

Rudrapur Master Plan- 2041 (Draft)



TOWN & COUNTRY PLANNING DEPARTMENT

UTTARAKHAND

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Abbreviations

AMRUT: Atal Mission for Rejuvenation and Urban Transformation

AOI: Area of Interest

BOD: Biological Oxygen demand

BPL: Below Poverty Line

BSNL: Bharat Sanchar Nigam Limited

CM: Chief Minister

CBD: Central Business District

CCTV: Closed-Circuit Television

CERC : Consultance Evaluation Revue commitee

CETP: Common Effluent Treatment Plant

CGWB: Central Ground Water Board

CHC: Community Health Centre

CNG: Compressed Natural Gas

COD: Chemical Oxygen Demand

CPCB: Central pollution Control board

CPHEEO: Central Public Health & Environmental Engineering Organisation

CSS: Centrally Sponsored Scheme

CVC: Classified Volume Count

Db: Decibel

DC: Deviated Commercial

DDA: District Development Authority

DIC: District Industry centre

US Nagar: Udham Singh Nagar

DO: Dissolve Oxygen

DPR: Detail Project Report

DR&DRC: Deviated Residential And Deviate Residential Colonies

DU: Dulling Unit

DUPH: Dulling Units Per Hectare

ECS: Equivalent Car Space

EOI: Expression of Interest

EPPCB: Environment Protection and Pollution Control Board

EWS: Economically Weaker Section

FY: Financial Year

FCI: Food Corporation of India

FGD: Focus Group Discussion

GO- Government Order

GDDP: Gross District Domestic Product

GEC 1997: Ground Water Resources Estimation Methodology, 1997

GIS: Geographic Information System

Ha: Hectare

HH: Household

HHI: House Hold Index

HLPCA: Housing Level Primary Census Abstract

HRIDAY: Heritage City Development and Augmentation Yojana

IIE-Pantnagar: Integrated Industrial Estate, Pantnagar.

ISRO: Indian Space Research Organisation

JLN Government Hospital: Jawaharlal Nehru Government hospital

KL: Kiloliter

KLD: kiloliter per day

Km: Kilometre

LIG: Low Income Group

LOR: Letter of Recommendation

LOS: Level of Service

LPCD: Liters Per Capita per Day

LPG: Liquefied Petroleum Gas

LULC: Land use and land Cover

MC: Municipal Corporation

MDR: Major District Road

MLA: Member of Legislative assemble

MLD: Million Liters per Day

MoHUA: Ministry of Housing and Urban Affairs

MSME: Micro, Small & Medium Enterprises.

MUZ: Multi Utility Zone

NH: National Highway

NHAI: National Highway Authority of India

NIDM: National Institute of Disaster Management

NO: Nitrogen Monoxide

NOC: No Objection certificate

NPP: Nagar Palika Parishad

NRSC: National Remote Sensing Centre

NUIS: National Urban Information System

NULM: National Urban Livelihood Mission

OCF: Other Community Facility

OD: Origin-Destination

ODR: Other District Road

OHR: Over Head Reservoir

OHT: Over Head Tank

PA: Planning area

PAC: Police Administrative Complex

PCU: Passenger Car Units

pH: Potential of hydrogen

PHC: Primary Health Centre

PM SVANidhi: Prime Minister Street Vendor's AtmaNirbharNidhi

PM10: Particulate Matter 10

PMAY: Pradhan Mantri Awas Yojana

PNG: Piped Natural Gas

PPH: Persons Per Hectare

PPP: Public Private Participation

PWD: Public Works Department

QA: Quality Assurance

QC: Quality Check

QC: Quality Control

Qtl: Quintal

RBM: Riverbed minerals

RCC: Reinforced Cement Concrete

RFP: Request for proposal

ROB: Rail over Bridge

ROW: Right Of Way

RPA: Rudrapur Planning area

SAAP: State Annual Action Plan

SC: Scheduled Caste

SDGs: Sustainable Development Goals

SH: State Highway

SIDA: State Industrial Development Authority

SIDCUL: State Infrastructure and Industrial Development Corporation of Uttarakhand Limited

SLIP: Service Level Improvement Plan

SO₂: Sulphur Dioxide

SPCB: State Pollution Control Board

ST: Scheduled Tribes

STP: Sewage Treatment Plant

SWM: Solid waste management

SWOT: Strengths, Weaknesses, Opportunities, and Threats

SWTP: Solid Waste Treatment Plant

TAZ: Traffic Analysis Zone

TCPO: Town and Country Planning Organisation, Government of India

TCPO: Town and Country Planning Organisation, Government of Uttarakhand

TDS: Total Dissolved Solids

TPD: Tons per day

TVC: Traffic Volume Count

UAAVP: Uttarakhand Avas Avam Vikas Parishad

UDD: Urban Development Directorate

UK: Uttarakhand

UKHUDA: Uttarakhand housing and Urban Development Authority

UKRERA: Uttarakhand Real Estate Regulatory Authority

ULB: Urban local bodies

UNDP: United Nation Development Programme

UP: Uttar Pradesh

URDPFI: Urban and Regional Development Plans. Formulation and Implementation

US Nagar – Udham Singh Nagar

UT: Union Territory

UTTIPEC: Unified Traffic and Transportation Infrastructure (Planning and Engineering)
Centre

V/C: Volume/Count

VHRS Imagery: Very High-Resolution Satellite Imagery

WFPR: Work Force Participation Rate

WTP: Water Treatment Plant

Definitions

The document is comprised of certain set of terms. Description of these terms has been provided in the following points:

- **Act:** It hereby means relevant act including:
 - The Uttarakhand Urban and Country Planning and Development Act” 1973 (Amendment) Act, 2013
 - Uttarakhand (The Uttar Pradesh Municipal Corporation Act, 1959) (Amendment) Act, 2017
 - The Uttarakhand Panchayati Raj Act, 2016
 - The Uttarakhand (The Uttar Pradesh Special Area Development Authority Act, 1986) Adaptation And Modification Order, 2006 (Amendment) Act, 2008
 - The Uttarakhand Building Construction and Development Byelaws / Regulations, 2011 (Amendment 2017)
 - Uttarakhand Special Area (Planned Development and Promotion of Tourism) Act, 2013
- **Abadi:** ‘abadi’ or ‘village abadi’ means such area in a village which, on the date of commencement of this Code, is being used for the purposes of residence of its inhabitants or for purposes ancillary thereto such as sahan and green trees, wells etc. or which may have been or be hereafter reserved for such use. [21]
- **Access:** A clear approach to a plot or a building. [4]
- **Accident:** Any event that happens by chance or unintentionally like collision of vehicles and injury, damage to property or death to passengers. [43]
- **Addition and/or Alteration:** A change from one occupancy to another, or a structural change including an addition to the area or change in height or the removal of part of building, or any change to the structure, such as the construction or removal or cutting into of any wall or part of a wall, partition, column, beam, joist, floor including a mezzanine floor or other support, or a change to or closing of any required means of access ingress or egress or a change to fixtures or equipment" as provided in the Bye-Laws. [4]
- **Affordable Housing Project:** An affordable housing project can be a mix of houses for different categories with at least 35% of the houses in the project are for EWS category and a single project has at least 250 houses. [77]

- **Age-sex Pyramid:** The graphical presentation of age-sex structure in the form a pyramid comprising two sets of horizontal bars placed side by side, one showing males and the other females in different age group at 5-years interval. [20]
- **Agriculture:** It Includes horticulture, farming, raising of crops, fruits, vegetables, flowers, grass, fodder, trees or any other kind of cultivation, dairy, animal husbandry, breeding and keeping of live-stock, including cattle, horses, donkeys, mules, pigs, fish, poultry and bees; and use of land which is ancillary to the farming of land or any other agriculture purposes, but shall not include the use of land attached to a building for the purposes of a garden to be used alongside such building. [2]
- **Agro based & food processing Industry:** An industry defined as a set of techno-economic activities, applied to all the products, originating from agricultural farm, aqua cultural sources, livestock and forests for their conservation, handling and value-addition to make them usable as food, feed, fibre, fuel or industrial raw materials. [46]
- **Air Pollutant:** Any solid, liquid, or gaseous substance, including noise, present in the atmosphere, due to any process of substances, in such a concentration as may be, or tend to be, injurious to human beings or other living creatures, or plants, or property, or environment. [11]
- **Alignment:** The ground plan of a road, railway, or waterway. [39]
- **Allocation of land:** Distribution of land for a specified purpose according to an approved layout plan. [2]
- **Amenities:** Natural and man-made features in a city or region and include natural landscaped areas, rivers, lakes, open spaces, road, and utilities, facilities, and services [11]. Amenity includes road, water supply, street lighting, drainage, sewerage. public works and such other convenience as the State Government may, by notification in the Gazette specify to be an amenity for the purposes of Uttarakhand Urban and Country Planning and Development Act, 1973. [4]
- **Amusement Park:** Amusement park means a permanent indoor or outdoor facility or park where amusement rides are available for use by the public that is located in a city with a population of more than 5 lakhs, encompasses at least 25 acres in surface area, is enclosed with access only through controlled entries, is open for operation more than 120 days in each calendar year, and has security guards on the premises at all times. The term does not include any public or private driveway, street, sidewalk or walkway, parking lot, parking garage, or other parking area. [13].

- **Anganwari / Anganwari Centre:** Anganwari as space provision at residential housing/ neighbourhood level is a centre to provide service for children of 0-6yrs age, pregnant women, feeding mothers, etc. under the Integrated Child Development Scheme (ICDS). [2]
- **Apartment:** These shall include any building or structure in which living quarters are provided for three or more families, living independently of each other and with independent cooking facilities, for example, apartment houses, mansions and Chawls. [14]
- **Approved Plan:** A plan approved by a competent authority having jurisdiction. [4]
- **Approved:** Approved by a competent authority having jurisdiction. [2]
- **Area of Influence:** The special extent of a central function identified by the interaction between places where such function is located and the places from where people derive its benefits. [2]
- **Area Plan:** A plan for development of an area consisting of data, text, maps, and other illustrations, pertaining to land use, transportation, utilities, facilities, and services as per provisions of the master plan and zoning and sub-division regulations. [2]
- **Arterial Roads in Development Area:** They are the primary roads for ensuring mobility function. They carry the largest volumes of traffic and longest trips in a city. These roads are characterized by mobility and cater to through traffic with restricted access from carriageway to the side. [2]
- **Auditorium:** A building especially designed with all related services and facilities, to serve as an enclosed space to seat audience and a stage for live performances. [4]
- **Authority or Development Authority:** ‘Authority’ in relation to the State Area shall be as per the relevant act. [1]
- **Auto / Taxi Stand:** A premise used for parking of intermediate public transport vehicles run on commercial basis. [39]
- **Automobile Service Station:** A premise for sale, repair and servicing of automobiles. [11]
- **Average Daily Traffic:** The total volume of traffic passing a point or segment of a roadway during a given time period (more than a day and less than a year) divided by the number of days in that time period. [39]
- **Bank:** (a) a banking company as defined in the Banking Regulation Act, 1949 ; (b) the State Bank of India constituted under the State Bank of India Act, 1955; (c) a subsidiary

bank as defined in the State Bank of India (Subsidiary Bank) Act, 1959 ; (d) a “corresponding new bank” constituted under the Banking Companies (Acquisition and Transfer of Undertakings) Act, 1970 ; (e) a Regional Rural Bank established under sub-section (1) of section 3 of the Regional Rural Banks Act, 1976 ; (f) any banking institution notified by the Central Government under section 51 of the Banking Regulation Act, 1949 ; or (g) any other banking or financial institution notified by the State. [27]

- **Banquet Hall / Barat Ghar / Marriage Palace:** A building exclusively used for holding social functions such as marriage and other such related get-togethers/activities. Its premises built up or open or both or any part thereof, where accommodation or space is used for marriage, receptions, social gatherings, meetings on regular or periodical or occasional basis and where at least fifty persons can congregate or gather. [3]
- **Base Map:** A map serving as the foundation for subsequent planning and design operations, showing all features and characteristics of the area, as per requirements of the plan/project. [2]
- **Basement / Cellar:** The lower storey of a building below or partly below the ground level. [14]
- **Basin:** A geographical area determined by the watershed limit of the system of waters, flowing into the ocean/sea either directly or through another sovereign nation or into a natural lake/depression having no outlet. [16]
- **Bazaar:** A commercial area in old city core, generally located along a main road in mixed land use pattern, where ground floor, especially the front portion, is shaping and the upper floors are occupied by residential use. [76]
- **Bio-diversity:** means the variability among living organisms from all sources and the ecological complexes of which they are part and includes diversity within species or between species and of eco-systems. [17]
- **Biogas Plant:** A biogas plant is the name often given to an anaerobic digester that treats farm wastes or energy crops. It can be produced using anaerobic digesters (air-tight tanks with different configurations). [53]
- **Birth Rate:** Ratio of the number of live births per 1,000 populations in a given year. [20]
- **Botanical Garden:** A park landscaped with a variety of plant species for exhibition, nature studies, and botanical research purposes. [2]

- **Bottleneck:** A portion of road with lowest capacity along the route due to an obstruction to free-movement of vehicles. [39]
- **Brick Kiln:** A kiln in which blocks of clay are baked into bricks, bricks are baked or burned. [46]
- **Buffer Zone:** Buffer zones are areas created to enhance the protection of a conservation area, often peripheral to it, inside or outside. Within Buffer zones, certain legal and/or customary restrictions are placed upon resource use and/or is managed to reduce the negative impacts of restrictions on the neighbouring communities. [2]
- **Buffer:** A landscaped area between two zones provided for the purpose of separating two incompatible land uses and curtailing unwanted view, noise, odour, or dust using plants, walls, berms, or other such elements. [2]
- **Building Bye-laws / Building Regulations:** Building bye-laws here means, the bye-laws mentioned in the Building Construction and Development Regulation, 2011 (Amended in 2015), Uttarakhand. Municipal rules, regulations, and procedures that in the interest of public health, safety, and welfare, ensure minimum acceptable, (i) quality of the design of all types of buildings, (ii) quality of building materials, (iii) structural safety, (iv) provision of sanitation, and (v) other safety and local requirements. [18]
- **Building:** 'Building' includes any structure or erection or part of a structure or erection which is intended to be used for residential, industrial, commercial, or other purposes, whether in actual use or not. "Building" shall mean any structure for whatsoever purpose and of whatsoever materials constructed and every part thereof, whether used as human habitation or not including foundation, plinth, walls, floors, roofs, chimneys, plumbing and building services, fixed platforms, veranda, balcony, cornice or projection, part of a building or anything affixed thereto. [3]
- **Built-up Area:** It means such densely populated areas wherein commercial, industrial or residential area has been developed as mixed use horizontally and vertically and contains all essential facilities and has been defined as built-up area in the master plan or has been demarcated as such by Authority Board / Competent Authority. In towns not having a master plan or not having a well-defined built up area, the built-up area or whether any land parcel in question falls under the said area or not shall be determined by the competent authority. In such areas, relative to the congested right-of-way, unavailable / negligible setbacks and absence of organized / unorganized open spaces; on the basis of

relatively highly dense built-up mass / urban form of buildings, following parameter may be taken as basis. [3]

- **Burial Ground:** A premise with facilities for burying of dead bodies. [2]
- **Bus Bay:** An additional area designed and designated at a bus stand for buses to pull into to pick up and drop off passengers with a view to minimise disturbance to the flow of traffic. [39]
- **Bus Depot:** A premises where the public transport buses are parked during the night period after completing all the trips for the day and includes servicing facility and other related infrastructure. [39]
- **Bus Lane:** A lane of roadway intended primarily for use by buses, either all day or during specified periods (Sacramento Regional Transit District). A vehicular right-of-way or portion thereof—often an exclusive lane—reserved exclusively for buses (California Planning Roundtable). [41]
- **Bus Stand:** A Bus Stand is a designated location on a road away from carriage-way to park buses for short time periods for embarkation and disembarkation of passengers. [41]
- **Bus Stop / Bus Shelter / Transit Stop Shelter:** A small, roofed structure, usually having three walls, located near a street and designed primarily for the protection and convenience of bus passengers. (Maryland Heights, Mo.) [41]
- **Bus Terminal:** A premise used by a public or private transport agency to park the buses for short duration to serve the population. It may include the related facilities for passengers. [2]
- **Bye-law:** It means a byelaw made under the relevant act by Uttarakhand Housing and Urban Development Authority (hereinafter referred to as the State Authority) or the Local Development Authority with the previous approval of the State Government. [1]
- **Cadastral Map/Khasra Map:** A map of an area on a scale 1:4000 or below. Showing the property boundaries, dimensions, ownership, and value of all subdivisions of land. [21]
- **Camping Site:** A premises located in a recreational or tourist zone and provided with all necessary facilities and services for the purpose of short-duration stay in tents or other temporary structures. [48]
- **Canteen:** A premise used for serving food items to workers in an institution including cooking facilities. It may have covered or open space or both for sitting arrangement. [4]

- **Cantonment/ Battalion:** An area notified by central government under The Cantonments Act, 1924. [19]
- **Capital Expenditure:** The money spent on fixed assets e.g., land, buildings, machinery, and equipment as well as on major public works like roads, bridges, airport, hospitals, schools, and other buildings. [49]
- **Carpet Area:** The covered area of the usable rooms of a dwelling unit / at any floor (excluding the area of the walls). [4]
- **Carriageway:** The part of road right-of-way designed for movement of vehicular traffic. [41]
- **Catchment Area:** The area from where the rain water drains into a river or lake. [50]
- **Cell Tower:** It tower houses the electronic communications equipment along with an antenna to support cellular communication in a network. A cell tower is usually an elevated structure with the antenna, transmitters and receivers located at the top. [51]
- **Census Town:** Administrative units satisfying the following three criteria simultaneously are treated as Census Towns:
 - i. A minimum population of 5,000 persons
 - ii. 75 per cent and above of the male main working population being engaged in non-agricultural pursuits
 - iii. A density of population of at least 400 persons per sq. km. (1,000 per sq. mile)[20]
- **Census:** The periodic, generally every 10 years, official enumeration of population and its demographic, social, and economic characteristics including area of settlements and housing conditions. [20]
- **Central Business District (CBD):** A major commercial area of a large city with high concentration of business activity, having very high land value and where major transportation and communication networks converge. [2]
- **Central/State Government Office:** A premise used for the offices of Central/State Government. [2]
- **Chemical Industry:** A complex of processes, operations, and organizations engaged in the manufacture of chemicals and their derivatives. [46]
- **Chief Town and Country Planner:** means the Head of the Town and Country Planning Department of the State Government. [1]
- **Church:** A premises serving the Christian community as a place of worship. [52]

- **Cinema/ Multiplex:** A premise with facilities for projection of movies and stills with a covered space to seat audience. [4]
- **City Centre / Town Centre / Downtown:** The central area of a city characterised by convergence of transportation and communication networks, concentration of socio-economic, cultural, and administrative activities and very high land value. [2]
- **City:** Towns with population of 1,00,000 and above are categorized as cities.. [20]
- **Cluster:** A group of generally up to maximum 20 plots or dwelling units arranged around a group open space. [4]
- **Collector Road / Collector Street:** As the name suggests, these are connector roads, which distribute the traffic from access streets to arterial and sub arterial roads. They are characterized by mobility and access equally. It carries moderate traffic volumes compared to the arterial roads. Due to its overlapping nature, distributor roads can act as sub arterial and as access streets, depending upon the function and the land use of the surroundings. [2]
- **College:** “College” means an educational institution meant for imparting education above Higher Secondary (10+2 level) and up to Bachelor’s/ Master’s degree affiliated to an University, and includes the land, buildings, playgrounds, hostels and movable properties such as furniture, books, apparatus, map and equipment, owned by and used for the activities of the educational institution. [40]
- **Commercial Building:** means any building or part of building, which is used as shop and / or market for display and sale of merchandise either wholesale or retail, or a building used for transaction of business or the keeping of accounts, records for similar purpose, professional service facilities, corporate offices, software services, offices of commercial undertakings and companies. Habitat centers, petrol pump, restaurant, lodge, Stand Alone Private Hostel, guest houses, hotel, motel, resort, cinema, theatre, multiplex, mall, wedding point, banquet hall, bank, gymnasium, multi-level car parking, storage and service facilities incidental to the sale of merchandise and located in the same building shall be included under this group, except where exempted and any other use which is in the opinion of sanctioning authority is of similar nature as mentioned in the above activities. [3]
- **Commercial Land Use:** A parcel of land, shown on a development or layout plan, where retail or wholesale commercial and related activities are being carried out (existing land use) or will be permitted in future (proposed land use). [2]

- **Commercial Office:** A built space in a commercial building used for office of an individual, group or organisation. [5]
- **Commercial:** Commercial areas in a city are areas, districts, or neighbourhoods primarily composed of commercial buildings, such as strip malls, office parks, downtown, central business district, financial district, "Main Street", or shopping centres. Commercial activity within cities includes the buying and selling of goods and services in retail businesses, wholesale buying and selling, financial establishments, and a wide variety of uses that are broadly classified as "business." While commercial activities typically take up a relatively small amount of land, they are extremely important to a community's economy. They provide employment, facilitate the circulation of money, and often serve many other roles important to the community, such as public gathering and cultural events. [2]
- **Community Development / Community Planning:** A participatory process where the people living in a locality, identify problems and initiate action for improvement of the area or quality of life of a section of the community such as women, children, or the elderly, through mobilising physical, social, human, and financial resources. [2]
- **Community Hall / Centre:** At city level, a commercial centre serving a population of 10000 and comprising shops (Retail, service and informal), offices, cinema, hotel, nursing home, service industries, post office, electric sub-station, and conveniences. At residential area level, an enclosed space, used for various social and cultural activities of a neighbourhood of 15,000 population. [4]
- **Community:** (a) A self-conscious social unit having common identity and interests, (b) An identifiable group of people living, studying, or working in proximity, (c) A planning unit, in a large city or metropolis, serving a population of 100,000 with a community centre as its core. [37]
- **Commute:** To travel daily between places of residence to place of work located in another settlement. [2]
- **Commuter:** The person who commutes. [2]
- **Concept Plan:** A generalized plan indicating the boundaries of a tract or tracts under common ownership, and identifying proposed land use, land-use intensity, and thoroughfare alignment. [2]
- **Conceptual Plan / Inception Plan / Conceptual Design / Inception Plan / Planning Concept / Preliminary Plan / Schematic Design / Schematic Plan:** A preliminary

plan/design giving the schedule of requirements, general approach, and alternative concepts/ solutions for the consideration of the client and his comments, suggestions, and choice of a preferred alternative for further detailing. [2]

- **Conservation:** Judicious and sustainable use and management of natural or manmade resources in such a manner that their natural, ecological, architectural, historical, socio-cultural significance, as applicable, is maintained. [48]
- **Convenience Shops:** means a shop where the necessary goods for daily needs of the public are available. [3]
- **Coordinate:** In GIS, a set of numbers that define location in a given reference system, such as x, y in a planar coordinate system or an x, y, z in a three-dimensional coordinate system. [5]
- **Corridor:** A broad geographical band that follows a general directional flow connecting major sources of trips that may contain a number of streets, highways, and transit route alignments. [2]
- **Country Planning:** A spatio-economic planning process that addresses to the issues of rural areas. [54]
- **Courts:** “Court” means a principal civil court of original jurisdiction, and includes any other civil court empowered by the State Government to perform the functions of the court under this Act within the pecuniary and local limits of its jurisdiction. [54]
- **Coverage:** In GIS, (a) A digital version of a map, which forms the basic unit of vector data storage in Arc Info: (b) A set of thematically (such as soils, streams, roads, or land use) associated data considered as a unit. [5]
- **Crèche / Day Care Centre / Day Nursery:** An educational or custodial facility, managed by an individual or an institution on commercial or non-commercial basis, for infants and pre-school children during day time when both parents are out to work. A premise having nursing facilities for young children during day time. The center may be managed by an individual or an institution on commercial or non-commercial basis. [2]
- **Cremation Ground/ Crematorium:** A premise with facilities of performing last rites of dead bodies by burning. [2]
- **Cottage and Household industry:** an industry whose labor force consists of family units or individuals working at home with their own equipment.
- **Cul-de-sac:** A dead end street with appropriately designed area at the end for turn around. [41]

- **Cultivation:** The processes of ploughing, sowing, and production of cereals and millet crops (such as Wheat, Paddy, Jowar, Bajra, Ragi, etc.), pluses, raw jute and kindred fibre crops, cotton, etc. and includes supervision or direction of cultivation but does not include growing of fruits and vegetables, keeping orchard or groves, or working in plantations like tea, coffee, rubber, cinchona, and medicinal plants. [20]
- **Cultivator:** For purpose of the Census, a person is classified as cultivator if he or she is engaged in cultivation of land owned or held from Government or held from private persons or institutions for payment in money, kind or share. Cultivation includes effective supervision or direction in cultivation. A person who has given out her/his land to another person or persons or institution(s) for cultivation for money, kind or share of crop and who does not even supervise or direct cultivate on land, is not treated as cultivator. [20]
- **Cycle Lane / Bike Lane / Bicycle Lane:** A portion of a road right-of-way reserved for use by bicycles exclusively. [41]
- **Cycle Rickshaw:** A three-wheeled vehicle driven manually the help of a cycle and serving a city as a para-transit. [41]
- **Cycle Track / Bike Path / Bike Way / Bicycle Path / Bicycle Track:** A path, physically separated from automobile and pedestrian traffic by an open strip or barrier, reserved for exclusive use by cycles and may or may not be part of the road right-of way. [41]
- **Dairy Booth:** A kiosk operated by private entity/local authority for the distribution of milk and dairy products. [5]
- **Dairy Farm:** A premise with facilities for rearing and processing of dairy products. It may have temporary structures for sheds of cows. [55]
- **Dam:** “Dam” means any artificial barrier and its appurtenant structure constructed across rivers or tributaries thereof with a view to impound or divert water which also include barrage, weir and similar water impounding structures but does not include— (a) canal, aquaduct, navigation channel and similar water conveyance structures; (b) flood embankment, dike, guide bund and similar flow regulation structures;. [56]
- **Database:** Information stored on a computer system that can be updated, modified, and retrieved by authorised persons for further analysis and presentation. [5]
- **Deforestation:** The direct human-induced conversion of forested land to non-forested land. [2]
- **Demand:** The quantity of goods or services required as per accepted norms and standards or need of the people. [57]

- **Demarcation:** Transferring the layout plan on the site by marking the boundaries of land subdivisions. [5]
- **Demography:** The scientific study of characteristics of human population. [20]
- **Density:** (a) In case of spatial distribution, number of persons or things per unit area (i.e., hectare, acre, sq. mile, or sq. km.), (b) In case of population served, number of things or facilities per unit of population (i.e., 100, 1000, 10,000 etc. persons) where depending upon need, the things may include telephone, phone, doctors, schools etc. The residential density expressed in terms of the number of dwelling units per hectare [4].
- **Department:** means office of the Chief Town and Country Planning Department of Uttarakhand. [1]
- **Design:** Conceptualisation of a thought and its planning. Architectural and / or engineering details, through plans, elevations, sections, and other graphic presentation, as required for its implementation. [4]
- **Detached Housing:** A plotted housing development where each dwelling unit is located on a plot with setbacks on all its four sides. [14]
- **Developed Land / Developed Area:** A land area in an urban centre that has been equipped with basic network of infrastructure such as roads, water supply, sewerage, drainage, electricity, and roadside plantation. [3]
- **Development Area:** means any area declared, development area under relevant act. [1]
- **Development Vision / Goals / Vision:** A perception of the future pattern of development based upon anticipated changes, dreams and aspirations that inspires further planning interventions. [2]
- **Development:** ‘Development’ with grammatical variations means the carrying out of building, engineering, mining or other operations in, on, over or under land, or the making of any material change in any building or land, and includes re-development and layout and subdivision of any land and ‘to develop’ shall be construed accordingly. [4]
[3]
- **Dharamshala / Ashram:** In Hindi, a building, normally located near religious places or hospitals where rooms are let out for short duration on non-profit basis. It means building used for holding religious meetings and as resting place for religious followers, a place where arrangements are made for stay of a particular community at minimal charge in the form of donation or free of cost. The ownership of such buildings / plots essentially be of a registered charitable institution and the operation of permissible activities within it shall

also be done by it. In the design of such buildings, a maximum of 25 percent of proposed F.A.R. may be proposed for single rooms and the rest of the F.A.R. shall be in the form of dormitory (along with common room and toilet). [3]

- **Digitise:** In GIS, (a) To encode geographic features in digital form as x, y coordinates, (b) The process of using a digitiser to encode the locations of geographic features by converting their map positions to a series of x, y coordinates stored in computer files. [5]
- **Disaster:** Disaster means a catastrophe, mishap, calamity or grave occurrence in any area, arising from natural or man made causes, or by accident or negligence which results in substantial loss of life or human suffering or damage to, and destruction of property, or damage to, or degradation of environment, and is of such a nature or magnitude as to be beyond the coping capacity of the community of the affected area. [22]
- **Dispensary for Pet Animal and Birds / Veterinary Dispensary:** A premise having facilities for medical advice and provision of medicines to pet animals and birds, managed by public/ private or charitable institutions. [2]
- **Dispensary:** A premise having facilities for medical advice and provision of medicine, managed by public or charitable institutions. [2]
- **District Court/ Family Courts:** Premises used for the offices of Judiciary. [9]
- **District Police Office & Battalion:** A premise having facilities for the offices and paramilitary forces. [2]
- **District:** (a) An administrative division of a state managed by a District Collector. [58]
- **Drainage System:** A system or a line of pipes, with their fittings and accessories, such as manholes, inspection chambers, traps, gullies, floor traps used for drainage of building or yards appurtenant to the buildings within the same cartilage; and includes an open channel for conveying surface water or a system for the removal of any waste water. [4]
- **Dwelling Unit:** A single self-contained house with independent access designed and constructed as an independent unit of a residential area. “Dwelling Unit” shall mean an independent housing unit with separate facilities for living, cooking and sanitary requirements. [3]
- **Earthquake:** A natural phenomenon caused by a sudden rupture inside the earth's crust resulting in shaking or movement of its surface which results in damage to life and property depending upon its intensity measured on a 10-point Richter scale. [59]
- **Eco-industrial Estate / Industrial Park:** A designated industrial area, developed and managed in an eco-friendly manner where the industries share resources, effluent is

treated in a common treatment plant, wastes are recycled and common facilities are jointly looked after. [60]

- **Ecosystem:** An arrangement of living (plants and animals) and non-living (mountains and minerals) things and the forces (climate and wildfire) that influence them. [61]
- **Educational Building:** A building exclusively used for a school or college, recognized by the appropriate Board or University, or any other Competent Authority involving assembly for instruction, education or recreation incidental to educational use, and including a building for such other uses as research institution. It shall also include quarters for essential staff required to reside in the premises, and building used as a hostel captive to an educational institution whether situated in its campus or outside. [4] [3]
- **Effluent Treatment Plant (ETP):** ETP is a Waste Water Treatment Process (WWTP) that is used to treat wastewater. It is mostly used in industries like pharmaceuticals, textiles, and chemicals where extreme water contamination is a possibility. ETP plays a significant role in treatment of industrial wastewater & domestic sewage. [62]
- **Electric Sub-station:** means a station for transforming or converting electricity for the transmission or distribution thereof and includes transformers converters, switch-gears, capacitors, synchronous condensers, structures, cable and other appurtenant equipment and any buildings used for that purpose and the site thereof. [23]
- **Electricity Grid:** Means the high voltage backbone system of inter-connected transmission lines, sub-stations and generating plants. [23]
- **Encroachment:** It means an act to enter into the possession or rights either of permanent or temporary nature on a land or built up property of local body or state/ central Government. [4]
- **Environment:** "Environment" includes water, air and land and the inter-relationship which exists among and between water, air and land, and human beings, other living creatures, plants, micro-organism and property. [24]
- **Equivalent Car Space (ECS):** A unit used to specify parking norms/ requirements where one equivalent car space (ECS) is equivalent to one standard car and the other modes are converted into this unit depending upon their size and parking space requirements, accordingly the ECS of a two-wheeler, bicycle, and a truck is 0.25, 0.10, and 3.00 respectively. [2]
- **EWS:** EWS households are defined as households having an annual income up to Rs. 3,00,000 (Rupees Three Lakh). [77]

- **EWS House:** An all-weather single unit or a unit in a multi-storied super structure having carpet area of upto 30 sq.m. with adequate basic civic services and infrastructure services like toilet, water, electricity etc. [77]
- **Existing Land Use Plan:** The Plan showing the different land use existing at the time of preparation of the Existing Land Use Plan of Planning Area. [7]
- **Facility:** A premises where health care, educational, socio-cultural, and recreational activities take place. [2]
- **Fair Grounds:** A multipurpose, centrally located, facility for a variety of short-duration socio-cultural, economic, and political functions. [2]
- **Farm House:** A farm, located in the green belt around a city, used generally for agriculture and allied activities, where a dwelling unit of a specified size (e.g. 100 to 150 sq. m.) is also permitted [11]. Farm House means a building allowed on a minimum holding of 2.5 acre of agricultural land for residential activity of the land holder [7].
- **Feature Class:** In GIS, a classification describing the format of geographic features, such as point, arc, node, route-system, route, section, polygon and region, and the supporting data in a coverage. [11]
- **Fencing:** Plant or construction materials used for provision of fences around an area. [4]
- **Fire Station:** A premise having facility for firefighting for a catchment area assigned to it. It may include residence of essential staff. [2]
- **Flat / Apartment / Residential Flat:** A complete dwelling unit, with independent entrance, for one household within a group housing complex containing similar such units. [4]
- **Flood Control:** Measures taken to prevent the damage to human life and property due to floods and include dredging, maintaining vegetation as groundcover, and construction of dams. [63]
- **Flood Zone / Flood Area:** Area inundated during floods. [63]
- **Floor Area Ratio (FAR):** The ratio of the gross floor area on all floors of a building to the area of the plot on which it is located and multiplied by 100, e.g., an FAR of 250 means that the gross floor area on all floors of a building can be 250 per cent of the area of the plot on which it is located [11]. The quotient obtained by dividing the combined covered area (plinth area) of all floors, excepting areas specifically exempted under these regulations, by the total area of the plot [4].
- **Flora:** The plant life of an area. [48]

- **Footpath / Footway / Path / Pathway/ Pedestrian Path / Sidewalk / Walkway:** Footpaths are defined as any area primarily used by ‘all’ pedestrians. They can be adjacent to roadways or away from the road. A footpath should consist of a dead or frontage zone, pedestrian zone and a multi-functional zone (IRC:103). [41]
- **Forecasting:** The technique of estimating the future conditions related to demographic and socio-economic characteristics, demand and supply of infrastructure, traffic volume etc. [41]
- **Forest Cover:** The Ministry of Environment, Forest and Climate Change defines ‘forest cover’ in India as “all lands, more than one hectare in area with a tree canopy density of more than 10%”.
- **Forest:** The 1996 Supreme Court judgement expanded the definition of forest to include lands that were already notified by the Centre as forests, that appear in government records as forests as well as those that fell in the “dictionary definition” of forest. This description covers all statutorily recognised forests, whether designated as reserved, protected or otherwise.
- **Freight Complex:** A complex having premises for booking and storage of goods that a train, truck, ship or aircraft carries. [2]
- **Freight Transport:** Movement of goods by means of common, carriers. [2]
- **Gap Analysis:** A process of evaluation of the difference between the demand and supply of an activity at a given point of time, or between the current and future state of an activity, with a view to identify the action needed and resources required to bridge the gap, if any. [2]
- **Garden:** An open space landscaped with trees, plants, flowers, water bodies, and other manmade elements of landscape for outdoor relaxation and pleasure. [64]
- **Gau Shala/ Dairy Farm:** A premise with facilities for rearing and processing of dairy products. It may have temporary structure for sheds of animals and birds. [2]
- **Geographic Information System (GIS):** A system which provides computerized mechanisms for integrating various geo information data sets and analysing them in order to generate information relevant to planning needs in a context. [5]
- **Goals:** Broad and general statements, that highlight the vision and development approach which direct further planning and implementation efforts. [2]
- **Golf Course:** A tract of land laid out with at least nine holes for playing a game of golf and improved with tees, greens, fairways, and hazards. A golf course includes a

clubhouse and shelters as accessory uses. (Maryland Heights, Mo.) An area or course for playing golf, consisting of at least nine holes, except miniature golf, within which the playing area is not artificially illuminated. (Pine Bluff, Ark.). At least nine separate holes consisting of a separate tee, fairway, and green for each of the nine holes, and requiring the use of standard golf clubs in addition to a putter. The minimum length of a golf course shall be 2,000 yards total, measuring from the front of each tee to the middle of each green. (Sioux City, Iowa.) [4]

- **Government Housing Scheme:** A project, often funded by a local or state or central government or jointly or another organization, that provides homes for people to buy or rent at a low price. For e.g., Pradhan Mantri Awas Yojana.
- **Government Quarter:** housing provided to an employer by the government. [5]
- **Government:** The system that has authority to govern a country and comprises three arms: the legislature to make laws, the administration-responsible for implementation of the laws, and the judiciary to protect the laws and ensure justice. [31]
- **Govt. / Semi Govt. / Public Undertaking/ Local Body Office:** A premise used for offices of the Union and State Governments, semi-Government organizations, Public Sector Undertakings and Local Body Offices. [6]
- **Gradient:** The degree of slope of land, pipe invert or road as compared with horizontal. [62]
- **Green Belt / Green Girdle / Park Belt:** An area of land predominantly agriculture in use, located around the proposed urbanisable limit of an urban area with a view to controlling its growth, preserving towns from merging into one another or to preserve special neighbouring character of a town. [64]
- **Grave Yard:** a place where dead people are buried. [2]
- **Grid:** In GIS, a geographic data model representing information as an array of equally sized square cells, referenced by their respective geographic x, y locations, and arranged in rows and columns. [5]
- **Ground Control Points:** Reference points on ground, obtained, through ground survey, to control and correct distortion of remote sensing images. [5]
- **Ground Cover:** Planting material that forms a carpet of low height. [4]
- **Ground Level Reservoir:** Ground reservoir includes four parts: storage zone consisting with natural storage structure, dam to enclose storage zone, infiltration works

of surface water and water-intake works from groundwater. In many countries, ground reservoirs always are referred to ASR (Aquifer Storage & Recovery). [62]

- **Ground Water:** The water under the earth's surface in an aquifer or in the soil, water of a spring or a shallow well. [62]
- **Group Housing:** means a building unit constructed or to be constructed with one or more floors having more than two dwelling units having common service facilities where land is owned jointly (as in the case of co-operative societies or the public agencies, such as local authorities or housing boards, etc) and the construction is undertaken by one Agency. [4]
- **Growth Rate:** Statistical estimate of the percentage increase or decrease in size of an entity or population of area(s) in a given year. [20]
- **Growth:** A process of positive change, (b) Quantitative increase or expansion in size. [20]
- **Guard House:** A building built in compliance with all building codes of the [jurisdiction] and all the terms granted in a special use permit and located on a private road or on private property adjacent to a private road as shown on the site plan approved with the special use permit, for the purpose of manually or electronically regulating and monitoring pedestrian and/or vehicular traffic into a subdivision or neighbourhood and promoting security within the subdivision or neighbourhood; provided, however, a guardhouse shall not be designed or used for sleeping or living purposes. [76]
- **Guest House / Lodging / Inn:** It means tourist houses having 5 to 20 rooms along with dormitory, dining hall, and capacity to provide kitchen. In the guest house any kind of banquet hall, seminal hall, wedding point or other multi-purpose hall for any community activities shall not be permitted. [3]
- **Gymnasium / Health Club:** A facility where members or non-members use equipment or space for the purpose of physical exercise. [4]
- **Hamlet:** A physically identifiable part of a dispersed village comprising a few households. [6]
- **Hazardous Building:** Any building or part thereof, which is used for the storage, handling, manufacture or processing of highly combustible or explosive materials or products which are liable to burn with extreme rapidity and / or which may produce poisonous fumes or explosions for storage, handling, manufacturing or processing which involve highly corrosive, toxic or noxious alkalis, acid or other liquids or chemicals

producing flame, fumes, and explosive, mixtures of dust or which result in the division of matter into fine particles subject to spontaneous ignition. [4] [3]

- **Health Care Facilities:** The premises where health care services are located e.g., hospitals, clinics, nursing homes, pharmacies, and training centres for health workers. [2]
- **Health Centre/ Family Welfare Centre:** A premise having facilities for treatment of indoor and outdoor patients having up to 30 beds. The health centre may be managed by a public or a charitable institution on non-commercial basis. [2]
- **Heritage Zone:** Means those areas of archaeological or historical or architectural or aesthetic or scientific or environmental or cultural significance including man made and natural features and sites of scenic beauty which are included in a list(s) published by notification in the Government Gazette, by the Government, from time to time. [26]
- **Historic Site:** An area having historical, architectural, archaeological, or cultural value that is protected by Survey of India or needs to be protected by the local community or state government. [65]
- **Horticulture:** Horticulture is the art of cultivating plants in gardens to produce food and medicinal ingredients, or for comfort and ornamental purposes. Horticulturists are agriculturists who grow flowers, fruits and nuts, vegetables and herbs, as well as ornamental trees and lawns. [66]
- **Hospital:** A building complex, having more than 30 beds with all necessary facilities, and services, providing general or specialised health-care facilities including observations, care, treatment to indoor patients and medical advice to outdoor patients suffering from illness, disease or injury and managed by public body or private institution. [4]
- **Hostel:** A building having several rooms with independent access and attached or common toilet/bath as well as other facilities like dining and indoor recreational spaces for letting out on long term basis to students or other persons belonging to an institution or otherwise. [4]
- **Hotel:** A building having a capacity of more than 20 rooms along with independent access and attached or common toilet/bath with or without dining and other facilities, with fooding facilities and multi-purpose hall for conference, exhibition for public programs. [3]
- **House / Dwelling:** A single self-contained house with independent access designed and constructed as an independent unit of a residential area. “Dwelling Unit” shall mean an

independent housing unit with separate facilities for living, cooking and sanitary requirements. [3]

- **Household Industry:** A small-scale industry, operated from a house by one or more members of the household for production or for servicing and repairs of goods [11]. Household Industry means household occupation/industry conducted only by family members/persons residing in the dwelling with or without power and not contrary to the provisions of the Water Pollution (Prevention and Control) Act 1974, Air Pollution (Prevention and Control) Act, 1981, and Environment (Protection) Act, 1986. [7]
- **Household:** A group of persons, related or otherwise, living in the same dwelling and sharing meals and expenses related to housekeeping. [20]
- **Housing Conditions:** General state of housing stock as measured by its age, quality, state of repairs and value. [20]
- **Housing Policy:** A series of financial, land-related, and administrative measures undertaken by the government to bridge the gap between the supply and demand of housing stock, ensure access to shelter to all sections of the society especially the economically weaker sections. [57]
- **Housing Shortage:** The gap between the demand and supply of dwelling units of various types for different sections of the society. [57]
- **Housing Stock:** The total quantity of housing units, irrespective of condition, legal status, or compliance to norms and standards, existing in a housing market area at a given point of time. [57]
- **Housing:** The total physical environment within and outside the house where families and households live and includes houses, and all necessary utilities, community facilities, park, playground, and roads. In Low-Income Group (LIG) housing accommodating households engaged in same or similar occupation, a common place of work is also included as an integral part of housing. [57]
- **Human Settlement:** A place, rural or urban, where people live, work, raise family and fulfil their physical, spiritual and intellectual needs and where, depending upon its hierarchy in the national or regional system of settlements, a variety of activities, facilities and services are located. [2]
- **Image:** The recorded representation of an object produced by optical, electro-optical, optical mechanical, or electronic means. [5]

- **Implementation:** The process of execution or carrying out of the provisions of a policy, plan, programme, project or scheme. [2]
- **Individual House:** A premise for one dwelling unit which may or may not have on it one main building block and one accessory block for garage/ garages and servant quarters. [4]
- **Indoor stadium:** A premise for indoor stadium with play area and spectator seating including related facilities. [4]
- **Industrial Land Use:** The use of a parcel of land, where process of manufacturing and related activities are being carried out (existing industrial land use) or will be permitted in future (proposed industrial land use). [2]
- **Industrial Sector:** The sector of economy contributing to development and employment generation comprising manufacturing of products, machines and consumer goods. [2]
- **Industrial Waste:** Residue or by-products of an industrial process that may contain inorganic, non-biodegradable and polluting substances such as metals, plastics, liquids, gases, and chemicals. [62]
- **Industry:** A group of productive enterprises or organizations that produce or supply goods, services, or sources of income. In economics, industries are generally classified as primary, secondary, tertiary, and quaternary; secondary industries are further classified as heavy and light. Industry” means a specific branch of manufacture and trade, which includes green, orange and red category industries as categorized by Uttarakhand Pollution Control Board / Department of Industries or as amended from time to time. It excludes mining and quarrying [7].
- **Informal Sector / Parallel Economy:** The sector of economy where the labour force is self-employed with family support, in economic activities such as trading and street vending that do not have any formal structure and designated areas, and is characterised by small-scale, labour-intensive operation. [67]
- **Infrastructure:** The basic components of a human settlement that make it functional, improve its quality of life, and include – network of water supply, sewerage, drainage, electricity, communication, transportation, and facilities and services. [62]
- **Institution:** A society or organisation established, through law, or otherwise, for a specific purpose. [4]
- **Integrated Freight Complex:** A strategically located premises, with access from both railway and a highway, comprising wholesale market, warehousing, truck terminal,

railway station and other related uses and infrastructure with a view to facilitate integrated movement of goods by rail as well as road. [41]

- **Jail:** “Prison” means any jail or place used permanently or temporarily under the general or special orders of a State Government for the detention of prisoners, and includes all lands and buildings appurtenant thereto, but does not include— (a) any place for the confinement of prisoners who are exclusively in the custody of the police; (b) any place specially appointed by the State Government under section 541 of the Code of Criminal Procedure, 1882 (10 of 1882); or (c) any place which has been declared by the State Government, by general or special order, to be a subsidiary jail;. [68]
- **Junction:** A place, serving as an interchange point, where two or more roads or railway lines meet. [69]
- **Jurisdiction:** The area, defined by a clear boundary (such as the municipal area, district, or state) within which the authority and powers of a legally constituted body extends and ceases beyond it. [2]
- **Khasra Number:** Official map of a village record indicating boundaries of all properties, dimensions, property number, ownership and other details. The property number, as recorded on the official khasra map, normally used in land acquisition notification to identify the property and its other details. [21]
- **Kitchen:** A place used for cooking of food. [20]
- **Lake:** A large body of water within land and can be natural or man-made. [38]
- **Land Development:** ‘development’ with its grammatical variations, means the carrying out of building, engineering, mining or other operations in, on, over or under land, or the making of any material change in any building or land, and includes re-development[1].
- **Land Disposal:** The procedure of sale or lease of land, acquired by a planning and development authority or local body for public purposes, according to the rules made in this respect. [29]
- **Land Use / Use of Land / Specific Land Use:** (a) The manner in which land is used at a given point of time to accommodate various human needs, (b) The activity that can be legally performed on a parcel of land and includes, in the context of urban settlements, residential, commercial, manufacturing, public and semi-public, recreation including open spaces, transport and communication, agriculture and other special areas, which are further subdivided into sub-categories. [2]

- **Land Use Plan (Existing):** A plan that gives the existing (in a given year) land use of all parcels of land in the planning area of a settlement and is supported by quantitative and qualitative analysis of each land use. [2]
- **Land Use Plan (Proposed):** A plan that gives the proposed land use of the area of a settlement that is likely to be developed during the plan period (5 years, or 20-25 years as the case may be) for various purposes and activities having regard to socio economic development needs as well as physical, environmental and accessibility considerations. Such plans serve as a guide to planned development of the settlement, land acquisition for public purposes, and future capital budgeting. [2]
- **Land Value:** (a) The value of parcel of land apart from structure or crops standing on it, (b) The value at which a person is ready to buy or sell a plot of land, (c) The value at which sale or purchase of a plot of land has been recently registered. [29]
- **Land:** the expression “land” includes benefits to arise out of land, and things attached to the earth or permanently fastened to anything attached to the earth. [29]
- **Landfill:** A designated disposal facility or part thereof, generally located on the out skirts of a city or away from residential zone, where municipal wastes are placed in or on land. [62]
- **Landmark:** A distinctive building or feature which can be entered or passed through and which stands out as being easily identifiable and easily retained image, forming part of the mental picture of a city and just a mention of its name reminds the city e.g. Qutab Minar - Delhi, Eiffel Tower-Paris, or Big Ben London,. [71]
- **Lane:** A portion of a road surface, usually indicated by road markings, that is intended for movement of one row of vehicles. [41]
- **Large Industries:** Industries that have fixed assets without depreciation, or project cost of more than Rs. 5 crore. [46]
- **Law:** (a) The rules of a community or state the statute, (b) in research, the theoretical principles deduced from practice or observations. [31]
- **Layout Plan / Site Plan / Site Layout:** A plan of an area showing its sub-divisions, land use, infrastructure services, prepared within the framework of the Master Plan, and/or zoning and sub-division regulations. Layout Plan means a Plan indicating configuration and sizes of all Use Premises. Each Use Zone may have one or more than one Layout Plan depending upon the extensiveness of the area under the specific Use Zones and vice

versa. A layout plan shall have at least two use premises (apart from Recreational, utilities and transportation) and a minimum area of 1 hectare. [4]

- **Lease:** A contractual agreement between a tenant and a landlord whereby the landlord permits a tenant to use his property for a specified period and use on payment of a specified rent and compliance of other mutually agreed conditions. [29]
- **Level of Service (LOS):** A quantitative stratification of a performance measure or measure that represents quality of service, measured on an A to F scale, with LOS-A representing the best operating conditions from the traveler's perspective and LOS-F the worst. [39]
- **Level of Urbanisation / Degree of Urbanisation:** The percentage of urban population to the total population in a country, state or region. [20]
- **Library (Public):** A premise having large selection of books for reading and reference for general public or specific class. [36]
- **Library/ Reading Room:** A premise having a large collection of books for reading and reference for general public or specific class. [2]
- **Literacy Rate:** The percentage of literates in the age group of seven years and above. [20]
- **Literate:** A person aged 7 years and above who can both read and write with understanding in any language was taken as literate. [20]
- **Local Bus Service:** An intra-city bus service that usually links residential areas and major activity centres using the local street system. [72]
- **Local Road / Local Street:** A street primarily for access to residence, business or other abutting property. Its primary function shall be for local activities and access to properties and not through movement of traffic. Local streets may not have a dedicated footpath and can be designed as shared space that gives priority to NMT modes. Various traffic calming elements will be employed to ensure that vehicle speeds are below 20 kmph, safe for intermingling of pedestrians, cyclists, and motor vehicles. [41]
- **Location Map:** A map showing the location of the project site in relation to neighbouring areas, settlements, transportation routes and other prominent features with a view to provide a clear comprehension of the locational characteristics of the site. [71]
- **LPG Godown:** A premise where cylinders of LPG are stored. [73]
- **Main Worker:** Workers who worked for more than 6 months (180 days) in the reference period are termed as Main Workers. [20]

- **Mall:** A large retail commercial complex with one large establishment acting as the anchor and several other small shops, owned and managed by different persons, selling a variety of goods and services. [4]
- **Mandi Town:** A town where trading of agricultural produce is the main economic activity and forms its economic base. [2]
- **Manufacturing Industries:** Industries that produce goods by using or processing a variety of raw, semi-processed and / or recycled materials. [46]
- **Map:** A representation on paper, of physical features, size, location, use, political and administrative boundaries, and other characteristics on land drawn to scale using cartographic techniques as per requirements. [71]
- **Marginal Worker:** Workers who worked for less than six months (180 days) in the reference period are termed as Marginal Workers. [20]
- **Market:** “Market” includes any place where persons assemble for the sale of, or for the purpose of exposing for sale, live-stock or food for live-stock or meat, fish fruit, vegetables, animals intended for human food or any other articles of human food whatsoever with or without the consent of the owner of such place, notwithstanding that there may be no common regulation of the concourse of buyers and sellers and whether or not any control is exercised over the business of or the persons frequenting the market by the owner of the place or any other person. [42]
- **Master Plan/Development Plan:** Development plan is a statutory plan prepared (under relevant Act) within the framework of an approved perspective plan. The objective of a development plan is to provide further necessary details and intended actions in the form of strategies and physical proposals for various policies given in the perspective plan and regional plan depending upon the economic and social needs and aspiration of the people, available resources and priorities. [2]
- **Median / Divider:** An area in the approximate center of a city street or state highway that is used to separate the directional flow of traffic, may contain left-turn lanes, and is demarcated by curb and guttering, having painted or thermally applied stripes or other means of distinguishing it from the portion of the roadway used for through traffic. (Thornton, Colo.) [41].
- **Medium Industries:** Where the investment in plant and machinery is more than five crore rupees but does not exceed ten crore rupees.[30]

- **Metropolis:** (a) Demographically, a city having a population of one million and above, (b) Administratively, a city having a population of one million and above and governed by one or more municipal body(ies), (c) Functionally, a city having a population of one million and above serving its influence region as the dominating centre of trade, commerce, art, culture, health care, recreation, education, research, administration and political activity. [20]
- **Microclimate:** The climate of a localised area which may differ from the overall climate of the wider area due to local factors such as tree cover (or the absence of tree cover), or exposure to winds. [74]
- **Migrant:** A person who moves from one place to another. [20]
- **Migration / Population Drift:** Movement of people from one place to another generally for employment, or other social purposes like education or marriage. [20]
- **Mining / Quarry:** All or any part of the process involved in the mining of minerals by removing overburden and mining directly from the mineral deposits, open pit mining or minerals naturally exposed, mining by auger method, dredging and quarrying, underground mining, and surface work incidental to an underground mine. [28]
- **Mining Site:** The entire area, including land and water, encompassed in the mining site plan. (Polk County, Fla.) [28]
- **Mixed Land Use:** The phenomenon of existence of two or more uses on a site, or plot or in a building, which may or may not be compatible. [2]
- **Mixed:** Mixed-use is a kind of urban development, urban design, urban planning and/or a zoning type that blends multiple uses, such as residential, commercial, cultural, institutional, or entertainment, into one space, where those functions are to some degree physically and functionally integrated, and that provides pedestrian connections. Mixed-use development may be applied to a single building, a block or neighbourhood, or in zoning policy across an entire city or other administrative unit. [2]
- **Mosaic:** An assemblage of overlapping aerial or satellite photographs or images whose edges have been matched to form a continuous pictorial representation of a portion of the earth's surface. [5]
- **Mosque:** A building or a complex of building with related infrastructure including parking and serving as an Islamic place of worship. [52]
- **Multiplex:** It shall mean an integrated entertainment and shopping complex/center. It shall necessarily have minimum two cinema halls and may have Theatres, Auditorium,

Retail Shops, Commercial show rooms, Restaurants and Food plazas, Health club and Fitness center, Clubs, Call centers, Corporate Offices, Convention Hall, Bank, Cyber café, Video Games, Parlours, Pubs, Bowling Allies and Recreational activities and all the areas/building except cinema halls shall fall in the commercial category. [3]

- **Multipurpose ground:** Support Facilities- Vending Booth/ Kiosk. [2]
- **Multipurpose Open Spaces / Maidan:** A space or an area, which is essentially, open and can be used for multiple temporal functions. [2]
- **Multi-storey parking:** A building designed for car and motorcycle parking and where there are a number of floors or levels on which parking takes place. [4]
- **Municipal Area:** The territorial area under the jurisdiction of municipality as notified by the Governor. [11]
- **Municipal Corporation / Nagar Nigam:** “Corporation” or “Municipal Corporation” means the Municipal Corporation constituted for a city under sub-clause (c) of clause (1) of Article 243-Q of the constitution. [42]
- **Municipal Council / Nagar Palika / Nagar Parishad:** An elected urban local body of self-governance for smaller urban areas constituted under the Municipal act. [6]
- **Municipal Government:** A municipal council, or corporation or Nagar Panchayat, constituted by election as per relevant municipal act to make policies, collect taxes, and discharge the specified administrative and developmental functions within their respective area of jurisdiction. [6]
- **Municipal Solid Waste:** All types of solid waste, except hospital waste, generated by different residential and commercial areas located in a municipality. [62]
- **Municipality:** The urban local institution of self-governance constituted under Municipal act. [6]
- **Museum:** A building having public significance by reason of its architecture or former use or occupancy or a building serving as a repository for a collection of natural, scientific, or literary curiosities or objects of interest, or works of art, and arranged, intended, and designed to be used by members of the public for viewing, with or without an admission charge, and which may include as an accessory use the sale of goods to the public as gifts or for their own use. [4]
- **Nala / Nallah:** In Hindi, an open main drain carrying storm water and / or sewage in a settlement. [21]

- **Natural Growth:** The surplus of population due to excess of births over deaths and does not include increase due to migration. [20]
- **Natural Reserve Area:** (a) A designated area of ecological significance with diversified flora and fauna kept reserved in their natural state for conservation, study, research and human enjoyment, (b) Designated areas, generally kept reserved in their natural state, that are unsuitable for urban development due to natural constraints and include rivers and their 100-year floodplains, wetlands, steep hill slopes, and the like. [61]
- **Nazul Land:** In Persian, the land vested with the government. [21]
- **Neighbourhood:** A residential planning unit in a city comprising housing-clusters that can support all necessary facilities and services to serve a population of 3,000 to 6,000 persons. [2]
- **Net Residential Density:** The number of persons per unit area (hectare or acre) of a residential site and it excludes area devoted to sector level facilities, services, commercial activity, parks, open spaces, and major roads (net residential density is generally double of the gross residential density as about 50 per cent area is occupied by sector level uses). [2]
- **Network:** (a) In transportation, a system that comprises transportation by rail, road, air, waterways, wires and pipe lines, (b) In planning, a system of transport and utility lines including water supply, electricity, gas, communication, roads connecting different areas of a city, (c) In administration, a system of relationship between different institutions, organisations and agencies having similar interests of organisational goals. [2]
- **New Town:** A self-contained town having its own economic base, administration and governance, comprehensively planned on a virgin site for accommodating industrial, commercial, and residential activities that are served by necessary utilities, facilities and services. [2]
- **Night Shelter / Ran Basera:** A premises generally owned and managed by the urban local body or a voluntary agency, for providing accommodation, in the night only, to homeless urban poor on daily payment of a token amount as rent, or without any charge [2].
- **Noise Pollution:** An undesirable sound produced by any source that has adverse impact on human beings such as annoyance, irritation, and deafness. [75]

- **Notified Area:** If in the opinion of the State Government any-area within the State requires to be developed according to plan it may, by notification in the Gazette declare the area to be a development area. [1]
- **Nursery:** Any land used to raise trees, shrubs, flowers, and other plants for sale or for transplanting. [66]
- **Nursing Home / Maternity Home / Polyclinic:** A premise having medical facilities for indoor and outdoor patients having up to 50 beds, where persons suffering from illness, injury or infirmity are usually received or accommodated or both the purposes of observation, Nursing and treatment. In case of polyclinic, it shall be managed by a group of doctors. [2]
- **Obnoxious Industry:** means an industry which creates nuisance to the surrounding in the form of smell, smoke, gas, dust, air pollution and other unhygienic conditions. [46]
- **Occupancy / Use:** Number of persons per habitable room in a house. The principal occupancy/ use for which a building or a part of a building is intended to be used. For the purposes of classification of a building according to occupancy, an occupancy shall be deemed to include the subsidiary occupancies which are contingent upon it [4]. “Mixed occupancy” buildings being those in which more than one occupancy is present in different portions of the buildings [4].
- **Office/ Corporate Office:** A premise used for office of commercial establishment, profit making organization and other Institutions. [54]
- **Office:** A building used for performing the functions and activities related to a government ministry or department, corporate body, private company or an individual. [4]
- **Off-Street Parking Area:** A site or a portion of a site, devoted to the off-street parking of vehicles, including parking spaces, aisles, access drives, and landscaped areas, and providing vehicular access to a public street. (Santa Rosa, Calif.). A land surface or facility providing vehicular parking spaces off of a street together with drives and manoeuvring lanes so as to provide access for entrance and exit for the parking of motor vehicles (Traverse City, Mich.). [2]
- **Old Age Home / Care Centre for Physically/Mentally Challenged:** A premise with commercial or non-commercial arrangement for long or short term stays of old people/ senior citizens. It may include arrangement for recreation, general health, catering etc

[11]. A premise having the facility of caring and training boarding and lodging of the elderly/ physically/ mentally challenged. [2]

- **On-Street Parking:** The storage space for an automobile that is located within the street right-of-way. (Hilton Head, S.C.) [2]
- **Open Spaces / Green Areas:** “Open space” means any land (whether enclosed or not), belonging to the State Government or any local authority, on which there are no buildings or of which not more than one-twentieth part is covered with buildings, and whole or the remainder of which is used for purposes or recreation, air or light. [79]
- **Orchard:** An enclosure for growing fruit trees for commercial purposes. [55]
- **Origin:** The starting point or zone of a trip. [41]
- **Orphanage:** A building with facilities for boarding and lodging of children, who are bereaved of parents. It may or may not have educational facilities. [2]
- **Overall Density / City Level Density / Town Density:** The density of population of a settlement calculated by dividing its total population by the total area covered by all uses. [11]
- **Overcrowding:** Excessive concentration of activities and people in an area that cannot be supported the existing infrastructure. [11]
- **Over-head tank (OHT):** A premise having overhead tank for storage and supply of water to its neighbouring areas. It may or may not include a pump house. [62]
- **Panchayat:** “Panchayat” means an institution of self-government constituted under article 243B of Constitution of India for the rural areas. [6]
- **Park:** An appropriately landscaped place used for outdoor leisure activity and may have fencing, parking space and public toilet. A premise used for recreational leisure activities. It may have on it related landscaping, parking facilities, public toilet, fencing etc. It will include synonyms like lawn, open space, green etc. [79]
- **Parking Space / Area:** Any public or private land area designed and used for parking motor vehicles including parking lots, garages, private driveways, and legally designated areas of public streets (*Bondurant, Iowa*). Parking space is an enclosed or unenclosed covered or open area sufficient in size to park vehicles. Parking spaces shall be served by a driveway connecting them with a street or alley and permitting ingress and egress of vehicles [4].
- **Passenger Car Unit (PCU):** An adjustment factor to convert a heterogeneous traffic into a homogeneous traffic where each vehicle type is assigned a factor equivalent to a

passenger car to convert it to the passenger car unit (PCU) (e.g. for car – 1-PCU, for Truck – 3-PCU). [41]

- **Path:** (a) In transport, *see footpath*, (b) In urban design, channel of movement in a city along which people walk, observe the various buildings and features and form part of the perceived image of the city. [41]
- **Peak Hour:** The hour, generally, in the morning and evening, when there is a maximum flow of traffic on a given transportation facility or corridor. [41]
- **Permission or Permit:** A valid permission or authorization in writing by the competent authority to carryout development or a work regulated by the regulations / bye-laws of the competent authority. [4]
- **‘Permitted Activities / Buildings’:** Use as specified in the zoning regulations / master plan, that are unconditionally allowed within specific land use. [2]
- **‘Permitted Activities / Buildings’ with Condition:** Use as specified in the zoning regulations / master plan, that require certain conditions within specific land use. Conditions are specified in the concerned zoning regulation / master plan document.
- **Petrol Pump/Service Station:** Means any premises specially prepared for the fuelling of motor vehicles and includes such places within the premises which have been specially approved by the licensing authority for the servicing of motor vehicles and for other purposes. [32]
- **Pharmaceutical Industry:** An industry discovers, develops, produces, and markets drugs or pharmaceutical drugs for use as medications to be administered to patients, with the aim to cure them, vaccinate them, or alleviate symptoms. [46]
- **Physical Infrastructure:** Essential utilities and services like water supply, sewerage, drainage, power supply, and solid waste management. [2]
- **Physical Planning / City Planning / Land Use Planning / Spatial Planning / Town Planning:** A process of formulation of the plan of a settlement or region, as the case may be, which serves as a tool in guiding the manner in which land will be used for various socio economic and physical activities and infrastructure provision and development therein shall be carried out by the public or private agencies. [2]
- **Plan:** (a) In spatial planning, a two dimensional representation of (i) existing or proposed characteristics of land and arrangement of various land uses and transportation network in an area, or (ii) spatial variations of an attribute, or (iii) distribution of various policy zones in a city or region, (b) In economic planning, a document highlighting the characteristics

of different sectors of economy, and proposed policies, programmes along with fiscal allocations for economic development and social justice in an area, (c) In administration, a scheme for accomplishing organisational goals, (d) In design, an arrangement of different components of a building at plinth level, seen from above. [2]

- **Planning Area:** An area, declared under the relevant act, having well defined boundaries identified by natural or manmade elements, for which the master plan or development plan shall be prepared. [1]
- **Planning Authority:** Hereby means Department of Town and Country Planning, Government of Uttarakhand. [1]
- **Planning:** A continuous, time-oriented and cyclic process of identification and achievement of goals. [2]
- **Play Ground:** “Playground” means a piece of land adapted for the purpose of play, game or sport and used by any educational institution or club or other association. [79]
- **Plot / Lot / Site:** A single unit of subdivision of land, that can be identified and defined in a layout plan, intended for the indicated specific use. A piece of land enclosed by definite boundaries. The maximum average between the frontage and depth of a plot meant for whatsoever purpose should be 1: 3.5 after leaving required right of way. In case of the average being higher than stated above, the map shall be approved only on notional 1:3.5 average of the plot and the remaining space shall remain open [11] [3]. Plot/ Site is a parcel or piece of land enclosed by definite boundaries [4].
- **Plotted Housing (Residential Plot):** A Premise for one or more than one dwelling unit and may have on it one main building block and one accessory block for garages and service personnel. [9]
- **Police Post:** A Building accommodating office and residential accommodation of some essential staff of police serving a designated local area having a population of about 50,000 (this figure may change). [47]
- **Police Station:** A building accommodating office and residential accommodation of some essential staff of police serving a designated area and having a population of 75,000 to 100,000 (this figure may change). [47]
- **Pollution Control:** Precautionary legal, administrative, planning, and monitoring procedures to control various sources of environmental contamination that are capable of causing harm to man or any other living organism supported by environment. [75]

- **Pollution:** Release into any environmental medium-air, water or land from any process or substances which are capable of causing harm to man or any other living organism supported by the environment. [75]
- **Population Density:** Number of persons per unit area (i.e. acre, hectare, square mile, square kilometre etc.). [2]
- **Population Projection / Population Forecast:** The statistical methods of calculation of population size of an area or settlement at a given point of time in future. [20]
- **Post Office:** A building used for collection, sorting, and distribution of articles sent by post to people as well as providing services related to deposit of money as a bank, and money-transfer from one place to another. A premise with facility for postal communication for public use. [2]
- **Potable Water:** Water that is satisfactory for drinking, culinary, and domestic purposes, meeting current drinking water standards (Troy, Ohio). Water which is satisfactory for drinking and culinary purposes (Temple Terrace, Fla.). The use of water for direct human consumption, human contact, or in the preparation of foods for human consumption (San Juan Capistrano, Calif.) [62]
- **Poultry Farm:** A premise with facilities for poultry products. It may have temporary structures for sheds of birds. [2]
- **Poverty:** (a) Poverty can be defined as a condition in which an individual or household lacks the financial resources to afford a basic minimum standard of living. (b) A condition where the people live on earnings less than US \$2 per capita per day (World Bank). [32]
- **Power Plant:** A power plant is an industrial facility that generates electricity from primary energy. Most power plants use one or more generators that convert mechanical energy into electrical energy in order to supply power to the electrical grid for society's electrical needs. [44]
- **Primary Health Centre / Family Welfare Centre / Diagnostic Centre:** A premise having facilities for treating indoor and outdoor patients having up to 10-15 beds. It may be managed by a public or charitable institution on non-commercial basis. It includes family welfare centre and maternity home. [2]
- **Primary School:** An institution located in a building or a campus of several buildings, managed by public or private institution, for offering education and play facilities for children between 6 to 10 years' age studying in I to V class / standard. [2]

- **Printing Press / Printing Plant (Service Industry):** A commercial printing operation involving a process that is considered printing, imprinting, reproducing, or duplicating images and using printing methods including but not limited to offset printing, lithography, web offset, flexographic, and screen process printing (Sioux Falls, S.Dak.). [46]
- **Private Garage:** A building or outhouse designed or used for the storage of private owned motor vehicles.
- **Private Office:** A building used for performing the functions and activities related to private company or an individual. [54]
- **Project:** A document related to a building, site, or equipment with all necessary supporting legal, administrative and technical details, estimated cost, sources of finance and cost recovery for submission to a funding agency or an approving body. [62]
- **Proposed Land Use Plan:** It means the plan showing the proposed admissible uses of different areas and land use zones covered in the Planning Area. [7]
- **Protected Area:** An area, building or structure designated as such, by law or otherwise in an approved plan, for protection from its misuse or abuse because of its special characteristics or historical or architectural significance or natural beauty. [61]
- **Public and Semi-Public Activities / Building:** A building used or intended to be used either ordinarily or occasionally by the public such as offices of State or Central Government, Public sector undertakings or Local authorities, a church, temple, chapel, mosque or any place of public worship, dharmashala/ashram, college, school, library, theatre for cultural activities, public concert room, public hall, hospital run by public institutions, public exhibition hall, lecture room or any other place of public assembly. Such buildings shall ordinarily include Assembly building, Educational building, Health building, Institutional building. [7] [3]
- **Public / Public Convenience / Community Toilets / Community Latrines:** a building providing WCs, urinals and wash basins for public use with or without payment of charges. [62]
- **Public Land:** A parcel of land owned by the government (central, state, or municipal) that holds its title and control. [11]
- **Public Parking:** A parking facility for use of any member of public free of charge or on payment of parking fee. [41]

- **Public Purpose:** The expression “public purpose” includes- (i) the provision of village-sites, or the extension, planned development or improvement of existing village-sites; (ii) the provision of land for town or rural planning; (iii) the provision of land for planned development of land from public funds in pursuance of any scheme or policy of Government and subsequent disposal thereof in whole or in part by lease, assignment or outright sale with the object of securing further development as planned; (iv) the provision of land for a corporation owned or controlled by the State; (v) the provision of land for residential purposes to the poor or landless or to persons residing in areas affected by natural calamities, or to persons displaced or affected by reason of the implementation of any scheme undertaken by Government, any local authority or a corporation owned or controlled by the State; (vi) the provision of land for carrying out any educational, housing, health or slum clearance scheme sponsored by Government or by any authority established by Government for carrying out any such scheme, or with the prior approval of the appropriate Government, by a local authority, or a society registered under the Societies Registration Act, 1860 (21 of 1860), or under any corresponding law for the time being in force in a state, or a co-operative society within the meaning of any law relating to co-operative societies for the time being in force in any State; (vii) the provision of land for any other scheme of development sponsored by Government or with the prior approval of the appropriate Government, by a local authority; (viii) the provision of any premises or building for locating a public office, but does not include acquisition of land for companies;]. [29]
- **Public Service:** (a) The civil service, (b) Services provided for the benefit of the people by the national, state or local government and include supply of water, gas, electricity, education and health care. [62]
- **Public-private Partnership:** Public Private Partnership means an arrangement between a government / statutory entity / government owned entity on one side and a private sector entity on the other, for the provision of public assets and/or public services, through investments being made and/or management being undertaken by the private sector entity, for a specified period of time, where there is well defined allocation of risk between the private sector and the public entity and the private entity receives performance linked payments that conform (or are benchmarked) to specified and pre-determined performance standards, measurable by the public entity or its representative. [33]

- **Quarry:** A place where mineral resources are being dug out and given primary treatment (like crushing), if needed, before its transportation to other users. [28]
- **R & D Centre:** A premise having facilities for research and development for any specialized field. [4]
- **Race course:** Area earmarked for racing with minimal built space for supporting the race. [4]
- **Rail Transport:** The mode of transport of people and goods that runs on fixed rail-tracks and includes sub-urban railways, tramways, and metro-rail. [69]
- **Railway Station:** A facility, either light or heavy rail, for the boarding of passengers and related ticketing sales and offices. (Prince William County, Va.) [69]
- **Railway:** “Railway” means a railway, or any portion of a railway, for the public carriage of passengers or goods, and includes— (a) all lands within the fences or other boundary marks indicating the limits of the land appurtenant to a railway; (b) all lines of rails, sidings, or yards, or branches used for the purposes of, or in connection with, a railway; (c) all electric traction equipments, power supply and distribution installations used for the purposes of, or in connection with, a railway; (d) all rolling stock, stations, offices, warehouses, wharves, workshops, manufactories, fixed plant and machinery, roads and streets, running rooms, rest houses, institutes, hospitals, water works and water supply installations, staff dwellings and any other works constructed for the purpose of, or in connection with, railway; (e) all vehicles which are used on any road for the purposes of traffic of a railway and owned, hired or worked by a railway; and (f) all ferries, ships, boats and rafts which are used on any canal, river, lake or other navigable inland waters for the purposes of the traffic of a railway and owned, hired or worked by a railway administration, but does not include— (i) a tramway wholly within a municipal area; and (ii) lines of rails built in any exhibition ground, fair, park, or any other place solely for the purpose of recreation. [34]
- **Rain Water Harvesting:** It means the process of harvesting of rainwater, which involves the collection of water from the surface(s) on which rain falls and subsequently storing this water for direct use or can be recharged into the underground aquifers; [62]
- **Rate of Growth:** The percentage increase or decrease of population/ number of vehicles/ industrial production/economy/etc. per year. [20]
- **Rates:** Charges levied by a municipal body or any other authorised agency for provision of utilities, facilities or services. [4]

- **Real Estate / Real Property / Landed Property / Immovable Property:** Includes land, buildings, rights of ways, lights or any other benefit arising out of land and things attached to the earth or permanently fastened to anything which is attached to the earth, but not standing timber, standing crops or grass. [35]
- **Recreational Area / Recreational Zone:** An area designated for activities related to active and / or passive recreation owned by a public agency or private body / individual. [54]
- **Recreational Club:** A premise having the facility for recreation with indoor sports, swimming pool, outdoor sports, socializing and gathering space for small functions with restaurant. [2]
- **Recreational:** An Area designated for activities related to active and passive recreation owned by a public agency or private body. [54]
- **Redevelopment :** In an Urban renewal programme of a dilapidated area declared unfit for human habitation, a process of (i) temporary or permanent relocation of affected people on the same or to another site, (ii) demolition of buildings, (iii) re-planning the area so cleared having regard to its full potential, (iv) construction of dwellings/other buildings and provision of infrastructure, (v) on completion, allotment of the dwellings to affected people, if located on a temporary site, and (vi) sale of remaining built spaces. [57]
- **Refuse / Wastes:** Anything that is discarded as worthless or useless and includes municipal, industrial, and other wastes. [62]
- **Region:** An area defined by a set of attributes. In practice, a prefix is added to highlight the attributes on which the region has been defined for example, agriculture region, resource region, city region, planning region, administrative region. [2]
- **Regulated Area:** It means any area specified or declared as per Master Plan / Development Control Regulations in force under relevant act by the State Authority or the Local Development Authority with the prior approval of the State Government. [1]
- **Regulation:** means a regulation made under relevant act by the State Authority or the Local Development Authority with the prior approval of the State Government. [1]
- **Rehabilitation:** (a) In housing and urban development, a process of improving the quality of a blighted area by one or more of the following actions: partial rebuilding, repair, remodelling, renovating, conserving, providing educational, health care and recreational facilities, or augmenting utilities and services, (b) In case of large projects requiring displacement of people, a processes of providing, the project-affected-people,

housing, job opportunities, training to enable them to take up new jobs and financial and technical assistance. [57]

- **Religious Building:** A general term for the building dedicated to the service of the god and may be a Temple, Mosque, Church, Gurudwara, Ashram and synagogue. [52]
- **Remote Sensing:** Science of acquiring information about the Earth's surface without actually being in contact with it. [2]
- **Remote Sensing:** The measurement or acquisition of information Remote of some property or an object or phenomenon by a remote recording device. [5]
- **Repair Shop:** A premise equivalent of a retail shop for carrying out repair of household goods, electronic gadgets, automobiles, cycles etc. Other shops include sweets shop, tailor shop, kirana store, meat shop, mobile repair shop, clock shop, cloth-iron shop, fish products shop, stationary shop, plumbing shop, carpenter shop, utensil shop etc. [9]
- **Residential Area:** An area in a settlement where people live and is characterised by residential buildings and related facilities, services and infrastructure. [54]
- **Residential Buildings:** It includes a building in which sleeping and living accommodation is provided for normal residential purposes, with cooking facilities and includes one or more family dwellings, apartment houses, flats, and private garages of such buildings. [4]
- **Residential Land Use:** The land use category in a development or layout plan devoted to residential activity, which may be further subdivided into zones/ clusters by nature. [54]
- **Residential Zone:** A designated area for residential activity where prohibited land uses shall not be allowed to maintain its safety, and environmental quality. [54]
- **Resolution:** (a) In GIS and remote sensing, resolution is the accuracy at which a given map scale can depict the location and shape of geographic features where, the larger the map scale, the higher is the possible resolution. [5]
- **Resort:** A group or groups of buildings containing more than five dwelling units and/or guest rooms and providing outdoor recreational activities that may include golf, horseback riding, swimming, shuffleboard, tennis and similar activities. A resort may furnish services customarily furnished by a hotel, including a restaurant, cocktail lounge, and convention facilities. [4]
- **Restaurant:** A premises used for cooking and serving, on commercial basis, food items to people seated in the covered or open space or both. [4]

- **Retail Shop:** A premises where sale of commodities, directly to the consumer, takes place and includes space for necessary storage of goods. [2]
- **Revenue Forest:** The forest revenue system is closely linked to the issuance of harvesting permits, which are based on inventories and farm inspections. This permit system is meant to ensure that harvesting is only allowed at a sustainable level. Thus, it is a mechanism to control and limit the exploitation of forest resources. [21]
- **Revenue Village:** ‘village’ means any local area whether compact or otherwise, recorded as a village in the revenue records of the district concerned, and includes an area which the State Government may, by general or special notification, declare to be a village. [21]
- **Right of Way:** (a) The total width of the strip of land designated as a road, railway, waterway, or a public utility, (b) The legal right to pass through the grounds of another under certain circumstances. [41]
- **Risk:** A possibility of loss or damage arising from a specific action, processes or situation that could be economic, socio cultural, environmental or political. [59]
- **River:** A natural water body that carries water collected from its catchment area to another river or sea and on the way, serves the irrigation, drinking water and other needs of the people. [16]
- **Road / Street:** Any highway, street, lane, pathway, alley, stairway, passageway, carriageway, footway, square, place or bridge whether a thorough-fare or over which the public have a right of passage or access or have passed and have access uninterruptedly for specified period, whether existing or proposed in any scheme and includes all bends, channels, ditches, storm water drains, culverts sidewalks, traffic islands, roadside trees and hedges, retaining walls fences, barriers and railing within the street lines. [4]
- **Room:** A space defined by walls, roof and floor. [4]
- **Row Housing:** A row of houses with only front, rear and interior open spaces. [4]
- **Rules:** means a rule made under the relevant act by the State Government or the State Authority. [1]
- **Run-off:** The portion of precipitation that flows over the land surface or in open channels. [62]
- **Sanctuary / National Park / Safari Park / Wildlife Sanctuary:** An area of adequate ecological, faunal, floral, geomorphologic, natural, or zoological significance reserved under a Wild Life Protection act, for the purpose of protecting, propagating or developing wild life and the environment. [61]

- **Sanitary Landfill Site:** A premise where solid waste is disposed of for short or specific period. [62]
- **Sanitation:** Measures taken to protect public health and include control of insects, rodents, environmental pollution, and management of solid and liquid wastes. [62]
- **Saw mill / Timber Mill:** A sawmill (saw mill, saw-mill) or lumber mill is a facility where logs are cut into lumber. Modern sawmills use a motorized saw to cut logs lengthwise to make long pieces, and crosswise to length depending on standard or custom sizes (dimensional lumber).
- **Scale of Maps:** Depending upon the size of the planning area and the coverage and extent of information required, the scale of maps vary and it generally is – 1:100,000 to 1:250,000 for regional plans, 1:50,000 to 1:100,000 for perspective plan, 1:10,000 to 1:25,000 for development plan (master plan) and 1: 500 to 1:5,000 plans of projects and schemes. [71]
- **Scale:** (A) A system or scheme of relative values or correspondence, (b) In a drawing or model, proportional relationship between an actual object and its representation on paper or as a model. [71]
- **School:** An institution located in a building or a campus of several buildings with or without hostel accommodation, managed by public or private institution, for offering education and play. facilities at different levels comprising children of different age groups. [2]
- **Scrap yard:** A place where old vehicles and machines are collected and either sold or prepared for being used again.
- **Secondary School:** An institution located in a building or a campus of several buildings, with playing facility, with or without hostel accommodation, managed by public or private institution, for offering education and play facilities for children between 11 to 17 years' age studying in VI to X class / standard. [2]
- **Secondary Sector:** One of the three sectors of economy comprising manufacturing, and household industries. [2]
- **Sector:** (a) In physical planning, a particular and distinguishable planning unit forming part of division or sub-division of a city for the purpose of equitable spatial distribution of utilities, facilities and services as per population residing or expected to reside there, (b) In economic planning, it refers to the various components of economy, where each is called a sector, and include agriculture, industry, trade and commerce, transport, urban

development, rural development, social development, science and technology, and infrastructure. [11]

- **Semi-detached Housing:** An arrangement of houses using pairs of dwelling units in such a way that two houses are attached by a common wall between them leaving the remaining three sides of each house detached. [4]
- **Senior Secondary School:** An institution located in a building or a campus of several buildings, with playing facility, with or without hostel accommodation, managed by public or private institution, for offering education and play facilities for children studying in X to XII class / standard. [2]
- **Service Centre:** In the context of a region, a town or large village having linkages with its rural hinterland and providing commercial, education, health, communication and recreational facilities and agriculture-related services to the group of villages in the service area. [46]
- **Service Industry:** A labour intensive economic activity that provides services rather than production of goods and includes printing, photography, health care, film and TV serial making, cold storage, laundry, dry cleaning, repair, servicing and maintenance of equipment and machineries. [46]
- **Service Lane / Road:** (a) A road, 7 to 10 m right of way, running at the rear side of residential or commercial buildings dedicated for providing services, scavenging in residential areas, or loading and unloading of goods in commercial areas (b) A 2-lane road forming a part of highway, arterial or sub-arterial road on its either side and dedicated to providing direct access to properties. [41]
- **Services:** Include transportation by rail, road, air, waterways, telecommunication, police protection, firefighting, postal, and such other services, not covered under utilities or facilities. [2]
- **Settlement:** A human settlement, whether urban or rural in character. It includes habited villages, towns, townships, cities and the areas notified under the control of the competent authority. [4]
- **Sewage / Waste Water:** Waste water from all sources - residential, commercial, and industrial or other areas. [11]
- **Sewage Disposal:** A system of collection, treatment, and safe disposal of sewage. [62]
- **Sewer:** A conduit pipe or channel, open or closed, carrying sewage or trade effluent. [62]

- **Sewerage pumping station:** A premise with a pumping station used for pumping sewage on to a higher gradient. It may include, treatment facilities used for treatment of sewage. [62]
- **Sex Ratio:** Number of females per 1000 males. [20]
- **Shelter:** A structure that provides bare minimum space for living Shelter and a cover for protection from sun and rain, which may not always be adequate. [20]
- **Shopping Mall:** One or more buildings forming a complex of shops representing merchandisers, with interconnecting walkways enabling visitors to easily walk from unit to unit, along with a parking area; a modern, indoor version of the traditional marketplace with controlled environment. [4]
- **Signage:** A well designed display mechanism, located strategically along the channel of movement of vehicle and people, indicating (i) direction to important places, facilities and services, (ii) name of roads, buildings, and sites, (iii) information of tourist interests, or (iv) traffic regulations. [41]
- **Site:** A well-defined parcel of land or area intended or suitable for development and building construction purposes, the various types of sites by accessibility are Corner Site, Double-Frontage Site, and Interior Site. [2]
- **Slaughterhouse:** A facility for the slaughtering and processing of animals and the refining of their by-products (Sioux Falls, S.Dak.). A building used for the for-profit slaughtering of animals that are either raised or transported to the building and the processing and storage of animal products and waste that results from a slaughtering process. (Washoe County, Nev.) [70]
- **Slope / Grade:** A raise in elevation within a specific distance generally expressed in percentage, e.g. one per cent slope means a rise of one metre in elevation over a horizontal distance of 100 metre. [62]
- **Slum:** ‘Slum’ shall mean those areas located within the local body which due to overcrowding, unplanned construction, lack of basic infrastructure and lack of tenurial rights are unfit for human habitation for reasons of health and security and for the above any one or a combination of factors have been notified by the State Government. [36].
- **Small/ Light Industry:** Small/ light industries as per classification of the State Government. [11]
- **Small Scale Spices Industry:** A household industry, in which one or more families are engaged in the processing of spices and substances which are used as adjuncts to food.

Spice processing include Cleaning, Grinding, Blending, Sieving, Material Handling and Bulk Storage, Batch making up to Packing. [46]

- **Social Infrastructure:** Social facilities needed for a community and include health care, education, recreation, communication. security, safety, religious and cultural activities, old-age homes, night shelters, cremation and burial grounds and cemeteries. [2]
- **Social Service:** activities of individuals, groups, NGOs, or Social government agencies that aim at well-being of society especially the poor, deprived, disadvantaged, and may include education, health care, recreation, mother and childcare, and provision of employment opportunities. [2]
- **Social Welfare Centre:** A premise with facilities for welfare and promotion of community development. It includes healthcare, empowerment, housing and other programs geared towards assisting the poor, unemployed and marginalized in society. It shall be run by a public or charitable institution. [5]
- **Solid Waste Disposal:** The process of collecting, transporting, processing, recycling, and disposing solid wastes safely in landfills or incinerators. [62]
- **Solid Waste Management:** A holistic approach to the issue of solid wastes and includes reduction of waste generation at source, segregation, collection, transportation, recycling, and safe disposal. [62]
- **Solid Waste Treatment Plant:** A premise where solid waste is collected treated mechanically / electrically and processed for reuse. [62]
- **Solid Waste:** Solid materials discarded from houses, business establishments, industries, gardens and forests, construction sites and other places and it does not include excreta. [62]
- **Special Areas:** (a) In city planning, areas designated as such that need unique and specific development norms, rules and regulations and include city core requiring redevelopment, or a heritage area needing conservation, (b) In regional planning, areas designated in the regional plan that require unique and specific policies and programmes and approaches for their planning and development and include hill areas, coastal areas and tribal areas, and environmentally sensitive areas. [2]
- **Sports Centre:** A premise having facilities for training and coaching for different indoor and outdoor games including swimming. It shall also include centre for physical education. [2]

- **Sprawl:** The haphazard outward physical growth around a large city in a disorderly fashion. [2]
- **Stadium:** A large building with tiers of seats for spectators at sporting or other recreational events. [4]
- **Stakeholder:** An individual or group of individuals who has an interest in and can influence the decisions pertaining to the government activities, programs and objectives. [2]
- **Standards:** Technical specifications based on accepted practice and approved by a recognised agency for repeated and continued use. [2]
- **Statutory Town:** All administrative units that have been defined by statute as urban like Municipal Corporation, Municipality, Cantonment Board, Notified Town Area Committee, Town Panchayat, Nagar Palika etc., are known as Statutory Towns. [20]
- **Storage or Warehouse Building:** It means a building used or constructed or adapted to be used either ordinarily or occasionally for the storage or sheltering of goods, wares, merchandise or any other similar activity, including servicing, processing or repairs incidental to such storage, warehouses, cold storages, freight depot, transit sheds, store houses / garages, hangars, truck terminals, grain elevators, barns and stables. [4] [3]
- **Storey:** The portion of a building included between the surface of any floor and the surface of the floor next above it, or if there be no floor above it, then the space between any floor and the ceiling next above it. [4] [3]
- **Stream:** “stream” includes— (i) river; (ii) water course (whether flowing or for the time being dry); (iii) inland water (whether natural or artificial); (iv) sub-terranean waters; (v) sea or tidal waters to such extent or, as the case may be, to such point as the State Government may, by notification in the Official Gazette, specify in this behalf. [38]
- **Street:** (a) A means of access to abutting properties, (b) A transport link connecting various areas of a city. [41]
- **Surface Water Drain:** A drain carrying surface water including storm water. [62]
- **Swimming Pool:** A pool or tub constructed either above or below grade and having a capacity of 5,000 or more gallons. [4]
- **SWOT Analysis:** An analysis that highlights the strengths, weaknesses, opportunities and threats pertaining to an area, project, or policy initiative. [2]
- **Taxi / Taxi Cab / Cab:** (a) A car available for hire, (b) A para-transit hired mode of transportation run by a private operator, available on demand for hire. [41]

- **Telecommunication:** Communication of voice, data and images through telephone and other methods. [51]
- **Telephone Exchange:** A building with all necessary equipment and office space to provide telephone service to an area. [51]
- **Temple:** A building or a complex of building with related infrastructure including parking and serving the public as a place of worship. [52]
- **Thematic Map:** A map representing information pertaining to an area on a specific theme like soil characteristics, or land use and the like. [5]
- **Tent House:** A retail facility on higher order road which is used for providing tents are made of a thin fabric, which is attached to supporting ropes or to poles. It is used in various functions to protects people from rain, wind, and the cold climate. It may also include the dining sets, foldable tables, dustbins, portable water and sanitation materials, decoration material, etc. It must have adequate space for loading / unloading in shop.
- **Textile industry:** An industry primarily concerned with the design, production and distribution of yarn, cloth and clothing. [46]
- **Topography:** The shape of the surface of the earth in a given area. [71]
- **Topology:** In GIS, the spatial relationships between connecting or adjacent coverage features, e.g., arcs, nodes, polygons, and points. [5]
- **Tourism:** A socio-economic activity initiated by desire to travel and enjoy the places of natural beauty and / or architectural, historical, religious, and socio-cultural significance. [8]
- **Town:** A small urban settlement in the hierarchy - mega-city, metropolis, city, and town, functioning as a service centre to the surrounding rural areas and housing people engaged in non-agricultural activities. [20]
- **Township:** An urban extension to a large city that may be within or outside its administrative boundary and may have both urban and rural characteristics. [2]
- **Traffic Congestion:** Overcrowding of vehicles and other activities that obstruct free flow of traffic along a route at a given point of time. [41]
- **Traffic Volume:** The number of vehicles, in passenger car units, passing a road in both directions. [41]
- **Traffic:** To and for movement of people or vehicles in an area, or along a route that could be a road, rail, waterway, or airway. [41]

- **Training Centre / Training Institute:** A public or private establishment equipped with all necessary physical facilities and technical, administrative and financial resources, for imparting training. [36]
- **Transport Network:** The pattern of transport routes, links and facilities in an area. [41]
- **Transport System:** The total transport network in an area including all modes of transportation to cater to the movement of goods and people. [41]
- **Travel Time:** The length of time taken to travel between two points. [41]
- **Tree:** A woody plant, generally taller than 2 metre, with well-distinguished trunk. [48]
- **Trip:** One-way travel from one point (origin) to another (destination) for a specific purpose, the destination of one trip becomes the origin of the next. [41]
- **Truck terminal / Transport Nagar:** A premise for parking of trucks on short term or long-term basis. It may include agency offices, workshops, dhabas, spare part shops, godowns, petrol/ diesel filling stations, restaurants, guest houses, hotels and such other operational facilities as decided by the Authority. [2]
- **Tube well:** A system to extract water from underground sources using mechanical means. It may consist of a room for operation and maintenance. [62]
- **Tuition Centre:** Means an educational institution which specifically provides educational guidance or assists a pupil of a school or educational institution or any person to prepare for an examination. Private educational institutions which offer tutoring in various subjects and preparation for specific tests and examinations.
- **Unauthorised Development:** ‘Unauthorised Development’ means such use of land or use of building and construction of building which are not relevant to the sanctioned plans or without obtaining the sanction from Competent Authority or in contravention of the Master Plan or Zonal Plan or lay out plan, or as the case may be, and it also includes encroachment [78].
- **University:** “University” means a University established or incorporated by or under a Central Act, a Provincial Act or a State Act, and includes any such institution as may, in consultation with the University concerned, be recognised by the Commission in accordance with the regulations made in this behalf under The University Grants Commission Act, 1956. [36].
- **Urban Area:** Urban areas are comprised of two types of administrative units – Statutory Towns and Census Towns. a) Statutory Towns: All administrative units that have been defined by statute as urban like Municipal Corporation, Municipality, Cantonment Board,

Notified Town Area Committee, Town Panchayat, Nagar Palika etc., are known as Statutory Towns. b) Census Towns: Administrative units satisfying the following three criteria simultaneously are treated as Census Towns: i) A minimum population of 5,000 persons, ii) 75 per cent and above of the male main working population being engaged in non-agricultural pursuits; and iii) A density of population of at least 400 persons per sq. km. (1,000 per sq. mile). [20]

- **Urban Form:** The three-dimensional shape of an urban area evolved out of the urban design characteristics and the spatial arrangement of land uses and activities. [2]
- **Urban Growth:** Physical expansion, generally unplanned, of a city as a result of increase in its population and socio-economic activities. [2]
- **Urban System:** A set of interconnected urban settlements extending over a designated area - regional, national or international serving a role in the development process depending upon their functional hierarchy. [2]
- **Urban:** (a) Belonging to a town or city, as defined in census of India. [20]
- **Use Zones:** Areas designated in a development plan or layout plan for a specific land use that could be residential, commercial, industrial, recreational, and related to transport, and facilities and services. [54]
- **Utility:** Services such as roads including approach roads, bridges, bypasses and underpasses, street lights, water supply system, sewerage system, storm water drainage system, electrical network, communication network, sewage treatment plants, percolation wells, solid waste disposal system, collection, treatment, discharge and disposal of industrial, institutional and township waste, gas pipeline, common effluent treatment plants (CETP), spaces for informal services, and any other as may be delineated by the Government. [2]
- **Vacant Land:** A public or private parcel of land that is not used for any purpose or has not been designated in an approved development plan for a specific use at a given point of time. [2]
- **Vector:** In GIS, a coordinate-based data structure commonly used to represent linear geographic features where each linear feature is represented as an ordered list of vertices. [5]
- **Vegetable/ Fruit Market:** A premise for retail sale of fruits and vegetables in shops or platforms. [54]
- **Vehicle Occupancy:** The number of people travelling in a car, bus, or other vehicle. [41]

- **Vehicle:** Any means of transportation of people and goods that may be driven by any source of power-human, animal, petrol, diesel, gas, electricity and others. [41]
- **Veterinary Hospital / Dispensary / Clinic:** A premise offering medical and similar facilities for animals. In other words, veterinary is used to describe the work of a person whose job is to treat sick or injured animals, or to describe the medical treatment of animals. A premise having medical facilities for indoor and outdoor treatment of pet animal and birds. It may be managed by a public or charitable institution or on community basis [2].
- **Vocational Institute:** A premise with training facilities for short term courses for discipline, predatory to the employment in certain profession and trade. It includes training-cum-work centre. [36]
- **Volume to Capacity Ratio / VC Ratio:** The ratio between the actual volume of traffic in PCUs to the designed capacity of a road. [11]
- **Ward:** Subdivision of a city into physically identifiable boundaries based upon population for the purpose of municipal elections, collection of property taxes, and grassroots participation in local development process as envisaged under Constitution (Seventy fourth Amendment) Act 1992. [37]
- **Warehouse/ Godown:** A premise for storage of goods and commodities in a manner as per requirement of respective goods/ commodities. The premise includes loading and unloading facilities. [46]
- **Wasteland:** Barren land not fit for agriculture purposes and not occupied by any other use. [45]
- **Water Bodies:** Water body means surface waters including rivers, streams, lakes, marine waters, estuaries and wetlands. Water body means a lake, reservoir, wetland, or a geographically defined portion of a river or stream. [21]
- **Water Conservation:** Protection, development, sustainable use and efficient management of water resources. [38]
- **Water Management:** The technical, administrative and fiscal arrangement for procurement, processing and distribution of water in an area. [38]
- **Water Pollution:** Means such contamination of water or such alteration of the physical, chemical or biological properties of water or such discharge of any sewage or trade effluent or of any other liquid, gaseous or solid substance into water (whether directly or indirectly) as may, or is likely to, create a nuisance or render such water harmful or

injurious to public health or safety, or to domestic, commercial, industrial, agricultural or other legitimate uses, or to the life and health of animals or plants or of aquatic organisms. [38]

- **Water Pumping Station:** Water pumping stations are machines that can be used to transport water from one site to another, without needing direct human or animal input. These devices can supply water to canals, circulate water in treatment systems and can even drain water from low-lying land. [62]
- **Water Supply System:** The entire arrangement for supply of water from a source at one end to an outlet at the other and includes water reservoir, treatment facility, pumping facility, storage, and network of pipes for distribution, control valves, fittings and fixtures. [62]
- **Water Supply:** (a) The quantity of water available from all sources to meet the water demand of a community for all purposes. (b) The processes of provision, treatment, storage and distribution of water to a settlement for domestic, industrial, commercial and other purposes. [62]
- **Water Table:** The upper surface of groundwater in an area at a given point of time. [62]
- **Water Treatment Plant:** The facility for treatment of water to ensure that it is potable. In other words, a waste water treatment plant cleans sewage and water so that they can be returned to the environment. These plants remove solids and pollutants, breakdown organic matter and restore the oxygen content of treated water. [62]
- **Water Treatment:** The processes of cleansing water for human consumption. [62]
- **Way:** A passage to a building or site, which may or may not be motor able, (b) A manner, system or method of doing something. [41]
- **Weekly Market:** An area used once a week by a group of informal shop establishments in the form of a market. These markets may shift from one area to another on different days of the week and may be planned at designated places in all land uses. [67]
- **Weigh Bridge/ Dharam Kanta:** A premise with weighing facilities for empty or loaded trucks. [41]
- **Wholesale Market/ Mandi:** A premise from where goods and commodities are sold/ delivered to retailers. The premise includes storage, godown, loading and unloading facilities. [70]

- **Zonal Development Plan:** Zonal Plan is a plan detailing out the proposals of Master Plan and acting as a link between Master Plan and the Layout Plan. A zonal development plan may-
 - (a) contain a site-plan and use-plan for the development of the zone and show the approximate locations and extents of land uses proposed in the zone for such things as public buildings and other public works and utilities, roads, housing, recreation, industry, business, markets, schools, hospitals and public and private open spaces and other categories of public and private uses;
 - (b) specify the standards of population density and building density;
 - (c) show every area in the zone which may, in the opinion of the 2[Town and Country Planning Department or any other agency appointed/ nominated by the State Authority], be required or declared for development or re-development; and
 - (d) in particular, contain provisions regarding all or any of the following matters, namely,
 - (i) the division of any site into plots for the erection of buildings; (ii) the allotment or reservation of land for roads, open spaces, gardens, recreation-grounds, schools, markets and other public purposes; (iii) the development of any area into a township or colony and the restrictions and conditions subject to which such development may be undertaken or carried out; (iv) the erection of buildings on any site and the restrictions and conditions in regard to the open spaces to be maintained in or around buildings and height and character of buildings; (v) the alignment of buildings of any site; (vi) the architectural features of the elevation or frontage of any building to be erected on any site; (vii) the number of residential buildings which may be erected on plot or site; (viii) the amenities to be provided in relation to any site or buildings on such site whether before or after the erection of buildings and the person or Authority by whom or at whose expense such amenities are to be provided. [1]
- **Zone:** means any one of the divisions in which a development area may be divided for the purposes of development under the relevant act. [1]

Definition of any term related to development and construction which is not mentioned here, will be followed as defined in National Building Code (NBC)/ Urban and Regional Plan Formulation and Implementation Guidelines (URDPFI)/ Model Building Byelaws as well as in IS/BIS.

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1. Project Background

1.1 Introduction

The urban settlements of the country have witnessed relatively rapid population growth and the percentage of India's population living in urban areas has increased more than twice in the year 2011 as compared to the percentage of people living in urban areas at the time of independence. This is expected to increase even further to nearly 40% by 2026 and is expected to be more than 50% by 2051. Most of the urban settlements, smaller ones, in particular, are being identified by haphazard and unplanned growth, non-conforming land uses, mushrooming unauthorized colonies, and land conversion from agriculture to urban resulting in environmental degradation and poor quality of life. The proper management of urban areas calls for accurate and vital information to be available regularly.

Master Plan/ Development Plan has been identified as a major tool for the management of urban land and for the provision of detailed land use allocation, which would help to ensure the sustainable development of the town/city. Formulation of master plans starts with base map preparation, existing land use surveys and collection of socio-economic data necessary for reviewing the existing situation and proposing the future land use plan.

The government of India launched Atal Mission for Rejuvenation and Urban Transformation (AMRUT) in 2015 as a Centrally Sponsored Scheme with the objectives to (i) ensure that every household has access to a tap with an assured supply of water and a sewerage connection; (ii) increase the amenity value of cities by developing greenery and well maintained open spaces (e.g. parks); and (iii) reduce pollution by switching to public transport or constructing facilities for non-motorized transport (e.g. walking and cycling). One purpose of the Mission is to improve governance through a set of Reforms. During the Mission period, 11 reforms are being implemented. Formulation of GIS-based Master/Development Plans for 500 AMRUT Cities is one of the important reforms under AMRUT, which has been approved as a 100% centrally funded sub-scheme with a budget outlay of Rs. 515.00 crores. The major objectives of the sub-scheme include developing common digital geo-referenced base maps and land use maps using Geographical Information System (GIS) and Master Plan Formulation for 500 cities that are selected as AMRUT Cities. The major deliverables under this scheme include:

a) Base Map & Thematic Maps: Final base maps in the form of user-friendly spatial products at the functional scale of 1:4000 having defined layers as per Design & Standards.

City /town base map and thematic maps including existing land use map which is a prerequisite for the formulation of the master plan and other plans.

b) Urban Database Creation: Sector-wise data collection and data analysis report of 25 aspects as per Design & Standards.

c) Formulation of Master Plan: Formulation of Master Plan of the city as per State Town & Country Planning Act, which includes demand assessment, identification of issues, projected requirements, development strategy and draft proposals on the GIS base map and sector-wise data analysis.

d) Capacity Building: Build capacity among town planning, line departments and other concerned personnel at State and local levels including ULBs and development authorities to create a cadre of professionals proficient in the use of GIS technology for using and updating databases in urban planning and management.

Urban Development Department (UDD) is the administrative department for local self-governments in the state, the Uttarakhand Housing Department plays a similar role to the Urban Development Authorities and the Town and Country Planning Department, is responsible for urban planning and development control. The authority has taken up the task of preparing the GIS-Based Master Plan for Rudrapur to address the current issues and promote sustainable development for the future. The plan would include the determination of the carrying capacity of the development areas taking into account their location and should be based on assumptions of a decent and adequate quality of life, based on the acceptable/appropriate infrastructure, amenities and the available natural resources. It will also assess the potential industrial and tourism-led development along with the projections of population and future employment.

1.2 Present Status of Master Plans

In the present scenario, about 52% of the statutory towns and 76% of the census towns in India do not have any Master Plans to guide their spatial growth and infrastructural investments. This implies that three-fourths of the urban centres in the country do not have any spatial strategy for the next 20 years. Such a severe lack of preparedness to manage the level of urbanisation that the Indian cities are bound to witness in the coming decades is a huge risk.¹

¹ Reforms in Urban Planning Capacity in India, Niti Aayog (2021).

Aspiring Uttarakhand, a newly formed state, had a master plan for many towns namely Dehradun, Ramnagar, Rudrapur, Kichha, Rishikesh, Kashipur, Nainital, Bhimtal, Srinagar, Chamauli-Gopeshawar and so on, since its formation in the year 2000. Post formation, Master Plans for Dehradun, Badrinath, Pauri, Doon Ghati and Rudrapur towns were made. Thus, the state has controlled a lot of organic development state, especially in the large towns and tourist cities. Besides these, a lot of organic development has taken place in the state, especially in the neglected small towns and Haldwani city.

The sub-scheme ‘Formulation of GIS-based Master Plans’ for 500 AMRUT Cities, launched by MoHUA, is one of the important reforms under AMRUT Mission, 2015. Out of 500 cities, 07 cities viz. Dehradun, Haridwar, Roorkee, Rudrapur, Kashipur, Haldwani and Nainital have been selected under the AMRUT mission in Uttarakhand. Except for the Nainital town, the remaining six cities are class-one cities, which have major urban population and major urban population growth rate.

1.3 Need for GIS-based Master Plans

A city is a ‘system of systems, wherein the spatial components include land use, transport, logistics, heritage, environment, housing, etc., and the non-spatial ones include the administrative structures, legislative frameworks, economic policies, labour market, budget allocations and so on.

Master plans are critical for managing urbanization. They are statutory instruments to guide and regulate the present and future utilization of land, expansion, and zoning of cities for 20–25 years. It is an essential tool for socio-economic development, better liveability, inclusion, citizen engagement, environmental sustainability, and prevention of climate change-related risks. The covid-19 pandemic has revealed the dire need for planning and management of our cities, with a thrust on health aspects.

The need for the Master plan is to promote the balanced, orderly, & planned development of the town as well as the planning area of a town, as it acts as a basic guiding principle, for wiping out the deficits in urban infrastructure, minimising the problems and helps to explore the potentials of a town. To make the urban transition efficient, equitable and cost-effective there is a master plan is a prerequisite as it helps to bring out new projects/schemes. Due to urbanization, our towns and cities are growing very fast but in an organic way. The planned development is lacking in most of our towns and cities because of which these towns and cities are facing various kinds of problems, like congestion, environmental degradation etc.

- **Master Plan as a Structure to Guide and Accomplish Urban Growth:**
Development plan is one of the important tools to guide and manage the future growth of the cities in a planned manner. Since its introduction in Uttarakhand under the Town and Country Planning Act 1947, the master plan has been widely prepared for many cities in both developing and developed countries. It is a long-term plan and is usually prepared to guide the future growth of a city for the next 20 years mainly consisting of a report, land use maps, and a programme of action. Conceptually, the master plan is based on the study of the existing situation of every component of a city comprising land use, socioeconomic and other facilities.
- **Master Plans as forwarding Planning Tools:** Master plans are planning tools that anticipate urban development and make provisions for city space in terms of:
 - (a) The allocation of land for various uses,
 - (b) The regulation of its development, and
 - (c) The provision of civic infrastructure.

Thus, Master Plan is important to give a perspective picture of a fully developed town.

- Urbanisable/developable land is costly as well as limited in supply. Government guides and regulates development through planning regulations and building bylaws. Thus, to decide on current & future development-related issues, Master Plan helps to rationalize the pattern of Land use and their interrelationship.
- To segregate major functions - residential, commercial, industrial, and recreational for minimizing the public nuisance and maximizing the efficiency of the urban system in effect constitute the policing powers in the guise of land use planning, zoning, and developmental controls.
- It helps to identify the existing gaps in physical and social infrastructure & to bridge those gaps. Thus, Master Plan makes proposals/schemes for the provision of various facilities and ensures that the basic amenities/services are in place; in that process, the Master Plan guides the urban development.
- To discourage the growth of the city in an unplanned and unscientific way. It offset evils, which have come up due to overcrowding of population such as shortage of houses, traffic congestion, inadequate open spaces, insufficient public amenities, etc.
- To control the development of various industries in a systematic manner.

- To rationalize the orderly movement of traffic and transportation within the town and defines the area for laying down a network of various services.
- To limit to a certain extent, the unprecedented flow of rural population.

So, Master Plan is considered one of the most effective mechanisms to promote the planned growth of the urban centres. As city regeneration initiatives are generally long-term propositions, it is important to consider the master plan as a dynamic document that can be altered based on changing project conditions over time².

Master planning aims at improving the urban environment as the efficiency of urban settlements largely depends upon how well they are planned, how economically they are developed and how efficiently they are managed. In one sense, master planning is an exercise of resource planning, generation, development, and management. In short, Master Plan is a design for the physical, social, and economic development of the city, and to improve the quality of life as well. The functions of the Master Plan / Development plan are as follows:

- To guide the development of a city in an orderly manner to improve the quality of life of the people;
- Organize and coordinate the complex relationships between urban land uses;
- Chart a course for growth and change, be responsive to change and maintain its validity over time and space, and be subject to continual review;
- Direct the physical development of the city concerning its social and economic characteristics based on comprehensive surveys and studies on the present status and the future growth prospects; and
- Provide a resource mobilization plan for the proposed development works.

Further, good Master planning can assume some or all these functions:

- Develop a phasing and implementation schedule and identify priorities for action.
- Act as a framework for regeneration and attract private sector investment.
- Conceptualize and shape the three-dimensional urban environment.
- Define public, semi-private, and private spaces and public amenities.
- Determine the mix of uses and their physical relationship.
- Engage the local community and act as the builder of consensus.

²

<https://urban-regeneration.worldbank.org/node/51>

The absence of a planned development strategy leads to multiple issues, for example, lack of land for affordable housing, flooding, traffic jams, and wastage of water resources. Moreover, once the city has grown haphazardly, corrective measures and provision of infrastructure are difficult and costlier to undertake. Master planning of a city is essentially an exercise involving land allocation for various uses, amongst other purposes. As a planner, one has to arrive at solutions for competing land uses, economic versus environmental considerations, and many other paradoxical situations. For example, a decrease in the density of land development may reduce air pollution in certain pockets, but in turn, may increase dependence on automobiles as well as travel time.

Figure 1-1: Dharavi Slum: Staggering Inequality in Rich and Poor in Mumbai



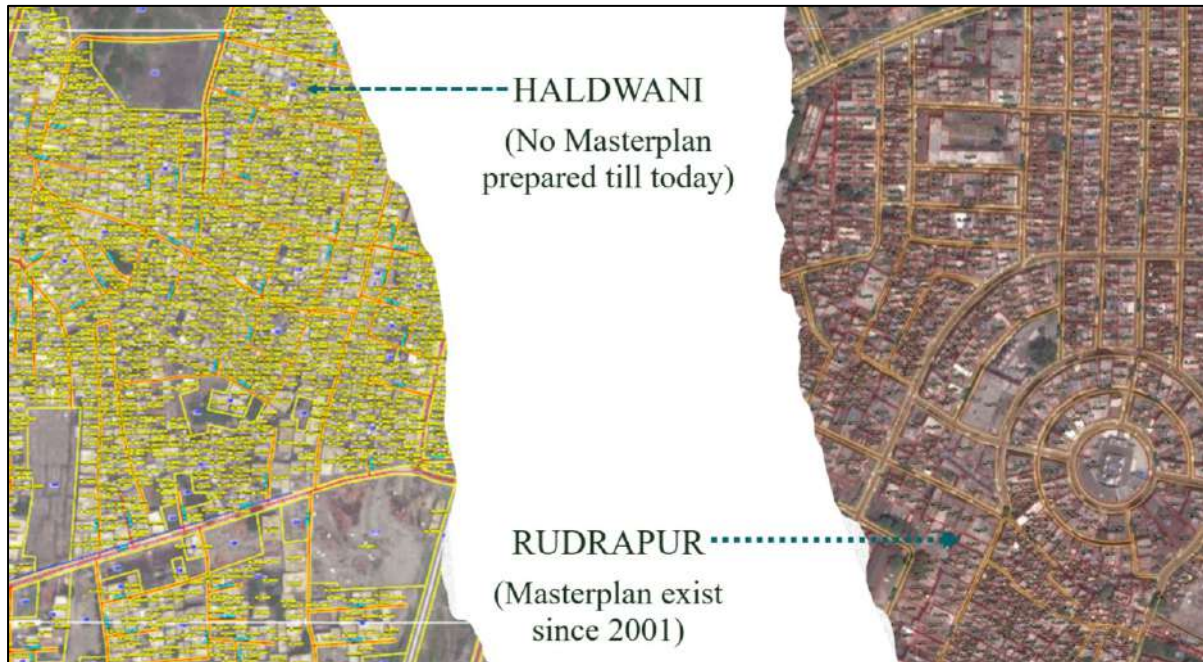
Figure 1-2 India's 'Mount Everest of Trash' in the National Capital, Delhi



Figure 1-3 Lack of Land use-Transport Integration Leading to Traffic & Congestion



Figure 1-4 Organic & Unplanned Development leading to Sector-wise Problems in Haldwani



The spatial and land use plans use environmental legislations and development control regulations to affect/control the land use. These instruments can restrict the usage of land in a certain way, but may not necessarily offer the most efficient, community and market-driven land use patterns to emerge. The non-spatial systems may create incentives to use land in a certain but may not correspond to the objectives of land use planning systems.

