



Dehradun Master Plan- 2041 (Draft)

Part – 1

Study & Analysis



TOWN & COUNTRY PLANNING DEPARTMENT
UTTARAKHAND

PREFACE

The Master Plan for Dehradun, prepared under the Atal Mission for Rejuvenation and Urban Transformation (AMRUT), presents a comprehensive framework for the city's planned and sustainable development up to the horizon year 2041. As the capital city of Uttarakhand and a major administrative, educational, and economic centre, Dehradun has been experiencing rapid urbanization, population growth, and increasing pressure on land and infrastructure. This Master Plan has been formulated with the primary objective of guiding orderly urban growth, addressing emerging challenges, and enhancing the overall quality of life for its residents.

The need for a long-term and integrated planning approach arises from the imperative to manage future population growth, rationalize existing land use patterns, protect environmentally sensitive areas, and ensure the timely provision of essential physical and social infrastructure. The plan seeks to balance development needs with environmental sustainability, resilience, and inclusiveness, keeping in view Dehradun's unique ecological setting in the Doon Valley.

The planning process adopted a rigorous and multi-disciplinary approach, beginning with a detailed assessment of Dehradun's existing spatial structure, historical evolution, demographic characteristics, economic base, infrastructure systems, and socio-environmental conditions. This analysis helped identify key issues such as infrastructure gaps, traffic congestion, environmental degradation, and uneven spatial development, as well as opportunities for economic diversification and improved urban livability.

Based on these assessments, sector-wise strategies and proposals have been formulated covering land use planning, transportation and mobility, housing, physical and social infrastructure, environmental management, and economic development. The Master Plan provides a structured and statutory framework that integrates physical, social, economic, and environmental dimensions of urban development, guiding Dehradun towards a more sustainable, resilient, and prosperous future by 2041.

Report Composition:

Part I- Analysis

Part II- Proposal

Part III- Annexure

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1 PROJECT BACKGROUND

1.1 INTRODUCTION

Since independence, Dehradun has witnessed rapid and continuous urban growth, transforming from a quiet valley town into one of North India's fastest-expanding cities. Its population has multiplied several times since 1947, driven by administrative importance, educational institutions, military establishments, and rising migration from surrounding hill regions. By 2011, Dehradun had already crossed major urban thresholds, and its urbanization is expected to accelerate further in the coming decades. However, this growth has often been unplanned and unregulated, resulting in non-conforming land uses, unauthorized colonies, shrinking agricultural land, pressure on forests, traffic congestion, and increasing strain on natural resources. As a result, Dehradun faces significant challenges related to haphazard expansion, ecological imbalance, and the need for sustainable and well-managed urban development.

The urban population will be the driver of the Indian economy, contributing about three-fourths of the GDP by 2030. With such perspectives in sight, the Government of India (GoI) has launched various urban development schemes such as Smart City Mission and Atal Mission for Rejuvenation and Urban Transformation (AMRUT). They are intended to create new urban clusters, renew existing urban scenarios and improve the overall quality of life by ensuring basic amenities like water supply, sanitation, urban transport, development of green space & parks, capacity building improvement programs, etc. to the residents. The total population of the state is 10,086,292 as per Census 2011 and of this, nearly 30% of them reside in urban areas. As per Census 2011, the state has 92 Urban Local Bodies (ULB) and a total of 41 Census Towns. The state comprises 7 class 1 towns with Dehradun being the capital city of Uttarakhand state and the one with the highest population of 5,69,587 as per Census 2011. MDDA jurisdiction covers Mussoorie and Dehradun, but the GIS based master plan is prepared only for Dehradun comes under Amrut 500 cities. For the purpose of clarity consultant is preparing two separate reports for Mussoorie and Dehradun. This report solely focuses on the Dehradun Planning Area.

Dehradun is nestled between the Himalayan foothills to the north and the South. The town offers breath-taking scenery. Dehradun is situated at an altitude of 1400 ft. in the MDDA Planning Area. The town also serves as a convenient base for visiting the area's many tourists' sites. It is well connected and close to Himalayan tourist destinations like Mussoorie and Auli, as well as Hindu holy cities like Haridwar and Rishikesh and the Himalayan pilgrimage circuit of Chota Char Dham.

Following rapid urbanisation and economic growth, the Government of Uttarakhand (GoU) intends to regulate the development process in its urban settlements in order to ensure that these urban settlements continue to serve their purpose without causing inconveniences and difficulties to the population and administration. Dehradun, as the interim capital and the state's largest urban agglomeration, requires special attention, and it is with this in mind that the Government of Uttarakhand has invited consultants to support them in the preparation of the GIS-based Base Map, Master Plan, and Zonal Plan for the planning area under Mussoorie Dehradun Development Authority (MDDA).

1.2 PRESENT STATUS OF MASTER PLANS

Currently, around 52% of statutory towns and 76% of census towns in India lack Master Plans, leaving nearly three-fourths of urban areas without a formal spatial development framework. This gap poses a major challenge for managing the rapid pace of future urbanization. In the case of **Dehradun**, the city has benefitted from having formally prepared Master Plans—most notably the Dehradun Master Plan 2005–2025 and the draft GIS-based Master Plan 2041—which have guided its urban expansion, zoning, and infrastructure planning. However, while Dehradun has a structured planning framework, many of the surrounding settlements and peri-urban areas continue to expand organically without effective land-use controls or coordinated infrastructure development. As a result, the broader Dehradun urban agglomeration faces increasing pressure

in the form of unregulated growth, unauthorized construction, and rising environmental stress, highlighting the need for comprehensive and up-to-date planning across the entire region.

Since its formation in 2000, Uttarakhand has developed Master Plans for key towns such as Dehradun, Rishikesh, Rudrapur, and Nainital. While these have supported planned development in major cities and tourist hubs, smaller towns continue to grow organically, often without adequate infrastructure or land use regulation.

Dehradun is a city that is constantly changing and becoming more complex. Continuous urban development necessitates the spatial information of the Dehradun city on GIS portal, which aids in decision-making for both public and private entities. GIS helps to analyse the town's current situation and future needs for economic and social infrastructure and mitigation of the impact of traffic and transportation issues and natural disasters.

1.3 NEED FOR GIS-BASED MASTER PLANS

The Master Plan/Development Plan is the primary tool for urban land management, providing detailed land use allocation for the city's or town's long-term development. A base map of the planning area that is accurate and up to date, showing road and building layouts, the spatial extent of development, and information on the use of each parcel of land, among other things, is required for developing a Master Plan. The Master Plan is a constitutional instrument, according to the provisions of the Uttarakhand Urban and Country Planning and Development Act 1973.

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GIS technology enables accurate mapping of land parcels, real-time spatial analysis, and integration of multiple layers such as land use, transportation, utilities, environmental zones, and hazard-prone areas. This enhances transparency, reduces errors in land-use classification, and improves decision-making for planners and administrators. GIS-based plans also support better monitoring of urban growth, help identify unauthorized developments, and allow scenario-based forecasting for infrastructure demand.

1.3.1 GIS-Based Master Plans: A Modern Approach

GIS-based Master Plans represent a transformative shift from traditional planning methods to a more scientific, data-driven, and dynamic approach to urban development. By using Geographic Information Systems (GIS), planners can overlay and analyze multiple spatial layers—such as land use, transportation networks, utilities, natural features, population density, and hazard zones—with high accuracy. To address the shortcomings of conventional planning, GIS-based Master Plans are being adopted. These use Very High-Resolution Satellite (VHRS) imagery and spatial data to create accurate base maps at 1:4000 scale, enabling data-driven decision-making.

Key features of GIS-based planning:

- Digitally editable and updatable land use and attribute data.
- Integration of spatial and non-spatial data for 2D and 3D urban analysis.
- Standardized methods for base map preparation across cities.
- Quality Assurance/Quality Control (QA/QC) processes at every stage.

The Ministry of Housing and Urban Affairs (MoHUA), under the AMRUT mission, launched a sub-scheme to prepare GIS-based Master Plans for 500 cities. This initiative is 100% centrally funded and aims to:

- Develop digital, geo-referenced base and land use maps.
- Facilitate Master Plan preparation using GIS tools.

In summary, Master Plans, particularly GIS-based, are vital instruments for sustainable, inclusive, and resilient urban development, aligning land use planning with the broader goals of economic growth, environmental conservation, and social well-being.

1.4 OBJECTIVES OF MASTER PLAN PREPARATION

The primary objective of the Dehradun Master Plan is to promote sustainable and balanced development of the city by regulating its spatial growth up to the horizon year 2041. Prepared under the provisions of the Uttarakhand Urban and Country Planning and Development Act, 1973 (as amended in 2013), this Master Plan serves as a statutory instrument to guide and control land use, infrastructure development, and environmental conservation, while outlining a long-term vision for integrated and orderly urban development of the Dehradun Planning Area. Another key objective is to improve the overall quality of life by promoting planned neighbourhoods, adequate open spaces, and inclusive urban services. Additionally, Master Plans seek to strengthen disaster resilience, enhance economic opportunities, and support transparent, data-driven governance. Ultimately, the Master Plan serves as a strategic tool to shape a city's growth in a coordinated and sustainable manner.

Key objectives include:

- Promote planned development by minimizing haphazard and unregulated growth, ensuring a healthy and livable environment.
- Distribute urban functions sustainably to meet current demands and future needs while maintaining environmental balance.
- Coordinate physical growth of city components by treating the entire urban area as a single planning entity.
- Optimize transport and infrastructure through rational zoning and an efficient network of services and facilities.
- Preserve natural resources and prevent the degradation of environmental assets.
- Ensure compatible land uses by aligning residential, commercial, industrial, and recreational areas to avoid land use conflicts.
- Enable future improvements without major disruptions by anticipating long-term needs in today's planning.

1.5 PROJECT APPROACH

The preparation of the Master Plan for **Dehradun** follows a similarly comprehensive and structured approach aimed at managing the city's rapid and complex urban growth. It involves a detailed assessment of the current demand–supply gaps in housing, transportation, public utilities, social infrastructure, and environmental resources. Critical urban issues—such as unplanned expansion, traffic congestion, pressure on forests and water bodies, proliferation of unauthorized colonies, and inadequate drainage—are systematically identified and analyzed. Based on these findings, the plan develops a strategic management framework that outlines future land-use zoning, infrastructure investments, development controls, and policy interventions required to guide Dehradun's growth in a sustainable, resilient, and well-coordinated manner. This approach ensures that the city's expansion aligns with its ecological sensitivity, regional importance, and long-term urban development goals.

The Plan will:

- Propose strategies and guidelines for sustainable urban development.
- Introduce realistic land use management interventions within the existing regulatory and institutional framework.
- Integrate development trends by reviewing ongoing and planned schemes of both public and private agencies influencing the city's growth.
- Review previously prepared Master Plans to identify deviations in land use and recommend corrective actions.

The methodology includes:

- Base map updation using GIS.
- Data collection and analysis on demographics, infrastructure, environment, and services.
- City-level assessment, including SWOT analysis and service gap identification.
- Stakeholder consultations to ensure participatory planning.
- Preparation of the Existing Land Use Plan, Proposed Land Use Plan, and supporting thematic maps.

This structured approach ensures a responsive, integrated, and sustainable Master Plan aligned with the city's long-term vision and development needs.

1.6 METHODOLOGY FOR PREPARATION OF MASTER PLAN

The methodology outlines the systematic and structured approach adopted for the preparation of the Master Plan for **Dehradun**. It ensures a logical progression of tasks, minimizes the chances of errors, and aligns each stage of the process with the defined planning objectives. Given the unique geographical, environmental, and urban challenges of Dehradun, selecting the most effective and context-specific methods is crucial. Although multiple techniques can be employed to achieve planning goals, the chosen methodology focuses on producing accurate, reliable, and high-quality outcomes that support sustainable and well-managed growth for the city.

This section elaborates on various activities and the corresponding methodology adopted for the preparation and Implementation of the Master Plan for the Dehradun Planning Area. The main 5 stages for preparation and implementation of the Master Plan are given in Figure 1-1 (reference diagram), consists of following stages:

Figure 1-1 Project Methodology



1.6.1 Stage 1: Project Initiation and Team Mobilization

The primary objective of this stage is to initiate the project by finalizing the work plan, methodology, and the familiarization of the project team with the Planning Area. It shall include the following components:

- Mobilization of the multidisciplinary team and orientation about project objectives and tasks.
- Introductory meetings with the Planning Authority and relevant line departments to inform them about the planning scope and data requirements.

- Reconnaissance surveys were conducted to understand on-ground conditions and spatial development patterns.
- Review of secondary data collected from various government and online sources.
- Preparation of a detailed work plan, outlining milestones and deliverables.

1.6.2 Stage 2: Base Map Updation

One of the key prerequisites for the preparation of a suitable Master Plan is the preparation of an accurate and authentic Base Map. An ideal base map should be indicative of and a perfect demonstration of all the existing site features. It should be accurately positioned and mapped and should be based upon an in-depth site survey.

In addition to all the spatial features captured in order to generate an accurate base map, this stage shall also aim at carrying out socio-economic surveys, Infrastructure Surveys, Traffic Surveys and Tourism Surveys, which shall eventually help develop a brief existing profile of the planning area.

- Preparation of a comprehensive GIS base map using data provided by NRSC, verified through field surveys.
- Ground-truthing of spatial features to ensure accuracy.
- Spatial attribute data collection and correction of discrepancies based on field validation.
- Integration of this data into a GIS-based Urban Land Use/Land Cover database.

1.6.3 Stage 3: Data Collection and Policy Review

Collection and compilation of both primary and secondary data related to:

- Socio-economic conditions
- Environmental and natural resources
- Physiography and geology
- Human settlement hierarchy and structure
- Built-up environment and existing land use
- Transport and connectivity infrastructure
- Physical and social infrastructure
- Ongoing and proposed projects

Simultaneously, a comprehensive review of existing policies, plans, and strategies was undertaken including:

- Regional economic policies, industrial strategies, tourism and heritage frameworks
- Environmental regulations and judicial directives (Supreme Court, High Court, NGT)
- Public-Private Partnership (PPP) policies

1.6.4 Stage 4: City Assessment and Situation Analysis

- Identification of critical issues, opportunities, and challenges through comparative analysis of current conditions with national and state-level norms.
- Assessment of infrastructure gaps and carrying capacity, using satellite imagery and environmental data.
- Evaluation of development trends at the city and regional levels to determine long-term planning needs.

1.6.5 Stage 5: SWOT Analysis

A detailed SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis was conducted on various thematic areas:

- Demographics and population growth
- Real estate and housing market assessment
- Economic base and employment trends
- Investment and industrial scenario
- Catchment area and regional influence
- Transport and mobility systems
- Infrastructure and utility services
- Urban poverty and slums
- Water resources and future capacity
- Environmental mapping and ecosystem status
- Heritage and conservation priorities
- Land use modelling and spatial planning

1.6.6 Stage 6: Stakeholder Consultations

Consultations were carried out across all relevant stakeholder groups, including:

- Local citizens (urban and rural)
- Farmers, traders, and industrialists
- Elected representatives and civil society groups
- Academicians and research institutions
- Government departments and NGOs

These sessions were conducted through workshops, meetings, and focus group discussions to gather inputs for the vision, objectives, and sectoral strategies.

1.6.7 Stage 7: Vision Formulation and Policy Development

Based on the analysis and consultations, a development vision for the year 2041 was formulated. This included:

- A clear vision statement with measurable targets
- Sector-wise development strategies for sustainable growth
- Policy amendments to address deviations from the previous Master Plan
- Projections for land use, economic activity, infrastructure demand, and employment generation

1.6.8 Stage 8: Preparation of Preliminary Plans

Formulation of preliminary proposals, including:

- Proposed Land Use Plan and zoning regulations
- Sectoral plans for:
 - 1) Transportation and mobility
 - 2) Water supply, sewerage, and stormwater drainage
 - 3) Social and physical infrastructure
 - 4) Solid waste and wastewater management
 - 5) Conservation of heritage and water bodies
- A Strategy Report covering:
 - 1) Regional context and socio-economic trends
 - 2) Development projections
 - 3) Opportunities, challenges, and spatial implications
 - 4) Short- and medium-term action plans

1.6.9 Stage 9: Draft Master Plan Preparation

A Draft Master Plan was prepared in compliance with the Uttarakhand Urban and Country Planning and Development Act, 1973 (as amended in 2013) and URDPFI / AMRUT guidelines, integrating:

- 1) Spatial strategy
- 2) Sectoral plans
- 3) Institutional framework
- 4) Regulatory and policy recommendations
- 5) Technical drawings and maps on ArcGIS and AutoCAD platforms

1.6.10 Stage 10: Finalization of the Master Plan

- Compilation of public objections and suggestions following the release of the Draft Plan.
- Review and finalization of these inputs in consultation with the Town and Country Planning Department, Uttarakhand.
- Final Draft Master Plan prepared incorporating all necessary revisions.
- Submission of all outputs including maps, plans, and drawings in prescribed formats.

This comprehensive and phased methodology ensures a participatory, data-driven, and policy-aligned planning process for the sustainable and integrated development of Haridwar Planning Area by the horizon year 2041.

1.7 BASE MAP PREPARATION

1.7.1 Need for Preparation of Base Map/ Existing Land Use

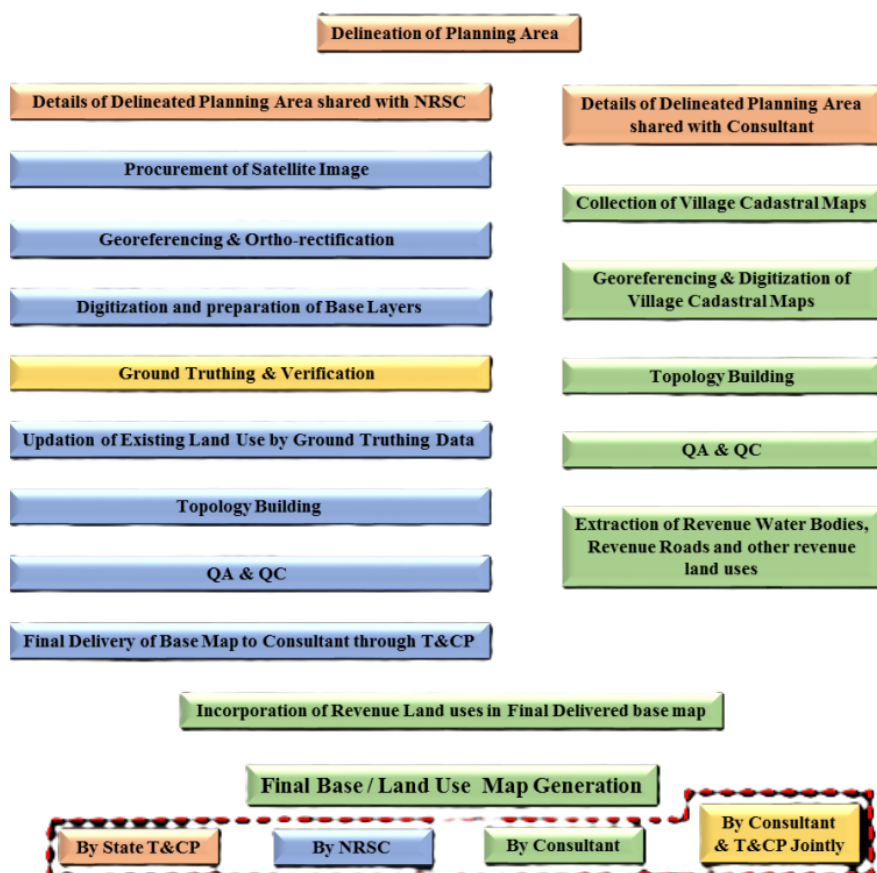
The preparation of a Base Map and Existing Land Use (ELU) is essential for establishing an accurate and reliable foundation for Master Plan development. A Base Map provides the fundamental spatial framework that captures the city's physical features, such as road networks, building footprints, water bodies, public utilities, open spaces, and administrative boundaries. Without this precise spatial reference, planning decisions may lead to errors, overlaps, or misinterpretations. Similarly, mapping the Existing Land Use is crucial for understanding how land is currently utilized—whether for residential, commercial, industrial, institutional, recreational, agricultural, or vacant purposes.

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.

1.7.2 Approach & Methodology of Base Map Formulation

The formulation of the Base Map follows a systematic and scientific methodology to ensure accuracy, reliability, and compatibility with GIS-based planning requirements. The process begins with the acquisition of High-Resolution Satellite (HRS) imagery from NRSC, which serves as the spatial foundation. This imagery is geo-referenced and processed to generate preliminary map layers depicting major physical and infrastructural features. Field verification is then carried out to validate the satellite-derived information and capture additional spatial attributes not visible in imagery, such as land use characteristics, utility networks, and local facilities.

