual house construction

Some of the salient features of the programme are as follows:

- All 4041 statutory towns as per Census 2011 with focus on 500 Class I cities would be covered in this scheme.
- The mission will support construction of houses upto 30 square meter carpet area with basic civic infrastructure.
- Slum redevelopment projects and Affordable Housing projects in partnership should have basic civic infrastructure like water, sanitation, sewerage, road, electricity etc.
- The minimum size of houses constructed under the mission under each component should conform to the standards provided in National Building Code (NBC). If available area of land, however, does not permit building of such minimum size of houses as per NBC and if beneficiary consent is available for reduced size of house, a suitable decision on area may be taken by State/UTs. All houses built or expanded under the mission should essentially have toilet facility.
- The houses under the mission should be designed and constructed to meet the requirements of structural safety against earthquake, flood, cyclone, landslides etc.

- The houses constructed/acquired with central assistance under the mission should be in the name of the female head of the household or in the joint name of the male head of the household and his wife, and only in cases when there is no adult female member in the family, the house can be in the name of male member of the household.

This scheme can help to address issues of slums and access to affordable housing by dovetailing the efforts under one programme.

5.11.7 Slum Networking

Slum networking requires a detailed study of the existing slums, especially those existing in submerged areas as per contours of the area. This approach can integrate improvement of overall physical infrastructure and social development of the area. It can also integrate upgradation of entire city using slums as urban nets and not as isolated islands. There is close correlation between the slum locations and the natural drainage path of a city and it can be used to design low cost service trunks, particularly for gravity based systems of sewerage and storm drainage. This can also help in proposing for environmental improvements such as creation of fresh water bodies, cleaning up of polluted rivers, and development of green pedestrian spines and restoration of waterfront structures. The net effect is holistic development, which changes the functional, physical, socioeconomic and environmental qualities of a city at a fraction of the costs of conventional approach.

5.11.8 Slum Relocation

Slums located on environmentally hazardous areas such as those along nallah, river, railway area should be relocated to suitable sites close to the work places of the existing slum population and well connected by affordable transport mediums so as to cause minimum disruption to livelihood linkages. Land assembly shall be done compulsorily by the government and handed over to the corporation for any kind of resettlement or slum improvement schemes.

5.11.9 Social and Economic up gradation

Social development of a slum essentially refers to the provision of social infrastructure like schools, anganwadi, health care etc. Community Based organisations are to be strengthened for sustainable local self-Governance. Basic services of health, education and access to credit are crucial for human capital development and reduction of incidence of poverty. Improved access to social services would also help

building up the capacities of poor and empowering them to improve their own living conditions and quality of life.

Income generation activities in slums which are non-polluting (tailoring, making toys, handicrafts etc.) need to be encouraged on mixed land use basis. The provision of vocational training facilities, implementations of savings and credit schemes for self-employment need to be taken up for economic elevation to the slum dwellers. Empowering communities for participation in planning and monitoring of slum development, creation and strengthening of Mohalla Samitis as formal and legal mechanism is crucial in local development. Slum dwellers, women group and SHGs for micro finance need to be ensured for livelihood and economic upliftment of slum dwellers.

5.11.10 Creating Affordable Housing Stock

To address shortage of EWS, LIG, LMIG and MIG housing in a time bound manner and to promote affordable housing through multiple cost reduction measures such as, making available land at reasonable cost, cross subsidization through higher FAR and TDR, stamp duty exemption etc. has been taken by the state government under its Affordable Housing Policy – 2013. Some of the salient features of the scheme are outlined below:

- Minimum 20% of developed land earmarked for residential purposes in the city development plan/ master plan/ zonal development plan shall be reserved for EWS,LIG and LMIG housing
- Development authority, Special Planning Authorities and ULBs to earmark at least 30% of developed land earmarked for residential purposes under their possession for EWS and LIG housing in all their group housing projects
- Liberal building regulation for EWS and LIG housing in term of FAR, ground coverage set back, approach roads etc.
- Encouragement of PPP for creation of EWS housing stock

It is need to recognise that the urban poor are active agents of an urban center and need to be empowered through proper slum redevelopment intervention for creating a sustainable environment.

5.12 Future Housing Strategy

As mentioned above majority of the houses in the study area are small sized, semi-permanent structures which are highly vulnerable and offer little shelter during

disasters like heavy rain, storms and cyclones. The situation of some of the areas like slums and remote villages is quite desperate. Affordable group housing for the underprivileged sections and upgrading of kutcha structures to semi-permanent structures is urgently required to reduce vulnerability of these people. Identification of government land and financial sources for development of subsidized housing and exploring PPP model for the same can be some initiatives taken to solve the housing shortage of Keonjhar town.

5.13 Vision

The vision of the Master Plan is to make the city of Keonjhar a sustainable city with sufficient infrastructure, utilities and minimal housing shortage. This housing scheme will help provide housing for urban poor i.e., slum dwellers, urban poor living in non-slum areas, prospective migrants, homeless and destitute. Thus it will cover each and every aspect of housing shortage and will offer action against them.

Source: HFA guideline

5.14 Demand Assessment

The housing need for the master plan area has been estimated considering the existing housing shortage and future housing requirement for the horizon year 2030. The shortage is based on the number of existing households, housing stock, and excess of households over housing stock, congestion in households, obsolescence in households and up gradation of semi-pucca / liveable housing stock.

For estimating future housing need, household size of 4 is assumed in the master plan area for the estimated population for 2030. Primary reasons for this assumption are increasing urbanisation in the area along with decreasing household size.

Table 5-5: Future Housing Need for Master Plan – 2030

S. No.	Particulars	Amount	Remark
A	**Existing Housing Shortage**		
i	No. of Households	18,300	
ii	No. of Census houses used as residential and residential-cum-others	13,262	Census houses used for residential purpose
B	Numeric shortage	5,038	(i) – (ii)
C	No. of HHs in Congestion status	366	Assuming 2% congestion
1	**Existing Housing Shortage (B+C)**	**5,404**	
E	Future Housing Need		
	Projected Population - 2030	1,56,110	
	Existing Population	1,00,501	
	Additional Population	55,360	
2	**No. of Houses required to fulfil the future need**	**13,840**	Considering the future HH size to be 4.0, considering the trend in change in household size.
3	**TOTAL HOUSING REQUIREMENT (1+2)**	**19,244**	

Source: REPL Estimation

5.15 Housing Strategies

The housing strategies are framed in accordance with the PMAY strategies for providing housing for all. These are as follows:

5.15.1 New Residential Development

The new residential development will target the urban poor not living in slums and also future migrants. Such households will be catered to by Affordable Housing to be constructed in partnership with private sector. Efforts have to be made to augment supply of houses. The Affordable housing schemes shall have following incentives for private developers:

- Extra FAR/ TDR
- Relaxation of density norms
- Deemed NA permission if land falls in residential zone in Master Plan
- Single window clearance for building permissions

- Deemed layout and building permission for pre-approved designs
- Improvement in construction technologies
- Project finance to private developers

As the availability of suitable and sufficient urban land is most critical, few steps to augment land supply are as follows:

- Government/ ULB land within city limit be kept for affordable housing
- Land on fringe of city to be converted into urban land by developing and expanding trunk infrastructure
- Land pooling and such other methods to be adopted
- Mandatory 10-15% reservation of land in new layout for EWS/LIG housing
- Additional FAR/ TDR and relaxed density norms for EWS/LIG housing

For migrant families the main strategy will be to purchase affordable house with interest subvention. They shall also be able to avail temporary rental accommodations or dormitories, in case of single migrants.

The development authority shall solely or with the help of private developers adopt the following strategy for providing housing for the migrants. These are as follows:

- Rental units & dormitories to be available to individual / family for 3-5 years at subsidized rent
- Rental housing and dormitories by ULBs with GoI support (60-75%)
- Labour welfare boards, construction workers welfare boards etc. to be involved

All the above discussed strategies will help decrease the housing shortage for the city of Keonjhar.

5.15.2 Redevelopment Strategy for Core City

The main strategy for core city shall include re-densification of the old city areas based on the availability of infrastructure and the scope of enhancement of the existing facilities.

Road widening within the core areas will be taken up for reducing obstruction to traffic in case of bottlenecks. These roads will be declared by the Planning Authority time-to-time and measures will be taken to avoid any demolition as far as possible.

Infrastructure enhancement is one of the main factors of the redevelopment strategy for the core city area. The Master Plan shall aim on providing basic infrastructure and amenities to the existing households.

Another strategy will be improving dilapidated properties with unliveable conditions so as to reduce risk of damage in case of any natural disaster.

CHAPTER-6 TRAFFIC AND TRANSPORTATION

6.1 Introduction

Transportation network along with its modes form the backbone of any city's form and function. Master plan for Keonjhar aims to strengthen this backbone by aiming for the following principles:

- Capable and multi-modal Public Transport System
- Developing right of way (ROW) for safe and secure mobility of slow moving vehicles
- Connecting commercial spine of the city with sprawling residential sectors
- Providing adequate and continuous pathways in all activity zones
- Implementation of innovative Traffic Management Techniques along with augmenting new capacity systems
- Segregation of local and regional traffic w.r.t. space and time
- Providing continuity and uniformity in the corridors and Intersections
- Utilizing the unused Right of Way for Multi Utility Zones as per the needs of abutting landuse.

6.2 Types of surveys and their purpose

Following traffic studies were carried out in the town of Keonjhar so as to understand the existing traffic and transport system.

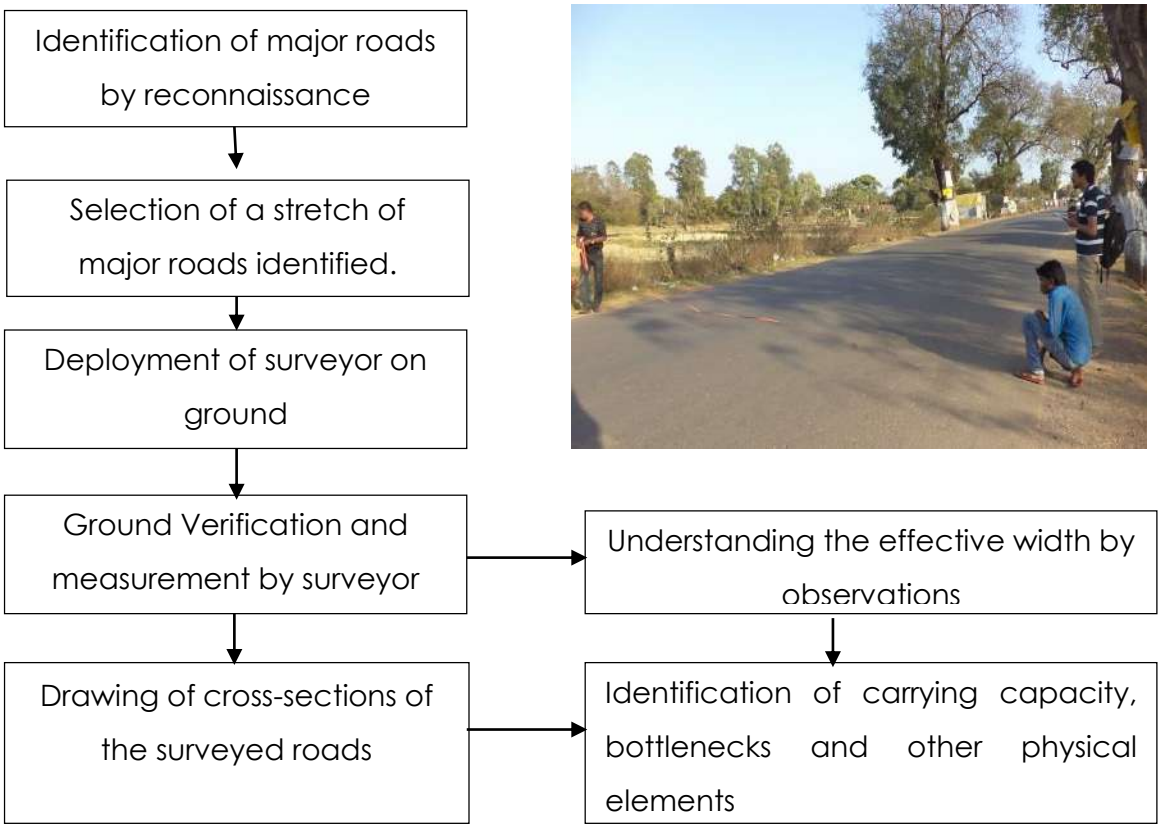
Name of survey	Purpose of survey
Cross-sectional elements	Assess the general supply and capacity of roads
Classified Traffic volume count	Assess the traffic load on network and traffic composition
Origin Destination Survey	Identification of travel desire pattern and network loading
Speed and delay	To estimate the general riding speeds and quality
Parking survey	Estimation of parking demand and supply

6.3 Cross-sectional elements of major roads

In order to understand the characteristics of major networks within the city and have an idea about their carrying capacity and dimensions cross-sections of various major

roads in the Keonjhar town were studied. In order to carry out the survey following methodology was adopted.

Figure 6–1: Cross-sectional survey methodology



After taking up reconnaissance survey, about 11 roads were selected for the purpose of the cross-sectional elements survey. Out of the 11 roads, 6 were catering to the regional traffic while others were primarily dealing with local traffic. The roads taken in the survey are as follows.

1. **NH-49 towards Rourkela Mumbai - Kolkata Highway**

The road characteristics are that of the highway with very little developed land adjoining the road. Most of the surrounding land use is agricultural and forest cover. The ROW is approximately 55 m with around 7 m of carriage way with shoulders on both sides.

Figure 6–2: NH 49 near Judia ghati

2. NH-49 near new bus stand

The road characteristics are that of the highway with large number of truck parking adjoining the main road. Most of the surrounding land is vacant. The ROW is approximately 31 m with around 8.5 m of carriage way with shoulders on both sides. No other significant street feature is present apart from electric line running parallel to the road.

Figure 6–3: NH 49 - Near Shreekhetra hotel

3. Road towards NH 20

This road also has a characteristics are that of the highway with. It is called NH-20 once outside the town. Most of the surrounding land is vacant. The ROW is approximately 23 m with around 7m of carriage way with shoulders on both sides. No other significant street feature is present along the road much of the surround land use is agricultural.

Figure 6–4: Towards NH 20 Near bus stand

4. NH-49 near towards Baripada

This road also has a characteristics are that of the highway with. It is Part of NH-49 once outside the town. The ROW is approximately 28 m with around 7m of carriage way with shoulders on both sides. No other significant street feature is present along the road. Service lines like electric lines are running along isolated stretches.

Figure 6–5: NH 49 - Near Shankarpur road

5. Raisua road towards Barbil

This road also has a characteristics are that of the highway with. It is called NH-20 once outside the town though part of it is under construction. The ROW is approximately 29 m with around 25m of carriageway under construction. No other significant street feature is present along the road.

Figure 6–6: Near Raisua on Barbil road

6. Naranpur road towards Bhubaneswar

This road also has a characteristics are that of the highway with. It is called NH-20 once outside the town the ROW is approximately 52 m with around 5m of carriageway available. No other significant street feature is present along the road except the electric line running along both sides.

Figure 6–7: Naranpur road towards Bhubaneswar

7. Haridagadh road towards Harichandarpur

Harichandarpur road is a state highway with a cross-section of around 22 m ROW with almost no development alongside the road the carriage way is around 12 meter wide with shoulder on both side. There is no major service line or any other major feature running along the road. However, some development has started to take place along some sections.

Figure 6–8: Haridagadh road

8. NH-49 Near Axis bank

This road is the part of NH-49 road which is connecting Baripada bus stand to the Gandhi chakka. The cross-section is around 19 m ROW with almost commercial and mixed land use development along-side the road. The carriage way is around 9.7 meter wide with shoulder on both side. There is a drain running along the road along with electricity and telephone line on the poles.

Figure 6–9: Nh-49 near Axis bank

9. Patna road near Chakka

Patna road is also a major road with a cross-section of around 11 m ROW with almost no development alongside the road the carriage way is around 5.5 meter wide with shoulder on both side. There is no major service line or any other major feature running along the road except an electric line .

Figure 6–10: Patna road near chakka

10. Hospital road

Hospital road is major town road connecting collector office to district hospital it has a cross-section of around 18 m ROW with institutional development alongside the road the carriage way is around 11 meter wide with shoulder on both side with plantations. There are service lines running along the road. Organized commercial development has started to take place along the major intersections.

Figure 6–11: Hospital Road

11. Post office road Keonjhar

This road is perhaps the busiest internal road in the town also a part of highway with a cross-section of around 24 m ROW with almost no development alongside the road the carriage way is around 9 meter wide with shoulder on both side. There is major service line running along both sides of the road. Part of the land has been encroached and being used for various commercial purposes.

Figure 6–12: Near Post Office Keonjhar

Table 6-1: Road characteristics of different stretches of major roads

Name and no.	Name of the Road/Area	ROW (Mtr)	C/ Way (Mtr)	Median	Left Foot-path	Right Foot-path	Road Surface Type	Road Surface Quality
OCP 1	Raisuan (badbil road)	29	25.6	3.5	Absent	Absent	Partly WBM	Poor
OCP 2	Sankarpur (Baripada road)	27.4	7	Absent	Absent	Absent	WBM	Good
OCP 3	Chaaka (Patna road)	11	5.5	Absent	Absent	Absent	WBM	Good
OCP 4	Near naranpur parking	52.2	5.5	Absent	Absent	Absent	WBM	Good
OCP 5	Haridagadh road	22.7	12.1	Absent	Absent	Absent	WBM	Good
OCP 6	Judia ghati (rourkela road)	55.1	6.8	Absent	Absent	Absent	WBM	Average
ICP 1	Badbil bustand	22.4	7	Absent	Absent	Absent	WBM	Average
ICP 2	Infront of Axis bank	18.7	9.7	Absent	Absent	Absent	WBM	Average
ICP 3	Near Post office	24	9	Absent	Absent	Absent	WBM	Average
ICP 4	Near Pustak Bhandar	17.6	11	Absent	Absent	Absent	WBM	Good
ICP 5	New Bus stand	31.3	8.3	Absent	Absent	Absent	WBM	Average

Source: REPL Primary Survey

Table 6-2: Cross-sectional elements of the major roads in the town

No.	Name of the Road	Street Lights	Street Furniture	Drain	On street parking	Electric line	Left side landuse	Right side landuse
OCP 1	Raisuan (badbil road)	Absent	Absent	Absent	Absent	Absent	Vacant	Residential
OCP 2	Sankarpur (Baripada road)	Absent	Absent	Absent	Present	Present	Small commercial	vacant/agriculture
OCP 3	Chaaka (Patna road)	Absent	Absent	Absent	Absent	Present	vacant/agriculture	vacant/agriculture
OCP 4	Near naranpur parking	Absent	Absent	Absent	Present	Present	Vacant	Small commercial
OCP 5	Haridagadh road	Absent	Absent	Absent	Absent	Absent	Vacant	Vacant
OCP 6	Judia ghati (rourkela road)	Present	Absent	Absent	Present	Present	Institutional	Institutional
ICP 1	Badbil bustand	Absent	Absent	Absent	Absent	Absent	Institutional	vacant/agriculture
ICP 2	Infront of Axis bank	Absent	Absent	Present	Present	Present	Commercial	Mixed Residential
ICP 3	Near Post office	Absent	Absent	Present	Present	Present	Commercial	Commercial
ICP 4	Near Pustak Bhandar	Absent	Absent	Absent	Absent	Present	Institutional	Institutional
ICP 5	New Bus stand	Absent	Absent	Absent	Present	Present	Institutional	Commercial

Source: REPL Primary Survey

Observations of the primary survey of the cross-sections are discussed below:

- Most of the roads in the town have an organically developed cross-section.
- The Service lanes in the town are not carefully planned according to the street cross-section and surrounding land use.
- Unregulated street parking contributes to the existing conditions of congestion on the internal roads.
- The provision for pedestrians and bicycles are completely overlooked in the street cross-sections.
- Provision of street illumination is either makeshift or not present at all.
- Due to unmaintained and choked drains along the roads, water logging during the rain damages the roads and degrades the surface quality.

6.4 Traffic volume count

In order to gauge the traffic load on the network, it is imperative to conduct a classified traffic volume count survey on the major roads of the Keonjhar town. The aim was to determine the classified traffic volume count for at-least a period of 12 hours on both sides of the cordon point. Following methodology was adopted for the process.

Figure 6–13: Methodology for CTVC

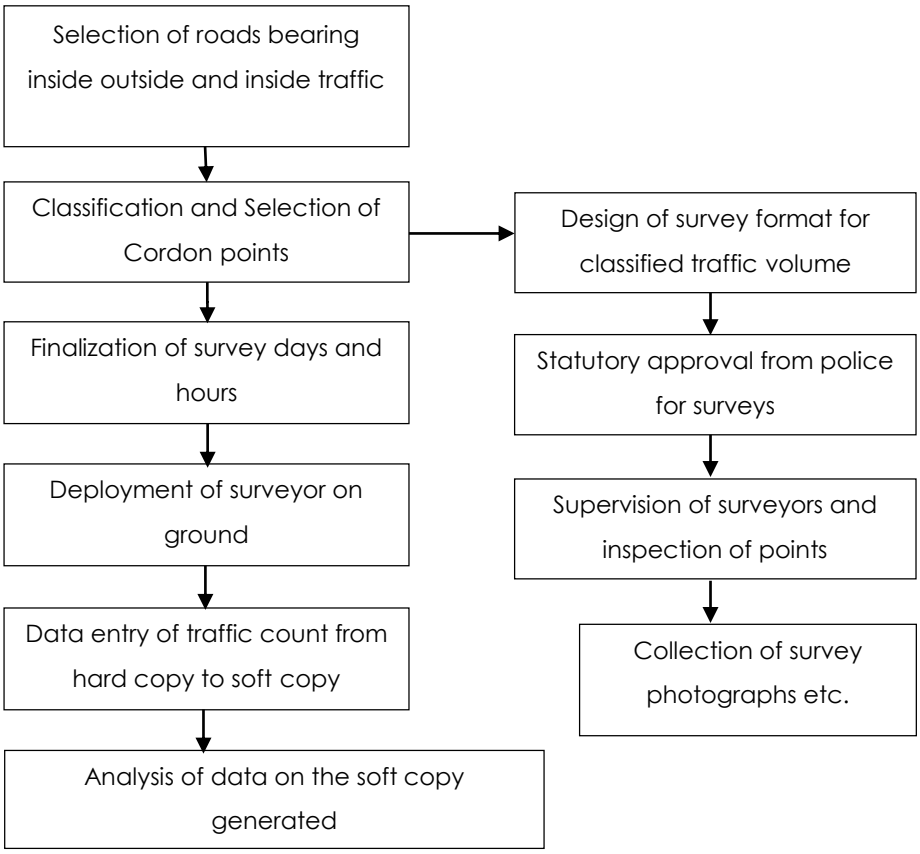


Figure 6–14 Traffic survey in progress

Cordon points were carefully selected to include exit points from the planning area through which outside traffic enters and leaves the town. Along with the same the inside points were selected in relation to the various physical boundaries present within the planning area so that the inter-zonal traffic within the planning area can be known.

Classification of cordon points was done to measure passenger, goods and NMT vehicles in the town. There were in total 6 Outer cordon Points and 5 inner cordon points taken up in the survey which are given in the following figure along with the analyses.

1. **Inner Cordon point 1: Bus stand**

The inner cordon point 1 has a peak hour between 5-6 pm with around 1350 vehicles crossing the station. Most of the traffic is composed of passenger vehicles which constitutes 94% of the vehicular count. Slow moving vehicles constitute 10% of the total traffic. Most of the fast moving vehicles are 2-wheelers and during peak hour it constitutes 62% of the vehicular traffic. The NMT constitutes 8% of the traffic during the peak hour.

2. **Inner cordon point 2: Near Axis bank**

The inner cordon point 2 has a peak hour between 1 -2 pm with around 1200 vehicles crossing the station. It shall be noted that PCU to Vehicle ratio for this location was much higher than unity indicating heavy flow of large and heavy vehicles. Most of the traffic is composed of passenger vehicles which constitutes 78% of the vehicular count. Most of the fast moving vehicles are 2-wheelers and constitutes 62% of the vehicular traffic during peak hour. The share of bicycle is second highest for an individual mode at 19% of total vehicular traffic.

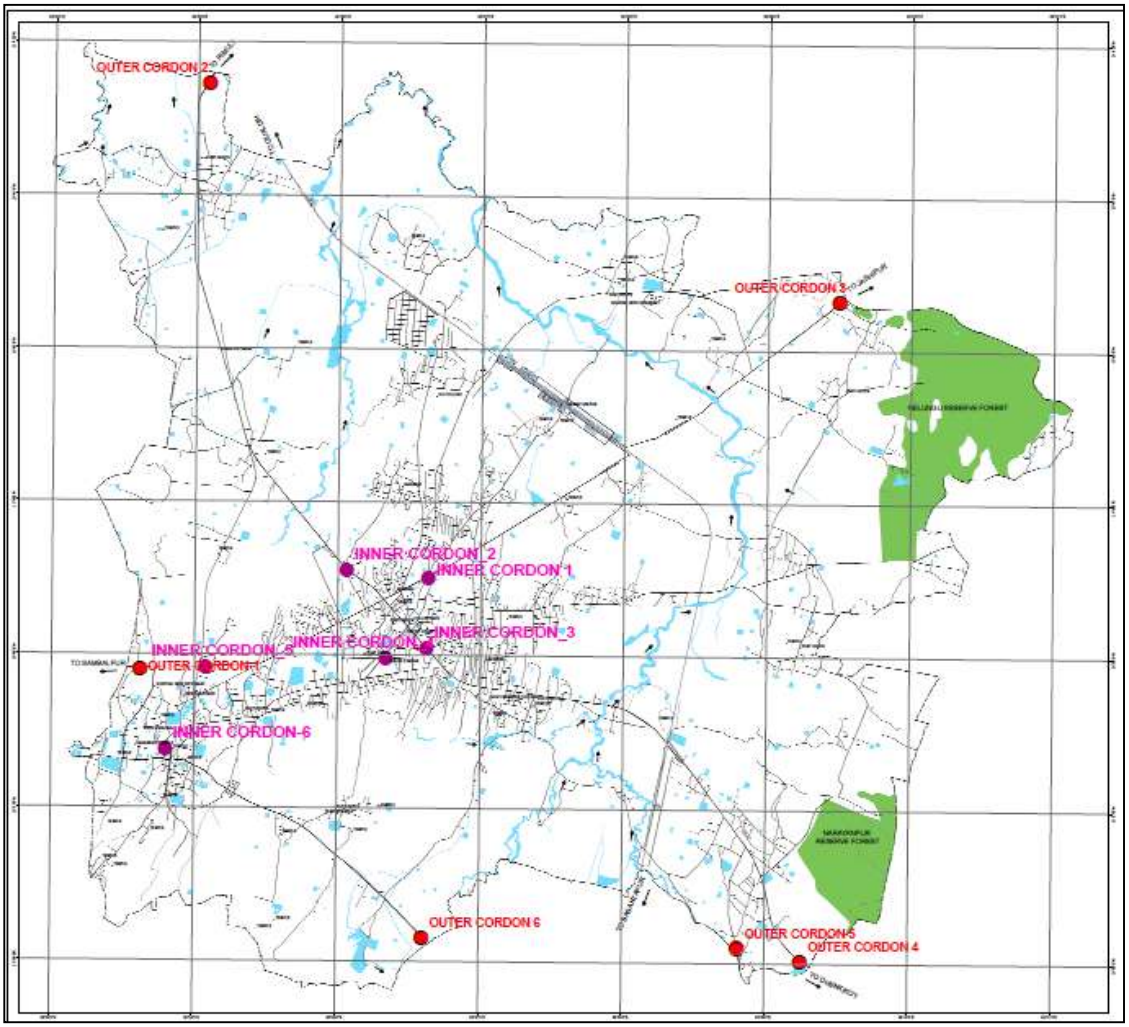
3. **Inner cordon point 3: Near Post office**

The inner cordon point 3 has a peak hour between 10-11 am. Most of the traffic is composed of passenger vehicles which constitutes 93% of the vehicular count. Slow moving vehicles constitute 18% of the total traffic. Most of the fast moving vehicles are 2and 3-wheelers and during peak hour it constitutes 55% of the vehicular traffic.

4. Inner cordon point 4: Near Pustak Bhandar

The inner cordon point 4 has a peak hour between 10-11 am. Most of the traffic is composed of passenger vehicles which constitutes 98% of the vehicular count. Slow moving vehicles constitute 18% of the total traffic. Most of the fast moving vehicles are 2and 3-wheelers and during peak hour it constitutes 68% of the vehicular traffic. The bicycle constitutes 21% of the traffic during the peak hour.

Map 6-1: Location of inner and outer cordon points in Keonjhar town



5. Inner Cordon point 5: Near new bus stand

The inner cordon point 5 has a peak hour between 9-10 am. Most of the traffic is composed of passenger vehicles which constitutes 75% of the vehicular count. Slow moving vehicles constitute 5% of the total traffic. Most of the fast moving vehicles are 2and 3-wheelers and cars and during peak hour it constitutes 56% of the vehicular traffic. The bicycle constitutes 8% of the traffic during the peak hour. It shall be noted

that PCU to Vehicle ratio for this location was much higher than unity indicating heavy flow of large and heavy vehicles.

6. **Outer Cordon point 1: Raisuan Badbil road**

The Outer cordon point 1 has a peak hour between 10-11 am with around a flow of 1500 vehicles. Most of the traffic is composed of passenger vehicles which constitutes 93% of the vehicular count. Slow moving vehicles constitute 7% of the total traffic. Most of the fast moving vehicles are 2and 3-wheelers and cars and during peak hour it constitutes 79% of the vehicular traffic. The bicycle constitutes 12% of the traffic during the peak hour. It shall be noted that PCU to Vehicle ratio for this location was also much higher than unity indicating heavy flow of large and heavy vehicles.

7. **Outer cordon point 2: Shankarpur, Baripada road.**

The Outer cordon point 2 has a peak hour between 10-11 am. Most of the traffic is composed of passenger vehicles which constitutes 74% of the vehicular count. Slow moving vehicles constitute 11% of the total traffic. Most of the fast moving vehicles are 2and 3-wheelers and cars and during peak hour it constitutes 51% of the vehicular traffic.

8. **Outer cordon point 3: Patna road near Chakka.**

The Outer cordon point 3 has a peak hour between 8-9 am. Most of the traffic is composed of passenger vehicles which constitutes 70% of the vehicular count. Slow moving vehicles constitute 13% of the total traffic. Most of the fast moving vehicles are 2and 3-wheelers and cars and during peak hour it constitutes 44% of the vehicular traffic.

9. **Outer Cordon Point 4: Near Naranpur parking**

The Outer cordon point 4 has a peak hour between 10-11 am. Most of the traffic is composed of passenger vehicles which constitutes 92% of the vehicular count. Slow moving vehicles constitute 9% of the total traffic. Most of the fast moving vehicles are 2wheelers and cars and during peak hour it constitutes 74% of the vehicular traffic.

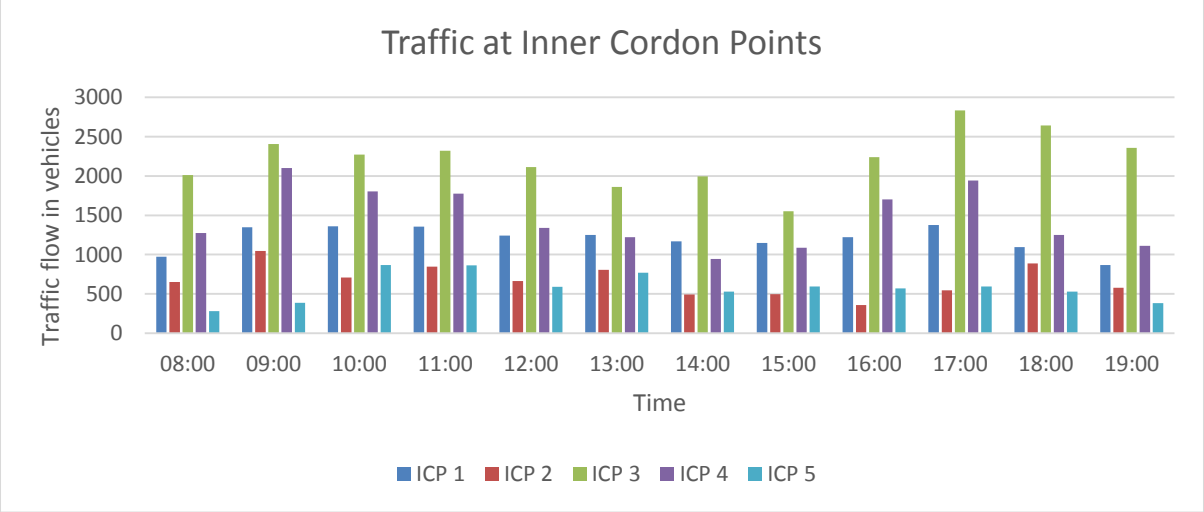
10. Outer Cordon point 5: Haridagadh road

The Outer cordon point 5 has a peak hour between 4-5 pm. Most of the traffic is composed of passenger vehicles which constitutes 89% of the vehicular count. Slow moving vehicles constitute 14% of the total traffic. Most of the fast moving vehicles are 2and 3-wheelers and cars and during peak hour it constitutes 73% of the vehicular traffic.

11. Outer Cordon point 6: Raurkela road near Rudia ghati

The Outer cordon point 6 has a peak hour between 8-9 am. Most of the traffic is composed of passenger vehicles which constitutes 63% of the vehicular count. Slow moving vehicles constitute only 2% of the total traffic. Most of the fast moving vehicles are 2and 3-wheelers and cars and during peak hour it constitutes 54% of the vehicular traffic. The NMT constitutes 3% of the traffic. 37% of the vehicles are goods vehicle.

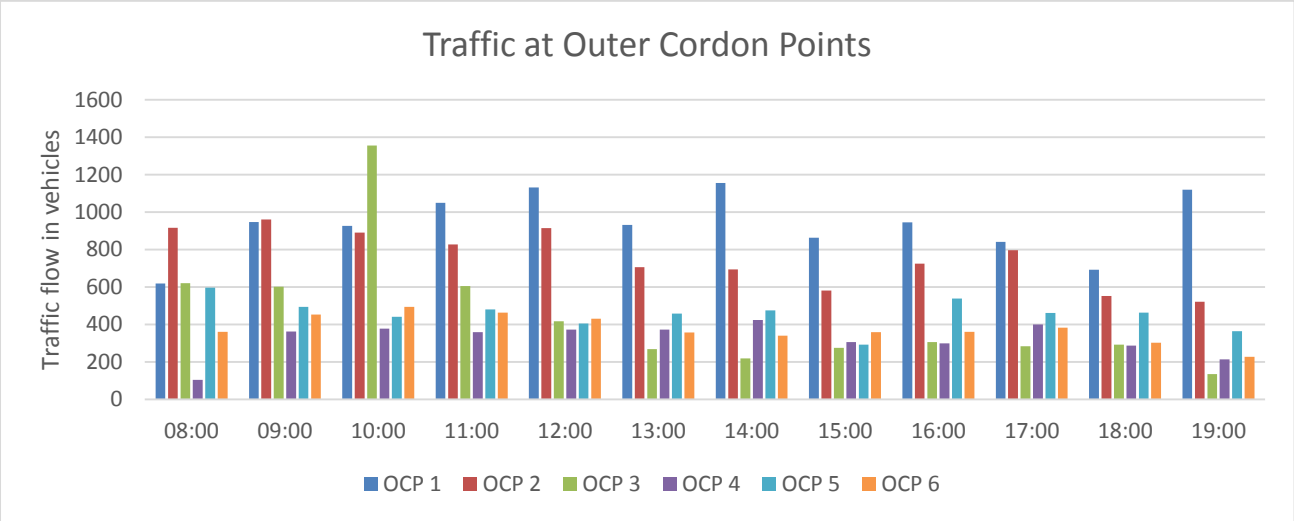
Figure 6–15: Traffic flow at Inner Cordon Points



Source: REPL Primary Survey

Except some roads, in general most roads have a two-lane carriageway. The corresponding capacity is estimated at 1200 – 1500 vehicles (Capacity is estimated to be in a range as auxiliary lanes concept is taken into consideration due to high share of two-wheeler vehicle movement). The ICP 3 and ICP 4 i.e. near Post Office and Pustak Bhavan respectively observe heavy traffic than the capacity for most of the day.

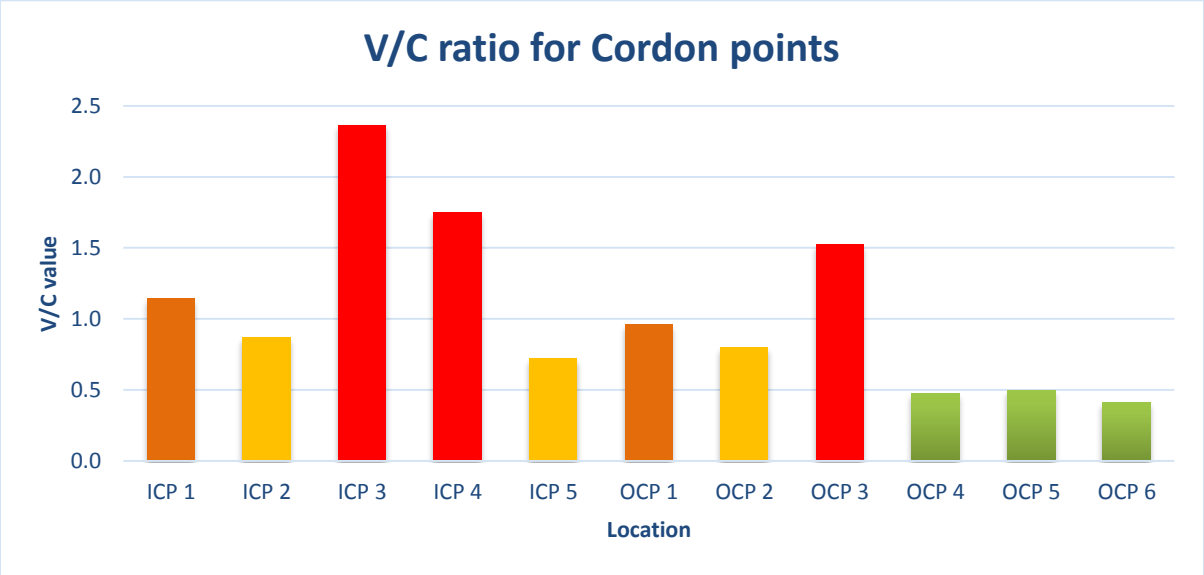
Figure 6–16: Traffic Flow at Outer Cordon points



Source: REPL Primary Survey

OCP 1 and OCP 2 have relatively higher traffic flow as compared to other locations. Occasionally it is been observed that traffic overshoots the capacity otherwise the traffic flow is just near about the acceptable limits. The following graph summarizes the traffic flow condition for the town of Keonjhar –

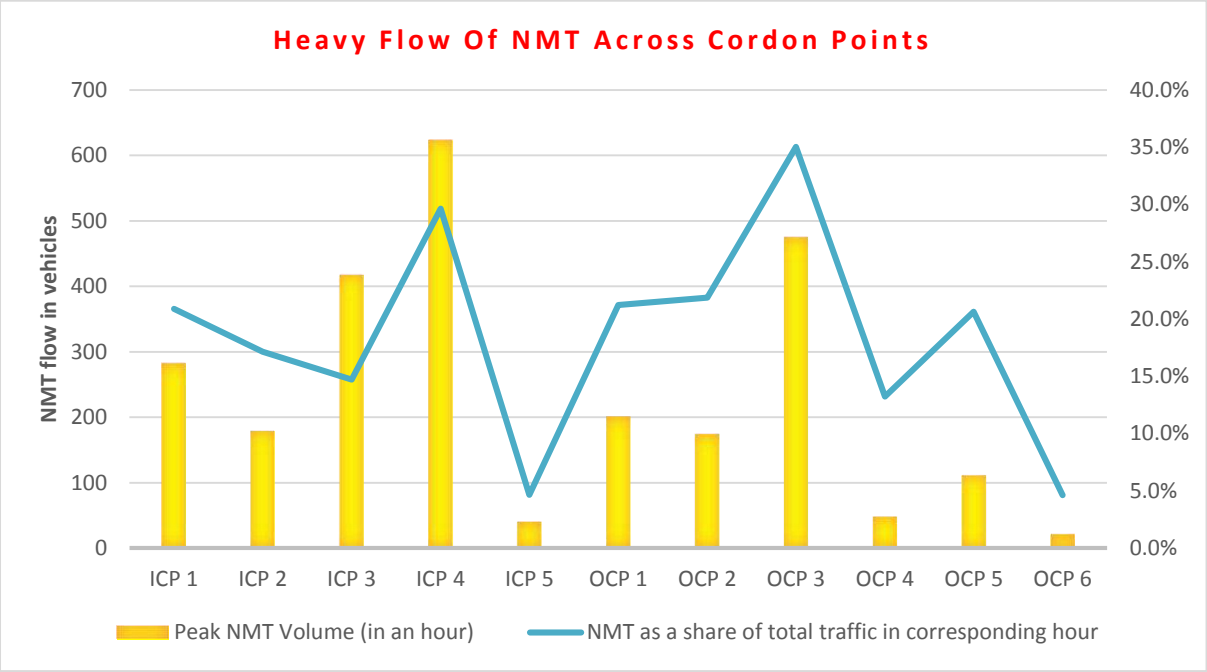
Figure 6–17: Analysis of the V/C ratio of all the cordon points



Source: REPL Primary Survey

The graph above indicates urgency for improvement measures for certain roads including possible road widening, if necessary. The town also witnesses huge movement of modes from Non-motorized transport (NMT). Following figure illustrates the extent of NMT flow in the town –

Figure 6–18: Heavy Flow of NMT across Cordon Points



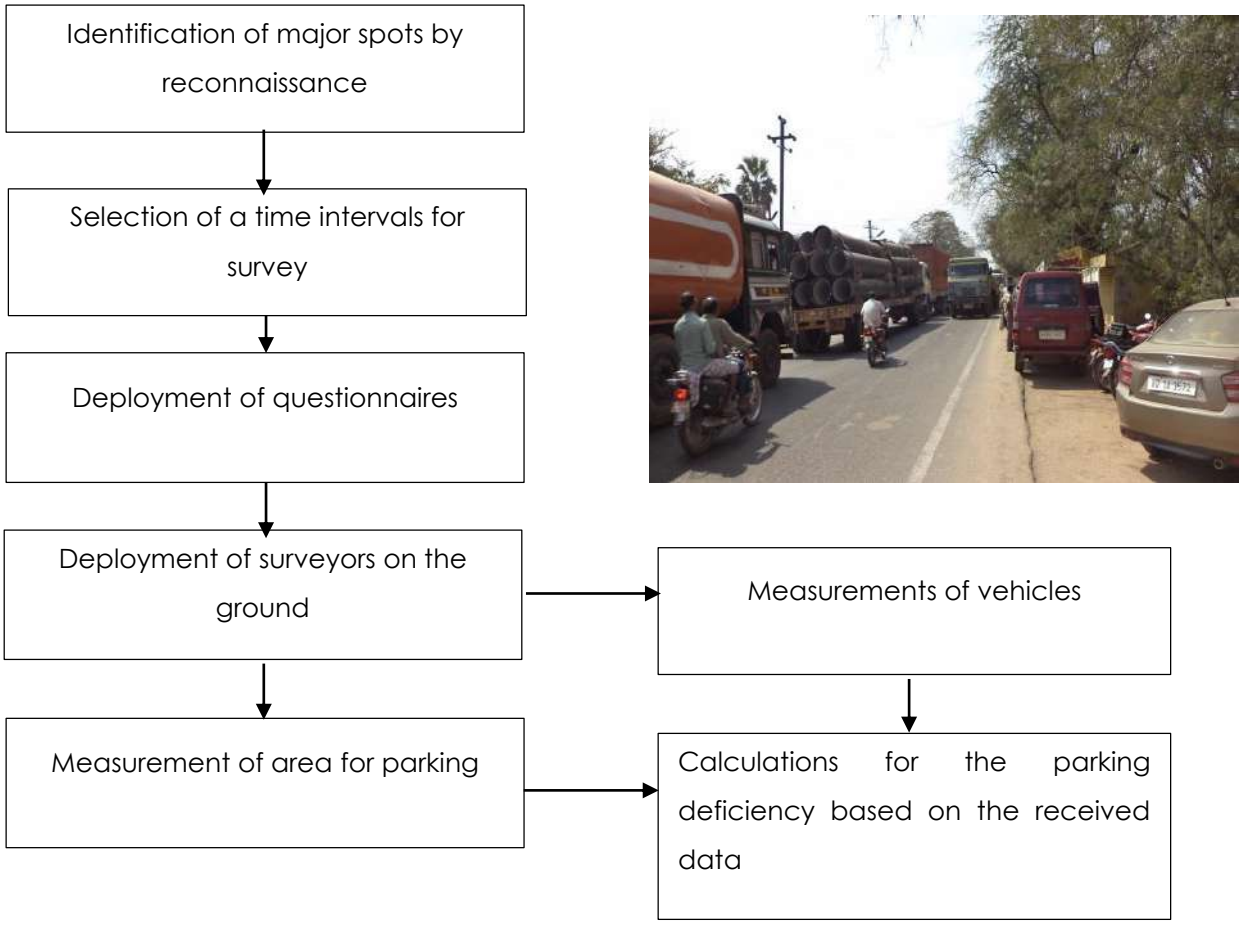
Source: REPL Analysis

It can be seen that at certain locations, the share of NMT is approximately one third of the total flow. Such high percentage share of NMT is peculiar fact for the town of Keonjhar. Other than the NMT traffic flow, there is significant flow of heavy vehicles. Mix of fast and slow vehicles, local and externally destined traffic, as seen in Keonjhar needs to be better segregated and managed.

6.5 Parking survey

In order to understand the accumulation of vehicles at different places in the town during the entire day parking survey was taken up. The survey consisted of identification of the areas of high vehicle parking and their subsequent numbers in order to access the parking demand and supply in the Keonjhar town.

Figure 6–19 Methodology for Parking survey and Example of on street parking in Keonjhar

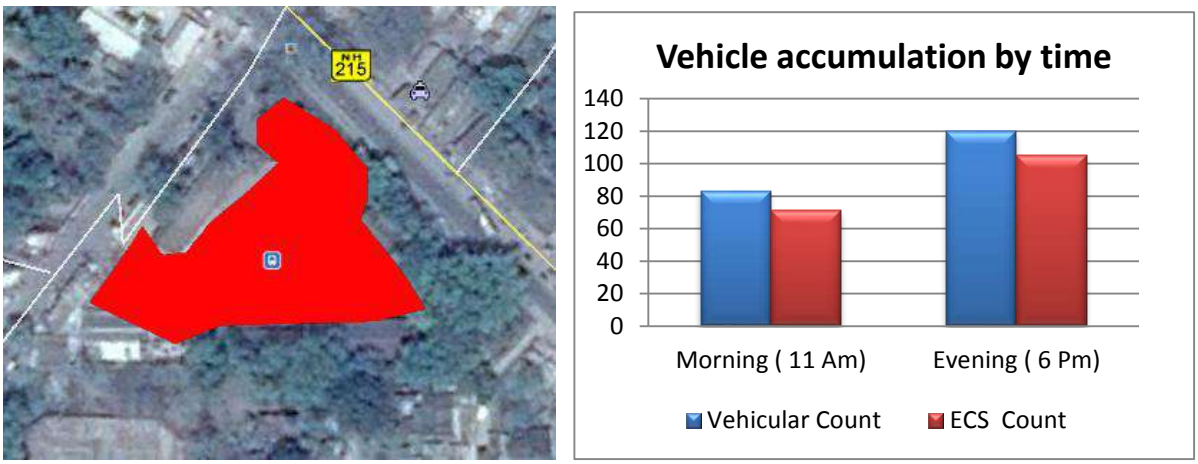


The parking survey was conducted for two types of parking areas, namely organized parking and unorganized street parking. 3 stretches were selected for on street parking purpose. First stretch was from new bus stand to Baripada bus stand covering the national highway, the second stretch was from bus stand to RTO and the third stretch was along the market road. The only organized public parking spaces were found inside town near the new bus stand and old bus stand apart from some administrative buildings. The survey was done for morning and evening during the late periods to see the accumulation. The details are presented below.

I. Site 1: Off street parking: old bus stand

The Bus stand has an organized parking space but it is being used in an unorganized manner. There is mix of all modes of transport present at the stand. The number of vehicles parked in the evening was much more than in the morning. Largely cars and two-wheelers were found parked at the location.

Figure 6–20: Location of the site and accumulation



Source: REPL Survey

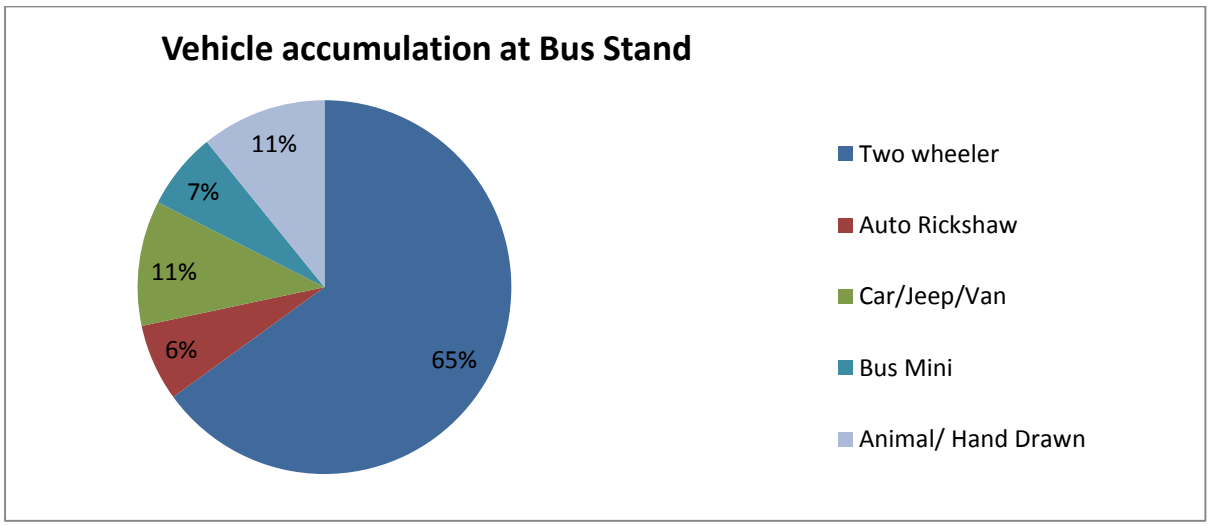


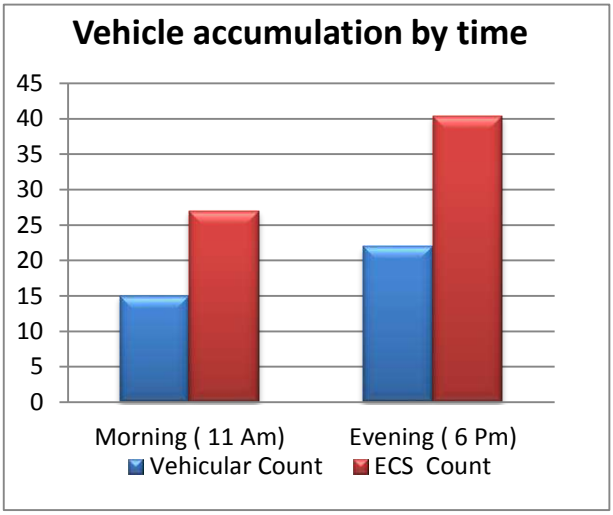
Figure 6–21: Maximum accumulation vehicular and ECS

Source: REPL Analysis

II. Site 2: Off street parking: New bus stand

The majority of the ECS was consumed by Mini Buses which were waiting for passengers. They consisted of 64% of the total vehicular count and 76% of the total occupied ECS space. The vehicular count was higher in the evening than in the morning. Many vehicles were parked at the site throughout the night. Around 24% of the other parked vehicles were Standard buses.

Figure 6–22: Location of site and parking accumulation

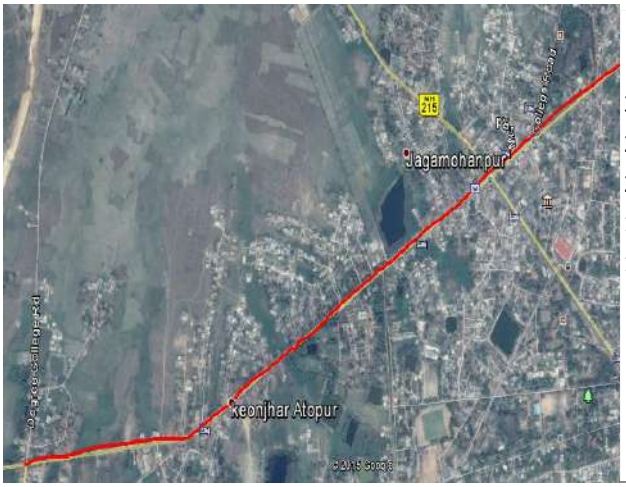


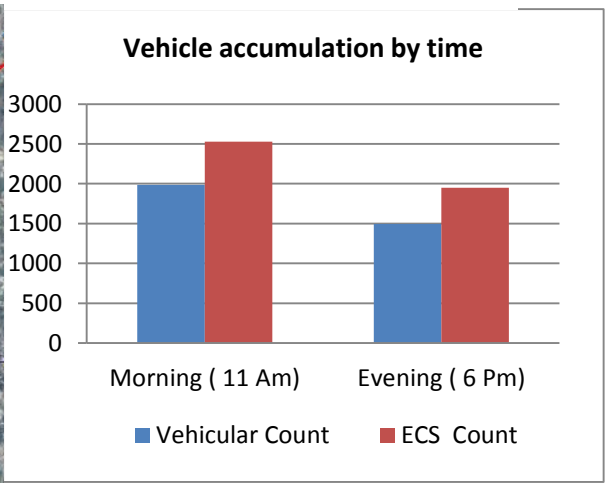
Source: REPL Survey

III. Site 3: On street parking: New bus stand to Baripada bus stand

The on-street parking stretch is the major road of the town with high traffic volume and has number of major roads attached to it, thus parking is intense throughout the day. The peak accumulation was observed in the morning hours with maximum demand of space by cars and two-wheelers. In terms of ECS value the parking demand was mostly skewed towards the motor cycles and cycles. The highest parking in the given stretch was near Gandhi chowk and joint market areas.

Figure 6–23: Location of the street and accumulation



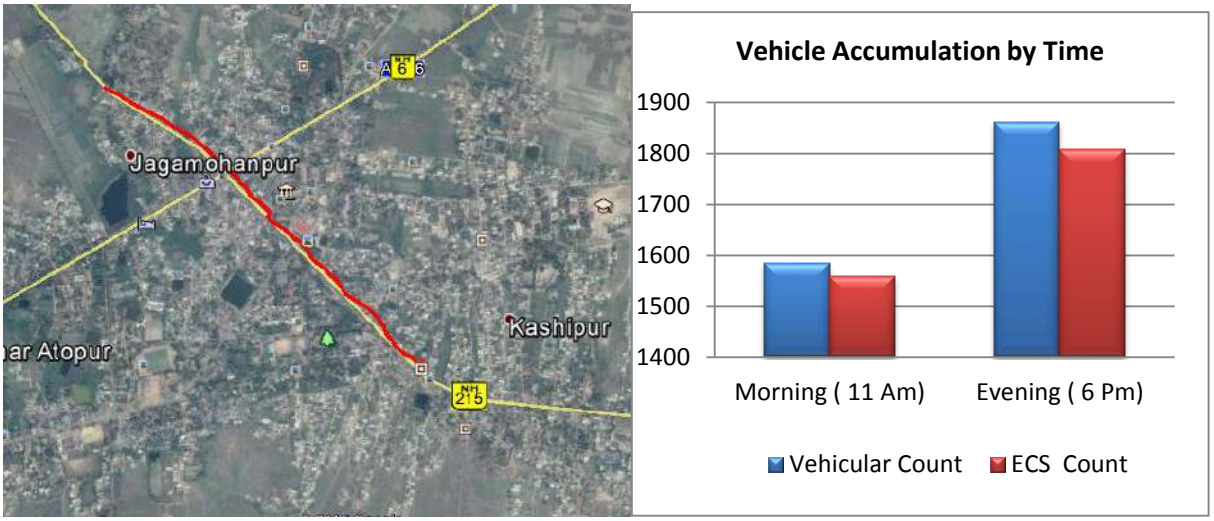


Source: REPL Survey

IV. On street parking: Bus stand to RTO

The on-street parking demand in this stretch is intense throughout the day as it is one of the arterial streets for the town of Keonjhar. Majority of the accumulated traffic consisted of two wheelers, auto rickshaws and cars which constituted around 75% of the parking demand. The highest parking demand was during the evening time when the parking demand increased by 1.3 times than that of morning.