Most urban settlements, especially smaller urban settlements, are characterized by haphazard and unplanned growth, non-conforming land uses, mushrooming unauthorized colonies, and land conversion from agriculture to urban resulting in environmental degradation and poor quality of life. Master Plan/Development Plan is the major tool for urban land management, providing detailed land use allocation for the sustainable development of a city/town. The most crucial information for the formulation of the Master Plan is an accurate and updated Base Map of the planning area, showing roads and building layouts, the spatial extent of development and information on the use of each parcel of land etc. Preparation of base maps from Very High-Resolution Satellite (VHRS) Images and Geographic Information System (GIS) technology is a time and cost-effective solution.

The GIS-based Master Plans help in different types of urban planning exercises, e.g., preparation of the master plan, development plan, zonal plan, utility plan, infrastructure plan, etc. to be simplified by using IT tools. The National Remote Sensing Centre (NRSC) provides geodatabase along with satellite data. This has been made available for all AMRUT

cities. The MoHUA coordinates the satellite data acquisition and the final base map preparation at 1:4000 scale will be undertaken by NRSC, Department of Space. The NRSC is an implementation agency for the activities like data acquisition, geo-referencing, GPS survey, data processing, and digitization and preparation of geodatabase in vector format. The geodatabase along with satellite images is provided to the respective consultants through the respective State Town & Country Planning Department for ground truthing. The vetted data has been given to NRSC for preparing the final Geo-database through State Town & Country Planning Department.

Formulation of GIS-based Master/Development Plans for 500 AMRUT Cities is one of the important reforms under AMRUT, which has been approved as a 100% centrally funded sub-scheme. The major two objectives of the sub-scheme are – i) To develop common digital geo-referenced base maps and land use maps using Geographical Information System (GIS), and ii) Master Plan Formulation for 500 cities that are selected as AMRUT Cities. Further, the need for GIS-based Master Plans using VHRS Images is –

- GIS data can be edited/modified and updated with the latest Satellite images/ground information.
- Local attribute data can be updated or new attributes can be added
- GIS analysis (both Spatial and attribute) tools are required for Master Plan formulation.
- With the advancements in GIS, the utilisation of hard copy maps is limited to the fieldwork and field verification of data. The digital GIS environment can be used for spatial and attribute data analysis and GIS-based Master plan formulation.
- To capture the features in 3-dimension high relief hilly areas. According to the feature dimensionality (2D or 3D), the GIS data structure of polygon, line or point features can be 2-dimension or 3-dimension.
- To attain thematic accuracy of land use classification. Urban Land use classification is based on attribute data and therefore it has to be done based on the latest attribute data.
- Quality Assurance and Quality Check (QA/QC) shall be carried out at all levels of project execution. The main products covered under QA/QC are (i) Input high-resolution satellite data (ii) Geo-referenced/Ortho-rectified satellite data (iii) GIS

Feature extraction from high-resolution data (iv) Final GIS database (v) Supply of the GIS database to the respective ULBs for Master Plan formulation.

- Apart from the above, the parameters like Completeness, Correctness, Conformity, Consistency and Compatibility assuring the final GIS database product quality in various plans can be achieved through the GIS only.
- To take the GIS database generation using remote sensing & GIS technology is adopted for the preparation of Master Plans in a standard form under a single platform. It was also observed that various Town & Country Planning organisations/Departments are following different methods and procedures for base map preparation.
- Online approval and governance for creation, and updating database.
- Authorised personnel at the ULB level, at the State Town Planning Directorate level and TCPO/ MoHUA level can access the specific city data, and view and read the status of cities.
- To support the generation of comprehensive GIS databases to meet the requirements of mapping under National flagship schemes like Smart Cities, AMRUT, HRIDAY and also other State level urban development projects.
- To enable the compatibility of cadastral map scales for better implementation of tasks.

Rudrapur city is the district headquarter of Udham Singh Nagar. It is the second most populous city in the Kumaon Division and the fifth most populous city of Uttarakhand, having a population of 140,857 as per the Census of India, 2011. It is known as one of the 'Gateway to Kumaon', which is close to regional attractions like Nainital, Corbett National Park, Bhimtal and Almora. Post the setup of the State Infrastructure and Industrial Development Corporation of Uttarakhand Limited (SIDCUL), enhanced by the broad-gauge railway network in the area, Rudrapur has developed into an industrial city with its city limits expanding to accommodate new residential demands of the workers and professionals moving into the area.

The city has witnessed massive population growth most of the time. The city population increased around three times during the census years 1961–1971 and nearly doubled during 1981–1991. Rudrapur surpassed Jaspur in 1971 and Kashipur in 2011 to become the second most populous city in Kumaon. The high growth rate has been attributed to the migration of

people from the upper hills and the development of the SIDCUL Industrial Estate in recent years.

Before the formulation of the long-term master plan of Rudrapur city, it is important to get an insight into its continuous development process, its origin, industrial importance, and its strategic and administrative importance and to review the impact of proposals of the previous master plan of 2031.

The master plan of the Rudrapur began originally by an order in 1952. Later, Town and Country Planning Department prepared the first master plan (1971-1991) of Rudrapur for the planned and controlled development of the town. The plan was prepared for the area falling under the jurisdiction of the Municipal Council of Rudrapur, which was approved by the secretariat order numbered 1380/37-3-56RBO/69 issued on the date 12-6-1973.

Over a period, the growth started occurring in the villages located near the municipal boundary. Therefore, to provide a planned direction to the development, 8 villages located near the municipal boundary were included in the planning area in the year 1992 by secretariat order numbered 1098/9-AA-3-92-52-H/57 issued on date 19-8-1992. Further, during this year, with the formation of the new district Udham Singh Nagar, construction work of the district office and collectorate premises began in the Kalyanpur village present near the boundary of the notified area of Rudrapur. Looking at the strong possibilities of expansion of the city, it became inevitable to include Kalyanpur in the notified area. Hence, with the secretariat orders by the Uttaranchal government, numbered 358/AA/SH.VI.-2003/Rudrapur/2003 Dehradun dated 10 November 2003 the notified area of Rudrapur was amended and Kalyanpur village was included in it.

The Rudrapur Master Plan 1991, which covered municipal area only, forecasted the population of MC to be 50,000 by the year 1991. However, in reality, the population of Rudrapur in 1991 was 61,067 a difference of 11,067 souls. Over time, keeping in view the strong possibilities of growth of the city due to progressive development of the SIDCUL Industrial area in Pantnagar area, the secretariat added another 16 villages in the notified area of the city making the total tally of villages 25 in the notified area by order number 3177/V/AA-2006-126 (A.)/ Dated 15 November 2006.

Considering all the arguments, it became necessary to prepare the master plan for the Rudrapur Planning Area for the comprehensive development of the city. “For the same, the Master plan of Rudrapur for the year 2031 was prepared”.

1.4 Objectives of Master Plan Preparation

The major objective of the master plan is to ensure sustainable development and evolving development vision road map to ensure balanced growth of the region by regulating the future spatial development to be envisioned for the horizon year of 2041. The Master Plan is a statutory instrument as it conforms to the provisions stated in The Uttarakhand Urban and Country Planning and Development ACT 1973 (as amended in 2013). The objectives of the Master Plan are as follows:

- To minimize haphazard and uncontrolled growth of the city and to achieve planned growth and development to provide a healthy living environment.
- To propose such a sustainable distribution pattern of activities in the city that satisfies the present requirements as well as the future needs of the coming generations.
- To remove the defects of uncoordinated physical growth of the various components of the city since it considers the entire city as a planning and development entity.
- To rationalize the orderly movement of traffic and transportation within the city and define the area for laying down a network of various services. Serving as a guide to the planning body for making any recommendations for public improvement.
- It helps in restricting haphazard and unplanned growth and helps to preserve natural resources.
- To place the various functions, that a city has to perform in the physical relationship of each other to avoid the chances of mutual conflict.
- To arrange the pattern of the city in such a way to satisfy the present requirement without the introduction of future improvement by the coming generation.
- To serve as a guide to the planning body for making any recommendations for public facilities improvement.
- To removes the defects of uncoordinated physical growth of the various components of the city because it considers the entire city as a planning and development entity.
- It aims at intelligent and economic spending of the public funds for achieving the welfare of the inhabitants in respect of amenities, convenience, and health.

Thus, the objective of the preparation of a Master Plan is to achieve comprehensive development of the city, in terms of its socio-economic and spatial aspects by way of utilizing its potential in the best possible manner and by exploring new avenues.

1.5 Project Approach

The approach to the preparation of the Master Plan would cover conducting a demand-supply gap analysis, highlighting the critical issues of the city, and formulating a management framework including outlining strategies and guidelines for future growth and development of Rudrapur city and planning area. It will also include options for promoting sustainable development through the introduction of a regulatory mechanism including realistic planning and effective land use management interventions within the overall regulatory and institutional framework. The preparation of the Master Plan will be based on existing trends of development taking into account the Development Plans/Schemes of public and private agencies operating in the city and contributing towards its growth and development. It will also include reviewing previously prepared Master Plans for the Planning Area with special emphasis on the deviations from proposed land uses and suggestions for the same.

The detailed methodology for the preparation of the Master Plan of Rudrapur includes base map updation, data collection, city assessment, identifying gaps in service delivery and infrastructure network, identifying strengths, weaknesses, opportunities and threats, stakeholder consultations, preparing Existing Land Use Plan, thematic maps, Proposed Land Use Plan etc. as given in the next point.

1.6 Methodology for Preparation of Master Plan

The methodology is a step-wise procedure to complete any task. It is important for the systematic approach in any planning exercise. It is essential to discuss before focusing on the project as there can be different ways of doing one task and the most suitable way must be decided for good output. For this master plan, the reference has been made in **Figure 1-5**.

The Preparation of the master plan has been formulated into various stages along with the assigned tasks. The project was initiated with the mobilization of the team with proper orientation of the project and the task to be assigned. Conducted meetings with planning authority and various line departments to orient them about the various aspects of the master plan and the data requirement. Further, a reconnaissance visit to the project area was conducted to understand the existing situation. Secondary data has been reviewed which has been collected through various online sources. Finally, a detailed work plan has been made for the preparation of the master plan.

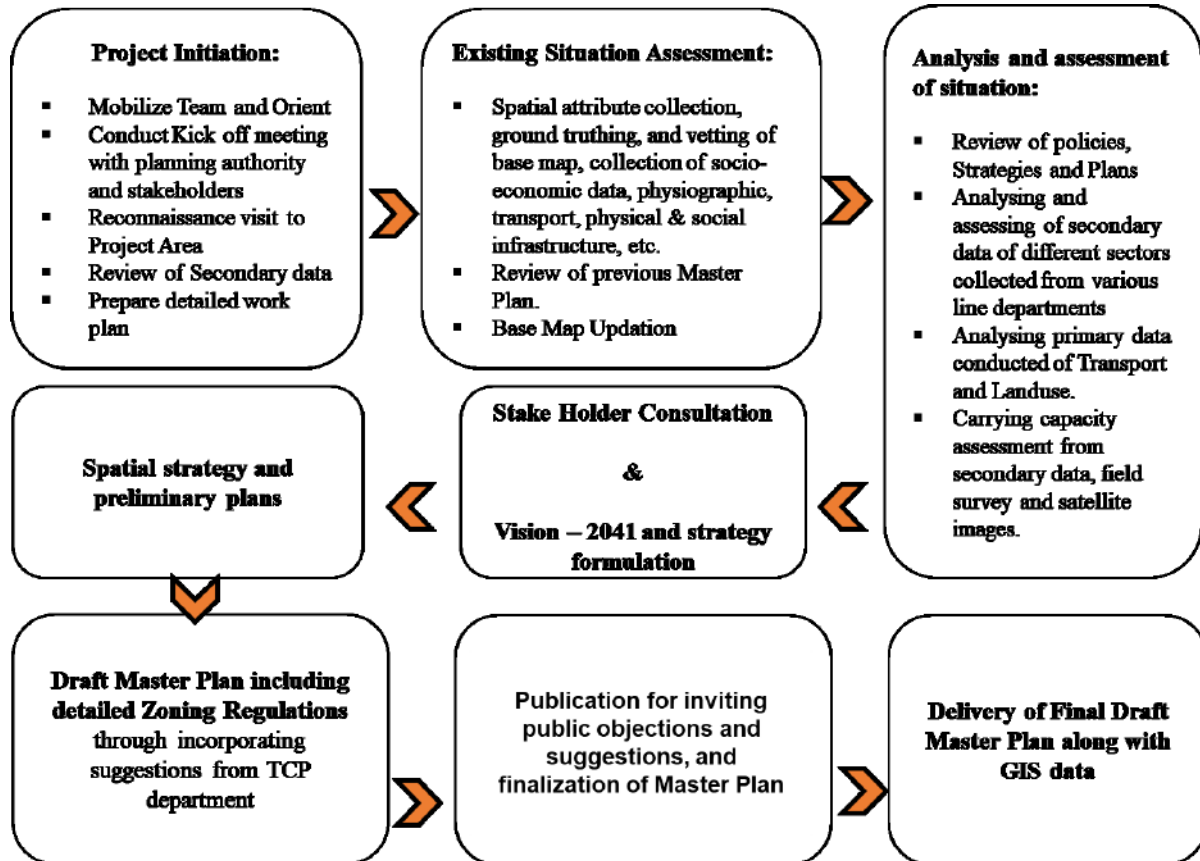
The existing situation has been accessed with spatial attribute collection, ground truthing, and vetting of the base map, collection of socio-economic data and comprehensive assessment of the existing situation along with identification of the general trends of socio-economic

development at the regional level. Compiled all available data of Socio-economic, Environment and Natural Resources, Physiographic and geology, Human settlement hierarchy, Built-up environment, Transportation infrastructure, and Physical and social infrastructure. Base map updation will be done through a field survey of the data provided by the NRSC. Moreover, data collected for review and documentation of Policies, Strategies and Plans have been done in parallel. Review of all sectoral policies, strategies and plans on regional economic development, industrial policy, tourism and heritage conservation, PPP framework, protection of environmental resources, directions given by Hon'ble Supreme court/ High Court/ National Green Tribunal etc. has also been done.

Further, analysis and assessment of the existing situation have been carried out to identify issues, opportunities, and challenges. A SWOT analysis must be done through various aspects like demographic characteristics, real estate market assessment, regional economic base, economic and investment scenario, transport sector, infrastructure and utilities, heritage and conservation, water resources, environment mapping, etc. to formulate the vision for the plan with stakeholder consultation.

Based on the detailed analysis and assessment of the development status and current trends in the development area, strategies need to be carried out to achieve the goals and objective of sustainable development in the development area in the light of State level policies and a development vision for 2041 will be formulated. Further, upon approval of the preferred strategy, the final spatial strategy and the resultant preliminary land use plan have to be prepared. The preliminary land use plan will be prepared by incorporating all comments and feedback from the Authority.

Figure 1-5 Methodology for the Preparation of Master Plan



Preparation of Draft Master Plan for the development area as per the provision of the Uttarakhand Urban and Country Planning and Development Act - 1973 with the incorporation of the suggestions received from the Town and Country Planning Department, Uttarakhand. Assistance to the Town and Country Planning Department., Uttarakhand in notification and finalisation of master plans will be done with the incorporation of public objections and suggestions of the Draft Master Plan as per provisions of the Uttarakhand Urban and Country Planning and Development Act – 1973. In consultation with the Town and Country Planning Department, Uttarakhand, strategies to incorporate objections and suggestions will be finalized and thereafter, it will be incorporated in the final Draft Master Plan. Finally, along with Final Draft Master Plan all the maps, plans and drawings in the ArcGIS platform and also in the AutoCAD platform in an agreeable format will be submitted to the Town and Country Planning Department, Uttarakhand.

i) **Base Map Updation**

The first stage of master plan preparation is to update the base map of the city as per the requirement of the plan. This would be done by carrying out a field survey in which each feature would be verified on the ground. Any kind of updation, if required, will be done in the

field and the same will be transferred to the soft copy. It will also include spatial attribute data collection from field and records for the generation of a comprehensive urban land use/land cover GIS database. The variation in the attributes will be corrected on the field and in the prescribed excel format.

ii) Data Collection and Review of Existing Policies, Strategies and Plans

The second stage is data collection related to various aspects covered in the master plan through primary and secondary surveys. It includes a compilation of spatial and attributes data regarding existing conditions of the following aspects:

- Socio-economic data
- Environment and Natural Resources
- Physiography and Geology
- Human settlement hierarchy, function, and distribution
- Built up environment & existing land use
- Transportation Infrastructure
- Physical Infrastructure
- Social Infrastructure
- Projects under implementation

iii) Assessment and Analysis of Situation

The third stage is to analyse the existing situation of the city based on the data collected in the second stage. This will help to identify the issues of the city along with the opportunities and challenges. The demand-supply gap analysis method will be adopted to determine the backlog of infrastructure. This will be done through comparison with available norms and standards and identification of critical problems and infrastructure gaps. It will also include the development of a carrying capacity assessment framework using environmental information, derived from field surveys and satellite images using the carrying capacity assessment process Methods or Tools Considering Development conditions.

iv) SWOT Analysis

This stage includes SWOT Analysis based upon the studies made and analysis carried on, city-level Assessment, identified problems and gaps and identifying major socio-economic drivers. It will cover the following:

- Review of all sectoral policies, strategies and plans and G.O.s
- Status of the present situation of the development area in terms of implementation strategies;

- Demographic characteristics;
- Real Estate Market Survey and Assessment
- Regional Economic base assessment
- Economic sectors' assessment
- Study of Economic and Investments Scenario in the development area
- Catchment Area Analysis
- Transportation sector assessment
- Infrastructure and utilities;
- Slums and urban poverty
- Heritage and conservation;
- Water resources and their future capacities for the horizon year and water management
- Geomorphologic studies;
- Water bodies and conservation
- Environmental Mapping and Strategic Environment Assessment; and
- Spatial planning efforts and land use preferably land use modelling

v) Stakeholder Consultation

Interactive consultation sessions have been carried out with all the stakeholders involved which include the civil society of both urban and rural areas, the agriculture community, industrialists, traders, elected representatives, academicians, government, and non-governmental organizations. Consultations have been conducted in the form of meetings and workshops at different levels.

vi) Vision and Policy Formulation

In this stage, a development vision for the year 2041 has been formulated stating the vision statement, targets, and strategies to achieve goals. It includes suggestions or alternate solutions for the violations in the previous master plan. The provisions of the previous master plan need to be amended as per the present need. This stage also includes making projections for future development including the type of activities and employment opportunities from those activities.

vii) Preparation of Preliminary Plans

It includes the preparation of a preliminary land use plan based on the approved final spatial strategy along with the general zoning. It also includes plans related to the following sectors:

- Transportation plan
- Water supply system, sewerage and stormwater drainage system
- Social Infrastructure
- Commercial centres at various levels.
- Solid waste and wastewater treatment and disposal facilities
- Heritage conservation system
- Conservation of ecosystem and water bodies and action plans for water harvesting

It also includes the preparation of a strategy report which includes the following:

- Regional Setting
- Current socio-economic conditions and trends
- Projections based on current trends
- Opportunities and challenges
- Proposed development strategy
- Projections based on the proposed strategy
- Spatial implications of the proposed strategy
- Action plans for the short and medium term

viii) Preparation of Draft Master Plan

Based on the previous stages and inputs from the authority, a draft master plan has been prepared for the development area as per the provisions of the Uttarakhand Urban and Country Planning and Development Act, 1973 (as amended in 2013) and as per AMRUT / URDPFI guidelines.

ix) Finalisation of Master Plan

This is the final stage of master plan preparation. In this stage, public objections and suggestions shall be compiled and strategies will be prepared to incorporate those will be finalised in consultation with the town and country planning department. The same shall be incorporated in the final Draft Master Plan and submitted for approval.

1.7 Summary

The whole process of Master Plan preparation is in different approaches. The intended aim of the Master Plan can be achieved by land management, conserving the environment, integrated approach for infrastructure and services duly supported by financial and legislative framework. The emphasis is on sustainable and liberal plan to accommodate the existing development which has taken place.

The methodology is focused on building a strong base of the existing scenario by reviewing the past planning process and proposals. For the updated database analysis GIS techniques are used for collecting and analysing spatial & non-spatial multi-level, multi-scalar and temporal data. This approach when integrated with the formulation of the overall vision through public consultation will lead to appropriate land use and transport integration, infrastructure needs, and controlled and conserved natural & built environment with detailing at the local level through zoning plans.

It is suggested that for regulating future development along with existing variations and growth the process of plan preparation shall incorporate the concept of zoning which can be further detailed in Local Area Plans.

2. Planning Area Profile

2.1. Introduction

The chapter includes the locational details of the study area, which mainly includes its regional importance, distance from major nodes, and insight into the regional linkages of the area. It would help to identify the locational advantage and disadvantages and understand the connectivity of the area to other parts of the state or country. The chapter also highlights the historical evolution of the city from the time of its inception to the present scenario. It also includes physiographic and geomorphological details of the area, which play a pivotal role in the formulation of the master plan of the planning area. It includes temperature, rainfall, wind, soil, geology, topography, and so on

2.2. Regional Setting

2.2.1. Location of Rudrapur

Rudrapur is a city in Udham Singh Nagar District in the state of Uttarakhand. Rudrapur is in the fertile Terai Region of Uttarakhand (refer to Error! Reference source not found.). It is the second most populous city in the Kumaon region and the most populous city in Udham Singh Nagar district, while at the state level Rudrapur takes the fifth position. After the establishment of SIDCUL, there was a rapid growth of Rudrapur city along with a lot of employment generation as well as an increase in the literacy rate. It also serves as the district headquarters of Udham Singh Nagar district and tehsil headquarters of Rudrapur Tehsil apart from being a major industrial and educational hub. According to the 2001 census, the population of Rudrapur city was 88,676 which increased to 1,54,554 in 2011. Further, after the addition of 9-villages in 2018 into the municipal corporation area, the population in 2018 increased to 1,76,447. As per Rudrapur Municipal Corporation records, the city is divided into 40 wards having a total area of 55.22 sqkm. Ward-wise area has been represented in Annex 1.

Rudrapur lies between about 28° 58' to 29° 1' North latitude and 79° 23' East longitude. The city is situated at an elevation of about 215 meters above mean sea level. Rudrapur is situated at a location from which Kashipur is 50 km, Haldwani is 32 km and Nainital is 72 km. Further, major cities lie in Uttar Pradesh i.e., Moradabad lies at a distance of 74 km and Rampur at a distance of 48 km from Rudrapur. Rudrapur is well connected by both rail and road networks to different parts of the country.

Map 2-1: Location Map of Rudrapur Planning Area

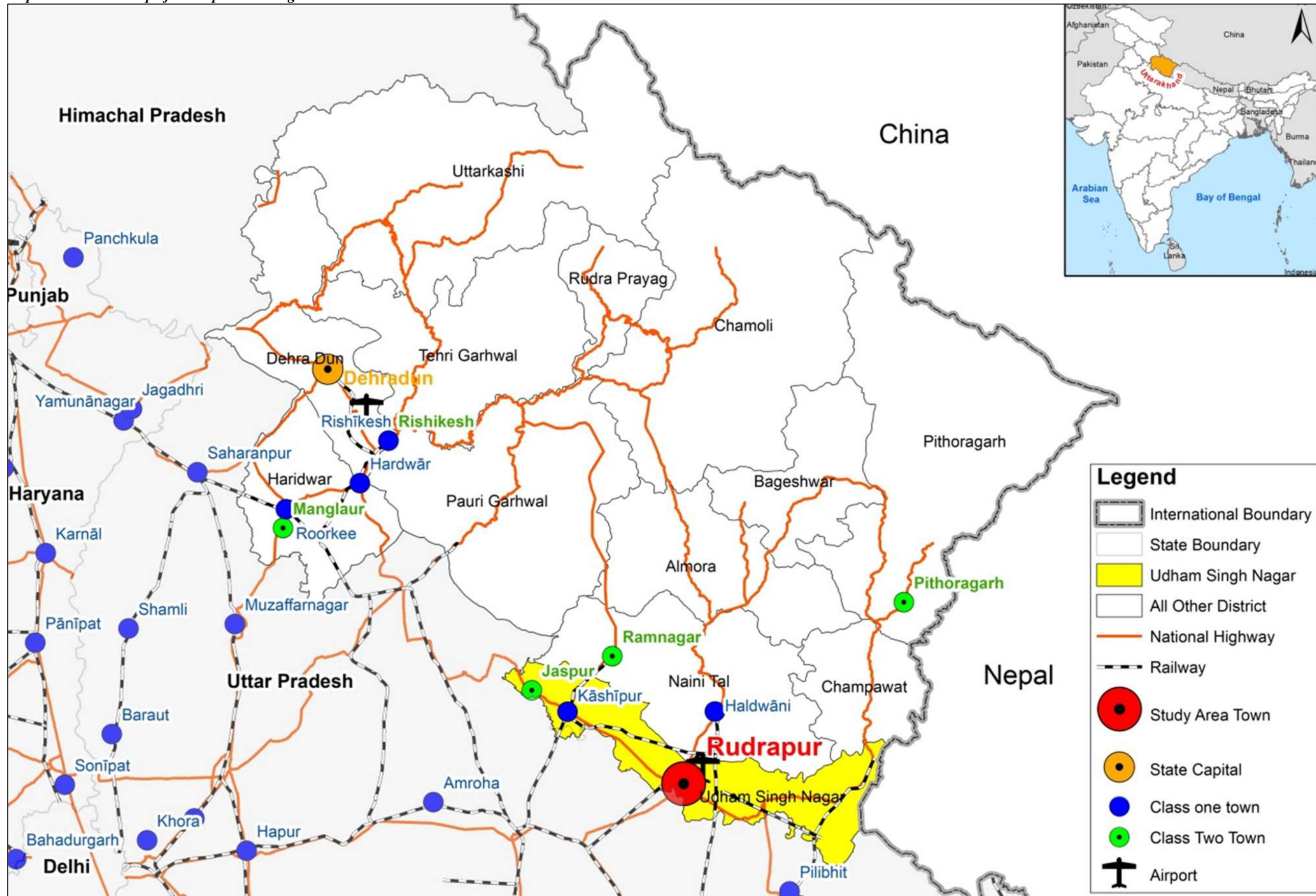


Table 2-1: Distance of Rudrapur Planning Area from Major Nodes

Sr. No.	Description	Name	Distance (km.)
i	State Head Quarters	Dehradun	253
ii	District Headquarters	Rudrapur	0
iii	Tehsil/Taluk/Mandal Headquarters	Rudrapur	0
iv	Nearest Class-I City	Haldwani	32
v	Nearest Railway Station/s	Rudrapur City	3
vi	Nearest Airport/Airstrip	Pantnagar Airport	13
vii	Nearest Port	-	-
viii	Nearest Bus Stand (govt./private)	Rudrapur Bus Terminal	0

Source: Google Maps (<https://www.google.com/maps>)

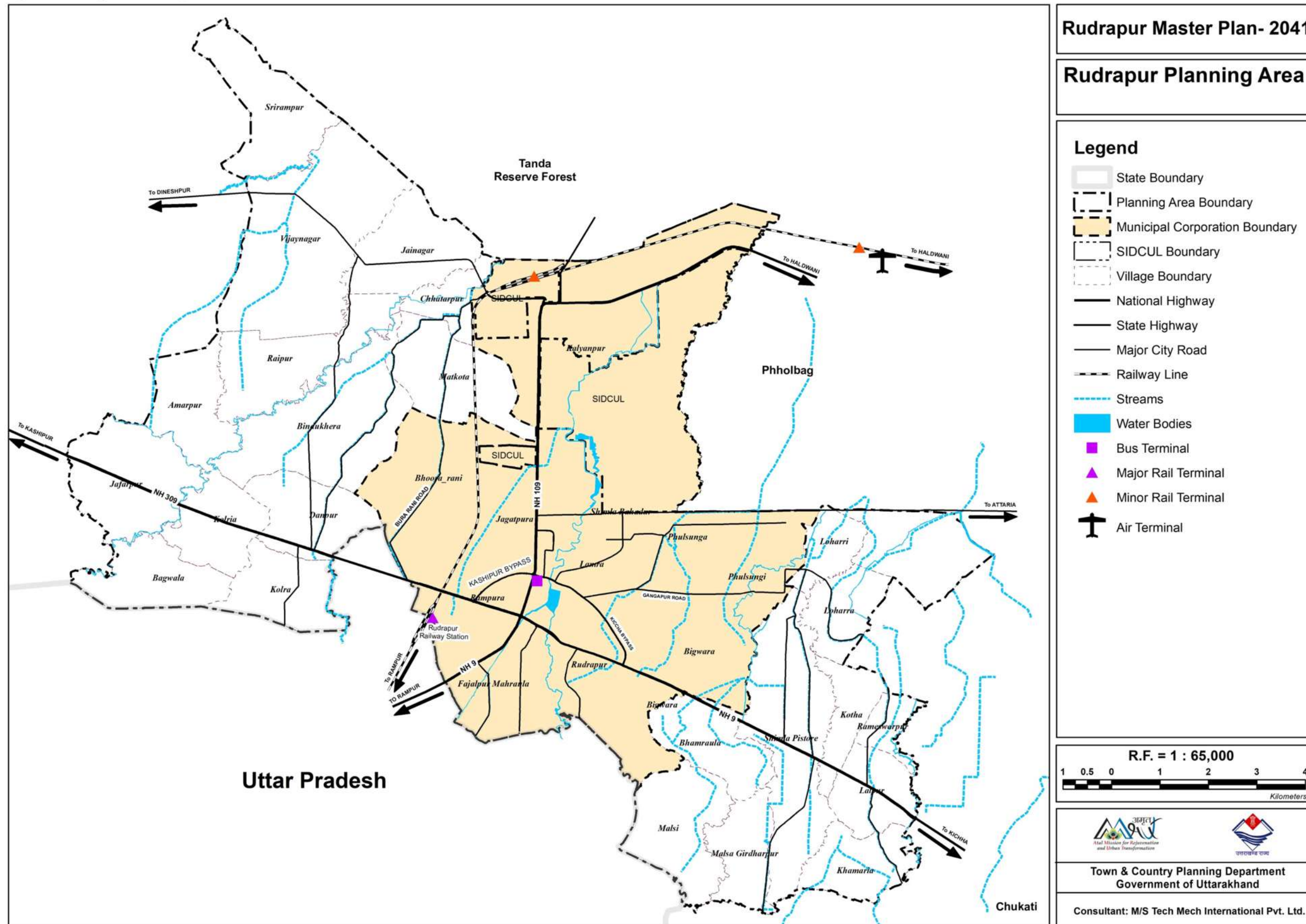
Rudrapur Planning Area is located 253 kilometers from the state headquarter i.e., Dehradun as shown in **Table 2-1**. The nearest Class-I city is Haldwani of district Nainital in Uttarakhand. The railway station of Rudrapur city is situated 3 kilometers from the city center. The nearest domestic airport is Pantnagar airport, which is located 13 kilometers for Rudrapur. Thus, by having good road, rail & air connectivity to major cities of Uttarakhand and different parts of the country, Rudrapur has become one of the hotspots for economic development.

2.2.2. Planning Area

The Planning Area covers an area of 120.04 square kilometers. It consists of Municipal Corporation Rudrapur with an area of 53.50 square kilometers and 33 rural settlements. Area falling under SIDCUL falling in the MC area with revenue villages i.e., Matkota, Chhatarpur, and Kalyanpur is notified under the SIDA (State Industrial Development Authority) Act and has been excluded from the planning area. Out of these 33 settlements, nine settlements have become part of the municipality in 2018, which implies that there are 24 rural settlements present outside the municipal limit, and within the planning area of Rudrapur (refer to **Map 2-2**). The list of the remaining 24 villages is as follows:

1. Amarpur	9. Jafarpur	17. Loharri
2. Bagwala	10. Jainagar	18. Shimala Pistore
3. Bhamraula	11. Khamaria	19. Malsagirdharpur
4. Bindu Khera	12. Kolara	20. Malsi
5. Chhatarpur	13. Kolaria	21. Mat Kota
6. Vijay Nagar	14. Kotha	22. Rameswarpur
7. Danpur	15. Lalpur	23. Raipur
8. Gangapur Patia	16. Loharra	24. Shri Rampur

Map 2-2: Rudrapur Planning Area



2.2.3. Regional Setting and Major Settlements nearby Rudrapur

Rudrapur city is the district headquarters of Udham Singh Nagar and is the largest urban settlement in the district followed by Kashipur in Class-I category towns. Udham Singh Nagar district is surrounded by the districts of Uttar Pradesh i.e., Moradabad, Rampur, Bareilly, and Pilibhit districts in the south and Bijnor district in the west. While the districts of Uttarakhand surrounding Udham Singh Nagar are the Nainital district in the north and the Champawat district in the Northeast. Rudrapur city is located at the Rampur district border that falls in Uttar Pradesh.

The urban settlements present within 50-km radius of Rudrapur have been depicted in **Map 2-3**. The settlements have been divided into three categories based on population i.e., urban centers having more than 5 lakh population, 1-5 lakh population, and less than 1 lakh population. Not a single settlement has more than five lakh population within 50 km radius of Rudrapur. Such nearest settlement is Moradabad with 8.9 lakhs population, located at a distance of 74 km from Rudrapur in Uttar Pradesh. Apart from Rudrapur, three settlements namely Haldwani, Kashipur, and Pilibhit have population between 1-5 lakhs within 50-km radius. 14 other urban centers within 50-km radius have less than one lakh population. Rudrapur city has a certain influence on these 14 settlements in terms of providing employment and various infrastructural facilities like education, medical and administrative. The settlements present near Rudrapur has more dependency as compared to settlements at a farther distance.

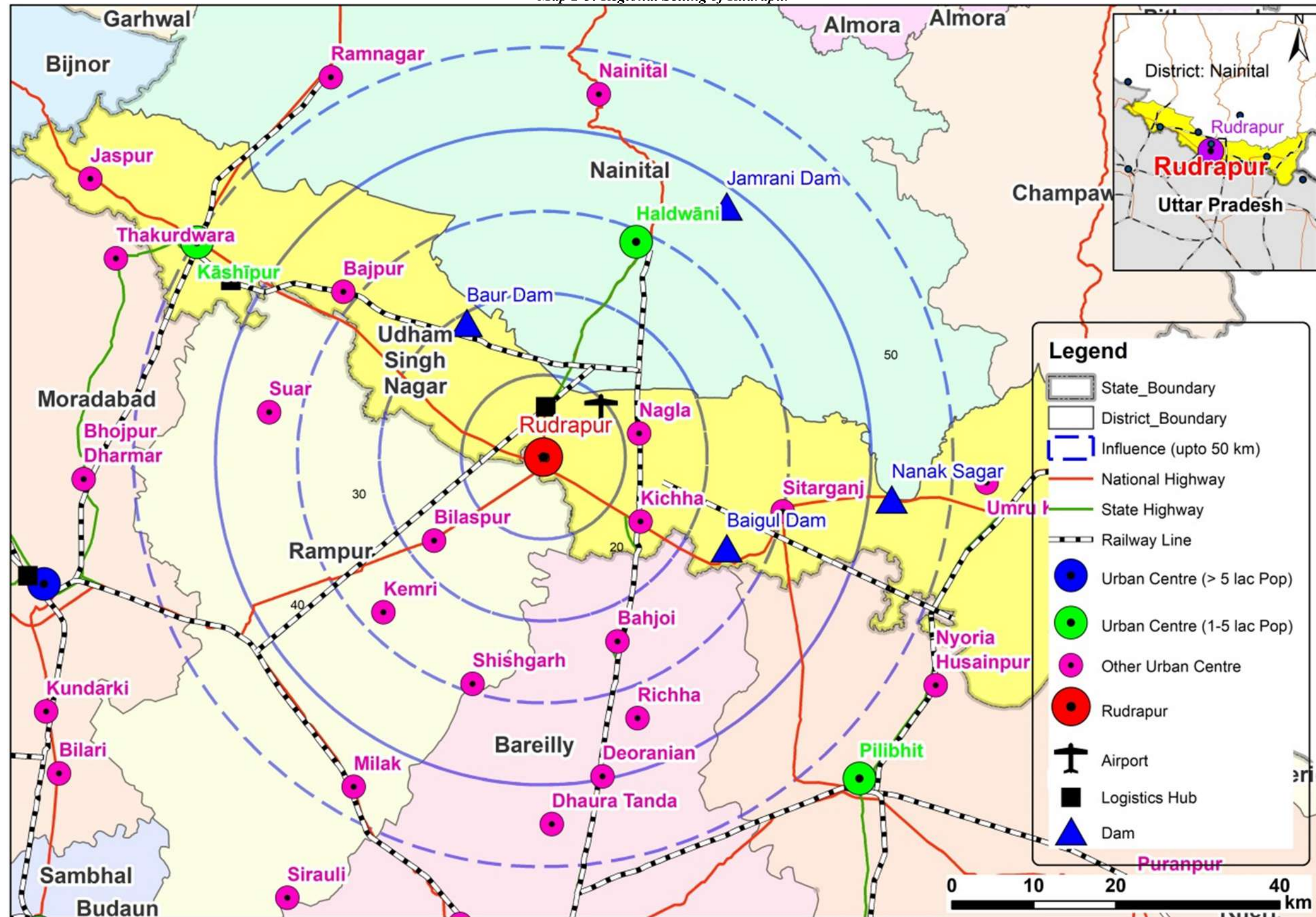
The regional importance of Rudrapur is also impacted by the presence of its logistics hub and airport in Pantnagar. Moreover, there is one multimodal logistic hub in Pantnagar and one logistics hub present in Kashipur city. There are three dams present within the district i.e., Baigul dam, Baur dam, and Nanak Sagar dam (refer to **Map 2-3**).

2.3. Regional Linkages and Connectivity

2.3.1. By Road

Rudrapur has good road connectivity by three major National highways converging and diverging to and from the city i.e., NH-9, NH-109 & NH-309. National Highway-9 runs from Malaut (Punjab) to Pithoragarh via Rudrapur. This highway connects Rudrapur with several cities like Rohtak, Hisar, Delhi, Rampur, Sitarganj, Khatima, Tanakpur, and Pithoragarh. NH-109 connects important settlements of the state i.e., Haldwani, Nainital, Almora & Rudrapur. NH-109 connects Rudrapur city with Karnprayag and serves as one of the major

Map 2-3: Regional Setting of Rudrapur



highways in the Kumaon Region of the state. While NH-309 connects Rudrapur to Srinagar through towns such as Kashipur, Ramnagar & Pauri. It is one of the major highways within Udham Singh Nagar district (refer to **Map 2-3**).

Along with good road connectivity, the bus stand of Rudrapur city acts as one of the nodal terminals for Uttarakhand State Transport Buses as well as private operators plying on the interstate and intrastate routes from Rudrapur city. It has also been proposed as a PPP complex with commercial activities.

2.3.2. By Rail

Rudrapur is connected by a broad-gauge railway line, which lies on the route of Rampur-Lalkuan. The city falls under the Izzatnagar railway division of the North-Eastern Railway Zone of Indian Railways. Train service in Rudrapur started in 1886, upon the construction of a branch line by Rohilkund and Kumaon Railway connecting Lalkuan on the Bareilly-Kathgodam line with Rampur. Some of the important trains that serve the Rudrapur Junction are given in **Table 2-2**.

Table 2-2: Timetable of the Rudrapur Railway Station

Train No.	Train Name	Timing
12040	New Delhi Kathgodam Shatabdi	Morning
12092	Naini Doon Jan Shatabdi Express	Morning
15036	Uttaranchal Sampark Kranti Express	Morning
14120	Dehradun Kathgodam Express	Morning
15013	Ranikhet Express	Morning
13019	Bagh Express	Morning
13020	Bagh Express	Evening
12039	Kathgodam New Delhi Shatabdi	Evening
12091	Doon Naini Jan Shatabdi Express	Evening
12207	Kathgodam Jammu Tawi Garib Rath Express	Evening
12208	Jammu Tawi Kathgodam Garib Rath Express	Evening
15035	Uttaranchal Sampark Kranti Express	Evening
14119	Kathgodam Dehradun Express	Evening
15014	Ranikhet Express	Evening

Source: Railway Station Manager, Rudrapur

2.3.3. By Air

The city is served by the Pantnagar Airport situated 12.2 km (7.6 mi) from the city center (refer to **Map 2-3**). The airport is operated by the Airports Authority of India and caters to domestic flights to Delhi and Dehradun. It has a single airstrip, which is 4,500 ft. (1,400 m) in length, and can handle a turboprop aircraft.

2.4. Locational Advantages and Disadvantages

2.4.1. Locational Advantages

- i. Rudrapur serves as one of the gateways to the Kumaon region, as it is located at the Uttarakhand-Uttar Pradesh border making it an important interstate urban center.
- ii. There is a wide scope of industrial expansion in the Rudrapur Planning Area due to its plain terrain and presence of major terminals with good connectivity.
- iii. Rudrapur city has good proximity to Integrated Industrial Estate, Pantnagar SIDCUL which comes within the M.C. limit. Thus, the SIDCUL attracts development and serves good employment to the city and surrounding settlements.

2.4.2. Locational Disadvantages

- i. The gateway city of Rudrapur is located at the Uttarakhand-Uttar Pradesh state border. In search of employment in industries, many workers are living south of the city in UP. Thus, many people are dependent on several infrastructural facilities of the city, which puts an additional burden on the city. In addition, these facilities could not be provided in those areas due to legal constraints.

2.5. Regional Resources

2.5.1. Mineral Resources

The district lacks mineral resources. The only major mineral produced in the district is Riverbed minerals (RBM). As per the details provided by Mining and Geology Department, Udham Singh Nagar, there are 37 sanctioned mining sites in the district out of which 32 are being mined along River Koshi while the rest are being carried out on other rivers. The mining sites have been sanctioned for 5 years from the date of allotment. There is no mining site present within Rudrapur Planning Area but the proximity to the Koshi river helps to cater to the demand of Rudrapur.

2.5.2. Forest Resources

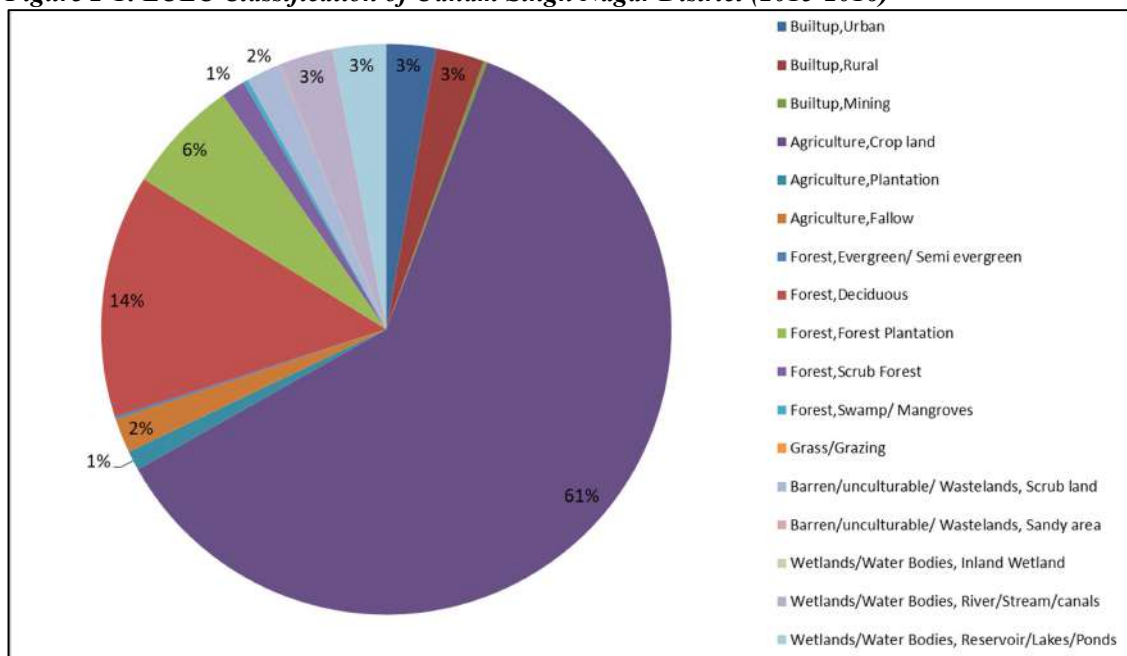
The total forest cover in the district is 568.33 sqkm. and constitutes nearly 22% of the total land area of the district. Deciduous forests are predominant in the district while evergreen forests occupy very less area in the district. Rudrapur Planning Area is located near the forest range in the northern portion and receives plenty of forest produce resources that enhance the economy. Details of the land cover are provided in **Table 2-3 & Figure 2-1**.

Table 2-3: LULC Classification of Udham Singh Nagar District (2015-2016)

LULC Class	Area (sq.km.)
Built up, Urban	72.89
Built up, Rural	70.37
Built up, Mining	5.61
Agriculture, Cropland	1,574.71
Agriculture, Plantation	28.53
Agriculture, Fallow	50.49
Forest, Evergreen/ Semi-evergreen	3.79
Forest, Deciduous	355.09
Forest, Forest Plantation	167.26
Forest, Scrub Forest	35.14
Forest, Swamp/ Mangroves	7.05
Grass/Grazing	0.03
Barren/ unculturable/ Wastelands, Scrub land	49.79
Barren/ unculturable/ Wastelands, Sandy area	2.3
Wetlands/Water Bodies, Inland Wetland	0.05
Wetlands/Water Bodies, River/Stream/canals	77.58
Wetlands/Water Bodies, Reservoir/Lakes/Ponds	78.32
Total	2,579.00

Source: <https://bhuvan.nrsc.gov.in>

Figure 2-1: LULC Classification of Udham Singh Nagar District (2015-2016)



Source: <https://bhuvan.nrsc.gov.in>

2.5.3. Flora and Fauna

Uttarakhand is known for its horticultural crops, which include fruits, vegetables, offseason vegetables, floricultural crops, and medicinal and aromatic plants. Horticulture is one of the critical sectors in the economy of the hill state of Uttarakhand. It provides a much-needed

opportunity for diversification and increased employment in the state where the scope of a high rate of growth in conventional agriculture is rather limited due to peculiar topography and a majority of scattered and marginal holdings. Uttarakhand shared 2.81 percent of all Indian territories under fruits amid 2010-11. Moreover, horticulture produces in the vicinity of the Planning Area help to cater to the daily demand of the city.

2.5.4. Water Resources

Udham Singh Nagar district lies on the plain regions of the state of Uttarakhand. The district has a dense network of drainage patterns. The rivers of the district belong to the Ganges drainage system. Of these, Sarada, Kosi, Gola, and Phikka River and their tributaries are Sawaldeh, Bour, Nandhour, Bhak, Kailash, etc. drain the district. The unique feature of the area is debouching of major rivers into the plains of the Lower Himalayas. The overall flow direction of these rivers is generally north-south trend or northeast-southwest and flows south till its confluence with the Ganga River. The major rivers are perennial, whereas their tributaries originating from the sub-Himalayan zone are ephemeral and remain dry during the non-monsoon seasons. The average water availability in the district is at a 10-meter level. Based on the behavior and occurrence of groundwater, the district can be broadly categorized into two broad hydro-geomorphic units namely (1) Bhabar and (2) Terai. The water table of Rudrapur Planning Area is very high which caters the domestic as well as industrial demands. Generally, groundwater flows from north to south in the Planning Area.

2.6. Historical Background

Rudrapur city came into existence in the 16th century under the rule of Kumaon King of Chandravanshi lineage Rup Chandra (1567-1596). The city was primarily founded as a treasury and military cantonment in the Terai Region. The city was also used as a link region to Hilly areas under various kings in Middle Ages. After a decline in the prosperity of the city, there are no records of the status of the town. Even after harsh geography and climate for health, the rural population prospered continuously.

In the initial days of the British Rule, Rudrapur was established as a purely plains region administrative headquarters but due to unsuitable climatic conditions for the Britishers, the town did not prosper to its full potential. Due to the construction of dams in the upper and lower regions of the population center in Rudrapur by Kashipur's Shivraj Singh and Nawab of Rampur on the Bahugul river by 1845, the whole area became marshy and was frequently and severely swamped with floods. As a result, Rudrapur Tehsil headquarter was shifted to

Kiccha. Hence due to unplanned waterworks in the area without keeping the town in mind, Rudrapur was not able to achieve its full potential during colonial rule.

With the independence of India, the social, geographical, and economic dawn of the town came into the picture. The Government of India decided to rehabilitate the people displaced due to partition in the new town of Rudrapur and the state provided the land for the same. People displaced due to the partition from erstwhile East Bengal (now Bangladesh) and West Punjab (now Pakistan) were rehabilitated in 1948 itself but the economic and industrial needs of the town started to be met in 1952 after the issuance of government order 6564/37-6592/52 dated 17th July 1955 wherein 867 hectares of land was acquired by the government. The basic and foremost objective of the acquisition exercise was to provide basic services on the acquired land for traders and the money raised from selling these acquired lands be used to create a fund “Rudrapur Nagar Vikas Kosh” which was valued at Rs. 50 lakhs. The resource base for this fund was identified as a land auction. A policy was framed in which the capital acquired so will be divided into 30% as a revenue deposit to the state and 70% as a revenue deposit for the fund. It was decided hence that the planning for the town would be done under a Master Plan in the next 4 years.

The policy for town development was hampered due to the partial accumulation of funds as mandated by “Rudrapur Nagar Vikas Kosh”, resulting in a scarcity of time for policy implementation and effective control. Meanwhile, it was observed that the revenue department has not been able to fully realize the aspirations of the people of the town and the help from the department had been limited. Hence to make the town management and works more in line with the aspirations of the people of Rudrapur, a notified area committee was formed in 1959. This autonomous administrative department was then 1968 promoted to the level of “Nagar Palika” to expand and work upon the aspiration of the local populace.

The ascension of the administration to autonomous level was possible due to increasing geographic and socio-economic development and diversity primarily due to the partition of India and rehabilitation of people affected by it, the resultant development in health and administration has provided people with a multi-dimensional security blanket. In 1952, the first Hospital and in 1958 a “Rehabilitation Plan Office” were opened for effective rehabilitation of displaced people in the region.

After the advent of the Green Revolution in the country, the social and economic status of Rudrapur was also elevated slowly. The importance of setting up food and grain storage

godowns for the produce in local areas by Indian Fertilizer Corporation and UP Warehouse Corporation is highlighted.

By the end of the 6th decade, given an unprecedented increase in centralization of the town's importance various administrative offices and social services were set up. Most importantly in 1969, the Paragana Office, Police Superintendent Office, and other Town Collector Offices were set up. Other than that, in 1970 the setting up of the city's Public Works Department, Local Civil Court, and Headquarters of the 31st Battalion of the Provisional Armed Constabulary advanced the importance of the town. Setting up of Intermediate College for Women and a Government College afterward is a highlight in the 7th decade. Hence, the 7th decade is known for an increase in the town's services and facilities.

The physical development of Rudrapur in the '80s was marked by the industrialization of Agro-based industries. The administration encouraged and helped in setting up various rice mills in the region and forming affirmative policies. In the same decade, renowned organizations Bharat Heavy Electrical (BEL) and Sri Ram Honda were established in Rudrapur too. Broad gauge railways were established in the initial years of the last decade of the previous century marking an uptick in the social and economic development of the region.

In 1995, the district Udham Singh Nagar was carved out from the Nainital district by the then UP State Government and Rudrapur became the district headquarter for the same. After the Parliament of India passed the Uttar Pradesh reorganization, in the year of 2000, Rudrapur along with Udham Singh Nagar district became part of Uttarakhand state. Rudrapur continues to grow up to the year 2013.

In 2013, Municipal Council Rudrapur was converted to Municipal Corporation, and 40 wards with an extended boundary of Corporation that include surrounding villages and SIDCUL. In the year 2018, Rudrapur city started serving as the tehsil headquarter for Rudrapur tehsil after its division from Kiccha Tehsil.

Presently, Rudrapur serves as a Class-1 city, District Headquarter and Tehsil Headquarter. Hence it is of utmost importance to give due recognition to the current state of development and prepare a long-term planning solution for town development keeping the aspiration of people, services, and facilities in mind. The main challenges ahead are ineffective management, inadequate transport, pollution control, etc.

2.6.1. Regulated Area of Rudrapur and Master Plan Background

The development of a functional framework marks that the development of Rudrapur happened as Agricultural Hub and Industrial Centre. On the other hand, Rudrapur fulfills the educational and healthcare requirements of the people in the rural plain of the Kumaon Division. Rudrapur has hence grown leaps and bounds as a multi-dimensional service center in the present. It's worth mentioning that as the importance of Rudrapur is growing as a regional service hub providing avenues of growth in jobs, the issue of rapid urbanization has led to problems such as undue pressures in settlement areas, clinics, education services, and transportation services. Non-availability of a new area for urban expansion has led to a newer settlement being made on an area demarcated for agriculture. This unplanned development has led to unequal distribution of services and dwindling of rural resources. Due to the absence of low-cost residential projects/facilities in the town, the laborers and blue-collared workers are forced to live in low-lying areas without basic facilities giving rise to rising slum-like conditions in town.

Keeping the aforementioned issues with the rapid development of Rudrapur in mind, the state administration of Uttar Pradesh in its notification dated 10th December 1958 No. 1379-H/37/50H57 notified the area as a 'Regulated Area'. This notification allowed for a more directed approach towards town development and in 1971, Rudrapur Masterplan 1971-1991 was prepared which was notified on 12 June 1973 through notification No. 1380/37-3-56/RBO/69. Taking into cognizance the upcoming industrial units and the unregulated colonies, jhuggis in low-lying areas and near riverfronts serving the housing demand for workers of these industries, Uttar Pradesh Housing Board under section-3, official notification No. 1098/9-A-3-92-50 H/57 dated 16th June 1992, included 8 revenue villages in its municipal limit, namely: Lamra, Bhudarani, Fazalpur Mehraula, Rampura, Jagatpura, Rudrapur Bigwada, and Shimla Bahadurpur and subsequently the Rudrapur Regulated Area was formed. After the notification of Udham Singh Nagar as a district and the formation of district headquarters in Kalyanpur-Jagatpur, Jagatpur village was also included in Rudrapur Regulated Area.

In the order given in Uttarakhand (U.P. Construction Regulation Act, 1958) in 2006 under the provision of an order issued, 1960 section 10-(A), a master plan for 'Rudrapur Regulated Area' must be prepared for the period of 2011-2021. Government notification No. 3069/V-A-2006A/2006 dated 10th November 2006 notified the Master Plan for Rudrapur Regulated

Area after including all the feedback for which a letter dated 13th June 2006 was issued by Commissioner, Kumaon Mandal (No. 1503/XXX-11-385/Rudrapur Masterplan). Moreover, in the same order issued, a proposal for a SIDCUL perspective area master plan authority was notified.

Considering remarkable industrial development in the Pantnagar area and its potential impact on the growth of Rudrapur, additional 16 villages have been added within the regulated area through Notification No. 3177/V/B-2006-126(A)/06 dated 15th November 2006. A Master Plan for the newly formed regulated area composed of Rudrapur Municipal Corporation and adjacent 25 villages has been prepared for the horizon period of 2031.

In the year of 2014, the Central government launched a sub-scheme for the preparation of a GIS-Based master plan under the AMRUT mission. Under this scheme, 546 towns from all over India were selected, out of which 07 towns named Dehradun, Haridwar, Roorkee, Haldwani, Nainital, Rudrapur, and Kashipur were selected from Uttarakhand state. Therefore, the master plan for Rudrapur along with 24 surrounding villages for the horizon year 2041 will be prepared under this scheme through GIS technology.

2.7. Physiographic and Geomorphological Studies

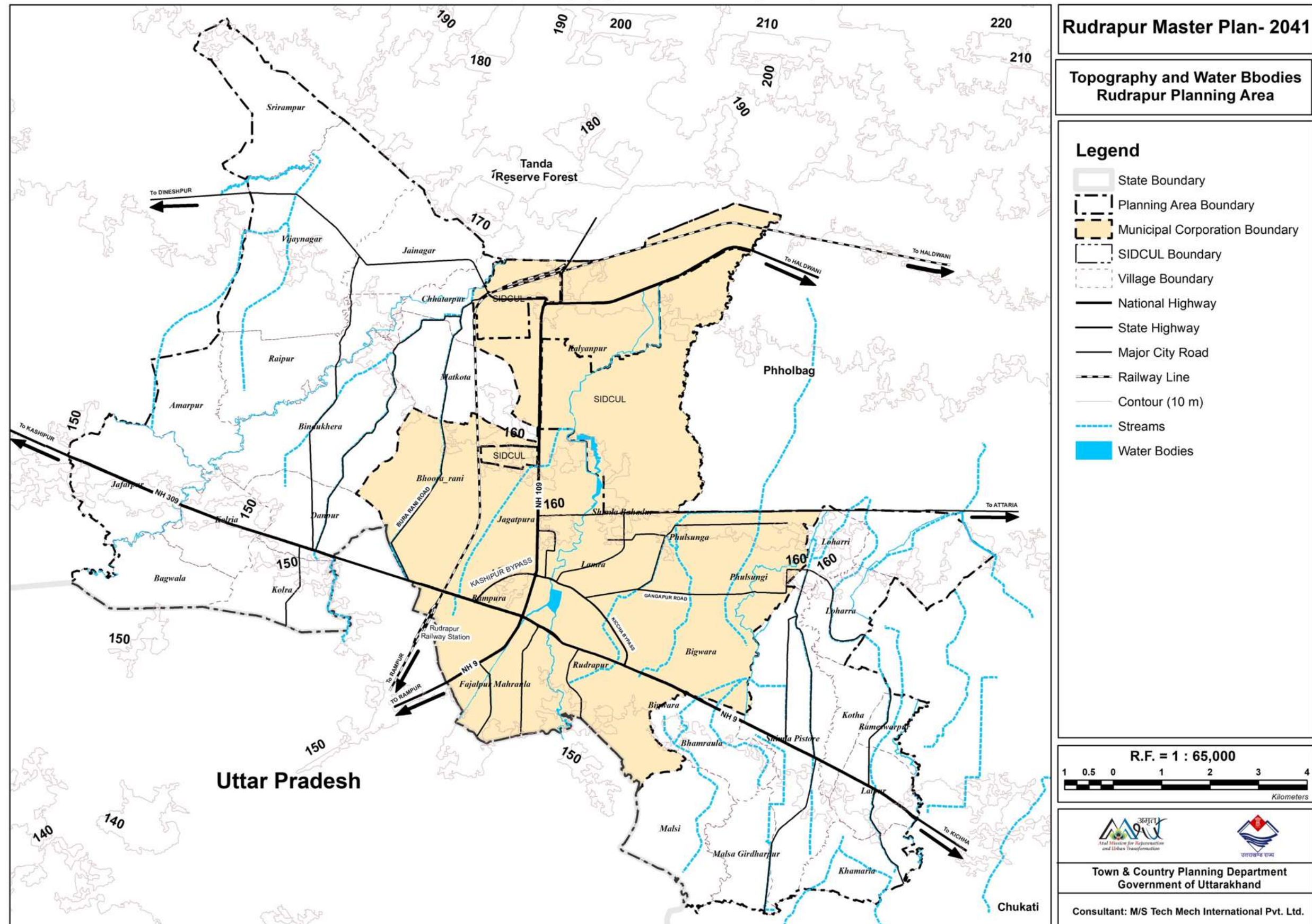
2.7.1. Physiography

2.7.1.1. Topography and Water Bodies

The slope and aspect of Rudrapur have been worked out in two ways i.e., based on the direction of the water body and contour map. Three major water bodies flow from the North to the south direction which implies that the southern area is low-lying. In the contour map, the maximum level of the contour is 200 m which is present towards the North-eastern side of the planning area and the lowest level of the contour is 140 m falling in the South-western direction (refer to **Map 2-4**). It implies that the slope is from the Northeast to the Southwest direction. Hence, the Southwest area is the low-lying area of the Rudrapur planning area. This would help with the laying of physical infrastructure projects.

Four major water bodies are passing through the planning area of Rudrapur, which include the Kalyani River, Baigul River, Dhimri River, and Gangapur canal. Kalyani River flows from north to south direction. It passes through the SIDCUL industrial area and Awas Vikas area of the city. Baigul River originates from the Baigul dam and flows through the Tehsil boundary of Rudrapur and Kichha. Baigul River passes through various villages including Fulsungi, Loharri, Phoolbag, and Fulsunga. The third water body i.e., the Dhimri river is

Map 2-4: Topography and Water Bodies of Rudrapur



present in the Western part of the planning area. It flows from North to South West and passes through Vijay Nagar, Jai Nagar, and Raipur villages (refer to **Map 2-4**). Apart from these four, there are certain smaller drains present within the planning area. These drains are not interconnected to each other lying within the planning area and the source of their origin is not known. It can be inferred that these drains are seasonal and constructed to contain flash flood water.

The nearest important river to the Planning Area is the Dhela river which is located at a distance of 56 km from the Planning area and flows through Kashipur city. The nearest canal from the Planning Area is the Baigul canal, which originates from the Baigul dam. Moreover, the region on the north-western part outside the Planning Area has numerous canals constructed by the irrigation department, Uttarakhand. The biggest drain is within the Planning Area itself, which flows from the SIDCUL area towards the southern portion of the city. The nearest major Dam/Reservoir is Haripura Dam located at a distance of 32 km from the Planning Area. (Refer to **Table 2-4**).

Table 2-4: Nearness / Distance of Major River / Canal / Coastline from Rudrapur

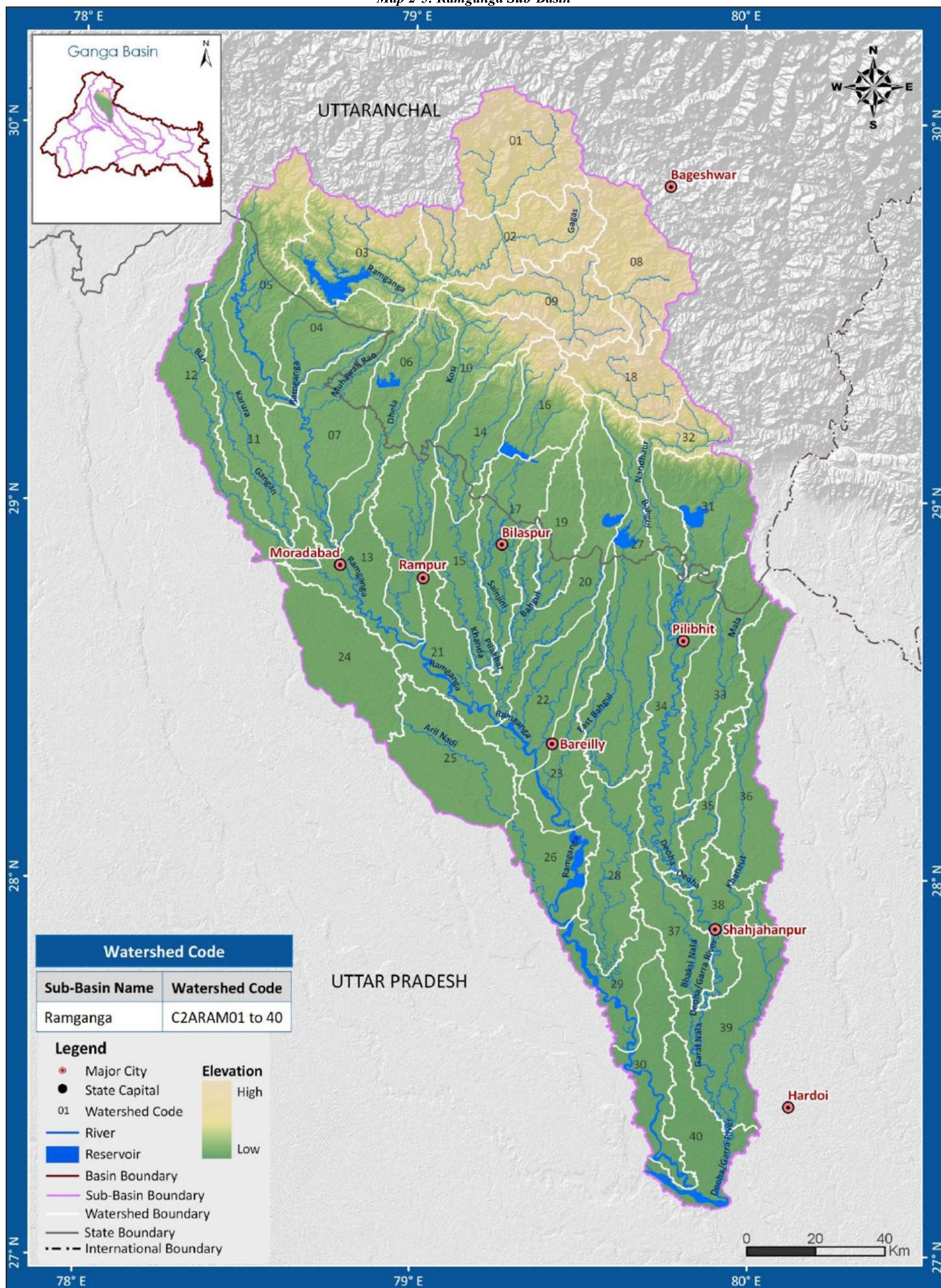
River Name & Distance (km)	Canal Name & Distance (km)	Distance of Big Drains	Distance of Major Dams & Reservoirs
Dhela (56 km)	Bail Canal (45km)	Within Planning Area	Haripura Dam (32 km)

Source: Analysis by Town and Country Planning Department

Rudrapur planning area falls in the Ramganga Sub-basin that lies between 78° 14' to 80° 8' east longitudes and 27° 7' to 30° 6' north latitudes of the country. The Ramganga is the first major tributary joining the River Ganga. It rises at an altitude of about 3,110 meters in the lower Himalayas near the Lohba village in the Garhwal district of Uttarakhand. The length of the Ramganga river from the source to the confluence with the Ganga is 596 km. During its course, the river flows through mountainous terrain and has several falls and rapids. The river enters the plains at Kalagarh near the border of the Garhwal district, where the famous Ramganga dam has been constructed. Beyond Kalagarh, the river flows in a south-easterly direction and finally joins the Ganga on its left bank near Kanauj in the Fatehgarh district. The river flows entirely in Uttarakhand and Uttar Pradesh states. The catchment area of the sub-basin is about 30,839 Sq.km. The important tributaries that join the Ramganga River are the Ban, the Khoh, the Gangan, the Gagas, the Aril, the Kosi, the Haldgadi Rao, and the Doha. (Refer to **Map 2-5**).

Rudrapur is located near watershed boundary of 17 and 19, which implies that the city is situated near the ridge. The chances of flash floods are very less in this area as there will be a surface run-off in this area. This will help in the long run the area with fewer natural

Map 2-5: Ramganga Sub-Basin



Source: Ganga Basin Report by Ministry of Water Resources, Govt. of India

calamities and the city can prosper in spatial development by having groundwater and Streams in abundance.

2.7.2. Climate

2.7.2.1. Temperature

As per the agro-ecological region classification of the National Bureau of Soil Survey and Land Use Planning, Rudrapur Planning Area falls in zone 14 (Western Himalayas) which is also known as a warm sub-humid to humid region with brown forest and podzolic soils. Mild summers and cold winters characterize the region. In addition, the climate is warm and temperate in Rudrapur. In Rudrapur, the average annual temperature is 24.3 °C. The warmest month of the year is June with an average temperature of 31.6 °C. The lowest average temperatures in the year occur in January when it is around 14.9 °C (refer to **Figure 2-2**).

Figure 2-2: Climate Data of Rudrapur

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature (°C)	14.9	17.2	22.5	28	31.5	31.6	28.9	28.4	28.1	25.1	19.7	15.8
Min. Temperature (°C)	8.6	10.2	15	19.9	24	25.7	25	24.8	24	19	12.5	9.1
Max. Temperature (°C)	21.3	24.3	30.1	36.2	39.1	37.6	32.9	32	32.2	31.2	26.9	22.6
Avg. Temperature (°F)	58.8	63.0	72.5	82.4	88.7	88.9	84.0	83.1	82.6	77.2	67.5	60.4
Min. Temperature (°F)	47.5	50.4	59.0	67.8	75.2	78.3	77.0	76.6	75.2	66.2	54.5	48.4
Max. Temperature (°F)	70.3	75.7	86.2	97.2	102.4	99.7	91.2	89.6	90.0	88.2	80.4	72.7
Precipitation / Rainfall (mm)	38	21	21	3	18	118	384	387	215	86	3	8

Source: <https://en.climate-data.org/asia/india/uttarakhand/rudrapur-33827/>

The variation in temperatures throughout the year is 16.7⁰C. The main seasons are summer from March to May, monsoon from June to October, and winter from November to February. Moderate annual temperature in the region helps in the economic prosperity of the region and preferable place to settle for people and Rudrapur has the potential to be located on plain terrain.

2.7.2.2. Rainfall

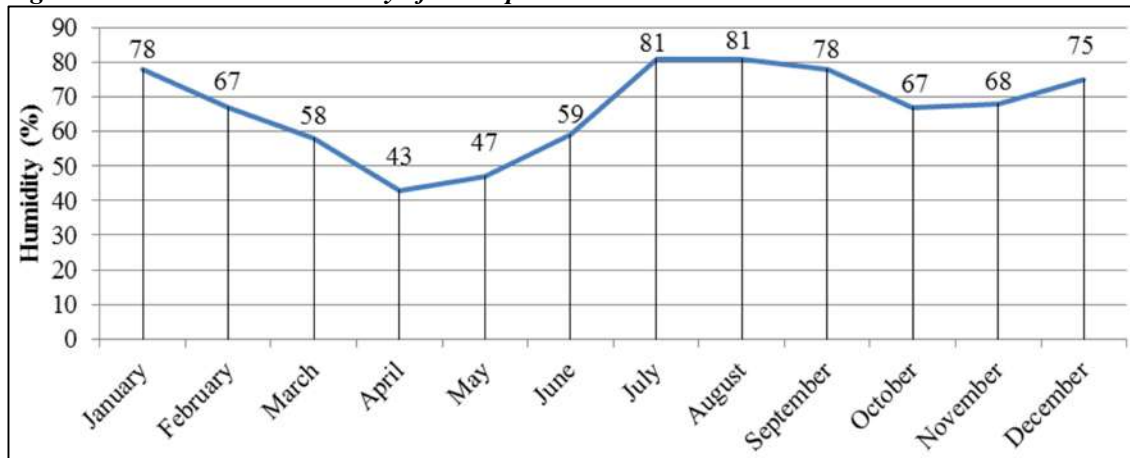
Rudrapur receives plenty of rainfall throughout the year being located on the foothills. Monsoon generally prevails from June to October with July to September being the peak season of rainfall (refer to **Figure 2-2**). The average annual rainfall in the area is 1302 mm. The monthly average rainfall is 108 mm while the monthly average of the peak season is 238 mm. The average rainfall difference between the driest month and the wettest month is 384 mm. Having good rainfall helps to prosper any region and Rudrapur having all the three

economic sectors booming requires a huge demand for water, which can be fulfilled by rainwater.

2.7.2.3. Humidity

Humidity is defined as the quantity-representing amount of water vapor in the atmosphere or gas and is depicted in percentage. The humidity level of Rudrapur has been depicted in **Figure 2-3**. The level of humidity is highest in July and August. The level of rainfall is highest during this time due to which there is a larger concentration of water vapours in the atmosphere. As a result, the climate is hot and humid from July to September. The level of humidity is also higher in January i.e., 78% due to rainfall, thus, the climate is cold and humid during this time as the temperature level is quite low. When conditions are too humid, it promotes the growth of mold and bacteria that cause plants to die and crops to fail. Humid conditions also invite the presence of pests, such as fungus gnats, whose larva feed on plant roots and thrive in moist soil. Thus, Rudrapur having an agriculturally rich economy suffers in crop production

Figure 2-3: Month-Wise Humidity of Rudrapur

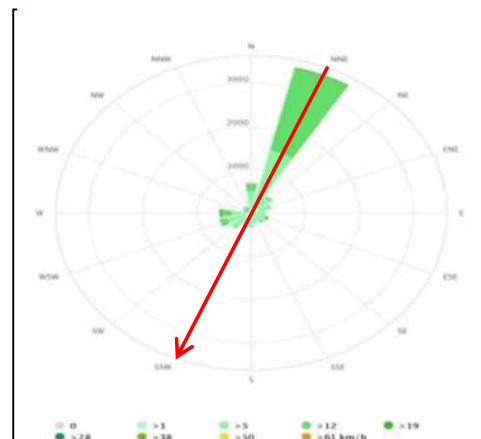


Source: <https://en.climate-data.org/asia/india/uttarakhand/rudrapur-33827/>

2.7.2.4. Wind

The wind rose diagram of Rudrapur shows that during the year majority of the hours' wind blows from the indicated direction. The maximum flow of wind is from NNE to SSW direction with 3449 hrs./year i.e., 144 days in a year (refer to **Figure 2-4**). The average wind speed of flow of wind in the same direction lies between 12 km/hr. to 19 km/hr.

Figure 2-4: Wind Rose of Rudrapur



Source: <https://www.meteoblue.com/en/we>

(1943 hours) followed by 5 km/hr. to 12 km/hr. (1339 hours). In Rudrapur, it is crucial to understand the wind direction because of its industrial base.

2.7.2.5. Atmospheric Pressure

Atmospheric pressure, also called barometric pressure, force per unit area exerted by an atmospheric column. The standard pressure at mean sea level is 1,013.25 mb. Rudrapur lies in the plain Terai region, foothills of Kumaon hills of Uttarakhand. The mean sea level of Rudrapur is 580 m. Although, being on the foothills, Rudrapur has an atmospheric pressure of approximately 1,018 mb, which generally is at mean sea level depicting a good sign for the living condition.

2.7.3. Geomorphology

2.7.3.1. Soil

The soil type of the Planning Area is sand and silt clay based on the geology of the area (refer to **Map 2-6**). This type of soil has deep, high organic matter; nutrients enriched surface soil, mainly of about 60-80 cm thickness. The fertile surface horizon results from the long-term addition of organic materials derived from plant roots. They have a soft, granular, soil structure. This soil is highly fertile and best suited for agricultural activity. Rudrapur having a rich agricultural economy benefited from the existing soil type.

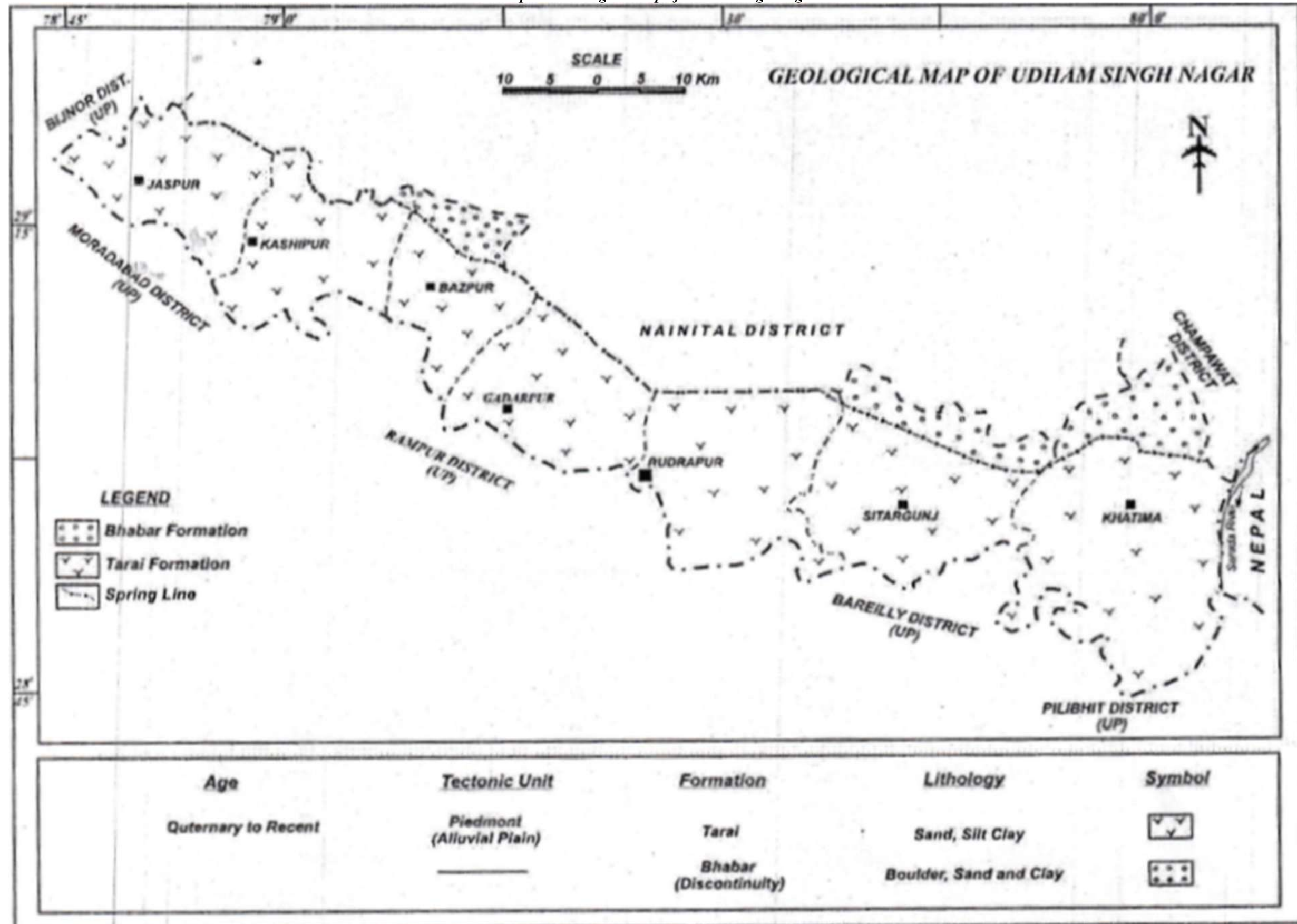
2.7.3.2. Geology

District Udham Singh Nagar may be broadly divided into two physiographic units from north to south viz., Bhabar and Terai respectively. Since the area is in the Himalayan foothills, a very thick column of alluvium is deposited, which further is classified into two distinct divisions: (A) Piedmont fan deposits known as Bhabar & (B) Terai Alluvium. Terai formation is present in the entire Rudrapur Planning Area as depicted in **Map 2-6**. It is composed of comparatively finer alluvium as compared to Bhabar or other geological formations.

2.7.3.3. Hydrogeology

Terai formation lies south of the Bhabar, which comprises predominantly of clays and silts with horizons of well-sorted granular material such as sand, gravel occasionally boulders and cobbles, and pebble beds. The boundary between the Bhabar and the Terai is defined by a spring line, which is characterized by auto-flow (free-flowing) conditions. There are plenty of moist and waterlogged areas around the spring line, particularly during the monsoon season. The sand and gravel associated with the finer fractions are the major aquifers in this zone.

Map 2-6: Geological Map of Udham Singh Nagar



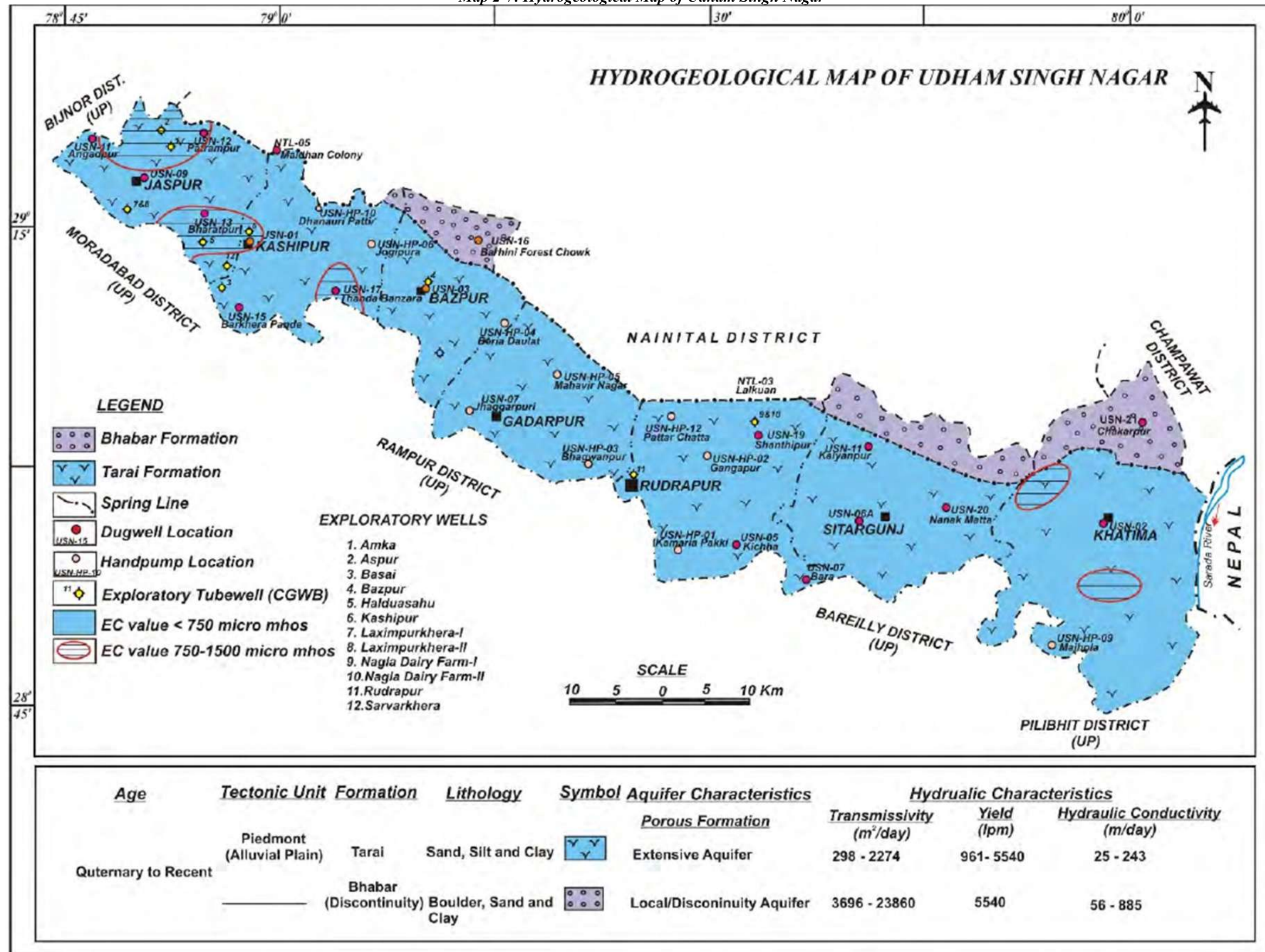
Source: Geology and Mining Department, US Nagar

Groundwater in shallow aquifer is tapped through dug-wells; the groundwater occurs under unconfined/phreatic conditions. The groundwater in deep aquifers is, under confined and artesian conditions. The deeper aquifers (> 50 m) are generally confined conditions with higher artesian heads, and the tightly cased tube wells constructed in them result in flowing wells. The unconfined shallow groundwater of the Terai may be recharged by (1) the direct infiltration from rainfall on the land surface, (2) the infiltration from the streams when flooded, and (3) return seepage from irrigation (4) lateral percolation from adjacent Bhabar zone.

On the contrary, the confined groundwater is probably recharged by downward percolation and lateral flow from the Bhabar belt. Bhabar is, therefore, the intake area for Terai as well. The groundwater in the Terai zone occurs both in unconfined and confined conditions. In the unconfined aquifer, the depth of the water level in pre-monsoon and post-monsoon varies from 2.09 to 7.08 m bgl and from 1.99 to 6.89 m bgl, respectively. The seasonal fluctuation varies from 0.09 to 3.56 m. The general slope of the water table is from north to south. The detailed hydrogeological map along with locations of exploratory tube wells are shown in **Map 2-7**. The tube wells tapping deeper confined aquifers with auto-flow conditions yield 25.0 to 55.0 lps of freshwater for a drawdown of 2.0 to 8.0 m. In the case of tube wells tapping confined aquifers with non-flowing conditions, the yield varies between 10 and 40 lps for a drawdown of 4.0 to 9.0 m. The exploratory wells of CGWB tapping confined aquifer, drilled depth ranges from 74.98 to 88.39 m, yield ranges from 2,683 to 3,100 lpm, transmissivity values range from 1,180 to 2,500 m²/day, and the hydraulic conductivity ranges from 25 to 243 m/day. The hydraulic gradient ranges from 1.35 to 4.0 m/km. the coefficient of permeability ranges between 17 and 108 m/day.

Artesian conditions are restricted to the Terai zone. In a well, penetrating through an aquifer, the water level will rise above the bottom of the confining bed. If the water level rises above the top of the upper confining layer, above the ground surface, free flowing /auto flow conditions result. In this zone, confining conditions result due to the intercalation of permeable materials like sand and gravel with impervious clay horizons. The difference in elevation of Bhabar and Terai, together with the regional slope of the strata, appears to build the artesian head in the aquifers. Permeability of the Terai aquifers is less than that of Bhabar, thereby playing a vital role in developing the pressure, as it impedes groundwater flow. The discharge of the tube wells is dependent on aquifer properties, and local ground conditions.

Map 2-7: Hydrogeological Map of Udhm Singh Nagar



Source: Central Groundwater Board, Report, US Nagar

More than 2000 artesian wells exist in Kashipur, Bazpur, Gadarpur, Rudrapur, and Sitargunj blocks. Central Ground Water Board (CGWB) has constructed artesian wells at Basai, Kashipur, Bazpur, Nagla, and Rudrapur (refer to **Map 2-7**). The drilled depth ranges from 84.4 to 433.0 m bgl, with a free-flowing head up to 8.69 m above ground level.

The yield of these wells is up to 3,400 lpm, with a drawdown of 5.39 to 10.69 m. The Transmissivity values range from 825 to 12,274 m²/day, and the hydraulic conductivity ranges from 16.17 to 106.6 m/day. It is observed that the pressure head of the artesian aquifers drastically reduced over the two decades and some of the shallower depth wells lost their artesian conditions. The causes of reduction in discharge of artesian wells may be attributed to i.) Overexploitation of groundwater due to industrialization, ii.) Reduction in recharge area due to developmental activities in Bhabar zone, iii.) Overexploitation of confined artesian aquifer, iv.) Interlinking of confined and unconfined aquifers due to an increased number of tube wells, v.) Choking of wells, and vi.) Continuous free flow of artesian water as there are no efforts to arrest the auto-flow.

2.7.3.3.1. Ground Water Availability

In the Rudrapur block, the total groundwater availability as per the CPWG report of 2004 was 7880.80 while the Groundwater draft was 6838.26. Rudrapur block (86.77%) has shown the highest groundwater development, and the lowest groundwater development is shown by the Sitargunj block (69.60%). As per the norms of GEC-1997, all the blocks are under semi-critical situation except the Sitargunj block with safe distinction.

2.7.3.3.2. Groundwater Related Issues and Problems

Hydrogeological investigations reveal that the depth to water level is shallow in the Udham Singh Nagar district for the last two decades and there is no change in the long-term water level trend. The shallow aquifer is contaminated and gives a foul smell as many industries discharge their untreated effluents directly to nearby water bodies, which affects the quality of drinking water. Groundwater pollution studies are to be taken up in project mode to bring out a clearer picture in a realistic manner. However, in hand pumps the quality problem is mainly because of the colour (yellowish-brown) and bitter taste, indicating that the water has very high iron content. Putting an iron filter unit with the outlet of the hand pump can solve the problem.

2.7.3.3.3. Recommendations

The groundwater is developed mainly through tube wells, hand pumps, and dug wells. The overall groundwater scenario in the district is safe to semi-critical. However, the situation is slowly deteriorating due to over-exploitation of groundwater due to rapid urbanization, and industrialization besides rapid deforestation. There is an urgent need for intensive monitoring of the groundwater scenario in the district. In the district, paddy is grown intensively, leading to over-exploitation of groundwater. The local farmers should be encouraged to adopt cultivate other less water-consuming crops along with paddy. Unmetered domestic water is being supplied in the district, which leads to the wastage of water. There should be metered domestic water supply to encourage water conservation. The district receives moderate to high rainfall and most of it goes waste as runoff. There is an urgent need to harvest the rainwater by utilizing it for artificial recharge. On-farm, rainwater conservation will not only help to reduce the depletion of groundwater but will also help to preserve the soil nutrients. Detailed pollution studies are required near the industrial areas like Kashipur, Rudrapur and Sitargunj blocks to assess the quality of groundwater.

2.8. Conclusion

To conclude, the regional importance of Rudrapur due to the presence of employment opportunities, transport facilities, connectivity, and infrastructural facilities has been highlighted in this chapter. The study of historical evolution would help establish the growth trend of the city. The physiographic features such as topography, wind direction, soil, and geology would play a vital role in the allocation of various land uses and provision of different infrastructure. Climatic conditions such as rainfall and humidity would be helpful in the formulation of building bylaws and norms.

3. Demographic Profile

3.1. Introduction

The chapter includes the statistical study of population size, distribution, and composition of human settlements. It also covers various aspects related to demography including caste composition, sex ratio, literacy, occupational classification, etc. The study of demographic characteristics is essential to assess and evaluate the existing human resource and infrastructural facilities, which in turn would help to identify the shortcomings.

3.2. Demographic Scenario

3.2.1. District Profile

The total population of Udham Singh Nagar is 16,48,902 out of which 10,62,142 (64.4%) are residing in rural areas while the remaining 5,86,760 (35.6%) reside in urban areas. The total population of the district falling from 0-6 years of age is 2,29,162 having 1,20,687 males and 1,08,475 females, which constitutes a share of 13.9% of the total population. This share shows a positive sign for the district as the district will have a younger population in the coming future, which will subsequently be added to the human resource demand. Further, the sex ratio of the rural areas in the district is 930 and the sex ratio of urban areas in the district is 903. The sex ratio of the district comes out to be 920 females per 1,000 males, which is lower than the state average of 963. In terms of literacy rate, Udham Singh Nagar district has 73.10% literates, which is lower than the state average of 78.82%. The male literacy rate (81.09%) is higher than the female literacy rate (64.44%).

3.2.2. Urbanization Pattern

Urbanization represents the demographic transition or change from rural areas to urban areas. Urbanization is defined as the increasing proportion of people that live in towns and cities and can be viewed at the regional, district, or state level. Udham Singh Nagar is the third most urbanized district of Uttarakhand having 5,86,760 urbanites. The district comprises 19.24% of the state urbanites (i.e., 30,49,338). Being an economic and administrative hub of the Udham Singh Nagar district, Rudrapur city is following the pattern of urbanization. Urbanization has increased beyond its municipal limits after its Industrial development due to the establishment of the Integrated Industrial Estate, Pant Nagar of SIDCUL. Rudrapur, being the most urbanized center in the district, is having 1,76,447 urbanites, comprising 30.07% of the district's urban population of 5,86,760. The percentage share of the urban population of the district to the state and Rudrapur with respect to the district has been shown in **Table 3-1**.

Table 3-1: Distribution of Urban Population

	Urban Population	Percentage of Urban Population Distribution
Uttarakhand	30,49,338	-
Udham Singh Nagar	5,86,760	19.24 %
Rudrapur Urban Area (As per new boundary)	1,76,447	30.07 %

Source: Census of India, 2011

3.2.3. Population Growth Trends

The planning Area of Rudrapur covers an area of 127.38 square kilometers. It consists of one urban settlement i.e., Rudrapur, and 24 rural settlements. Rudrapur is the district headquarters of Udham Singh Nagar and is the only urban settlement of the Planning Area having a population of 1,76,447 as per 2018 municipal corporation data (including the population of villages added in the new M.C. boundary in 2018), whereas the rural population is 43,447 (refer Error! Reference source not found. for the ward-wise and village-wise population). Moreover, the growth rate is quite high in Planning Area as compared to State and district growth rates. The growth rate of the urban population of Rudrapur Planning Area is also higher than the State and district growth rate during 2001-2011 (refer to **Table 3-2**).

In the year 2018, 9 rural settlements have become part of the Municipal area, which implies that those settlements have become part of the Municipal Corporation. Hence, the population of those 9-villages has been added to the urban population of the city. The rural population of 2011 comprises the population of the remaining 24 villages falling within the Planning Area.

Table 3-2: Population of Rudrapur Planning Area

Year	Urban	Rural	Total
Rudrapur Planning Area			
1961	9,662	17,571	27,233
1971	25,173	23,670	48,843
1981	34,658	28,375	63,033
1991	61,280	34,847	96,127
2001	88,676	44,122	132,798
2011	154,554	65,340	219,894
2018	176,447	43,447	219,894
Udham Singh Nagar District			
2001	403,014	832,600	1,235,614
2011	586,760	1,062,142	1,648,902
Uttarakhand State			
2001	2,179,074	6,310,275	8,489,349
2011	3,049,338	7,036,954	10,086,292

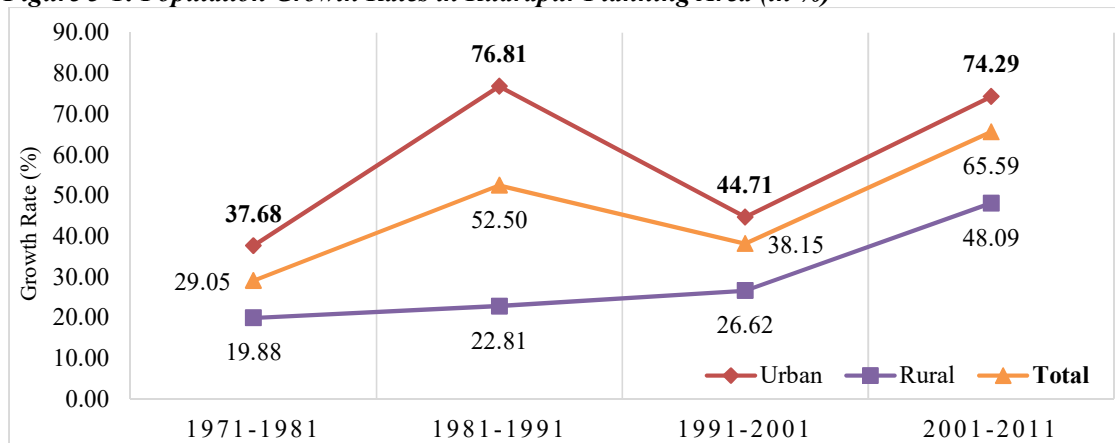
Source: Census of India, 1961-2011.

The growth rates of urban, rural, and planning areas have been shown for four decades in **Figure 3-1**. Discussing the urban area, it is evident from **Figure 3-1** that the population growth rate was 37.68% during the decade 1971-81, which increased to 76.81% during next

decade i.e., 1981-91. This sharp increase was because of the setting up of the town's Public Works Department, Local Civil Court, and Headquarters of the 31st Battalion of the Provisional Armed Constabulary. On the contrary, the employment opportunities have also increased due establishment of agro-based industries. Furthermore, the growth rate again declines from 76.81% to 44.71% in-between 1991-2001. The reason being during this decade a plague came into the district. Further, the growth rate has again shown an increasing trend during the next decade i.e., between 2001-2011. This increase was due to the establishment of the SIDCUL Industrial Estate because of which a huge population has migrated to the city.

Discussing rural areas, the population growth rate shows an increasing trend from 1971 to 2001 at its nominal pace due to the addition of the population. Further, the growth rate shows a sharp increase from the decade 1991-2001 to the next decade i.e., 2001-11 due to the establishment of industries in the rural areas. After the formation of the SIDCUL industrial estate more migration occurred in the rural areas since initially, SIDCUL was in the rural part of the planning area. Therefore, the population also settled in the rural parts abutting the SIDCUL industrial estate, which subsequently increased the population in the rural areas.

Figure 3-1: Population Growth Rates in Rudrapur Planning Area (in %)



Source: Census of India, 1961-2011.

3.2.4. Population Distribution

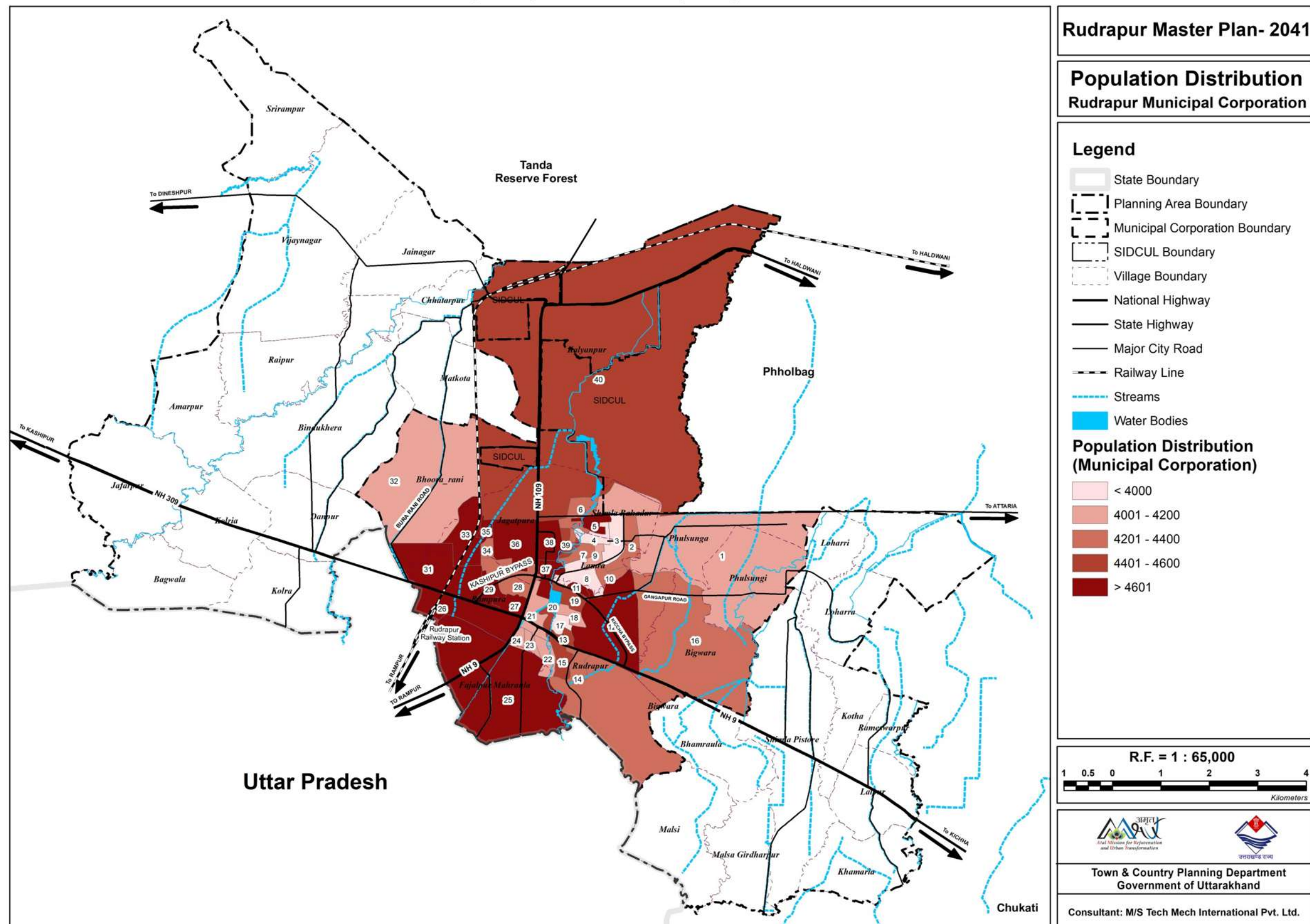
Population distribution is perhaps the most essential of all geographic expressions because how people have organized themselves in space at any given time represents the sum of all the advances they have made to their overall geographical area. The population distribution ward-wise has been discussed for the municipal corporation. The village-wise population distribution has been discussed to identify how the population is increasing outside corporation boundary with the advent of increasing sprawl because of economic activities.

Rudrapur Planning Area had a population share of 8.05% of the total district population in 2001 and which increased to 13.34% of the total Udham Singh Nagar district population in 2011. While Rudrapur Urban Area comprises 75.01% of the total Planning Area population in 2001, which increased to 80.24% in 2011.

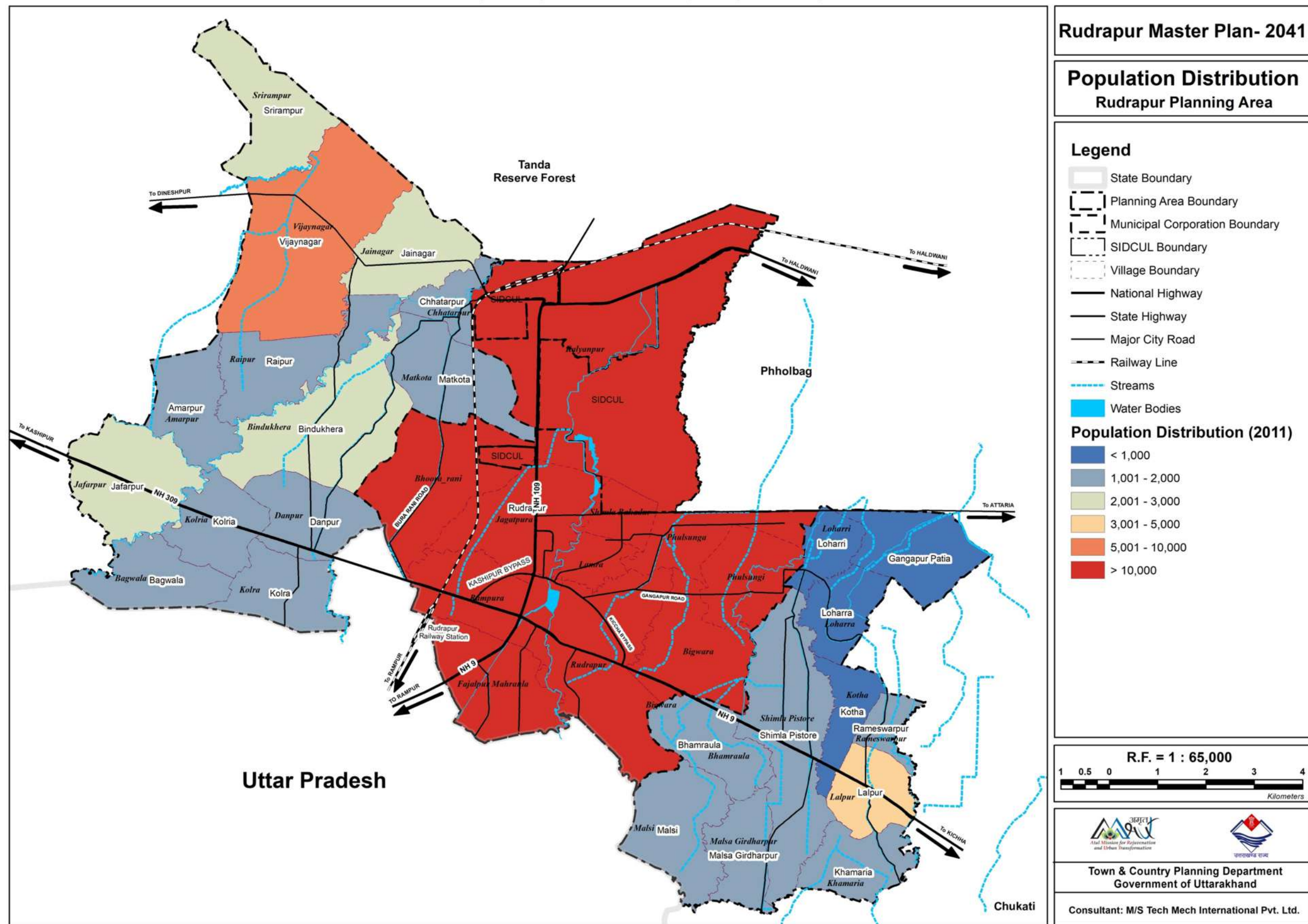
The population of Rudrapur MC ranges from the lowest population in ward-17 i.e., 3,607 to the highest in ward-31 i.e., 4,953. The population of Rudrapur MC has been classified into 5-categories as shown in **Map 3-1**. It has been observed that 13 wards are falling into the fifth category of the population distribution, having a population above 4,600, which has the maximum number of wards in a single category. The wards in this category lie mostly in western and southern parts of the city i.e., on Rudrapur-Kashipur road and the road leading towards Rampur. It can be inferred that the highest population distribution is in this direction because of the outward growth of the city in these directions. The same can be seen in ward-12 on Kichha bypass and onwards ward-36 & 38 on Rudrapur-Haldwani road. The next category is category-3 which comprises 9-wards having a population range of 4,201-4,400, followed by category-2 having population ranges from 4,001-4200, and category-4 having population ranges from 4,401-4600. The least populous wards are ward-3,4,8&17 which come into category 1 of the population distribution, having a population below 4,000.

The Rural Area of Rudrapur Planning Area had a population share of 24.99% of the Rudrapur Planning Area in 2001, which decreased to 19.76% in 2011. The population of Rural Area, coming within Rudrapur Planning Area, ranges from the lowest population in Loharra village i.e., 532 to the highest in Vijay Nagar village i.e., 8,818. Out of 24 villages in the planning area, the majority of villages i.e., 14 villages come into category 2 of the population distribution (refer to **Map 3-2**). These villages lie towards the western and eastern parts of the planning area. Whereas, the least populous villages fall into category-4 of the population distribution, having a population below 1,000 only.

Map 3-1: Population Distribution of Rudrapur MC (Ward-Wise)



Map 3-2: Population Distribution of Rudrapur Planning Area



3.2.5. Household Size

Household size is defined as the average number of persons per household. The household size has been calculated by dividing the total population by the number of households. The average household size of the planning area is 5.15, which is lower than the district's average of 5.3, while it is higher than the state average of 4.9. Moreover, the household size of the urban area is 5.16 while that of rural areas is 5.13 (refer to **Table 3-3**). Thus, the household size within the planning area is almost like the urban and rural areas.

Table 3-3: Household Size of Rudrapur Planning Area, 2011

	Total Population	Number of Households	Household Size
Urban Settlement	1,76,447	34,207	5.16
Rural Settlements	43,447	8,467	5.13
Planning Area	2,19,894	42,674	5.15

Source: Census of India, 2011

3.2.6. Sex Ratio

The sex ratio is the number of females per 1,000 males. The sex ratio of the Planning Area has been analyzed along with the urban and rural sex ratio separately for the census year 2011. Moreover, the child sex ratio has also been analyzed for the same. The sex ratio of the planning area is 901 females per 1,000 male population, which is lower than the district and state sex ratio of 920 and 963 respectively. Further, the sex ratio of the urban area is 897 females per 1,000 males which is lower than the planning area, while rural areas have a sex ratio of 919 females per 1,000 males is higher than the planning area.

Table 3-4: Sex Ratio of Rudrapur Planning Area, 2011

	Rudrapur Urban	Rudrapur Rural	Rudrapur Planning Area
Sex Ratio	897	919	901
Child Sex Ratio (0-6)	914	904	912

Source: Census of India, 2011

The male and female population, falling in the age group of 0-6 years, have been taken as a reference to calculate the child sex ratio (represented in **Table 3-4**). The child sex ratio of the Planning Area has also been analyzed along with the urban child sex ratio and rural child sex ratio separately. The child sex ratio of the planning area is 912 females per 1,000 male population, which is higher than the district and state child sex ratio of 899 and 890 respectively. Further, the child sex ratio of the urban area is 914, which is higher than the planning area, while the rural planning area has a child sex ratio of 904, which is lower than the whole planning area.

The above analysis represents that the number of females is quite less than the males because Rudrapur, being an industrial town, offers many job opportunities to the male population. The

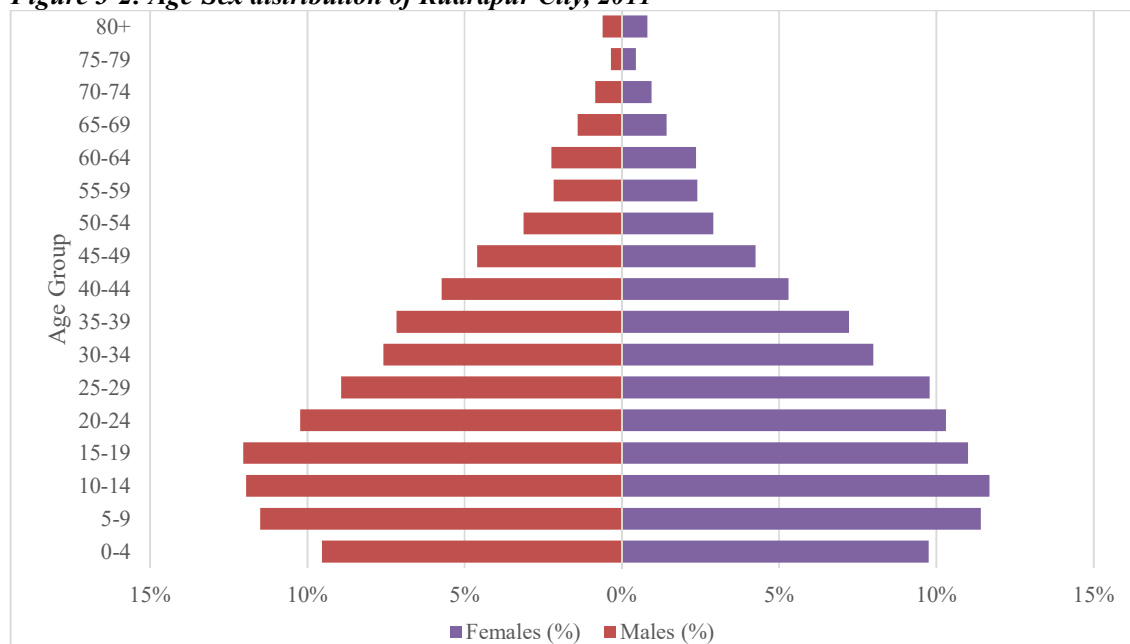
male population migrates to the city, especially from hilly areas in search of better employment opportunities leaving behind their family in their native places. This results in a variation in the number of males and females in the city. There is a need to incorporate certain alternative family setups so that the male population does not migrate only but instead come with their family. In addition, there is a need to ensure women empowerment, which could be done by providing equal employment opportunities to the female population.

Furthermore, the child sex ratio is seen well as compared to the overall sex ratio in the planning area. This represents that the future of the planning area will tend towards gender equality, which subsequently helps in the prosperity of that area from an economic as well as developmental perspective.

3.2.6.1. Age-Sex Pyramid

The age-sex pyramid also known as the population pyramid is classified based on age groups given by the census of India. These are the most important characteristics in demography to understand the population growth of a specific age group.

Figure 3-2: Age-Sex distribution of Rudrapur City, 2011



Source: Census of India, 2011.

Figure 3-2 represents both males and females in different age groups. In Rudrapur city, it is observed that the age group between 10-14 and 15-19 has a larger population which represents the young population dominating in the city. This epitomizes that the city, as well as the planning area, will see a younger population in the coming future, which subsequently helps in the prosperity of that area from an economic as well as developmental perspective.