Figure 1-2 Approach & Methodology for Preparation of Existing Land Use



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”.

1.7.3 Details of Delineated Planning Area shared with NRSC

1.7.3.1 Delineation of Planning Area

Delineation of the Planning Area is a fundamental step in Master Plan preparation, as it defines the geographical extent within which all planning proposals, regulations, and development strategies will be applied. The process involves identifying the urban core, peri-urban zones, and potential growth corridors based on factors such as administrative boundaries, existing settlement patterns, natural features, transportation networks, and future development pressures. Population trends, economic activities, ecological sensitivity, and infrastructure availability are also assessed to determine the most appropriate and manageable boundary. Coordination with local bodies, district authorities, and state planning agencies ensures that the delineated area aligns with statutory requirements and regional development priorities. A well-defined Planning Area helps avoid jurisdictional overlaps, supports efficient resource allocation, and provides a clear spatial framework for sustainable and integrated urban planning.

1.7.3.2 Procurement of Satellite Image

The procurement of satellite imagery is a crucial initial step in preparing a GIS-based Master Plan, as it provides the foundational spatial data required for accurate mapping and analysis. High-resolution satellite images are obtained from authorized agencies such as the National Remote Sensing Centre (NRSC) under the Department of Space. These images, typically acquired at a scale suitable for urban planning (such as 1:4000), capture detailed information on terrain, built-up areas, road networks, water bodies, vegetation, and other physical features. The imagery is delivered in a geo-referenced format to ensure precise alignment with ground coordinates and administrative boundaries. Once procured, these satellite images form the base for generating detailed base maps, updating existing land use patterns, and validating on-ground developments through field surveys. Accurate and recent satellite imagery ensures that the planning process is data-driven, comprehensive, and reflective of real-time conditions.

1.7.3.3 Geo-referencing and Ortho-rectification

The Satellite imagery of the planning area boundary has been procured from NRSC Hyderabad [Panchromatic Data (0.5m resolution) + Digital Elevation Model (2.5m resolution)] after which it has been Geo-Referenced on the basis of a DGPS Survey. After that, all the physical features have been digitised from the Satellite Images. The images are ortho-rectified and submitted to the authority for approval.

Figure 1-3 GCPs for DGPS Survey marked on Satellite Imagery



1.7.3.4 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 (Annexure 3.1 and Annexure 3.2).

1.7.3.5 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 Dehradun Planning Area for sample vetting and attribute data collection.

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 has supervised the field visit and rectified the queries issued there on the field.

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.

Figure 1-4 Ground Truthing by TCPD officials



1.7.3.6 Validation of Existing Land Use

Validation of Existing Land Use (ELU) is a critical step that ensures the accuracy and authenticity of land use categories derived from satellite imagery and digitization. This process involves cross-checking the spatial data with information collected through field surveys, departmental records, and ground truthing exercises. Each land use classification—such as residential, commercial, industrial, agricultural, public/semi-public, transportation, utilities, and open spaces—is verified to confirm its correctness and current relevance. Discrepancies identified during validation, including misclassifications, outdated features, or new developments, are systematically corrected to refine the ELU map. The process also helps detect unauthorized constructions, encroachments, and deviations from previous Master Plans. By ensuring that the ELU accurately reflects the real on-ground situation, the validation step provides a reliable foundation for subsequent spatial analysis, zoning proposals, infrastructure planning, and policy formulation in the Master Plan.

1.7.3.7 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.

1.7.3.8 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.
- **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.

1.7.3.9 Final Delivery of Base Map / Existing Land Use Map

After validation and QA/QC, the ArcGIS data of the Dehradun 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 Dehradun Planning Area.

1.7.4 Details of Delineated Planning Area shared with consultant

1.7.4.1 Collection of Village Cadastral Maps

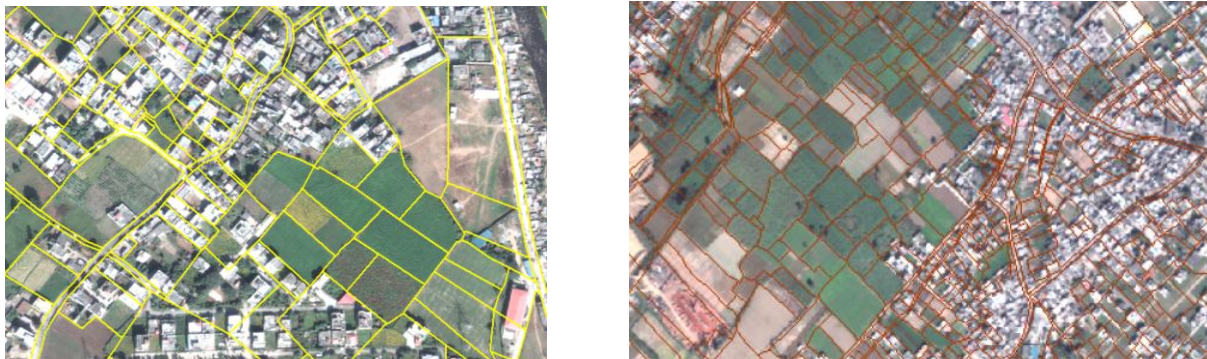
The process of base map preparation is done by the consultant; this involves the collection of required information such as cadastral maps and revenue data regarding the manuals for which mapping is to be done. It is followed by the linkage of cadastral and revenue information using the appropriate platform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

1.7.4.2 Geo-referencing and Digitization of Village Cadastral Maps

Village maps procured from the Dehradun Tehsil Office have been geo-referenced using geo-rectified satellite imagery to ensure accurate spatial alignment. Large-scale maps are first geocoded with respect to the satellite imagery, followed by smaller-scale maps, enabling a consistent and hierarchical approach to spatial integration. Revenue maps are co-registered with the satellite imagery to maintain the relative accuracy, shape, and geometry of buildings and plots. Advanced geo-referencing and geo-coding techniques are applied to preserve the integrity of proportions, shapes, and areas depicted in the revenue data. Additionally, mosaicking and geo-referencing of cadastral village maps—including revenue boundaries and survey numbers—are carried out to bring all datasets to a uniform scale suitable for Master Plan preparation. This

process ensures that cadastral information is seamlessly integrated into the GIS database, supporting precise land use analysis and planning decisions for the Dehradun Master Plan. (Figure 1-5)

Figure 1-5 Digitization of Agricultural Fields and Residential Area



Internal quality assurance and quality checks are performed during geo-referencing to ensure the Master Plan requirements are met. Cadastral survey parcel boundaries, village boundaries, and water bodies including lakes, ponds, and rivers are vectorized from the cadastral village map, and the survey parcel number is stored as attribute information.

1.7.4.3 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/visualization of maps.

1.7.4.4 Extraction of Revenue Land Uses

The extraction of revenue land uses in Dehradun plays a vital role in creating an accurate and legally consistent foundation for Master Plan preparation. Revenue records provide detailed information on land ownership, plot boundaries, khasra numbers, and officially recorded land use categories such as agricultural, residential, commercial, forest, and government land. By digitizing and integrating these revenue maps into the GIS environment, planners can cross-verify existing land use identified from satellite imagery with statutory land use classifications.

1.7.4.5 Incorporation of Revenue Land Uses in Final Delivered Base Map

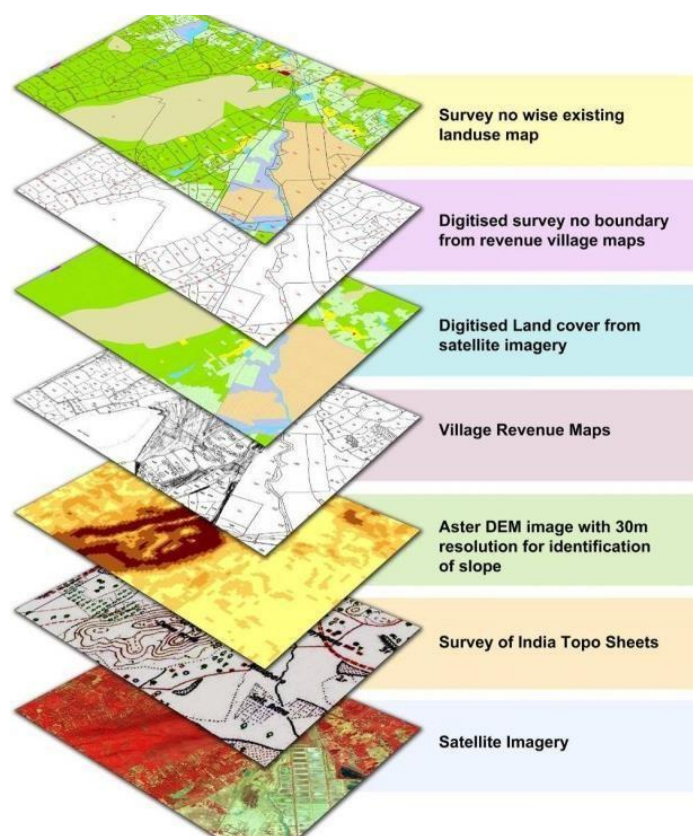
The data obtained from the NRSC and data obtained from the cadastral maps are merged to improve the quality of the base map / existing land use map. From this, the revenue rasta, revenue water bodies and water channels are incorporated into this geo-database.

1.7.5 Final Base Map / Land Use Map Generation

The generation of the Final Base Map and Land Use Map for the Dehradun Master Plan marks the culmination of a series of coordinated tasks involving satellite data processing, digitization, field verification, and integration of departmental records. After the preliminary base layers are prepared and enriched with ground truthing inputs, NRSC incorporates all verified spatial attributes into the

master GIS database. These refined datasets are then reviewed and approved by the Town and Country Planning Department, ensuring accuracy, consistency, and adherence to AMRUT standards. 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 (Figure 1-6).

Figure 1-6 Overlapping of various layers to arrive at Accurate Land Use Map



1.7.6 Land Use Classification

The geo-database structure for preparing the base map and existing land use has been adopted from the AMRUT Design & Standards issued by the Ministry of Housing and Urban Affairs, Government of India. The land use classification addresses both land use and land cover. Most urban land uses are mapped as polygons, while selected features such as community toilets, fire stations, garbage collection points, landfill sites, cell towers, slums, bus stops, and trees are mapped as points. Roads are captured as both polygons (road area) and lines (road centerline), whereas railway lines are mapped as lines in the base layer and railway track areas as polygons in the 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. 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.

Land use classification is the systematic categorization of land parcels within the planning area based on their existing or proposed use. It helps in understanding development patterns, identifying incompatible or unauthorized uses, and guiding future spatial planning. The classification follows uniform coding and mapping standards in line with national guidelines such as AMRUT and UDPFI norms. Accurate land use classification supports infrastructure assessment, effective zoning, environmental protection, and sustainable urban development.

2 PLANNING AREA PROFILE

2.1 INTRODUCTION

This chapter outlines the locational and physical context of the planning area. Dehradun, the state capital of Uttarakhand, is one of the state's major economic growth centres, after Haridwar and Nainital, and functions as a "Counter Magnet" to the National Capital Region (NCR) to help reduce migration pressure on Delhi. Known as India's school capital, the city is a prominent educational hub with over 300 reputed institutions and also serves as a major tourist destination and transit point to Rishikesh, Haridwar, Mussoorie, and other nearby areas. Several national institutions established during the British and post-independence periods, such as IMA, FRI, ONGC, and LBSNAA, contribute to the city's importance. However, the core city continues to face challenges related to solid waste management, drainage, sewage treatment, traffic congestion, inadequate public transport, and parking shortages. Rapid urbanisation has also led to pollution of seasonal rivers like the Bindal and Rispana, affecting overall urban health and sustainable city growth.

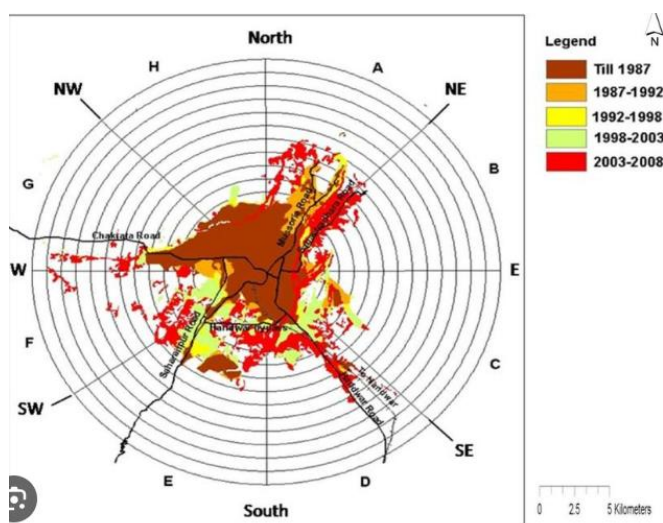
2.2 HISTORICAL AND RELIGIOUS BACKGROUND

Dehradun has a rich historical and religious heritage that reflects its deep cultural roots and long-standing significance in the Indian subcontinent. The city's history dates back to ancient times, with references found in the *Skanda Purana* and the *Mahabharata*, where the Doon Valley is mentioned as part of the Kedarkhand region. The name "Dehradun" is derived from the word "**Dehra**" meaning camp or abode, and "**Doon**" referring to the valley between the Ganga and Yamuna rivers. Tradition holds that the Sikh Guru, **Guru Ram Rai**, established a 'dera' (camp) in the area in the 17th century, which eventually evolved into the modern city. His shrine, the **Guru Ram Rai Darbar Sahib**, remains a key religious landmark and an important part of the city's cultural identity.

Over different periods, Dehradun came under the rule of the Mauryas, Kushans, Mughal Empire, and later the Gorkhas, before being annexed by the British in 1816 under the Treaty of Sugauli. The British developed Dehradun as a quiet cantonment town and established several iconic institutions, many of which continue to define the city's character.

Religiously, Dehradun is home to numerous temples, gurudwaras, and spiritual centers that attract devotees from across the region. The city's proximity to the famous Char Dham shrines and Rishikesh–Haridwar pilgrimage belt further enhances its spiritual significance. Temples such as **Tapkeshwar Mahadev**, **Laxman Siddh**, **Sai Darbar**, and **Tapovan** reflect Dehradun's deep-rooted religious traditions. This historical and spiritual heritage not only shapes the city's identity but also plays a vital role in its tourism and cultural vibrancy.

Figure 2-1 History of Urban Development



Dehradun City is the interim capital of Uttarakhand, located in the western part of the state in the Doon Valley on the Himalayan foothills nestled between the Song River, a tributary of Ganga on the east and the Asan River, a tributary of Yamuna on the west.

2.3 REGULATED AREA OF DEHRADUN AND MASTER PLAN BACKGROUND

The Mussoorie–Dehradun Development Authority (MDDA) was constituted in **October 1984** under the provisions of the **U.P. Urban Planning and Development Act, 1973**. At the time of its establishment, a comprehensive *Development Area* was notified to ensure planned and regulated urban growth across the Dehradun–Mussoorie region. To manage urban growth and control unplanned construction, the State Government declared the then municipal limits of Dehradun — along with the area falling within a 5-mile radius beyond those limits — as a “**Regulated Area**” under the relevant building regulation laws. This declaration was made in **1963**.

This notification expanded the regulated planning area to include not only the core city but also a large number of surrounding revenue villages and the Mussoorie urban area.

The MDDA area includes **Dehradun’s urban agglomeration, Mussoorie Municipal area, plus 185 revenue villages** from the surrounding region (excluding cantonment areas and central government lands under army/air force).

1) Preparation of the First Master Plan

After the establishment of the MDDA Planning area in the year of 1984, first Master Plan was prepared in the year of 1985 for the plan period of 2001. After the publication of final Doon valley notification in the year of 1989, New Master Plan was prepared for the plan period of 2005 – 2025. Till 2013, the Master Plan was on hold by MoEF under the Environmental Protection Act 1986. Finally in 2013, the revised Master Plan 2025 was prepared for the planned development in the region. The plan had regulatory strength: it applied within the **Mussoorie–Dehradun Development Area (MDDA)**, which had been notified in 1984 and included the core city plus many surrounding revenue villages under its jurisdiction.

2) Dehradun Master Plan 2025

The **Dehradun Master Plan 2025** was developed by the Mussoorie Dehradun Development Authority (MDDA) under the jurisdiction of the Town and Country Planning Department, Uttarakhand (TCPD). As part of the plan's expansion efforts, in **2016**, MDDA cleared draft proposals to bring **10 additional villages** on the outskirts of Dehradun under the Master Plan 2025.

These draft additions were opened for public objections and suggestions before being finalized, following statutory procedure. Thus, while the Master Plan is referred to as "2025," the process involves periodic updates, expansion, and revision — not a one-time notification like a smaller municipal plan. The total planning area under Dehradun Master Plan 2025 is approximately **35,867.20 hectares**.

2.4 REGIONAL SETTING

2.4.1 Location of Dehradun

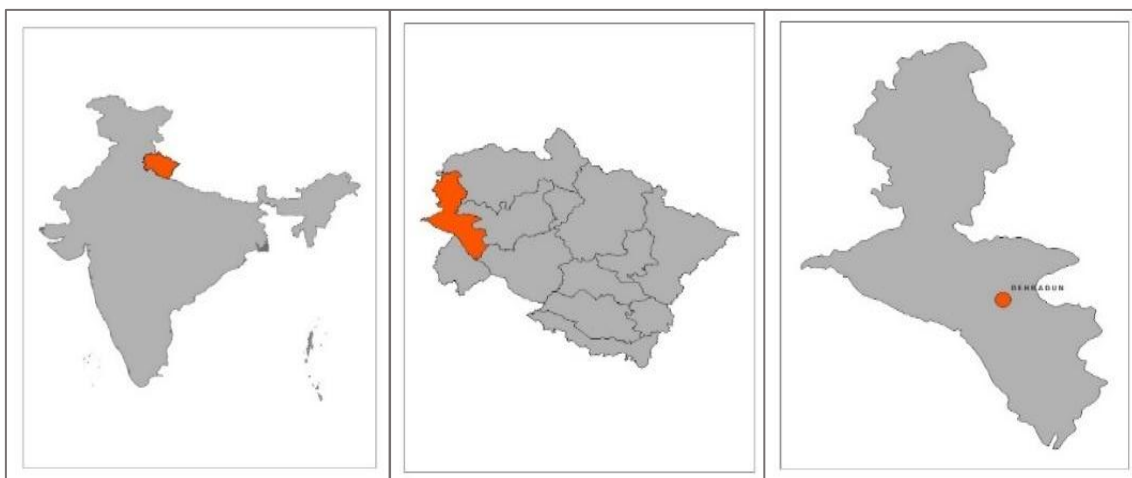
Dehradun district is located in Uttarakhand and is part of the Garhwal division. It is located at 30°32'N latitude and 78°03'E longitude. According to a 2019 study, this district has 52.09% of its geographical area covered by forest. The district has a land area of 3,088 square kilometres. The district is divided into six sub-districts, 22 towns, and 748 villages. The district's economy is primarily based on agricultural production.

Table 2-1 Major Cities Distances

S. No	Major Cities	Distance from Dehradun (in Km)
1	Delhi	255
2	Chandigarh	130
3	Agra	382
4	Haridwar	54
5	Shimla	221

Dehradun is well-connected to the country's capital- New Delhi, Rishikesh, Haridwar, Kedarnath, Badrinath, Uttarkashi, Saharanpur, Roorkee and other significant towns in north India. Road distances to some important cities are given in the above/following table. Apart from all-weather road connectivity, Dehradun is well connected via railways and airways. (*Refer Map 2-1*).

Map 2-1 Location of Dehradun



2.4.2 Planning Area

Initial Planning Area – 300 sq. km

The initial notified planning area of the Mussoorie–Dehradun Development Authority (MDDA), declared in 1984, comprised approximately **300 sq. km** (commonly cited in government and mobility-planning documents as 300–360 sq. km). This area covered the following jurisdictions:

- **Dehradun Nagar Palika (Municipal Area)** – the core urban area consisting of the city's primary residential, commercial, and institutional zones.
- **Mussoorie Nagar Palika** – the major hill town and tourism hub forming an integral part of the region's urban system.
- **185 rural settlements (revenue villages)** surrounding Dehradun and Mussoorie, forming the peri-urban and rural hinterland of the Doon Valley.

This extensive planning boundary was notified to ensure coordinated, regulated, and environmentally sensitive development across both the valley and the surrounding hill region, considering the rapid urban expansion and ecological sensitivity of the Doon Valley.