Figure 6–24: Location and accumulation



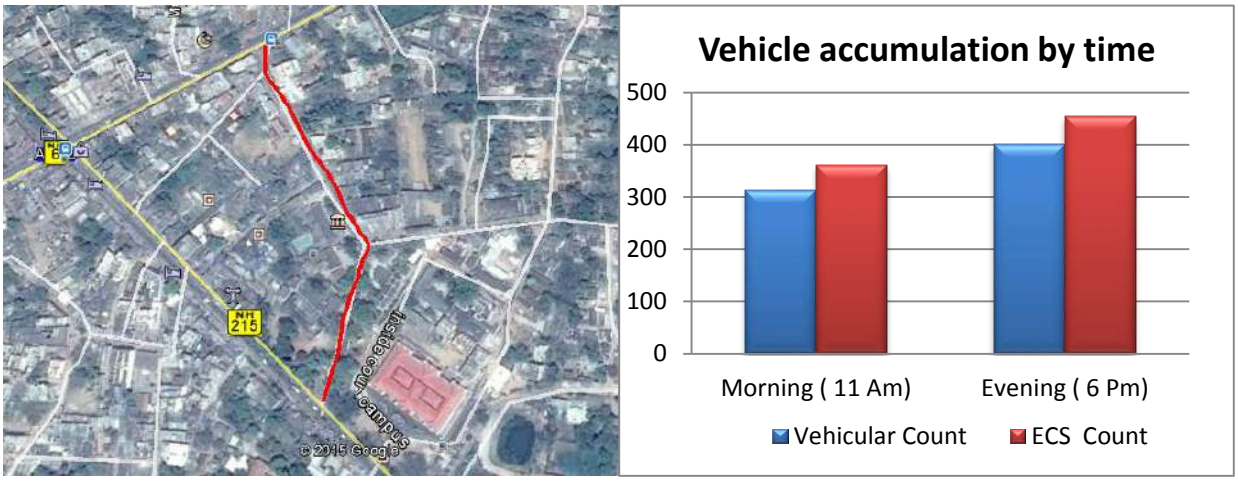
Source: REPL Survey

V. On street parking: Market

The on-street parking demand for this stretch is intense throughout the day as it consists of the central wholesale market of the town. The heavy traffic and demand for parking makes it difficult to travel along the stretch. Considering the above issues, the traffic along the stretch is managed by one-way traffic loops. Majority of the parked vehicles consist of two wheelers, cycle rickshaw and thelas which constituted around 85% of the traffic demand.

- The greatest demand for parking was at the commercial stretches where demand supply ratio exceeded 3.5. Urgent parking intervention is required at these sites.

Figure 6–25: Vehicle accumulation by time



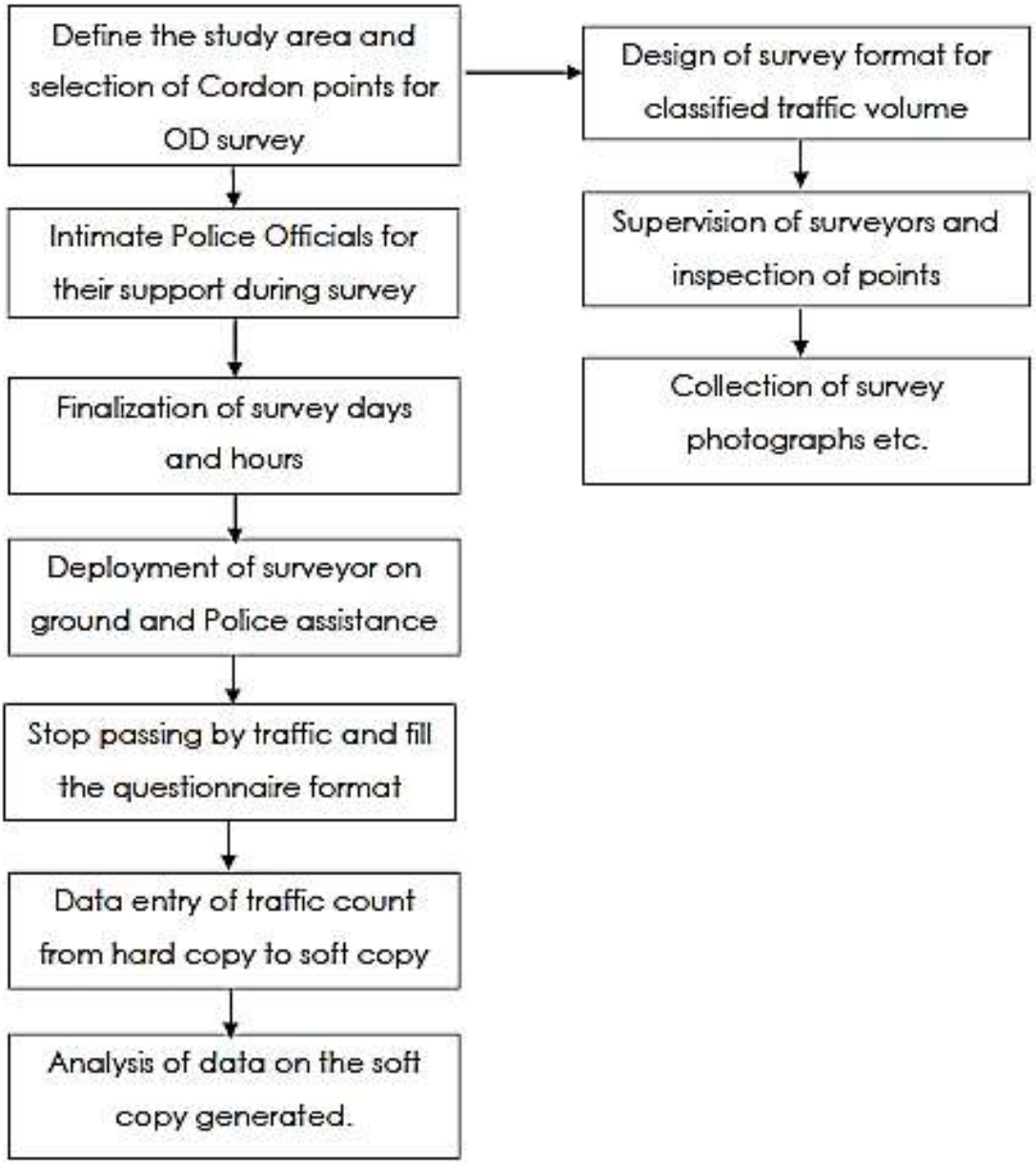
Source: REPL Survey

- At market road also there was a huge gap in demand and supply and the ratio exceeded 7.8. due to insufficient parking space

6.6 Origin-Destination Survey

To study the regional and local travel desire pattern, Origin – Destination survey was carried out by road side interview method at cordon points. The study gave insight about trip-ends, number of trips made by vehicles, distance travelled by vehicles and purpose of travel, occupancy of mode for at-lest a period of 8 hours on both sides of the cordon point. Following methodology was adopted for the process.

Figure 6–26: Methodology for Origin destination survey



Classification of cordon points was done to measure passenger vehicles, goods vehicles and buses in and outside the town. There were in total 6 Outer cordon Points taken up in the survey which are given below along with the analyses.

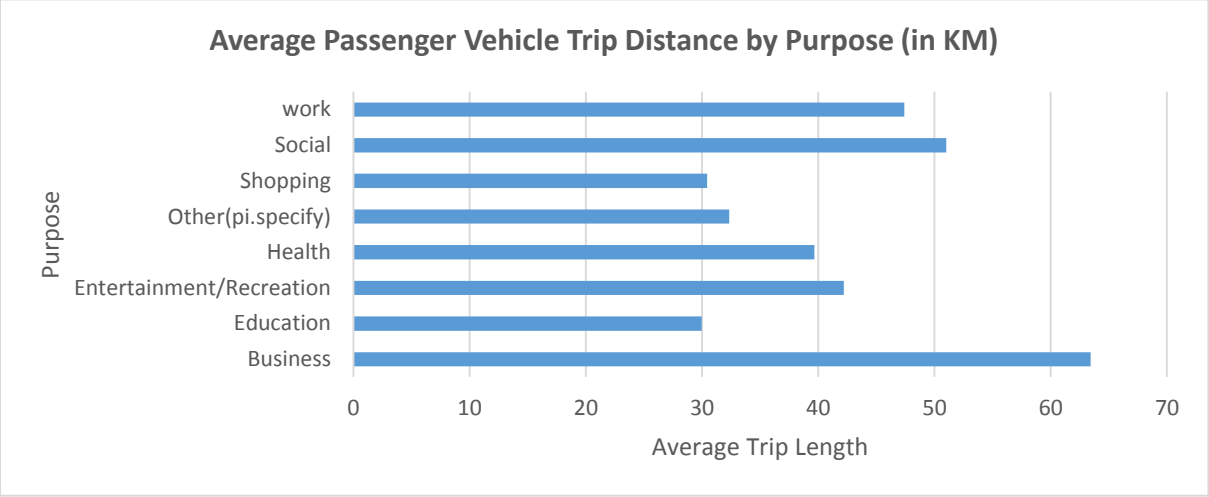
1. **Outer Cordon point 1**

Trip frequency of two wheelers was the highest for the given point especially among the daily up down passengers and was followed by cars. The greatest trip distance

was made by car followed by taxi and two wheelers. Majority of the commuters were travelling long distance either for business or work.

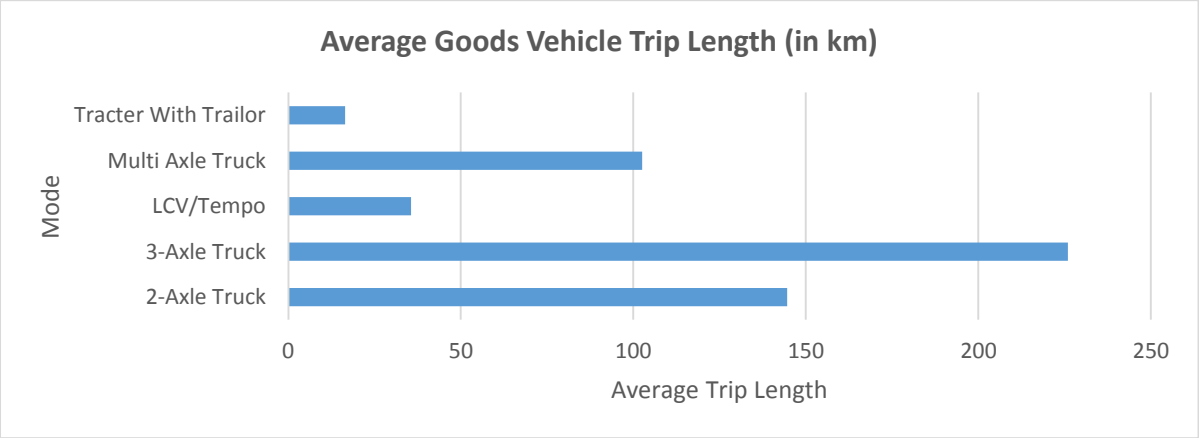
2- Axle Trucks have the highest average trip frequency of travelling occasionally. 3-Axle Truck have the highest average trip length. Most of the vehicles travel from Keonjhar to Tata in this route. Large number of them carried building materials.
Most of the buses operating in the region are privately owned. The buses are generally destined to Champua, Joda, Barbil and Kiruburu. There is huge through traffic of buses operating between Rourkela and Baripada.

Figure 6–27: Average Passenger Vehicle Trip Distance by Purpose (in km) at OCP 1



Source: REPL Survey

Figure 6–28: Average Goods Vehicle Trip Length (in km) at OCP 2



Source: REPL Survey

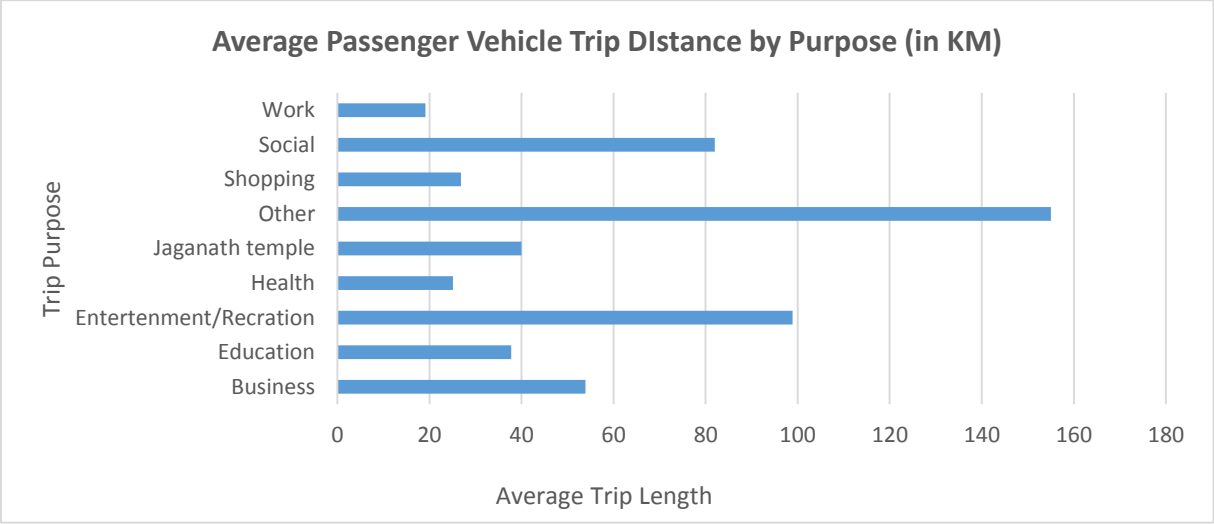
2. Outer Cordon Point 2

Trip frequency of the two wheeler and bicycle was the highest at the given point especially among the daily up-down passengers followed by cars. The greatest trip distance was made by car followed by taxi and two wheelers. Majority of the commuters were travelling long distance either for entertainment or other purposes.

Multi - Axle Trucks have the highest average trip frequency of travelling occasionally. Multi & 3-Axle Truck have the highest average trip length. Most of them were travelling to Keonjhar from Kolkata. Large number of them carried building materials followed by fruits and vegetables.

Most of the buses operating in the region are privately owned. The buses are generally destined to Baripada, Karanjia, Udala and Ukhunda. There is huge through traffic of buses operating between Rourkela and Baripada. Generally the occupancy of buses (all types) was observed in the range of 25 – 40 passengers.

Figure 6–29: Average Passenger Vehicle Trip Distance by Purpose (in km) at OCP 2



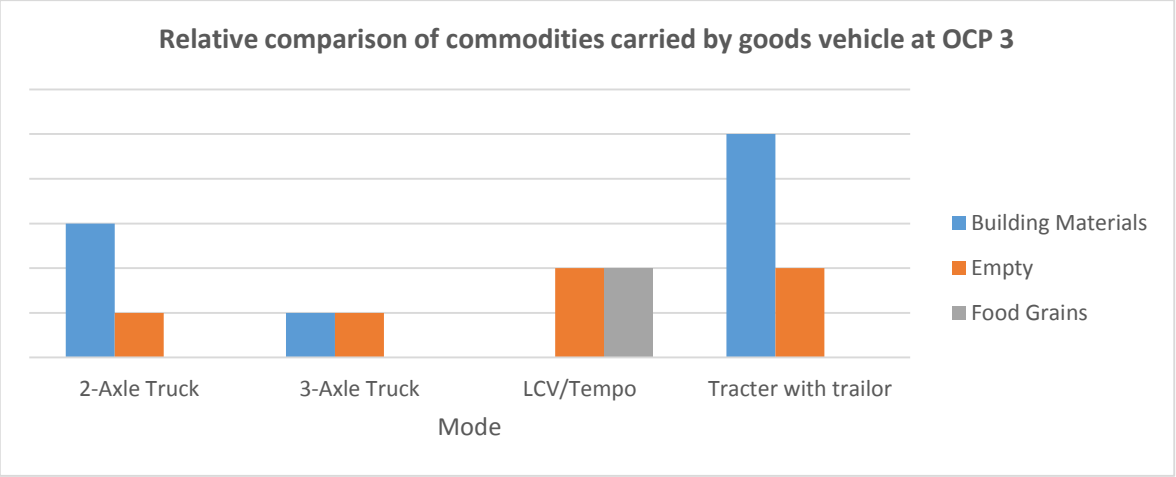
Source: REPL Survey

3. Outer Cordon point 3

Trip frequency of two wheelers was observed to be highest for the given location especially among the daily up down passengers followed by cars. The greatest trip distance was made by car followed by taxi and two wheelers. Majority of the commuters were travelling farther distances for social purposes.

LCV are having the highest average trip length. Most of them were destined to Keonjhar. Large numbers of them were carrying building materials while many of them were also empty as displayed in the following figure –

Figure 6–30: Relative comparison of commodities carried by goods vehicle at OCP 3

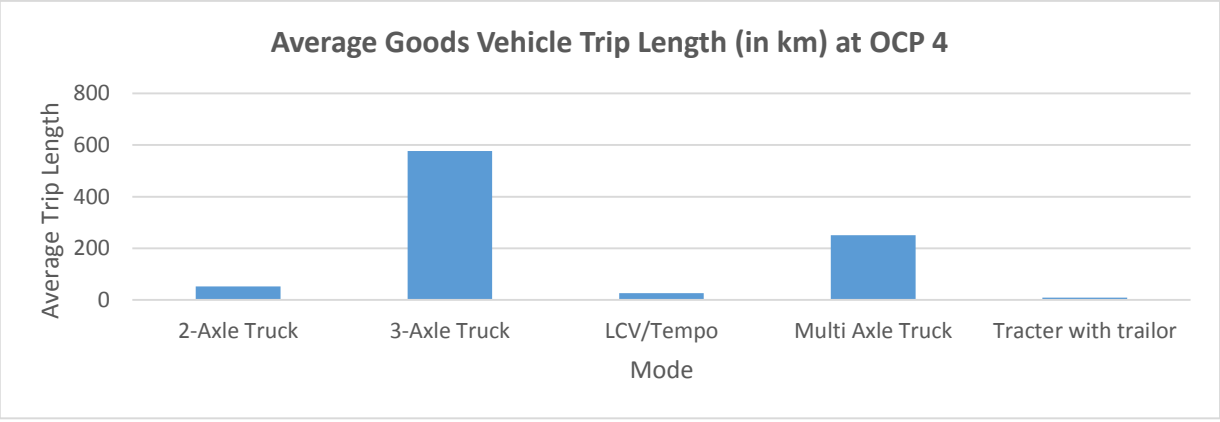


Source: REPL Survey

4. Outer Cordon point 4

Trip frequency of two wheelers was observed to be maximum at OCP 4 followed by cars. The greatest trip distance was made by car followed by taxi and two wheelers. Majority of the commuters were travelling either for business or work. LCV are having the highest average trip frequency of travelling 3 times per day. 3 Axle Truck are having the highest average trip length. Most of them were travelling to Keonjhar. Large numbers of them were carrying building materials while many of them were also empty. Average occupancy of buses operating across the station was observed to be in the range of 25 – 40 passengers.

Figure 6–31: Average Goods Vehicle Trip Length (in km) at OCP 4



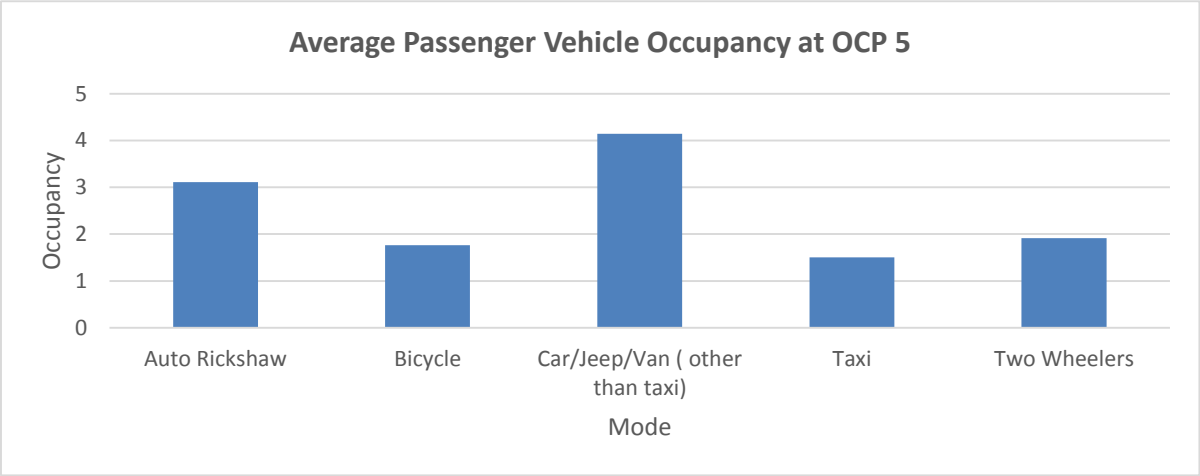
Source: REPL Survey

5. Outer Cordon point 5

Trip frequency of two wheelers was the highest for the given point especially among the daily commuters followed by cars. The greatest trip distance was made by car followed by taxi and two wheelers. Majority of the commuters were travelling either for business or work or for entertainment purposes.

The trip length of freight vehicles was maximum for 2-axle trucks as shown in the following figure -

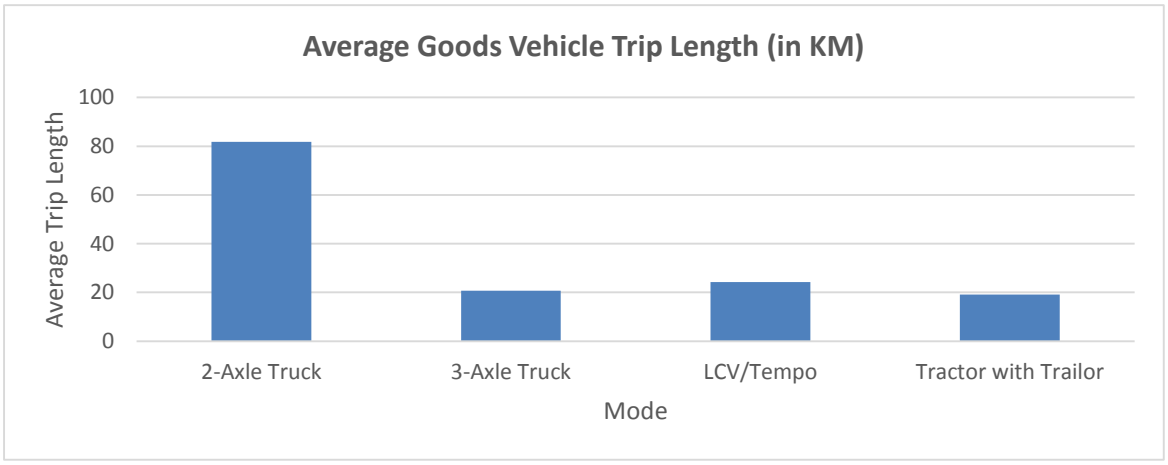
Figure 6–32: Average Goods Vehicle Trip Length (in km) at OCP 5



Source: REPL Survey

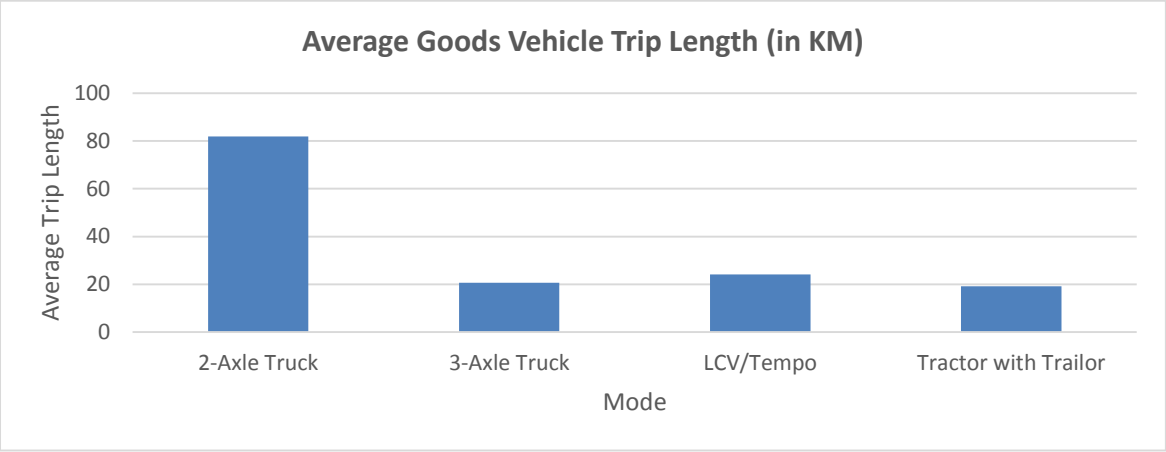
Trip frequency of two wheelers was the highest for the given location followed by cars. The greatest trip distance was made by car followed by taxi and two wheelers. Majority of the commuters were travelling either for Shopping and social purposes. Taxi is used as a shared mode of travel with very high occupancy as shown in the following figure –

Figure 6–33: Average Goods Vehicle Trip Length (in km) at OCP 5



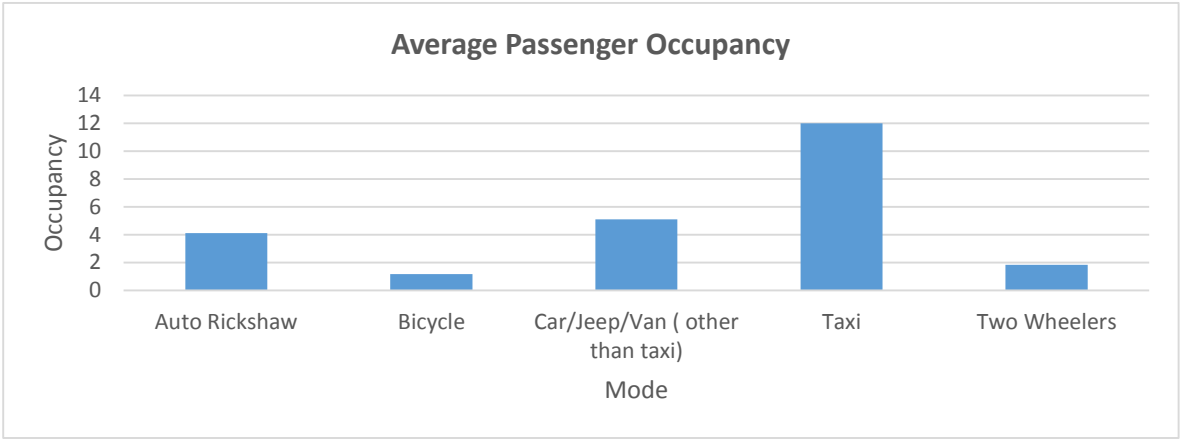
Source: REPL Survey

Figure 6–34: Average Goods Vehicle Trip Length (in km) at OCP 5



Source: REPL Survey

Figure 6–35: Average Passenger Occupancy at OCP 5

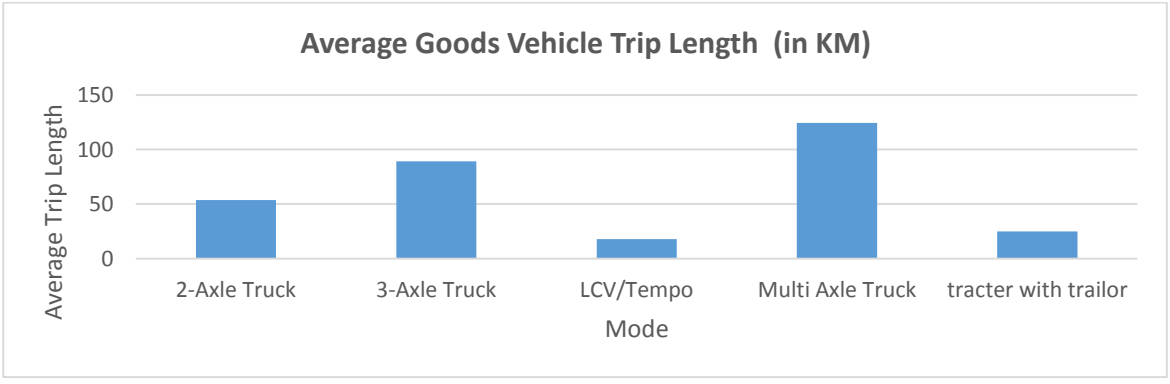


Source: REPL Survey

6. Outer Cordon point 6

Trip frequency of two wheelers was the highest for the given location especially among the commuters followed by cars. The greatest trip length was made by car followed by taxi and two wheelers. Majority of the commuters were travelling either for business or work.

Figure 6–36: Average Goods Vehicle trip Length at OCP 6



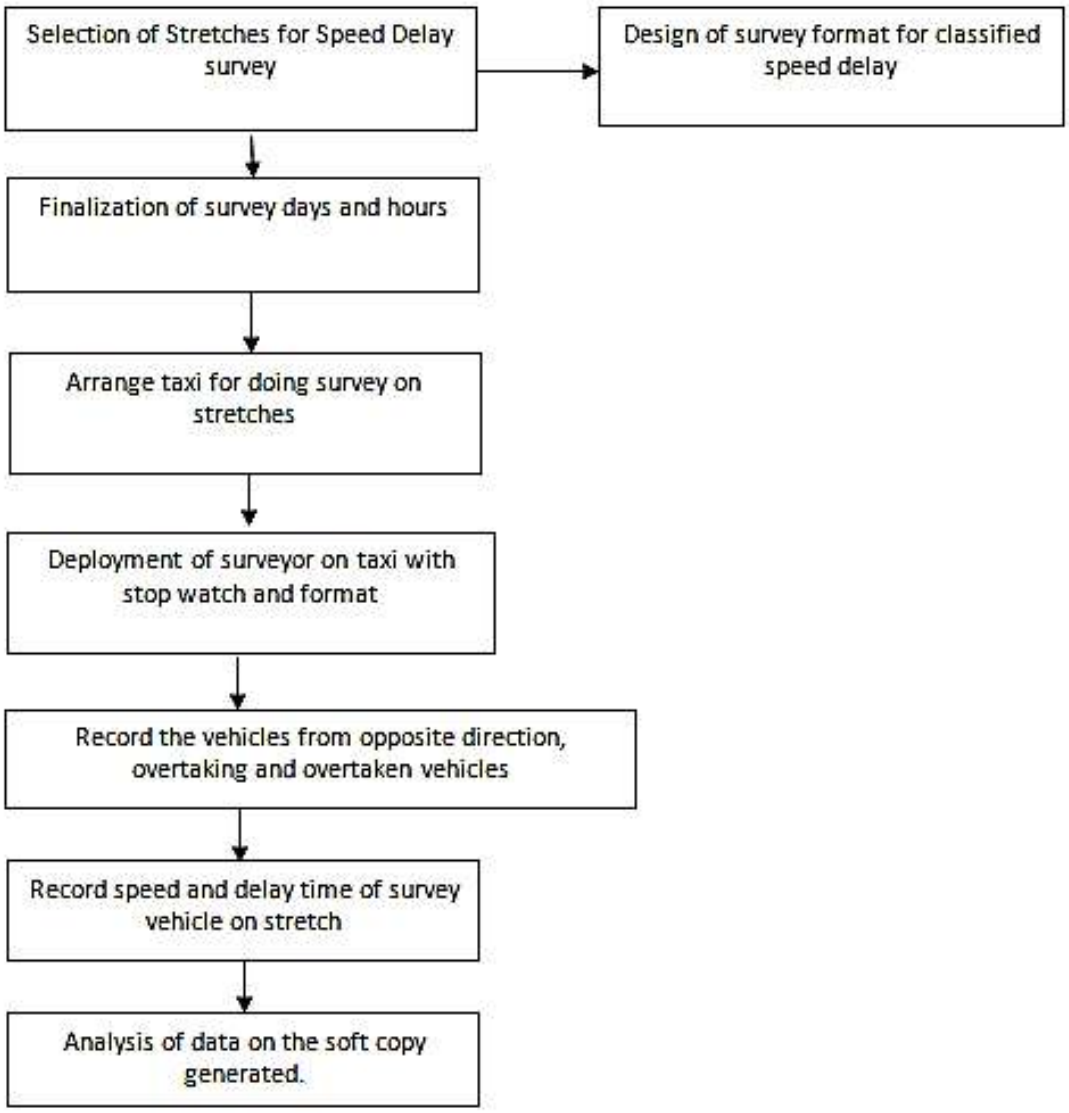
Source: REPL Survey

3- Axle Trucks are having the highest average trip frequency of travelling occasionally. Multi-Axle Truck have the highest average trip length. Most of them were travelling from Keonjhar to various places including Sukati and Sambalpur. Large numbers of them were also empty.

6.7 Speed Delay Survey

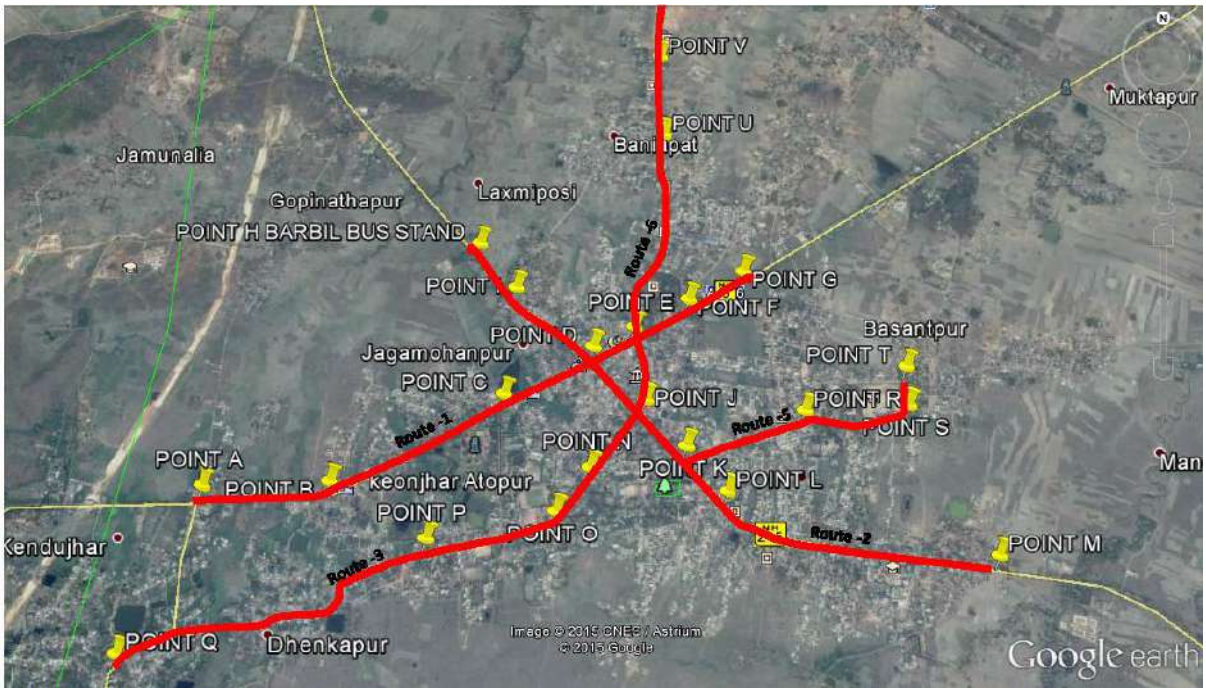
Speed is the most important characteristic of traffic and its measurement is a frequent in traffic studies. Speed, journey time and delay studies are used for measuring spot speeds, journey speeds and delays. Following methodology was adopted for the process.

Figure 6–37: Methodology adopted for speed and delay



Survey stretches were carefully selected to know the moving traffic in opposite direction, vehicles overtaken by test car and vehicles overtaking test car. This survey also helps to determine the speed and delay time of test car. The major classification was done to measure average journey speed and flow of traffic in particular direction. There were in total 5 stretches/ routes taken up for surveys which are given below along with the analyses.

Figure 6–38: Stretches for Speed Delay survey in Keonjhar

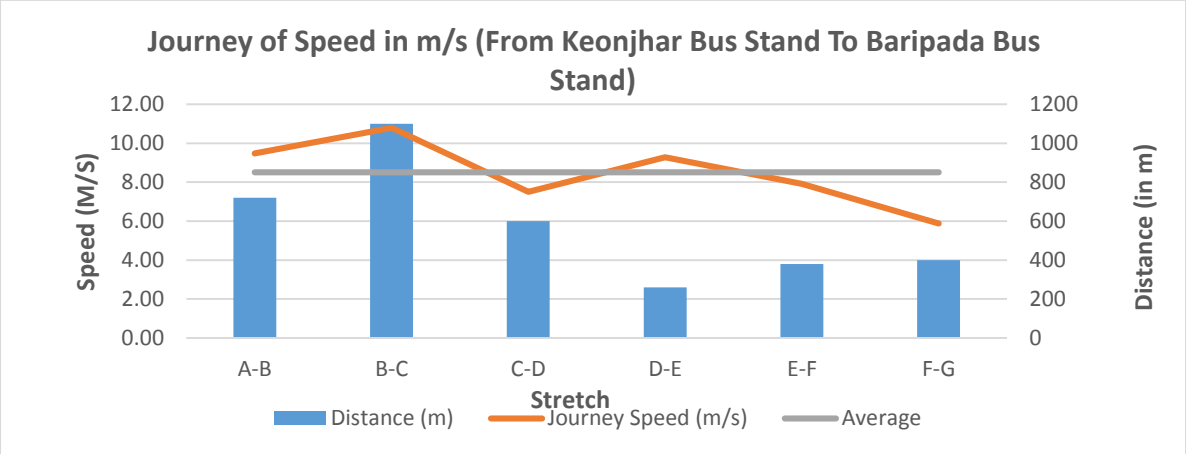


Source: REPL Survey

6.7.1 Journey Speed Data

Stretch-1: National Highway – Keonjhar Bus Stand To Baripada Bus Stand (Up and Down)

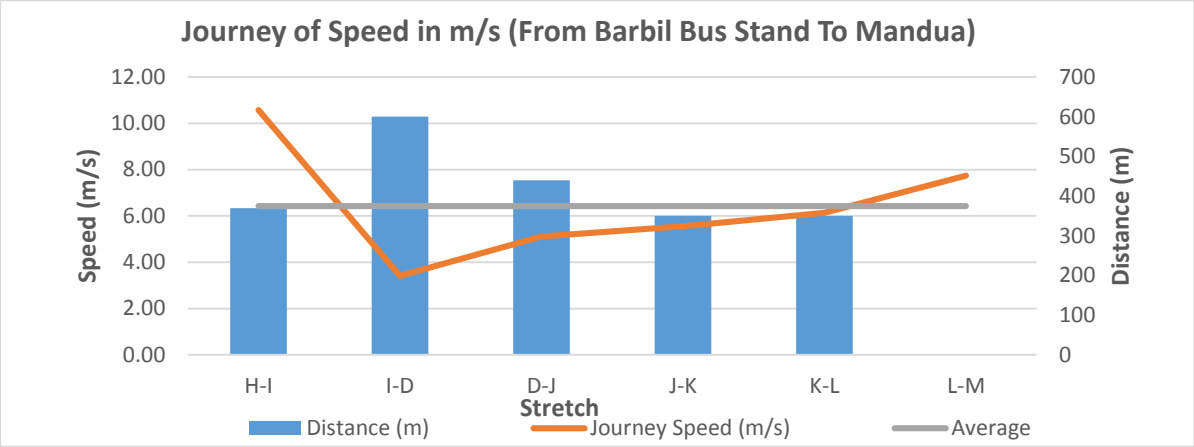
Figure 6–39: Speed profile along stretch 1



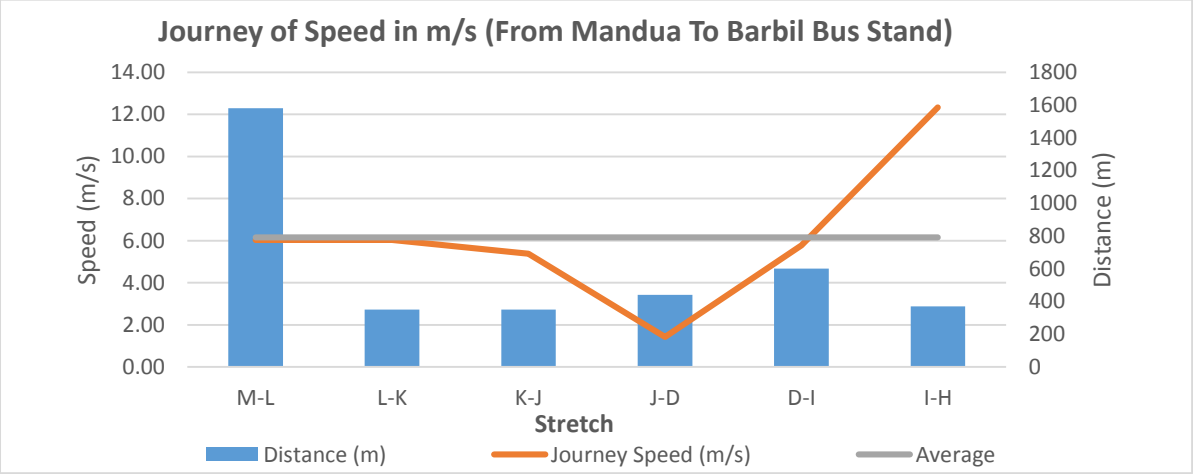
Source: REPL Survey

Stretch-2: Bus Stand To Mandua (Up and Down)

Figure 6–40: Speed profile along stretch 2



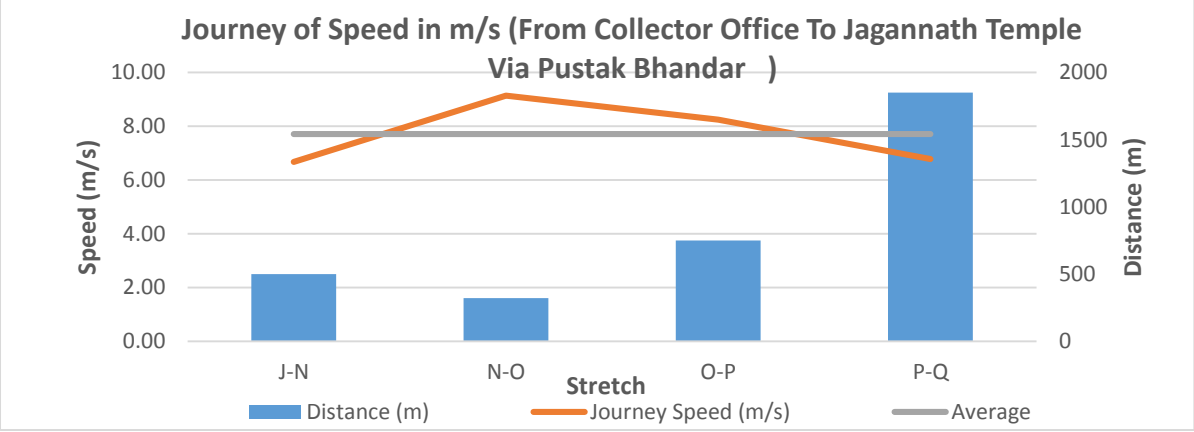
Source: REPL Survey



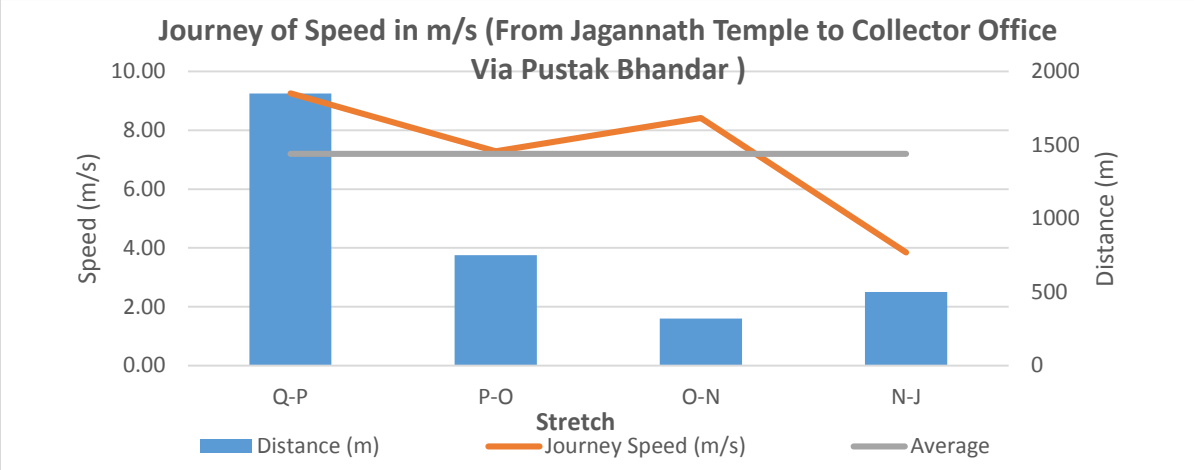
Source: REPL Survey

Stretch-3: Collector Office To Jagannath Temple Via Pustak Bhandar (Up- Down)

Figure 6–41: Speed profile along stretch 3



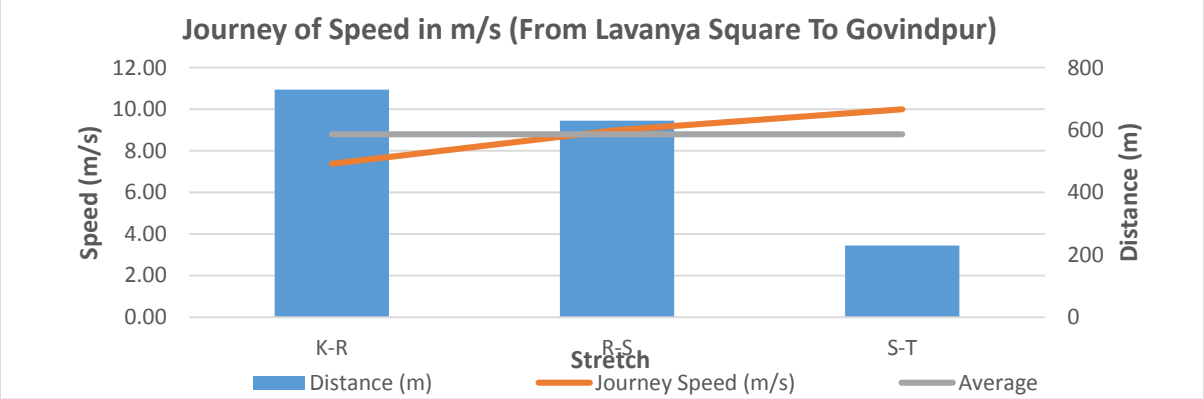
Source: REPL Survey



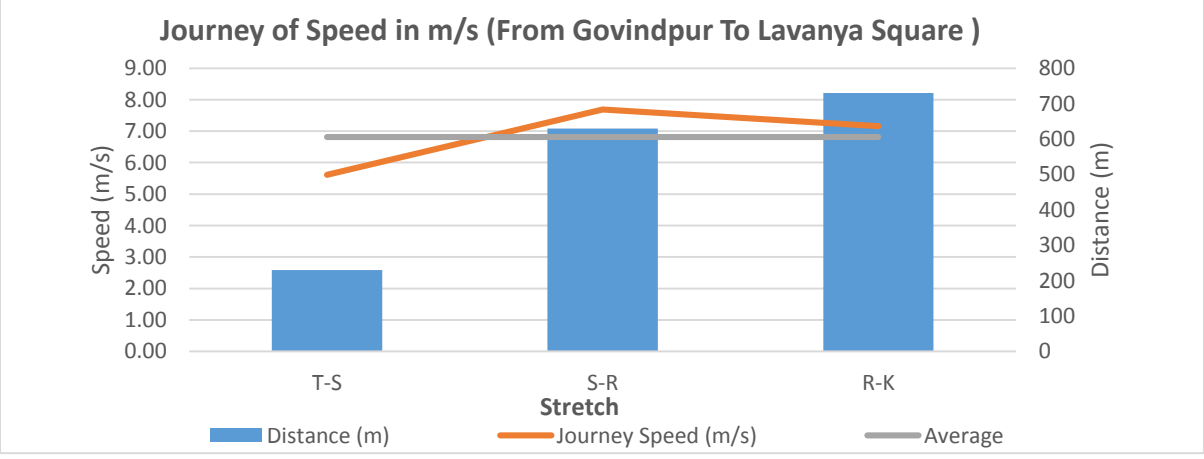
Source: REPL Survey

Stretch-4: Lavanya Square To Govindpur (Up and Down)

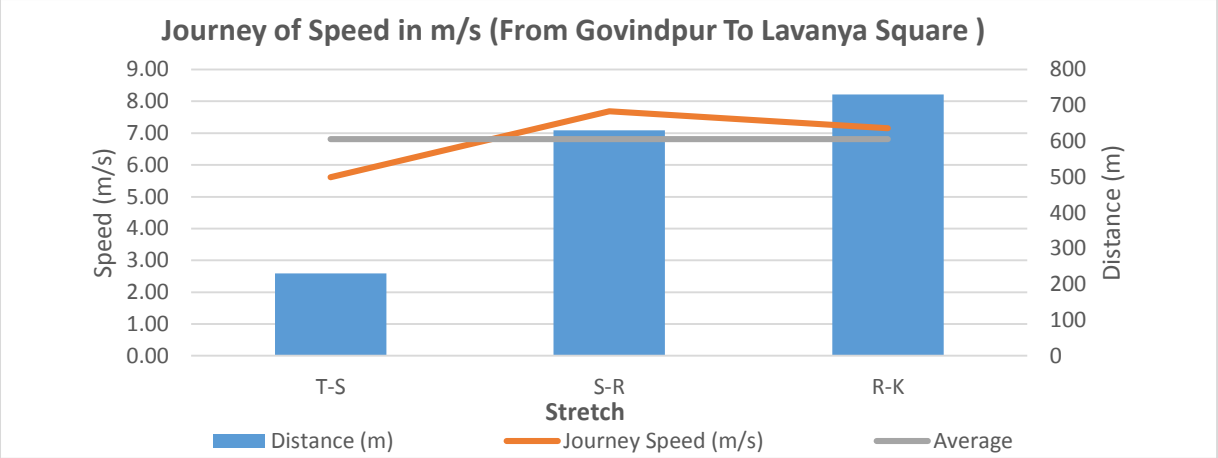
Figure 6–42: Speed profile along stretch 4



Source: REPL Survey



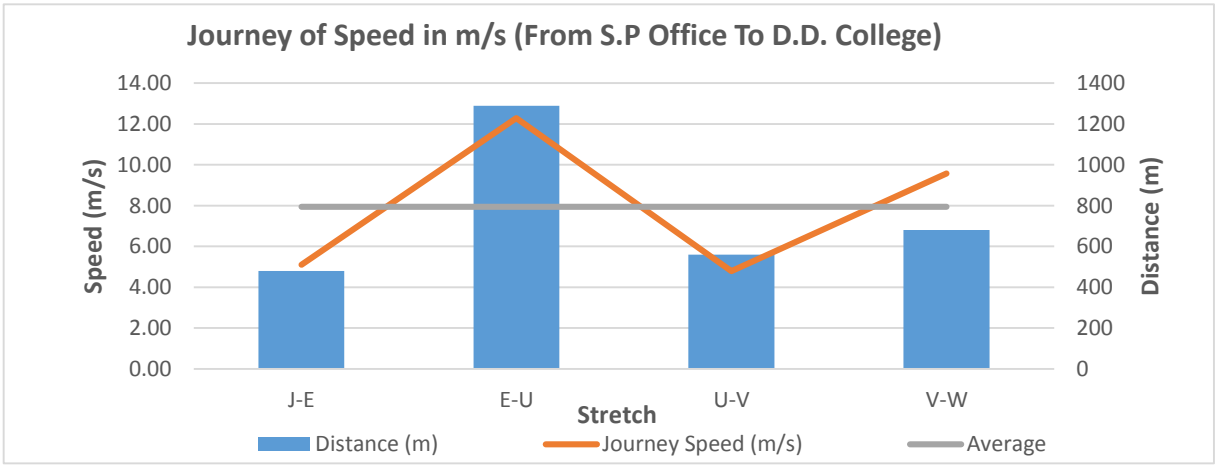
Source: REPL Survey



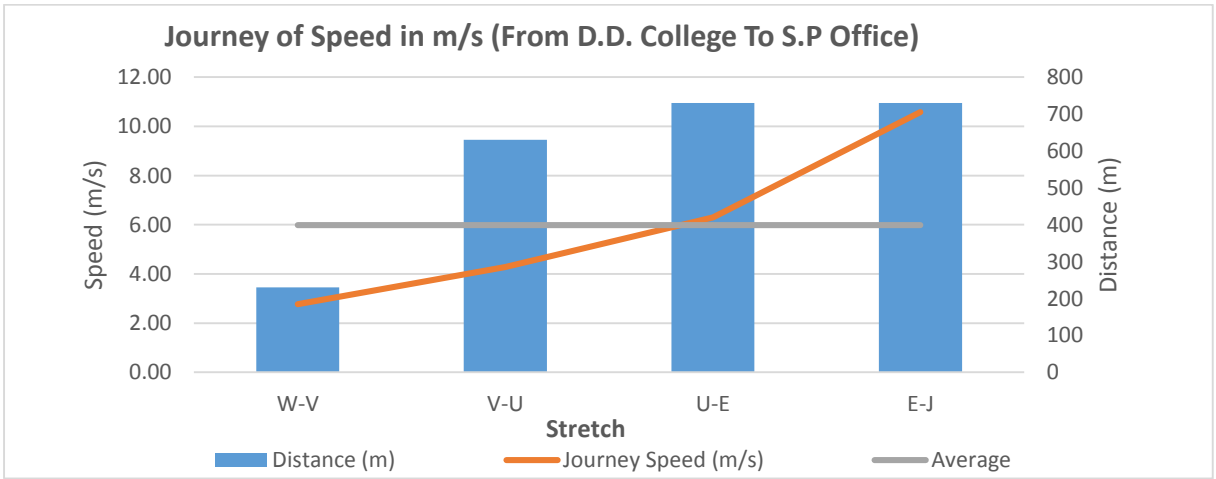
Source: REPL Survey

Stretch-5: S.P Office To D.D. College

Figure 6–43: Speed profile along stretch 5



Source: REPL Survey



Source: REPL Survey

6.7.2 Flow of traffic in Stretches

Flow of traffic in different stretches can be measured by vehicles met from the opposite obtained by travelling in a car against and with the flow of traffic, noting down the journey time, the number of vehicles overtaking the test vehicle. Formula used for calculating the flow of traffic is:

$$q = \frac{x + y}{t_a + t_w}$$

Where, q= flow of vehicles in one direction stream

x= total number of vehicles met in section while travelling against the stream

y= number of vehicles overtaking the observer minus the number he overtakes when travelling with the stream

t_a= journey time in opposite direction of stream

t_w= journey time in same direction of stream

Flow of traffic in various stretches are as follows:

Table 6-3: Route wise Speed and Delay Survey

Route No.	Journey Time (Seconds)	Stopped Time (Seconds)	Vehicles met with in the Opposing Direction (PCU)	Vehicles in Same Direction		Flow of traffic (in PCU/ Hr)
				Overtaking Vehicles	Overtaken Vehicles	
Route No. 1 (Up)	380.0	0	143	2	23	570
Route No. 1 (Down)	517.0	56	163	1	42	409
Route No. 2 (Up)	570.0	51	190	0	23	473
Route No. 2 (Down)	716.0	113	192	11	22	501
Route No. 3 (Up)	474.0	0	65	0	10	272
Route No. 3 (Down)	491.0	20	83	7	12	224
Route No. 4 (Up)	192.0	0	45	0	8	242
Route No. 4 (Down)	225.0	0	36	1	7	337
Route No. 5 (Up)	387.0	14	107	0	5	220
Route No. 5 (Down)	415.0	0	54	3	10	449

Source: REPL Survey

6.7.3 Observations

- Generally the riding experience is good and acceptable moving away from the town but reduced carriageway due to parking, unregulated pedestrian crossing and unwarranted vehicular movement along the commercial stretches in the core town is the cause of congestion.
- Flow of traffic in different routes varies from 220 PCU per Hour to 570 PCU per Hour.

6.8 Traffic flow Scenario

Traffic for regional context was estimated adopting econometric approach wherein the traffic growth rates are estimated taking into account the growth rates of economic parameters such as NSDP and the elasticity of transport demand. Following figure presents the normalised mode wise traffic growth rate.