3.2.7. Literacy Rate

The literacy rate of an area is the percentage of the number of literates of that age group to the total population of that age group. **Table 3-5** depicts the literacy rate of Rudrapur in comparison to the state literacy rate and district level rate. In addition, there is a comparison based on gender and areas (urban and rural). Ward-wise and Village-wise literates can be referred to in Error! Reference source not found.. At the Rudrapur Planning Area level, the literacy rate of Rudrapur is less than the state average by approximately 4-5% while it is more than the district average by 0.58% as per census 2011. The literacy rate is slightly higher in rural areas than in urban areas. It infers that the awareness of literacy is more prevalent in rural areas than the urban areas in the case of Rudrapur. Moreover, due to the sprawl of the city because of industrial development, the literate population tends to reside near their workplace, which comes under panchayat jurisdiction.

Table 3-5: Literacy Rate of Uttarakhand, Udham Singh Nagar, and Rudrapur

			Rudrapur			Udham Singh Nagar	Uttarakhand
			Urban	Rural	Planning Area		
2001	Total	Total Literates	47,786	24,136	71,922	659,165	5,105,782
		Literate (%)	53.89	54.70	54.16	53.34	60.14
	Male	Total Male	28,655	14,613	43,268	402,308	3,008,875
		Literate (%)	32.31	33.12	32.58	61.03	58.93
	Female	Total Female	19,131	9,523	28,654	256,857	2,096,907
		Literate (%)	21.57	21.58	21.58	38.97	41.07
2011	Total	Total Literates	111,838	27,847	139,685	1,037,839	6,880,953
		Literate (%)	63.38	64.09	63.52	62.94	68.22
	Male	Total Male	64,539	16,135	80,674	598,525	3,863,708
		Literate (%)	36.58	37.14	36.69	57.67	56.15
	Female	Total Female	47,299	11,712	59,011	439,314	3,017,245
		Literate (%)	26.81	26.96	26.84	42.33	43.85

Source: Census of India, 2001 & 2011

In comparison to the census 2001, the literacy rate has increased by 9-10% in both cases i.e., in urban areas as well as in rural areas. Based on gender, the literacy rate among males is quite high in Rudrapur in both urban as well as rural areas. The female literacy rate of Rudrapur is less than the state and district female literacy rates. It implies that awareness among females is quite less as compared to the males due to which the literacy rate is comparatively low among them (refer to **Table 3-5**).

The overall literacy rate of the Rudrapur Planning Area is quite well which would help to ensure that skilled and unskilled workers are easily available within the Planning Area. However, there is a need to take measures that would help to ensure that the female literacy

rate is at par with the male literacy rate, which could be done by ensuring better educational facilities.

3.2.8. Population Density

The population density is an important indicator of any developed or developing area. As per 2011 Census, the population density for the Rudrapur Planning Area is 1,427 persons per sqkm. which is almost double the district average i.e., 649 persons per km². It can be inferred from **Table 3-6** that the population density of the Planning Area from 2001 to 2011 has increased and almost doubled during this span. This is because of the industrial establishments after the formation of SIDCUL in the year 2002.

Talking about the population densities of urban and rural areas, the population density for Rudrapur urban decreased from 14,779 persons per sq. km. in 2001 to 4,683 persons per sqkm. to 2011 because of the inclusion of major villages in terms of area, which further decreased to 3,329 persons per sqkm. in 2019 with more addition of villages in the municipal corporation boundary. While the population density of rural areas within the Planning Area has increased from 2001 to 2011 due to industrial development in the vicinity of the MC boundary.

Table 3-6: Population Density of Rudrapur Planning Area for 2001, 2011 & 2019

		Rudrapur Urban	Rudrapur Rural	Rudrapur Planning Area
2001	Population	88,676	44,122	1,32,798
	Area (sq.km.)	6	147	153
	Population Density (persons / sq.km.)	14,779	300	867
2011	Population	1,54,554	65,340	2,19,894
	Area (sq.km.)	33	121	154
	Population Density (persons / sq.km.)	4,683	540	1427
2019	Population	1,76,447	43,447	2,19,894
	Area (sq.km.)	53	75	128
	Population Density (persons / sq.km.)	3,329	579	1,717

Source: Census of India, 2001 & 2011, M.C. Rudrapur

The ward boundaries have been changed in the year 2018 after the inclusion of the abutting villages of the MC boundary. Therefore, as per 2019 data, the new MC boundary of Rudrapur consists of 40 numbers of wards with a total area of 53 sqkm. having 176,447 people as per municipal record.

Table 3-7 shows the ward-wise population density for the Rudrapur Municipal Corporation area. A considerable variation has been found within different wards of the city. The highest density in Rudrapur M.C. is in ward-11 i.e., 832 persons/ha according to M.C. data for 2019.

Mostly the wards falling in the old core area are having high density. Against this, the lowest population density is 2-PPH in Ward No. 40 in 2019 due to the presence of industries.

The core area is highly dense and it goes on decreasing while moving from the core to peripheral areas. Looking at the population distribution pattern, it can be observed that the population is evenly distributed in all the wards ranging from 3,607 persons in ward 17 to 4,953 persons in ward 31. Moreover, the city has two wards whose population densities are above 500 PPH, i.e., Ward No. 11 (831 PPH) and Ward No. 34 (512 PPH). The high-density areas (wards) of the city includes the core part while the low-density area (wards) comprises all the peripheral areas located within the city.

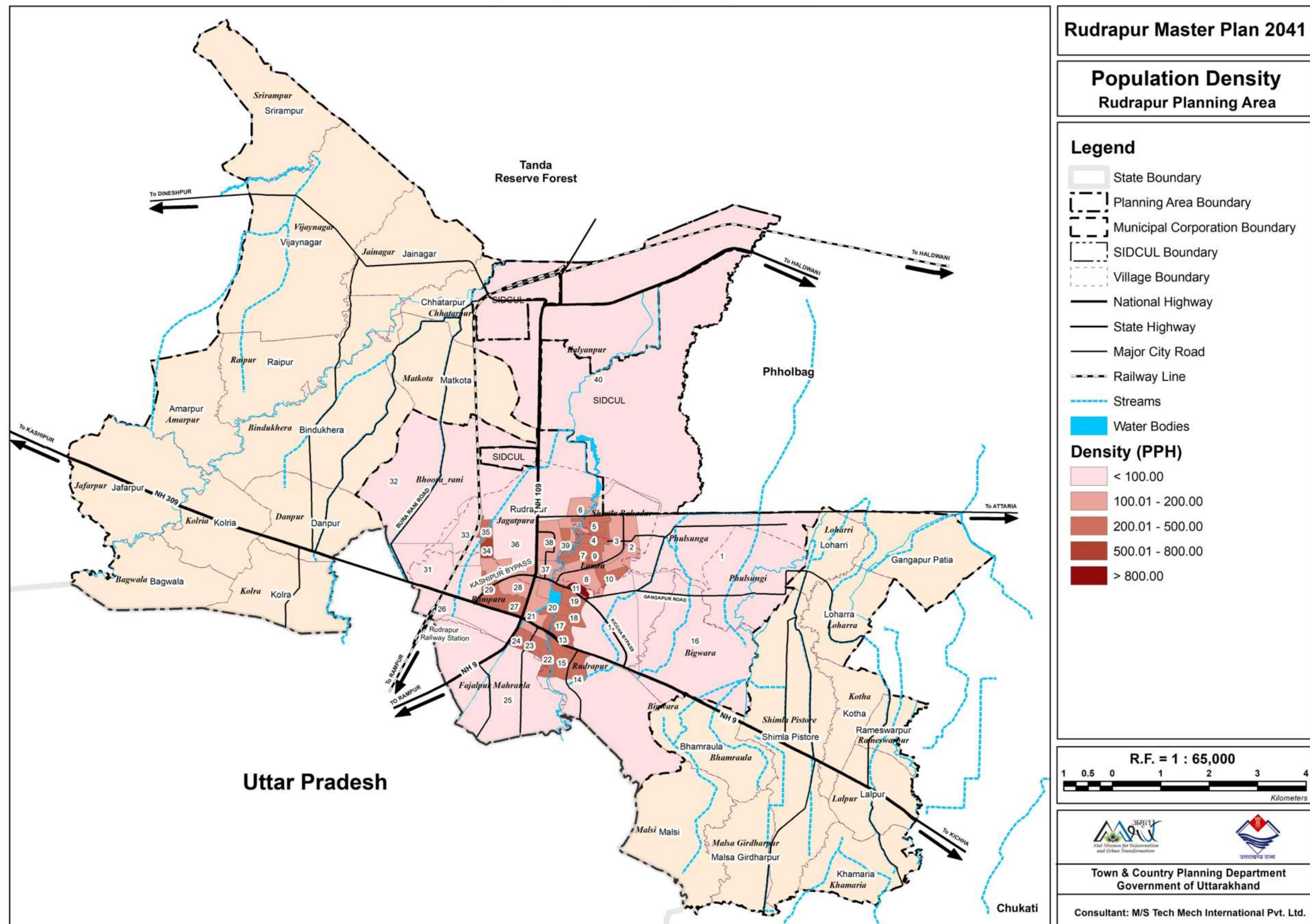
Table 3-7: Ward-wise Population Density of Rudrapur MC, 2019

Ward Number	Population	Area (Ha)	Population Density/Ha
1	4159	617.98	6.76 PPH
2	4335	31.91	136.40 PPH
3	3892	30.12	129.74 PPH
4	3986	16.82	237.89 PPH
5	4623	16.92	274.25 PPH
6	4369	32.02	136.97 PPH
7	4334	14.64	297.23 PPH
8	3801	34.53	110.51 PPH
9	4085	11.23	365.25 PPH
10	4331	13.64	318.80 PPH
11	4826	5.82	831.79 PPH
12	4782	169.48	28.33 PPH
13	4522	11.01	412.34 PPH
14	4348	18.30	238.50 PPH
15	4437	21.29	209.27 PPH
16	4275	736.41	5.83 PPH
17	3607	11.37	318.62 PPH
18	4151	12.57	331.45 PPH
19	4473	15.98	280.98 PPH
20	4483	20.24	222.36 PPH
21	4025	33.38	121.07 PPH
22	4175	20.71	202.38 PPH
23	4113	9.36	441.20 PPH
24	4124	8.67	477.36 PPH
25	4676	397.05	11.82 PPH

Ward Number	Population	Area (Ha)	Population Density/Ha
26	4862	96.42	50.62 PPH
27	4758	19.14	249.61 PPH
28	4349	25.85	168.92 PPH
29	4769	22.65	211.40 PPH
30	4307	26.96	160.40 PPH
31	4953	126.57	39.28 PPH
32	4197	381.69	11.04 PPH
33	4606	65.71	70.37 PPH
34	4309	8.44	512.38 PPH
35	4782	10.39	462.23 PPH
36	4682	76.36	61.55 PPH
37	4647	24.68	189.05 PPH
38	4611	33.90	136.55 PPH
39	4425	11.85	375.00 PPH
40	4535	2144.83	2.12 PPH

Source: Municipal Corporation, Rudrapur

Map 3-3: Population Density of Rudrapur Planning Area



The population density of Rudrapur has been classified into five categories as depicted in **Map 3-3**. It has been observed that 10 wards are having population density of less than 100 PPH and 9 wards are having population density in the range of 100-200 PPH. 6 wards fall in the maximum range i.e., above 400 PPH.

Ward number 11 is having the maximum population density of 831 PPH followed by ward number 34 with 512 PPH. Ward number 40 has the least population density i.e., 2 PPH which is due to the presence of SIDCUL in most of the area followed by ward number 16 due to agricultural area. Wards having higher population density are located along Kichha bypass road due to the expansion of the core area towards it and the new development coming abutting the road. In addition, wards having transit camp area has the highest population density. All the rural settlement outside the corporation area and within the planning area shares the least population density, which is below 100 PPH.

3.2.9. Families below Poverty Line

There are 829 families Below the Poverty Line in the Rudrapur Municipal Area, which accounts for 2.80% of the total families within the corporation area. In the case of Rudrapur rural areas, there are 7,387 families Below Poverty Line. The total number of families including both urban and rural comes out to be 8,216. Taking 5.08 as average family size, the total population below the poverty line comes out to be 41,737.

3.2.10. Vital Statistics

The birth and death rate of Rudrapur city in the year 2011 as per Municipal Corporation records has been represented in **Table 3-8**. It has been analyzed that the birth rate of females is slightly higher than that of males having a variation of 0.46%. However, the birth rate of Rudrapur is on the higher side and certain family planning measures need to be taken to ensure that the increase in the population remains in control. The death rate, on the other hand, is higher among males i.e., 4.43% as compared to 1.79% among females.

Table 3-8: Vital Statistics of Rudrapur MC

Sr. No.	Vital Statistics	Male	Female	Total
1	Birth Rate (%)	33.94	34.40	34.16
2	Death Rate (%)	4.43	1.79	3.18

Source: Municipal Corporation, Rudrapur

There is a variation of 2.64% between the two death rates i.e., male death rate and female death rate. It shows that males are more vulnerable as compared to females since the male population is more engaged as workers in the industries. It is attributed to the provision of

better medical facilities for the local people, which helps to ensure that people are healthy and not vulnerable to any sort of diseases for the overall development of the Planning Area.

3.2.11. Religious Composition

Hindi is the main spoken language in Uttarakhand although Garhwali and Kumauni (both Pahari languages), Punjabi, and Nepali are also spoken in the state. In Rudrapur, the major languages that are spoken are Hindi, Kumauni, Bengali & Punjabi. The religion in Rudrapur MC Area comprises Hindu, Muslims, Christians, Sikhs, Buddhist, Jain, Other religions & persuasions, and religion not stated. Almost 80% of the population comprises Hindus followed by Muslims with 15.76% and Sikhs with 3.17% composition. Other religions share a very minimal ratio that is below 1% only (refer to **Table 3-9**).

The religious community composition decided the number, location, and area under various religious places like Temples, Gurudwaras, Mosques, Churches, etc. For the spatial planning of an area, considerations should be given to their religious sentiments as well as to other respective religious communities for the inclusive planning of that area.

Table 3-9: Religious Composition of Rudrapur, 2011

Religion	Population	Percentage Distribution
Hindu	1,24,088	80.29%
Muslim	24,363	15.76%
Christian	666	0.43%
Sikh	4,893	3.17%
Buddhist	52	0.03%
Jain	185	0.12%
Other religions and persuasions	42	0.03%
Religion not stated	265	0.17%

Source: Census of India, 2011

3.2.12. Scheduled Caste (SC) and Scheduled Tribes (ST) Population

The SC and ST population of US Nagar and Rudrapur including urban and rural areas is depicted in **Table 3-10**. The percentage of SC population in rural areas is more than that of urban areas having a difference of 2.28%. In comparison to the district level, the overall percentage of SC population is higher. There is a variation of 2.56% between the district level and Rudrapur Planning Area of SC population. In the case of the ST population, the percentage is higher in the case of urban areas of Rudrapur as compared to the rural areas falling in the Planning Area. In comparison to the percentage of ST population at the district level, the percentage of ST population in Rudrapur is very less and accounts for 0.63% only.

Table 3-10: SC, ST, and General Population of US Nagar and Rudrapur Planning Area

Area	Total Population	General Population	General Population (%)	SC Population	SC Population (%)	ST Population	ST Population (%)
Rudrapur Planning Area							
Urban	1,76,447	1,45,868	82.67	29,225	16.56	1354	0.77
Rural	43,447	35,223	81.07	8,184	18.84	40	0.09
Total	2,19,894	1,81,091	82.35	37,409	17.01	1394	0.63
Udham Singh Nagar							
Total	16,48,902	12,87,601	78.09	2,38,264	14.45	123037	7.46

Source: Census of India, 2011.

Table 3-10 also represents the composition general population of the Rudrapur Planning Area which accounts for 82.35% of the total population. About 17.01% of the population in the Planning Area belongs to the SC category while the remaining 0.63% belongs to the ST category. Ward-wise and village-wise SC and ST population can be referred to Error! Reference source not found..

3.3. Key Issues & Potentials

The Planning Area is experiencing a positive transition phase after the establishment of SIDCUL. Urbanization has increased beyond its municipal limits after its Industrial development due to the establishment of the Integrated Industrial Estate, Pant Nagar of SIDCUL.

- The population density of Planning Area, as well as rural areas within Planning Area, has increased and almost doubled during 2001-2011 span. This is because of the industrial establishments after the formation of SIDCUL in the year 2002.
- With the formation of the SIDCUL industrial estate, more migration occurred in the rural areas. The district will have a younger population in the coming future, which will subsequently be added to the human resource demand.
- Wards that have transit camps and wards located along Kichha bypass road have higher population density due to the expansion of the core area towards these. The core area is highly dense (in wards 11 & 34) and it goes on to decrease while moving from core to peripheral areas (Ward No. 40 & 16) due to vast agricultural fields.
- All the rural settlement outside the corporation area and within the planning area shares the least population density which is below 100 PPH.
- Rudrapur Planning Area has a lower sex ratio, especially, in Rudrapur city. The number of females is quite less than the males because Rudrapur, being an industrial

town, offers good job opportunities to the male population. There is a need to incorporate certain alternative family setups so that the male population does not migrate only but instead come with their family.

- The age group between 10-14 and 15-19 has a larger population which represents the young population dominating the city. This epitomizes that the city, as well as the planning area, will see a younger population in the coming future, which subsequently helps in the prosperity of that area from an economic as well as developmental perspective.
- The literacy rate of the Rudrapur Planning Area is quite good which would help to ensure that skilled and unskilled workers are easily available within the Planning Area. There is a need to take measures that would help to ensure that the female literacy rate is at par with the male literacy rate which could be done by ensuring better educational facilities.

3.4. Population Projection

Projections are a set of calculations, which attempt to describe what is likely to happen under certain explicit assumptions about the future as related to the immediate past. Planners are concerned with population projections, which form the basic framework for setting targets expected to be achieved within a specified time frame, be it for land use, services, or facilities. Population projection is a method used to estimate the future population of an area based on various factors like previous growth trends, birth and death rate, floating population, immigration, etc. Population projection gives us a picture of the future size and structure of the population. Population projection is an imperative part of the Master plan as the entire future proposal is of various sectors i.e., housing, social infrastructure, physical infrastructure, etc., is dependent on the population projections.

The arithmetic method of population projection is suitable for large and old cities with considerable development, while the geometric mean method gives higher values and hence should be applied for a new industrial town at the beginning of development for only a few decades. The incremental method of population projections is suitable for an average size town under normal conditions where the growth rate is found to be in increasing order.

3.4.1. Methods for Population Projection

For estimation of population projection, 'Arithmetic Increase Method', 'Geometric Increase Method', and 'Incremental Increase Method' have been used for the Rudrapur Planning Area.

3.4.1.1. Arithmetic Method

In this method, the average increase in population per decade is calculated from the past decades. This increase is added to the present population to find out the population for the next decades. Thus, it is assumed that the population is increasing at a constant rate. This method is generally applicable to large and old cities where the growth has stabilized.

Hence, $dP/dt = C$ i.e., rate of change of population with respect to time is constant.

Therefore, Population after n^{th} decade will be $P_n = P + n.C$

Where, P_n is the population after 'n' decades and 'P' is present population

$n = 2031, 2041$

3.4.1.2. Geometric Increase Method

In this method, the percentage increase in population from decade to decade is assumed to remain constant. This method is used to find out the future increment in population. Since this method gives higher values and is hence mostly applicable for growing towns and cities having vast scope for expansion.

$$P_n = P (1 + IG/100)^n$$

Where, IG = geometric mean (%)

P = Present population

N = No. of decades

3.4.1.3. Incremental Increase Method

This method is the modification of the arithmetical increase method and it is suitable for an average size town under the normal condition where the growth rate is found to be in increasing order. While adopting this method the increase in increment is considered for calculating future population. The incremental increase is determined for each decade from the past decade's population and the average value is added to the present population along with the average rate of increase.

Hence, population after n^{th} decade is $P_n = P + n.X + \{n(n+1)/2\}.Y$

Where, P_n = Population after n^{th} decade

X = Average increase

Y = Incremental increase

n = 2031, 2041

3.4.2. Population Projection for Rudrapur Planning Area

Rudrapur Planning Area has witnessed an increase in population from 1.32 Lakhs to 2.20 Lakhs at a growth rate of 65.59%, which is higher than the district Udham Singh Nagar (33.45%), and the state of Uttarakhand (18.81%) in the year 2011. Rudrapur (2018) is highly urbanized with about 80% of its population living in urban areas.

3.4.2.1. Forward Population Projections

The conventional methods of the “Predict and Provide” approach for population projections use population data of the past decades to derive growth rates. These growth rates typically are the cumulative result of multiple factors including the influence of birth rates, death rates, in-migration, and out-migration due to economic trends, etc. Based on Census data from 1961 to 2011 the projected population is calculated. However, discussing the growth rate patterns of the Rudrapur Planning Area, the growth rate for the decade 1961-71 is 133% because of the relocation of refugees at Rudrapur during the partition of India and Pakistan in 1947. Since it is not a natural growth but an induced one, which cannot be used for population forecast. Thus, the population from 1971 to 2011 has been considered for the future projection.

Table 3-11 Forward Population Projection of Rudrapur Planning Area

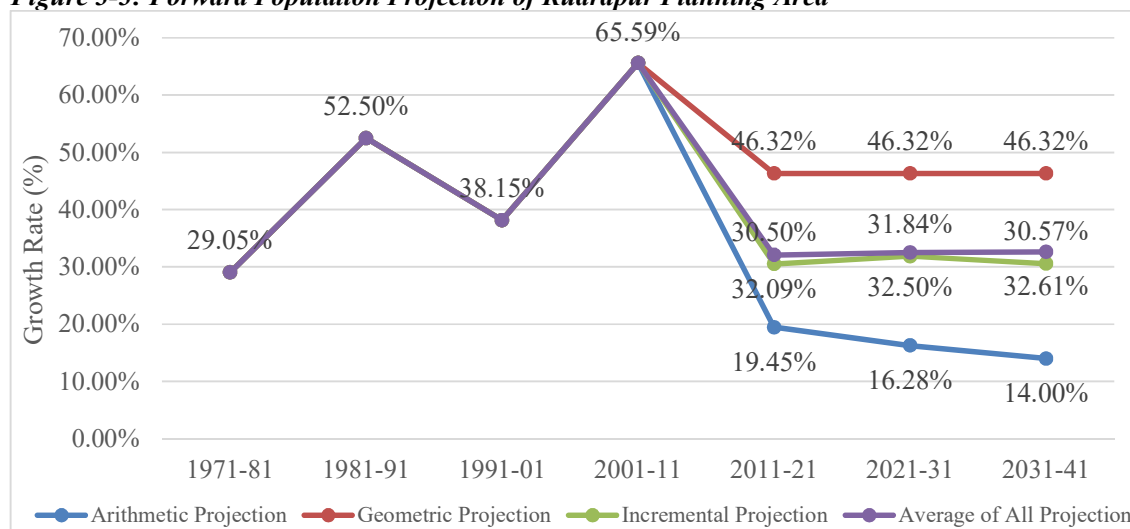
Year	Arithmetic Projection	Growth Rate	Geometric Projection	Growth Rate	Incremental Projection	Growth Rate	Average	Growth Rate
1971	48,843	-	48,843	-	48,843	-	48,843	-
1981	63,033	29.05%	63,033	29.05%	63,033	29.05%	63,033	29.05%
1991	96,127	52.50%	96,127	52.50%	96,127	52.50%	96,127	52.50%
2001	132,798	38.15%	132,798	38.15%	132,798	38.15%	132,798	38.15%
2011	219,894	65.59%	219,894	65.59%	219,894	65.59%	219,894	65.59%
2021	262,657	19.45%	321,754	46.32%	286,959	30.50%	290,456	32.09%
2031	305,420	16.28%	470,797	46.32%	378,326	31.84%	384,847	32.50%
2041	348,182	14.00%	688,881	46.32%	493,994	30.57%	510,352	32.61%

Source: Computed Values based upon Census of India, 1971, 1981, 1991, 2001, 2011.

In **Table 3-11**, growth rates of the population have been calculated for each method for each decade and have been represented in **Figure 3-3** for better understanding. The highest population growth rate i.e., 46.32% is achieved through the Geometric Increase Method, while, through Arithmetic Increase Method, a maximum of 19.45% growth rate is achieved which decreases to 14% in 2041. Whereas, through the Incremental Increase Method, the maximum growth rate of 31.84% is achieved. However, the average of all the three methods gives 32.6% growth rate which is maximum as compared to arithmetic and incremental methods.

The previous growth rates of the Rudrapur Planning Area are varying. It had the highest growth rate of 65.59% from 2001-2011, which was due to the establishment of SIDCUL in 2002. However, it cannot be expected that this huge growth will not continue in successive years. The average growth rates from 1981 to 2001 were 39.90% which is comparatively near to the projected growth rate of 46.32% in the Geometric Projection Method. Still, the projected growth rate of the Geometric Projection Method is on the higher side for the Rudrapur Planning Area. Considering the above facts, different approaches have been adopted for determining and arriving at the estimated future population for Rudrapur Planning Area.

Figure 3-3: Forward Population Projection of Rudrapur Planning Area



Source: Computed Values based upon Census of India, 1971, 1981, 1991, 2001, 2011.

3.4.2.2. Backward Population Projections

In general, all population projections are based on past data on the future population. They are called forward projections. However, in certain exceptional cases, projections are made about the past population (or current population) using available data which are known as

backward projections. Backward projections are made where population census has not been done or to check the correctness of past population data or to identify the best population projection method.

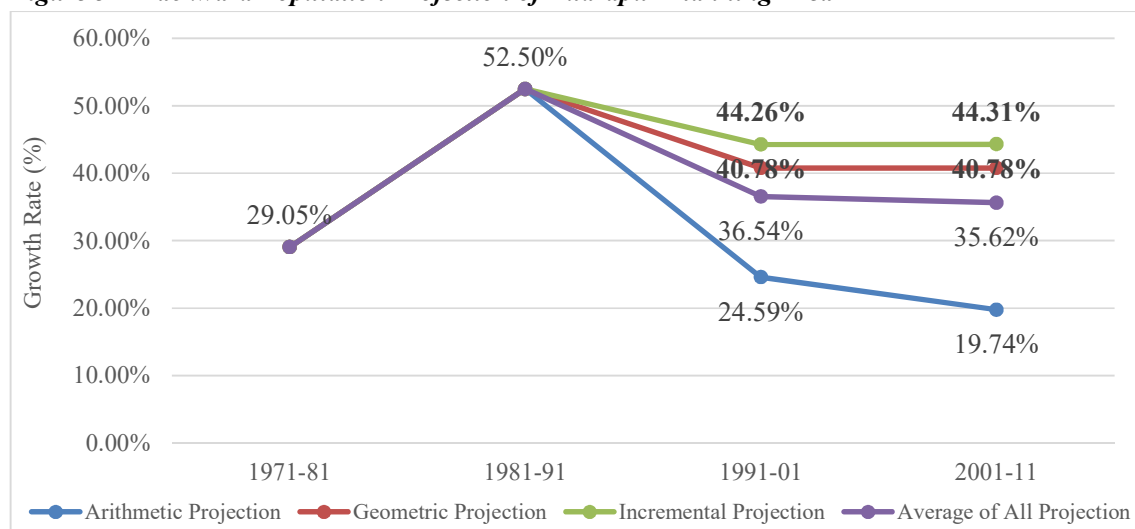
To do so, data from 1981 to 1991 was used to project the population of 2001 and 2011, and this projected population was compared with the current population. A suitable population project method was adopted by which the projected population comes close to the current population.

Table 3-12 Backward Population Projection of Rudrapur Planning Area

Year	Arithmetic Projection	Growth Rate	Geometric Projection	Growth Rate	Incremental Projection	Growth Rate	Average	Growth Rate
1971	48,843	-	48,843	-	48,843	-	48,843	-
1981	63,033	29.05%	63,033	29.05%	63,033	29.05%	63,033	29.05%
1991	96,127	52.50%	96,127	52.50%	96,127	52.50%	96,127	52.50%
2001	119,769	24.59%	135,325	40.78%	138,673	44.26%	131,256	36.54%
2011	143,411	19.74%	190,507	40.78%	200,123	44.31%	178,014	35.62%

Source: Computed Values based upon Census of India, 1971, 1981, 1991

Figure 3-4 Backward Population Projection of Rudrapur Planning Area



Source: Computed Values based upon Census of India, 1971, 1981, 1991

As per the comparison of backward projection with the current population, it is inferred that the projected growth rate of the 'Geometric Increase Method' (40.78%) is closer to the actual population growth rate in 2001 i.e., 38.15% growth rate. Whereas the projected growth rate of the 'Incremental Increase Method' (44.31%) is closer to the actual population growth rate in 2011, i.e., 65.59% growth rate. By connecting the backward projection with the forward projection, the suitable method of population projection is selected which is discussed under the next sub-heading (refer to **Table 3-12** and **Figure 3-4**).

3.4.2.3. Adopted Method to Forecast Population

Since the growth rate of 44% exists due to the establishment of SIDCUL, several employment seekers have already migrated to the Rudrapur Planning Area. It is assumed that further population will not grow at this growth rate. It implies that 46.32% of the population growth rate, obtained through the Geometric Increase Method would not work. Therefore, the growth rate of 41% is assumed most suitable and thus adopted for the population forecast of the Rudrapur Planning Area. (Refer to **Table 3-13**)

Using a 41% growth rate as depicted in **Figure 3-4**. The projected population for the year 2021 is 310,051, for 2031 is 437,171 and for 2041 is 616,411 respectively.

Table 3-13 Population Projection of Rudrapur Planning Area

Year	Projected Population	Assuming a Growth Rate of 41%	Total (Floating +Projected)
2011	219,894	90,157	-
2021	310,051	127,121	-
2031	437,171	179,240	-
2041	616,411	-	653,396

Rudrapur is an industrial dominant city many workers commute each day for employment purposes. For estimating the floating population, the current employment data for SIDCUL and the projected population of 2021 have been used. As the current year is 2021, the projected population for 2021 is assumed to be achieved.

Table 3-14 Calculations for Floating Population in the Rudrapur Planning Area

1.	Projected Population for the year 2021	310,051
2.	Assumption: 50% WFP for Industrial City Rudrapur*	155,025
3.	Norm: Participation of Industrial Workers to Total WF: 20%*	31,005
4.	Current Industrial Employment**	66,139
Floating Population (4 - 3)		35,134

According to the URDPFI Guidelines, about 33% of the total population can be considered as workforce, which is 75% in the case of an industrial city. Looking at Rudrapur's dominant industries, it is assumed that this participation rate shall reach 50%, thus comes about 155,025 workers. As per URDPFI Guidelines, the participation of industrial workers is 20% of the total workforce. Thus, there must be 31,005 industrial workers based on the projected population for 2021. However, there are 66,139 workers already engaged in SIDCUL (*refer to Error! Reference source not found. on page Error! Bookmark not defined.*). Thus, considering the available human resources in SIDCUL, it is assumed that the rest of the workers i.e., 35,134 must be commuting every day, which constitutes about 5.7% of the total projected population of 2041. Considering the floating population share in the round figure, it

is assumed 6% of the total population of 2041. Hence, the total projected population for the year 2021 is 328,654, for 2031 is 463,401, and for 2041 is 653,396 respectively.

4. Economic Profile

4.1. Introduction

Development is described in terms of the economic growth over a period in each spatial unit. The Chapter Deals with the assessment of the economic parameters like occupational structure analysis and sector-wise analysis of Rudrapur Planning Area by the distribution of workers in different economic sectors and the output from each sector in terms of productivity. This would give us a clear set of pictures of the current economic scenario in the notified planning area.

4.2. Occupational Structure

4.2.1. Work Participation Rate

The workforce participation rate increased by nearly 3.53% in the year 2011 in comparison to 2001. In 2011, the overall Work Force Participation Ratio (Ratio of total workers vs. total population) for Rudrapur Planning Area stands 34.19%, which is lower than the WFPR figure (38.39%) for the state. The workforce participation of RPA is also lower than the district figure. The total number of workers in the district is 5,91,458 which constitutes of 35.9% of total population. Out of the total workers, 76.21% are main while 23.79% are marginal workers in the district. Among the total workers, 83.43% are main while 17.57% are marginal workers in the Rudrapur Planning Area (refer **Table 4-1**). The percentage of main workers in urban areas has reduced in 2011 as compared to 2001 by 7.68%. However, percentage of main workers accounts for minimal variation i.e., 0.98% at the Planning Area level. Ward-wise & village-wise workforce composition can be referred in Error! Reference source not found..

Table 4-1: Workforce Participation

	Rudrapur (2001)			Rudrapur (2011)			District (2011)	State (2011)
	Urban	Rural	P.A.	Urban	Rural	P.A.		
Total Population	88,676	44,122	132,798	1,76,447	43,447	219,894	1648,902	10,086,292
Total Workers	25,936	14,782	40,718	59,025	16,155	75,180	591,458	3,872,275
Total Workers (% of Total Population)	29.25	33.50	30.66	33.45	37.18	34.19	35.87	38.39
Non-Workers	62,740	29,340	92,080	1,17,422	27,292	144,714	1057,444	6,214,017
Non-Workers (% of Total Population)	70.75	66.50	69.34	66.55	62.82	65.81	64.13	61.61
Main Workers	23,568	10,394	33,962	49,100	12,869	61,969	450,762	2,870,624
Main Workers (% of Total Workers)	90.87	70.32	83.41	83.19	79.66	82.43	76.21	74.13
Marginal Workers	2,368	4,388	6,756	9,925	3,286	13,211	140,696	1,001,651
Marginal Workers	09.13	29.68	16.59	16.81	20.34	17.57	23.79	25.87

	Rudrapur (2001)			Rudrapur (2011)			District (2011)	State (2011)
	Urban	Rural	P.A.	Urban	Rural	P.A.		
(% of Total Workers)								

Source: Census of India, 2001 & 2011.

4.2.2. Main and Marginal Workers

As per the Census of India, a person who has worked for a major part of the reference period (i.e., six months or more during the last year preceding the date of enumeration) in any economically productive activity is termed as 'Main worker'. As per Error! Reference source not found., the percentage of main workers in Rudrapur city is 83.19% and in the case of rural areas, the percentage of main workers is 79.66%, which is higher than district and state in 2011. In 2001, the percentage of main workers in Rudrapur city was 90.87% and in the case of rural areas, the percentage of main workers is 70.32%. In the case of the Planning Area, main workers contribute 82.43% of the total worker population, which is higher than district and state in 2011. While in 2001, it was 83.41% indicating a slight decline in 2011. It also indicates that the majority of the working population falls under the main worker category and there are employment opportunities in the area.

As per the Census of India, a person who worked for 3 months or less than six months of the reference period (i.e., in the last one year preceding the date of enumeration) in any economic activity is termed as 'Marginal worker'. The percentage of marginal workers in Rudrapur urban area is 16.81% and the percentage of marginal workers in rural areas is 20.34%, which is lower than the district and state in 2011. In the case of the Planning Area, the marginal workers contribute 17.57% to the total worker population, which is also lower than district and state (refer to Table 4-2). The percentage of marginal workers has increased in 2011 as compared to 2001. This implies that there are plenty of employment opportunities available for workers as the percentage of main workers to the total workers is quite high in the study area.

4.2.3. Gender-wise workforce Distribution

As per the census 2011, the gender-wise workforce distribution in Rudrapur urban area fluctuates much with that of district and state. In the case of main workers, males constitute 84.31% of the total main workers, which is much higher than that of the state, while females constitute only 15.69%. While considering marginal workers, males constitute 61.34% and females constitute only 38.66% of the total marginal working population which is less than that of district and state. The work opportunities for women are less than that of men in the case of Rudrapur. Another inference can also be made that, women are less willing to work

due to fewer opportunities to work or available opportunities are not suitable. (Refer to **Table 4-2**).

In comparison to the 2001 census, the percentage of male main workers has declined from 87.95% to 84.31% at the Planning Area level in 2011. Similarly, the percentage of male marginal workers has reduced from 59.92% to 61.34% in 2011. It implies that there were more suitable employment opportunities for males in 2001 as compared to 2011.

Table 4-2: Gender-wise Workforce Distribution of Rudrapur Planning Area

	Rudrapur (2001)			Rudrapur (2011)			District (2011)	Uttarakhand
	Urban	Rural	P.A.	Urban	Rural	P.A.		
Main Workers	23568	10394	33962	49100	12869	61969	450762	2870624
Male	20761	9109	29870	41917	10328	52245	373061	2070760
Male Main Workers (% of Main Workers)	88.09	87.64	87.95	85.37	80.25	84.31	82.76	72.14
Female	2807	1285	4092	7183	2541	9724	77701	799864
Female Main Workers (% of Main Workers)	11.91	12.36	12.05	14.63	19.75	15.69	17.24	27.86
Marginal Workers	2368	4388	6756	9925	3286	13211	140696	1001651
Male	1492	2556	4048	6191	1912	8103	71517	481161
Male Marginal Workers (% of Marginal Workers)	63.01	58.25	59.92	62.38	58.19	61.34	50.83	48.04
Female	876	1832	2708	3734	1374	5108	69179	520490
Female Marginal Workers (% of Marginal Workers)	36.99	41.75	40.08	37.62	41.81	38.66	49.17	51.96

Source: Census of India, 2001 & 2011.

4.2.4. Sector Distribution

The sector distribution has been noticed for the main workers of Rudrapur Planning Area as per Census 2011. In Rudrapur Planning Area, the maximum number of workers i.e., 75.72% are engaged in other works than agriculture and allied activities and household industries. In the case of rural areas of Rudrapur Planning Area, it has been observed that persons engaged in primary activities, (cultivators & agriculture) are 59.14%, which is higher than other workers.

Table 4-3: Classification of Main Workers of Rudrapur Planning Area

	2001			2011		
	Rudrapur Urban	Rudrapur Rural	Rudrapur P.A.	Rudrapur Urban	Rudrapur Rural	Rudrapur P.A.
Main Workers	23,568	10,394	33,962	49,100	12,869	61,969
Cultivators	209	3,367	3,576	963	2,840	3,803
(% of total Cultivators)	0.89	32.39	10.53	1.96	22.07	6.14
Agricultural Labourers	1,924	3,174	5,098	3,929	4,771	8,700
(% of total Agricultural Labourers)	8.16	30.54	15.01	8.00	37.07	14.04
HHI	372	247	619	2219	321	2540
(% of total HHI)	1.58	2.38	1.82	4.52	2.49	4.10
Others	21,063	3,606	24,669	41,989	4,937	46,926
(% of total others)	89.37	34.69	72.64	85.52	38.36	75.72

Source: Census of India, 2001 & 2011.

Almost 20% of workers are engaged in primary activities out of which maximum are present in rural areas. The remaining workers below 4.1% are working as household industry workers which is part of the secondary activity (refer to **Table 4-3**). From the data, it can be inferred that the economic base of Rudrapur is both industries and trade & commerce as nearly 80% of the workforce is engaged in these two activities. In 2001, main workers were mainly engaged in tertiary activities with almost 72.64%. In comparison to 2001, the percentage of main workers engaged in primary activities has reduced from 25.54% to 20.18% while the percentage of household industry and other workers have increased during the decade. It implies that workers are being employed in the secondary and tertiary sectors. (Refer to **Table 4-3**)

4.2.5. Dependency Ratio

Dependency ratio refers to the number of non-workers dependent on total workers. **Table 4-4** describes the total population, total workers, and non-workers. As per Census 2001, Rudrapur Urban (242) has a higher dependency ratio than Uttarakhand (171) and Udham Singh Nagar (215). In 2011, Rudrapur Urban has a higher dependency ratio than the state and district level. At the Planning Area level, the dependency ratio has reduced in 2011 to 192 from 226 in 2001.

Table 4-4: Dependency Ratio of Rudrapur Planning Area

		Rudrapur Urban	Rudrapur Rural	Rudrapur Planning Area	Uttarakhand	Udham Singh Nagar
Total Population	2001	88,676	44,122	1,32,798	84,89,349	12,35,614
	2011	1,76,447	43,447	2,19,894	1,00,86,292	16,48,902
Total Workers	2001	25,936	14,782	40,718	31,34,036	3,92,156
	2011	59,025	16,155	75,180	38,72,275	5,91,458

		Rudrapur Urban	Rudrapur Rural	Rudrapur Planning Area	Uttarakhand	Udham Singh Nagar
Non-Workers	2001	62,740	29,340	92,080	53,55,313	8,43,458
	2011	1,17,422	27,292	1,44,714	62,14,017	10,57,444
Dependency Ratio (per 100 workers)	2001	242	198	226	171	215
	2011	199	169	192	160	179

Source: Census of India, 2001 & 2011

The dependency ratio in rural areas is more than that of the state level in 2001 and 2011, while it is lower than the district in both cases (refer to **Table 4-4**). The lower dependency ratio in rural areas in the census years 2001 (198) and 2011 (169) implies that people in rural areas are engaged in gainful employment more than that in urban areas. In comparison to 2001, the dependency ratio has reduced considerably 2011 at all levels, which is a good approach. It implies that the employment opportunities have increased in the Planning Area and the whole district.

4.2.6. Household Income

Household income is an important factor for assessing the economic condition of the people. It has been observed that the per capita income of district Udham Singh Nagar was 119,936 in the year 2011-2012. The total households of Udham Singh Nagar are 3,08,581 and the total household income is Rs. 3,700 crores. The total household income of the Rudrapur Planning Area comes out to be 511 crores (Refer to **Table 4-5**).

Table 4-5: Household Income, 2011

Area	No. of Households	Per Capita Income	Household Income (in crores)
Udham Singh Nagar	3,08,581	1,19,936 (At Constant Price)	3,700
Rudrapur Urban	34,204		410
Rudrapur Rural	8,467		101
Rudrapur Planning Area	42,671		511

Source: Directorate of Economics & Statistics, Dept. of Planning, Uttarakhand

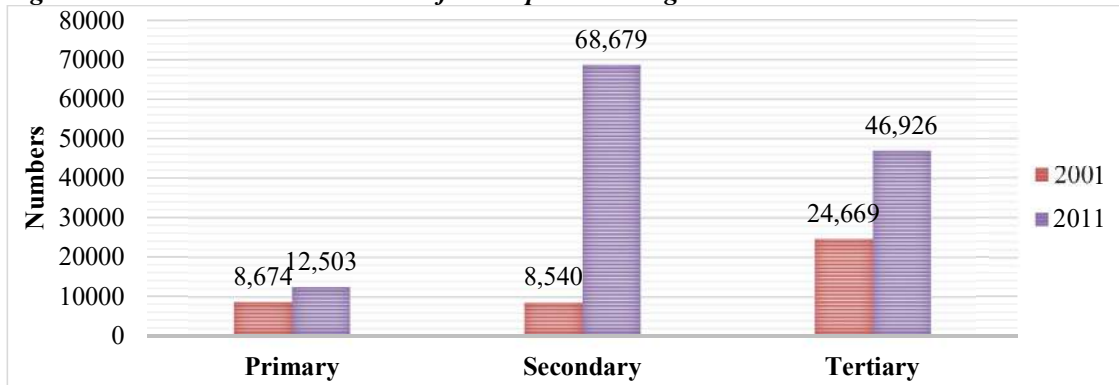
4.3. Sector Wise Analysis of Rudrapur Planning Area

Industrial development is the major driver in several identified economic drivers within the Rudrapur Planning Area. These activities have played a great role in both the Physical and Economic development of the city.

Besides this, several other activities such as shopping malls and multiplexes including Metropolis, Movie time, and Vishal Mega Mart have come up in the city, which is contributing to economic development. The Planning Area has good rail, road, and air connectivity thus boosting the trade activities in the area. The tourism industry is also flourishing gradually in the area due to the presence of certain religious and recreational sites. The increasing tourism industry is bound to give employment to many people in the future.

The Planning Area was primarily an agrarian and tertiary economy supported by the secondary sector before the formation of the state and district. Since the establishment of IIP-SIDCUL in 2002, the secondary sector has boomed in the area and workers have increased exponentially. Share of the secondary sector has increased from almost 20% to 53% from 2001 to 2011 in Rudrapur Planning Area. This increase was due to the industrial development in the area. While primary and tertiary sectors also show a considerable increase in the Planning Area (refer to **Figure 4-1**).

Figure 4-1: Sector-wise Distribution of Rudrapur Planning Area



Source: Census of India, 2001 & 2011.

4.4. Primary Sector

The primary sector takes the third share in the Udham Singh Nagar district. Out of the total GDDP share of Udham Singh Nagar, the primary sector shared 9.1% during 2017-18 FY. The share of the primary sector in GDDP has decreased over the period. During 2011-12, the share of the primary sector was 11.4%, which fell to 9.1% in the 2017-18 FY. This is clear from the statistic that people are shifting from the primary sector to other sectors for employment purposes. The secondary sector in Udham Singh Nagar is dominating because of the presence of the industrial estate of SIDCUL and DIC-U.S. Nagar.

The primary sector plays a key role in the master plan preparation. Udham Singh Nagar has an agro-based economy, which is now shifting towards the secondary sector. Therefore, it is crucial to understand the various type of agricultural produces in the district to restrict the land use for agricultural use, which are highly fertile. Udham Singh Nagar being agriculturally rich provides food grains to the planning area as well as the perishable needs of Rudrapur.

Crop cultivation is mainly undertaken in Kharif and Rabi seasons in the Planning Area. The crops grown in the Kharif season in the area include paddy, wheat, Barley, maize, groundnut, soybean, and turmeric and those grown in the Rabi season include paddy, wheat, Barley,

maize, groundnut, soybean, and turmeric. Overall, paddy is cultivated in both seasons and the major factor for the success of paddy cultivation is the availability of water and suitable soils. The highest productivity is of wheat, which constitutes 39.27 Qty/Hec. in the cereal crops. Further, the production of pulses in the district has a substantial share. The major pulses grown in the district are Urad, Pea, Lentil, gram, and Arhar with the highest share of Pea having productivity of 11.22 Qty/Hec. Cash crops are also grown in the area with the highest share of sugarcane. The total production of sugarcane is 1140478 metric tonnes having productivity of 652 Qty/Hec. as per the statistical data (2015-16) of the Directorate of Economics and Statistics, Uttarakhand.

Apart from main agriculture, the allied activities also play a major part in the economy of the region. Livestock production and agriculture are intrinsically linked; both are dependent on each other and crucial for overall food security. The livestock sector forms an important livelihood activity for most farmers, supporting agriculture in the form of critical inputs, contributing to the health and nutrition of the household, supplementing incomes, and offering employment opportunities. It acts as a supplementary and complementary enterprise. Therefore, for the agricultural demand as well as the daily needs of the people in the planning area, it is imperative to understand the actual availability of livestock in the region. Moreover, it also provides employment opportunities for the people.

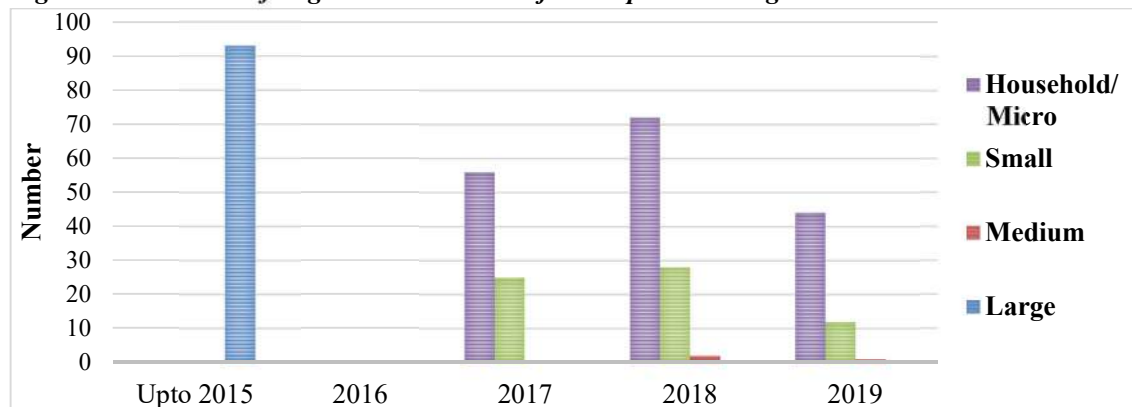
4.5. Secondary Sector

There are at present 333 industrial units that have been registered with District Industrial Corporation, Udham Singh Nagar that are located within the Rudrapur Planning Area. The industries have been classified into micro/household, small, medium, and largely based on the investment in plant machinery as per classification in the MSME policy of the Indian government. **(Figure 4-2)** represents the number of industries that have been registered in the Rudrapur Planning Area. It is analyzed from the data that after the year 2015, no large industrial unit is registered in the Planning Area. While in the year 2016, not even a single unit of any industrial category is registered in the study area. Most of the industries are registered under the category of micro/household but it is also worth noting that all the units under the micro/household category were registered in the last three years and before that no such industries were functioning in the Planning Area. The number of medium industries is very less as only 3 units have been registered to date. The increase in the number of industries can be attributed to the favorable government policies that have come up in the last few years

thus encouraging entrepreneurs to set up industrial units in the Planning Area. (Refer to Error! Reference source not found.)

There are certain industries whose address is missing in the data provided by the District Industrial Corporation of Udham Singh Nagar. The number of industries may vary after receiving the complete list of industries or filling in the required data.

Figure 4-2: Number of Registered Industries of Rudrapur Planning Area



Source: District Industrial Corporation, Udham Singh Nagar

Major commodities that are manufactured in the industrial area include automobiles, metal works, Automobile Parts, Machinery, Agriculture Implements, Confectionary, etc. Certain other types of goods are also manufactured in the Planning Area. In the case of exports, major goods that are being exported include Automobiles, Decorative and Industrial laminates, Automobile parts, etc. In the case of imports, raw material required for these industries is being imported to function in these industrial units, which mainly include iron, steel, and rubber.

Table 4-6: Industrial Classification and Number of Workers

Sr. No:	Type of Industries	No. of Units	No. of Workers	Average Workers per Unit
1	Large	93	22,635	243
2	Medium	3	71	24
3	Small	65	1,031	16
4	Household	172	297	2
Total		333	24,034	-

Source: District Industrial Corporation, US Nagar

The total number of industries falling in each category of industries that have been registered till June 2019 have been depicted in **Table 4-6**. the Maximum number of industries falls in the Household or Micro Industries category while Large Industries are 93 in number. The least number of industries are present in Medium Category having only 3 in number. The table also depicts the workforce employed by these units in which the maximum workforce is employed in the case of large industries i.e., 22,635 which is 94.17% of the total employed followed by small industries which employ 1,031 workers. Large industries are employing

the maximum number of workers per unit followed by medium, small, and households in the same sequence.

4.5.1. Industrial Estates

There is one industrial estate setup in Rudrapur Planning Area by the Department of Industrial Corporation under State Govt. Policy to facilitate industrial development in the city with potential for industrialization. The industrial estate, commonly known as SIDCUL, is in Pantnagar on the Nainital road having 528 industrial units. The total area of this estate is 10.64 sq. km in which 65 plots are present which are being used by multiple industries and even bifurcated further to distinguish its use (refer to **Figure 4-3** & **Figure 4-4**).



Figure 4-3: SIDCUL Industrial Estate



Figure 4-4: Industrial Units in SIDCUL

The major industries include automobiles, automobile parts, confectionary items, and decorative and industrial laminates. This estate is employing 66,139 workers, which belong to various cities or towns or even have come from different states to get jobs. The estate is very well planned with the incorporation of all the basic facilities.

4.5.2. Other Industries

Apart from the industrial estate, there are other industries, which are present in the Planning Area of Rudrapur. The total number of remaining industries as per District Industrial Corporation is 243 that are scattered in the Rudrapur Planning Area. These industries are mainly located along the major roads that include Kichha Road, Rampur Road, Nainital Road, and Kashipur Road. Railway and road connectivity provides a good opportunity to the industries for export and import of products. These are scattered along the major roads as discussed above causing certain inconvenience to the people as these industries in some instances are surrounded by residential or public/semi-public areas.

4.6. Tertiary Sector

The tertiary sector covers a wide range of activities from commerce to administration, transport, financial and real estate activities, business and personal services, education, health, and social work. Two major activities are contributing to economic development in the Rudrapur Planning Area. It includes administrative activities and trade and commerce activities. Apart from this tourism is also one sector, which has a substantial contribution to the economy. The majority of the tourism potential destination is at a regional scale i.e., at the district level.

4.6.1. Administration

Rudrapur being a district headquarter houses many government offices due to which various people are coming to the city. These offices are employing a lot of people thus contributing to the economy of the city. Some of the present offices are District Collectorate, District Urban Development Authority, District Tourism Office, District Agriculture Office, District Horticulture Department, etc.

4.6.2. Trade and Commerce

The main market of Rudrapur is in the city center along Kashipur bypass road. There are specialized zones for each activity in the market. For example, the circular roads along Gurudwara accommodate service industries (refer to **Figure 4-5 & Figure 4-6**). In addition, there are certain streets where only one kind of product is being sold. There is also a specialized vegetable and grain market present in this area.



Figure 4-5: Service Industry, near Gurudwara, Main Market



Figure 4-6: Service Industry, Gol market, Main Market

4.6.2.1. Mandis

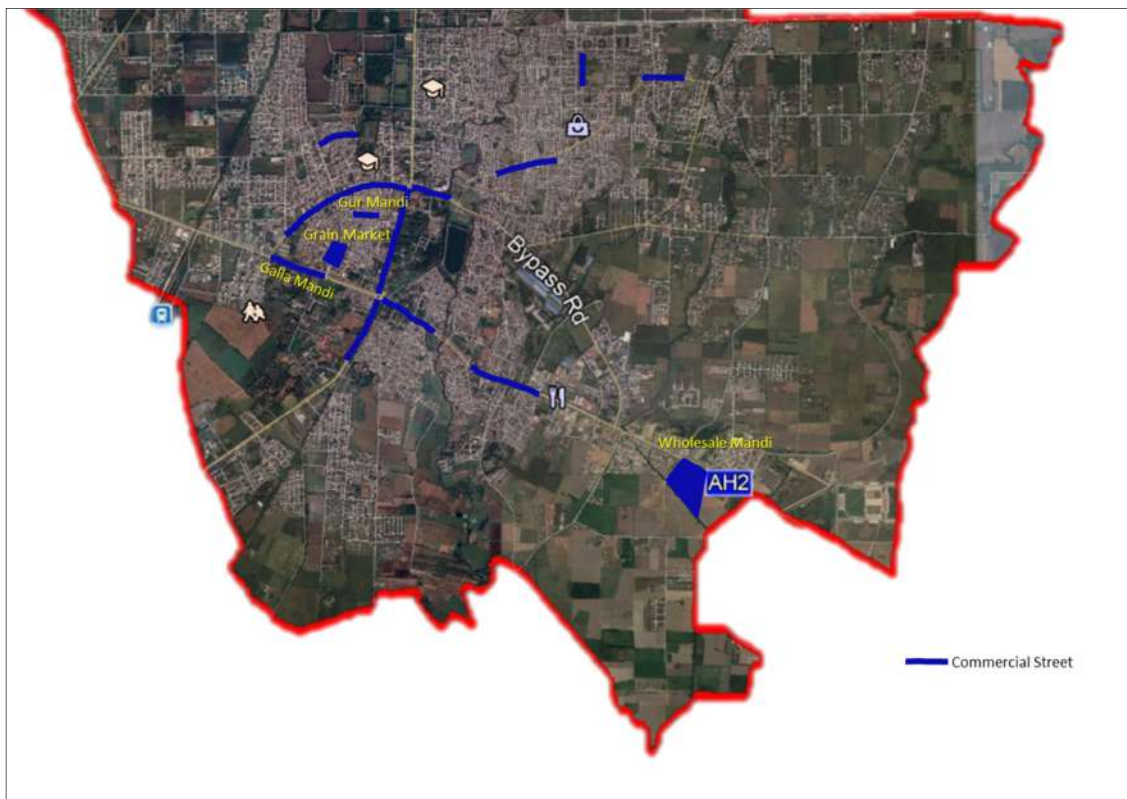
There is one mandi in the Planning Area of Rudrapur located at Kichha road, which is in the form of a rectangle spread over an area of 14 acres. This market is doing export and imports fruits and vegetables to different parts of the state and country as well. The mandi is

wholesale as the import and export are done in wholesale quantity. The facilities present in the Mandi include the following:

1. Administrative Office	6. OHR
2. Check Post	7. Canteen
3. Bank Bhavan	8. Mechanical Handling Unit
4. Toilet Blocks	9. Shops
5. Auctioning Space	10. Residential Area for Staff

A new land terminal market has been proposed on Nainital road near Omaxe city society, which covers an area of 50 acres. This land is lying vacant in the present scenario. The most important agricultural commodities coming to mandi are Green Peas, Wheat, Paddy, and Potato. Various other agricultural products are also imported and exported in the mandi but in lesser quantity than the above mentioned.

Map 4-1: Commercial Areas in Rudrapur



4.1.1.1. Grain Market

This market is located along the Galla mandi road, which is present close to the main market. This deals in the retail business of grains, pulses, red chilies, etc. The vegetable market is present on a road diverging from Haldwani road near the Nagar Nigam office.

The area under the Vegetable market is not sufficient and is further choked by Rehris, handcarts, and heavy vehicles in the mandi area (refer to **Map 4-1**).

4.1.1.2. Informal Sector

As per data received from the Municipal Corporation Rudrapur, there are 13-identified informal markets in Rudrapur city. These are located along the following stretch/area:

- From Indira Chowk towards Rampur Road
- Indira Chowk to Deen Dayal Chowk at Kashipur Road
- Indira Chowk to Teen Pani along Kichha Road
- Deen Dayal Chowk to Teen Pani along Kichha Bypass Road
- Deen Dayal Chowk to Indian Agency along Kashipur Bypass Road
- Galla Mandi
- Indira Colony near Balaji Gate
- Khera Colony, Ward Number-6
- Gur Mandi
- Transit Camp Main Road (near Chamunda Temple and Govind Temple)
- Near Junior High School, Transit Camp
- Near Bata Chowk (weekly market on Monday)

The informal sector does not have organized space due to which they are causing problems like encroachment, traffic congestion, littering of waste, etc. Hence, there is a need to provide certain organized spaces with basic amenities for this sector (refer **Figure 4-7 & Figure 4-8**).



Figure 4-7: Informal Market, Main Market, Rudrapur



Figure 4-8: Informal Market, Rudrapur-Haldwani Road

4.1.2. Support to Urban Street Vendors under NULM

Street vendors constitute an important segment at the bottom of the pyramid of the informal economy in cities. Street vending provides a source of self-employment and acts as a measure of urban poverty alleviation. Street vending is, therefore, an integral part of the economic

growth process in urban areas. Under the Street vendor component of the National Urban Livelihood Mission (NULM), it has the following objectives, which will address the vulnerabilities of the urban street vendors through a multi-pronged approach. This includes:

- Survey of street vendors and the issue of Identity Cards
- Development of city street vending plans
- Infrastructure development of vending zones in the city
- Training and Skill Development
- Financial Inclusion
- Access to credit
- Linkages to social security schemes

In the context of Rudrapur, 3,566 street vendors have been identified as per the municipal corporation data in 2020 and the identity cards have been disbursed to all the vendors under NULM. Further, there are seven vending zones identified by Rudrapur Municipal Corporation that will be constructed and 960 identified vendors will be deployed in these vending zones across the city to avoid congestion on the streets. The largest area for vending zones will be in Indra Nagar, Moti Maidan, and Atariya Road with maximum vendor capacity (refer to **Table 4-7**).

Table 4-7: Identified Vending Zones in Rudrapur Municipal Corporation

Location	Area (m ²)	Total vendors stationed
Beside the wall of 31 P.A.C in Indra colony Gali No. 1	2,300	154
In front of F.C.I Godown besides labor stand in Moti Maidan land	2,981.25	154
Tin shed land in Galla Mandi	943	152
	564	60
Besides junior J.P.S school land	528	52
Land besides drainage constructed under AMRUT on Nainital road	500	40
Northern portion of Atariya Devi road beside police boundary	2,370	147
In Galla Mandi parallel to dilapidated secretary office	1,321	86
	1,527	115
Grand Total		960

Source: Municipal Corporation, Rudrapur

Furthermore, due to the pandemic situation in 2020, the government of India has launched a different scheme “PM SVANidhi” for street vendors. Due to the decline in the economy and the poor condition of the EWS group, this scheme will come out to be a boon for the marginalized section of society. This scheme will work on the identified vendors in the previous street vending scheme and an allotment of subsidy will be offered.

In Rudrapur, under PM SVANidhi 514 applications have been received out of which 94 are from the marketplace. Out of the total applications, 183 have been sanctioned and 125 of them have been issued LOR. This scheme has benefited the people and it will in the future.

It is imperative to know the existing vending zones while preparing for the master plan so that it can be channelized with the existing demand of the city. Moreover, vending zones along the major roads, which are being saturated due to traffic congestion, shall be relocated to the identified zones under the street vending NULM mission.

4.2. Key Issues & Potentials

The Rudrapur Planning Area has a population of 176,447 that is spread across a delineated area of 127.38 sqkm. Due to the locational significance, having located along national highways, the planning area has a high potential to develop in the future in terms of employment providers. The Planning Area is the hub of administrative, industrial, and trade & commerce sectors for its population as well as for the region. Thus, it will act as one of the major urban centers in the Kumaon division soon.

It has been analyzed that the economy of Rudrapur is mainly dependent on the secondary sector as it has a constant share in the economy of the Planning Area. The employment opportunities are also maximum in this sector followed by the tertiary sector. The Planning Area is experiencing a positive transition phase after the establishment of SIDCUL. This has immense opportunity in becoming employment and facility provider in the state. The number of industries is increasing over the period. The per capita income is also increasing over the period. The household income of the Planning Area has also been worked out at three different levels. Identified key issues are –

- 1) Some Industrial units along major roads are developed without proper policies/strategies and are incompatible with their respective uses.
- 2) There is a need to boost the small and medium industries in the Planning Area as the majority of the industries are either micro or large.
- 3) The industries present outside the industrial estate are scattered and no consideration is given to accessibility or approach to these units.
- 4) There is the absence of adequate loading and unloading facilities in the industries and parking space is limited in some cases.
- 5) No organized space is available for the informal sector of the city. So that they do not create a problem but rather help in the economic generation of the city.

- 6) There is a lack of space in the vegetable market and repairs and handcarts further choke it.

4.3. Workforce Projections

Workforce analytics involves using models that integrate internal and external data to predict future workforce and help organizations in any industry examine factors that have a prognostic effect. The models are decomposed into three modes: supply-based, demand-based, and need-based, which in some cases provide substantially different estimates of future workforce needs. One of the principal reasons to use workforce-forecasting models is to identify the potential gap between the present workforce and future requirements to predict training and recruitment needs. Focusing on the most frequently used modeling approaches, the qualitative model and time series model have been adopted which are based upon historical data. Further, optimization models fix the workforce projection. Optimization, which is concerned with minimizing and maximizing an objective function, usually subject to various constraints, has been widely used in workforce modeling.

As discussed in the preceding points of this chapter, the probable occupational structure for the horizon years is used as a policy measure to alleviate the economic problems of the region. The estimate of prospective workforce structure has been based on certain assumptions and the explanation of underlying assumptions is necessary to ensure the realization of the objectives of the Master Plan in totality.

The past trends of the workforce show that the participation rate was 30.66% and 34.19% in the years 2001 and 2011 respectively. The workforce Based upon the standards mentioned in the URDPFI Guidelines, it is assumed that the workforce participation rate will almost remain the same as it was in 2001 and 2011 with an average of 33% workforce participation rate in the case of Rudrapur Planning Area as a whole¹.

4.3.1. Projected Workforce

The proposed workforce participation ratio (WFPR) for the horizon of 2041 is estimated at 33%. Workers for the horizon year have been projected based on some assumptions like, it is expected that few of the proposals in the master plan will be implemented by then, also, the share of workers engaged in the primary sector will get reduced in the coming years and for the service sectors, the numbers will increase (refer to **Table 4-8**).

¹ As given in the URDPFI Guidelines, the workforce participation of Rudrapur Planning Area for the year 2041 works out to be 33% of total projected population of Rudrapur Planning Area.

Table 4-8: Workforce Forecast for the year 2041

Projected Population for the year 2041 (including Floating Population)	653,396
Workforce Participation for Small Town (at 33% of the total population) *	172,497

*Standards given in URDPFI Guidelines

These population projections are based on the following assumptions:

- The strong economic base of SIDCUL outside the Planning Area has started attracting industries and other builders for investment in real estate, which is likely to invite more people.
- Economic corridors shall be extended from Delhi to Moradabad, which will enhance the present employment opportunities and hence make the stronger economic base of the city.

The workforce projections for industrial workers' classification have been made for Rudrapur Planning Area based on the category-wise employment data available for it from the census 2011. To estimate category-wise employment for the year 2041, it has been assumed that the employment pattern of the Rudrapur Planning Area will be almost the same as observed in 2011 with a slight downward trend in the primary sector. The category-wise employment data for 2011 and employment forecast for Rudrapur Planning Area up to the year 2041 are given in the following sub-points.

4.3.1.1. Primary Sector

As per the past trend, the share of the workforce engaged in the primary sector has declined drastically from 20.71% in 2001 to 9.76% in 2011. The basic assumption for the projection of WFPR in the planning area is that the primary workers will decrease in absolute number during the plan period (refer to **Table 4-9**).

Table 4-9: Proposed Workforce Engaged in Primary Sector for the year 2041

1.	Total Planning Area	12,738 Ha
2.	Projected Population for the year 2041 (Excluding Floating Population)	616,411
3.	Adopted Town Density (100-150 PPH) *	125
4.	Required Developable Area = (2 / 3)	4,931.29 Ha
5.	Existing Developed Area	3,833.30 Ha
6.	Additional Land Required = (4 – 5)	1,097.99 Ha
7.	Available Vacant Land (Calculated from Existing Land Use Analysis)	1,010.14 Ha
8.	Available Agriculture Land (Calculated from Existing Land Use Analysis)	7,943.88 Ha
9.	Loss of Agriculture Land = (6 – 7)	87.85 Ha
10.	Pending Agriculture Land = (8 – 9)	7,856.03 Ha
11.	Existing Primary Sector Workers (Census 2011)	12,503
12.	Existing Dependency Ratio (in workers / ha) = (8 / 11)	0.64
13.	Assumed Dependency Ratio (in workers / ha)	0.64
	Forecast of Primary Sector Workers for the year 2041 = (10 x 13)	4,991

*Standards given in URDPFI Guidelines

4.3.1.2. Secondary Sector

Undoubtedly, the industrial sector must play a major role if employability is to be increased. For an industrial city like Rudrapur, the URDPFI Guidelines suggests a share of fifty percent of industrial workers in the total workforce (refer to **Table 4-10**).

Table 4-10: Proposed Workforce Engaged in Secondary Sector for the year 2041

Computed Workforce Participation	172,497
Industrial Workforce (at 50% of the total workforce)*	86,248

**Standards given in URDPFI Guidelines*

The secondary sector is proposed to provide the platform for the economic development of the region shifting the dependence from marginal jobs in the tertiary sector to substantial jobs in the secondary sector. The city is already the focus of industrial development.

4.3.1.3. Tertiary Sector

The tertiary sector, which is the predominant feature of all district headquarters, will continue to play an important role in the economy of Rudrapur city. The tertiary sector will continue to play an important role in the local and regional economy of Rudrapur primarily because of its insignificant industrial base and unemployment presently existing in the region. By forecast, employment in the tertiary sector would add as many as 34,331 new jobs during the next three decades (from the base year of 2011).

4.3.2. Comparison of Sector-wise Workforce Distribution

Correction to the basic economic structure has become inevitable and must be supplemented by proper infrastructure to streamline its economy during the plan period of twenty years. It has been observed from the sectoral composition that the employment opportunities in the secondary are limited. However, given the land availability and better connectivity, the city could explore the development of industrial corridors. This would affect the future employer's composition. The agriculture practice would be limited in the city jurisdictions. Overall, in the long run, the secondary sector remains the major contributor followed by the service sector and primary sector.

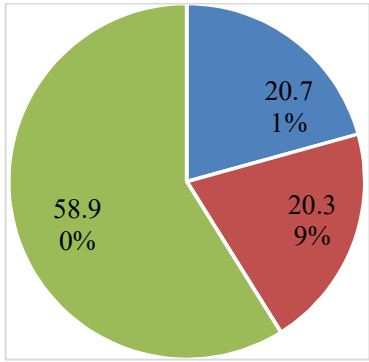


Figure 4-9: Sector-wise Distribution of Rudrapur Planning Area, Census 2001

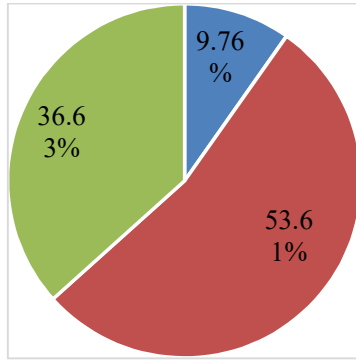


Figure 4-10: Sector-wise Distribution of Rudrapur Planning Area, Census 2011

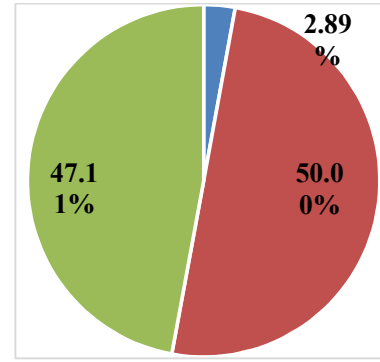


Figure 4-11: Sector-wise Distribution of Rudrapur Planning Area, Projected-2041

The Master Plan proposes a static increase in the workforce of the tertiary sector. It could be seen from the table that in 2041, the percentage of workers in the primary sector will be reduced to 2.89%, while the tertiary sector will share near to half of the total workforce. To restructure the sectoral workforce, the tertiary sector is proportionately increased from 36.63% to 47.11% i.e., about 10% increase in the next thirty years (based on 2011 census data). These jobs will be created in sectors like Retail and Wholesale Trade, Warehousing Storage, Transport and Communications, Commerce, Services, and allied activities including the informal sector.

The share of the secondary sector has increased from almost 20.39% to 53.61% from 2001 to 2011 in Rudrapur Planning Area. However, the establishment of industries has come up at saturation level. Thus, the secondary sector is expected to maintain saturation to 50% of the total workforce. With time, the share of the secondary sector will remain the same i.e., from 53.61% in 2011 to 50.00% by 2041, which will add up to another 17,569 new industrial jobs in the area (refer to **Figure 4-9**, **Figure 4-10** and **Figure 4-11**).

4.3.3. Commercial Demand

Commercial activity within cities includes the buying and selling of goods and services in retail businesses, wholesale buying and selling, financial establishments, and a wide variety of uses that are broadly classified as “businesses”. While commercial activities typically take up a relatively small amount of land, they are extremely important to a community's economy. They provide employment, facilitate the circulation of money, and often serve many other roles important to the community.

Commercial demand for Rudrapur Planning Area has been calculated under this section. The commercial area calculation based on URDPFI guidelines has been presented in **Table 4-11**. The URDPFI Guidelines suggest the area required per 1,000 persons and the number of shops

required for the population. Based on the calculation the total area under commercial comes to be 124.15 Ha with 14,652 numbers of shops. As highlighted in the URDPFI Guidelines, small and medium towns should emphasize the weekly markets to promote the local economic activities. In addition, emphasize Mandis and wholesale markets in the regional planning. Integration of the rural, small, and medium towns to be developed through the provision of adequate Mandis.

Table 4-11: Area Calculation for Commercial Centres – URDPFI Guidelines

S. N.	Category of Commercial Centres	Area per 1,000 persons (m ²)	No. of Shops (1 shop for the below-mentioned persons)	Area required for 2041 (m ²)	Area required for 2041 (Ha)	Required Number of Shops
				653,396		
1	Convenience Shopping	220	110	143,747.12	14.37	5,940
2	Local Shopping including Service Centre	300	200	196,018.80	19.60	3,267
3	Community Centre with Service Centre	500	200	326,698.00	32.67	3,267
4	District Centre	880	300	574,988.48	57.50	2,178
Grand Total					124.15	14,652

Apart from commercial centers and convenience shops space has also been considered for Urban Street Vendors. Street vendors form a very important segment of the unorganized sector in the country and it is estimated that in several cities, street vendors account for about 2% of the population. Master/ Zonal/ Local/ Layout development plans to be ‘inclusive’ and address the requirements of space for street vending through the reservation of space. With the growth of cities/ towns in response to urbanization, the statutory plans of every new area should have adequate provision for Vending / Hawking zones and ‘Vendor Markets’.

URDPFI Guidelines also suggest an average area of land for commercial area based on population. According to URDPFI, the average land requirements for commercial activities work out to be **0.4 ha per 1,000 persons** in a range of 0.2 to 0.6 Ha/ 1,000 persons depending on the location of these large cities concerning metropolitan which comes to be about 261.36 Ha for Rudrapur Planning Area.

The city’s main economy is industry, the need for warehousing is evident in the city as the existing residential land uses are being converted to godowns. The area requirements of warehousing have been calculated based on the land use break-up of the Integrated Freight Complex as given in URDPFI guidelines. It states that 10% of land should be reserved for warehousing. Hence, 10% of SIDCUL land has been proposed for warehousing for Rudrapur Planning Area. The total area under SIDCUL is 978 ha and the proposed land for

warehousing is 98.24 Ha. which is 10.04% of the total SIDCUL area and 41.26% of the total commercial area (refer to Error! Reference source not found.).

4.3.4. Industrial Demand

All the Industrial units and Industrial estates fall under this category. Rudrapur is known as an industrial town of Udham Singh Nagar. Rudrapur has SIDCUL with various multiple industries, along with residential facilities within the land. Due to SIDCUL, many other industrial facilities have been coming up haphazardly in the planning area.

The Industrial area demand calculation has been presented in **Table 4-12**. The base population of the Rudrapur Planning Area is 616,411. The workforce participation of Rudrapur Planning Area has been decided as 50% as it is an Industrial Town. Therefore, the total workers of Rudrapur Planning Area come to be 343,340. From the total workforce participation, 53% of workers are considered to be involved in industries as the existing workforce in the secondary sector is 53%. The total workers in Industries are 181,970. According to URDPFI, the Industrial worker density has been considered as 125 PPH. Based on this the area needed for Industry is 1,456 Ha.

Table 4-12: Industrial Area Demand

2041 Population	6,16,411
No of the workers considering 50% workforce participation + Floating Population	3,43,340
Total no. of workers in Industry (53%)	1,81,970
Industrial worker density (PPH)	125
Industrial Area (Ha)	1,456

The existing total land under SIDCUL is 978 ha and other industries are 424.64 ha. In total 1,402.64 ha. Hence, the existing land under industries is slightly less than existing. However, few parcels of land are still vacant inside SIDCUL.

5. Preparation of Base Map & Existing Land Use Map

5.1. Introduction

The Land use of an area deals with the various socio-economic activities occurring in a particular area/land. It is one of the most important aspects of a Master Plan as it helps study the spatial development pattern. The chapter will feature the pattern of development of the Rudrapur Planning Area through the study of various land use categories such as residential, commercial, public semi-public, recreational, religious, etc. and the type of structure occupying the specific area/land.

5.2. Need for Preparation of Base Map/ Existing Land Use

The primary purpose of a Base Map is to provide general information about spatial patterns, provide specific information about particular locations while serving as a base for overlaying various layers of information, spatial and non-spatial. The Base Map is a crucial output of the GIS database. It provides essential information that forms the basis of all further data layers that are added to form the complete database. Typically, a Base Map would involve a geo-referenced satellite image over which various data layers are superimposed to form GIS database for the base map.

Land-use planning is important to mitigate the negative effects of land use and to enhance the efficient use of resources with minimal impact on future generations. The main objective of this planning process is to allocate land uses to meet the needs of people while safeguarding future resources. To prepare the land use map, it is of crucial importance to have an accurate and updated base map for the formulation of the Master Plan. The systematic procedure has been discussed in the following sub-points.

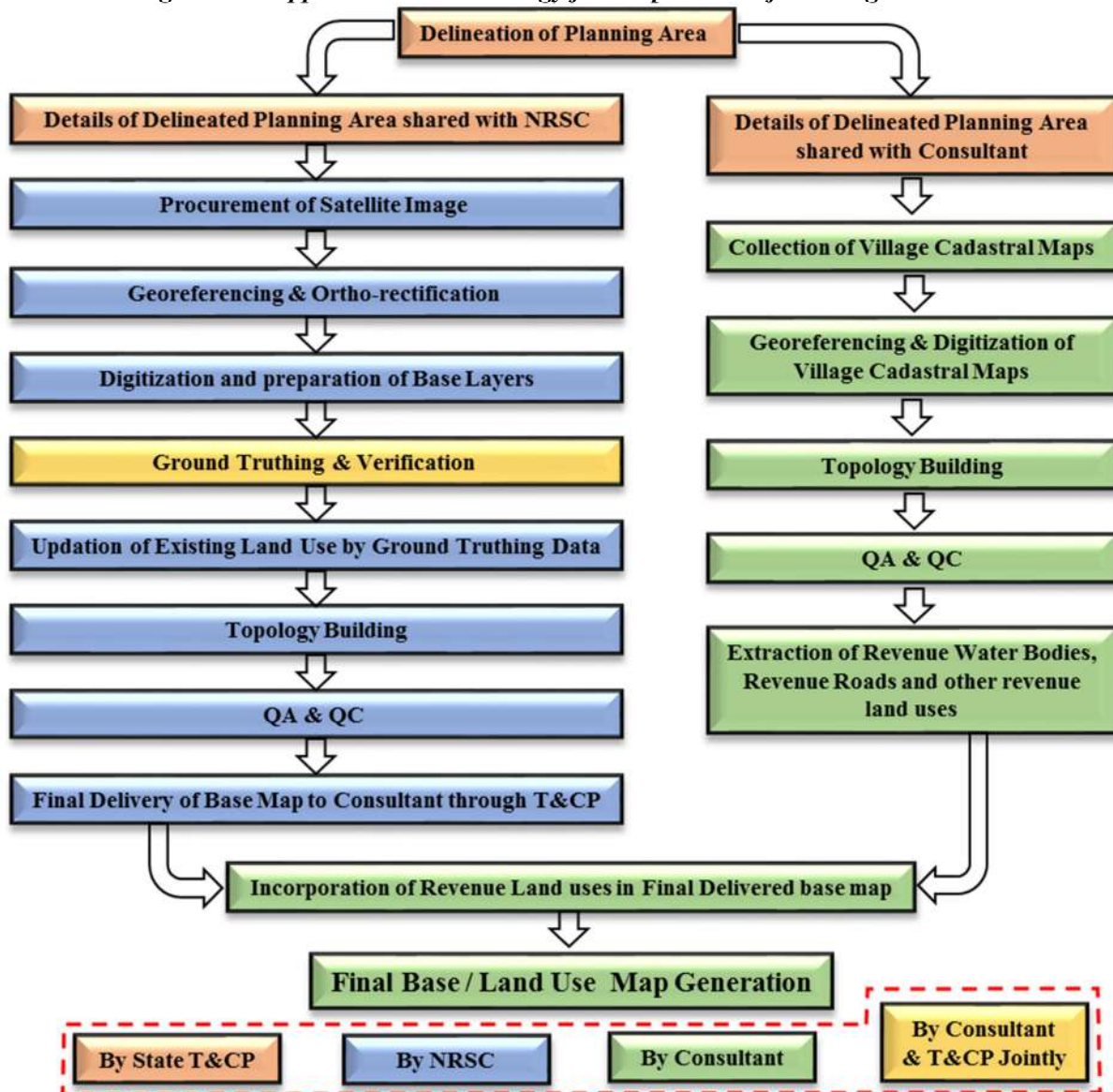
5.3. Approach & Methodology of Base Map Formulation

The State Mission Directorate has provided the draft base map of the Rudrapur Planning Area obtained from NRSC to the Consultant for value addition by collecting spatial attributes as per AMRUT Design and Standards. After updating the base maps, the same has been sent back to NRSC (National Remote Sensing Centre), Indian Space Research Organisation (ISRO), Hyderabad to incorporate the attributes collected by the consultant on the GIS database. NRSC, after incorporating spatial attributes, has sent the generated to the TCPD, Uttarakhand for

vetting, after which the final base maps were generated which were used as an input for plan formulation (refer to **Figure 5-1**).

As the planning area comprises both urban and rural areas, the land use classification adopted is comprised of urban and regional level land uses as specified in the URDPFI guidelines. Consequently, a two-level classification of land use has been adopted i.e., for the Municipal Corporation Area as well as the Planning Area. Formulation of Master Plan of city region (which includes the urban local body and peripheral areas for which base map is prepared by NRSC) is as per “Uttarakhand Urban and Country Planning and Development Act, 1973”.

Figure 5-1: Approach & Methodology for Preparation of Existing Land Use



5.3.1. Delineation of Planning Area

Demarcation of the area of mapping is used to define the boundaries of the study area, and/or to divide the study area into sub-areas. For the AMRUT sub-scheme, the concerned State Mission Directorate is responsible for the demarcation of Area of Interest (AOI) for mapping by delineation of the planning area. After demarcation, the State Mission Directorate has shared the boundary with NRSC (National Remote Sensing Centre) through Town & Country Planning Organisation, MoHUA. In addition to this, the delineated planning area boundary is also shared with the consultants for the cadastral mapping and extraction of land uses. These are further discussed under the following headings.

5.3.2. Procurement of Satellite Image

The base map has been updated on the satellite image map provided by NRSC (National Remote Sensing Centre), Indian Space Research Organisation (ISRO), Hyderabad. The base map has been prepared on a high-resolution satellite image. The NRSC has provided the satellite imagery of the city into grids, which comprise 790 grids for the Rudrapur Planning Area. The Grids have been provided on a 1:1000 scale as a “Field Map”. The NRSC has also provided a Base map in GIS shapefile format (.shp) at a 1:4000 scale. As mentioned in ‘Spatial Reference Standards’¹, an additional 5 km buffer is selected to cater to accommodate the near future increase in Planning Area. The Base Map Vector Data has also been obtained from the NRSC, a Quality check of the image has been carried out and necessary adjustments have been made to the available satellite imagery and Vector Data.

5.3.3. Geo-referencing and Ortho-rectification

The DGPS survey was undertaken by NRSC using various ground control points recorded throughout the Rudrapur Planning Area and verified. Further, NRSC provided the geo-referenced satellite image to the consultant through the State Town & Country Planning Department (refer to **Figure 5-2**).

¹ Formulation of GIS based Master Plan for AMRUT Cities – Design & Standard, Page-7.



Figure 5-2 GCPs for DGPS Survey marked on Satellite Imagery

5.3.4. Digitization & Preparation of Base Layers from Satellite Data

The mentioned task entails the preparation of base layers, based on which spatial analysis has been done. Under this, the base layer preparation included digitization of existing features, geo database preparation and preparation of a preliminary base map which with further inputs will lead to final base map preparation. The whole task is done by the NRSC, Hyderabad.

5.3.5. Ground Truthing & Verification

The officials of local departments and consultants were provided with a grid sheet of maps, a copy of the correspondent attribute table and a simplified coding list provided by NRSC. They visited different locations in Rudrapur Planning Area for sample vetting and attribute data collection (refer to *Figure 5-3*).

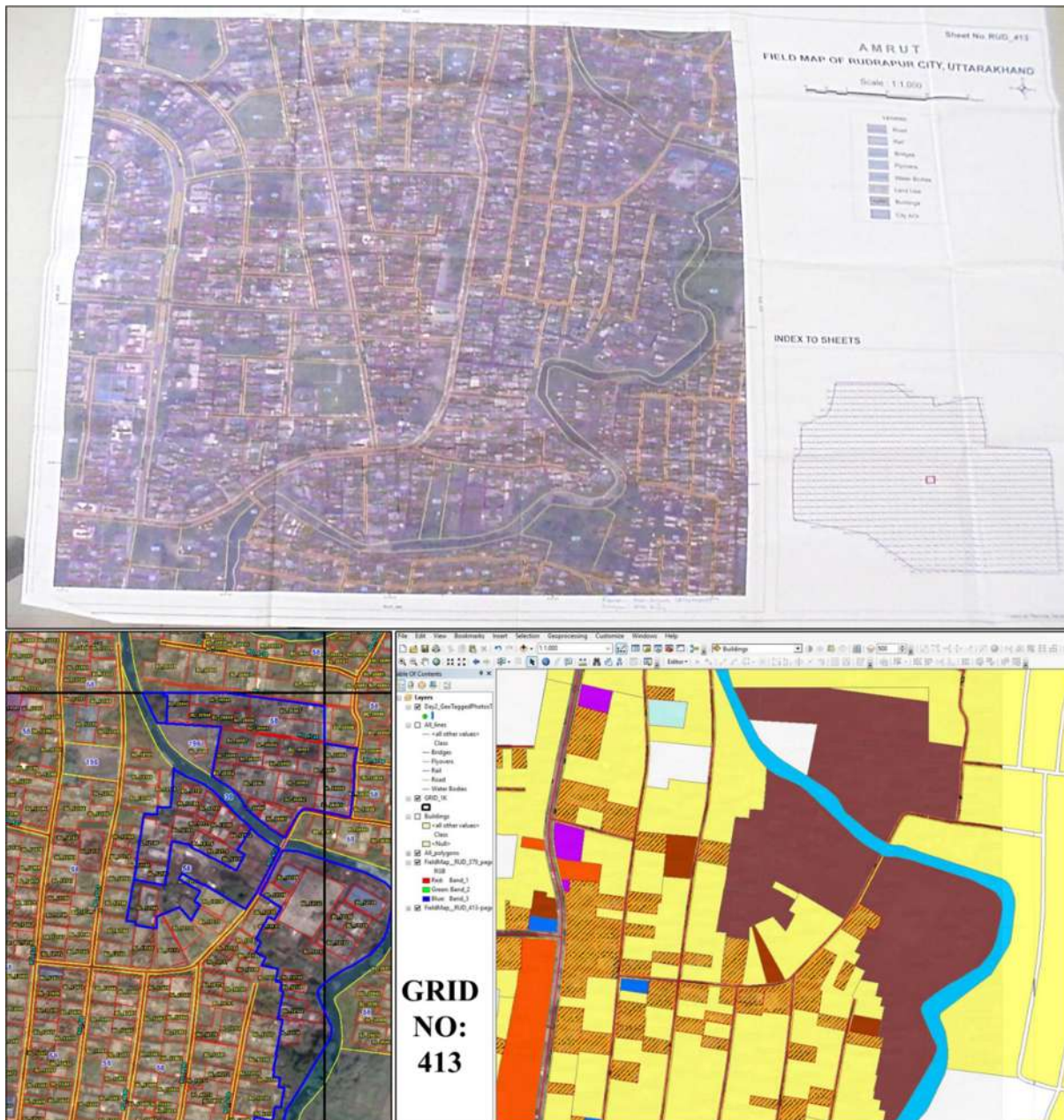


Figure 5-3 Sample Base Map Vetting by Digitising the NRSC Pdf Sheets

Required hard copy maps were printed for visualisation purposes at different scales for example at 1:2000 or 1:1000 for field verification. The concerned Divisional Town Planner along with the planning team and consultant (M/S TMIPL) has supervised the field visit and rectified the queries issued there on the field.



Figure 5-4 Sample Road Inventory by using Laser Distance Meter



Figure 5-5 Geo-tagged Photos used during Ground Truthing

Ground truth and verification of the land use details obtained above have been carried out and submitted to NRSC to prepare the updated land use map for the project area (refer to **Table 5-1** and **Table 5-2**).

Table 5-1: Sample Attribute Table: Buildings (GRID 413)

ID	Code	Class	Sub_Class	Ward_No	Rd_ID	No_floors	Cons_type	Area	Desc_r	SHAPE_Length	SHAPE_Area	Bldg_ID
63895	86	Mixed	Residential & Commercial		RD_6_330	3	RCC	85.925		40.05613469	85.92472831	BL_12012
63891	86	Mixed	Residential & Commercial		RD_6_330	3	RCC	73.929		37.3549092	73.92901488	BL_12016
63844	86	Mixed	Residential & Commercial		RD_4_706	2	RCC	67.943		35.75421498	67.94281552	BL_12018
12020	86	Mixed	Residential & Commercial		RD_4_706	3	RCC	107.026		41.71505072	107.02594	BL_12020
12021	88	Mixed	Residential & Educational		RD_4_706	3	RCC	74.138		36.95895143	74.13768258	BL_12021
12023	63	Commercial	General Business		RD_4_706	2	RCC	163.492		51.50955584	163.492163	BL_12023
63774	92	Mixed	Commercial & Educational		RD_6_338	3	RCC	125.966		46.95354148	125.9664546	BL_12024
12026	86	Mixed	Residential & Commercial		RD_6_338	3	RCC	136.907		55.29959478	136.9072277	BL_12026
12027	58A	Residential	House		RD_6_338	2	RCC	174.679	UC	54.53193538	174.6790814	BL_12027
12042	86	Mixed	Residential & Commercial		RD_6_338	2	RCC	141.076		51.1361138	141.0764536	BL_12042
12043	86	Mixed	Residential & Commercial		RD_6_338	2	RCC	120.355		46.03122605	120.3545511	BL_12043
12044	58A	Residential	House		RD_6	2	RCC	132.582		50.16608343	132.5819459	BL_12044

ID	Code	Class	Sub_Class	Ward_No	Rd_ID	No_floors	Cons_type	Area	Desc_r	SHAPE_Length	SHAPE_Area	Bldg_ID
					338							
12046	86	Mixed	Residential & Commercial		RD_6338	3	RCC	168.475		52.96633969	168.4751005	BL_12046
12047	73	Commercial	Hostel		RD_6338	3	RCC	190.922		55.79787974	190.9219032	BL_12047

Table 5-2 Sample Attribute Table: Roads (GRID 413)

ID	Class	Sub-Class	Code	SHAPE_Length	Line_Id	Length_km	Rd_Name	Con_Mat	CW_Wid	ROW_Wid	Rd_Maintai	FP	FP_Width	FP_Con_Mat
821	Road	Minor City Road	10	128.2970138	RD 810	0.1283		Bituminous	4	9		No	0	
827	Road	Minor City Road	10	54.77994083	RD 816	0.0548		Tiles	3.5	5.5		No	0	
835	Road	Minor City Road	10	63.49142774	RD 823	0.0635		Concrete	4.5	4.5		No	0	
836	Road	Minor City Road	10	80.19349889	RD_N41	0.0802		Tiles	5.5	5.5		No	0	
837	Road	Minor City Road	10	33.19523311	RD 825	0.0332		Concrete	4.5	4.5		No	0	
838	Road	Minor City Road	10	70.29771755	RD 826	0.0703		Concrete	4	4		No	0	
839	Road	Minor City Road	10	45.47898829	RD 827	0.0455		Concrete	6.5	6.5		No	0	
840	Road	Minor City Road	10	104.1187309	RD 828	0.1041		Concrete	5	5		No	0	
4949	Road	Minor City Road	10	106.6306174	RD 4689	0.1066		Concrete	5	5		No	0	
4950	Road	Minor City Road	10	116.9865088	RD 4690	0.1170		Concrete	4.5	4.5		No	0	
4952	Road	Minor City Road	10	78.33114254	RD 4692	0.0783		Tiles	4.5	4.5		No	0	
4953	Road	Minor City Road	10	46.40633023	RD 4693	0.0464		Tiles	5.5	5.5		No	0	
4954	Road	Minor City Road	10	29.59826524	RD 4694	0.0296		Concrete	4.5	5.5		No	0	
4955	Road	Minor City Road	10	26.65773607	RD 4695	0.0267		Concrete	6	6		No	0	
4957	Road	Minor City Road	10	73.87366802	RD 4697	0.0739		Tiles	5.5	5.5		No	0	
4959	Road	Minor City Road	10	39.58312794	RD 4699	0.0396		Concrete	4	4		No	0	
4960	Road	Minor City Road	10	68.37440046	RD 4700	0.0684		Tiles	5	6		No	0	

5.3.6. Validation of Existing Land Use

The base map and existing land use is a pre-requisite input to assess the existing situation of the planning area. To infer the intensity of activities and their spatial distribution, an existing land use map is necessary. GARMIN Virb XE action camera with capabilities to capture wide-angle geo-tagged pictures mounted on a 2-wheeler is used to capture the exact situation of ground with buildings to map and update the existing land use. Two trips have been made to cover properties on either side of roads by orienting the camera towards properties. Whereas, the camera is oriented towards the driving direction to capture properties on either side in all minor/collector streets. Track logs of the geo-tagged images are imported to the GIS platform and land use is visually interpreted and validated.

5.3.7. Updation of Existing Land Use by Ground Truthing Data

The NRSC updated the geo-database of existing land use based on the information received from the State Town & Country Planning Department.

5.3.8. Topology Building

For cartographic representation/visualisation of the GIS database or to generate a copy of maps, appropriate symbols have been used. In urban applications, it is also important to choose appropriate symbols as a statutory requirement in the States Town Planning Act. To facilitate uniform symbology, symbols (mentioned in AMRUT Design & Standards) for the feature data content have been used. However, some of the symbols have been customised as per the requirement of the States Town Planning Act and have been adapted accordingly for the representation/visualisation of maps.

There are 69 major classes and 475 sub-classes for 1:4000 scale urban geospatial data for GIS-based Master Plan formulation under the AMRUT scheme. Each GIS feature is assigned with a unique four-character alphanumeric code. The code is unique concerning the feature, irrespective of its geometry and layer. The first two characters of the code represent the Class and the next two characters represent the Sub Class.

5.3.9. Quality Assessment & Quality Control

Quality Assessment (QA) and Quality Control (QC) procedures have been implemented at all stages of base map preparation. The routines and procedures used have been a combination of automated procedures and manual procedures. These have been finalized at the time of geo-database design. As a guideline, however, following data validation and QA/QC procedures have been adopted. Quality reports against each data validation and QA/QC procedure have been generated for rectification and record.

Quality Assurance and Quality Control for Base Map Preparation: The data after technical scrutiny by QA/QC team has been integrated into the base map.

Geo-Spatial Content from various Departments: Spatial data received in either soft or hard copy from various line departments have been digitized/generated and integrated into the base map after QA/QC.

Integration of Geo-spatial data: Geo-Spatial data from various sources has been integrated onto a single platform to perform various spatial assessments and generation of thematic maps. Final QA & QC checks were performed to check the following parameters –

- **Completeness:** Entire Planning Area should be covered – (i) There should not be any gaps within the Planning Area, and (ii) Ensure that all features are mapped, as per the feature content, which is present in the Planning Area.
- **Correctness:** (i) Feature extraction should ensure correct interpretation, the shape of the feature as per the image and feature geometry definition (ii) The feature classification as per the ground truth and attribute data.
- **Conformity:** GIS database should conform to the specifications and standards of NUIS.
- **Consistency:** Interpretation, feature extraction/digitization, and geometry should be consistent in all parts of the local planning area.
- **GIS Compatibility:** The Geo-Spatial Data should conform to the co-ordinate system and conform to the GIS data structure as defined by QA/QC expert. It should be topological clean, free from errors such as sliver polygons, duplicates, overlaps and gaps.
- **Attribute Data Quality Check:** Attribute data is collected from field and line departments and has been confirmed with the source data.

5.3.10. Final Delivery of Base Map / Existing Land Use Map

After validation and QA/QC, the ArcGIS data of the Rudrapur Planning Area was provided by the NRSC to State Town & Country Planning Department in the standard format in soft copy. As soon as receiving the NRSC's base map data, State Town & Country Planning Department handed over one copy of data to the consultant for inclusion of other databases and preparation of the Master Plan of Rudrapur Planning Area.

5.3.11. Collection of Village Cadastral Maps

The process of base map preparation is done by the consultant, this involves the collection of required information such as cadastral maps and revenue data regarding the manuals for which mapping is to be done. It is followed by the linkage of cadastral and revenue information using the appropriate platform and finally, it involves the application of colour composition for different categories of land.

5.3.12. Geo-referencing and Digitisation of Village Cadastral Maps

Village maps procured from Rudrapur Tehsil Office have been geo-referenced by referencing geo-rectified satellite imagery. Available large-scale maps shall be initially geocoded concerning the satellite imagery and then proceeded to smaller-scale maps. Revenue maps will be co-

registered with satellite imagery. The co-registration, in general, maintains the relative accuracy, shape and geometry of the buildings as well as the plot. Advanced geo-referencing techniques and geo-coding of revenue maps will be conducted to ensure the integrity of proportion, shape, and area. Mosaicking (GIS) and Geo-referencing of cadastral revenue village maps, revenue boundaries with survey number and bringing them to uniform scale for Master Plan (refer to *Figure 5-6*).



Figure 5-6 Digitization of Agricultural Fields and River

Internal quality assurance and quality checks are carried out during geo-referencing to meet the master plan requirements. Cadastral survey parcel boundary, village boundary, and water bodies including lakes, ponds, and streams have been vectorised from cadastral village maps and survey parcel numbers are stored as attribute information. Quality assurance and quality checks have been carried out at all levels to overcome digitization errors. Further, attribute errors where information about the feature capture is inaccurate or false have been rectified.

5.3.13. Topology Building

For cartographic representation/visualisation of the GIS database or to generate a copy of maps, appropriate symbols have been used. In urban applications, it is also important to choose appropriate symbols as a statutory requirement in the States Town Planning Act. To facilitate uniform symbology, symbols (mentioned in AMRUT Design & Standards) for the feature data content have been used. However, some of the symbols have been customised as per the requirement of the States Town Planning Act and have been adapted accordingly for the representation/visualisation of maps.

5.3.14. Quality Assessment & Quality Control

Quality Assessment (QA) and Quality Control (QC) procedures have been implemented at all stages of base map preparation. The routines and procedures used have been a combination of automated procedures and manual procedures. These have been finalized at the time of geo-database design. As a guideline, however, following data validation and QA/QC procedures have been adopted. Quality reports against each data validation and QA/QC procedure have been generated for rectification and record.

5.3.15. Extraction of Revenue Land Uses

After successful validation, QA and QC, features like revenue water channels water bodies, revenue rasta/roads and other revenue land uses have been extracted which are further added to the Base Map of Rudrapur Planning Area.

5.3.16. Incorporation of Revenue Land Uses in Final Delivered Base Map

The data obtained from the NRSC and data obtained from the cadastral maps are merged to improve the quality of the base map / existing land use map. From this, the revenue rasta, revenue water bodies and water channels are incorporated into this geo-database.

5.3.17. Final Base Map / Land Use Map Generation

With the inputs received from the site visits, overlaying with high-resolution imageries and consultations with officials as well as the client, the draft base map is modified and the final base map has been prepared. Key projects that are located in the Rudrapur Planning Area with relevant details are incorporated into the base plan as appropriate. The base plan so prepared enables the project to seamlessly conceptualize, formulate a strategy and prepare a master plan.

The mentioned task entails the preparation of a base map, based on which spatial analysis has been done. Preparation of a good base map is the

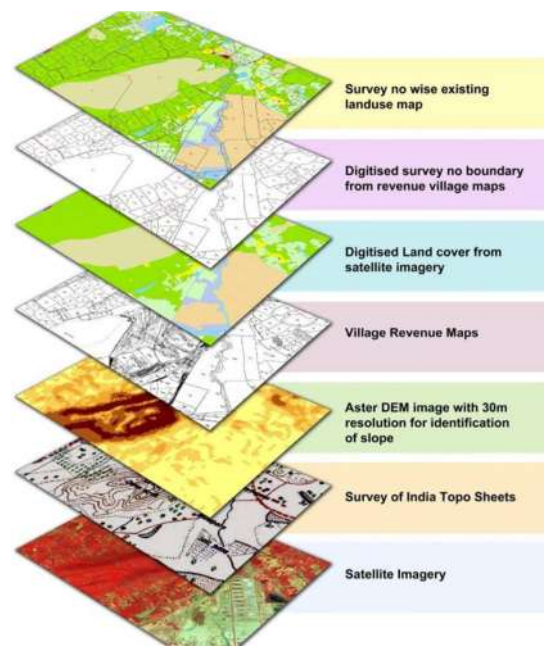


Figure 5-7 Overlapping of various layers to arrive at Accurate Land Use Map

key to the preparation of the Master Plan for the development area. Site visits are undertaken to add any existing site feature, access points, vegetation, and utility lines if any on the base map. The major components of the base map preparation include data collection from the concerned departments, procurement of satellite imagery, digitization of existing features, surveys, geodatabase design, geo database preparation and preparation of a preliminary base map which with further inputs will lead to the final base map preparation (refer to **Figure 5-7**).

5.3.18. Land Use Classification

The geo-database structure designed for the preparation of base map and existing land use is referred from the AMRUT Design & Standards, published by the Ministry of Housing & Urban Affairs, Government of India. The land use classification schemes typically address both land use and land cover. All the urban land uses are extracted as polygons, except a few, such as Community toilets, Fire stations, Garbage Collection points, Landfill sites & Dumping yard, Cell towers, Slums, Bus Stops, Trees etc, which are extracted as points. The road feature is captured as both Polygon and Line. Road area is represented as polygon and Road centreline as Line. Whereas, all the railway lines are captured as lines in the base layer and the railway track area is captured as polygon in Urban Land Use layer.

Buildings falling within each of the Class/Sub-class of urban land use/land cover is represented in the same Sub-class of the Building Footprint Layer. For example, buildings falling within 'Commercial Retail' urban land use/land cover area is represented as 'Commercial Retail' buildings. A single symbol is used for the representation of all buildings. The Sub-Class details for each building are provided as an attribute. The building footprints overlap with land use/land cover. A major land-use classification system developed under the AMRUT has multiple levels of classification.

5.4. Existing Land Use Distribution at Planning Area Level

Based on the finalization of the Planning Boundary by the Town and Country Planning Department, Haldwani, the total land area of the Rudrapur Planning Area is 12,004.11. As per the Land use analysis of Rudrapur Planning Area only 2791.16 ha i.e., 23.25% of total landfall under the category of developed land, while the remaining 9212.95 ha i.e., 76.75% is underdeveloped (agricultural, vacant land and others).

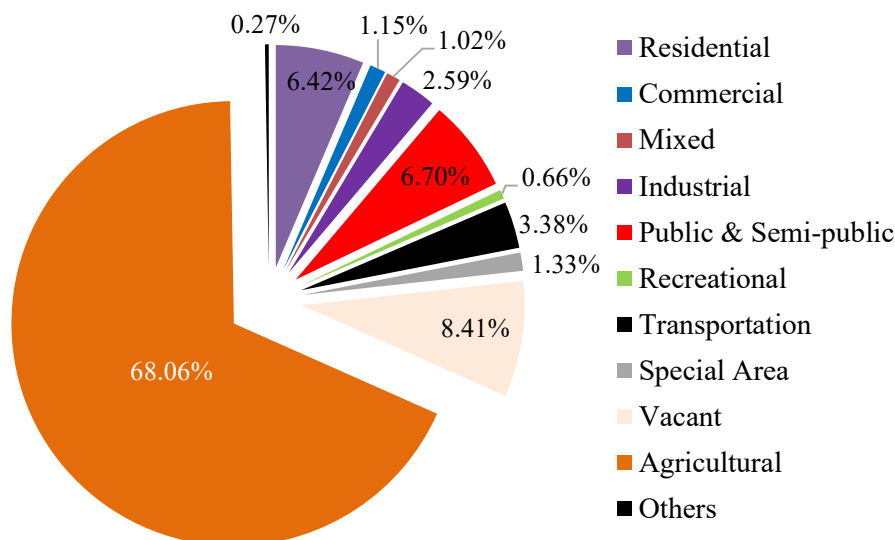
Table 5-3: Existing Land Use Classification of Rudrapur Planning Area (2021)

Sr. No.	Category	Rudrapur Planning Area	
		Area (in Ha.)	Percentage
1.	Residential	770.41	6.42
2.	Commercial	137.82	1.15
3.	Mixed	122.82	1.02
4.	Industrial	311.37	2.59
5.	Public & Semi-public	804.41	6.70
6.	Recreational	79.23	0.66
7.	Transportation	405.57	3.38
8.	Special Area	159.53	1.33
9.	Vacant	1009.73	8.41
10.	Agricultural	8170.30	68.06
11.	Others	32.92	0.27
Grand Total		12,004.11	100.00

Source: Primary Survey, 2019

Of the total land in RPA, the highest share is of manufacturing which constitutes 10.22% followed by residential areas of about 7.09%. Being an administrative city, it shares a substantial share in the public and semi-public categories

Figure 5-8 Existing Land Use Distribution of Rudrapur Planning Area



Source: Primary Survey, 2019

constituting 6.36%. Transportation, which includes roads, parking areas and other transportation facilities, constitutes an area of 3.76% of the total area. The commercial area in Rudrapur Planning Area accounts for nearly 1.15% of the total area. Recreation has a minimal share of about 0.25% of the total area. (Refer to Table 5-3, Table 5-4 and Figure 5-8).

Table 5-4: Detailed Land Use Classification of Rudrapur Planning Area (2021)

Sr.	Level-1	Level-2	Code	Area (ha)
1	Residential	-	-	770.41
2	Commercial	General Business / Retail / Private Office	C-1	47.47

Sr.	Level-1	Level-2	Code	Area (ha)
		Wholesale	C-2	7.40
		Function Hall / Marriage Garden / Hostel / Hotel / Lodge / Restaurant	C-3	15.29
		Storage Godown / Warehouse	C-4	54.33
		Shopping Centre / Mall	C-5	3.63
		Petrol Pump / LPG filling station	C-6	5.99
		Informal Shop	C-7	3.71
		Sub-Total		137.82
3	Mixed	Mixed Use Buildings	-	122.82
4	Industrial	Medium Industries	-	311.37
5	Public & Semi-public	Anganwadi	A	0.20
		School	S	71.00
		Training Institute	TI	3.50
		College	C	42.69
		University	U	194.32
		Clinic/Dispensary	C/D	0.21
		Hospital	H	14.00
		Primary/Community Health Centre	PHC/CHC	0.05
		Nursing Home	NH	0.08
		Veterinary Hospital	VH	1.59
		Banks / ATMs	B	0.97
		Fire Station	FS	0.51
		Police Station	PS	1.64
		Public/Community Toilet	T	0.13
		Governmental	G	350.09
		Other Community Facilities	OCF	4.20
		Religious	R	107.42
		Crematorium Burial Ground /Grave Yard	CBG	1.88
		Electric Sub-Station	ES	4.78
		Water Pumping Station	WTS/WPS	0.11
		Solid Waste Management	SWM	4.47
		Communication	CM	0.56
		Sub-Total		804.41
6	Recreational	Park / Play Ground / Stadium	RE	26.68
		Club / Gymnasium / Sports Centre	RC	2.07
		Garden / Tree Clad Area	G	50.48
		Sub-Total		79.23
7	Transportation	Roads	-	369.06
		Parking Space / Area	PS	27.24
		Bus stand /Terminus	BS	1.69
		Railway Station	RS	2.15
		Railway Property	-	5.42
		Sub-Total		405.57
8	Special Area	Monument	H	0.18
		Village / Abadi Area	-	159.35
		Sub-Total		159.53
9	Vacant	Vacant Land	-	1009.73
10	Agricultural	Agricultural Land	-	7303.76
		Orchard / Plantations	-	766.96
		Water Channels	-	69.57
		Water Bodies	-	30.02

Sr.	Level-1	Level-2	Code	Area (ha)
		Sub-Total		8170.30
11	Others	Brick kiln	BK	6.38
		Dairy farm	DF	0.47
		Poultry farm	PF	2.39
		Slaughter House	SH	0.03
		Others	-	23.65
		Sub-Total		
Grand Total of Existing Land Use (2021)				12004.11

Source: Primary Survey, 2019

5.4.1. Residential

Rudrapur Planning Area has a total residential area of 770.41 ha which accounts for 6.42% of the total area. The residential use features residential townships, plotted housing, detached and semi-detached housing, non-notified slum and squatter or *Kachibasti*. The majority of residential use is under townships, which account for 716.22 ha area. Rudrapur Planning Area covers a substantial share of residential use and it is growing in terms of high urbanization due to the establishment of industries and increasing trade and commerce as well as administrative setup, which subsequently has a trickle-down effect on the housing scenario of the city. In addition, in the rural areas within the planning area, plotted housing has started flourishing in the eastern and western parts of the city to cater for the needs of housing.

5.4.2. Commercial

The area under commercial use in Rudrapur Planning Area is 137.82 ha which accounts for 1.15% of the total area. This land use comprises general business, retail, private office, wholesale, function hall, marriage garden, hostel, hotel, lodge, restaurant, storage godown, warehouse, shopping centre/mall, petrol pump, LPG filling station, informal shop, which are denoted on the Existing Land Use Map with their specific land use codes into six categories. The majority of the area falls under the categories of Storage Godown/& Warehouse (C-4), and General Business / Retail / Private Offices (C-1) which are 54.33 ha and 47.47 ha respectively. Due to the presence of the SIDCUL industrial area, several storage godowns and warehouses have come up in the Rudrapur Planning Area. Also, being one of the important gateways to the Kumaon division and headquarter of Udham Singh Nagar, Rudrapur urban centre acts as a business and retail activities hub.

In Rudrapur Planning Area, commercial activities can be seen in mixed-use form along major roads. This is well seen in the case of Rudrapur which is flourishing in commercial as well as

mixed uses on the NH-109 because of the administrative buildings as well as the expansion of the city towards it because of IIE-SIDCUL. Also, the Kichha bypass road and NH-309 have seen mixed-commercial activities due to the growth of the city in these directions.

5.4.3. Mixed

The area under mixed land use is 122.82 ha in the Rudrapur Planning Area, which accounts for 1.02% of the total area. This use comprises Commercial-Educational, Commercial-Health Services, Commercial-Industrial, Commercial-Institutional, Commercial-Recreational, Religious-Commercial, Residential-Commercial, Residential-Commercial-Health Services, Residential-Commercial-Institutional, Residential-Commercial-Public/Semi-Public, Residential-Educational, Residential-Health Services, Residential-Household Industry, Residential-Industrial, Residential-Storage Godown. The majority of the mixed area falls under the Residential & Commercial Mix category, which is 112.17 ha.

5.4.4. Industrial

It serves predominantly for employment opportunities in Rudrapur Planning Area. The area under industrial use in Rudrapur Planning Area is 311.37 ha, which accounts for 2.59% of the total area. Rudrapur Planning Area has a substantial share in the manufacturing category because of the proximity of the Integrated Industrial Estate of SIDCUL to the Rudrapur Planning Area. Apart from the industries in IIE-Pantnagar, there are at present 333 industrial units which have been registered with District Industrial Corporation, Udham Singh Nagar which are located within the planning area of Rudrapur. These industries are agro-based & food processing industries, chemical industries, manufacturing industries, obnoxious industries, pharmaceutical industries, service industries, textile industries, and other industries. The majority of these are located along Kichha road and Kashipur road. This is the reason for the huge share in the land use of the industrial category.

5.4.5. Public & Semi-Public

The area under this use is 804.41 ha which accounts for 6.70% of the total Planning Area. These public and semi-public spaces usually consist of administrative offices such as government offices, schools, dispensaries, etc. as well as government vacant land, offices, quarter and guest house.

Education facilities under this land use comprise an area of 311.71 ha, which is one of the major sectors under this land use. The majority of this category includes some land of GB Pant Agriculture University, which is 194.32 ha. Two training institutes count in the planning area, which accounts for 3.50 ha of land area. Besides these, there are the number of Anganwadi centres, government & private schools and degree colleges.

Whereas, healthcare facilities hold less area, comprised of 15.92 ha in the Rudrapur Planning Area. Existing health infrastructure includes Clinics, Dispensaries, Government & Private Hospitals, Nursing homes, Primary Health centres (PHC), Community Health centres (CHC) and veterinary health care centres.

A category named 'Other Community Facility (OCF)' includes a community hall, credit society, Dharamshala, LPG/CNG gas booking office, old age home, orphanage, social welfare centre etc. comprising an area of 4.20 ha land.