(Refer Map 2-2 for village locations and planning area boundary)

Map 2-2 Village Map of Dehradun Planning Area



2.5 REGIONAL SETTING AND MAJOR SETTLEMENTS NEARBY DEHRADUN

Dehradun is strategically located in the **Doon Valley** of Uttarakhand, forming a vital regional urban center in the foothills of the Himalayas. Positioned between the **Himalayan ranges to the north** and the **Shivalik hills to the south**, the city occupies a unique ecological and geographic corridor. It lies between the two major rivers of northern India—the **Ganga on the east** and the **Yamuna on the west**—which define its natural boundaries and influence its hydrology and landscape. The district is bounded by Rishikesh (South East), Haridwar (South), Mussoorie (North), Vikasnagar (West).

2.5.1 Road Connectivity

Dehradun City is well connected to nearby urban centres via National and State Highways. Through NH 7, the city is directly connected to Rishikesh (45 km) and Haridwar City (50 km) in the south-eastern direction, and to Rudraprayag (176 km) and Badrinath (329 km) in the east. The same highway connects to Chandigarh (169 kms west). NH 334 connects Roorkee (70 km), Saharanpur (68 km), and Delhi (334 km) in the south and Ambala (180 kms) in the west.

(Refer Map 2-3):

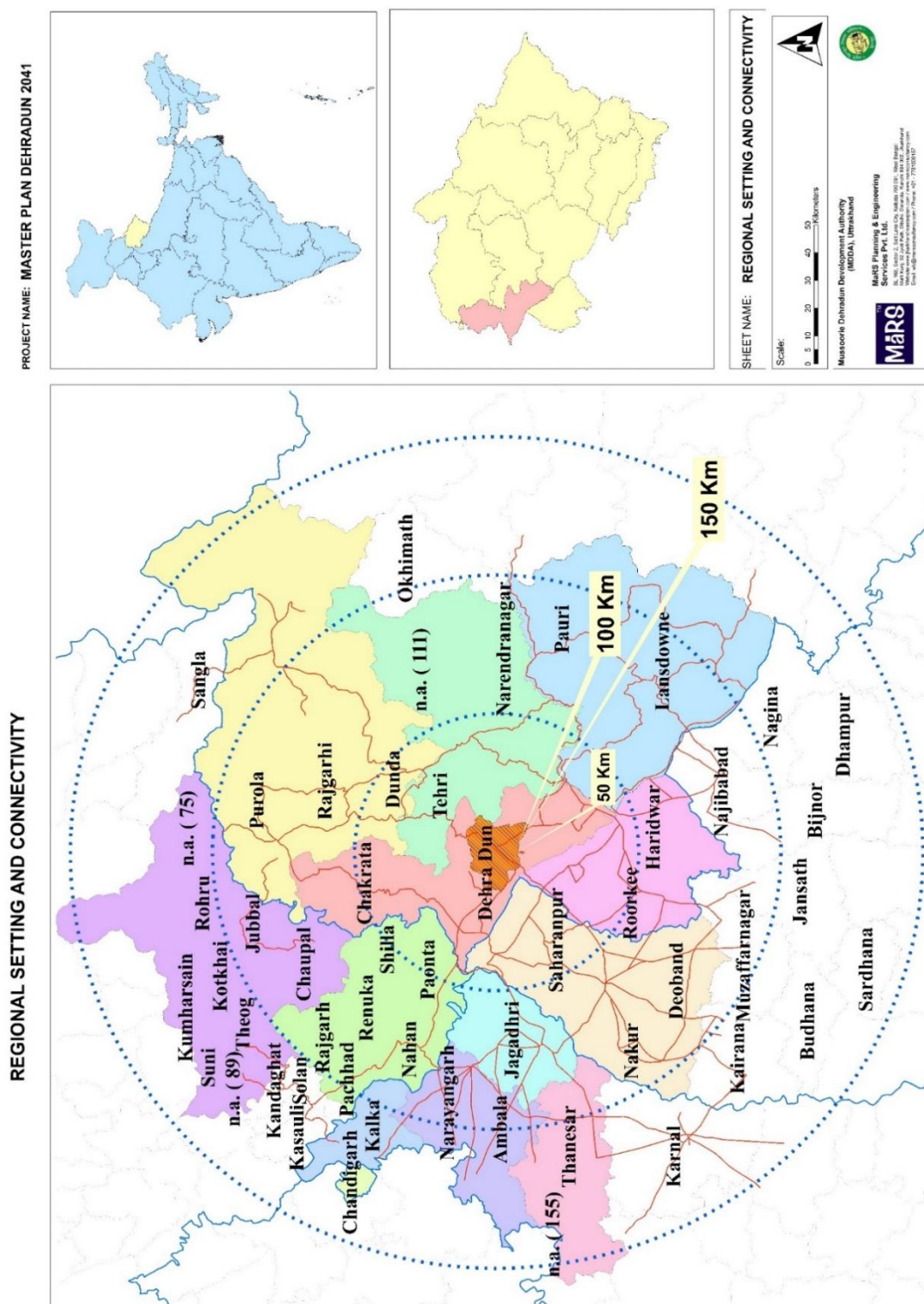
2.5.2 Rail Connectivity

Dehradun is part of the Northern Railway Zone and has a terminal railway station on the Northern line of the Northern Railway network. The Zone Head Quarters are located in Firozpur, Ambala, and Moradabad. A portion of the Lashkar-Haridwar-Dehradun section of the Northern Railway's Moradabad division connects Dehradun. The section Lashkar-Haridwar-Dehradun is broad gauge with a single non-electrified line. There are five stations between Haridwar and Dehradun: Motichur, Raiwala, Kansrao, Doiwala, and Harrawala. (Source: From the Doon Ghati Master Plan 2031.)

2.5.3 Air Connectivity

Jolly Grant is the largest commercial airport of Uttarakhand. This airport is located between Dehradun, Haridwar and Rishikesh, about 27km, 39km and 21km from the respective cities. Daily several flights operate from here by various air lines such as: IndiGo, Spice Jet, Air India, Jet Airways towards Delhi, Mumbai, Ahmedabad, Hyderabad, Kolkata, Bengaluru etc. Its near proximity to various tourist places enables tourists to fly into Uttarakhand instead of travelling by rail or road.

Map 2-3 Regional Setting and Connectivity



2.6 LOCATIONAL ADVANTAGES AND DISADVANTAGES

2.6.1 Locational Advantages

- **Gateway to the Himalayan Region**

Dehradun serves as the primary access point to the **Garhwal Himalayas**, linking major tourist, pilgrimage, and trekking destinations such as Mussoorie, Rishikesh, Haridwar, and the Char Dham. This location fuels tourism, hospitality, and transport-related economic activities.

- **Strategic Position Between Two Major Rivers**

Situated between the **Ganga (east)** and **Yamuna (west)**, the city benefits from a fertile valley, moderate climate, and abundant groundwater resources. The rivers also create natural corridors that influence the city's growth and ecological balance.

- **Proximity to National Capital Region (NCR)**

Dehradun lies within a **5–6 hour** travel distance from Delhi via road, rail, and air. This proximity enhances business interactions, administrative coordination, tourism flow, and migration for education and employment.

- **Educational and Institutional Hub**

Dehradun hosts some of India's most renowned institutions such as the **Indian Military Academy (IMA)**, **Forest Research Institute (FRI)**, **Survey of India**, **ONGC**, **Wadia Institute**, and numerous prestigious schools and universities. This concentration of institutions attracts students, researchers, and professionals from across the country.

- **Growing Industrial and Service-Sector Base**

Nearby industrial zones such as **Selaqui**, **Doiwala**, **Haridwar SIDCUL**, and **Rudrapur** help strengthen the city's economic linkages. The service sector—including IT, education, healthcare, and hospitality—has grown rapidly due to the city's strategic location.

- **Gateway to Religious Tourism**

Dehradun is located along the route to major pilgrimage destinations including **Haridwar**, **Rishikesh**, **Yamunotri**, **Gangotri**, **Kedarnath**, and **Badrinath**, making it a key staging point for spiritual tourism.

2.6.2 Locational Disadvantages

1. **Eco-Sensitive and Protected Zones**

Large portions of the surrounding region fall under:

- Reserved forests
- Eco-sensitive zones
- Wildlife corridors
- River floodplains

These protected areas restrict development, reduce usable land, and require stringent environmental clearances, slowing down infrastructure and housing expansion.

2. **Geographical Constraints of the Doon Valley**

Dehradun is situated in a narrow valley between the **Shivalik Hills** and the **Lesser Himalayas**, which restricts outward expansion. The city's growth is constrained by steep slopes in the north and forested foothills in the south, limiting the availability of buildable land.

3. **Limited Agricultural Land for Expansion**

The valley's fertile agricultural lands are increasingly being converted to urban uses. This creates land-use conflicts and threatens long-term food security and groundwater recharge zones.

4. Seasonal Tourist Pressure on Limited Infrastructure

Being a gateway to Mussoorie, Char Dham, Rishikesh, and Haridwar, Dehradun experiences:

- Seasonal traffic congestion
- Overburdened transport systems
- Pressure on civic amenities

This strain is particularly severe in summer and during pilgrimage seasons.

5. Environmental Constraints on Industry

Because the Doon Valley is governed by environmental restrictions (Doon Valley Notification, 1989), polluting or heavy industries are prohibited, limiting economic diversification and industrial investment compared to nearby cities like Haridwar and Rudrapur.

2.7 REGIONAL RESOURCES

2.7.1 Mineral Resources

Dehradun district, located in the Doon Valley between the Shivalik range and the Lesser Himalayas, possesses a limited yet significant range of mineral resources. Although not a major mining-intensive region compared to other parts of Uttarakhand, the district contains several minor minerals that play an important role in local construction, industrial activities, and economic development. The mineral profile of Dehradun is shaped by its geological setting, alluvial deposits, and forested mountainous terrain.

Dehradun was well known for its **limestone deposits**, especially along the Mussoorie hills. Limestone was extensively mined for cement and construction industries until the 1980s.

Building materials like Sand, Bajri and Boulder originating from the seasonal streams such as Song, Suswa, Rispana, Bindal, Tons and Asan.

Alluvial soil deposits in the plains of Dehradun contain pockets of **brick earth and clay**, which support small-scale brick kiln industries mainly in Doiwala region, Raipur block and Sahaspur belt.

2.7.2 Forest Resources

Through various working plans of 1999, 2008, 2009 created by the authorities under the chairmanship of different personnel, it has been noted that forestry has traversed many crossroads in the last few decades but it has never found itself in such a critical phase as it is facing today. The question before us is to find out a 'Sustainable Forest/ eco-system Management' strategy to produce enough goods & services to fulfil the ever-increasing demand of all the stakeholders (local, national & global). A dedicated plan that aims at finding strategies of resource use and mitigating conflicts by providing sustainable ecological proposals, scientific management, and proposals that encourage active participation of the local community is required to ease down these critical phases of ecology.

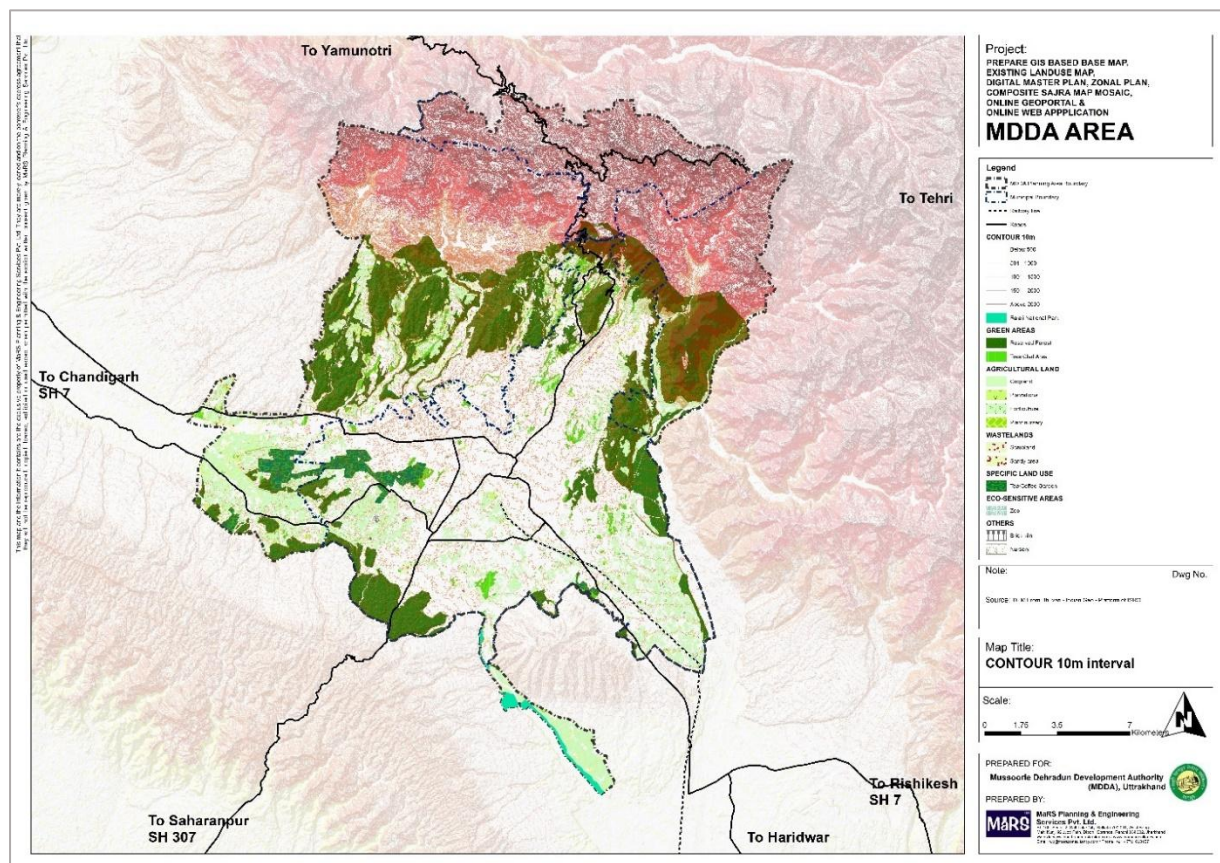
From the 6-fold classification of forest with 16 sub-groups by Champion and Seth 1968, Dehradun consists 4 types and 3 sub-groups of forest. Below is the table showing the types of forest, name of forest and area. (*Refer Map 2-4*)

Dehradun area has 6 forest ranges namely Ashrodi in the south, Lachhiwala in the southeast, Yamuna Circle in the northeast, Jhajra in the west, and Badkot in the centre. Following is the table showing the area of these ranges; (*Refer Table 2-2*)

Table 2-2 Forest Ranges in Dehradun Planning Area

Range	Area (Ha.)	Range	Area (Ha.)
Ashrodi	1752	Jhajra	2880
Malsi	1934	Malhan	244
Yamuna Circle	8605	Lachhiwala	47

Map 2-4 Forest Map of Dehradun Planning area



2.7.3 Landuse Landcover

Land Use and Landholding Pattern (2008-2009)

As per the 2008-09 Statistical Magazine, the land use distribution in Dehradun district is detailed in Table 2-3 below

Table 2-3 Landuse and Landholding Pattern

Land Use Category	Area (in hectares)
Reserved Forest	2,03,659
Cultivable Waste Land	44,870
Current Fallows	5,770
Other Fallows	8,092
Usar and Uncultivable Land	3,975
Land Under Non-Agricultural Use	14,596
Net Area Sown	46,247

1) Landholdings:

Landholdings in Dehradun district follow a predominantly **small and fragmented pattern**, shaped by terrain conditions, urban expansion, and historical settlement patterns.

- **Holdings of 2–4 hectares:**

These form the largest share of agricultural holdings in the district, covering approximately **(14596 ha)**, indicating the prevalence of small-scale farming.

- **Holdings of 4–10 hectares:**

These medium-scale holdings account for around **(22868 ha)** registered holdings, forming the second-largest category.

This distribution shows that **agriculture in Dehradun is dominated by small and marginal farmers**, particularly in the Doon Valley's rural belts such as Doiwala, Raipur, Sahaspur, Vikasnagar, and Herbertpur.

2) Tenancy System:

Following the provisions of the **Kumaon and Uttarakhand Zamindari Abolition and Land Reforms Act, 1960**, traditional forms of tenancy were abolished and replaced by legally recognized tenure given below. This Act replaced the multiplicity of tenures existing in the region by three types: the bhumidhar, sirdar and asami.

- **Bhumidhar:** Holders under this category possess **full ownership rights**, including transfer, lease, mortgage, and inheritance. Most agricultural and peri-urban land in Dehradun is held under Bhumidari tenure.
- **Sirdar:** These tenure holders have **permanent and heritable rights** but are limited to agricultural, horticultural, and allied activities. They may become Bhumidhars upon fulfilling the conditions laid down in the Act.
- **Asami:** Heritable but non-transferable and non-permanent rights; subject to eviction.

2.7.4 Flora and Fauna

Dehradun is blessed with a rich and bio-diverse ecosystem which at the present moment is in critical condition and needs to be preserved and managed. The forest of this area falls under the West Himalaya Biotic Province Bio-geographical Zone of India as per Wild Life Institute, Dehradun (1998). The forests of the site area are blessed with wide range of plants, forest, vegetation and varying degree of cover which encourages variety of animals, birds, reptiles, rodents and fishes to inhabit.

The important species of animals commonly found in the forest area of the site are classified as under:

Table 2-4 Various Mammals and Birds observed in the forest area

Mammals		Birds	
Common Name	Scientific Name	Common Name	Scientific Name
Tiger	Panthera tigris tigris. Linnacus	Pea Fowl	Pavo cristatus Linnaeus
Leopard	Panthera pardus fusca Mayer	Red Jungle Fowl	Gallus gallus murghi Robinson and Kloss
The Jungle Cat	Felis chaus affinis Gray	Kaleej Pheasant	Lophura leucomelana hamiltonii J.E. Gray
The Himalayan Jackal	Canis aureus indicus Hodgson	Black Partridge	Francolinus francolinus asiae Bonararte
The Hyena	Hyaena hyaena hyaena Linnaeus	Grey Quail	Coturnix coturix coturnix Linnaeus
The Indian Fox	Vulpes bengalensis Shaw	Rain Quail	Coturnix coromandelica Gmelin
Elephant	Elephas maximus indicus Cuvier	Jungle Bush-quail	Perdica asiatica puniaubi Whistler
Goat Antelope	Nemorhaedus goral goral Hardwicke	Green Pigeon	Treron phoenicoptera phoenicopters Latham
Sambar	Cervus unicolor niger Blainville	Grey Horn Bill	Tockus birostris Scopoli
Spotted Deer	Axis axis Erxleben	Pochard	Arthya ferina
Barking Deer	Muntiaous muntia vaginalis Boddaert	Teal	Anas crecca
Langur	Presbytis entellus schistaceus Hodgson	Tufted duck	Arthya fuligula
Monkey	Macaca Mulatta villosa True	Shoveller	Anas clypeata
Indian Hare	Lepus nigricollis ruficaudatus Geoffroy	Brahminy Duck	Tadorna ferruginea
Porcupine	Hystrix indica indica Kerr	Pintail	Anas acuta
Wild Boar	Sus scrofa cristatus Wagner	Mallard	Anas platyrhynchos
Small Indian Civet	viverricula indica wellsi Pocock	Red-Crested Pochard	Netta rufina
Yellow Throated Marten	Martes flavigula flevigula Boddaert		

Source: Working Plan of Dehradun Forest Division, 2007

2.7.5 Water resources

Dehradun is known for its **high-yield groundwater aquifers**, which have traditionally supplied most of the city's drinking water. The valley's alluvial formations allow significant recharge from precipitation, river seepage, and forest catchments.

- **Shallow aquifers** near foothills and river terraces
- **Deep confined aquifers** supporting tube wells and pumping stations
- Abundance of **percolation zones**, especially in Rajpur–Malsi belt
- Recharge contributions from surrounding **forests and hill slopes**

2.7.6 Master Plan Background

The development of a functional framework highlights that Dehradun has evolved as a major **administrative, educational, and service-oriented hub** in Uttarakhand. Initially known for its agricultural base and forest-related activities, the city has gradually expanded into a vibrant centre for governance, institutional research, and commercial activity. At the same time, Dehradun caters to the **educational, healthcare, and employment needs** of the surrounding rural and hilly regions across the Doon Valley and Garhwal division. In recent decades, Dehradun has experienced rapid growth as a **multi-dimensional urban centre**, combining administrative functions, specialized institutions, tourism, and service-sector development, making it one of the most significant and diversified cities in the region.