Table 6-4 - Mode Wise Estimated Traffic Growth Rate

Transport Demand Elasticity Values w.r.t NSDP of Odisha				
Mode	**2015-2020**	**2020-2025**	**2025-2030**	**2030-2035**
2w	1.6	1.4	1.2	1.1
Car	1.4	1.3	1.2	1.1
Bus	1.5	1.4	1.3	1.2
Truck	1.3	1.2	1.1	1.0
Traffic Growth Rates				
Mode	**2015-2020**	**2020-2025**	**2025-2030**	**2030-2035**
2w	12.0%	9.8%	7.8%	6.6%
Car	10.5%	9.1%	7.8%	6.6%
Bus	11.3%	9.8%	8.5%	7.2%
Truck	9.8%	8.4%	7.2%	6.0%

Source: REPL Estimation

For the above elasticity values and growth rates, average CAGR was estimated and applied to present traffic along the cordon points. Following table presents the growth of traffic in horizon period with severity of traffic congestion indicated increasing from green to red colour.

Table 6-5 Projection of Traffic and V/C for the roads of Keonjhar town

location	2015	2020	2025	2030
		CAGR - 9.15%	CAGR - 8.5%	CAGR - 7.8%
ICP 1	1.1	1.8	2.7	3.9
ICP 2	0.9	1.3	2.0	3.0
ICP 3	2.4	3.7	5.5	8.0
ICP 4	1.8	2.7	4.1	5.9
ICP 5	0.7	1.1	1.7	2.5
OCP 1	1.0	1.5	2.2	3.3
OCP 2	0.8	1.2	1.9	2.7
OCP 3	1.5	2.4	3.5	5.2
OCP 4	0.5	0.7	1.1	1.6
OCP 5	0.5	0.8	1.2	1.7
OCP 6	0.4	0.6	1.0	1.4

Sufficient Right of way is available along all stretches (to the tune of 24 m at least) other than Patna Road i.e. OCP 3. This provides an opportunity to upgrade the ROW for 4 lane and 6 lane carriage way as and where needed. Some stretches in the core town still would have higher traffic and hence traffic management techniques coupled with better execution would be needed to manage the traffic in the town.

6.9 Summary of Issues related to Traffic and Transportation

Most of the roads in the town are without median which handle two-way traffic. There are number of encroachments on various sections of the roads especially the ones with large scale commercial activity. The cross-section of the road is not clearly defined and planned. There is also lack of any pedestrian movement facility on any of the roads in the town. Many roads in the town have water logging problems. Major roads are Tarmac roads and the lower hierarchy roads are mostly concrete roads. The road surface quality is generally good.

6.10 Proposed Mobility Plan

The Transport system of a town needs supporting infrastructure to function smoothly. This includes appropriate capacity augmentation, geometric improvement, public facilities like Public transport terminals and halts, parking, public convenience, illumination, information dissipation etc. The facilitation of these support systems is a time consuming process and once augmented they need to be backed by policy framework. The transport system of Keonjhar is envisaged to be developed as a smart mix of Traffic Management Technique, Infrastructure and Geometric Improvements along with policy formulations.

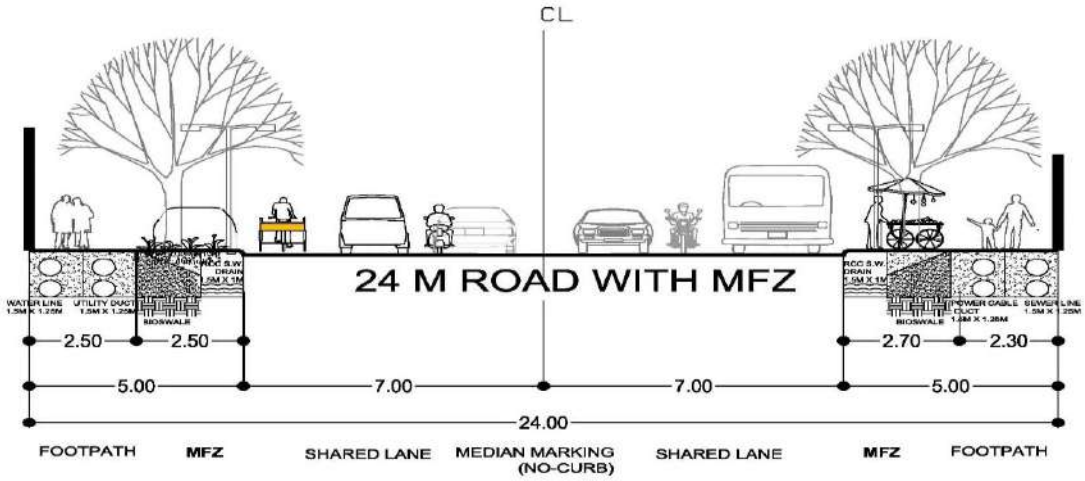
6.11 Geometric Treatments and Capacity Augmentation

Various design strategies which can be incorporated in the geometric improvement plans described herewith:

1. **Improvement in Intersection design –**
   Most of the intersections need to be redesigned so as to facilitate better and continuous layout of carriage way along with better turning radius and superior visibility distance.

   Also at certain 3 arm intersections, the non- conflicting straight traffic needs to be segregated so as avoid the delay associated with such traffic. In other words, merging and diverging shall be segregated for straight moving traffic. In case of traffic signals operating on such intersections, since the straight moving flow is separated, the effective cycle time gets reduced which in turn reduces the delay and enhances the overall experience of mobility.
2. **Uniformity in carriageway design**
   It is seen that V/C Ratio for ICP 3 and ICP 4 is exceeding unity by a huge margin at present. With time to come traffic is going to increase. Sufficient Right of Way is available along all arterial and sub arterial corridors and hence more lanes can be augmented along these stretches so as to accommodate increasing traffic. Apart from increasing no. of lanes, it is of prime importance to make sure that cross section is uniform throughout the stretch. Any aberration from the approved cross-section acts as bottleneck to traffic system and whole purpose of carriageway widening gets defeated. Hence it is beneficial to develop the cross section of stretch at the site of minimum Right of Way of that road. A typical cross section of 24 m Right of Way as suggested by UTTIPEC with Multi-function zone (MFZ) is as follow-

Figure 6–44: Typical Cross section of 24 m ROW



3. **Access Control**

   The travel profile reveals an unsafe mixing of local and regional traffic along the arterial and sub arterial roads. Frequent punctures, ribbon development and Street Bazaar system is the primary cause for such turbulence. It is preferable to have access for arterial and sub arterial roads at a spacing of 0.5 – 1km and 0.2 – 0.5 km respectively. Delineation of service roads, parking lanes, Multi-Utility zones out of Right of Way also helps in segregating local and regional traffic

4. **Continuity in Along and Across pedestrian facility design**

   No urban mobility improvement intervention is complete without facilitating the needs of pedestrians along and across the road. Pedestrian crossings at grade shall be facilitated with provisions of table top crossing and staggered Zebra crossing. Also, pedestrian sidewalk of minimum 2m width should be mandatorily provided along the arterial, sub-arterial and collector roads on both sides of carriageway.

5. **Provisions of On-Street and Off-Street Parking**

   Parking provisions arterials need to be regulated. Following table presents the parking demand and supply gap for the Keonjhar town –

Table 6-6: Parking site summary and observations

Location	Area under parking (Sq m)	ECS available	Peak accumulation in ECS	Demand / supply	Remarks
New Bus stand To baripada Bus stand both sides	12800	557	2577	4.6	Extremely insufficient parking space
Bus stand to Rto Both sides	10998	478	1834	3.8	Extremely insufficient parking space
Market road Near Collectorate	1336	58	454	7.8	Extremely insufficient parking space
New Bus stand	5896	256	40	0.2	Good situation
Govt Bus stand	2929	127	105	0.8	Good situation

Hence, considerable provision for off-street parking is needed for first three stretches of parking stretches. Parking for IPT and loading/ unloading operations should not be encouraged along arterial roads in principle and wherever required should be scientifically planned. On street parking policy should promote short term parking wherever road Right- of -Way permits its integration with abutting parking attracting activities.

It should be noted that on- street parking on carriageway is difficult to regulate and beyond sidewalk is difficult to operate. Hence ramps along with bollards should be provided wherever vehicles cross the sidewalk. The sidewalk should get preference and should run at same level while level differences being traversed by vehicles. Such punctures should also be regulated in such a way that they are not frequently crossing the sidewalk.

6. **Design Sensitivity to surroundings**

The town is a living entity and the transport system design should be sensitive to local needs. Environmental, ecological and cultural practices shall always be respected and preserved in the process of infrastructure development.

6.12 Traffic Management Techniques

The traffic management techniques are generally advisable for all hierarchy of towns but implemented with segmental need. Broadly these techniques can be classified into effective carriageway improvement techniques and behavioural improvement

techniques. Following are the general solutions advised as traffic management techniques –

- Prohibiting on-street parking of vehicles and simultaneously developing off-street parking
- Removal of encroachments and relocation of IPT – Rickshaw stops mainly on the stretch from Gandhi Chowk to Shreekhetra Hotel and towards Barbil Bus stand and Baripada Bus stand from Gandhi Chowk.
- Improving Traffic Discipline such as proper lane use and correct overtaking through signage, education and publicity.
- Reduction in roadside friction through control of abutting land-use, access and roadside commercial activity
- Provision of adequate facilities for pedestrian and cyclists
- Banning certain conflictive movements at major intersections, specifically during peak hours
- Provision of segregated right of way for slow moving and fast moving vehicles
- Imposing restriction upon movement of heavy vehicles during selected periods, specifically peak hours.

6.13 Other suggested measures and policies

In addition to specific strategies some other support measures and policy are needed which are proposed as under:

- Development Controls along arterial road: Unregulated and mixed land uses pose a serious threat upon the intention of improving the Level of Service. Since the corridor houses major government institutions and commercial activities, any act of encroachment by such activities upon the right of way should be timely addressed. Appropriate development controls in terms of permissible FAR and land uses need to evolved.
- Augmentation of Capacity and Level of Service for Public Transport: No corridor or town can address the challenge of ever increasing traffic without propagating the public transport. Public Transport can function better with support infrastructure like:
    - improved and strategic location of bus shelters,
    - prioritized movement on signalized intersections,
    - Support system of feeder modes and IPT along the public transport modes
    - Competitive pricing and special benefits to target group

It is proposed that a comprehensive public transport operation policy for Keonjhar needs to be evolved on priority. This approach shall not be conventional but unique based upon the demand of the town.

- IPT and Feeder modes also need a comprehensive operation policy which should include planning of their stops, routes, timing of operation and integration of fare with the line haul mode system such as city buses.

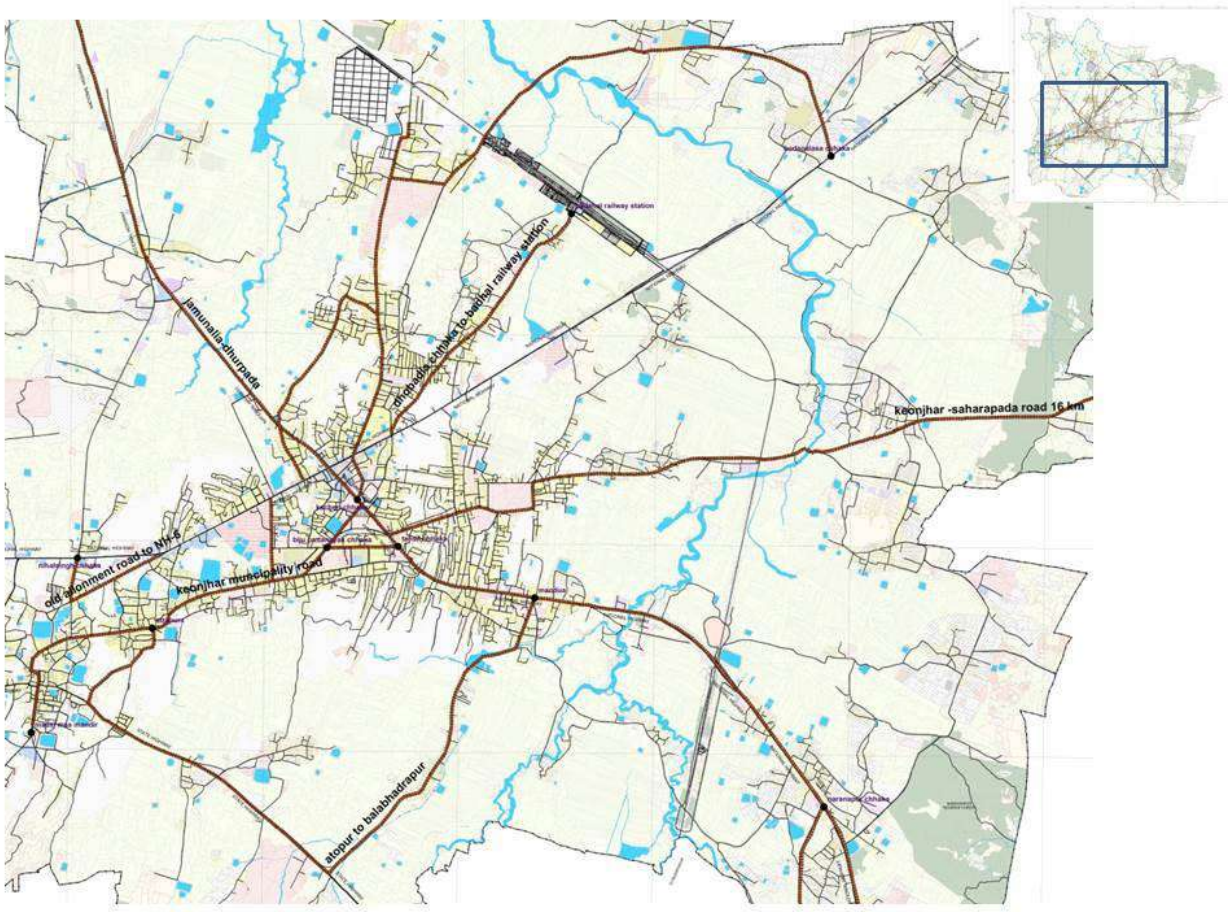
- A comprehensive parking policy with strategic fare and slabs system to encourage and discourage (wherever/ whichever applicable) parking needs to be evolved for the town.
- A regular awareness program for Traffic discipline with the help of advertisement, special drives, Traffic Weeks, Incentives to law abiding citizens etc. need to be promoted in city in general and corridor in particular.

Effective enforcement policy needs to be evolved so as to ensure no encroachments of the right of way by informal activities, illegal parking, etc.

6.14 Proposals for on-going road improvements

The interior roads of the master plan area are either managed by the municipality or the gram panchayats. Some of the major roads are under Roads and Buildings department. There is already an existing proposal at R&B for the major overhaul of the connectivity in the MPA under which around 12 Roads are to be constructed in the master plan area the details of which are being furnished below.

Map 6-2:Proposed roads to be taken up by R&B in MPA Keonjhar



Source: ORSAC DATA/ R&B Keonjhar/REPL Analysis.

Table 6-7: List of Proposed road to be taken up by R&B

SL.NO.	NAME OF ROAD	LENGTH	EXISTING WIDTH	PROPOSED WIDTH
1	JAMUNALIA-DHURPADA,NH-20	0.2 KM TO 5.6 KM 5.6 KM TO 9.3 KM 9.3 KM TO 12 KM	5.5 Meter 7 Meter 7 Meter	10 Meter 20 Meter 07 Meter
2	KACHERI CHHAKA-BODAPALASA	8 KM	3 Meter	7 Meter
3	OLD ALLOTMENT NH-49	1.3 KM	5.5 Meter	NO
4	KEONJHAR COLLAGE APPROCH ROAD	3 KM	5.5 Meter	9 Meter
5	NH-20 TO NH-49 VIA MADHAPUR	2.3 KM	2.66 Meter	7 Meter
6	DHOBADIA CHHAKA TO BADAHAL RAILWAY STATION	3 KM	3 Meter	7 Meter
7	ATTAPURA TO MANDUA	7.34 KM	3 Meter	7 Meter
8	JAGANNATHAPUR CHHAKA-BSNL CHHAKA		3 Meter	7 Meter
9	BIJUPATTNAYAK CHHAKA - TAHSIL CHHAKA	0.700 KM	7 Meter	NO
10	CHURCH CHHAKA - DHARANIBHUYAN CHHAKA	0.900 KM	7 Meter	NO
11	KEONJHAR-MUNICIPALITY ROAD	4.125 KM	-	D.L I.L -
12	KEONJHAR-SAHARAPADA ROAD	2 KM 5 KM 12.900 KM	-	NO NO 7 Meter

Source: R&B Keonjhar

6.14.1 Proposed new roads/ road improvement Concept.

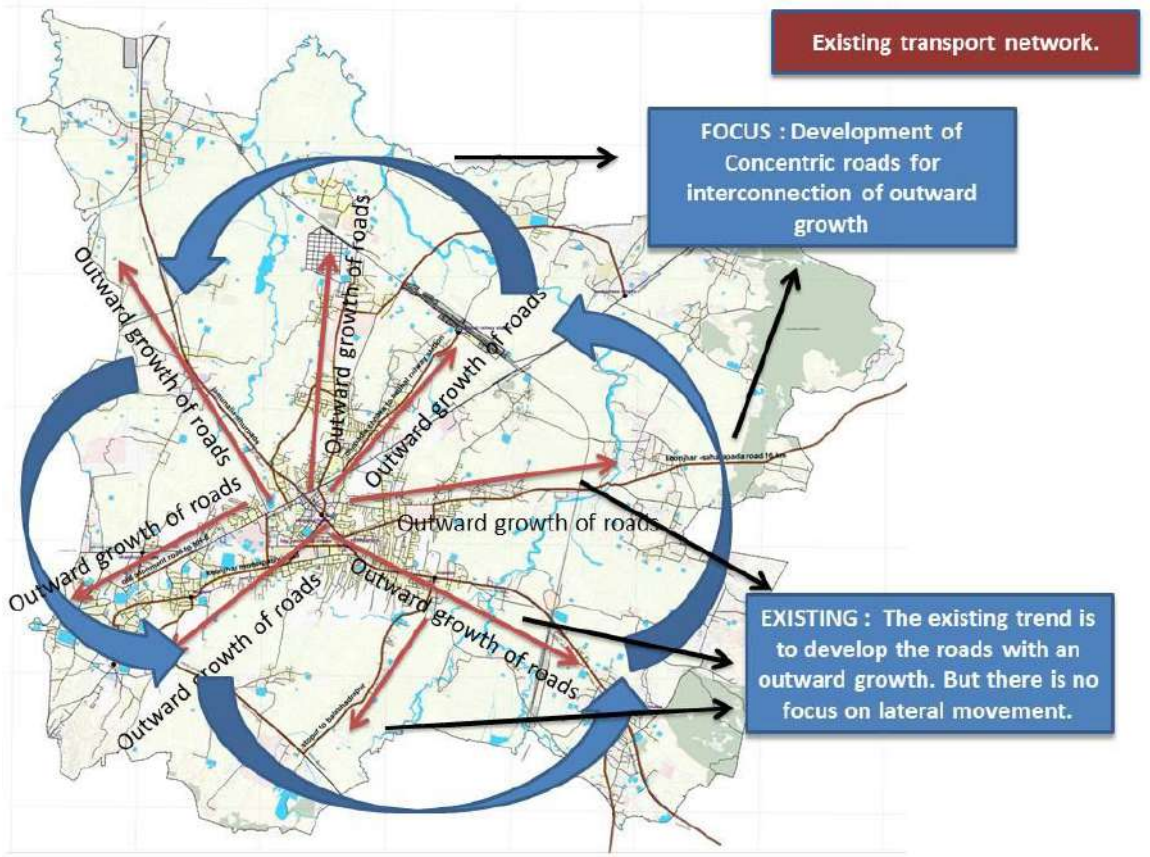
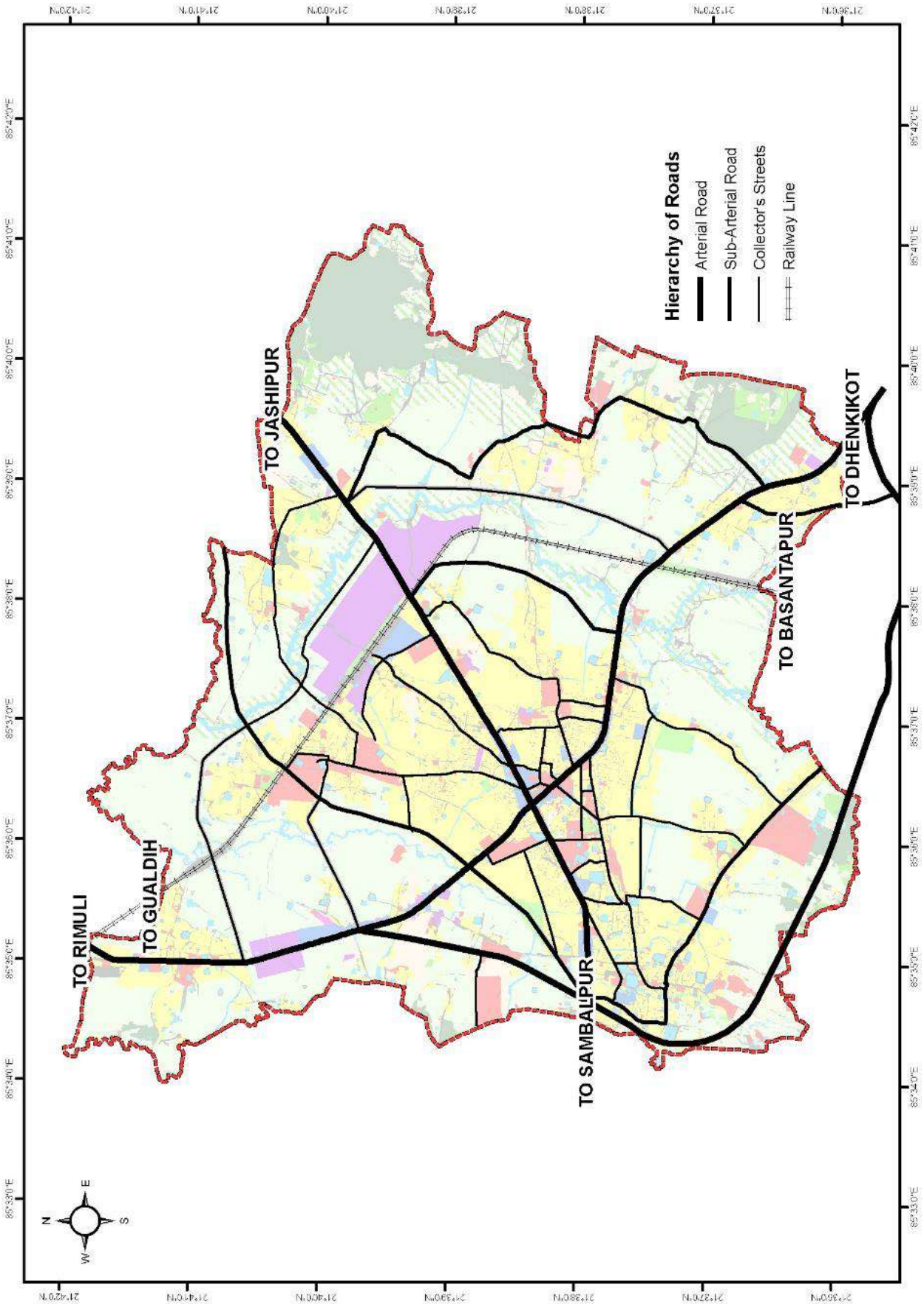


Figure 6–45: The Concept for proposal for new roads for the Keonjhar MPA.

Source: REPL Analysis

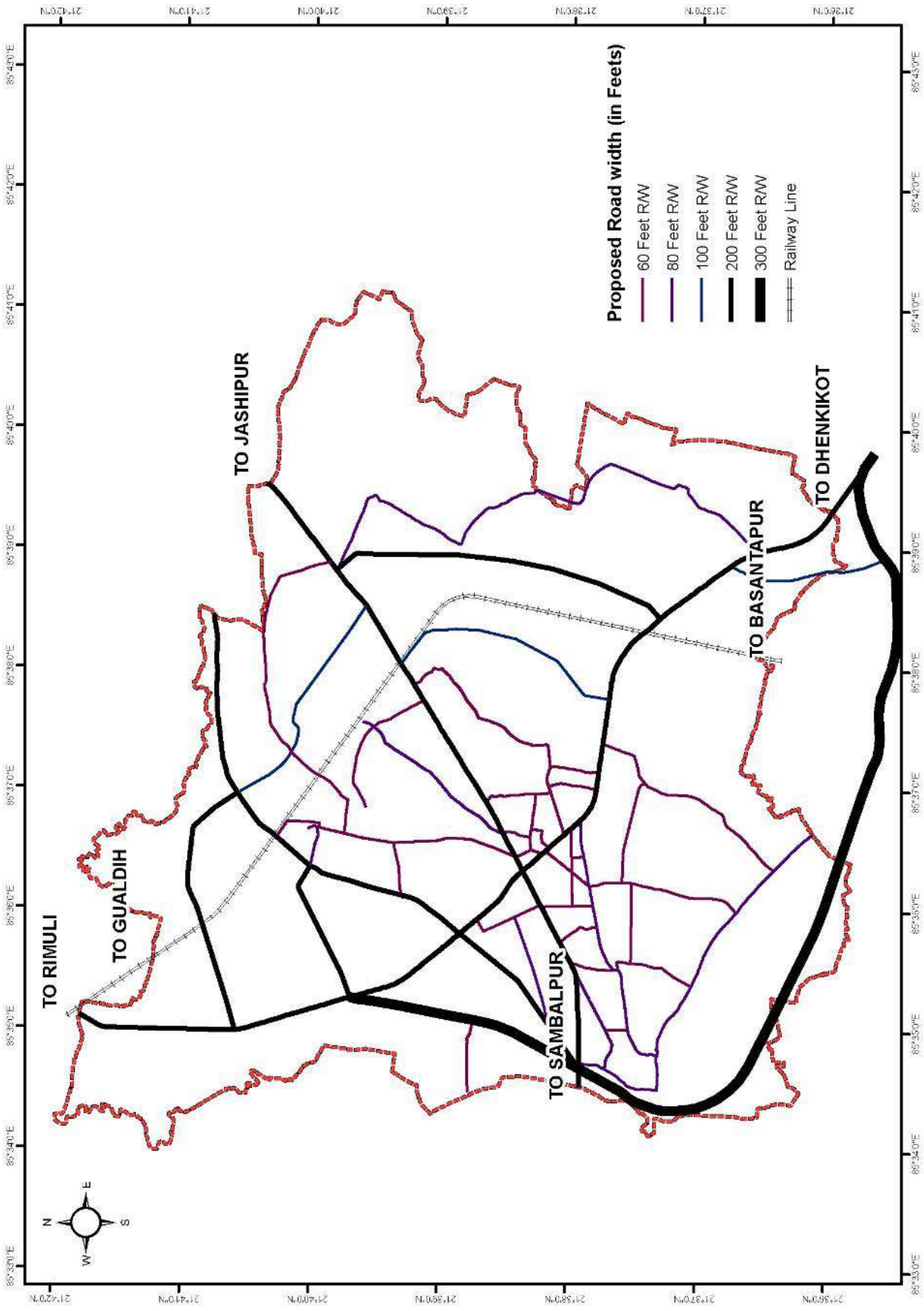
The focus while proposing the road network is on the lateral movement resulting for the outward growth of the city. In this connection, a proposal for outer ring road from Naranpur to Sankarpur via Dimbo has been kept in provision for the future expansion. The number of roads which have been proposed will help the concentric movement of traffic and remove through traffic load from the interior roads. The map below shows the proposed road in pink. For detailed width of the roads please refer the proposed land use map in annexure.

Map 6-3: The Roads Hierarchy in the Keonjhar MPA



Source: REPL

Map 6-4: Proposed Roads in the Keonjhar MPA



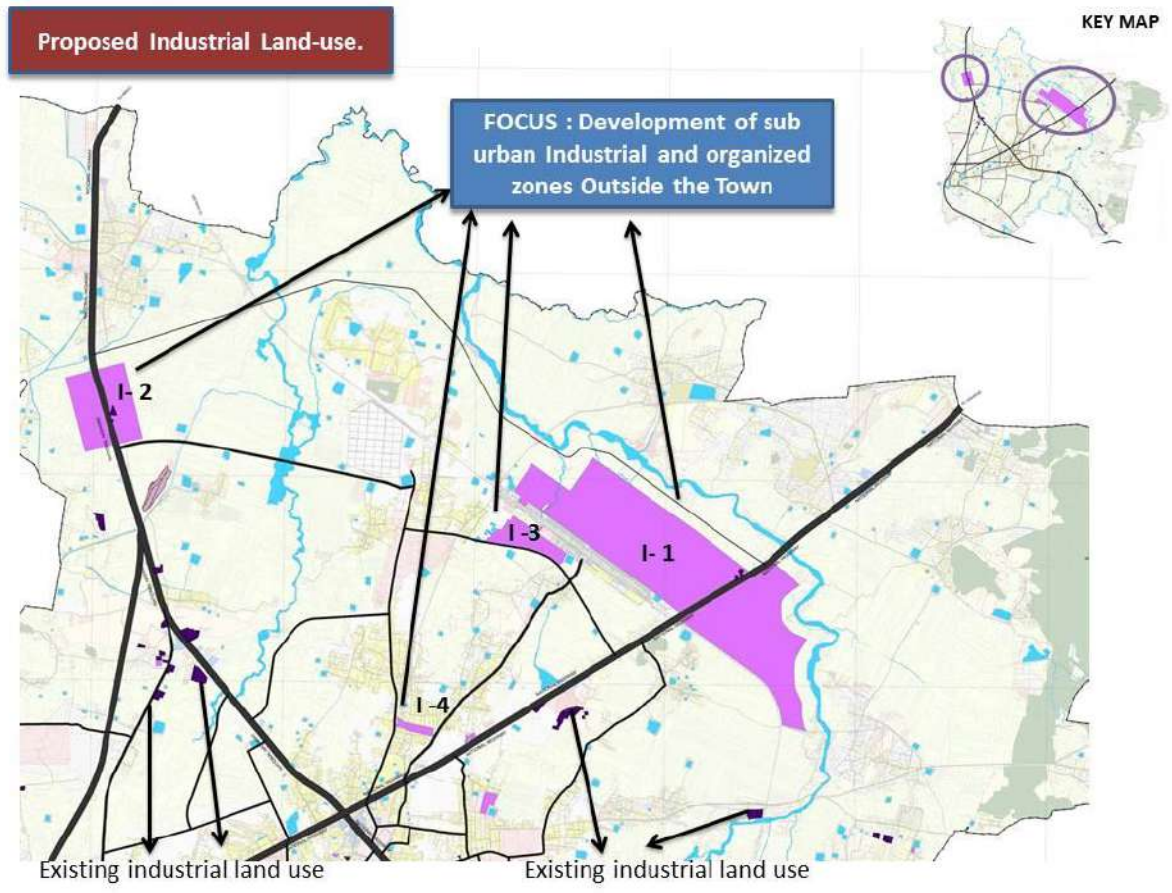
Source: REPL analysis.

6.14.2 Bus and truck terminal facilities

The bus terminal facilities in Keonjhar have been recently developed. The existing terminal is located in the outskirts of town on the way to Judia ghati.

The truck terminal facilities have been proposed inside the industrial area for the convenience of moving and loading and unloading of the goods for the industry. The truck terminal is to be aligned with the container handling facility as proposed in the industrial policy. The location of the industrial parks as proposed is shown below. The alignment and land allotment is to done based on the consultation with the truck owners association of the town.

Map 6-5: Industrial corridor proposed and the same used for truck terminal facilities



Source: REPL Analysis.

CHAPTER-7 URBAN SERVICES

7.1 Physical Infrastructure

Access to basic infrastructure like water supply, sewerage, drainage, solid waste management and power influences the quality of life in any settlement. To have sustainable development in the area, existing infrastructure needs to be augmented and demands for future population has to be assessed and proposed for.

7.2 Water Supply

7.2.1 Existing Scenario

Keonjhar receives around 6.6 MLD water for drinking other purposes from Badaghagra located in the west of Keonjhar. Rest of the 0.75MLD water supply is supplied through PHED Bore wells in various places in Keonjhar town. The current rate of supplied water is around 95 LPCD in the municipal area. Water from Badaghagra is treated at Judia Treatment Plant which has a capacity of 5 MLD.

At present, only 10 wards are fully covered by piped water supply, 9 are covered partially while 2 wards aren't covered at all with water supply due to sparse habitation.

Rural areas within the Master Plan Area, however, access drinking water mainly through covered wells. These are covered under the Rural Water Supply and Sanitation (RWSS), which is entrusted with the responsibilities of water supply along with operation & maintenance and sanitation. These wells are treated through manual chlorination, twice a year.

The location of sources of water supply is shown below –

Figure 7–1 Location of source of water supply in Keonjhar

7.2.2 Demand Assessment for existing population

Water supply standard for a city is taken as 135 LPCD. Thus, at present, Keonjhar with a population of 1.1 lakh should receive 18.2 MLD water. However, only 6.6 MLD water is received in the city though piped network.

7.2.3 Overview of ongoing / proposed projects

Water supply network is proposed to be augmented with an additional 15 MLD supply till 2043. Water is proposed to be sourced from Kanjhari dam. Three Water Treatment Plants of capacity 5 MLD each, along with ten UGRs and nine ESRs with a total storage capacity of 4.6 MLD are proposed in the scheme.

7.2.4 Issues

Main issues related to Water Supply in Keonjhar are –

- Present per capita supply rate (95 LPCD) is grossly below standards (135 LPCD).
- Coverage of water supply network is partial and is abysmal in the rural areas.

7.3 Sewerage

7.3.1 Existing Situation

Keonjhar, having a population of 1.1 lakh (2011 Census), presents a dismal condition of Waste Water Management. A city wide Sewerage system is absent in the Master Plan Area and many of the households (10%) defecate in open. Around 62% of the households in the urban areas and 31% in the rural areas have Septic Tanks connected to their latrines. The waste from septic tanks is cleaned by the municipality and disposed at the dumping site without any treatment. Around 44% of the rural households have dry pit latrine.

There are 3 Public Toilets in the city having 32 number of toilet seats. These toilets function as per Pay and Use, tariff generally being Rs. 5.

7.3.2 Waste Water Sewerage Assessment

Around 80%[3] of the water demand is taken as quantity of waste water. Existing water supply is 6.6 MLD. Thus, around 5.28 MLD waste water is generated in the city at present, which is entirely left untreated and falls into drains.

[3] Rangwala, S.C. 1999. Water supply & Sanitary engineering Charactor. Publishing house, Anand Ashok Kumar Jain and B.C. Punmia, 1998. Waste Water Engineering Laxmi Publication, New Delhi

7.3.3 Overview of ongoing / proposed projects

No projects have been proposed or are under construction for revamping the sewerage system in the city.

7.3.4 Issues

Main issues related to Sewerage in Keonjhar are –

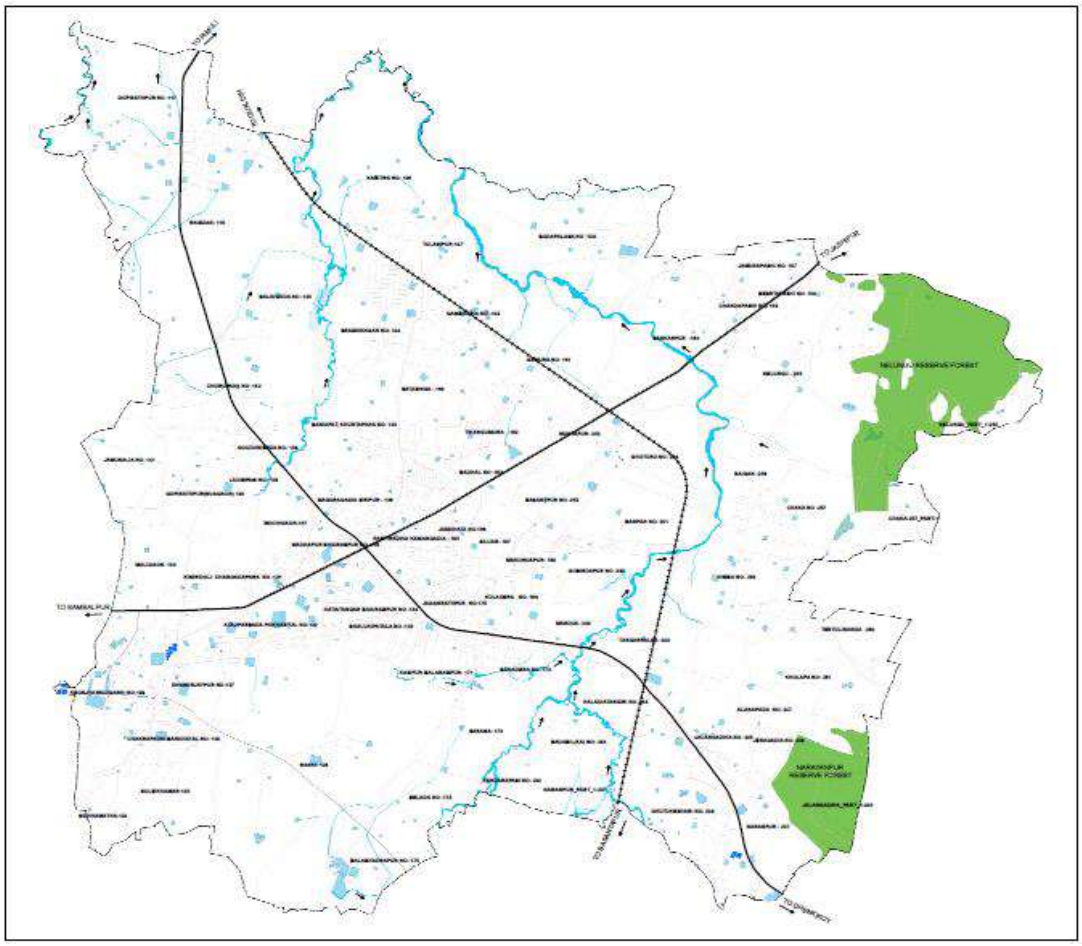
- Absence of comprehensive sewerage disposal system
- Wide usage of 'Dry Pit Latrine' in rural areas.

7.4 Drainage

7.4.1 Natural Drainage Pattern

Two streams traverse through the city and together mingle to form a complex system, finally draining out towards the north east of the town. The general slope of the town is from south west to north east direction and most of the rivers follow this direction only. Please refer the map below for the same.

Map 7-1: Major rivers and streams in Keonjhar town



Source: REPL Survey

7.4.2 Manmade drainage

Keonjhar has a network of drainage lines which is distributed irregularly throughout the town and discharges its water to the nearest natural drainage channels. According to the municipality data the length of drains in Keonjhar is around 97 kms which consists of both kutcha and pucca drains.

The natural water drainage pattern has been distorted, due to improper designing of streets with respect to the natural drainage, which results in spilling of water from drains and water logging on the streets. Most of these drains act as disposal points of sewage from households due to lack of sewerage system.

The responsibilities of construction & structural maintainance of road side drains is laid with the PWD section of the municiaplity, whereas the day to day cleasning activity is mainly carried out by the Health section of Keonjhar municiaplity. But in the surrounding rural revenue villages of municipality, the constuction of drains are mainly carried out by the Rural Development Department of Govt. of Odisha through the block and gram panchayat.

7.4.3 Issues

Main issues related to Drainage in Keonjhar are –

- Water logging due to inefficient drainage network
- Deteriorating quality of drains in the city due to open defecation and improper solid waste disposal practices
- Lack of drainage in peripheral areas

7.5 Solid Waste Management

7.5.1 Existing Scenario

At present, Keonjhar Municipal Area generates around 30.9 MT of solid waste per day as estimated by average per capita generation for small towns. If Keonjhar Planning Area is taken into consideration, then solid waste generation is in the order of 51.3 MT per day as estimated by average per capita generation for small towns. Currently solid waste management of Keonjhar Urban is being dealt by Keonjhar Municipality. The municipality employs 90 sanitary workers and has the responsibility for collection, transportation and disposal of solid waste in Keonjhar Urban. There is no organization for integrated solid waste management in rural areas of Keonjhar.

Door –to- door collection of waste is carried out in all wards of the municipality. At present, the municipality has 6 vehicles (tractor trolleys) and 52 hand carts for collection of solid waste from households and collection points and its transportation to the disposal site. On average, these vehicles make 4 trips per day.

The solid waste collected in the Keonjhar town is not treated or segregated at any level. At present, waste is unscientifically dumped at the 5 Acre dumping site located near Judia Ghati. There is no effort to salvage materials or energy from the waste before burning.

7.5.2 Demand Assessment

According to Municipality, 15 MT of waste is generated in the city. However, as per URDPFI standards for small towns, around 30.9 MT of solid waste is generated in Keonjhar.

7.5.3 Issues

Main issues related to Solid Waste Management in Keonjhar are –

- Unscientific solid waste management practices including disposal by dumping and subsequent burning of waste
- Inefficient collection of waste.

7.6 Physical Infrastructure Proposals

7.6.1 Background

Physical infrastructure is an essential component for development in Keonjhar. As per the vision for development in Keonjhar, one of the focus areas is the augmentation of existing infrastructure, so as to cater to the existing as well as the projected population efficiently. Keonjhar, a district headquarter, attracts population from surrounding areas. Thus, the city should be prepared to provide better infrastructure services to the incoming population in addition to improved quality of infrastructure to its own population.

7.6.2 Water Supply

Demand Assessment

For provision of adequate amount of water for drinking and other activities, demand assessment for water supply has been done on the standard of 135 LPCD. An unaccountable flow of water is assumed as 15%, which is lost during transportation

and other reasons such as leakages, etc. The table below shows the Water demand till 2030.

Demand for water supply is presented incorporating the demand for floating population and losses due to unaccountable flow of water.

Table 7-1: Projected Water Demand

Year	Population (in Lakh)	Floating Population (in Number)	Water Demand (@ 135 LPCD + Unaccountable flow @ 15%) mld
2015	1.10	21980	18.20
2020	1.23	24587	20.36
2025	1.38	27618	22.87
2030	1.56	31222	25.85

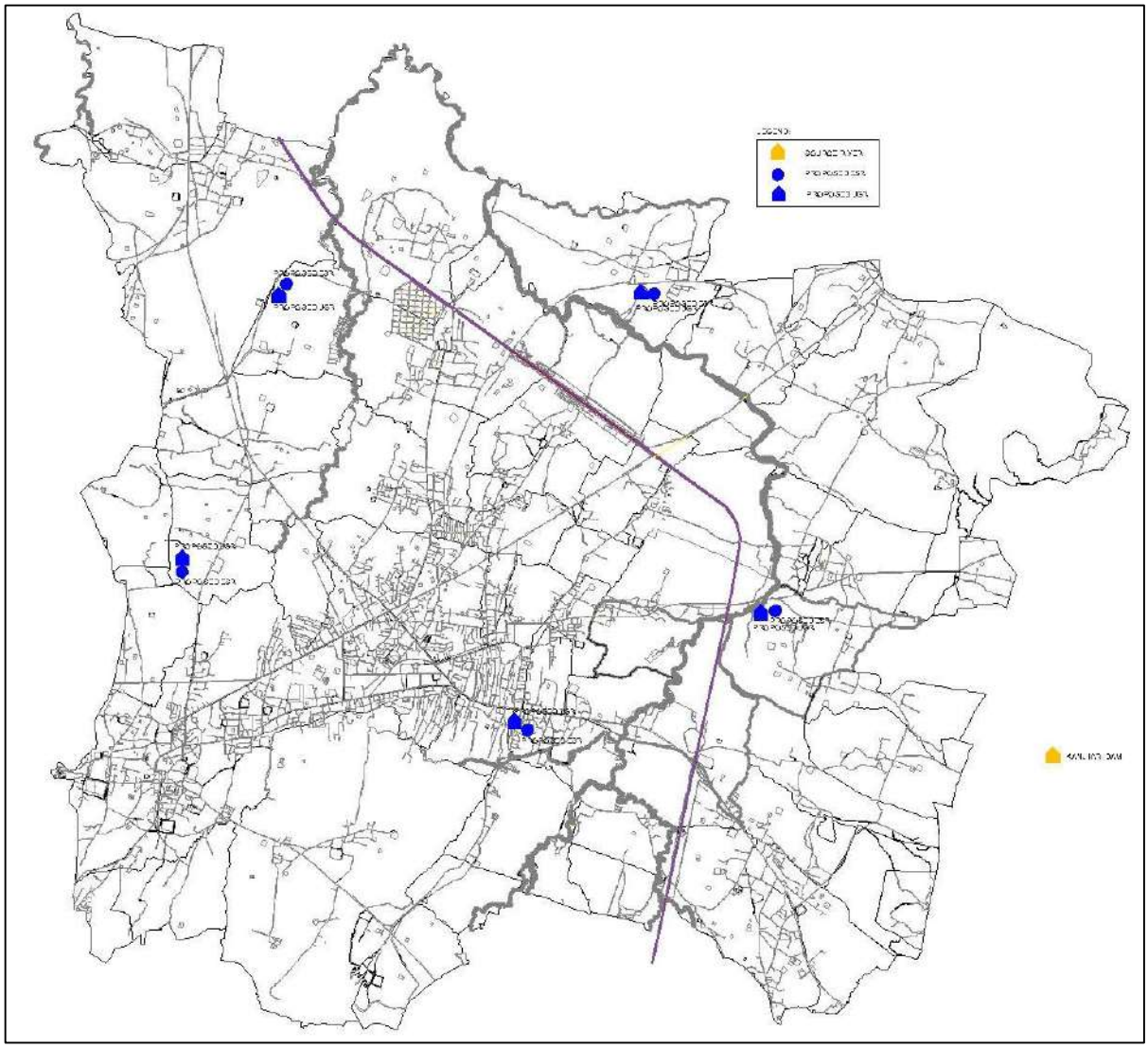
Source: REPL Estimation

Proposed Intervention

Existing water supply system provides around 5 MLD of treated water, while 25.85 MLD water shall be required to satisfy water demand in 2030. Thus, an additional source having capacity of at least 20.85 MLD is to be proposed. The water of River Baitarani from any suitable point may be used as a source of water supply.

It is also proposed that with increased supply, storage capacity of the city shall also be increased. An additional storage capacity of 6,960 KLD is proposed in Keonjhar. Considering unit storage capacity of 1,500 KLD each, 5 OHTs are proposed till 2030. The location of proposed OHTs is shown the figure below.

Map 7-2: Location of proposed OHT



Cost Estimate

Major cost components in the proposed water supply scheme are augmentation of source and storage, laying of network and adding of connections. It is estimated that a cost of Rs. 1.5 crore is incurred for augmenting capacity by 1 MLD. Thus, a total of Rs. 31.27 crore shall be incurred to put in place the proposed water supply system.

7.6.3 Sewerage and Sanitation

Sewerage Generation

It is estimated that 80% of water supplied shall be released as sewage from the households. Taking this into consideration, it is projected that around 18.0 MLD of sewage shall be generated in 2030. The table below shows the projected generation of sewage.

The table below shows the generation of waste water till 2030.

Table 7-2: Projected Waster Water Generation

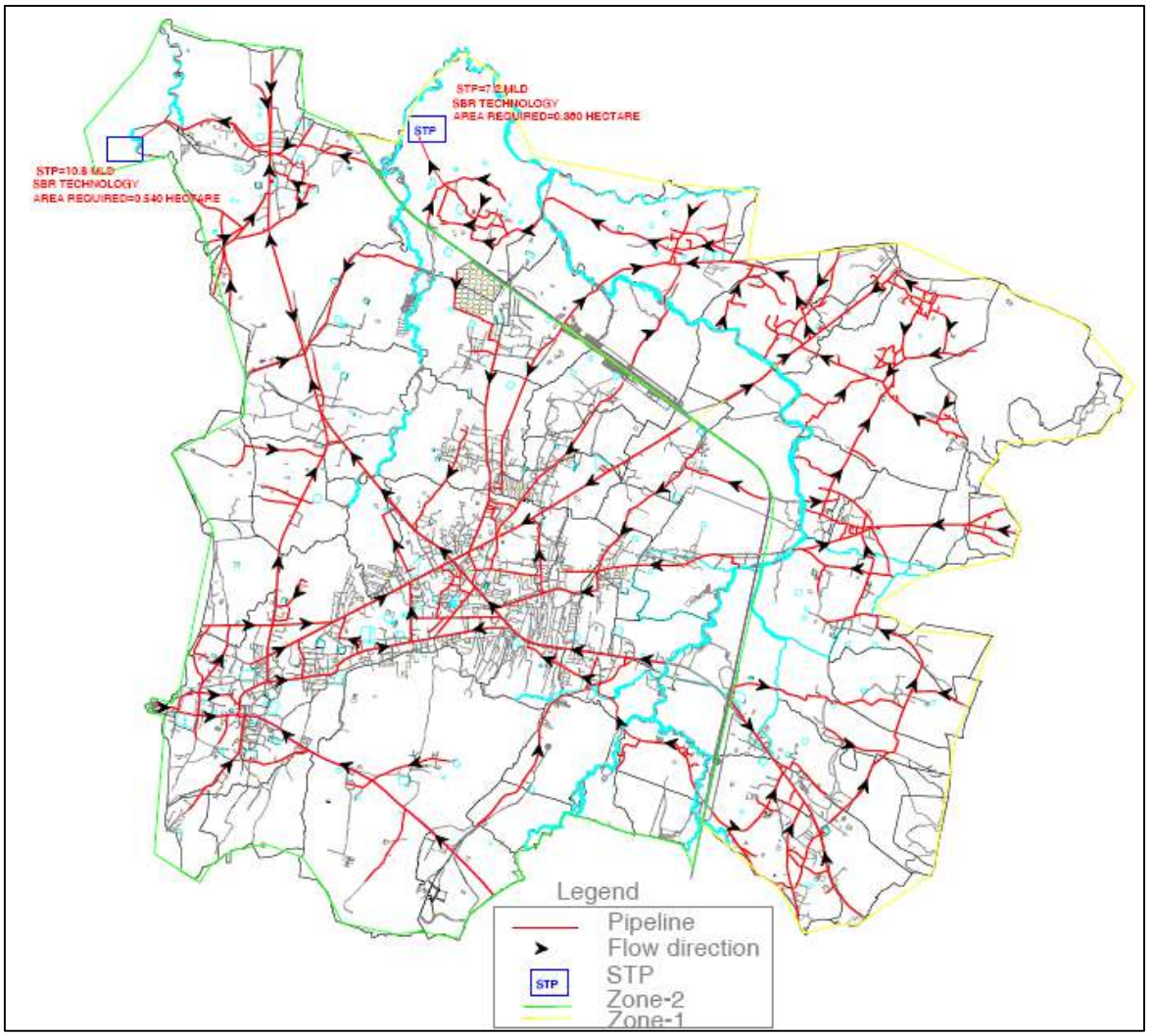
Year	Population (in Lakh)	Floating Population (in Number)	Sewage Generation (MLD)
2015	1.10	21980	12.7
2020	1.23	24587	14.2
2025	1.38	27618	15.9
2030	1.56	31222	18.0

Strategy for Waste Water Management

As the city lacks a comprehensive waste water management system, it is proposed that sewerage shall be laid in the city connecting each establishment. The sewage generated in the city shall be treated at a Sewage Treatment Plant with 'Sequential Batch Reactor' technology and the treated waste water shall be used for irrigation.

As per the topography of the city, two STPs are required for the city. The capacity of the STPs shall be 7.2 and 10.8 MLD respectively and shall require an area of 0.36 Ha and 0.54 Ha respectively or the Sewage generated in the city shall be treated at sewage treatment plant at the different sites of the Master Plan areas like Rajabandha, Ghusuri nallah bandha, Sarasa nallah bandha and back side of Anukul Chandra temple near Radio Station with sequential batch reactor technology subject to availability of land at DPR stage.

Map 7-3: Proposed sewerage network and location of proposed STPs



Cost Estimate

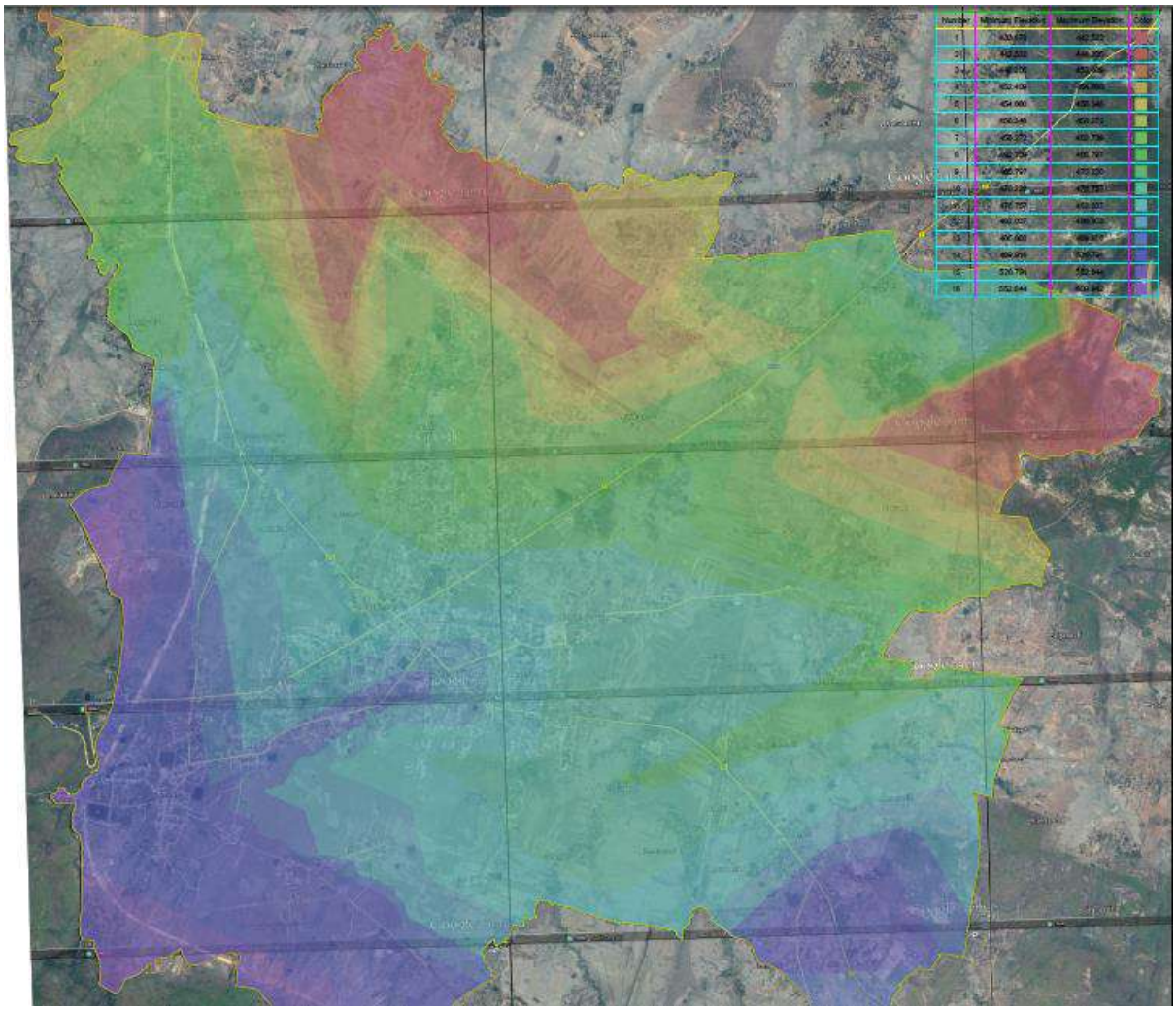
Major cost components in the proposed sewerage scheme are laying of trunk network and construction of STP. It is estimated that a cost of Rs. 2.5 crore is incurred for collecting and treating 1 MLD of sewage. Thus, for proposing sewerage network including its treatment, a total cost of Rs. 45 crore shall be incurred.

7.6.4 Storm Water Management

Drainage Proposals

A separate system for drainage is proposed in the city. All areas within the Master Plan are proposed to be covered by a network of drains. Neighbourhood level roads shall be lined with tertiary drains while all major roads shall have Primary drains. The proposed drainage network as shown in figure below follows the natural drainage pattern.

Figure 7–2: Digital Elevation Model of Keonjhar MPA.