Religious institutions share a large area of land (107.42 ha) under public/semi-public land use. These institutions include varieties of land parcels like Ashram/Math/Bhojan Shala (96.20 ha), Temple (8.76 ha), Gurudwara (1.17 ha), Mosque (0.69 ha), Church (0.60 ha) and Mazar (0.01 ha).

In addition, public utilities like the electric sub-station, solid waste management, and water pumping station share a total area of 9.36 ha only with the Rudrapur Planning Area. Whereas, communication infrastructure like cell towers, post/telegraph offices, satellite & telecommunication centres and telephone exchange comprehensively share an area of 0.56 ha under public/semi-public use.

5.4.6. Recreational

The area under recreational use constitutes 79.23 ha which accounts for 0.66% of the total Rudrapur Planning Area as per the existing situation. It consists of a certain park, playground, stadium, recreational club, gymnasium, sports centre, garden, and tree-clad area. The majority of the recreational area falls under tree clad area, which is 50.44 ha, which is under land use code 'G'.

5.4.7. Transportation

The area under the transportation zone comprises categories of roads, bus terminals, off-street parking, railway station, and railway property with coverage of an area of 405.57 ha which accounts for 3.38% of the total Planning Area.

5.4.8. Special Area

The special area consists of existing one heritage monument (Shaheedi Smark, located opposite the bus terminal on Kichha road) and a rural Abadi area of villages within Rudrapur Planning Area which has an area of 159.53 ha accounting for 1.33% of the total Planning Area.

5.4.9. Vacant Land

As per the records available, an area under this use has also been calculated for Rudrapur Planning Area. The vacant land area is 1009.73 ha which accounts for 8.41% of the total Planning Area. This category comprises private vacant land as well as plotted vacant land.

5.4.10. Agricultural

As per the records available, the area under agriculture use is 8,170.30 ha, which accounts for 68.06% of the Rudrapur Planning Area. It is comprised of agricultural land (including wasteland), orchards & plantations, water channels like canals, drains & streams, and water bodies like lakes and ponds. The maximum area under this use is agricultural land (7,303.76 ha) and orchard & plantations (766.96 ha).

5.4.11. Other Uses

Based upon the survey, other than categories mentioned in the above points, brick kiln, poultry farm, dairy farm, slaughterhouse and so on. These consist of the land of 32.92 ha, which comprises 0.27% of the total Rudrapur Planning Area. There are several brick kilns, poultry farms, dairy farms and slaughterhouses, which have an area of 6.38 ha, 2.39 ha, 0.47 ha and 0.03 ha respectively. Other than these, uses like a dairy farm, nursery, private garage, scrap yard and under construction buildings etc.

5.5. Existing Land Use Distribution at Municipal Level

In the case of Rudrapur Municipal Corporation, the total geographical area is 5,374 ha as per the municipal records of 2019. As per the Land use analysis of Rudrapur Municipal Corporation

Area, 2,972.5 ha. i.e., 55.29% of land is under the developed land while the remaining 2,402.47 ha i.e., 44.7% is underdeveloped (Agriculture and Vacant Land) (refer to **Table 5-5** and **Figure 5-9**).

Table 5-5: Existing Land Use Classification of Rudrapur M.C. (2021)

Sr. No.	Category	Rudrapur Municipal Corporation	
		Area (in Ha.)	Percentage
1.	Residential	559.13	10.45
2.	Commercial	97.02	1.81
3.	Mixed	107.43	2.01
4.	Industrial	651.71	12.18
5.	Public & Semi-public	750.28	14.02
6.	Recreational	46.20	0.86
7.	Transportation	385.08	7.20
8.	Special Area	1.66	0.03
9.	Vacant	509.42	9.52
10.	Agricultural	2235.54	41.78
11.	Others	6.72	0.13
Grand Total		5350.21	100.00

Source: Primary Survey, 2019

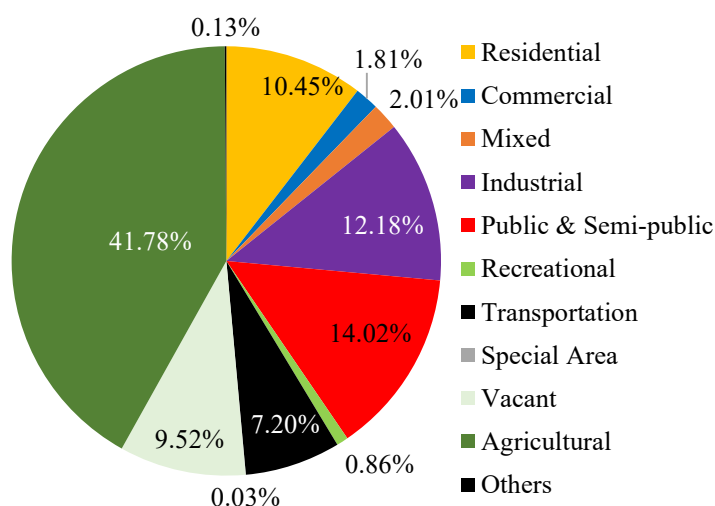
Rudrapur MC being an industrial and administrative centre (both situated in MC limit i.e., administrative buildings as well as SIDCUL), shows the highest share in the manufacturing category i.e., 21.16% of the total municipal area followed by public/semi-public of 13.04%. Residential areas also show a substantial share in the total developed land i.e., 12.91%.

Transportation, which includes roads, parking areas and other transportation facilities, constitutes an area of 5.65% of the total area.

The commercial area in Rudrapur

MC Area accounts for nearly 1.96%. Share of recreational in the MC limit is minimal which accounts for only 0.53% of the total developed land. Rudrapur MC being an industrial and administrative centre (both situated in MC limit i.e., administrative buildings as well as SIDCUL), shows the highest share in the manufacturing category i.e., 21.16% of the total

Figure 5-9 Existing Land Use Distribution of Rudrapur



Source: Primary Survey, 2019

municipal area followed by public/ semi-public of 13.04%. Residential areas also show a substantial share in the total developed land i.e., 12.91% (refer to **Table 5-6**)

Table 5-6: Detailed Land Use Classification of Rudrapur Municipal Corporation (2021)

Sr.	Level-1	Level-2	Code	Area (ha)
1	Residential	-	-	559.13
2	Commercial	General Business / Retail / Private Office	C-1	38.36
		Wholesale	C-2	7.40
		Function Hall / Marriage Garden / Hostel / Hotel / Lodge / Restaurant	C-3	10.60
		Storage Godown / Warehouse	C-4	32.09
		Shopping Centre / Mall	C-5	2.19
		Petrol Pump / LPG filling station	C-6	2.81
		Informal Shop	C-7	3.58
		Sub-Total		97.02
3	Mixed	Mixed Use Buildings	-	107.43
4	Industrial	Medium Industries	-	651.71
5	Public & Semi-public	Anganwadi	A	0.17
		School	S	37.37
		Training Institute	TI	3.14
		College	C	34.40
		University	U	194.32
		Clinic/Dispensary	C/D	0.18
		Hospital	H	13.99
		Primary/Community Health Centre	PHC/CHC	0.03
		Nursing Home	NH	0.08
		Veterinary Hospital	VH	1.37
		Banks / ATMs	B	0.68
		Fire Station	FS	0.51
		Police Station	PS	1.64
		Public/Community Toilet	T	0.10
		Governmental	G	346.50
		Other Community Facilities	OCF	2.20
		Religious	R	103.04
		Crematorium Burial Ground /Grave Yard	CBG	1.35
		Electric Sub-Station	ES	4.12
		Water Pumping Station	WTS/WPS	0.11
		Solid Waste Management	SWM	4.47
		Communication	CM	0.50
		Sub-Total		750.28
6	Recreational	Park / Play Ground / Stadium	RE	23.86
		Club / Gymnasium / Sports Centre	RC	2.01
		Garden / Tree Clad Area	G	20.33
		Sub-Total		46.20
7	Transportation	Roads	-	360.98
		Parking Space / Area	PS	15.38
		Bus stand /Terminus	BS	1.69
		Railway Station	RS	2.15
		Railway Property	-	4.88
		Sub-Total		385.08
8	Special Area	Monument	H	0.18

Sr.	Level-1	Level-2	Code	Area (ha)
		Village / Abadi Area	-	1.48
		Sub-Total		1.66
9	Vacant	Vacant Land	-	509.42
10	Agricultural	Agricultural Land	-	1825.57
		Orchard / Plantations	-	351.20
		Water Channels	-	42.33
		Water Bodies	-	16.44
		Sub-Total		2235.54
11	Others	Dairy farm	DF	0.36
		Poultry farm	PF	0.11
		Slaughter House	SH	0.03
		Others	-	6.21
		Sub-Total		6.72
Grand Total of Existing Land Use (2021)				5350.21

Source: Primary Survey, 2019

5.5.1. Residential

The total residential area of Rudrapur MC has an area of 559.13 ha accounting for 10.45% of the total MC area. The residential use features residential townships, plotted to houses, and detached and semi-detached housing. The gross density of MC is coming out to be low since 9 new villages have been added to the MC limit in 2018, which constitutes more agricultural area, while the net residential density within the MC area is quite high.

5.5.2. Commercial

The total commercial area of Rudrapur MC shares an area of 97.02 ha having 1.81% of the total MC area. This land use comprises general business, retail, private office, wholesale, function hall, marriage garden, hostel, hotel, lodge, restaurant, storage godown, warehouse, shopping centre/mall, petrol pump, LPG filling station, informal shop, which are denoted on the Existing Land Use Map with their specific land use codes into six categories. The majority of the area falls under the categories of General Business / Retail / Private Offices (C-1), and Storage Godown/& Warehouse (C-4), which are 38.36 ha and 32.09 ha respectively. Being one of the important gateways to the Kumaon division and headquarter of Udham Singh Nagar, Rudrapur Municipal Corporation acts as a 'business and retail activities' hub. Also, due to the presence of the SIDCUL industrial area in RMC, several storage godowns and warehouses have come up in the Rudrapur Municipal Corporation.

The main market of Rudrapur is in the city centre along the Kichha bypass road which acts as a regional centre and as well as a main commercial centre for the city in this category. There are

specialised zones for each activity in this market. Also, the commercial activities can be seen in mixed-use form along major roads within the municipality. All these markets whether planned or unplanned have witnessed informal commercial activities in form of rehires, kiosks located outside bus stands and areas with major economic activities creating a chaotic situation.

5.5.3. Mixed

The area under mixed land use is 107.43 ha in Rudrapur Municipal Corporation, which accounts for 2.01% of the total area. This use comprises Commercial-Educational, Commercial-Health Services, Commercial-Industrial, Commercial-Institutional, Commercial-Recreational, Religious-Commercial, Residential-Commercial, Residential-Commercial-Health Services, Residential-Commercial-Institutional, Residential-Commercial-Public/Semi-Public, Residential-Educational, Residential-Health Services, Residential-Household Industry, Residential-Industrial, Residential-Storage Godown. The majority of the mixed area falls under the Residential & Commercial Mix category, which is 98.99 ha.

5.5.4. Industrial

The area under industrial use in the Rudrapur Municipal Corporation shares an area of 651.71 ha having 12.18% of the total MC area. Rudrapur has a substantial share in the manufacturing category because of the presence of the Integrated Industrial Estate of SIDCUL. As per the record of SIDCUL, the IIE-Pantnagar accounts for 528 industrial units. This is the reason for the huge share in the land use of the manufacturing category.

5.5.5. Public & Semi-Public

The Rudrapur MC shares an area of 750.28 ha under the public & semi-public land use category, having 14.02% of the total MC area. These public and semi-public spaces usually consist of administrative offices such as government offices, hospitals, schools, institutes, dispensaries, nursing homes, and government vacant land within the municipal limits. Being the administrative headquarter, Rudrapur houses several district and city level government offices like the District administrative complex, Police administrative complex, Municipal Corporation, District Hospital, etc.

5.5.6. Recreational

The area under recreational use, in terms of Rudrapur MC, is 46.20 ha only, which accounts for 0.86% of the total municipal area as per the existing situation. It consists of a certain park, playground, stadium, recreational club, gymnasium, sports centre, garden, and tree-clad area. The majority of the recreational area falls under tree clad area, which is 20.33 ha, which is under land use code 'G'.

Important recreational spaces in the Rudrapur Municipal Corporation are one district-level sports centre, one community-level multi-purpose ground namely Gandhi Park, parks in the SIDCUL complex as well as various neighbourhood and housing parks.

5.5.7. Transportation

The area under the transportation zone comprises categories of roads, bus terminals, off-street parking, railway station, and railway property with coverage of an area of 358.08 ha, which accounts for 7.20% of the entire MC area.

5.5.8. Special Area

The special area consists of existing one heritage monument (Shaheedi Smark, located opposite the bus terminal on Kichha road) and a rural Abadi area of villages within the municipal area which has an area of 1.66 ha, which accounts for only 0.03% of the entire MC area.

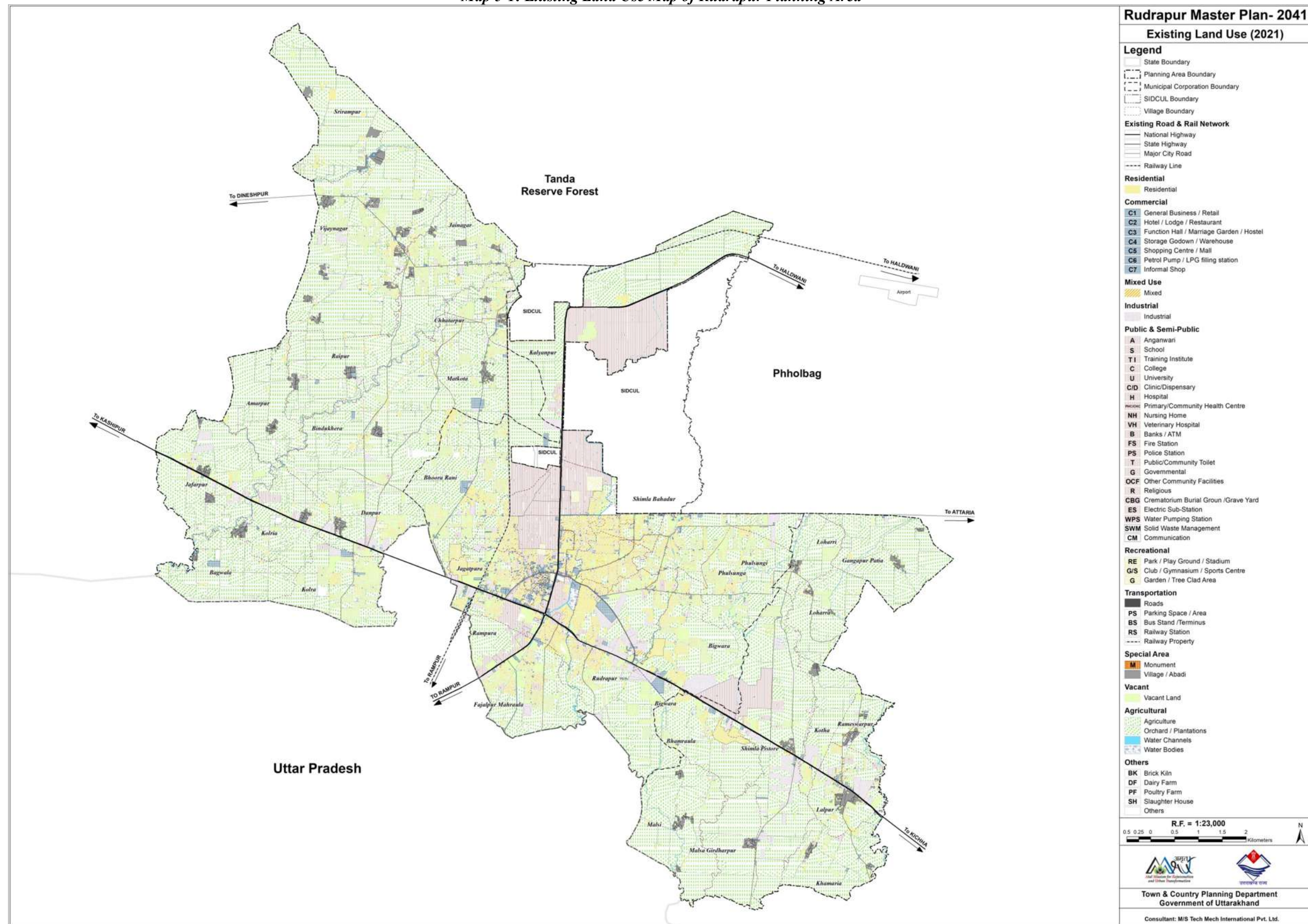
5.5.9. Vacant Land

As per the records available, the area under this use has also been calculated for Rudrapur Municipal Corporation. The vacant land area is 509.42 ha which accounts for 9.52% of the entire Rudrapur Municipal Corporation. This category comprises private vacant land as well as plotted vacant land.

5.5.10. Agricultural

As per the records available, the area under agriculture use is 2235.54 ha, which accounts for 41.78 to the Rudrapur Municipal Corporation. It is comprised of agricultural land (including wasteland), orchards & plantations, water channels like canals, drains & streams, and water bodies like lakes and ponds. The maximum area under this use is agricultural land (1825.57 ha) and orchard & plantations (351.20 ha).

Map 5-1: Existing Land Use Map of Rudrapur Planning Area



Source: Primary Survey, 2019

5.5.11. Other Uses

Based upon the survey, other than the categories mentioned in the above points, poultry farm, dairy farm, slaughterhouse and so on. These consist of the land of 6.72 ha, which comprises 0.13% of the total Rudrapur Planning Area. There are several poultry farms, dairy farms and slaughterhouses, which have an area of 0.36 ha, 0.11 ha, and 0.03 ha respectively. Other than these, uses like a dairy farm, nursery, private garage, scrap yard and under construction buildings etc (refer to **Map 5-1**)

5.6. Land Availability for Future Development

The land which is currently not underbuilt environment can be considered as potential land for future development. In this regard, vacant land and agricultural land have been considered potential land for future development. As per current land use, there is 2235.54 hectare of land under agricultural use which is 41.8% of the total land of Planning Area, and 509.42 hectares of vacant land which stand for 9.5% area of Planning Area. In total 2,744.96 hectares of land is available for potential future development which constitutes 51.31% of the total Planning Area.

5.7. Land Required for Different Land Uses

Based on the requirements of the planning area and future gross density to be achieved, the proposed land uses classification has been derived. The entire planning area is divided into seven broad land uses, which are residential, commercial, manufacturing/industrial, public & semi-public, recreation, transport & communication, and special area and water bodies.

The total projected population for Rudrapur planning Area for 2041 is 653,396. According to the URDPFI Guidelines, density should be 75-125 PPH and 100-150 PPH for small towns and medium towns respectively. The average existing population density of the Rudrapur Planning Area is 17.17 PPH for the whole planning area and 33.29 PPH for the urban area (refer to **Table 5-7**).

Table 5-7 Total Developable Area for Rudrapur Planning Area

Population	Density (PPH)	Developable Area (ha)
653,396	75	8,711.94

However, the existing density is low and considering the existing low density taking medium town density will be a drastic change in the planning area. It would be better to provide a smooth

transition, and it is preferred to consider the small-town density for future development. Hence, by taking 75 PPH as the density base, the total developable area comes out to be 8,711.94 ha.

Table 5-8 represents the classification of land uses for the industrial city, normal cities, the previous master plan and the adopted land use classification for Rudrapur Planning Area. For residential land use, as per **Table 5-8**, industrial towns suggest 25% and normal town suggests 39% and the previous year's master plan has 48.3% of the land. Based on the requirement for residential land 46% of the land is allocated for residential purposes in the Rudrapur Planning Area which comes to be about 3702.72 Ha out of which 929.94 is already existing and we need an additional 2772.78 Ha of land till 2041.

For commercial as industrial town classification suggests, 4% has been adopted for the planning area. Hence the additional land required in commercial areas is 100.25 Ha.

For manufacturing or industrial land use, the industrial town land use structure suggests 30-35% a normal town suggests 8% and in the previous master plan, 15.7% of the land was suggested. As Rudrapur is an industrial dominant city, it also has a lot of influence from trade and commerce and the vision is also to maintain Rudrapur as Industrial City. Hence, the percentage is kept at 8% which calls for an additional 294.07 Ha of land for industries.

The public semi-public land use percentage is kept at a higher side i.e., 16% than suggested in industrial towns, normal towns, and previous master plans. This is because there already exist a lot of public/semi-public uses and the vision is to develop Rudrapur as the Administrative Centre. For this, additional land of 512.02 Ha is required.

The recreation land uses are kept at 12%, which is higher than the suggested percentage of the previous master plan. To achieve 12% of recreational facilities an additional 884.33 Ha of land is required.

Rudrapur being an Industrial city needs good transportation and communication facility for easy movement of goods and vehicles. Also, as the vision states to become an administrative centre, the transportation facilities need to be of high quality and hence, the percentage is kept at 10% for which an additional 415.73 Ha of land is required.

The rest of the land in the Rudrapur Planning Area will be allocated as green or open areas for agricultural purposes and shall be reserved for the future growth of the city.

Table 5-8 Proposed Land Use Classification

Land Use	Industrial Town	Normal Town	Previous Master Plan	Adopted for RPA	Existing Land	Total Require Land	Additional Required Land
	All figures in Percentage				All figures in Hectare		
Residential	20-25	43-48	48.3	46	929.94	3702.72	2772.78
Commercial	2-4	4-6	2.1	4	137.82	238.07	100.25
	--	--	--	--	122.82	365.52	242.7
Manufacturing	30-35	7-9	15.7	8	311.37	605.44	294.07
Public & Semi-Public	6-8	6-8	10.9	16	804.41	1316.43	512.02
Recreation	12-15	12-14	10.5	12	79.23	963.56	884.33
Transportation & Communication	10-12	10-12	12.5	10	405.57	821.30	415.73
Special areas and water bodies	Balance	Balance		Balance	Balance		

5.8. Conclusion

After analysing the land use pattern of Rudrapur, it is observed that the city has distinct land use characteristics. The maximum area of Rudrapur is under agriculture which consists of agricultural land (62.12%). The least percentage share is shown by recreation 0.25% (31.56 hectares) of total land use area. In Rudrapur Municipal Corporation, the land use share is also highest for the agriculture category i.e., 35.34%, since new villages were added to the Municipal Corporation area in 2018, which have more agricultural land. In both the administrative jurisdictions, the land use the highest share after the agriculture use category is devoted to the manufacturing sector, followed by public & semi-public land use. This implies that the city is an administrative and industrial hub in the region.

Furthermore, the analysis of existing land use reveals that the Rudrapur Municipal Corporation does not have adequate recreational spaces, which is a negative approach to the overall development of the area. In addition to this, the residential share comprises 12.91% of the MC area, which is a substantial share, but there is unplanned growth within Rudrapur Municipal Corporation and the majority of the residential development in the city is organic and unplanned.

6. Housing and Slums

6.1. Housing

Housing is one of the most basic human needs as well as an indicator of the standard of living of the people. Economic development is also influenced by the housing sector developments as it provides jobs to various people during construction and maintenance times. It is an important component of the human development index as it provides shelter, safety, and warmth. Housing provides a sense of security, possession, and status.

6.1.1. Existing Housing Stock

Since 11 rural settlements have become part of Rudrapur MC in the year 2011, the number of households in the Rudrapur Urban area has increased tremendously to more than double as compared to 2001 (refer to **Table 6-1**). In the case of rural areas, an increase of 8.29% of households is observed, while the increase is quite higher in the case of the Planning Area which comprises 77.45% of households.

Table 6-1: Growth of Households:

Category	Year	Population	Number of Households	Percentage Growth of Households	Household Size
Rudrapur Urban	2001	88,676	16,229	-	5.46
	2011	176,447	34,207	110.78%	5.16
Rudrapur Rural	2001	44,122	7,819	-	5.64
	2011	43,447	8,467	8.29%	5.13
Planning Area	2001	132,798	24,048	-	5.52
	2011	219,894	42,674	77.45%	5.15

Source: Census, 2001 & 2011

The household size has been reduced in the case of urban areas from 5.46 PPH to 5.16 PPH. The case of rural settlements has also seen a decline from 5.64 PPH to 5.13 PPH. Hence, the overall household size has also reduced to 5.15 in 2011 from 5.52 in 2001. It may have decreased due to an increase in quality education facilities, which implies a positive trend for the future.

6.1.2. Qualitative Aspects of Housing

6.1.2.1. Housing Characteristics

The city of Rudrapur is having two types of housing pattern which includes gated societies such as Metropolis City, Omaxe Riviera City, River Crest City, and so on. Whereas non-gated

housing includes detached, semi-detached, and row housing. The character of both these housing patterns varies from each other (refer to **Figure 6-1** and **Figure 6-2**).

Figure 6-1: Metropolis City, Rudrapur



Figure 6-2: Housing condition in Awas Vikas



6.1.2.2. Occupied Residential Houses and Houseless Population

The details regarding the total households and occupied residential households of urban and rural areas of Rudrapur have been given in **Table 6-2** below. The table details several houseless populations in the study area. The total number of households is 34,207 and 8,467 in urban and rural areas respectively. As per census 2011, the total occupied residential houses are 100% i.e., same as the number of households present which is a positive sign. However, as per the Rudrapur Municipal Corporation survey data for the year 2018, about 162 households in the city need to be provided houses to achieve 'Housing for All'.

Table 6-2: Occupied Residential Houses and Houseless Population

Category	Total Population	Total Households	Occupied Residential Houses	Houseless Population
Rudrapur Urban	176,447	34,207	34,207	836
Rudrapur Rural	43,447	8,467	8,467	0
Planning Area	219,894	42,674	42,674	836

Source: Census of India, 2011 & Rudrapur Municipal Corporation, 2018

6.1.2.3. Type of Housing Structures

According to the construction material used and considering the durability of the structure, the households by structure have been classified into four categories i.e., Permanent, Semi-permanent, Temporary, and Unclassifiable. **Table 6-3** reveals that most of the structures are permanent in the case of both urban and rural areas. The permanent structures account for 87.55% and 77.41% in urban and rural areas respectively.

In addition to this, 5.88% of structures are semi-permanent in Rudrapur city, while the share of semi-permanent structures is 10.48% in the case of rural areas, which is higher than in the city. The percentage of temporary structures is considerable in number in the case of rural areas accounting for 11.69% of the total structures, which includes 8.45% of structures that are non-serviceable.

Table 6-3: Households by Type of Structures, 2011

Category	Permanent	Semi-Permanent	Total Temporary	Serviceable	Non-Serviceable	Unclassifiable
Rudrapur Urban	87.55%	05.88%	03.11%	1.42%	1.69%	1.12%
Rudrapur Rural	77.41%	10.48%	11.69%	3.24%	8.45%	0.41%

Source: Census of India, 2011

6.1.2.4. Distribution of Persons by Living Room

The distribution of households by living room of both urban and rural areas of Rudrapur along with the percentage share residing in it has been shown in **Table 6-4**. There are 6 categories namely, no exclusive room, one room, two rooms, three rooms, four rooms, five and above. Almost one-third of houses in urban and rural areas collectively are having only one room, which accounts for 32.86% of the total houses. For details, refer to Error! Reference source not found..

Table 6-4: Distribution of Households by Number of Dwelling Rooms, 2011

Attributes	Rudrapur Urban		Rudrapur Rural		Planning Area	
	HHs	HH (%)	HHs	HH (%)	HHs	HH (%)
No Exclusive Room	487	1.42	150	1.77	637	1.49
One Room	10,295	30.10	3,727	44.01	14,022	32.86
Two Room	9,945	29.07	2,402	28.37	12,347	28.93
Three Room	6,461	18.89	1,079	12.74	7,540	17.67
Four Room	4,135	12.09	595	7.03	4,730	11.08
Five & above	2,884	8.43	515	6.08	3,399	7.96
Total	34,207	100.00	8,467	100.00	42,674	100.00

Source: Census of India, 2011

Around 28.93% of houses are having two rooms while 17.67% are staying in houses having three rooms. Only 1.49% of households do not have an exclusive room in their house, which implies that the remaining 98.51% of households have at least one room. This is a positive point in the context of good housing. Households having more than four rooms accounts for 11.08% of the total households in the Rudrapur Planning Area.

6.1.2.5. Ownership Status

The tenure status of houses of both urban and rural areas of Rudrapur along with the percentage share residing is highlighted in **Table 6-5**. The status has been divided into three categories that include owned, rented, and others. More than two-thirds of houses in urban and rural areas collectively are owned by individuals which accounts for 80.26% of the total houses. For details, refer to Error! Reference source not found..

Table 6-5: Tenure Status of Houses, 2011

Attributes	Rudrapur Urban		Rudrapur Rural		Planning Area	
	HHs	HH (%)	HHs	HHs	HH (%)	HHs
Owned	27076	79.15	7172	84.71	34248	80.26
Rental	3809	11.14	822	9.71	4631	10.85
Others	3321	9.71	473	5.58	3794	8.89
Total	34207	100.00	8467	100.00	42674	100.00

Source: Census of India, 2011

About 10.85% of the houses are rented by individuals or families while the remaining 8.89% of households are having some other tenure status than the two mentioned above (refer to **Table 6-5**). The percentage of houses owned is high in both urban and rural areas but comparatively, it is slightly higher in rural areas than in urban. It shows that majority of households might be native to the Planning Area.

2.1.1. Housing Condition

Housing condition of housing stock has been assessed qualitatively as well as based on Census data. The qualitative housing condition has considered the predominant use of building material. The housing condition is variable in different parts of the city. For example, townships like Metropolis, Omaxe Riviera, etc., and Awas Vikas area has good housing condition as these are built recently and are well-maintained areas. On the contrary, settlements along the Kalyani River have moderate to bad housing conditions. These settlements are densely populated and are not being maintained at regular intervals.

The housing condition as per Census 2011 has been represented in **Table 6-6**. It shows that 56.29% of houses are in good condition in urban areas while 38.9% of houses are liveable. The remaining 4.81% of houses are dilapidated in nature. In the case of rural areas, houses having good condition constitute 48.38% followed by liveable houses which account for 42.66%. The percentage of dilapidated houses is higher in rural areas in comparison to urban areas.

Table 6-6: Housing Condition, 2011

Attributes	Good	Liveable	Dilapidated
Rudrapur Urban	56.29%	38.90%	4.81%
Rudrapur Rural	48.38%	42.66%	8.96%

Source: Census of India, 2011

6.1.3. Availability of Utilities and Services

6.1.3.1. Water Supply

As per Housing Level Primary Census Abstract (HLPCA) 2011, the utilities and services discussed in this part includes water supply, sanitation, lighting, and fuel. The distribution of water supply as depicted in **Table 6-7** reveals that the main source of drinking water in the urban area is hand pumps (44.6%) followed by tap water from the treated source (42.36%). In the case of rural areas, the major source remains the same i.e., hand pump accounting for (59.07%) and tap water from the treated source (25.91%).

Table 6-7: Distribution of Water Supply, 2011

Attributes	Rudrapur Urban	Rudrapur Rural
Tap water from a treated source	42.36%	25.91%
Tap water from an untreated source	6.29%	10.44%
Covered well	0.44%	0.08%
Un-covered well	0.04%	0.01%
Hand pump	44.60%	59.07%
Tube well/ Borehole	5.40%	2.63%
Spring	0.01%	0.02%
Rive/ Canal	0.01%	0.00%
Tank/ Pond/ Lake	0.33%	0.00%
Other sources	0.52%	1.84%

Source: Census of India, 2011

Almost 84.33% of houses present within Rudrapur MC get their water within their premises while 4.26% of houses are dependent on sources present away from their house as shown in **Table 6-8**. The situation is similar in the case of rural areas as 76.74% of houses have a water source within premises while 4.82% of houses rely on sources situated at a farther distance. It infers that most of the houses have an accessible water source.

Table 6-8: Location of Drinking Water Source, 2011

Attributes	Rudrapur Urban	Rudrapur Rural
Within Premises	84.33%	76.74%
Near Premises	11.41%	18.45%
Away	4.26%	4.82%

Source: Census of India (2011)

6.1.3.2. Lighting

The main source of lighting in case of urban and rural areas is electricity as depicted in **Table 6-9**. The percentage of houses dependent on electricity is 90.55% and 84.79% in urban and rural areas respectively. About 7.04% of houses are dependent on kerosene in urban areas while this percentage is higher in rural areas which comprise 12.61%. Only 0.76% of houses are not having lighting in urban areas and 2.16% of houses in rural areas.

Table 6-9: Main Source of Lighting, 2011

Attributes	Rudrapur Urban	Rudrapur Rural
Electricity	90.55%	84.79%
Kerosene	7.04%	12.61%
Solar energy	0.78%	0.06%
Other Oil	0.2%	0.18%
Any Other	0.65%	0.20%
No lighting	0.76%	2.16%

Source: Census of India (2011)

6.1.3.3. Sanitation

In Rudrapur MC, 93.34% of houses are having toilets within their premises out of which 67.5% are having septic tanks and 20.11% are having piped sewer systems. The percentage of pit latrine toilets is 2.71% while 0.31% of households do night soil disposal in an open drain. In the case of rural areas, 67.03% of houses are having toilets within their premises out of which 52.02% are having septic tanks and 8.08% are having piped sewer systems. The percentage of pit latrine toilets is 3.08% while night soil disposal in the open drain is done by 0.11% of households (refer to **Table 6-10**).

Table 6-10: Sanitation Facilities

Category	Sub- Category	Rudrapur Urban	Rudrapur Rural
Number of Households Having Latrine Facility within the Premises		93.34%	67.03%
Flush/Pour Flush Latrine Connected to	Piped Sewer System	20.11%	8.08%
	Septic Tank	67.5%	52.02%
	Other System	2.57%	3.71%
Pit Latrine	With Slab/ Ventilated Improved Pit	1.68%	2.42%
	Without Slab/ Open Pit	1.03%	0.66%
Night Soil Disposed into Open Drain		0.31%	0.11%
Service Latrine	Night Soil Removed by	0.07%	0.00%

Category	Sub- Category	Rudrapur Urban	Rudrapur Rural
	Human		
	Night Soil Serviced by Animal	0.07%	0.04%
Number of Households not having Latrine Facility within Premises		6.66%	32.97%

Source: Census of India (2011)

Several households have a bathing facility within the premises as represented in (Table 6-11). About 88% of houses are having bathing facilities within their premises in the case of urban areas while in the case of rural areas, 60.52% of houses are having a bathing facility within their premises.

Table 6-11: Households having a bathing facility

Attributes	Rudrapur Urban	Rudrapur Rural
Bathroom	73.59%	46.17%
Enclosure with Roof	14.41%	14.35%
Not available	12.00%	39.47%

Source: Census of India (2011)

6.1.3.4. Drainage

Table 6-12 shows the wastewater outlet connected to closed drainage, open drainage, and no drainage systems in urban and rural areas of Rudrapur Planning Area. The percentage of open drainage is maximum in both cases accounting for 74.07% and 49.16% in urban and rural areas respectively. About 7.66% of houses are devoid of any drainage system within Rudrapur MC while this percentage is 44.10% in rural areas.

Table 6-12: Drainage Facility, 2011

Attributes	Rudrapur Urban	Rudrapur Rural
Closed Drainage	18.27%	06.74%
Open Drainage	74.07%	49.16%
No Drainage	07.66%	44.10%

Source: Census of India (2011)

6.1.3.5. Cooking Fuel

The major fuel used for cooking in urban areas, as shown in Table 6-13, is LPG/PNG (63.4%), followed by firewood (31.73%). In the case of rural areas, the major fuel used is firewood which accounts for 61.19% followed by LPG/PNG i.e., 33.29%.

Table 6-13: Type of Fuel used for Cooking, 2011

	Rudrapur Urban	Rudrapur Rural
Firewood	31.73%	61.19%
Crop residue	2.05%	2.73%
Cow dung cake	0.52%	0.88%
Coal, Lignite, Charcoal	0.15%	0.08%
Kerosene	1.43%	1.16%
LPG/PNG	63.4%	33.29%
Electricity	0.03%	0.00%
Biogas	0.3%	0.26%
Any Other	0.11%	0.02%
No Cooking	0.28%	0.38%

Source: Census of India (2011)

6.1.3.6. Kitchen Facilities

The percentage of households cooking within their house is 95.76% in urban areas while in the case of rural areas, the percentage of households cooking within their house is 71.02%. Amongst these households, 70.08% of houses have kitchen facilities in urban areas and 46.92% of houses have kitchen facilities in rural areas (refer to **Table 6-14**).

Table 6-14: Households having Kitchen Facilities

	Rudrapur Urban	Rudrapur Rural
Cooking inside house	95.76%	71.02%
Has Kitchen	70.08%	46.92%
Does not have a kitchen	25.68%	24.10%
Cooking outside the house	3.95%	28.59%
Has Kitchen	1.24%	15.23%
Does not have a kitchen	2.71%	13.36%
No Cooking	0.29%	0.38%

Source: Census of India (2011)

6.1.4. Proposed Projects

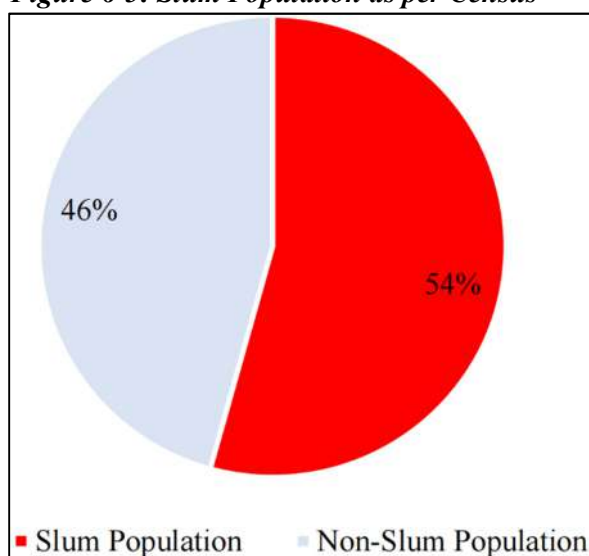
To provide housing to the houseless population, housing projects have been proposed at three different locations in the city under the Housing for All scheme. The site locations for these have been selected. Two out of these three sites would be planned by District Urban Development Authority, Udham Singh Nagar. One site would be planned by Awas Vikas Authority.

6.2. Slums

A Slum, as per the Census of India, has been defined as residential areas where dwellings are unfit for human habitation for reasons of dilapidation, overcrowding, faulty arrangement and design of such buildings, narrowness or faulty arrangement of streets, lack of ventilation, light,

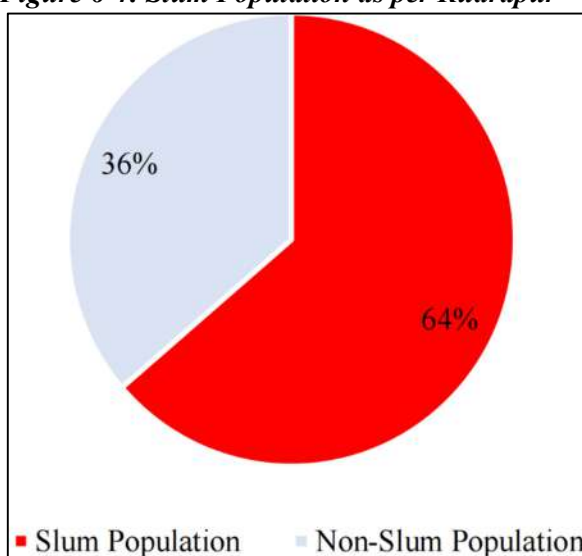
or sanitation facilities or any combination of these factors which are detrimental to the safety and health. In Rudrapur, there are 18 slums in total as per the 2011 census, which is notified in nature. The total number of households residing in the slums is 15,976 having a population of 83,938 which implies that 46.77% of the total population of the city is residing in slums (refer to **Figure 6-3, Figure 6-4 & Error! Reference source not found.**). It implies that almost half of the population of Rudrapur city is staying in slums that are quite high. The family size of these households is 5.25, which is slightly higher than the national average, and the overall family size of Rudrapur city which stands at 5.15.

Figure 6-3: Slum Population as per Census



Source: Census of India (2011)

Figure 6-4: Slum Population as per Rudrapur



Source: Records of Municipal Corporation (2017)

As per Municipal Corporation data of 2016, there are in total of 20 slums in the city of Rudrapur which have been considered non-notified slums by the Municipal Corporation of Rudrapur. The total number of households residing in the slums is 21480 has a population of 1,11,910 i.e. 63.68% of the total population. It infers that more than 3/5th of the population is staying in slums which is quite high. The family size of these households is 5.21 which is slightly more than the national average and equal to the average family size of Rudrapur. The population and details of these slums have been depicted in **Table 6-15 and Map 6-1** below.

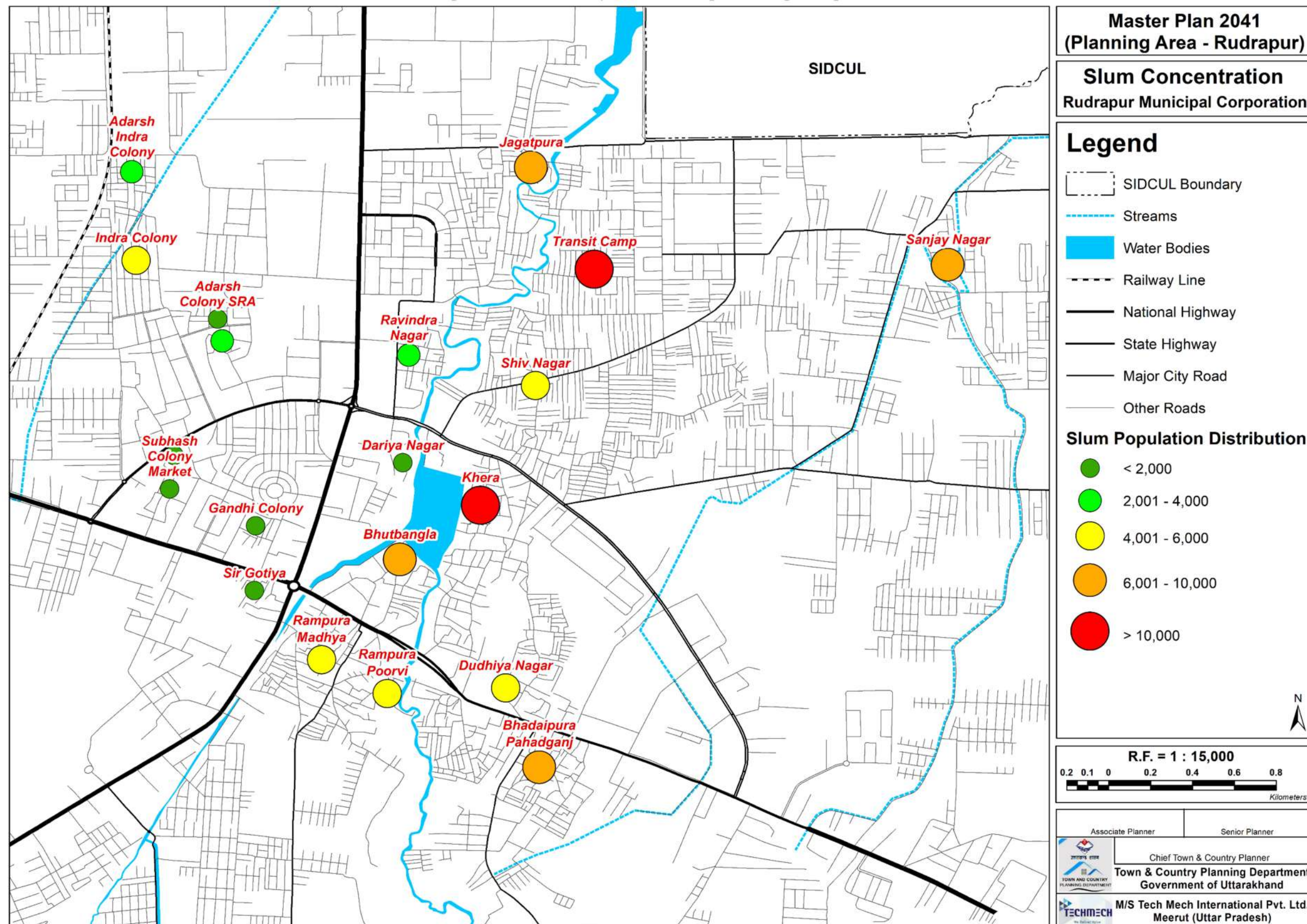
Table 6-15: Details of Existing Slums in Rudrapur Municipal Corporation

Sr. No.	Slum Name	No. of Households	Slum Population	Area (hectares)	Population Density	Water Supply	Electricity
1	Jagatpura	1426	7429	15	495.27	A	A
2	Shiv Nagar	769	4006	3.17	1263.72	A	A
3	Sanjay Nagar	1166	6075	12.22	497.14	A	A
4	Bhadaipura Paharganj	1481	7716	29.30	263.34	A	A
5	Dudhiya Nagar	1052	5481	7.50	730.80	A	A
6	Khera	2088	10878	33	329.64	A	A
7	Bhutbangla	1383	7205	9	800.56	A	A
8	Rampura Poorvi	1108	5773	46.50	124.15	A	A
9	Rampura Madhya	1095	5705	16.58	344.09	A	A
10	Sir Gotiya	307	1599	2.67	598.88	A	A
11	Gandhi Colony	284	1480	3.55	416.90	A	A
12	Subhash Colony	354	1844	3	614.67	A	A
13	Indira Colony	968	5043	10	504.30	A	A
14	Adarsh Indira Colony	743	3871	6.50	595.54	A	A
15	Adarsh Colony Ghash Mandi	427	2225	4.40	505.68	A	A
16	Ravindra Nagar	681	3548	4	887.00	A	A
17	Dariya Nagar	305	1589	1.50	1059.33	A	A
18	Subhash Colony	180	938	1.70	551.76	A	A
19	Adarsh Colony SRA	289	1506	5.70	264.21	A	A
20	Transit Camp	5374	27998	101.21	276.63	A	A
Total		21480	111910	316.50	353.59	A	A

Source: Records of Rudrapur Municipal Corporation (2017)

Except for Rampura Poorvi, all the slums are having a population density of more than 200 persons per hectare which indicates that the slum areas are densely populated in nature. The most vulnerable slums include Dariya Nagar, Ravindra Nagar, Shiv Nagar, Bhutbangla, and Dudhiya Nagar as these have a population density of more than 600 persons per hectare which is more than three times the standard value. Hence, there is a need to rehabilitate these slums to decongest the areas. Another consequence of the same is that open spaces are absent within the slum areas.

Map 6-1: Concentration of Slums in Rudrapur Municipal Corporation



Source: Rudrapur Municipal Corporation

6.2.1. Availability of Basic Services

The basic services, which are available to the households residing in the slums of Rudrapur as per the census 2011, are represented in **Table 6-16**. In the case of water supply, 167 tap points are present for 15976 households which means one tap for almost 100 households, which is very high. In the case of electricity, about 8,554 households are having electric connections which accounts for 53.54% of the total households which implies half of the households do not have electricity or there is electricity theft on a large scale. There are four community toilets available in the slums that are located at different locations.

Table 6-16: Availability of Basic Services in Slums

Type of Amenity	No. of HHs Covered
Water Supply	167 Tap points/Public Hydrants installed
Electricity	8,554
Community Toilets	4 Toilets Present
Other (Specify)	---

Source: Census of India, 2011

As per Municipal Corporation data, households residing in slums are being provided with all the basic services as per their requirement. There is water supply and solid waste collection from these areas as well. They do have access to paved roads which are being maintained by the Municipal Corporation of Rudrapur. The data relating to the number of electric connections present in these areas is not available. In short, the scenario of availability of basic services has improved over the last few years as per MC data.

Figure 6-5 Slum Encroachment Along the Drains



Figure 6-6 Absence of Pucca Lanes and Drains resulting in Dirty Water Logged Streets



Figure 6-7 Poor Solid & Liquid Waste Management



Figure 6-8 Poor Housing Condition



6.2.2. Housing Policy and Status of housing scenario under PMAY

6.2.2.1. National Urban Housing and Habitat Policy 2007

The shelter is a basic human need next only to food and clothing. At the end of the 10th Five Year Plan, the housing shortage is estimated to be 24.7 million. However, urban areas in our country are also characterized by a severe shortage of basic services like potable water, well-laid-out drainage systems, sewerage networks, sanitation facilities, electricity, roads, and appropriate solid waste disposal. These shortages constitute the rationale for a policy focus on

housing and basic services in urban areas. This policy intends to promote sustainable development of habitat in the country to ensure an equitable supply of land, shelter, and services at affordable prices to all sections of society. Given the magnitude of the housing shortage and budgetary constraints of both the Central and State Governments, it is amply clear that Public Sector efforts will not suffice in fulfilling the housing demand. Given this scenario, the National Urban Housing, and Habitat Policy, 2007 focuses the spotlight on multiple stakeholders namely, the Private Sector, the Cooperative Sector, the Industrial Sector for labor housing, and the Services/Institutional Sector for employee housing. In this manner, the Policy will seek to promote various types of public-private partnerships for realizing the goal of 'Affordable Housing for All'.

6.2.2.2. Pradhan Mantri Awas Yojana (PMAY)

This Central Government housing scheme is started for the people who are from the Below Poverty Line (BPL), Low Income Group (LIG), and the people who are from the Economically Weaker Section (EWS). Under PM Awas Yojana the candidates who want to take the houses should be from a lower class and the annual income of the candidate should not be more than Rs. 6 Lakh. The central government will provide loans up to Rs. 6 Lakh to the beneficiaries at affordable interest rates of 6.5%.

The Mission will support the construction of EWS (Economically Weaker Section) houses of up to 30 square meters of carpet area. As per PMAY EWS households are defined as households having an annual income up to Rs. 3,00,000 (Rupees Three Lakhs). The PMAY mission will be implemented as a Centrally Sponsored Scheme (CSS) except for the component of credit-linked subsidy that will be implemented as a Central Sector Scheme.

Given that this is a path-breaking approach being taken up by the Central, State, and City governments, there is a felt need to embark on a set of pilot projects to evolve, demonstrate, and establish models that can thereafter be scaled. A key objective of the program would be to therefore incentivize innovation and encourage new approaches and solutions that can demonstrably improve the quality and quantity of shelter and services for the poor.

In the context of Rudrapur, PMAY Schemes have been under process with 6,551 applications received under the credit link subsidy scheme vertical. After the verifications of the applications, 11 were found eligible under this component. Until the FY, 2019-20 only one house was

constructed other was under implementation. Under the vertical beneficiary-led construction total applications received were 1,832 out of which 680 were for new construction and the remaining 1,152 were for enhancement. None of the applications was found eligible so there has been no progress under this vertical. Moreover, in the ISSR component, as per the record of 2019, there are no slums in the municipal corporation area that subsequently drops this vertical for further process. Although, there are 405 applications received with the municipal corporation under this vertical but would not be eligible for it.

Further, for the AHP component, there were 6,551 applications received and all of them were found eligible. Therefore, keeping this into consideration the Uttarakhand Housing and Urban Development Authority along with Uttarakhand Avas Avam Vikas Parishad has decided to invite PMAY (AHP) projects in PPP modes to develop housing society for the EWS group under this vertical. A total of 11 projects were identified out of which one project was in Rudrapur. Uttarakhand Avas Avam Vikas Parishad will be the nodal agency to do a tripartite agreement with the land owner and developer. The share of the beneficiary will be collected by UAAVP.

The project is located on Rudrapur-Kiccha road in Barbara, which is in the corporation area. The total area of 26,299.83 m² having total proposed units of 1,144 with a total cost of Rs.7846.3 lakhs will be implemented. The project is expected to be completed in the coming FY. With the completion and disbursal of units to beneficiaries identified under the PMAY AHP component, it will surely become one of the significant projects for the migrants and houseless population of the city.

6.2.3. Key Issues

The following key issues are identified during the survey –

- The number of slums is increasing in the city, which is a big concern as it indicates that the housing condition in the city is dilapidating with time.
- There is also a contradiction in the notification of these slums because as per MC data these slums are non-notified while as per census record, these slums are notified.
- There is an absence of open spaces in the slum areas.
- In certain cases, there is poor access to basic services like Health, Education, etc. leading to a lower rate of literacy and a high degree of health hazards.

- In certain cases, the slum population is exposed to open drains and unhygienic conditions including the dumping of garbage.
- There is no policy or strategy adopted to improve the living conditions of slum dwellers or rehabilitate them to increase their quality of living

6.3. Real Estate

Real estate is the land along with any permanent improvements attached to the land, whether natural or man-made - including water, trees, minerals, buildings, homes, fences, and bridges. Real estate is a form of real property. It differs from personal property, which are things not permanently attached to the land, such as vehicles, boats, jewelry, furniture, and farm equipment.

The real estate sector has a crucial role in the economy. It also affects various other allied sectors. The expenditure in the real estate sector affects the expenditure and return in other sectors too. The pattern of urbanization in India influences the real estate sector across all its segments of residential, commercial, and hospitality. The region with its bestowed natural beauty and existence of various topographical features along with excellent connectivity offers opportunities for economic development under various kinds of projects in sectors of tourism, real estate, industries, and others. The increase in work opportunities in many urban areas has attracted the migrant working population. The increase in population has demanded a rise in the available housing stock. The situation is the same in every other region in the country and Rudrapur is no exception. The vast scope of this sector is waiting for exploration. The increased need has created a demand for housing as well as commercial activities. After the bifurcation of Uttarakhand from Uttar Pradesh, Rudrapur has emerged as an attraction for investments.

Rudrapur lies in the Udham Singh Nagar district that is on the foothills of the Kumaon region. Rudrapur area comes in the plain region of Uttarakhand. The district is one of the industrialized districts of the state with most Industrial estates established by SIDCUL. These industrial estates have excellent infrastructure facilities according to the norms and standards. Further, with the establishment of these industrial estates, the real estate sector has also flourished to cater to the needs of housing for the workers engaged in these industrial estates. In Rudrapur, two residential townships (Metropolis city and Omaxe Riviera group housing) have also been set up to cater to the needs. Moreover, land value has also increased near IIP Pantnagar with the trickle down

effect of industrial establishments. In addition, administrative offices have also come up abutting the National Highway 109 that enhances the land value and real estate sector.

6.3.1. Characteristics of the Tracked Residential Market

A growing base of Industrial establishments with rising disposable incomes and substantial global exposure initiated market developments for a variety of uses from residential to commercial office space to retail have become increasingly common in Rudrapur. Rudrapur has emerged as one of the most preferred residential locations in the district in terms of developments in the residential tracked the market. It must be noted here that supply in the tracked market is skewed towards higher-income groups. Rudrapur area has not faced any real estate demand but in the recent past, the real estate market saw a huge leap in the city with many developers who have come forward to invest in various sectors.

6.3.2. Key Players

Public agencies such as UKHUDA & UKRERA along with private developers play an important role in real estate development in Udham Singh Nagar district and the Rudrapur area. The key public players and their role in the development of real estate are as follows.

6.3.2.1. UK housing and urban development authority

The “Development Authority or the Authority” about the whole of the State Area shall be ‘The Uttarakhand Housing and Urban Development Authority (hereinafter referred to as the State Authority) and concerning any development, the area shall be the Local Development Authority (hereinafter referred to as the Local Authority) constituted and notified under section 4 of the Act.

Further, the Urban Local Bodies and Village Panchayats will also be construed as Local Development Authority/Local Authority under this Act if so, declared by the State Government by issuing Notification under sub-section (1-A) of section 4 of this Act defining the extent of their development area(s). Concerned Officer/ person of such Urban Local Bodies and Village panchayats shall exercise powers as determined by the State Government.

UHUDA regulates the development according to the master plan and guides the private developers in developing layouts, housing schemes, integrated townships, apartments,

commercial buildings/complexes and accords approval. UHUDA has given approvals for various layouts spread across Rudrapur Planning Area.

6.3.2.2. UK real estate regulatory authority

The real estate sector has grown in recent years but has largely been unregulated from the perspective of consumer protection. However, consumer protection laws are available; the recourse available therein is only curative, but not preventive. The government of India has enacted the Real Estate (Regulation and Development) Act 2016 and all the sections of the Act have come into force with effect from 1st May 2017.

The key responsibilities of the Authority shall be Ensuring Disclosures of Real Estate Projects by Promoters, Real Estate Projects Registration, and Real Estate Agents Registration & Complaints Redressal.

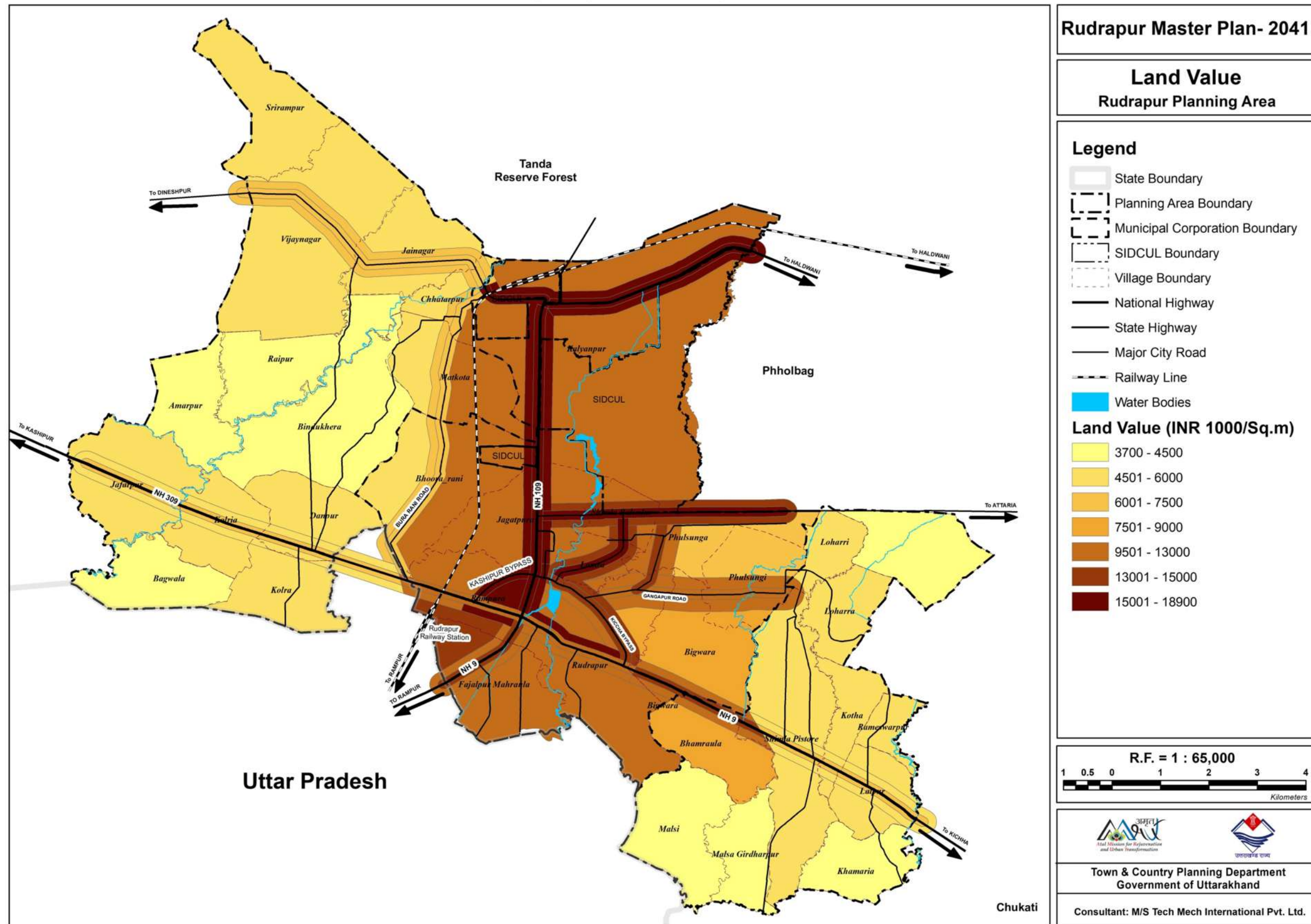
The Authority looks upon the real estate establishment in Rudrapur and stands for transparency in the real estate industry. It was brought to action to eradicate the existing discrepancies and problems within the sector. It has been set up across India to promote uniformity and transparency, as well as to regulate the real estate sector.

6.3.3. Land Value

Land value is the value of a piece of property including both the value of the land itself as well as any improvements that have been made to it. Land value has been analyzed in the Rudrapur Planning Area along the major and city roads to identify how land value changes as we move away from the roads and how it changes with the change in land use. Land value is high in the central areas of the city. **Figure 6-9** shows the land value changes in three types of categories i.e., non-agricultural land, multi-storied apartment flats, and commercial areas along the national highways and other roads.

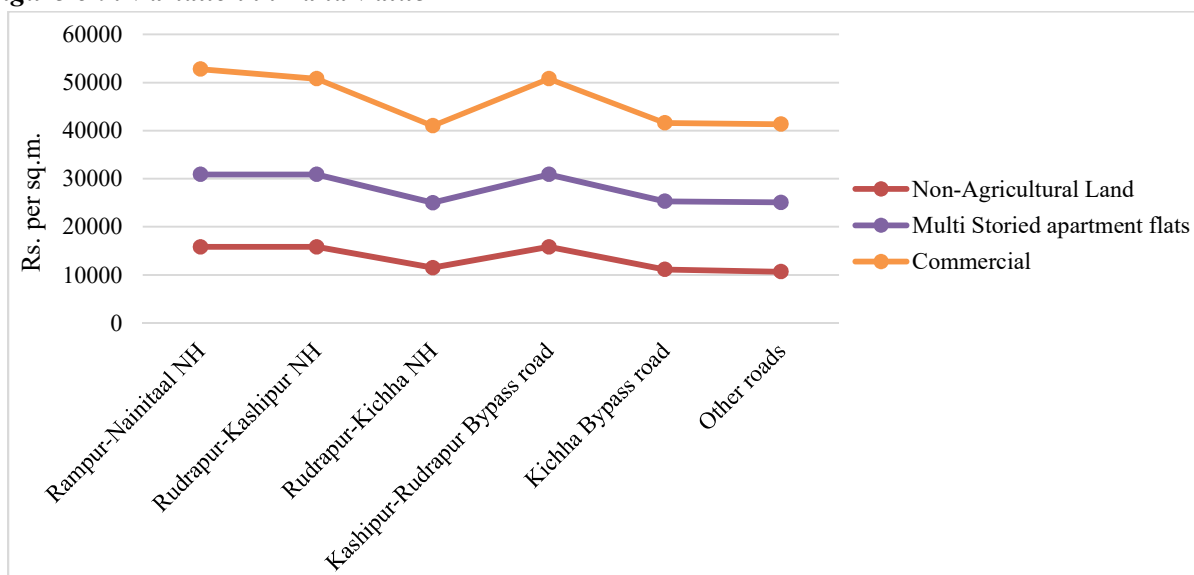
It is evident from the figure that the commercial areas have much higher land prices as compared to other uses. The highest land value can be seen on the national highway from Rudrapur to Nainital because of real estate development along the corridor and near the SIDCUL area. Moreover, administrative offices are also located in this direction making it suitable for a commercial establishment to flourish which subsequently increases the land value (refer to **Map 6-2**).

Map 6-2: Spatial Distribution of Land Value



Source: Office of District Magistrate, District Udham Singh Nagar

Figure 6-9: Variation in Land Value



Source: Office of District Magistrate, District Udham Singh Nagar.

Table 6-17 shows the land rates along national highways, bypass roads, and other roads both within the municipal limit and outside but within the Rudrapur Planning Area. The roads comprise arterial, sub arterial, collector, and local roads within the corporation boundary. Moreover, agricultural land value has also been analyzed abutting the municipal corporation boundary to identify how the land prices are changing with the development occurring in the vicinity. It is evident from the data that how the land prices are changing when we move away from the roads. For instance, the land value of Non-agricultural land of Rampur-Nainital is Rs. 18,900 per square meter from the road to 50 meters which decreased to Rs. 5,100 from 51 meters to 200 meters and it further seems to decline to Rs. 13,500 beyond 201 meters. This show that road infrastructure plays a crucial part in changing land use and its prices with development. Similarly, if the data is analyzed for the commercial area, which includes various shops, restaurants, and offices the land value, is much higher in the core area as compared to the area in the vicinity. The commercial area evolves with the demand for it and it differs for different roads. In the case of Rudrapur Planning Area, the highest land prices are on Rampur-Nainital NH, Rudrapur-Kashipur NH, & Kashipur-Rudrapur Bypass Road because the city is growing in these directions with more industrial and services sectors flourishing in these directions.

Table 6-17: Land Rates in Rudrapur Planning Area

S. N.	Road Type	Ward Nos. / Villages	Non-Agricultural Land value (Rs. / m ²)			Multi-Storied apartment flats (Rs. / m ²)	Commercial (Rs. / m ²)	
			From 0 to 50mts.	From 51 to 200mts.	Beyond 201mts.		Shops/ Restaurants/ Offices	Others
Municipal Corporation Area								
1	Rampur-Nainital NH	6, 8, 9, 10, 11, 13, 14, 17, 18, 19	18900	15100	13500	30900	55800	49800
2	Rudrapur-Kashipur NH	(9, 10, 14-Partial)	18900	15100	13500	30900	55800	45800
3	Kashipur-Rudrapur Bypass	12, (11, 13, 14 - Partial)	18900	15100	13500	30900	55800	45800
4	Rudrapur-Kichha NH	4, 5, (6-Partial)	13000	12000	9500	25000	44000	38000
5	Kichha Bypass Road	18	13300	10600	9500	25300	44600	38600
		4	13300	10600	9500	25300	44600	38600
6		(2, 3, 5, 6-Partial)	13300	10600	9500	25300	44600	38600
7	Other roads	2, (3-Partial)	13300	10600	9500	25300	44600	38600
		(19-Partial), 20	15400	13300	8000	27400	48800	42800
		15	13900	11100	8000	25900	45800	39800
		16	13900	11100	8000	25900	45800	39800
		1	12000	10000	7000	24000	42000	36000
		7	10500	9500	7000	22000	39000	33000
Villages								
8	Kashipur-Rudrapur- Kichha NH	Khanpur Purv, Zafarpur, Koldiya, Danpur, Rampura, Bingwada, Bhamraula, Shimla Pistaur, kothi & Lalpur	6600	6000	5800	18600	31200	25200
9	Rampur-Nainital NH	Fazalpur Mahrauli, Jagatpur, Kalyanpur, Matkota, Bhudarani & Phoolbagh	6600	6000	5800	18600	31200	25200
10	Dineshpur Marg	Chattarpur, Jainagar & Vijaynagar	7500	7200	5000	20000	33000	27000
11	Other roads	Phulsungi, Lohri & Lohra	5500	5200	5000	18000	29000	23000
12	Other roads	Lamra, Shimla Bahadur & Phulsunga	5700	5500	4000	18000	29500	23500
		Kolda	4800	4400	4000	16800	27600	19600
13	Other roads	Rameshverpur	4800	4200	4000	16800	25000	22000
		Bindukheda, Raipur & Amarpur	4500	3600	3500	16500	25000	22000

S. N.	Road Type	Ward Nos. / Villages	Non-Agricultural Land value (Rs. / m ²)			Multi-Storied apartment flats (Rs. / m ²)	Commercial (Rs. / m ²)	
			From 0 to 50mts.	From 51 to 200mts.	Beyond 201mts.		Shops/ Restaurants/ Offices	Others
		Lambakheda & Saiyad ali ganj	6000	5000	4000	18000	27000	22000
		Shrirampur	4800	4200	4000	16800	25000	22000
14	Other roads	bangwala, Gangapur Patiya, Khamriya, Malsa Girdharpur, Kurauli, Saenjini, Rahpura, Malsi & Badaura	3700	3300	3000	16500	22500	19500

Source: Office of District Magistrate, District Udham Singh Nagar.

6.4. Key Issues & Potentials

- The houseless population in Rudrapur municipality needs to look to achieve housing for all.
- Rudrapur Planning Area has a majority of the houses as semi-pucca, which needs to be improved.
- Dilapidated houses in rural settlements exist, which need to be improved under housing schemes.
- Unhygienic condition of living near transit camp area because of cluttered housing.

6.5. Future Housing Demand

For the housing demand in 2041, the existing situation was analyzed and the gap/shortage was considered. **Table 6-18** represents the calculation of the total houses required by 2041. The existing household size of Rudrapur is above five. The household size considered for calculating future housing demand for Rudrapur Planning Area is 4.5. The projected population for 2041 without considering the floating population is 6,16,411 and considering the household size of 4.5, the total number of households comes to be 1,36,980. In addition, according to the census 2011, the number of dilapidated houses is 2,406 and according to Rudrapur MC, the total number of houseless households in the planning area is 162. These two factors have been considered in the future housing demand calculation and hence are added to the total housing Demand. The total number of existing households is 42,674 and the total required houses for 2041 and net housing Demand comes to 96,874.

Table 6-18 Housing Demand, 2041

Housing Demand	2041
Total population	6,16,411
Household Size	4.5
Total Housing Stock Required (1)	1,36,980
Dilapidated Household (2)	2,406
Houseless Households (3)	162
Total Housing Demand (4) = (1) + (2) + (3)	1,39,548
Existing Residential Houses as per Census 2011 (5)	42,674
Housing Shortage (4)-(5)	96,874

6.6. Housing Proposals

The existing housing has been analyzed for new housing facilities in the Rudrapur Planning Area. For the housing proposals, the existing and new residential areas are kept separate as both would have different characteristics (refer to **Table 6-19**). The Housing proposals have been elaborated under the Residential Use of Proposed Land use to accommodate the upcoming population of 6,16,411. Proposals have been Categorised as mentioned in the following table:

Table 6-19 Proposed Residential Area

Code	Residential	Area (Ha)	Proposed Density (PPH)	Population	Dwelling units required	Net residential Area (ha)	DU/ Ha	Average Plot Size (m ²)
R 1	Built up (Urban)	305.46	220	67201	14934	137.46	109	92
R 2	Built up (Rural)	194.96	210	40942	9098	87.73	104	96
R 3	Residential Zone	2913.01	160	466082	103574	1310.85	79	127
DR & DRC	Deviated Residential Land use	289.29	160	46286	10286	130.18	79	127
	Total	3702.72		620511				

Source: Proposed by Town and Country Planning Department

- R1 Urban Buitup:** Existing Buitup areas are developed in the form of slums/ Squared and an unorganized manner along Both sides of the Kalyani River like Transit Camp, Rampura, Khera, Bhuthangla, Dariya Nagar, Ravindra Nagar, Shiv Nagar, Jagatpura, Rampura, Gandhi Colony, Sir Gotiya, Subhash Colony. The total area considered under this use is 305.46 Ha. Existing Buitup Condition is in the form of single or dual stories with very small plot size with almost full built coverage. It is proposed to prepare a DPR for the In situ slum Redevelopment and Rehabilitation Plan. In These Proposals, it is recommended that to develop this area to multistorey and Land for Parks/Open spaces/Utility Infrastructure can be obtained from this land only. The proposed Gross Density for this is 220 pph and the

proposed Average household plot size is 92 sqm. (Refer to **Table 6-19**). The total population to be accommodated under this use will be 67201 (refer to Error! Reference source not found.).

- **R2 Rural Builtup:** All the existing Village settlements/ Abadi areas have been considered under this use. All abadies falling outside the municipal limit is considered under this category. The total area under this Category is 194.96 ha. The proposed Gross Density for this is 210 PPH and the proposed Average household plot size is 96 sqm. (Refer to **Table 6-19**).
- **R3 Residential Area:** New Residential areas have been proposed under this use in the planned form with Proposed Gross Density for this being 160 PPH and the proposed Average household plot size is 127 sqm. The total area under this residential category is 2913.01 Ha (refer to Error! Reference source not found.).
- **DR/RRC:** All the deviated residential colonies/ areas from the previous master plan have been recommended to be regularized. These colonies have been shown separately in the proposed land use map. The total area under this residential category is 289.29 Ha.

7. Physical Infrastructure

7.1. Introduction

Physical Infrastructure is the physical facilities that are needed by a city like Water Supply, Sewerage & Sanitation, Solid Waste Management, and Storm Water Drainage. These are the basic facilities, which must be provided in a city. Availability and adequacy of infrastructure services have a larger role in well- the being of any habitation. Infrastructure services act as a catalyst for development, which fosters economic growth and enhances public well-being. Hence, the provision of adequate infrastructure is defined as Basic Services for any developed and developing region to sustain its growth and development.

This chapter outlines the details and analyses various types of physical infrastructure present in the planning area of Rudrapur. It includes water supply, sewerage and sanitation, drainage, solid waste management, and telecommunication. Each of the above-mentioned infrastructures has been analyzed to highlight the issues regarding it. This chapter also details the proposals for physical infrastructure for Rudrapur Planning Area.

7.2. Water Supply

Water supply is the provision of water by public utilities, commercial organizations, community endeavors, or individuals, usually via a system of pumps and pipes.

7.2.1. Sources of Water Supply

Rudrapur city, located at an altitude of 284 meters from mean sea level is dependent on various sources of water, tube well and hand pump being the two most important ones. Pey Jal Nigam is responsible for the supply of water in the city. As per the data from Pey Jal Nigam, there are 10 tube wells in the city, which is the main source of water supply. There are 2831 registered connections with Pey Jal Nigam to whom they are supplying water. It implies that less than 10% of households in the city are receiving water from Pey Jal Nigam. Other households are dependent on illegal connections or other sources of water like hand pumps, river water, wells, etc. Hence, there is a need for an organized system of water supply, which would ensure minimally or zero theft of water that can be ensured through an efficient metering system. The water supply system is intermittent as the household gets water supply for 5 hours in a day only

(three hours in the morning and two hours in the evening). This is another reason for people depending on other sources than water supply from Pey Jal Nigam.

In the case of rural areas, there are 17 villages out of 24 which are having more than 10% of households dependent on treated tap water supply as per the census 2011. Other villages which include Raipur, Malsi, Bindu Khera, Kolara, Bagwala, Bhamraula, and Mat Kota are dependent on other sources of water such as untreated tap water, and hand pumps, wells, springs, rivers, etc. There are multiple sources of water supply in these areas even in the villages having treated tap water. There is no organized system of water supply in these areas. Therefore, an organized system will be proposed in the area, which will be within the urbanized area of Rudrapur. For details, refer to Error! Reference source not found..

7.2.1.1. Domestic Demand & Supply

The existing water supply of Rudrapur city is 59 LPCD as per Pey Jal Nigam which implies that the total water supplied to the registered connections is 0.17 MLD. The total demand taking 70 LPCD as standard comes out to be 12.56 MLD. Hence, there is a shortage of 11.71 MLD out of which a certain percentage of supply is being fulfilled by other uses.

7.2.1.2. Non-Domestic Demand

In the case of Rudrapur, SIDCUL industrial estate is having its water supply system which has been discussed in the previous chapter. Industrial Demand: Bulk water supplied to the industrial establishment will be considered as per the specific requirement of each industry. The figure of 70 LPCD includes water requirements for commercial, institutional, and minor industries.

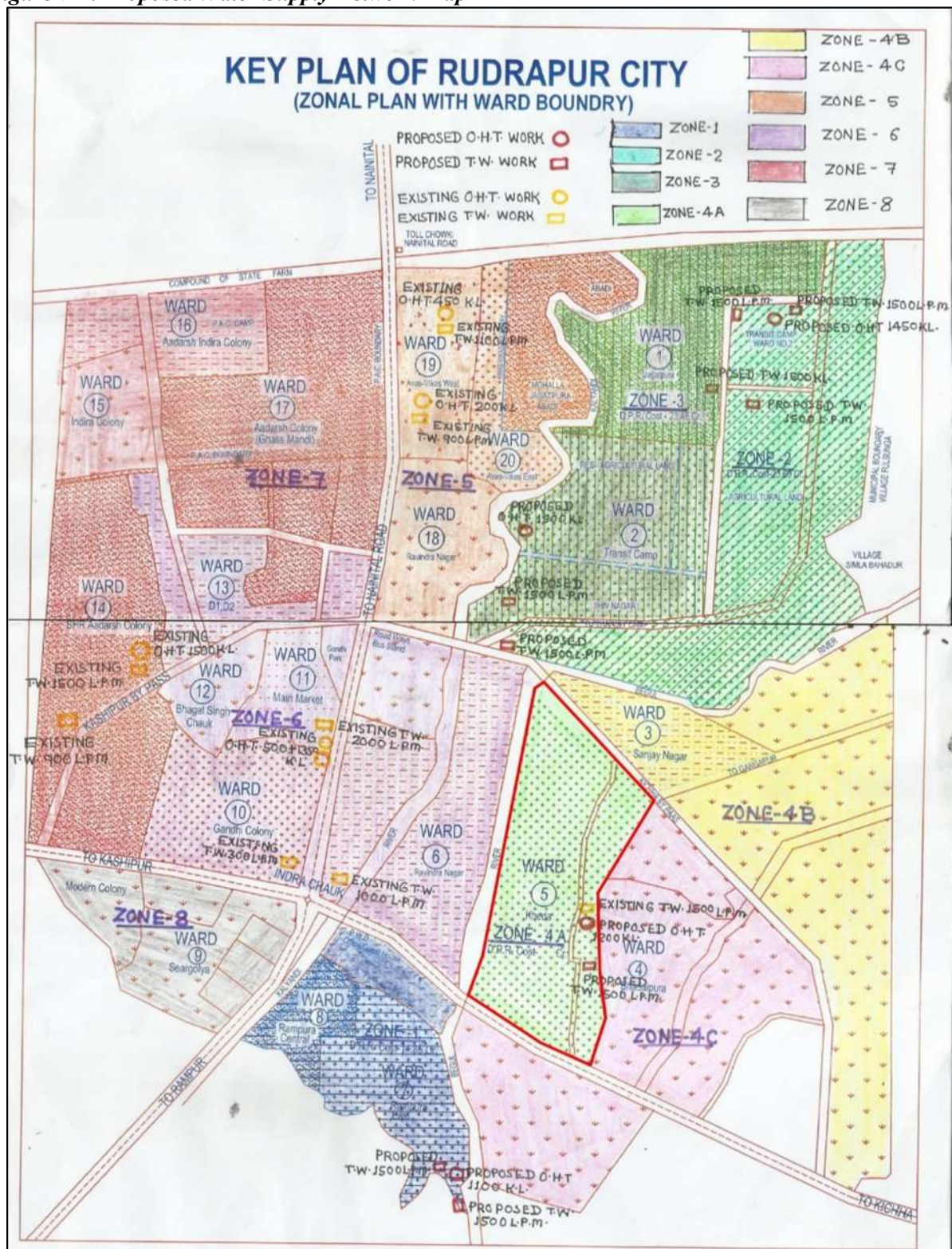
7.2.2. Water Treatment

There is no water treatment plant present in Rudrapur city as per Pey Jal Nigam, Rudrapur. However, there is a need for a water treatment plant in the city to ensure that people are getting safe and pure water for drinking and other purposes.

7.2.3. Area Coverage

At present, there is very partial coverage of the water supply network in Rudrapur city as per water supply data. However, there is a proposal for the provision of a water supply network in the city under the AMRUT scheme in which 20 wards as per the previous municipal limit have been covered. In

Figure 7-1: Proposed Water Supply Network Map



Source: Pey Jal Nigam, Kashipur

In this proposal, the city has been divided into 10 zones, and the water network will be laid down accordingly (refer to **Figure 7-1**). In addition to this, SIDCUL industrial area has its water supply system which has been discussed earlier. In addition, there are two townships in the city, which are having their private supply of water which are Super Tech Metropolis City and Omaxe Riviera City. Super Tech Metropolis is dependent on groundwater for supply for which they have three bore-well to pump water. They also have a water treatment plant for treating the water before supply to houses. The water supply system is continuous as water is being supplied throughout the day. There are 49 Over Head Reservoirs having a capacity of 20 KL each, one raw water tank of 50 KL capacity, and two stock tanks of 50 KL each for the supply of water. In the case of Omaxe Riviera, it is also dependent on groundwater for supply for which they have four submersibles to pump water. There is a treatment plant of 1300 KLD for treating the water before supply. The water supply system is intermittent as water is being supplied for 4-6 hours per day. The total quantity of water supplied in the society is 500 KLD, which implies 500 liters per house that are occupied. 42 Overhead Reservoirs are having a capacity of 75 KL each for the supply of water.

Overall, certain rural areas have become part of the municipal area as per the latest ward demarcation. These areas are not having a water supply network and they are not covered in the proposed plan of Payjal Nigam. Hence, there is a need to ensure the provision of water supply in these areas as well.

7.2.4. Supply Infrastructure

There are a total of seven Overhead Reservoirs at present, which are being used for the supply of water to households. The total capacity of OHRs is 5000 KL. The locations of these hours with the capacity of each are as follows:

- Jal Kal Parisar-2 (500 KL and 1350 KL)
- Adarsh Colony-1 (1500 KL)
- Awas Vikas- 2 (200 KL and 450 KL)
- Collectorate Parisar- 2 (650 KL and 350 KL)

A few more hours and tube wells have been proposed at various locations in the DPR prepared for water supply under the AMRUT scheme (refer to **Figure 7-1**). The purpose of proposing new OHRs and tube wells is to serve the existing population and to meet future demand.

7.2.5. Status of Water Supply under AMRUT Mission

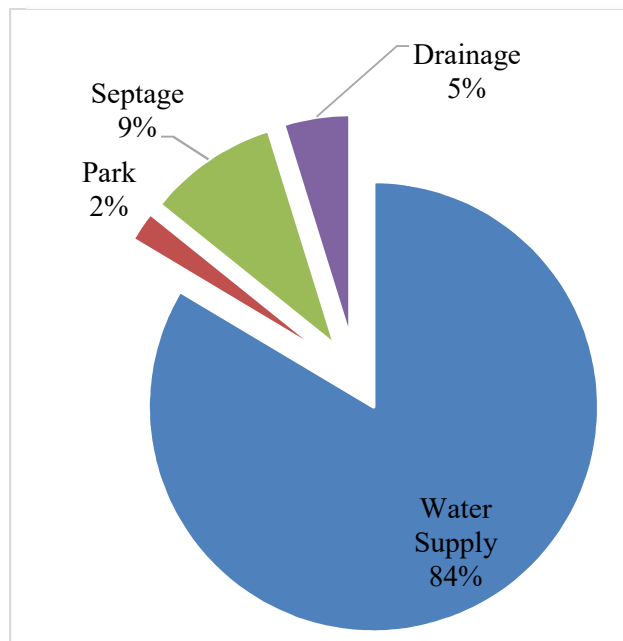
Providing basic services (e.g., water supply, sewerage, urban transport) to households and building amenities in cities, which will improve the quality of life for all, especially the poor and the disadvantaged is a national priority that is catered by this mission.

Water Supply in the context of Rudrapur under AMRUT Mission is getting the highest funds for safe drinking water facilities. The majority of the drinking water supply is provided in the transit camp in Ward-2 of Zone 2 during F.Y. 2015-16 until F.Y. 2017-18. Almost 84% of the funding from AMRUT in Rudrapur municipal corporation is dispensed and used in the water supply sector. Corporation receives the findings but it is disbursed to Pey Jal Nigam and they do implementation only.

Furthermore, the funding is disbursed annually with proposals submitted by the ULBs, which are to be implemented during

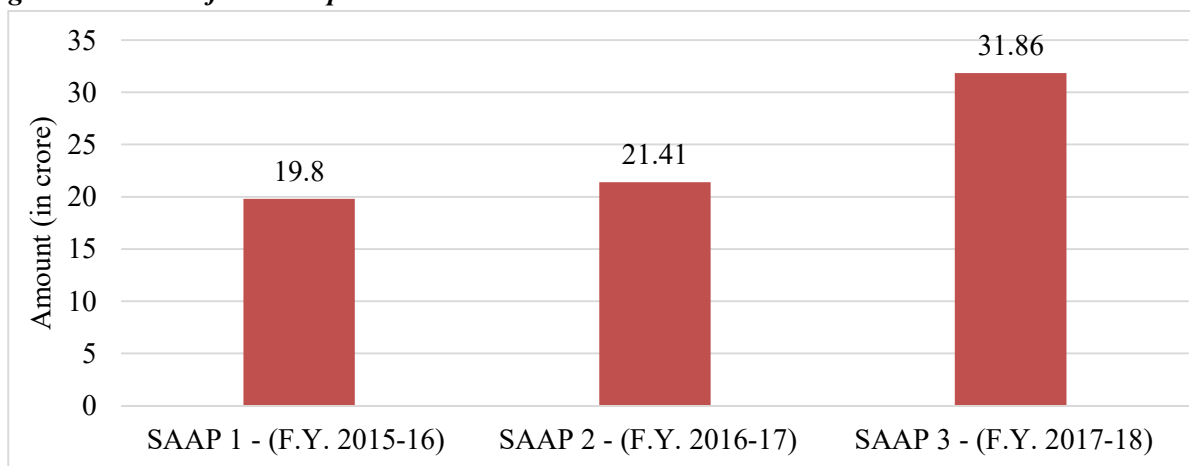
the same year. The primary purpose is to cover all households with a water supply and sewerage (including septage). For this, the Service Level Improvement Plan (SLIP) must be prepared by each ULB by assessing the service level gap, bridging the gap, examining alternatives, estimate the cost and financing at the individual ULBs level. After the preparation of SLIPs, a State Annual Action Plan (SAAP) is to be prepared at the state level for getting the funds. The basic building block for the SAAP will be the SLIPs prepared by the ULBs. At the State level, the SLIPs of all Mission cities will be aggregated into the SAAP. Therefore, the SAAP is a state-level service improvement plan indicating the year-wise improvements in water supply and sewerage connections to households.

Figure 7-2 SAAP-wise Allocation of Funds under AMRUT



Source: Census of India, 2011

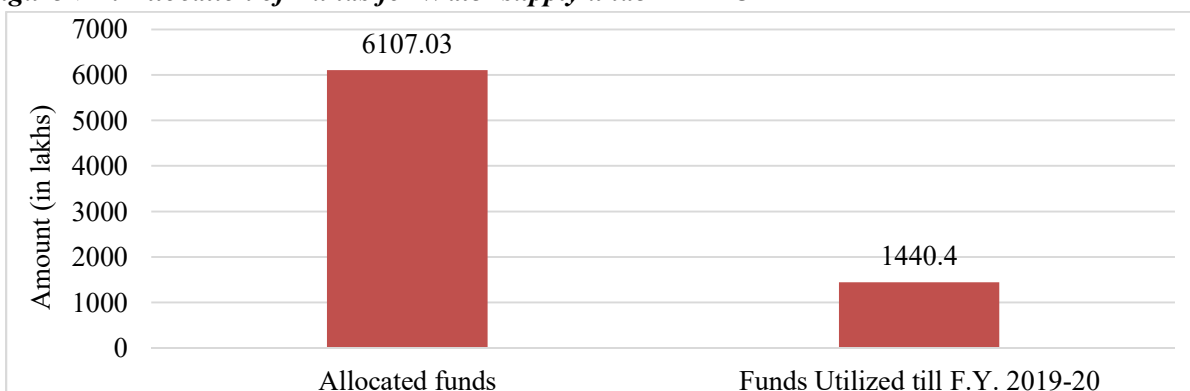
Figure 7-3: SAAP for Rudrapur M.C.



Source: Census of India, 2011

There has been a continuous increase in funding from the state for the Rudrapur municipal corporation with 19.8 crores in the F.Y. 2015-16 to 31.86 crores in the F.Y. 2017-18 (Refer to **Figure 7-3**). Seven projects of water supply were to be implemented in all three financial years. During the first F.Y. 2015-16 of the project initiation water supply work has been provided in Rampura wards 7 & 8 of zone 1 and transit camp ward 2 in zone 2. Further, in the F.Y. 2016-17 water supply to the transit camp and Jagatpura in ward 2 of zone 3. Finally, in the F.Y. 2017-18 Jagatpura, Transit camp, and Kheda in ward 5 of zone 4 have been covered under the scheme. All the funding has been done in a phased manner.

Figure 7-4: Allocation of Funds for Water supply under AMRUT



Source: Census of India, 2011

Out of the seven projects, six projects are under the implementation stage and one project is yet to start. The F.Y. 2017-18 data shows that around 24% of funds have been utilized while 76% are remaining which is expected to be utilized in the F.Y. 2020-21. (Refer to **Figure 7-4**)

7.2.6. Key Issues & Gaps

- About 90% of the population doesn't have the provision registered water supply connections.
- Wastage and theft of water are there due to unmetered water supply.
- Lack of use of Rainwater Harvesting Techniques.
- Areas that have been recently added to the municipality are not covered under water supply even in the case of proposals, which are being implemented under AMRUT.
- There is no water treatment plant present at the city level.
- There is a water shortage of 11.71 MLD in the city of Rudrapur.
- There is unorganized system of water supply in the case of rural areas.

Considering the growth of Rudrapur, appropriate strategies and mechanisms need to be explored, including recycling the wastewater generated by the industries. Mechanism of rainwater harvesting should also be encouraged at the household/ institutional/ industrial level to provide better quality and quantity of water. This would also help to reduce the water demand and in turn, save water.

7.2.7. Demand and Proposal

The total water required for 2041 in Rudrapur Planning Area is 218.49 MLD as discussed earlier. However, at present, there is very partial coverage of the water supply network in Rudrapur city under AMRUT Schemes and there is a proposal for the provision of a water supply network in the city under the AMRUT scheme in which 20 wards as per the previous municipal limit has been covered. In this proposal, the city has been divided into 10 zones, and the water network will be laid down accordingly (refer to **Figure 7-1**). Rudrapur has abundant groundwater and is mostly used for water supply in the planning area. Hence, the rest areas where there is no water supply are being proposed to be taken under each area by using groundwater.

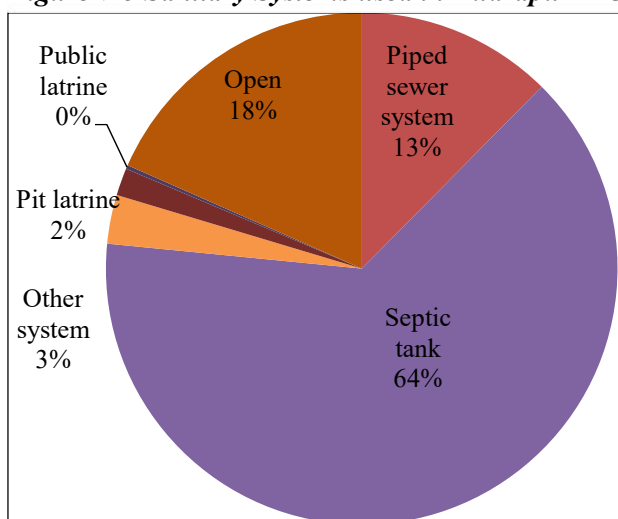
7.3. Sewerage and Sanitation

The disposal of sewage generated by industrial, commercial, domestic, and institutions is one of the basic functions of the local bodies/ concerned authorities. Providing a sewage disposal network is mandated due to its impact on the quality of life and the quality of the environment. Accordingly, sewage disposal has also been considered one of the critical components of urban infrastructure determining the quality of life in the urban sector. The city, in general, is not having any sewerage network and is dependent on a septic tanks system along with a pit latrine and direct disposal of sewage into drains. The polluted water of the septic tank is being directed to the open drains flowing along the roads on both sides. However, there is one Fecal Sludge and Septage Treatment Plant proposed in Rudrapur, which would be located at Rampura ground.

Rudrapur Municipal Corporation has done the allocation of tender for the same. This would prove to be beneficial in the coming years, as it would minimize the discharge of sludge and septage at inappropriate locations.

The sanitary systems, which are being used by households of Rudrapur city as per census 2011, are represented in **Figures 7-5**. The maximum percentage of households are dependent on septic tanks i.e., 64% of the total households followed by piped

Figure 7-5 Sanitary Systems used in Rudrapur MC



Source: Census of India, 2011

sewer system that accounts for 13% of the total households in the city. Only 1% of households are using public toilets while 18% are defecating in the open. Ward-wise and village-wise sanitary systems can be referred to. There are 6 public toilets in the city of Rudrapur which have been constructed by the Municipal Corporation of Rudrapur and are being maintained by them only. The piped sewer system in the city of Rudrapur is limited to the two-gated townships which include Metropolis city and Omaxe City. Apart from these two, SIDCUL industrial area is also having a sewerage system in function.

In the case of Metropolis city, a Separate sewerage system is presently laid along the roads of the society. The wastewater is transported to the Sewage Treatment Plant where this water is treated within the society. The capacity of the Sewage Treatment Plant is 1200 KLD. However, the treated wastewater is discharged into open drains or vacant land. In Omaxe City, a separate sewer network is also present and sewage flows to a Sewage treatment plant present within the society. The capacity of the Sewage Treatment plant is 1300 KLD. Like Metropolis, the wastewater is not being reused and is instead being discharged on vacant lands. There is a combined sewage network in the SIDCUL area having a total length of 12 km. This network is used to transport sewage from industries and other components to Sewage Treatment Plant, which is present within the SIDCUL area. The total quantity of waste generated is 2.25 MLD, which is being treated completely. However, the wastewater is being disposed of in the Kalyani River instead of reusing it.

In the case of rural areas, people are mainly using septic tanks and pit latrines as sanitary systems as per the census 2011. However, there are certain villages in which more than 50% are defecating in the open or disposing of the night soil in open drains including Jainagar, Kotha, Raipur, Amarapur, Loharra, etc. as per census data. Hence, there is a need for an organized sewerage system in Rudrapur Planning Area, which is best suited to it based on its existing conditions. Ward-wise and village-wise sanitary systems can be referred to in Error! Reference source not found..

7.3.1. Status of Individual & Public toilets under AMRUT Mission

Under household toilets the components of SBM look for: no households engage in the practice of open defecation; no new insanitary toilets are constructed during the mission period and Single pit latrines are converted to sanitary latrines/sanitary cleaning. For Public toilets, all places within the city attracting a floating population should be covered. Care should be taken to ensure that these facilities have adequate provisions for men, women, and facilities for the disabled (e.g., ramp provision, Braille signage, etc.) wherever necessary. ULBs should ensure that all Public Toilets being constructed under SBM (Urban) are built in tandem with water supply arrangements in ULBs. The Projects will be prepared, sanctioned, and implemented by ULBs.

In the Rudrapur context, there have been 832 forms received for the construction of individual toilets out of which 534 have been verified and 436 have been fully constructed until FY 2019-20. The remaining verified 98 toilets are under construction. The amount received from the government under SBM for the construction of these toilets was 72 lakhs rupees out of which Rudrapur Municipal Corporation has disbursed around 4.4 lakh rupees to individuals. The remaining are expected to be utilized in the coming FY.

7.3.2. Key Issues & Gaps

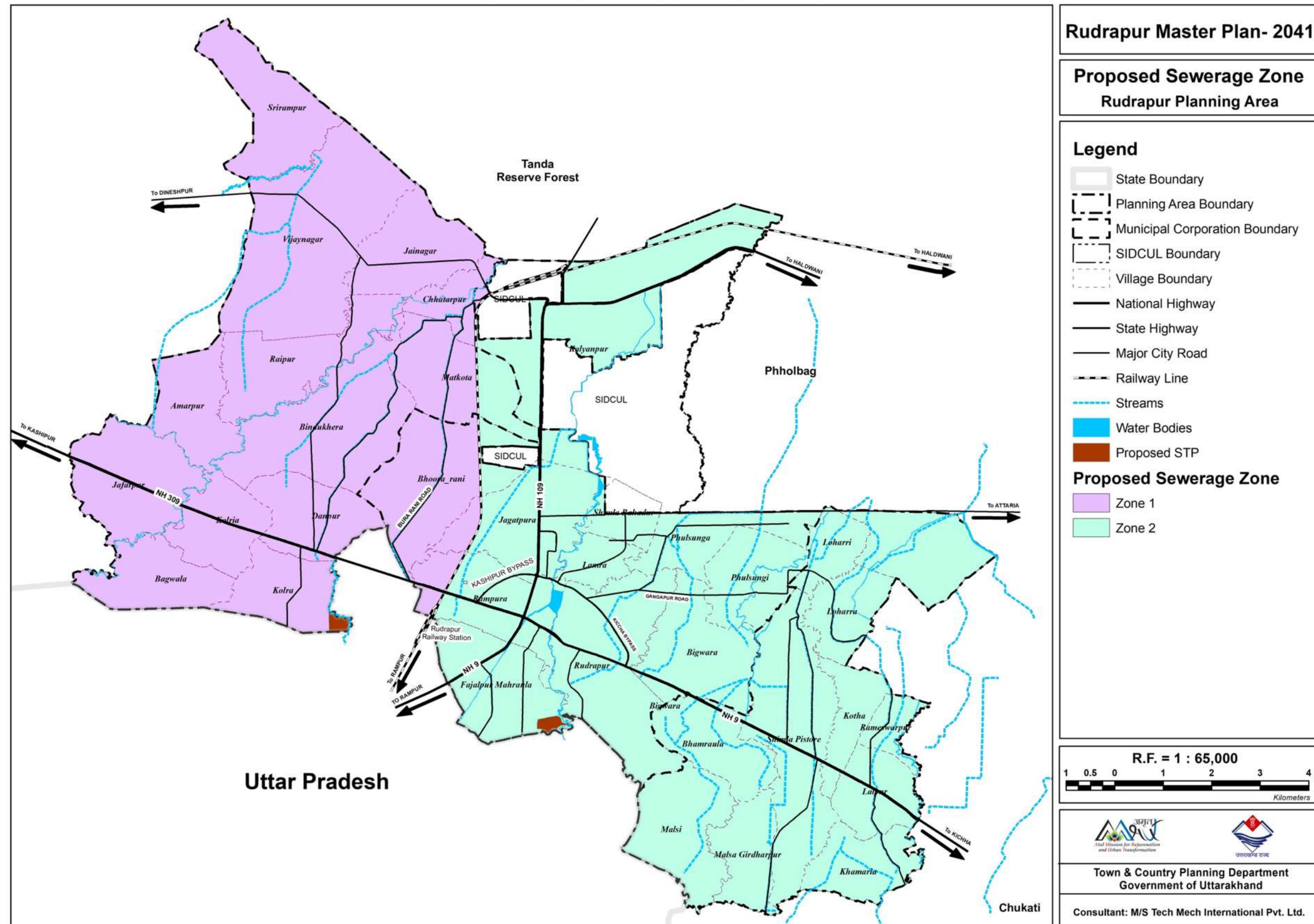
- An organized sewerage system is absent in the city of Rudrapur.
- The untreated wastewater is being dumped in the Kalyani River or vacant land or drains.
- 18% of households in the city are defecating in the open while the percentage is quite high in the case of rural areas, which are creating unhygienic conditions.
- The areas, which are having piped sewage systems, are disposing of the treated waste in the same way the untreated waste is being dumped. Instead, this treated wastewater can be reused in some way or the other.

7.3.3. Demand and Proposal

As per the CPHEEO manual, 80% of the water supply may be expected to reach the sewers as given in URDPFI guidelines. The total water requirement for 2041 is 218.49 LMD and hence the total sewage produced taking 80% of water reaching sewers is 174.79 MLD. To the treatment plant, the land required for the conventional Activated Sludge Process is 1000 m² per MLD. So, the total land required is 137660 m² or 13.76 Ha.

The entire city of Rudrapur is divided into two parts by the railway lines. Hence, the proposal for sewerage is also divided into two zones for the feasibility of the project. The two zones identified are presented in **Map 7-1**. For the eastern side zone, the project for Faecal Sludge & Septage Management of 125 KLD is already under construction. In the western zone, the septage plant is proposed on the southern end near the Kolara locality.

Map 7-1: Sewerage Zones Map for Rudrapur Planning Area



Source: Proposed by Consultant

7.4. Storm Water Drainage System

With the creation of a large area of hard surface by bringing vacant and green land into urbanization, a large volume of stormwater drainage is generated in urban areas. Draining the rainwater assumes importance because of the numerous problems created due to the inefficient disposal of stormwater. Due to the inefficient or non-existence of the Storm Water Drainage network, most of the city face a problem of water logging, causing heavy loss of property and human lives.

7.4.1. Area and Population Coverage

The city of Rudrapur is having man-made drains constructed along both sides of the roads including both major and minor roads. The city is 100% covered with drains but those drains are open drains and not closed ones (refer to Error! Reference source not found. &Error! Reference source not found.). This network is constructed and maintained by the Municipal Corporation of Rudrapur. It plays an important role in the disposal of stormwater and sewage as well since the sewer network is not present within the city. There are 22 main drains of Rudrapur having a total length of 17.45 km which are present in different parts of the city (Refer to Error! Reference source not found.). The total length of minor drains is 738.42 km that including drains present on both sides of the roads within the municipal limit.

Figure 7-6: Open Drain, Kashipur Bypass Road



Figure 7-7: Open Drain, Kashipur Road



In the case of rural areas, a drainage network is also present in all the villages falling within Planning Area. The type of drainage network present in villages is mostly open which includes

both pucca as well as Lucha drains. These drains are also used for the disposal of sludge and septage taken out from septic tanks or pit latrines.

7.4.2. Status of Drainage under AMRUT Mission

Drainage is an important component that needs to be addressed while preparing the SLIPs for any ULB. In Rudrapur municipal corporation area very less efforts have been taken to address this issue being on the verge of demand. While Industrial Estate under SIDCUL has its management system according to the standards. Also, the two housing societies Metropolis city and Omaxe Riviera have their own drain management systems with standards. So, at the city level, there is a huge demand for construction drains.

There are two projects sanctioned under the AMRUT mission which will be done for Rs. 350 lakhs by Rudrapur Municipal Corporation. Out of the two-project sanctioned one is completed and the other is under implementation. The total utilized fund till F.Y. 2017-18 was Rs.120.98 lakhs and the remaining will be utilized in the F.Y. 2020-21. The projects are:

- Cleaning & covering of drainage from irrigation department on Nainital Road till Kalyani River.
- Drainage construction from Shiv Nagar in transit camp till SIDCUL.

7.4.3. Key Issues & Gaps

- Disposal of domestic refuse and untreated sludge in the Drains water drains has led to a high degree of health hazard, emerging as a major threat to the environment and quality of life.
- Use of stormwater drains/nallahs for disposal of sewage.
- There is no mechanism for cleaning drains at regular intervals of time.

7.4.4. Demand and Proposal

The existing drainage network is open and solid waste dumping is found for which the drainage system is not functioning properly. For the stormwater drainage, the drains are proposed to be provided below the roads. On each road, the drainage channels are being proposed along the MUZ or pedestrian zone or along the edge of the bypass. These drainage channels would collect all the stormwater within the planning area to the natural drains that run through the planning area (refer to **Figure 7-8**).

Figure 7-8 Storm water drainage illustration



7.5. Solid Waste Management

Solid waste management is the prime responsibility of the Municipal Corporation Rudrapur involving collection, storage, segregation, transportation, and disposal. In Rudrapur city, door-to-door collection of solid waste is carried out through several sanitary workers deployed by the Municipal Corporation. In all, there are 156 sanitary workers deployed by MC, and another 150 workers have been employed through out-sourcing. In addition to this, there are one health inspector, one sanitary inspector, and 9 environment supervisors who are working to ensure safe and efficient management of solid waste.

7.5.1. Generation

The total generation of solid waste in the city of Rudrapur is estimated to be 43-44 tons per day (TPD). This large amount of solid waste generated is disposed of in the sanitary landfill also known as trenching ground located at Kichha road. Out of 43-44 tons generation, only 25-26 tons per day are being collected by Municipal Corporation, which implies that 42% of the waste is not being collected by MC (refer to Error! Reference source not found.).

7.5.2. Composition

Solid waste comprises waste generated from different sources. Major sources of generation are individuals, households, industries, trade and commerce, hotels and restaurants, healthcare institutions including dispensaries and hospitals, animals, and floating populations in terms of tourists, hawkers, etc. The solid waste generated can be broadly classified into four categories:

- Organic Waste, which includes kitchen waste (food items), leaves, remains of animals slaughtered, etc.,
- Recyclable Waste, which includes paper, plastic, glass, metal, rags, packing materials, twigs, bark, etc.,
- Inert Waste includes bricks, cement, building debris, furniture waste, etc.
- Industrial Waste, which includes the byproducts.
- In addition, a large amount of waste is also generated by several hospitals, dispensaries, and other health care institutions, which are operational in the city.
- The recently added category is E-Waste generated from electronic products.

7.5.3. Collection

The collection of municipal solid waste at the household level is reported to be roughly 58-59%. Different methods are adopted for the collection of solid waste from different uses. At the household level, Door-to-Door collection of waste is practiced. Despite having a high content of organic waste in household waste, no system of segregation is used at the generation level. At the community level, dustbins have been placed in different spaces which are emptied at regular intervals (refer to **Figure 7-9 & Figure 7-10**). In the process, the quality of recyclable material is also distorted due to the mixing of the dry and wet waste. However, the segregation is done at later stages and 0.3 tons of organic waste is converted into fertilizers. There is one health assistant employed by the Municipal Corporation along with 167 sanitary workers who are responsible for the collection of waste. In addition to this, 150 other workers have also been involved in the waste collection through outsourcing. Industrial waste generated in SIDCUL is collected by their staff, which is having the quantity of 100 kgs per day. Metropolis city has leased out the contract to a private company, which is responsible for the collection and disposal of solid waste. In the case of Omaxe Riviera, 350 kg per day of waste is collected this is being dumped on open land.



Figure 7-9: Dustbin at Main Market, Adjacent to the Gandhi Park



Figure 7-10: Dustbin at Kashipur Road

7.5.4. Transportation

To transport solid waste from houses or from community bins to the disposal site, Municipal Corporation has deployed various kinds of vehicles, which include the following:

Table 7-1: Vehicles Deployed for collection of Solid Waste

Type of Vehicles Deployed	Trucks/ Lorry	Tippers	Dumpers/ Placers	Rickshaw/ Hand Cart	Others
209	5	23	4	164	13

Source: Municipal Corporation, Rudrapur

The number and type of vehicles, which have been deployed for waste collection, are depicted in **Table 7-1**. There are in total 209 vehicles deployed out of which 164 are either rickshaws or hand carts accounting for 78.5%. Other vehicles include 5 water tanks, 1 cesspool cleaning machine, 3 JCB and 4 compactor/refuse collectors.

7.5.5. Disposal

Rudrapur Municipal Corporation is dumping their solid waste in the sanitary landfill, also known as, trenching ground located at Kichha road. The area of the dumping site is 7945.25 sq.m. This landfill has reached its saturation level as the quantity of waste that is being dumped is more than its capacity (refer to **Figure 7-11 & Fig**). This has resulted in waste overflowing onto the road forcing the administration to adopt precautionary measures which also include closing the adjacent road of the landfill. A certain quantity of organic waste is being converted into fertilizer through composting at the two composting plants managed by the Municipal Corporation of Rudrapur. These plants are located at District Hospital, Nainital Road, and near PAC Campus. The industrial waste generated by SIDCUL is being recycled within the area and is being reused which is a positive approach by the management of SIDCUL and other involved stakeholders.



Figure 7-11: Landfill Site, Kichha Road

In addition to this, informal dumping of waste has been witnessed in Dallas, open spaces, vacant plots, etc. This informal dumping of garbage along nallah, etc. has led to the creation of an unhygienic environment in the areas of the city. Moreover, there is no formal system of solid waste management operating in the villages of the Planning Area, which has been included within the planning area.

To effectively manage solid waste, it will be important to involve all the stakeholders and create awareness among the masses to manage the waste and keep the city clean. The best approach will be to ask people to generate as little waste as possible and to segregate the waste at the household level itself. There should be strategies to deal with the generation of e-waste in the city.

7.5.6. Key Issues & Gaps

- Around 42% of the total waste generated is not being collected by Municipal Corporation, which has resulted in informal dumping of waste in drains, open land, and even along roads.
- There is no segregation of waste at the generation level or any other level except for a certain quantity of organic waste.
- There is an absence of scientific collection and disposal.
- The Sanitary landfill has reached its saturation level and is overflowing which could be dangerous for the nearby residents.
- The quantity of solid waste that is being segregated for composting is very less because the majority of waste collected at the household level is organic.

- Segregation of e-waste and its safe disposal and treatment are completely missing in the city.
- There is no formal system of solid waste management operating in the villages of the Planning Area, which has been included within the planning area.
- Informal dumping of waste is creating an unhygienic environment and health-related risks for the local people.

7.5.7. Proposed Projects

Municipal Corporation has identified a new site for a sanitary landfill area of 44515.42 sq. mt. near Aditya Nath Jha Inter College. This site would be used to meet the existing as well as future demands of the city.

7.5.8. Status of Solid Waste Management under SBM

ULBs are to prepare bankable Detailed Project Reports (DPRs) for Solid waste management of their city in consultation with state governments. Smaller cities can form clusters to become viable entities to attract private investment. Central assistance is up to 35% of the project cost for all States/ UTs. The respective ULBs and private investors will arrange other funds. In the case of Rudrapur, the municipal corporation is responsible for implementing and monitoring the solid waste generated. The corporation has a dumping site of 4.04 hectares at 1.5 km from the Municipal Corporation. As of now the highest solid waste generating bodies within the municipal limit are Metropolis, Omaze, Radisson blue hotel & SIDCUL which generate more than 100 kg per day and have more than 200 families.

All the 40 wards of the corporation area are covered for SWM under the SBM mission with door-to-door collection in every ward. A private player M. Akanksha enterprises have been assigned the work for the door-to-door collection. Further, only 3 to 4 wards are doing segregation and others are in progress. Total waste produced in the corporation is approximately 65-70 tonnes per day that is collected the same day and transported to dumping sites. Moreover, the municipal corporation is also composting the waste generated under the SBM mission. As of now, there are 25 government housing colonies in the corporation area which have composed dumping pits. Apart from this, a plant for scientific segregation has also been proposed whose E-tender is currently out to the public.

Further, the ban on poly bags in the corporation is maintained very well and a total of 288 challans have been done in the current F.Y. An amount of Rs.252650 has been collected from these challans that can be used in the upliftment of the infrastructure in the city. Moreover, under the Uttarakhand Anti Littering and Anti Spitting Act, 2016 which aims to keep the State clean and pollution-free, restriction on littering and spitting across ULBs and also in villages is under force in Rudrapur. About 303 challans have been generated for offending the law with a revenue collection of Rs. 3,34,610 in the current F.Y.

7.5.9. Demand and Proposal

By 2041, the total solid waste produced will be 363.85 TPD. Nagar Nigam has identified a site of the land of 3.74 Ha for a solid waste processing plant. It has been finalized by the Nagar Nigam that the Bio-methanation process shall be used for solid waste processing. According to URDPFI Guidelines, for 500 TPD of waste, 4 Ha of land would be required for Bio-methanation Process. Therefore, the 3.88 Ha of the site is sufficient for 363.85 TPD of waste.

7.6. Tele-Communication

There are four units of the telephone exchange in Rudrapur Planning Area, which are providing telecommunication facilities to the people of Rudrapur. In these four telephone exchanges, there are 2,177 landline telephone connections registered in Rudrapur Planning Area. Several private companies have emerged in the telecommunication sector due to the privatization of this sector. To provide better connectivity services, 29 mobile towers are present within the Planning Area which provides both 3G and 4G data services. These towers are scattered and located at strategic locations within the Planning Area. Private sector companies are providing the majority of the services and the share of the public sector is very less in this sector as far as Rudrapur is concerned.

8. Social Infrastructure

8.1. Introduction

Social Infrastructure refers to the facilities and the process involved, which ensures education, health facilities, and community development in any town. Social Infrastructure includes the education system, health care, social and cultural facilities, parks, open spaces, etc. The different components of social infrastructure will help to know how well a city or town is equipped with facilities. The provision of education, health, etc. defines the quality of life. As the city expands and the population increases, the gap between demand and supply of these essential services increases, which deteriorates the quality of life in urban areas.