2.8 PHYSIOGRAPHIC AND GEOMORPHOLOGICAL STUDIES

2.8.1 Physiography

2.8.1.1 Topography and Water Bodies

Dehradun's topography and water bodies are central to its environmental identity and urban form. The combination of Himalayan foothills, alluvial plains, and Shivalik slopes creates a varied landscape that influences climate, hydrology, and settlement patterns. Its extensive network of rivers, streams, wetlands, and springs enriches ecological diversity and sustains the city's water requirements. For future planning, conservation of these natural systems is essential to maintaining ecological balance and ensuring the sustainable growth of the Dehradun metropolitan region.

Dehradun has a rich hydrological network comprising **perennial rivers, seasonal streams (rivers and nalas), wetlands, ponds, and natural springs**. The hydrology plays a critical role in sustaining the ecosystem, agriculture, and urban water supply.

Major Rivers

Yamuna River- Forms the western boundary of Dehradun district. Receives water from the Tons, Asan, and smaller tributaries

Tributaries of the Ganga Basin- Though the main Ganga does not pass through the city, major tributary systems define Dehradun's hydrology:

- **Song River** – Important for surface water supply
- **Suswa River** – Flows through southern Doon and manages major drainage
- **Tons (Tamsa River)** – Largest tributary of Yamuna
- **Asan River** – Forms Asan Barrage and wetland ecosystem

2.8.1.2 Soil Erosion

Soil erosion is a significant environmental concern in Dehradun due to its varied topography, fragile geological formations, and rapidly expanding urban footprint. The northern Himalayan foothills and southern Shivalik ranges consist of young, unconsolidated sediments that are highly prone to erosion, especially during the intense monsoon season. Deforestation, unregulated construction on steep slopes, and encroachment along riverbanks further accelerate the removal of topsoil, leading to increased siltation in rivers such as the Rispana, Bindal, Suswa, and Song. In rural and peri-urban areas, traditional drainage patterns and natural recharge zones have been disrupted by road cutting, mining activities, and expanding settlements, contributing to landslides and the degradation of agricultural land. As a result, soil erosion poses direct risks to ecological stability, water quality, and infrastructure, highlighting the need for integrated watershed management, slope stabilization, and strict land-use regulation.

2.8.1.3 Ground Water Level

There are Six Development Blocks in Dehradun district, out of which Dehradun Planning area falls under Raipur Division and Pithuwala Division, which has water level in range between 6.2 m to 46m. The water level data sets were obtained from the CGWB (Central Ground Water Board) for the months of January 2011, January 2015, and January 2019. (Refer Table 2-5)

Table 2-5 Level of ground water table in Dehradun

Division and Year	Year	Minimum Water Level (In m)	Maximum Water Level (in m)
Raipur Division	Year 2011	6.2	44.8
	Year 2015	8.9	70.0
	Year 2019	8.9	70.0
Pithuwala Division	Year 2011	10.1	46.0
	Year 2015	9.1	49.6
	Year 2019	9.2	49.6

From 2011 to 2019, the water table in Raipur Division ranged between 6.2 m and 70 m. Despite a population increase in the mentioned years, the storm water run-off is able to recharge the ground water table, and the same is true in Pithuwala Division, where the water table has increased from 10.1m to 49.6m.

2.8.1.4 Lineament

The lineament structure of Dehradun reflects the strong tectonic forces shaping the Doon Valley, which lies between the Main Boundary Thrust (MBT) in the north and the Main Frontal Thrust (MFT) in the south. These major regional faults, along with numerous secondary fractures and joints, create a dense network of linear geological features that influence the valley's topography, drainage, and seismic sensitivity. Many rivers and streams—including the Rispana, Bindal, Song, Suswa, and Tons—follow lineament-controlled alignments, indicating the structural control on hydrology and erosion patterns. The presence of these active tectonic features also contributes to slope instability along the Mussoorie foothills and increases the city's vulnerability to earthquakes, placing Dehradun in Seismic Zone IV. Understanding the lineament patterns is therefore essential for guiding safe urban expansion, assessing geohazards, and planning resilient infrastructure in the region.

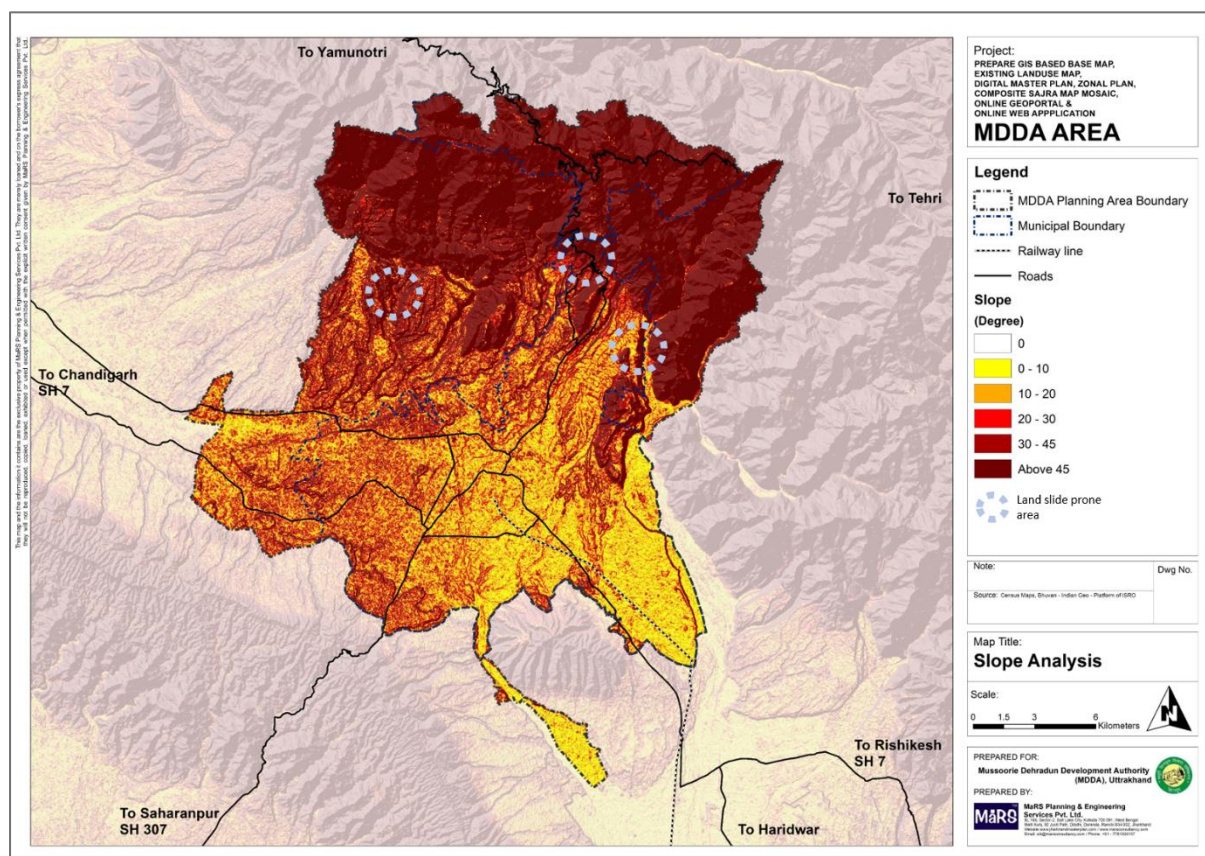
2.8.1.5 Flood Plain and Land Slide Area

The problem of floods is mainly experienced in the Dehradun blocks namely Sahaspur, Vikas Nagar, Raipur and Doiwala. Therefore, various rivers are flowing down from Dehradun and Tehri Garhwal districts assemble their flow in these blocks. Few of these rivers are Ganga, Song, Suswa, Rispana, Tons and Asan. All the mentioned rivers pose a big threat of flood in the rainy season.

Rainwater channels flowing down in Rajaji National Park need to be managed at the upper watersheds as they end up as a great damage in rainy season. Water flowing with rigorous velocity erodes the soil which adversely harms the vegetation and affects cultivation adversely. Loosen up soil encourages slipping of land masses due to which landslides occur. It becomes a serious problem in rainy seasons. Rainfall particularly in the Doon Valley is often punctuated by flashes of cloudburst. Dehradun began to see regular flooding after 2010. The most vulnerable are the migrant construction workers, hawkers and vendors.

Uttarakhand has witnessed many landslides in past creating crucial conditions. Below is the landslide hazard zonation map of the state. Dehradun falls under the category of Highly vulnerable zone of landslide with some parts falling under severe to very high landslide vulnerable zone.

Map 2-5 Landslide prone areas in Dehradun Planning area



Source: (National Institute of Disaster Management, 2015)

There are three major land slide prone areas in MDDA planning area which has a slope more than 30° angle, located on Shahastradhara road, Guniyal Gaon and Gajiyawala.

2.8.2 Climate

As per Doon Ghati Master Plan – 2031, Dehradun lands resting at the middle of Ganga and Yamuna rivers in the valley, offering plains type of climate temperature tends to rise in accordance with the annual season cycle by mid of March and is at peak by mid of June. Monsoon prevails from mid-June till September. Temperatures are low from November till February. As a result of vast forest cover and micro climate, valley often receives rainfall other than monsoon which keeps the weather pleasant throughout the year and is a significant reason for present tourist thrust.

2.8.2.1 Temperature

In Dehradun and its nearby villages, maximum temperature is observed around 25 to 30 °C in the month of May & June. While minimum temperature is observed in the month of January. In terms of rainfall, maximum precipitation is observed in the month of July & August which is around 430 mm. Details are described into the figure which is given below Table 2-6.

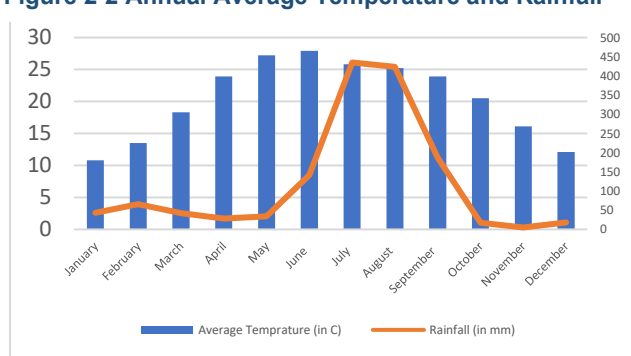
Table 2-6 Climate Data of Dehradun

Avg. Temperature °C (°F)	10.8 °C (51.4) °F	13.5 °C (56.3) °F	18.3 °C (64.9) °F	23.9 °C (75.1) °F	27.2 °C (81) °F	27.9 °C (82.1) °F	25.8 °C (78.5) °F	25.2 °C (77.4) °F	23.9 °C (75.1) °F	20.5 °C (68.8) °F	16.1 °C (61.1) °F	12.1 °C (53.9) °F
Min. Temperature °C (°F)	4.1 °C (39.4) °F	6.4 °C (43.6) °F	10.2 °C (50.3) °F	15.3 °C (59.5) °F	19 °C (66.3) °F	21.8 °C (71.3) °F	22.8 °C (73.1) °F	22.3 °C (72.2) °F	19.7 °C (67.4) °F	14.2 °C (57.5) °F	9.5 °C (49) °F	5.6 °C (42) °F
Max. Temperature °C (°F)	17.4 °C (63.4) °F	20.3 °C (68.5) °F	25.5 °C (77.9) °F	31.4 °C (88.5) °F	33.9 °C (93) °F	32.7 °C (90.9) °F	28.9 °C (84) °F	28.3 °C (82.9) °F	27.9 °C (82.1) °F	26.6 °C (79.9) °F	23 °C (73.4) °F	19.1 °C (66.5) °F
Precipitation / Rainfall mm (in)	43 (1)	66 (2)	42 (1)	28 (1)	34 (1)	142 (5)	435 (17)	424 (16)	187 (7)	17 (0)	5 (0)	18 (0)
Humidity(%)	73%	67%	55%	39%	42%	58%	85%	87%	83%	70%	68%	72%
Rainy days (d)	4	5	4	4	6	11	20	20	14	2	1	2
avg. Sun hours (hours)	8.7	9.4	10.6	11.5	11.9	10.7	8.0	7.5	8.7	9.8	9.4	8.9

Source: <https://en.climate-data.org/asia/india/uttarakhand/dehradun-3679/>

2.8.2.2 Rainfall

Dehradun receives one of the highest amounts of rainfall in northern India due to its location along the Himalayan foothills and the funnel-like formation of the Doon Valley. The district records an average annual rainfall of **approximately 400–430 mm**, with nearly 75–80% of it occurring during the **southwest monsoon months** from June to September. Orographic effects caused by the surrounding Mussoorie hills intensify precipitation, often resulting in heavy downpours and cloudbursts in localized areas. Pre-monsoon showers and occasional western disturbances during winter also contribute to the annual rainfall, supporting the region's rich vegetation and groundwater recharge. However, the intensity of monsoonal rainfall frequently leads to challenges such as flash floods, soil erosion, urban waterlogging, and increased sedimentation in drainage channels like the Rispana, Bindal, and Suswa. Overall, rainfall plays a crucial role in shaping Dehradun's hydrology, ecology, and planning needs, necessitating robust stormwater management and disaster-mitigation strategies. (Refer Figure 2-2)

Figure 2-2 Annual Average Temperature and Rainfall


2.8.2.3 Humidity

Dehradun experiences moderate to high humidity levels throughout the year due to its location in the Doon Valley and proximity to dense forests, rivers, and the Himalayan foothills. Humidity is generally highest during the **monsoon months**, when moisture-laden winds elevate average relative humidity to **75–85%**, often accompanied by cloud cover and reduced evaporation. In winter, humidity remains moderate, ranging between **50–65%**, influenced by western disturbances and cooler temperatures. During the pre-monsoon summer period, humidity tends to fluctuate, with mornings relatively humid and afternoons becoming drier due to rising temperatures. The valley's enclosed topography often leads to moisture retention, contributing to foggy mornings in winter and a mild discomfort during the monsoon season. Overall, humidity plays a significant role in shaping the local climate, influencing human comfort, vegetation patterns, and the design of ventilation and drainage systems in Dehradun. In Dehradun & its nearby villages, maximum humidity is observed also into the month of August which is around 82% and minimum humidity is

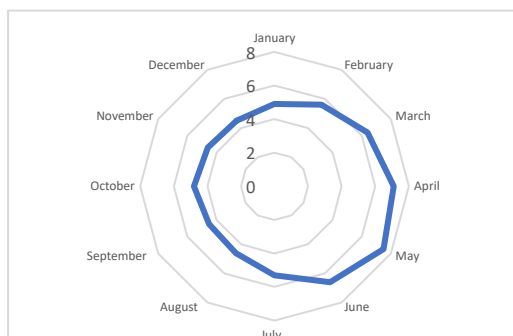
observed in to the month of March which is around 21%. Details are described into the figure which is given below.

2.8.2.4 Wind

Dehradun experiences generally calm to moderate wind conditions throughout the year, influenced by its valley location between the Himalayas and the Shivalik ranges. The **prevailing winds** blow predominantly from the **west and northwest**, especially during the summer and pre-monsoon months, providing ventilation and aiding in dispersing urban pollutants. During the **monsoon season**, winds become more humid and southeasterly, accompanying rain-bearing clouds. Winter brings relatively lighter winds, often contributing to fog formation and temperature inversion in the valley. Wind speeds typically range between **2–10 km/h**, though gusty conditions can occur during thunderstorms and western disturbances. The surrounding hills act as natural barriers, reducing wind speed but also creating localized funnel effects along river valleys and ridgelines. Understanding wind patterns is essential for planning ventilation corridors, managing air quality, and designing climate-responsive buildings in Dehradun.

To understand land use land, cover the data from 1995 to 2020 is taken into consideration. The statical analysis of the study area shows that the urban area has increased many folds. The forest cover has decreased from 1995 to 2020. While the major increase in urban areas is due to the conversion of barren areas and agricultural lands into urban area. (*Refer Figure 2-3*)

Figure 2-3 Wind Speed (mph)



2.8.3 Geomorphology

2.8.3.1 Soil

In Dehradun, the topography, sun direction, and soil characteristics collectively impart the region's rich vegetation. Surface water conveniently sinks into the depths of loose boulders and seeps at the bottom of the valley which makes an impermeable band of clay come up to the surface. The abundant rainfall and presence of numerous water bodies provide the basis of rich biomass productivity. This rich vegetation cover in turn helps in the effective management of heavy rainfall and contributes to groundwater recharge.

Because topography varies so greatly, erosion intensity, Soils have a variety of characteristics that vary depending on parent material and other factors. Many aspects, particularly textures and depth, differ. Colour, stoniness, drainage, moisture status, and organic matter are all factors to consider. soil contains and has the capacity for cation exchange The three major categories are the Lesser Himalaya, Middle Himalaya, and Upper Himalaya. The Shivalik Belt and the Boulder Belt are two of the valley's belts the geological band.

2.8.3.2 Hydrogeology

The hydrogeology of Dehradun is shaped by its location within the Doon Valley, which contains a complex system of **unconfined and confined aquifers** formed by alluvial deposits from the Ganga and Yamuna river systems. The valley's permeable sediments—comprising sand, gravel, silt, and boulders—support significant groundwater storage and movement, making Dehradun one of the most groundwater-rich regions in Uttarakhand. Recharge occurs primarily through **intense monsoonal rainfall**, seepage from rivers such as the Song, Suswa, Tons, Rispana, and Bindal, and infiltration from the forested Mussoorie slopes. The northern and central valley areas host highly productive aquifers with deep water tables, while the southern Shivalik belt contains younger, coarse, and less stable sediments with moderate to low groundwater potential. Natural springs, seepage zones, and fracture-controlled flow further contribute to the hydrogeological dynamics. However, increasing urbanization, over-extraction, and reduced recharge surfaces are causing localized declines in water levels, highlighting the need for careful groundwater management and aquifer protection in Dehradun.

2.8.4 Conclusion

Dehradun is well known for its natural resources, as it is surrounded by such dense green forests. Dehradun is best known for its Basmati rice and Lychees, which grow in abundance throughout the district. Furthermore, with the Himalayas and the Shivalik's to its north and south, Dehradun has an abundance of natural resources in the form of forest, energy, and soil. Furthermore, with renowned institutions in the city such as the Indira Gandhi National Forest Academy, Forest Survey of India, National Hydrographic Office, Oil and Natural Gas Corporation, and Indian Institute of Remote Sensing, Dehradun's natural resources are carefully utilised. Magnesite, Limestone, and Gypsum deposits can also be found here.

3 DEMOGRAPHIC PROFILE

3.1 INTRODUCTION

The development of a particular city, town or a region depends upon natural, physical and socio-economic factors. Among these factors, population assumes significance in determining the future pattern of progress and development of the city. The Demographic profile of the planning area has been prepared based on the information derived from different sources such as Census of India, economic survey of India and others. Population projection is projected on basis of Decadal Change, Decadal Growth Rate, Compound Annual Growth Rate.

3.2 DEMOGRAPHIC SCENARIO

3.2.1 District Profile

The total population of Dehradun district is 16,96,694 (Census 2011), of which 7,54,753 persons (44.48%) reside in rural areas, while 9,41,941 persons (55.52%) live in urban areas. The sex ratio of rural areas in the district stands at 921 females per 1,000 males, whereas the urban sex ratio is 886 females per 1,000 males. The overall district sex ratio is 902, which is lower than the Uttarakhand state average of 963.

In terms of literacy, Dehradun district records an impressive 84.25% literacy rate, higher than the state average. The male literacy rate is 89.40%, while the female literacy rate is 78.54%, indicating a significant gender gap but still reflecting relatively high educational attainment across the district.

3.2.2 Population Growth Trends

As per Census 2011, total population of Dehradun Planning Area is around 9,48,950. Among them 8,79,652 is the Urban Population and 69,298 is the Rural Population. Further details are described into the table given below: (Refer Table 3-1 and 3-2)

Table 3-1 Population Distribution

Category	1971	1981	1991	2001	2011
Dehradun MC	169827	220530	270159	426674	804379
Villages Merged into the MC	69919	97273	143953	143268	
Cantonment Board	33637	43566	43031	53675	52716
Clement Town	11898	15450	18237	19569	22557
Sub Total	285281	376819	475380	643186	879652
Rural Population - Dehradun	24569	31395	39464	46494	69298
Total	309850	408214	514844	689680	948950

Source: Census of India

Note: Cantonment Board and Clement Town are not the part of the Dehradun Planning Area. But, during the population projection, employment projection and Calculation of Infrastructure Requirement, entire area needs to be considered as population of cantonment board and clement town may depend upon the Dehradun Planning Area for infrastructure, employment and public amenities.