Source: REPL Analysis

Strategy for Storm water Management

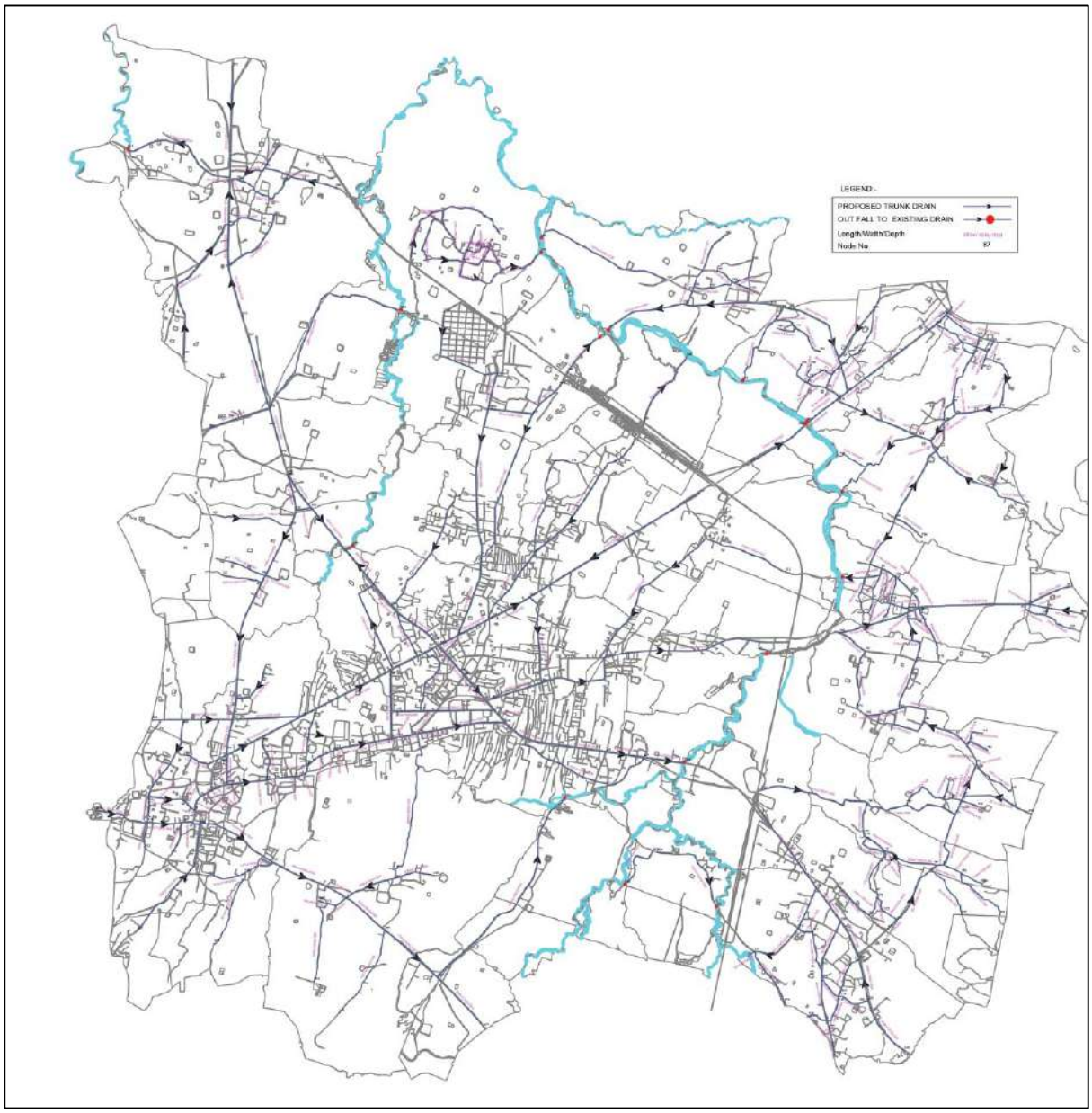
As the drainage network is designed to follow natural topography, the water from the drains is proposed to be discharged in Natural Drains and streams which drains towards the North-eastern side of the town. Regular cleaning of drains and proper solid waste collection practices must be followed in the city, so as to reduce the amount of pollution entering the streams.

The drains of the town are proposed to be discharged in natural drains and streams, which drains towards the north-eastern side of the town. Regular cleaning and proper solid waste collection as well as treatment at STP will ensure entry of clean water to river Ardei, so as to reduce the amount of pollutants entering the stream and river Ardei.

Cost Estimate

Major cost components in the proposed drainage network are laying of trunk network, construction of flood gate and construction of embankment as part of Riverfront Development. It is estimated that around Rs. 15 thousand is incurred for construction of drainage per acre. Thus, for construction of drainage as well flood protection measures, total cost of Rs. 323.9 crore shall be incurred.

Map 7-4: Proposed Drainage Network



7.6.5 Solid Waste Management

Solid Waste Generation

Per capita waste generation in any settlement increases with increase in population. Also, the constitution of waste becomes more complex with growth of the settlement. Thus, a bigger settlement like city would have more amount of non-biodegradable waste generated than a smaller town.

Generation of solid waste in Keonjhar is projected to be in the order of 112.3 MT per day by 2030. Projected Solid waste generation is shown in table below.

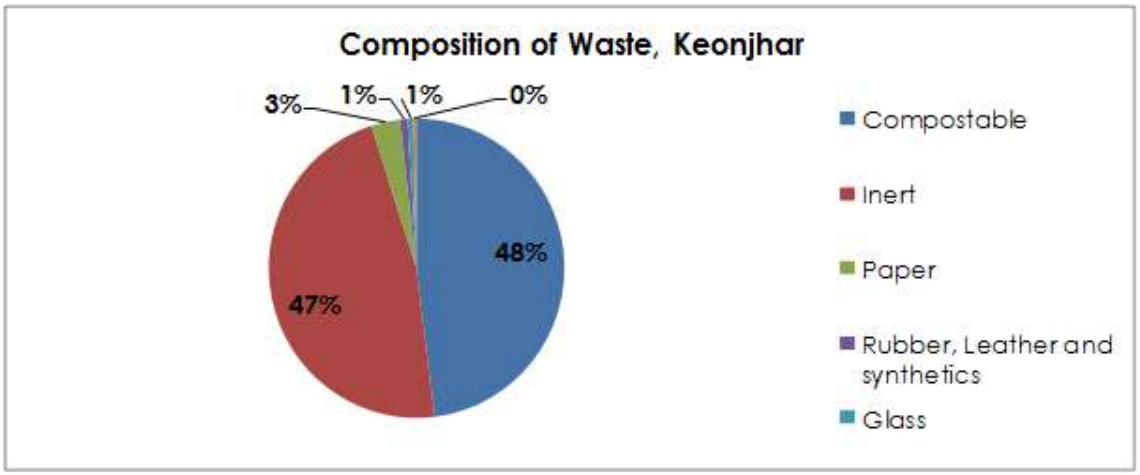
Table 7-3: Projected Solid Water Generation

Year	Population (in Lakh)	Floating Population (in Number)	Solid Waste Generation (@ 600 gm/Capita/Day)
2015	1.10	21980	79.1
2020	1.23	24587	88.5
2025	1.38	27618	99.3
2030	1.56	31222	112.3

Source: REPL Estimation

According to study by NEERI, cities with population less than 5 lakh generally have higher percentage of compostable matter. Using the study, it is projected that Keonjhar shall have the composition of waste as shown in the figure below.

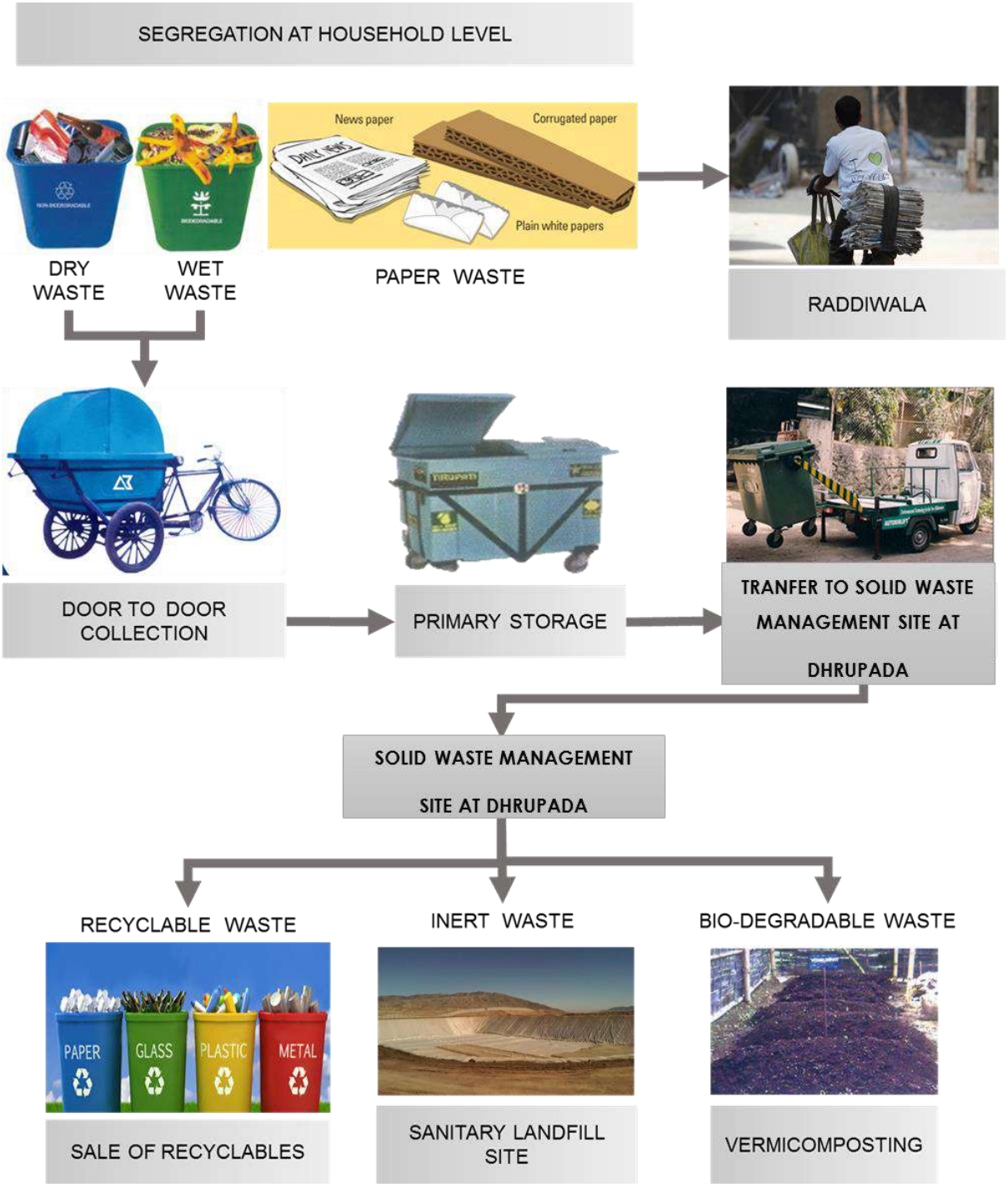
Figure 7–3 Composition of Waste in Keonjhar



Source: REPL Estimation

Proposed Intervention

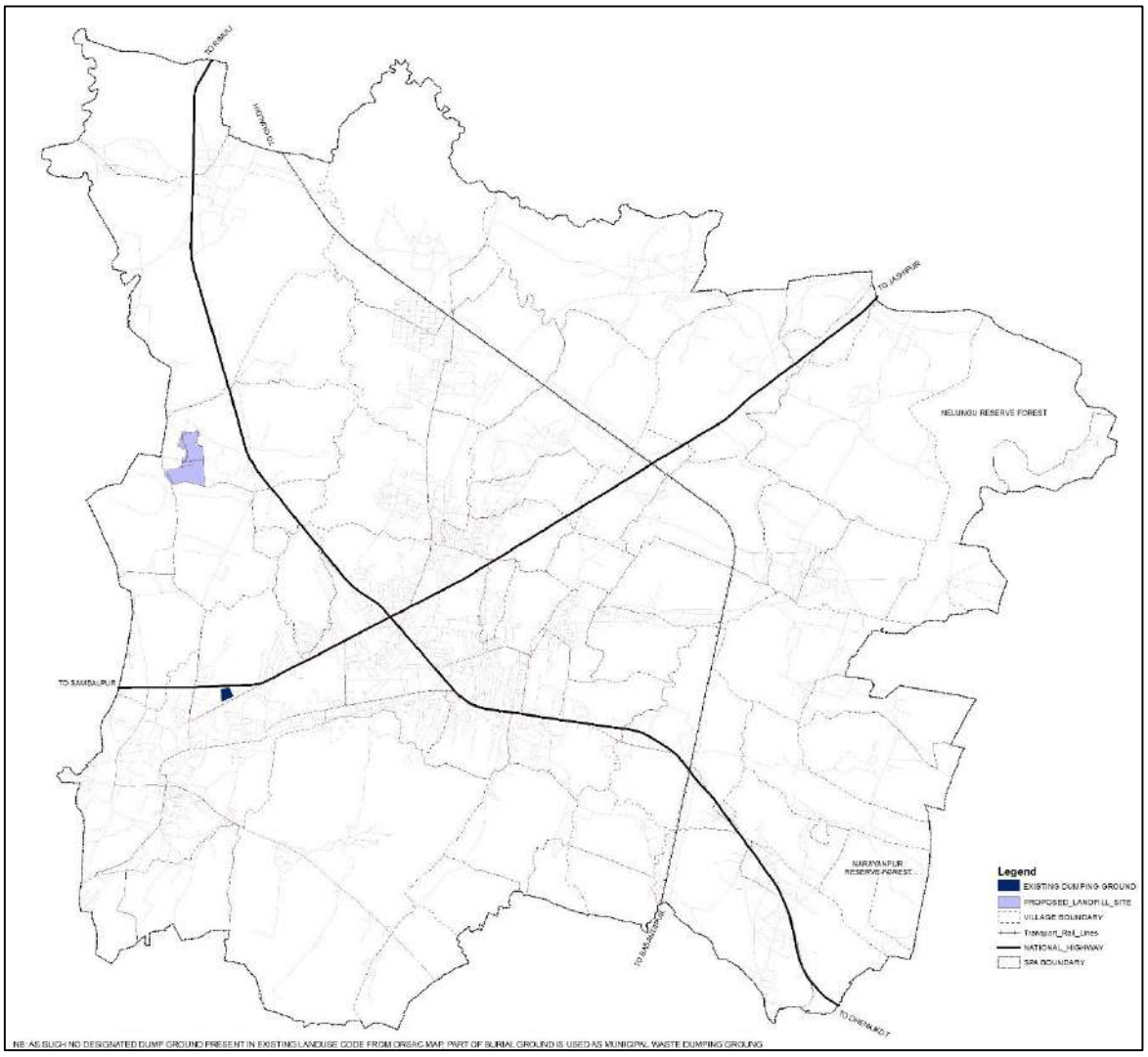
Level of Solid Waste Management in any city defines the level of hygiene. It is thus proposed that a comprehensive solid waste management system shall be designed for Keonjhar. The proposed SWM system is shown in figure below.



The above process shall take care of domestic waste which are in general non-hazardous. To dispose 112.3 MT of waste by 2030, an area of 10.69Acres shall be used to develop an Integrated Solid Waste Management Site. 5 Acre of land has been

acquired at site Dhrupada and as such it is required to be extended by another 5.69 acres of land by 2030 A.D. This site shall consist of a Vermicomposting area so as to retrieve value from the Bio-degradable waste.

Map 7-5: Location of proposed Landfill site



Waste from hospitals and clinics are proposed to be segregated at source and the hazardous waste is proposed to be incinerated. Waste from meat and fish market should be collected separately and be deposited in a compost pit. Construction and demolition waste should be used for pot-hole filling in the Master Plan area and responsibility of collection and transportation of such waste should be on the municipality.

Cost Estimate

Major cost components in the proposed SWM system purchase of equipment, vehicles and construction of Integrated SWM site. It is estimated that around Rs. 30

lakh per MT is incurred for putting a SWM system in place. Thus, for establishing an efficient and sustainable SWM system in Keonjhar, total cost of Rs. 19.67 crore shall be incurred.

7.7 Power consumption

The current power distribution in Keonjhar town is handled by NESCO. Currently there the network is divided into 2 sub divisions for distribution of power sub division 1 for the urban area and subdivision 2 for the rural areas. The urban and rural division itself is further subdivided into 4 zones each.

Table 7-4: Details of electrical distribution network in Keonjhar

Sl. NO.	Particulars	Length in kilometres
1	33KVA lines	168 KM.
2	11 KVA lines	1294 KM.
3	Length of LT lines	614.66 KM.

Source: NESCO Keonjhar

There will an escalation in demand for the consumption in power for the year 2031 for the Keonjhar MPA. There will be additional requirement for substations for handling the load and the same is to be taken up by NESCO from time to time.

Table 7-5: Projected Power consumption demand for the Keonjhar planning area

Area	Population for 2031	Consumption in KWH Per capita per day	Total consumption per day (KWH)	Total consumption per day (MWH)
Planning area	156110	5	780550	781

Source: REPL Analysis.

7.8 Social Infrastructure

Introduction

Educational and health services and other socio- cultural facilities constitute the social infrastructure that forms the foundation for economic and human development. While education provides the vital input for increasing the supply of trained and motivated manpower, health services enables optimum utilisation of human resources. Education and health are also identified as major challenges in the

Millennium Development Goals (MDG) and are important components of the Human Development Index (HDI).

The provision of these requirements should cater to the regional as well as the city-level requirements, especially as Keonjhar is the headquarter as well as the biggest urban settlement in the district. Adequate social infrastructure like schools and hospitals are the basic needs of the human life which would allow for improvement of the standard of the living and affordability levels of the people in the area.

This chapter deals with the availability of social infrastructure facilities, focusing on health and education, at settlement level in the study area. Assessment of service levels is undertaken based on the Census 2011 data. The analysis helps to identify gaps in infrastructure at settlement level and thus provides key inputs for a comprehensive plan preparation.

7.8.1 Education

Existing Status

The Keonjhar town is the educational hub for the Keonjhar district as it has number of private and government schools and colleges. The details of educational institutions are given below.

Table 7-6 : List of schools and student teacher ratio

S.No	School name	School type	Enrolment			Total teachers	Student-Teacher ratio
			Boys	Girls	Total		
1	BODAPALASA P.S.	SCHOOL UNDER SME DEPT.	73	81	154	5	31
2	C.S.HIGH SCHOOL, BODAPALASA	SCHOOL UNDER SME DEPT.	146	122	268	9	30
3	SANKARPUR PUPS	NEW UPPER PRIMARY SCHOOL (SSA/DPEP)	43	54	97	5	19
4	CHAKA UGUPS	NEW UPPER PRIMARY SCHOOL (SSA/DPEP)	57	63	120	5	24
5	RAGHUNATHSWEAR H.S., CHAKA	PVT RECOGNISED ONLY	52	50	102	12	9
6	CHAKA NUASAHI PS	NEW PRIMARY SCHOOL (SSA/DPEP)	27	24	51	2	26
7	DIMBO P.S.	SCHOOL UNDER SME DEPT.	66	64	130	5	26
8	DIMBO UP SCHOOL	NEW UPPER PRIMARY SCHOOL (SSA/DPEP)	65	42	107	5	21
9	JANAMANGAL HIGH SCHOOL	TAKEN OVER SCHOOL	90	86	176	8	22

S.No	School name	School type	Enrolment			Total teachers	Student-Teacher ratio
			Boys	Girls	Total		
10	VIVEKANANDA SIKSHYA KENDRA, DIMBO	PVT RECOGNISED ONLY	15	24	39	8	5
11	KHOLAPA P.S.	SCHOOL UNDER SME DEPT.	51	48	99	4	25
12	XAVIER' HIGH SCHOOL	PVT RECOGNISED ONLY	285	249	534	20	27
13	TENTULINANDA P.S.	SCHOOL UNDER SME DEPT.	30	42	72	4	18
14	NUAGAON P.S.	SCHOOL UNDER SME DEPT.	18	20	38	1	38
15	MALIGAON P.S.	NEW PRIMARY SCHOOL (SSA/DPEP)	14	12	26	2	13
16	JAMUNALIA NEW P.S.	NEW PRIMARY SCHOOL (SSA/DPEP)	35	32	67	3	22
17	ADIVASI H.S, KANDARAPOSI	SCHOOL UNDER SME DEPT.	40	46	86	4	22
18	KANDARAPOSI NODAL UPS	NEW UPPER PRIMARY SCHOOL (SSA/DPEP)	123	105	228	6	38
19	SARASWATI SISHU MANDIR, KANDARAPOSI	PVT UNRECOGNISED	13	8	21	4	5
20	GHUTURU MUNDASAHI N.P.S.	NEW PRIMARY SCHOOL (SSA/DPEP)	19	14	33	4	8
21	GHUTURU U.G.M.E.S.	NEW UPPER PRIMARY SCHOOL (SSA/DPEP)	86	91	177	8	22
22	GOVINDAPUR HIGH SCVHOOL	40%/ 60% BLOCK GRANT	59	36	95	6	16
23	GOVINDAPUR U.G.M.E.S.	NEW UPPER PRIMARY SCHOOL (SSA/DPEP)	74	61	135	8	17
24	GUMURA U.G.U.P.S.	NEW UPPER PRIMARY SCHOOL (SSA/DPEP)	102	96	198	9	22
25	BADADERA P.S.	SCHOOL UNDER SME DEPT.	59	61	120	4	30
26	ALANAPADA N.P.S.	NEW PRIMARY SCHOOL (SSA/DPEP)	11	13	24	2	12
27	UGUPS	NEW UPPER PRIMARY SCHOOL (SSA/DPEP)	33	34	67	5	13
28	HALADIATANGI R U.P.S.	NEW UPPER PRIMARY SCHOOL (SSA/DPEP)	99	78	177	8	22
29	JAMUNALIA P.S.	SCHOOL UNDER SME DEPT.	27	36	63	1	63
30	NARANPUR GOVT H.S	SCHOOL UNDER SC&ST DEVELOPMENT DEPT.	142	62	204	9	23
31	NARANPUR H.S	40%/ 60% BLOCK GRANT	86	76	162	7	23
32	NARANPUR P.S.	SCHOOL UNDER SME DEPT.	45	86	131	5	26
33	NARANPUR U.P. SCHOOL	SCHOOL UNDER SME DEPT.	69	113	182	9	20

S.No	School name	School type	Enrolment			Total teachers	Student-Teacher ratio
			Boys	Girls	Total		
34	GODASAHI GHUTAKESWARI P.S.	NEW PRIMARY SCHOOL (SSA/DPEP)	58	59	117	3	39
35	ANANDAMARGA PUBLIC SHOOL, NARANPUR	PVT RECOGNISED ONLY	8	3	11	4	3
36	VIVEKANANDA SIKHYA KENDRA	PVT RECOGNISED ONLY	73	66	139	9	15
37	PRAYAS SPECIAL SCHOOL FOR CWSN	SPECIAL SCHOOL	53	29	82	10	8
38	AMBUAPOSI P.S.	SCHOOL UNDER SME DEPT.	30	48	78	3	26
39	JHADIKHUNTA P.S.	SCHOOL UNDER SME DEPT.	20	24	44	3	15
40	NELUNG U.G.M.E.S.	NEW UPPER PRIMARY SCHOOL (SSA/DPEP)	77	93	170	8	21
41	NELUNG MUNDASAHI P.S.	NEW PRIMARY SCHOOL (SSA/DPEP)	27	25	52	2	26
42	NAIGAON P.S.	SCHOOL UNDER SME DEPT.	26	29	55	2	28
43	KALIABEDA CHAKA NODAL UPS.	NEW UPPER PRIMARY SCHOOL (SSA/DPEP)	62	64	126	7	18
44	GOVINDAPUR P.S.	SCHOOL UNDER SME DEPT.	25	15	40	2	20
45	BALIAGODA UGUPS	NEW UPPER PRIMARY SCHOOL (SSA/DPEP)	47	57	104	4	26
46	GOPINATHPUR P.S.	SCHOOL UNDER SME DEPT.	68	58	126	5	25
47	RAISUAN GOVT MES	NEW UPPER PRIMARY SCHOOL (SSA/DPEP)	119	116	235	9	26
48	RAISUAN MUKTAB PS	MAKTAB GOVT,	17	17	34	2	17
49	RAISUAN P.S.	SCHOOL UNDER SME DEPT.	47	53	100	3	33
50	RAJBANDH UGUPS.	NEW UPPER PRIMARY SCHOOL (SSA/DPEP)	141	125	266	8	33
51	TANGARTALI PRIMARY SCHOOL	NEW PRIMARY SCHOOL (SSA/DPEP)	17	16	33	2	17
52	RAISUAN HIGH SCHOOL	SCHOOL UNDER SME DEPT.	110	145	255	7	36
53	S.S.M, RAISUAN	PVT RECOGNISED ONLY	83	85	168	12	14
54	RAISUAN ME SCHOOL,BANDHU	PVT RECOGNISED ONLY	0	131	131	2	66
55	STATE BRIGADE SCHOOL,RAISUAN	PVT RECOGNISED ONLY	78	38	116	2	58
56	RANKI UP SCHOOL	NEW UPPER PRIMARY SCHOOL (SSA/DPEP)	30	22	52	4	13

S.No	School name	School type	Enrolment			Total teachers	Student-Teacher ratio
			Boys	Girls	Total		
57	RANKI S/S	TRW SCHOOLS UPGRADED BY SSA	97	167	264	6	44
58	THAKURPATNA P.S.	SCHOOL UNDER SME DEPT.	30	25	55	3	18
59	EKALABYA MODEL RESIDENTIAL SCHOOL	ANY OTHER CATEGORY	395	400	795	9	88
60	KENDRIYA VIDYALAYA	CENTRAL SCHOOL/KVS	466	508	974	9	108
61	SARAS PUPS	NEW UPPER PRIMARY SCHOOL (SSA/DPEP)	43	26	69	4	17
62	BISWESWARPUR P.S.	SCHOOL UNDER SME DEPT.	23	19	42	2	21
63	MUNICIPAL H.S,OLDTOWN	SCHOOL UNDER SME DEPT.	52	0	52	4	13
64	PRACTICING P.S.	SCHOOL UNDER SME DEPT.	14	18	32	1	32
65	SULEIKHAMAR P.S.	NEW PRIMARY SCHOOL (SSA/DPEP)	19	28	47	2	24
66	M M S B BLIND, DEAF& DUMB,SIDHAMATH	SPECIAL SCHOOL	23	14	37	8	5
67	SCHOOL FOR THE DEAF, MMSB, KEONJHAR	SPECIAL SCHOOL	54	39	93	9	10
68	BAIDYARAJSAHI U.G.M.E.SCHOOL	NEW UPPER PRIMARY SCHOOL (SSA/DPEP)	124	91	215	8	27
69	SRIGANESH SIKHYAKENDRA , OLD TOWN	PVT RECOGNISED ONLY	37	29	66	10	7
70	VED VIDYALAYA KEONJHAR	PVT RECOGNISED ONLY	42	0	42	5	8
71	BHATTASAHI P.S.	SCHOOL UNDER SME DEPT.	38	23	61	1	61
72	K. GARH MUKTAB P.S	MAKTAB GOVT,	23	20	43	2	22
73	TOWN GIRLS HIGH SCHOOL	SCHOOL UNDER SME DEPT.	0	187	187	9	21
74	DHANURJAYAPUR P.S.	SCHOOL UNDER SME DEPT.	18	22	40	2	20
75	ATOPER NODAL UP SCHOOL.	NEW UPPER PRIMARY SCHOOL (SSA/DPEP)	184	111	295	10	30
76	JANARDANPUR U.G.M.E.SCHOOL	NEW UPPER PRIMARY SCHOOL (SSA/DPEP)	104	104	208	7	30
77	JANASTANGANJA P.S.	SCHOOL UNDER SME DEPT.	22	34	56	1	56
78	DHIPASAHI P.S.	SCHOOL UNDER SME DEPT.	18	38	56	3	19
79	BADASASAN P.S.	SCHOOL UNDER SME DEPT.	19	20	39	2	20

S.No	School name	School type	Enrolment			Total teachers	Student-Teacher ratio
			Boys	Girls	Total		
80	ANANDMARG PUBLIC SCHOOL	PVT RECOGNISED ONLY	50	54	104	3	35
81	D.N. HIGH SCHOOL	SCHOOL UNDER SME DEPT.	387	166	553	21	26
82	SAMANTARAYA PUR P.S.	SCHOOL UNDER SME DEPT.	13	18	31	1	31
83	FOREST PARKLINE P.S.	SCHOOL UNDER SME DEPT.	18	18	36	2	18
84	GOVT GIRLS HIGH SCHOOL	SCHOOL UNDER SME DEPT.	0	267	267	18	15
85	POLICE LINE UP SCHOOL	SCHOOL UNDER SME DEPT.	15	9	24	3	8
86	BHALUKIPATALA NPS	NEW PRIMARY SCHOOL (SSA/DPEP)	10	18	28	2	14
87	KASIPUR U.G.M.E.S.	NEW UPPER PRIMARY SCHOOL (SSA/DPEP)	79	64	143	10	14
88	DAV PUBLIC SCHOOL	PVT RECOGNISED ONLY	99	100	199	5	40
89	VIVEKANANDA SHIKSHA KENDRA	PVT RECOGNISED ONLY	122	76	198	14	14
90	AUROBINDO INST.OF INT.EDU.	PVT RECOGNISED ONLY	234	191	425	10	43
91	M.M.SISHUBHA WAN NODAL UP SCHOOL	NEW UPPER PRIMARY SCHOOL (SSA/DPEP)	168	85	253	9	28
92	NEW COLONY P.S.	SCHOOL UNDER SME DEPT.	13	22	35	1	35
93	BAPUJEE ADARSHA M.E.BIDYAPITHA	NEW UPPER PRIMARY SCHOOL (SSA/DPEP)	47	39	86	3	29
94	NIRMALA CONVENT	PVT RECOGNISED ONLY	270	178	448	10	45
95	M.M.S.B. H.S.	40%/ 60% BLOCK GRANT	85	61	146	7	21
96	MOCHIBANDH HIGH SCHOOL	SCHOOL UNDER SME DEPT.	124	84	208	9	23
97	MOCHIBANDHA U.G.M.E.SCHOOL	SCHOOL UNDER SME DEPT.	116	111	227	10	23
98	DHOBADIHA P.S.	SCHOOL UNDER SME DEPT.	48	51	99	4	25
99	GUJURATI P.S.	SCHOOL UNDER SME DEPT.	11	15	26	2	13
100	POLICE LINE BOYS P.S.	SCHOOL UNDER SME DEPT.	27	0	27	2	14
101	POLICE LINE GIRLS P.S.	SCHOOL UNDER SME DEPT.	0	29	29	1	29
102	SARASWATI SISHU BIDYA MANDIR	PVT RECOGNISED ONLY	758	641	1399	10	140
103	SIRIPUR P.S.	SCHOOL UNDER SME DEPT.	43	35	78	3	26
104	NUASAHI N.P.S.	NEW PRIMARY SCHOOL (SSA/DPEP)	15	18	33	2	17

S.No	School name	School type	Enrolment			Total teachers	Student-Teacher ratio
			Boys	Girls	Total		
105	MAGURGADIA P.S.	SCHOOL UNDER SME DEPT.	1	2	3	2	2
106	KAMARGODA GIRLS H.S.	40%/ 60% BLOCK GRANT	0	78	78	7	11
107	BADAHALA PROJECT U.P. SCHOOL	NEW UPPER PRIMARY SCHOOL (SSA/DPEP)	84	76	160	6	27
108	BRAHMANGAON GOVT NODAL UPS.	NEW UPPER PRIMARY SCHOOL (SSA/DPEP)	116	166	282	10	28
109	COLLAGE ROAD H.S., BADAHAL	FULL GIA	50	47	97	6	16
110	N.S POLICE HIGH SCHOOL	FULL GIA	301	181	482	4	121
111	KIDS NURSERY ENGLISH MEDIUM SCHOOL	PVT RECOGNISED ONLY	272	180	452	22	21
112	GAHMARIA P.S.	SCHOOL UNDER SME DEPT.	26	33	59	2	30
113	KEONJHAR INTEGRAL PUBLIC SCHOOL	PVT RECOGNISED ONLY	23	19	42	9	5
114	BANIAPAT P.S.	SCHOOL UNDER SME DEPT.	60	79	139	6	23
115	SARASWATI SISHU MANDIR,BANIAPAT	PVT RECOGNISED ONLY	288	263	551	10	55
116	BRAHMANIGAON P.S.	SCHOOL UNDER SME DEPT.	67	67	134	5	27
117	DHRUPADA U.G.M.E.SCHOOL	NEW UPPER PRIMARY SCHOOL (SSA/DPEP)	65	48	113	5	23
118	KABITRA NODAL UP SCHOOL	NEW UPPER PRIMARY SCHOOL (SSA/DPEP)	105	118	223	7	32
119	BALDEVJEW HIGH SCHOOL	PVT RECOGNISED ONLY	30	38	68	8	9
			9,455	**9,015**	**18,470**	**698**	**26**

Source: Sarva Shiksha Abhiyan, Keonjhar

The current trend shows that Keonjhar town is a major educational hub for the surrounding areas at the district level. The number of primary schools, high schools and colleges exceed the domestic demands as per standards and as such many pupils in these schools are from the surrounding areas that come to the town to get good education. Apart from having number of convent private high schools, there are also a number of technical institutes located in Keonjhar. The student teacher ratio in many schools is more than 100, suggesting worst situation with respect to availability of teachers for student. As per government of Odisha, for primary school level student

teacher ratio should be 30:1 and for upper primary school level it should be 35:1. From the above table it can be analysed that around 18 schools do not meet the standards and there are 10 schools which has student teacher ratio is more than 50, which is the worst condition. In many of the government institutions positions for teachers were lying vacant due to recruitment being pending for a long time.

The names of some of the major colleges have been shown in the table below.

Table 7-7: List of major +2 Science Collages in the Keonjhar town

Block/ULB Name	College Name	TOTAL	Arts	Science	Comm
Keonjhar (MPL)	Dharanidhar (Junior) College, Keonjhar	544	192	256	96
Keonjhar (MPL)	Ekalabya (Junior) Model Residential School, Ranki	66	-	66	-
Keonjhar (MPL)	Gayatri Residential (Junior) College, Keonjhar	128	-	128	-
Keonjhar	Gonasika (Junior) Science College, Kashipur	192	-	192	-
Keonjhar (MPL)	Government Women's (Junior) College, Keonjhar	192	128	64	-
Keonjhar (MPL)	Keonjhar (Junior) College, Keonjhar	128	128	-	-
Keonjhar	Raisuan (Junior) Mahavidyalaya, Raisuan	192	128	-	64

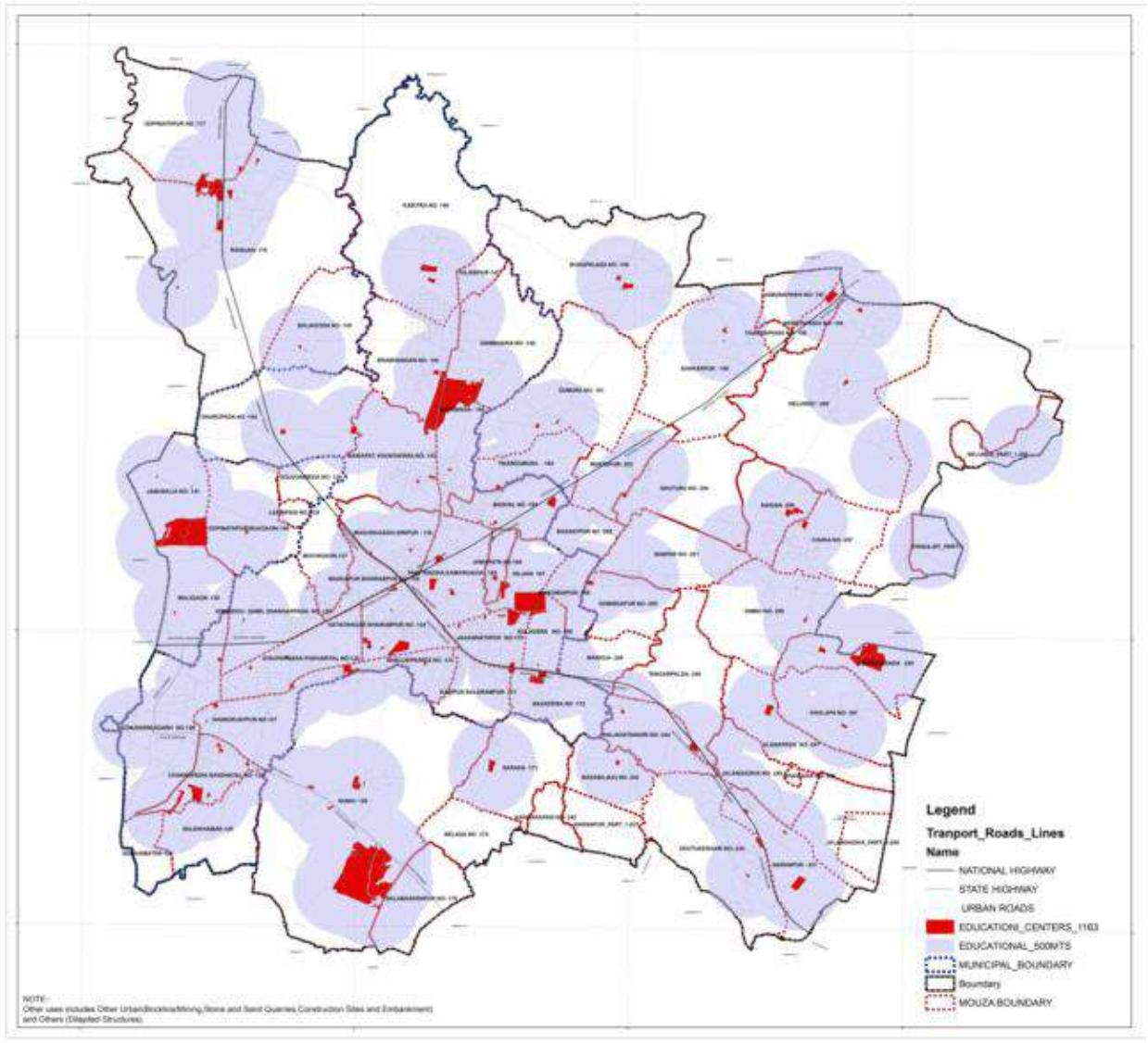
Source :DEO Keonjhar

Apart from educations institutes listed above, there are important institutes like Rabindra Vidya Nuketan & ITIs serving the educational need of the Area.

Existing and future gap assessment

Analysing the existing gap with respect to UDPFI guidelines, it has been observed that even though number of educational institutes are in surplus, the quality of education facilities and infrastructure need improvement. Similarly, there are very few gaps in educational facilities for future requirement in 2030. Table below indicates the existing and future gap assessment in educational facilities.

Figure 7–4: Proximity analysis of the existing educational facility in Keonjhar MPA.



Source: ORSAC Database, REPL Analysis

Table 7-8: Status of Existing and Future Requirement of education facilities in Keonjhar

Educational Facilities	Norms (Population requirement for 1facility)	Existing Facilities in 2015 (no.)	Future requirement (2030) (no)	Proposed Facilities for 2030 (no.)
Pre-primary, nursery school	2500	84	94	10
Primary school (class 1 to 5)	5000			
Senior secondary school (class 6 to 12)	7500	28	21	NOT Required
Integrated school with hostel facility (class 1 to 12)	90000	0	2	2
School for physically challenged	45000	0	3	3
College	125000	5	1	NOT Required
Technical Education (ITI)	100000	3	2	NOT Required

Educational Facilities	Norms (Population requirement for 1facility)	Existing Facilities in 2015 (no.)	Future requirement (2030) (no)	Proposed Facilities for 2030 (no.)
Engineering college	1000000	3	0	NOT Required
Medical college	1000000	0	0	NOT Required
Other Professional college	1000000	1	0	NOT Required

Source: Based on ORSAC data/ DEO Keonjhar/ SSA Keonjhar/ NOU Keonjhar/ URDPFI

By 2030, there will be a need for 10 more school at primary level, 2 integrated school with hostel facilities and 3 schools for physically challenged students. As per the URDPFI Guidelines, there is no requirement of medical college for the projected population of Keonjhar till 2030, however, a medical college has already been proposed and under construction to provide better health infrastructure to the population of Keonjhar town as well as the district.

7.8.2 Health

Existing Status

Keonjhar Sadar hospital, the district hospital for Keonjhar district has 160 number of beds, 37 number of doctors and 53 total number of other staff. However, around 210 beds are actually functional because of the greater demand as about 250 patients in the hospital come daily. Details of government hospital, private hospitals and nursing homes in Keonjhar town are given below.

Table 7-9: Details of private medical facilities in the Keonjhar town.

Sl No.	Name of establishment	No. of beds
1	Swati health care,Keonjhar.	6-9
2	Dipali Nursing home, Keonjhar.	6-9
3	Draupadi Mohants emergency care unit Dhurupada Keonjhar	6-9
4	Maa Tarini Netradham, Keonjhar	6-9
5	Keonjhar hospital, church road keonjar	6-9
6	Keonjhar health point, mandua Keonjhar	6-9
Total number of beds available		36-54 Beds

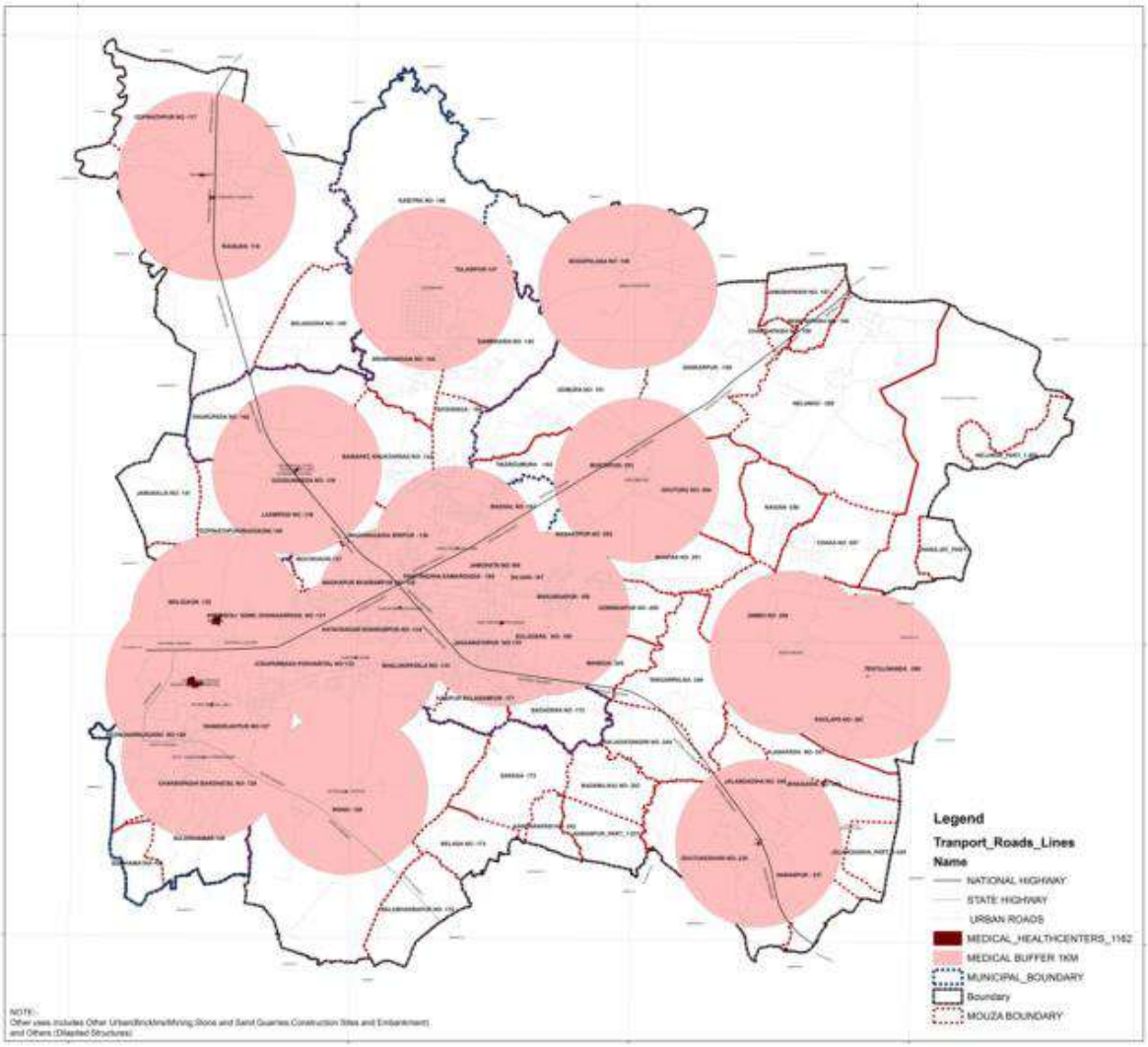
Source :CDMO Keonjhar

Existing and future gap assessment

Analysing the existing gap with respect to UDPFI guidelines, it has been observed that in number as well as in quality, Keonjhar is deficient in health facilities. An intermediate level hospital is absent while there is deficiency of dispensary and nursing home in the

region. Similarly, there are gaps in medical facilities for future requirement in 2030. Below table indicates the existing and future gap assessment in medical facilities.

Figure 7–5: Proximity analysis of the existing medical facility of the Keonjhar MPA.



Source: ORSAC DATA, REPL Analysis

Table 7-10: Status of Existing and Future Requirement of medical facilities in Keonjhar

Health Care Facilities	*Norms (Population requirement for 1facility)*	*Existing condition in 2015 (no.)*	*Future requirement for 2030 (no)*	*Proposed Facilities for 2030 (no.)*
Dispensary	15000	6	10	4
Nursing home, child welfare and maternity Centre	45000	NIL	3	3
Polyclinic with some observation beds	100000	NIL	2	2
Intermediate hospital (category A)	100000	NIL	2	2
Intermediate hospital (category B)	100000	NIL	2	2

Health Care Facilities	Norms (Population requirement for 1facility)	Existing condition in 2015 (no.)	Future requirement for 2030 (no)	Proposed Facilities for 2030 (no.)
Multi-specialty hospital	100000	1	2	1
Specialty hospital	100000	NIL	2	2

7.8.3 Socio- Cultural Facilities

The master plan area has sufficient socio-cultural facilities in terms of community hall, recreational clubs and sports centres, but lacks in shopping area facilities and residential unit play area.

7.9 Administration

There are around 120 large and small government offices located in the Keonjhar master plan area. Most of these offices are under district administration and state government. The list of the major administrative offices is given below.

Table 7-11: Major government offices located under MPA Keonjhar.

NESCO ELECTRIC OFFICE	**REGIONAL RESEARCH TRANSFER STATION,OUAT**
BSNL OFFICE	SADAR TAHASIL OFFICE
G.P OFFICE	SUPERENTENDING ENGINEER OFFICE
ANM centres	DIST. SESSION JUDGE
SADAR P.S	SUPERENTENDING ENGINEER OFFICE
G.P OFFICE	MEDITATION CENTER
OSBC	OFFICE OF THE DY. S.P. VIGILANCE
ANIMAL RESOURCES DEVELOPEMENT LIVESTOCK BREEDING & DIARY FARM	SPECIAL COURT JUDGE (VIGILANCE)
SALE TAX OFFICE	BAR ASSOCIATION
EXTENSION TRAINING CENTRE	SUB-POST OFFICE
RWD OFFICE	POLICE CLUB
DISTICT CHIEF VETERINARY OFFICE	DIST. LABOUR OFFICE
RPF UNIT	ATHELETIC ASSOCIATION
RAILWAY HEALTH CENTRE	R.M.S.POST
SIGNAL ROOM	MUNICIPALTY OFFICE
FOREST BIT HOUSE	INSPECTOR OF SCHOOL
LIFT IRRIGATION OFFICE	MUNICIPALTY OFFICE
CHECK POST	ODISHA NON GAZZATED EMPLOYEE ASSOCIATION
GRAMBHUMI VIKASH CO-OP LTD.	INCOME TAX OFFICE
DOORDARSHAN OFFICE	R,T,O, OFFICE
L.I.C. OFFICE	WORKING PLAN OFFICE FOREST DIVISION
DIRECTOR OF AGRICULTURE OFFICE	HANDLOOM GOVT. OF INDIA
SERVICE INDIA TRUST	POSTAL QUARTER
GOVT. CONTROL SHOP	COMMUNITY CENTER

L.I.C. OFFICE	DISTRICT MEDICAL
ASST. ENGG. MECHANICAL SUB DIVISION R&B	DEPUTY DIRECTOR OF HORTICULTURE
KEONJHAR DIST. INSPECTOR OF SCHOOL	JOINT DIRECTOR OF GEOLOGY
GOVT. BRANCH PRESS	FINANCIAL ADVISER
DISTICT POLICE OFFICE	DIRECTOR OF SPORTS AND YOUTH HOSTEL
COLLECTORATE KEONJHAR	CHIEF EXECUTIVE ENGG.
DIST. AGRICULTURE OFFICE	B.J.D. OFFICE
DIAPITATED ASST. ENGG. M.I.I. SUB-DIVISION	I.T.D.A OFFICE
GOVT. DEVELOPEMENT AGENCY	FISHERY OFFICE
WILD LIFE WARDEN, SUB-DIVISIONAL FOREST	ANGANWADI CENTER
DISTRICT INDUSTRIES CENTER	ASST. DIRECTOR OF TEXTILES
REGIONAL RESEARCH TRANSFER STATION,OUAT	ANGANWADI CENTER
GOVT. OF INDIA METEROLOGICAL OFFICE	NATIONAL HIGHWAY AUTHORITY OF INDIA
P,H,D, OFFICE	ATAPUR SUB-POST OFFICE
REGIONAL RESEARCH TRANSFER STATION,OUAT	R,W,S,OFFICE OF THE ASST. ENGG.
DIST. FISHERIES OFFICE	RESEARCH OFFICER ZONAL LABORATORY
PANCHAYAT OFFICE	L.I.C. OF INDIA
PRAVAH MANJARI LAW COLLEGE	DIGDAN FISH FARM
MEERA N,G,O	CIVIL SUPPLY OFFICE
ELECTRICAL OFFICE	REGIONAL RESEARCH TRANSFER STATION,OUAT
REGIONAL RESEARCH TRANSFER STATION,OUAT	ASST. EXECUTIVE ENGG. N.H. DIVISION
CIRCUIT HOUSE	T.M.T
TRUCK OWNER ASSOCIATION Office	SPECIAL LAND ACQUISITION COMPETENT AUTHORITY
HEAD POST OFFICE	GOVT. TASAR BHAWAN AND GODWONS
P.W.D, I.B	BAIDARAJ SAHI U.P. SCHOOL
P,H,D,OFFICE	FOREST DEVELOPEMENT PROJECT OFFICE
P.W.D, I.B	SUB-POST OFFICE
REGIONAL RESEARCH TRANSFER STATION,OUAT	DIST. INSTITUTE OF EDUCATION AND TRAINING
CONGRESS BHAWAN	FOREST DEVELOPMENT PROJECT OFFICE
TOWN PLANNING OFFICE	P.H.D.OFFICE
ARMED POLICE RESERVE	LAMP
DIST. PROBATION OFFICER	PANCHAYAT OFFICE
CENTRAL EXCISE AND CUSTOMS OFFICE	POLICE FIRING TRAINING AREA
REGIONAL RESEARCH TRANSFER STATION,OUAT	SADAR P.S
KENDUJHARI PHULABATI AGRANI PRAKALPA	SUB-COLLECTOR OFFICE
REGIONAL RESEARCH TRANSFER STATION,OUAT	TOWN POLICE STATION
R.I. OFFICE	TRUCK OWNER ASSOCIATION

Source: ORSAC database.

7.10 Religious institutions

There are 77 large and small temples located in Keonjhar master plan area. There are also two Gurudwaras , one mosque and one church located within the town.

Table 7-12: Major temples located within Keonjhar MPA based on area.

Sl. No.	Name of temple	Loaction
1	SIDHA HANUMAN TEMPLE	SIDHHAMATHA-124
2	JAGANNATH TEMPLE	DHANURJAYPUR NO-127
3	JAGANNATH TEMPLE	SIDHHAMATHA-124
4	SHIVA TEMPLE	BODAPALASA NO -149
5	SATSANG TEMPLE	TIKARGUMURA -162
6	VAIRABI TEMPLE	RANKI- 126
7	MAA TARINI TEMPLE	BADADERA NO -172
8	LAXMINARAYAN TEMPLE	KEONJHARNIJIGARH NO-129

Source: ORSAC DATABASE

7.11 Recreational facilities

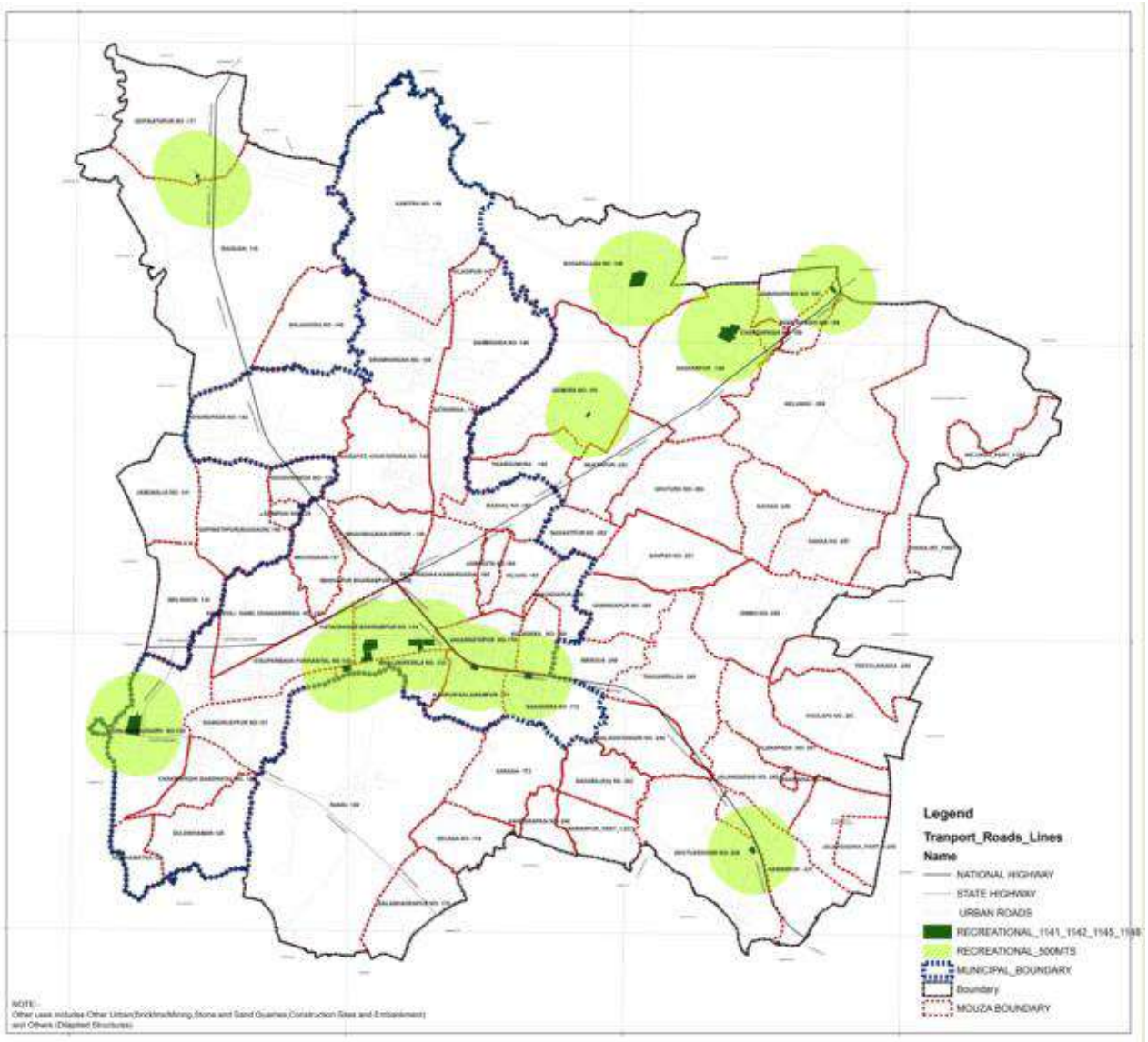
The Keonjhar MPA has limited recreational facilities, and has acute shortage of recreational facilities like parks, playground and theatres etc. At present, there is only one park which is centrally located and being maintained by the Keonjhar administration. There are other smaller playgrounds which cater to the demand of open space in the urban as well as fringe areas the list of major playground in Keonjhar is listed below. There is only one cinema hall in Keonjhar. Numerous ponds within the city limit can also be used as recreational sites if they are maintained properly.

Table 7-13: Major playground and sports facilities in Keonjhar MPA.

SL.NO	Name of playground	Location
1	D.D COLLEGE PLAY GROUND	BRAHMANGAN & SATASINGA
2	STADIUM	HATIATANGAR BHAIRABPUR NO -134
3	MUNICIPALITY PLAY GROUND	HATIATANGAR BHAIRABPUR NO -134
4	WOMENS COLLEGE PLAYGROUND	BADADERA NO -172
5	INDOOR STADIUM	SANKARPUR -160

Source: ORSAC DATABASE.