8.2. Education Facilities

Educational facilities play an important role in the overall development of a nation. These facilities enhance economic growth and employment by making people capable enough to work. Rudrapur Planning Area has a hierarchy of educational institutes (from Anganwadi to College) which makes the region fortunate enough. There are in total 533 educational institutes (including 349 Anganwadis) both at the lower level and higher level which cater to the needs of both urban and rural people. Rudrapur Planning Area has many institutions imparting education at the school level.

Table 8-1: Educational Facilities in Rudrapur Planning Area

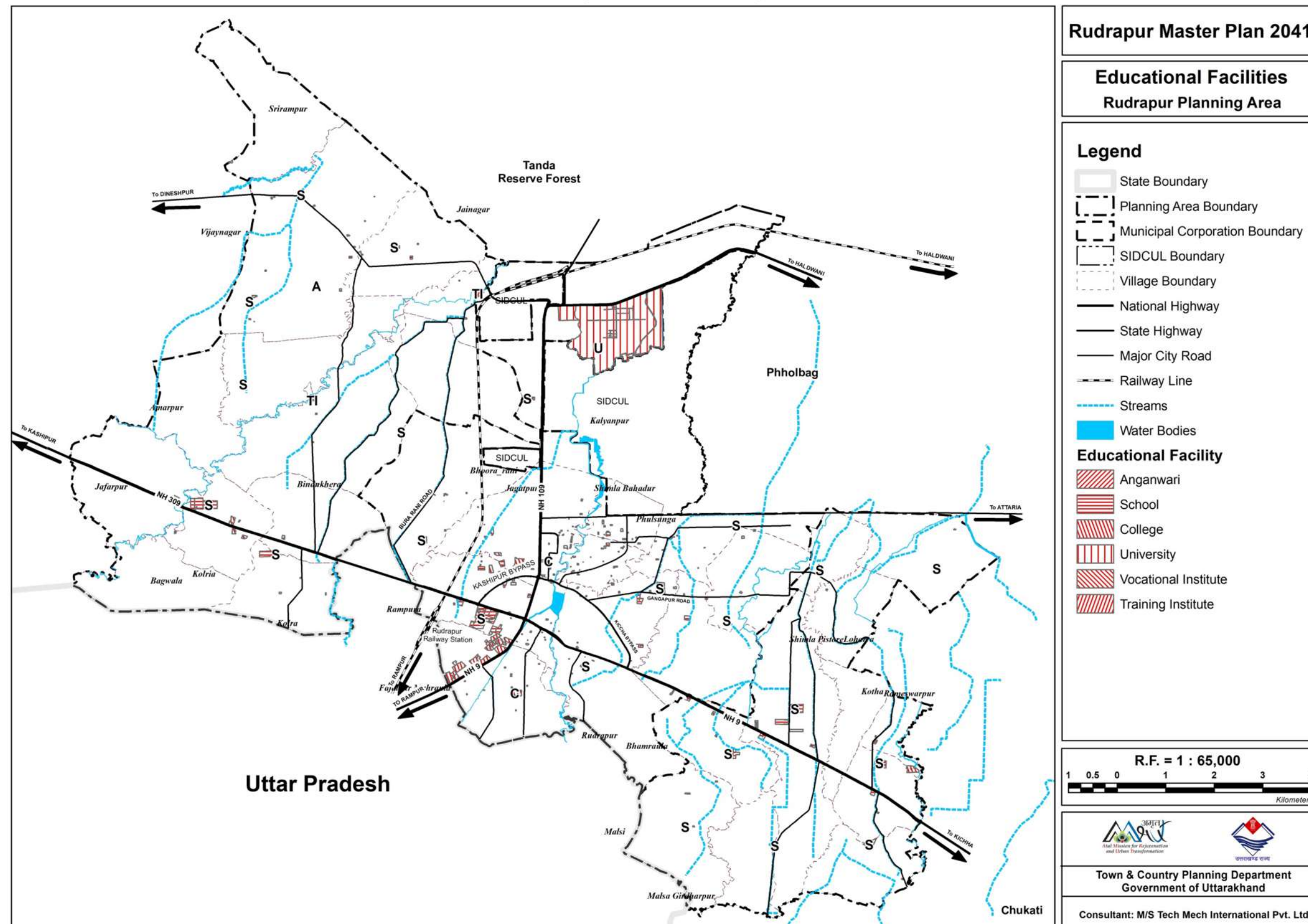
Type of Institution	Standard	Urban		Rural		Planning Area	
		No.	Variation	No.	Variation	No.	Variation
Anganwadi	1 per 5,000	171	+135	178	+166	349	+301
Primary School	1 per 5,000	40	+4	26	+14	66	+18
Middle to Senior Secondary School	1 per 7,500	69	+45	36	+28	105	+73
College	1 per 1.25 lakh	13	+12	-	-	13	+11

Source: District Education Office, US Nagar & Kumaon University, Nainital

Note: + depicts surplus and – depicts shortage

The table represents the number of educational institutions of each type that are present in both urban and rural areas. There are 171 Anganwadis in urban areas while there is a requirement of 30 and in the case of the Planning Area, there is a total of 349 Anganwadis which is much more than the requirement as depicted in **Table 8-1**. The existing number of facilities has been compared with the standards to calculate the shortage of each kind of facility. At present, there

Map 8-1: Educational Facility



Source: Extracted from Existing Land Use 2021 based on Primary Survey

are 40 primary schools, 69 middle to senior secondary schools, and 13 colleges in Rudrapur city while in the case of rural areas there are 26 primary schools and 36 middle to senior secondary schools. There is no college facility available in rural areas of Rudrapur. There is a surplus number of schools available compared to the required number in both urban and rural areas and the Planning Area as a whole. Also, there is a surplus number of colleges present in the Rudrapur Planning Area based on the URDPFI standards (**Map 8-1**).

8.3. Health Care Facilities

Health care facilities are provided by the department of health and family welfare in the case of Rudrapur. The data provided by the concerned department given below is providing a clear image of the scenario of health infrastructure in the Rudrapur Planning Area.

Table 8-2: Health Care Facilities in Rudrapur Planning Area

Type of Institution	Standard	Urban		Rural	Planning Area	
		No.	Variation	No.	No.	Variation
Primary Health Centre	1 per 1 lakh	3	+1	0	3	+1
Primary Sub-Health Centre	1 per 45,000 to 1 lakh	0	-2	0	0	-3
Dispensary	1 per 15,000	25	+13	1	26	+10
Nursing Home	1 per 45,000 to 1 lakh	7	+5	0	7	+4
Hospital	1 per 1-2.5 lakh	32	+31	2	34	+32
Family Welfare Centre	1 per 50,000	0	-3	0	0	-5
Diagnostic Centre	1 per 50,000	16	+13	1	17	+12
Others	-	44	-	1	45	-
Veterinary Hospital for pets and animal	1 per 5 lakhs	1	0	1	1	+1
Dispensary for pets/ animals	1 per 1 lakh	0	-1	4	4	+3

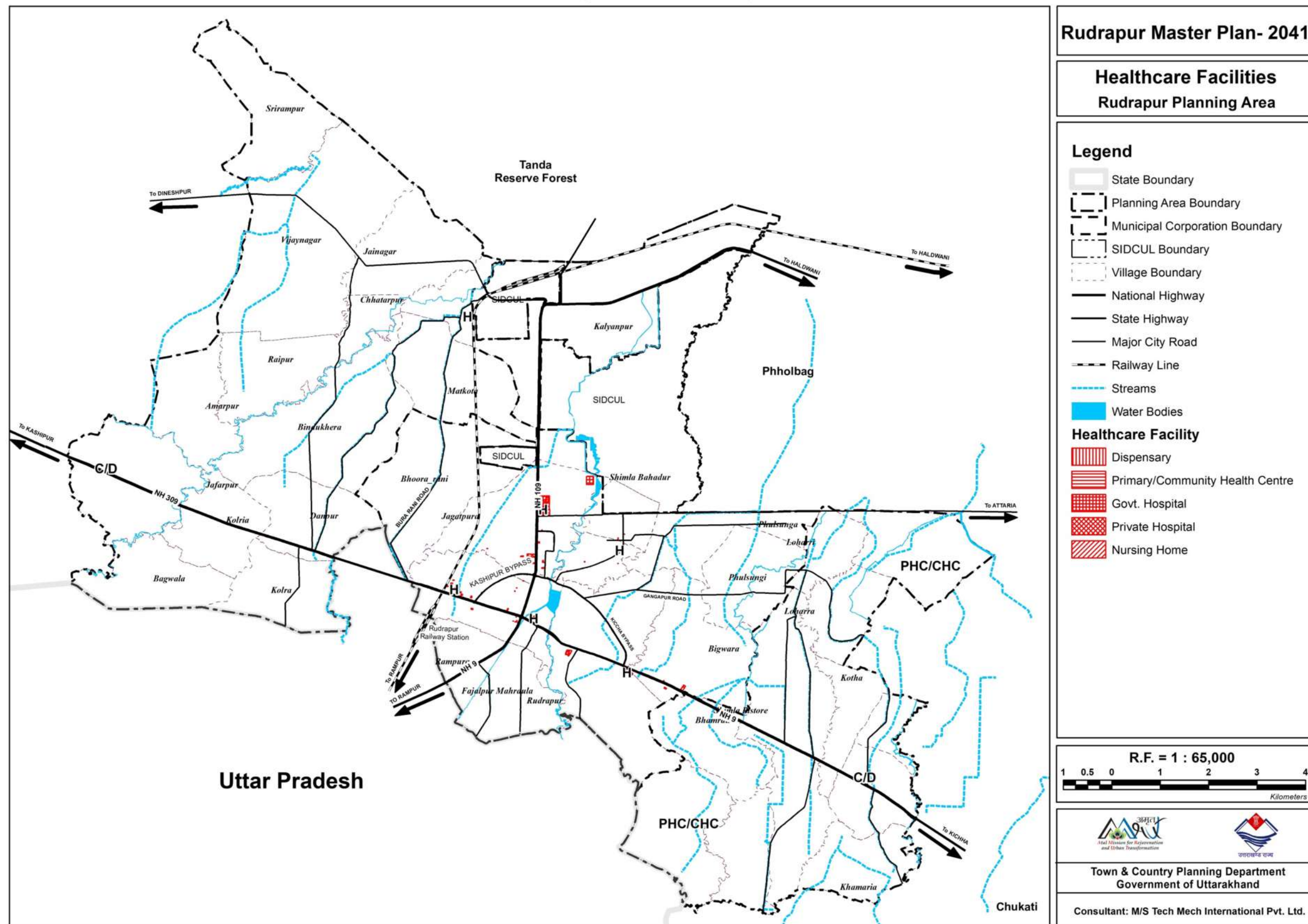
Source: Health and Family Welfare Department, US Nagar

Note: + depicts surplus and – depicts shortage

The numbers of health facilities of each type that are present in both urban and rural areas have been depicted in **Table 8-2**. The existing number of facilities has been compared with the standards to calculate the shortage of each kind of facility. There are 3 primary health centers, 25 dispensaries, 7 nursing homes, 32 hospitals, 16 diagnostic centers, and 44 other specialized health care centers in urban areas which are sufficient as per the requirement.

There is the absence of primary sub-health centers and family welfare centers in the urban area, while, there is a requirement for two primary sub-health centers and three family welfare centers. At the Planning Area level, there is a shortage of primary sub-health centers and family welfare

Map 8-2: Healthcare Facility



Source: Extracted from Existing Land Use 2021 based on Primary Survey

centers while other facilities are more in number than required (Refer to **Table 8-2**). Facilities available for animal treatment include a veterinary hospital and dispensary. There is a shortage of one dispensary for pets in urban areas. But at the Planning Area level, the number of dispensaries is surplus in number which is since these dispensaries are in rural areas (refer to **Map 8-2**).

8.3.1. Epidemiological Details

The most prevailing disease in the Tehsil is Tuberculosis having 3,984 patients in the last three years. Other prevalent diseases include Dengue (115 cases) and Leprosy (23) cases. The cases of other diseases including Japanese Encephalitis (8), Malaria (4), etc. are negligible (Refer to **Table 8-3**).

Table 8-3: Epidemiological Details of Rudrapur Tehsil (Period from April 2016 to August 2019)

Name of Predominant Diseases	No: of persons Affected
Leprosy	23
Phylaria	0
Tuberculosis	3984
Cholera	0
Dengue	115
Chikungunya	0
Malaria	4
Others (Specify)	9 Japanese Encephalitis: 8

Source: Health and Family Welfare Department, US Nagar

8.4. Socio-cultural & Other Facilities

There are various socio-cultural facilities present in Rudrapur Planning Area which mainly include Anganwadi, community room/hall, recreational facilities, parks, open spaces, stadiums, etc. The details of each have been given below:

Table 8-4: Socio-Cultural Facilities in Rudrapur Planning Area

Type of Institution	Standard	Urban		Rural	Planning Area	
		No.	Variation	No.	No.	Variation
Community Room	1 per 5,000	0	-36	0	0	-48
Community Hall	1 per 15,000	4	-8	0	4	-12
Music, Dance, and Drama Centre	1 per 1 lakh	0	-2	0	0	-2
Meditation and Spiritual Centre	1 per 1 lakh	0	-2	1	1	-1
Recreational Club	1 per 1 lakh	0	-2	0	0	-2
Housing Area Park and Play Area	1 per 5,000	51	+15	0	51	+3
Neighborhood Park and Play Area	1 per 15,000	5	-7	0	5	-11
Community Park	1 per 1 lakh	0	-2	0	0	-2

Type of Institution	Standard	Urban		Rural	Planning Area	
		No.	Variation	No.	No.	Variation
Community Level Multi-Purpose Ground	1 per 1 lakh	1	-1	0	0	-1
District Sport Centre	1 per 1 lakh	1	0	0	1	-1
Petrol Pump	-	7	-	12	-	19
Police Post	1 per 40,000-50,000	4	0	1	5	0
Police Station	1 per 90,000	2	0	0	2	-1
Fire Station	1 per 2 lakh population	2	+1	0	2	+1
District Management Centre	1 per administrative zone	1	0	0	1	0
Fire training institute	1 per city	0	-1	0	0	-1
Cremation/Burial Ground	1 per 5 lakhs	4	+3	0	4	+3
Telephone Exchange	1 per 4 lakhs	2	+1	2	4	+3
Post Office	1 per 15,000	4	-8	4	8	-8
Bank	1 per 15,000	20	+8	9	29	+13
Poultry and Slaughter House	-	3	-	0	3	-

Source: Municipal Corporation, Rudrapur; Concerned District Departments, US Nagar

Note: + depicts surplus and – depicts shortage

8.4.1. Socio-cultural Facilities

There are four community halls in Rudrapur city only, whereas, the requirement of community halls is 16 at the planning area level. This implies that there is a shortage of 12 community halls in the Rudrapur Planning Area. Other socio-cultural facilities such as a community room, music, dance and drama center, meditation and spiritual center, and recreational club are missing in the planning area. The number of units required for each can be referred to in **Table 8-4**. Also, there are 69 Self-Help Groups registered with the Municipal Corporation up to the year 2019 having a total of 690 members.

8.4.2. Sports and Recreation

For Physical and Social development of individual recreational facilities are foremost important. Therefore, the provision of these facilities at the local; sub-city, and city levels in a balanced form is necessary. Recreational facilities exist in the shape of parks, stadiums, sport-related activities, etc. To cater to the essential needs of the individuals and communities these facilities need to be provided. Rudrapur Planning Area has several recreational and sports facilities which

are elaborated in **Table 8-4**. There are two types of parks present in the city namely, housing area parks and neighborhood parks. The third type of park i.e., the community park is missing in the Planning Area and there is a shortage of 2 such parks. 51 housing area parks and 5 neighborhood level parks are present in the urban area and Rudrapur Planning Area. The neighborhood parks are in Ward Number 2, Ward number 3, Ward number 11, Ward Number 18, and Ward number 19. The number of housing in Area Park is more than the requirement as per the existing population. But there is a shortage of neighborhood-level parks at both urban and Planning Area levels. In addition to this, there is one district sports center which is present in Rudrapur city. This park is in Vikas Bhavan near the district collectorate. There is a requirement for one more stadium as per the population of the Rudrapur Planning Area.

8.4.3. Petrol Pump

The number of petrol pumps present within the Rudrapur Planning Area is depicted in **Table 8-4**. There are 19 petrol pumps present in Planning Area. There are 7 petrol pumps in urban areas while there are 12 petrol pumps in rural areas of Rudrapur. The petrol pumps are located along Nainital road, Kichha road, Kashipur road, and Rampur Road.

8.4.4. Police Facilities

Maintaining the law and order situation in the region is one of the primary functions of the Police Administration. To fulfill this purpose, Rudrapur has 2 Police stations in the city and 5 Police Posts in Rudrapur Planning Area out of which 4 are present in the city while one is present in Rampura village. The existing number of police stations is less than the requirement as there is a need for one more police station to cater to the needs of people (Refer to **Table 8-4**). In its addition, there is one home guard office and one traffic police office in the district collectorate.

8.4.4.1. Law and Order - Crimes Reported

The total number of crime cases reported in 2018 was 424 which was the highest in the last 5 years (2014-2018) as depicted in **Table 8-5**. The two major crimes reported in the last 5 years were theft (683) and a crime against women (547). The crime rate has shown a variable trend in the last 5 years as it increases in the year 2015 in comparison to 2014 and 2016 in comparison to 2015. However, the number of cases reduced in the year 2017 as compared to 2016 and again increased in the year 2018. The police department has installed 29 CCTV cameras along major roads and at major junctions to control crime.

Table 8-5: Crimes Reported in Rudrapur in the Last Five Years

Type	2018	2017	2016	2015	2014
Theft	147	106	166	123	141
Burglary	9	12	15	12	6
Kidnapping	25	17	29	22	16
Robbery	14	14	6	7	10
Riots	13	22	9	11	9
Murder	9	7	11	5	4
Crime Against Women	152	111	128	87	69
Fatal Accidents	21	15	30	27	29
Non-Fatal Accidents	32	23	23	15	21
Cyber Crimes	2	7	4	2	1
Total	424	334	421	311	306

Source: Police Department, US Nagar

8.4.5. Fire Prevention and Protection

Fire accidents have become a common day phenomenon, so to prevent & protect from fire it is necessary to provide essential services in the city. Due to the advancement in technology and high-rise construction, industrial accidents, and short-circuiting in commercial establishments are most vulnerable to fire incidents. It becomes the foremost obligation of the govt. to provide security from these accidents. There are two fire stations present in Rudrapur Planning Area. One of the fire stations is located at Kashipur bypass road and the other one is in SIDCUL Pantnagar. The number of fire stations is sufficient to serve the existing population as per the given standards (Refer to **Table 8-4**). However, there is an absence fire training college which is missing at present but has been proposed within the city.

8.4.5.1. Existing Infrastructure in Fire Stations

As per the information supplied by the respective District Fire Officer, the infrastructure present in each of the fire stations can be referred to in **Table 8-6**:

Table 8-6: Infrastructure Available in Fire Station present in Rudrapur Planning Area

Sr. No.	Infrastructure	Number	
		Rudrapur	SIDCUL, Pantnagar
1	Water Tender	3	1
2	Foam Tender	1	2
3	Mini-Water Tender	2	1
4	Water Mist High-Pressure Mini Tender	1	0
5	Fire Fighting Bike	1	1
6	Ambulance	1	1

Sr. No.	Infrastructure	Number	
		Rudrapur	SIDCUL, Pantnagar
7	DCP Tender	0	1

Source: Fire and Safety Department, US Nagar

8.4.5.2. Telephone Exchange and Postal Facilities

There are 4 telephone exchanges present in the Rudrapur Planning Area, of these, two are situated in the municipal corporation while the remaining are located in Jafarpur and Lalpur villages. One telephone exchange is required as per standard which implies that the existing number of telephone exchanges is sufficient (Refer to **Table 8-4**). In the case of postal facilities, 4 post offices are present in urban areas and 4 in rural areas. The post offices are in Bhoora rani, Chhatarpur, Kanpur, and Khanpur villages. There is a shortage of 6 post offices in Rudrapur city while at the Planning Area level there is a shortage of 8 post offices as per the existing population (Refer to **Table 8-4**).

8.4.6. Banking Facilities

The existing banking facilities in Rudrapur city and Rudrapur Planning Area have been shown in **Table 8-4**. The existing number of facilities has been compared with the standards to calculate the shortage of each kind of facility. There are 20 banks located in Rudrapur city and 29 banks in total located in Rudrapur Planning Area. The number of banks present is sufficient in number as per the existing population.

8.4.7. Poultry and Slaughter Houses

The poultry and slaughterhouses present in Rudrapur Planning Area are represented in **Table 8-4**. There are three such units present in the Planning Area which include a government poultry farm situated on the Sadar hospital campus nearby the block office. Other units include the disease research center and Sadar hospital. There are 11 dairy outlets & collection centers (Milk Co-Operative Societies) within Rudrapur Planning Area.

8.4.8. Status of Socio-cultural facilities under AMRUT Mission:

The development of green spaces and parks with special provisions for child-friendly components is one of the essential components of the AMRUT mission. The mission mandate is that for parks, ULBs will have to establish a system for maintenance with resident participation. One-half of the project cost will be given by the central government. Also, the total expenditure on these projects will not exceed 2.5% of the State Annual Action Plan (SAAP).

In the context of Rudrapur, 8 parks were proposed from the F.Y. 2015-16 to F.Y. 2017-18 in the corporation area under the AMRUT mission. The projects are as follows:

1. Beautification of Park in Block-C Transit Camp in Ward No. 1 in FY 2015-16
2. Beautification of Ekram Array Park in Ward No. 7 in FY 2016-17
3. Beautification of Subhash Park in Ward No. 2 (Part - 1) in FY 2016-17
4. Beautification of Subhash Park in Ward No. 2 (Part - 2) in FY 2017-18
5. Beautification of Park in front of girl's hostel in Ward No. 19 in FY 2017-18
6. Beautification of Gayatri Park in Ward No. 20 in FY 2017-18
7. Beautification of Ram Kumar Arya Park in Ward No. 17 in FY 2017-18
8. Beautification of Patel Park in Ward No. 19 in FY 2017-18

A total amount of Rs.160 lakhs have been disbursed in all the three FYs. Out of the eight projects seven projects are completed and one is under the implementation stage. The F.Y. 2017-18 data shows that almost 84% of funds have been utilized while 16% are remaining which is expected to be utilized in the coming F.Y. 2020-21.

8.5. Key Issues & Potentials

9. There are a requirement for 2 primary sub-health center and 3 family welfare centers at the Planning Area level.
10. There is a shortage of one dispensary for pets in urban areas but at the Planning Area level, the number of dispensaries is surplus in number.
11. Socio-cultural facilities such as a community room, music, dance and drama center, meditation and spiritual center, and recreational club are missing.
12. 8 more post offices are required to serve the population of Rudrapur as per the given standards.
13. There is a requirement for one more police station as per the analysis of existing police facilities.
14. Criminal activities have increased in the last few years which needs to be given due consideration in the formulation of the master plan.
15. There is a shortage of one stadium, two community parks, and 11 neighborhood parks as per the given standards.

16. There is an absence of a fire training college/institute in the Rudrapur Planning Area. However, it has been proposed within Planning Area itself.

8.6. Future Requirements

The facilities and land requirements under social infrastructure are provided in **Table 8-7**. The total area required under social infrastructure is 577.56 ha. The maximum use of land under this category is for education, health, and parks & open spaces. However, community-level facilities should be provided along with the residential areas at the neighborhood level. From education, the facilities are being provided in residential areas at the neighborhood level till senior secondary high school and the number of colleges are sufficient in the planning area. Hence total of 195.50 Ha under education is being provided at neighborhood levels. In healthcare, dispensary, nursing homes and polyclinic are also being provided in residential areas. Other facilities like Multispecialty hospital, Special Hospital, Rehabilitation Centre, etc. are provided in dedicated zones. So, out of 136.69 ha, 130 ha are being provided in healthcare rest of 6.69 ha land is being provided in residential areas at the neighborhood level. Likewise, the socio-cultural facilities, open spaces, and multipurpose grounds are being incorporated into residential areas. Of the rest other facilities, the community level facilities i.e., 5,000-15,000 population serving facilities are incorporated in residential areas at the neighborhood level and the higher-level facilities are being presented in mixed-use. Telephone, Postal, and Banking facilities, though 2.82 ha of land is deficient based on URDPFI guidelines. However, on the ground, due to growing online facilities, the existing facilities would be enough for Rudrapur Planning Area.

Table 8-7 Demand for Social Infrastructure

Facility	Area (ha)
Education	195.50
Health Care	136.69
Socio-Cultural	24.04
Open Spaces	139.00
Multipurpose grounds	18.00
Sports Facilities	48.00
Police, Civil Defence, and Home Guards	9.51
Fire and Disaster	4.00
Telephone, Postal, and Banking facilities	2.82
Total	577.56

A dedicated zone for education and health facilities should be provided for Rudrapur Planning Area with a total land of 130 ha. In all the residential areas, education and health zone should be

proposed so that all the residential areas in the Rudrapur Planning Area can avail the facilities. These facilities are proposed under public / semi-public land use.

9. Traffic and Transportation

Transport is the backbone of the economy and social structure of any region. If urban centers have been recognized as engines of Economic Growth, Traffic and Transportation has rightly been termed as the wheels of such engine. The transport network is considered the lifeline of a city and if any bottleneck or obstruction comes in between it poses a severe threat to the day-to-day life of the city people. A good road and rail network are the symbols of sound development of any city and the study of transportation helps in understanding the existing situation, potentials, weaknesses, etc., and helps to draft out strategies and projects for future development. Road and Rail sectors occupy significant roles in the transport sector in Rudrapur Planning Area. The road network has been studied in terms of classification of roads, length of roads, cross-section of roads (divided and undivided carriageways), area under major existing roads, and major road intersections. Available data regarding the rail network has also been studied.

9.1. Existing Road Network

The Rudrapur Planning Area is well served by roads connecting it to various cities of other districts and within the district. Three National Highways i.e., NH-9, NH-109, and NH-309 are passing through the Planning Area. NH-109 connects Rudrapur to Karnaprayag having a Right of Way varying from 24m to 34m and a carriageway width of 7-14.5 m. NH-309 connects Rudrapur to Srinagar having a Right of Way varying from 24m to 34m and a carriageway width of 12-20 m. NH-9 connects Malaut to Pithoragarh District having a Right of Way varying from 24m to 34m and a carriageway width of 12-20 m. In addition to it, two state highways are passing through the Planning Area which includes SH-5 connecting Gadarpur, Rudrapur, Haldwani, and Dineshpur and SH-44 connecting Kichha and Nagla. Two MDRs are passing through the city which include Kichha Darau road having a ROW of 12-24 m and Manoonnagar road has a ROW of 24 m. There is another Road which is known as Jafarpur Gularbhoj road connecting Jafarpur village to Gularbhoj having a right of way of 12-24 m within the Planning Area boundary. There are two bypass roads namely, Kichha bypass road and Kashipur bypass road having ROW of 18-30 m and 12-20 m respectively. The length of roads within Municipal limits is 365.11 km which accounts for 51.63% of total roads within the Planning Area. The total length of village roads is 226.49 km which is 32.03% of total roads. The existing road network shows that it is well served by the regional roads which provide a high level of connectivity.

Map 9-1: Road Network Map of Rudrapur Planning Area

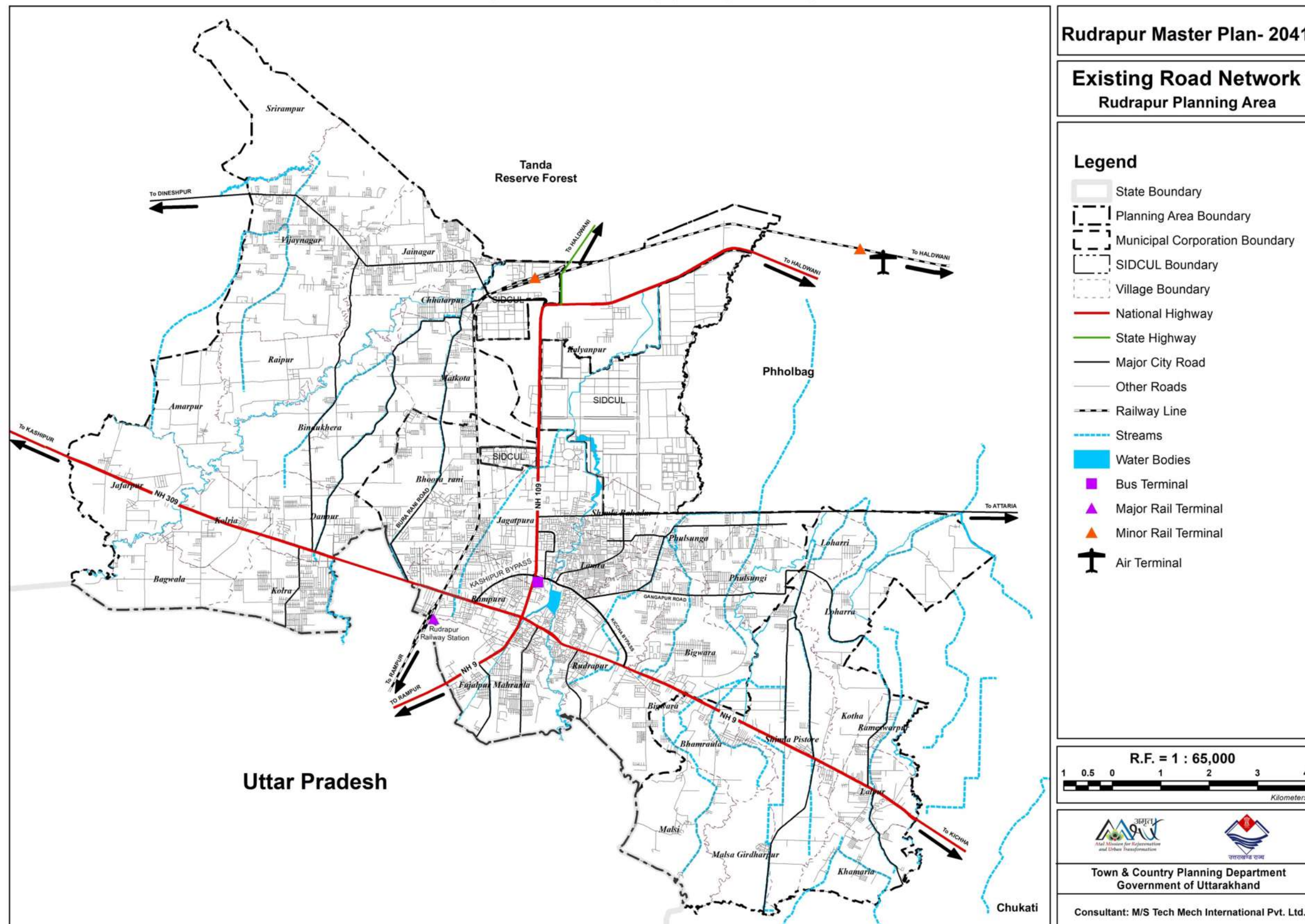


Figure 9-1: Cross Section, Rudrapur-Haldwani Road



Figure 9-2: Cross Section, Kashipur Bypass Road



Figure 9-3: Cross Section, Kashipur Road



Figure 9-4: Cross Section, Rampur Road



Figure 9-5: Cross Section, Kichha Bypass Road



Figure 9-6: Cross section, Kichha Road



Figure 9-7: Deen Dayal Chowk



Figure 9-8: Indira Gandhi Chowk



The road hierarchy is not being followed efficiently and there is a need for R2 roads to cater to the traffic demands. **Map 9-1** shows the road network of the Rudrapur Planning Area. For details refer to **Table 9-1**. The cross-sectional details can be referred to in **Figure 9-1, Figure 9-2, Figure 9-3, Figure 9-4, Figure 9-5, Figure 9-6, Figure 9-7 & Figure 9-8**.

Table 9-1: Length and Width of Roads within Rudrapur Planning Area limit

Sr. No.	Hierarchy	Name of Road	Length of Road (Km.)	Right of Way (m)	Carriageway (m)
1	R1	NH-109	11.6	24-30	7-14.5
2	R1	NH-309	10.1	24-30	12-20
3	R1	NH-9	7.8	24-34	12-20
4	R1	Gadarpur-Dineshpur-Matkota-Haldwani Road-SH-5	23.0	15-24	7-14.5
9	R2	Kashipur bypass road	1.4	12-20	7-14
10	R2	Kichha bypass road	2.7	18-30	7-14
11	R3	Municipal Roads	365.1	3-24	2.5-14.5
12	R4	Village Roads (97 in number)	226.5	4-18	2.75-7

Source: PWD Department, Rudrapur; Rudrapur Municipal Corporation; NHAI, Rudrapur

9.1.1. Bridges & Culverts

The details of bridges and culverts on roads within the Rudrapur Planning Area located on various rivers and drains can be referred to in **Table 9-2**. As per data collected from the PWD department in November 2019, there are 1-bridge and 8-culverts present on SH-5 made up of RCC covering a span of 45 m and 120 m respectively. 1 RCC bridge of span 36 m is also present on Kichha Darau road. Also, there is 1 bridge made of brick on Jafarpur-Gularbhoj road having a span of 51.20 m along with 3 RCC culverts having a span of 52.30 m. In the case of village

roads, there is one RCC bridge of spans 37.20 m and 10 culverts having a total length of 93.20 m.

Table 9-2: Details of Bridges and Culverts on Roads in Rudrapur Planning Area

Sr. No:	Hierarchy	Name of Road	Number of Bridges/Culverts	Type of Material	Span (m)
1	R1	Gadarpur-Dineshpur-Matkota-Haldwani Road-SH-5	1 Bridge 8 Culverts	RCC	B: 45 C: 120
2	R1	Kichha Darau Road (MDR)	1 Bridge	RCC	36
3	R1	Jafarpur Gularbhoj Road (ODR)	1 Bridge 3 Culverts	Bricks RCC	B: 51.20 C: 52.30
4	R4	Village Roads (97 in number)	1 Bridge 10 Culverts	RCC	B: 37.20 C: 93.20

Source: PWD Department, Rudrapur

9.2. Trends of Vehicle Registration

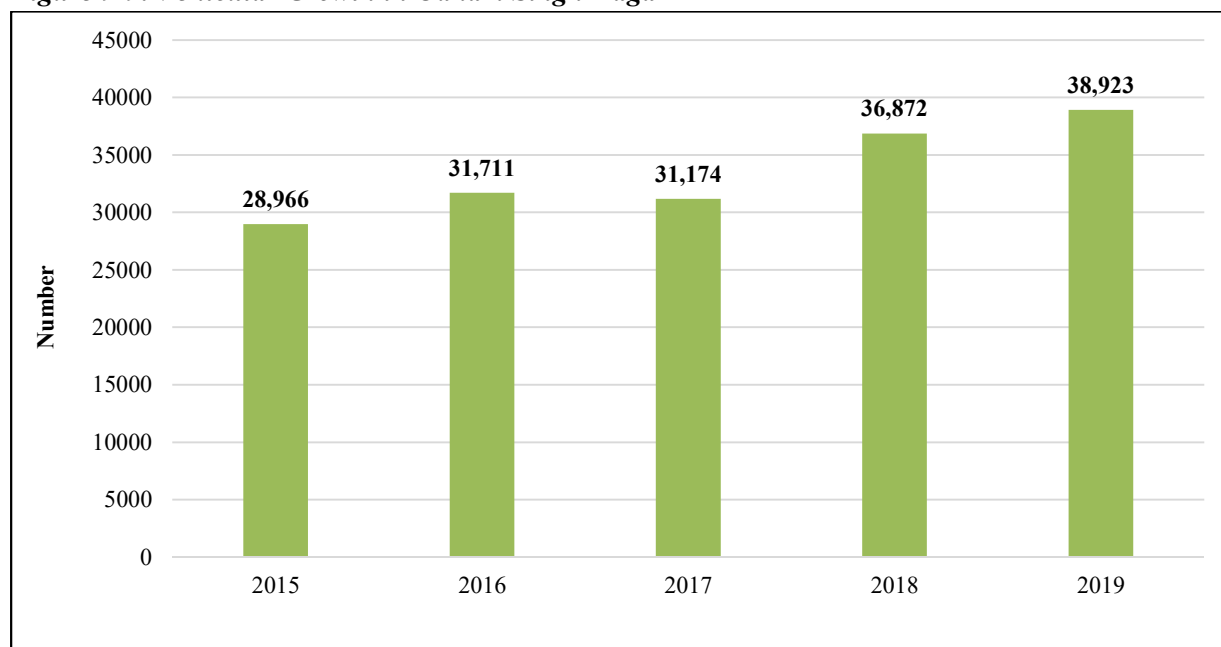
The vehicular growth in Udham Singh Nagar district from the period of the year 2015 to 2019 (Up to July) is shown in **Table 9-3**. The number of vehicles has increased in each year except in 2017 where it has shown a marginal decline from 31711 in 2016 to 31174 in 2017. Private passenger vehicles have a greater share of the total number of registered vehicles and are observed to have increased every year although by a marginal rate from 10.1% in 2015-16 to 15.85% in the year 2018-2019 (Refer **Figure 9-9**).

Table 9-3: Growth of Vehicles

Sr. No	Type of Vehicle	2019 (up to 31/07/2019)	2018	2017	2016	2015
1	Two Wheelers	30,913	28,910	24,879	25,069	22,547
2	Car	4,979	5,150	4,521	4,877	4,653
3	Truck	1,143	895	765	831	741
4	Bus	116	111	63	80	76
5	Auto Rickshaw	349	261	184	229	182
6	E-Rickshaw	702	770	210	0	0
7	Tractor	721	775	552	625	767
Total		38,923	36,872	31,174	31,711	28,966

Source: Regional Transport Office, US Nagar

Figure 9-9: Vehicular Growth in Udham Singh Nagar



Source: Regional Transport Office, US Nagar

The personalized modes of the vehicle such as two-wheelers and cars together hold approximately 90-95 percent of the total passenger vehicles. The growth rate of public transport vehicles is lower as compared to private vehicles. So, there is a need for a cheap and convenient Public Transport System in the city which is lacking in the existing situation. Also, there is a need to provide adequate infrastructure to support the growing number of vehicles to avoid any sort of inconvenience.

9.3. Road Accidents

Rudrapur Planning Area is facing acute traffic problems resulting in accidents that can be revealed from the figures of accidents. There are a total 264 accidents that have occurred from 2014 to July 2019 in which 147 people have died and 172 have been injured. The number of accidents has shown a lot of variation every year as compared to the preceding year. The number of accidents reduced to 42 in 2015 from 50 in 2014. Similarly, the number increased in the year 2018 i.e., 53 from 38 in 2017. There are 28 cases registered till July in the year 2019. The maximum numbers of people who have died in a year are 30 in the year 2014 and 2016 while the maximum number of people injured in a year is 40 in the year 2018. The major cause of accidents as mentioned by the police department is the negligence of the driver and speeding of

the vehicle. Hence, there is a need to adopt certain speed control measures to minimize the number of accidents. For details refer to **Table 9-4**:

Table 9-4: Accidents Record of Rudrapur Planning Area

S. N.	Year	Total Accidents	Deaths	Number of Injured Persons
1	2019	28	21	17
2	2018	53	22	40
3	2017	38	15	25
4	2016	53	30	27
5	2015	42	29	28
6	2014	50	30	35
Total		264	147	172

Source: Police Department, US Nagar

9.4. Traffic Characteristics & Travel Behaviour

Numbers of traffic and travel surveys were conducted to appreciate and quantify traffic and transport characteristics of commuter travel within the study area. First, a detailed reconnaissance survey was conducted to identify the appropriate locations for carrying out the Traffic Volume Count (TVC) and Origin-Destination (O-D) surveys. The surveys were conducted in best-suited locations. The survey details are presented in **Table 9-5 & Map 9-2**.

Map 9-2: Traffic Survey Locations in Rudrapur Planning Area

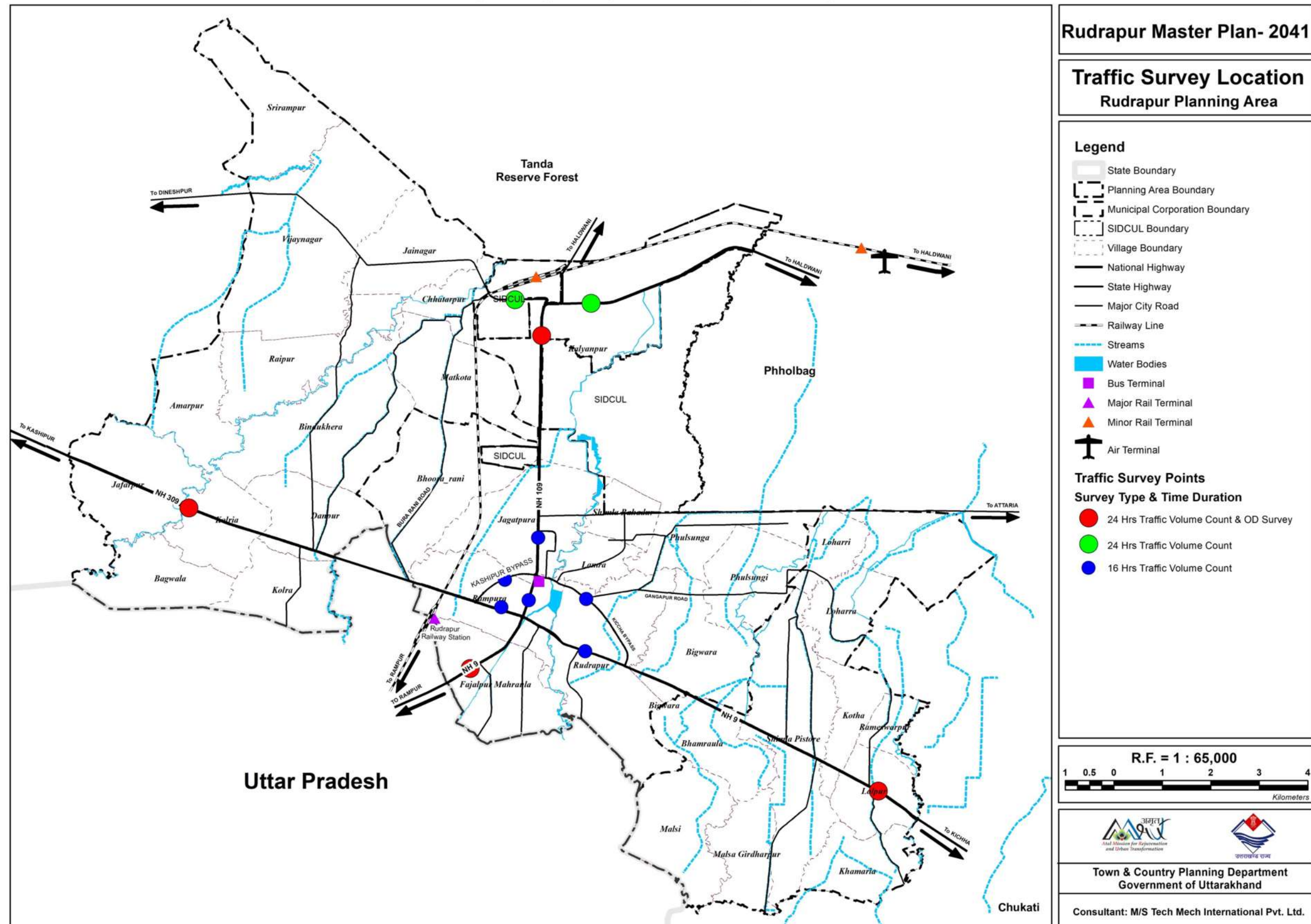


Table 9-5: Survey Location and Duration of Survey

Survey Type		Location	Duration (Hrs.)	Survey Date
Traffic Volume Counts	Mid-Block	Kashipur Bypass Road (at Celebration Bakery)	16	21-11-2019
		Kashipur Road (Opposite Amrit Hospital)	16	21-11-2019
		Kichha Road (Near Hotel Le Castle)	16	17-12-2019
		Kichha Bypass Road (Near Lake Paradise)	16	22-11-2019
		Haldwani Road (Near District Hospital)	16	22-11-2019
		Bilaspur Haldwani Road (Opposite BSNL)	16	04-12-2019
	Outer Cordons	Kashipur Road (Dashmesh Nagar)	24	27-01-2020
		Rampur Road (Opposite Sales Tax Office)	24	24-01-2020
		Kichha Road (Lalpur)	24	27-01-2020
		Haldwani Road (Near SIDCUL Concor Infra)	24	24-01-2020
		Dineshpur Road (Near Ashok Leyland Plant)	24	24-01-2020
Origin Destination Survey	Outer Cordons	Kashipur Road (Dashmesh Nagar)	24	27-01-2020
		Rampur Road (Opposite Sales Tax Office)	24	24-01-2020
		Kichha Road (Lalpur)	24	27-01-2020
		Haldwani Road (Near SIDCUL Concor Infra)	24	24-01-2020
		Dineshpur Road (Near Ashok Leyland Plant)	24	24-01-2020

Source: Primary Survey, 2019

9.4.1. Traffic Volume Characteristics at Outer Cordon

The objective of classified volume count (CVC) is to determine the movement pattern of traffic coming into the city from various directions and vice versa. The survey was conducted at 5 outer cordon locations.

9.4.1.1. Average Daily Traffic

The traffic counts both in terms of numbers of vehicles and Passenger Car Units (PCU) have been computed for the total daily (24-hour) traffic at 5 Outer Cordon locations (Refer to **Table 9-6**). It is observed that traffic at different locations varies from 14,889 vehicles (14,698 PCU) at Dineshpur Road to 43,339 vehicles (43,433 PCU) at Kashipur Road on normal working day

Table 9-6: Daily Traffic Volume (24 Hours) at Outer Cordon Locations

S. No.	Location of Outer Cordon	Grand Total (No.)	Grand Total PCU	Percent of total traffic
1	Kashipur Road (Dashmesh Nagar)	43,339	43,433	32%
2	Rampur Road (Opposite Sales Tax Office)	25,402	27,162	19%
3	Kichha Road (Lalpur)	36,405	36,577	27%
4	Haldwani Road (Near SIDCUL Concor Infra)	15,318	16,721	11%
5	Dineshpur Road (Near Ashok Leyland Plant)	14,889	14,698	11%
Total		1,35,353	1,38,590	100%

Source: Primary Survey, 2019

The above table shows the traffic characteristics of each cordon points. It can be observed that TVC count at cordon point 1 on NH309 (Dashmesh Nagar, Kashipur Road) shows heaviest traffic while cordon point 4 towards Haldwani as well as cordon point 5 leading towards Dineshpur carries the least traffic movement towards and outward of the city.

9.4.1.2. Peak Hour Traffic Characteristics

The peak hour is the maximum percentage of the total traffic that uses the road in single hour of the day. The peak hour traffic at the Outer cordon locations is presented in **Table 9-7**. The peak hour volume varies from 1,327 vehicles (1,303 PCUs) at Haldwani Road (Near SIDCUL Concor Infra) to 3,252 vehicles (3,052 PCUs) at Kashipur Road (Dashmesh Nagar).

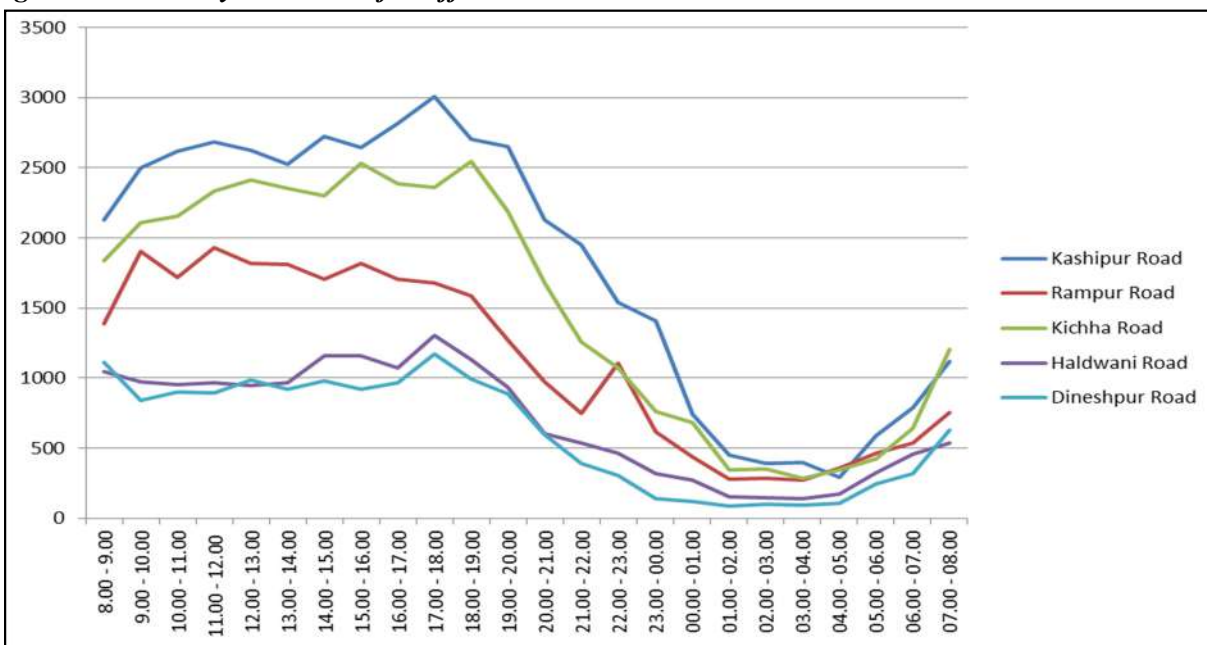
Table 9-7: Observed Peak Hour and Peak Hour Traffic

S. N.	Name of Outer Cordon Location	Peak hour	Peak Hour Traffic			
			Vehicles	% of Total Traffic	PCUs	% of Total Traffic
1	Kashipur Road (Dashmesh Nagar)	17:00 -18:00	3,252	8%	3,052	7%
2	Rampur Road (Opposite Sales Tax Office)	09:00 -10:00	1,928	8%	1,935	7%
3	Kichha Road (Lalpur)	17:45 -18:45	2,830	8%	2,553	7%
4	Haldwani Road (Near SIDCUL Concor Infra)	17:00 -18:00	1,327	9%	1,303	8%
5	Dineshpur Road (Near Ashok Leyland Plant)	08:00 -09:00	1,370	9%	1,175	8%

Source: Primary Survey, 2019

It can be observed from above table that maximum peak hour traffic is at Kashipur Road (Dashmesh Nagar) with around 3,052 PCU between 17:00 – 18:00 hours. The hourly variation of traffic illustrates the distribution of traffic over the day with respect to time shows in **Figure 9-10**.

Figure 9-10: Hourly Variation of Traffic at Outer Cordon Points



Source: Primary Survey, 2019

9.4.1.3. Directional Distribution of Traffic

The directional distribution analysis, which is presented in **Table 9-8**, indicates that there is marginal variation in both directions of travel at most of the locations.

Table 9-8: Directional Distribution of Outer Cordon Points

S. No.	Name of Outer Cordon Location	Directional Distribution	
		Inflow%	Outflow%
1	Kashipur Road (Dashmesh Nagar)	52	48
2	Rampur Road (Opposite Sales Tax Office)	51	49
3	Kichha Road (Lalpur)	49	51
4	Haldwani Road (Near SIDCUL Concor Infra)	52	48
5	Dineshpur Road (Near Ashok Leyland Plant)	47	53

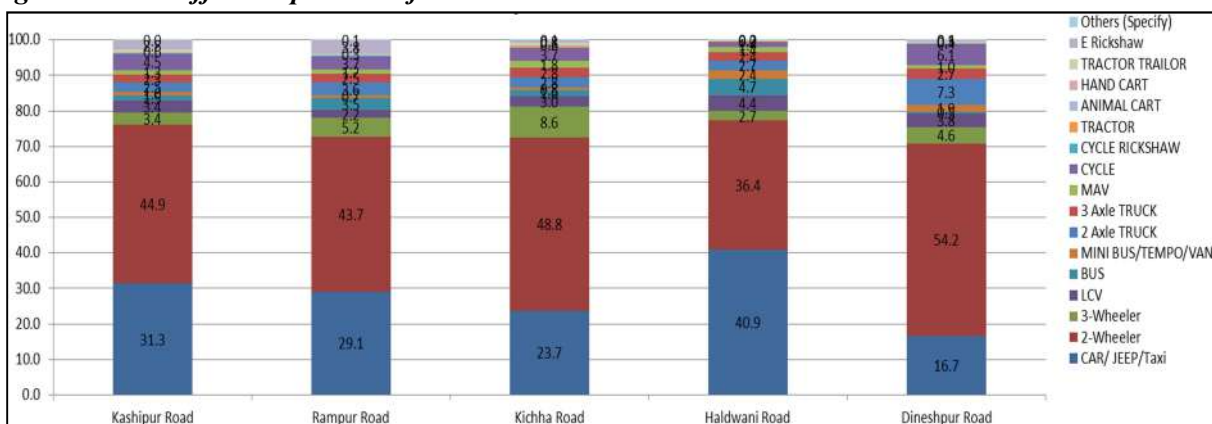
Source: Primary Survey, 2019

From the survey, it can be interpreted that inward directional traffic at Outer Cordon generally varies from 47% at Dineshpur Road (Near Ashok Leyland Plant) to 52% at Kashipur Road (Dashmesh Nagar) and Haldwani Road (Near SIDCUL Concor Infra). Whereas, outward directional traffic at Outer Cordon generally varies from 48% at Kashipur Road and Haldwani Road to 53% at Dineshpur Road (Near Ashok Leyland Plant).

9.4.1.4. Traffic Composition

An analysis was carried out to find the composition of traffic both for fast- and slow-moving traffic. The finding of the vehicular composition distribution for the Outer Cordon locations is shown in **Figure 9-11**.

Figure 9-11: Traffic composition of Outer Cordon locations



Source: Primary Survey, 2019

The 2-wheeler composition is maximum on all Outer cordon locations as it represents around 54.2% of total movements at Dineshpur Road (Near Ashok Leyland Plant) Location, 48.8% at Kichha Road (Lalpur) Location, 44.9% at Kashipur Road (Dashmesh Nagar) location. On the other hand, the Car/Jeep/taxi classification also comprises most of the traffic after a 2-wheeler.

9.4.1.5. Classification of Traffic (Passenger-Goods and Fast-Slow)

The traffic has been analyzed in terms of passenger and goods traffic as well as fast- and slow-moving vehicles. **Table 9-9** gives detail of passenger - goods traffic and Fast - slow vehicles.

Table 9-9: Classification of Outer Cordon Traffic Points

Sr. No.	Location	Total volume	Classification-1				Classification-2			
			Passenger	%	Goods	%	Fast	%	Slow	%
1	Kashipur Road (Dashmesh Nagar)	43,339	38,880	90	4,459	10	39,650	91	3,689	9
2	Rampur Road (Opposite Sales Tax Office)	25,402	22,839	90	2,563	10	23,275	92	2,127	8
3	Kichha Road (Lalpur)	36,405	32,091	88	4,314	12	34,227	94	2,178	6
4	Haldwani Road (Near SIDCUL Concor Infra)	15,318	13,596	89	1,722	11	15,017	98	301	2
5	Dineshpur Road (Near Ashok Leyland Plant)	14,889	12,597	85	2,292	15	13,814	93	1,075	7

Source: Primary Survey, 2019

The maximum passenger traffic percentage is flowing at Kashipur Road (Dashmesh Nagar) location around 38,880 vehicles while goods traffic percentage is also maximum at Kashipur Road (Dashmesh Nagar) location around 4,459 vehicles. On the other hand, minimum passenger traffic percentage is observed at Dineshpur Road (Near Ashok Leyland Plant) location of outer cordon point and goods traffic at Haldwani Road (Near SIDCUL Concor Infra) location. In terms of fast- and slow-moving classification, the maximum percentage of fast-moving and slow-moving traffic is observed at Kashipur Road (Dashmesh Nagar) location.

9.4.1.6. V/C Ratio and Level of Service (LOS)

The V/C ratio and level of service have been derived to check the adequacy of a particular road stretch. **Table 9-10** shows the V/C ratio and LOS of outer cordon points. The V/C ratio and level of service are satisfactory at all Outer Cordon locations.

Table 9-10: V/C Ratio and Level of Service of Outer Cordon Locations

S. No.	Location	Peak Hour PCU	Type of Carriageway	Design Service Volume (PCU)	Capacity (PCU)	V/C	LOS
1	Kashipur Road (Dashmesh Nagar)	3,052	4 lanes divided	3,600	5,143	0.6	C
2	Rampur Road (Opposite Sales Tax Office)	1,935	4 lanes divided	3,600	5,143	0.4	B
3	Kichha Road (Lalpur)	2,553	4 lanes divided	3,600	5,143	0.5	C
4	Haldwani Road (Near SIDCUL Concor Infra)	1,303	2 lanes undivided	1,500	2,143	0.6	C
5	Dineshpur Road (Near Ashok Leyland Plant)	1,175	4 lanes divided	2,900	4,143	0.3	A

Source: Primary Survey, 2019

9.4.2. Traffic Volume Characteristics at Mid-Block Points

The objective of classified volume count (CVC) is to determine the movement pattern of traffic plying on the major stretches of the city. The survey was conducted at 6 mid-block points.

9.4.2.1. Average Daily Traffic

The traffic counts both in terms of numbers of vehicles and Passenger Car Units (PCUs) have been computed for the 16-hour traffic at six mid-block points and are presented in **Table 9-11**.

It is observed that the traffic at different locations varies from 42,065 Vehicles (47,306 PCUs) at Kashipur Road (Opposite Amrit Hospital) to 68,200 Vehicles (58,341 PCUs) at Haldwani Road (Near District Hospital) on a normal working day.

Table 9-11: Daily Traffic Volume (16 Hours) at Mid-Block Points

Sr. No.	Location of Mid-Block Points	Total Nos.	Total PCU's	Percent of total traffic
1	Kashipur Bypass Road (at Celebration Bakery)	59,796	52,697	18%
2	Kashipur Road (Opposite Amrit Hospital)	42,065	47,306	13%
3	Kichha Road (Near Hotel Le Castle)	44,166	47,100	14%
4	Kichha Bypass Road (Near Lake Paradise)	58,960	51,217	18%
5	Haldwani Road (Near District Hospital)	68,200	58,341	21%
6	Bilaspur Haldwani Road (Opposite BSNL)	52,838	43,996	16%
	Total	3,26,025	3,00,656	100%

Source: Primary Survey, 2019

There are six mid-block locations at which total traffic is 3,26,025 vehicles. The maximum traffic is observed at Haldwani Road (near District Hospital) carrying 21% of total mid-block traffic. Minimum traffic (13%) is observed at Kashipur Road (opposite Amrit Hospital).

9.4.2.2. Peak Hour Traffic Characteristics

The peak hour is the maximum percentage of the total traffic that uses the road in a single hour of the day. The peak hour traffic at the Mid-Block locations is presented in **Table 9-12**. The peak hour volume varies from 3,654 vehicles (3,768 PCUs) at Kichha Road (Near Hotel Le Castle) to 6,354 vehicles (5,037 PCUs) at Haldwani Road (Near District Hospital).

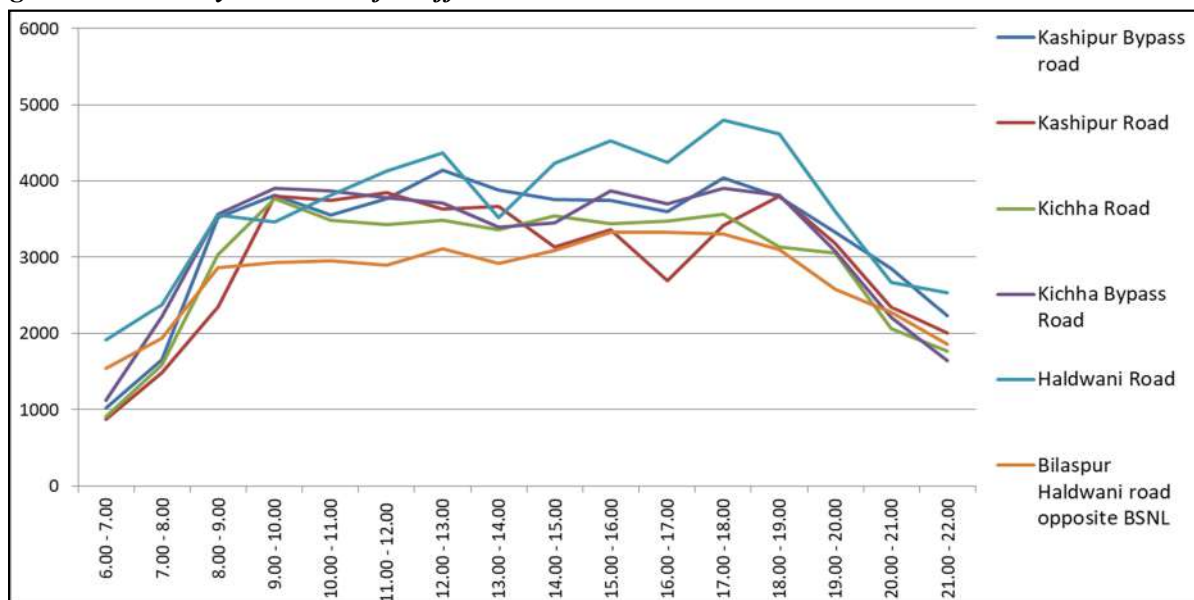
Table 9-12: Observed Peak Hour and Peak Hour Traffic

Sr. No.	Name of Mid-Block Points	Peak hour	Peak Hour traffic			
			(Veh.)	% of Total Traffic	(PCUs)	% of Total Traffic
1	Kashipur Bypass (at Celebration Bakery)	17:45 -18:45	4,744	8%	4,144	8%
2	Kashipur Road (Opposite Amrit Hospital)	17:30 -18:30	3,682	9%	3,924	8%
3	Kichha Road (Near Hotel Le Castle)	09:00-10:00	3,654	8%	3,768	8%
4	Kichha Bypass Road (Near Lake Paradise)	17:30 -18:30	4,873	8%	4,053	8%
5	Haldwani Road (Near District Hospital)	17:30 -18:30	6,354	9%	5,037	9%
6	Bilaspur Haldwani Road (Opposite BSNL)	17:30 -18:30	4,319	8%	3,462	8%

Source: Primary Survey, 2019

It can be observed from above table that maximum peak hour traffic is at Haldwani Road (Near District Hospital) with around 5,037 PCU between 17:30 -18:30 hours. The hourly variation of traffic illustrates the distribution of traffic over the day with respect to time shows in **Figure 9-12**.

Figure 9-12: Hourly Variation of Traffic at Mid-Block Points



Source: Primary Survey, 2019

9.4.2.3. Directional Distribution of traffic

The directional distribution analysis, are presented in **Table 9-13**, indicates that, there is marginal variation in both directions of travel at most of the locations. It can be observed that directional traffic at Mid-block points generally varies from 48% at Kichha Bypass Road (Near Lake Paradise) to 52% at Haldwani Road (Near District Hospital) and Kashipur Road (Opposite Amrit Hospital).

Table 9-13: Directional Distribution of Mid-Block Points

S. No.	Name of Mid-Block Point	Directional Distribution	
		D1%	D2%
1	Kashipur Bypass Road (at Celebration Bakery)	51	49
2	Kashipur Road (Opposite Amrit Hospital)	52	48
3	Kichha Road (Near Hotel Le Castle)	50	50
4	Kichha Bypass Road (Near Lake Paradise)	48	52
5	Haldwani Road (Near District Hospital)	52	48
6	Bilaspur Haldwani Road (Opposite BSNL)	51	49

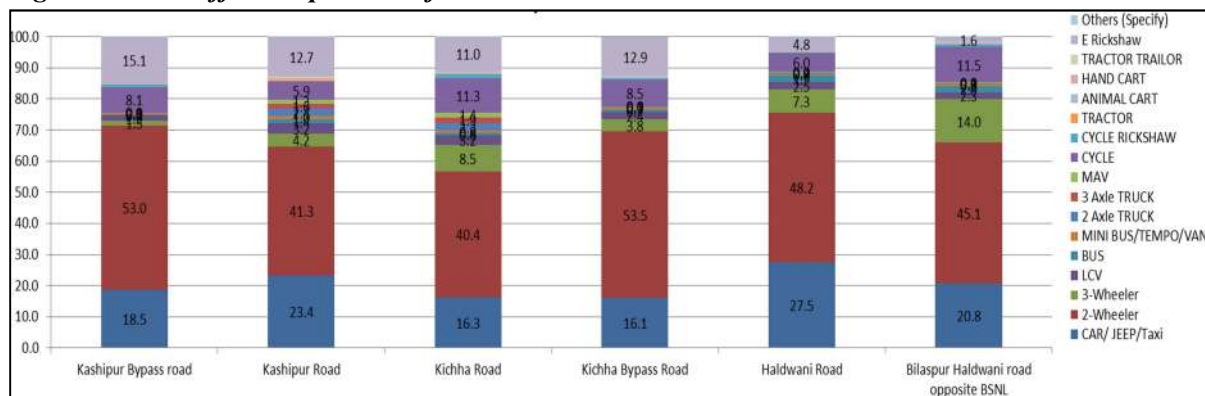
Source: Primary Survey, 2019

9.4.2.4. Traffic Composition

An analysis was carried out to find the composition of traffic both for fast & slow-moving traffic. The finding of vehicular composition distribution for midblock locations is shown in **Figure 9-13**. The 2-wheeler composition is maximum on all midblock locations as it represents

around 53.5% of total movements at Kichha Bypass Road (Near Lake Paradise), and 53% at Kashipur Bypass Road (at Celebration Bakery), 48.2% at Haldwani Road (near District Hospital). On the other hand, the Car / Jeep/taxi classification also comprises most of the traffic after a 2-wheeler.

Figure 9-13: Traffic composition of Mid-block locations



Source: Primary Survey, 2019

9.4.2.5. Classification of Traffic (Passenger-Goods and Fast-Slow)

The traffic has been analysed in term of passenger and goods traffic as well as fast & slow moving vehicles. **Table 9-14** gives detail of passenger-goods traffic and fast-slow vehicles.

Table 9-14: Classification of Midblock Traffic Points

S. No.	Location	Total volume	Classification 1				Classification 2			
			Passenger	%	Goods	%	Fast	%	Slow	%
1	Kashipur Bypass Road (At Celebration Bakery)	59,796	58,434	98	1,362	2	45,232	76	14,564	24
2	Kashipur Road (Opposite Amrit Hospital)	42,065	37,838	90	4,227	10	33,566	80	8,499	20
3	Kichha Road (Near Hotel Le Castle)	44,166	39,855	90	4,311	10	33,333	75	10,833	25
4	Kichha Bypass Road (Near Lake Paradise)	58,960	57,206	97	1,754	3	45,763	78	13,197	22
5	Haldwani Road (Near District Hospital)	68,200	65,902	97	2,298	3	60,467	89	7,733	11
6	Bilaspur Haldwani Road (Opposite BSNL)	52,838	51,008	97	1,830	3	45,070	85	7,768	15

Source: Primary Survey, 2019

The maximum passenger traffic percentage is flowing at Haldwani Road (Near District Hospital) around 65,902 vehicles while goods traffic percentage is at location Kichha Road (Near Hotel Le Castle) around 4,311 vehicles. On the other hand, minimum passenger traffic percentage is

observed at Kashipur Road (Opposite Amrit Hospital) location of Mid-Block points and goods traffic at Kashipur Bypass Road (at Celebration Bakery). In terms of fast & slow-moving classification, the maximum percentage of fast moving at Haldwani Road (near District Hospital) and slow moving at Kashipur Bypass Road (at Celebration Bakery).

9.4.2.6. V/C Ratio and Level of Service (LOS)

The V/C ratio and level of service have been derived to check the adequacy of road stretch.

Table 9-15 shows the V/C ratio and LOS of Mid-Block points.

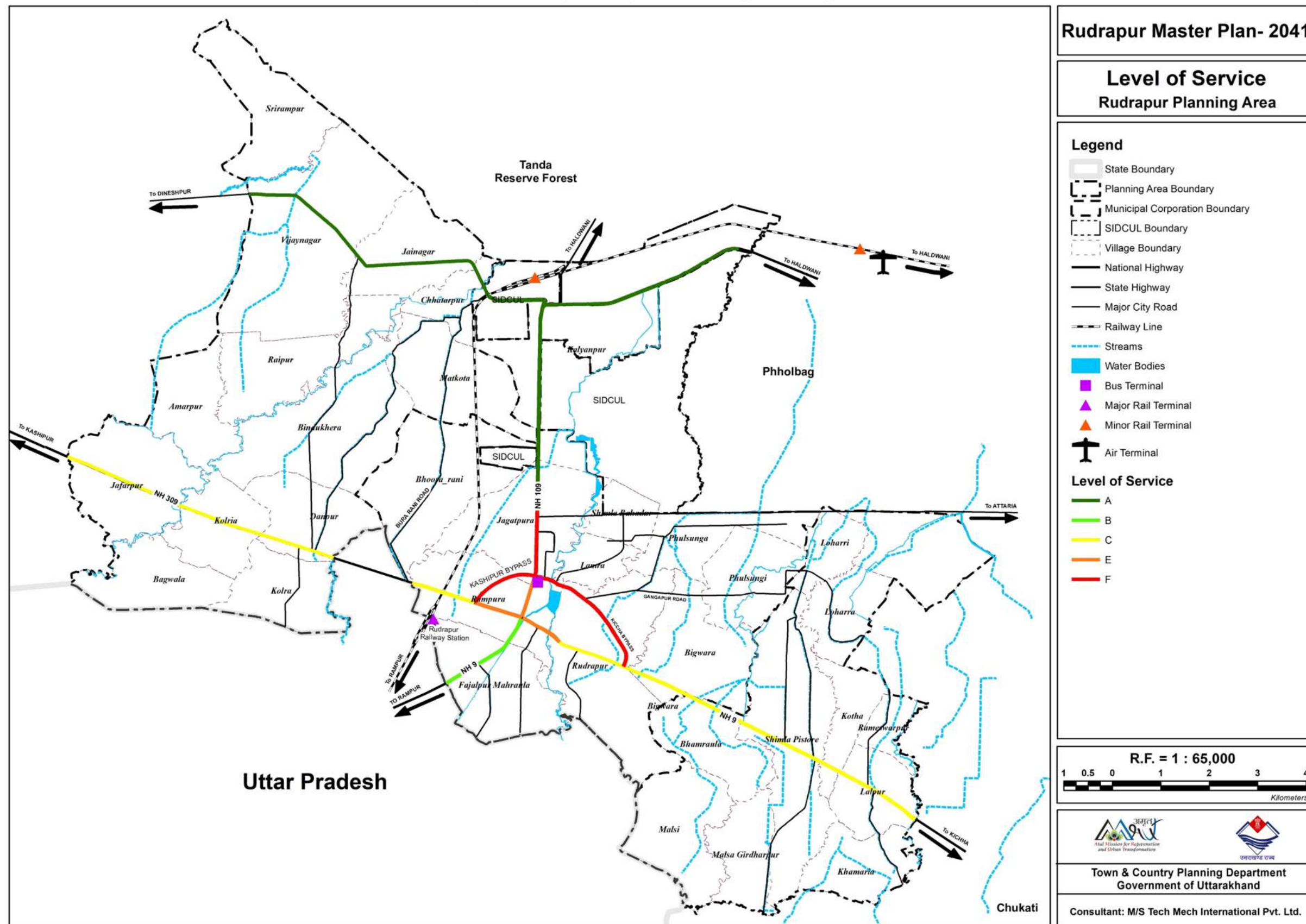
Table 9-15: V/C Ratio and Level of Service of Mid-Block Points

S. No.	Location	Peak Hour PCU	Type of Carriageway	Design Service Volume (PCU)	Capacity (PCU)	V/C	LOS
1	Kashipur Bypass Road (at Celebration Bakery)	4,144	4 lanes divided	2,900	4,143	1.0	F
2	Kashipur Road (Opposite Amrit Hospital)	3,924	4 lanes divided	2,900	4,143	0.9	E
3	Kichha Road (Near Hotel Le Castle)	3,768	4 lanes divided	2,900	4,143	0.9	E
4	Kichha Bypass Road (Near Lake Paradise)	4,053	4 lanes divided	2,900	4,143	1.0	F
5	Haldwani Road (Near District Hospital)	5,037	4 lanes divided	2,900	4,143	1.2	F
6	Bilaspur Haldwani Road (Opposite BSNL)	3,462	4 lanes divided	2,900	4,143	0.8	E

Source: Primary Survey, 2019

The V/C ratio and level of service are worst at Haldwani Road (Near District Hospital) of Mid-Block points. In addition to that, Kashipur Bypass Road (at Celebration Bakery), Kichha Bypass Road (Near Lake Paradise), Bilaspur Haldwani Road (Opposite BSNL), and Kichha Road (Near Hotel Le Castle) also have Level of service F although all locations have the V/C ratio more than 0.7, so need improvements (refer **Map 9-3**).

Map 9-3: Level of Service of Roads in Rudrapur Planning Area



9.4.3. Origin Destination Survey at Outer Cordon Locations

9.4.3.1. Zoning

For traffic and travel analysis, a traffic zone system has been developed for the Study Area. The boundaries of wards and villages falling inside the local planning area have been taken as boundaries for traffic analysis zones. The Study Area has been divided into 46 TAZ which are referred to as internal TAZ. There are 16 external zones consists areas falling outside the local planning area and have been termed as external TAZ. The list of traffic analysis zone is in **Annex 16**.

9.4.3.2. Passenger Traffic

The analysis of trip purposes suggests that about 50% of passengers travel for work, 3% for education, 10% for business, 10% for social gatherings, 2% for health, 7% for the return home, and 18% for other reasons than mentioned above (refer **Table 9-16**).

Table 9-16: Distribution of Outer Cordon Passengers by Trip Purpose

Mode	Work	Business	Education	Social	Health	Return Home	Others	Total
	1	2	3	4	5	6	7	
Car	45834	9198	3179	13707	4593	7387	14680	98578
2-Wheeler	49139	8770	2746	8088	0	6082	8939	83764
Auto	12564	3266	1793	45	246	1401	15049	34362
Total	107537	21233	7718	21840	4838	14869	38668	216704
Composition (%)	49.62	9.80	3.56	10.08	2.23	6.86	17.84	100

Source: Primary Survey, 2019

The analysis of travel frequency suggests that about 54% of passengers travel on daily basis, 23% weekly, 11% monthly, and 12% occasionally (refer to **Table 9-17**).

Table 9-17: Distribution of Outer Cordon Passengers by Travel Frequency

Mode	Daily	Weekly	Monthly	Occasionally	Total
	1	2	3	4	
Car	41125	26283	15077	16093	98578
2-Wheeler	46022	21196	7840	8707	83764
Auto	29971	1922	921	1549	34362
Total	117117	49400	23838	26349	216704
Composition (%)	54.04	22.80	11.00	12.16	100.00

Source: Primary Survey, 2019

The trip characteristics analysis of passenger trips at the outer cordon points reveals that external to external trips are insignificant with only 19% share in total trips. This shows that most of the trips are either originating or destined in the Planning Area. **Table 9-18** shows the passenger travel pattern at outer cordon locations. The maximum number of passenger trips in Rudrapur come from Kashipur road (37.30%) followed by Kichha road (27.68%). Maximum E-E movement has been recorded on Haldwani road (25%) followed by Rampur Road (23%).

Table 9-18: Distribution of Outer Cordon Passenger Trips Based on OD

S. No.	Name of Outer Cordon	Trips (I-E)	Trips (E-I)	Trips (E-E)	Total
1	Kashipur Road	47005	45574	13299	105878
		44%	43%	13%	100%
2	Rampur Road	17307	19621	11283	48211
		36%	41%	23%	100%
3	Kichha road	35954	27211	15403	78567
		46%	35%	20%	100%
4	Haldwani Road	18638	19823	12684	51145
		36%	39%	25%	100%
Grand Total		118903	112229	52669	283801
		42%	40%	19%	100%

Source: Primary Survey, 2019

9.4.3.3. Goods Traffic

Modes carrying freight in to and out of Rudrapur city are light commercial vehicles, heavy trucks, and multi-axle trucks. Data collected from the Origin-Destination survey has been analyzed to study the movement pattern of freight vehicles at the outer cordon.

The movement of goods from Rudrapur to outer cordons is maximum on Haldwani road (46%) and Kashipur road (40%) (refer to **Table 9-19**). The external to internal share of goods trips is also high on Haldwani road (48%) and Kashipur road (48%). Maximum about 33% of through trips (E-E) use Rampur Road followed by Kichha road (32%) (refer to **Table 9-19**).

Table 9-19: Distribution of Outer Cordon Goods Trips Based on OD

S. No.	Name of Outer Cordon	Trips (I-E)	Trips (E-I)	Trips (E-E)	Total
1	Kashipur Road	1777	2140	542	4459
		40%	48%	12%	100%
2	Rampur Road	983	728	852	2563
		38%	28%	33%	100%
3	Kichha Road	1434	1495	1385	4314
		33%	35%	32%	100%
4	Haldwani Road	786	829	106	1722
		46%	48%	6%	100%
Grand Total		4980	5192	2886	13058

S. No.	Name of Outer Cordon	Trips (I-E)	Trips (E-I)	Trips (E-E)	Total
		38%	40%	22%	100%

Source: Primary Survey, 2019

9.5. Existing Terminal Facilities

9.5.1. Inter-State Bus Terminus

The existing bus terminal of Rudrapur is located on Bilaspur-Haldwani road near the central part of the city. The terminal is having capacity of accommodating about 50 buses per day. In addition to this, there is the capacity of accommodating another 100 buses in the workshop of the terminal (refer to **Figure 9-14 & Figure 9-15**). The existing number of buses departing from Rudrapur Bus stand is 72 per day which includes 62 buses and 10 mini-buses. However, there is a need for organized bus bays. This bus terminal is sufficient to cater to the existing requirement of the Rudrapur planning area. The total number of passengers traveling from Rudrapur is 2000 per day and to Rudrapur is 1800 per day as per data provided by the bus terminal office. There is no organized stop for buses due to which they are halting at different spaces which mainly include Indira Chowk, DD Chowk, Awas Vikas junction, etc. So, there is a need for organized stops for buses for smooth traffic circulation and bus parking. Also, there is a need to ensure that the bus traffic remains segregated from other traffic to ensure smooth traffic flow.

Figure 9-14: Bus Terminal, Rudrapur



Figure 9-15: Workshop at Bus Terminal



9.5.2. Bus Routes

The daily bus traffic of Rudrapur has been highlighted in **Table 9-20** which depicts that, 49 buses operate from Rudrapur city. It includes buses owned by Private Transporters and public transport corporations. Most buses are plying on local routes which are 21 in number followed by the Rudrapur-Delhi route where 17 buses are plying. The buses are majorly connecting Rudrapur to neighboring cities/towns/villages which are plying on local routes. Local routes

include Rudrapur-Kashipur, Rudrapur-Haldwani, Rudrapur-Tanakpur, Rudrapur-Bareilly, etc. Buses are also available to travel to Punjab (three buses), Haridwar (three buses), Dehradun (three buses), Lucknow (one bus), and Agra (one bus).

Table 9-20: Details of Bus-Routes

S.N.	Name of Route	Number of Buses/day
1.	Rudrapur-Delhi	17
2.	Rudrapur-Punjab	3
3.	Rudrapur-Haridwar	3
4.	Rudrapur-Dehradun	3
5.	Rudrapur-Lucknow	1
6.	Rudrapur-Agra	1
7.	Local Routes (Kashipur, Tanakpur, Haldwani, Moradabad, Bareilly)	21

Source: Depot Manager, Rudrapur Bus Terminus

9.5.3. Intra-City Transport Service

The public transport system is not very much developed in Rudrapur city. The increased number of private vehicles like cars, Motorcycles, scooters, light-weight scooters, etc. has reduced intra-city distances. In the city, Auto rickshaws and E-Rickshaws are mainly used as public transport within the city. A certain number of cycle rickshaws are also present in the city to travel shorter distances. Auto-Rickshaws are also being used to travel to nearby villages located on the periphery of the city. School buses also contribute to the bus traffic of Rudrapur city.

9.5.4. Truck Terminal

There is no organized truck terminal in the city of Rudrapur or within the Planning Area. The trucks are being parked near the railway station and within the SIDCUL area. Being an industrial-based economy, there is a need for a truck terminal or transport Nagar in the city to fulfill the industrial needs. There is a proposal for a truck terminal near the solid waste management site on Rampur Road.

9.6. Public Transport

9.6.1. Rail Based Transport

Besides road traffic, rail transport also plays a vital role in the traffic and transportation network of the city. There is no railway station present in Rudrapur Planning Area. However, there is one railway station i.e., Rudrapur city railway station having two platforms (refer to **Figure 9-16**) present in the proximity of Rudrapur Planning Area. This railway station is fulfilling the existing

needs of the population. The railway line is broad gauge in nature. A total number of 14 passenger trains and 2 weekly trains pass through the railway line of Rudrapur. The list of trains and their timings are given in **Table 9-21**.

Table 9-21: Train Timings

Train No.	Train Name	Timing
15013	Ranikhet Express	Morning
14120	Dehradun Kathgodam Express	Morning
12092	Naini Doon Jan Shatabdi Express	Morning
13019	Bagh Express	Morning
12040	New Delhi Kathgodam Shatabdi	Morning
15036	Uttaranchal Sampark Kranti Express	Morning
12208	Jammu Tawi Kathgodam Garib Rath Express	Evening
12039	Kathgodam New Delhi Shatabdi	Evening
12207	Kathgodam Jammu Tawi Garib Rath Express	Evening
15035	Uttaranchal Sampark Kranti Express	Evening
14119	Kathgodam Dehradun Express	Evening
12091	Doon Naini Jan Shatabdi Express	Evening
15014	Ranikhet Express	Evening
13020	Bagh Express	Evening

Source: Railway Station, Rudrapur

Figure 9-16: Railway Station, Rudrapur



Figure 9-17: Parking at Railway Station, Rudrapur



The total number of passengers traveling from Rudrapur to other cities/towns is estimated to be 1630 generating an average earning of 2, 25,000 per day. In addition to the passenger trains, 1 goods train also passes through Rudrapur on daily basis. Major goods which are exported include Rice, Sugar, Husk, and public food grain seeds. The goods imported include cement, palm oil, maize (seasonal), and manure (refer to **Figure 9-18 & Figure 9-19**). In terms of infrastructure,

there is a dedicated parking space present outside the railway station having an area of 350 square meters (refer to **Figure 9-17**). Also, there are dormitories available at the railway station where passengers can stay during their travel.

Figure 9-18: Goods Shed, Railway Station, Rudrapur



Figure 9-19: Platform for Goods Train



9.6.2. Air Based Transport

There is one domestic airport present in Pantnagar are present in the vicinity of Rudrapur Planning Area. The airport is operated by the Airport Authority of India and is having single runway of length 4,500 ft. (refer to **Figure 9-20 & Figure 9-21**). The airport is operating only 2 flights regularly which include Pantnagar-Dehradun-Pantnagar and Delhi-Pantnagar-Delhi. The total passengers arriving per day are 35 and departing per day is 35. Hence, it indicates that there is not much passenger footfall due to which the number of flights is also limited. There is a proposal of extension and up gradation of Pantnagar airport as per airport authorities i.e., the airport is being upgraded from domestic to international. Hence, it will attract more industrialists and tourists thus encouraging economic activities.

Figure 9-20: Airport, Pantnagar



Figure 9-21: Airport, Pantnagar



9.7. Freight Transport

There is an absence of a freight transport facility in the Rudrapur Planning Area. The Rudrapur has a diverse industrial setup, which needs supporting infrastructures like a good truck terminal for growth in the mobility of raw material and finished goods. Thus, there is a need to propose good freight transport infrastructure in the Rudrapur Planning Area.

9.8. Major Traffic Problems

9.8.1. Parking Problems

There is a parking problem in the city center area of the city due to mushrooming of informal commercial on road. Also, there is a presence of specialized markets like vegetable and fruit market, Gol Market and Main bazaar, etc. These create severe traffic problems due to negligible parking space. There is a lack of organized space for halting auto-rickshaws and e-rickshaws in the city center area and near the terminals which also cause inconvenience (refer to **Figure 9-22** & **Figure 9-23**).

Figure 9-22: On Street Parking, Main Market, Rudrapur



Figure 9-23: Halting of Auto-Rickshaws at Unorganised Spaces



9.9. Key Issues & Potentials

- 1) Increased Number of registered vehicles in Rudrapur, which has directly impacted increasing road jams and accident cases. Most of these are private rather than public ones.
- 2) Due to lack of enforcement, almost all the shopkeepers encroached the road space resulting in traffic problems
- 3) V/C ratio at mid-block points is more than 0.7 on all the roads which need improvements.

- 4) The absence of dedicated space for stops of auto rickshaws and regulation for streamlining movement without hindrance is required.
- 5) Unauthorized conversion of residential to commercial needs to be regulated as it leads to traffic chaos.
- 6) The lack of organized parking spaces near the activity areas leads to traffic jams (refer to **Figure 9-24 & Figure 9-25**).
- 7) There is no such provision for the safe movement of pedestrians and cyclists within the city.
- 8) Lack of proper public transport system within the city.

Figure 9-24: Traffic Congestion near Gandhi Park, Main Market, Rudrapur



Figure 9-25: Traffic Congestion, Main Market, Rudrapur



9.10. Future Requirements

9.10.1. Public Transport

Rudrapur being an industrial and administrative hub receives a lot of people, travel to Rudrapur on daily basis from all over the district and state of Uttarakhand. At present Intermediate Public Transport system (IPT) comprising E-rickshaw, Three-wheelers, and Cycle Rickshaw is providing service which is inadequate and inefficient. The city lacks a formal public transport system. In a future scenario, if a formal public transport system is not provided the intra-city trips will have to rely on personalized vehicles which will further burden on the transport system and deteriorate the environment. A formal efficient public transport system is required for Rudrapur Planning Area. For the selection of the public transport system, the hourly trips per direction have been projected for 2041 (refer to Annexure- 18) for all the mid-block points. Future trips

have been projected with a growth rate of 41% which is similar to the growth rate of the Projected Population of Rudrapur Planning Area. It is assumed that 30% of total projected trips shall use the public transport system (refer to **Table 9-22**). According to URDPFI guidelines when passenger per hour per direction trips lies in the range of 5000-7500 trips/hour/direction in an urban area then the city should have public transport based on the bus. To enhance the efficiency of the bus system the bus priority lanes should be developed along the arterial road network. In Rudrapur, the projected maximum trips per hour per direction are 4,972 on Haldwani road. So Rudrapur should have a Bus Priority Lane system for formal public transport. Therefore, a bus priority lane has been proposed with 38,487 trips per day for Rudrapur Planning Area.

To develop a bus priority lane in Rudrapur Planning Area five routes have been identified. The five routes with distances have been provided in **Table 9-22 and Table 9-23**. All the nearby towns like Gadarpur, Kichha, Bilaspur, and Dinespur have been covered under the routes. Route 1 starts from the Old Bus Stand to Pant Nagar University on the northeastern side, covering a total distance of 15.2 km. Route 2 is from Old Bus Stand to Gadarpur on the west side with a total distance of 17.6 km. Route 3 is from Old Bus Stand to Kichha on the eastern side covering a total distance of 13.7 km. Route 4 is from Old Bus Stand to Bilaspur on the southern side with a total distance of 16.5 km. Route 5 is from the proposed New Bus Stand to Dinespur on the north-western side with a total distance of 9.91 km.

Table 9-22 Projected Trips for Public Transport System

Name of Mid-Block Point	Projected Trips (Overall)					Projected PT Trips (BAU)				
	Decadal Projected Population Growth Rate	2031		2041		Assumed PT trips of total trips	2031		2041	
		UP	Down	UP	Down		UP	Down	UP	Down
Kashipur Bypass Road	41%	6862	6607	9675	9316	30%	2059	1982	2903	2795
Kashipur Road		6217	5815	8766	8200		1865	1745	2630	2460
Kichha Road		5767	5737	8131	8090		1730	1721	2439	2427
Kichha Bypass Road		7245	7787	10216	10980		2174	2336	3065	3294

	Projected Trips (Overall)					Projected PT Trips (BAU)				
Name of Mid-Block Point	Decadal Projected Population Growth Rate	2031		2041		Assumed PT trips of total trips	2031		2041	
		UP	Down	UP	Down		UP	Down	UP	Down
		UP	Down	UP	Down		UP	Down	UP	Down
Haldwani Road		11753	11005	16572	15517		3526	3302	4972	4655
Bilaspur Haldwani Road		8318	7871	11728	11099		2495	2361	3518	3330

Table 9-23 Routes for Public Transport System

Routes	Distance (Km)
Route 1 - Old Bus Stand - Pant Nagar University - North	15.2
Route 2 - Old Bus Stand - Gadarpur - West	17.6
Route 3 - Old Bus Stand - Kichha - East	13.7
Route 4 - Old Bus Stand - Bilaspur - South	16.5
Route 5 - New bus stand - Dineshpur	9.91

The specification of the Bus Public Transport System has been provided in **Table 9-24**. The interval of each bus has been kept at 5 minutes. The service time is from 7 am to 9 pm i.e., for 14 hours. The average speed of the bus is kept at 20 Km/hr, it includes the time of stoppage at each bus stand which should be at an interval of 800m.

Table 9-24 Design parameters for Public Transport System

Bus Interval (min)	5
Service Time (Hr)	7 a.m. - 9 p.m. (14 hours)
Average Speed of Bus (Km/Hr)	20
Distances between bus stops (m)	800

Based on **Table 9-24** the total number of buses required for each route has been calculated (refer to **Table 9-25**). So, parking for these 49 buses needs to be provided at the bus stand. Now, the total number of bus bays for loading and unloading has been calculated by taking peak hour trips (10%- URDPFI) of the total projected trips for 2041(refer to **Table 9-26**). The average occupancy of a bus is taken as 30. The loading and unloading bus ratio is considered to be 2:1 with 12 min as loading time and 6 min as unloading time (URDPFI guidelines) and the total bus bays calculated are 21.

Table 9-25 Total Number of Buses Required

Routes	Distance (km)	Time is taken by bus to cover the distance	No. of bus required for the route
Route 1 - Old Bus Stand - Pant Nagar University - North	15.2	45.6	10
Route 2 - Old Bus Stand - Gadarpur - West	17.6	52.8	12
Route 3 - Old Bus Stand - Kichha - East	13.7	41.1	9
Route 4 - Old Bus Stand - Bilaspur - South	16.5	49.5	11
Route 5 - New bus stand - Dineshpur	9.9	29.7	7
Grand Total			49

Table 9-26 Number of Bus Bays

Projected number of Trips	38,487
Number of Buses (Occupancy 30)	1,283
Peak hour (10%)	128
Bus Bays (Considering 12 min loading and 6 unloading time)	21

Apart from parking, all the facilities have been considered for the bus terminal like the Workshop area for buses, public/semi-public facilities like Offices/Administration, Police Post, Post office, Telephone, First Aid, etc., parking of other vehicles, commercial, circulation, and open spaces. Based on the case study, the area of bus parking and bus bays have been considered as 30% and the other facilities areas have been calculated (refer to **Table 9-27**). The total area under this comes to be 27137 m²/ 2.7 Ha.

Table 9-27 Proposed Bus Terminal Area

Bus Facility (30%)	Number	Area per Unit (m ²)	Area (m ²)
Bus Parking	49	104	5096
Bus Bays	23	145	3045
	Sub-total		8141
Other Facilities	Percentage	Area (m ²)	
Workshop (6%)	6	1,628	
Public/Semi-Public - Offices/Administration, Police Post, Post office, Telephone, First Aid, etc. (3%)	3	814	
Parking (18%)	18	4,885	
Commercial (3%)	3	814	
Circulation (30%)	30	8,141	
Open Spaces (10%)	10	2,714	
	Sub-total	18,996	
Grand Total		27,137	

9.11. Hierarchy of Roads

The total land under roads is 650.84 Ha in the proposed road network, a road hierarchy has been maintained in the proposed road network. In the road hierarchy, each roadway is defined in terms of its function such that appropriate objectives for that roadway can be set and appropriate design criteria can be implemented. A road hierarchy has, for some time, been accepted as one of the important tools used for the road network and land use planning. The hierarchy of roads categorizes the roads according to their functions and capacities. Developing a hierarchy of roads for any urban area separates various types of traffic in different directions to channelizing the overall traffic. The road hierarchy for Rudrapur Planning Area has been presented in **Table 9-28**. There is five level of road hierarchy that has been proposed for the Rudrapur Planning Area. These are 60m, 45 m, 30m, 24m, and 18m in width. The three National Highways i.e., NH 9, NH 109, and NH 109, and the newly proposed bypass which forms the spine of the planning area, from which other roads begin has been proposed to be 60m. It is the highest ROW in the Planning Area. According to URDPFI, it falls under the Arterial Road/Expressway category based on its width.

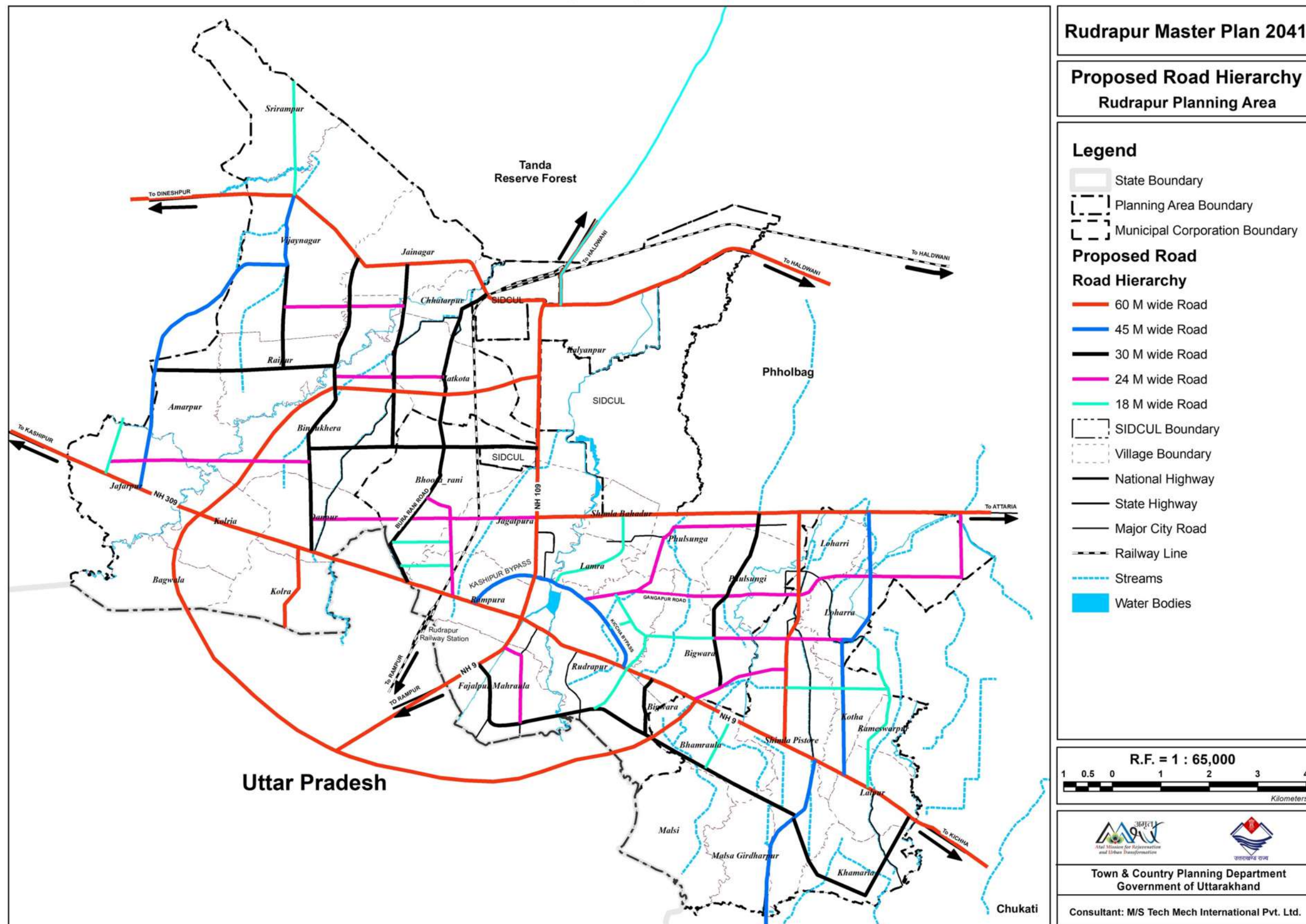
The other major roads in the planning area have been proposed to be 45m, 30m, 24m, and 18m based on the existing road width availability, population density, and need of the catchment area. These roads act as the Sub- Arterial/collector/distributor roads for the planning area. The Kashipur and Kichha bypass has been kept as it is as per the previous Master Plan, i.e., 45 m due to lack of space. The design cross section of these roads is different based on the requirement of the area and its functions (refer to **Map 9-4**).

Table 9-28 Proposed Road Hierarchy

Hierarchy	ROW	Description	Proposed Hierarchy	Properties
R1	60	NH 09, NH 309	Arterial	Access controlled carriageway, with MUZ, service lane including parking and pedestrian facilities on both sides
R1	60	Bypass Road, Proposed By NHAI	Arterial/ Expressway	Grade separated accessed control highway on both sides
R1	60	Attaria Road	Arterial	Carriageway with separate non-motorized, MUZ, and pedestrian facilities on both sides
R2	45	Arterial Road	Arterial	Carriageway with separate non-motorized, MUZ, and pedestrian facilities on both sides
R3	30	Sub-Arterial	Sub-Arterial	Carriageway with separate non-motorized and pedestrian

Hierarchy	ROW	Description	Proposed Hierarchy	Properties
				facilities on both sides
R4	24	Residential	Collector	Carriageway with MUZ and Pedestrian facilities on both sides
R4	24	Commercial	Collector	Carriageway with parking & pedestrian facilities on both sides
R5	18	Residential	Collector	Carriageway with MUZ and Pedestrian facilities on both sides
R5	18	Commercial	Collector	Carriageway with parking & pedestrian facilities on both sides

Map 9-4: Proposed Road Network

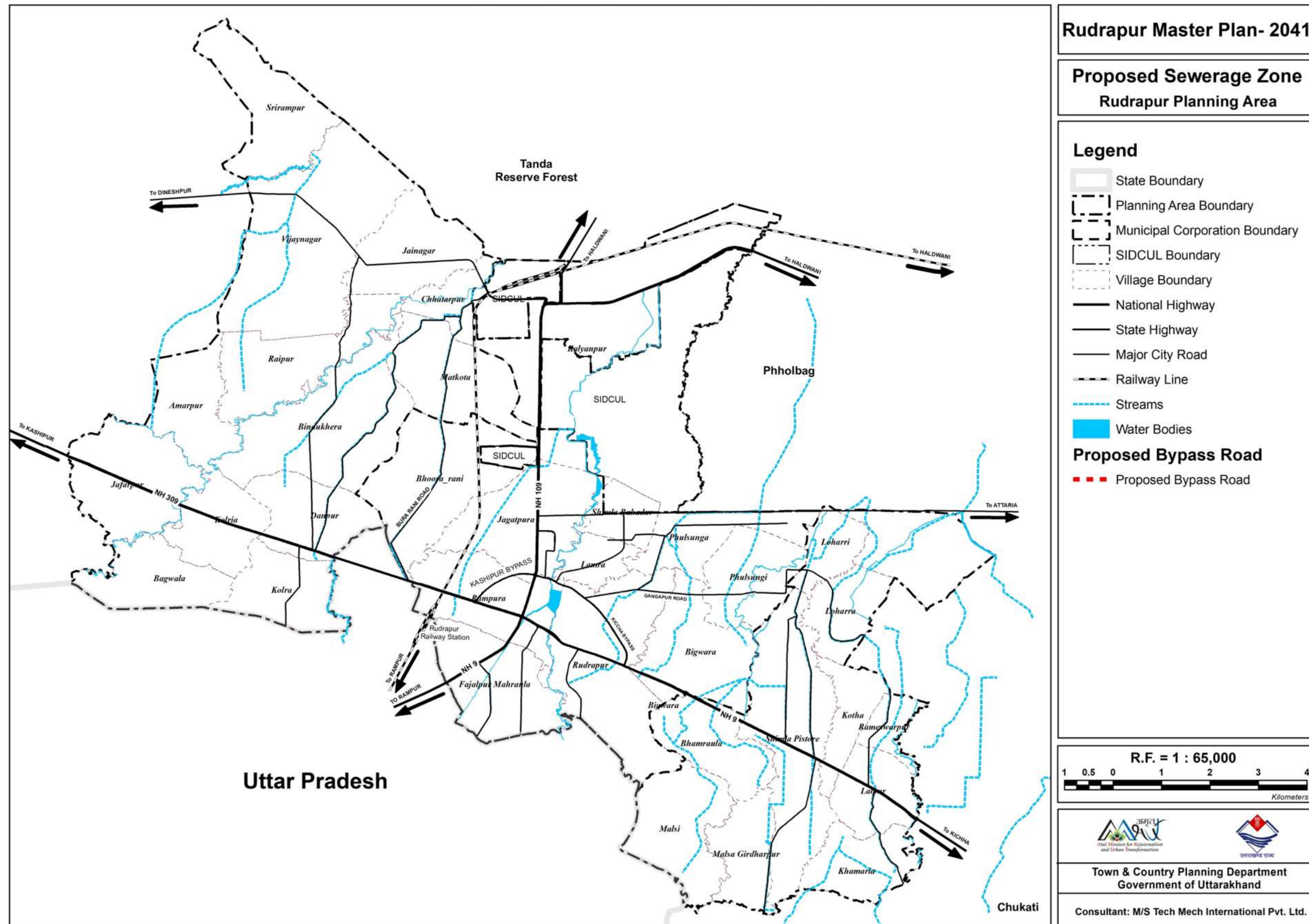


9.11.1. Bypass

Rudrapur being an industrial city highly needs good transportation infrastructure to facilitate the movement of heavy goods and vehicles. From the transportation analysis view, it was found that the city needs bypass roads as there is a lots of thru traffic passing through the city. Hence new bypass road has been proposed to better serve the Rudrapur Planning Area (**Map 9-5**). The proposed bypass origins from opposite Radhaswami Satsang Beas at Kiccha Road then passes through the revenue villages of Bhamraula and Rudrapur, and then enters into the state of Uttar Pradesh, then again enters in Planning Area in the revenue village of Baglwala, Kolria and then crossing the Kashipur Road, and then passes through the revenue villages of Bindukhera, Matkota and ends at Haldwani Road (opposite to SIDCUL. This bypass would cater to all the industrial goods traffic and will bypass the through traffic passing through the city.

At the local level as per **Map 9-5**, a bypass has been proposed. This bypass facilitates Rudrapur by an alternative route for people/traffic going to Haldwani/ Nainital and Kichha without going into the city. Just from the outskirts of the planning area on the western side along the NH-109, the bypass bifurcates into two directions, one leading towards Haldwani and the other leading towards Kichha. The bypass joins the NH-109 within the planning area near the SIDCUL. This bypass will improve the current issues of transport network and hence develop the planning area.

Map 9-5: Proposed Bypass Road in Rudrapur Planning Area



Source: Proposed by NHAI

9.12. Cross- sections

Urban roads in Rudrapur Planning Area have a heterogeneous mix of traffic. These include pedestrians, slow-moving vehicles like bicycles, rickshaws both for passenger and freight movement, and fast motorized vehicles like motorcycles, scooters, three-wheelers, cars, and public transport vehicles. The space occupied by each of these vehicles, accelerations and deceleration characteristics, and possible maximum speeds by each user are variable. Therefore, space allocation to different vehicles must be carefully ensured to achieve a smooth and safe flow of traffic.

The type and character of each urban road need to be carefully detailed to respond to the functions it performs, i.e., providing mobility or access or both. The safety of road users is a major concern now because the number of traffic accidents and fatalities on urban roads has continued to increase in the past few years. Therefore, the application of appropriate geometric design standards on urban roads is essential to ensure the safety of all road users. Hence, the design of each road hierarchy in the Rudrapur Planning Area has been carefully carried out separately. The guidelines from IRC 86-1983 standards for urban roads in plains have been followed. Apart from this reference from the Unified Traffic and Transportation Infrastructure (Planning and Engineering) Centre, UTTIPEC, Delhi Development Authority, and Urban Street guidelines, Pune has been considered for the preparation of the cross-sections.

9.12.1. Design components of cross-section

9.12.1.1.Carriageway/Motorized vehicle zone

The carriageway is the reserved portion of the street only for moving vehicles. This includes the number of lanes required for the throughput of motorized traffic. It is divided by railing/median or undivided depending on ROW for to and fro traffic. The motorized vehicles include Public transport vehicles too. The lane widths of a carriageway affect the safety and driving behavior of drivers. Wide lanes encourage higher speeds. The carriageway should not be used for parking, hawking, walking, and laying utilities. The public transport proposed here is Bus Priority Lane and hence in the carriageway, a lane is dedicated for Buses. These dedicated bus lanes are only provided on more than 30 m wide roads.

9.12.1.2. Non-motorized vehicles zone

The non-motorized vehicle zone is reserved for non-motorized vehicles or slow-moving vehicles like cycles, rickshaws, e-rickshaws, etc. Generally, a separate cycle track is provided for the movement of bicycle riders. But in Rudrapur Planning Area there are plenty of people who use cycles as well as e-rickshaw for regular travel. As both are slow-moving vehicles, combining both, a dedicated zone for non-motorized vehicles has been introduced in the planning area. This improves the capacity of the lanes designed for motorized vehicles and increases the safety of bicyclists too.

9.12.1.3. Multi-Utility Zone (MUZ)

Multi Utility Zone or MUZ is a new and highly appreciated concept that has been successfully implemented in the city of Nanded in Maharashtra. As its awareness increased Urban Street Guidelines for Delhi have made it a mandatory element on Urban Streets. The concept is all the stationary elements on the streets are organized in a dedicated space which generally results in the obstruction of free streets. Stationary elements include trees, hawkers, bus stops, underground and overhead utilities like electric supply, light poles, and similar other elements are organized in a space in between the footpath/cycle tracks and motorized lanes. This concept has brought high efficiency and improvements to urban streets.

9.12.1.4. Service lane

Service lanes are provided to provide vehicular access to properties, and minor roads are channelized through service lanes reducing the number of punctures on bicycle facility to the bare minimum required for accessing this lane. These are generally spaces at an interval of 200m or more. Most urban roads require the provision of parking facilities that can be conveniently integrated with service lanes eliminating conflicts between parked vehicles and bicycle lanes

9.12.1.5. Parking

Parking is major traffic issue in Rudrapur commercial area. The roads of the cities are mainly encroached by parking of vehicles. Hence, the parking has not been assigned along the carriageway. The parking facility where ever possible has been incorporated with service lanes. As arterial roads also serve the flow function, it is desirable that parking should be limited to dedicated service lanes.

9.12.1.6. Pedestrian Zone

A pedestrian zone or footpath or sidewalk is the portion of the street reserved only for people who commute through the walk. It is provided on both edges of the street. It should be walkable and safe for pedestrians and should be free from encroachments, parking, and utility obstructions. The width of the pedestrian zone is determined by the hierarchy of the road.

9.12.2. Design principle

The design principle of the cross sections of roads varies from place to place according to the requirement of the city. In consideration of this, the design principle of the Rudrapur Planning Area has also been developed. The new concept of the multi-use zone has been introduced in the urban roads of the city to organize the stationary elements of streets in a single dedicated zone, stop the encroachment of carriageways, and ease the movement of motorized vehicles zone. As the name suggests it can be utilized for multiple purposes and hence it has been kept adjacent to the carriageway in all the road types so that it can be utilized for various purposes according to the demand of the different types of roads. In residential areas, it has been incorporated with a pedestrian zone and on commercial roads, it has been combined with a carriage way. Also, it is kept adjacent to the non-motorized vehicle zone wherever it has been introduced to provide the same facilities as the motorized vehicle zone.

9.12.3. Cross section for 60 m road

The National Highways of the planning area are proposed to be 60 m in width. Along the NH 09 and NH 309 mixed-use has been proposed. The cross-section of 60 m roads is designed to cater to the mixed-use proposal for the planning area. The cross-section is represented in **Figure 9-26**. The road is proposed with a median of 6m and then 3 carriageways or motorized vehicle zone of two 3.5 m and one 4 m wide. The 4 m wide road is reserved for buses providing a bus priority lane as a public transport system. After the carriageway, 3 m of Multi-Use Zone (MUZ) has been proposed. The MUZ can be utilized for providing a bus stand, public toilets, public seating, and public utilities beneath it. It can also be utilized for needed fixtures for the road like lights. After the MUZ, 7 m of service lane which includes non-motorized vehicles too have been provided with 3 m of parking. The MUZ can also be utilized by the e-rickshaws for similarly making stops to buses. After the service lane, a pedestrian zone of 3 m is provided. As these cross sections will

cater to the mixed-use zone. The service lane has been provided with parking and the pedestrian has been kept wide for easy flow of traffic and people.

9.12.4. Cross section for 45 m road

The cross-section of the 45m road type has been illustrated in **Figure 9-26**. Two cross sections of 45 m wide have been proposed. The first one is for the arterial road along SIDCUL and the second is the bypass. The median is kept at 3 m and then in a similar manner as 60 m wide road, a total of 3 carriageways with two carriageways as 3.5 m and one carriageway as 4 m (Bus priority lane) has been proposed. Adjacent to the carriage way is the MUZ of 3 m and adjacent to it is the non-Motorized Vehicle zone for e-rickshaw and cycles. The MUZ will be used for bus stands, e-rickshaw stops, public utilities, etc. Adjacent to it is the pedestrian zone of 3m.

The 45m cross-section of the bypass road is presented in **Figure 9-26**. The bypass is for thru traffic. Hence only a carriageway of 4m each and a paved shoulder of 2m with a 3m median is provided. After the carriageway slope on both sides of the road has been provided to avoid direct access to the bypass road. After the slope, a 2m buffer which shall act as a drainage channel for the roads has been proposed. The total carriageway is 31 m (including a median of 3m) with a slope of 5m and a drainage channel /buffer of 2m on each side has been proposed.

9.12.5. Cross section for 30 m road

The cross-sections of the 30m road have been presented in **Figure 9-27**. Two cross sections have been developed for Rudrapur Planning Area for a 30 m wide road. First is the general cross-section and second is the cross-section of bypass within the planning area on the eastern side starting from Asteria road – 45m. The general cross-section of 30m has been proposed with a median of 1m and two carriageways each of 3.5 m. The buses can also travel on the 30 m wide road. Adjacent to the carriageway is a buffer of 1 m for road fixtures and separation of motorized and non-motorized traffic has been developed. Adjacent to the buffer is the non-motorized zone of 4 m and after that the pedestrian zone of 2.5m.

For the 30 m wide bypass road which is in continuation with Attaria road the proposed network has been illustrated in **Figure 9-27**. Here a motorized vehicle zone/carriageway/ shared lane of 10m has been proposed with a 4m service lane. The median is kept at 1m and a buffer of 0.5m in between the carriageway and service lane has been provided.