Table 3-2 Growth Rate of three decades

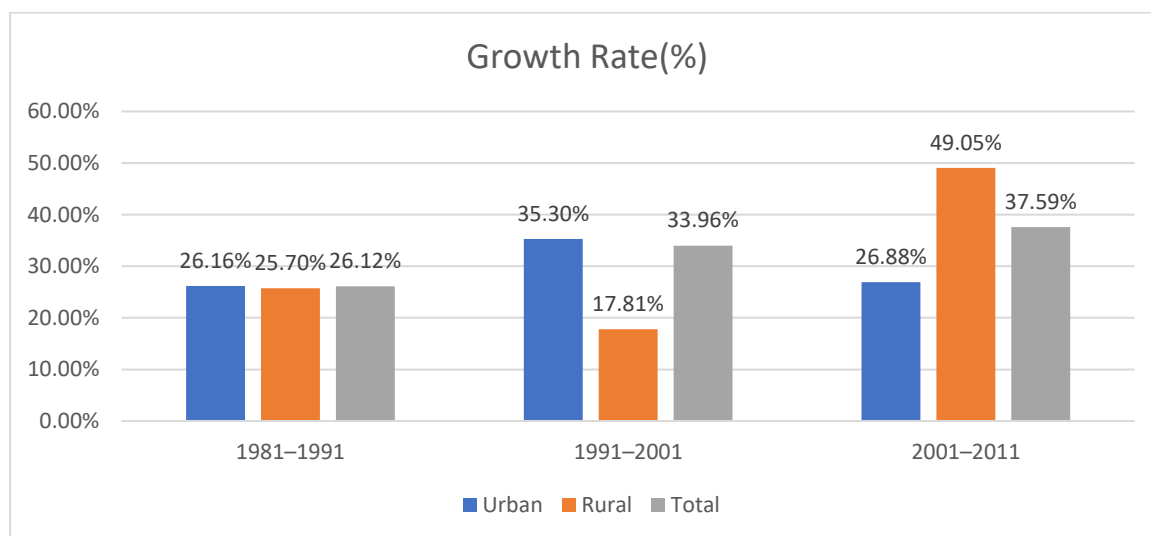
Year	Growth Rate (%)		
	1981–1991	1991–2001	2001–2011
Urban	26.16%	35.30%	26.88%
Rural	25.70%	17.81%	49.05%
Total	26.12%	33.96%	37.59%

Source: Census of India, 1981-2011

As illustrated in Figure 3-1, the urban population of Dehradun experienced a significant rise between 1981 and 2001. The population grew from 4,08,214 in 1981 to 5,14,844 in 1991. This growth was driven by Dehradun's emergence as a major administrative, educational, and service hub, particularly after becoming the capital of Uttarakhand. The expansion of government offices, educational institutions, defense establishments, and service-sector activities accelerated urbanization and attracted substantial in-migration, resulting in a high decadal growth during this period.

In contrast, the rural areas of the Dehradun planning area recorded a relatively steady and moderate population growth from 1981 to 2011. Agriculture and allied activities continued to be the primary occupations, and population increase was largely due to natural growth rather than large-scale industrialization. Limited employment diversification and gradual rural-to-urban migration toward Dehradun city further contributed to the comparatively slower growth in rural areas.

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



3.2.3 Population Distribution and Density of Planning Area

The table below discusses the ward-wise population distribution in Dehradun City. Dehradun City was previously divided into 60 wards. Later that year, the municipal corporation boundary was revised, and 68 villages were merged into Dehradun Municipal Corporation Jurisdictions and converted into 40 wards. Currently, 8,04,379 people live in Dehradun Municipal Corporation's 100 wards.

Table 3-3 Population Distribution

Settlement Type	Year Source	2011 Census / DCHB
City	Dehradun Municipal Corporation+Cantonment Board+Clement Town Board	(804379+75273)=879652
Urban Population		8,79,652
Rural Population		69,298
Total Planning Area		9,48,950

Source: Dehradun Municipal Corporation and Census 2011

3.2.4 Population Density

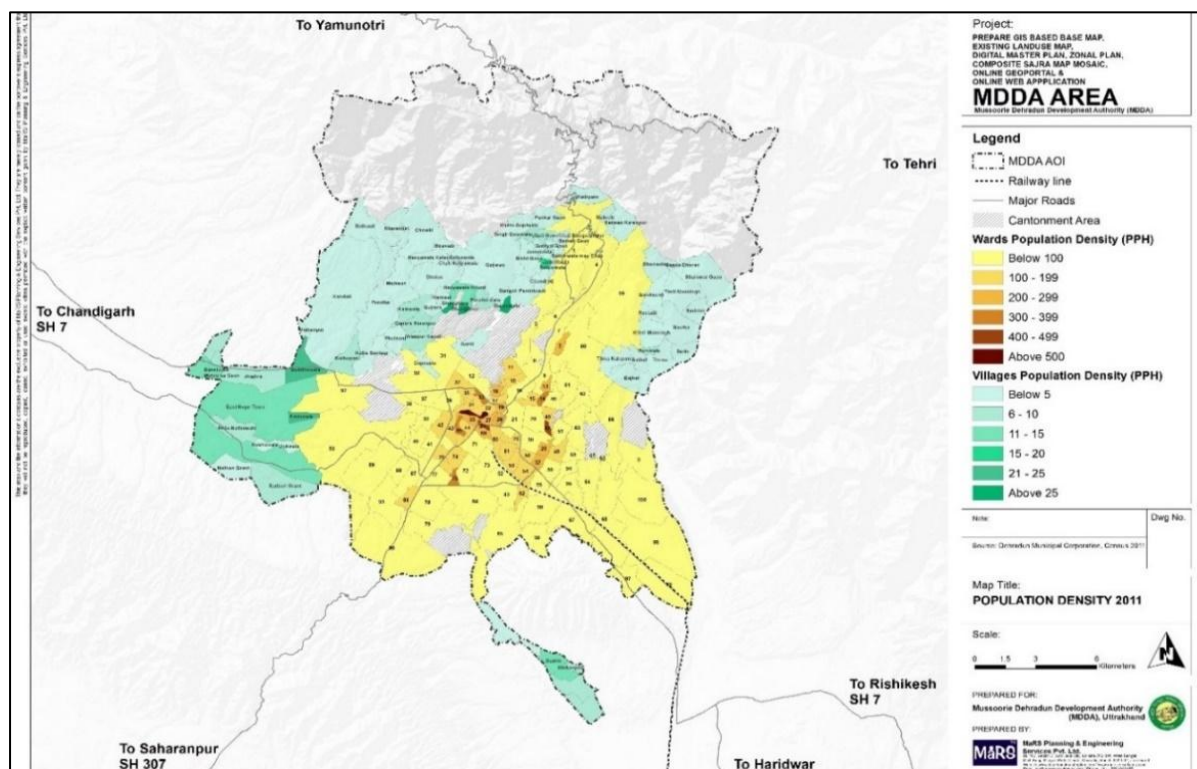
The average density of Dehradun Planning Area is around 25 pph. But, if we calculate for the developed area, density is coming around 75 pph (Gross density). As per URDPFI Norms, for hilly region, developed area density of large cities should be around 60 – 90 pph. So, we can conclude that, developed area density of Dehradun Planning Area is within the desirable limit. But the city's core and periphery have a different situation. The central part of the city, which includes Wards 24, 23, 47, and 75, has a population density of more than 200 people per hectare, while the peripheral area has a population density of only 4 people per hectare.

Table 3-4 Average Population Density

Description	Population (2011)	Area (sq.km.)	Population Density (Persons per sq.km, 2011 census)	Population Density (Persons per Ha, 2011 census)
Dehradun MC	804379	211.6	3801.41	38
Rural areas - Dehradun	69298	166.4	416.45	4
Average Population Density	—	—	2108.92	21
Cantonment Board	75273	27.9	2697.96	27

Source: Census 2011

Map 3-1 Population Density as per Census 2011



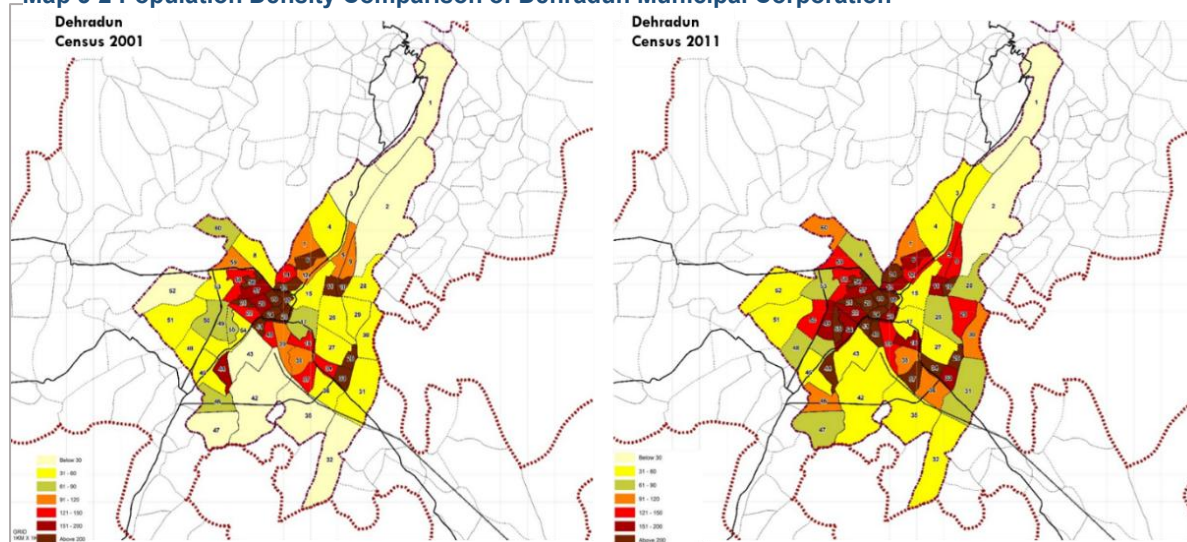
Source: Dehradun Municipal Corporation and Census 2011

Table 3-5 Developed Area Density

Description	Population (2011)	Area (sq.km.)	Population Density (Persons per sq.km, 2011 census)	Population Density (Persons per Ha, 2011 census)
Developed Area	948950	125.43	7841	78.41

Source: Census 2011 and Existing Land Use Primary Survey, 2021

Map 3-2 Population Density Comparison of Dehradun Municipal Corporation



Source: Census 2001 and Census 2011

Map no 3-2 describes the ward-wise population density as of Census 2011, the population density is higher in ward no.24, 23, 47, and 70, as well as within the core city along the State highways (SH 55) and the Rajpur Road. However, in the rural areas, some of the villages on the eastern side (towards Shahaspur) that are closer to the Municipal Corporation Boundary have a population density of more than 125 persons per hac. Aside from that, most villages outside of the Municipal Corporation area have a population density of less than 10 pph.

3.2.5 Demographic Characteristics

On 9th November 2000, Uttarakhand State was formed and Dehradun city was declared as the capital city of the state. The population growth over the years has been displayed below

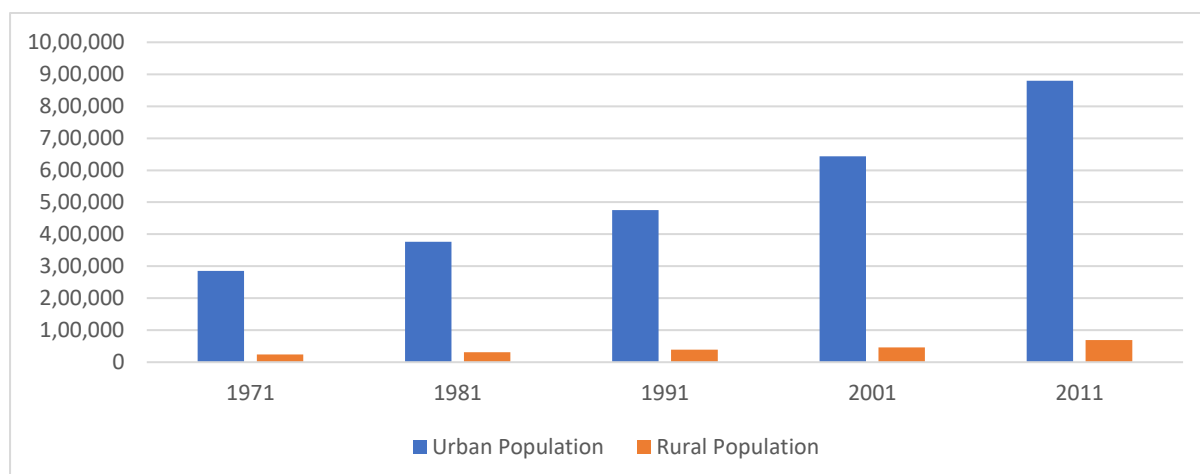
Table 3-6 Population Growth Rate of Dehradun

S.No.	Census Year	Urban Population			Rural Population		
		Urban Population	Decadal Population Change	DGR	Rural Population	Decadal Population Change	DGR
1	1971	285,281	—	—	24,569	—	—
2	1981	376,819	91,538	32.10%	31,395	6,826	27.80%
3	1991	475,380	98,561	26.20%	39,464	8,069	25.70%
4	2001	643,186	167,806	35.30%	46,494	7,030	17.80%
5	2011	879,652	236,466	36.80%	69,298	22,804	49.00%
Average		—	148,593	32.60%	—	11,182	30.09%

Source: Census of India 2011

In Dehradun City, population growth rate considerably increased after 1991. At the same time, population growth rate in the rural areas were considerably low which indicates higher in migration into the urban centre especially in the Dehradun City. The population growth rate of the adjoining areas of the municipality observed in the decade 2001 – 2011 is higher. The rural population after 2001 has increased dramatically with 32% increase in DGR.

Figure 3-2 Rural and Urban Population



Source: Census of India 2011

Population growth has accelerated in recent years as a result of increased industrial and information technology investment. A planned infrastructure and institutional improvement with additional funding from the Asian Development Bank, as well as town development under various development plans and an increase in secondary and tertiary sector possibilities. As shown in the

table number 3-5 , the population has grown at a faster rate due to migration and natural population growth.

3.2.6 Literacy Rate

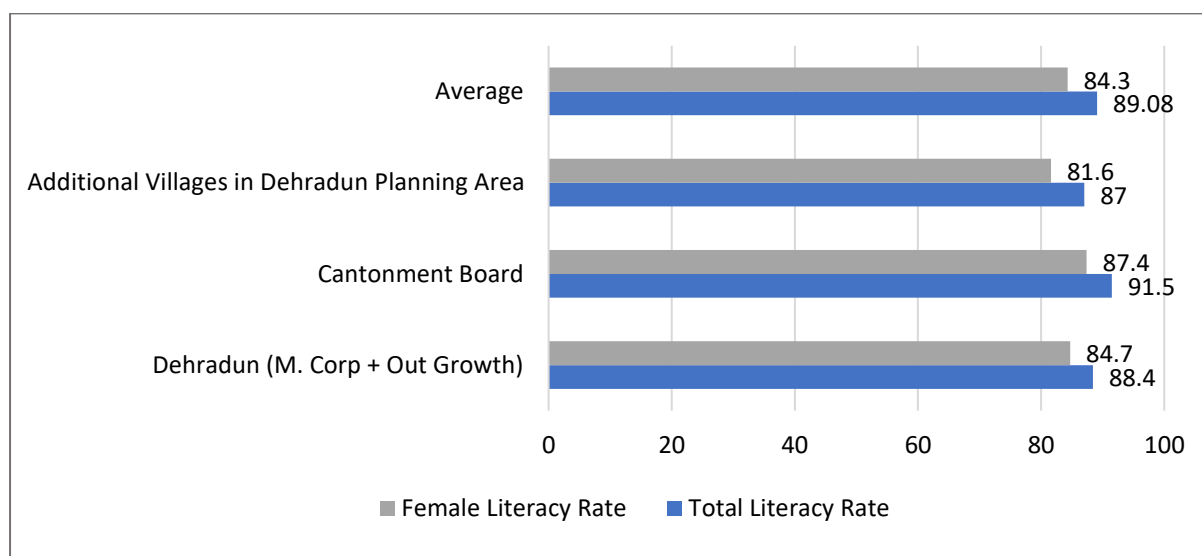
Average Literacy Rate of India, Uttarakhand State and Dehradun District is around 74.04%, 79.63% and 85.24% respectively while in Dehradun city, it is around 88%. In Dehradun Planning Area, more than 80% population is literate. Higher Literacy Rate (more than 90%) is observed in to the Cantonment Board Areas while lower literacy rate is observed in villages. As far as the Female Literacy Rate is concerned, the same trend is observed. In comparison to total literacy rate, higher female literacy is observed in the Cantonment Board while least is observed in the villages. The availability of educational institutes and successful government scheme and policies for improving education impacts the literacy rate of the city.

Table 3-7 Literacy rate in comparison to National, State and District's Average, 2011

Level	Literacy Rate
Nation (India)	74.05 %
State (Uttarakhand)	79.63 %
District (Dehradun)	85.24 %
Dehradun City	88.36 %

Source: Census of India 2011

Figure 3-3 Literacy Rate in Dehradun Planning Area



Source: Census of India 2011

3.2.7 Sex Ratio

The Dehradun City sex ratio is 907, which is higher than district average and lower than state and national level. Migration rate is high among men for work or education. At the city level the job opportunities in the secondary and tertiary sectors attracts the workers, resulting the higher in migration of male working population from rural to urban.

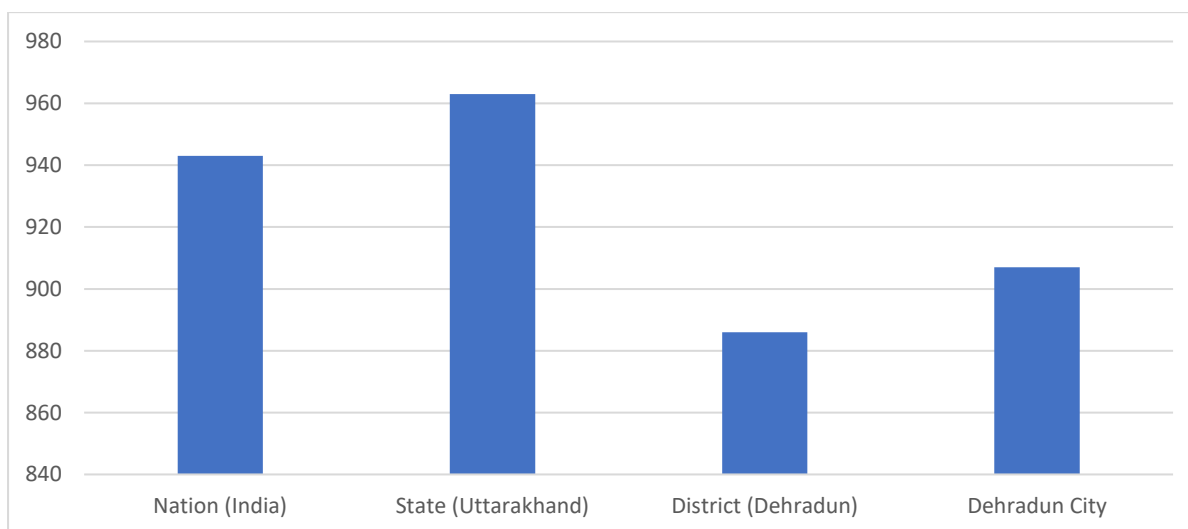
Table 3-8 Sex ratio in comparison to National, State and District's average

Level	Sex Ratio
Nation (India)	943
State (Uttarakhand)	963
District (Dehradun)	886
Dehradun City	907

Source: Census of India 2011

Due to population growth, census data show an increase in the sex ratio in all settlements in the Dehradun planning area in 2011 compared to 2001. The Cantonment Board Areas have a lower sex ratio due to the higher migration rate.

Figure 3-4 Sex ratio in comparison to National, State and District's average



Description	Sex Ratio (2011)
Dehradun MC	908
Rural areas - Dehradun	925
Average Population Density	917
Cantonment Board	775

As per census 2011 data, the sex ratio of Dehradun within the municipal corporation is 908 females after every 1000 males. The rural area and Cantonment Board sex ratio are 925 and 775 females per 1000 males. The average sex ratio of Dehradun is 917.

3.2.8 Household Size

According to Census 2011, the average household size in Dehradun district reflects distinct differences between its rural and urban areas. The district as a whole records an **average household size of about 4.3 persons per household**, which is consistent with demographic patterns in the rest of Uttarakhand.

In **rural Dehradun**, the average household size is **higher, at around 4.6 persons per household**, reflecting traditional joint/extended family structures and larger family compositions that are characteristic of agrarian communities. In contrast, **urban Dehradun**—which includes Dehradun Municipal Corporation, Mussoorie, and other urban settlements—records a **smaller average household size of about 4.0 persons per household**, driven by nuclear family patterns, higher migration of working individuals, and a more compact housing typology.