Figure 7–6: Proximity analysis of Recreational facilities in Keonjhar MPA.



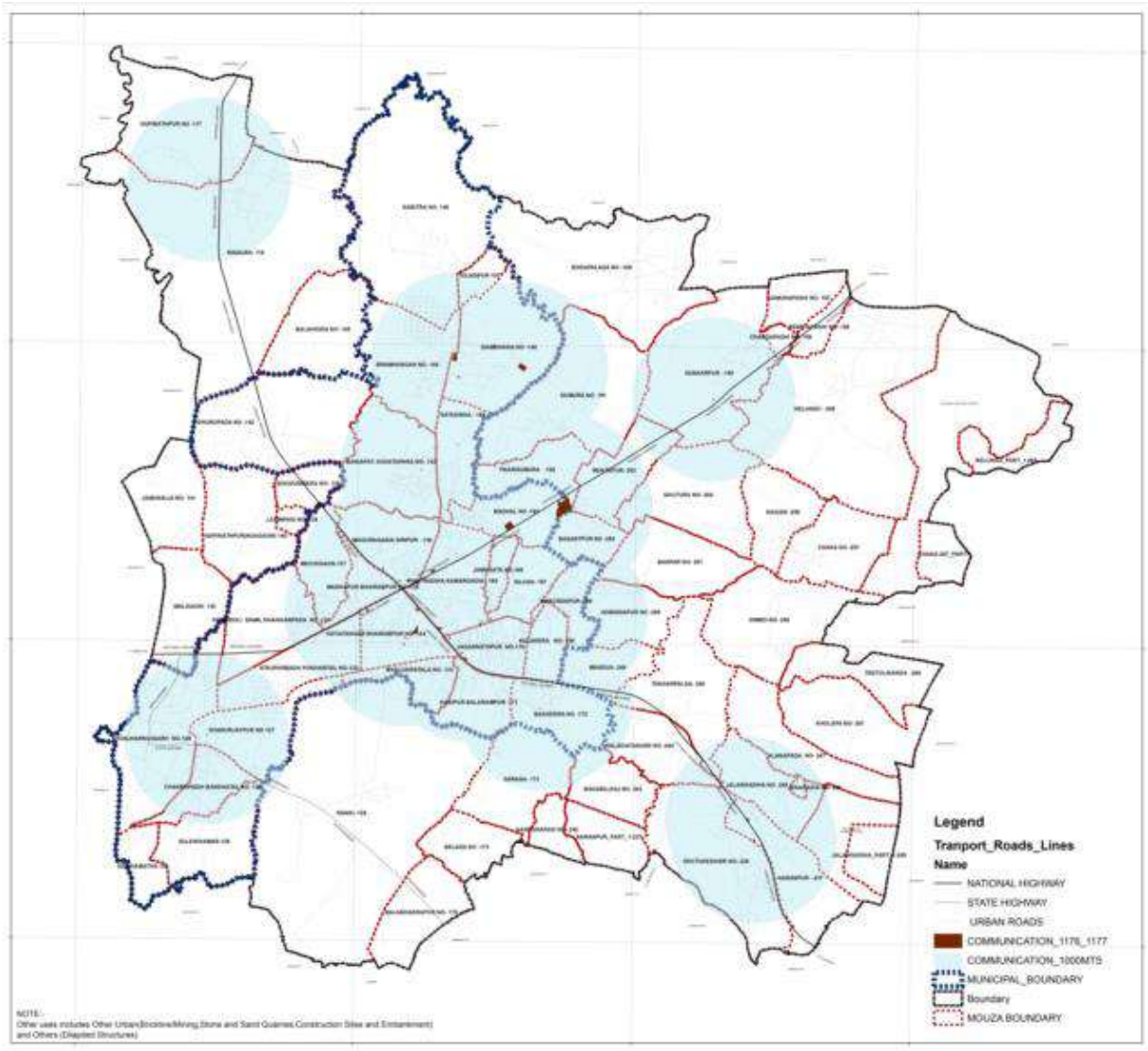
Source: ORSC Data, REPL Analysis.

7.12 Communication facilities

7.12.1 Telephone

Keonjhar town has a telephone exchange having capacity of providing 6000 land line connections and 912 broad band connections. As per the situation in 2015 there are 1721 connections of landlines in Keonjhar and 721 broadband connections. The broadband connections need augmentation by the year 2030 to meet the demand. The tables presented below shows the growth rate in connection. There are also around 20-30 mobile BTS towers around this area. There is also All India Radio station located within the town to provide radio connectivity to the entire town of Keonjhar.

Figure 7–7: Proximity analysis of the communication facilities in Keonjhar town.



Source: ORSAC database REPL Analysis.

Table 7-14: Details of landline connections in Keonjhar from year 2012 to 2015

Sl. No.	Name of Telephone Exchange	Capacity	No. of Landline connections	No. of Landline connections	No. of Landline connections	No. of Landline connections
			YEAR 2012	YEAR 2013	YEAR 2014	YEAR 2015
1	KEONJHAR	6000	1846	1843	1729	1721

Source: BSNL Office Keonjhar.

Table 7-15: Details of Broadband connections in Keonjhar from year 2012 to 2015

Sl. No.	Name of Telephone Exchange	Capacity	No. of BROADBAD connections	No. of BROADBAD connections	No. of BROADBAD connections	No. of BROADBAD connections
			YEAR 2012	YEAR 2013	YEAR 2014	YEAR 2015
1	KEONJHAR	912	625	691	723	731

Source: BSNL Office Keonjhar.

7.12.2 Post Offices

One of the major social facilities in Keonjhar is post office at the neighbourhood level. In Keonjhar, there are 7 postal services facilities and are generally located in the central part of the town.

7.12.3 Banks and ATMs

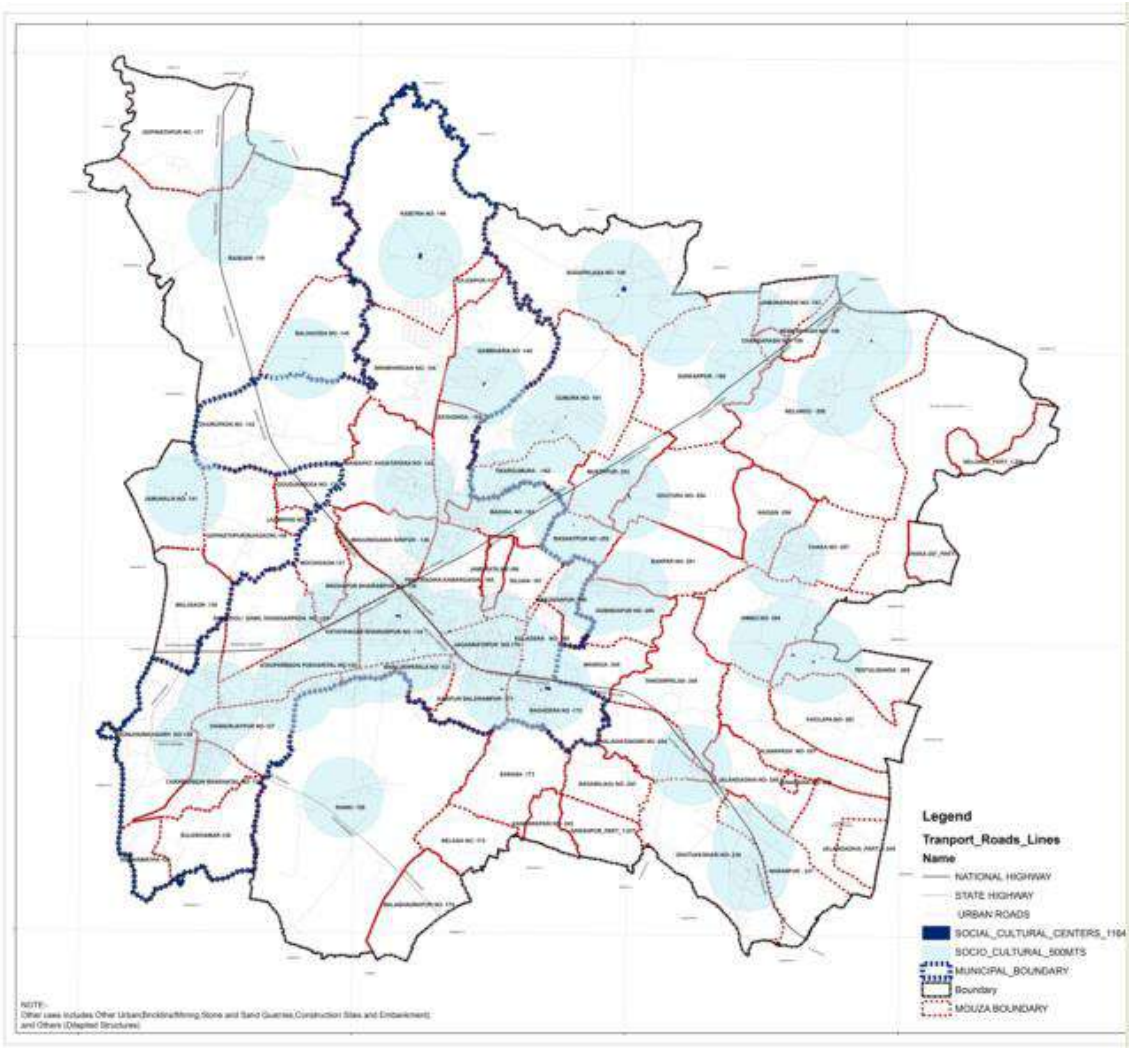
There are currently 35 different branches of different banks and more than 15 independent ATMs in the town which are primarily concentrated in the market.

7.13 Burial Ground

There are around 18 Burial/cremation ground in the town. All these cremation/Burial grounds are required to be developed with the name of "Smruti Vatika" wherein the inheritors may chew the memory (Smruti) of their ancestors. Most of these grounds are located near the river Aradei or tributaries of the river Aradei. So, construction of check dams for accumulation of water at these particular points with the provision of pathways as well as stepping provision for bathing ghat system for the general public will meet out the long felt need of the people.

Most of them are located near the water bodies especially the tributaries of river. There is however shortage of any organized space for cremation for different communities like Hindus, Muslims and Christians in the town.

Figure 7–8: Buffer analysis of the existing socio-cultural facilities in Keonjhar MPA.



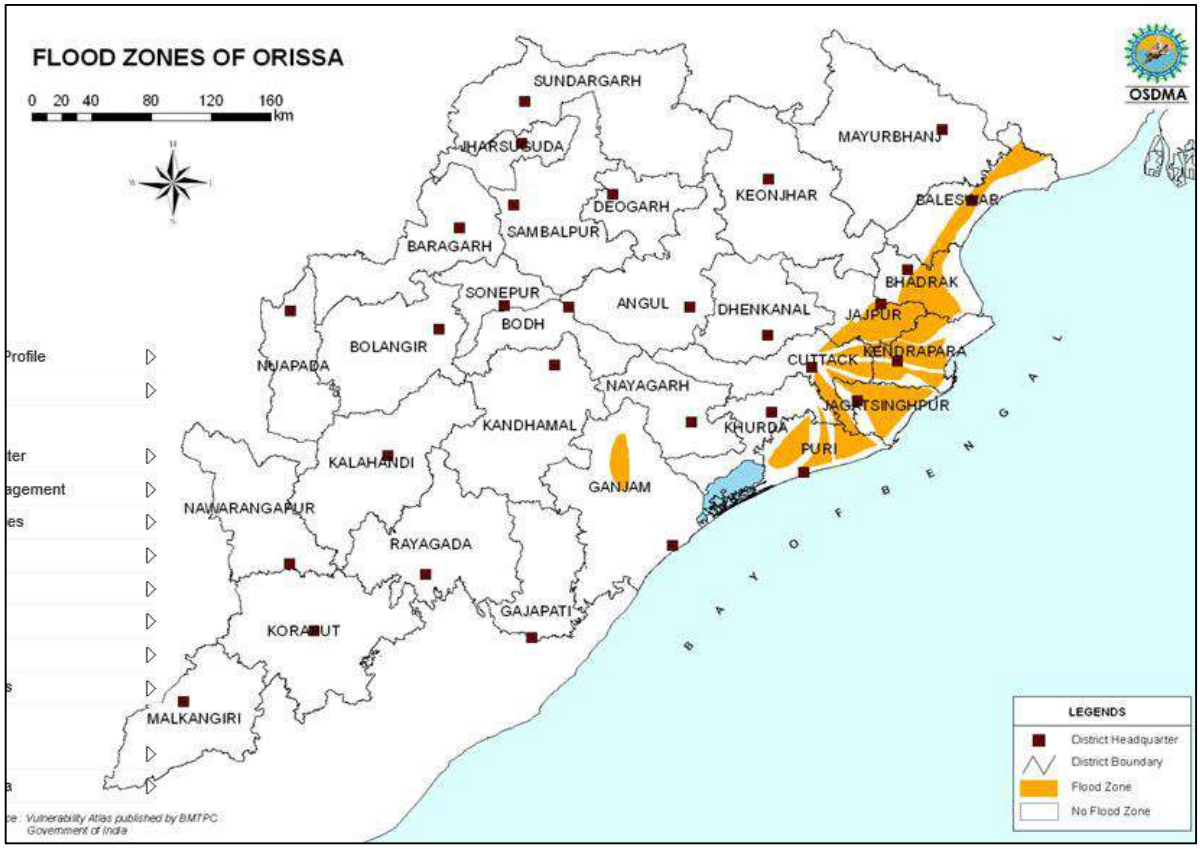
Source: ORSAC DATA, REPL Analysis

7.14 Safety and Security

For maintenance of proper law and order, the security force must keep pace with the growth and development of an area. The main agency looking after security aspect in the city is the Police. Fire services have to play pivotal role and be fully prepared in protecting people from fire hazards, building collapses, road accidents and other unforeseen emergencies etc. According to the Indian Seismic Zone map, Keonjhar is placed in moderate risk zone. As per earthquake zones of Odisha, Keonjhar falls in Low Damage Risk Zone (MSK VI). As per flood zones of Odisha, Keonjhar falls in No Flood Zone and as per wind & cyclone zones of Odisha, Keonjhar falls in very high damage risk zone- B (Vb= 50 m/s). Below maps shows the district wise disaster prone zones in Odisha.

Map 7-6 : Disaster maps of Odisha state

Source: OSDMA



Source: OSDMA

Source: OSDMA

7.15 Other Socio-Cultural facility

There are around 48 community rooms, community halls and recreational clubs which are more than present requirement as well as requirement for 2030. As per current requirement there is a need of 7 convenience shopping and 7 local shopping centres, which is the gap as per existing situation.

7.15.1 Assessment of existing and future Requirement

Analysing the existing gap with respect to UDPFI guidelines, it has been observed that the Master Plan area has sufficient socio-cultural facilities in terms of community halls, recreational clubs and sports centres, but lacks in shopping area facilities and residential unit play area. Similarly, there are gaps in facilities for future requirement in 2030. Below table indicates the existing and future gap assessment in medical facilities.

Table 7-16: Status of Existing and Future Requirement of public facilities in Keonjhar

Facilities	Norms (Population requirement for 1facility)	Existing facilities in 2015 (no.)	Future requirement (2030) (no)	Proposed facilities 2030 (no.)
Socio-cultural Facilities				
Community room	5000	48	45	NOT Required
Community hall	15000			
Recreational club	100000			
Music, dance and drama centre	100000			
Dhobi Ghat	100000	0	**2**	**2**
Police, Civil Defence and Home Guards				
Police station	90000	2	2	0
Police Post	50000	1	3	2
Safety Management				
Fire station	200000	1	1	0
Disaster Management Centre	1 in administrative zone	1	1	0
Fire Training Institute	City level	0	1	1
Sports facilities				
District sport centre	100000	2	2	0
Neighbourhood play area	15000	8	10	2
Residential unit play area	5000	0	31	31
Shopping				
Convenience shopping	15000	0	10	10
Local shopping including service centre	15000	0	10	10
Community Centre with service centre	100000	0	2	2

7.16 Problems and issues related to Education and Health facilities

i. There is lack of pre-primary level education facilities in the Master Plan Area, which is to be emphasised.

ii. Higher educational facilities like colleges and technical institutions are available in Keonjhar but they are serving the entire district and hence there is a shortage of facilities.

iii. Quality of education and health facilities needs to be upgraded as per the norms and standards of government.

iv. Central and State Governments have formulated a number of policies and programmes aimed at improving the indices of education and health which need to be implemented effectively in a time bound manner.

v. Most of the higher educational facilities are in the private sector and the quality needs to be improved in terms of facilities, infrastructure and teachers to meet competitive standards.

vi. Modern ICT technologies has not been fully realised especially in the healthcare sector eg. tele-medicine for treatment of distant patients and super speciality training for health personnel. Since this area is serving the whole district, potential for linking with National Knowledge Network of high speed broadband connectivity needs to be done on priority basis.

vii. Emerging specialty areas both in education (design, animation, gaming, biotechnology) and health (cancer, wellness, trauma centres) need to be developed.

viii. Since this region has many local artisans, artists who are semi-skilled and skilled but do not have exposure, there is a need for certified courses for skill upgradation in construction, retail, businesses, arts and handicrafts etc. and has to be developed through partnerships with private sector based on their specific demand.

Based on the analysis of the survey data and comprehensive study of the area, the following objectives, proposals and strategies for Social Infrastructure sector has been identified.

7.17 Objectives

7.17.1 Education

i. Education for All in 6-14 age group with access, retention and quality
ii. Secondary education for all
iii. Skill development for youth
iv. Improvement in quality of Higher, Technical and Medical Education

7.17.2 Health

i. Health for All by providing access to quality health facilities so as to reduce Infant Mortality Rate (IMR), Maternal Mortality Rate (MMR), Total Fertility Rate (TFR), Malnutrition Rate and Disease Prevalence Rate(DPR) and increase Contraception Prevalence Rate (CPR) and Life Expectancy.

7.18 Steps to achieve the objectives

7.18.1 Education

i. Sarva Shiksha Abhiyan (SSA) as per spatial and population norms of Programme in a time bound manner.

ii. Rashtriya Madhyamik Shiksha Abhiyan (RMSA) as per spatial and population norms of Programme in a time bound manner.
iii. National Skills Development Mission as per spatial and population norms of programme.
iv. Scheme for establishing Medical Colleges and Technical Colleges.
v. Public-Private-Partnership (PPP) for funding new institutions
vi. Technological advancement in the provisioning of social infrastructure through high speed broadband connectivity among institutes under National Knowledge Network (NKN), Extension campuses.

7.18.2 Health

i. Provision of health facilities as per norms under National Rural Health Mission (NRHM) and National Urban Health Mission (NUHM) in a time bound manner.
ii. PPPs for expansion of health facilities such as hospitals and super specialty centres, medical colleges and para medical services especially Auxiliary Nurse Midwives Training Centre (ANMTC).
iii. Technological advancement in the provisioning of health infrastructure through high speed broadband connectivity among institutes under National Knowledge Network (NKN), Telemedicine and telepreventive medicine.

In order to attain the above objectives for Social Infrastructure in Keonjhar Master Plan Area, proposals based on local assessment of requirements and consultation with stakeholders have been prepared. These proposals will be implemented through State Government department/ agencies/ private developers/ PPP mode.

7.19 Proposals

As per the requirement of Social Infrastructure facilities assessed, proposals for Education, Health, Socio- cultural facilities and other Socio- cultural facilities are given at appropriate location in the Master Plan for Keonjhar- 2030 . Within this land use total 185.63 ha land is proposed for uses which will be allowed as per Zoning Regulations. Social Infrastructure Facilities are given as per URDPFI guidelines. Requirement of facilities are given in table below:

Table 7-17: Social Infrastructure Facilities requirement as per URDPFI Guidelines for Keonjhar

Facilities	***Proposed Facilities (No.)***	***Min. Area Required for each Unit (Ha)***	***Total Approx. Area Required (Ha.)***
Educational Facilities			
Pre-primary, nursery school	3	0.08	0.24
Primary school (class 1 to 5)	7	0.4	2.8
Senior secondary school (class 6 to 12)	NOT Required	1.8	NOT Required

Facilities	*Proposed Facilities (No.)*	*Min. Area Required for each Unit (Ha)*	*Total Approx. Area Required (Ha.)*
Integrated school without hostel facility (class 1 to 12)	2	3.5	7
Integrated school with hostel facility (class 1 to 12)	2	3.9	7.8
School for physically challenged	3	0.7	2.1
College	NOT Required	5.00	N.A.
Technical Education	NOT Required	4.00	N.A.
Sub total			**19.94**
Health Care Facilities			
Dispensary	4	0.08	0.32
Nursing home, child welfare and maternity Centre	3	0.20	0.60
Polyclinic with some observation beds	2	0.20	0.40
Intermediate hospital (category A)	2	3.70	7.4
Intermediate hospital (category B)	2	1.00	2
Multi-specialty hospital	1	9.00	9
Specialty hospital	2	3.70	7.4
Sub total			**27.12**
Socio-cultural Facilities			
Community room	NOT Required	0.08	N.A.
Community hall	NOT Required	0.20	N.A.
Recreational club	NOT Required	1.00	N.A.
Music, dance and drama Centre	NOT Required	0.10	N.A.
Meditation and spiritual Centre	NOT Required	0.50	N.A.
Sub total			
Dhobi Ghat	2	**0.50**	**1**
Police, Civil Defense and Home Guards			
Police station	NOT Required	1.50	N.A.
Police Post	2	0.16	0.32
Sub total			**0.32**
Safety Management			
Fire station	NOT Required	1.00	N.A.
Disaster Management Centre	NOT Required	1.00	N.A.
Fire Training Institute	1	3.00	3.00
Sub total			**3.00**
Sports facilities			

Facilities	*Proposed Facilities (No.)*	*Min. Area Required for each Unit (Ha)*	*Total Approx. Area Required (Ha.)*
District sport Centre	NOT Required	8.00	12.49
Neighborhood play area	2	1.50	3
Residential unit play area	31	0.50	15.61
Sub total			**31.1**
Shopping			
Convenience shopping	10	0.15	1.56
Local shopping including service Centre	10	0.46	4.6
Community Centre with service Centre	2	5.00	10
Sub total			**16.16**
Total Area in ha.			***98.64***

7.20 Strategies

7.20.1 Education

Education facilities in Master Plan Area are ample but few facilities need to be proposed as per the future requirement. There is deficiency of specialised education facilities. Involvement of the private sector in the development of educational facilities is growing. With limited availability of land, existing facilities need to be upgraded and extended as per policies/ norms. The educational institution premises may be permitted to function in two shifts, subject to statutory approvals and any other conditions that may be stipulated by the relevant competent authority.

7.20.2 Health

Health facilities in Master Plan Area are ample in terms of availability of beds but there is lack of dispensary and other health facilities in the area. With the limited land resource, existing facilities need to be upgraded and extended as per policies/ norms. Essential provisions shall be made for Old Age Home-cum-Care Centres for Senior Citizens and Mentally Challenged by way of specialised / target group oriented facilities, which will also relieve the pressure on general hospitals to some extent. Premises earmarked for health facilities should also include other medical streams like Ayurvedic/ Homeopathic medicine, governed by any statutory code / body.

7.20.3 Socio- Cultural Facilities

A. Fire

Guidelines for locating fire stations and other firefighting facilities (As per MPD):

- Fire stations should be located so that the fire tenders are able to reach any disaster site within 3-5 minutes
- Fire stations should be located on corner plots as far as possible and on main roads with minimum two entries.
- In the new layouts, concept of underground pipelines for fire hydrants on the periphery exclusively for firefighting services should be considered.
- Necessary provisions for laying underground/ over ground firefighting measures, water lines, hydrants etc. may be kept wherever provision of fire station is not possible.
- The concerned agencies shall take approval from Fire Department for firefighting measures while laying the services for an area.

B. Disaster Management Centre

Guidelines for Disaster Management Centre

With the technological advancement to some extent mechanism can be developed to mitigate the after effects of the disaster. Areas of vulnerability can be identified and necessary measures can be proposed by the concerned agencies. The concerned local bodies should keep updating the building bye-laws to safeguard against disasters and ensure effective and impartial enforcement. Following policies and strategies for disaster management are proposed:

1. Pre-Disaster Preparedness

i. a) Micro-zonation surveys should be referred for land use planning and be considered while preparing the Zonal Plans and Layout Plans.

- Seismic micro-zonation for selected areas having high growth rates should be taken up on priority.
- On the basis of vulnerability studies and hazard identification, which includes soil conditions, probable intensity of earthquake, physiographic conditions of the area, fault traces, etc., local level land use zoning and planning should be undertaken.

b) Building bye-laws should incorporate the aspects of Multi Hazard Safety, and Retrofitting.

- Priority should be given to public buildings (such as hospitals, educational, institutional, power stations, infrastructure, heritage monuments, lifeline

structures and those which are likely to attract large congregation) for their ability to withstand earthquake of the defined intensity.

- Suitable action should be taken for retrofitting and strengthening of structures identified as vulnerable as per earthquake manuals and National Building Code. A techno-legal regime has to be adopted for provisions on Multi Hazard Safety aspects.

ii. The nodal agency for disaster management should identify vulnerable areas such as areas with high density and poor accessibility in the city and propose suitable measures. Proposed Disaster Management Centres should be established in every zone to deal with the disasters, including biochemical and nuclear disasters.

iii. Sensitize people, particularly school children, about after effects of disaster.

iv. Make people aware through media campaigns and advertisements about emergency procedures and location of emergency shelters etc.

2. Post Disaster Management

I. It has been observed that any disaster is generally followed by break down of communication lines and disruption of essential services. Therefore, the key communication centres should be protected from natural disasters i.e. flood, fire and earthquake etc. and services restoration should be taken up on top most priority. Necessary setup should be created in each of the concerned department for such eventualities.

II. Standard type designs and layout should be prepared by the local bodies and made available to the people so that crucial time is not lost in approval of layout plans and building plans after disaster.

Disaster Management Centres have been proposed to serve people in the case of disaster and provide emergency shelters.

C. Sports facility

Sports activities are an important part of physical and social development of an individual and, at another level sports activities have a significant aspect of, and potential in the form of congregational and competitive events at the community, city and regional levels. Keeping this in view norms and space standards separately for sports facilities at neighbourhood level and city level have been proposed with the aim of development of sports and play areas for all age groups at appropriate levels.

D. Security

For maintenance of proper law and order, the security force must keep pace with the growth and development of an area. The main agency looking after security aspect in the city is the Police.

E. Proposed Intervention

Within the Master Plan area, there are 45 numbers of big ponds situated at different places. In order to develop and beautify the town. Renovation of the same is essential. Filling of soil for four sides of the bank of these ponds, construction of rest shed, four side plantation, pathway, provision of benches and also development of children are required in order to beautify the town.

7.21 Policies

I. All facilities performance to service standard norms would be stated in the form of a Citizen Charter to match citizens' expectations so that they can play the expected role.

II. Education and health facilities are primarily concentrated in Keonjhar among the all towns of the District. New facilities are to be encouraged in the Master Plan Area.

III. Facilities should be well connected through public transport so that people can access easily to the facilities and reduce the risk of migration.

IV. To promote advanced technologies used in cropping, synchronized cropping pattern with optimum utilisation of available land and water, research and development based Agricultural Institutions should be established.

V. Centres for higher education should be connected to the National Knowledge Network (NKN) to avail high speed broadband connectivity to make these institutions more accessible.

VI. Facilitating academic and industrial linkages to ensure the future provision of skilled graduates in a variety of employment sectors within the region based on the available talent and vocations. Value added training with focus on entrepreneurship on an accreditation model on PPP mode for potteries and ceramics, mudhe/ cane furniture, agriculture products, milk products, food processing, sports goods, leather products, ornaments, scissors etc. would be given.

CHAPTER-8 TOURISM AND HERITAGE

8.1 Introduction

Keonjhar town is the headquarters as well as the largest municipality of Keonjhar district. It has been the traditional seat of power under the Khijinga kingdom and the Bhanja dynasty for hundreds of years. Almost half of the area of the Keonjhar district is covered by deciduous type forest and contains rich ecological heritage, beautiful landscapes and water falls. This confluence of cultural and natural heritage of the district makes the Keonjhar town an important and prominent centre for tourism in the state of Odisha. In the present context Keonjhar is perhaps the most central and most connected town of North- Odisha and hence can serve as a base point to access the entire region and tourist places of the northern Odisha. There are several recreational sites in the vicinity of the town, which attract large number of visitors. Waterfall on the western hills of the town is the most prominent tourist sight in Keonjhar. Apart from natural heritage the place is also a centre of attraction for the religious tourism. The pilgrim centres like Balbhadra and Tarani temple account for most number of tourist footfalls in the district. Considering the natural and cultural capital of the area, there is an immense potential for the development of tourism as an industry in the vicinity of the town. Necessary initiative and investment is required by various stakeholders and the district administration as most of the sites are located beyond the planning boundary. Tourism potential and existing scenario is discussed in detail below.

8.2 Tourism scenario

Given the characteristics of the town especially natural and cultural heritage, Keonjhar has potential for the following types of tourism-

- Heritage tourism.
- Ecological and wild life tourism.
- Religious tourism.
- Cultural tourism.

Figure 8–1: Types of tourism found in the Vicinity of Keonjhar town.

Source: image courtesy google images. Analysis: REPL.

8.3 Heritage tourism

Keonjhar has a number of sites around outside the municipal boundary which have their own cultural and historic significance. These also include some protected archaeological sites discovered recently in adjacent blocks. Out of the protected archaeological sites, the wall paintings at Sitabinji cave are most prominent and has been listed as a protected site by the archaeological survey of India. This site is located at the banks of a stream 23 km away from the town having two inclined boulders making a cave like structure which has rock paintings dating back to 5 century A.D. The paintings are locally known as Ravana Chhaya as it resembles a form of shadow puppetry art in Odisha, also called Ravana-Chhaya. Another noteworthy monument is the Kendujhargadh fort belonging to the Bhanja dynasty era. It is located on the western edge of the town and is currently privately held by the decedents of the Bhanja kings. This site has a potential to be developed and beautified with partnership of the local government and the property owner. Apart from this there are number of relic sites having remains of Jain and Buddhist artefacts, which has been found around the Baitarani River in the Anandpur block which can be developed with the help of district administration, the same can increase the tourist potential of the town and give it a greater historical significance.

Figure 8–2: The Site of Sitabhinji along with the rock paintings and comparison with the shadow play of Ravana Chaya.

Source: Google Images.

Figure 8–3: The Kendujhargadh fort and the view of the palace pond.

Source: Primary survey and Google Earth

8.4 Ecological tourism

As discussed earlier the Keonjhar district and the surrounding area are endowed with rich natural and ecological habitat. There are several natural and manmade scenic sites around the Keonjhar town. Of these, most of them are waterfalls and water bodies which arise in the hilly regions around Keonjhar. The most prominent of these are the water falls of Badaghagra and Sanaghaghra located west of the Keonjhar town at a distance of 6 and 9 kilometres from the town. It can be accessed throughout the year and is a perennial stream. Similarly other sites of water fall and religious worship is located around the town. Ssites like Kandahar, Murga waterfall, Handibhanga waterfall, Bhimkund and water fall at Gonasika are popular tourist destinations. Since these sites are located at a very convenient

Figure 8–4: Sanaghaghra Waterfall

driving distance from the town, most of the places can be visited as a day-trip from the city. Hence there is an immense potential to develop a tourist circuit around the town which can be organized around these sites along with the stay in Keonjhar town.

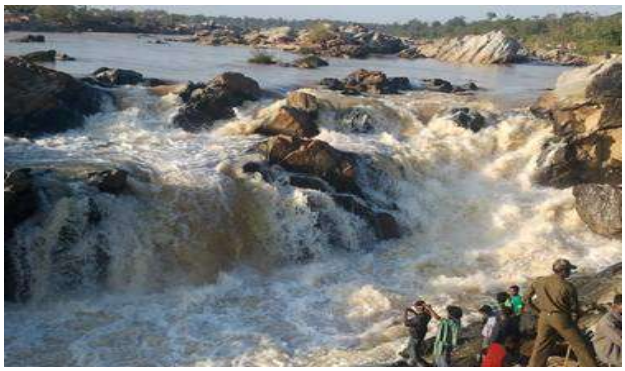
Figure 8–5: Various waterfalls around Keonjhar MPA

Table 8-1: List of major waterfalls and scenic spots

Sl. No.	Major Waterfalls and scenic spots around Keonjhar
1	Sanaghagra Waterfalls
2	Badaghagra Waterfalls
3	Khandadhar Water Falls
4	Murga Water Falls
5	Handibhanga Waterfalls
6	Bhimkund Waterfall
7	Gonasika
8	Kanjhari Dam site
9	Baitarni River

Source: DOT Census

Figure 8–6: The ecological sites for tourism around the Keonjhar town




8.5 Religious tourism

Similar to ecological tourism, religious tourism has immense potential in the district. The major temples located in the district include the shrines of goddess Tarini and the temple of Balbhadra and makes the town a destination for the pilgrims from all over Odisha. Many of the temples are located close to the town and within the driving distance. Numbers of these temples are located in an uninhabited area with almost non-existent arrangement for lodging and food. As a result, Keonjhar is the preferred destination for stay for tourists travelling to these sites. Further promotion, branding and advertisement of the tourism potential will result in greater number of tourist inflow, especially from the areas outside of Odisha. For this, the district tourism office needs to take up initiatives for developing and beautification of the identified tourist sites as well as organizing and promoting the tourist facilitators, organizers and volunteers. Some of the major temples and religious sites in and around Keonjhar town are mentioned in the table below.

Table 8-2: List of major temples in and around the Keonjhar town.

Name of Temples	Location
Lord Baladev Jew Temple	Keonjhargarh
Lord Dadhibaman Jew Temple	Rajanagar
Lord Dadhibaman Jew Temple	Hunda
Lord Sidha Jagannath Temple	Sidhamath
Sidha Kali Temple	Sidhamath
Maa Tarini Temple	Ghatagaon
Bramheswar Mahesh Temple	Gonasika
Ghatakeswar Mahesh Temple	Ghatagaon
Nilakantheswar Mahesh Temple	Barhatipura
Pateswar Mahesh Temple	Suakati
Chandrasekhar Mahesh Temple	Bodapalasa
Balunkeswar Mahesh Temple	Keonjhargarh
Kapileswar Temple	Tangarapalasa

Source: DIC Website Keonjhar

Figure 8–7: View of Sidhamatha temple and Maa tarini Temple complex near Keonjhar

Source: REPL

8.6 Cultural tourism

The Keonjhar district and town in general is home to significant tribal population. The region is home to the number of tribes like Bathudi, Bhuyan, Gond, Ho, Juang, Kolha, Munda and Santhal tribes which are major tribes in the district. Apart from that there are number of other tribes which are in minority. These tribes practice agriculture and in the neighbouring surrounding villages they can be found to living in their ethnic fashion. This includes their special customs and rights, ethnic wear such as dress and ornaments and special festivals.

Figure 8–8 Major tribes around Keonjhar



Some of them have special practices in terms of tattooing, worship and housing nature. They also practice traditional paintings and art which is generally made up of locally available material. The rich tribal welfare of the area can be used to generate tourism activity. Place should be available in the town where they can exhibition and celebrate their art and heritage. A tourist circuit should be identified in the area designating one village for each type of tribe to organize special trips.

8.7 Tourist foot-fall

Keonjhar town lies in the central part of the Keonjhar district which is well connected by road and rail link to rest of the country. Keonjhar, however, experiences certain connectivity issues with respect to tourism. It is connected by NH-20 and NH-49 which connects Keonjhar to neighbouring districts. The rail link of Keonjhar town runs from the south and is well connected to Cuttack and Bhubaneswar. Keonjhar district is visited by about 16 lakh tourists every year. Out of which, Keonjhar town is specifically visited by around 80 thousand domestic tourists. The details of tourist inflow in the district are shown below.

Table 8-3: Tourist inflow by destination in Keonjhar district.

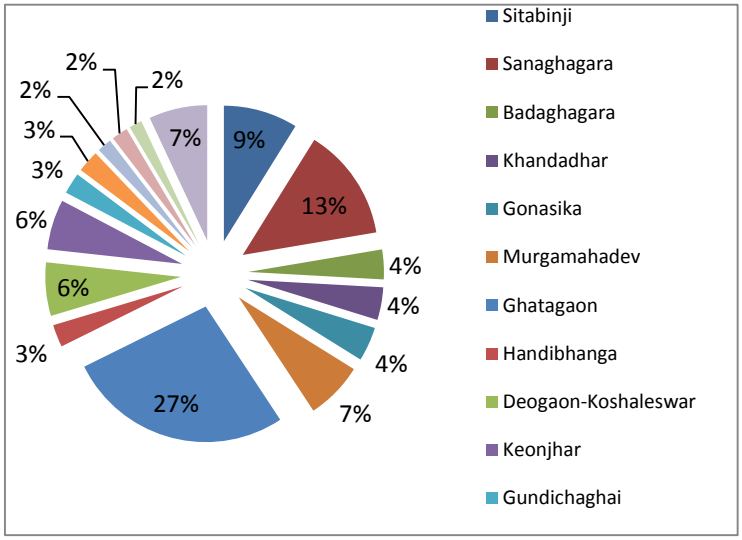
Sl. No.	Name of the Tourist Centre	2010			2011			2012		
		Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total
1	Sitabinji	139107	4	139111	143487	-	143487	146942	4	146946
2	Sanaghagara	204206	53	204259	216300	-	216300	223458	28	223486
3	Badaghagara	68975	8	68983	57657	-	57657	58810	-	58810
4	Khandadhar	62735	2	62737	63362	-	63362	64629	-	64629
5	Gonasika	77280	2	77282	66383	-	66383	67711	-	67711
6	Murgamahadev	110593	-	110593	111698	-	111698	113932	-	113932
7	Ghatagaon	388559	4	388563	434059	-	434059	447080	-	447080
8	Handibhanga	49136	-	49136	43450	-	43450	44319	-	44319

Sl. No.	Name of the Tourist Centre	2010			2011			2012		
		Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total
9	Deogaon-Koshaleswar	114870	-	114870	103566	-	103566	105637	-	105637
10	Keonjhar	79771	38	79209	79962	4	79966	99146	-	99146
11	Gundichaghai	39049	-	39049	41140	-	41140	41963	-	41963
12	Hadagada	58650	-	58650	42745	-	42745	43560	-	43560
13	Kanjipani	29132	-	29132	27745	-	27745	28300	-	28300
14	Podasingidi(Garh Chandi Chakratirh)	38081	-	38081	31388	-	31388	32016	-	32016
15	Rajnagar	28223	-	28223	24887	-	24887	25385	-	25385
16	Sarai (Keshari Kunda)	194656	-	194656	113314	-	113314	115580	-	115580
Total		**1683023**	**111**	**1682534**	**1601143**	**4**	**1601147**	**1658468**	**32**	**1658500**

Source: Odisha Tourism Statistical Bulletin

As seen in the table the major centre for attraction for the tourist in the district is the temple of Goddess Tarini and other religious centres in the district. The religious tourism accounted for nearly 50% of the total tourist inflow in the district. The neighbouring waterfalls of the Badaghagra and sanaghaghra were also having large number of tourist footfalls.

Figure 8–9: Tourist map by destination in Keonjhar district.



8.8 Tourist Accommodations

Tourist accomodations in the town are relatively well developed due to mining activity in the area. There are range of hotels and lodging facilities. There are 4-5 high expenditure category hotels in the town apart from other more affordable hotels.

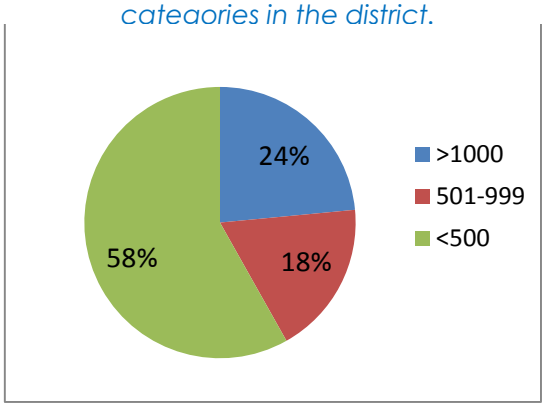
Table 8-4: Hotels facility in the town.

Hotel facility in Keonjhar	No. of Hotels	No. of Rooms	No. of Beds
2011	21	334	626
2012	24	395	722

Source: Odisha Tourism Statistical Bulletin

Adequate number of existing hotel beds is an advantage for the tourism sector and can be utilized with appropriate measures to boost tourism in the area . Listed below are the issues identified with respect to the tourism in the town of Keonjhar and Keonjhar district in general.

Figure 8–10: Hotel range by expenditure cateaories in the district.



Source: Odisha Tourism Statistical Bulletin

8.9 Identified issues

8.9.1 Lack of promotion and branding

Odisha attracts large number of tourist from all over India but most tourists visit just Puri, Bhubaneswar and nearby towns. Due to the lack of promotion and branding, the sites and natural heritage of other areas like Keonjhar district are overlooked. Lack of awareness coupled with low priority of the government institution for Keonjhar is a reason for less development of tourism sector in Keonjhar.

8.9.2 Lack of connectivity to the sites

There is a general lack of connectivity of Keonjhar town with the rest of the district especially to some of the tourist sites. The sites of Sanaghagra and Badaghagra are a good example of the disparity and difference in connectivity between two tourism sites of similar nature. Tourist footfall in Sanaghagra is about 4 times higher than the Badaghagra waterfall because the latter is not so developed or accessible.

8.9.3 Lack of public transport infrastructure

Public transport infrastructure in the town is quite poor as there is only a small Bus stand with little or no connectivity to the surrounding tourist areas. Tourists have to primarily rely on their personal mode of transportation for commuting to the sites. Sometimes tourists overlook these sites due to high cost in commuting to these areas.

8.9.4 Lack of beautification of the ecological points

Aesthetics of existing waterfalls and their vicinity can be enhanced by providing relevant architecture design at the site. Local groups and youth in the surrounding villages can be mobilized for providing and caring for the site and its surrounding so that the improved site can be maintained and protected.

8.10 Proposals for tourism development

8.10.1 Establishment of new distinct tourism centre

The current district tourism office is functioning from the Collectorate office with shortage of staff and resources. Appropriate staffing and resource allocation for tourism office should be taken up by the district administration. To generate awareness about tourism potential of the area, a handbook listing local tourist places can be published and distributed. Preparation of an annual action plan for the development of tourism in the district to identify projects on a regular basis can also be taken up to develop tourism potential of the area.

8.10.2 Establishment of a separate campus for District museum

Currently the district museum functions from the compounds of Baladevjew temple. A new campus can help in enlarging the collection and increasing footfall of visitors. Funds should be earmarked by district administration for development of the same.

8.10.3 Protection of monuments in the planning area

There is currently no legislative framework for protection of old monuments in the town. These monuments have to be identified and included in the byelaws in the master plan. Currently the temples of Baladevjew, the Sidhamatha and the Maharaja palace are some of the identified monuments in the town which must be protected. Moreover, Maharaja Palace and lake are located near the newly developed by-pass which might have adverse impact on the monument and the water body. To avoid this, adequate buffer needs to be identified according to the byelaws, between the monument and the road and this should be developed with plantation for reducing the adverse impacts from heavy traffic and smoke.

8.10.4 Enhancing Accessibility to Badaghagra water fall

Currently there is scope for improving the accessibility to Badaghagra waterfall which is a scenic spot very close to Keonjhar town. It needs to be connected by a new road with proper road markings and street-lighting. Design intervention might be taken-up to enhance the landscape and aesthetic appeal of the site. The department of tourism must take steps to increase the footfall at the particular site.

8.10.5 Formulation of a volunteer network for identified sites

Some of the tourist spots are located in remote rural areas which are difficult to be monitored all the time due to lack of efficient connectivity. To overcome this problem,

the department of tourism and district administration should mobilize a volunteer network for taking up necessary work locally. The stakeholders and institutions have to be identified in each locality which can take up the task of monitoring and facilitation of the visitors and other such activity. Tour operators and other infrastructure providing institutions must work closely with this volunteer network to identify and resolve the issue at hand.

8.10.6 Identifying tourist circuit and organizing regulated tourism.

Currently tourism to and around these sites are unorganized with no regulations on tour operators or even their identification. The department of tourism should work on collecting information on such tour operators and standardizing and listing the quality operators in their list of recognized tourist operators in the town. Steps can be taken up for regulating the cost and giving them preference for using government infrastructure. Regular check-ups and field visits must be taken up to ensure quality. Also the department must take steps for establishment of a grievance management system for the tourists.

8.10.7 Development of theme based IPT mode

In smaller towns lacking efficient public transport, intermediate public transport often take up the role of the former. These IPT modes like rickshaws and autos offer an opportunity to advertise special character of the town, which can help to create awareness of tourism in the surrounding area. Development of an effective IPT based shared auto routes shoud be focused on by the Municipality.

8.10.8 Tourism branding and promotion

Keonjhar tourism office needs to create tourism website for the Keonjhar town which provide information to tourists regarding the places to visit and the months of the year which are best to travel along with hotel reservation, chartered tour operators and other facilities.

8.10.9 Improvement of environment

Monitoring of the ambient air quality is necessary from time to time in order to know the existing situation and make efforts to regulate the same by taking various measures like regulation on the entry of vehicles and their pollution levels and mobilizing the vehicle owners for the same. Automated data collection points for the collection of ambient air quality information from various parts of town and its continuous monitoring is necessary. The information should be shared with the public on a LED digital board

outside municipality office and other places so that they are made aware of the increasing pollution level and can prepare accordingly.

Figure 8–11: Air Quality should be measured and should be displayed on a public LED Board.

Source: Google images

8.10.10 Safety of tourists

Police control room for event monitoring and control should be established with the increase in the number of tourists in the town. The lighting facilities around the town in parks and public spaces should be improved in order to make the visitors feel safe.

8.10.11 Improvement in infrastructure

Street markings and hoardings and boards should be put on various landmarks and streets and entry points in the town so that the people coming to the town are more informed. Such design intervention will also give an aesthetic appeal to the town.

Figure 8–12: Examples of street markings

Source: Google images

8.11 Conclusion

With the design intervention and investment in the infrastructure, public mobilization and connectivity, tourist footfall in the town and the district can be increased significantly. Tourism activity will give a great boost to the economy of the town giving benefit to the residents and diversifying the economy of the town.

CHAPTER-9 ENVIRONMENT AND DISASTER PROFILE

9.1 Introduction

Environment plays a crucial role in establishing the path for future development. Environmental concerns of both natural as well as built environment, not only need to be conserved but also protected from various forms of natural hazards. Keonjhar town is endowed with various ecologically sensitive natural features such as river basins, tanks/ waterbodies, reserved forest areas etc. Hence, it needs to be planned in a way to achieve an environmentally sustainable pattern of urban development through a rational land use pattern and conservation.

Disaster results from the combination of hazard, vulnerability and insufficient capacity or measures to reduce the potential chances of risk. Keonjhar town is vulnerable to natural disaster due to its geographical location. Flood, earthquake, wind, fire are some of the major threats. Disaster Management includes pre disaster preparedness as well as post disaster response.

9.2 Environment

9.2.1 Geology and hydrogeology of the study area

Odisha, situated on the eastern side of the country is rich in mineral resources. The state is endowed with large reserves of bauxite, china clay, chromite, coal, dolomite, fireclay, graphite, gemstones, iron ore, limestone, manganese ore, mineral sand, nickel ore, pyrophylite and quartz. Other minerals present in the state are copper ore, lead ore, titanium bearing vanadiferous magnetite, talc/ soap stone and high magnesia igneous rocks. Recent boom of the mineral industry has resulted in increased interest of private entrepreneurs.

Keonjhar district is rich in mineral resources. The table below shows the type of minerals and their distribution in the district:

Table 9-1: Mineral availability

S.No.	NAME OF MINERAL	LOCATION AND DISTRIBUTION
1	BAUXITE	Dholkata pahar
2	CHINA CLAY	Ramchandrapur, Kathkaranjia, Nanua, Nijli, Mangalpur, Tikasil etc.
3	DIMENSION STONE	Industrial units of the district

S.No.	NAME OF MINERAL	LOCATION AND DISTRIBUTION
4	IRON ORE	Roida-Bhadrasahi, Unchabali, Jajang, Jurudi, Belkundi, Bolani, Khandbandh, Katamati, Thakurani, Gandhamardan, Sakradihi, Joda-East, Haromoto, Guali, Kasia, Malangtoli etc
5	MANGANESE	Bonai-Keonjhar Belt
6	PYROPHYLLITE	Rebra-Palaspal belt. Deposits are Dhobakuchuda, Balabhadrapur, Amjore, Baliadihi, Madrangajodi, Nitigothe, Sidhamath, Uchkabeda, Rodvan, Rebna, Palaspal etc
7	QUARTZ & QUARTZITE	Quartz occurs in the form of veins and as a constituent of pegmatites. In Odisha, quartz and silica sand deposits are located in the Precambrian terrains occurring in the districts of Boudh, Bargarh, Kandhamal, Keonjhar, Jharsuguda, Kalahandi, Mayurbhanj, Nuapada, Sonepur, Nabarangpur, Rayagada & Koraput. Quartzite occurs as beds interstratified with other metasedimentaries. Quartzite deposits in Odisha are located in Bolangir, Kalahandi, Koraput, Mayurbhanj, Keonjhar, Sambalpur, Sundargarh, Kandhamal, Angul and Bargarh districts.
8	PLATINUM GROUP OF ELEMENTS	Balasore- Bhalukasuni, Jajpur- Sukinda valley, Keonjhar- Baula- Nuasahi complex,Dhenkanal-Bhuban, Asurbandha, Maulabhanj- Keonjhar- Amjori sill

Keonjhar district is divided into two parts: the lower Keonjhar and the upper Keonjhar. The former i.e. to the east of the highway, is a region of valleys and low lands with planes of Anandpur and a portion of Sadar Sub-division, while the latter includes mountainous highlands with a general slope from North to South and some of the highest peaks of Odisha namely Gandhamardan, Gonasika and Thaurani. Keonjhar Planning area has similar characteristics like that of other hilly region of the district. The western side of the town has hilly terrain. Although no big river flows through the master plan limit of Keonjhar, River Aradei flows on the northern part of the master plan area, which formerly

formed the boundary of the previous master plan area. Besides some undulating hilly terrain and streams, vast area is covered by green areas within the master plan area. The fringes are at a higher altitude with a flat core.

9.2.2 Soil

Red soil is present in majority of the areas in the district whereas black soil is limited to a small patch in the southern part. The district has rich deposits of iron and manganese ore, which results in the red colour of soil due to presence of iron oxides.

9.2.3 Forests

The forest around the town primarily consists of Sal trees. However, other tree species like Piasal, Asan, Neem, Kusum, Mahul, Dhow and Sisu are also found all over the area. There are two reserve forests in the town.

9.2.4 Climate

The climate of Keonjhar district is characterised by an oppressively hot summer with high humidity with summer generally commencing in the month of March. Temperature begins to rise rapidly attaining the maximum in the month of May. During summer, maximum temperature is around 38.2^0 C. The weather becomes more pleasant with advent of monsoon in June and remains as such up to the end of October. Temperature in the month of December is lowest i.e. 1.7^0 C. The average annual rainfall is 1487.7 mms. The nature of rainfall in the district is quite erratic and uneven. There may be heavy rainfall in a short span of time. This results in flash floods in the hilly terrain of the district. Flash floods in hilly area causes large scale house damages as mostly huts and small thatched houses are being constructed by the predominant tribal in these tracks. The rainfall may not be available for a long span of time. Due to this, there occurs a long period of dry spell even during the peak season of rainfall. This erratic nature of rainfall in the district is mostly responsible for occurrence of drought and it causes large scale failure in crop production. Besides, sometimes unseasonal rain occurs usually after retreat of monsoon and it causes damage to the crops before harvesting.

9.2.5 Rainfall

Storms and depression, which originate in the Bay of Bengal during monsoon, pass over the town during their westward movement and causes heavy rains in the catchments area of the River Aradei. During this period, when the Baitarni River is flooded, it creates a situation of flood in other small rivers also. In most of the years, the town has

experienced temporary/ long dry spell or flood situation in some parts of the town due to heavy rainfall. The Temperature and Humidity Report for Keonjhar is as below:

Table 9-2 Temperature and Humidity Report

WEATHER ANALYSIS REPORT				
Month	Mean daily max temp in °C	Mean daily min. temp in °C	Relative Humidity	
			08:30	17:30
			(in IST)	
January	25.4	11.7	62	51
February	28.3	14.4	59	43
March	33.2	18.6	51	36
April	36.9	22.7	53	41
May	38.2	24.6	56	42
June	34.2	24.7	70	65
July	29.7	23.1	82	80
August	29.6	23.6	83	81
September	29.8	22.5	82	81
October	29.2	20.2	77	70
November	27.0	14.8	64	55
December	25.1	11.7	63	54
Annual	30.5	19.4	67	58

Table 9-3 Cimatical Rainfall Report

Sl. No.	Month	Average Rainfall (in m.m.)	Normal Rainfall (in m.m.)
1.	JANUARY	Nil	14.6
2	FEBRUARY	30.4	33.8
3	MARCH	19.9	33.1
4	APRIL	12.9	42.1
5	MAY	78.1	94.8
6	JUNE	130.2	241.4
7	JULY	427.8	318.0
8	AUGUST	367.6	343.6
9	SEPTE MBER	158.8	241.1
10	OCTOBER	108.8	101.3

Source: District Disaster Management and Response Plan, Keonjhar

9.2.6 Air Quality

i. Overview

In addition to gases such as nitrogen and oxygen, with small amounts of carbon dioxide, argon etc. air, especially in large settlements might contain harmful substances in the air. These impurities may generate from natural or manmade activities and may consist of substances which could adversely affect the life process and other bio geochemical cycles on earth.

ii. Status of Ambient Air Quality in Keonjhar Town

Air Pollutants are added in the atmosphere from a variety of sources that change the composition of atmosphere and affect the biotic environment. The concentration of air pollutants depends not only on the quantities that are emitted from air pollution sources but also on the ability of the atmosphere to either absorb or disperse these emissions. The sources of air pollutants in large urban settlements are mainly vehicles and industries. Residential areas also generate pollution, if wood or coal is used as fuel. Study of air quality within Keonjhar was conducted to obtain the ambient air quality. Vehicular traffic, industries as well as mines near the town, has contributed to the air pollution of the town. Increase in number of vehicles has inevitably caused major air pollution problems for city dwellers.

Table 9-4: Air Quality Status

Locations	Category	No. of Obs. (24 hrs.)	Parameters* (values expressed in microgram per cubic meter)				Frequency of violation of data (24 hrs. Avg.) from prescribed standard (% of violation)			
			SPM	RSPM	SO_2	NO_x	SPM	RSPM	SO_2	NO_x
			Annual Average (24 hourly range)							
Keonjhar										
Pollution Control Board, Baniapat	R	103	123	75	BDL	15	6	20	--	--
			(76-206)	(44-120)	(BDL-17.0)	(13.0-17.0)	-5.80%	-19%		
Prescribed Standard	**R**		**200**	**100**	**80**	**80**				
(24 hourly)	**I**		**500**	**150**	**120**	**120**				
Standard for Annual Average Value	**R**		**140**	**60**	**60**	**60**				
	I		**360**	**120**	**80**	**80**				

N.B.: BDL - Below Detectable Limit	SPM - Suspended Particulate Matter
For SO_2 BDL is < 4 µg/m^3	RSPM - Respirable Suspended Particulate Matter
For NOx BDL is < 9 µg/m^3	SO2 - Sulphur Dioxide
R – Residential, I = Industrial	NOx – Oxides of Nitrogen

Source: Pollution Control Board, Keonjhar

The air quality analysis from the study revealed significant changes. The SPM and RSPM level is below the CPCB standards of 200 micrograms/m^3. Similarly, the selected trace elements analysis of air deposited dust, also indicate higher level of concentrations in most of the locations.

iii. National Ambient Air Quality Standards (NAAQS), 2009

An air quality standard is a description of a level of air quality that is adopted by a regulatory authority as enforceable. The basis of development of standard should be to provide a rationale for protecting public health from adverse effects of air pollutants, to eliminate or reduce exposure to hazardous air pollutants, and to guide national and local authorities in their air quality management decisions. To provide the legislative support for air quality protection, the Central Pollution Control Board (CPCB) reviewed the air quality criteria/standards and proposed air quality standards which are presented in Table.