9.12.6. Cross section for 24 m road

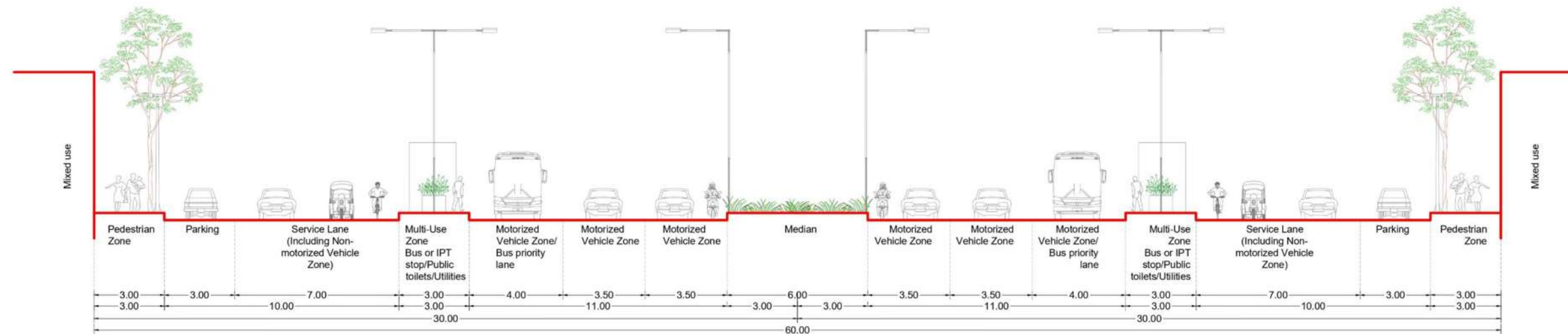
The cross-section for the 24 m road has been illustrated in **Figure 9-27**. On 24 m as well two cross sections have been developed. One is the general cross-section which is mostly found in residential areas and the other is for Kichha and Kashipur Bypass Road which is in the main commercial area of the planning area. In the general section two carriageway with shared traffic of each 3.5m, has been proposed. Adjacent to the carriageway is a 2.5m MUZ and 2.5m pedestrian zone. The MUZ here can be utilized for street vendors and public utilities. In the commercial cross-section, the median and carriageway are kept the same but instead of MUZ parking has been provided, as it is a commercial zone where parking is needed.

9.12.7. Cross section for 18 m road

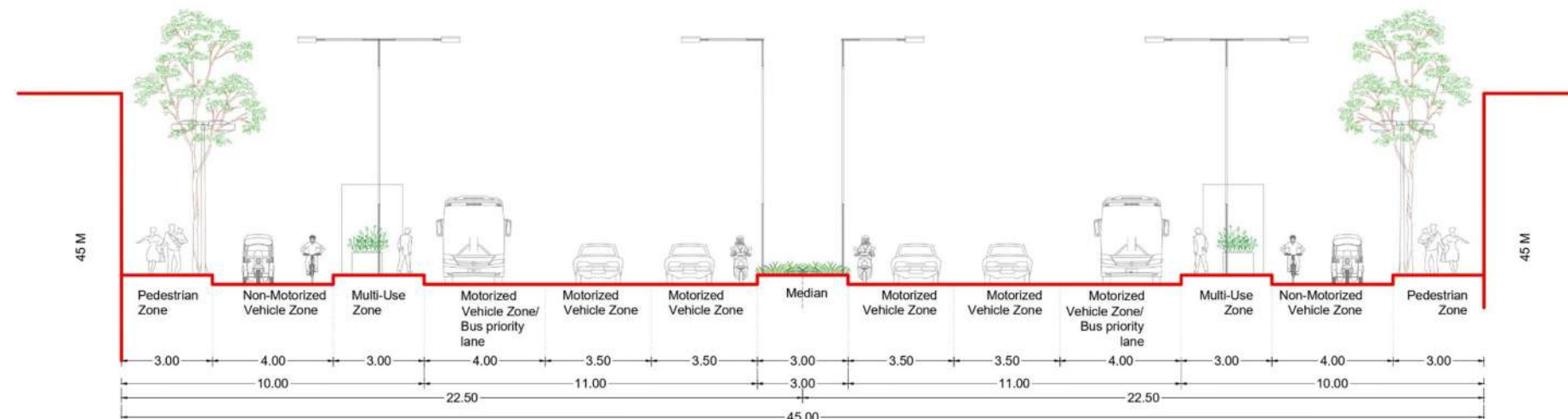
The cross-section of the 24 m road has been illustrated in **Figure 9-27**. Two alternatives one for residential and one for commercial have been proposed. A shared lane of 10 m in total with 2m MUZ and 2m pedestrian on each side has been proposed for residential areas. The proposed 18 m wide road in the core city of predominant commercial use has been proposed with 10 m carriageway with 2m parking and 2 m pedestrian on each side. The parking facility has been given importance in commercial areas.

Figure 9-26: Cross Section of Arterial Roads - 60m and 45m wide

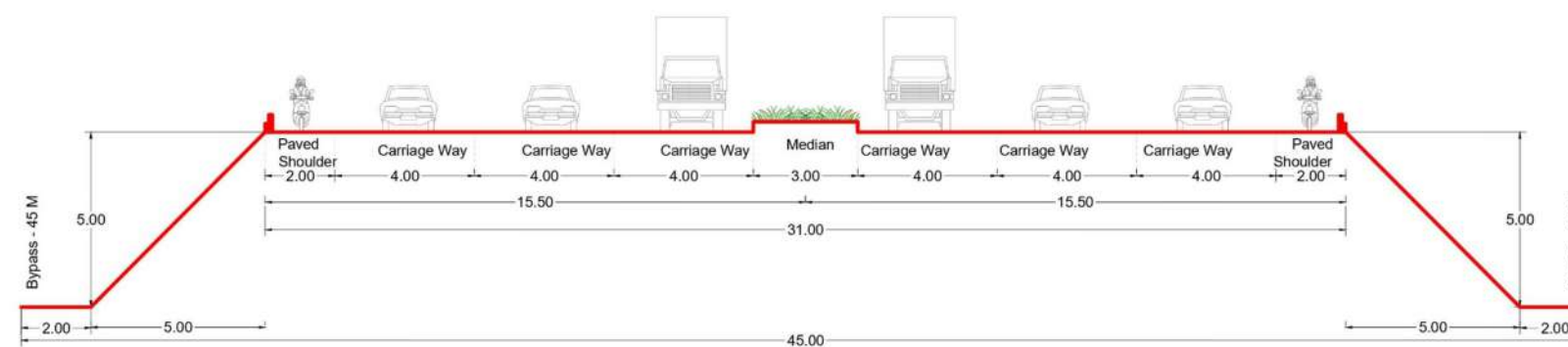
Road Cross Section - 60 m



Road Cross Section - 45 m

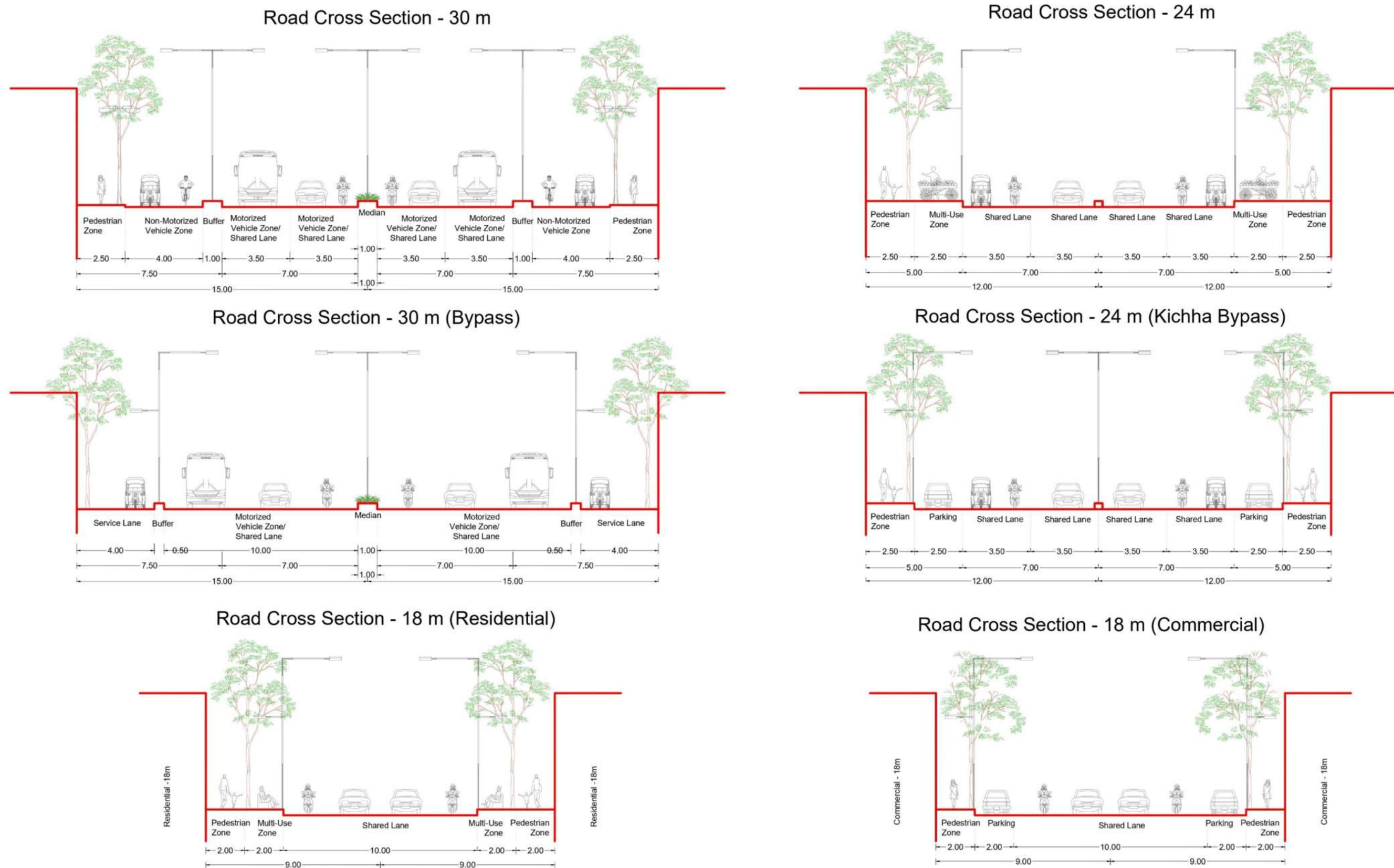


Road Cross Section - 45 m (Bypass)



Source: Proposed by Consultant

Figure 9-27: Cross-section of Sub-Arterial and Collector roads - 30m, 24m, and 18 m wide



Source: Proposed by Consultant

9.13. Terminal Facilities

9.13.1. Existing Bus Stand

The existing bus stand is located in the city center with an area of 1.55 Ha. For regional transport facilities, the District Development Authorities have proposed 16 bays Bus Stand cum commercial plaza on PPP mode in the existing bus stand area (refer to **Map 9-6**).

9.13.2. Transport Nagar/Truck Terminal

Rudrapur being an industrial city receives a lot of goods traffic regularly and there is a lack of facilities in the planning area for the goods traffic. However, a truck terminal has been proposed by the District Development Authority on the southern side of the planning area near the railway lines. To determine the requirement for Transport Nagar/ Truck Terminal and to analyze if the exiting truck terminal is sufficient for the planning area or not the area of the truck terminal has been calculated. The area calculation of the Transport Nagar has been explained in **Table 9-29** and **Table 9-30**. The total amount of goods traffic in the Rudrapur Planning Area with SIDCUL as the Origin or Destination is 10172. Assuming only 50% of vehicles are traveling to SIDCUL, 25% of parking has been provided for the trucks (referred from Logistics Park at Hubli-Dharwad) which comes to be about 1272 trucks (refer to **Table 9-29**). As per URDPFI, the Equivalent Car Space (ECS) is the same for buses and trucks. Hence 76 m² has been provided for each truck for angular parking which is considered 18% of the total land use as per URDPFI. Based on this the other areas have been calculated as per Truck Terminal Land Use break up as per URDPFI. The land requirement for the Transport Nagar comes to be 537067 m²/53.71 Ha. The proposed land for Transport Nagar is 55.24 Ha on Ateria Road (refer to **Map 9-6**).

Table 9-29 Parking Requirements for the Transport Nagar

Total goods traffic on Outer Cordons with SIDCUL as Origin/destination	No. of trucks required for Parking	Provision of Parking (25%)
10,172	5,086	1,271.5

Table 9-30 Truck Terminal Area Calculation

Truck Terminal (18%)	Number	Area per Unit (m ²)	Area (m ²)
Parking	1272	76	96672
Other facilities	Percentage	Area (m ²)	
Transport operators - Office, Godown, Loading/Unloading	30	161,120	
Service Industry - Petrol Pump, Service	6	32,224	

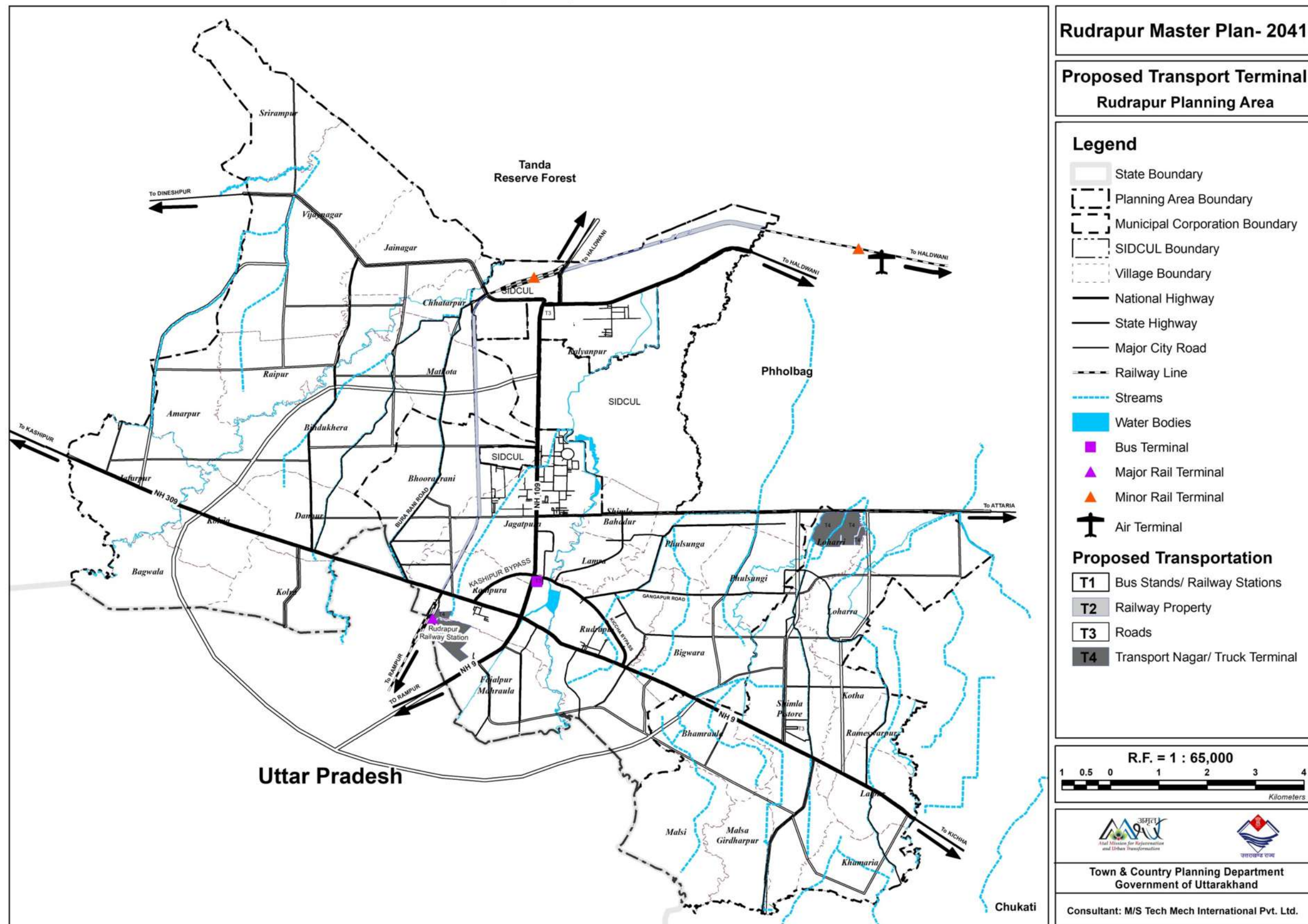
Truck Terminal (18%)	Number	Area per Unit (m ²)	Area (m ²)
Area, Weigh Bridge, etc.			
Public/Semi-Public - Police Post, Post office, Telephone, First Aid, etc.	3	16,112	
Commercial	3	16,112	
Open Spaces	10	53,707	
Circulation	30	161,120	
Grand Total		537,067 (53 Ha)	

9.14. Junction Improvement Plan and Proposed Flyovers

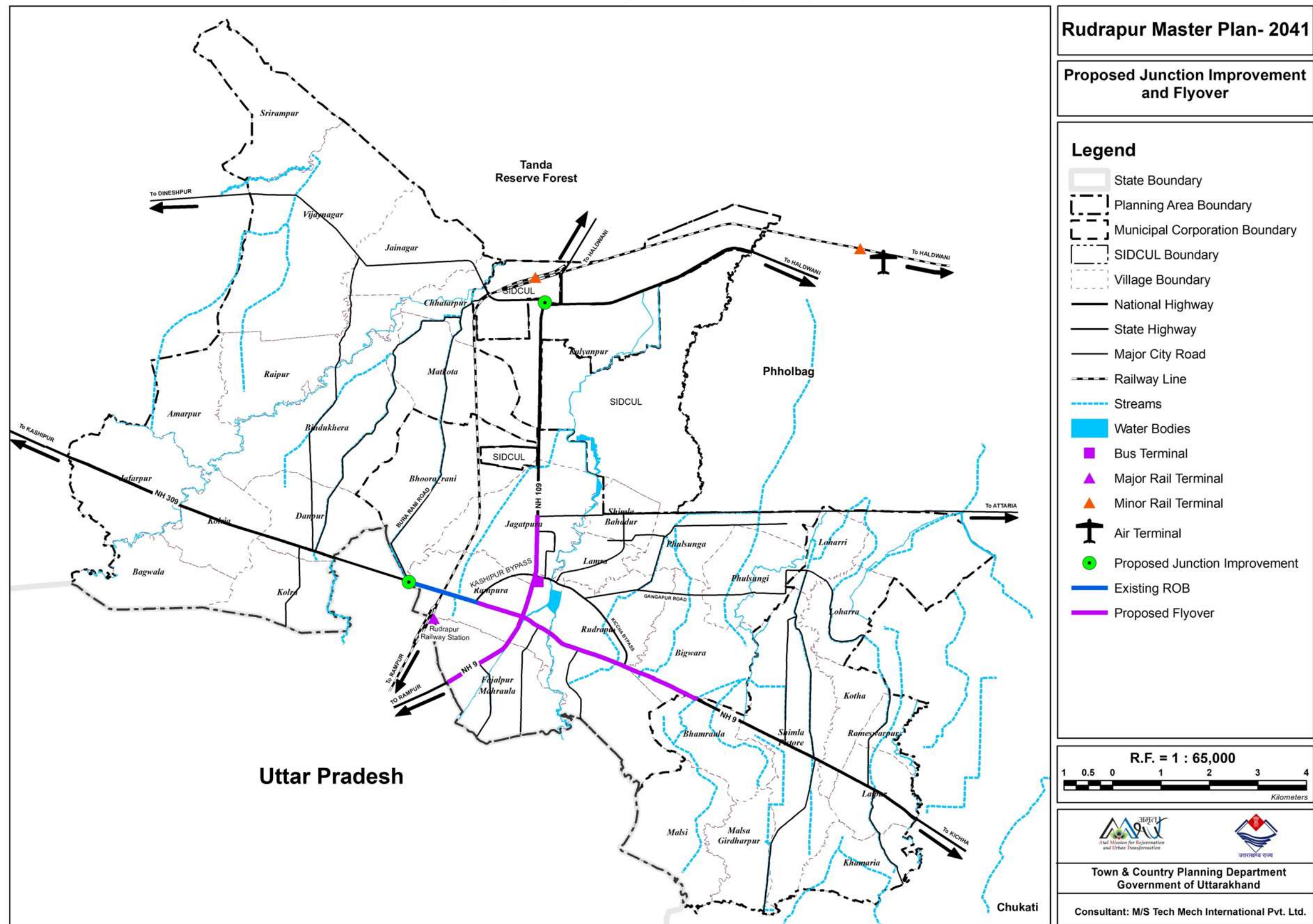
Map 9-7 provides the locational details of the junction improvement and flyover proposals. Junction improvement has been proposed at two locations. The first is on Dineshpur Chauraha on NH 309, second is on Tel Mel Chauraha on NH 109 where we have an existing Rail over Bridge (ROB). As the main city is at the junction of three National Highways, the junction has become too crowded.

As highlighted the National Highways connect various urban areas to Rudrapur on all sides i.e., Kichha on the east, Gadapur on the west, Haldwani on the east, and Bilaspur on the south. Traffic trips from any of the cities pass through Rudrapur which creates a lot of unwanted traffic within the city. To resolve the issue a bypass has been proposed. In addition, two flyovers have been proposed in the planning area. Both the flyovers are proposed on the crossing of NH-09, NH-109, and NH-309. The first flyover is proposed from the UP border on the north side till Attaria Chowk. This proposal is already in compliance with the NHAI proposal. The other proposal for flyover is on NH-09 and NH-109. It starts from Radha Swami Satsang and extends till Guava Chowk. It crosses Indira Chowk as well.

Map 9-6: Proposed Bus Terminal and Truck Terminal



Map 9-7: Junction Improvement and Flyover Proposal



10. Tourism

Tourism industry is one of the booming industries in India as well as in the world. The section covers the tourism nodes present within the planning area as well as in the whole district. It also highlights the inflow of tourists in the last 5 years which would be helpful to establish the trend of tourists coming to the area.

10.1. Tourism Nodes at District Level

The district of Udham Singh Nagar is dotted with several sacred shrines both for Hindu and Sikh devotees which attract a major quantum of tourists. Overall, there are a total of 13 major tourist nodes in the district of Udham Singh Nagar which mainly includes religious places and recreational places. The list of the tourist nodes has been given below:

1. Gurudwara Nanakmatta Sahib, Nanakmatta	8. Haripura and Baur Lakes, Gularbhoj
2. Atariya Devi Temple, Rudrapur	9. Nanak Sagar, Nanakmatta
3. Chaiti Temple, Kashipur	10. Dhaura Reservoir, Kichha
4. Panch Mandir, Rudrapur	11. Begul Reservoir, Sitarganj
5. Drona Sagar, Kashipur	12. Tumaria Reservoir, Kashipur
6. Giri Sarovar, Kashipur	13. Hari Mandir, Rudrapur
7. Lake Paradise, Rudrapur	

These nodes attract a large number of tourists on a day-to-day basis which can be further developed for leveraging the tourism potential and for providing the required impetus to tourism.

a) Tourist's Inflow at District Level

The district is well connected with other parts of the country by rail, road, and airways. The district attracts tourists from all walks of life. **Table 10-1** represents the tourist inflow in the district in the last 5 years. The data provided by the tourism department shows that the number of tourists coming to the district has increased from 130624 in 2014 to 154875 in 2018.

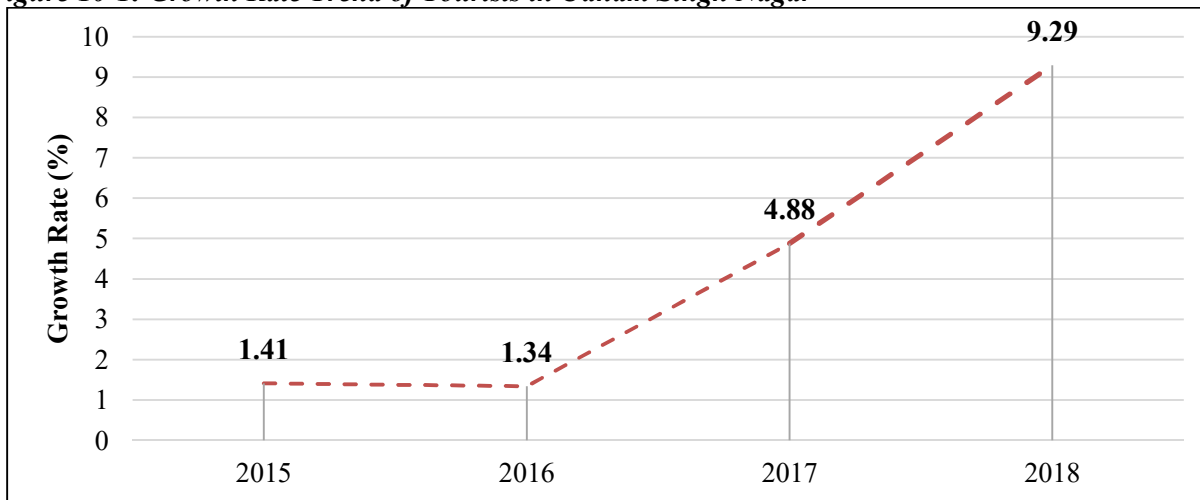
Table 10-1: Tourist Inflow in Udham Singh Nagar District

Year	Domestic Tourists	Foreign Tourists	Total Tourists	Growth Rate
2014	128,903	1,721	130,624	-
2015	130,703	1,771	132,474	1.41
2016	132,515	1,728	134,243	1.34
2017	139,140	1,654	140,794	4.88
2018	152,022	1,853	153,875	9.29

Source: Tourism Department, US Nagar

The growth rate of tourists has increased in the last 4 years as shown in **(Figure 10-1)**. The growth rate is almost constant in the years 2015 and 2016 as there is a variation of 0.7% only. In the year 2017, the growth increased to almost 5% while in 2018; it increased to 9.29%. It implies that the number of tourists is increasing with an increasing growth rate indicating that there is the potential of developing the tourism industry in the district.

Figure 10-1: Growth Rate Trend of Tourists in Udham Singh Nagar



Source: Tourism Department, Udham Singh Nagar

10.2. Tourist Attraction Nodes at Local Level

10.2.1. Atariya Devi Temple

It is in Gali Number 2, Rudrapur Haldwani motor route at 2 km from bus stand, Rudrapur. It is regarded as the most important tourist/pilgrims spot of Rudrapur where people come from far-off places to pay their obeisance. It is an ancient temple that was built by King Rudra. According to the folktale when King Rudra was passing through, his chariot got stuck in marshy land, so he decided to build a temple and well in the same place and this temple is the same. This temple is easily accessible by Auto rickshaw, e-rickshaw, or any private mode of transport. Once a year, a fair is organized in this temple where a huge gathering of pilgrims is there who visit the temple and enjoy the fair as well.



Figure 10-2).



Figure 10-2: Atariya Devi Temple

10.2.2. Panch Mandir

This temple was established in the year 1967-1968 and is also known as the Laxmi Narayan Temple. It is a beautiful temple dedicated to the Hindu Gods and Goddesses. They are a group of 5 temples dedicated to different deities inside this temple complex. The Laxmi Narayan Temple is dedicated to Lord Vishnu and Goddess Lakshmi. It is a beautiful temple where there is a huge gathering during the Janmashtami festival. This place is easily accessible by Auto rickshaw, e-rickshaw, or any private modes of transport (refer to **Figure 10-3**).

Figure 10-3: Panch Mandir, Rudrapur



10.2.3. Lake Paradise

It is a privately owned artificial lake located at Rudrapur-Kichha by-pass road. It is a recreational place for tourists where they can have a picnic, have fun, and enjoyment. This place is having restaurant facility as well. However, this place is not well-maintained as the lake is not cleaned periodically creating a foul smell thus discouraging the number of visitors. This place is easily accessible by Auto rickshaw, e-rickshaw, or any private modes of transport (refer to **Figure 10-4**).

Figure 10-4: Lake Paradise, Rudrapur



10.3. Tourism Infrastructure Assessment

10.3.1. Hotels

There are 52 hotels in the city of Rudrapur. Some of the prominent hotels in the city are Radisson Blu, Rudra Continental, Le Castle, and Ginger hotel. There are rooms available with AC and Non-AC Facilities having a cost that varies from Rs 100 per day to Rs 5000 per day. The list and detail of hotels have been given in Annex. There are various good options available for tourists who do not want to spend much on accommodation. However, these options are not enough to cater to the tourists who wish to stay in budget accommodation. Therefore, there is a need for creating affordable and budget accommodation with quality facilities for the tourists in the city. This would be beneficial to attract more tourists and even help the tourists to extend their stay by a day or two. Considering the potential of Rudrapur in terms of its connectivity and location of a few places of historical and tourist interest in the close vicinity, the stay of the tourist could be increased from a single day to a minimum of 2-3 days. This would help to facilitate the city's trade and commerce and boost its economy.

10.4. Key Issues & Potentials

From the study, it has been observed that Rudrapur Planning Area does not have any tourist attractions. Most of the attractions are present in the vicinity of the planning area. Attractions like Lake Paradise is a privately owned lakes in Rudrapur. Despite the large number of tourists visiting the city, their actual stay is highly restricted as most of the tourists stay only for one day. Hence, efforts must be given to increase their stay in the area to at least two to three days. Also, the city has very good accommodation options catering to low-budget tourists as well. However, these options are not enough and require certain other hotels to be established or some innovative measure to be adopted in this regard.

10.5. Future Requirement

A scheme for accommodating tourists in the residential houses (bed & breakfast) can be considered as an option for providing affordable accommodation to the tourists. An incentive-based scheme will have to be framed for creating an appropriate level of budget accommodation. Another way of increasing the stay of the tourists is to provide them with certain options which they can visit. This could be done by developing tourist circuits at various levels like Local and Regional levels.

The entire approach to promoting tourism shall revolve around the provision of 4 including –

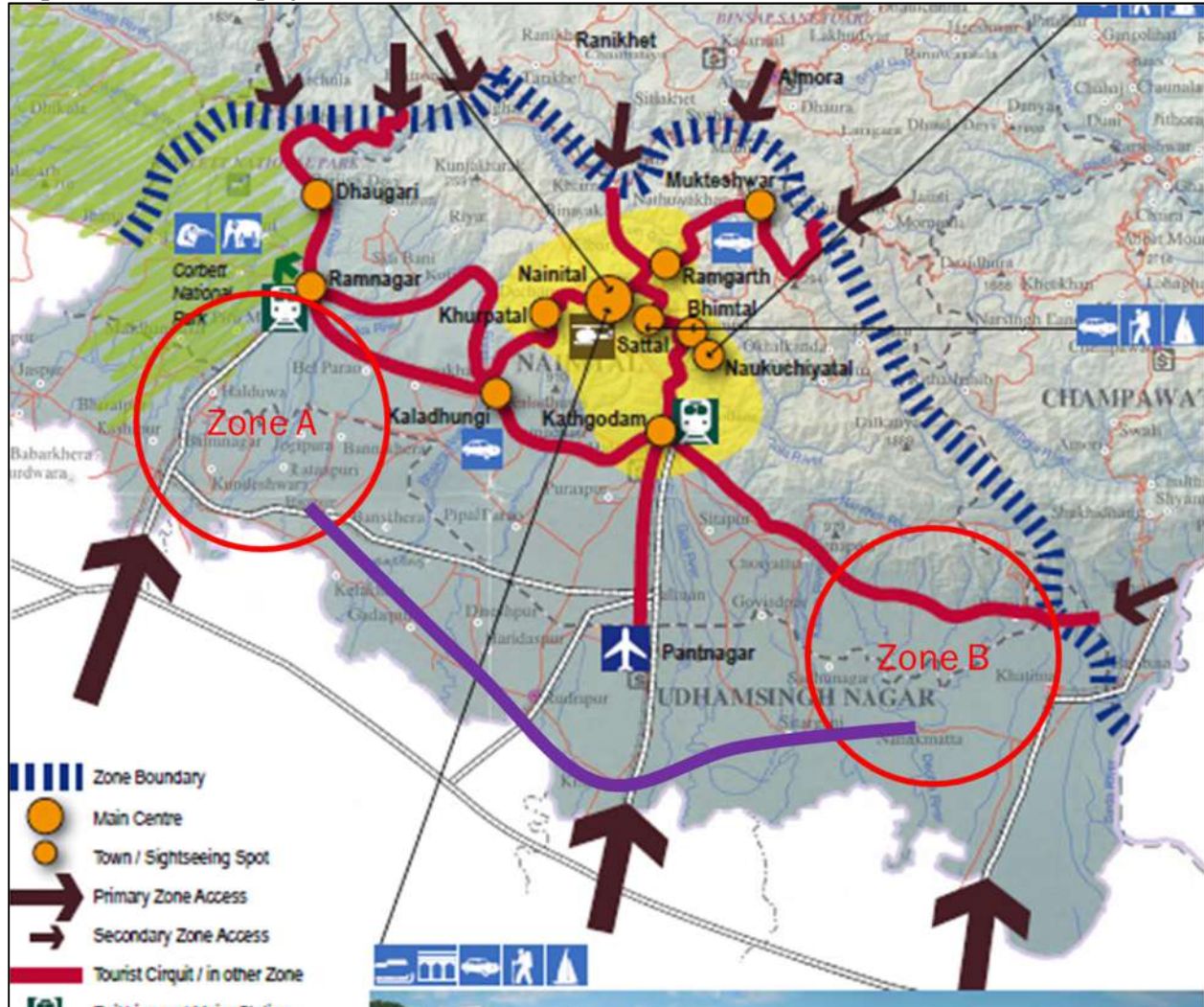
1. Promoting a high degree of Accessibility,

2. Providing comfortable and affordable quality accommodation, including low-budget accommodation.
3. Creating more opportunities for attracting tourists, and
4. Providing state of art tourism-related infrastructure and amenities.

10.5.1. Regional Tourism Plan

According to Uttarakhand Tourism Development Master Plan 2007 – 2022, Udham Singh Nagar is under Zone 2 of the Tourism Plan (refer to **Map 10-1**). In zone 2 the proposals have been made mainly connecting Nainital, Jim Corbett National Park, and the surrounding important tourist destinations. As Rudrapur is the only nearest airport which is in Zone 2, it can be developed as an integral part of tourist circuits. Within zone 2 the proposal is to develop zone A and Zone B (refer to Error! Reference source not found.). Zone A i.e., Kashipur which has potential tourism sites and within 30 km we have Jim Corbett National Park. In the “Uttarakhand Tourism Development Master Plan 2007-2022”, the Jim Corbett National Park circuit has been proposed. In Zone-B, Reetha Sahib and Nanak Matta circuit has been proposed. Rudrapur can act as an entry zone for both zones.

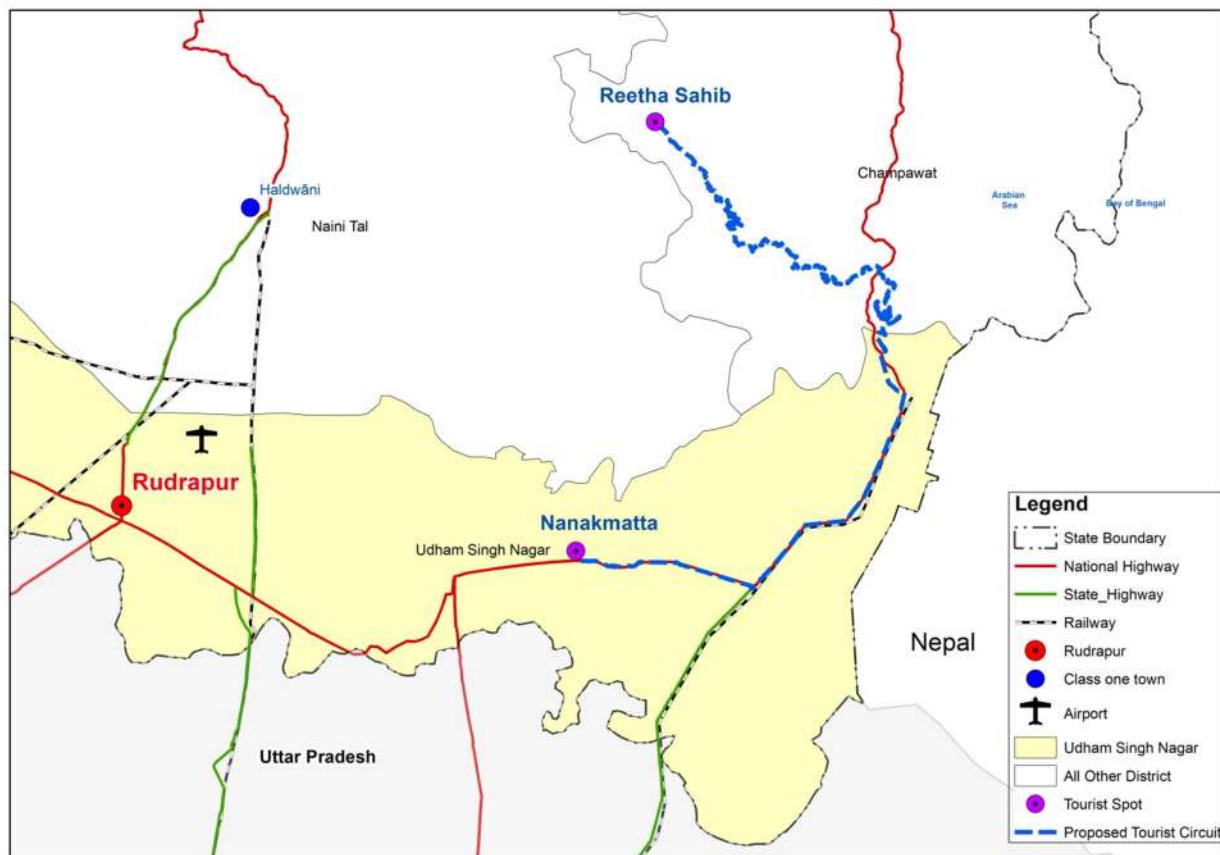
Map 10-1: Zone 2 Map of Uttarakhand Tourism Plan



Source: Proposed by Tourism Department, Uttarakhand

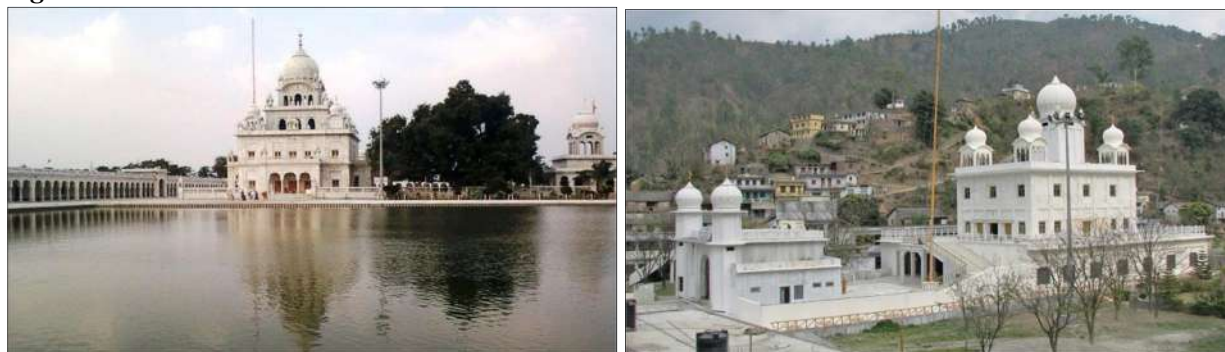
Along with this, an extension of the existing tourist circuit of Reetha Sahib and Nanak Matta is proposed to be established along with Rudrapur Planning Area (refer to **Map 10-1**). The circuit starts with Rudrapur, then to Nanak Matta which is about 54.1 km from Rudrapur. The end of the circuit is at Reetha Sahib which is about 116.9 km from Nanak Matta (refer to **Figure 10-5**).

Map 10-2: Proposed Tourist Circuit



Source: Proposed by Tourism Department, Uttarakhand

Figure 10-5: Gurudwara Nanak Matta and Rita Sahib



11. Environment & Pollution: Generation, Consequences & Remedies

The Urbanisation and development activities impact the environment of an area significantly. For a sustainable development, the assessment of impact plays a great role in mitigating the ill effects and envisaging the future threat. Lack of physical infrastructure and industrialisation of ecological sensitive Trai area has resulted in degradation of environment. In this master plan of Rudrapur Planning area a comprehensive study has led to arrive at platform that shall ensure a healthy urban environment.

The various parameters covered in the environment are as follows:

11.1. Air Quality

Air quality in India is measured by national air quality index (AQI) prepared by CPCB. In this There are six AQI categories, namely Good, Satisfactory, Moderately polluted, Poor, Very Poor, and Severe. Each of these categories is decided based on ambient concentration values of air pollutants and their likely health impacts (known as health breakpoints). AQ sub-index and health breakpoints are evolved for eight pollutants (PM₁₀, PM_{2.5}, NO₂, SO₂, CO, O₃, NH₃, and Pb) for which short-term (upto 24-hours) National Ambient Air Quality Standards are

Figure 11-1: Air Quality Index

AQI Category	AQI	Concentration range*							
		PM ₁₀	PM _{2.5}	NO ₂	O ₃	CO	SO ₂	NH ₃	Pb
Good	0 - 50	0 - 50	0 - 30	0 - 40	0 - 50	0 - 1.0	0 - 40	0 - 200	0 - 0.5
Satisfactory	51 - 100	51 - 100	31 - 60	41 - 80	51 - 100	1.1 - 2.0	41 - 80	201 - 400	0.5 - 1.0
Moderately polluted	101 - 200	101 - 250	61 - 90	81 - 180	101 - 168	2.1 - 10	81 - 380	401 - 800	1.1 - 2.0
Poor	201 - 300	251 - 350	91 - 120	181 - 280	169 - 208	10 - 17	381 - 800	801 - 1200	2.1 - 3.0
Very poor	301 - 400	351 - 430	121 - 250	281 - 400	209 - 748*	17 - 34	801 - 1600	1200 - 1800	3.1 - 3.5
Severe	401 - 500	430 - +	250+ -	400+ -	748+* -	34+ -	1600+ -	1800+ -	3.5+ -
* CO in mg/m ³ and other pollutants in µg/m ³ ; 2h-hourly average values for PM ₁₀ , PM _{2.5} , NO ₂ , SO ₂ , NH ₃ , and Pb, and 8-hourly values for CO and O ₃ .									

Prescribed (refer to **Figure 11-1**). Emissions from vehicles and factories along with construction activity are the major cause of air pollution in Rudrapur Planning area. Inhaling them can increase the chance of health problems. People with heart or lung disease, older adults, and children are at greater risk from air pollution.

To monitor the quality of Air in Rudrapur, an air quality monitoring system has been set up which is located at JLN Government Hospital, Rudrapur which is keeping a check on the concentration of air pollutants in the air. Data base Only three criteria pollutants is available.

Table 11-1: Air Pollution Concentration ($\mu\text{g}/\text{m}^3$) in Rudrapur

Type of Pollutant	Concentration	Standard	Variation
SO ₂	13.54	80	-66.46
NO	22.40	80	-57.60
PM ₁₀	127.23	100	+27.23

Source: EPPCB, Kashipur

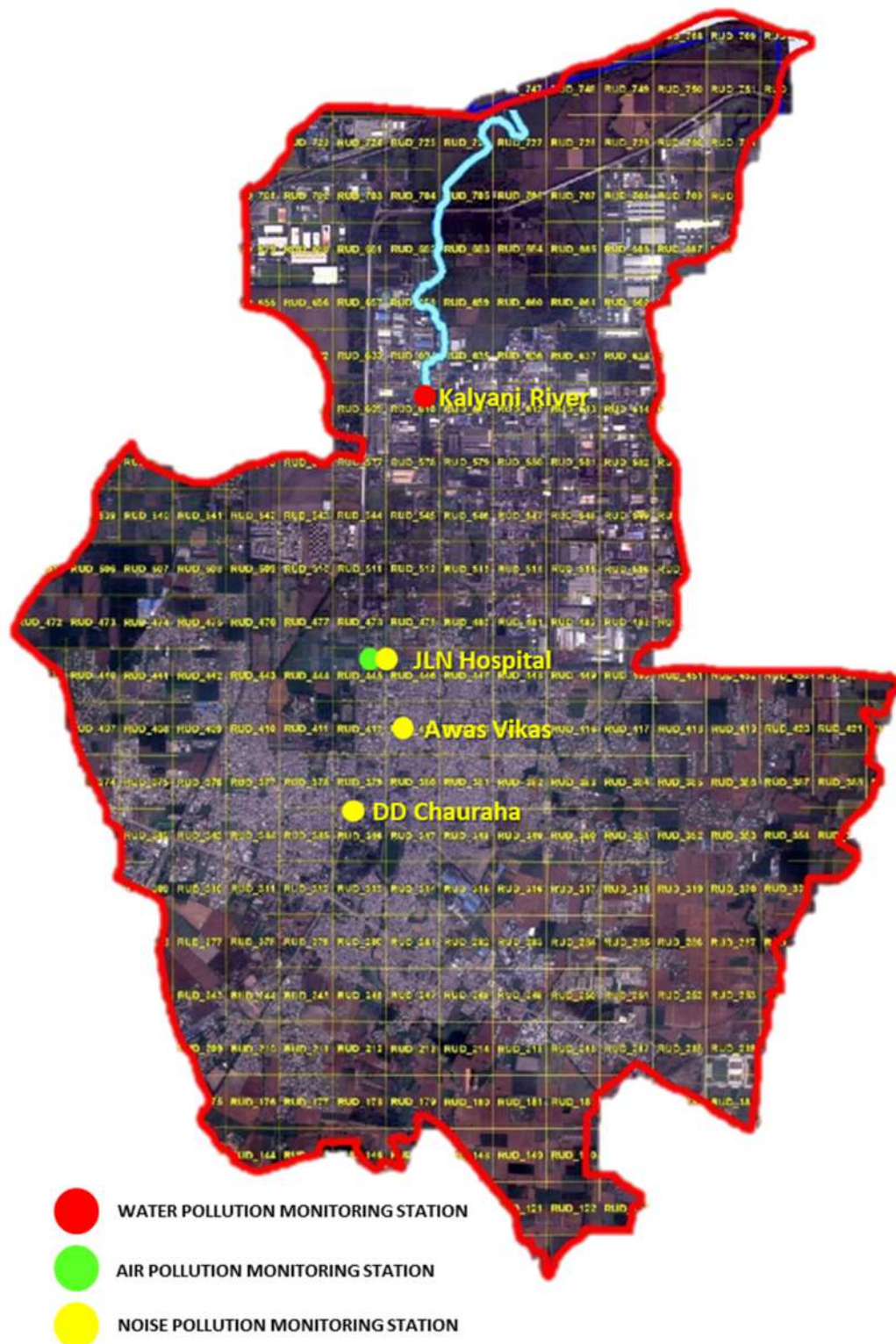
Note: + depicts more than the standard and – depicts less than the standard.

The concentration of various air pollutants in the city of Rudrapur in July 2019 is depicted in **Table 11-1**. It can be analyzed that the concentration of SO₂ and NO is under permissible limit. While the concentration of PM₁₀ has crossed the permissible limit by 27.23 $\mu\text{g}/\text{m}^3$. AQI falls under moderately polluted category.

As discussed in Error! Reference source not found., the wind flows from NNE to SSW on most days of the year. Since the industrial estate is in the NE direction; it implies that the ashes and smoke from the industries are flowing towards the settlement area of the city. It is one of the major causes of air pollution in the city. Therefore, there is a need to adopt certain strategies to minimize the impact of ash/smoke from these industries on the air quality of the city and the Planning Area, as a whole.

Exposure to high concentrations of PM₁₀ can result in several health impacts ranging from coughing and wheezing to asthma attacks and bronchitis to high blood pressure, heart attack, strokes, and premature death. The young and old and persons with existing medical conditions are most likely to be adversely affected by exposure to high PM₁₀ concentrations.

Map 11-1: Location of Pollution Monitoring Station



11.2. Noise Pollution

Noise pollution is defined as an unwanted or excessive sound that can have deleterious effects on human health and environmental quality. Noise is measured in Db (A) which indicates the loudness of the sound. Noise level refers to the decibel levels of noise that are produced by any appliance or machine. In general, the human ear can tolerate noise levels up to 85 Db and anything beyond that can affect their productivity as well as their quality of life. The decibel levels of common sounds above 80 Db are considered 'loud' while the decibel levels of common sounds between 100-125 Db are termed as 'uncomfortable'. So, all the machines operating in an area should produce noise within the acceptable noise level to maintain the well-being of the people around.

Table 11-2: Level of Noise Pollution (Db.) in Rudrapur

Day	Pre-Diwali Day	Diwali Day	Standard	Variation (Pre-Diwali)	Variation (Diwali)
Residential	48.91	85.57	45	+3.91	+40.75
Commercial	87.85	85.53	55	+32.85	+30.53
Silent Zone	51.45	47.36	40	+11.45	+7.36

Source: EPPCB, Kashipur

Note: + depicts more than the standard and – depicts less than the standard.

The level of noise pollution as per various land uses in Rudrapur on pre-Diwali and Diwali days is represented in **Table 11-2**. This noise level pollution has been analyzed by comparing it with the standards to know the variation. In general, the noise pollution level is high as compared to the permissible noise pollution level as per government standards. In the case of the residential area, there is a variation of 3.91 on pre-Diwali day but this increase considerably on Diwali day where the variation is more than 40 Db. which is a great concern. The variation in commercial areas is almost the same in both cases having a variation of around 30 Db. There least variation on Diwali day is in the case of the silent zone where it is 7.36 Db.

11.3. Water Pollution

Water pollution is the contamination of water bodies, usually as a result of human activities. Water pollution results when contaminants are introduced into the natural environment. For example, releasing inadequately treated wastewater into natural water bodies can lead to the degradation of aquatic ecosystems. In turn, this can lead to public health problems for people living downstream. They may use the same polluted river water for drinking or bathing

or irrigation. There is only one major water body in Rudrapur which is the Kalyani River which is being monitored at two different locations.

Table 11-3: Level of Water Pollution in Rudrapur

Aspect	Standard	Kalyani River at U/S Pantnagar	Variation	Kalyani River at D/S Pantnagar	Variation
Ph.	6.5-8.5	7.1	0	7.1	0
DO	6	6.8	+0.8	6.4	+0.4
BOD	2	6.0	+4	4.0	+2
COD	-	20.0	-	40.0	-
TDS	500	253.0	-247	282.0	-218
Conductivity	-	389.2	-	433.8	-

Source: EPPCB, Kashipur

Note: + depicts more than the standard and – depicts less than the standard.

The level of water pollution in the Kalyani River which has been monitored at two different locations based on various parameters under study is highlighted in **Table 11-3**. The Ph. level at both locations is within the standard range which means that the water is neutral. The Dissolve Oxygen (DO) is adequate, the minimum dissolved oxygen concentration of 5 mg/l ensures reasonable freedom from oxygen consuming organic pollution immediately upstream which is necessary for preventing production of anaerobic gases (obnoxious gases) from sediment. BOD is the measurement of the amount of oxygen required biologically to decompose organic matter under aerobic condition whereas COD is the measurement of total oxygen required to oxidize all biologically available and inert organic matter into carbon dioxide and water. BOD values thus are always smaller than COD values while it takes longer time for BOD measurement usually five days as compare to COD measurement that only a few hours. The level of BOD is also higher in both cases with the variation of 2-4 mg which means that the water is moderately polluted which is due to the dumping of wastewater and solid waste in the river at some locations. The Biochemical Oxygen Demand of 3 mg/l or less of the water ensures reasonable freedom from oxygen demanding pollutants and prevent production of obnoxious gases. As there is no standard for COD but ratio of BOD to COD is important parameter to assess the quality of water of rivers or natural streams. In table 11-3, two locations are mentioned for water quality assessment one is Upstream and another is Downstream of Pantnagar. The BOD:COD at upstream is 6.0 mg/l : 20 mg/l (1:3.33) and at downstream is 4.0 mg/l : 40.0 mg/l (1:10). As the

ratio is higher in down stream data, it indicates that toxic chemicals may be present which can be harmful aquatic life as well as human beings.

Groundwater contamination due to Integrated Industrial Estate, Pantnagar

Water pollution because of accelerated industrial growth has drawn concerns over public health and the environment. To assess the extent of environmental impact due to integrated industrial estate-Pantnagar (IIE-Pantnagar) various studies have been done since the establishment of industries. As per CGWB data, which reveals that how the groundwater quality of the IIP-Pantnagar, as well as the surrounding areas, has degraded because of the untreated water discharged openly into the drains. Although there have been various steps taken by the government to solve this problem it has been deteriorating over the years.

Furthermore, the water quality of most of the hand pumps is under the stress of severe pollution. The area near the Kalyani River (Khera, Pukka Khera, Reserve police line) is under more threat of groundwater pollution than the other areas and this may be due to the discharge of wastes from various sources into the river and ground surface. So, controlled waste disposal practice should be encouraged in the industries in SIIDCUL and local areas to minimize groundwater contamination, otherwise, the water quality index value will increase continuously resulting in degradation of groundwater quality in the area.

Figure 11-2: Water Pollution



The water quality in Rudrapur is found to be suitable for drinking in a few locations, while a few places like transit camps are getting deteriorated gradually and are exposed to water-borne diseases due to polluted groundwater. Moreover, groundwater inside and surrounding of IIE-

Pantnagar are getting into the severe condition which needs to be looked upon. Rudrapur is in the plain Terai region, the area is rich in groundwater which is getting worsened by the polluting industries of Pantnagar.

11.4. Key Issues & Potentials

- 1) The concentration of PM10 is higher in the air by a value of 27.23 which can cause various health impacts among people.
- 2) The level of noise pollution in the city is higher than the standards in all the three land uses which is a matter of great concern. The variation is in the range of 3.91-40.75 Db. in all three uses.
- 3) The river water is polluted as the BOD level of the rivers is higher by 2-4% than the standard given by CPCB. Also COD values and BOD to COD ratio indicates presence of chemicals which can be toxic so further investigations are required.

11.5. Environment Plan

As whole state of Uttarakhand lies in Ganga basin therefore it has very strategic role in Namami Ganges project of GOI. Therefore the various guidelines of this project is applicable to Rudrapur planning area. This area also falls under the Terai region in the sub-tropical and temperate zone of Uttarakhand.

The act, policies and guidelines which are applicable to Rudrapur planning area is as under.

National Environmental Policy (NEP), 2006

Reforms suggested through policy that can be applicable to Rudrapur Planning Area

- Environmental and Forest clearance
- Economic principles for environmental decision making by costing the resources
- Environmentally sensitive zones: environmental sensitive zones may be defined as areas with identified environmental resource with 'incomparable values' which require special attention for their conservation.
- Monitoring & enforcement of environmental compliance.
- Use of economic principles in environmental decision making so that costs are associated with the degradation and depletion of natural resources.
- Enhancing and conserving environmental resources through production and consumption practices with focus on regulatory and institutional reforms. Land degradation

n, forests and wildlife, biodiversity, freshwater resources; ground water and wetlands are the thrust resources of concern.

- Pollution abatement: ecosystems have some natural capacities to assimilate pollution; however these vary considerably with the nature of the pollutant and the ecosystem.
- Climate change issues

Environment Protection Act, 1986

The Environment Protection Act, 1986 (EPA) has notified various rules under EPA for protecting the environment which are chronologically mentioned below:

- The Manufacture, Use, Import, Export and Storage of Hazardous Micro-Organism Genetically Engineered Organism or Cells Rules, 1989
- The Hazardous Wastes (Management and Handling) Rules, 1989
- The Manufacture, Storage and Import of Hazardous Chemicals Rule, 1989
- Scheme of Labelling of Environment Friendly Products (ECO-MARK)
- Restricting certain activities in special Specified area of Aravalli Range
- The Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996
- The Bio -Medical Waste (Management and Handling) Rules, 1998, as amended to date
- The Recycled Plastics Manufacture and Usage Rules, 1999
- The Municipal Solid Wastes (Management and Handling) Rules, 2000
- The Noise Pollution (Regulation and Control) Rules, 2000
- The Ozone Depleting Substances (Regulation) Rules, 2000
- The Batteries (Management and Handling) Rules, 2001

Forest Conservation Act, 1980

- This Act has five Sections, which deal with conservation of forests.
- The Act was enacted with the twin objectives under Section 2 of restricting the use of forestland for non-forest purposes, and preventing the de-reservation of forests that have been reserved under the Indian Forest Act, 1927. However, in 1988 the Act was further amended to include two new provisions under Section 2, where

it sought to restrict leasing of forest land to private individuals, authority, corporations not owned by the Government, and to prevent clear felling of naturally grown trees.

- The Act empowers Central Government to constitute a committee to advise the Government with a grant of approval under Section 2, as also on any other matter connected with the conservation of forest and referred to it by the Central Government.
- The Act provides for punishment of offenders from the Government Departments, including Head of the department.

Sewage Treatment in Class I Towns: Recommendations and Guidelines:

As Rudrapur Planning area falls under Ganga river basin. These guidelines have prepared by National Ganga River Basin Authority under provisions of EPA 1986. These guidelines have formed the basis for the selection of technologies for Sewage Treatment Plants so that after treatment the effluent achieve bathing quality standards before discharging into river.

Urban Greening Guidelines, 2014

It is the outcome of blatant and random concretization of pavements in Indian cities. Of late, a number of Urban Development Authorities and Urban Local Bodies have undertaken large scale concretization of pavements which has resulted in destruction of a large number of trees by first rendering those weak and reducing their lives and consequently most of them falling down on account of moderate winds and storms. In 2000, Ministry of Urban Affairs and Employment had published Guidelines for Greening of Urban Areas and Landscaping. Its objectives are:

- To highlight the impact of urbanisation on urban greenery.
- To suggest practices and methods for protecting and enhancing urban greenery in a sustainable manner.
- To identify the key stages in planning and development where urban greenery maybe integrated with the built environment.
- To recommend suitable guidelines for enhancing urban greens.

Urban Climate and importance of green spaces within Urban Area:

Relationship between cities and nature is a basic challenge for nature conservation in future urban development and also for the future of the wilderness (Kowarik, 2013). The ecological footprint of cities affects ecosystems indirectly from regional to global scales and the ecological

functions within open green spaces involve the whole system of plants, animals, soil and human activity.

Due to rapid increase in artificial urban pavement and concrete, which are different in thermal, optical and geometric properties (Feyisa, Dons & Meilby, 2014), urban settlements are hotter than rural areas and cities all over the world are experiencing more common urban heat islands (Skoulika, Santamouris, Kolokotsa & Boemi, 2014). Urban heat islands can negatively affect the health and welfare of urban dwellers (Song & Park, 2014), particularly infants, the elderly and poor people who are highly affected by thermal stress (Feyisa et al., 2014). Furthermore, temperature increase from UHIs worsens the thermal comfort conditions, intensifies the pollutant concentrations (Skoulika et al., 2014), and considerably increases the energy consumption for cooling, (Mirzaei & Haghighat, 2010) and the aggregated effects from UHIs can cause changes in urban ecosystems. This problem is associated with worldwide environmental issues and expected to worsen global warming (Bowler, Buyung-Ali Knight,& Pullin, 2010)

Various categories of green spaces have been specified in URDPFI guidelines.

- Housing parks
- Neighbourhood Park
- City level Park
- Botanical Garden
- Recreational complex including zoo

The open spaces shall be provided at the rate of 1.4 to 1.6 ha per 1000 persons. The lower income areas shall be provided with more open spaces and the area under facilities like community halls etc. can be merged with the open spaces to suit their social requirements.

These green spaces help create liveable micro climate. Following are the benefits from green spaces.

Urban Heat Island Mitigation and Reduced Energy Demands

Urban heat islands form as cities replace natural land cover with dense concentrations of pavement, buildings, and other surfaces that absorb and retain heat. The displacement of trees and vegetation minimizes their natural cooling effects. Additionally, tall buildings and narrow

streets trap and concentrate waste heat from vehicles, factories, and air conditioners. By providing increased amounts of urban green space and vegetation, green infrastructure can help mitigate the effects of urban heat islands and reduce energy demands. Trees, green roofs and other green infrastructure can also lower the demand for air conditioning energy, thereby decreasing emissions from power plants.

Improved Air Quality

Green infrastructure facilitates the incorporation of trees and vegetation in urban landscapes, which can contribute to improved air quality. Trees and vegetation absorb certain pollutants from the air through leaf uptake and contact removal. If widely planted throughout a community, trees and plants can even cool the air and slow the temperature- dependent reaction that forms ground-level ozone pollution (smog).

Additional Wildlife and Recreational Space

Greenways, parks, urban forests, wetlands, and vegetated swales are all forms of green infrastructure that provide increased access to recreational space and wildlife habitat.

Improved Human Health

An increasing number of studies suggest that vegetation and green space – two key components of green infrastructure can have a positive impact on human health. Recent research has linked the presence of trees, plants, and green space to reduced levels of inner-city crime and violence, a stronger sense of community, improved academic performance, and even reductions in the symptoms associated with attention deficit and hyperactivity disorders.

Reduced and Delayed Stormwater Runoff Volumes

Green infrastructure reduces storm water runoff volumes and reduces peak flows by utilizing the natural retention and absorption capabilities of vegetation and soils. By increasing the amount of pervious ground cover, green infrastructure techniques increase storm water infiltration rates, thereby reducing the volume of runoff entering our combined or separate sewer systems, and ultimately our lakes, rivers, and streams. When rain falls in natural, undeveloped areas, the water is absorbed and filtered by soil and plants. Storm water runoff is cleaner and less of a problem. Green infrastructure uses vegetation, soils, and other elements and practices to restore some of the natural processes required to manage water and create healthier urban environments. At the city or county scale, green infrastructure is a patchwork of natural areas that provides habitat,

flood protection, cleaner air, and cleaner water. At the neighbourhood or site scale, storm water management systems that mimic nature soak up and store water.

Enhanced Groundwater Recharge

The natural infiltration capabilities of green infrastructure technologies can improve the rate at which groundwater aquifers are 'recharged' or replenished. This is significant because groundwater provides about 40% of the water needed to maintain normal base flow rates in our rivers and streams. Enhanced groundwater recharge can also boost the supply of drinking water for private and public uses.

Stormwater Pollutant Reductions

Green Infrastructure techniques infiltrate runoff close to its source and help prevent pollutants from being transported to nearby surface waters. Once runoff is infiltrated into soils, plants and microbes can naturally filter and break down many common pollutants found in storm water. Storm water runoff is a major cause of water pollution in urban areas. When rain falls on our roofs, streets, and parking lots in cities and their suburbs, the water cannot soak into the ground as it should. Storm water drains through gutters, storm sewers, and other engineered collection systems and is discharged into nearby water bodies. The storm water runoff carries trash, bacteria, heavy metals, and other pollutants from the urban landscape. Higher flows resulting from heavy rains also can cause erosion and flooding in urban streams, damaging habitat, property, and infrastructure. While single-purpose gray storm water infrastructure is conventional piped drainage and water treatment systems and is designed to move urban storm water away from the built environment, green infrastructure reduces and treats storm water at its source while delivering environmental, social, and economic benefits.

Reduced Sewer Overflow Events

Utilizing the natural retention and infiltration capabilities of plants and soils, green infrastructure limits the frequency of sewer overflow events by reducing runoff volumes and by delaying storm water discharges.

Increased Carbon Sequestration

The plants and soils that are part of the green infrastructure approach serve as sources of carbon sequestration, where carbon dioxide is captured and removed from the atmosphere via photosynthesis and other natural processes.

Increased Land Values

Several case studies suggest that green infrastructure can increase surrounding property values. A green retrofit program can convert unsightly abandoned lots into "clean & green" landscapes resulted in economic impacts that exceeded expectations. Vacant land improvements led to an increase in surrounding housing values by as much as 30%.

11.6. Strategies for Environmental Plan

In Rudrapur the pollution of the largest natural Drain i.e., the Della River is a major concern and many natural drains in the Planning Area fall under the eco-sensitive zone which needs to be protected. The strategies to attain environmental sustainability are as follows:

1. Ensuring the preservation of natural drains and sensitive zones by providing buffer space along with it.
2. Development of afforestation along with the water bodies
3. Restrict the discharge of pollutants in the natural drains. Zero tolerance policy for untreated discharge of industrial effluent in Kalayani river.
4. Under clean Ganga mission the uttrakhand state has special status. State authorities have been already set up. Institutional and administrative set up is already in place. STP should be setup at utmost priority for Rudrapur urban area.
5. Maintaining the sanctity of master plan proposals regarding Green spaces in Rudrapur planning area. These areas are shown in detail in Map 11-2. As discussed in previous section of **Urban Climate and importance of green spaces within Urban Area**. These green spaces have been judiciously distributed in planning area to achieve a cohesive healthy environment in whole urbanised area.

11.6.1. Preservation of Natural Drains and Sensitive Zones/Water Bodies

The natural drains of the planning area have been presented in Error! Reference source not found. along with other proposed green spaces within the planning area. Throughout the planning area, various channels of water bodies can be found, which are being encroached currently by the people of Rudrapur. Due to encroachment and solid waste dumping these channels are polluted and will cause harmful effects to the environment as well as to people. These channels are extremely important for the natural drainage of the planning area hence it needs to be reserved and preserved. The construction along these drains hampers the natural flow of the drains.

To rejuvenate these areas a large chunk along both sides of Kalyani River and Baigul River 25 m wide green belt on both sides and 10 m wide green belt along both sides of all other drains/ has been proposed. These green belt zones are an excellent opportunity for creating recreational zones along the natural drains. No construction will be allowed in this green buffer zone. In these areas, a recreational zone or afforestation has been proposed. The recreational zones need to be carefully established without hampering the natural flow and with minimum construction. These zones will play the role of lungs in the planning area, it will enhance the quality of life in Rudrapur.

The afforestation to revive flora and fauna along the tributaries at a localized level is proposed to be done by the Miyawaki method. The method involves planting two to four trees per square meter. Miyawaki forests grow in two to three years and are self-sustaining. They help lower temperatures in concrete heat islands, reduce air and noise pollution, attract local birds and insects, and create carbon sinks. The benefit of the Miyawaki Technique, a unique methodology proven to work worldwide, irrespective of soil and climate conditions.

- Approximately 30 times more trees have been planted, as compared to conventional plantation techniques.
- A minimum of 300% more species in the same area as compared to conventional plantation species.
- A substantial 3000% increase in noise and dust isolation
- Up to 30 times or more Carbon-dioxide absorption as compared to conventional forest
- Guaranteed growth of at least 1 meter every year, in tree height
- A completely maintenance-free, wild, and native forest after the first three years
- A completely chemical-fertilizer-free forest that sustains itself and supports local biodiversity.

11.6.2. Other Recreational Land Uses

The lack of parks and multipurpose open spaces could be seen in the Rudrapur Planning Area which has been discussed in the gap analysis part. Therefore, it is of utmost importance to provide parks and multipurpose open spaces which act as breathing space for the people of the planning area. To achieve this all the vacant plots and existing parks in the proposed built-up

area have been reserved for the proposal of parks and multipurpose open spaces. Many other recreational spaces have been proposed within the planning area. Agro forest has been proposed along the natural drains. In addition to this, Theme Parkes are being proposed in the revenue village of Chattarpur and Raipur, Malsi Girdharpur, Lohari, Rudrapur, and Burarani. This would enhance the recreational activities in the planning area as well as act in support of the environment.

11.6.3. Landscaping along with Road network

Landscaping along the road network has become an integral part of road sections when looking from an environmental point of view. It provides shade to the pedestrian, making it more user-friendly for people. **Table 11-4** highlights a few of the native species of trees for different road sections for landscaping along the roads.

Table 11-4: Recommended Native Tree Species for Landscaping along the Road Network

ROW of Road	Recommended Native Tree species for Arboriculture in Planning Area of Kashipur
60m -45m	KOSAM(Schleicher oleos): Large Deciduous Tree; Height: 16m SAL(Shorea Robusta): Large Deciduous Tree: Height: 15m Jamun(Syzygium cumini): Large Evergreen; Height: 16m Grey OAK (Quercus leucotrichophora): Large Semi-Evergreen; Height:18m KAKKAR (Pistacia integerrima): Large Deciduous; Height:16m HARADA(Terminalia chebula): Large deciduous; Height: 15m
30m – 45m	Haldu(Haldina cordifolia): Middle Size Deciduous; Height:12m
24m – 30m	Amaltas(Cassia Fistula): Middle Size Deciduous; Height: 10m
18m- 24m	Kachnar(Bauhinia variegata): Middle Size Deciduous; Height:10m Kamala(Mallotus philippensis): Small Evergreen; Height:8m Barna(Crataeva adansonii): Small Deciduous; Height:6m Dheu(Artocarpus launch): Middle size Deciduous; Height:10m

Source: Proposed by Consultant

11.6.4. Recommended Strategy Guidelines

Rudrapur is an important industrial city in the district that also has natural drains all along with the Planning Area and Kalyani River. These areas are eco-sensitive, where industrial waste is

being dumped by industries and solid waste by the people residing along the river. Because of these major environmental issues, few strategies have been recommended.

1. Banning of discharge of untreated industrial waste into the Kalyani River.
2. Demarcation of the entire catchment area of Kalyani River and removal of encroachments.
3. Desilting of the Kalyani River should be ensured.
4. The entire length of Nallah and drains especially within the city limits should be channelized.
5. Conversion of the whole Kalyani River into a green belt acting like a bio point runoff from the city.
6. Greening of Kalyani River and Baigul River within the city limits.
7. A treatment Plant for Water supply and Sewage must be installed to improve the surface water quality.

11.7. Other Mandatory Recommendations

Green spaces or parks in urban areas are often called lung spaces and are one of the most important public spaces in the city. According to the World health organization, urban green spaces such as parks, playgrounds, and residential greenery can promote mental and physical health, and reduce morbidity and mortality in urban residents by providing psychological relaxation and stress alleviation, stimulating social cohesion, supporting physical activity, and reducing exposure to air pollutants, noise and excessive heat¹. A city with attractive and accessible green spaces provide opportunities to the resident for exercise, sports, active mobility, and recreation, it is likely that these spaces also act as a counter mechanism for urban heat island due to extreme heat waves and essential cost-effective resilient green infrastructure to manage and reduce surface runoff as well as act as sponge spaces to avoid urban flooding within the city during heavy rainfall. The urban green spaces have numerous health benefits for every group of society, especially for economically deprived communities, children, pregnant women, and senior citizens. With the immense benefits of these gifts from nature to human mankind, it is our utmost responsibility to take full advantage by fixing up essential land areas within the urbanized limits to provide the citizen with improved, healthy, and blissful urban environs so that all the land under green spaces (G1, G2 and G3) has to be acquired and developed by Rudrapur Municipal Corporation and District Development Authority, US Nagar.

The Change of Land Use (CLU) will not be permitted on the land reserved for these Green Spaces.

12. Disasters & Hazards

A Disaster is a sudden, calamitous incident that seriously disrupts the functioning of a community or society and causes human, material, economic, or environmental losses that exceed the community's or society's ability to cope using its resources. Rudrapur Planning Area is prone to certain disasters including earthquakes, flash floods, and fire as per the data provided by District Disaster Management Office, US Nagar, and Rudrapur Tehsil office.

12.1. Natural Disasters

12.1.1. Earthquake

Uttarakhand state overall falls in two seismic zones i.e., Zone IV (high damage risk zone) and Zone V (the most active region). According to the National Institute of Disaster Management (NIDM) Report, the entire Udham Singh Nagar district falls in zone IV which implies that Rudrapur Planning Area also falls in Zone IV (refer to **Map 12-1**). Hence, there is a need to adopt construction practices that are best suited in this zone following the specifications and standards laid down by the concerned authorities. Also, it is necessary to figure out a response plan in case any sort of damage/loss occurs. These measures should be part of building bye-laws and zoning rules and regulations which need to be thoroughly adopted for approval of building plans.

12.1.2. Floods

Rudrapur falls under the flood zone according to 'Hazard Profiles of Indian Districts' (National Capacity Building Project in Disaster Management, UNDP, archived from the original in May 2006, retrieved in October 2016). The area is most vulnerable to flash floods as per data provided by District Disaster Management Office, US Nagar. There were 3 incidences of flash floods in Rudrapur tehsil in the year 2018, though no loss has been reported due to flash floods. The occurrence of flash floods was mainly witnessed in August of the year 2018. There is no incidence of floods in the year 2019 as per data given by the District Disaster Management Office, US Nagar (refer to Error! Reference source not found.).

Map 12-1: Uttarakhand Earthquake Zonation



Source: Uttarakhand Disaster Report (2013), NIDM

As per District Disaster Management Plan (2018-2019), there are three major rivers in Rudrapur Tehsil, namely, the Kalyani River, Dheemri River, and Begul River. The plan also highlights the critical areas identified by the authority which includes the Khera and Jagatpur colonies near the bank of river Kalyani. There have been some incidences of loss of animal and human life along with crop loss. Other identified critical areas include Rampura and Rudrapur villages which are now part of the urban settlement as discussed earlier. Two flood protection posts have been made in Rudrapur Planning Area to deal with the occurrence of floods.

Hence, there is a need to adopt precautionary and recovery measures to ensure the safety of people and property. There is a need for a stormwater drainage plan which should be implemented that would help to carry the surface runoff during storms and heavy rains. Also, precautionary measures like rainwater harvesting must be included within building bye-laws so that rainwater could be stored in a better way and reused, thus reducing dependence on groundwater as well. Details of disasters that occurred are given in **Annex 15**.

12.2. Key Issues & Potentials

- It is needed to adopt construction practices that are best suited as per Zone-IV (High Damage Risk Zone) following the specifications and standards laid down by the concerned authorities.
- There is a need for a stormwater drainage plan which should be implemented that would help to carry the surface runoff during the storm and heavy rain.
- It is needed to adopt precautionary and recovery measures to ensure the safety of people and property in case any sort of disaster occurs in the area.
- It is required to incorporate any sort of preventive/precautionary measure within building bye-laws or zoning regulations.

12.3. Recommended proposals

12.3.1. Earthquake Risk Mitigation At Municipal And Village Levels:

The Disaster Management Act, 2005, seeks safety of built environment under the action of all perceivable hazards. The matter of structural safety under earthquake hazard is precariously positioned because the subject is NOT taught in any college in the country as part of the mandatory curriculum in any of the degree programs – bachelor, master or doctoral programs; most engineers and architects are self-taught with only minimal continuing education options

available in the country. Therefore, a robust statutory system is required to steer carefully the nation towards an earthquake resistant built environment. A few actions towards building such a robust system are included in the NERMP, which are described hereunder

The component of introducing earthquake risk mitigation at municipal and village levels has five sub-components namely:

i. Earthquake Risk Reduction Act:

- Strengthening existing Laws and their implementation, and
- Preparing a bill to enact a law towards Earthquake Risk Reduction, including provisions on Structural Safety

ii. National Seismic Safety Commission:

A national level technical think tank is needed to identify the needs, steer R&D activities, and facilitate the implementation of earthquake safety initiatives. This think tank will address all technical aspects that lead towards ensuring earthquake safety of the 140 Crore people, of which at least 100 Crore people live in Seismic Zones III, IV and V (wherein moderate to severe level earthquake ground shaking is expected). NDMA will establish a National Seismic Safety Commission (NSSC), as an apex technical body to deliberate on the subject of earthquake safety and guide the NDMA on possible policies to be taken forward for the earthquake safety of India. NSSC will establish collaborations with similar bodies worldwide to establish international good practices in India

iii. Techno-Legal Regime:

A robust techno-legal regime has three components namely: (a) State-of-the-art Building Codes, (b) State or UT region-sensitive Building Bye-Laws, and (c) Legally empowered, objective and transparent Building Permit System

iv. Earthquake Risk Insurance Pool for States & UTs:

All States and UTs, especially those in seismic zones IV and V, will pool their insurance premiums collected annually, and compensate those persons who are affected by earthquakes. The Earthquake Risk Reduction Act is expected to offer incentive through rebate in income tax to those who adopt earthquake safe practices articulated in the Techno-Legal Regime of the said Act. Also, Earthquake Risk Insurance is another aspect on the demand side. The proposal also

includes sensitisation of home owners to adopt earthquake safe construction of houses and purchase the earthquake risk insurance. An affordable insurance scheme is envisaged by pooling the risk of states and UTs. Further, the insurance is perceived to address multiple hazards.

v. Post-Earthquake Investigations:

Often, Governments face a contentious issue of determining the amount of compensation to be paid to a person whose house is damaged (to different levels), partially collapsed or completely collapsed during an earthquake. NERMP will develop and approve (before the next earthquake) legally empowered processes for:

(1) Post-Earthquake Damage Assessment (PEDA) to address key aspects, including: (a) Purpose of assessment, namely Rapid Assessments for paying compensation immediately, and Detailed Assessments for use in Reconstruction Programs; (b) Objective and transparent method of post-earthquake damage assessment, based on a published Indian Standard; (c) Composition of Post-Earthquake Damage Assessment Teams (PEDATs), consisting of the trained technical persons who can carry out the assessments; (d) Timing of the assessment; and (e) Levels of damage for which the compensation will be paid.

(2) Post-Earthquake Reconnaissance Surveys (PERS) to address key aspects, including: (a) Method of post-earthquake reconnaissance survey, based on pre-agreed protocol; (b) Composition of a multi-disciplinary Post-Earthquake Reconnaissance Team (PERT), consisting of the persons with different background to assess holistically the earthquake scenario; (c) Timing of the survey, and (d) Purpose of survey, namely: (i) provide quick input to governments on the gravity of the situation, (ii) advise governments on the need for detailed damage and collapse studies, (iii) estimate broadly likely loss, and (iv) capture lessons for reconstruction activities and possible improvements towards earthquake safety in India.

NERMP will support these two activities for the duration of the program. Subsequently, NDMA will take this forward. In particular:

(1) NDMA will form the proposed Standing Committees. and

(2) NERMP will provide grants to Standing Committees for studying behaviour of structures. NERMP will work with BIS to identify the possible members of Standing Committees from amongst the Working Groups of the Earthquake Engineering Sectional Committee engaged in the different technical thematic areas. In addition to that, all the Guidelines given in

Comprehensive National Earthquake Risk Mitigation Program has to be followed and implemented.

12.3.2. Proposals to Mitigate Floods

The natural drains of the planning area have been presented in Map along with other proposed green spaces within the planning area. Throughout the planning area, various channels of water bodies can be found, which are being encroached currently by the people of Rudrapur. It is proposed that green belt along the all-water bodies, where a dense manmade forest will be developed which will control the floods as well as preserve the flood catchment areas of these drains. These channels are extremely important for the natural drainage of the planning area hence it needs to be reserved and preserved. The construction along these drains hampers the natural flow of the drains.

13. Review of Existing Master Plan, 2031

Before the formulation of the long-term master plan of Rudrapur city, it is important to get an insight into its continuous development process, its origin, industrial importance, and its strategic and administrative importance and also to review the impact of proposals of the previous master plan of 2031. The master plan of the city began originally by an order in 1952. Later on, the town and country planning department prepared a master plan (1971-1991) of Rudrapur for the planned and controlled development of the city. The plan was prepared for the area falling under the jurisdiction of the municipal council of Rudrapur which was approved by the secretariat order numbered 1380/37-3-56RBO/69 issued on the date 12-06-1973.

Over some time, the development started occurring in the villages located near the municipal boundary. Therefore, to provide a planned direction to the development 8 villages present near the municipal boundary were included in the planning area in 1992 by secretariat order numbered 1098/9-AA-3-92-52-H/57 issued on date 19-08-1992. In the year 1992, with the formation of the new district Udham Singh Nagar, construction work of the district office and collectorate premises began in the Kalyanpur village present near the boundary of the notified area. Looking at the strong possibilities of expansion of the city, it became inevitable to include Kalyanpur in the notified area. Hence, with the secretariat orders by the Uttaranchal government numbered 358/AA/SH.VI.-2003/Rudrapur/2003 Dehradun dated 10th November 2003 the notified area of Rudrapur was amended, and Kalyanpur village was included in it.

The 1991 plan which covered the municipal area only projected a population of 50,000 by the year 1991 but in reality, the population of Rudrapur in 1991 was 61,067 a difference of 11,067 between the both. Over time, keeping in view the strong possibilities of growth of the city due to progressive development of SIDCUL Industrial area in Pantnagar area, a secretariat order numbered 3177/V/AA-2006-126 (A.)/ Dated 15th November 2006 was passed which added another 16 villages in the notified area of the city making the total tally of villages 25 in the notified area. Considering all the arguments, it became necessary to prepare a master plan for Rudrapur city for the comprehensive development of the city.

In the Rudrapur Master Plan, 2031 the total projected population of the urban settlement as well as 25 villages was 6,53,820 and all the proposals were given for this population. The plan had been prepared including the industrial area in the plan which had been used for the development

of the city. The government of India launched Atal Mission for Rejuvenation and Urban Transformation (AMRUT) in 2015 as a Centrally Sponsored Scheme. One purpose of the Mission is to improve governance through a set of Reforms. During the Mission period, 11 reforms are being implemented. Formulation of GIS-based Master/Development Plans for 500 AMRUT Cities is one of the important reforms under AMRUT, which has been approved as a 100% centrally funded sub-scheme with a budget outlay of Rs. 515.00 crores. Rudrapur is one of those 500 cities for which GIS based Master Plan is being prepared. The total area of master plan 2031 was 108.42 sqkm. while the notified area in the RFP of Rudrapur master plan is 184 square kilometers for which plan preparation is underway.

13.1. Town Development as per Proposed Land Use

The proposals given in the previous master plan of the city for the year 2031 have been reviewed aspect wise mainly focussing on the urban area before preparing the GIS-based master plan of the city. The total area proposed under the master plan of 2031 is 108.42 square kilometers. The intent behind reviewing the master plan of the city aspect-wise is to know the status of development that has occurred over time and the relevance of planning envisaged in the master plan is also reviewed.

13.1.1. Residential

In the master plan of 2031, it had been expected that 2,73,010 people will reside in the city by the year 2031 which had been projected based on the past trends of population growth in the city. As per the 2011 census, the total population of the city was 1,54,544 and as per the latest municipal data collected on 6th August 2019, the city has been divided into 40 wards having a total population of 1,75,723. Seeing the trends of population growth, it can be analyzed that the projections done in the previous master plan had been correctly estimated as the population projected for the year 2021 is 1,87,765 which can be achieved by that year. To accommodate this population, additional 2599.1 hectares of land had been proposed for residential use along with the present 529.20 hectares of land. The total land under residential use came out to be 3128.30 hectares which accounted for 49.08% of the total area. As per the URDPFI guidelines, the maximum percentage of residential area in a medium town is 48%. There is a variation of 1% in the case of the proposed residential area when compared with URDPFI standards. The residential area had been proposed in all directions of the city to decentralize the city.

The residential areas had been divided into three categories based on the proposed residential densities, namely, residential high density, medium density, and low density. Keeping because of different expected physical development, 298.43 hectares of land was proposed as a high-density residential area, 1113.50 hectares was the medium density and 1716.37 hectares was a low-density area. In addition to this, there was a proposal to safeguard and develop the social and cultural environment of the rural population of the villages falling in the notified area. The present development in these villages was mixed-use development. Therefore, to fulfill the needs of people in terms of community and commercial needs, there was a provision for the land reservation near the residential area. There was the provision of medium-density development around these developed residential areas intending to boost the population and prevent the acquisition of agricultural land for residential development.

The master plan, 2031, on one hand, tried to restrict the population growth in urban centers and on the other hand, proposed medium-density residential areas in certain villages which include Shimla Bahadurpur, Fajalpur Mahraula, Bhoora Rani, and Bigwara intending to reduce the population in the urban area and provide land for future population growth.

13.1.2. Commercial

Since, Rudrapur is the entry gate of the Kumaon Region and prime trade center, the importance, and level of trade and commerce functions increased. The major commercial area of the city was located in the core area in the form of mixed land use. There were only two business associations in the city which are the grain market and mandi Samiti as per the previous master plan. In Master Plan 2031, there was the provision of keeping these places unchanged but reorganizing the same. To decentralize the core, there was the provision of setting up of commercial centers along 24m-wide roads present in residential areas to reduce dependence on the core.

Other proposals include the provision of parking space and loading/unloading space in the core of the city along with the proposal of new sub-centers at various locations which include near the new market area Bigwara, new vidhut colony at Rampur chauraha, near the petrol pump at Kashipur road, Rampur road at Fajalpur Mahraula and near Thapar mill in Bhoora rani/jagatpur. The built-up area was kept 40% of the total area while the remaining 60% was meant for circulation, parking, and green area. The total area under commercial centers/sub-centers was 94.45 hectares which are 1.48% of the total.

Under the commercial land use, expansion of food grain market of area 14 ha, expansion of the wholesale market of area 6.40 ha, storage facility of area 17.28 ha, hotel and restaurants of area 1.50 ha, and petrol pump of area 2.50 ha had been proposed.

13.1.3. Industrial

Rudrapur along with being the entry gate to Uttarakhand is an important developing city. Hence, the setting up of industries had been given due importance to boost the city's economy. In this context, an easy access road had been reserved. To encourage industrial development, 919.55 Ha of land had been reserved. In the Master Plan 2031, there was the provision of keeping the existing industrial areas intact but reorganizing the same by including parking and loading & unloading spaces. It was expected that 60% of the land would be used for providing access to small industries, green areas, and parking areas. The proposed guideline given for setting up of industrial unit was 10 units per 2 acres of land in which central storage, entertainment facilities for workers, canteen and office were to be included.

13.1.4. Administration

With the formation of district Udham Singh Nagar, the administration acquires land in the village Kalyanpur for the establishment of district headquarters in which offices of various departments had already been established. In the previous master plan, this area was included in the administrative land use. In addition to this, the land expansion for setting up of state-level departments as in sugarcane growth commission and field development institute on Rampur road and Rudrapur village had been proposed. One fire station and police line had been proposed on Haldwani Road in Jagatpura village. The total land proposed under administration use is 347.37 hectares which accounts for 5.46%.

13.1.5. Community-level Facilities and Services

In the previous master plan, 352.11 hectares of land was reserved for provision which accounts for 5.52% of the total area. It includes the upgradation, expansion, and addition of units of educational facilities, health facilities, and cultural facilities.

a) Education

There was the provision of reservation of land around the agricultural college located in the southwest direction of the city at Rampur Marg for its expansion. Apart from it, there was the

provision of primary and high schools in each enclosure of the city. The total land reserved under education facilities is 100.72 hectares.

b) Health

There was a proposal for the upgradation and enhancement of the hospital located at Rudrapur-Kichha road. In addition to this, the land had been reserved in the district collectorate for the establishment of the hospital. There was also the provision of health facilities in each enclosure of the city. The total land under health facilities is 7.93 hectares.

c) Other Facilities

The land was reserved for various facilities as per the proposals and standard design. Total land reserved was 208.42 hectares accounting for 3.27% of total land. There was a provision of a fire station near the district collectorate near Haldwani Marg, a stadium with an area of 3.30 hectares in district collectorate premises, a specialized educational institute with an area of 15.36 hectares, religious places of an area of 3.04 hectares along with the provision of religious place in different enclosures of the city. Land for mela ground had been reserved along the Kalyani River in the ancient temple premises. The total land kept for the same is 1.02 hectares. 1.42 hectares of land had been reserved for cremation/burial ground in the city. The land available with the electric department was kept as such which was 15.70 hectares.

13.1.6. Traffic and Transportation

About 806.65 hectares of land had been reserved for traffic and transportation in the previous master plan of Rudrapur. There was an absence of transport Nagar in the city which had been proposed in the master plan. The local administration reserved land for the same on the Kichha bye pass road on the recommendation of the committee set up by transport Nagar and bus station. The total area proposed for transport Nagar was 40.96 hectares. The facilities that had been proposed in the transport Nagar include 24 cooking agency shops, 19 motor parts shops, 22 workshops along with petrol pump, fire brigade center, and a park. In the case of the bus station, improvement and up gradation of existing bus station had been proposed in the previous master plan. Apart from it, an additional bus station had been proposed on the existing Rudrapur-Kichha bye-pass ring road before the Indian Food Corporation and BHEL based on population needs. In

this way, the total area reserved under the bus station was 8.82 hectares. In the case of the railway line, 54.68 hectares of land had been reserved under railway property.

a) Road Network Proposals

There was a proposal regarding the development and expansion of existing roads. Along with it, easy access roads were also proposed. The roads proposed in the previous master plan were:

From Transit Camp to Kichha Road

- A 30-meter-wide road had been proposed from the transit camp colony present in village Shival Bahadurpur to Kichha Road passing through villages Rudrapur and Bioware.
- There was the proposal of another 24-meter-wide road from the center of the proposed Transit Camp-Kichha to Kichha road.
- A bye-pass was proposed from Rampur road to Kichha road having a width of 30 meters.
- Another 45-meter-wide bye-pass road had been proposed which starts in front of Jha College located on Rampur road and terminates at Kichha road in village Bigwara passing through Fajalpur Mahraula village.

13.1.7. Green Areas and Open Spaces

There were two existing parks in the city including Gandhi Park and a park in the transit colony which was reserved as such under-park sports place. The proposal included the improvement and development of these two parks. In addition to it, three new park sports places were proposed in the village Rampura, Bhoora Rani, and district headquarters. The total area reserved under parks was 199.40 hectares. There was a proposal to make green spaces in riverside areas for which 55.80 hectares of land had been reserved. A botanical garden of the area of 412.80 hectares had been proposed as there was an absence of botanical gardens in Rudrapur. This garden was proposed in the area present near the Kalyani River which was an inoperable and flood-prone area. Also, 10.8 hectares of land were reserved for sewerage treatment or pumping.

13.1.8. Non-Urban and Other Uses

Agriculture is the major occupation of people living in this city. Therefore, to protect agricultural practices, 4252.47 hectares of land had been proposed for agricultural practices. The total land under rivers, canals, and drains was 215.70 hectares. There was the proposal of planting trees on

the banks of rivers and canals. Along with it, another proposal included the protection, expansion, and development of the water bodies.

13.2. Proposed Land Use Distribution

The total notified area in the previous master plan was 108.42 sqkm. out of which 63.74 sq. km. is urban area while the remaining 44.68 sq. km. is under non-urban or other uses which mainly includes agriculture and water bodies. **Table 13-1** represents the comparative analysis of the proposed land use distribution with the standard land use distribution of a medium town (refer to **Map 13-1**).

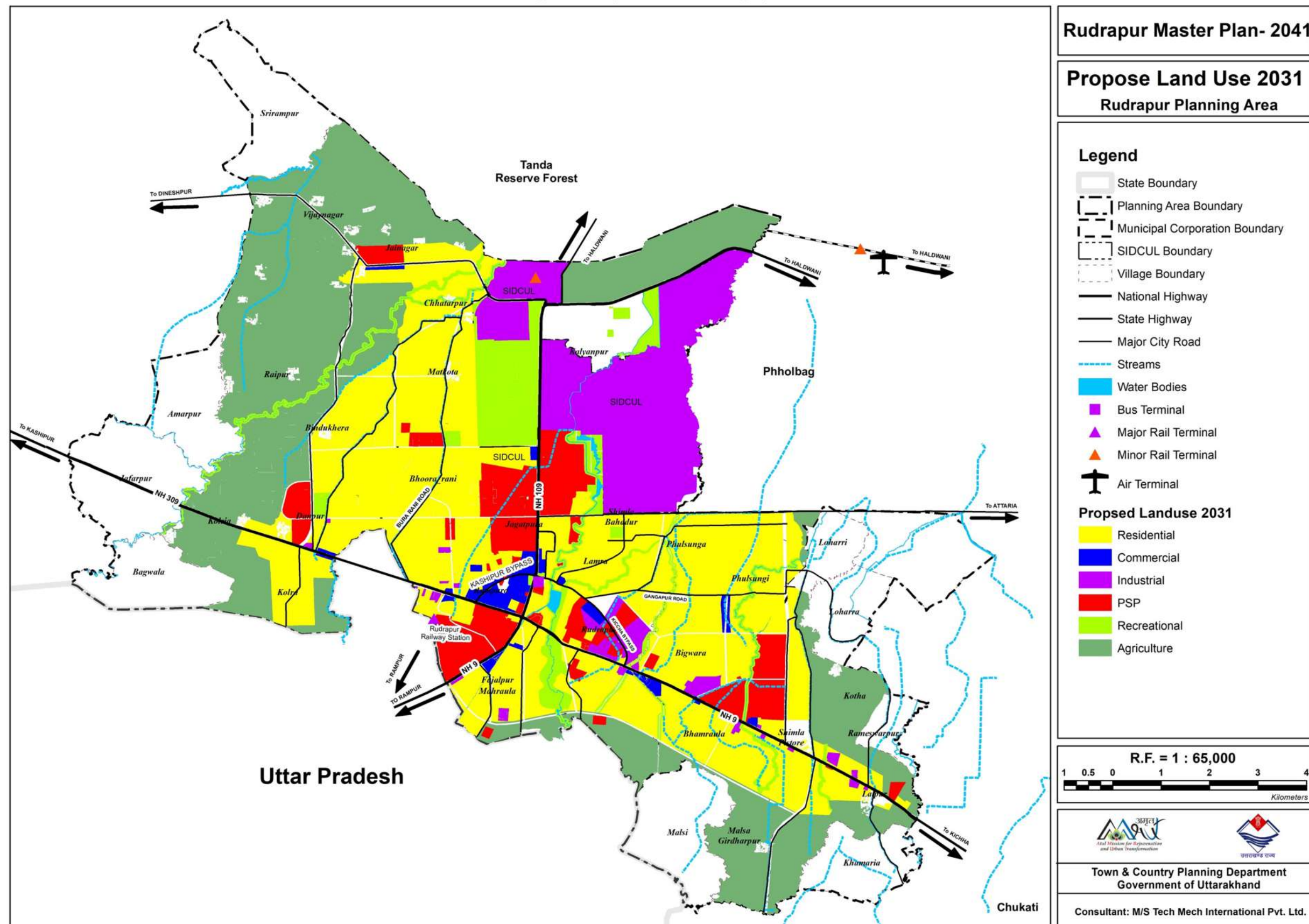
Table 13-1: Comparative Analysis of Proposed Land Use Distribution in 2031 Master Plan

Sr. No.	Land Use	Area (Hectares)	Area (in percentage)	Standard Percentage*	Variation (in Percentage)
1	Residential	3128.30	49.08	43-48	+1
2	Commercial	136.13	2.14	4-6	-2
3	Industrial	919.55	14.42	7-9	+5
4	Administrative	347.37	5.46	6-8	+3
5	Community Level Facilities & Services	357.59	5.59		
6	Traffic and Transportation	806.65	12.65	10-12	+1
7	Green Areas and Open Spaces	678.8	10.64	12-14	-1
Total Area (Urban)		6374.39	100	-	-
8.	Non-Urban & Other Uses	4468.17	-	-	-
Total Area		10842.56			

Source: Master Plan, 2031; URDPFI Guidelines; Computed Values

Note: * Standard Percentage has been taken as per the land use distribution given in URDPFI guidelines.
+ sign in variation indicates more than the standard percentage and the – sign indicates less than the standard percentage.

Map 13-1: Proposed Land Use Map of 2031



Source: Derived from Rudrapur Master Plan 2031

The maximum variation is in the case of industrial land use which is more than 5% indicating that the town is functioning as an industrial town. Community level facilities are also in abundance as it also shows a positive variation of 3%. However, it will be important to review these facilities individually so that the shortcomings can be identified (if any). The percentage of commercial facilities is less than what is required which would result in more pressure on the facilities causing inconvenience and problems to the people. Green areas also need to be given due consideration as it shows a negative variation of more than 1%. The proposed land use distribution has been represented in **Map 13-1**.

13.3. Current Deviation in Land Use as per previous Master Plan 2031

Rudrapur planning area has the deviation in various land uses, primarily in the agricultural land use (45.66%), which is followed by Residential (18.78%), Recreational (17.51%), and Public / Semi-Public (12.40%) land use. (Refer to **Table 13-2**)

Table 13-2: Use-wise Deviation in the Proposed Land Use (2021)

Master Plan Land Use	Deviated land use	Area (in Ha)	Area (in Ha)	Percentage
Agricultural	Commercial	6.09	324.95	45.66
	Industrial	31.82		
	Public & Semi-Public	23.43		
	Residential	70.46		
	Vacant Land	193.15		
Commercial	Industrial	6.69	33.64	4.73
	Public & Semi-Public	9.58		
	Recreational	0.27		
	Vacant Land	17.10		
Industrial	Commercial	4.67	6.55	0.92
	Residential	1.88		
Public & Semi-Public	Industrial	10.17	88.28	12.40
	Residential	34.29		
	Vacant Land	43.82		
Recreational	Commercial	5.43	124.63	17.51
	Industrial	17.53		
	Public & Semi-Public	18.06		
	Residential	49.88		
	Vacant Land	33.72		
Residential	Commercial	24.24	133.65	18.78
	Industrial	109.41		
Grand Total of Deviated Land Use		711.70	711.70	100.00

13.3.1. Residential

From the above Table 13-2, it is clear that the 18.78% of proposed land use deviation is only in the proposed residential area. In core areas, the proposed residential got deviated from the commercial units due to the better income opportunities and market forces. Whereas, some portion of residential land use proposed along the expressway got deviated to industrial land use due to the growth potential of industries to leeward side along the higher order road. Due to the potential of the expressway, manufacturing units have come up in the proposed residential areas near it.

13.3.2. Commercial

From the above Table 13-2, it is clear that the proposed commercial land use has deviated from the other land uses like Industrial use (6.69 ha), Public & Semi-Public use (9.58 ha), Recreational use (0.27 ha), and majorly vacant land (17.10 ha), i.e., undeveloped residential colonies.

13.3.3. Industrial

From the above Table 13-2 it is clear that the proposed industrial land use got a minor deviation (0.92% only) from the residential and commercial land uses i.e., 1.88 ha and 4.67 ha respectively. Industrial area deviated majorly from the commercial areas in the municipal areas become high-value land and increase business opportunities in the city.

13.3.4. Public & Semi-Public

Proposed Public & Semi-Public land use got a 12.40% deviation from the Industrial (10.17 ha), Residential (34.29 ha), and Vacant Land (43.82 ha). Proposed public/semi-public areas have deviated majorly to the vacant land which is undeveloped residential colonies.

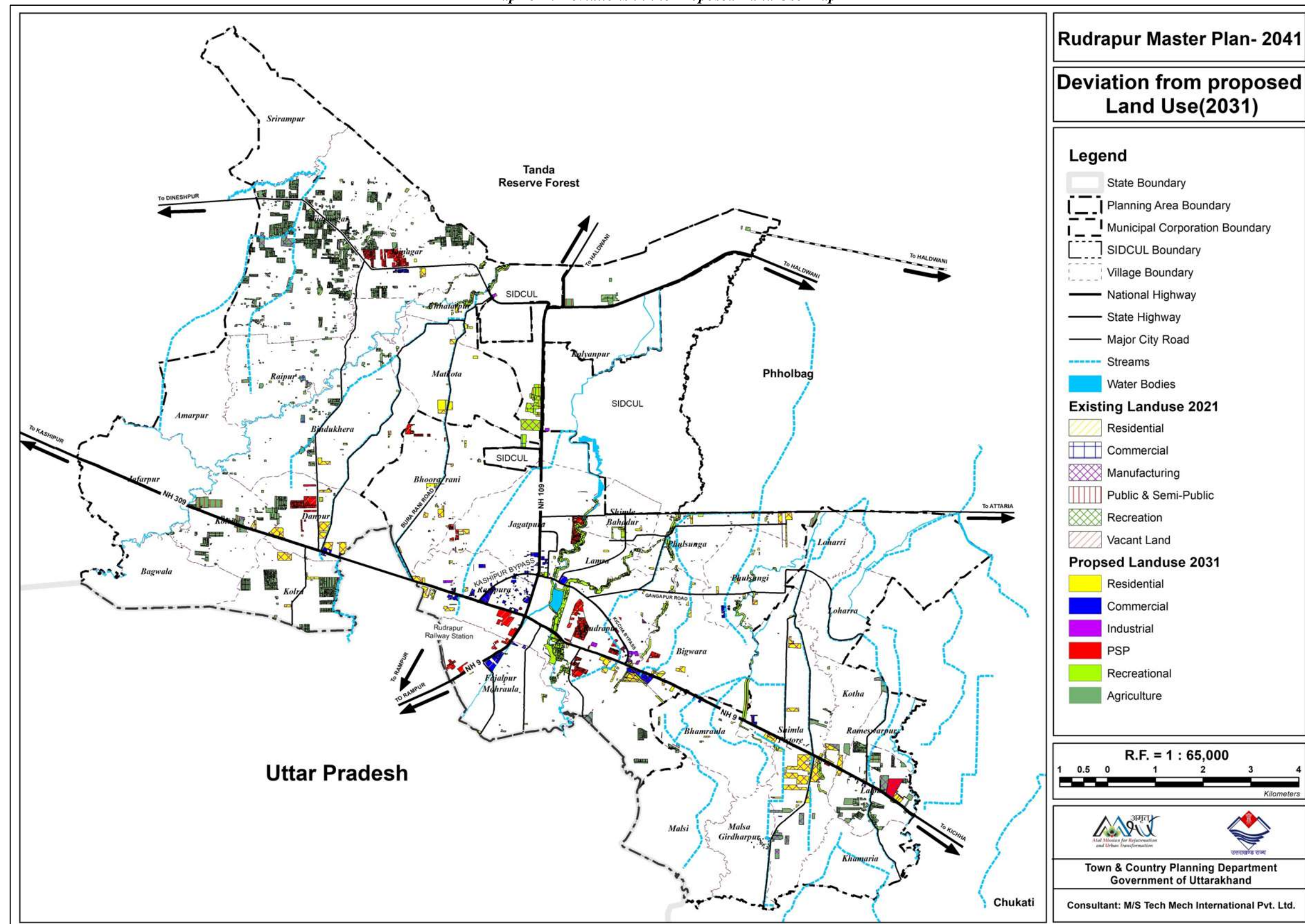
13.3.5. Recreational

Proposed recreational land use got a 17.50% deviation for Residential (49.88 ha), Vacant Land (33.72 ha), Public & Semi-Public (18.06 ha), Industrial (17.53 ha), and Commercial (5.43 ha) uses.

13.3.6. Agricultural

Proposed agricultural land use has a majority deviation of 45.66% of the total deviations. It got deviated to land uses like Vacant Land (193.15 ha), Residential (70.46 ha), Industrial (31.82 ha),

Map 13-2: Deviations in the Proposed Land Use Map



Source: Derived from Rudrapur Master Plan 2031

Public & Semi-Public (18.06 ha), and Commercial (6.09 ha) land use. Agricultural areas have deviated majorly to the vacant land and residential land use, which are undeveloped residential colonies and developed residential colonies. In addition to this, manufacturing activities have come up at proposed agricultural land use due to low land prices in the hinterland and good connectivity to regional roads. Further, some of the wholesale and retail activities have also come up due to the economic potential near settlements (refer to **Map 13-2**).

13.4. Present Deviation in Proposed Road Network as per previous Master Plan 2031

So far, Rudrapur Planning Area got implemented 55.55% of the variety of proposed master plan road networks. Out of the remaining 44.45% of the proposed network, around 39.05% got anomaly due to coming up of development and 5.04% is under agricultural and vacant use, which could be developed.

Maximum anomaly is observed in the proposed roads of 30 meters, which is followed by 24 meters, 60 meters, 45 meters, and 18 meters, which have road length anomaly of 18.92 km, 12.18 km, 11.02 km, 4.46 km, and 1.13 km respectively with a total deviation of 47.71 km road. Besides this, only 6.60 km (i.e., 5.40% of the proposed road

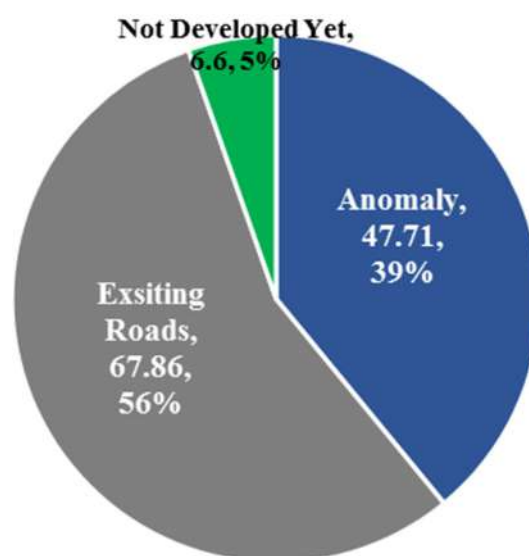


Figure 13-1: Deviation in Proposed Master Plan Road Network

network) of 24m wide road is not yet developed. Road width-wise present status of the road network is given in the following **Table 13-3**, **Figure 13-1** and **Map 13-3**.

Table 13-3: Deviation Status in the Proposed Master Plan Road Network (2021)

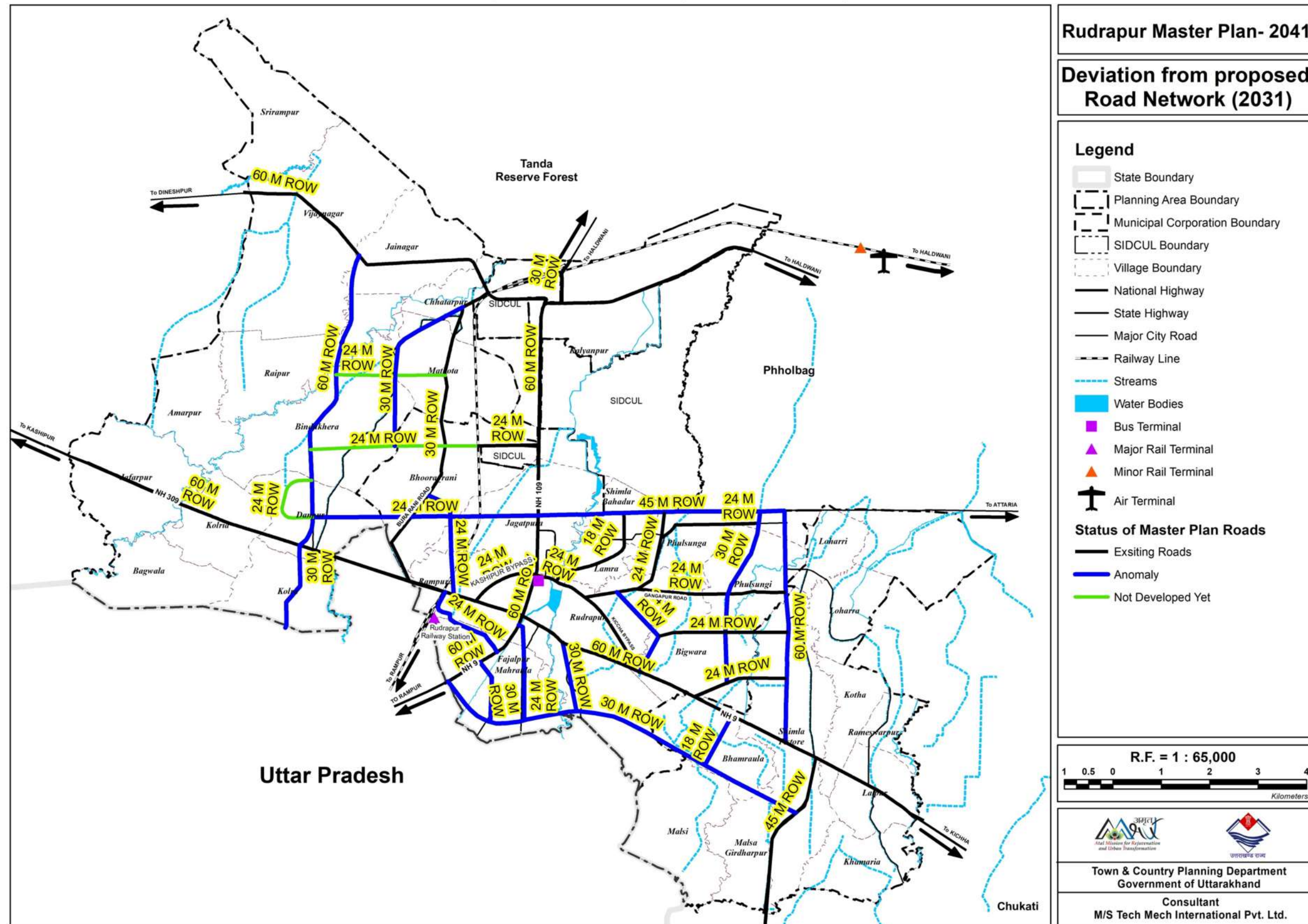
Proposed Roads' ROW	Present Status of Proposed Master Plan Roads	Length of Proposed Roads	% of total Proposed Road Length
60 Meter	Anomaly	11.02 km	9.02%
	Existing Roads	37.95 km	31.06%
	Sub-total	48.97 km	40.08%
45 Meter	Anomaly	4.46 km	3.65%
	Existing Roads	3.74 km	3.06%
	Sub-total	8.20 km	6.71%
30 Meter	Anomaly	18.92 km	15.49%
	Existing Roads	7.53 km	6.16%

Proposed Roads' ROW	Present Status of Proposed Master Plan Roads	Length of Proposed Roads	% of total Proposed Road Length
	Sub-total	26.45 km	21.65%
25 Meter	Existing Roads	3.95 km	3.23%
24 Meter	Anomaly	12.18 km	9.97%
	Existing Roads	12.51 km	10.24%
	Not Developed Yet	6.60 km	5.40%
	Sub-total	31.30 km	25.62%
18 Meter	Anomaly	1.13 km	0.92%
	Existing Roads	2.18 km	1.78%
	Sub-total	3.31 km	2.71%
Grand Total of Proposed Master Plan Roads		122.18 km	100.00%

13.1. Conclusion

The review of the master plan has provided an insight into the variation in the proposed land use distribution in comparison to the URDPFI standards. It highlights that the percentage of commercial areas and green areas is less than what is required which would be given due consideration in the formulation of the Master Plan. The industrial character of the town has also been highlighted in the review of the previous master plan of the town. To improve the deviation need to meet the people's aspirations and strong implementation agency as well as enforcement should be encouraged.

Map 13-3: Deviations in the Proposed Road Network Map



Source: Derived from Rudrapur Master Plan 2031

14. SWOT ANALYSIS

SWOT analysis is a powerful technique for providing a basic straightforward model that provides direction and can serve as a basis for the development plan. It has concentrated on issues that potentially have a major impact on the planning area. It is an important step in planning and also helpful in accomplishing the objectives of the development plan and obtaining the desired results by maximizing the potential of the strengths and opportunities and minimizing the impact of weakness and threats. Hence, while developing plan Rudrapur, a SWOT analysis has been conducted.

Based on an analytical study of the journey made in the realm of growth and development during the last centuries of its existence, a SWOT analysis has been carried out for Rudrapur Planning Area illustrating its inherent strengths and weaknesses, opportunities offered and threats faced both from within and outside, which has been used as a framework for redefining the agenda for future growth and development of the planning area (refer to **Table 14.1**).

Table 14.1: SWOT Analysis

STRENGTH	WEAKNESS
1. Rudrapur Planning Area acts as transit and one of the major gateway cities for travellers going to the Kumaon Division within the Himalayas to destinations such as Nainital, Almora, Pithoragarh, etc. 2. Connectivity through road, rail, & air of the planning area with major destinations such as the state capital, the national capital as well major destinations of the country. 3. Strategic location in terms of roads as the planning area is located on the junction of two major national highways i.e., NH-87 and NH-74. 4. Presence of Integrated Industrial Estate (IIE)- Pantnagar within the planning area is one of the major strengths. 5. The planning Area acts as an important industrial centre for the Kumaon Division of Uttarakhand. 6. Availability of Regenerated Binding	1. Low level of investment by the private sector. 2. Haphazard/unauthorised growth towards south direction adjoining the municipal boundary which falls in Uttar Pradesh. 3. Absence of a Master Plan for the area adjoining the municipal boundary falling in Uttar Pradesh due to legally binding. 4. Buildings on land exceed the threshold limit and also overcrowding of people in transit camp areas due to the absence of a clear policy for the development. 5. Extreme vehicular congestion and absence of parking facilities within the municipal area. 6. Mushrooming of unauthorised colonies in all directions of the Rudrapur Planning Area. 7. Absence of sewerage network in the municipal area.