3.2.9 Religion

Hinduism is the predominant religion in Dehradun, with a majority of the population following it. Islam, Sikhism, and Jainism are the other religions present in the city (Census 2011).

3.3 KEY ISSUES & POTENTIALS

1. Demographically, Dehradun Planning Area has been experiencing increased population pressure especially after the formulation of Dehradun City as a State Capital of Uttarakhand.
2. People are migrating to the capital city in search of better job opportunities and more efficient infrastructure, including educational and medical services, which puts enormous pressure on city infrastructure.
3. The core city area's population density exceeds the URDPFI norms, resulting in a negative growth rate in some wards due to a lack of better environment and infrastructure facilities for its residents, which becomes the reason for slum development in core area.
4. Average Literacy Rate of the city is 88.34% which is more than the average literacy rate of the Nation and Uttarakhand State both i.e., 74.04% and 79.63% respectively which depicts that people are literate enough to understand the technology advancement.
5. Management of resources for floating population is also an challenge for administration to cater the visitors and provide them services and infrastructure during the stay period.

4 ECONOMIC PROFILE

4.1 INTRODUCTION

Economic base of any area is a crucial parameter for its physical development and growth. In order to address the issues of regional development and achieve regional balance, it is vital to gain a deeper understanding of the existing economic structure of the area. As center for economic growth, urban area not only provides major economic opportunities as off-farm employment, but also instrumental the transformation of traditional farming production systems. The dominant sector of economy in Dehradun City is Tertiary sector.

4.2 ECONOMIC PROFILE OF DEHRADUN PLANNING AREA

The Dehradun Planning Area exhibits a diverse and expanding economic base driven by its strategic location, administrative importance, and strong connectivity with the wider region of Uttarakhand. As the **state capital**, Dehradun functions as the primary administrative, institutional, and service hub of the state, generating widespread employment across government, private, and auxiliary sectors. The economy is predominantly **tertiary-sector oriented**, reflecting the city's rapid evolution into a centre for education, services, tourism, trade, and governance.

1) Major Economic Sectors

- **Agriculture:**

Agriculture continues to play an important role in the rural fringe of the planning area, with crops like basmati rice, wheat, sugarcane, and vegetables forming the main produce. Floriculture and horticulture have grown significantly due to favourable climatic conditions, while dairy farming and allied activities supplement rural incomes.

- **Service Sector:**

The service sector forms the backbone of the Dehradun economy, supported by a large presence of state and central government offices, defence establishments, premier educational institutions such as the Indian Military Academy (IMA), Forest Research Institute (FRI), Doon University, and numerous private universities and schools. The IT and knowledge-based industry is steadily emerging, encouraged by the development of the **IT Park (Sahastradhara Road)** and growth in start-ups, consultancies, and outsourcing services.

- **Industrial Sector:**

The industrial sector is relatively moderate within the core planning area but gains strength in peripheral pockets such as Selaqui, Bhagwanpur, and the Dehradun-Haridwar-Rishikesh regional industrial corridor. Selaqui Industrial Area, in particular, has grown into a significant cluster for pharmaceuticals, food processing, manufacturing, packaging, and ancillary industries, providing substantial employment to both urban and rural populations.

- **Tourism Sector:**

The tourism sector contributes significantly to the local economy, with Dehradun serving as a gateway to Mussoorie, Rishikesh, and Char Dham pilgrimage circuits. Hospitality, retail, transport, and tourism-related services continue to expand due to increasing tourist inflow and improved infrastructure. The city's vibrant market centres—such as Paltan Bazaar, Rajpur Road, Clock Tower area, and newly developing commercial corridors—support thriving trade and business activity.

4.3 OCCUPATIONAL STRUCTURE

Dehradun is known as India's education hub and carries a label of "School capital of India", for its institutional activities as many important and well-known institutions are located here like some famous institutes such as: Indian Military Academy, Survey of India, Indian Forest Research Institute etc. Due to these reasons, proportion of student population is quite high in the region. Moreover, it is a gate – way to Himalayan region and hence it attracts a large number of tourists due to that reason, proportion of population engaged into the service industries especially in hotels and tourism related activities are quite high in the region as compare to the other economic sector.

Tourism, information technology, higher education, and banking are the major economic bases in Dehradun, and some people are engaged in primary activities such as agriculture, animal husbandry, and forest produce based furniture and craft items, and other things. Dehradun has an appropriate climate, and the city has experienced strong economic growth in recent decades as a result of increased tourism activities and secondary sector, as well as the establishment of Software Technology Parks of India (STPI), which attracts the majority of the working population from the nearby villages and towns to the Dehradun City.

4.3.1 Work Participation Rate

Workforce participation rate (WFPR) is defined as the ratio of total working population to total population. The details of WFPR at various administrative level is described in the table given below. As we can see from the table, WFPR of Dehradun district and town comparatively less in comparison to state and national average.

Table 4-1 Workforce Participation Rate at various administrative level

Level	Workforce Participation Rate
Nation (India)	39.80 %
State (Uttarakhand)	38.39 %
District (Dehradun)	34.35 %
Dehradun City (M. Corp+OG)	33.93 %

Source: Census of India

(*Note: Data facts are taken from the 2011 Census of India, and for the same reason, the consultant only showed figures for 60 wards.)

Ward Wise Work Force Participation Ratio:

WFPR in various wards are discussed below. As we can see from the table, except ward no. 9, 25 and 46 has WFPR greater than 30%. The highest WFPR is found in ward no. 57 and the lowest is in the ward no. 25.

Table 4-2 WFPR at Ward Level

Ward No.	WFPR (%)	Ward No.	WFPR (%)	Ward No.	WFPR (%)	Ward No.	WFPR (%)	Ward No.	WFPR (%)
1	36.66	13	36.80	25	27.09	37	31.53	49	32.21
2	32.85	14	32.52	26	38.30	38	33.16	50	33.96
3	34.18	15	38.21	27	35.74	39	32.60	51	33.97
4	34.83	16	33.54	28	36.68	40	32.24	52	37.23
5	33.60	17	37.92	29	32.96	41	34.87	53	33.21
6	34.29	18	35.34	30	31.75	42	31.78	54	34.55
7	32.40	19	36.01	31	30.89	43	34.69	55	33.71
8	33.68	20	34.50	32	31.55	44	30.58	56	34.23
9	29.17	21	35.35	33	35.12	45	39.14	57	38.70
10	36.71	22	36.14	34	34.89	46	29.72	58	34.09
11	34.04	23	36.64	35	31.73	47	31.64	59	33.62
12	35.33	24	37.43	36	33.80	48	37.84	60	31.19

Source: Census of India, 2011

(*Note: Data facts are taken from the 2011 Census of India, and for the same reason, the consultant only showed figures for 60 wards.)

4.3.2 Main and Marginal Workers

As per census 2011, out of total working population, around 90% workers are the main workers while only 10% workers are the marginal workers which has been seen in the wards where availability of the slum pockets is high. Proportion of marginal workers may be reduced by generating employment opportunities in the secondary sectors where workers may able to get a regular job.

4.3.3 Gender-wise workforce Distribution

As per Census 2011, the gender-wise workforce distribution in Dehradun urban area also reflects a substantial gender gap in employment. Among urban main workers, males constitute 83.97%, while females account for only 16.03%, indicating comparatively limited female participation in stable, long-duration employment. In the case of urban marginal workers, males represent 66.69%, whereas females comprise 33.31%, showing a relatively higher female presence in short-term or seasonal employment, though still lower than the state average. This pattern suggests that employment opportunities suitable for women remain limited or that available jobs do not adequately align with women's occupational preferences and mobility constraints. When compared to 2001, male dominance in the workforce has slightly reduced—reflecting a gradual, though modest, shift toward increased female participation—yet the overall imbalance continues to persist in Dehradun's urban labour market. (Refer Table 4-3)

Table 4-3 Gender-wise Workforce Distribution of Dehradun Planning Area

Category	Urban	Rural	District (2011)
Main Workers	2,82,175	2,05,986	4,88,161
Male	2,36,931	1,62,764	3,99,695
Male Main Workers (% of Main Workers)	83.97	79.02	81.88
Female	45,244	43,222	88,466
Female Main Workers (% of Main Workers)	16.03	20.98	18.12
Marginal Workers	35,252	59,355	94,607
Male	23,510	35,629	59,139
Male Marginal Workers (% of Marginal Workers)	66.69	60.03	62.51
Female	11,742	23,726	35,468
Female Marginal Workers (% of Marginal Workers)	33.31	39.97	37.49

4.3.4 Sector Distribution

As per Census 2011, share of primary (Cultivator and Agriculture labour), secondary (HH Industry Workers) and tertiary sector workers in Dehradun (M. Corp+OG + OG) is around 2.04%, 4.49% and 93.47% respectively. Details of sector wise workforce distribution at ward level is discussed into the table given below.

Ward 40 had the highest percentage of primary workers, while Ward 18 had the lowest. Ward 29 has the most secondary workers, while Ward 40 has the fewest. Because the majority of the population works in tourism-related services, ward no. 60 has the highest concentration of tertiary workers, while ward no. 42 has the lowest concentration. (Refer Table 4-4)

Table 4-4 Sector Wise Workforce Distribution

Ward No.	Primary Sector Workers	Secondary Sector Workers	Tertiary Sector Workers	Ward No.	Primary Sector Workers	Secondary Sector Workers	Tertiary Sector Workers
1	1.72	2.67	95.62	31	1.33	3.71	94.96
2	2.17	1.82	96.01	32	0.60	3.54	95.86
3	1.72	2.89	95.39	33	0.64	4.31	95.06
4	0.89	3.65	95.46	34	0.68	2.60	96.72
5	1.32	3.71	94.97	35	3.06	8.53	88.41
6	0.98	2.13	96.89	36	1.84	2.61	95.55
7	0.92	3.35	95.73	37	2.31	2.57	95.12
8	1.49	4.22	94.28	38	3.63	9.88	86.50
9	5.29	6.75	87.97	39	2.98	1.89	95.13
10	1.09	2.21	96.70	40	9.30	1.12	89.59
11	0.79	5.31	93.90	41	0.61	4.81	94.58
12	0.49	6.80	92.72	42	6.33	9.95	83.72
13	0.38	2.65	96.97	43	4.27	3.34	92.40
14	0.49	2.48	97.03	44	4.12	3.50	92.38
15	1.13	2.65	96.23	45	1.40	6.25	92.35
16	1.27	2.36	96.38	46	2.55	4.11	93.34
17	0.56	4.13	95.31	47	2.23	9.24	88.53
18	0.37	4.99	94.63	48	2.80	5.01	92.19
19	0.45	4.25	95.30	49	1.27	3.96	94.77
20	1.81	2.16	96.03	50	2.43	3.17	94.41
21	7.99	1.93	90.08	51	1.21	1.94	96.84
22	1.18	2.35	96.47	52	2.48	6.79	90.73
23	0.67	8.04	91.29	53	0.89	3.13	95.99
24	1.95	7.90	90.15	54	0.98	9.43	89.59
25	1.01	3.57	95.42	55	1.43	5.57	93.00
26	0.98	1.99	97.03	56	0.48	2.60	96.93
27	1.25	4.11	94.65	57	2.75	6.45	90.80
28	1.22	5.55	93.23	58	0.83	7.40	91.77
29	1.85	12.44	85.71	59	2.03	2.06	95.91
30	2.82	3.76	93.42	60	0.64	2.14	97.22

Source: Census 2011

4.3.5 Dependency Ratio

The dependency ratio, which indicates the number of non-workers per 1,000 workers, provides insight into the economic burden on the working population. As per Census 2001, **Dehradun Urban** recorded a relatively high dependency ratio compared to the district and state averages,

indicating a greater economic burden on the working population. The dependency ratio in **Dehradun District** also stood above the state average, reflecting the district's demographic structure marked by a substantial non-working population. However, by **Census 2011**, the dependency ratio in the **Dehradun Planning Area** showed a notable decline, demonstrating improved workforce participation and reduced pressure on earners. This decline was more pronounced in **urban areas**, where employment opportunities expanded significantly between 2001 and 2011, while **rural areas** also experienced a reduction in dependency but continued to remain above the state average. Overall, the downward shift in dependency ratios across both rural and urban Dehradun highlights improved economic engagement, better livelihood opportunities, and a gradual strengthening of the district's working-age population during the 2001–2011 period. (Refer Table 4-5)

Table 4-5 Dependency Ratio of Dehradun Planning Area

Category	Dehradun Urban (2011)	Dehradun Rural (2011)	Dehradun Planning Area (2011)
Total Population	9,41,941	7,54,753	16,96,694
Total Workers	3,17,427	2,65,341	5,82,768
Non-Workers	6,24,514	4,89,412	11,13,926
Dependency Ratio (per 100 workers)	197	185	191

4.4 SECTOR WISE ANALYSIS OF HARIDWAR PLANNING AREA

The sector-wise workforce distribution in the Dehradun Planning Area, as per Census 2011, reflects a predominantly service-driven economy with a comparatively smaller dependence on the primary sector. The **primary sector**, comprising agriculture, forestry, and related activities, engages a limited share of the workforce, particularly in urban regions, as rapid urbanization and shrinking agricultural land have reduced reliance on traditional livelihoods. In contrast, the **secondary sector**, which includes manufacturing and household industries, contributes moderately to employment, with industrial pockets such as Selaqui, Mohabbewala, and Raipur fostering small- and medium-scale industrial activities. However, the most dominant is the **tertiary sector**, which forms the backbone of Dehradun's economy. With a large concentration of educational institutions, administrative offices, health facilities, defence establishments, IT services, retail, hospitality, and tourism-related activities, the service sector commands the highest workforce share. Overall, Census 2011 highlights the transition of the Dehradun Planning Area from an agriculture-based economy toward a service-oriented urban centre, supported by expanding institutional, commercial, and industrial activities.

4.4.1 Primary Sector

Major Primary activities in Dehradun are Agriculture Forest and Animal Husbandry. As per the Economic Survey of Uttarakhand State for the year of 2016 – 17, contribution of primary sector of Dehradun district in state GDP is around 7.30%. The details of various primary sectors are given into the sub – sections given below:

Agriculture

Agriculture remains the primary source of income for the majority of the state due to the region's terrain and advantageous climatic conditions. However, cropped land in the Dehradun planning area is significantly lower. Basmati rice, wheat, soybean oil, ground nuts, coarse cereals and

pulses, and sugarcane are the major crops, and oranges, peaches, litchees, and plums are the major fruits.

Agriculture produce market

There are eleven functional regulated markets in Kumaon division and nine functional regulated markets in Garhwal division. According to the annual arrival of vegetables, the major vegetable markets are Halwani in Kumaon and Dehradun in Garhwal.

Table 4-6 Agriculture Product Market

District	Principal Markets (Major Mandis)	Sub markets (Minor Mandis)	Weekly Markets
Dehradun	Dehradun	Doiwala	Selkuyi
		Mussoorie	
	Vikas Nagar	-	Raiwala
			Chhidarwala
			I.D.P.L.
	Chakrata	Sahiya	Rani Pokhari
			Baniyawala
			Shyampur
	Rishikesh	-	Ganganagar

Source: Uttarakhand Krishi Utpadan Vipnan Board

4.4.2 Secondary Sector

Due to government support in the industrial sector, Dehradun has attracted many investors since its independence. Many industries, particularly agro-based industries and information technology, consider Dehradun to be an appealing destination. Food processing, biotechnology, floriculture, information technology, and tourism are the major industries in Dehradun. Dehradun's total industrial area is 0.834 square kilometres.

Dehradun has maximum industries in MSME sector. As per the Economic Survey of Uttarakhand State for the year of 2016 – 17, contribution of secondary sector of Dehradun district in state GDP is around 13.36%. The details of various industries in Dehradun are discussed into the sub sections given below:

Major Industries Operating in Dehradun District are:

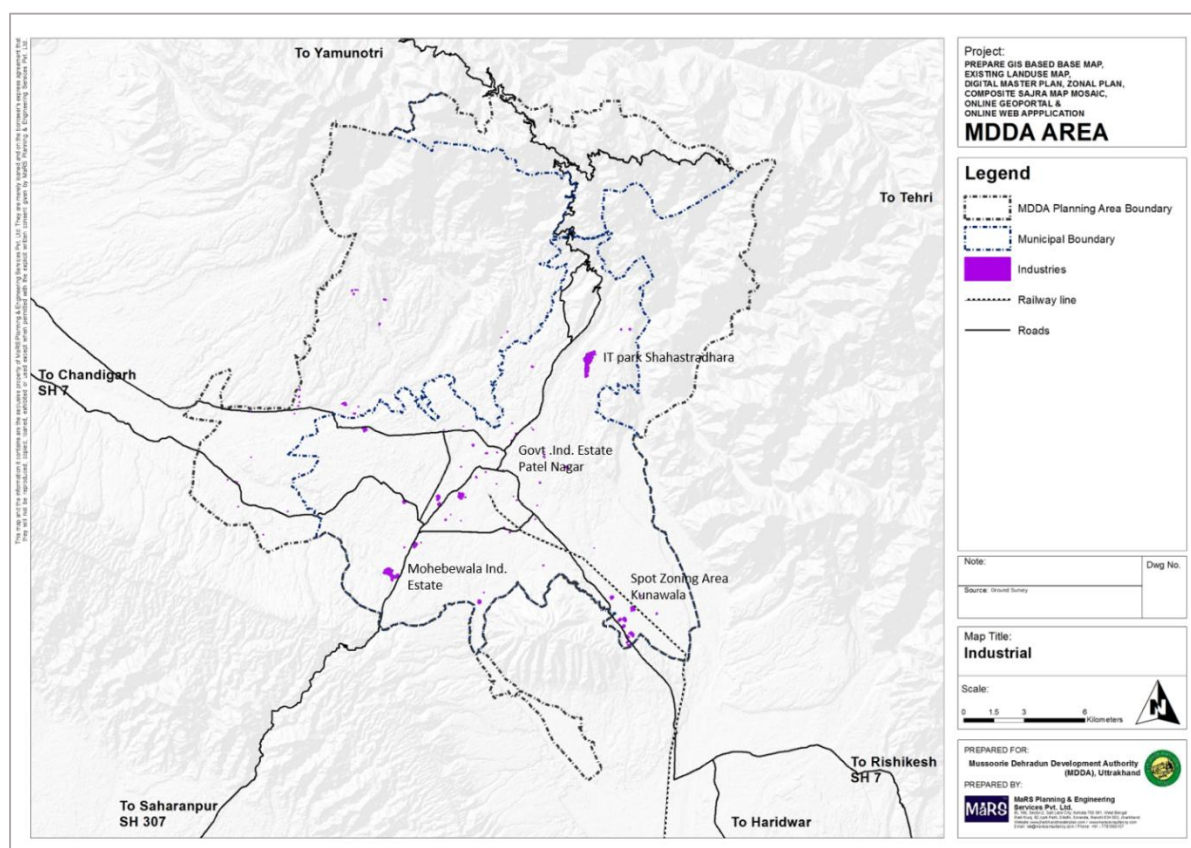
- **Food Processing Industry:** Food processing is a major industry in Dehradun, which is why the government has announced four Agri Export Zones (AEZ) in the district for the following industries: leeches, horticulture, herbs, medicinal plants, and basmati rice.
- **Information and Communication Technology:** The IT Sector in Dehradun is also among the city's top industries. To further promote this industry, the government has announced the establishment of an Information Technology Park in Dehradun.
- **Floriculture and Horticulture:** Dehradun's climate is ideal for growing flowers all year, which is why Floriculture and Horticulture are two of the most important industries in the city.
- **Tourism:** Due to the rapid development of Dehradun in the past 20 years, the tourism sector in the city has increased tenfold. It is now considered a major industry in Dehradun and steps have been taken to further improve the industry.

4.4.2.1 Industrial Estates

4.4.2.1.1 Software Technology Park (STPI)

The **IT Park Dehradun**, located on **Sahastradhara Road**, is one of Uttarakhand's key technology hubs, developed by the **Uttarakhand State Industrial Development Corporation (SIDCUL)**. Established in the year 2001, the park was created to promote information technology, software development, and IT-enabled services in the state. Its presence in two locations in Dehradun viz. Survey Chowk, near Vikas Bhawan and IT Park Sahastradhara Road. Spread over a well-planned campus with modern infrastructure, the IT Park houses a mix of national and regional IT/ITES companies, startups, and service-based firms. Its strategic location, connectivity to the city center, and availability of skilled manpower—supported by Dehradun's strong educational ecosystem—have made it an emerging destination for tech-based employment. Over the years, the park has contributed significantly to the city's economy by generating jobs, encouraging innovation, and strengthening the tertiary sector in the Dehradun Planning Area.