Table 9-5: Table National Ambient Air Quality Standards (NAAQS), 2009

Sl No.	Pollutant	Average (Time)	Concentration in air sample	
			Industrial, Residential, Rural and other area	Ecological sensitive area (according to Central govt.)
1	Sulphur dioxide (SO_2) General Area, µg/m³	Yearly	50	20
		Hourly	80	80
2	Nitrogen dioxide (NO_2) General Area, µg/m³	Yearly	40	30
		Hourly	80	80
3	Particulate matter (PM_{10}), µg/m³	Yearly	60	60
		Hourly	100	100
4	Particulate matter ($PM_{2.5}$), µg/m³	Yearly	40	40
		Hourly	60	60
5	Ozone (O_3), µg/m³	per 8 hr	100	100
		per 1 hr	180	180
6	Lead, µg/m³	Yearly	0.5	0.5
		Hourly	1	1
7	Carbon Monoxide (CO), µg/m³	per 8 hr	2	2
		per 1 hr	4	4
8	Ammonia (NH_3), µg/m³	Yearly	100	100
		Hourly	400	400
9	Benzene (C_6H_6), µg/m³	Yearly	5	5
10	Polyaromatic Hydrocarbons (BaP)	Yearly	1	1
11	Arsenic, ng/m³	Yearly	6	6
12	Nickel, ng/m³	Yearly	20	20

Source: CPCB

(1) Whenever measurement of vapour mercury cannot be done, standard for particulate mercury only is applicable

(2) For sensitive area, more stringent standards will be applicable for NO2 and SO2; standards for other parameters remain unchanged Notes:

Notes:

(a) Annual Arithmetic mean of minimum 104 measurements taken twice a week 24 hourly at a uniform interval should not exceed the annual standard.

(b) 1-hour/24-hour/8-hour values should be met 98% of the time in a year. However, 2% of the time, it may exceed but not on two consecutive days.

9.2.7 Water Quality

i. Overview

Water, an essential element for survival, is getting increasingly scarce and its quality is also deteriorating over time. Water resources of an area depend on the precipitation as well as surface water in rivers and canals. Recharge potentials of groundwater reserves also influence the availability of annual utilizable groundwater resources. However, indiscriminate use of water for various urban uses, urbanization of green-field areas and soil erosion are causing depletion of surface as well as ground water resources. On the other hand, untreated sewage being let into water bodies, lack of concern for treating industrial effluents and dumping of solid waste are the reasons for deteriorating quality of water.

ii. Status of Water Quality in Keonjhar Town

Since agriculture and animal husbandry are the main occupations of the populace here, water has become an important commodity. Though River Aradei flows nearby, no proper surface irrigation system has been developed. For drinking, piped water supply has been provided only to a few places of the urban area. In rest of the places, people depend on dug wells and tube wells. Monsoon is the chief source of water for irrigation.

Normal water requirements of the town is met by water lines from the river and underground bore-wells, but catering to the influx of 100,000 residents puts a major strain in providing water and drainage facilities. Some of the festival rituals entail bathing on the river banks by the devotees. This leads to large amount of offerings to the Gods in terms of flowers, sweets and clothing which are generally consecrated to the holy river waters and create large amount of solid waste dumping into the river and tanks/ponds. Industries near the river in the town also pollute the water of the river making it unfit to be used for drinking purpose.

During major fairs/festivals, toilet facilities are provided by the public administration through temporary toilets. However, large numbers tourists/pilgrims render this number of facilities inadequate. It is important to provide adequate toilet and drainage facility

to avoid environmental pollution of the town and the river. As per the existing situation in Keonjhar sewerage network does not exist in the town. Major sanitation facilities used in the town are septic tanks and wet pit toilets. Majority of the population especially in the slum areas defecate in the open. Most of the water bodies in the areas are used as places of open defecation in the town.

a. Ground Water Resources

Based on a study conducted on groundwater quality the following observations were seen:

Ground water was collected from 5 locations & analysed in environmental laboratory. pH values varied between 5.8 and 6.2 while Turbidity ranged from 1.3 to 2.1 NTU. Dissolved Solids varied between 72 mg/l & 102 mg/l and total hardness varied from 52 to 66 mg/l. Chloride values varied between 3.0 mg/l & 5.5 mg/l. Calcium values varied between 13.6 mg/l & 20.4 mg/l, Sulphate values varied from 4.5 to 6.3 mg/l and Nitrate values varied from 4.7 to 6.5 mg/l. Zinc values varied from 0.15 to 0.35 mg/l, Lead varied from 0.020 to 0.035 mg/l, Copper value varies from 0.005 to 0.009 mg/l.

From above discussion, it is evident that the ground & surface water quality of the study area confirms to IS: 10500 & IS: 2296 respectively.

b. River System

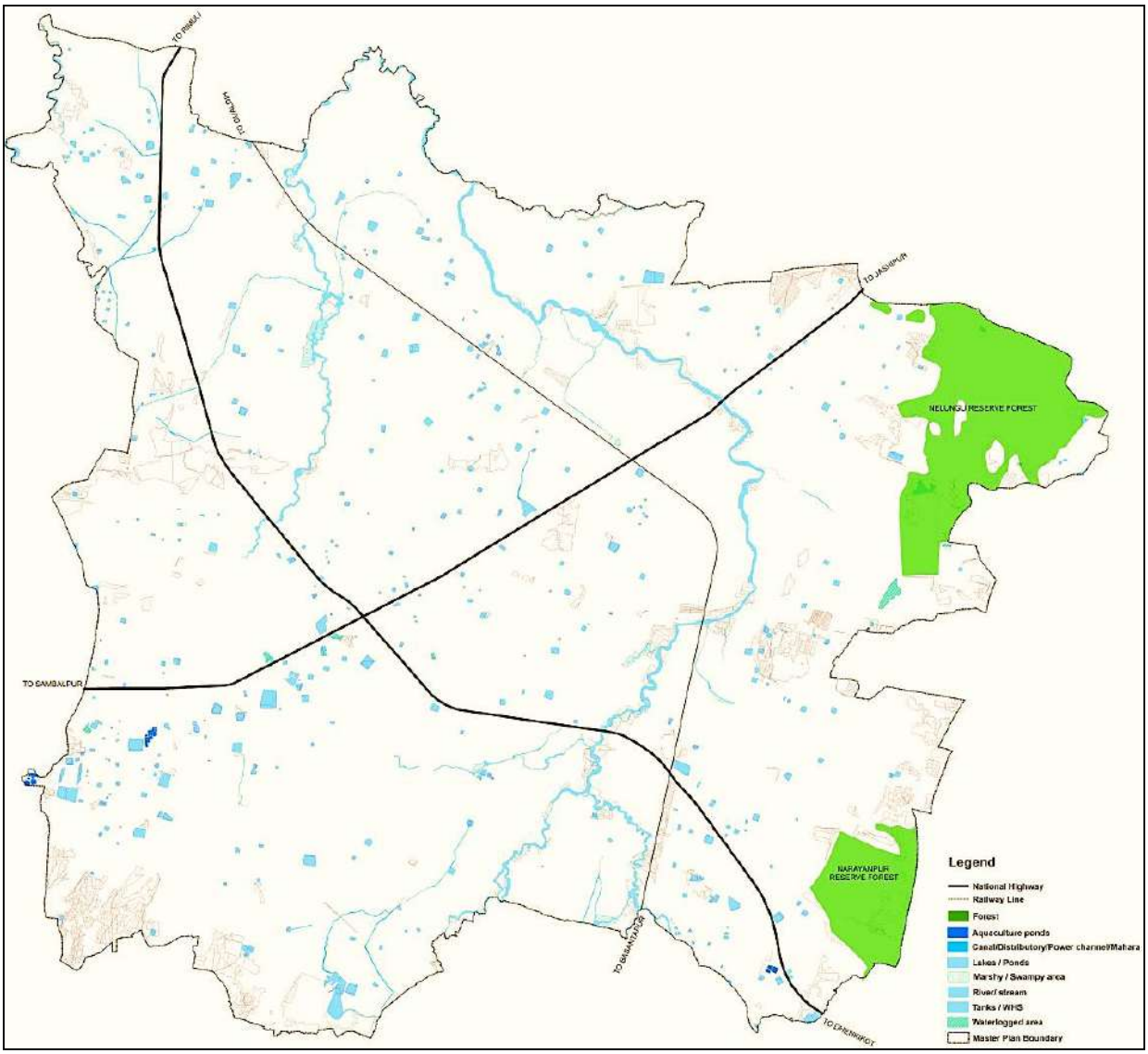
There are very few number of water resources in the planning area except some natural nallah, small rivers, ponds, streams. River Ardei, which is a tributary of Baitarani River, is the only river which flows on the north eastern side of the Keonjhar town. Apart from River Ardei, there are a number of natural waterfalls in the master plan area, which gives a tourist identity to the region. Badaghagara waterfall is almost 9 km. away from the district headquarter, which is situated on a small river Machha Kandana, plunges from a height of 60 m. Being a perennial source of water, it acts as a major source of water supply for the town along with other ground water resources.

Apart from Badaghagara, Sanaghagara is also a significant tourist spot in the district. Sanaghagara, a perennial waterfall, is located at a distance of 6km. from Keonjhar town and is situated on the upstream of Badaghagara waterfall. The area spreads over 488 Ha of hilly tract with mixed deciduous and miscellaneous types of forest vegetation.

The area attracts a number of visitors throughout the year and occupies a major position on the tourist map of Odisha.

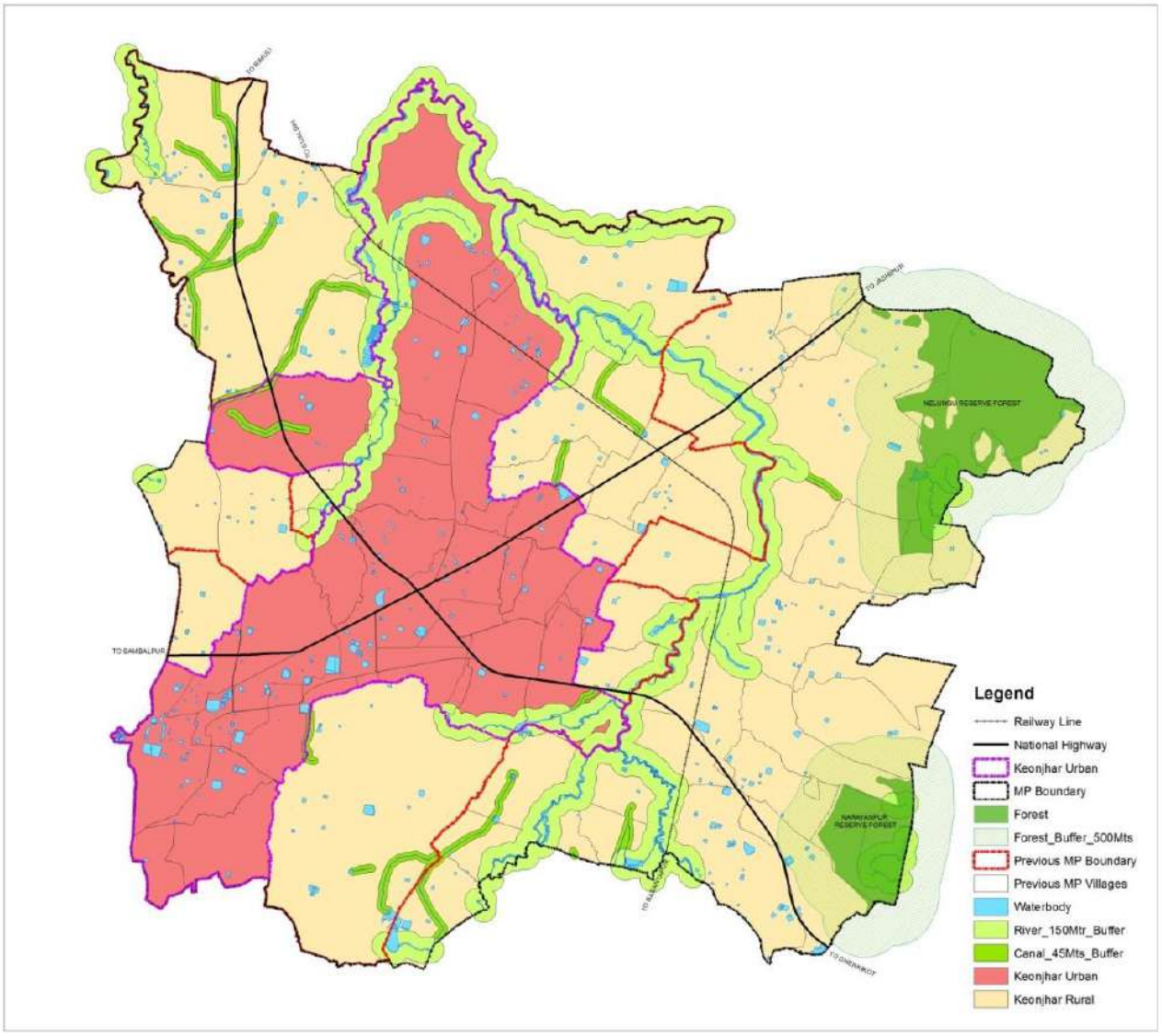
Also there are a very few water bodies in the form of ponds which mainly used for household activities in the rural environ. In summer season, there is scarcity of drinking water facility in the study area as the ground water level depletes. Therefore proper intervention needs to be taken up for augmentation of existing water supply scenario in the planning area.

Map 9-1: Water Resources



Source: Basemap of Keonjhar, REPL

Map 9-2: Rivers flowing within MP Area



Source: Landuse Map, Keonjhar

c. Ponds and reservoirs

The presence of ponds gives character to the town and adds to its aesthetic value. The large city level ponds are also being used for recreational purposes. However many are polluted and are being used to dispose of solid waste and waste water.

9.2.8 Noise

Noise pollution is considered as one of the major factors affecting the quality of life in urban areas. The ambient noise standards being followed in India for different types of areas are given hereunder (CPCB, 2000).

Table 9-6: Ambient Noise Standards

Area	Day Time (6 AM- 10PM)	Night Time (10 PM- 6 AM)
	L eq in dB	L eq in dB
Industrial area	75	70
Commercial area	65	55
Residential area	55	45
Silence zone	50	40

Source: CPCB

- **Sources of Noise Pollution**

Various sources of noise are : industries, road, rail- and air-traffic, construction and public works, indoor sources (air conditioners, air coolers, fans, radio, television and other home and office appliances) etc. Indiscriminate use of loudspeakers, generator sets and firecrackers adds to the noise pollution problem.

- **Status and Assessment of Noise Environment**

The assimilative capacity of the acoustic environment is the maximum amount of noise load that can be discharged into the environment without causing private or public nuisance for the designated use of land units.

Heavy vehicles like trucks and buses contribute more noise to the environment, as compared to smaller automobiles like cars, bikes etc. It is evident that, besides the total noise level, the number of heavy vehicles will be an important parameter in the annoyance function.

9.3 Disaster Vulnerability

Risk assessment and vulnerability assessment of Keonjhar has been conducted by District Disaster Management Authority. Following hazards have been identified at Keonjhar Town.

i. Flood
ii. Cyclone
iii. Sun Stroke/ Fire
iv. Drought
v. Hail Storm/ Whirl wind
vi. Tornado

9.3.1 Risk assessment and Vulnerability analysis

Table 9-7: Disaster History of Keonjhar District: (Since 1978)

Year of Occurrence	Type of Hazard	Area affected	Impact on life	Livelihood Property	Livestock	Remarks
2014	Flood/	Anandpur Sub-Division	Loss of lives	Loss of Livelihood	Loss of Livestock	
	Hudhud	Anandpur Sub-Division				
	Havey Rain	Entire district				
2013	Cyclone (PHAILIN)	Entire Dist.	Loss of lives	Loss of Livelihood	Loss of Livestock	
2011	Flood	Anandpur Sub-Division	Loss of lives	Loss of Livelihood	Loss of Livestock	
	Drought	Entire district				
	Heavy Rain	Entire district				
2010	Unseasonal rain	Anandpur Sub-Division	--	Loss of Livelihood	--	
2009	Flood/	Anandpur Sub-Division	--	Loss of Livelihood	Loss of Livestock	
	Havey Rain	Entire district				
2008	Flood/	Anandpur Sub-Division	--	Loss of Livelihood	Loss of Livestock	
	Havey Rain	Entire district				
2007	Flood	Anandpur Sub-Division	--	Loss of Livelihood	Loss of Livestock	
2006	--	--	--	--	--	
2003	Flood	Anandpur Sub-division		Loss of Livelihood	Loss of Livestock	
1999	Cyclone	Anandpur Sub-division	Loss of lives	Loss of Livelihood	Loss of Livestock	
2001	Drought	Entire Dist.		Loss of Livelihood	Loss of Livestock	
1998	Sunstroke	Entire Dist.	Loss of lives		Loss of Livestock	
1978	Tornado	Gadabandhagada of Ghasipura Block	Loss of lives	Loss of Livelihood	Loss of Livestock	

Source: DDMP, Keonjhar

Table 9-8: Seasonal Hazard Analysis

Type of Hazards	JAN-MAR				APR-JUNE				JULY-SEPT				OCT-DEC			
*	H	C	A	I	H	C	A	I	H	C	A	I	H	C	A	I
FLOOD								←	—	—	—	→				
CYCLONE							←	—	—	—	—	—	—	—	→	
DROUGHT						←	—	—	—	—	—	—	—	→		
HEAT-STROKE					←	—	—	→								
EARTHQUAKE	←	—	—	—	—	—	—	—	—	—	—	—	—	—	—	→
FIRE		←	—	—	—	—	—	→								
EPIDEMIC								←	—	—	—	→				
ACCIDENT	←	—	—	—	—	—	—	—	—	—	—	—	—	—	—	→
LIGHTNING				←	—	—	—	—	—	—	—	—	—	—	—	→
TARNADO		←	—	—	—	—	—	—	—	—	—	—	—	—	—	→

*CHAI=Health Care Associated Infection

Source: DDMP, Keonjhar

Table 9-9: Disaster Probability

Sl.No	Block	Flood	Flash Flood	Cyclone	Tarnado	Heavy Rain	Drought	Sunstroke	Total Population
01	Keonjhar		✓	✓	✓	✓	✓	✓	116724

Source: DDMP, Keonjhar

9.3.2 Existing Institutions and Disaster Mitigation Plans

District Disaster Management Authority

District Disaster Management Authority has been constituted at District level in the year 2010 vide Notification No.46269/RDM dt.12.11.10 to tackle disaster management related activities at local level.

The District Disaster Management committee is the apex planning body at the district level and will play a major role in preparedness and mitigation. A District Disaster Management Committee is formed in the district to assist the Collector in the following steps.

- Reviewing the threat of disasters.
- Vulnerability of the district to different disasters.
- Evacuation process to reduce risk and emergency response.
- Considering suggestions for improvement of the response document i.e. District Disaster

- Management Plan

A district disaster mitigation plan has been prepared which covers the town. All rescue and preparedness measure have been taken care of in detail in the plan which may be meticulously followed.

9.4 Proposed Environmental and Disaster Management Plan

9.4.1 Environment

1. The database for air quality, water quality (surface and ground water), noise pollution and land pollution is very poor and need to be created for the region. In order to create better database, more air quality monitoring stations are required. A Committee should be formed by the respective State Governments to recommend locations of the monitoring station of air and water quality, to regularly review the status and recommend remedial measures. Pollution Control Boards should monitor the above-cited parameters on a regular basis.
2. Data inputs to check the performance of various parts of the town in relation to these needs be made and regularly monitored.
3. Proposed Industrial parks/estates must be allowed with controlled environment and with Combined Effluent Treatment Plant (CETP) constructed considering the carrying capacity concept. For the hazardous waste producing industries in the region, land allocation should be done appropriately for Combined Treatment, Storage and Disposal Facility (TSDF).
4. Good agricultural land in the town should be protected and conserved. There is substantial surplus vacant land and waste land existing in the Master Plan area to accommodate various land uses. This may reduce the need for unnecessary conversion of good agriculture land to various urban uses.
5. Check needs to be put in areas where inefficient and excessive irrigation causes water logging and salination of the soil.
6. Action should be taken to stop the dumping of solid waste in rivers, drains, ponds and other water channels. Forest conservation programs need to be initiated.
7. Public awareness programmes should be conducted at all levels to educate people regarding the health effects due to prolonged noise exposure. The Keonjhar Administration needs careful attention for abating road traffic noise through modification of traffic flow and also by sustainable traffic management.

8. Massive plantation of trees with dense foliage (rich canopy) should be encouraged as they were found to be highly effective in absorbing the acoustic noise and act as very good screens in bringing down the noise levels
9. While carrying out activities for the development of Keonjhar, provisions under Environmental Protection Act, 1986 and Rules thereof should be followed. Carrying Capacity of the town based on Minimum National Standards should be followed in order to provide a better quality of life to the people in the area.
10. The areas/zones mentioned below located in the Master Plan should be conserved/protected:
    - Reserved/protected forests
    - Forests other than reserved and protected forests
    - Monuments-National, State, Local
    - Heritage/cultural sites
    - Scenic areas
    - Parks/Playgrounds
    - Marshlands
    - Mining areas
    - Areas of tourist interest
    - Water bodies/Ponds/Tanks/Reservoirs
    - Springs/water recharge areas
    - Burial Ground/Crematorium
    - Other environmental resource areas
11. Management during fairs/festivals shall see the:

    I. Upgradation of the supply of water from the river through additional pumps at the time of fairs/festivals
    II. Allocation of additional spaces for toilet facility on higher ingress of pilgrims during festive times. The concept shall be to provide hygienic sanitary facilities without despoiling the natural environment and allowing for natural treatment of wastes without high technology inputs.
    III. Provision of adequate garbage bins near mela grounds and deity procession routes.
12. Solid waste disposal scheme: It is imperative to adopt more environment conscious methods of waste disposal in the town. The segregation of non-degradable wastes like plastic and metal is imperative which can then be sent

to the processing units. Vermiculture pits could be developed for the degradable waste in the open outskirts.

13. Mining Area Measures:
    a. Mining will be carried out on diverted forest land only. No mining will be carried on the non-diverted land. Forestry Clearance will have to be taken for such areas.
    b. Compensatory afforestation is being / will be carried out as per stipulation of Forest Department.
    c. Topsoil to be stacked for utilization in plantation.
    d. Sewage Sludge to be used as manure for green belt development.

9.4.2 Disaster Mitigation and Preparedness

1. It should be made compulsory for all the new construction to be designed and constructed as seismic proof and withstand during severest quakes.
2. Building byelaws need to be updated to ensure earth quake resistant measures in the structural design of buildings and to minimize the risk of damage.
3. Flood zones need to be identified by the District Disaster Management Authority and accordingly No construction zone should be clearly specified. It should be regularly patrolled so as to prevent encroachment on these areas.
4. Flood forecasting and warning system is used for alerting the likely damage areas in advance of the actual arrival of floods, to enable the people to move to safer places.
5. Stakeholder participation should be encouraged.
6. All the structures should be well anchored so as to resist them from being uplift from the strong winds during cyclones.
7. Risk evaluation of the towns and cities should be done regarding the areas vulnerable to fires and database in terms of available equipment and personnel should be compiled and periodically updated.
8. At the time of disaster, distribution of relief materials should be organized in planned and disciplined manner so that there will be no irregularity overlooking or overlapping in distribution of relief materials.
9. Special training programmes on disaster preparedness, First Aid and Rescue techniques to be conducted for The NSS and NCC, Scout & Guide, Red Cross volunteers in the town. Their services may be entrusted as Volunteers during the

response action by the public administration. They can be a part of different task forces to actively be involved in rescue, relief, rehabilitation action.

10. Local authorities should review the relief manuals and scarcity preparedness guidelines as detailed out in the District Disaster Mitigation and Response Plan, Keonjhar District to blend the vernacular climate and the local needs.
11. Plantation should be done as much as possible, plants will hold the soil, act as shield against wind etc.

CHAPTER-10 EXISTING AND PROPOSED LAND USE

10.1 Introduction

Land use pattern delineate, by area, function of each parcel of land in a settlement. It provides a base for understanding the city structure and guiding to achieve a sustainable form of urban development in form of spatial expansion. The study on the existing land use pattern helps in assessing the spatial structure of the master plan area, its growth characteristics which are prime factors for framing the future planning proposals within the master plan limit. This section deals with components of use of land such as existing spatial growth trends, existing land utilisation, and land use categorization etc. along with the future proposals for the horizon year 2030.

Existing land use map was prepared by interpretation of the satellite imagery with ground verification in the year 2014. In an initiative for preparing GIS enabled base map of the Keonjhar Master Plan Area, the Govt. of Odisha had engaged ORSAC to prepare the map for the respective areas. The land use map prepared by ORSAC is used as the base for the assignment. The provided base map of ORSAC is extensively studied & analysed by ground verification and final base map is prepared by considering the deviation on existing use, for framing the future spatial proposals.

10.2 Existing Land Utilization in Keonjhar Master Plan Area

In an initiative for preparing GIS enabled base map of Keonjhar Master Plan Area, the Government of Odisha has engaged ORSAC to prepare the map for the respective areas. The existing land use map of the Master Plan area has been prepared with the help of the base map provided by ORSAC.

10.3 Existing Land Use

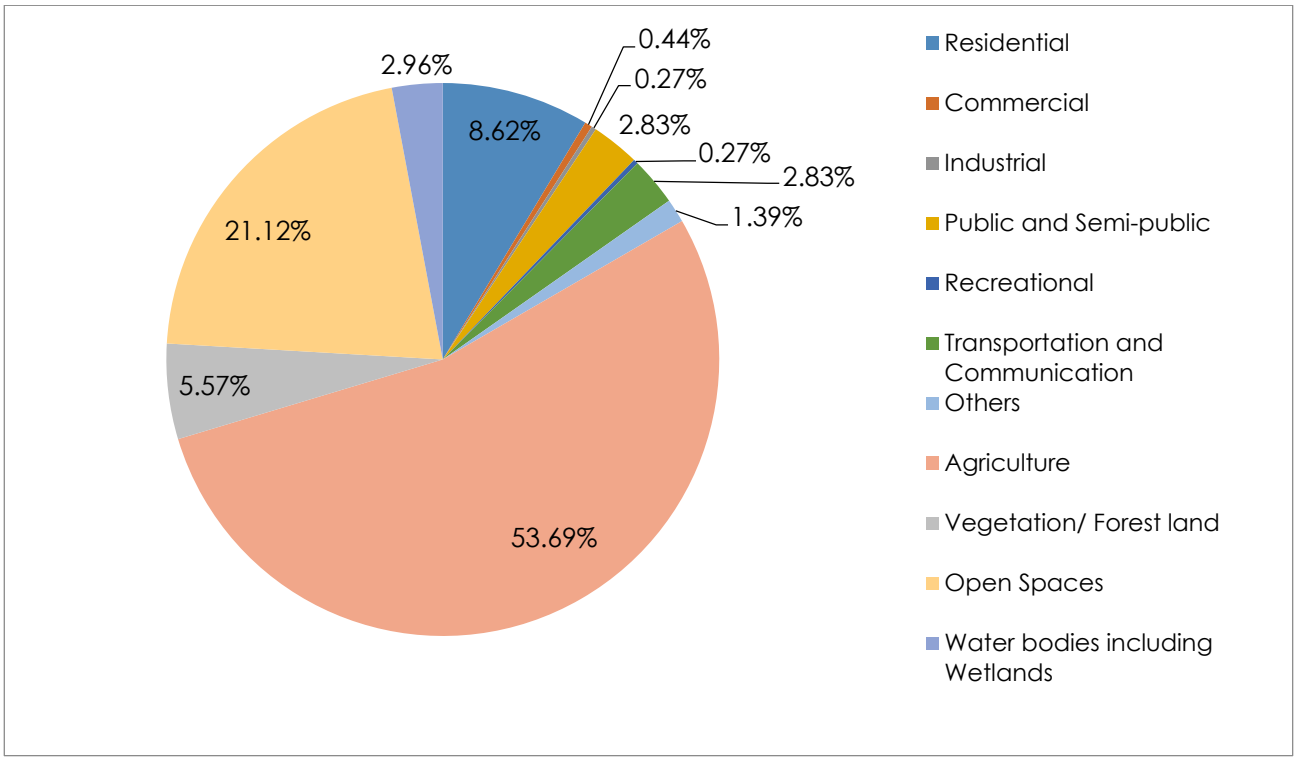
Table 10-1: Land use Distribution - Keonjhar Master Plan, 2014 (After LU Validation)

Sl. No.	Land use Description	Area in Sq.km.	Area in Ha	% of Total Area	% of Developed Area
1	Residential	7.54	754	8.62	51.79
2	Commercial	0.38	38	0.44	2.64
3	Industrial	0.24	24	0.27	1.64
4	Public and Semi-public	2.47	247	2.83	16.97
5	Recreational	0.24	24	0.27	1.64
6	Transportation and Communication	2.47	247	2.83	16.97

Sl. No.	Land use Description	Area in Sq.km.	Area in Ha	% of Total Area	% of Developed Area
7	Others	1.21	121	1.39	8.34
Developed Area (A)		**14.55**	**1455**	**16.65**	**100.00**
8	Agriculture	46.92	4692	53.69	
9	Vegetation/ Forest land	4.87	487	5.57	
10	Open Spaces	18.45	1845	21.12	
11	Water bodies including Wetlands	2.59	259	2.96	
Un-developed Area (B)		**72.80**	**7280**	**83.35**	
Total Master Plan Area (A+B)		**87.36**	**8739**	**100.00**	

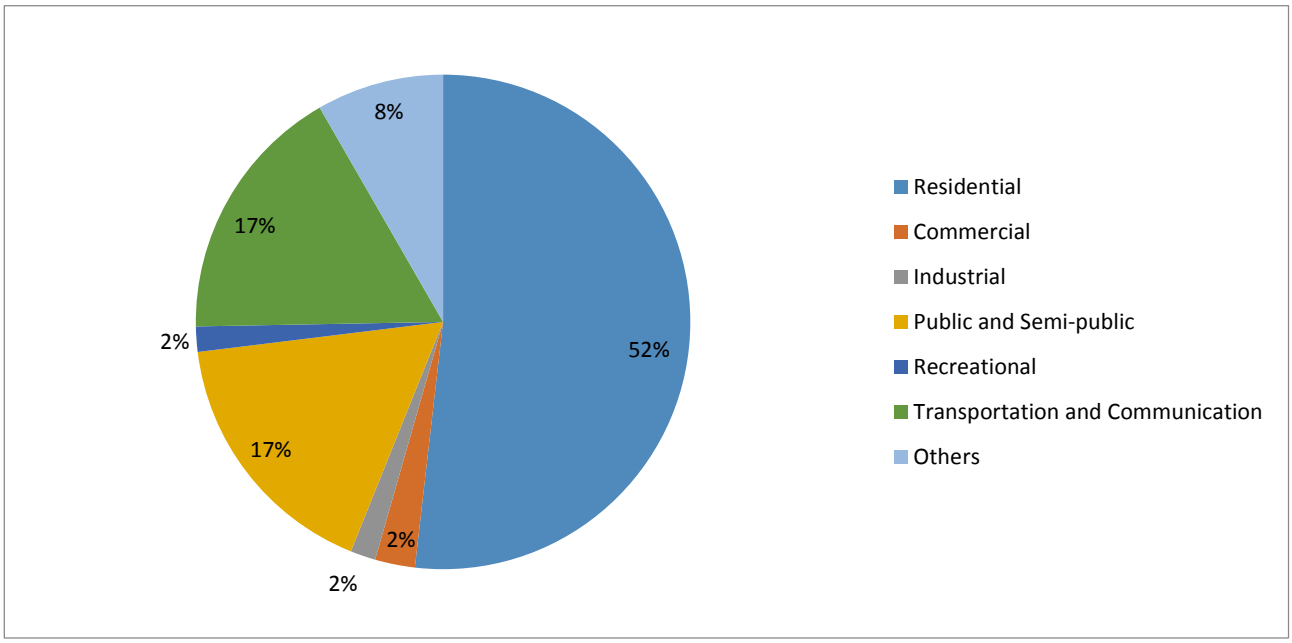
Source: (Land Use Validation- REPL, 2015)

Figure 10–1 Keonjhar Master Plan - Land use Distribution, 2015



From the above figure and table, it is evident that 83.00% of the total land is undeveloped area only 17% of the land is developed area. Developed area has been further sub-divided in to the following categories.

Figure 10–2 Keonjhar Master Plan - Land use Distribution of Developed Area, 2015



Out of the total 1455 hectare developed area, Residential Landuse is dominating and constitutes 52% of the total land followed by Transportation and Public and Semi-public which are 17% each. There is lack of recreational, commercial and Industrial spaces in the city as evident by their small percentage of 2% in the land use distribution. Existing Landuse pattern of the city is as follows:

10.3.1 Residential Use

As per the physical survey and landuse validation, 416.64 hectare land is utilized for residential purpose to accommodate population of 2014. In rural area of the Master Plan area, 331.5 hectare of land is utilized for residential purpose, in the form of rural "ABADI". There are 746.24 hectare vacant land in urban and 581.29 hectare land in rural sector which shall be utilized to accommodate future population. Total residential area is 58.8% of the Master Plan area and 8.6% of developed area.

10.3.2 Commercial use

Commercial development has been confined mainly to the intersection of the NH-20 and NH-49 passing through the city making it major commercial hub or Central Business District (CBD) of the city. Total area within the commercial use is 36.83 hectare which is 2.9% of the developed area and 0.4 % of the total planning area. Apart from the CBD, major commercial activities have been developed along both the NH.

10.3.3 Industrial use

Industrial development has been sparse and non-conforming to the master of 2001. Total industrial area is 23.73 hectare which is 1.9% of developed area and 0.3% of total planning area. Some industries have come up close to intersection of NH-20 and university road, where as some industries can be seen within the residential areas which shall be considered for relocation for the future planning.

10.3.4 Transport and Communication

A total of 236.97 hectare land is under the Transport and Communication use zone which is 18.6% of developed area and 2.7% of Master Plan area. Existing roads having development potential along them shall be considered for the widening.

10.3.5 Public and semi-public Use

Being a district headquarter, about 206.9 hectare of land is under the Public and semi-public use which is 16.3% of total developed land and 2.4% of Master plan area. Out of this 45.43 hectare is administrative and 143.83 hectare is under educational land use. Area under medical/ health centre is only 4.43 hectare.

10.3.6 Recreational Space

As per the URDPFI guidelines, organised green space for a city should be between 18% to 20%. Physical survey reveals that there is only 20.37 hectare land under the recreation use which in only 1.6% of planning area and 0.2% of master plan area.

10.3.7 Agriculture and Allied use

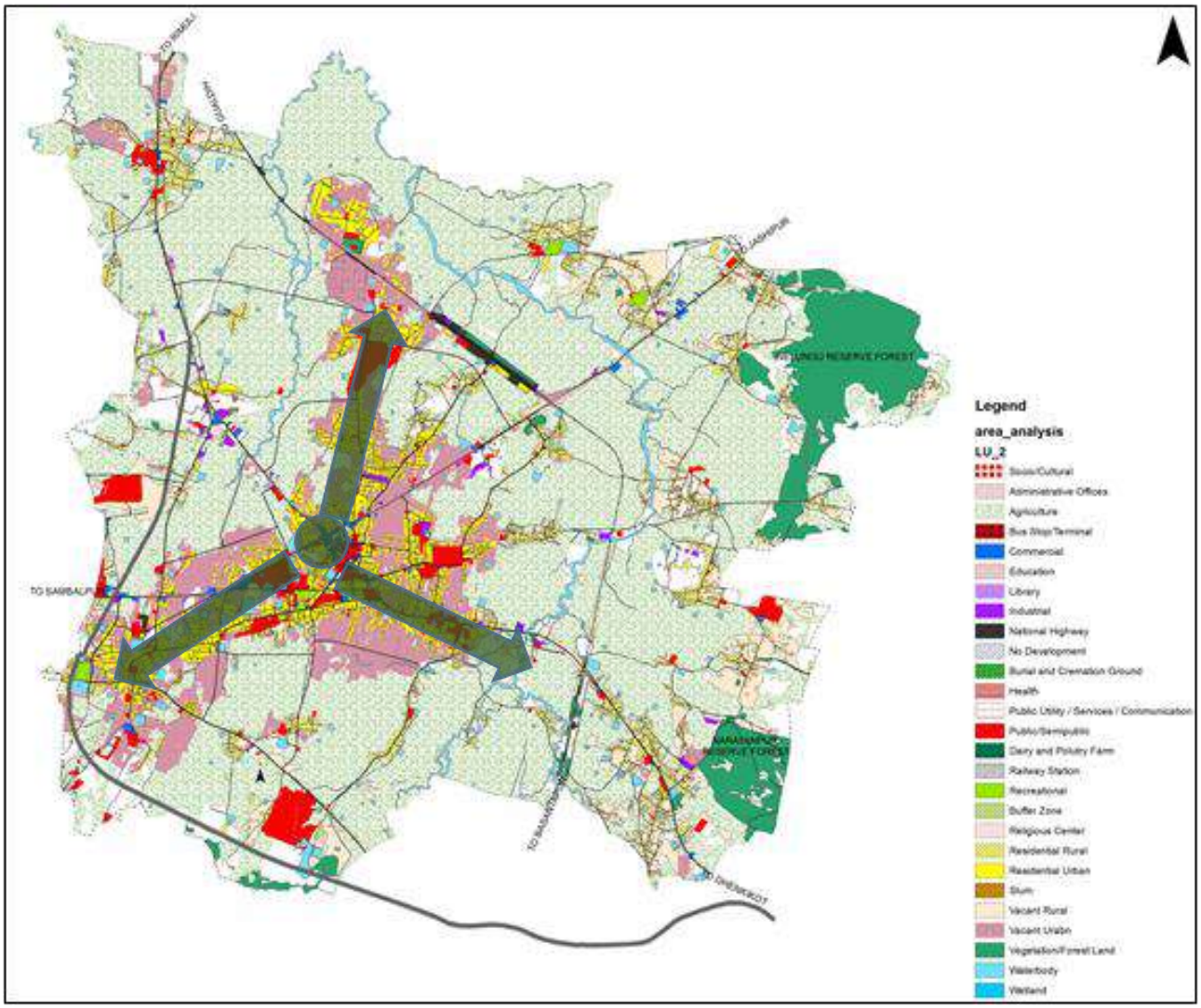
Area of Keonjhar Master Plan area is 8739 hectare. Out of which, 7283 hectare is undeveloped area which includes agriculture, vegetation/forest land, waste land, wetland, water body etc.

10.4 Growth direction

The growth of town is limited due to the presence of physical constraints such as river and forest on the south-western and south-eastern side of master plan area. Availability of land is analysed regarding growth potential and it is found that there is scope for growth on the eastern and northern side of region. The central part of master plan area is growing at a faster rate, mainly around intersection of national highways and north-western side of railway station. The city is mainly growing along national highways and road connecting junction of NHs to railway station area in north-east direction.

Spatial expansion in Keonjhar is mainly governed by the transport corridors. Identified growth corridors are as follows:

- Corridor 1: NH-20
- Corridor 2: NH-49
- Corridor 3: Road connecting NH junction to railway station area

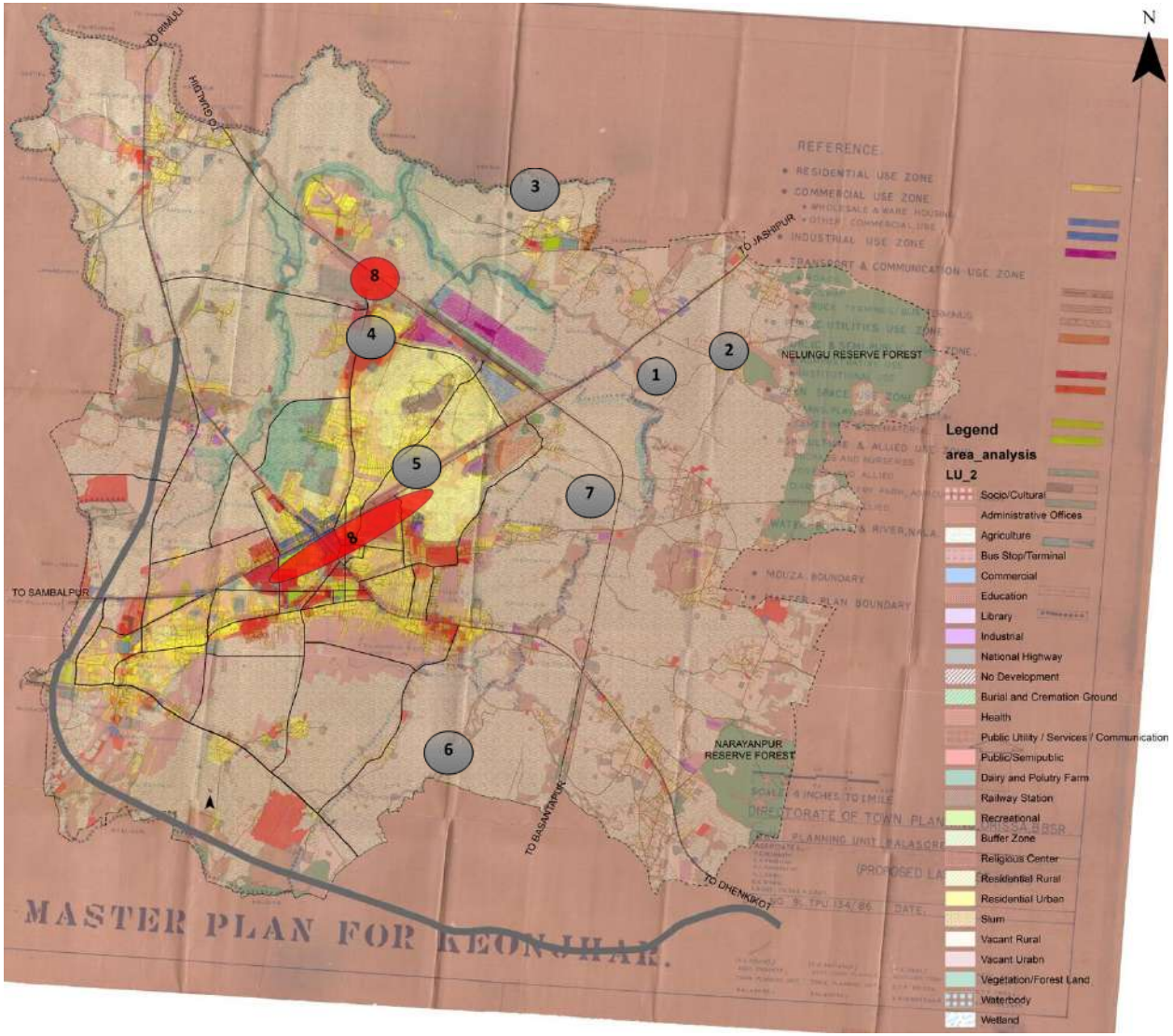


Map 10-1: Spatial Growth Direction

10.5 Deviation in Land Use from Master Plan 2001 and Existing landuses

Comparing the existing landuse of keonjhar master plan area and the landuse proposed in master plan 2001, some deviations have been observed at various places. Existing landuse has developed in deviation from proposals in master plan 2001. All major deviations have been shown in the map below. These deviations need to be addressed and resolved by the master plan committee due to potential implication on proposed landuse plan of 2030.

Figure 10–3: Deviation from Proposed Master Plan 2001 in Existing land-use



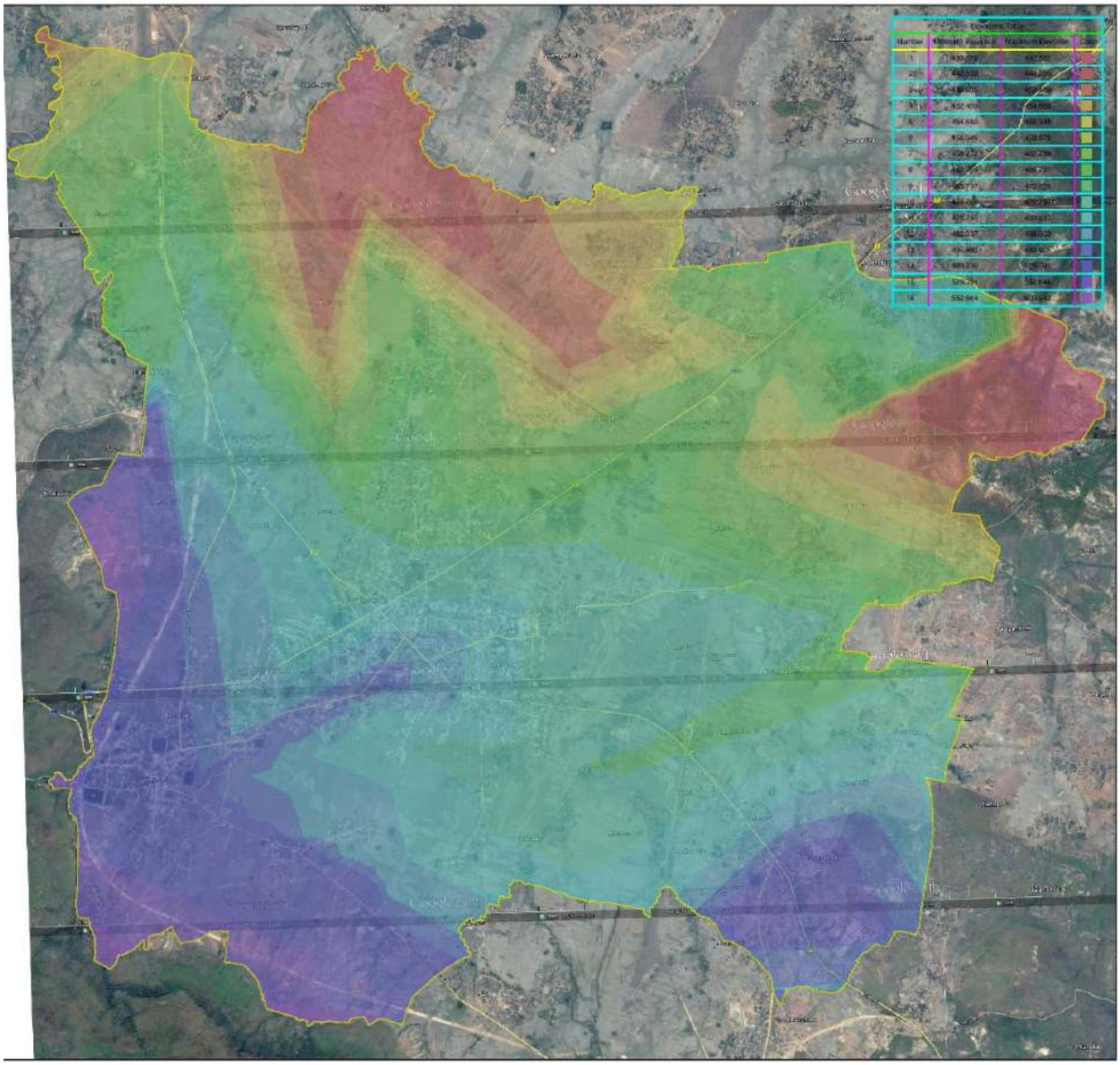
As Shown in the map above, area 1 marked on the map was proposed for agriculture allied use in proposed master plan 2001 but currently it is under industrial landuse; similarly in area 2, deviation is from agricultural allied use to residential use; in area 3, deviation from agricultural farm uses to residential use; in area 4, deviation is from agriculture allied use to commercial & industrial use; in area 5, deviation is from PSP to residential use; in area 6, deviation is from agriculture allied use to PSP use; in area 7, deviation is from residential use to PSP use and area 8, indicates the development of slum mainly around water bodies.

Keeping in mind, the developments already existing, even though they are deviations from the proposed master plan, it is proposed to keep them intact in the proposed master plan 2030. Similarly, slum area has been shown as residential use. However, decision of the master plan committee shall be paramount and these proposals can be altered or scrapped, as per the decisions of the committee.

10.6 Land suitability

The Digital Elevation Model (DEM) shows that South-West & South-East part of the Keonjhar planning area have higher altitude. The slope is gradually decreasing from South-east & South-West to the north & North-east. Due to the low altitude, North & Northeast part is more susceptible to water logging as shown in the map below. All the proposals shall be based on the existing topography.

Map 10-2: Digital Elevation Model (DEM)



10.7 Proposed Land Use -2030

In order to build robust Land-use Plan, holistic approach has been taken. The scope of the master plan is limited to the broad planning and allocation of land for various usages such as residential, commercial, industrial, institutional, public semi-public etc. It proposes land-use plan for successful functioning and economic development of the city. Planning of transportation facilities shall be aimed at safe and better traffic circulation system. Conservation of natural resources and heritage such as water body, forest, etc. shall be taken as a priority. It will include zoning regulation for controlled development in each zone. Therefore, Master Plan is important instrument for regulating and guiding development of the city over a period of time and

contributing to planned development. Master Plan of Keonjhar comprises following components:

1. Proposed Land use plan
2. Zoning Regulations

10.7.1 Land Requirements

Land is a scarce resource, on which entire infrastructure and human settlement is created. Before proceeding to prepare Landuse plan, optimum utilization of land is to be worked out on the basis of need assessment of the projected population, prevailing and envisaged trends and norms and standards. (URDPFI Guidelines)

Table 10-2 Proposed Land use Distribution- Master Plan Area 2030

Sl. No.	Land use Description	Percentage of Developable Area, as per UDPFI Guidelines	Area in Sq.Km	Area in Ha	Percentage of Total Planning Area
1	Residential	40 to 45	20.8	2084	23.63%
2	Commercial	2 to 3	1.14	114	1.29%
3	Mix Use		0.011	1.10	0.01%
4	Industrial	8 to 10	2.5	2503	2.85%
5	Public and Semi-public	6 to 8	3.47	347	3.94%
6	Recreational/Open Space + Environmental Sensitive Zone	12 to 14	0.44 + 7.94	44 + 794	9.5%
7	Transportation and Communication	10 to 12	9.95	995	11.28%
Developed Area (A)			**46.25**	**4625.1**	**52.50%**
9	Agriculture		30.0	2998	34.00%
10	Forest land		5.23	523	5.96%
11	Water bodies including Wetlands		3.55	355	4.02%
12	Waste Land		2.33	233	3.53%
Un-developed Area (B) Balance			**41.11**	**4111**	**47.51%**
Total Master Plan Area (A+B)			**87.36**	**8736**	**100%**

10.7.2 Residential use

The existing land utilization of the master plan area shows that the developed area constitute around 51.79% of the master plan area with 7.54 sq.km (754 ha) of land

area, with a gross density of 69.24 persons per ha for developed area. For the plan period of 2030, it is estimated that the population of the master plan area will be increased to 1.56 lakhs of population with an absolute increase of about 55360 persons from 2011. It is estimated that an additional land of 13.26 Sq.km (1326 ha) will be required to accommodate the additional population of 2030 .

A total of 20.8 Sq.km (2080 ha) land area will be required to accommodate population of 1.56 lakh by 2030. Since, current area of Keonjhar municipal + OG is 87.36 Sq. Km (8736 ha).

Residential sectors have been planned such that, they integrate socio-economic development by proposing people of different income categories such as EWS, LIG, MIG and HIG to reside in each sector.

10.7.3 Commercial use

Required area has been calculated on the basis of need assessment for projected population, prevailing and envisaged trends and is in line with the URDPFI guideline. As per the guidelines, 2-3 percentage of the land can be taken for medium size town to fulfil its commercial needs. The projected population, including that in fringe area, has been worked out to be 1.56 lakh or 17.82 persons per hectare. Thus, as per the population density, it is quite convincing that Keonjhar city would require 2-3 percent of commercial space as a small size town according to URDPFI Guidelines. However, considering the huge percentage of land under agricultural use, the percentage for commercial use has been balanced to 1.29% for commercial development.

Table 10-3 Area of commercial centres

Sl. No.	Category	Area per 1000 persons (sq.m)	Number of shops
1	Convenience Shopping	220	1 for 110 persons
2	Local shopping including service centre	300	1 for 200 persons
3	Community Centre with service centre	500	1 for 200 persons
4	District centre	880	1 for 300 persons
	Total	1900	

As shown in the table above a total of 1900 sq mt area has been proposed per 1000 population thus, 1.9 Sq mt areas is required per person for different commercial activities.

Therefore, keeping in mind the projected population of 1.56 lakh for Keonjhar city and urban fringe, the total area required for commercial activities has been worked out as shown in the table below.

Table 10-4 Commercial area requirement for Keonjhar

Sl. No.	City	Projected population	Commercial area required
1	Keonjhar	1.56 Lakh	114 hectare

10.7.4 Public and Semi Public Areas

Provisions have been made for public and semi-public offices and institutions. Areas have also been allocated for facilities for education, health care, religious functions, cultural activities, firefighting, police protection, cremation and burial grounds, distributive services such as petrol pumps, LPG godown, and host of other facilities normally needed by residents of a town.

Physical Infrastructure

For efficient working of any settlement, public utilities have to be provided as per population standards.

Solid Waste Management

To dispose 65.6 MT of waste by 2030, an area of 10.69 Acres shall be used to develop an Integrated Solid Waste Management Site. This landfill site proposed on western part of the KMA shall be utilized.

Social Infrastructure

Provision of social infrastructure is one of the key principles of planned development. These are provides in a hierarchical manner. Whereas the lower order facilities are included as part of the residential areas, higher order facilities have been incorporated for area calculations for public and semi-public facilities.

Educational facility

Whereas facilities at the level of Nursery, Primary and Higher Secondary Schools have been made available in every sector, additional facilities have been provided at higher levels. A provision has been made for one college to serve a population of 1.00 lakh to 1.25 lakhs. A university campus has also been located which will also accommodate an engineering college, a medical college, an ITI, a Polytechnic and a technical and vocational centre along with coaching facilities. Besides, sites have

been allocated for few integrated schools with hostel facilities and schools for handicapped children as shown in table below.

Table 10-5: Proposed Educational Facilities

Educational facilities	Proposed Unit	Area per unit (in Ha)	Required Area (in Ha)
Pre-primary, nursery school	3	0.08	0.24
Primary school (class 1 to 5)	7	0.4	2.8
Senior secondary school (class 6 to 12)	NOT Required	1.8	NOT Required
Integrated school without hostel facility (class 1 to 12)	2	3.5	7
Integrated school with hostel facility (class 1 to 12)	2	3.9	7.8
School for physically challenged	3	0.7	2.1
College	NOT Required	5	N.A.
Technical Education	NOT Required	4	N.A.
			19.94

Source: URDPFI Guidelines

In order to cater the required education facilities, 0.83 Sq. Km (83 ha) land area will be required as per the projected population by 2030.

Health facilities

Dispensaries have been provided at the residential sector level. Additional facilities will be made available at the level of the community and the city level. For each community of one lakh population, an intermediate hospital category A for general treatment facilities and an intermediate hospital category B including a maternity ward have been propose. Additionally, provision has been made for a polyclinic and a nursing home. At the city level, a general hospital as well as a specialized hospital has been suggested as shown in the table below.

Table 10-6: Proposed Health Care Facilities

Health care facilities	Proposed Unit	Area per unit (in Ha)	Required Area (in Ha)
Dispensary	4	0.08	0.32
Nursing home, child welfare and maternity Centre	3	0.20	0.60
Polyclinic with some observation beds	2	0.20	0.40
Intermediate hospital (category A)	2	3.70	7.4
Intermediate hospital (category B)	2	1.00	2
Multi-specialty hospital	1	9.00	9
Specialty hospital	2	3.70	7.4
			27.12

Socio-cultural facilities

There has been already existing infrastructure to accommodate the socio-culture events of projected population. There is requirement of renovation and improvement of such infrastructure to promote local art and culture. The existing facilities can also be used as public theatre and a central public library. This would also accommodate an art gallery where studios can be provided to various artists for promotion of Indian classical music, art and culture.

Table 10-7: Proposed Socio-cultural Facilities

Socio-cultural facilities	Prop. Unit	Area per unit (in Ha)	Required Area (in Ha)
Community room	NOT Required	0.08	N.A.
Community hall	NOT Required	0.20	N.A.
Recreational club	NOT Required	1.00	N.A.
Music, dance and drama Centre	NOT Required	0.10	N.A.
Meditation and spiritual Centre	NOT Required	0.50	N.A.
Total			

10.7.5 Open and Recreation Spaces

Out of the total area of Master Plan, 9.5% has been proposed as open and Recreational use which also includes environmental sensitive zones. Within recreational uses around 32 Ha has been proposed for Neighborhood play area and Residential unit play area.

Existing water bodies e.g. ponds, nallah, streams, shall be retained/renovated. Beautification of embankment by fencing, plantation, landscaping etc. shall be taken up. Children/recreational park shall be made on the embankment of some of the big ponds. There should be plantation at both sides of all existing water channels for prevention of soil erosion to facilitate smooth drainage of storm water.

Like other facilities, recreational facilities too have been provided at different level the facilities are namely:

I. Tot lots at housing cluster level
II. Park and Playground at the sector level
III. Recreation clubs sports Centre, and major green space at the community level.

The area required for open spaces has been calculated from the URDPFI norms for organised open spaces for plain areas as shown in the table below.

Therefore, keeping in mind the projected population of 1.56 lakh for Keonjhar city and urban fringe area required for Open Space has been worked out as shown in the table below:

Area required for sports facilities has been worked out based on the URDPFI Norms for Sports Facilities for the plains as shown in the table below:

Table 10-8 Area required for Sports Facilities as per URDPFI guidelines

Sports facilities	Prop. Unit	Area per unit (in Ha)	Area requirement(ha)
District sport Centre	NOT Required	8	0
Neighborhood play area	10	1.5	15.6
Residential unit play area	31	0.5	15.6
Total Area			**31.2**

10.7.6 Industrial

Required Industrial Land use has been calculated on the basis of URDPFI guideline. As per the guideline, a range between 8-10 percentages can be taken for medium size town.