Materials (RBM) in abundance. 7. Availability of workforce engaged in manufacturing and trade/commerce.	8. Overconsumption of landfill sites. 9. The inadequate public transport system in the Rudrapur Planning Area.
OPPORTUNITY	THREATS
1. Rudrapur Planning Area can act as an important regional tourist destination centre. 2. Right of Way (RoW) on major roads is ample for further design purposes like for pedestrians, on-street parking, and vending zones (wherever possible). 3. Slope as a locational advantage which acts as an opportunity for the natural flow of drainage system through gravity. 4. Available groundwater is very shallow.	1. Unregulated development is expanding in the south direction towards Uttar Pradesh is one of the major threats to the planning area due to the legal binding. 2. Present scenario of commercial development along major corridors which will create parking problem in future. 3. Thru traffic puts pressure on the city roads as it is located at the junction of two national highways. 4. Growth directions for the city are only towards east and west since in the north direction there is a reserve forest while towards south state boundary. 5. The city is under the shadow of Moradabad and Rampur. Thus, it is lacking the opportunity for investment by the private sector. 6. Improper implementation of the existing master plan. 7. Environmental challenges due to industrial development are majorly on groundwater and the Kalyani River.

15. Stakeholder Consultations

The Government of India has envisaged the preparation process of the GIS-based Master Plan of AMRUT cities through a consultative and participatory approach and it requires the involvement of various stakeholders at the ULB, regional, and state levels. At this phase, the consultant team conducted consultative meetings at the district level, and ULB level along with focus group discussions with various stakeholders to discuss the status and performance of the service delivery mechanism on the Planning area development and to ensure a participatory and inclusive development process.

15.1. Summary of Consultations

A focus group discussion (FGDs) is a form of qualitative research involving a group of people and understanding their perceptions, opinions, and views regarding the development of the area. This is a forum, where participants are free to express their views and give suggestions on the development front. As part of the Master Plan preparation for Rudrapur, FGDs were conducted to gather the collective opinion of key stakeholders.

The purpose of focus group discussions with key stakeholders is to exclusively bring out the opinions and suggestions toward the vision for Rudrapur, future economic base, and future urban form/ structure for development.

These meetings were conducted to review the master plan preparation and also to finalize the concepts and preliminary plans. The list of meetings held in ascending order is given in **Table 15-1**.

Table 15-1: Meeting held at the highest level

Date	Meeting with	Venue
13/10/2020	Meeting with various stakeholders of the different departments under the chairmanship of the District Magistrate	Dr. A.P.J Abdul Kalam conference hall, District collector office, Rudrapur
07/11/2020	Meeting with all elected representatives including MLA, Mayor & ward members along with Municipal commissioner. The meeting was held under the chairmanship of Hon'ble MLA of Rudrapur	Meeting hall, Municipal corporation office, Rudrapur

15.2. Stakeholders Key Suggestions

These are listed in the following sub-points:

15.2.1. Meeting with various stakeholders of different departments at District Collector

Office, Rudrapur

- Current land use to be incorporated and meticulously noted in the plan.
- Underground water is approx. 50ft. in Rudrapur which makes the use of rainwater harvesting unfeasible
- A planned urban drainage system is needed to direct excess runoff from rain to natural drainage to avoid flooding scenarios in the future.
- Post office requirements (As per URDPFI) in Rudrapur city need to be evaluated as the current office fulfills all the present needs of the city.
- PWD needs to be consulted for their future/planned works in an area with different land use and changes need to be incorporated into the plan
- Transport Nagar has been proposed for which land has been acquired and for which a copy will be provided to the Town and Country Planning Department for incorporation into the Master plan.
- A multimodal Logistics hub in SIDCUL is also present which needs to be incorporated into the Master Plan
- Some land that is neither in SIDCUL jurisdiction and also not notified has been shown in under SIDCUL which needs to be corrected; this land is not under any use.
- Some projects by Municipal Corporation, Rudrapur have been initiated during the lockdown period which needs to be incorporated in the Master Plan Report.

15.2.2. List of Attendees

Attendance of all the members present in the meeting has been carefully undertaken. The list is given in (Annexure 15.1)

15.2.3. Meeting with all elected representatives at Municipal Corporation

Focus group discussions with stakeholders were conducted to ascertain their perceptions regarding the future vision, economic base, and urban form of the Rudrapur. Elected representatives were conveyed about the process adopted for Master Plan preparation as well as the current status. Further, Performa's were circulated to MLA, Mayor, Municipal commissioner

as well as all elected ward counselors for their suggestions at ward level and vision formulation for the master plan. Documentation of all stakeholders' consultations including photography, attendance sheets, etc., has been carefully undertaken.

Extensive stakeholders' consultations were carried out in which broad suggestions from Hon'ble MLA, Mayor, Municipal commissioner, and all elected ward counselors were given for various infrastructure development. The suggestions are as follows:

- Proposal for Public toilets in main market areas
- Recommendation for ropeway and camping sites at Tanda reserve forest to enhance tourism potential.
- Suggestions to put in front with Hon'ble C.M. to take Integrated Industrial Estate-Pantnagar from SIDCUL to Municipal corporation for maintenance & various tax collections.
- Proposal for park on the land of Irrigation department opposite M.C. which needs to be discussed with the state government.
- Proposal for off-street parking facilities near the market area.
- Proposal for park on 2.5-acre vacant land near Kalyani river. Suggestions with ward counselors of 7, 8, & 9 as well as NOC with the Irrigation department will be required.
- Suggestion to propose open gym in identified existing as well as proposed parks.
- Suggestion to propose 13 main entrance gates on major roads like NH-74, etc
- Suggestion to propose new road from menta road to Bharani road.
- Park development at the individual community level or society level for which EOI (Expression of Interest) has already been published by M.C.
- Suggestion to propose shopping complex through identifying demand locations for revenue generation.
- Suggestion for utilizing all the land of M.C. for commercial purposes for revenue generation.
- Suggestion to propose outer ring road towards the southern portion of the city on the land of GoUP. Discussion with GoUP for suggestions and taking NOC.
- Suggestion for channelizing Drainage system
- Suggestion to implement Water treat plants

- Suggestion to propose Rehan Basera's for the alarming housing demand because for the migrant people.
- Suggestion to incorporate Pantnagar NPP, Kichha NPP & Gadarpur NPP in the Municipal boundary of Rudrapur and further prepare an integration plan for all the statutory towns.

Further, Performa's have been circulated to all ward members for vision formulation which is pending collection as of now.

15.2.4. List of Attendees

Attendance of all the members present in the meeting has been carefully undertaken with photographic evidence (**Figure 15-1 and Figure 15-2**). The list is given in (**Annexure 15.2**).

Figure 15-1: Meeting with Hon'ble MLA along with all Ward members



Figure 15-2: List of Attendees at Municipal Corporation Meeting



15.2.5. Other Meetings

Various meetings have been conducted at different levels for the status report and progress of work. The inputs and valuable comments given in these meetings have been incorporated into the reports.

Date	Purpose	Venue
16/07/2019	Chairman ship of chief development officer for data collection	Vikas Bhavan, District Collectorate
27/02/2020	To present status of work	Haldwani Town and Country Planning Department
27/05/2020	CERC	Online
13/10/2020	Meeting with various stakeholders of the different departments under the chairmanship of the District Magistrate	Dr. A.P.J Abdul Kalam conference hall, District collector office, Rudrapur
16/10/2020	Review meeting with TCPD	(Online)
28/10/2020	Review meeting with TCPD	(Online)
07/11/2020	Meeting with all elected representatives including MLA, Mayor & ward members along with Municipal commissioner. The meeting was held under the chairmanship of Honorable Mayor, Rudrapur	Conference Hall, Municipal Corporation Office, Rudrapur
15/01/2021	Final draft report -Stage 1 + Vision Formulation + Population Projections	TCPD
19/01/2021	Spatial strategy formulation + Land use Analysis (Spatially superimposition of violations)	TCPD
27/01/2021	Gap analysis and space requirements + Planning concepts with special reference to the town's special needs, problems, and potentials, the growth trend	TCPD

Date	Purpose	Venue
04/02/2021	Drafting of Zoning regulations	TCPD
25/02/2021	Draft proposals - Transport, Environment, Disaster	TCPD
16/03/21	CERC	UDD
20/04/21	Proposed Land Use	Divisional office Dehradun
19/05/21	Transportation Plan and proposed land use	Online
27/05/21	Solid Waste Proposals	Online
31/05/21	Tourism and Ecology	Online
04/06/21	Zoning Regulations	Online
05/06/21	Changes in Zoning regulations	Online
14/06/21	Proposed Residential and associated Zoning Regulations	Online
17/06/21	Proposed Mixed and Commercial Land Use along with associated Zoning Regulations	Online
24/06/21	PSP, Recreational, Industrial, Transport, and Agriculture land use proposals along with associated Zoning Regulations	Online
31/07/21	Review Meeting by Chief Town and Country Planner	TCPD, Dehradun
27/08/21	Review Meeting by Divisional Commissioner, Kumaon Division	Divisional Commissioner Office, Haldwani
04/09/21	Review Meeting by Chief Town and Country Planner	TCPD, Dehradun
25/10/21	Review Meeting by Chief Town and Country Planner and Senior Planner	TCPD, Dehradun

Date	Purpose	Venue
03/12/21	Review Meeting by Chief Town and Country Planner and Senior Planner	TCPD, Dehradun
04/12/21	Review Meeting by Chief Town and Country Planner and Senior Planner	TCPD, Dehradun
13/12/21	Review Meeting by Secretary (Urban)	UDHA, Dehradun
12/01/22	Review Meeting by Chief Town and Country Planner and Senior Planner	TCPD, Dehradun
09/03/22	CERC	UDD
21/07/22	Review of Draft Master Plan by DM, US Nagar and VC, District Development Authority, US Nagar	DM office, Rudrapur
13/08/2022	CERC	UDD

16. Vision 2041 & Strategy Formulation

A vision is an imperative part of the Master Plan which leads to the evolution and development of the city. Vision gives the city a direction of holistic growth of the city. Understanding the present need and future aspirations of the city is crucial and is developed through vision. Vision for Rudrapur Planning Area was developed based on the detailed analysis and assessment of the development status and current trends in the development area carried out during Stage -1, extensive stakeholders' consultations, and the identified strengths, weaknesses, opportunities, and weaknesses. Keeping in view all of the factors, the Vision for Rudrapur-2041 was developed. To support the vision, different objectives are formulated and to achieve these objectives various strategies are also formulated. The stage also includes the demand assessment for the city for the year 2041 to analyze future development prospects, identify target sectors/markets based on the competitive and comparative advantage to enhance the pace of economic development, and ensure balanced development.

16.1. Uttarakhand State Government Vision 2030

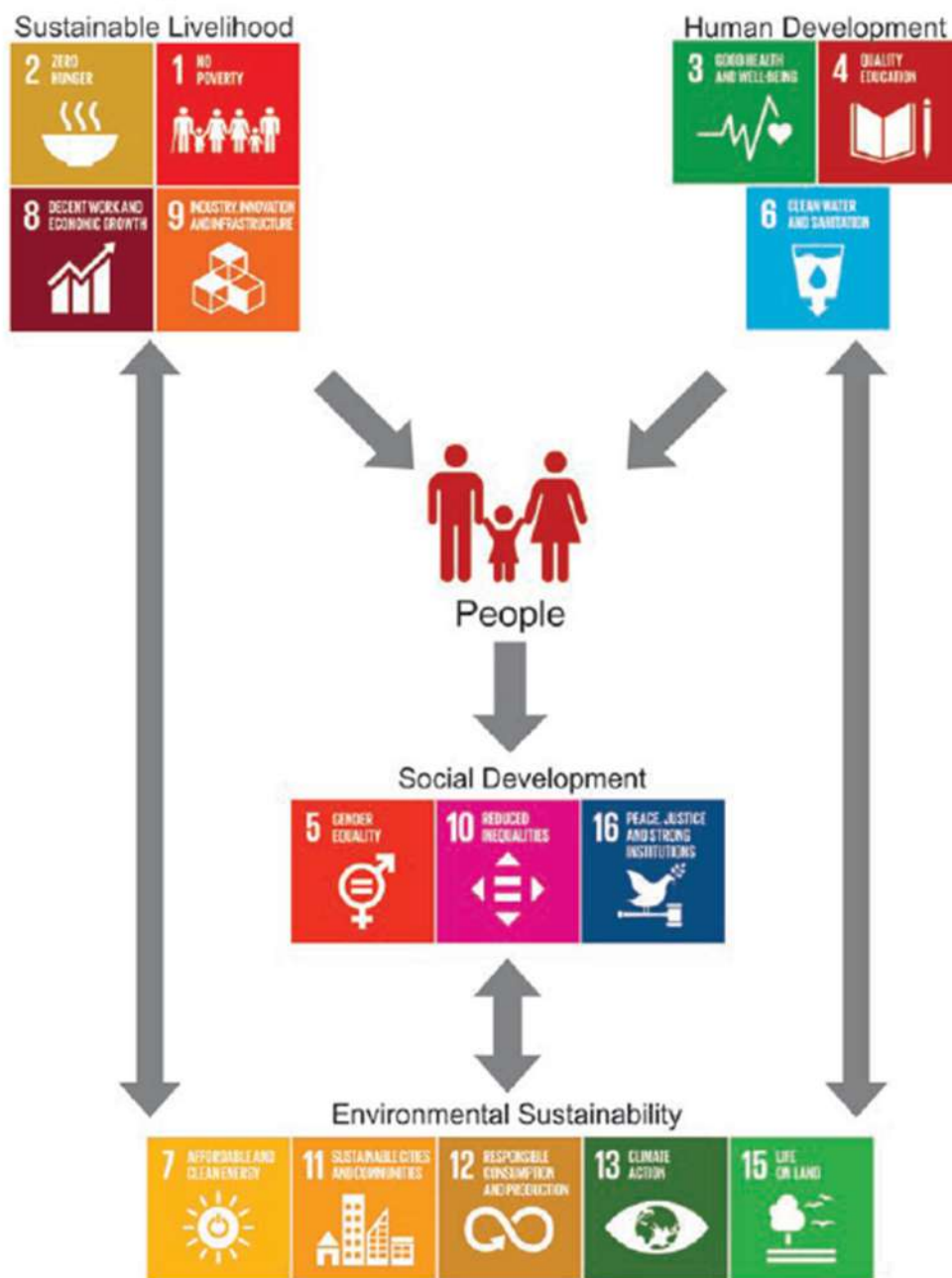
The Vision for Uttarakhand outlines the vision for the SDGs and the targets/indicators as applicable for the state for the coming years till 2030 and indicates the strategy to achieve the same. A set of indicators suitable for the state have been developed for the targets under the individual SDGs, which can be monitored over time. The Vision for Uttarakhand State Government was framed with the background of 17 Sustainable Development Goals. The framework is focused on the people for the development process. SDGs are categorized into four groups, each of which contributes toward enhancing the development process for the people of Uttarakhand. The four categories are:

1. Sustainable Livelihoods,
2. Human Development,
3. Social Development and
4. Environmental Sustainability (refer to **Figure 16-1**).

The Vision 2030 for the state, keeping in mind the implementation of the SDGs, is the following:

“Transform the Uttarakhand economy into a prosperous, healthy state such that the people are educated and gainfully employed in an equitable society, synergy between the environment and the inhabitants is enhanced, and the development process is sustainable and inclusive.”

Figure 16-1: Framework for Uttarakhand Vision 2030



Source: Uttarakhand Vision Document 2030

The vision centers on the creation of sustainable livelihoods for the people of the state and also enhancing human and social development in a sustainable manner which would conserve natural resources and protect the environment, such that no one is left behind.

The four groups as represented in **Figure 16-1**, Sustainable Livelihoods, Human Development, Social Development, and Environmental Sustainability center around people. Sustainable

livelihoods and human development directly influence the people which as result help us achieve social development. And all the above three together influence environmental sustainability. To achieve environmental sustainability, all the sectors have to come together.

16.2. Vision for the Rudrapur Master Plan, 2041

The evolution of the vision for the Rudrapur Master Plan was through various stages of stakeholder consultations and thorough discussions with the representative of the client agencies. A detailed analysis of the existing situation, current development scenario, and future prospective was also recognized during the development of the vision. Also, the strengths, weaknesses, opportunities, and threats of the Rudrapur Planning Area have been considered. The Vision for Rudrapur Planning Area 2041 is as follows:

“To maintain Rudrapur as an Industrial Hub and storage center for its products, the center of Trade and Commerce and Administration for the Immediate Surrounding Region, and to make it a Modern, Clean, Green, Inclusive, Safe and Citizen Friendly and well-governed city.”

Rudrapur is a prominent Industrial City in the district, due to the presence of SIDCUL, the same is conserved and promoted in the vision along with its auxiliary facilities like storage space for its products. The vision also supports Rudrapur's potential for being the center of Trade and Commerce at a regional level. From an environmental perspective, Rudrapur's vision is to be a clean, green city. It also highlights making the city inclusive, safe, citizen-friendly, and well-governed city.

16.3. Goals and Strategies

In alignment with the Vision for Rudrapur Planning Area five goals are developed and to achieve these goals strategies are also prepared. The goals for Rudrapur Planning Area are as follows:

1. Developing Rudrapur as an Industrial City
2. Enhancing Trade and Commerce
3. Strengthening its Administrative function as District Head Quarter
4. Facilitating Traffic and Transportation Development
5. Attaining Environmental Sustainability

Figure 16-2: Goals of Master Plan



16.3.1. Rudrapur as an Industrial City

Industries are the dominant base of the Rudrapur Planning Area. Due to its plain geography, available workforce in the surrounding region and the establishment of SIDCUL Rudrapur's location as an Industrial City is justified and hence it has been supported and represented as a dominant character of the Rudrapur Planning Area. The strategies for developing an Industrial City are as follows:

1. Encouraging Micro, Small, Medium, and Large Industries
2. Encouraging Investment and growth in the industrial sector through a public-private partnership.

16.3.2. Enhancing Trade and Commerce

Rudrapur acts as a center for Trade and Commerce at a Regional level. There are special grain markets, a Mandi, and 13 informal markets. There is a need to regularize these markets for enhancing the growth of Trade and Commerce in the Rudrapur Planning Area. The strategy to enhance trade and commerce are as follows:

1. Owing to its proximity to UP (Rampur and Moradabad), Rudrapur city is the gateway to the Kumaon region of Uttarakhand. Hence encouraging interstate trade and commerce centers.
2. Ensuring the implementation of the NULM mission and PM SVANidhi for street vendors.
3. Spatial regularization of informal markets through designation space for informal markets

16.3.3. Strengthening its Administrative function as District Head Quarter

Rudrapur, the headquarters of the Udham Singh Nagar is an appropriate city for being an Administrative Centre for the region and State. There already exist major government offices like District administrative complex, Police administrative complex, Municipal Corporation, and District Hospital, in the Planning area, and in the future, it can act as an Administrative Centre. The strategy for making Rudrapur an Administrative Centre is as follows:

1. Ensuring the establishment of major administrative offices in Rudrapur
2. Providing good connectivity to other regions
3. Providing district-level infrastructure facilities

16.3.4. Traffic and Transportation Development

With industrial growth, the city demands a good transportation network to support its movement of goods without hindering the city's flow of vehicles. Keeping because of the AMRUT scheme alternate modes of transport like walking and bicycle were emphasized. The strategies are as follows:

1. Developing a hierarchy of road networks facilitating both passenger and goods movement.
2. Expand, improve, and strengthen the existing roads to support the industrial development of the city.
3. Provision of Transport Nagar to support the goods movement of vehicles in an organized manner.
4. Creating bypass by the provision of an outer ring road to direct the through traffic outside the city.
5. A suggestion of road cross-sections which would accommodate all types of vehicles like e-rickshaw, cycles, buses, three-wheelers, etc.

16.3.5. Attaining Environmental Sustainability

In Rudrapur the pollution of the major natural Drain i.e., the Kalyani River is a major concern and many natural drains in Rudrapur Planning Area that falls under the eco-sensitive zone need to be protected. The strategies to attain environmental sustainability are as follows:

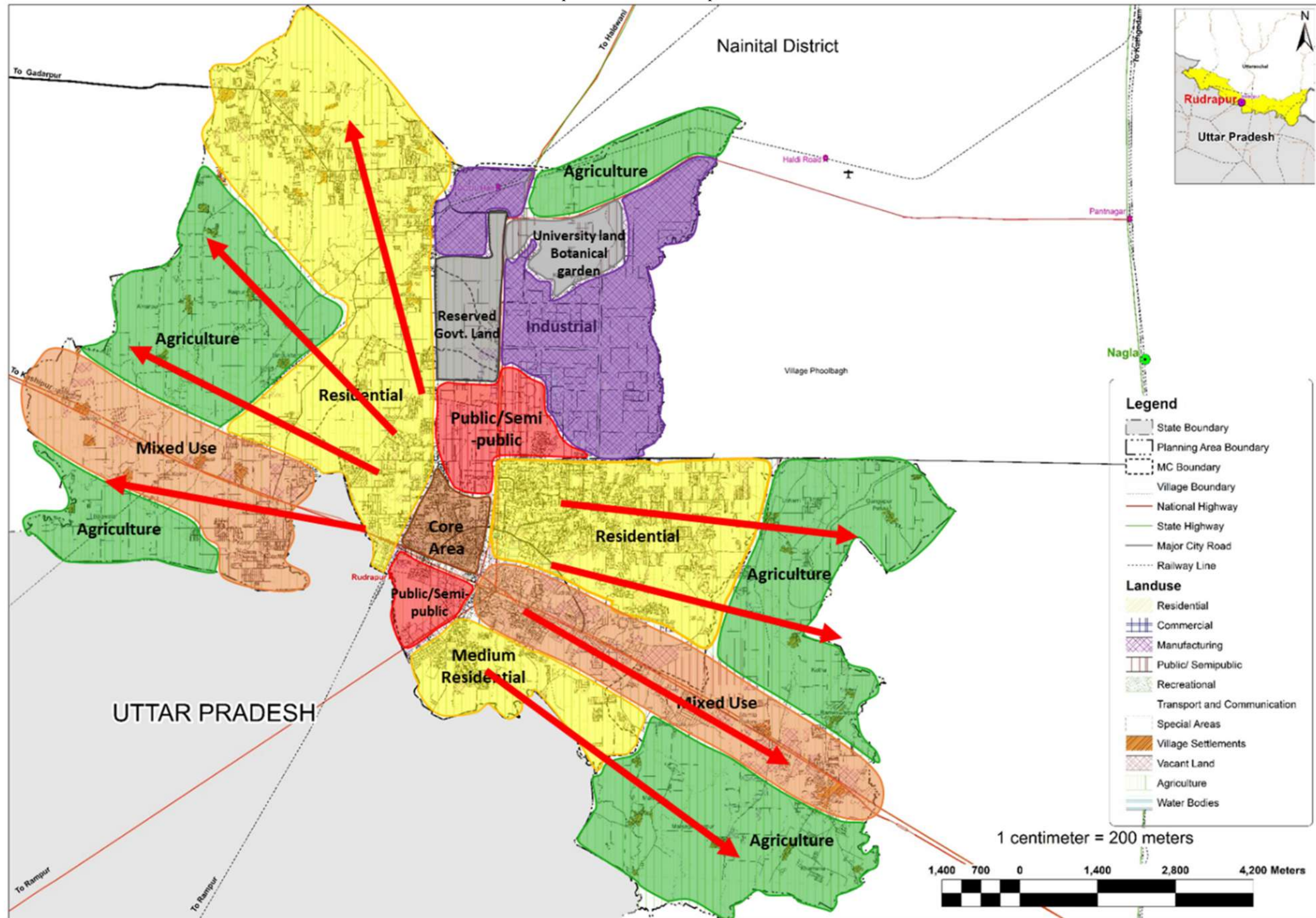
1. Ensuring the preservation of natural drains and sensitive zones by providing buffer space along with it.
2. Development of Parks and Open spaces.
3. Restrict the discharge of pollutants in the natural drains.

17. Spatial Growth Strategies

This chapter presents the existing urban form characteristics and concerning it, how the future form is directed which is based on the need and requirements of the city. To analyze this various land-use models were analyzed like Burgess Model or Concentric Zone Model, Sector Model, Multiple Nuclei Model, and Compact city model concerning existing urban form. All the methods have been considered for the future growth of the Rudrapur Planning Area and discussed below and the best-suited method is adopted for the planning area.

17.1. Morphology & Direction of Growth

Rudrapur is a naturally grown city that has developed on the junction of three National Highways i.e., NH 9/Old NH 87, NH 109/ Old NH 87, and NH 309. Rudrapur has developed rapidly for good transport and communication facilities which leads to good connectivity to other regions and is an ideal location for future development. And hence SIDCUL was established in 2002 which led to further development of the city. The major spine of the city is along the northern side from the junction of the National Highways. On the southern side, the growth is restricted due to the Uttar Pradesh border resulting in low land availability and hence the growth is taking place on other sides - east, west, and northern side of the origin of the city. On the northern side along the east of NH 109, SIDCUL has developed and eventually lead to the development of the city on the eastern side of NH 109 more than on the western side. The growth on the eastern side is also restricted due to the presence of Pant Nagar university land. On national highway 309, we can notice the growth of mixed-use development along both sides of the road. The Rudrapur-Kashipur road is witnessing low growth compared to Rudrapur- Kichha road as it is passing through UP and then again in Uttarakhand, which creates a lot of ownership disputes among the government. The western part of the city is comparatively less developed due to the above-stated reasons but the growth along the Dineshpur road is taking place rapidly. It is mainly due to the low land value and proximity to SIDCUL. Also, a lot of people from Dineshpur travel to Rudrapur for work purposes. The major growth of the city is towards the north but again it is also restricted by natural features like forests and that's why it cannot grow beyond the planning boundary. Residential sector development of more in the city it is along with improvement in transport facilities residential colonies are also developing along the lines (refer **Map 17-1**).



Source: Analysis by Town and Country Planning Department, Uttarakhand

In addition to this, the development of the city is governed by the natural features of the planning area like natural drains. There are a lot of natural drains that could be found in the planning area, which runs from north to south. We can perceive that along these drains illegal construction has been taking place. These drains are ecologically sensitive areas and need to be protected. These constructions hamper the natural drainage and in the long run, these drains can cause destruction too by causing flash floods in the city. So, protection of these areas is imperative for sake of both people and the environment.

Overall, on the northern side, the growth is restricted by forest and on the southern side, it is restricted due to the UP border, and that is why the city is growing in eastern and western directions overall.

17.2. Concept Alternatives

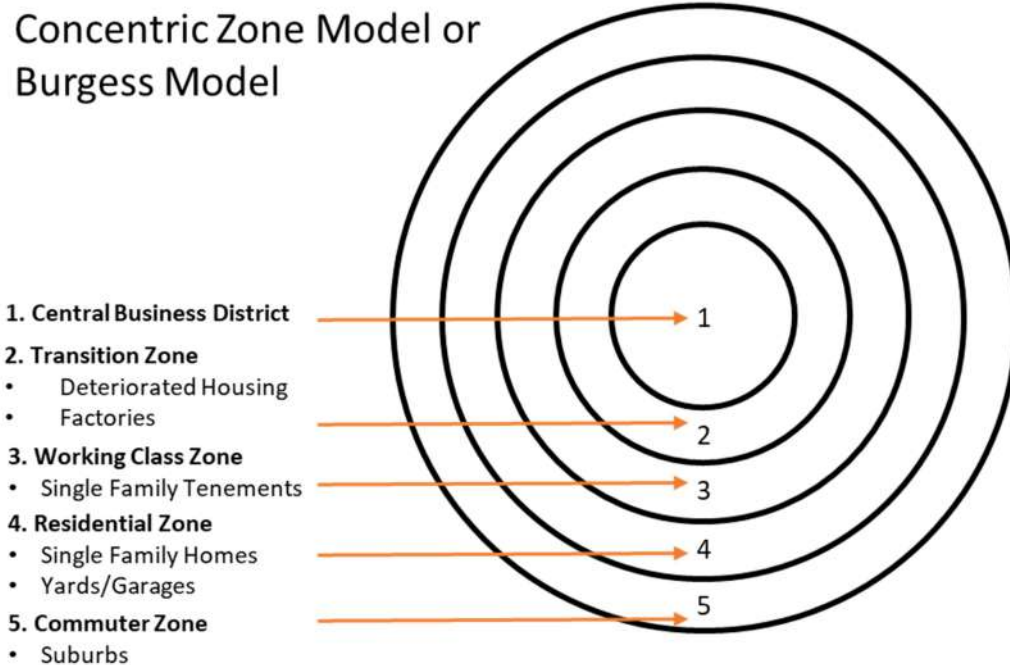
In this section different concepts like Burgess Model or Concentric Zone Model, Sector Model, Multiple Nuclei Model, and Compact city model for Rudrapur Planning Area have been discussed. These concepts attempt to explain the spatial arrangement and settlement patterns and their relationship with each other.

17.2.1. Concept Alternative 1: Concentric Zone Model

The concentric zone model also known as the Burgess Model was created by Ernest Burgess and is based on how different social groups are located in a metropolitan area. Burgess model is one of the well-known models which have been used widely in urban planning. The zones are based on the distance from the Central Business District. The concentric zone model was developed between 1925 and 1929 based on the study of American cities. According to the model, five different zones were arranged concentrically from the center (refer to **Figure 17-1**). The center/zone 1 is the oldest part of the city around which the city has developed over time. The development of the city is also in a concentric manner with the newest development on the edge. Zone 2 is the transition zone from where mixed residential and commercial could be found leading towards completely residential and hence, called the transition zone. Zone 3 is the working-class zone which is mainly for residential purposes of the workers but with better conditions than zone 2. The area is found to be a mixture of old and new buildings. Zone 4 is also a residential zone for middle-class families. Most of the homes are detached unlike in zone 3 where single occupants were mostly found. Better facilities are available in this zone but the

communication cost is higher. Zone 5 is the peripheral area and the farthest from the city with a high communication cost. But this provides a better quality of life and houses are more spacious.

Figure 17-1: Concentric Zone Model

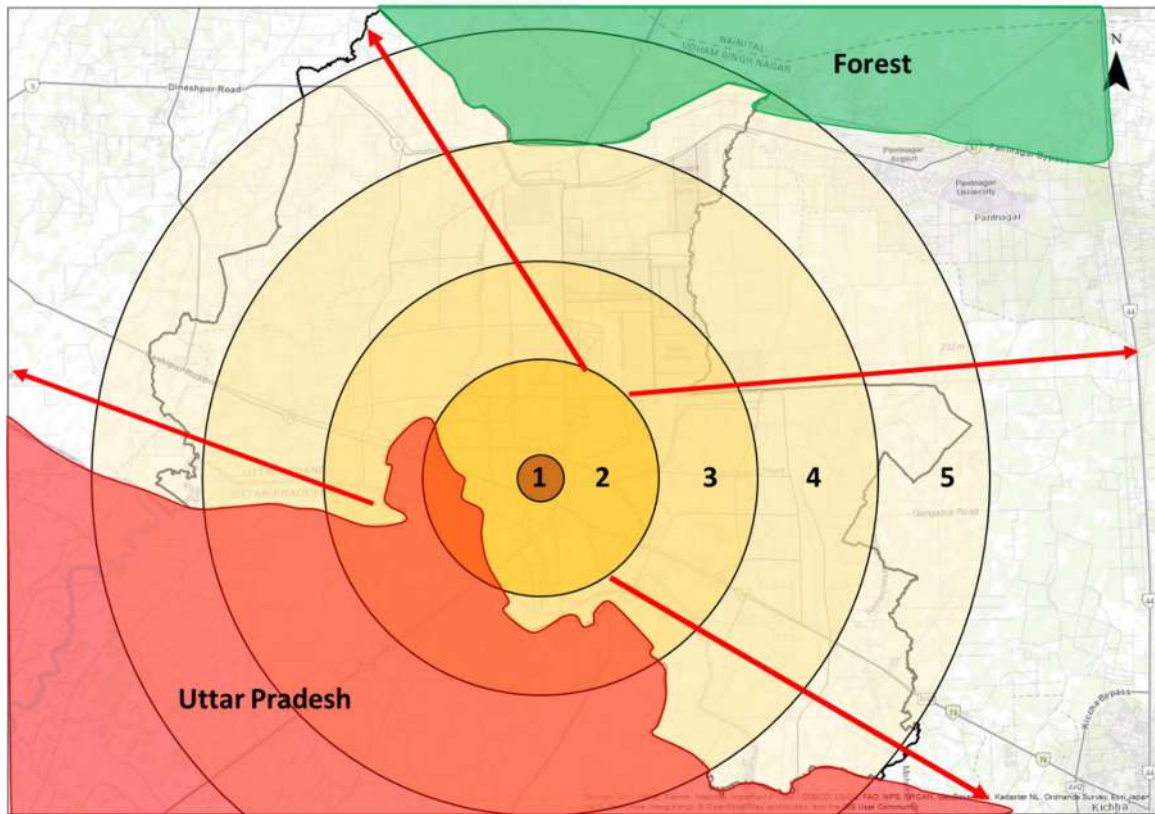


Source: Planning Tank

The concentric zone model has been tried to be implemented in Rudrapur Planning Area as given in **Figure 17-2**. Zone 1 is the Core area of Rudrapur which is dominated by commercial activities. Zone 2 is the transition zone where we can find mixed-used development of residential, commercial as well as industrial. After Zone 2 the concentric zones invade the UP border and hence restricting growth towards the south of the city. Zone 3 is the residential zone where a mixture of the old and new city could be found but in Rudrapur, we find half of it is residential and the rest is industrial as Rudrapur falls in zone 3. In Zone 4 also with residential, we find industrial development in Rudrapur and the city is going towards low-density development. After zone 4 Zone 5 is occupying the forest area on the northern side and the rest of the area is agricultural land and the only development is along the major roads of the Rudrapur Planning Area. So, overall, we can infer that in the concentric zone model the growth of the city is not possible in all directions as it is hindered by the UP border on the south side and the forest area on the north side. On the east and west, the model could be implemented as

directed by red arrows in Figure 17-2 but the zones are not following the natural growth of the city.

Figure 17-2 Concentric Zone Model in Rudrapur Planning Area



Source: Analysis by Town and Country Planning Department, Uttarakhand

17.2.2. Concept Alternative 2: Multiple Nuclei Model

The multiple Nuclei model was given by C.D. Harris and Edward L. Ullman in 1945 which was based on the argument that a city has multiple growth points which are referred to as nuclei. This is one of the widely adopted models which applies to modern cities as the city developed it undergoes many changes and the structure of the city and its land-use patterns have distinct characteristics and noticeable patterns. Based on these patterns the model can be developed and help understand the city. The multiple Nuclei Model is contrary to the monocentric model like the Concentric Zone Model. The argument presented in the Multiple Nuclei Model is that the city might start with the central business district but with time the activities are scattered and get modified, where each dominant activity is formed as a nucleus. The model is presented in **Figure 17-3**. With the central business, the district is attached to wholesale and manufacturing industries, and closer to the CBD are the low-class residential. From low class residential the

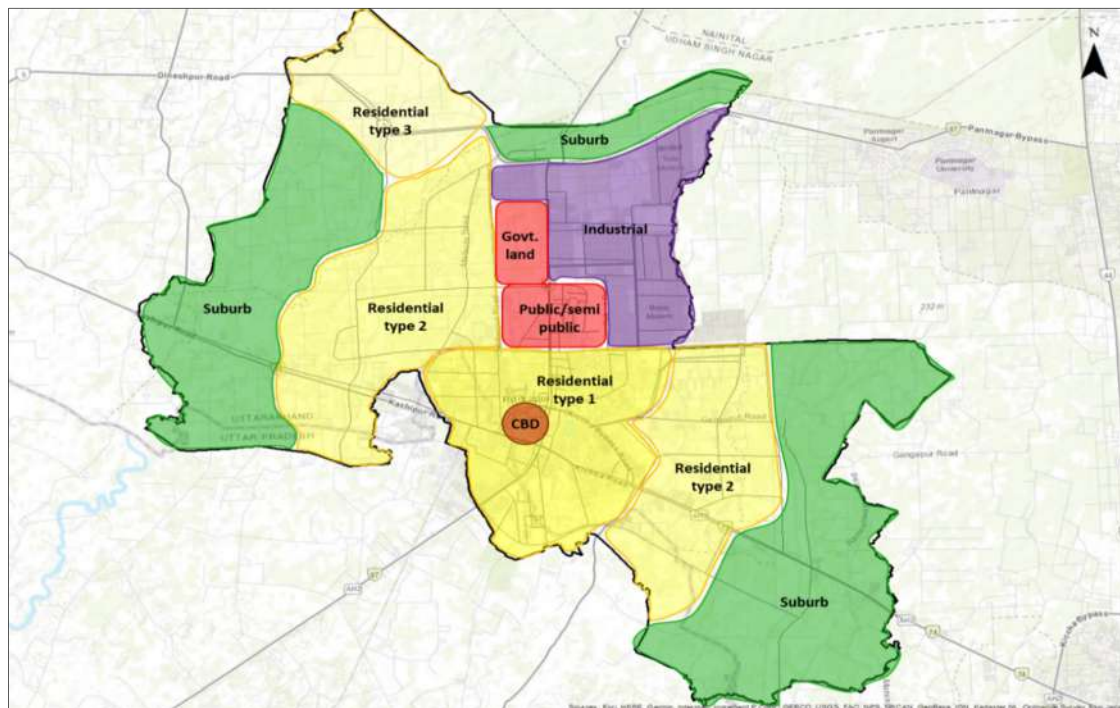
model gradually moves to medium class residential and then high class residential. An additional outlying business district is formed to cater to the needs of the residential areas of the outside which are far away from the CBD. Heavy manufacturing, Industrial suburbs, and Residential Suburb are present on the outside of the city.

Figure 17-3 Multiple Nuclei Model



Source: Planning Tank

Figure 17-4 Multiple Nuclei Model in Rudrapur Planning Area



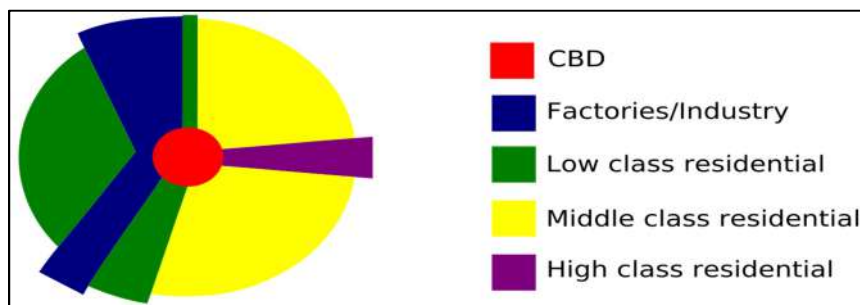
Source: Analysis by Town and Country Planning Department, Uttarakhand

When the Multiple Nuclei Model is applied to Rudrapur Planning Area **Figure 17-4** was generated. While only two nuclei were found dominant in the Rudrapur Planning Area. First is the main CBD and second is the Industrial nuclei which are SIDCUL. Apart from these two, there are no other major nuclei in the city. The residential also shows mixed character and is not classified as low-class residential, medium-class residential, and high-class residential. The outskirts have very less development and hence have been kept as a suburb. The growth is taking place along the major roads which are not considered in the Multiple Nuclei Model. Residential is also growing on Dinespur Road and it does not fall into any category of the Multiple Nuclei Model. Overall, the Multiple Nuclei Theory does not fit with the exciting growth of the Rudrapur Planning Area.

17.2.3. Concept Alternative 3: Sector Model

Sector Model (also known as Hoyt Model and Hoyt Sector Model) is an urban land use model which talks about the spatial arrangement of activities in an urban area. Homer Hoyt gave a sector model in 1939 which explains how cities grew and activities arranged themselves in the form of sector radiating out from the main central district. He argued that cities do not develop as simple rings but instead develop various sectors. He suggested few activities grow in the form of sectors that radiates out along the main travel links. The land use in each sector would remain the same as like attracts like. These sectors generally grow along railway lines, highways, or rivers. The components of the Hoyt Model include the Central Business District (CBD), Factories and industries, low-class residential, middle-class residential, and high-class residential as given in **Figure 17-5**. The main center is the CBD which is complex and dynamic and from this radiates out the industries because of the presence of transport linkages along which the activities grew and thus a continuous corridor or sector is developed. Manufacturing industries have a huge influence on how a city grows and shapes the overall geometry of the area.

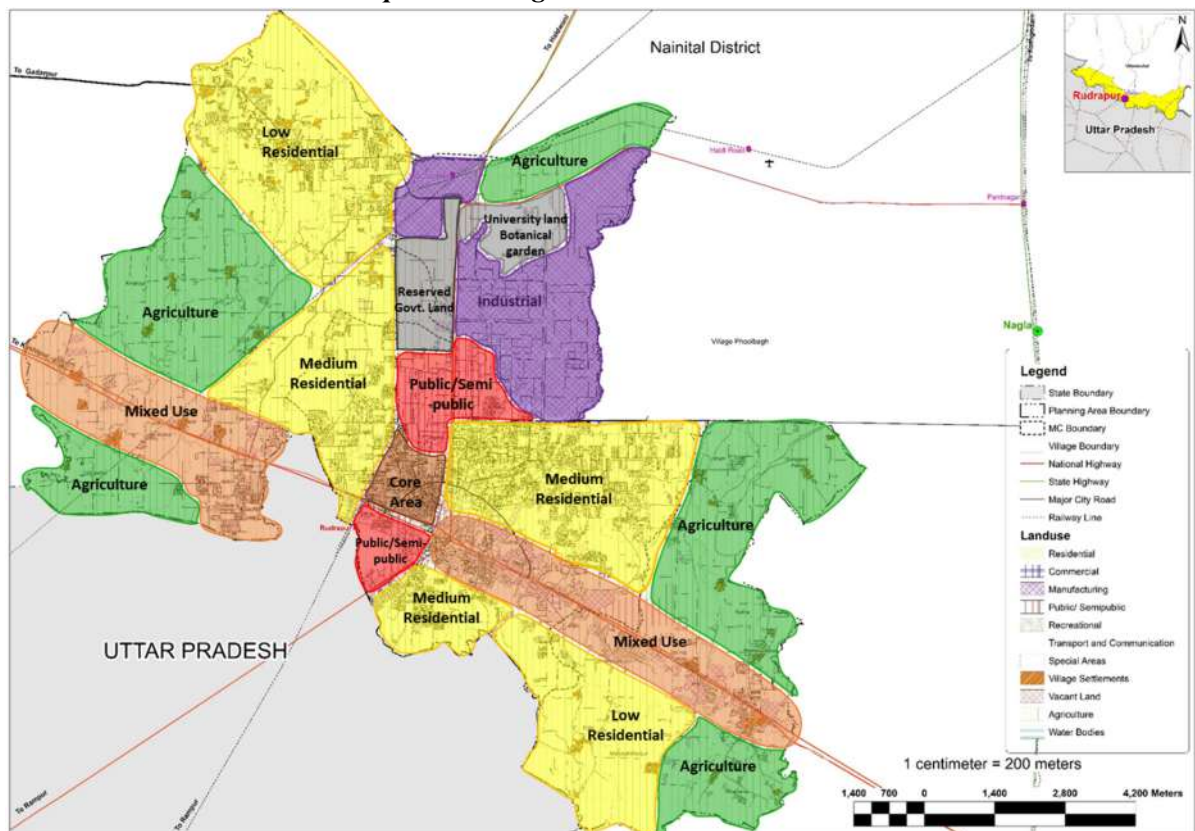
Figure 17-5 Sector Model



Source: Planning Tank

Figure 17-6 represents the overlapping of the Sector Model in the Rudrapur Planning Area. The main center is the core area where the city originated and is the main commercial district of the planning area. The CBD is formed at the junction of the three major highways NH 9, NH 109, and NH 309, and along with these linkages, the city has grown gradually. The major growth is on National Highway 109 where SIDCUL has developed. On the other national highways as well, we can see the growth of industries as well as commercial and residential apartments. But it is mainly industries as suggested by the Sector Model. Along these, the residential sector is developing where the workers of the industries reside. As we go outside the city, we can see the residential sector with good housing conditions developing in the city. Few sectors like public/semi-public sectors are also developed in the planning area which has not been catered to in the sector model. But can be modified and added for the future development of the planning area. There is no demarcation of low-class, medium class and high-class residential divisions in the existing planning area. But a major division based on the densities could be differentiated in the city.

Figure 17-6 Sector Model in Rudrapur Planning Area

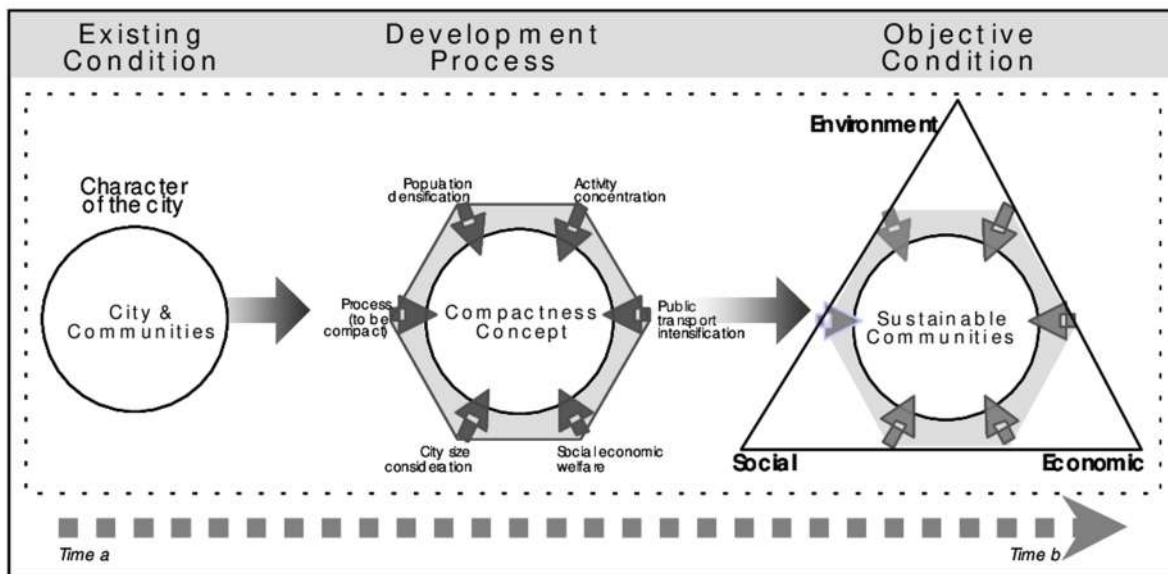


Source: Analysis by Town and Country Planning Department, Uttarakhand

17.2.4. Concept Alternative 4: Compact City Model

The compact city also known as the city of short distances is a currently emerging concept in urban planning. It is a sustainable approach of planning which mainly emphasizes urban activities to be located closer together to ensure better access to services and facilities via public transport, walking, cycling, and other efficient utility and services. It promotes high-density development with predominantly mixed land use and provides infrastructure facilities within walkable distance. The advantage of compact city development is that it consumes less territory and creates an efficient network of public utilities and public transit system. The three pillars of the compact city are Environmental sustainability, Economic sustainability, and Social sustainability. **Figure 17-7** represents the development process of the compact city. It focuses on a convergent process where all the activities are concentrated in one place compactly to achieve environmental, economic, and social sustainability. In terms of transportation, it suggests the provision of outer and inner ring roads for connecting the entire city with the core.

Figure 17-7 Compact City Concept

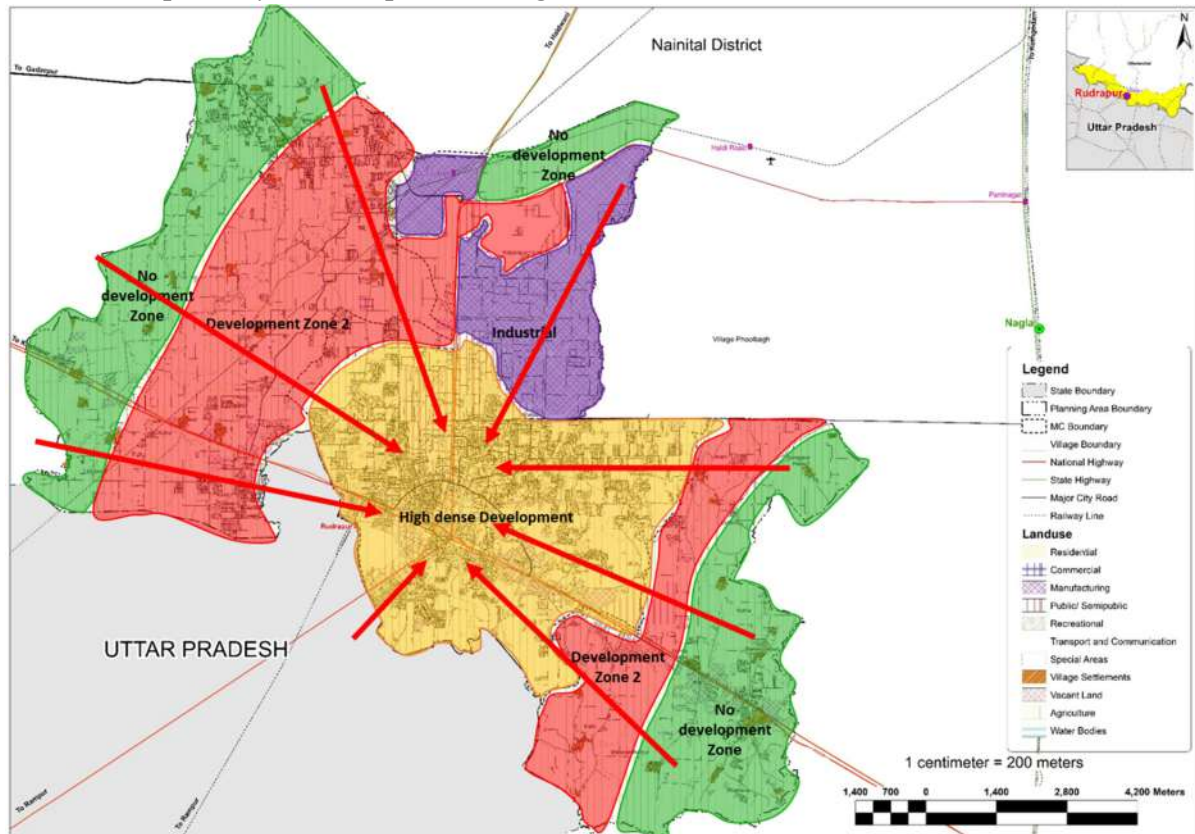


Source: semanticscholar.org

In Rudrapur planning Area as per **Figure 17-8**, the compact city has been developed conceptually. As the compact city supports high-density development the entire planning area cannot be converted into high-density development as the character of the city differs. Only the zone highlighted in orange can be achieved as high-density development. The industrial area cannot be changed as the existing industries cannot be removed. The areas beyond this high dense development zone have to be developed differently as we can see plotted housing has been

coming across in parts of the land that cannot be converted to high dense development. Also, in the compact city, a green belt is preferably left on the outskirts of the city which act as a no-development zone. The entire planning area needs to connect from the outside via a ring road which would not be possible in the Rudrapur Planning Area as the form of the eastern side where the land belongs to SIDCUL cannot be achieved. The issue of land is present on the southern side where we have the UP border and on the northern side, we have a forest.

Figure 17-8 Compact City in Rudrapur Planning Area



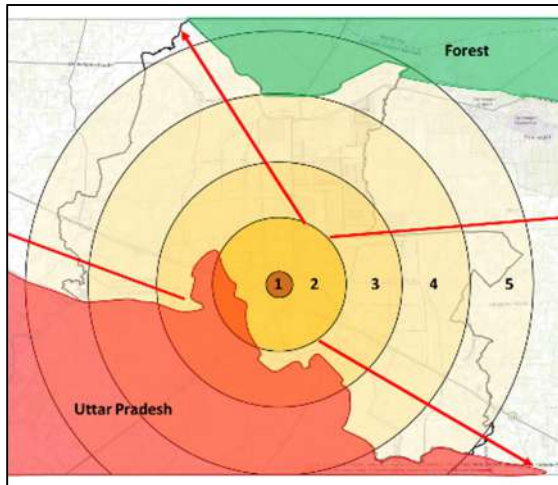
Source: Analysis by Town and Country Planning Department, Uttarakhand

17.3. Selection of Preferred Concept

As discussed in the previous section four concept alternatives are developed and discussed in detail for Rudrapur Planning Area. All the models have been tried and tested to be implemented in the Rudrapur Planning Area. The gist of each model and selected model for the Rudrapur Planning Area is discussed in this section and based on this discussion the best-fit alternative is used for Rudrapur Planning Area. With the selected model, the spatial growth direction and strategies for Rudrapur Planning Area 2041 are identified. The final proposals for the master plan are in alignment with these strategies and growth directions.

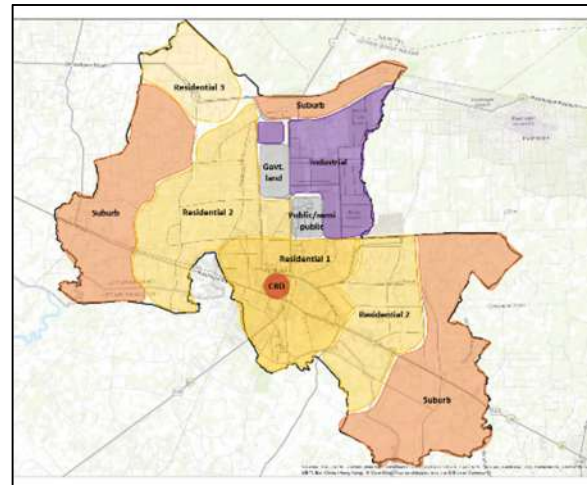
In addition to the four models, the existing Masterplan is also considered so that the proposed concept does not deviate from the Master plan completely and is conformed to the direction of development envisioned in the existing Master Plan.

Concentric Zone Model



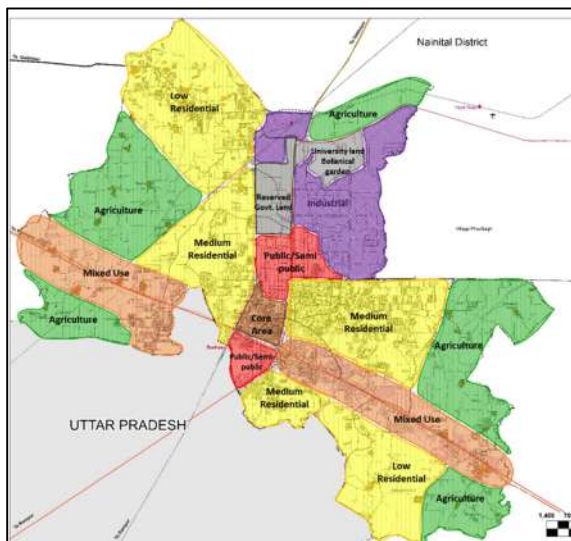
Growth is hindered due to the UP border on the south and Forest on the North.

Multiple Nuclei Model



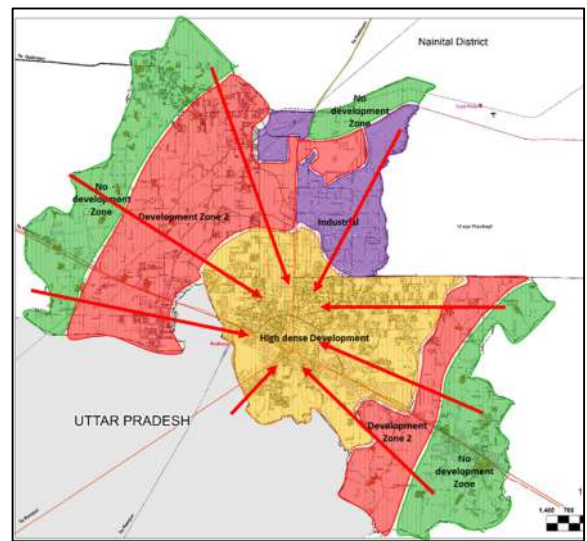
Only two major nuclei are identified and existing growth is not in alignment with the model.

Sector Model



Growth along the transport linkages and with-it residential growth could be seen. Different sectors radiate from the core area.

Compact City Model



High-density development can only be achieved in a limited area. Provision of inner and outer ring roads is not possible due to the UP border in the south and Forest in the north

We can infer from the above that with the existing growth the Sector Model fits the best. The model suggests the formation of different sectors along the corridors. We find industrial as well as public/semi-public sectors developing along the transport corridor. And after these, the residential sectors are developing. Instead of following a new model for the planning area, the model which is supporting the existing growth should be preferred and hence the sector model has been utilized for the Rudrapur Planning Area

17.4. Spatial Strategies for Preferred Concept

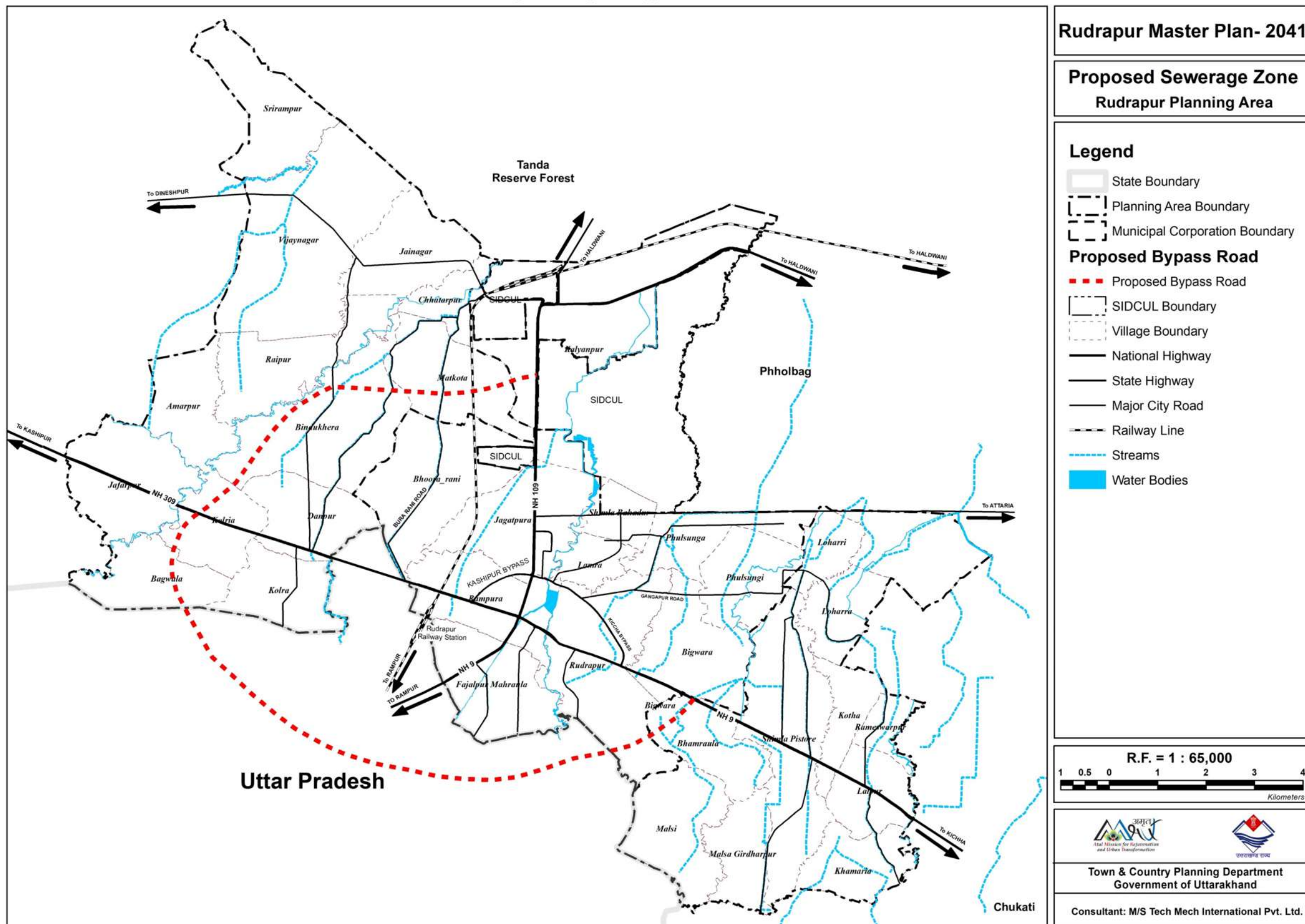
Based on the Vision, Goals, and Strategies and the selected model for spatial growth in the above sections the spatial strategies are developed.

17.4.1. Transport

Rudrapur being an industrial city highly needs good transportation infrastructure to facilitate the movement of heavy goods and vehicles. From the transportation analysis also, it was found that the city needs southern bypass roads, as there is 20% thru traffic passing through Rudrapur city. Hence new bypass road has been proposed by NHAI to better serve the Rudrapur Planning Area at both the regional level and local level (refer to **Map 17-2**).

From Seetanganj according to the land availability and feasibility, the bypass is proposed towards the UP and then again enters Uttarakhand from Kichha. This bypass would cater to all these towns and help the movement of vehicles at a regional level. The second bypass is from Maheshpura junction to the Tanda range on the northern side of the planning area. These two bypasses have been proposed at the regional level (refer to **Map 17-2**). The proposed bypass originates opposite Radhaswami Satsang Beas at Kiccha Road then passes through the revenue villages of Bhamraula and Rudrapur, and then enters into the state of Uttar Pradesh, then again enters in Planning Area in the revenue village of Bagwala, Kolria, and then crossing the Kashipur Road, and then passes through the revenue villages of Bindukhera, Matkota and ends at Haldwani Road (opposite to SIDCUL). This bypass Road will act as a Ring Road connecting all the surrounding roads (Kiccha Road, Haldwani Road, Kashipur Road, and Rampur Road towards Uttar Pradesh) and form a ring radial pattern for the Rudrapur city and planning area. This ring road will help to bypass all the through traffic passing through the city from all directions.

The bypass facilitates by providing an alternative route for people going to Haldwani/ Nainital and Kichha without going into the city.



Source: Proposed by NHAI

17.4.2. Environmental Considerations

Error! Reference source not found. represents the natural drains that run along the Rudrapur Planning Area. These natural drains if not protected will be a major concern for the planning area. These natural drains are eco-sensitive areas and these areas have been encroached on by local people for residential purposes. The construction along these drains hampers the natural flow of the drains. If this encroachment is not rectified it could lead to disaster in the future and leads to tremendous human and property loss. So, to preserve the natural flow of the drains a buffer is proposed on both sides of the natural drains. These buffer zones are an excellent opportunity for creating recreational zones along the natural drains. The recreational zones need to be carefully established without hampering the natural flow and with minimum construction. These recreational zones could be utilized as a tourist attraction point and in return would help in enhancing the economy of the Rudrapur Planning Area. Also, the recreational zones will play the role of lungs in the planning area with green areas. With open spaces all along the planning area, it will increase the quality of life and would become a getaway space for the people in Rudrapur.

17.4.3. Spatial Growth Directions

Map 17-3 represents the new spatial growth direction that overlapped with the existing master plan. Like the sector model of Homer Hoyt Rudrapur's vision in a similar direction as discussed above. The different zones of the city radiate from the center. The main center of the city is the core which is mixed but mainly dominated by commercial. It also has residential and public & semi-public land uses. Here the major needs of the city are fulfilled and hence making it the Central Business District. The transport facilities like bus stands are also in the CBD. From the CBD radiates public/semi-public zones, mixed-use and residential zones along with the transportation linkages i.e., roads. The development along the NH 309 or Rudrapur-Kichha and Rudrapur-Kashipur road is mainly dominated by industries but it is proposed as mixed-use zones as with industries the residential has started developing along with it and to cater to the residential needs the commercial facilities have also started to grow along the roads.

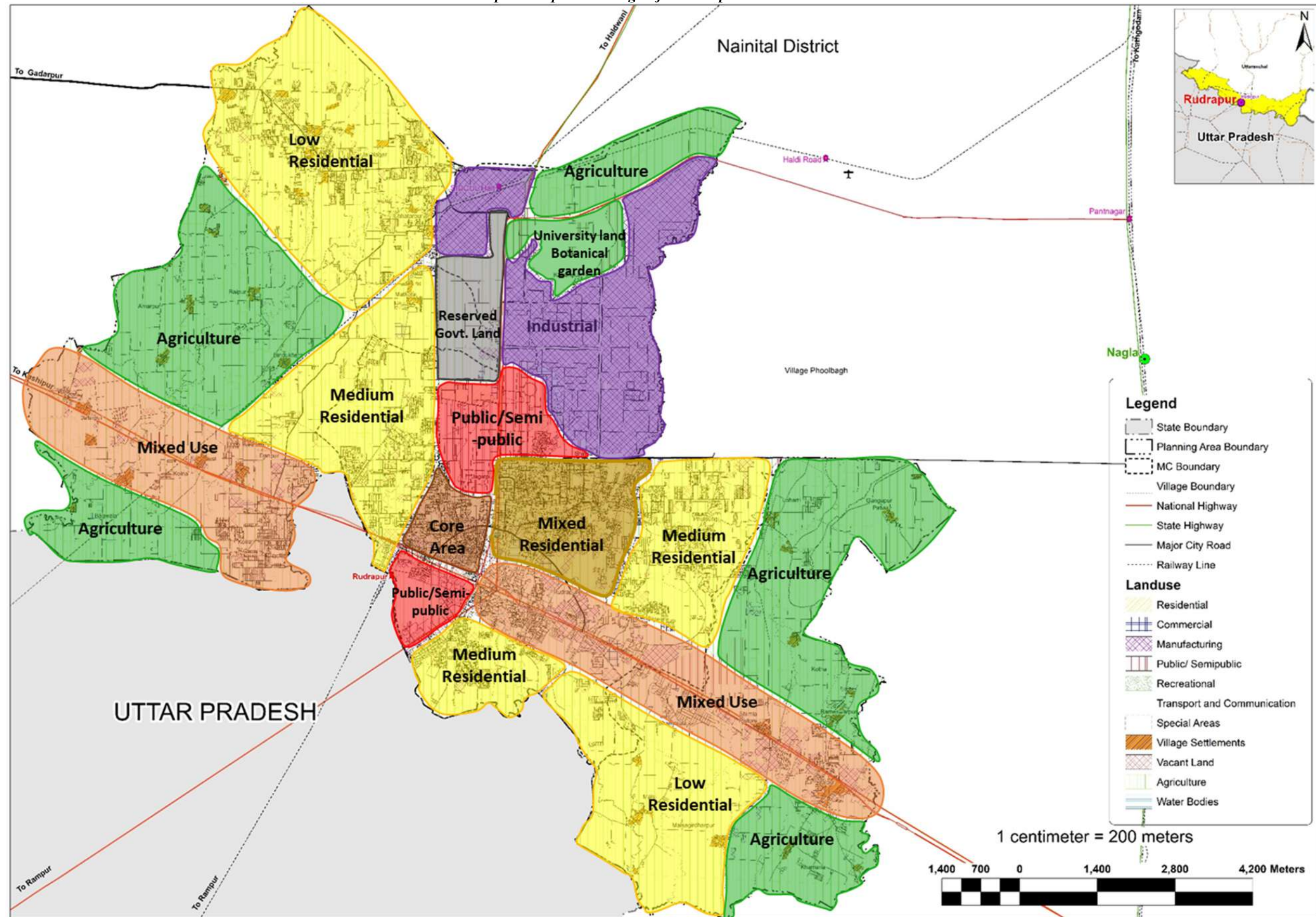
On the eastern side of the core area along the mixed-use zone on both sides of the roads are proposed residential zones. The mixed residential zone on the right side of CBD is a continuation of the CBD with dominating land use as residential but also has commercial buildings, public/semi-public, and industries too. This zone needs to be carefully planned. To provide a smooth transition next to the mixed residential is proposed medium residential zones. And next to it is

land reserved for agriculture where only rural settlements would be allowed. On the lower right side of the CBD towards the UP, the border is the proposed medium residential zone. There are already colonies planned in those areas as it is near CBD and just on the border it needs to be controlled and avoid very high density. Just along this medium residential zone on the southern side, the proposal is for low-density residential as the industrial area is nearby it is preferred to develop it as low density and also it is towards the outskirts of the city.

On the western side of the core, the area is proposed medium residential zone which is alignment with the existing development as well as the previous master plan. In sector model as well with the core area develops the residential zones and as we travel away from CBD the residential changes from lower class to middle class to high class. But instead in Rudrapur Planning Area, we are changing from high density to medium density to low density as we travel away from CBD. So, after medium residential, low residential, and then agriculture or after medium agriculture zones have been proposed to provide the transition from high dense to low dense. Along the Rudrapur-Kashipur road as well as mixed-use development has been proposed due to the same reasons as discussed above and, on both sides, agricultural land has been reserved.

Along with the core on the north and south side the public/ semi-public zone where major offices, and educational and health facilities are found. It is because it is developed as per the previous master plan and the existing development is also in that direction.

On the north side beyond the public/semi-public zone and along the NH 109 or Rudrapur-Nainital road is the main industrial zone where we find the establishment of SIDCUL. The industrial area is also in alignment with the previous master plan and also in alignment with the sector model of industries developing along with the transport linkages. In between the industrial zone is the Pant Nagar University land and a botanical garden have also been proposed there. Beyond this agricultural land has been proposed. On the east side of the NH 109, we also have govt. the land where no proposal can come up. On the east, west, and north side of the city green zones have been proposed to promote green areas or agriculture areas, to conserve land for future growth.



Source: Analysis by Town and Country Planning Department, Uttarakhand

18. Proposed Land Use, 2041

18.1. Introduction

The Land Use Plan has been developed for the regulation of land use of the Rudrapur Planning Area. After an in-depth study of the existing situation, calculating future requirements of the city and land suitability analysis, a sustainable development plan has been developed. Based on various surveys and studies detailed analysis has been carried out to identify the city's potential, strengths and weaknesses. Rigorous discussions have been carried out with the client's representative and also with various stakeholders to arrive at the final Land Use Plan for the Rudrapur Planning Area. The provisions/ proposals of the previous master plan have also been incorporated for the preparation of the final Land Use plan. The major land use categories have been adopted from URDPFI guidelines.

18.2. Proposed Land Use Distribution

The total land under Rudrapur Planning Area is 12004.11 Ha. This area has been divided into two broad categories i.e. Developable area and Non-developable area. 8945.30 Ha is the developable area which is 66.18% of the total Planning Area. The developable area contains proposals for future requirements for the horizon year 2041 while undevelopable area shall act as a reserved resource so that the goal of sustainable development can be achieved. This area is comprised of Agriculture land, Highway Facility Zone, and Water Bodies. The impact of development in the developable area on the environment can be balanced by undeveloped areas. The land use distribution of the Rudrapur Planning Area has been presented in **Table 18-2** and

Table 18-1: Breakup of Developable area, Proposed Land Use

Land Use	Proposed In New Master Plan	Deviated From Previous Master Plan	Total	Share (%)	Standard	Remarks
-1	-2	-3	(2+3)		(As per URDPFI)	
Residential	3932.83	289.29	4222.12	49.92	43-48	
Commercial	200.52	28.79	229.31	2.711	4-6	
Industrial	436.98	166.57	603.55	7.136	7-9	

Land Use	Proposed In New Master Plan	Deviated From Previous Master Plan	Total	Share (%)	Standard	Remarks
-1	-2	-3	(2+3)		(As per URDPFI)	
Public and Semi Public	897.42	22.5	919.92	10.87	6-8	Being District and Tehsil headquarter
Recreation	1387.01		1387.01	16.40	12-14	Due to Pant Nagar University Botanical Garden Land
Mixed	150.69		150.69	1.78		Balanced through Residential and Commercial
Transport	944.36		944.36	11.16	10-12	
Total	7949.81	507.15	8456.96	100.00		

The future land use for the horizon period has been proposed as per URDPFI Guidelines and existing ground conditions. A total of 49.92% (3932.83 Ha.) land share of the total planning area has been allocated to residential use which is slightly higher than the URDPFI guidelines. A land share of 2.71% (200.52 Ha.) has been proposed for commercial use and a land share of 1.78% (150.69 Ha) has been put to mixed-use in the proposal. As per the URDPFI guideline, the city should have 4%-6% area under commercial use while there is no provision for mixed land use in the guideline. Thus, by combining Residential, commercial, and mixed land use ,we have tried to balance the ratio of residential and commercial land use of the city. Rudrapur is the district and tehsil headquarter and as such has a huge area under different government offices which constitutes of 5.82% (466.44) of total developable area. A large amount of land is under PAC which has resulted in a large share of land under Public and Semi-public use. The land share of 10.87% (919.92 Ha.) has been proposed for public and Semi-public use. This not only includes existing land under Public and Semi-public use but also additional land required to serve the future population of the Planning Area. For efficient travel within the Planning Area, 11.16% (944.36 Ha.) of total area has been proposed under Transportation. This area includes the existing area under transportation use, additional land required for the proposed road network, and the area required for proposed road widening. Considering the quality of the urban environment a land share of 16.40% (1387.01 Ha.) area has been proposed for recreational use.

This use comprises parks, green belts along natural drains, the area under tree cover, theme parks, and multipurpose open spaces and the land of Botanical under the GB Pant agriculture land.(Figure 18-1).

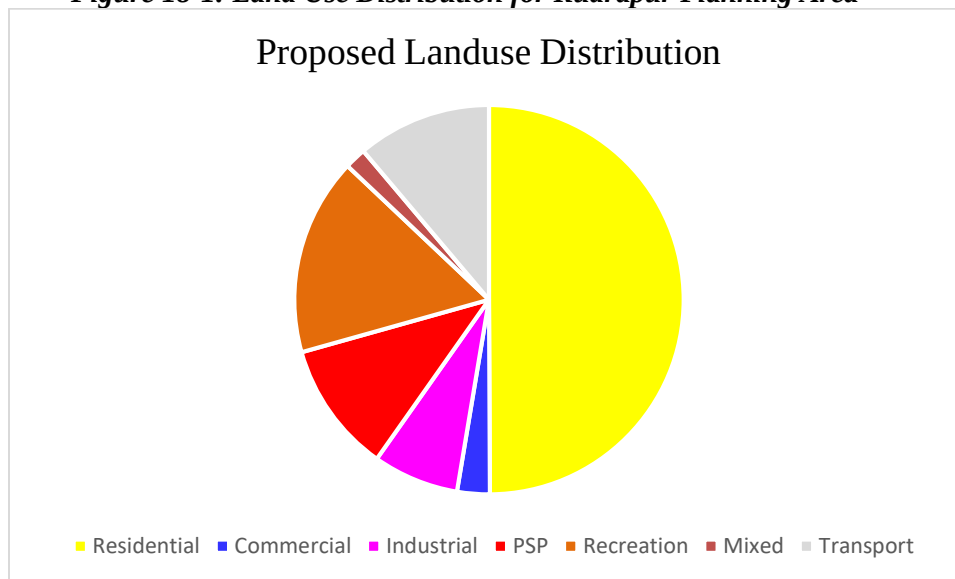
Table 18-2: Land Use Distribution of Rudrapur Planning Area

Developable Area					
Level I			Level II		
Code	Use Category	Area (Ha)	Code	Use Zone	Area (Ha)
R	Residential	3932.83	R 1	Built up (Urban)	298.89
			R 2	Rural Settlement	194.86
			R 3	Residential Zone	3435.51
			R4	Affordable Housing	3.57
C	Commercial	200.52	C 1	Built-up Commercial	50.87
			C 2	Commercial Zone	53.24
			C 3	Wholesale Markets/ Mandis	11.91
			C 4	Warehouse/Godown	84.50
I	Industry	436.98	I	Industrial	436.98
M	Mixed Use	150.69	M1	Mixed Use	101.77
			M2	High Rise Building Zone	48.92
PS	Public/Semi-Public	859.40	PS 1	Govt./ Semi Govt./ Public Office Use Zone	380.89
			PS 2	Educational and Health Zone	379.52
			PS 3	Socio-cultural and Religious Zone	98.99
U	Utilities and Services	38.03	CR	Cremation and Burial Ground/Graveyard	1.45
			ESS	Electric Sub-station	21.52
			STP	Sewage Treatment Plant	4.50
			SWTP	Solid Waste Treatment Plant	3.88
			SWM	Landfill Site	2.18
G	Green Zone	1193.50	G 1	Parks	66.30
			G 2	Green Belt Along Natural Drain	1127.20
P	Recreational	193.51	P1	Play Grounds	0.64
			P2	Multi-Purpose Open Space	1.31

			P3	Horticulture/Botanical Garden	191.56
T	Transportation	944.36	T 1	Roads	786.84
			T 2	Railway Property	50.49
			T 3	Bus Stand/Railway Station	19.25
			T 4	Transport Nagar / Truck Terminal	87.78
DLU	Deviated Land Use		DR	Deviated Residential	107.62
			DRC	Deviated Residential Colonies	181.67
			DC	Deviated Commercial	28.79
			DI	Deviated Industries	166.57
			DSP	Deviated Public and Semi-public	22.50
Total Developable Area		7945.309	66.18% of total Rudrapur Planning Area		
Undevelopable Area					
Level I			Level II		
Code	Use Category	Area (Ha)	Code	Use Zone	Area
PA	Primary Activity	3924.017	PA	Agriculture	3851.02
			HFC	Highway Facility Corridor	73.00
E	Protective Zone	400.083	E 1	Water Bodies	82.64
			E2	Eco-Sensitive Zone	92.72
			E3	Vegetation	224.73
Total Un Developable Area		4324.09	36.02% of total Rudrapur Planning Area		

The land use allocation under each category is composed of proposed land use and deviated land use from the previous Master Plan. There is 507.15 Ha. of the area which is of deviated land use from the previous Master Plan (**Table 18-1 and Figure 18-1**).

Figure 18-1: Land Use Distribution for Rudrapur Planning Area



18.2.1. Residential

The land proposed for residential use is 3702.72 Ha, which is 46.21% of the total developable area. The area under residential land use is composed of four types of residential land use, viz., R1: Urban Built-up, R2: Rural Settlements, R3: Residential Zone and DR: Deviated Residential and (Error! Reference source not found.). The Housing proposals have been elaborated under the Residential Use of Proposed Land use to accommodate the upcoming population of 6,16,411. Proposals have been categorised as mentioned in the following table:

Table 18-3: Proposed Residential Area

Code	Residential	Area (Ha)	Proposed Density (PPH)	Population	Dwelling units required	Net residential Area (ha)	DU/ Ha	Average Plot Size (m ²)
R 1	Built-up (Urban)	298.89	220	65755.8	14934	137.46	109	92
R 2	Built-up (Rural)	194.86	200	38972	9098	87.73	104	96
R 3	Residential Zone	3435.51	150	515326.5	103574	1310.85	79	127
R4	Affordable Housing	3.57	150	535.5	10286	130.18	79	127
	Total	3932.83		620590				

- **R1 Urban Builtup:** Existing Built-up areas are developed in the form of slums/ Squared and an unorganized manner along Both sides of the Kalyani River like Transit Camp, Rampura, Khera, Bhuthangla, Dariya Nagar, Ravindra Nagar, Shiv Nagar, Jagatpura, Rampura, Gandhi Colony, Sir Gotiya, Subhash Colony. The total area considered under this use is 298.89 Ha. Existing Built-up Condition is in the form of single or dual stories with very small plot size with almost full built coverage. It is proposed to prepare a DPR for the In-situ slum Redevelopment and Rehabilitation Plan. In these Proposals, it is recommended to develop this area into a multi-storey and Land for Parks/Open spaces/Utility Infrastructure can be obtained from this land only. The proposed Gross Density for this is 220 pph and the proposed Average household plot size is 92 sqm. (**Refer Table 18.3**). The total population to be accommodated under this use will be 65755.
- **R2 Rural Settlements:** All the existing Village settlements/ Abadi areas have been considered under this use. All abadies falling outside the municipal limit is considered under this category. The total area under this Category is 194.86 ha. The proposed Gross Density for this is 200 PPH and the proposed Average household plot size is 96 sqm. (**Refer Table 18.3**)
- **R3 Residential Area:** New Residential areas have been proposed under this use in the planned form with Proposed Gross Density for this being 150 PPH and the proposed Average household plot size is 127 sqm. The total area under this residential category is 3435.51 Ha.
- **Affordable Housing:** As per the Government of India, area for affordable housing is also proposed as per requirement for which District Development authority also acquired a land parcel and project has been initiated.

18.2.2. Commercial

To cater to the need of the present as well as the upcoming population of Rudrapur Planning Area of 238.07 Ha of the commercial area covering 2.97% area of the total developable area has been proposed which is composed of C1: Built-up Commercial, C2: Commercial Zone, C3: Wholesale Markets/ Mandis, C4: Warehouse/Godown, and DC: Deviated Commercial(**Table 18-4**) and the spatial distribution of all this category has been shown in **Table 18-4**.

Table 18-4 Proposed Commercial Area

Code	Use Zone	Area(Ha)
C 1	Built-up Commercial	50.87
C 2	Commercial Zone	53.24
C 3	Wholesale Markets/ Mandis	11.91
C 4	Warehouse/Godown	84.50

- **C1 Built-up Commercial:** The Zone of 50.87 Ha of land has been proposed along the central Gol Market area, Kashipur Bypass Road and Haldwani road, which already exist in the planning area.
- **C2 Commercial Zone:** This have been proposed all around the planning area with a total land of 53.24 ha of land. Commercial area has been proposed in the residential areas to meet the commercial needs of the projected population. It has been taken into consideration that all the residential areas have access to these commercial areas. These centres have been proposed as follows:
 - Eastern side residential zone in between Phulsungi and Bigwara Village,
 - The southern side of the village fajalpur Mahraula along the Rampur Road,
 - On the Westren side in the center of Bhoora rani village, near Matkota and along the Dinespur road and near Vijaynagar. On Haldwani road, existing commercial centers could be found
 - Already Existing Gol Market area is also considered as City Centre.
- **C3: Wholesale Market/Mandis:** Under this total 11.91 ha. of land has been earmarked at two locations, one is the Existing Grain Mandi along the Kiccha Road, and a new Mandi has been proposed in the revenue village of Fajalpur Mahraula in between the Railway Station and Rampur Road.
- **C4: Warehousing/ Godowns:** To cater storage needs of the City due to the existence of SIDCUL a total area of 84.50 Ha has been proposed along the Bindu Khara Road. Accessibility from National Highway and approach to SIDCUL through the new Proposed By-pass by NHAI have been taken into consideration.

18.2.3. Mixed Use

A new land use i.e., mixed-use has been introduced in the Rudrapur Master Plan. Mixed land Use reduces the need for people to travel. In mixed-use areas, we can find housing, restaurants, services, schools, cultural facilities, parks, and more. This connectivity reduces the need for private vehicles, thus increasing the viability of public transport, walking, and bicycling. Mixed Use encourages development within dense, more compact areas of land and reduces traffic and pollution by encouraging residents to use their cars/vehicles less. It creates pedestrian-friendly environments due to the short distances between living, work, commercial and recreational destinations.

In Rudrapur along the NH 09 (Kiccha Road) and NH 309 (Kashipur Road) Mixed Use has been proposed). A stretch of 50 m on both sides of Kashipur-Kiccha Road and 50 m on both sides of Dineshpur Road has been proposed for mixed land use. High-rise development with higher FAR and density are provided within this 200 m mixed land use to have higher growth along the transport corridors which would facilitate the planning area as well as its nearby areas. The total proposed land under mixed land use along the corridors is 365.52 Ha which is 4.56%. The proposed mixed land use will act as an attractive point of facilities in Rudrapur and hence efficient public transport would be required for the planning area. So, to successfully implement the mixed land use, bus priority lanes and pedestrian-friendly roads have been proposed along the stretch (refer to **Table 18-5**).

Table 18-5: Proposed Mixed Use

Code	Use Zone	Area(Ha)
M1	Mixed Use (Residential and Commercial	101.77
M1	High Rise Building Zone	48.92

18.2.4. Industrial

The total proposed area under industrial use is 436.98 Ha which is 7.13% of the total developable land (refer to **Table 18-6**). Overall, no additional area has been proposed for manufacturing in the planning area as there is a separate dedicated zone for industrial use, i.e., SIDCUL with an area of 978 Ha. (Which is outside of Planning Area). The existing industrial establishments are scattered throughout the planning area which is not suitable as per the Land Use compatibility are proposed to be new Industrial area proposed near the Lalpur Village.

Table 18-6 Proposed Industrial Land Use

Code	Use Zone	Area(Ha)
I	Industrial	436.98

The existing industrial land differs from the demand by 54 ha. The industrial areas of the planning area have been proposed/ promoted to be shifted to the southern side of the planning area, near the revenue village of Shimla Pstore. A Wind Direction to avoid air Pollution and the slope of the Planning area has been taken into consideration while proposing this Industrial land use. The area proposed under Industrial is **436.98 ha**. Which is a total of 7.13% of the Developable area.

18.2.5. Public and Semi-Public

To cater to the Future need of all social infrastructure including Education, Health Care, Socio-Cultural Facilities, Open Spaces, Multipurpose grounds, Sports Facilities, Police, Civil Defence, Fire and Disaster, Telephone, Postal, and Banking facilities land uses of Public/Semi-public and its subcategories have been proposed as mentioned in **Table 18-7**.

Table 18-7 Proposed Public/Semi-public Area

Code	Use Zone	Area (Ha)
PS 1	Govt./ Semi Govt./ Public Office Use Zone	380.89
PS 2	Educational and Health Zone	379.52
PS 3	Socio-cultural and Religious Zone	98.99
	Total	859.40

An area of 859.40 Ha. has been proposed for Public and Semi-public facilities to cater to the need of the present as well as the upcoming population in the Planning Area (refer to **Table 18-7**). Spatial Distribution throughout the planning area to serve the catchment area and population for this land use has been taken into consideration.

18.2.6. Public Utilities and Services

To serve the reserved utilities and services in the proposed land use following land has been earmarked (refer to **Table 18-8**). These activities will come under the mandatory services to be provided and no change of land use (CLU) will be allowed.

Table 18-8: Proposed Public Utilities and Services

Code	Use Zone	Area (Ha)
CR	Cremation and Burial Ground/Graveyard	1.45
ESS	Electric Sub-station	21.52
STP	Sewage Treatment Plant	4.50
SWTP	Solid Waste Treatment Plant	3.88
SWM	Landfill Site	2.18

18.2.7. Recreational Zone and Green Zone

To improve the quality of life of the people residing within the Planning Area 963.55 Ha area has been allocated. The details of allocated land and their distribution over the Planning Area have been provided. Spatial Distribution throughout the planning area to serve the catchment area and population for this land use has been taken into consideration (**Table 18-9**).

Table 18-9 Proposed Recreational Space Area

Code	Use Zone	Area(Ha)
G 1	Parks	66.30
G 2	Green Belt Along Natural Drain	1127.20
P1	Play Grounds	0.64
P2	Multi-Purpose Open Space	1.31
P3	Horticulture/Botanical Garden	191.56
	Total	1387.01

18.2.8. Transportation

Transportation and Communication are like the backbone of a Master Plan. Rudrapur is Industrial city transportation plays a major role in it. Both passenger and goods traffic has been given equal importance in the Master plan. The total area under transportation is 821.30 Ha which is 10.25% of the total developable area. In the transportation sector, four zones have been proposed, they are, T1 – Roads, T2 – Railway Property, T3 – Bus Stand/Railway Station, and T4 – Transport Nagar / Truck Terminal (refer to **Table 18-10**).

Table 18-10 Proposed Transportation Zones

Code	Use Zone	Area
T 1	Roads	786.84
T 2	Railway Property	50.49
T 3	Bus Stand/Railway Station	19.25
T 4	Transport Nagar / Truck Terminal	87.78
	Total	821.30

18.2.9. Undevelopable area

The undevelopable area consists of agriculture, rural settlements, and water bodies. The total land under undevelopable area is 3950.89 Ha which is 30.92% of the total Planning Area (refer to **Table 18.2**). The three land uses do not have any sub-zones.

18.2.10. Primary Activity

Primary activities are related to natural materials and man's natural environment. Under this zone, only Agriculture and Highway Facility Corridor have been proposed (refer to **Table 18-11**). Agriculture – PA is one of the economic activities as well as a source of livelihood in the

planning area. Hence, it is important to preserve agricultural land within the planning area. Almost 32% of the land is being preserved for agricultural purposes in the entire planning area in the Eastern, Western, Northeastern, North-western, and South Eastern outskirts of the Planning area.

Two Highway Facility Corridors of 45 m have been proposed on both sides of the newly proposed bypass road and along one side along Haldwani Road (northern stretch from Dineshpur Chowk) to facilitate Highway facilities as per the IRC Norms.

Table 18-11 Primary Activity

Code	Primary Activity	Area (Ha)
PA	Agriculture	3835.28
HFC	Highway Facility Corridor	73.16
	Total	3,908.44

18.2.11. Protective Zone

The physiography of the Rudrapur Planning area comprises natural water bodies. These bodies are comprised of perennial and non-perennial water bodies. Perennial water bodies include drainage channels and a manmade lake located along the Kalyani drainage channel. Non-perennial bodies include seasonal ponds/low-lying areas which are part of the natural drainage system having great significance in managing discharge from the urbanized area during the rainy season. These bodies need to be protected and should remain in natural form i.e. free from any encroachment by human activities. The GIS-based master plan has helped to identify these bodies with accuracy. These areas have been identified during the physical survey and have been marked in Proposed Land Use. A secondary database (Sajra maps from the Revenue department) of these bodies have also been referred for proper identification of these bodies with the accurate area. The code for protective zones is E with a total land of 82.64 Ha (refer to **Table 18-12**). It is proposed that all the revenue water bodies, along with others shown in the Proposed Land Use map should come under a protective zone, whether these bodies exist or not on the ground. A 10 m green belt has been kept around these water bodies.

Eco sensitive Zone of 100 M wide belt along the Tanda reserve forest has been proposed which is constituting the total area of 92.72 Ha of land.

In addition to that **Vegetation area** on GB Pant University Land has been Proposed, Opposite to SIDCUL which will act as buffer between the Residential area of City of Rudrapur and SIDCUL Industrial area.

Table 18-12 Protective Zone Area

Code	Protective Zone	Area (Ha)
E1	Water Bodies	82.64
E2	Eco-Sensitive Zone	92.72
E3	Vegetation	224.73

Deferred from Notified area: Master Plan also include the area which is deferred from the notified area as per order 626/V-2/21-05/ 2017 dated 17.03.2021, applicants (as per their own interest) may ask for approval of development/construction Maps can be approved though the development authority as per the proposed Master Plan for the deferred area. The Villages falling under this area are Amarpur, Jafarpur, Bagwala, Malsi, Malsi Girdharpur, Khamria, Rameshwarpur, Lohara, Lohari and Gangapur Patia.

Rudrapur Master Plan (2041)

Proposed Land Use (2041)

Legend

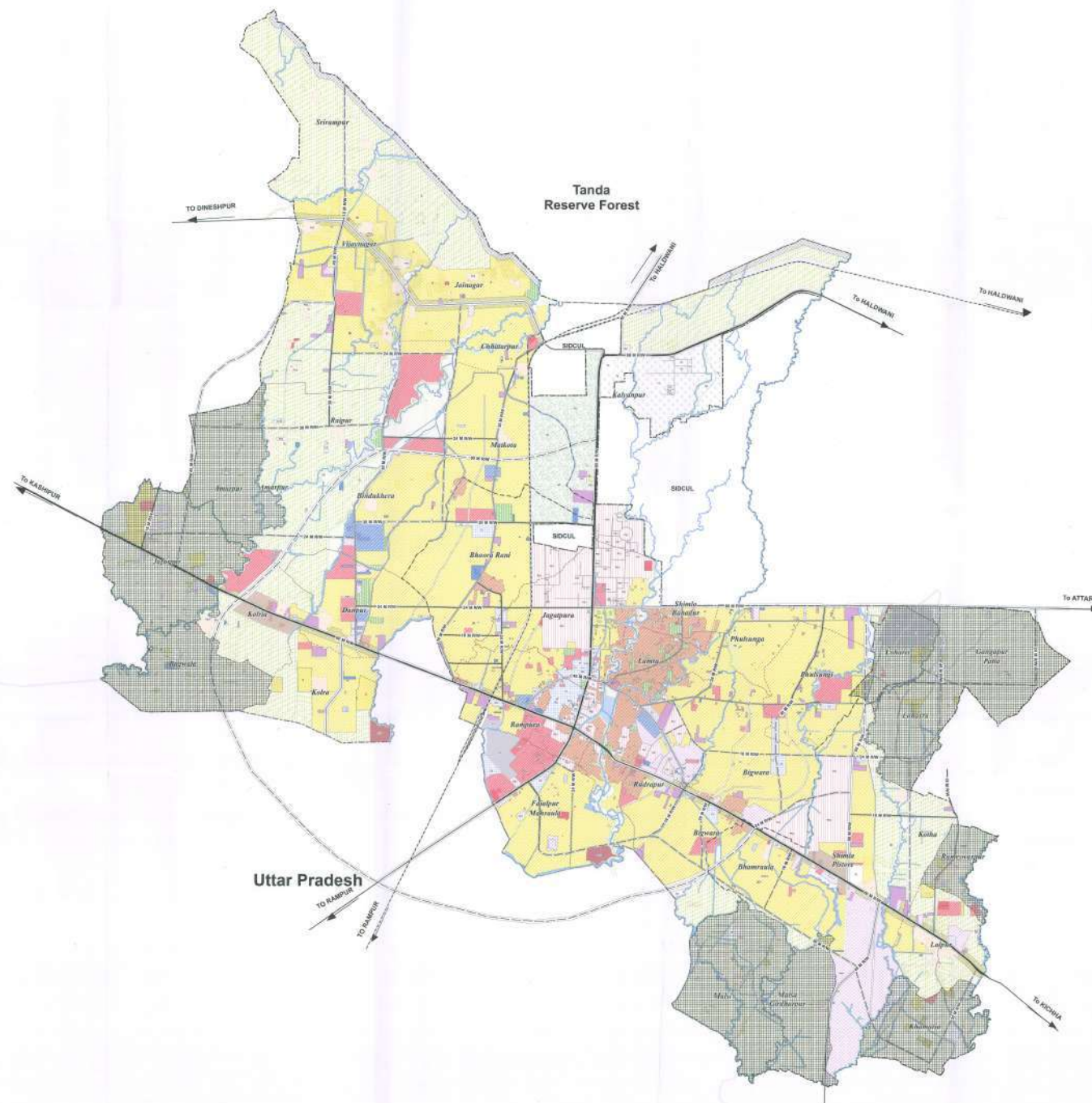
- State Boundary
- Planning Area Boundary
- Municipal Corporation Boundary
- SIDCUL Boundary
- Village Boundary
- NH- National Highway
- SH- State Highway
- Major City Road
- Existing Road
- Proposed Road
- Streams / Drains
- Developable Area
- Residential
 - R1 Builtup Residential (Urban)
 - R2 Rural Settlement
 - R3 Residential Zone
 - R4 Affordable Housing
- Commercial
 - C1 Builtup Commercial
 - C2 Commercial Zone
 - C3 Wholesale Markets / Mandis
 - C4 Warehouse / Godowns
- Mixed Use
 - M1 Residential & Commercial
 - M2 High Rise Building Zone
- Industrial
 - I1 Industrial Zone
- Public & Semi-Public
 - PS1 Govt/Semi Govt/Public Office Zone
 - PS2 Education & Health Zone
 - PS3 Socio-Cultural & Religious Zone
- Utilities and Services
 - CR Crematorium Burial Ground / Grave Yard
 - CSA Electric Sub-Station
 - LSW Land Fill Site
 - STP Sewage Treatment Plant
 - SWTP Solid Waste Treatment Plant
- Recreational
 - P1 Play Ground
 - P2 Multi-Purpose Open Space
 - P3 Horticulture / Botanical Garden
- Green Zone
 - G1 Parks
 - G2 Green Belt
- Transportation
 - T1 Roads
 - T2 Railway Property
 - T3 Bus Stands/ Railway Stations
 - T4 Transport Nagar/ Truck Terminal
- Undevelopable Area
- Primary Activity
 - PA Agriculture
- HFC Highway Facility Corridor
- Protective Zone
 - E Existing / Revenue Water Bodies
 - ESZ Eco-Sensitive Zone
 - VE Vegetation
- Deferred from Notified Area
- Deviated Building / Area from Master Plan - 2031
 - DR Deviated Residential
 - DC Deviated Commercial
 - DI Deviated Industrial
 - DPS Deviated Public/Semi-Public

R.F. = 1:23,000
 500 200 0 500 1,000 1,740 2,320
 NORTH



Town & Country Planning Department
 Government of Uttarakhand

Consultant: M/S Tech Mech International Pvt. Ltd.



19. Zoning Regulation

19.1. Introduction

Zoning regulations are laws of development authorities that dictate the use of land and the construction of buildings/ Premises. In zoning, the land is divided into different zones where different land use patterns are enforced. For developing the zoning regulations for Rudrapur Planning Area the existing situation analysis, URDPFI guidelines and previous master plan 2031 zoning has been considered. The activities listed in “Permitted”, in the following section of different Land Use and its sub-zones are allowed in the particular land use and subzones. The activities listed in “Permitted by board” under each land use and its sub-zones will be permissible under the permission of the Competent Authority after analysing the merits and demerits of activity in any Landuse Zones and its immediate surrounding.

19.2. Objective

The objective of the development/control regulations of Rudrapur Master plan 2041 is to promote and regulate development controls for buildings/activities within use premises following the development policies and land use proposals contained in the Rudrapur Master Plan 2041. These regulation will be effective throughout the Rudrapur Planning Area. To achieve compatibility between the different land uses that are proposed in the plan, a set of broad Zoning Regulations are proposed defining the proximity of such uses with each other, so that adverse externalities do not arise. The various activities/Landuses have been grouped into classes (use zones) and sub-classes (premises use) where they can or cannot be put together in a geographical domain.

19.3. Classification of regulations

The various land use zones mentioned in the Master Plan will be regulated through the zoning regulation by two classes mentioned below.

19.3.1. Permitted activities

These activities are permitted within the particular land use zone. There may be further conditions imposed, like approach road width, minimum plot or maximum plot area for some particular activity (mentioned alongwith the activity).

19.3.2. Permitted by board

Approval of these activities are subject to prior application to the concerned authority. The approval may be provided by the competent authority after satisfactory conclusion of its location and impact to surrounding areas, carrying capacity of the area as well as cost-benefit of that particular project/activities/building/premises.

19.3.3. Prohibited Activities

The activities which can have adverse impact or are of non confirming activity to the defined land use zone are mentioned under this class and activities /landuses which are not listed under permitted and permitted by board category will be treated as prohibited activity and permission for those activities shall not be allowed.

19.3.4. Issue resolution

Permission for any activity or use by the applicant under the zoning regulations may not be obtained as a right.

19.4. Impact Fee:

If a land use category is allowed which is relatively more active urban use under the "permitted and permitted by board" category of the zoning regulation, these activities will likely result in attracting more traffic, stress on infrastructure and comparatively have more environmental impact in the immediate surrounding area. Therefore, in such cases "Impact Fee" will be applicable. It is to clarified that, only Impact Fee will be payable for permitted activities /uses based on the zoning regulation. Impact fee will be decided by the board of development authority but, it should not be less than the land use conversion fees (as applicable zone wise).

1. Impact fee will not be payable under the following circumstances -
 - Permitted activities/ uses in the built up area.
 - Public facilities developed by government and semi-government agencies
 - Public / semi-public recreational activities.
2. Impact Fee will be applicable on the regularization/approval of Land Uses for Deviated Land Uses from Master Plan- 2031, i.e., Deviated Residential (DR), Deviated Commercial (DC), Deviated Industries (DI), Deviated Public/Semi-public(DSP) under the category of unauthorised development which is defined in 'The Uttarakhand (The Uttar Pradesh Special Area Development Authority Act, 1986) Adaptation and Modification

Order, 2006 (Amendment) Act, 2008' and Uttarakhand (Uttar Pradesh) Revenue Code, 2006.

19.5. Other requirements

1. Permission for any activity or use by the applicant under the zoning regulations may not be obtained as a right.
2. Such activity/use whose change of land use has been done already by Government of Uttarakhand or layout has been approved by District Development Authority/Competent Authority, is deviation from land use allocated in the present Master plan, the changed Land use/approved layout will be considered valid.
3. Construction of all Activities listed in the zoning regulation will be permitted as per prevalent building bylaws.
4. To preserve natural water body/stream and forest, provision of built green belt will be there as per applicable rule. These green belt may be use, as per requirement, for tree plantation/open space/development of parks etc.

Sl. No.	Preserved Area	Buffer (mtr.)
1	Main River (Distance from river bank/highest water level, whichever is higher)	30
2	Other river/Nalah	10
3	Natural waterbody and stream	15

5. To maintain the building line along main road, a setback as per mention below/as per building by-laws (whichever is higher) will be applicable:

Sl. No.	ROW of Road	Building Line (Mtr.)
1	60	8
2	45	7
3	30	6
4	24	5
5	18	4
6	12	3

6. If existing ROW of any road under the category of NH, SH or comes under PWD, is more than proposed ROW in the Master Plan, the existing ROW will be considered.

7. If any activity has been rewritten in all categories of zonal regulation or having a conflicting situation arises, in such cases matter shall be settled on merit basis through the Authority
8. No change of Land Use will be allowed in the following landuses –
 - a. Affordable housing
 - b. All categories under public utilities like fire station, cremation and burial ground, water treatment plant, sewage treatment plant etc.
 - c. All categories under Green zone /Orchards
 - d. Waterbodies
 - e. All Categories under protective zone
9. Individual Houses will be permitted as per zoning regulations (listed in permitted by board Category) subject to the condition that applicant must have land registry before the date of notification of this master plan.
10. Such activities in Master Plan which is not defined than the concent report of chief town and country planner will be treated as final decision.

19.6. General Conditions for Public Utilities and Services

1. No other activities will be allowed in the area earmarked for STP, WTP, CETP, graveyards, SWTP, etc.
2. Activities like STP, CETP, graveyards, SWTP, etc. shall be permitted only on earmarked areas in the master plan.
3. Activities like Water Treatment Plant, Water Pumping stations, Ground Level reservoirs, Electric Power Plant, Electric Sub-Station, Rain Water Harvesting systems, Effluent Treatment Plant, and OHTs are permitted in all the land use categories.

19.7. Board Land Use Classification

The proposed land use plan incorporated in the Rudrapur Master Plan, 2041 notified area depicts the following land use class and sub-class (refer to **Table 19-1**).

Table 19-1: Classification of Proposed Land Use in Rudrapur Master Plan, 2041

Sr. No.	Class	Sub-Class	Code
1	Residential	Built up Residential	R1
		Rural Settlement	R2
		Residential Zone	R3
		Affordable Housing	R4

Sr. No.	Class	Sub-Class	Code
2	Commercial	Built up Commercial	C 1
		Commercial Zone	C 2
		Wholesale Markets/ Mandis	C 3
		Warehouse/Godown	C 4
3	Mixed	Residential and Commercial	M 1
		High Rise Building Zone	M 2
4	Industry	Industry	I
5	Public and Semi-Public	Govt./ Semi Govt./ Public Office Use Zone	PS 1
		Educational and Health Zone	PS 2
		Socio-cultural and Religious Zone	PS 3
6	Utilities and Services	Cremation and Burial Ground/Graveyard	CR
		Electric Sub-station	ESS
		Sewage Treatment Plant	STP
		Solid Waste Treatment Plant	SWTP
		Landfill Site	SWM
7	Recreational	Play Ground	P 1
		Multipurpose Open/Green Spaces	P 2
	Green	Parks	G 1
		Green Belt Along Natural Drain	G 2
8	Traffic and Transportation	Roads	T1
		Railway Property	T2
		Bus Stand/Railway Station	T3
		Transport Nagar / Truck Terminal	T4
9	Primary Activity	Agriculture	PA
		Highway Facility Corridor	HFC
10	Protective Use Zone	Water Bodies	E1
		Vegetation	E2
		Eco-Sensitive Zone	E3
11		Outside Regulated Area	OC
12	Deviated Land Use	Deviated Residential	DR
		Deviated Commercial	DC
		Deviated Industries	DI
		Deviated Public and Semi-public	DSP

Residential

R1: Built up Residential

Permitted Activities

In this Landuse Maximum Building Height permitted will be G+2 based on the aligned road width mentioned in the building Bye Laws Uttarakhand clause 7.1. (ii).

1. Individual House
2. Government Housing Scheme (Only for slum redevelopment/improvement schemes)
3. Government Quarter
4. Renovation and Modification of Existing/ Sanctioned Hostel
5. Retail Shop
6. Daily Need shops
7. Private Office (The plot area must not be larger than 45 sq.m.)
8. Service Industry (As per Zoning Annex –III)
9. Cottage and Household Industry (Maximum Plot area 200 sq m only)
10. Existing/ Sanctioned School
11. Anganwari Centre
12. Clinic / Dispensary (Maximum Plot area 45 sq m only)
13. Veterinary Dispensary / Hospital for pets only
14. Government Offices (It must be on minimum 18m wide approach road only)
15. Bank/ATM
16. Police Station / Police Post
17. Public Library
18. Creche / Day Care / Kindergarden
19. Public Toilet
20. Religious Building
21. Milk Collection Centre (Minimum 18m wide approach road)

Permitted by Board

1. Hospitals/Nursing Home/ Diagnostic Centre/Other Medical Units (Maximum Plot area (750 sq M) (Impact fee applicable)

2. Community Hall (on 18 M wide approach/ Master Plan Road) -
3. Multi-Storey Parking (Minimum 18m wide approach road)
4. Orphanage / Old Age Home/Home for Handicapped Children (It must be on minimum 18m wide road)
5. Sports Centre/Complex
6. Gymnasium
7. Club House with Swimming Pool (**Impact fee applicable**)
8. Government Night Shelter
9. Bus Stop
10. Taxi / Auto Stand (Applicable on a minimum 18m wide approach road)
11. Parking Space / Area
12. Electric Vehicle Charging Dairy Booth
13. All Government/semi government Institutions/ Activities which contribute to public welfare, and does not have any adverse affect on its immediate surrounding, will be allowed through the concent report of Competent officer.
14. All the terms and conditions will be applicable along with the activities/land uses during the renewal/freehold lease of State Nazul Land (if applicable).

R2: Rural Settlements

In this Landuse Maximum Building Height permitted will be G+1 based on the aligned road width mentioned in the building Bye Laws Uttrakhand clause 7.1. (ii).

Permitted Activities

Permitted Activities

1. Individual House
2. Daily Need shop
3. Private Office (The plot area must not be larger than 45 sq.m.)
4. Cottage and Household (Maximum plot area 200 sq m)
5. Anganwari Centre
6. Clinic / Dispensary
7. Milk Collection Centre (Minimum 18m wide road)

Permitted by Board

1. School (Minimum 12m wide approach roads)
2. Bus Stop
3. Taxi / Auto Stand (Applicable on a minimum 18m wide approach road)
4. Electric Vehicle Charging Station
5. All Government/semi government Institutions/ Activities which contribute to public welfare, and does not have any adverse affect on its immediate surrounding, will be allowed through the concent report of Competent officer.

R3: Residential Zone

Permitted Activities

1. Individual House
2. Sub Division Residential Layouts
3. Group Housing (Apartment / Flatted Housing)
4. Residential Township
5. Government Housing Scheme
6. Retail Shop
7. Private Office (The plot area must not be larger than 45 sq.m.)
8. Hostel (Maximum area 1000 sqm)
9. Service Industry (As per Zoning annexure III)
10. Cottage and household Industry (Maxumum area 200 sq m)
11. Anganwari Centre
12. School (Minimum 12m wide approach roads only)
13. Clinic/ Dispensary (maximum plot area 45 sq.m. only)
14. Veternary Dispensary / Hospital for Pets only
15. Government Offices (It must be on minimum 18m wide approach road only)
16. Government Quarter
17. Bank / ATM
18. Police Station / Police Post
19. Guesthouse (It must be on a minimum of 18m wide approach road only)
20. Art Gallery

21. Public Library
22. Creche / Day Care / Kindergarden
23. Public Toilet
24. Orphanage / Old Age Home/Home for Handicapped Children
25. Fire Station (Minimum 24m wide approach roads)
26. Religious Building
27. Playground
28. Recreational Club (Minimum 18m wide approach road)
29. Sports Centre/Complex (ROW – Minimum 24 m wide road)
30. Gymnasium **Impact fee applicable**
31. Swimming Pool
32. Milk Collection Centre (Minimum 18m wide road)

Permitted by Board

1. Shopping Mall (On minimum 24 m wide road and outside municipal limit only. The maximum ground coverage area of 35%) **Impact fee applicable**
2. Multiplex / Cinema (On minimum 24 m wide road and outside municipal limit. The maximum ground coverage area of 35%) **Impact fee applicable**
3. Petrol Pump / LPG filling station (It must be on a minimum of 24m wide approach road only. Applicant must obtain NOC for fire safety from the fire department) **Impact fee applicable**
4. College (Minimum 24m wide approach roads and Minimum area 1 acre)
5. Indoor / Outdoor Stadium (Must be within 12m and 18m wide approach roads only)
6. Multi-Storey Parking (Minimum 18m wide approach road)
7. Hotel /Lodge / Restaurant (On minimum 18m wide approach road and area greater than 1000 sq m only) **Impact fee applicable**
8. Hostel (area greater than 1000 sq m only)
9. Hospital and Nursing Home (It must be on a minimum of 18m wide approach road only) **(Impact fee applicable for Private Facility)**
10. Dharmashala (Minimum 18 M wide Road)
11. Diagnostic Centre/Other Medical Units
12. Community Hal . (It must be on minimum 18m wide road)

13. Bus Stop
14. Taxi / Auto Stand (Applicable on a minimum 18m wide approach road)
15. Parking Space / Area
16. Electric Vehicle Charging Station Dairy Booth
17. Golf Course / Race Course
18. Hotel /Lodge / Restaurant/Tourist unit as defined in building bylaws (On minimum 18m wide approach road and Maximum area 1000 sq m only) **Impact fee applicable**
19. All Government/semi government Institutions/ Activities which contribute to public welfare, and does not have any adverse affect on its immediate surrounding, will be allowed through the concent report of Competent officer.
20. All the terms and conditions will be applicable along with the activities/land uses during the renewal/freehold lease of State Nazul Land (if applicable).

R4: Affordable Housing

In this Landuse Maximum Building Height permitted will be G+3 based on the aligned road width mentioned in the building Bye Laws Utrakhand clause 7.1. (ii).

Permitted Activities

1. Affordable Housing Projects under Housing policy
2. Government Housing Scheme
3. Retail Shop
4. Primary School (Minimum 12m wide approach roads only)
5. Anganwari Centre
6. Clinic / Dispensary
7. Bank / ATM
8. Police Station / Police Post
9. Public Library
10. Creche / Day Care / Kindergarden
11. Public Toilet / Community Toilet
12. Religious Building
13. Playground
14. Dairy Booth

Permitted by Board

1. Individual House
2. Multi-Storey Parking (Minimum 18m wide approach road)
3. Bus Stop
4. Taxi / Auto Stand (Applicable on a minimum 18m wide approach road)
5. Parking Space / Area
6. Electric Vehicle Charging Station
7. All Government/semi government Institutions/ Activities which contribute to public welfare, and does not have any adverse affect on its immediate surrounding, will be allowed through the concent report of Competent officer.
8. All the terms and conditions will be applicable along with the activities/land uses during the renewal/freehold lease of State Nazul Land (if applicable).

Commercial

C1: Built up Commercial

In this Landuse Maximum Building Height permitted will be G+2 based on the aligned road width mentioned in the building Bye Laws Utrakhand clause 7.1. (ii).