Map 4-1 Location of Industrial Areas



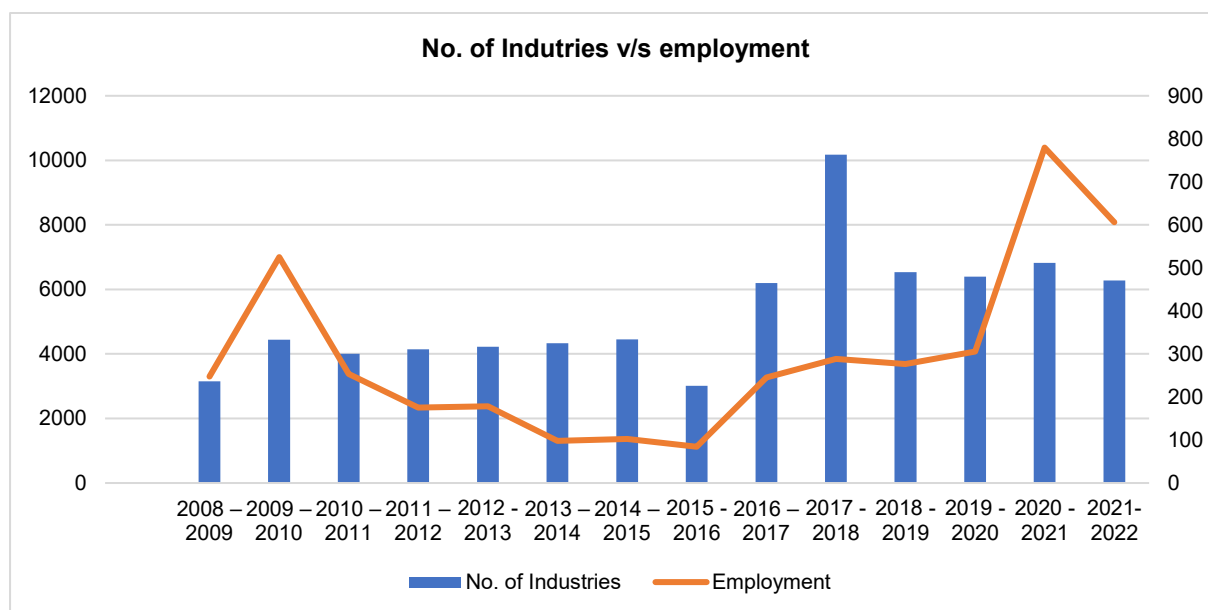
Source: Doon Ghati Master Plan

4.4.2.1.2 Transport Nagar Industrial Area

Transport Nagar Industrial Area, located in Dehradun, is a key logistics-oriented industrial hub developed to support transport, warehousing, and small-scale industrial activities within the city. Situated strategically along the national highway corridor near Mohabbewala, the area was planned to streamline transport operations, reduce congestion in the city core, and provide dedicated space for transport companies, repair workshops, storage facilities, and ancillary service units. Over time, Transport Nagar has evolved into an important node for goods movement, serving as a base for truck operators, logistics firms, and distribution networks that cater not only to Dehradun but also to adjoining hilly districts. Its development has strengthened the city's commercial and industrial ecosystem by improving freight handling capacity, promoting organized

logistics, and supporting the growing demand for transport-related services in the Dehradun Planning Area.

Figure 4-1 No. of Industries v/s employment generation in MSME



Source: Directorate of Industries, Dehradun

4.4.2.1.3 Mohabbewala Industrial Area

Mohabbewala Industrial Area is one of the older and established industrial zones in Dehradun, originally laid out in the late 1970s–1980s under the state industrial development drives to decentralize manufacturing and promote small- and medium-scale industries outside the congested city core. Over the decades, Mohabbewala has grown steadily, hosting a mix of light manufacturing, packaging, repair workshops, agro-processing, and small-scale production units. Its strategic location along the Dehradun–Mussoorie–Haridwar corridor and accessibility via main road networks have made it a convenient base for industrial and commercial operations. The area continues to play an important role in Dehradun’s industrial ecosystem by providing employment, supporting ancillary services, and facilitating local industry growth even as newer industrial zones have emerged.

4.4.3 Tertiary Sector

The tertiary sector forms the backbone of Dehradun’s economy and is the fastest-growing segment of the Dehradun Planning Area. As the capital of Uttarakhand, Dehradun hosts a large concentration of administrative and government offices, generating extensive employment in public administration, governance, and support services.

The tertiary sector of Dehradun covers the activities from commerce to administration, transport services, tourism, institutions, and various business and personal services. The region’s vast pool of natural resources adds considerably to its attractiveness as an investment destination, particularly for tourism and institutional establishments. As per the Economic Survey of Uttarakhand State for the year 2016 – 17, the contribution of the tertiary sector of Dehradun district to state GDP is around 24.64%.

4.4.3.1 Administration

4.4.3.1.1 Trade and Commerce

Trade and commerce form a vital component of Dehradun's economy, shaping the city into a major commercial hub of Uttarakhand. The city's strategic location—connecting the plains of northern India with the Himalayan region—has historically made it an important trading gateway for goods moving toward Mussoorie, Rishikesh, Haridwar, and the Garhwal hills. Dehradun hosts a diverse and vibrant market structure, ranging from traditional bazaars such as Paltan Bazaar, Rajpur Road, Chakrata Road, and Saharanpur Road to modern commercial complexes, malls, and organized retail chains. Wholesale markets dealing in agricultural produce, textiles, construction materials, and consumer goods play a critical role in supplying both urban and rural areas of the district. The presence of Transport Nagar and the city's expanding logistics network further enhance commercial activity by facilitating the movement, storage, and distribution of goods. Additionally, the growth of educational institutions, tourism, hospitality, and IT services has boosted demand for retail trade, restaurants, financial services, real estate, and professional services. With increasing urbanization, rising purchasing power, and improved connectivity, Dehradun's trade and commerce sector continues to expand, positioning the city as one of the most dynamic commercial centers in Uttarakhand.

4.4.3.1.1.1 Formal Sector

The formal sector of Dehradun within the tertiary economy is well-developed and expanding rapidly, reflecting the city's role as the administrative, educational, and commercial capital of Uttarakhand. As the state headquarters, Dehradun hosts a wide network of government offices, public institutions, administrative departments, and regulatory bodies that generate substantial employment in organized services. The city is also a major center for education and research, housing prominent institutions such as the Forest Research Institute (FRI), Indian Military Academy (IMA), Survey of India, Wildlife Institute of India (WII), Indian Institute of Remote Sensing (IIRS), Doon University, and numerous schools and colleges, contributing significantly to the skilled workforce. The healthcare sector is equally strong, with formal establishments including government hospitals, private multispecialty hospitals, diagnostic centers, and medical colleges. Banking, financial services, insurance (BFSI), and corporate offices of national and state-level agencies form an essential part of Dehradun's organized service sector. Additionally, the presence of the IT Park at Sahastradhara Road has strengthened formal employment in IT/ITES, software development, and business process services. Retail chains, hospitality institutions, tourism-related enterprises, and transport services further reinforce the city's structured service economy. Overall, the formal tertiary sector in Dehradun plays a pivotal role in shaping its economic landscape through stable employment, institutional strength, and continuous service expansion.

Banking System

Various public and private banks are available within the Dehradun District with a facility of internet banking, money disposal/ withdrawal as well as loan facilities. As per the details available on Dehradun District Portal, a total number of 33 banks are available within the district. Among them, top available banks are: Allahabad Bank, Axis Bank, Punjab National Bank, State Bank, ICICI Bank, Bank of Baroda, Union Bank of India, Corporation Bank, Dena Bank and Oriental Bank of Commerce

Finance and Investment

Apart from government schemes and subsidies, government has also encouraged involvement of private sector to induce better quality control in tourist infrastructure. Private sector has invested in accommodation and transportation services. Apart from that, Uttarakhand government has started the up-gradation and establishment of air strips. All the tourist information centres of state are to be linked through a computer network supported by satellite linkage to improve database management.

The Tourism Board has been providing a range of options to invest for the private investors. Some of the options are resorts, way-side amenities, amusement park, ropeways, golf-courses, drive-in theatres, heritage hotels, camping sites, tent-colonies, manufacturing/marketing of equipment of trekking, river-rafting, hand-gliding, angling etc.

Retail Market

The Paltan bazaar, Gandhi Road, Lakhtar Bazar, Indira Marg, Connaught Place are major commercial areas of Dehradun and which attracts the inter and intra city market visitors. The working duration of these commercial areas are from morning 10 to evening to 8. The function of the commercial areas adds up the financial contribution of Dehradun Planning Area.

But the pattern of development into these areas are the major concerns that needs special attention through modification into the building regulations such as:

- Lack of availability of parking spaces into the commercial building results into the off-street parking. Example: DL Road, Arhat Bazaar, Paltan Bazaar ISBT, Premnagar and Rajpur Road etc.
- Inadequate pedestrian moment due to narrower streets and unplanned vender's moment.
- Most of the buildings are outage and unsafe – is a threat to the people who residing in them. Hence, no activities for heritage conservation in Gandhi Road market., Moti Bazar, Hanuman Chownk, D.L. Road Arat Bazar.
- Lack of landscape adds to the unpleasant visual quality of the street for e.g., Astley Hall, Paltan Bazaar, Indira Marg etc.
- Hardly any harmony is found in the facade element of the street
- Lack of necessary amenities like; public toilets, dustbins, drinking water booths.
- No availability of open spaces or natural beauty.

Informal commercial areas

According to Times of India news articles and surveys conducted by the consultant while preparing the Base Map and ELU, informal commercial activities have been observed along the Panditwadi, Rispana, and Shahastradhara Road. In addition, illegal commercial development has been observed near Paltan Bazar, Lakhtar Bazar, and Arhat Bazar. conducted (Source: “27 Vending zones to be developed in a city”. Times of India, Jul 20, 2017,22:19 IST)

Vending Zones under NULM scheme

Around 27 locations have been identified where modern vendor's zones in the city will be developed under National Urban Livelihood Mission. These vendor zones will be constructed in locations like Indra Nagar, Race Course, Vasant Vihar, Rajpur Road, Parade Ground, Patel Nagar, Raipur Road, Dharmapuri and Deep Nagar Areas. As per the latest article published by Times of India, around 3000 street vendors are in the city. Among them, a survey of 1758 vendors have already conducted (Source: “27 Vending zones to be developed in a city”. Times of India, Jul 20, 2017,22:19 IST)

Figure 4-2 Retail market in Dehradun Planning area



Rajpur Road



Gandhi Road Market



Niranjn Pur Sabji Mandi



Astley Hall



Paltan Bazaar



Mall Road



Indira Marg



Connaught Place



Landour Bazaar



Tibetan Market



Arhat Bazaar



Sister Bazaar

4.4.3.1.1.2 Informal Sector

The informal sector forms a vital component of Dehradun's economy, providing livelihood opportunities to a substantial segment of the population, especially migrants, low-skilled workers, and those engaged in small-scale services and trade. This sector includes street vendors, hawkers, daily-wage labourers, construction workers, domestic helpers, auto-rickshaw drivers, carpenters, electricians, mechanics, small shopkeepers, and workers employed in unregistered micro-enterprises. Informal markets such as Paltan Bazaar, Indira Market, Darshanlal Chowk, Araghar, Saharanpur Road, and neighbourhood-level weekly haats house numerous small traders dealing in garments, footwear, fruits and vegetables, household items, and food stalls. A considerable share of the workforce is engaged in informal services including catering, repair workshops, hospitality support, dhabas, private transport, and home-based manufacturing of bakery products, handicrafts, and tailoring. Due to the growing urbanization and expanding service demand, the informal sector has become increasingly dynamic, contributing significantly to the city's retail trade, logistics, and construction activities. However, the sector continues to face challenges such as lack of social security, inadequate workspace, vulnerability to seasonal fluctuations, and limited access to credit or formal markets. Despite these constraints, the informal sector remains a crucial economic pillar for Dehradun, supporting employment generation, local commerce, and low-cost service provision across the Planning Area.

Street Vendors and Hawkers

Under Pradhan Mantri Street Vendors Atma Nirbhar Nidhi Scheme, Municipal Corporation will conduct a survey to check the status of street vendors who had returned to their villages during the lockdown. Under this scheme, the vendors will receive a loan up to Rs.10,000 for their livelihood.

4.4.3.1.1.3 Other Sector

Dehradun hosts a significant number of Ashrams and Dharmshalas that play an important socio-cultural and economic role in the city. These institutions, many of which are located along Rajpur Road, Sahastradhara Road, Haridwar Bypass, and near pilgrimage routes, provide low-cost accommodation and spiritual services to visitors, pilgrims, and students. Although Ashrams and Dharmshalas are generally exempted from property tax, they contribute to a dependent local economy by supporting employment in hospitality, maintenance, food services, transport, and retail. Several Ashrams also run charitable activities, yoga and meditation centres, Ayurvedic wellness programs, and small-scale agricultural or dairy units that help sustain their operations. Donations received from devotees and visitors form a major source of revenue, enabling these institutions to manage their facilities and community services. Some of the larger Ashrams manage affiliated centres within the district, offering accommodation and spiritual programs but remaining accessible to the public. Overall, these establishments not only enhance the cultural identity of Dehradun but also support a parallel service economy that benefits local residents and micro-businesses.

4.5 DEHRADUN AS INDUSTRIAL GROWTH POTENTIAL

Dehradun holds substantial industrial growth potential, driven by its strategic location in the Doon Valley, proximity to major markets in North India, and well-developed connectivity through air, rail, and road networks. The city has evolved into a preferred destination for clean and high-value industries such as pharmaceuticals, food processing, IT/ITeS, biotechnology, handcrafts, packaging, and precision manufacturing. Existing industrial estates like **Selaqui, Mohabbewala, Transport Nagar, IT Park (Sahastradhara Road), and Patel Nagar** have already attracted significant investments, creating a strong foundation for further expansion. The availability of skilled manpower—supported by renowned institutions such as **IISc Dehradun (formerly FRI), Doon University, UPES, IIT Roorkee Extension Centres**, and numerous training institutes—strengthens the city's competitiveness in knowledge-based sectors. Dehradun's clean environment, favourable climate, and policy incentives offered by the Uttarakhand government further enhance its industrial attractiveness. With rising demand for logistics, warehousing, IT-enabled services, and food-based industries, Dehradun is poised to grow as a major regional industrial hub, provided land availability, infrastructure augmentation, and environmental safeguards are addressed systematically in future planning.

5 EXISTING LAND USE DISTRIBUTION AT PLANNING AREA LEVEL

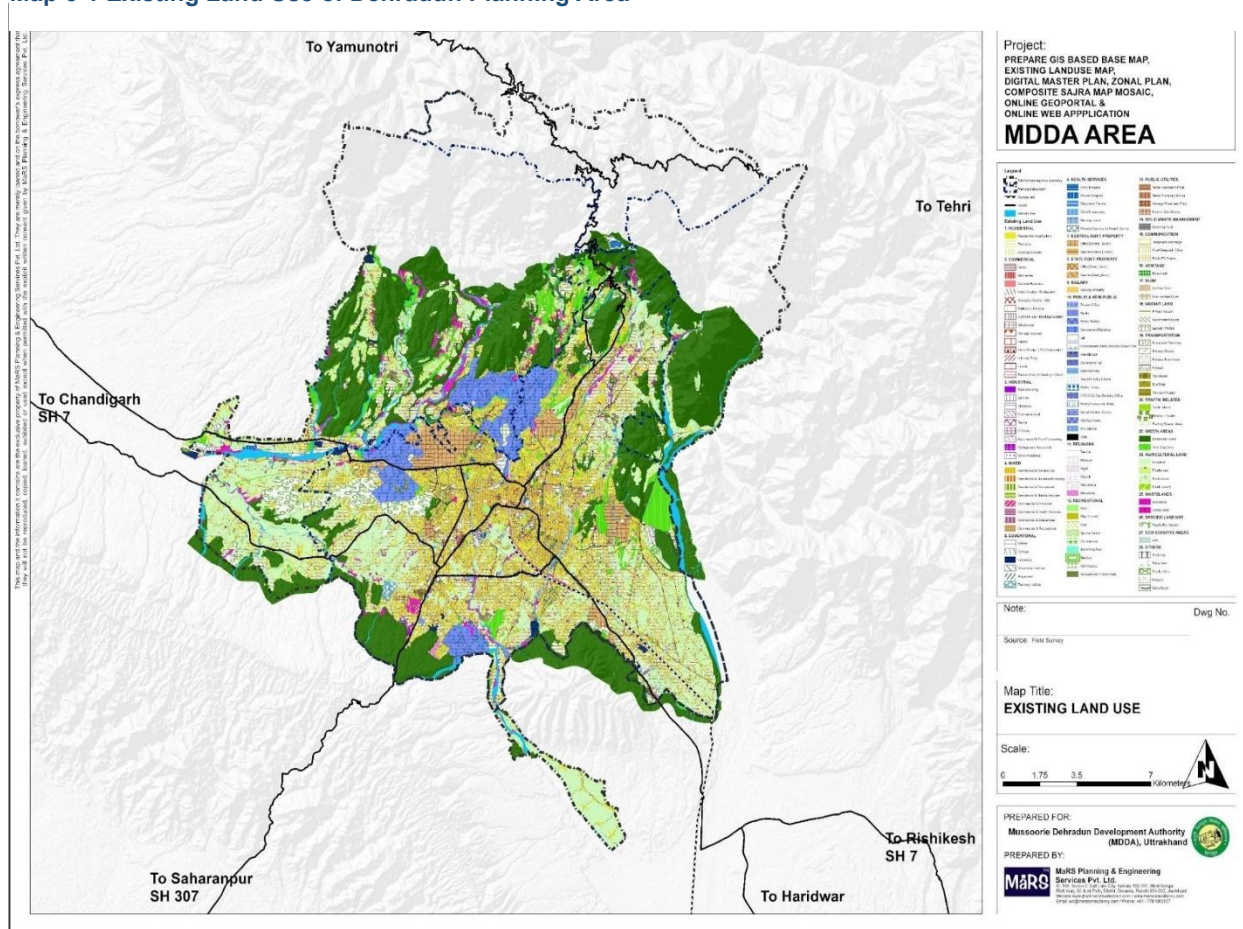
The Existing Land Use distribution of the Dehradun Planning Area, as outlined in the Master Plan 2025, reflects a diverse mix of urban, semi-urban, and rural land use patterns shaped by the city's rapid growth and geographic constraints. A substantial portion of the planning area is occupied by residential use, concentrated primarily within the Municipal Corporation limits and along key urban corridors such as Rajpur Road, Sahastradhara Road, Haridwar Bypass, Shimla Bypass, and Chakrata Road. Significant land is also allocated to institutional and public/semi-public uses, owing to the presence of major educational, research, and defense establishments that define the character of Dehradun. Commercial and industrial uses, though limited in comparison to residential and institutional areas, are clustered in zones such as Paltan Bazaar, Connaught Place, Mohabbewala, Selaqui, and Transport Nagar. Large tracts of agricultural land, forests, riverbeds (notably along the Rispana and Bindal rivers), and vacant land remain within the planning area, particularly toward the southern and peripheral regions. Overall, the Existing Land Use 2025 highlights the city's expanding urban footprint and the continued coexistence of developed and underdeveloped areas, underscoring the need for balanced and sustainable planning interventions. (Refer Table 5-1)

Table 5-1 Existing Land Use Classification of Dehradun Planning Area (2025)

Sr. No.	Category	Area (In Ha)	Percentage
1	Residential	5306.55	14.79%
2	Commercial	431.00	1.20%
3	Industrial	281.00	0.78%
4	Mixed	—	—
5	Public/ semi public	2908.18	8.11%
6	Public utilities	132.92	0.37%
7	Transportation	1526.80	4.26%
8	Recreational	1007.89	2.81%
9	Green Areas	13539.77	37.75%
10	Water bodies	1183.81	3.30%
11	Agriculture	6416.50	17.89%
12	Defence area	3132.8	8.73%
13	Vacant land	—	—
14	Waste land	—	—
	Total	35867.22	100%

Within the Dehradun Planning Area, agricultural land occupies 17.89%, followed by residential areas at 14.79%. As an administrative centre, public and semi-public uses occupies 8.11%. Transportation and communication infrastructure, occupies 4.26%, while commercial uses account for 1.20% of the total area.

Map 5-1 Existing Land Use of Dehradun Planning Area



5.1 RESIDENTIAL

The residential activities are majorly concentrated in the existing town area. Most development is observed along or parallel to the major corridors next to the mixed-use development. At present, the existing residential area is 44.65 sq. km. which includes approximately more than 2,00,000 of building units. The prominent residential areas are: Rajpur Road, Indra Nagar, Nehru Colony, Niranjapur, Subhasnagar, Ballawala, Naya Nagar, Prem Nagar etc.