Master Plan proposes approximately 2.5 Sq.km of land for small, medium and large scale industries, which is 2.85 % of the total area. The industrial units should be facilitated with provision of commercial area, public and semi-public facilities, green and recreational areas etc. CETPs, solid waste separation/ treatment plant etc. should be provided for the industries so as to minimize water pollution. The land distribution for the above mentioned requirements shall conform to the norms given below;

Table 10-9 Norms for Land Distribution in Industrial Area

S. No.	Use Premises	Percentage
1	Industrial plots	70-75
2	Green and Recreational (Parks, Water Bodies, Green Belts etc.)	5-7
3	Commercial Area (Shopping Centres, Petrol Pumps, Guest House, Services and Repair Shops etc)	2-3
4	PSP facilities (Fire Station, Police station, Police Chowki, Night Shelter, Day Care Centre etc) Utilities (Electric Substation, CETPs, Pumping Station, Water Reservoirs etc)	5-7
5	Transportation (Circulation, Loading/Unloading Area, Parking Facilities etc)	10-15
	Total	**100**

Source: URDPFI Guidelines

10.7.7 Traffic and Transportation

Proposed Road Network:

The proposed road network for LPA, Keonjhar has been developed in concurrence with the proposed land use pattern as shown in the Plan. In order to provide relief to the city roads and the expected increase in volume of traffic in future, the concept of ring road radial pattern has been followed. A new bypass road has been proposed on the eastern part of the KMA connecting NH20 and NH49. The existing roads have been designated as radial roads. Efforts have been made to follow existing road pattern as much as possible. The following hierarchy of roads has been proposed:

R-1 200 feet wide

R-2 150 feet wide

R-3 80 feet wide

R-4 60 feet wide

Bypass Road

Looking forward for the year 2030 and keeping in view the proposed city structure of Keonjhar, a bypass road having a right of way of 200 feet has been proposed. This proposed bye-pass road starts from NH20 and NH49 then interconnecting the various existing local and regional roads. The alignment of this outer ring road has been shown in proposed land use plan.

Existing Roads:

The existing Master Plan roads have been kept intact. It is also proposed that roads of this hierarchy may also be carved out at the time of preparing zonal plans. It is further proposed that roads of further lower hierarchy than 60' would be carved out while preparing zoning plans of the proposed zones.

Proposals for Urban Roads:

The study of existing city road network reveals that most of the existing roads are not overcrowded as due to less volume of traffic than their respective capacities. However, in future, some of these roads may become overcrowded due to increase in traffic volume. Although, there is no possibility or scope of widening of Right Of Way (R.O.W.) of some of these roads in dense built up areas of the city, some measures of road engineering can be adopted for improving the capacity of these roads, as per the guidelines for capacity enhancement of Urban Roads in plain areas published by

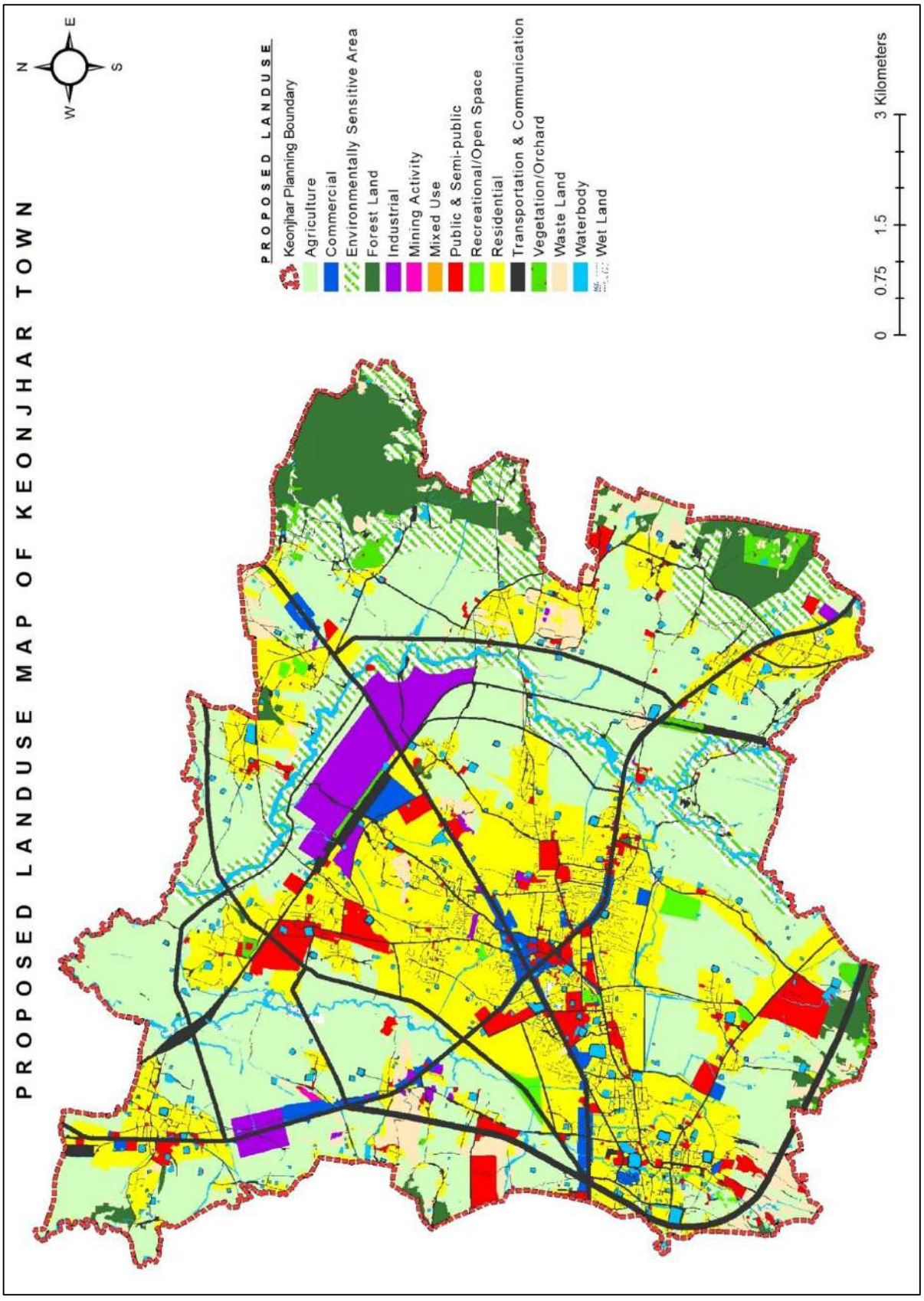
the Indian Road Congress. Some of the measures that could be considered for enhancement of capacity of roads are as under:

- Prohibiting on–street parking of vehicles, and simultaneously developing off–street parking facility;
- Segregating the bi-directional traffic flow through central verge/median wherever it is possible;
- Provision of segregation of slow moving vehicles such as animal drawn carts, rickshaws/ tongas etc.;
- Imposing restrictions on the movement of animal drawn /other slow moving vehicles, and/ or heavy commercial vehicles on these roads during selected periods, especially the peak hours;
- Reduction of roadside congestion through control of abutting land–use and roadside commercial activity;
- Provision of adequate facilities for pedestrians and cycles wherever it is possible;
- Banning certain conflicting movements at major intersections, particularly during peak hours;
- Controlling the cross traffic and side–street traffic by regulating the gaps in medias;
- Improving traffic discipline such as proper lane use and correct over taking, through appropriate road markings, education and publicity.

Flyover/Foot over Bridge:

As per the study and the stakeholder's consultation, a flyover from Gandhi chaka to college chaka and foot over bridge near collectorate shall be made.

Map 10-3: Proposed Land Use Map 2030



CHAPTER-11 LAND OWNERSHIP

11.1 Land Ownership in Keonjhar.

The government owns about 21 percent land or around 17 sq. Km (1700 ha)in Keonjhar town. The entire spatial distribution of government land is presented in the figure 11-1.

The breakup of the government land area, under development zones, according to the zoning proposed in the masterplan in the chapter above is shown below. Of all the development zones the highest percentage of government land is present in zone D which contains 24% of the government land and second highest is present in zone B which has around 16% of the government land. The remaining government land is evenly distributed across all development zones. The rest of the land area of around 5 sq. km is located in conservation zone and hence the breakup status is not shown for those zones.

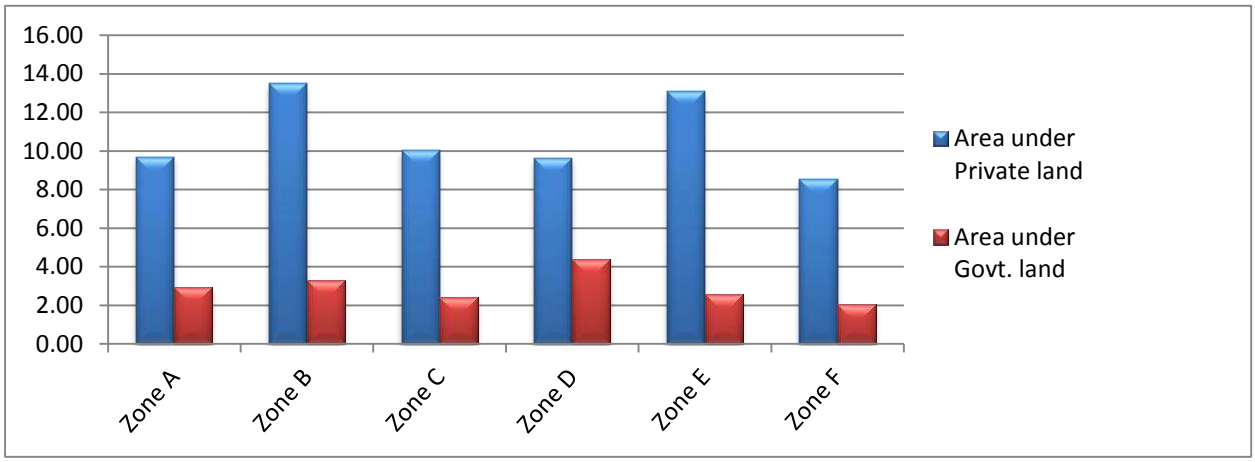
Table 11-1: The details of Area under government land and private land in Keonjhar master plan area.

Name of development Zone	Area under Private land	% of area under Private land	Area under Govt. land	% of area under Govt. land	Zone total
Zone A	9.69	15.03	2.95	16.66	12.64
Zone B	13.51	20.96	3.31	18.69	16.81
Zone C	10.03	15.56	2.43	13.76	12.46
Zone D	9.60	14.89	4.42	24.97	14.02
Zone E	13.08	20.29	2.55	14.43	15.63
Zone F	8.56	13.28	2.03	11.50	10.59
Total	**64.46**	**100.00**	**17.69**	**100.00**	**82.15**
*** All area given in Sq. Km.**					

Source: SPA Keonjhar.

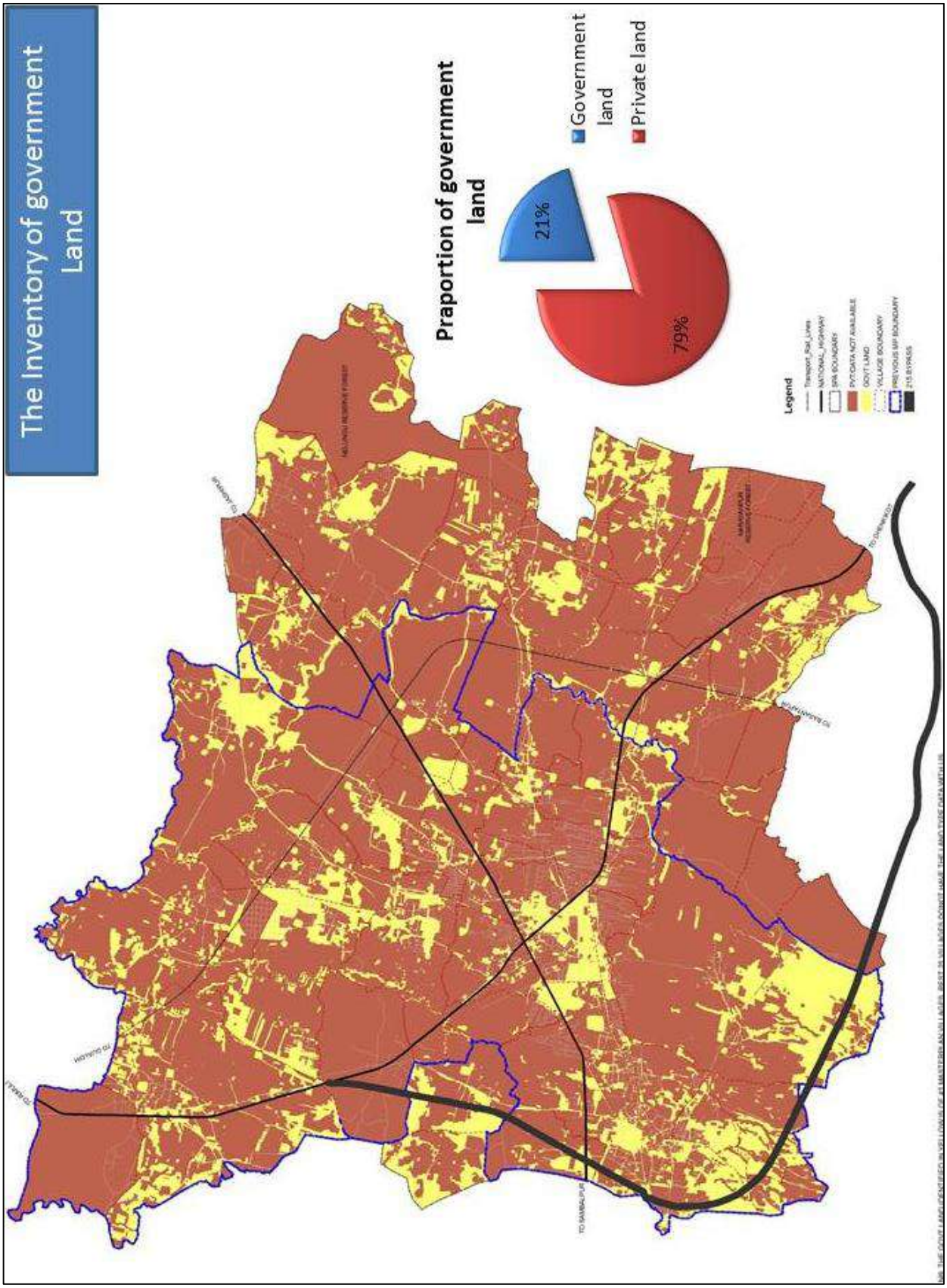
The relative availability of government land varies according to the location of administrative offices in the given zone. Since Zone D falls in the core city area and has a number of public and semi-public buildings, it has the highest concentration of government land. With respect to the land use, most of the private land comes under agricultural land use and government land comes under public and semi-public land use.

Figure 11–1: The zone wise variation of Government and private land.



Source: SPA Keonjhar

Map 11-1: The spatial distribution of government land in Keonjhar town.



Source: SPA Keonjhar

CHAPTER-12 ZONING AND SUB DIVISION REGULATION

12.1 Introduction

Zoning regulations help to promote healthy and liveable environment ensuring safety and general social welfare of the community. These regulations ensure that the area develops according to the vision for the town with optimum distribution of the amenities and the envisaged urban form.

In the preceding chapter, under land use, the Master Plan envisages spatial distribution of the Urban Land into various functional use zones (Land Use Zones). Zoning is essentially a legal and administrative method of putting into effect certain functional features of a comprehensive plan i.e. Master Plan for a particular town, vis-à-vis the plan for circulation, conceived to solve the present deficiencies and to plan for future requirements of the urban community.

The development control regulations ensure that the development of the region takes place in accordance with the land use plan. Since various land uses have different characters, separate set of regulations establishing reasonable and minimal control over the land use have to be framed. This can prevent overcrowding in buildings and land, thus, ensuring adequate facilities and services. These regulations will promote public health, safety and general welfare of the community.

Land and buildings established prior to the zoning regulations are not prohibited. But, if there is any conflict with the newly proposed uses, they will be termed as non-conforming uses, which will be gradually eliminated keeping in mind the ease of the property owners.

The regulations are framed keeping in mind the character of each zone along with their relevant activity mix, for the desired development as proposed in the new regulations. The use based guidelines detail the permissible, restricted and non-permissible activities in each zone.

12.2 Objective of Zonal Guidelines

The zoning guidelines and development control regulations will attain the following objectives:

- To promote public health, safety and general welfare of the community
- Eliminate and phase out polluting and conflicting land uses

- To be pro-active and responsive to the envisioned needs of the region
- Realistic in nature and in close conformity to the market conditions and forces
- To recognize the dynamics of land values, densities and infrastructure
- To help match the development needs and demands of individuals and the city
- To permit mixed use and a dynamic urban form

The following principles, here-in-after called the 'Zoning Regulations' framed in keeping with the objectives of planned urban expansion, development of residential areas on neighbourhood principles, promotion of correct land use and convenience and general betterment of the inhabitants of the locality in view, will be applicable to the area covered by this Master Plan.

12.3 Zonal Development Boundaries

The Master Plan Area has been divided into **six zones** namely; **Zone-A, B, C, D, E ,F and Conservation Zone1&2**.

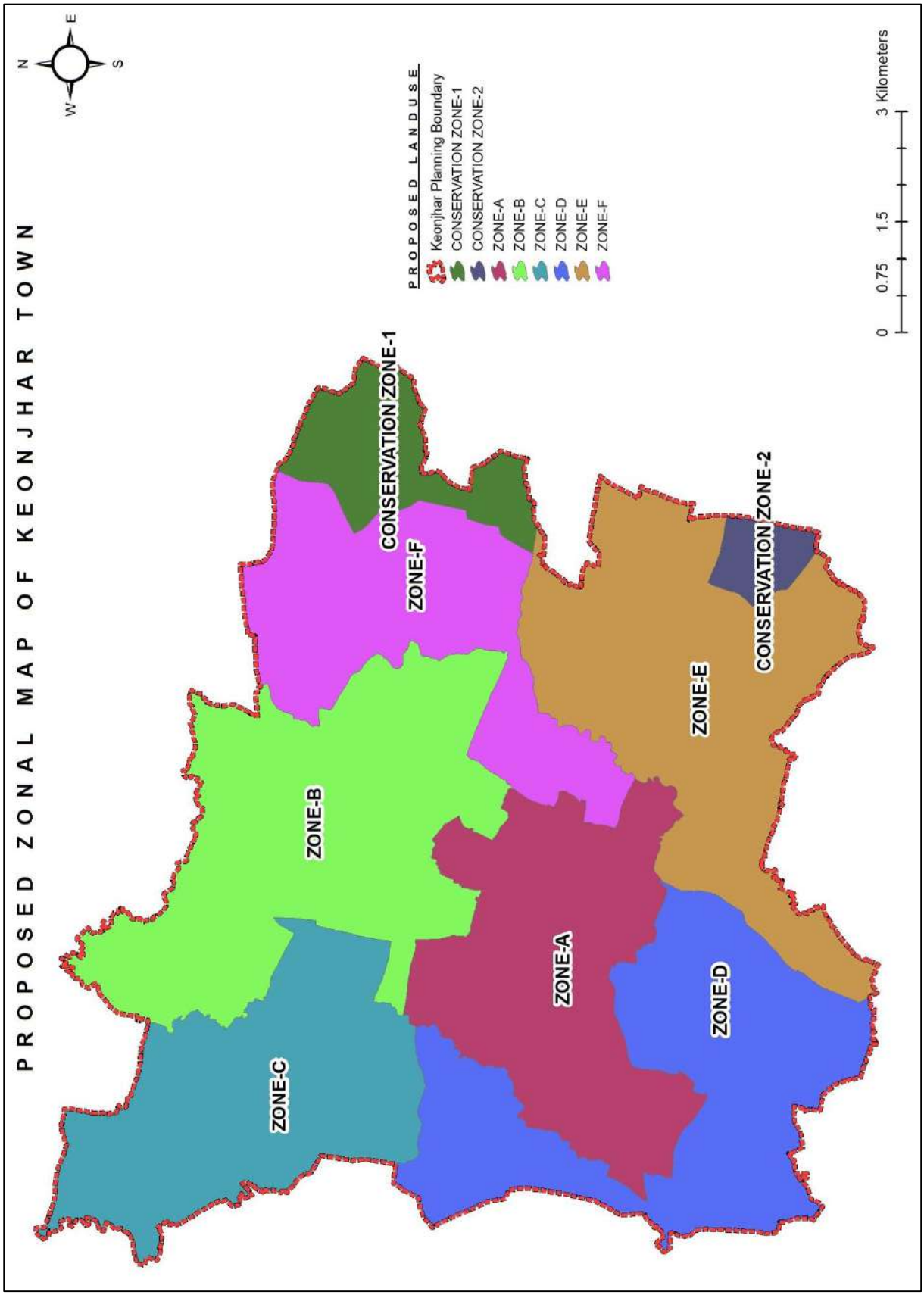
The zones are divided on the basis of:

1. Existing administrative boundaries like the ward boundaries
2. Existing physical features
3. Existing land-use and settlement pattern, its nature and character
4. Area fixed by each zone is manageable administratively

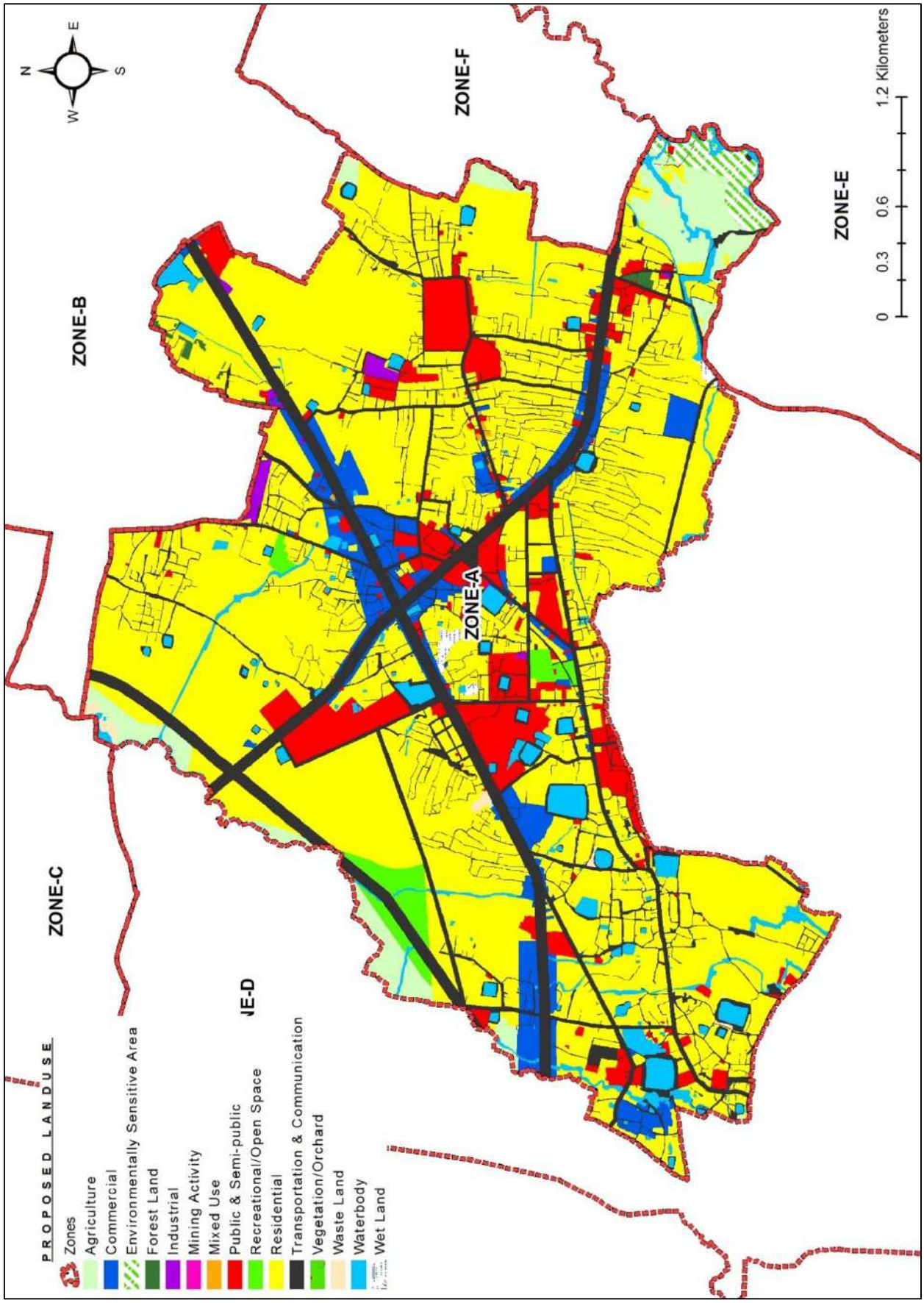
12.3.1 Decisions on Zone boundaries:

1. The boundaries of each of the zones shall be, as indicated in the Master Plan. Unless, otherwise shown in the Master Plan, the boundary lines of zones shall be plot line, the centre lines of the streets or such lines extended over the railway right of the way lines or corporate limit lines it existed at the time of enforcement of those regulations.
2. The zones designed may further be divided into sub-zones by the Planning Authority where it deems it expedient, the designation of such sub-zones being dependant on the special use to which each sub-zone is being utilized.
3. All the disputes and differences with respect to the exact location of the zonal boundaries shall be referred to the Director of Town Planning, Odisha, Bhubaneswar whose decision shall be final and binding.

Map 12-1: Zonal Map



Zone-A


N
E
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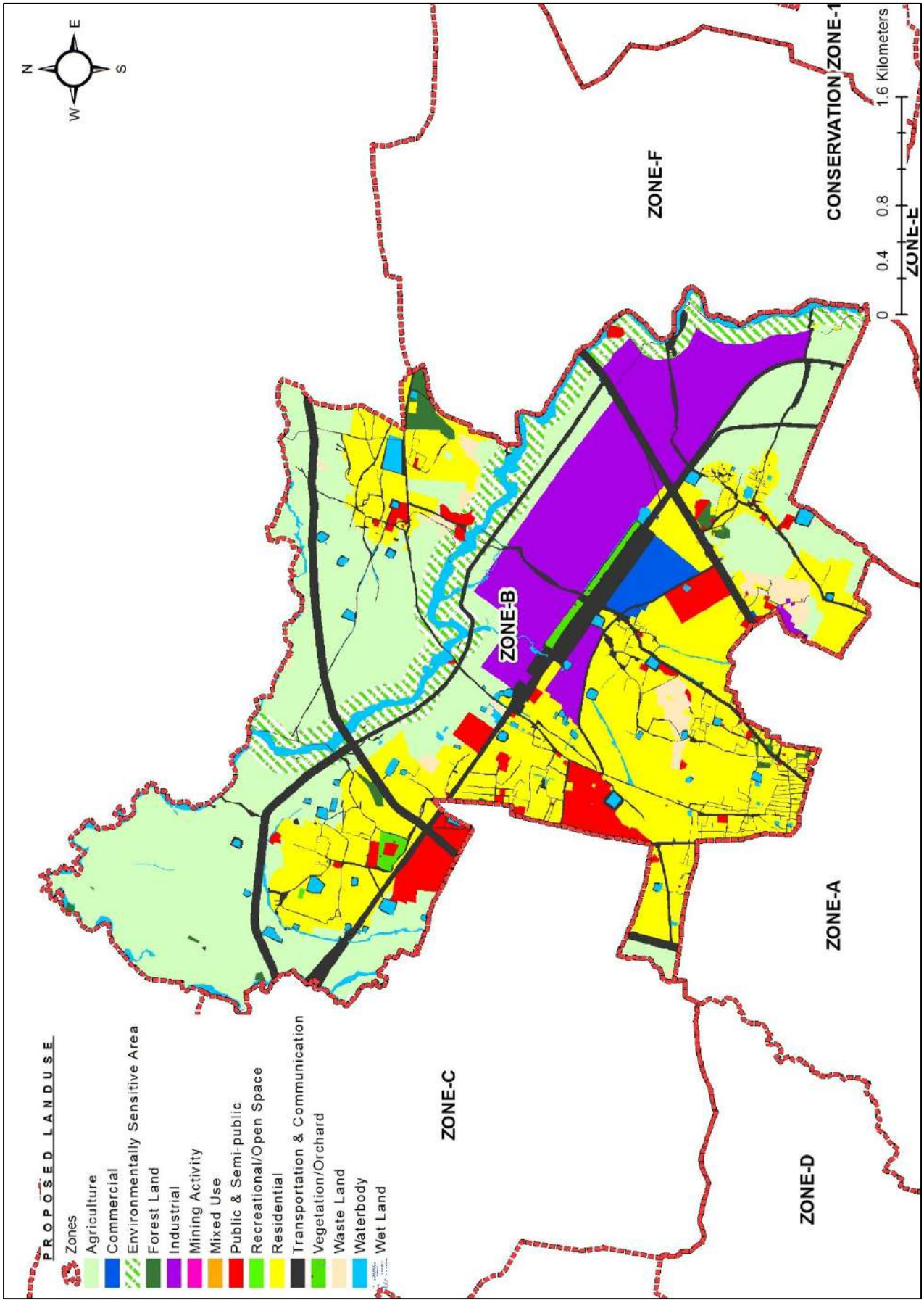
ZONE-B
ZONE-F
ZONE-E
ZONE-A
ZONE-C
0 0.3 0.6 1.2 Kilometers
PROPOSED LANDUSE
Zones
Agriculture
Commercial
Environmentally Sensitive Area
Forest Land
Industrial
Mining Activity
Mixed Use
Public & Semi-public
Recreational/Open Space
Residential
Transportation & Communication
Vegetation/Orchard
Waste Land
Waterbody
Wet Land

Zone-B


N
E
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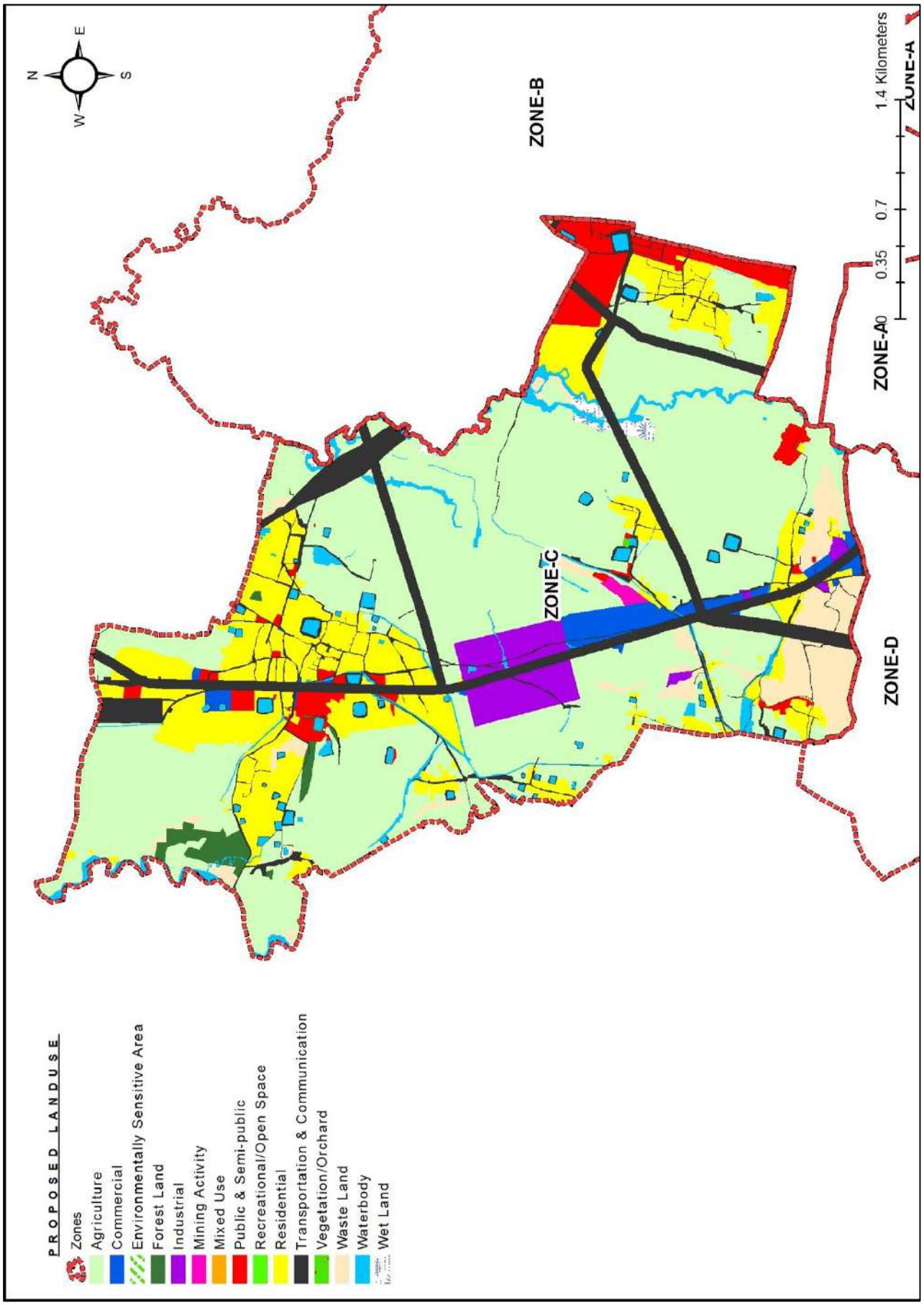
PROPOSED LANDUSE
Zones
Agriculture
Commercial
Environmentally Sensitive Area
Forest Land
Industrial
Mining Activity
Mixed Use
Public & Semi-public
Recreational/Open Space
Residential
Transportation & Communication
Vegetation/Orchard
Waste Land
Waterbody
Wet Land
ZONE-A
ZONE-B
ZONE-C
ZONE-D
ZONE-E
ZONE-F
CONSERVATION ZONE-1
0
0.4
0.8
1.6 Kilometers


N
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ZONE-B
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0
0.35
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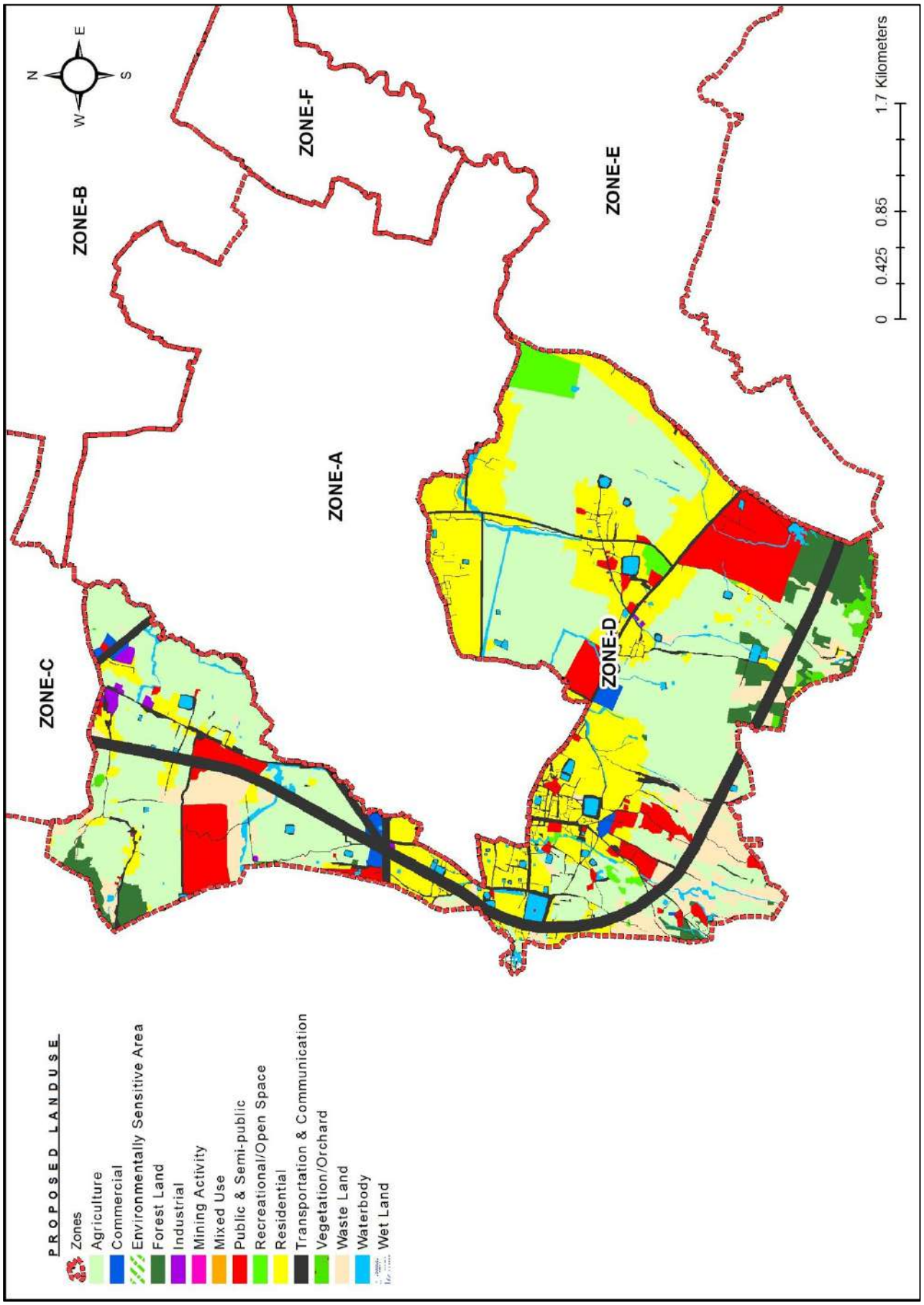
1.4 Kilometers
PROPOSED LANDUSE
Zones
Agriculture
Commercial
Environmentally Sensitive Area
Forest Land
Industrial
Mining Activity
Mixed Use
Public & Semi-public
Recreational/Open Space
Residential
Transportation & Communication
Vegetation/Orchard
Waste Land
Waterbody
Wet Land

Zone-C


ZONE-B
ZONE-F
ZONE-E
ZONE-C
ZONE-A
ZONE-D
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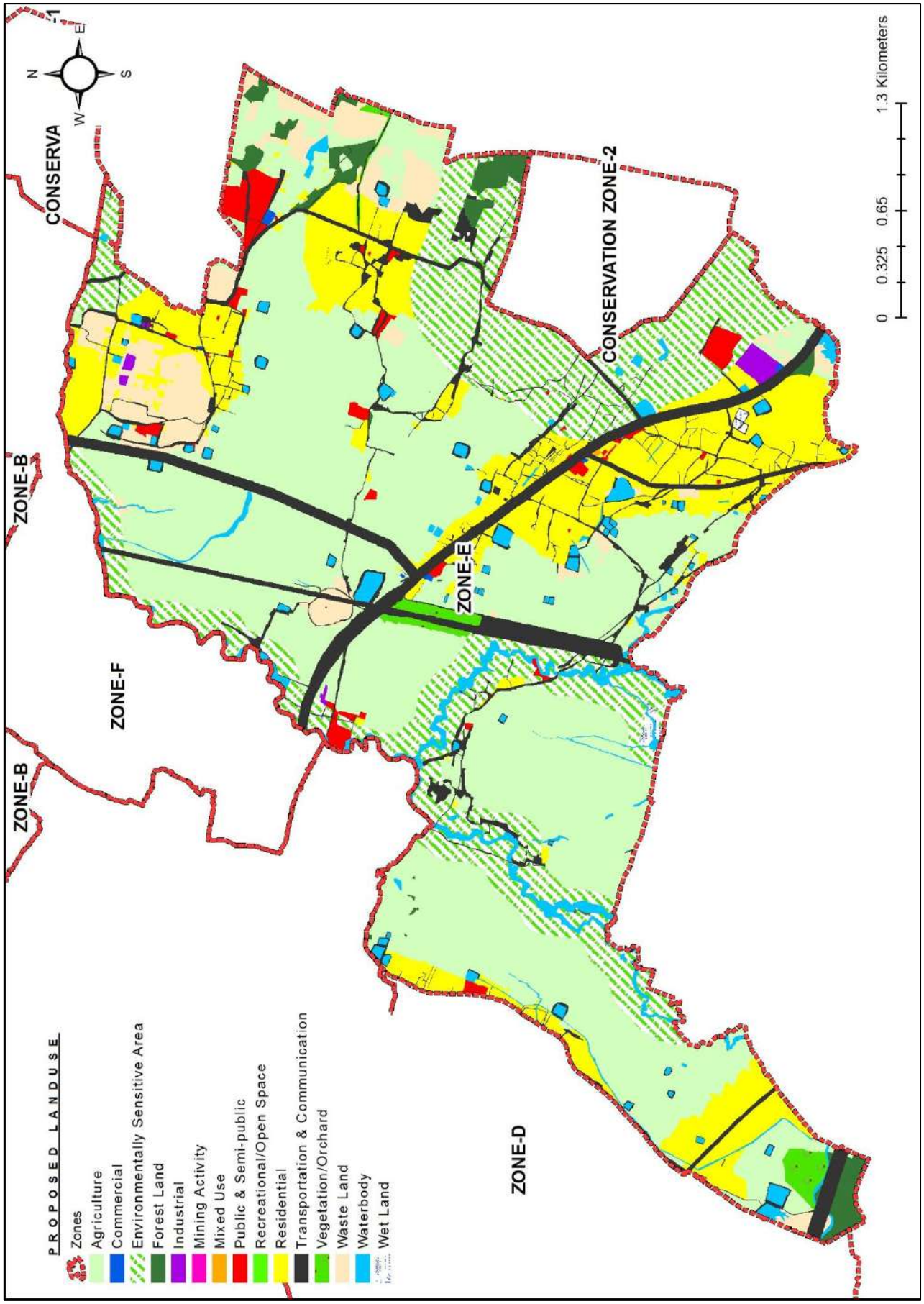
PROPOSED LANDUSE
Zones
Agriculture
Commercial
Environmentally Sensitive Area
Forest Land
Industrial
Mining Activity
Mixed Use
Public & Semi-public
Recreational/Open Space
Residential
Transportation & Communication
Vegetation/Orchard
Waste Land
Waterbody
Wet Land

Zone-D


CONSERVA -1
CONSERVATION ZONE-2
ZONE-B
ZONE-F
ZONE-B
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ZONE-D
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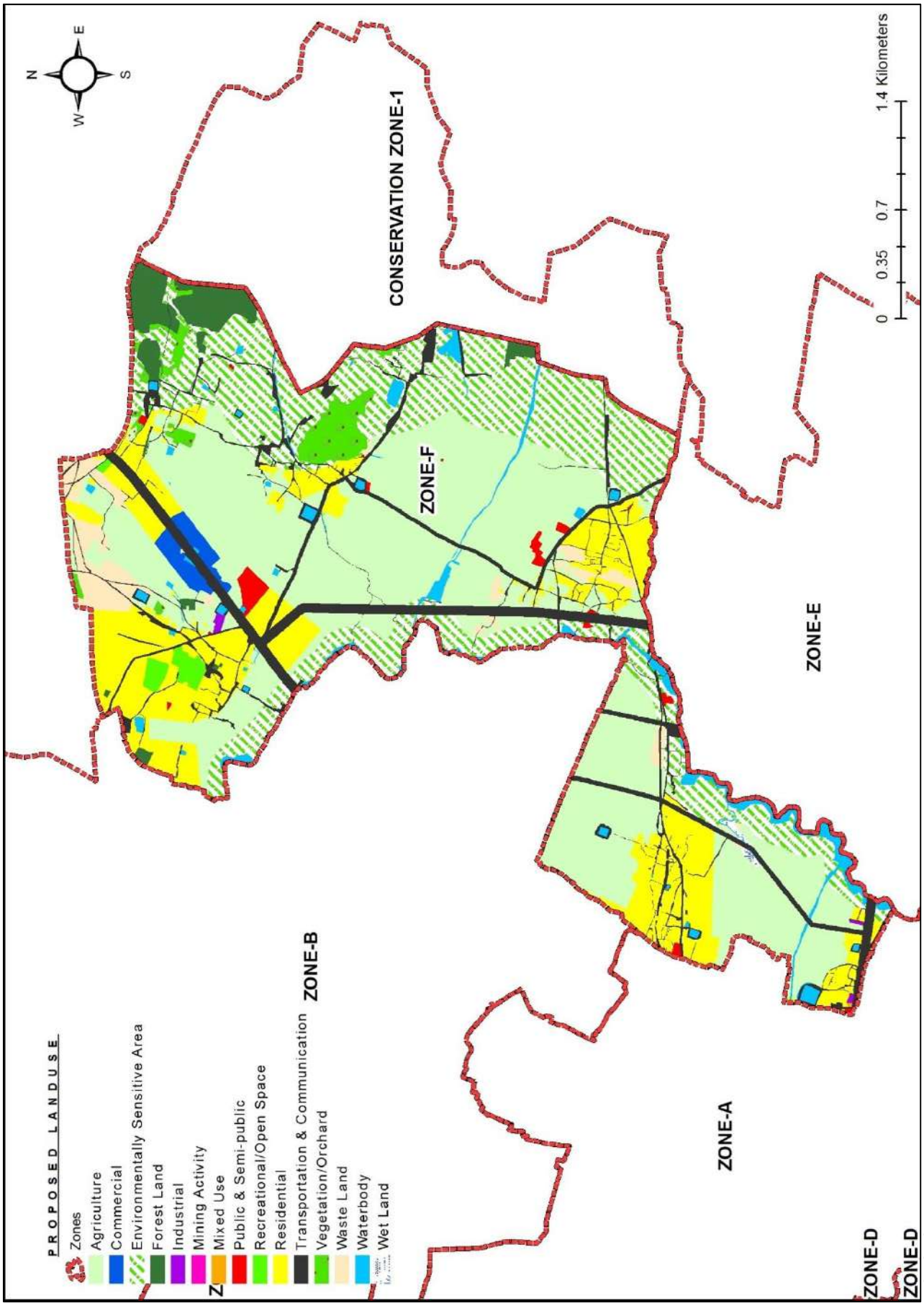
0 0.325 0.65 1.3 Kilometers
PROPOSED LANDUSE
Zones
Agriculture
Commercial
Environmentally Sensitive Area
Forest Land
Industrial
Mining Activity
Mixed Use
Public & Semi-public
Recreational/Open Space
Residential
Transportation & Communication
Vegetation/Orchard
Waste Land
Waterbody
Wet Land

Zone-E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CONSERVATION ZONE-1
ZONE-F
ZONE-E
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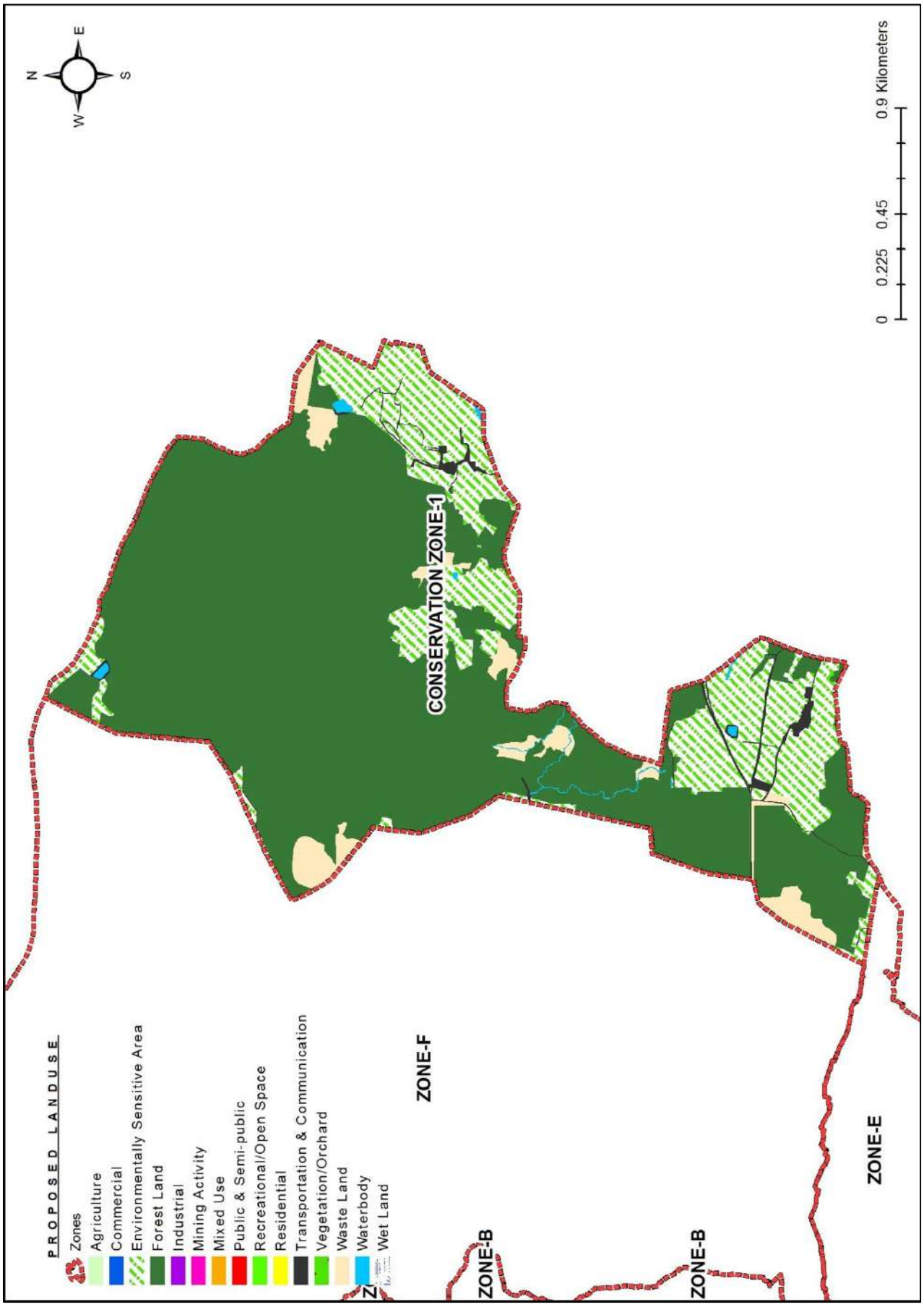
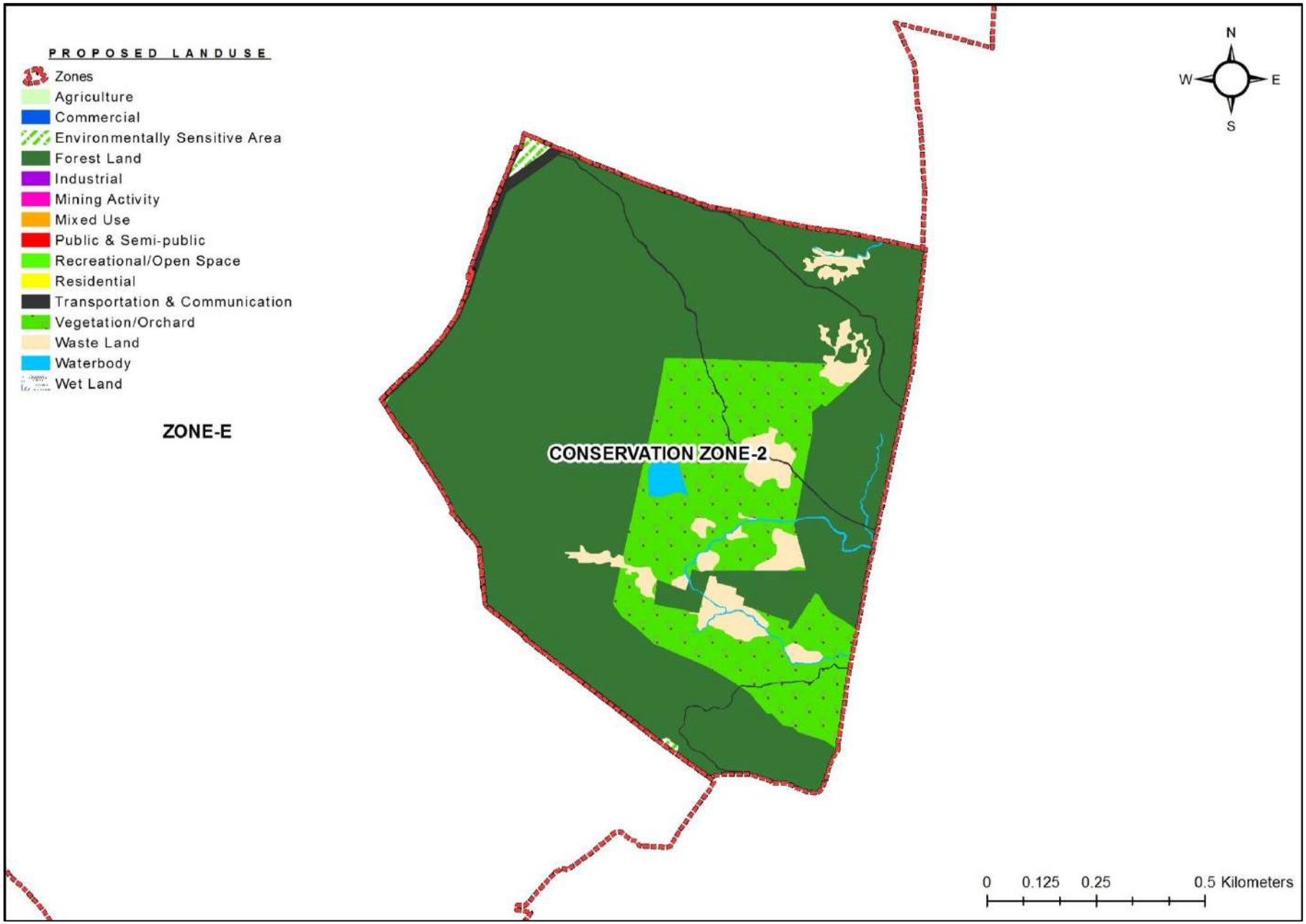
ZONE-D
PROPOSED LANDUSE
Zones
Agriculture
Commercial
Environmentally Sensitive Area
Forest Land
Industrial
Mining Activity
Mixed Use
Public & Semi-public
Recreational/Open Space
Residential
Transportation & Communication
Vegetation/Orchard
Waste Land
Waterbody
Wet Land

Zone-F

CONSERVATION ZONE-1



CONSERVATION ZONE-2



12.3.2 General Regulation

1. Except as otherwise provided, no structure or land hereafter shall be used and no structure or part there of shall be erected, re-erected or materially altered and no contract dealing with land its sale, lease, subdivision shall be made unless in conformity with these regulations.
2. Any use of land or structure existing at the time of these enforcement of the regulations, but not in conformity with these regulations:

Such uses of land or structure shall not be:

a. Changed to another non-conforming uses
b. Re-established after discontinuance of use for six consecutive months
c. Extended except in conformity with these regulations and
d. Re-built or repaired after damage exceeding one half of its cubical contents immediately prior to such damage.

3. All existing places of worship, temples, churches, mosques etc. and burial and cremation grounds shall not be treated as non-conforming uses.

12.3.3 Period of Moratorium for Change from Non-conforming to Conforming use

1. All non-conforming uses of land and buildings shall be discontinued and made to conform to the Master Plan as specified below for different non-conforming uses, under section 32 of Odisha Town Planning and Improvement Trust Act, 1956.

12.3.4 Non-conforming Uses – General

1. Notwithstanding anything contained in the zoning regulations, the Planning Authority may, in exceptional and unavoidable cases, if it considers appropriate, recommend to the Government through the Director, Town Planning, Odisha, for the establishment of any non-conforming use in any zone. The final decision in this regard shall, however, lie with the State Government.
2. Notwithstanding anything contained in the zoning regulation, the Planning Authority may allow any addition or alteration in the existing non-conforming residential uses in the Industrial, Commercial, Administrative, Institutional and Utilities and Open Spaces zone with such restrictions as it may considered desirable in the interest of the community.
3. In the plan for residential neighbourhood, requirement of open spaces, roads and neighbourhood commercial uses will be provided. In case where land is

subdivided. It is essential that sub-divisional layout plan should have the prior approval of the Planning Authority. While approving the Planning Authority will consider the provision of about 20-25 percent for roads, 5 percent for open spaces and 1 percent for neighbourhood shopping areas.