Permitted Activities

1. Retail Shop
2. Private Office
3. Service Industry As per Zoning Aneexure III
4. Cottage and Household Industry (Maximum Plot area 200 sq m only)
5. Veterinary Dispensary / Hospital for pets only
6. Bank / ATM
7. Police Station / Police Post
8. Public Library
9. Public Toilet / Community Toilet
10. Religious Building
11. Gymnasium
12. Indoor Stadium

13. Bus Stop (Applicable on a minimum 18m wide approach road.)
14. Taxi / Auto Stand (Applicable on a minimum 18m wide approach road.)
15. Parking Space / Area
16. Electric Vehicle Charging Station
17. Dairy Booth

Permitted By Board

1. Hospital and Nursing Home (It must be on a minimum of 18m wide approach road only)
2. Diagnostic Centre/Other Medical Units
3. Swimming Pool
4. Hotel/ Lodge/ Restaurant/ Tourist unit as defined in building bylaws
5. Recreational Club (Minimum 18m wide approach road)
6. All Government/semi government Institutions/ Activities which contribute to public welfare, and does not have any adverse affect on its immediate surrounding, will be allowed through the concent report of Competent officer.
7. All the terms and conditions will be applicable along with the activities/land uses during the renewal/freehold lease of State Nazul Land (if applicable).

C2: Commercial Zone

Permitted Activities

1. Retail Shop (As per Zoning Annexure I)
2. Daily need Shops
3. Wholesale (Maximum area 500 sq M)
4. Private Office
5. Shopping Mall
6. Multiplex Cinema
7. Service industry (As per Zoning Annexure III)
8. Clinic / Dispensary (maximum plot area 45 sq.m. only)
9. Primary / Community Health Centre (Govt. only)
10. Veterinary Dispensary / Hospital for pets only
11. Government Offices (It must be on minimum 18m wide approach road)
12. Bank / ATM

13. Police Station / Police Post
14. Guesthouse
15. Auditorium / Convention Centre
16. Art Gallery
17. Public Library
18. Public Toilet
19. Dharmashala
20. Religious Building
21. Recreational Club
22. Gymnasium
23. Dairy Booth

Permitted By Board

1. Hotel /Lodge / Restaurant/ Tourist unit as defined in building bylaws (Maximum Plot area 1000 sqm)
2. Hostel (Maximum Plot area 1000 sqm)
3. Petrol Pump / LPG filling station (It must be on a minimum of 24m wide approach road only. Applicant must obtain NOC for fire safety from the fire department)
4. Apartment / Flatted Housing (For studio apartments only)
5. Individual House (Only applicable to plot $\leq 90 \text{ m}^2$)
6. Hospital and Nursing Homes (It must be on a minimum of 18m wide approach road only)
7. Diagnostic Centre/Other Medical Units
8. Multi-Storey Parking
9. Fire Station (Minimum 24m wide approach roads.)
- 10. Function Hall / Marriage Garden / Banquet Halls (Impact fee applicable)**
11. Bus Stop (Applicable on a minimum 18m wide approach road.)
12. Taxi / Auto Stand (Applicable on a minimum 18m wide approach road.)
13. Electric Vehicle Charging Station
14. Parking Space / Area
15. All Government/semi government Institutions/ Activities which contribute to public welfare, and does not have any adverse affect on its immediate surrounding, will be allowed through the concent report of Competent officer.

16. All the terms and conditions will be applicable along with the activities/land uses during the renewal/freehold lease of State Nazul Land (if applicable).

C3: Wholesale Markets/ Mandis

Permitted Activities

1. Wholesale
2. Private Office (Maximum Area 45 sq m)
3. Clinic / Dispensary (maximum plot area 45 sq.m. only)
4. Bank / ATM
5. Police Station / Police Post
6. Public Toilet
7. Religious Building
8. Bus Stop (Applicable on a minimum 18m wide Master Plan/Existing road)
9. Taxi / Auto Stand(Applicable on a minimum 18m wide approach road)
10. Parking Space / Area
11. Dairy Booth

Permitted By Board

1. Warehouse (It must be on a minimum of 30m wide approach road only. Applicant must obtain NOC for fire safety from the fire department)
2. Storage Godown (It must be on a minimum of 30m wide approach road only. Applicant must obtain NOC for fire safety from the fire department)
3. Cold Storage (It must be on a minimum of 30m wide approach road only. Applicant must obtain NOC for fire safety from the fire department)
4. LPG Godown (Applicant must obtain NOC for fire safety from the fire department)
5. Petrol Pump / LPG filling station (It must be on a minimum of 30m wide approach road only. Applicant must obtain NOC for fire safety from the fire department.)
6. Retail Shop
7. Fire Station(Minimum 24m wide approach roads)
8. Multi-Storey Parking
9. Electric Vehicle Charging Station

10. All Government/semi government Institutions/ Activities which contribute to public welfare, and does not have any adverse affect on its immediate surrounding, will be allowed through the concent report of Competent officer.
11. All the terms and conditions will be applicable along with the activities/land uses during the renewal/freehold lease of State Nazul Land (if applicable).

C4: Warehouse/Godown

Permitted Activities

1. Storage Godown
2. Warehouse
3. Cold Storage
4. Retail Shop
5. Clinic / / Dispensary (maximum plot area 45 sq.m. only)
6. Bank / ATM
7. Police Station / Police Post
8. Public Toilet
9. Religious Building
10. Bus Stop(Applicable on a minimum 18m wide approach road)
11. Weight Bridge
12. Dairy Booth

Permitted By Board

1. Fire Station (Minimum 24m wide approach roads)
2. Petrol Pump / LPG filling station (It must be on a minimum of 45m wide approach road only. Applicant must obtain NOC for fire safety from the fire department)
3. LPG Godown (Applicant must obtain NOC for fire safety from the fire department)
4. Any Storage Godown/ warehouses for Perishable and Hazardouds material
5. Taxi / Auto Stand (Applicable on a minimum 18m wide approach road)
6. Parking Space / Area
7. Electric Vehicle Charging Station

8. All Government/semi government Institutions/ Activities which contribute to public welfare, and does not have any adverse affect on its immediate surrounding, will be allowed through the concent report of Competent officer.
9. All the terms and conditions will be applicable along with the activities/land uses during the renewal/freehold lease of State Nazul Land (if applicable).

Mixed

M1: Residential and Commercial

Permitted Activities

All activities listed in permitted category of **Residential Zone (R3)** and **commercial Zone (C2)**

Permitted By Board

All activities listed in permitted by board category of **Residential Zone (R3)** and **Commercial Zone (C2)**

Conditions for Other Permitted activities for Mixed Land use

- Plots that are abutting to Kashipur – Kichha road and Dineshpur Road may avail benefits as mixed-use, any other plots which are not accessible directly from the main Kashipur – Kichha road and Dineshpur Road will be treated the same as adjoining land use behind the mixed land use.
- If more than 50% of the plot area is falling under mixed use, will be treated as mixed land use with the satisfactory concent report given by the Town and Country Planning Department.

M2: High Rise Building Zone

Permitted Activities

All activities listed in permitted category of **Residential Zone (R3)** and **commercial Zone (C2)** but in vertical Mix Only

Permitted By Board

All activities listed in permitted by board category of **Residential Zone (R3)** and **Commercial Zone (C2)** but in vertical Mix Only. In addition to that Board can decide the vertical mixing following activities with the consent of Chief Town and Country Planner.

- Residential / Commercial – Multi-story buildings with residential units above and commercial units on the ground floor facing the street
- Urban Residential / Commercial – multi-story residential buildings with commercial and civic uses on the ground floor
- Office Convenience – office buildings with small retail and service uses oriented to the office workers.
- Office / Residential – multi-family residential units within office building(s).
- Shopping mall conversion – residential and/or office units added (adjacent) to an existing standalone shopping mall.
- Retail District Retrofit – retrofitting of a suburban retail area to a more village-like appearance and mix of uses
- Live / Work – residents can operate small businesses on the ground floor of the building where they live
- Studio / Light industrial – residents may operate studios or small workshops in the building where they live
- Hotel/ Residence – mix hotel space and high-end multi-family residential
- Parking structure with ground-floor retail
- Single-family detached home district with standalone shopping center

I: Industry

Permitted Activities

1. Manufacturing (It must be on minimum 18m wide approach road. Applicant must obtain NOC from SPCB for pollution)
2. Service Industry
3. Chemical (It must be on minimum 18m wide approach road. Applicant must obtain NOC from SPCB for pollution)
4. Pharmaceutical (It must be on minimum 18m wide approach road. Applicant must obtain NOC from SPCB for pollution)

5. Textile (It must be on minimum 18m wide approach road. Applicant must obtain NOC from SPCB for pollution)
6. Agro based & Food Processing
7. Obnoxious (It must be on minimum 18m wide approach road. Applicant must obtain NOC from SPCB for pollution)
8. Cottage and Household
9. Individual House(Only applicable to plot $\leq 90 \text{ m}^2$)
10. Retail Shop
11. Clinic /Dispensary (maximum plot area 45 sq.m. only)
12. Bank / ATM
13. Police Station / Police Post
14. Public Toilet /
15. Religious Building
16. Fire Station (Minimum 24m wide approach roads)

Permitted By Board

1. Warehouse (It must be a minimum of 30 m wide road)
2. Storage Godown (It must be a minimum of 30 m wide road)
3. Cold Storage ((It must be a minimum of 30 m wide road)
4. Petrol Pump / LPG filling station (It must be on a minimum of 30m wide approach road only. Applicant must obtain NOC for fire safety from the fire department)
5. Bus Stop
6. Taxi / Auto Stand
7. Parking Space / Area
8. Multi-Storey Parking
9. Electric Vehicle Charging Station
10. Weight Bridge
11. Dairy Booth
12. All Government/semi government Institutions/ Activities which contribute to public welfare, and does not have any adverse affect on its immediate surrounding, will be allowed through the concent report of Competent officer.

13. All the terms and conditions will be applicable along with the activities/land uses during the renewal/freehold lease of State Nazul Land (if applicable).

Public and Semi-Public

PS1: Govt./ Semi Govt./ Public Office Use Zone

Permitted Activities

1. Government Offices
2. Government Quarter
3. Bank / ATM
4. Police Station / Police Post
5. Auditorium / Convention Centre
6. Art Gallery
7. Public Library
8. Public Toilet /
9. Fire Station (Minimum 24m wide approach roads)
10. Religious Building
11. Retail Shop
12. Private Office (The plot area must not be larger than 45 sq.m.)
13. Playground
14. Swimming Pool
15. Indoor / Outdoor Stadium
16. Dairy Booth
17. Police lines

Permitted by Board

1. Bus Stop
2. Taxi / Auto Stand
3. Parking Space / Area
4. Multi-Storey Parking
5. Electric Vehicle Charging Station
6. Government Housing Scheme

7. All Government/semi government Institutions/ Activities which contribute to public welfare, and does not have any adverse affect on its immediate surrounding, will be allowed through the concent report of Competent officer
8. All the terms and conditions will be applicable along with the activities/land uses during the renewal/freehold lease of State Nazul Land (if applicable).

PS2: Educational and Health Zone

Permitted Activities

1. School
2. College
3. University
4. Research and Development Centre
5. Vocational Institute / Training Institute / Research Centre
6. Anganwari Centre
7. Hospital and Nursing Home
8. Diagnostic Centre/Other Medical Units
9. Clinic / Dispensary
10. Primary / Community Health Centre (Govt. only)
11. Bank / ATM
12. Police Station / Police Post
13. Auditorium / Convention Centre
14. Art Gallery
15. Public Library
16. Creche / Day Care / Kindergarden
17. Public Toilet
18. Playground
19. Sports Centre/Complex
20. Indoor / Outdoor Stadium
21. Dairy Booth

Permitted by Board

1. Orphanage / Old Age Home/Home for Handicapped Children

2. Retail Shop
3. Private Office (The plot area must not be larger than 45 sq.m.)
4. Government Offices
5. Government Quarter
6. Fire Station (Minimum 24m wide approach roads)
7. Religious Building
8. Bus Stop
9. Taxi / Auto Stand
10. Parking Space / Area
11. Multi-Storey Parking
12. Electric Vehicle Charging Station
13. All Government/semi government Institutions/ Activities which contribute to public welfare, and does not have any adverse affect on its immediate surrounding, will be allowed through the concent report of Competent officer.
14. All the terms and conditions will be applicable along with the activities/land uses during the renewal/freehold lease of State Nazul Land (if applicable).

PS3: Socio-cultural and Religious Zone

Permitted Activities

1. Community Hall (It must be on minimum 18m wide road)
2. Art Gallery
3. Public Library
4. Public Toilet
5. Orphanage / Old Age Home/Home for Handicapped Children
6. Dharmashala / Night Shelter
7. Bank / ATM
8. Police Station / Police Post
9. Fire Station (Minimum 24m wide approach roads)
10. Religious Building
11. Retail Shop
12. Playground

13. Dairy Booth

Permitted by Board

1. Crematorium Burial Ground / Grave Yard / Incinerator
2. Sports Centre/Complex
3. Indoor / Outdoor Stadium
4. Bus Stop
5. Taxi / Auto Stand
6. Parking Space / Area
7. Multi-Storey Parking
8. Electric Vehicle Charging Station
9. All Government/semi government Institutions/ Activities which contribute to public welfare, and does not have any adverse affect on its immediate surrounding, will be allowed through the concent report of Competent officer.
10. All the terms and conditions will be applicable along with the activities/land uses during the renewal/freehold lease of State Nazul Land (if applicable).

Recreational

P1: Play Ground

Permitted Activities

1. Playground
2. Public Toilet
3. Park
4. Outdoor gym

Permitted by Board

1. Mela ground
2. All Government/semi government Institutions/ Activities which contribute to public welfare, and does not have any adverse affect on its immediate surrounding, will be allowed through the concent report of Competent officer.
3. All the terms and conditions will be applicable along with the activities/land uses during the renewal/freehold lease of State Nazul Land (if applicable).

P2: Multipurpose Open Spaces

Permitted Activities

1. Playground
2. Shooting range
3. Open air theatre
4. Multipurpose recreational park/special recreational and educational park
5. Temporary use (trade fair/circus/exhibition place)
6. Rescue Pockets during any Hazard or disaster occurrence

Permitted by Board

1. Police post/fire post/structure related to utility services
2. Public Toilet
3. Bus Stop
4. Taxi / Auto Stand
5. Parking Space / Area
6. Electric Vehicle Charging Station
7. All Government/semi government Institutions/ Activities which contribute to public welfare, and does not have any adverse affect on its immediate surrounding, will be allowed through the concent report of Competent officer.
8. All the terms and conditions will be applicable along with the activities/land uses during the renewal/freehold lease of State Nazul Land (if applicable).

P3: Horticulture/Botanical Garden

Permitted Activities

1. Horticulture Gardens
2. Botanical Garden
3. Playground
4. Shooting Range

Permitted by Board

1. Sports Centre/Complex
2. Swimming Pool

3. Golf Course / Race Course
4. Zoo
5. Associated Research and Development Centre
6. Public Toilet / Community Toilet
7. Bus Stop
8. All Government/semi government Institutions/ Activities which contribute to public welfare, and does not have any adverse affect on its immediate surrounding, will be allowed through the concent report of Competent officer.
9. All the terms and conditions will be applicable along with the activities/land uses during the renewal/freehold lease of State Nazul Land (if applicable).

Green Zone

G1: Parks

Permitted Activities

1. Park
2. Outdoor Gymnasim
3. Botanical Garden
4. Picnic spot
5. Open air theater

Permitted by Board

1. Water park
2. Amusement Park
3. Theme park
4. Golf course
5. Public Toilet
6. Parking
7. Structure associated to utility services

G2: Green Belt Along Natural Drain

Permitted Activities

1. Park
2. Garden
3. Plantation
4. Afforestation
5. Nursery
6. Picnic spot

Permitted by Board

1. Public Toilet
2. Structure associated to utilities

Traffic and Transportation

T1: Roads

Permitted Activities

1. Bus Stop

Permitted By Board

1. Street vending Zone
2. Parking Space / Area
3. Public Toilet

T3: Bus Stand

Permitted Activities

1. Bus Parking / Bus Bays
2. Bus Stop
3. Parking Space
4. Electric Vehicle Charging Station
5. Public Toilet

Permitted by Board

1. Bus Depot/ Workshop
2. Auto/ Taxi Stand
3. Retail Shop
4. ATM
5. Dairy Booth
6. PPP Mode Bus Terminal with Mix of Commercial and Terminal facilities

T4: Transport Nagar / Truck Terminal

Permitted Activities

1. Booking offices
2. Loading/ Unloading Spaces
3. Weight Bridge
4. Parking Space / Area
5. Electric Vehicle Charging Station

Permitted by Board

1. Warehouse (It must be a minimum of 30 m wide road)
2. Storage Godown (It must be a minimum of 30 m wide road)
3. Cold Storage ((It must be a minimum of 30 m wide road)
4. Petrol Pump / LPG filling station (It must be on a minimum of 30m wide approach road only. Applicant must obtain NOC for fire safety from the fire department)
5. Retail Shop
6. Bus Stop
7. Taxi / Auto Stand
8. Dairy Booth
9. All Government/semi government Institutions/ Activities which contribute to public welfare, and does not have any adverse affect on its immediate surrounding, will be allowed through the concent report of Competent officer
10. All the terms and conditions will be applicable along with the activities/land uses during the renewal/freehold lease of State Nazul Land (if applicable).

Primary Activity

PA: Agriculture

Permitted Activities

1. Nursery
2. Dairy Booth
3. Milk Collection Centre
4. Biogas Plant
5. Scrap yard
6. Public Toilet
7. Parking Space / Area
8. Dairy farm / Gaushala
9. Poultry farm
10. Private Garage
11. Weight Bridge (Minimum 30m wide road)
12. Cottage and Household industry
13. Animal Husbandary

Permitted by Board

1. Shopping Mall (Minimum 45m wide road and outside of municipal limit only) **(Impact Fee Applicable)**
2. Multiplex / Cinema (Minimum 45m wide road and outside of municipal limit only) **(Impact Fee Applicable)**
3. Function Hall / Marriage Garden / Banquet Halls (Minimum 30m wide road and outside of municipal limit only) **(Impact Fee Applicable)**
4. Storage Godown for Agriculture Products only
5. Petrol Pump / LPG filling station (45 M Wide Road)
6. LPG Godown
7. School (Minimum 12m wide approach roads)
8. College (on 30 M wide Road)
9. Research and Development Centre (on 30 M wide Road)
10. Vocational Institute / Training Institute / Research Centre (on 30 M wide Road)

11. Anganwari Centre
12. Clinic / Dispensary (maximum plot area 45 sq.m. only)
13. Primary / Community Health Centre (Govt. only)
14. Veterinary Dispensary / Hospital for Catttles Only
15. Police Station / Police Post
16. Crematorium Burial Ground / Grave Yard / Incinerator
17. Orphanage / Old Age Home/Home for Handicapped Children
18. Fire Station (24 M wide Road)
19. Religious Building
20. Sports Centre/Complex (24 M wide Road)
21. Swimming Pool
22. Golf Course / Race Course
23. Brick kiln as per NGT Norms
24. Individual House/Farm House (maximum 250 sq.m./35%ground coverage whichever is larger)
25. Slaughter House (The competent authority must verify that it is not affecting the existing surrounding areas/ proposed areas)
26. Amusement Park (Minimum 30m wide road) (Imapct Fee Applicable)
27. Shooting Range (Minimum 30m wide road)
28. Bus Stop
29. Taxi / Auto Stand
30. Hospital (Hospitals for mentally restarted patients and infectious diseases)
31. Diagnostic Centre/Other Medical Units (Hospitals for mentally restarted patients and infectious diseases)
32. Electric Vehicle Charging Station
33. Mining (RBM), stone crusher (Imapct Fee Applicable)
34. Zoo/zoological park/botanical garden
35. Jail
36. Reformatory house

37. All Government/semi government Institutions/ Activities which contribute to public welfare, and does not have any adverse affect on its immediate surrounding, will be allowed through the concent report of Competent officer.
38. All the terms and conditions will be applicable along with the activities/land uses during the renewal/freehold lease of State Nazul Land (if applicable).

HFC: Highway Facility Corridor

Permitted Activities

1. Petrol Pump / LPG filling station (It must be on a minimum of 45m wide approach road only. Applicant must obtain NOC for fire safety from the fire department.)
2. Public Toilet
3. Bus Stop
4. Taxi / Auto Stand
5. Parking Space / Area
6. Nursery
7. Dairy Booth
8. Milk Collection Centre
9. LPG Godown (It must be on a minimum of 45m wide approach road only. Applicant must obtain NOC for fire safety from the fire department.)
10. Park
11. Weight Bridge

Permitted By Board

1. Retail Shop
2. Individual House (Only applicable to plot $\leq 90 \text{ m}^2$)
3. Function Hall / Marriage Garden / Banquet Halls (Minimum 30m wide road and outside of municipal limit only) **(Imapct Fee Applicable)**
4. Dhabas/ Resaturant
5. Electric Vehicle Charging Station
6. All Government/semi government Institutions/ Activities which contribute to public welfare, and does not have any adverse affect on its immediate surrounding, will be allowed through the concent report of Competent officer.

Protected Areas

E1: Water Bodies

All the water Bodies, On Ground Existing on ground/ as per revenue records will be treated as water bodies, Green belt will be applicable as per the clause 4.4 (iii) mentioned in building bye laws

E2: Vegetation

Permitted Activities

1. High density Plantation
2. Nursery
3. Playground
4. Sports Centre/Complex
5. Swimming Pool
6. Indoor / Outdoor Stadium
7. Golf Course / Race Course
8. Shooting Range
9. Zoo

Permitted by Board

1. Public Toilet
2. Structure associated to utilities

E3: Eco – sensitive Zone

No new Construction (other than Existing) is allowed from the 100 metre from the boundary of Tanda reserve Forest and will be treated as Eco- sensitive Zone.

A. Category-wise Details of Buildings Permitted

Retail	General Business	Service Industry	HH Industry
• Retail Stores (Kirana & Muniyari Store, Bread, Vegetables, Fruits, Soft Drinks, Canned Juices, Dairy Booth) • Sweets Shop without Restaurant Facility • Stationary / Book/ magazine/newspaper Store	• Financial Institution • Photostat / Printing Shop • Cyber Café • Tent House / Decoration Shop • Coaching / Tuition	• Bakeries & Confectionaries • Junk Yards • Printing Press • Ice Factory • Automobile servicing, repairing	• Atta Chakki (Flour Mill) • Small Scale Spices Industry • Dairying • Cottage • Book Binding

Retail	General Business	Service Industry	HH Industry
• Medical Clinics / Pet Clinics / Medical Stores • Utensil Shop • Mobile Repair Shop • Cloth-Iron / Dry-Clean Shop • Clock/Spectacle Shop/repair • Shop for fruit juice • Typing/photostate/cyber cafee • Shop for sports equipments • Telephone booth/PCO • Readymade garments • Beauty paulor • Cosmetics • Hear drying • Tailoring and butic • Kadai and painting • Cable TV operator • Plumber shop • Electrical equipments • Hardware • Cycle repairing/servicing • Shop for daily needs • Production of milk products including Ghee/Butter • Printing press/book binding • Jewellery shop • Shop for shoe • Blacksmith • Workshop for sign board • Photo framing • Photo framing • Cobbler • Electrician • Bakery • Atta Mill (upto 10 HP) • Furniture • Private Office The conditions to satisfy the above criteria is to the total shop area will not be more than 20 m². and a maximum number of workers will be 2 including the owner/manager of the shop.	• Centre (Only in Residential) • Private Office up to 45sq.yard. • Departmental Store • Electronic Appliances Store • Jewellery Store • Cloth / Garment Store • Plumbing / Hardware Store • Saloon • Showrooms with a maximum area of 150sq.yard The conditions to satisfy the above criteria are to the total shop area will not be more than 40 m². and the maximum number of workers will be 4 including the owner/manager of the shop.	• Carpenter Store with Saw Mill • Laundry/Dry Cleaning • Repairing of TV/Radio etc • Production of milk products including Ghee and Butter. • Cycle repairing • Printing Press/Bok Binding • Jewellery works • Kadai/weaving • Manufacturing of shoe laces • Tailoring • Blacksmith • Clock/Spectacle Shop/repair • Making of sign board (except for board made of iron) • Photo framing • Cobbler • Electrical repairing • Bakery • Atta Mill (10 HP) • Furniture • Cyber cafee	• Paper Bag Making • Cloth-Iron / Dry-Clean Shop • Tailoring • Carpenter Store without Saw Mill • Portable Water Mill

Note: Other activities with the approval of competent authority, if not listed in the above table.

20. Implementation Plan

To implement the proposals provided in the Master plan, a series of projects according to sector, their nature and implementation agency have been identified. The details of the project are discussed below and the list is provided in **Table 20-1**.

Table 20-1: Identified Projects for 2041

Sector	Projects	Time	Implementation Agency
General for implementation	Development of Web-GIS Portal and linking proposed land use along with the registry of land.	Short Term	District Development Authority along with District Magistrate
Housing	In situ slum redevelopment (Phase wise)	Short Term	Municipal Corporation
Commercial	Development of city centre and sub-city centres	Long Term	District Development Authority
	Development of Street Vending Zones	Short Term	Municipal Corporation
Physical Infrastructure	Development of Water Supply Network (Phase wise)	Medium Term	Pey Jal Nigam
	Development of Sewerage Network Phase wise	Medium Term	Pey Jal Nigam
	Development of Solid Waste Treatment Plant	Medium Term	Municipal Corporation
	Development of Faecal and Sludge Treatment Plant	Medium Term	Pey Jal Nigam
Industry	Development of New Industrial Area and Auction to the existing industrial owners for shifting scattered industries within the planning area.	Long Term	District Development Authority/ State Industrial Department
Transport	Bus Terminal along with Public Transport System (Last Phase)	Short Term	District Development Authority
	Operation of the old bus stand in PPP mode (First Phase)	Long Term	District Development Authority
	Widening of NH and Flyovers	Short Term – Last Phase	National Highway Authority of India/PWD
	Development of Bypass Ring Road	Medium Term	NHAI
	Development of Master Plan road network	Long Term	PWD
	Junction Improvement Projects at Dineshpur Chauraha and Tel Mel Chauraha (First Phase)	Short Term	PWD
	Development of Transport	Medium Term	District Development

Sector	Projects	Time	Implementation Agency
	Nagar(First Phase)		Authority
Environment	Afforestation along the river and natural drains (Phase wise)	Long Term	Irrigation Department/DDA
	Cleaning of Kalyani River(First Phase)	Short Term	District Development Authority
	Development of parks and multipurpose open spaces(Phase wise)	Long Term	Municipal Corporation/District Development Authority
Tourism	Development of Tourist Circuit along with promotional activities	Medium Term	State Tourism Department

Source: Proposed by Town and Country Planning Department, Uttarakhand

20.1. Short Term

Short-term projects are important to solve the immediate issues in the planning area. The projects under short-term projects are discussed below:

20.1.1. Development of Web-GIS Portal and linking proposed land use along with the registry of land

The implementation of an IT-based system for better land management is proposed. The land use of the land parcel will be linked to the ownership and location of the parcel. People should be able to know the information about ownership, land use type currently and the permitted activity on that land use. This should help in the accountability of land use and ease the burden of background information checks on citizens. We also recommend that this system be integrated as an essential system when purchasing land, during registration processes and during change of land use request processes. To implement the project consultant needs to be appointed to develop and maintain the Web-GIS Portal.

20.1.2. In-Situ Slum Redevelopment

An in-situ slum redevelopment plan has been proposed for the existing Urban Built-up zone (R1). The household along the Kalyani River is in a very congested, dilapidated state and lacks basic facilities. To improve the housing condition of these areas in-situ development is proposed. The proposal is to go for vertical redevelopment instead of horizontal development. The development of a group housing project with lower ground coverage through the merging of several small plots may solve the existing congestion issue. This proposal would hugely improve

the housing condition in the core city. Delay in this project would make the housing condition of this area even worse and the encroachment caused by these households would keep disturbing the natural flow of the drainage channels. It is recommended to prepare a Slum Redevelopment Plan and associated Detail Project Report with the cost estimate.

20.1.3. Development of Street Vending Zones

Street vending zones are dedicated areas for vendors to provide their services. The existing situation of Street Vendors is unorganised which creates a lot of traffic during peak hours of the city. Street vendors play an important role in terms of serving the various commercial needs as well as income for various families. So eight organised street vending zones have been identified by the Nagar Nigam. However, another site has been identified in the core area, beside the Nagar Nigam Office for the vending zone. This is near to the main market and Gurudwara where the origin of the city is considered. Due to its location in the core city, it would receive a lot of footfall which would help the livelihood of many vendors in an organised manner. It is suggested to implement the Street Vending Action Plan as well as DPR for Street Vending Zone, prepared by Rudrapur Municipal Corporation.

20.1.4. Operation of the old bus stand in PPP mode (First Phase)

The old bus stand is currently managed by Assistance Regional Transport Office. The proposal is to change the operation mode of the old bus stand to Public Private Partnership (PPP). The advantages of the PPP mode are it provides easy access to private sector finance with higher efficiency in the private sector. It also increases transparency in the use of funds and results in better enforcement and monitoring. Hence, a tender needs to be developed for the old bus stand to function in PPP mode.

20.1.5. Bus Terminal along with Public Transport System

Rudrapur does not have any proper Public Transport System. The local transport is only via e-rickshaw and autos with no dedicated stops or parking spaces. Hence, according to the requirement of the city, Public Transport System with Bus Priority Lane has been proposed. A bus terminal with 49 parking spaces and 21 bays has been proposed which would cover 5 routes to towns Haldwani, Dineshpur, Kichha, Gadarpur and Bilaspur. The public transport system would provide an organised flow of movement of people as well as traffic. On all the roads from 60m to 30m Bus priority lanes have been proposed which cover most of the area of the planning

area. The bus terminal is proposed near the Dineshpur Chowk just attached to SIDCUL land. Its proximity to the main road would help in easier movement of the buses. For establishing the project DPR with infrastructure details, promotional activities and cost estimation need to be carried out.

20.1.6. Widening of National Highway and Development of Flyovers

According to the previous master plan, the National Highways 09, 109 and 309 of Rudrapur Planning Area are proposed to be 60 m but due to unauthorised development, the effective ROW of the National Highways varies from 27m-45m. Hence, the widening of National Highways is a crucial project for the planning area. It would help in the reduction of traffic congestion by facilitating the easy movement of vehicles.

To solve the traffic congestion at Kashipur Road, Kiccha Road, Haldwani Road and Rampur Road near Indira Chowk, two Flyovers have been proposed. The first flyover is proposed at Rampur Road-Haldwani Road, starting from the UP border on the southern edge of Rampur Road to Attaria Chowk on Haldwani Road. This proposal is already in compliance with the NHAI proposal. The other proposal for flyover is on NH 09 and NH 109. It starts from Radha Swami Satsang and extends till Guawa Chowk. Both the proposed flyovers cross Indira Chowk making a junction. It is recommended to prepare Detail Project Report along with a cost estimate for this project.

20.1.7. Junction Improvement Projects at Dineshpur Chauraha and Tel Mel Chauraha

With rapid industrialisation in the recent past, the volume of traffic has become multiple times and lack of proper transportation planning the city has developed a few choke points where intervention is necessary, else it would become worse with time. Junction improvement has been proposed in two locations. The first is on Dineshpur Chauraha on NH 309, second is on Tel Mel Chauraha on NH 109 where we have an existing Rail over Bridge (ROB). As the main city is at the junction of three National Highways, the junction has become too crowded. Without any intervention, the situation at the junction would become worse. To implement the project, Junction Improvement Plan and DPR along with cost estimation need to be carried out.

20.1.8. Cleaning of Kalyani River

The Kalyani River is the main water channel in the planning area. The existing situation analysis of the river water suggests that the water is polluted due to solid waste dumping in the river. And

the people encroaching the river dump all the waste in the river. There needs to be a complete ban on solid waste dumping in the river. The cleaning of the Kalyani River needs to be in top priority. The removal of solid waste and revival of the river would benefit the planning area. The river forming a lake in between the city plays an important recreational space for the people of Rudrapur. If the project is not carried out the pollution level of the river would keep increasing and would deteriorate the river even more with time harming the environment and the people in the future. To execute the task, an action plan needs to be prepared with phasing details.

20.2. Medium Term

20.2.1. Development of Bypass Ring Road

There is a proposal for a bypass road for Rudrapur which will also act as a ring road for the city. The proposed bypass originates from opposite Radhaswami Satsang Beas at Kiccha Road then passes through the revenue villages of Bhamraula and Rudrapur, and then enters into the state of Uttar Pradesh, then again enters in Planning Area in the revenue village of Baglwala, Kolria and then crossing the Kashipur Road, and then passes through the revenue villages of Bindukhera, Matkota and ends at Haldwani Road (opposite to SIDCUL). The process to initiate the construction of this bypass road needs to start soon.

20.2.2. Development of Water Supply Network (Phase-wise)

Water supply is one of the basic facilities which need to be provided to the people. The existing system of water supply is done via Pey Jal Nigam. They have already proposed a water supply network covering the old Municipal Area. For the rest of the Municipal Area, DPR, tendering and construction works need to be completed in Phase Wise. Pey Jal Nigam is also responsible for the water supply in the new planning area. The project would be carried out phase-wise as the city grows. In rural areas, the water supply is the responsibility of the panchayat and in urban areas Pey Jal Nigam is responsible. For any townships outside the city limits, the responsibility for water supply will be their own. To execute the project Detailed Project Report needs to be prepared for the rural part of the Planning Area, DPR for the urban part of the Planning Area has been prepared already.

20.2.3. Development of Sewerage Network

Rudrapur Planning Area has no existing sewerage network. A new sewerage network has been proposed for the entire planning area. As the city is divided into two parts by the railway line two

different zones of sewerage network are proposed. The two different zones' sewerage networks would be collected in two different Faecal Sewage Treatment Plant. The DPR, tendering and construction works need to be carried out.

20.2.4. Development of Solid Waste Treatment Plant

The existing system of Solid Waste Management is carried out by the Municipal Corporation of Rudrapur. The solid waste is being dumped without any treatment in the landfill site which is very near to the city centre and hence a new site for the Solid Waste Treatment Plant is already proposed by the Nagar Nigam. On the same site, a larger capacity SWTP is being proposed. For the preparation of SWTP, the DPR, tendering and construction works need to be carried out.

20.2.5. Development of Faecal and Sludge Treatment Plant

Under AMRUT a Faecal Sewage Treatment Plant is proposed for the planning area in Rampura. Nevertheless, as discussed above two zones are being proposed for the sewerage network because the planning area is divided into two parts by the railway lines. The AMRUT proposed plant would cater to the eastern side of the planning area. Hence, another sewage treatment plant has been proposed on the western side of the planning area near Kolara. It is recommended to prepare a Detail Project Report along with cost estimation.

20.2.6. Development of Transport Nagar (First Phase)

Rudrapur being an Industrial City receives a lot of goods traffic within the planning area to serve the industrial need as well as the allied services which support the industries. A Transport Nagar is proposed to provide parking and other facilities for the goods traffic in the planning area. A Transport Nagar is already proposed by the District Development Authority in the southern part of the Planning Area near Rampur Road. As this proposed truck Terminal is far from the SIDCUL area which is the prime destination of goods traffic, another Transport Nagar/ Truck Terminal has been proposed on the southern edge of the SIDCUL area at Attaria Road. This Transport Nagar/ Truck Terminal will serve the SIDCUL area in terms of goods traffic. It is recommended to prepare a Layout Plan and Detail Project Report with the cost estimate.

20.2.7. Development of Tourist Circuit along with promotional activities

Rudrapur acts as a connecting centre for the tourist sites nearby. A circuit between Reetha Sahib and Nanak Matta circuit has been proposed in the Uttarakhand Tourism Development Master Plan 2007 – 2022. So, in line with the proposal, an extension of the circuit to Rudrapur is

proposed. For establishing the circuit advertisement and promotional activities needs to be carried out.

20.3. Long Term

20.3.1. Development of city centre and sub-city centres

To serve the present as well as the upcoming population of Planning Area three one city centre and three sub-city centres for commercial purpose has been proposed. The triangular portion in-between Kashipur Road, Kashipur Bypass and Haldwani Road, which is acting as main commercial centre of the town, is proposed to be developed as commercial city centre. In addition, three commercial sub-city centres has been proposed in the southern portion along Rampur Road, in the western portion along Bura Rani Road and in the eastern portion near to Kiccha Road along proposed 30m wide road. It is recommended to prepare a Detailed Layout Plan and associated Detail Project Report with cost estimate.

20.3.2. Afforestation along the river and natural drains (Phase-wise)

Rudrapur has a lot of natural drainage running throughout the planning area from north to south. To rejuvenate these drains 25m buffer along the Kalyani and Baigul river and 10 m on other drainage channels are proposed. In these buffers, afforestation is proposed with the natural vegetation of the area. This is a time taking process and needs to be carried out phase-wise. Being an industrial city air pollution is an issue and afforestation would help to reduce this pollution within the city. To implement the idea, an Action Plan for Afforestation needs to be prepared.

20.3.3. Development of parks and open spaces (Phase wise)

The parks and open spaces proposed within the planning area will be developed phase-wise under The Uttarakhand (Uttar Pradesh) Parks, Playgrounds and Open Spaces (Preservation and Regulation) Act, 1975. Many park projects are already being developed within the planning area via AMRUT schemes. To develop parks on the ground, the concerned authority needs to acquire land, and prepare a Detailed Project Report along with cost estimation.

Annex 1: Ward-Wise Area of Rudrapur

Ward No:	Area (in sq. km)	Area (in Hectares)
1	6.180	617.977
2	0.319	31.909
3	0.301	30.119
4	0.168	16.822
5	0.169	16.924
6	0.320	32.024
7	0.146	14.639
8	0.345	34.531
9	0.112	11.229
10	0.136	13.639
11	0.058	5.825
12	1.695	169.481
13	0.110	11.010
14	0.183	18.303
15	0.213	21.286
16	7.364	736.411
17	0.114	11.366
18	0.126	12.573
19	0.160	15.982
20	0.202	20.241
21	0.334	33.377
22	0.207	20.711
23	0.094	9.359
24	0.087	8.673
25	3.971	397.052
26	0.964	96.424
27	0.191	19.137
28	0.258	25.847
29	0.226	22.647
30	0.270	26.956
31	1.266	126.575
32	3.817	381.691
33	0.657	65.708
34	0.084	8.443
35	0.104	10.386
36	0.764	76.364
37	0.247	24.678
38	0.339	33.902
39	0.118	11.847
40	21.448	2144.830

Source: Consultant Analysis and Rudrapur Municipal Corporation

Annex 2: Population Composition of Rudrapur Planning Area (1991, 2001 and 2011)

Population Composition of Rudrapur (Urban Area), 1991

Ward	Population			Child Pop. (0-6)		
	T	M	F	T	M	F
1	3545	1877	1668	658	334	324
2	7351	3802	3549	1727	735	992
3	5639	2910	2729	1159	623	536
4	2464	1412	1052	335	173	162
5	2517	1335	1182	428	216	212
6	1097	556	541	189	87	102
7	2360	1254	1106	385	211	174
8	1363	710	653	174	87	87
9	8941	4754	4187	1733	885	848
10	3555	1889	1666	748	393	355
11	3045	1685	1360	637	337	300
12	2669	1493	1176	512	281	231
13	3660	1997	1663	770	416	354
14	8135	4352	3783	1731	892	839
15	1417	785	632	253	157	96
16	3522	1844	1678	629	343	286

Source: Census, 1991

Population Composition of Rudrapur (Rural Area), 1991

Name of Village	Population			Child Pop. (0-6)		
	T	M	F	T	M	F
Amarpur	654	327	327	121	64	57
Bagwala	661	362	299	138	77	61
Bhamraula	943	504	439	208	103	105
Bhoora Rani	1971	1050	921	326	164	162
Bigbara	861	455	406	177	86	91
Bindu Khera	1577	819	758	291	148	143
Chhatarpur	785	440	345	144	75	69
Danpur	751	409	342	118	57	61
Fajalpur						
Mahraula	564	344	220	91	40	51
Fulsunga	517	281	236	82	40	42
Fulsungi	743	389	354	159	79	80
Gangapur Patia	886	463	423	174	90	84
Jafarpur	852	465	387	183	90	93
Jainagar	1564	856	708	348	173	175
Kalyanpur	3693	2048	1645	827	412	415
Khamaria	617	349	268	127	68	59
Kolara	715	387	328	139	81	58
Kolaria	1311	746	565	207	118	89
Kotha	464	244	220	94	55	39
Lalpur	1407	753	654	306	148	158
Lamara	69	37	32	15	8	7
Loharra	250	143	107	30	17	13
Loharri	575	316	259	101	59	42
Malsagirdharpur	634	351	283	102	58	44
Malsi	943	493	450	227	116	111
Mat Kota	783	437	346	110	67	43
Phoolbag	3164	1763	1401	646	339	307
Raipur	986	515	471	172	89	83
Rameswarpur	1014	551	463	168	78	90
Rampura	801	495	306	141	83	58
Shimala Pistore	1208	707	501	213	116	97
Simla Bahadur	306	181	125	57	34	23
Vijay Nagar	5361	2713	2648	1117	565	552

Source: Census, 1991

Population Composition of Rudrapur (Urban Area), 2001

Ward	Population			Child Pop. (0-6)		
	T	M	F	T	M	F
1	3097	1663	1434	613	328	285
2	4098	2212	1886	864	451	413
3	3635	1980	1655	729	400	329
4	2482	1356	1126	448	251	197
5	3399	1774	1625	479	262	217
6	4380	2267	2113	844	438	406
7	4841	2597	2244	1039	523	516
8	6173	3304	2869	1265	652	613
9	2678	1403	1275	412	230	182
10	2482	1331	1151	303	167	136
11	2478	1299	1179	364	186	178
12	3232	1685	1547	538	280	258
13	4063	2373	1690	557	293	264
14	4368	2353	2015	816	459	357
15	1926	952	974	295	153	142
16	2432	1301	1131	570	295	275
17	5445	2906	2539	1064	587	477
18	2015	1064	951	333	142	191
19	2762	1586	1176	359	183	176
20	7119	3745	3374	1256	663	593
21	3597	1876	1721	548	279	269
22	4890	2562	2328	544	320	224
23	2641	1335	1306	374	196	178
24	2641	1405	1236	388	210	178
25	1802	964	838	199	102	97

Source: Census, 2001

Population Composition of Rudrapur (Rural Area), 2001

Name of Village	Population			Child Pop. (0-6)		
	T	M	F	T	M	F
Amarpur	1155	577	578	260	124	136
Bagwala	906	504	402	175	98	77
Bhamraula	1246	656	590	210	107	103
Bhoora Rani	2857	1490	1367	534	281	253
Bigbara	1432	755	677	314	157	157
Bindu Khera	2148	1103	1045	387	209	178
Chhatarpur	967	513	454	155	83	72
Danpur	1115	592	523	175	90	85
Fajalpur						
Mahraula	1201	633	568	218	106	112
Fulsunga	1036	542	494	186	98	88
Fulsungi	462	237	225	69	38	31
Gangapur Patia	1055	546	509	194	96	98
Jafarpur	1410	751	659	265	146	119
Jagatpura	1184	634	550	188	102	86
Jainagar	1782	933	849	320	164	156
Kalyanpur	976	504	472	147	74	73
Khamaria	793	468	325	146	89	57
Kolara	950	503	447	156	81	75
Kolaria	1538	819	719	273	145	128
Kotha	539	282	257	120	56	64
Lalpur	2334	1222	1112	463	222	241
Lamara	137	73	64	26	12	14
Loharra	279	150	129	54	36	18
Loharri	652	356	296	126	71	55
Malsagirdharpur	844	444	400	154	80	74
Malsi	1447	747	700	264	130	134
Mat Kota	732	391	341	112	59	53
Phoolbag	3381	1862	1519	398	231	167
Raipur	1453	726	727	292	152	140
Rameswarpur	1469	743	726	299	143	156
Rampura	1173	661	512	205	115	90
Shimala Pistore	1294	723	571	272	144	128
Simla Bahadur	479	269	210	92	54	38
Vijay Nagar	7077	3638	3439	1328	712	616

Source: Census, 2001

Population Composition of Rudrapur (Urban Area), 2011

Ward	Population			Child Pop. (0-6)		
	T	M	F	M	F	T
1	11109	5826	5283	832	810	1642
2	25415	13604	11811	2128	1896	4024
3	6395	3287	3108	457	424	881
4	15862	8469	7393	1412	1296	2708
5	13255	7009	6246	1052	910	1962
6	8099	4309	3790	649	557	1206
7	6361	3362	2999	609	507	1116
8	5222	2799	2423	431	394	825
9	3318	1720	1598	228	206	434
10	3337	1706	1631	202	184	386
11	1898	994	904	89	86	175
12	1801	908	893	101	99	200
13	3916	2028	1888	234	212	446
14	7123	3782	3341	563	541	1104
15	4309	2235	2074	268	236	504
16	4089	2035	2054	238	250	488
17	4679	2458	2221	294	261	555
18	5060	2564	2496	300	303	603
19	4615	2415	2200	244	220	464
20	4994	2530	2464	301	300	601
21	6212	3234	2978	469	413	882
22	2126	1288	838	167	153	320
23	5359	2778	2581	322	294	616
TOTAL	154554	81340	73214	11590	10552	22142

Source: Census, 2011

Village name	Population			Child Pop. (0-6)		
	T	M	F	T	M	F
Bhoora Rani	7224	3849	3375	990	500	490
Bigbara	1729	884	845	292	146	146
Fajalpur Mahraula	4672	2483	2189	698	366	332
Fulsunga	1714	911	803	267	131	136
Fulsungi	893	477	416	103	57	46
Kalyanpur	2883	1566	1317	391	196	195
Lamara	319	187	132	56	26	30
Rampura	1226	666	560	151	90	61
Simla Bahadur	1233	666	567	213	116	97

Source: Census, 2011

Population Composition of Rudrapur (Rural Area), 2011

Village name	Population			Child Pop. (0-6)		
	T	M	F	T	M	F
Amarpur	1242	627	615	177	94	83
Bagwala	1082	565	517	154	75	79
Bhamraula	1555	816	739	186	100	86
Bindu Khera	2319	1176	1143	323	163	160
Chhatarpur	1498	828	670	204	104	100
Danpur	1158	608	550	154	81	73
Gangapur Patia	979	516	463	113	66	47
Jafarpur	2258	1186	1072	376	199	177
Jainagar	2257	1202	1055	320	174	146
Khamaria	1137	580	557	167	80	87
Kolara	1212	638	574	164	79	85
Kolaria	1929	988	941	281	145	136
Kotha	741	382	359	135	66	69
Lalpur	3975	2075	1900	659	342	317
Loharra	532	277	255	86	47	39
Loharri	748	401	347	118	67	51
Malsagirdharpur	1158	609	549	175	91	84
Malsi	1885	982	903	320	176	144
Mat Kota	1875	1024	851	233	141	92
Phoolbag	11251	5879	5372	1561	782	779
Raipur	1636	822	814	207	97	110
Rameswarpur	1774	906	868	269	142	127
Shimala Pistore	1679	891	788	280	152	128
Vijay Nagar	8818	4536	4282	1139	597	542

Source: Census, 2011

Annex 3: Number of Literates of Rudrapur Planning Area

Number of Literates of Rudrapur (Urban Area), 2001

Ward	Literates		
	M	F	T
1	554	251	805
2	1016	518	1534
3	759	360	1119
4	913	593	1506
5	1366	1131	2497
6	1023	550	1573
7	1164	642	1806
8	1715	957	2672
9	986	801	1787
10	990	728	1718
11	933	729	1662
12	1016	625	1641
13	1723	875	2598
14	1294	802	2096
15	613	428	1041
16	597	335	932
17	1463	1003	2466
18	813	597	1410
19	1106	652	1758
20	2252	1432	3684
21	1211	849	2060
22	2186	1947	4133
23	1111	988	2099
24	1024	659	1683
25	827	679	1506
TOTAL	28655	19131	47786

Source: Census, 2001

Number of Literates of Rudrapur (Rural Area), 2001

Name of Village	Literates		
	T	M	F
Amarpur	527	328	199
Bagwala	419	264	155
Bhamraula	790	461	329
Bhoora Rani	1596	936	660
Bigbara	658	392	266
Bindu Khera	1157	687	470
Chhatarpur	581	342	239
Danpur	668	391	277
Fajalpur Mahraula	671	414	257
Fulsunga	612	361	251
Fulsungi	312	169	143
Gangapur Patia	596	350	246
Jafarpur	766	457	309
Jagatpura	825	467	358
Jainagar	850	553	297
Kalyanpur	633	380	253
Khamaria	384	266	118
Kolara	649	377	272
Kolaria	945	559	386
Kotha	236	164	72
Lalpur	1241	754	487
Lamara	29	21	8
Loharra	162	95	67
Loharri	367	223	144
Malsagirdharpur	543	316	227
Malsi	947	544	403
Mat Kota	444	263	181
Phoolbag	2251	1382	869
Raipur	674	416	258
Rameswarpur	844	477	367
Rampura	694	456	238
Shimala Pistore	710	459	251
Simla Bahadur	209	142	67
Vijay Nagar	3397	2129	1268

Source: Census, 2001

Number of Literates of Rudrapur (Urban Area), 2011

Ward	Literates		
	M	F	T
1	3875	2602	6477
2	9249	6013	15262
3	2073	1461	3534
4	5067	3145	8212
5	4317	3011	7328
6	2708	1924	4632
7	1648	984	2632
8	1622	1016	2638
9	1052	845	1897
10	1309	1086	2395
11	886	764	1650
12	683	611	1294
13	1698	1473	3171
14	2381	1779	4160
15	1838	1522	3360
16	1388	1020	2408
17	2056	1608	3664
18	1933	1542	3475
19	2140	1877	4017
20	2097	1850	3947
21	2608	2198	4806
22	914	558	1472
23	2397	2165	4562
TOTAL	55939	41054	96993

Source: Census, 2011

Name of Village	Literates		
	T	M	F
Bhoora Rani	4857	2822	2035
Bigbara	1044	603	441
Fajalpur Mahraula	3201	1833	1368
Fulsunga	1144	662	482
Fulsungi	547	317	230
Kalyanpur	1963	1179	784
Lamara	239	150	89
Rampura	965	528	437
Simla Bahadur	885	506	379

Source: Census, 2011

Number of Literates of Rudrapur (Rural Area), 2011

Name of Village	Literates		
	T	M	F
Amarpur	839	485	354
Bagwala	645	390	255
Bhamraula	1131	637	494
Bindu Khera	1534	884	650
Chhatarpur	1018	607	411
Danpur	850	471	379
Gangapur Patia	708	399	309
Jafarpur	1263	722	541
Jainagar	1422	850	572
Khamaria	681	373	308
Kolara	870	508	362
Kolaria	1367	773	594
Kotha	462	287	175
Lalpur	2464	1426	1038
Loharra	328	183	145
Loharri	489	277	212
Malsagirdharpur	780	456	324
Malsi	1074	614	460
Mat Kota	1417	835	582
Phoolbag	7515	4423	3092
Raipur	981	587	394
Rameswarpur	1172	656	516
Shimala Pistore	1028	601	427
Vijay Nagar	5324	3114	2210

Source: Census, 2011

Annex 4: Scheduled Caste (SC) and Schedules Tribe (ST) Population of Rudrapur Planning Area

SC & ST Population of Rudrapur (Urban Area), 2011

Ward	SC Population			ST Population		
	M	F	T	M	F	T
1	798	749	1547	39	44	83
2	1973	1821	3794	35	29	64
3	364	355	719	14	19	33
4	430	406	836	325	290	615
5	834	758	1592	9	15	24
6	708	638	1346	14	9	23
7	2460	2209	4669	7	8	15
8	2112	1826	3938	5	8	13
9	374	332	706	3	5	8
10	249	234	483	8	4	12
11	4	4	8	0	0	0
12	61	63	124	0	0	0
13	199	182	381	0	0	0
14	136	121	257	10	6	16
15	157	154	311	3	3	6
16	407	430	837	2	5	7
17	684	627	1311	72	60	132
18	588	614	1202	9	6	15
19	74	77	151	8	6	14
20	94	97	191	23	23	46
21	295	287	582	32	28	60
22	64	26	90	7	7	14
23	70	53	123	8	10	18
TOTAL	13135	12063	25198	633	585	1218

Source: Census, 2011

Villages	SC Population			ST Population		
	M	F	T	M	F	T
Bhoora Rani	586	538	1124	38	31	69
Bigbara	389	383	772	1	3	4
Fajalpur Mahraula	352	327	679	2	2	4
Fulsunga	77	83	160	2	2	4
Fulsungi	96	90	186	0	0	0
Kalyanpur	469	384	853	28	27	55
Lamara	5	3	8	0	0	0
Rampura	13	14	27	0	0	0
Simla Bahadur	115	103	218	0	0	0
TOTAL	2152	1961	4113	77	71	148

Source: Census, 2011

SC & ST Population of Rudrapur (Rural Area), 2011

Village	SC Population			ST Population		
	M	F	T	M	F	T
Amarpur	0	0	0	0	0	0
Bagwala	269	235	504	6	3	9
Bhamraula	151	172	323	0	0	0
Bindu Khera	37	26	63	1	1	2
Chhatarpur	216	199	415	0	0	0
Danpur	145	128	273	3	2	5
Gangapur Patia	253	229	482	0	0	0
Jafarpur	386	308	694	2	1	3
Jainagar	350	304	654	1	0	1
Khamaria	99	105	204	0	0	0
Kolara	232	200	432	0	0	0
Kolaria	273	247	520	0	0	0
Kotha	258	256	514	1	2	3
Lalpur	240	201	441	11	6	17
Loharra	136	143	279	0	0	0
Loharri	88	93	181	0	0	0
Malsagirdharpur	15	12	27	0	0	0
Malsi	405	416	821	0	0	0
Mat Kota	176	140	316	0	0	0
Phoolbag	1585	1464	3049	21	21	42
Raipur	25	24	49	0	0	0
Rameswarpur	158	161	319	0	0	0
Shimala Pistore	111	94	205	0	0	0
Vijay Nagar	236	232	468	0	0	0
TOTAL	5844	5389	11233	46	36	82

Source: Census, 2011

Annex 5: OCCUPATIONAL CLASSIFICATION (URBAN AREAS)- 2001 and 2011

Occupational Classification, 2011

Ward	Main Workers			Marginal Workers			Total Workers			Non-Workers		
	M	F	T	M	F	T	M	F	T	M	F	T
1	2438	664	3102	398	236	634	2836	900	3736	2990	4383	7373
2	5845	848	6693	1370	863	2233	7215	1711	8926	6389	10100	16489
3	1589	445	2034	186	157	343	1775	602	2377	1512	2506	4018
4	3506	371	3877	547	292	839	4053	663	4716	4416	6730	11146
5	3051	330	3381	272	180	452	3323	510	3833	3686	5736	9422
6	1603	180	1783	440	128	568	2043	308	2351	2266	3482	5748
7	1404	200	1604	261	145	406	1665	345	2010	1697	2654	4351
8	1150	205	1355	317	159	476	1467	364	1831	1332	2059	3391
9	774	257	1031	203	215	418	977	472	1449	743	1126	1869
10	777	136	913	174	55	229	951	191	1142	755	1440	2195
11	535	94	629	16	18	34	551	112	663	443	792	1235
12	494	181	675	64	69	133	558	250	808	350	643	993
13	1057	254	1311	268	260	528	1325	514	1839	703	1374	2077
14	1734	187	1921	132	86	218	1866	273	2139	1916	3068	4984
15	1097	128	1225	61	20	81	1158	148	1306	1077	1926	3003
16	1035	348	1383	44	40	84	1079	388	1467	956	1666	2622
17	1148	218	1366	95	90	185	1243	308	1551	1215	1913	3128
18	1067	283	1350	194	144	338	1261	427	1688	1303	2069	3372
19	1216	254	1470	127	49	176	1343	303	1646	1072	1897	2969
20	1079	160	1239	198	42	240	1277	202	1479	1253	2262	3515
21	1562	261	1823	50	41	91	1612	302	1914	1622	2676	4298
22	905	145	1050	40	17	57	945	162	1107	343	676	1019
23	1511	169	1680	36	39	75	1547	208	1755	1231	2373	3604
TOTAL	36577	6318	42895	5493	3345	8838	42070	9663	51733	39270	63551	102821

Source: Census of India, 2011

Occupational Classification, 2011

Village	Main Workers			Marginal Workers			Total Workers			Non-Workers		
	M	F	T	M	F	T	M	F	T	M	F	T
Bhoora Rani	1768	340	2108	266	174	440	2034	514	2548	1815	2861	4676
Bigbara	427	123	550	44	28	72	471	151	622	413	694	1107
Fajalpur Mahraula	1138	155	1293	176	98	274	1314	253	1567	1169	1936	3105
Fulsunga	346	14	360	34	5	39	380	19	399	531	784	1315
Fulsungi	169	8	177	27	5	32	196	13	209	281	403	684
Kalyanpur	734	119	853	98	40	138	832	159	991	734	1158	1892
Lamara	115	7	122	1	0	1	116	7	123	71	125	196
Rampura	342	66	408	19	19	38	361	85	446	305	475	780
Simla Bahadur	301	33	334	33	20	53	334	53	387	332	514	846
TOTAL	5960	950	6910	714	395	1109	6674	1345	8019	6195	9904	16099

Source: Census of India, 2011

Draft Master Plan 2041 (Rudrapur)
Occupational Classification, 2001

Ward	Main Workers			Marginal Workers			Total Workers			Non-Workers		
	M	F	T	M	F	T	M	F	T	M	F	T
1	725	66	791	31	11	42	756	77	833	907	1357	2264
2	954	72	1026	45	14	59	999	86	1085	1213	1800	3013
3	663	114	777	259	87	346	922	201	1123	1058	1454	2512
4	612	85	697	21	10	31	633	95	728	723	1031	1754
5	841	57	898	11	3	14	852	60	912	922	1565	2487
6	1034	251	1285	99	183	282	1133	434	1567	1134	1679	2813
7	1115	146	1261	70	35	105	1185	181	1366	1412	2063	3475
8	1301	85	1386	187	44	231	1488	129	1617	1816	2740	4556
9	656	70	726	14	5	19	670	75	745	733	1200	1933
10	590	78	668	45	20	65	635	98	733	696	1053	1749
11	603	62	665	13	4	17	616	66	682	683	1113	1796
12	650	133	783	129	94	223	779	227	1006	906	1320	2226
13	1301	111	1412	33	35	68	1334	146	1480	1039	1544	2583
14	930	144	1074	96	60	156	1026	204	1230	1327	1811	3138
15	464	212	676	14	7	21	478	219	697	474	755	1229
16	439	21	460	190	63	253	629	84	713	672	1047	1719
17	1331	141	1472	56	44	100	1387	185	1572	1519	2354	3873
18	534	68	602	0	1	1	534	69	603	530	882	1412
19	617	49	666	1	0	1	618	49	667	968	1127	2095
20	1659	173	1832	51	47	98	1710	220	1930	2035	3154	5189
21	794	221	1015	32	19	51	826	240	1066	1050	1481	2531
22	1201	142	1343	8	7	15	1209	149	1358	1353	2179	3532
23	601	72	673	14	9	23	615	81	696	720	1225	1945
24	628	200	828	63	69	132	691	269	960	714	967	1681
25	518	34	552	10	5	15	528	39	567	436	799	1235
TOTAL	20761	2807	23568	1492	876	2368	22253	3683	25936	25040	37700	62740

Source: Census of India, 2001

Draft Master Plan 2041 (Rudrapur)
Occupational Classification of Main Workers, 2001

Ward	Cultivators			Agricultural Labourers			HHI			Others		
	M	F	T	M	F	T	M	F	T	M	F	T
1	1	0	1	1	0	1	1	1	2	722	65	787
2	2	1	3	156	33	189	4	0	4	792	38	830
3	2	0	2	120	29	149	7	7	14	534	78	612
4	1	1	2	7	2	9	0	0	0	604	82	686
5	5	0	5	15	1	16	29	6	35	792	50	842
6	7	0	7	432	138	570	27	1	28	568	112	680
7	3	1	4	19	3	22	44	11	55	1049	131	1180
8	3	1	4	1	1	2	28	6	34	1269	77	1346
9	11	5	16	4	0	4	2	2	4	639	63	702
10	1	0	1	0	0	0	1	0	1	588	78	666
11	4	0	4	31	2	33	0	0	0	568	60	628
12	0	0	0	44	17	61	0	0	0	606	116	722
13	7	1	8	53	9	62	7	10	17	1234	91	1325
14	9	2	11	154	61	215	16	0	16	751	81	832
15	0	0	0	52	18	70	5	0	5	407	194	601
16	5	0	5	73	3	76	22	0	22	339	18	357
17	16	1	17	47	2	49	13	3	16	1255	135	1390
18	16	7	23	3	1	4	5	0	5	510	60	570
19	2	0	2	0	0	0	0	0	0	615	49	664
20	1	0	1	290	29	319	63	2	65	1305	142	1447
21	2	0	2	12	0	12	2	0	2	778	221	999
22	9	0	9	1	0	1	4	1	5	1187	141	1328
23	5	4	9	2	0	2	13	1	14	581	67	648
24	67	3	70	50	8	58	19	9	28	492	180	672
25	3	0	3	0	0	0	0	0	0	515	34	549
TOTAL	182	27	209	1567	357	1924	312	60	372	18700	2363	21063

Source: Census of India, 2001

Draft Master Plan 2041 (Rudrapur)
Occupational Classification of Main Workers, 2011

Ward	Cultivators			Agricultural Labourers			HHI			Others		
	M	F	T	M	F	T	M	F	T	M	F	T
1	3	0	3	275	129	404	47	159	206	2113	376	2489
2	168	33	201	505	94	599	221	50	271	4951	671	5622
3	21	6	27	250	97	347	58	10	68	1260	332	1592
4	36	6	42	474	57	531	189	42	231	2807	266	3073
5	30	3	33	469	51	520	67	28	95	2485	248	2733
6	13	3	16	50	8	58	43	21	64	1497	148	1645
7	5	0	5	92	36	128	44	9	53	1263	155	1418
8	45	19	64	37	29	66	21	8	29	1047	149	1196
9	1	0	1	59	25	84	20	9	29	694	223	917
10	9	1	10	3	0	3	21	6	27	744	129	873
11	11	1	12	0	0	0	24	5	29	500	88	588
12	2	0	2	83	23	106	43	21	64	366	137	503
13	10	0	10	28	6	34	344	115	459	675	133	808
14	1	1	2	1	2	3	29	7	36	1703	177	1880
15	2	0	2	23	1	24	97	5	102	975	122	1097
16	6	0	6	165	49	214	20	14	34	844	285	1129
17	4	0	4	6	0	6	8	10	18	1130	208	1338
18	8	2	10	21	3	24	45	13	58	993	265	1258
19	9	0	9	4	1	5	30	4	34	1173	249	1422
20	3	2	5	9	2	11	10	0	10	1057	156	1213
21	14	1	15	26	0	26	46	12	58	1476	248	1724
22	1	1	2	0	1	1	1	3	4	903	140	1043
23	9	0	9	14	0	14	37	10	47	1451	159	1610
TOTAL	411	79	490	2594	614	3208	1465	561	2026	32107	5064	37171

Source: Census of India, 2011

Draft Master Plan 2041 (Rudrapur)
Occupational Classification of Main Workers, 2011

Village	Cultivators			Agricultural Labourers			HHI			Others		
	M	F	T	M	F	T	M	F	T	M	F	T
Bhoora Rani	73	13	86	73	33	106	18	15	33	1604	279	1883
Bigbara	131	24	155	137	54	191	11	6	17	148	39	187
Fajalpur Mahraula	61	9	70	195	32	227	85	9	94	797	105	902
Fulsunga	85	3	88	98	9	107	4	0	4	159	2	161
Fulsungi	27	0	27	43	0	43	17	0	17	82	8	90
Kalyanpur	4	6	10	16	4	20	4	4	8	710	105	815
Lamara	1	0	1	1	0	1	0	0	0	113	7	120
Rampura	19	0	19	0	0	0	11	0	11	312	66	378
Simla Bahadur	13	4	17	25	1	26	8	1	9	255	27	282
TOTAL	471	62	533	614	138	752	222	40	262	4653	710	5363

Source: Census of India, 2011

OCCUPATIONAL CLASSIFICATION (RURAL AREAS)- 2001 and 2011

Occupational Classification, 2011

Village	Main Workers			Marginal Workers			Total Workers			Non-Workers		
	M	F	T	M	F	T	M	F	T	M	F	T
Amarpur	223	51	274	110	71	181	333	122	455	294	493	787
Bagwala	274	68	342	7	16	23	281	84	365	284	433	717
Bhamraula	302	47	349	129	45	174	431	92	523	385	647	1032
Bindu Khera	566	254	820	77	81	158	643	335	978	533	808	1341
Chhatarpur	470	70	540	28	12	40	498	82	580	330	588	918
Danpur	260	31	291	53	16	69	313	47	360	295	503	798
Gangapur Patia	273	43	316	2	3	5	275	46	321	241	417	658
Jafarpur	637	208	845	9	11	20	646	219	865	540	853	1393
Jainagar	536	162	698	115	127	242	651	289	940	551	766	1317
Khamaria	163	17	180	142	24	166	305	41	346	275	516	791
Kolara	323	56	379	33	89	122	356	145	501	282	429	711
Kolaria	444	140	584	143	154	297	587	294	881	401	647	1048
Kotha	25	9	34	161	10	171	186	19	205	196	340	536
Lalpur	898	125	102	181	49	230	107	174	125	996	172	272

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			3				9		3		6	2
Loharra	123	13	136	1	1	2	124	14	138	153	241	394
Loharri	190	24	214	9	41	50	199	65	264	202	282	484
Malsagirdharpur	288	87	375	20	11	31	308	98	406	301	451	752
Malsi	440	58	498	41	24	65	481	82	563	501	821	1322
Mat Kota	530	130	660	62	56	118	592	186	778	432	665	1097
Phoolbag	2746	525	3271	123	61	184	2869	586	3455	3010	4786	7796
Raipur	375	49	424	55	36	91	430	85	515	392	729	1121
Rameswarpur	428	79	507	81	67	148	509	146	655	397	722	1119
Shimala Pistore	318	78	396	183	95	278	501	173	674	390	615	1005
Vijay Nagar	2242	742	2984	270	335	605	2512	1077	3589	2024	3205	5229
TOTAL	14212	3481	17693	2115	1501	3616	16327	4982	21309	14434	23270	37704

Source: Census of India, 2011

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Occupational Classification of Main Workers, 2011

Village	Cultivators			Agricultural Labourers			HHI			Others		
	M	F	T	M	F	T	M	F	T	M	F	T
Amarpur	66	2	68	142	45	187	5	1	6	10	3	13
Bagwala	51	7	58	163	49	212	7	4	11	53	8	61
Bhamraula	73	3	76	32	9	41	4	2	6	193	33	226
Bindu Khera	201	58	259	198	103	301	6	20	26	161	73	234
Chhatarpur	93	49	142	103	6	109	26	4	30	248	11	259
Danpur	64	0	64	81	14	95	4	3	7	111	14	125
Gangapur Patia	93	7	100	140	23	163	1	0	1	39	13	52
Jafarpur	92	8	100	329	123	452	11	8	19	205	69	274
Jainagar	231	28	259	170	75	245	5	2	7	130	57	187
Khamaria	19	2	21	53	4	57	2	0	2	89	11	100
Kolara	110	19	129	44	8	52	25	12	37	144	17	161
Kolaria	110	28	138	92	36	128	16	12	28	226	64	290
Kotha	3	2	5	5	1	6	0	1	1	17	5	22
Lalpur	93	4	97	102	23	125	24	4	28	679	94	773
Loharra	34	4	38	59	5	64	1	0	1	29	4	33
Loharri	53	5	58	55	10	65	0	0	0	82	9	91
Malsagirdharpur	77	14	91	83	53	136	5	0	5	123	20	143

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Malsi	88	6	94	142	15	157	3	4	7	207	33	240
Mat Kota	148	26	174	18	12	30	10	11	21	354	81	435
Phoolbag	29	12	41	32	4	36	28	5	33	2657	504	3161
Raipur	134	9	143	157	21	178	1	0	1	83	19	102
Rameswarpur	75	4	79	96	12	108	9	4	13	248	59	307
Shimala Pistore	54	6	60	51	27	78	2	0	2	211	45	256
Vijay Nagar	467	120	587	1285	497	1782	46	16	62	444	109	553
TOTAL	2676	437	3113	3965	1379	5344	275	141	416	7296	1524	8820

Source: Census of India, 2011

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Occupational Classification, 2001

Village	Main Workers			Marginal Workers			Total Workers			Non-Workers		
	M	F	T	M	F	T	M	F	T	M	F	T
Amarpur	294	100	394	13	6	19	307	106	413	270	472	742
Bagwala	254	67	321	5	21	26	259	88	347	245	314	559
Bhamraula	230	12	242	72	20	92	302	32	334	354	558	912
Bhoora Rani	630	63	693	125	34	159	755	97	852	735	127 0	200 5
Bigbara	315	5	320	67	8	75	382	13	395	373	664	103 7
Bindu Khera	441	92	533	107	63	170	548	155	703	555	890	144 5
Chhatarpur	266	25	291	3	4	7	269	29	298	244	425	669
Danpur	168	34	202	134	41	175	302	75	377	290	448	738
Fajalpur Mahraula	267	37	304	41	38	79	308	75	383	325	493	818
Fulsunga	184	20	204	83	34	117	267	54	321	275	440	715
Fulsungi	107	6	113	8	7	15	115	13	128	122	212	334
Gangapur Patia	202	11	213	44	1	45	246	12	258	300	497	797
Jafarpur	330	66	396	57	10 4	161	387	170	557	364	489	853
Jagatpura	233	29	262	77	20	97	310	49	359	324	501	825
Jainagar	292	19	311	139	13 6	275	431	155	586	502	694	119 6

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Kalyanpur	203	24	227	22	3	25	225	27	252	279	445	724
Khamaria	249	17	266	3	4	7	252	21	273	216	304	520
Kolara	174	28	202	85	48	133	259	76	335	244	371	615
Kolaria	239	19	258	156	60	216	395	79	474	424	640	1064
Kotha	111	0	111	15	24	39	126	24	150	156	233	389
Lalpur	485	46	531	147	43	190	632	89	721	590	1023	1613
Lamara	12	2	14	20	15	35	32	17	49	41	47	88
Loharra	36	3	39	44	17	61	80	20	100	70	109	179
Loharri	81	4	85	91	0	91	172	4	176	184	292	476
Malsagirdhar pur	248	6	254	12	55	67	260	61	321	184	339	523
Malsi	205	6	211	194	87	281	399	93	492	348	607	955
Mat Kota	162	13	175	27	7	34	189	20	209	202	321	523
Phoolbag	746	114	860	21	6	27	767	120	887	1095	1399	2494
Raipur	330	56	386	60	86	146	390	142	532	336	585	921
Rameswarpu r	370	29	399	6	9	15	376	38	414	367	688	1055
Rampura	287	24	311	68	15	83	355	39	394	306	473	779
Shimala Pistore	248	10	258	124	84	208	372	94	466	351	477	828
Simla	63	9	72	50	11	61	113	20	133	156	190	346

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Bahadur												
	139		179		72	118	185	113	298	178	230	409
Vijay Nagar	3	403	6	457	7	4	0	0	0	8	9	7
	107	154	123	272	19	462	135	344	169	136	209	346
TOTAL	86	3	29	4	05	9	10	8	58	99	61	60

Source: Census of India, 2001

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Occupational Classification of Main Workers, 2001

Village	Cultivators			Agricultural Labourers			HHI			Others		
	M	F	T	M	F	T	M	F	T	M	F	T
Amarpur	163	23	186	110	77	187	1	0	1	20	0	20
Bagwala	48	3	51	150	47	197	2	1	3	54	16	70
Bhamraula	76	6	82	11	0	11	1	0	1	142	6	148
Bhoora Rani	155	7	162	122	17	139	30	4	34	323	35	358
Bigbara	114	1	115	84	1	85	0	0	0	117	3	120
Bindu Khera	293	71	364	60	10	70	2	1	3	86	10	96
Chhatarpur	103	4	107	127	18	145	0	0	0	36	3	39
Danpur	69	16	85	11	3	14	7	0	7	81	15	96
Fajalpur												
Mahraula	15	4	19	9	3	12	13	6	19	230	24	254
Fulsunga	54	2	56	8	2	10	29	7	36	93	9	102
Fulsungi	30	1	31	25	3	28	4	0	4	48	2	50
Gangapur Patia	68	5	73	102	2	104	1	0	1	31	4	35
Jafarpur	68	3	71	183	57	240	7	2	9	72	4	76
Jagatpura	6	0	6	11	0	11	9	0	9	207	29	236
Jainagar	150	1	151	95	14	109	4	0	4	43	4	47
Kalyanpur	129	3	132	43	0	43	1	13	14	30	8	38

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Khamaria	40	0	40	147	14	161	2	0	2	60	3	63
Kolara	83	7	90	6	1	7	12	9	21	73	11	84
Kolaria	74	4	78	20	0	20	9	1	10	136	14	150
Kotha	5	0	5	81	0	81	3	0	3	22	0	22
Lalpur	76	5	81	114	27	141	4	3	7	291	11	302
Lamara	0	0	0	2	1	3	1	0	1	9	1	10
Loharra	18	1	19	7	2	9	2	0	2	9	0	9
Loharri	37	2	39	16	0	16	1	0	1	27	2	29
Malsagirdharpur	99	1	100	80	4	84	4	0	4	65	1	66
Malsi	93	3	96	3	0	3	10	0	10	99	3	102
Mat Kota	75	2	77	34	5	39	0	0	0	53	6	59
Phoolbag	5	2	7	7	0	7	6	0	6	728	112	840
Raipur	252	15	267	51	38	89	0	0	0	27	3	30
Rameswarpur	63	1	64	124	13	137	5	2	7	178	13	191
Rampura	50	5	55	37	2	39	1	1	2	199	16	215
Shimala Pistore	68	3	71	3	0	3	3	0	3	174	7	181
Simla Bahadur	2	0	2	3	1	4	0	0	0	58	8	66
Vijay Nagar	557	35	592	596	337	933	22	7	29	218	24	242
TOTAL	3415	240	3655	2778	790	3568	210	59	269	4383	454	4837

Source: Census of India, 2001

Annex 6: Details of Industries of Rudrapur Planning Area

Sr. No:	Type of Industries	Up to 2015	2016	2017	2018	2019
1	Large	93	-	-	-	-
2	Medium	-	-	-	2	1
3	Small	-	-	25	28	12
4	Household/Micro	-	-	56	72	44
5	Hazardous	-	-	-	-	-

Source: District Industrial Corporation, US Nagar

Annex 7: Source of Drinking Water of Rudrapur (Rural Area), 2011

Name of Village	Source of Drinking Water (%)									
	Tap water from treated source	Tap water from un-treated source	Covered well	Un-covered well	Hand pump	Tube well/Bore hole	Spring	River/ Canal	Tank/ Pond/ Lake	Other sources
Amarpur	51.2	0	0	0	48.8	0	0	0	0	0
Bagwala	1	57.4	0	0	41.6	0	0	0	0	0
Bhamraula	5.6	2.2	0.4	0	86.5	3.7	0	0	0	1.5
Bindu Khera	0.9	9.8	0	0	72.3	5.9	0	0	0	11.1
Chhatarpur	29.8	26.6	0	0.3	42.7	0.5	0	0	0	0
Danpur	34.5	0	0	0	61.3	4.3	0	0	0	0
Gangapur Patia	86.5	11.2	0	0	2.4	0	0	0	0	0
Jafarpur	34.3	0.5	0	0	58.8	1.8	0	0	0	4.6
Jainagar	24.4	47.6	0	0	21.2	5.1	0	0	0	1.7
Khamaria	12.4	2	0	0	85.1	0	0	0	0	0.5
Kolara	0.9	0	0	0	96	1.3	0	0	0	1.8
Kolaria	58.8	10.8	0	0	13.8	3.3	0	0	0	13.3
Kotha	99.3	0	0	0	0	0	0	0	0	0.7
Lalpur	33.9	5.5	0.1	0	57.8	2.5	0	0	0	0.2
Loharra	17.8	68.9	0	0	13.3	0	0	0	0	0
Loharri	45	0.7	0	0	52.9	1.4	0	0	0	0
Malsagirdharpur	56	0	0.4	0	42.2	0	0	0	0	1.3
Malsi	0.3	0	0	0	90.7	9	0	0	0	0
Mat Kota	8.4	19	0.5	0	70.4	0	0	0	0	1.7
Phoolbag	62.2	4.2	0	0.3	27.4	5.8	0	0	0	0.1
Raipur	0	42.7	0	0	56.7	0	0	0	0	0.6
Rameswarpur	58.3	1.1	0	0	39.3	0.3	0	0	0	1.1
Shimala Pistore	47.1	0	0	0	48.9	3.9	0	0	0	0
Vijay Nagar	10.6	1.9	0.1	0	83.8	3.5	0.1	0	0	0.2

Source: Census, 2011

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Water Supply Details in Rudrapur MC

Quantity of Water Supplied (MLD)	Times/Hours of supply per day	No. of Connections	Per Capita Consumption (LPCD)	Area Covered (sq. km.)	Metering Achieved (%)	Efficiency in collection of charges
0.85	5 hours	2831	59	NA	NA	NA

Supply Infrastructure

No of Over Head Tanks/Reservoirs & Capacity	Capacity of WTPs	Treated supply as % of total water supplied
7 OHTs (5000 KL)	NA	10% approx..

Annex 8: Type of Sanitary Systems of Rudrapur Planning Area, 2011

Type of Sanitary Systems of Rudrapur (Urban Area), 2011

Ward	Households Having Following Sanitary Facility (%)						
	Water Closet			Pit Latrine	Other Latrine	No: of Latrines Within Premises	
	Piped Sewer System	Septic Tank	Other System			Pit Latrines	Open
1	14.1	14.1	1.5	3	0	95.2	4.5
2	15.7	15.7	3.7	7.2	0	96.7	3
3	20.7	20.7	5.4	0.5	1.7	89.1	10.6
4	14.2	14.2	6.2	2.1	0.2	95.6	3.4
5	19.6	19.6	0.7	1.4	0.3	94.6	4.5
6	56.6	56.6	4.2	1.3	0	96.3	3.5
7	22.7	22.7	2.2	15.7	0	84.1	15.7
8	1.4	1.4	5.4	0.5	1.1	95.3	4.6
9	43.3	43.3	0.8	1.5	0	93.7	6.1
10	16.4	16.4	5.8	0.5	0.9	98.5	0.7
11	24.7	24.7	1.1	0	0	100	0
12	30.6	30.6	0	0	0	98.8	0.6
13	30.2	30.2	0.5	0	0	99.3	0.4
14	13.1	13.1	1	0.2	0	99.5	0.5
15	20.8	20.8	0.6	0	0	99.4	0.6
16	4	4	0.4	0.5	0	88.5	4.3
17	0.7	0.7	0	0	0	100	0
18	14.3	14.3	2.1	10.3	0	95.3	2.9
19	51.4	51.4	0	0	0	100	0
20	5.8	5.8	0.6	0.5	0	99.9	0.1
21	43.7	43.7	5	1.3	0	96	4
22	100	100	0	0	0	100	0
23	3.4	3.4	0	0	0	99.6	0.4
TOTAL	20.4	69.4	2.6	3	0.2	95.9	3.5

Source: Census, 2011

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Name of village	Number of households having latrine facility within the premises	Flush/pour flush latrine connected to			Pit latrine		Number of households not having latrine facility within the premises	Alternative source	
		Piped sewer system	Septic tank	Other system	With slab/ventilated improved pit	Without slab/ open pit		Public latrine	Open
Bhoora Rani	80.9	15.2	65.1	0	0.1	0.4	19.1	0.5	18.6
Bigbara	53.6	11.5	28.1	0.3	13	0	46.4	0	46.4
Fajalpur Mahraula	79.5	20	58.5	0.3	0	0.7	20.5	0.7	19.9
Fulsunga	87.1	5.9	78.3	1.5	0.4	1.1	12.9	0.4	12.5
Fulsungi	59.9	0.5	57	2.4	0	0	40.1	0	40.1
Kalyanpur	50.6	19.5	30.6	0.5	0	0	49.4	0	49.4
Lamara	100	0	100	0	0	0	0	0	0
Rampura	99.5	13.1	86.5	0	0	0	0.5	0.5	0
Simla Bahadur	92.9	30.1	36.3	26.5	0	0	7.1	0	7.1

Source: Census, 2011

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Type of Sanitary Systems of Rudrapur (Rural Area), 2011

Name of village	Number of households having latrine facility within the premises	Flush/pour flush latrine connected to			Pit latrine		Number of households not having latrine facility within the premises	Alternative source	
		Piped sewer system	Septic tank	Other system	With slab/ventilated improved pit	Without slab/ open pit		Public latrine	Open
Amarpur	47.6	0.4	45.9	1.2	0	0	52.4	0	52.4
Bagwala	53	0.5	23.8	0.5	28.2	0	47	0	47
Bhamraula	87.6	51.7	35.2	0	0.4	0.4	12.4	3	9.4
Bindu Khera	52.1	1.1	38.8	0.2	11.5	0.4	47.9	0.7	47.3
Chhatarpur	84.7	0.5	80.6	2.2	1.3	0	15.3	0.3	15.1
Danpur	71.9	69.8	2.1	0	0	0	28.1	3.8	24.3
Gangapur Patia	50.6	1.8	47.1	0	0.6	1.2	49.4	0	49.4
Jafarpur	62.7	2.8	57.4	0.5	0.9	1.2	37.3	0	37.3
Jainagar	38.4	1.1	36.9	0.4	0	0	61.6	0	61.6
Khamaria	65.7	10.9	40.3	3	0	7	34.3	0	34.3
Kolara	67.4	0.9	56.8	0.9	7.5	1.3	32.6	8.8	23.8
Kolaria	64.5	8.4	52	3	1.1	0	35.5	0	35.5
Kotha	40	37.8	0	0	2.2	0	60	0	60
Lalpur	80	9.4	70.4	0.1	0.1	0	20	0	20
Loharra	50	10	40	0	0	0	50	0	50
Loharri	59.3	22.9	32.1	3.6	0.7	0	40.7	1.4	39.3
Malsagirdharpur	59.1	32.4	26.2	0.4	0	0	40.9	4	36.9
Malsi	60.7	0.9	57	0.6	0.9	1.2	39.3	0	39.3
Mat Kota	73.6	2	70.4	0.2	0.7	0	26.4	0.5	25.9
Phoolbag	60.9	3.9	56.1	0.3	0.3	0	39.1	2.4	36.8
Raipur	39.2	0.3	21.7	15.3	1.9	0	60.8	5.7	55.1
Rameswarpur	80.5	7.9	71.5	0	1.1	0	19.5	0	19.5
Shimala Pistore	72.1	0.3	70.6	0.3	0	0.9	27.9	0	27.9
Vijay Nagar	79.2	3	59.1	12	4	1.1	20.8	2.2	18.7

Source: Census, 2011

(Rudrapur)

Annex 9: Major Storm Water Drains of Rudrapur

Sr. No:	Name of the Drain	Length (km)	Open/Covered
1	Transit Camp West Side Big Drain	1.12	Open
2	From Kashipur By-pass Deen Dayal Chauraha towards Gaba Rice Mill on both sides	2.01	Open
3	Gandhi Colony Basant Lal Ji' House to Kirti's Residence	0.22	Open
4	Rampura Chaurasi Ghanta Temple to Rupan Devi's House	0.51	Open
5	From Masjid till SP Residence	0.40	Open
6	From Grass Mandi Tank to Church on both the sides	0.60	Open
7	Both sides of Awas Vikas Main Bazaar	1.38	Open
8	From Post Office to Meat Market	0.24	Open
9	Near Kali Temple Rampura	1.08	Open
10	Behind Ojha/ SDM Residence	0.30	Open
11	Sanatan Dharm Girls College Adarsh Colony	1.44	Open
12	Ravindra Nagar/Shyam Talkies	1.08	Open
13	Near Mahaveer Vatika Jain Temple	0.56	Open
14	From Resham Badi to Khera River	0.53	Open
15	Two drains in Sanjay Nagar	0.61	Open
16	From Dudhiya temple in Dudhiya Nagar to Hotel Le-Castle	0.68	Open
17	From Rajiv Nagar Bengali Basti to Gaba Rice Mill	1.58	Open
18	From fish market to Balaji Gate via Gandhi Colony and Subhash Colony	0.61	Open
19	From Sidhu Palace to Kalyani river via Deendayal Chauraha	0.82	Open
20	From Deendayal Chauraha to Market culvert	0.26	Open
21	From Balaji Gate to Vidya Mandir	1.14	Open
22	Transit Camp Ward No. 2 near police post	0.24	Open
TOTAL	-	17.45	-

Source: Municipal Corporation, Rudrapur

(Rudrapur)

Annex 10: Solid Waste Generation and Collection of Rudrapur City (Ward-Wise)

Ward	Average Generation (Tons/day)	Average Collection (Tons/day)	No: of Houses Covered for House-to-House Collection	Area of Landfill Site (Sq.km.)	Manpower Deployed	No. of sties for Land Fill
1	1.04	0.70	843	7945.25	4	One Dumping Site at Kichha Road
2	1.08	0.26	914		7	
3	0.97	0.44	740		7	
4	1.00	0.44	820		7	
5	1.16	0.44	965		4	
6	1.09	0.44	840		4	
7	1.08	0.26	864		4	
8	0.95	0.26	730		4	
9	1.02	0.26	736		4	
10	1.08	0.26	932		4	
11	1.21	1.31	916		4	
12	1.20	0.32	926		4	
13	1.13	0.32	778		4	
14	1.09	0.32	709		4	
15	1.11	0.32	764		6	
16	1.07	-	857		4	
17	0.90	0.62	578		4	
18	1.04	0.62	635		4	
19	1.12	0.62	799		4	
20	1.12	0.62	797		4	
21	1.01	0.62	726		4	
22	1.04	1.11	752		4	
23	1.03	1.11	729		4	
24	1.03	1.11	786		4	
25	1.17	-	954		4	
26	1.22	1.53	947		8	
27	1.19	0.52	888		6	
28	1.09	1.84	821		8	
29	1.19	1.15	846		4	
30	1.08	0.82	826		4	
31	1.24	-	1070		4	
32	1.05	-	871		4	
33	1.15	-	1014		4	
34	1.08	0.82	807		8	
35	1.20	1.33	907		4	
36	1.17	1.04	989		3	
37	1.16	1.22	1026		4	
38	1.15	1.52	894		7	
39	1.11	1.50	887		6	
40	1.13	-	550		1	
TOTAL	43.93	25.45	33435		186	

Source: Municipal Corporation, Rudrapur

(Rudrapur)

Disposal method of Solid Waste, 2019

Sanitary land fill	Incinerated	Open dump	Recycled	Burned openly	Others
•	•	•		•	

Employees details SWM in Rudrapur MC

No. of Sanitary supervisors	No. of Health Assistant	No. of Health workers	Others
1	1	0	9 (environmental supervisors)

(Rudrapur)

Annex 11: Post & Telecommunications

No. of telephone Exchanges	4, (2 in Urban & 2 in Rural)
No. of telephone connections (land line)	2177
No. of Public Telephone booths	-
No. of Mobile Connections	-
No of Mobile Towers	29
No. of Post/telegraph office	8, (4 in Urban & 4 in Rural)
No of Internet Connections	-
No. of Wi-fi hotspots	-

(Rudrapur)

Annex 12: Tenure Status of Rudrapur Planning Area, 2011

Tenure Status of Rudrapur (Urban Area), 2011

Ward No	Ownership type (%)		
	Owned	Rented	Any others
1	95.4	3.5	1.1
2	84.5	10.4	5
3	96.2	2.6	1.2
4	85	6	9
5	92.9	6.5	0.7
6	81.2	6.2	12.6
7	92.4	6.7	0.9
8	86	8.2	5.8
9	72.6	2	25.4
10	80.3	8.7	10.9
11	89.8	6.9	3.3
12	76.1	21	2.9
13	80.8	18.7	0.5
14	82.4	12.3	5.3
15	85.8	12.4	1.8
16	91.9	7.5	0.5
17	51.1	7.9	41.1
18	84.5	8.1	7.4
19	78.9	17.8	3.3
20	80	6	13.9
21	57.6	15.6	26.8
22	56.1	2.4	41.5
23	73.8	24.5	1.6

Source: Census, 2011

Name of Village	Ownership Type (%)		
	Owned	Rented	Others
Bhoora Rani	51.6	18.3	30.1
Bigbara	90.5	8	1.5
Fajalpur Mahraula	61.5	19.3	19.1
Fulsunga	90.1	9.9	0
Fulsungi	84.1	10.6	5.3
Kalyanpur	0.5	60.5	39
Lamara	29.3	70.7	0
Rampura	66.2	31.5	2.3
Simla Bahadur	73.9	23.9	2.2

Source: Census, 2011

Tenure Status of Rudrapur (Rural Area), 2011

Name of Village	Ownership Type (%)		
	Owned	Rented	Others

(Rudrapur)

Amarpur	100	0	0
Bagwala	84.7	0.5	14.9
Bhamraula	71.9	13.5	14.6
Bindu Khera	96.9	0.7	2.4
Chhatarpur	54.8	12.6	32.5
Danpur	74.5	14	11.5
Gangapur Patia	95.3	0	4.7
Jafarpur	87.3	5.3	7.4
Jainagar	93.6	2.8	3.6
Khamaria	91	4	5
Kolara	74.9	11	14.1
Kolaria	85.9	2.4	11.7
Kotha	100	0	0
Lalpur	70.3	26.6	3.1
Loharra	91.1	0	8.9
Loharri	83.6	0	16.4
Malsagirdharpur	56.9	40.9	2.2
Malsi	97.8	0.6	1.5
Mat Kota	68.6	29.9	1.5
Phoolbag	9.8	73.3	16.9
Raipur	98.4	0	1.6
Rameswarpur	73.2	24.1	2.7
Shimala Pistore	67.3	27.9	4.8
Vijay Nagar	97.3	1.4	1.3

Source: Census, 2011

(Rudrapur)

Annex 13: Distribution of Houses by no: of Living Room of Rudrapur Planning Area, 2011

Distribution of Houses by no: of Living Room of Rudrapur (Urban Area), 2011

Ward	Number of Dwelling Rooms (%)						
	No exclusive room	1	2	3	4	5	6 and above
1	4.1	23	24.9	21.2	11.6	6.7	8.5
2	1.3	26.4	25.9	22.1	12.4	4.5	7.4
3	1.2	29.1	36.2	18.7	8.7	3.4	2.6
4	1.3	33.5	29.8	16.9	10.5	4.2	3.8
5	1.5	36.5	32.8	14.2	9	3.1	2.9
6	1.8	37.8	30.5	17.4	7.5	1.9	3.1
7	2.8	48.8	25.5	12.6	6.6	1.6	2.2
8	0.4	48.7	29.3	12.6	5.3	1.5	2.2
9	1.2	44.7	39.4	7.3	5.2	1.4	0.8
10	0.9	31.5	36.9	13.7	11.5	2.4	3.2
11	2.2	9.9	26.9	31	20.1	5.2	4.7
12	1.5	30	34.1	20.7	9.9	1.7	2
13	0.3	17.1	32	22.6	17.1	4.4	6.6
14	0.6	45.3	27.8	13.2	6.9	3	3.2
15	0.5	25.1	34.5	20.2	12.9	3.6	3.2
16	0.4	26.6	36.2	19.9	10.5	3.9	2.6
17	1.3	53.7	16.2	13.6	8	3.5	3.7
18	1.2	26.3	28.1	20.8	14.2	3.5	6
19	1.4	7.2	25.5	19.5	23	10.1	13.2
20	1.4	24.1	37.7	16.5	12.4	3.8	4.1
21	0.4	16.7	32.7	27.7	17	2.1	3.5
22	3.4	0.5	0	54.1	42	0	0
23	0.6	5.6	29.3	19.3	29	8.2	7.8

Source: Census, 2011

Name of village	Number of Dwelling Rooms (%)						
	No exclusive room	1	2	3	4	5	6 and above
Bhoora Rani	2.2	39.9	31.8	14.9	8.2	2.1	0.9
Bigbara	1.2	54.4	19.8	13.3	4.7	3.6	3
Fajalpur Mahraula	1.2	36.3	24.4	19	13.8	2.7	2.6
Fulsunga	0.7	16.5	21.3	21	12.9	9.6	18
Fulsungi	0.5	36.2	30.9	15.9	7.2	5.8	3.4
Kalyanpur	0.2	41.4	49.2	4.8	3.6	0.5	0.2
Lamara	0	67.2	12.1	15.5	5.2	0	0
Rampura	0.5	8.1	23	40.5	19.4	3.6	5
Simla Bahadur	0.9	14.2	34.5	26.5	15	5.8	3.1

Source: Census, 2011

(Rudrapur)

Distribution of Houses by no: of Living Room of Rudrapur (Rural Area), 2011

Name of village	Number of Dwelling Rooms (%)						
	No exclusive room	1	2	3	4	5	6 and above
Amarpur	0.8	57.3	39.4	1.2	1.2	0	0
Bagwala	0	52	24.3	8.9	6.4	4.5	4
Bhamraula	2.2	34.5	33.7	12.7	7.5	4.9	4.5
Bindu Khera	0.7	45.3	27.5	14.8	5.4	4.1	2.2
Chhatarpur	1.3	32.3	36.3	14	6.5	5.9	3.8
Danpur	0.4	31.9	30.6	11.9	16.2	5.1	3.8
Gangapur Patia	0	48.2	25.3	8.8	8.2	2.9	6.5
Jafarpur	2.5	46.5	27.4	11.3	7.4	2.1	2.8
Jainagar	1.3	55.8	22.3	10.2	6.2	1.5	2.8
Khamaria	9.5	47.8	23.4	10	6.5	2	1
Kolara	3.5	33.9	24.2	15.4	9.3	5.7	7.9
Kolaria	2.7	41.2	23.8	13.8	10	4.1	4.3
Kotha	0.7	63	20	8.1	8.1	0	0
Lalpur	3.2	50.4	21.2	11.2	6.9	2.8	4.3
Loharra	1.1	30	41.1	6.7	8.9	6.7	5.6
Loharri	0.7	47.9	23.6	12.9	7.1	2.1	5.7
Malsagirdharpur	1.3	50.2	15.6	7.6	14.2	7.6	3.6
Malsi	8	36.2	30.7	17.3	4.6	1.5	1.5
Mat Kota	0	42.5	17.3	13.3	15.1	5.2	6.7
Phoolbag	0.5	49.2	32.5	6.9	8.9	1.8	0.2
Raipur	3.8	45.2	37.6	10.8	1.3	1	0.3
Rameswarpur	0.3	50.4	23.8	15.7	6	2.2	1.6
Shimala Pistore	0.3	45.6	28.2	17.4	5.7	2.1	0.6
Vijay Nagar	0.4	38.2	36.1	15.2	5.4	2.7	1.9

Source: Census, 2011

(Rudrapur)

Annex 14: Details of Slums as per Census, 2011

Slum Name	No. of Households (Approximate)	Slum Population (Approximate)
Dudhiya Nagar	1035	5655
Gandhi Colony	538	2987
Rampura Paschim	143	774
Rampura Poorvi	1414	6157
Subhash Colony	227	1745
Khera	2178	13356
Sir Gotiya	447	2441
Bhadaipura Paharganj	1505	8469
Sanjay Nagar	1170	6103
Shiv Nagar	806	4327
Jagatpura	1030	5192
Bhutbangla	1211	7055
Rampura Madhya	950	5114
Dariya Nagar	230	820
Indira Colony	774	4192
Indira colony Bengali	758	4084
Adarsh Colony	411	2057
Ravindra Nagar	1149	3410

Source: Census, 2011

Annex 15: Disasters occurred in the Planning Area

Type of Disaster	Year of Disaster	No. of Houses damaged	Persons affected	Property Loss (Rs. Lakhs)	Action Taken
Earthquake	NA	NA	NA	NA	NA
Floods	2019, (3 times)	0	0	0	-

Source: District Disaster Management Authority, Udham Singh Nagar

Annex 16: Traffic and Travel Characteristics

Passenger Car Unit (P.C.U.) Standards

Sr. No:	Vehicle Type	P.C.U. Value
Fast Vehicles		
1	Two Wheelers	0.5
2	Passenger Car, Pick-up van	1
3	Auto-Rickshaw	1
4	Light Commercial Vehicle	1
5	Truck or Bus	3
6	Multi-Axle Vehicle	4.5
7	Agricultural Tractor Trailer	4.5
Slow Vehicles		
8	Cycle	0.5
9	Cycle Rickshaw	2
10	Animal Cart	6
11	Hand Cart	3

Source: Indian Road Congress Guidelines

Railway

Items	No.
No of railway Stations	1
Types of rail gauge; viz broad, narrow and meter gauge	Broad Gauge
Length of rail network (in km.)	Length will be calculated afterwards based on NRSC data
No of platforms	2
No of yards	0

Source: Railway Department, Rudrapur

Air

Items	No:
No. of Airports (Domestic and International)	1 Domestic
Traffic Volume and Passenger Data	Commercial Flights:2 Passengers per day: 35 Arrival and 35 Departure approximately

Source: Airport Authority of India Office, Pantnagar

Origin-Destination Zoning

Zone Number	Area Covered
Internal Zones	
1	Ward no.1 (Fulsunga and Fulsungi)
2	Ward no.2 (Transit camp east)
3	Ward no.3 (Transit camp Mid)
4	Ward no.4 (Transit camp west)
5	Ward no.5 (Mukharji Nagar)
6	Ward no.6 (Jagatpura)
7	Ward no.7 (Azad Nagar)
8	Ward no.8 (Vivek nagar)
9	Ward no.9 (Shiv Nagar)
10	Ward no.10 (Raja Colony, Thakur Nagar)
11	Ward no.11 (Sanjay nagar)
12	Ward no.12 (FCI, Industrial area)
13	Ward no.13 (Dudia nagar)
14	Ward no.14 (Bhadai Pura)
15	Ward no.15 (Pahar Ganj)
16	Ward no.16 (Bigwara)
17	Ward no.17 (Khera south)
18	Ward no.18 (Khera Mid)
19	Ward no.19 (Khera North)
20	Ward no.20 (Bhoot Bangla North east)
21	Ward no.21 (Bhoot bangla west south)
22	Ward no.22 (Rampura East)
23	Ward no.23 (Rampura Mid)
24	Ward no.24 (Rampura West)
25	Ward no.25 (Fazalpur mehrola)
26	Ward no.26 (Seer Gontia)
27	Ward no.27 (Gandhi colony)
28	Ward no.28 (Main Bazar)
29	Ward no.29 (Adarsh Colony)
30	Ward no.30
31	Ward no.31 (Alliance Colony, Rampura)
32	Ward no.32 (Bhura Rani)
33	Ward no.33 (Singh Colony)
34	Ward no.34 (Indra Colony)
35	Ward no.35 (Adarsh Indra Colony)
36	Ward no.36 (Adarsh Colony Ghass Mandi)
37	Ward no.37 (Kalyani View)
38	Ward no.38 (Awas Vikas west)
39	Ward no.39 (Awas Vikas east)
40	Ward no.40 (Sidcul, Jagalpura, District court, Omex Metro)
41	Area between Gadarpur road (OC 1) and Dineshpur road (OC 6) upto Rudrapur Planning Area

42	Area between Dineshpur road (OC 6) and Haldwani road (OC 5) upto Rudrapur Planning Area
43	Area between Haldwani road (OC 5) and Pantnagar road (OC 4) upto Rudrapur Planning Area
44	Area between Pantnagar road (OC 4) and Kichha road (OC 3) upto Rudrapur Planning Area
45	Area between Kichha road (OC 3) and Rampur road (OC 2) upto Rudrapur Planning Area
46	Area between Rampur road (OC 2) and Gadarpur road (OC 1) upto Rudrapur Planning Area
External Zones	
47	Jaspur Tehsil , Kashipur Tehsil , Bajpur Tehsil , Rest of Gadarpur Tehsil
48	Rest of Kicha Tehsil, Sitarganj Tehsil, Khatima Tehsil
49	District Nanital
50	District Rampur, Moradabad
51	Gharwal Division (Dehradun, Haridwar, Tehri Garhwal, Pauri Garhwal, Uttarkashi, Rudraprayag and Chamoli)
52	Kumaon Division (Almora, Pithoragarh, Bageshwar, Champawat)
53	District Bareilly
54	Saharanpur, Shamli, Muzzafar nagar, Baghpat, Bijnor, Meerat, Ghaziabad, Amroha, Gautam Budh nagar, Bulandshahar, Sambhal, Aligarh, Mathura, Agra, Hathras
55	Rest of Uttar Pradesh
56	Delhi
57	Himachal Pradesh
58	Punjab, Haryana & Jammu kashmir
59	Rajasthan, Madhya Pradesh, Gujarat and Maharashtra
60	Chattisgarh, Odisha, Jharkhand, Bihar, West bengal
61	North eastern states
62	Rest of India
48	Jaspur Tehsil , Kashipur Tehsil , Bajpur Tehsil , Rest of Gadarpur Tehsil
49	Rest of Kicha Tehsil, Sitarganj Tehsil, Khatima Tehsil
50	District Nanital
51	District Rampur, Moradabad
52	Gharwal Division (Dehradun, Haridwar, Tehri Garhwal, Pauri Garhwal, Uttarkashi, Rudraprayag and Chamoli)
53	Kumaon Division (Almora, Pithoragarh, Bageshwar, Champawat)
54	District Bareilly
55	Saharanpur, Shamli, Muzzafar nagar, Baghpat, Bijnor, Meerat, Ghaziabad, Amroha, Gautam Budh nagar, Bulandshahar, Sambhal, Aligarh, Mathura, Agra, Hathras
56	Rest of Uttar Pradesh
57	Delhi
58	Himachal Pradesh
59	Punjab, Haryana & Jammu kashmir

60	Rajasthan, Madhya Pradesh, Gujarat and Maharashtra
61	Chattisgarh, Odisha, Jharkhand, Bihar, West bengal
62	North Eastern States
63	Rest of Rudrapur Tehsil

Source: Consultant Analysis

Annex 17: Travel and Tourism

S. No	Description	No. of Units
1	Tourism Destination Centers	13
2	Tourism Information Centers	0
3	Tourism Season	12 Months
4	Average No. of Foreign Tourist	1745
5	Average No. of Domestic Tourist	136657
6	No. of Star hotels	3
7	No. of House boats	0

Source: Tourism Department, Udham Singh Nagar

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Annex 18: Projections of Traffic & Transportation

Total Number of Vehicles																		
Name of Mid-Block Point	Car/ Jeep/ Taxi	2-Wheeler	3-Wheeler	Lcv	Bus	Mini Bus/ Tempo/ Van	2 Axle Truck	3 Axle Truck	Mav	Cycle	Cycle Rickshaw	Tractor	Animal Cart	Hand Cart	Tractor Trailer	E Rickshaw	Others (Specify)	Total
Kashipur Bypass road	11060	31681	899	1117	110	281	59	24	1	4864	481	12	23	98	23	9058	5	59796
Kashipur Road	9846	17353	1784	1340	569	428	1025	679	542	2464	62	39	24	336	208	5332	34	42065
Kichha Road	7206	17822	3742	1392	355	358	1029	826	603	4984	521	39	20	144	220	4867	38	44166
Kichha Bypass Road	9496	31549	2227	1433	396	546	85	23	8	5006	381	19	48	74	64	7605	0	58960
Haldwani Road	18765	32865	4950	1681	1327	499	243	114	23	4121	122	26	14	141	37	3253	19	68200
Bilaspur Haldwani road opposite BSNL	10990	23826	7392	1211	1035	402	140	63	11	6057	478	23	23	209	45	828	105	52838

Source: Computed Value

Peak Hour Vehicles																		
Name of Mid-Block Point	Car/ Jeep/ Taxi	2-Wheeler	3-Wheeler	Lcv	Bus	Mini Bus/ Tempo/ Van	2 Axle Truck	3 Axle Truck	Mav	Cycle	Cycle Rickshaw	Tractor	Animal Cart	Hand Cart	Tractor Trailer	E Rickshaw	Others (Specify)	Peak Traffic %
Kashipur Bypass road	877	2513	71	89	9	22	5	2	0	386	38	1	2	8	2	719	0	7.93%
Kashipur Road	862	1519	156	117	50	37	90	59	47	216	5	3	2	29	18	467	3	8.75%
Kichha Road	596	1474	310	115	29	30	85	68	50	412	43	3	2	12	18	403	3	8.27%
Kichha Bypass Road	785	2608	184	118	33	45	7	2	1	414	31	2	4	6	5	629	0	8.26%
Haldwani Road	1748	3062	461	157	124	46	23	11	2	384	11	2	1	13	3	303	2	9.32%
Bilaspur Haldwani road opposite BSNL	898	1948	604	99	85	33	11	5	1	495	39	2	2	17	4	68	9	8.17%

Source: Computed Value

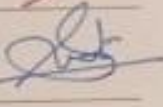
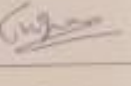
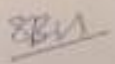
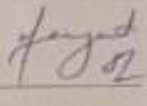
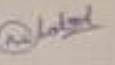
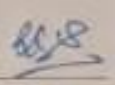
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Peak Hour Trips																	
Name of Mid-Block Point	Car/ Jeep/ Taxi	2-Wheeler	3-Wheeler	Lcv	Bus	Mini Bus/ Tempo/ Van	2 Axle Truck	3 Axle Truck	Mav	Cycle	Cycle Rickshaw	Tractor	Animal Cart	Hand Cart	Tractor Trailor	E Rickshaw	Others (Specify)
Vehicle occupancy	2.8	1.5	5.3		16.5	19.5				1	2					2.6	
Kashipur Bypass road	2451	3833	380		144	434				386	76					1848	
Kashipur Road	2408	2316	832		821	729				216	11					1200	
Kichha Road	1665	2248	1650		484	577				412	86					1036	
Kichha Bypass Road	2192	3976	981		540	879				414	63					1617	
Haldwani Road	4884	4669	2458		2038	905				384	23					780	
Bilaspur Haldwani road opposite BSNL	2509	2970	3220		1395	640				495	78					174	

Source: Computed Value

Annex 19: List of Attendees at District Level Meeting

अमृत उपयोग के अन्तर्गत रुद्रपुर एवं काशीपुर महायोजना की बैठक दिनांक 13.10.2020 की उपस्थिति जिला-उधमसिंह नगर				
क्र. सं.	नाम	पदनाम	मोबा. नं० / ई-मेल आई.डी.	हस्ताक्षर
01	02	03	04	05
01	श्रीमती रजना राजगुरु	जिलाधिकारी, उधमसिंह नगर		
02	बशीर तिवारी	उपायुक्त, जिला स्टाफ प्रधिकरण, उधमसिंह नगर		<i>[Signature]</i>
03	Rinku Bhatt	MNA Nagar Nagar Rtd.	9412943419	<i>[Signature]</i>
04	Naresh dargopal	02	941164435	<i>[Signature]</i>
05	Pankaj Upadhyay	Secretary DDA USM	953630268	<i>[Signature]</i>
06	P.K. Srivastava	A.E. Jhansi Pudhup	8958514522	<i>[Signature]</i>
07	K. M Budhla Kati	DDO Kathiary	9412943970	<i>[Signature]</i>
08	Amrita Rauturi	Urban Planner NMR	9456657211	<i>[Signature]</i>
09	Shashipal Singh	A.E. Uttarakhand Pooja Nigam Kathiary	9927193555	<i>[Signature]</i>
10	H.C. Tewari	C.H.O. USM	9412436222	<i>[Signature]</i>
11	Moh Uniyal	Nagar Nigam Kathiary	8218382478	<i>[Signature]</i>
12	Shivraj Chand	S.D.O. Foxbat T.E. F.D. Haldwari	9536444 833	<i>[Signature]</i>
13	मि. सह अमृत	Mio Rtd-U	805110066	<i>[Signature]</i>

14	Tuhardeep Dhinan	Asst. Architect SIDA	96346372	
15	Puja Nayal	AR-TO (A) URM	TA099688	
16	Swati Agrawal	V.O., Ramchurni	701205728	
17	Gurpreet Singh	Nagar Nigam Pankhuri	9958327 901	
18	Anam kumar	EE. PWD karnipur	9414956372	
19	Sanjay Bisht	RS, GIS, Tech Mech Interurbans	878007272	
20	Hajjeet Singh	Director, Tech mech Interurbans	76380999 19	
21	Manvendra Ghatale	Assistant Urban Planner, TechMech	97946316	
22	Raghuniraj Bhatt	J.E. TCID. H/d	9927027425	
23				
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ANMOL			
P. No.			
Dt.			
क्र.सं.	नाम	पता	हस्ताक्षर
11-	श्री. बबलरा बीरवी	पान 2	<i>(Signature)</i>
12-	श्री. मतीशामाशुता	— " —	<i>Scuft</i>
13-	श्री. प्रकाशसिंह शर्मा		
14-	श्री. शिवकुमार पादरा		<i>(Signature)</i>
15-	श्री. नारायण शर्मा		मनिक अली
16-	श्री. अमरकुमार शर्मा		<i>Pisawat</i>
17-	श्री. मतीशालुपावा		<i>Shahid</i>
18-	श्री. मतीशालुपावा		सम्रा कोली
19-	श्री. सुनीलकुमार		<i>Scuft</i>
20-	श्री. मां जीहिंद		मो. जाहिंद
21-	श्री. अमितकुमार मिश्रा		<i>(Signature)</i>
22-	श्री. मतीशालुपावा		पुतपारानी
23-	श्री. मतीशालुपावा		पुतपारानी
24-	श्री. मतीशालुपावा		
25-	श्री. सुनीलकुमार पादरा		<i>(Signature)</i>

ANMOL			
P. No.			
Dt.			
क्र.सं.	नाम	पदनाम	हस्ताक्षर
26	श्री मतीरामजी शर्मा	पारिव	<i>Pant</i>
27	श्री मती मधु शर्मा	"	मधु शर्मा
28	श्री मती दिनेश शर्मा	"	<i>Di</i>
29	श्री मती इत्तमशर्मा	"	Ilma Samreen
30	श्री आपुष लमेजा	"	<i>Apurush</i>
31	श्री मती सुनीलकुमार	"	सुनील मन्जाल
32	श्री मोहनलाल शर्मा	"	Moh...
33	श्री सुशांत चौहान	"	<i>Sushant</i>
34	श्री रामेश सिंह	"	<i>Ramesh</i>
35	श्री मती रामजी शर्मा	"	श्यामली
36	श्री विरेश कुमार	"	<i>Vir</i>
37	श्री बालकृष्ण शर्मा	"	<i>Bal</i>
38	श्री मती शीनाजगगा	"	शीनाजगगा
39	श्री रमेश कुमार	"	<i>Ramesh</i>
40	श्री राजेश कुमार	"	Rajesh Kumar

ANMOL
P. No.
Dt.

15)

क्र.सं.	नामित/पञ्चाय	नाम	हस्ताक्षर
प.1	— " —	श्री बीरेश गुप्ता	
प.2	— " —	श्री सुनील मोदक	सुनील मोदक
प.3	— " —	श्री मेली शक्ती बोर	Shree...
प.4	— " —	श्री मणि क...	
प.5	— " —	श्री महावीर कश्यप	
प.6	— " —	श्री अजय मोदी	
प.7	— " —	श्री राजकुमार कौशिक	राजकुमार
प.8	— " —	श्री नारायण विश्वाम	नारायण विश्वाम
	पदल सदस्य		
1-	श्री अजय गार्ग	मान. सा. सद.	निगीन शर्मा
2-	श्री राजकुमार कौशिक	मान. विश्वाम	
3-	श्री राजेश शक्ती	मान. विश्वाम	