12.3.5 Industrial Non-conforming Uses

1. Industrial use of structures or land which does not conform to the land use shown in the Master Plan, shall either have to be discontinued gradually, or shifted, in stages to the industrial areas earmarked in the Plan.
2. All noxious and nuisance industries which may be dangerous to life, or injurious to health or property, or causing offence to the sense of sights small or hearing or disturbance to rest and sleep must be the first to go from their present location. The time of their shifting ranging from period of 3 to 10 years shall be fixed by the Planning Authority, depending upon the nature and degree of such nuisance and the areas occupied.
3. Other industries will get more time for shifting i.e. from 5 years to a maximum period of 15 years on a sliding scale on the following criteria.
4. The capital value of land structure and machinery allowing for depreciation.
    a. The registered employment of industry (more time will be given to industries employing more workers).
    b. The registered employment of industry (more time will be given to industries employing more workers).
    c. The production floor space per workers.

12.3.6 Residential Non-conforming Use

1. Existing residential use of building in industrial, commercial use zones in ground floors only, and such residential building in Administrative, Institutional and Utilities and open spaces zones as shown in the Master Plan, shall be discontinued within a period of twenty years.
2. Not-withstanding anything contained in the zoning regulations, the Planning Authority may in any exceptional and unavoidable cases, if it considers appropriate, recommend to the Government through the Director of Town Planning, Odisha for the establishment of any non-conforming use in any zone. The final decision in this regard shall however lie with the State Government.

3. Notwithstanding anything contained in the zoning regulations, the Planning Authority may allow any addition or alteration in the existing non-conforming residential uses in the industrial, commercial, administrative, institutional and utilities and open space zone with such restrictions as it may consider in the interest of the community.
4. In the plan for residential neighbourhood, requirement of open space, roads and neighbourhood commercial uses will be provided. In case, where land is sub-divided, it is essential that sub-divisional layout plan should have prior approval of the Planning Authority. While approving the Planning Authority will consider the provision of about 20-25 percent for roads, 5 percent for open spaces and 1 percent for neighbourhood shopping areas.

12.3.7 Commercial non-conforming uses

1. Except otherwise provided in the Master Plan commercial use of buildings or lands of wholesale nature as existing at the time of enforcement of this regulations in industrial, residential, administrative, Institutional and Utilities and Open Spaces zones as shown in the Master Plan will have to be discontinued within a period of ten years.

12.3.8 Off Street Parking Space for Motor Vehicles

1. Off street parking space shall be provided on any plot on which the uses specified in table are hereafter established. Such parking space as specified in table 9.2 shall be minimum and provided with adequate vehicular access to a street. In case of uses not included in table 9.2 the Planning Authority shall determine the requirements on the merit of each case commensurate with the intensity and adequacy of the requirements.
2. Each off-street parking space provided shall not be less than 250 square feet in area which includes the area of drives, isles and such other requirements.
3. If a vehicle parking space required by these regulations is provided in parking areas by groups of property owners for their mutual benefit, the Planning Authority may construe such use of this space as meeting the off-street parking requirements under these regulations.
4. If off-street vehicle parking space cannot be reasonably provided the Planning Authority may permit such space to be provided in the vicinity. Such vehicle

parking space shall be required as open space associated with the permitted use and shall not be encroached in any manner.

12.3.9 Off Street Loading

All uses involving the loading and unloading of trucks and heavy vehicles shall be provided with sufficient space to permit the transfer of goods and products in areas other than a public street.

12.3.10 Application for Permission

a. Every owner of land who intends to erect a building or re-erect or alter materially or add to an existing building or intends to change the use of any land or structure shall submit application to the Special Planning Authority for approval of the site and for permission to execute the work in such form and manner and accompanied by such document as the Special Planning Authority may determine. All plans must be signed by an Architect or by a Graduate Engineer and thus be submitted to the Special Planning Authority, Keonjhar.
b. The Special Planning Authority may fix a reasonable price for the form which it shall prescribe for submission of application seeking permission for construction. A subscription as scrutiny fee may be charged to every person, thus submitting their building plan completed in every respect and the charges are be paid at the time of submission of such plan and credited to Revenue Accounts of Special Planning Authority.
c. In case of site of the building to be erected, re-erected or altered or added to, is held by the applicant on lease by any person or agency or department of Government, the application shall be accompanied by a certificate for the lessor to the effect that said lessor has no objection to such erection, re-erection, addition or alteration.
d. The Planning Authority may require the applicant to furnish with it such information which has not already been furnished, or to satisfy it that there are no objections which may lawfully be taken to the grant of permission to execute the work.
e. If any information, as required above or in the application form or plans and documents, is in the opinion of the Planning Authority incomplete or defective it may require the applicant to furnish further information. If the required

information is not furnished within one month the application shall be liable for rejection.

12.3.11 Duration of Permission

The permission once accorded shall remain valid for a period of 5 years for residential use and 3 years for the buildings other than residential use. If the construction is not completed within the specified period the owner shall get the permission revalidated by the Planning Authority and such revalidation shall be subject to the regulations then in force.

12.3.12 Issue of Refusal of Permission

The Planning Authority may either issue or refuse permission with such modification and directions or subject to such conditions as it may deem necessary. In case of refusal the Planning Authority shall quote the reasons for such refusal.

12.3.13 Permission not to be given under Certain Cases

a. Save as otherwise provided in the zoning regulation, no permission shall be given for re-erection of or addition or alteration to a building, the use of which has been declared as non-conforming in the Master Plan unless the owner undertakes to change the use to conforming one, but subject to time limit prescribed under these regulations.

b. No permission shall be given for erection, re-erection of or alteration or addition to a building, if the use of site in the opinion of the Planning Authority is likely to affect free flow of traffic in the area and is likely to cause congestion on the nearby.

12.4 Use Zones Designated

There shall be 8 land use categories subdivided into use Zones as given below:

Table 12-1: Land Use categories subdivided into Use Zones

S. No.	Land use	Name of Use Zone	Legend
1	Residential	Residential house/Plot, Group Housing	R
2	Commercial	Retail Shopping, General Business and Commerce, District Centre, Community Centre, Non Hierarchical Commercial Centre	C1
		Wholesale, Warehousing, Cold Storage and Oil Depot	C2
		Hotels	C3
3	Mixed use	Mix of two or more land uses	MU

S. No.	Land use	Name of Use Zone	Legend
4	Public- semi Public	Administrative Offices	PS1
		Institutional	PS2
		Public Utilities/ Services/ Communication	PS3
5	Industrial	Light Industries/Cottage/ Manufacturing Units/ Industrial estate	M1
		Medium Industries/ Warehouse/ Godown	M2
6	Transportation	Roads/Bus Stand/Airport/Railway station	T
7	Recreational	Park/ Garden/ Zoo	P1
		Playground/ Stadium	P2
8	Non-Built-up Land	Agriculture	NB1
		Forest Land	NB2
		Water body	NB3
		Land reserved for future development	NB4
		Environmentally Sensitive Areas	NB5

There will be certain landuses which shall be permitted and prohibited in different use zones.

12.5 LAND USE CLASSIFICATION AND PERMISSIBLE USES

12.5.1 Zoning:

(1). In the Planning area or areas where various use zones viz, residential, commercial, industrial, administrative, public & semi-public, recreational uses, transport & communication, green belt, natural drainage channel and water bodies having their zonal boundaries have been indicated, they shall be regulated as per rule 22 of these rules. Except as otherwise provided no structure or land hereinafter shall be used and no structure shall be erected, re-erected or altered unless its use is in conformity with these rules.

(2). For all non-confirming land use, no expansion shall be permitted. At the time of redevelopment, stipulated zoning regulations shall be followed.

(3). The Planning Authority shall notify the hierarchy of road, road width and land area on which the Mixed Land Use to be applicable.

12.5.2 Different use of land :

(1). Permission for different uses shall be accorded outright for principal use earmarked in the different zones described in the Table (uses / activities permitted).

(2). Permission for different uses described in table under Restricted uses / activities shall be permitted on special consideration and approval of the Authority and reasons for such consideration shall be recorded in writing.

(3). The purposes specified in table under prohibited activities / uses shall not be permitted in the areas reserved for particular uses.

(4). Residential buildings and others buildings may be permitted in the Primary Activity Use Zone if the following conditions are satisfied along with other conditions of these rules:—

- The land is not a leasehold land;
- The coverage is not more than 20%;
- The height is not more than 7.0 (seven) meters; and at least 60% of land is used for plantation/ agriculture;

Table 12-2 Land Uses Permitted/Restricted/Prohibited in Different Use Zones

Sl. No.	Use Zone	Permitted Uses / Activities	Restricted Uses/Activities	Prohibited Uses / activities
1.	RESIDENTIAL (Primary Residential Zone, Unplanned/ Informal residential Zone).	1. Residence – plotted, (detached, semi - detached and row housing) group housing houses, residential flat, residential-cum-work, 2. hostels, boarding and lodging (accommodation for transit employees of Govt./ Local Bodies) houses, 3. marriage hall, community hall, 4. old age home, 5. police post, 6. guest houses, 7. crèches, 8. day care centre, 9. convenience shopping centres, local (retail shopping),	1. *Dharamshala*, foreign missions, night shelters, 2. petrol pumps, motor vehicle repairing 3. workshop/garages, household industry, bakeries and confectionaries, 4. storage of LPG gas cylinders, 5. burial-grounds, 6. restaurants and hotels, 7. printing press, 8. godowns/ warehousing, 9. bus depots without workshop, 10. cinema hall, auditoriums, markets for retail goods, 11. weekly markets (if not obstructing traffic circulation	1. Heavy, large and extensive industries: noxious, obnoxious and hazardous industries, 2. warehousing, storage go-downs of perishables, 3. hazardous, inflammable goods, 4. workshops for buses etc., 5. slaughter-housing 6. wholesale mandis, 7. hospitals treating contagious diseases, 8. sewage treatment plant/disposal work, 9. water treatment plant, 10. solid waste dumping yards,

Sl. No.	Use Zone	Permitted Uses / Activities	Restricted Uses/Activities	Prohibited Uses / activities
		10.medical clinic, dispensaries, nursing home and health centres (20 bed), dispensary for pets and animals, 11.professional offices, educational buildings: (nursery, primary, high school, college), school for mentally/ physically challenged, 12.research institutes, 13.community centres, 14.religious premises, 15.library, 16.gymnasium, 17.park/tot-lots, 18.plant nursery, 19.technical training centre, yoga centres/health clinics, 20.exhibition and art gallery, clubs, 21.banks/ ATM, police stations, 22.taxi stand/three-wheeler stands, bus stops, 23.electrical distribution depot, 24.water pumping station, 25.post offices, 26.hostels of non-commercial nature, 27.kindergartens, 28.public utilities 29.Buildings except service and storage yards.	and open during non-working hours), 12.informal markets, 13.multipurpose or junior technical shops, 14.transient visitors camp, 15.municipal, State Central and Government offices.	11.outdoor games stadium, indoor games stadium, 12.shooting range, 13.zoological garden, 14.botanical garden, 15.bird sanctuary, 16.picnic hut, 17.international conference centre, 18.courts, 19.sports training centre, 20.reformatory, 21.district battalion office, 22.forensic science laboratory.

Sl. No.	Use Zone	Permitted Uses / Activities	Restricted Uses/Activities	Prohibited Uses / activities
2	COMMERCIAL USE (Retail Shopping Zone, General Business and Commercial District/ Centres, Wholesale, Go-downs, Warehousing/ Regulated markets, Service Sector, Regulated/ Informal/ Weekly markets	1. Shops, convenience /neighbourhood shopping centre, 2. local shopping centres, 3. professional offices, work places/offices, 4. banks, 5. stock exchange/financial institution, 6. bakeries and confectionaries, 7. cinema hall/theatre, 8. malls, banquet halls, 9. guest houses, 10.restaurants, hotels, 11.weekly market, 12.petrol pumps, 13.go-downs and warehousing, 14.general business, 15.wholesale, 16.residential plot-group housing, 17.hostel/boarding housing, 18.hostel, 19.auditoriums, 20.colleges, 21.nursing homes/medical clinics, pet clinics, 22.religious places, 23.commercial centres, 24.research/training institute, 25.commercial service centres/garages/ work shop,	1. Non-pollution, non-obnoxious light industries, 2. warehousing/storage go downs of perishable, 3. inflammable goods, coal, wood, timber yards, 4. bus and truck depots, 5. gas installation and gas works, 6. poly techniques and higher technical institutes, 7. junk yards, 8. water treatment plant 9. railway yards/stations, sports/stadium and public utility installation, 10.hotel and transient visitor's homes, 11.religious buildings, 12.hospitals and nursing homes.	1. Dwellings except those of service apartment, 2. Essential operational, watch and ward personnel, 3. heavy, extensive, noxious, obnoxious, hazardous and extractive industrial units, 4. hospitals/research laboratories treating contagious diseases, 5. poultry farms/dairy farms, 6. slaughter-houses, 7. sewage treatment/disposal sites, 8. agricultural uses, 9. storage of perishable and inflammable commodities, 10.quarrying of gravel, sand, clay and stone, 11.zoological garden, botanical garden, bird sanctuary, picnic hut, 12.international conference centre, 13.courts, 14.sports training centre, 15.reformatory, 16.district battalion office,

Sl. No.	Use Zone	Permitted Uses / Activities	Restricted Uses/Activities	Prohibited Uses / activities
		26.night shelter, weekly/formal markets, 27.library, parks/open space, 28.museum, 29.police stations/post, taxi stand/three wheeler parking site, stands, 30.30)post offices, government/ institutional offices, telephone exchange / centres, 31.warehousing 32.covered storage, research institutions.		17.forensic science laboratory 18.all other activities which may cause nuisance and are noxious and obnoxious in nature.
3	INDUSTRIAL USE ZONE (Service and Light Industry, Extensive and Heavy Industry, Special Industrial Zone – (Hazardous, Noxious and Chemical)	1. Residential building for essential staff and for watch and ward personnel, 2. all kind of industries, 3. public utilities, 4. parking, 5. loading, unloading spaces, 6. warehousing, storage and depot of non-perishable and non-inflammable commodities and incidental use, 7. cold storage and ice factory, 8. gas godowns, 9. cinema, 10.bus terminal, 11.bus depot and workshop, 12.wholesale business establishments,	1. Noxious, obnoxious and hazardous industries except storage of perishable and inflammable goods, 2. junkyards, sports /stadium /playgrounds, 3. sewage disposal works, 4. electric power plants, 5. service stations, 6. cemeteries, government/semi government/ private business offices, 7. bank and financial institutions, 8. helipads, hospitals/ medical centres, 9. religious buildings, 10.taxi stands, 11.gas installations and gas works,	1. Residential dwellings than essential operational, 2. service watch and ward staff, 3. schools and colleges, 4. hotels, motels and caravan parks, 5. recreational sports or centres, 6. other non-industrial related activities, 7. religious buildings, 8. irrigated and sewage farms, 9. major oil depot and LPG refilling plants, 10.commercial office, 11.educational institutions, 12.social buildings.

Sl. No.	Use Zone	Permitted Uses / Activities	Restricted Uses/Activities	Prohibited Uses / activities
		13.petrol filling stations with garage and service stations, 14.parks and playgrounds, 15.medical centres, restaurants.	12.animal racing or riding stables, 13.workshops/garages, 14.dairy and farming, 15.quarrying of gravel, sand, clay or stone.	
4	PUBLIC AND SEMIPUBLIC USE ZONE (Govt./ Semi Govt. / Public Offices, Govt. land use, Police Headquarter/ Station, Police line, Educational & Research, Medical & Health, Socio Cultural & Religious (incl. Cremation and Burial Grounds.	1. Government Offices, Central, State, local and semi Government, public undertaking offices, 2. defence Court, universities and specialized educational institute, 3. polytechnic, 4. colleges, 5. schools, nursery and kindergarten (not to be located near hospital or health care facility), 6. research and development centres, 7. social and welfare centres, 8. libraries, social and cultural institutes, 9. religious buildings /centres, 10.conference community halls, halls, marriage halls 11.dharamshala, 12.guest house, 13.museum / art galleries, 14.exhibition centres, auditoriums, open air theatre, 15.recreational club, playground,	1. Residential flat and residential plot for group housing for staff employees, hostels, 2. water supply installations, 3. sewage disposal works, 4. service stations, 5. railway stations/yards, bus/truck terminals, 6. burial grounds, cremation grounds and cemeteries /graveyards, 7. warehouse /storage godowns, 8. helipads, commercial uses / centres, 9. other uses/ activities.	1. Heavy, extensive and other obnoxious, hazardous industries 2. slaughter-houses, 3. junk yards, 4. wholesale mandis, 5. dairy and poultry farms, 6. farm-houses, 7. workshop for servicing and repairs, 8. processing and sale of farm product and uses not specifically permitted herein.

Sl. No.	Use Zone	Permitted Uses / Activities	Restricted Uses/Activities	Prohibited Uses / activities
		16.banks, police station/police posts, police lines, police headquarters, jails, 17.fire stations/fire posts, 18.post and telegraph, 19.public utilities and buildings, 20.solid waste dumping grounds/sites, 21.post offices, 22.local State and Central Government offices and use for defence purposes, 23.bus and railway passenger terminals, public utility and buildings, 24.local municipal facilities, 25.uses incidental to Government Offices and for their use, 26.monuments, 27.radio transmitter and wireless stations, telecommunication centre, telephone exchange, 28.hospitals, health centres, nursing homes, dispensaries and clinic.		
5	MIXED USE ZONE (Mixed Industrial	1. In M1 Zone activities falling	1. Activities related to commercial,	1. All other activities especially industrial

Sl. No.	Use Zone	Permitted Uses / Activities	Restricted Uses/Activities	Prohibited Uses / activities
	use, mixed Residential use, Mixed Commercial use)	within non- polluting industry/ service industry (dominant land use) categories can coexist with maximum up to 30% of commercial, institutional, recreational and residential land use. 2. In M2 Zone all activities falling within permitted residential land use (dominant land use) shall be minimum 60% and to coexist with commercial, institutional, recreational. 3. In M3 Zone all activities falling within permitted commercial, institutional land use (dominant land use) shall be minimum 60% and to coexist with residential, recreational and non- polluting and household industry.	institutional and residential land use in M1 Zone and non-polluting industrial land use in M2 Zone can be increased to between 20-50% depending on the contextual and locational feasibility of the area.	which are polluting in nature and which will have an adverse impact on the overall activities of this zone *Note: Mixed land use to be well defined by the Development control body by prescribing the limits on the use of activity based on the abutting road width, compatible uses, plots size, ground coverage, FAR/FSI, density, any other urban design guideline.*
6	RECREATIONAL USE ZONE (Playgrounds/ Stadium/ Sports Complex, Parks and Gardens – Public open spaces and Multi-open space	1. Regional parks, district parks, playgrounds, children traffic parks, 2. botanical / zoological garden, bird sanctuary, 3. clubs, 4. stadiums (indoor), outdoor stadiums	1. Building and structures ancillary to use permitted in open spaces and parks such as stand for vehicles on hire, taxis and scooters, bus and railway passenger terminals, 2. facilities such as police post, fire post, post and telegraph	1. Any building or structure which is not required for open air recreation, dwelling unit except for watch and ward personnel and uses not specifically permitted therein.

Sl. No.	Use Zone	Permitted Uses / Activities	Restricted Uses/Activities	Prohibited Uses / activities
		with/ without health centre for players and staff, 5. picnic huts, holiday resorts, 6. shooting range, sports training centres, 7. specialized parks /maidans for multiuse, 8. swimming pool, 9. special recreation and special educational areas, , 10.library, 11.public utilities.	office, 3. commercial use of transit nature like cinema, circus and other shows, 4. public assembly halls, 5. restaurants and caravan parks, 6. sports stadium, 7. Open air cinemas.	
7	TRANSPORT AND COMMUNICATION USE ZONE (Roads/ BRTS, Railway/ MRTS, Airport, Seaports/ Dockyard, Bus depots/ truck terminals and freight complexes, Transmission and Communication)	1. Road transport terminals (bus terminals and depots), 2. goods terminals, 3. parking areas, circulations, airports building and infrastructure, 4. truck terminal, 5. motor garage, workshop, 6. repair and repair shop and 7. facilities such as night shelter, boarding house, 8. banks, 9. restaurants, 10.booking offices, 11.transmission centre, wireless station, radio and television station, 12.observatory and weather office.	1. Any other use/activity incidental to transport and communication, residential dwelling units for essential staff and watch and ward personnel.	1. Use/activity not specifically permitted herein. In vicinity of airports: butcheries, tanneries and solid waste disposal sites shall be prohibited within 10 km from the Aerodrome Reference Point (ARP).

Sl. No.	Use Zone	Permitted Uses / Activities	Restricted Uses/Activities	Prohibited Uses / activities
8	PRIMARY ACTIVITY USE ZONE (Agriculture forest, Poultry and dairy farming, Rural settlements, Brick kiln and extractive areas, Others like fishing, pottery etc.)	1. Dwelling for the people engaged in the farm (rural settlement), 2. farm-houses and accessory buildings, 3. agriculture, 4. horticulture and forestry, 5. poultry, piggeries and dairy farm, 6. cottage industries, 7. storage, processing and sale of farm produce, 8. petrol and other fuel filling stations, 9. fishing, 10. public utility and facility buildings.	1. Farm houses, extensive industry, 2. brick kilns, 3. sewage disposal works, 4. electric power plant, 5. quarrying of gravel, sand, clay or stone, 6. service industries accessory to obnoxious and hazardous industries, 7. school and library, 8. temple, churches, mosques and other religious buildings, 9. milk chilling stations and pasteurization plants.	1. Residential use except those ancillary uses permitted in agricultural use zone, 2. heavy extensive, noxious, obnoxious and hazardous industries, 3. any activity which is creating nuisance and is obnoxious in nature.
9	ENVIRONMENTALLY SENSITIVE ZONE (Buffer of 500 meter on Forest area and 150 meter on each side of the river)	1. River side green areas, River front developments 2. Scenic value areas, Theme parks, yoga parks, sports centres and community recreational areas, International convention centre 3. Resorts, sculpture complex, lagoons and lagoon resort, water sports, Art academy, music pavilions 4. media centres, food courts, Parking areas, visitor facilities 5. Existing village settlements, Existing	1. Hospitals and health institutions, 2. Educational technical, research institutes of higher order 3. Water Treatment Plant, Sewage Treatment Plant, Solid waste Treatment Plant, Solid waste dumping ground 4. Apartment buildings having 100% stilt.	1. Plotted Housing 2. Small industries or small institutions 3. Use/activity not specifically related to Environmentally sensitive Use Zone not permitted herein 4. No development of any kind is permitted between the River/Canal/ Stream and the embankment

Sl. No.	Use Zone	Permitted Uses / Activities	Restricted Uses/Activities	Prohibited Uses / activities
		residential or other uses 6. Boating , Picnic huts, Camping sites Special Training camps 7. Tourist and pilgrim related commercial activities, hotels and lodges 8. Non-polluting, agro-based and processing industries, Storage or Godowns for food grains		
10	WASTELAND (Gullies and Ravines, Sodic land, Barren, Rocky/ Stony, Sandy and Water logged areas)	1. Cover cropping and strip planting 2. Industries requiring minimal water usage 3. Storage or Go-downs 4. Solid Waste Treatment Plant, Water Treatment Plant, Sewage Treatment Plant 5. Garbage Treatment Facility 6. Storage Yard or rail yard 7. Logistic Parks 8. Agro forestry 9. Play Ground or Exhibition Ground 10.Electricity Grid or Sub-stations	1. Affordable Housing 2. temple, churches, mosques and other religious buildings, 3. Educational technical, research institutes of higher order.	1. Plotted Housing 2. Heavy, extensive and other obnoxious, hazardous industries 3. slaughter-houses, 4. dairy and poultry farms, 5. farm-houses,

Source: The Odisha Special Planning Authority and Regional Improvement Trust Common Planning and Building Standard Rules, 2017

(B) Protected and Undevelopable use zone

The protective and undevelopable use zone shall be subdivided into

- Water bodies
- Special Recreation Zone / Protective Areas such as sanctuaries/ reserve forests and Eco sensitive zone
- Undevelopable use zone

Undevelopable use zone shall be identified as all earthquake/landslide prone, cliffs and environmentally hazardous area, areas adjacent to fault lines, areas with slope higher than 45 degree (NBC), flood plain and areas adjacent to major drainage lines191 for general guidance, other areas identified by State Disaster Management Authority and all the environmentally sensitive areas.

12.6 Development Control Regulations (DCR)

The Developmental activities shall be strictly as per the Odisha Special Planning Authority and Regional Improvement Trust Common Planning and Building Standard Rules, 2017.

12.6.1 Special Regulations

All the measures mentioned within the regulation would be enforced while envisioning the plan; however the development area has some unique features and opportunities to develop few of the areas differently with different sensibilities. Heritage precincts, areas in and around forest and other natural resources would have to be dealt with. Mentioned below are few of the selective measures that would have to be taken during Zonal Development Plan (ZDP) implementation.

1. **Environmental Sensitive Zone**

I. *Along Rivers and Water-bodies*

A 200m buffer/ green belt along both sides along the River Aradei and a 45m buffer/ green belt around both sides of other tributaries and water bodies are proposed in the Master Plan.

Within the demarcated buffer for the rivers and tributaries the following uses will be allowed:

- Sewerage Treatment Plants and Water treatment plants
- Roads, pathways, formation of drains, culverts, bridges, etc which will not obstruct the water course, run offs, channels.
- Activities associated with river and its buffer may be taken into account for reservation of park while sanctioning plans.

- Any new development to take place beyond the buffer area.

II. Around Forest Areas

A 500m buffer zone is proposed along the two main forests in which no polluting or hazardous industries, mining or activities which will destroy the natural beauty or environment of the area; will be prohibited.

2. Around Heritage Areas

Each of the zones would be detailed out at the stage of Zonal Development Plan. Separate regulations for heritage areas within the town would be detailed out to preserve and conserve heritage significance of the development area. These areas and buildings will be decided by the ASI or the State as 'Heritage and Conservation Areas'.

The heritage regulations focus on the building development / redevelopment/ repairs, heritage listing, management of heritage precinct, maintaining the aesthetics and heritage character of the zone. Mentioned below are few of the areas where change would be proposed to maintain the character of the area:

- **Land use density**- low density development is to be suggested to control the pressure on the area.
- **Land use restrictions**- check on establishment of industries and other activities which might cause deterioration of the heritage building and precinct should be there.
- **Height restrictions** for new and existing development should be checked to maintain the visibility and dominance of the heritage assets of the area.
- **Facade details and regulations-** facades of the buildings should be in accordance with the existing architectural character. There can be regulations on color schemes, materials used and other visible architectural elements.
- **FAR/ FSI regulation**- This should be regulated as per the guidelines for lesser density.

The details of the listed special area regulations will be framed in consultation with the concerned authorities.

CHAPTER-13 INSTITUTIONAL SET UP

Planning is a continuous process and the Planning Department's work continues through plan preparation, plan processing, plan enforcement, plan implementation, plan detailing, plan review and plan formulation. The plan formulation, implementation, monitoring and review exercises have to be statutorily prescribed in the State Acts and completed within the specified time-frame and schedule. To fulfil these requirements, institutional set-up has a vital role.

13.1 Institutional Set Up in Keonjhar

Directorate of Town Planning is responsible for planning in the state. However, the agency directly involved with the planning of cities depends on the size of the settlement as well as participation of local representatives. In Odisha, there are three types of agencies dealing in planning and development. These are –

- Special Planning Authority (for smaller towns / cities)
- Regional Improvement Trust (for medium sized cities)
- Development Authority (for larger cities)

Upgradation of any city from lower level to higher level of planning agency is accompanied by a Government notification.

Keonjhar has a Special Planning Authority responsible for preparation of Master Plan for the area and building plan approval.

13.2 Directorate of Town Planning, Government of Odisha

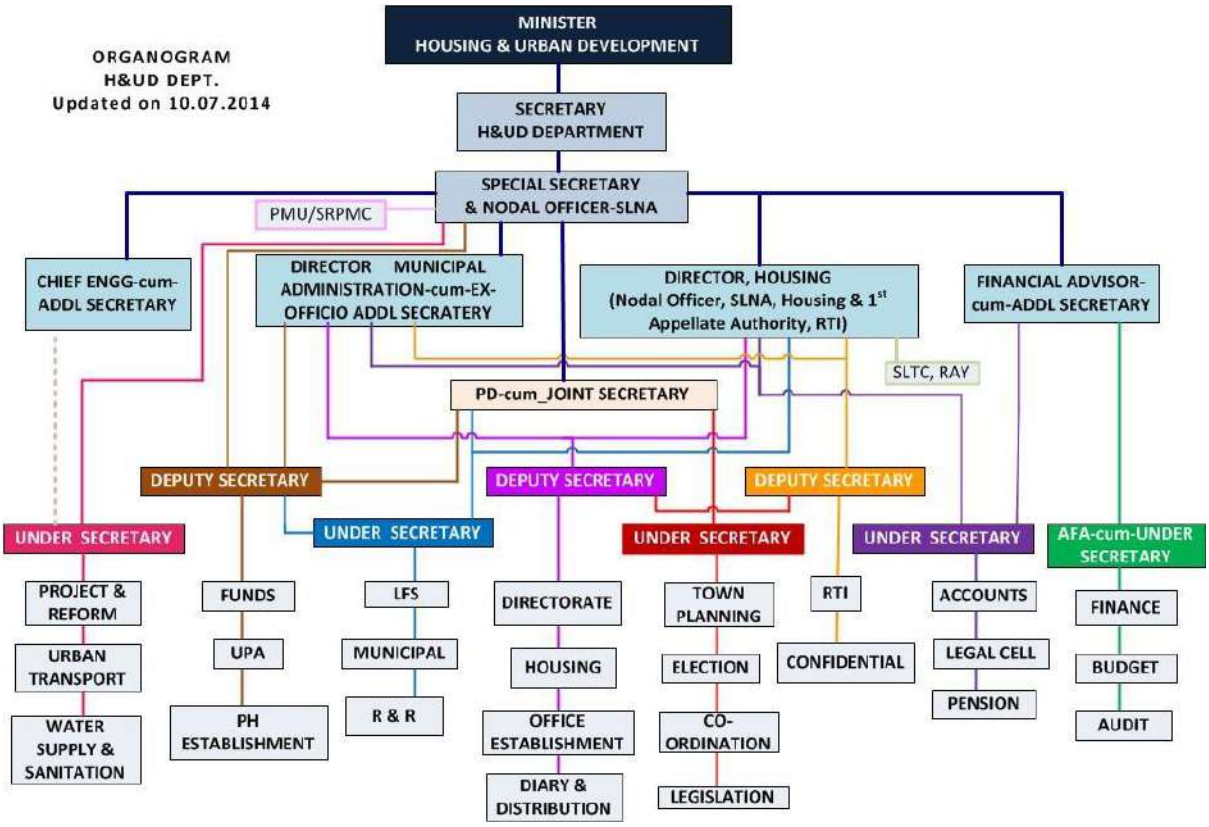
The first Town Planning Organization was created in Odisha for Planning of the Cuttack city with appointment of Town Planner in 1954. This Organization conducted various surveys and prepared various reports for Cuttack. The Town Planning Organization created for Cuttack drafted the legislation and Odisha Town Planning and Improvement Trust Act, 1956 was enacted.

Its major activities are:

- Preparation of Master Plans and approval of the same on behalf of Special Planning Authorities.
- Preparation of Project Reports for the IDSMT and monitoring of the schemes.
- Technical guidance to Government as well as Planning Authorities with respect to regulation of Plan proposals.

Directorate of Town Planning is under Ministry of Housing and Urban Development, Government of Odisha as shown in the figure below.

Figure 13–1 Organizational structure of Housing and Urban Development Department, Odisha



13.3 Special Planning Authority, Keonjhar

After enactment of Odisha Town Planning and Improvement Trust Act, 1956 the preparation of Master Plan was enforced through central assistance. The Planning Authority for Keonjhar town was constituted under Housing and Urban Development Department vide Notification No. 8077/ HUD, Dt.02.03.1981.

The aim of the Special Planning Authority, Keonjhar is to ensure provision for the planned development improvement and expansion of Keonjhar town so as ensure their present and future inhabitants. It is involved in preparation of Master Plan for the Urban centres with the perspective of 15 Years and preparation of various schemes for development of Housing, shopping, Trade & Commercial, Transport & Recreation etc. which will be economically viable & socially acceptable. The Master Plan exercise requires various surveys, analysis of data/ information, preparation of plan with major proposals, preparation of report etc. Considering the work load of the Special Planning Authority and lack of technical manpower, the Master Plan exercise

is taken up by the Town Planning Unit, Keonjhar. Regulation functions are attended by the staff of Town Planning Unit, Keonjhar and S.P.A., Keonjhar since there is necessity of disposal of individual cases in time. Preparation and implementation of development schemes are also attended by the Technical personnel of the Town Planning Unit, Keonjhar along with available staff of the Special Planning Authority, Keonjhar.

Special Planning Area Committee functions under the Chairmanship of the Collector & District Magistrate, Keonjhar.

The SPA Keonjhar renders the following services –

- Granting of license under section 33(1) of O.T.P. & I.T. Act, 1956 for construction of buildings.
- Construction of shopping complex and office buildings under IDSMT Schemes and self-finance.
- Development control within the town through O.T.P. & I.T. Act, 1956.

13.4 Keonjhar Municipal Council

Keonjhar city is managed and governed by the Keonjhar Municipal Council (KMC). It is responsible for the following functions.

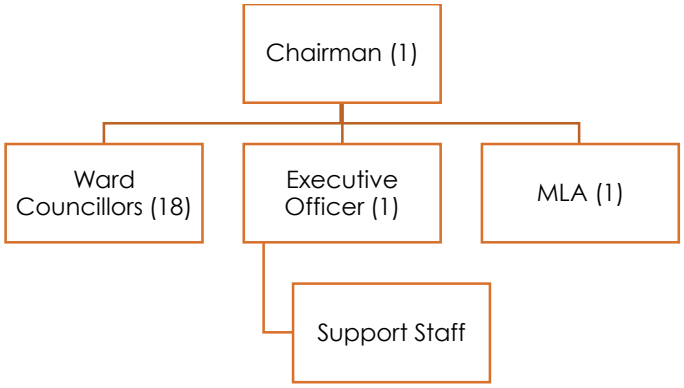
S. No.	Urban Infrastructure	Planning and Design	Construction	Operation and Maintenance
1	Water Supply	PHED (Urban)/ RWSSB (rural)	PHED (small works only)/ OWSSB/ RWSSB	PHED/ Municipality
2	Sewerage	OWSSB	OWSSB	OWSSB/ Municipality(Public Toilets)
3	Drainage	PHED/ Irrigation Dept.(rivers only)	PHED/Irrigation dept/ Municipality	PHED/Municipality
4	Solid Waste Management	Municipality	Municipality	Municipality
5	Municipal Roads	Municipality/ R&B	Municipality/R&B	Municipality
6	Street Lighting	General Electrical Department.	NESCO	Municipality
7	Public Transport	Municipality/ R&B	R&B	Municipality

The Odisha Municipal Act, 1950, governs the functioning of KMC. KMC performs the obligatory and discretionary functions as in the above Act. The governance of Urban Local Bodies (ULB) assumes importance in the wake of the 74th Constitution Amendment Act which delegates mandatory elections and greater devolution of powers and functions to the city corporations.

13.4.1 Organizational Structure

The Municipal Council is headed by a Chairman who is elected. Each ward is represented by a Ward Councillor in the Municipality. An officer on deputation is nominated as the Executive Officer in the municipality. All the members of Legislative Assembly are also part of the Municipal Council. The organizational structure of Municipal Council, Keonjhar is shown below.

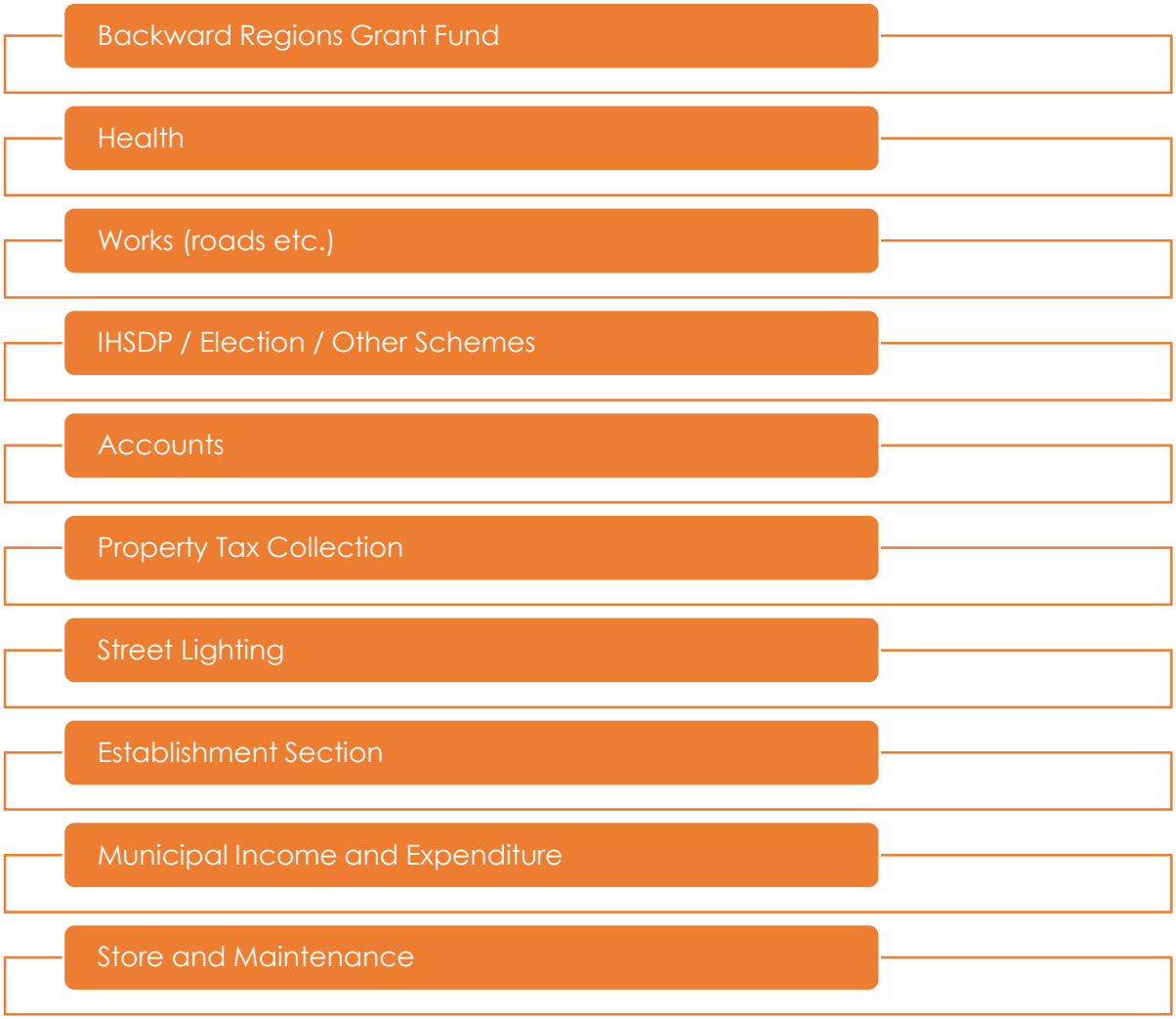
Figure 13–2 Organizational structure of Keonjhar Municipal Council



13.4.2 Departments

Keonjhar Municipal Council consist of 10 departments as shown in the figure below.

Figure 13–3 Departments in Keonjhar Municipal Council



Health department in the KMC works closely with the PHED, Government of Odisha which supplies the water to the city for provision of water supply and sanitation. Works department works closely with the R & B (PWD), Irrigation department. Street Lighting department is associated with NESCO which supplies power to the town.

CHAPTER-14 IMPLEMENTATION STRATEGIES, MANAGEMENT STRUCTURE AND RESOURCE MOBILIZATION

14.1 Introduction

Planning in a comprehensive, holistic and decentralized manner is essential to ensure ownership, commitment and relevance to the needs of the stakeholders. Planning involves the study of the existing problems, opportunities, challenges and their conceptualization in a framework. It is an effort to move in a desirable direction. Planning seeks to be efficient i.e. doing things rightly (make optimal use of resources, information, structures, funding etc), effective i.e. doing the right things (create desired and meaningful impacts and outcomes in a time bound manner which are measurable through monitoring). It also seeks to enhance equity and inclusion (of opportunity, rights and power, especially with regard to gender and deprived sections).

The three main resources for planning and development are money, manpower and land. Among all the three resources, land availability is limited and hence it must be utilised judiciously so that it helps in achieving a high level of economic efficiency.

Land and money, both the resources are limited with Government, hence private sector resources should be duly recognized and appropriately mobilized for investment in development depending upon the potential of the city. Proper mix of public and private sector resources is an impending need for the spatial and efficient implementation of public infrastructure programme.

For the development and rapid implementation of proposed projects, such policies will be framed which will help in meeting the envisioned target in minimum required time. Development proposals which will be self-sufficient, of public interest and resource generating will be encouraged.

To achieve the above envisaged proposal, points to be considered are as follows:

i. Phasing and prioritization of development activities.
ii. For major proposals according to phasing, land acquirement shall be done in six months.
iii. Upcoming schemes/ proposals in private sector shall be marked and private resources shall be invited.

iv. For solving the problem of land acquisition, town planning scheme and transferrable development right shall be adopted.

v. To overcome the problem of encroachment, strict action should be taken.

14.2 Preparation of Master Plan

Master Plan is a legal document prepared under the purview of the Odisha Town Planning and Improvement Trust Act, 1956. The Plan is prepared after conducting the detailed social economic survey, land use survey, traffic and transportation problems within the Master Plan Area with a view to diagnose the problem, potential of the town to view the perspective till 2030 taking into consideration the various objectives envisaged U/s 30 of the Odisha Town Planning & Improvement Trust Act. Keonjhar Master Plan 2030 is being prepared to fulfil the vision envisaged for the area.

14.3 Process of Master Plan Preparation

i. **Work order Issued to the Consultant for preparation of GIS Based Master Plan**- REPL received the Work order for the preparation of Plan for the perspective year 2030

ii. **Preparation of Inception Report**- Report contains the detailed understanding of the project, area and methodology to prepare a Master Plan.

iii. **Preparation of Concept report**- Report contains the study of existing condition of urban and rural areas, analysis of several aspects and conceptualization of Master Plan.

iv. **Land use Validation**- 100% validation of available data from the concerned Authority/ Department and updating of changes in the existing land use map.

v. **Survey Status Report**- 15% Socio- Economic Survey, Traffic and Transportation Survey and Land use Survey findings should be incorporated in the report.

vi. **Stakeholder Consultation**- Meeting with various Stakeholders will be done on the survey status report so that their inputs can be incorporated in the report and suggestions have been considered while preparing the report.

vii. **Preparation of Draft Master Plan**- Report contains the vision, aspect wise existing situation and proposals.

viii. **Publication of Draft Master Plan**- After the consultation with the SPA, Draft Master Plan will be published for the suggestion and comments of Public within 60 days U/s 31 (1) of the Act. After the suggestion and comments of public it is duly considered by the Planning Authority and forwarded to the Director/ State Government.

Until the Plan gets approval from the State Government, no building, layout plan or any land related plan will get into contract within the Master Plan Area unless having applied and obtained permission from the Planning Authority.

ix. **Approval and Final Publication**- after considering the views of the Planning Authority on suggestion and comments, the Director Town Planning/ State Government is to accord approval of the Plan and there upon, the same shall be finely published U/s 32 of the Odisha Town Planning & Improvement Trust Act. Since the Master Plan has to be dynamic Plan, being flexible enough to accommodate the fast pace of change taking place in an Urban Area over time, the Act also stipulates for the variation of Master Plan under section 32 (A) and periodic vision.

x. **Implementation of Master Plan**- Implementation of proposals of Master Plan require co-ordination between various agencies involved in Master Plan Area at Central, State and Local level. Any other proposals/ projects not mentioned in the Notified Master Plan but fall within the Master Plan Area should be in conformity with the proposed land use map and according to the zoning regulations.

14.4 Resource Mobilization and Implementation Framework

The Keonjhar Master Plan embodies number of development having long and short term implications. The process of materializing the planning proposals is called "Implementation of plan". The S.P.A Keonjhar constituted by the Government of Housing and Urban Development Department, Odisha, is the Implementing agency for implementation of development proposals in accordance with the provisions of the Odisha Town Planning & Improvement Trust Act, 1956 and Master Plan.

The basic aspects of implementation of Master Plan are:

1. Plan Enforcement and Regulation

Enforcement of plan refers to relates to regulatory aspects over constructional activities principally in informal sector. Hence, it is essential to enforce the Odisha Town Planning & Improvement Trust Act, 1956 in co-ordination with the Odisha Municipal Act/Rules to check Non-confirming Land uses, unplanned vertical/horizontal expansion of the urban area, creation of sums, squatters and other unhygienic conditions.

The Special Planning Authority, Keonjhar has to control unauthorized constructions/ developments after publication of the Draft Master Plan under 31(1) of the Odisha Town Planning & Improvement Trust Act, 1956. The publication of the Master Plan under section 32, it has taken care of the new developments in desired directions within the Master Plan Area as per the provisions mentioned in section 33(1) of the above said act.

2. Execution of Plan

Execution of Plan refers to the type and frequency of various developments taken-up for implementation by different Developing Agencies both in formal and informal sectors as per the provisions laid down in the Master Plan. In the urban set up, 90% of the development responsibility in the field of Housing, Trade and Commerce and Industries and rest comes from the private sector. The role of the public sector is more significant in the field of utility, facility and services.

The Special Planning Authority, Keonjhar has empowered to acquire vacant land within and in the peripheral areas of the Town, those are expected to be developed in next few years. After development, the same can be undertaken for different urban development schemes by the Special Planning Authority, Keonjhar raising funds from the Government as well as other financial institutions either in shape of Departments like: Director of Town Planning, Public Health & Engineering Department, Urban Local Body, Roads and Building etc. and actively association with the general public as far as possible.

For implementing various envisaged proposals, coordination among different responsible agencies and availability of fund with them is necessary. For increasing the resource availability with the local bodies, charges will be applied as per the usage of infrastructure facilities availed by the individual. This will help in achieving

and completion of large infrastructure projects such as development of roads, construction of sewage treatment plant etc.

Funds for development activities shall be available with local bodies through following sources:

i. Municipality Debentures
ii. Increase in users charges as per investment
iii. Regular and effective collection of user charges
iv. External development tax and betterment tax
v. Land use change charge
vi. Transferrable and purchasable development right
vii. Loans form the State and Central Government and other Corporations like LIC, HUDCO etc.
viii. Income from its own properties and services.

Expenditure for development activities of Planning Authorities are as follows:

i. Land acquisition and its development
ii. Housing Programme
iii. Social and utility services
iv. Action Programmes
v. Maintenance of its properties
vi. Surveys and inspections.

Implementation of plan can be effective only when it is monitored and reviewed time to time. While executing or implementing the project, it needs to be monitored regularly for seeing its effects. Monitoring will help in responding to the emerging socio-economic forces and check the unorganized development, alter the policies and proposals as per the actual demand of the time, effect of other neighbouring ongoing projects and completion of projects as scheduled.

For effective and efficient monitoring of plan, separate and dedicated Monitoring Unit shall be formed, which will be responsible for overall monitoring and implementation of the plan.

14.5 Phasing and Prioritization of Development

The phasing of the development schemes is done to address the most important issues on priority. The phasing will also help in avoiding the exhaustive use of the resources

and help in judicious and efficient resource utilization. Prioritization of development is very important concern for proper implementation of various proposals. City faces problems related to congestion, transportation, lack of infrastructure services like water supply, sewerage treatment, solid waste management which further impacts and degrades the environmental condition.

Management of solid waste is a serious threat to the city. To overcome the problem of solid waste, it is proposed to develop the solid waste management project for Keonjhar on priority basis. The sewer line needs to be laid in the developed areas which would help in minimizing the further degradation of water resources. (Water bodies/ Drains/ Rivers). Unplanned development and encroachment is also visible at various locations (in proposed Parks and Playground, industrial, institutional and commercial areas). It is recommended that such encroachments should be removed and proper fencing should be done after delineation of such spaces.

Adjudging the present growth scenario, slight increase in residential, commercial, industrial and public- semi-public uses happened in years 2008- 2014. Hence, new residential areas shall be developed according to the demand and infrastructure facilities shall be laid in priority according to their requirement.

14.6 Strategy

I. For capacity building in Master Plan Area, it is important that the present staffing pattern should be strengthened with persons with greater technical capabilities such as GIS, Auto cad, web designing, data mining, analytics etc. In addition, provision for short term contract, outsourcing of young staff with special skills from the open market should be permitted.

II. Master Plan Area should be developed through intelligent use of energy and resources with promotion of walk to work office area, digital communication networks and OFC connectivity.

III. It is observed that villages are largely excluded from the development purview. So, a separate funding window should be available for integrating them into the rural development strategy.

IV. Convergence and dovetailing of resources to be done in an innovative manner to maximize the impact of interventions in the area. Restructuring and reforms in institutional, fiscal and economic systems is necessary to achieve the

efficacy and effectiveness in management of long term programme of investments based on private finance by utilizing the public funds.

V. Project wise funds should be available for the development of infrastructure in the area.

As far as possible, agricultural land needs to be conserved. Urban land is a very precious resource and its use should be rationalised so that squatting on land for speculative purposes, artificial rationing and urban sprawl for sub-urbanisation and gentrification can be avoided.

CHAPTER-15 INVESTMENT PLAN

The different sectoral plans that have been drawn up for achievement over the period up to 2030 have given a rough estimate of investment to be undertaken. Notwithstanding the fact that this is just an indicative investment plan, it would be imperative to find out sources of enhanced capital finances to be able to carry out the required investment. Again, it has been a common experience that many of the capital expenditure has not been sustained properly leading the delivery of services to suffer. Therefore, sustenance of capital expenditure in terms of operation and maintenance of assets created becomes all the more important and this calls for looking at the recurrent revenue options.

15.1 Sector wise investment Plan

A summary of sector wise investment plan for all sector covering traffic and transportation, housing, water supply, sewage and storm water drainage. The following tentative standard rates are considered as per our calculation.

15.1.1 Traffic and Transportation

There are mainly four category of new roads proposed within the Master Plan Area. The cost of construction of 30M ROW road has been estimated as 6.00 Cr. Per kilometre. The total length of the 30M ROW road within the master plan area is 45.17 which requires a total cost of 271.02 Cr. The proposed road with 24M ROW requires a tentative estimation of 5.00 Cr per kilometre, so the total cost proposed 3.7km of 24M ROW require an investment of 18.50Cr. Similarly, 18M ROW road of length 6.2 km requires a tentative investment of 21.70Cr and 12M ROW road of length 35.34km require a total tentative investment of 88.35Cr. The total of cost of investment estimated for the improvement of road network is 399.57 Cr.

Table 15-1: Tentative Investment Plan of Traffic and Transportation

Item	Cost per Unit (In Cr. Rs.)	Length (in km)	Total Cost (In Cr. Rs.)
30 M ROW Roads	6.00 Cr/km	45.17	271.02
24 M ROW Roads	5.00 Cr/km	3.70	18.50
18 M ROW Roads	3.50 Cr/km	6.20	21.70
12 M ROW Roads	2.50 Cr/km	35.34	88.35
Grand Total			**399.57**

** These costs are tentative in nature and do not include land acquisition cost*

15.1.2 Affordable Housing

Considering the household size of 4 in the master plan area for the estimated population for 2030. The total number of affordable housing units proposed to accommodate the future population in 19,244. Considering the size of a single affordable housing unit in a municipal council area as 60 sq.m. the cost of constructing a single unit has been estimated as Rs.7000 per sq.m. In order to develop the proposed number of housing units a total tentative investment of 969.84 Cr is required.

Table 15-2: Tentative Cost of Development of Affordable Housing

Item	Dwelling Unit Required	Housing Area (60 sq.m. per unit)	Cost per Unit (Rs./sq.m.)	Total Cost for Development (In Cr.
Total Capital	19244	1154640	7000	808.24
Add the cost towards the price escalation of materials@10%				80.8
Add the cost towards the price escalation of labour charges@10%				80.8
Grand Total				**969.84Cr**

** These costs are tentative in nature and do not include land acquisition cost*

15.1.3 Water Supply Distribution

As per the estimation of water supply demand for the forecasted population of 2030, an additional water supply of 20.85 MLD is required. The total cost of development of a water supply network to distribute 1 MLD of water is estimated to be 20.85 MLD. In order to distribute a total amount of 20.85 MLD water an tentative investment of 31.28 Cr is required to construct the water supply network.

Table 15-3: Tentative Cost Estimate of Proposed Water Supply Distribution Systems in 2030

Item	Cost per Unit (In Cr. Rs.)	Proposed Quantity (In MLD)	Total Cost for Development (In Cr.)
Total Capital	1.5 Cr/MLD	20.85	31.28
Add the cost towards the price escalation of materials@10%			3.1
Add the cost towards the price escalation of labour charges@10%			3.1
Grand Total			**37.48**
Annual O&M Cost @5%			1.8

*Excluding cost of land

15.1.4 Sewerage Network

Considering that 80% of water supplied shall be released as sewage from the households. It is estimated that around 18.0 MLD of sewage shall be generated in 2030. In order to construct an sewerage network to cater the 18 MLD of sewerage, a total tentative estimation of 49.5 Cr is required.

Table 15-4: The Expected Cost Estimate of the Proposed STP System for 2030

Item	Cost per Unit (In Cr. Rs.)	Proposed Quantity (In MLD)	Total Initial Investment Cost (In Cr.)
Total Capital	2.5 Cr./MLD	18	45
Annual O&M costs for a STP unit @10%			4.5Cr.
Grand Total			**49.5 Cr**

*Excluding cost of Land

15.1.5 Solid Waste Management

Generation of solid waste in Keonjhar is projected to be 112.3 MT per day by 2030. In order to manage the household waste a comprehensive solid waste management system has been proposed which requires a capital investment of 0.2Cr per MT of waste. The management of total estimated 112.3 MT of solid waste would require a total investment of 27.96 Cr in 2030 which includes annual O&M costs of 1.1 Cr per year.

Table 15-5: Tentative Cost Estimate (In Crores) of Proposed SWM and Treatment Systems in 2030

Item	Cost per Unit (In Rs.)	Proposed Quantity (In MT)	Total Initial Investment Cost (In Cr.)
Total Capital	0.2Cr/MT	112.3	22.46
Add the cost towards the price escalation of materials@10%			2.2
Add the cost towards the price escalation of labour charges@10%			2.2
Annual O&M costs for a SWM unit @5%			1.1
Grand Total			**27.96**

Annexure-1

Government of Odisha
Panchayati Raj Department

NOTIFICATION

No. [illegible] Dtd. 2217 /PR, Whereas, the State Government [illegible] the matter has excluded the Revenue Village Kabitra under [illegible] Jajpur District from the limits of Keonjhargarh Municipality by the notification of the Government of Odisha in the Housing & Urban Development Department No. [illegible] 3/2011, dated 21st June 2011 which was hitherto included in the Keonjhargarh Municipality in the notification of the Government of Odisha in the Housing & Urban Development Department No.37202 – Ext. 24/88-HUD, dated the 25th October 1988

And whereas it is necessary to include the same village Kabitra as one of the villages within the local area of Badapalasa Grama Sasan under notification of Government of Odisha in the Panchayati Raj (G.P) Department No.19186 – LS – II – 29/2001- GP, dated the 20th October 2001 S.R.O No.825/2001 (hereinafter referred to as the said notification) in appropriate place relating to Keonjhar Subdivision of keonjhar District ;

Now, therefore, in exercise of the powers conferred by Section 3 of the Odisha Grama Panchayat Act, 1964 (Odisha Act 1 of 1965), read with Section 149 of the said Act, the State Government do hereby make the following amendments to the said notification, namely.

In the said notification, after Serial No.6 relating to the heading name of the village comprising local area in Column (4) appearing against Serial No.93 for Badapalasa Grama Sasan, the following serial and the village against it shall be added ;

" 7. Kabitra "

By order of the Governor,

(A.K.Das)
Deputy Secretary to Govt.

Memo No. 2218 /PR, Dated 4-2-15

Copy forwarded to the Assistant Director, Govt. Branch Press, Unit-III, Bhubaneswar with a request to publish the Notification in the extra-ordinary issue of the Odisha Gazette and send 10 (ten) copies to this Department. The Notification is statutory and shall bear a SRO Number.

Deputy Secretary to Govt.

By Fax/E-mail
Memo No. [illegible] /PR, Dated 4-2-15

Copy forwarded to the Collector, Keonjhar/ Sub-Collector, Keonjhar/ BDO, Keonjhar Sadar (Keonjhargarh) / DPO, Keonjhar / Home (Election) Department/ H & UD Deptt./ R & DM Deptt./ PARI Section, PR Deptt./ Guard file (10 spare copies).

Deputy Secretary to Govt.

P.T.O