5.2 COMMERCIAL

A scattered concentration of commercial use along the main roads has been observed in the Dehradun Planning Area. These include retail, wholesale, general business store, hotels/ restaurants, shopping centres, Multiplex/cinemas, function halls/ marriage halls, resorts, warehouses, storage godowns, fuel stations, hostels, daily and weekly markets etc. The existing main shopping centres are concentrated mainly in the core city area named as Paltan Bazar, Tibetan market, Rajpur Road, Indra Marg, Gandhi Road etc. At present, the commercial area in the Dehradun Planning area is only 3.62 sq.km which is only 3% of the total developed area.

5.3 MIXED

In Dehradun Planning Area, mixed-use development is often observed in the developed area, especially along the main roads and in and around the main market areas where the ground floor or first two floors has been used for commercial purpose, and the floors above are being used mainly for residential purpose. At present, the existing mixed-use area comprises 19.28 sq. km. which is around 15% of the total developed area.

5.4 INDUSTRIAL

Industrial activities have been observed near Raipur Road, Saharanpur Road and Haridwar Road in very small pockets. Currently, the area under industrial use is only around 0.83 sq. km which is 0.6 per cent of the total developed area. While preparing the proposed land use for the Dehradun Planning area, dedicated industrial patches need to be given based on the demand, terrain and ecological parameters.

5.5 PUBLIC & SEMI-PUBLIC

Being a State Capital and Education Hub of Uttarakhand, around 39 sq. km. the area is available under public – semi-public use, around 31 per cent of the total developed area. Having the status of the capital city, Dehradun is equipped with various services, state and central government offices and specialised institutes. This area of PSP includes education & health services, central & state government properties, public utilities such as water & sewerage treatment plants & garbage disposal sites, communication services etc.

5.6 RECREATIONAL

At present, recreational area is only 1.38 sq.km which is only around 1% of the developed area. As per the URDPFI Norms, area under recreational activities should be around 14 to 16 percent of the developed area for the better lifestyle of its citizens.

5.7 TRANSPORTATION

The Major city traffic and transportation system takes place on main roads such as: NH 7, NH 307, Rajpur Road, Saharanpur Road, Kanwali Road, Chakrata Marg, Cant Road, Mall Road, Raipur Marg, Shahastradhara Road etc. At present, area under traffic and transportation is 16.48 sq.km. which around 13 percent of the total developed area. The existing roads are well inter-connected with the different localities of the core city. However, roads in the outskirts are not so well developed and sparsely distributed. In core Dehradun also, frequent traffic congestion and bottlenecks are the major problems, which need to be tackled.

5.8 SPECIAL AREA

The cantonment area is considered in special area of Dehradun. The total area of cantonment area is 18.755 km sq. The total population of this Cantonment as per the latest census of 2011 is 52,716.

5.9 VACANT LAND

Area which is for future development under vacant and wasteland around 46 sq.km. which is nearly around 12 percent of the total planning area.

5.10 AGRICULTURAL

At present, agricultural land is around 61 sq.km. which is nearly 16% of the total planning area. As already mentioned, there are 72 villages in Dehradun Planning Area. In many of the villages, majority of rural population are engaged agricultural activities.

5.11 GREEN AREA

The entire Dehradun Planning Area falls under the Doon valley is the second ecologically sensitive area to be notified by the MoEF. Currently, area under Greens is around 131 sq.km, which is nearly 35% of the total planning area.

5.12 SLUM

In Dehradun City, more than 25% of the current census population has been living into the slum areas where there is no proper provision for the physical and social infrastructure.

5.13 RELIGIOUS

The area under religious use constituted 76.32 ha which accounts 0.42 % of the total Dehradun Planning Area as per the existing situation. It consists of church, Gurudwara, Idgah, Mosque and Temple.

5.14 EDUCATIONAL

The area under educational use constituted 669.52 ha which accounts for 3.73 % of the total Dehradun Planning Area as per the existing situation. It consists of Aganwadi, collage, Madrsa, School, Tranning institute, University and Vocational Institute.

5.15 HEALTH SERVICES

The area under Health Services use constituted 40.90 ha which accounts 0.22 % of the total Dehradun Planning Area as per the existing situation. It consists of clinic, Government Hospital, Nursing Home, PHC/CHC and Privet hospital.

6 HOUSING AND SLUMS

6.1 HOUSING

Housing is a fundamental human need and a key indicator of the population's standard of living. It plays a vital role in economic development by generating employment during both construction and maintenance phases. As a core component of the Human Development Index, housing contributes to shelter, safety, and well-being, while also offering individuals a sense of security, ownership, and social status.

6.1.1 Existing Housing Stock

According to the 2011 Census, the total number of households is 2,07,245 in Dehradun Planning Area. The average HH Size is around 4.5 Person/HH. In the Cantonment Board Area, there are 15,919 households, with an average HH size of 4.7 person per HH. However, as in any other city, the housing system through real estate developer does not have a sufficient provision of EWS & LIG Housing and lacks facilities such as open spaces, schools.

As per the HH Survey Analysis, maximum households are having either 2 or 3 dwelling rooms and maximum buildings in Dehradun Area is either 2 or 3 stories. Concrete, Tin and Brick are used as a construction material. As far as the typology of housing is concerned, maximum houses are detached, semidetached or row houses. As far as the ownership are concerned, around 22% of the household's lived into the rented properties. Details of Housing Condition, No. of Dwelling Rooms and Ownership Status are discussed in detail in the tables given below.

Table 6-1 Housing Condition in planning area

Housing Condition (%)			
Category	Good	Liveable	Dilapidated
Dehradun (M+ OG)	79	19	3
Cantonment Board	78	21	1
Villages	76	21	3

Source: Housing Census 2011

Similarly, 78% of the total houses in the Cantonment Board area are in good condition, 21% are habitable, and 1% are dilapidated. So, in the MMDA Area, the majority of houses are in good condition, and only a small percentage of houses are unfit to live in, whereas in rural areas, the majority of houses are in good condition, and only 3% are in dilapidated condition.

Table 6-2 Details of No. of dwelling rooms in Dehradun Planning Area

No. of Dwelling Rooms (%)					
Category	One	Two	Three	Four	More than 4
Dehradun (M+ OG)	23	25	23	16	12
Cantonment Board	20	31	25	15	9
Villages	21	27	23	16	12

Source: Housing Census 2011

In Dehradun Municipal and outgrowth areas, 25% of the houses have two dwelling rooms, while only 12% houses have more than 4 dwelling rooms, indicating that with a household size of 4.5 pph, most people live in two dwelling rooms in proper ventilation and sunlight. In rural areas majority of the people lives in two dwelling units and only 12% houses have more than 4 dwelling rooms.

Table 6-3 Growth of Households

Category	Year	Population	Number of Households	Percentage Growth of Households	Household Size
Dehradun Urban	2011	941,941	202,889	-	4.64
Dehradun Rural	2011	754,753	144,112	-	5.24
Planning Area	2001				
	2011	1,696,694	347,001	-	4.89

Source: Housing Census 2011

6.1.2 Qualitative Aspects of Housing

6.1.2.1 Housing Characteristics

The housing characteristics of Dehradun reflect the district's diverse socio-economic profile, rapid urbanization, and evolving settlement patterns. As per Census 2011, the district shows a mix of traditional rural housing and modern urban residential development, influenced by Dehradun's status as the capital city of Uttarakhand and a major regional service hub. The housing stock in urban areas is predominantly **pucca (permanent) structures**, constructed using cement, concrete, and brick, whereas rural regions continue to display a higher proportion of **semi-pucca and kutcha** houses, though the share of permanent structures has been steadily increasing due to rising incomes and government housing initiatives.

Most urban households in Dehradun have **access to basic amenities** such as electricity, treated drinking water, bathroom facilities, and separate kitchens, reflecting relatively high living standards. However, rural areas still face gaps in piped water supply, sanitation infrastructure, and drainage systems. The average **household size** in 2011 was lower in urban areas (around 4.4 persons) compared to rural regions (about 4.9 persons), indicating a shift toward nuclear family structures in cities. The rapid expansion of residential areas—particularly along Sahasradhara Road, Raipur, GMS Road, Shimla Bypass, and Harrawala—has led to the growth of plotted housing colonies, apartments, group housing, and gated communities.

Dehradun's housing characteristics are also shaped by migration patterns, with a significant influx of population due to employment, education, tourism, and administrative activities. This has increased the demand for rental housing, hostels, and affordable accommodations. While the

formal sector—including development authorities and private builders—has expanded planned housing supply, informal settlements and unauthorized colonies still exist in peri-urban belts, primarily due to land price escalation. Overall, the district's housing scenario shows improving quality, increasing urbanization, and rising demand for modern residential infrastructure, though challenges remain in equitable access to services and regulated development.

Houses provided under different schemes like Pradhan Mantri Awas Yojna and Rajiv Awas Yojna are as follows:

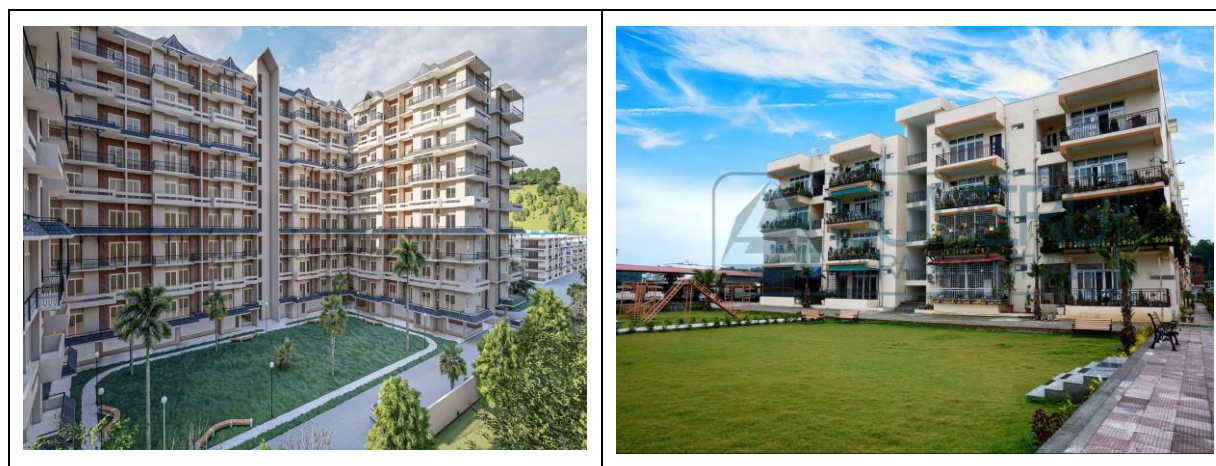
Table 6-4 Details of No. of dwelling rooms in Dehradun Planning Area

Housing category	Total number	Allotted	Empty
EWS	2267	2242	25
LIG	1175	981	194
MIG	1318	1168	194
HIG	646	349	297
Total	5406	4740	710

Source: Mussoorie Dehradun Development Authority

The total number of houses provided under different categories are 5406 where maximum units are covered under EWS category i.e., 2267 units. Total houses constructed under LIG, MIG and HIG are 1175, 1318 and 646 respectively. Out of the 5406 houses, 4740 has been allotted while 710 units are still empty. HIG houses are emptier as compare to other housing categories.

Figure 6-1 Flats and Apartments, Dehradun



6.1.2.2 Occupied Residential Houses and Houseless Population

According to Census 2011, Dehradun district recorded a total of **3,18,283 occupied residential houses**, reflecting the district's rapid urban expansion and growing housing demand following its designation as the state capital. Of these, **1,83,223 houses were located in urban areas** and **1,35,060 in rural areas**, indicating that nearly **57% of the occupied residential stock** lies within

the urban limits. The majority of these households reside in pucca structures, demonstrating improving housing quality across the district. The houseless population in Dehradun was relatively small, with **1,355 persons enumerated as houseless**, accounting for less than **0.1% of the total district population**. Most houseless individuals were found in urban areas, typically residing near marketplaces, roadside areas, religious places, or transit locations. The low houseless population percentage reflects the district's comparatively better socio-economic conditions and the availability of rental and informal housing options for migrant labor and economically weaker groups. Overall, Census 2011 indicates that while the district shows strong residential occupancy and improved housing conditions, continued attention to affordable housing and social welfare measures is essential to prevent future rise in houselessness due to ongoing urbanization pressures. (Refer Table 6-5)

Table 6-5 Occupied Residential Houses and Houseless Population

Category	Total Population (2011)	Total Households (2011)	Occupied Residential Houses (2011)
Dehradun Urban	9,41,941	1,83,223	1,83,223
Dehradun Rural	7,54,753	1,35,060	1,35,060
Planning Area	16,96,694	3,18,283	3,18,283

Source: Housing Census 2011

6.1.2.3 Type of Housing Structures

As per the census data majority of the houses are permanent houses in a city which refers to those houses whose walls & roofs are made of pucca materials, i.e., where burnt bricks, G.I. Sheets or other metal sheets, stone, cement, concrete is used for wall and tiles, slate, shingle, corrugated iron, zinc or other metal sheets, asbestos sheets, bricks, lime and stone and RBC/RCC concrete are used for roof. Semi-permanent houses refer to those houses made of other types of materials.

Temporary houses refer to those houses having wall and roofs made of Kutcha materials, i.e., mud and unburnt bricks are used for the construction of walls and wood etc. are used for roofs.

Table 6-6 Types of housing structures

Types of housing structures						
	Permanent	Semi-permanent	Total temporary	Serviceable	Non serviceable	Unclassified
%	94.1	4.1	1.3	0.9	0.4	0.5

Source: Housing Census 2011

According to Census 2011, the housing structures in Dehradun reflect a mix of permanent (pucca), semi-permanent, and temporary constructions, shaped by the district's urban growth and varied socio-economic conditions. A significant proportion of households in Dehradun reside in **permanent pucca structures**, built with durable materials such as concrete, burnt bricks, and cement. This dominance of pucca houses is particularly evident in the **urban areas**, where

improved affordability, higher land values, and greater access to construction materials have encouraged durable housing development.

6.1.2.4 Distribution of Persons by Living Room

The distribution of persons by number of living rooms in Dehradun, as recorded in the Housing Census 2011, reflects the overall household size, residential living conditions, and spatial variation between the district's urban and rural areas. In Dehradun, a significant proportion of households reside in dwellings with **two to three living rooms**, which is consistent with the district's moderate household size and relatively better housing standards compared to many other districts of Uttarakhand. Urban areas, particularly Dehradun Municipal Corporation and surrounding census towns, show a clear tendency toward **smaller dwelling units**, with a notable share of households occupying **one- or two-room** structures due to limited land availability and higher land values. In contrast, rural parts of Dehradun display a higher proportion of **larger dwellings**—typically three or more living rooms—owing to greater land availability and the prevalence of independent houses.

The Census 2011 data further indicate that only a **small proportion of households** in Dehradun live in **single-room dwellings housing large families**, suggesting relatively lower congestion levels when compared to national averages. The share of households living in **four rooms or more** remains prominent in rural regions, illustrating traditional housing patterns and joint-family arrangements. Overall, the distribution pattern demonstrates that Dehradun enjoys comparatively **better housing adequacy**, with most people living in dwellings that provide sufficient rooms for household size, though the pressure on space remains visible in dense urban settlements.

6.1.2.5 Ownership Status

The majority of houses in the Dehradun Planning Area are owned by city residents. The percentage of people who own their homes in Dehradun Municipal Area and Cantonment Board is high (71-73%) compared to 22%-23% who rent their homes. In villages, the majority of villagers (84%) own their homes, while only 9% rent their homes.

Table 6-7 Details of Ownership Status in Dehradun Planning Area

Ownership Status (%)			
Category	Own	Rented	Other
Dehradun (M+ OG)	71	22	7
Cantonment Board	73	23	3
Villages	84	9	6

Source: Housing Census 2011

Table 6-8 Tenure Status of Houses, 2011

Attributes	Dehradun Urban		Dehradun Rural		Planning Area	
	HHs	HH (%)	HHs	HH (%)	HHs	HH (%)
Owned	1,23,948	63.2	68,215	88.35	1,92,163	72.4
Rental	65,214	33.25	7,746	10.03	72,960	27.52
Others	6,961	3.55	1,248	1.62	8,209	3.09
Total	1,96,123	100	77,209	100	2,73,332	100

Source: Housing Census 2011

6.2 HOUSING CONDITION

As per census 2011 the overall houses that are good and in habitable conditions constitutes about 78.8% of the total. Whereas houses that are considered liveable and dilapidated are 18.6% and 2.6% respectively. If we look at only the residential buildings those in good conditions are about 78% out of the total 95.9% houses. Where as in the mixed-use areas (residence cum other use which includes houses used for non-residential purposes such as shops, offices, schools, colleges, hotel, lounge, guest house, hospital, dispensary, place of worship, factories etc) houses in good conditions are 2.9% and those in liveable conditions are 1.1%.

Table 6-9 Details of Ownership Status in Dehradun Planning Area

Building conditions within Municipal Corporation and Outgrowth					
Total	%	Residence	%	Residence-cum other use	%
Total	100	Total	95.9	Total	4.1
Good	78.8	Good	75.9	Good	2.9
Liveable	18.6	Liveable	17.5	Liveable	1.1
Dilapidated	2.6	Dilapidated	2.5	Dilapidated	0.1

Source: Housing Census 2011

6.3 AVAILABILITY OF UTILITIES AND SERVICES

6.3.1 Water Supply

Water supply in Dehradun shows a clear urban-rural disparity. In urban areas, the majority of households have access to treated tap water, reflecting well-developed municipal water systems. Specifically, **over 85% of urban households receive tap water from treated sources**, while around **10% rely on untreated tap water**. Alternative sources such as hand pumps and tube wells/boreholes are minimal in urban areas.

In contrast, rural areas depend largely on **hand pumps (59.28%)** and **tap water from treated sources (32.31%)**. Traditional sources like covered and uncovered wells, springs, and small water bodies contribute marginally to rural water supply. This indicates a strong reliance on groundwater in rural Dehradun, highlighting the need for improved rural water infrastructure and safe water access.

Majority of the city's population that is 91.7% has drinking water source within the premises followed by 5.5% having one nearby the premises and only 2.7% population having drinking water source away from where they reside. The main source of drinking water for the city is tap water from treated source as 90.4% population gets access to this source.

Table 6-10 Main source of drinking water

Types of sources	Topwater from treated source	Topwater from untreated source	Covered well	Un-Covered well	hand pump	tube well	spring	River/ canal	Tank/ pond/ lake	Other sources
%	90.4	3.1	0.1	0	4.1	1.8	0	0	0.1	0.4

6.3.2 Lighting

The primary source of lighting in both urban and rural areas of the Dehradun Planning Area is electricity, as detailed in Table 6-9. In urban areas, a significant 97.9% of households rely on electricity, indicating widespread access to the power grid. In rural areas, although slightly lower, electricity still serves as the main source of lighting for 53.3% of households.

However, a small share of households continues to depend on kerosene (1.7%) in urban areas and a notably higher (7.59%) in rural areas which reflect the disparity in infrastructure between the two regions. Additionally, 0.2% of urban households and 0.5% of rural households do not have access to any form of lighting. These figures highlight the need for targeted infrastructure interventions, especially in rural pockets, to achieve universal access to reliable lighting sources.

Table 6-11 Main source of lightning

Main source of lightning						
Types of sources	Electricity	Kerosene	Solar energy	Other oil	Any other	No lightning
%	97.9	1.7	0	0.1	0.2	0.2

6.3.3 Sanitation

As per Census 2011 and related official data for Uttarakhand (which includes Dehradun district), sanitation in Dehradun had improved substantially by 2011, but considerable gaps remained. For the state overall, about **65.8 % of households** had latrine facilities within their premises in 2011. In rural parts, latrine coverage was far lower — around **30.7 % of rural households** had a latrine at home, while **69.3 % lacked one**. Urban areas fared much better: approximately **81.4 % of urban households** had latrines.

In terms of drainage and wastewater management, nearly **51% of households** in the state had some form of drainage connectivity in 2011. However, this mask wide urban–rural disparities: many rural households had no drainage — leading to open discharge of wastewater.

Table 6-12 Sanitation facilities in the study area

Sanitation facilities in the study area														
Number of house holds having latrine facility within the premi ses	Flush/pour flush latrine connected to			Pit latrine		Nigh t soil disp ose d into ope n drain	Service Latrine		Numb er of house holds not havin g latrine facilit y within the premi ses	Alternati ve source		Number of households having bathing facility within the premises		
	Piped sewer syst em	Septic tank	Other system	With slab/ ventil ated impro vedpit	With out slab/ open pit		Night soil remo ved by hum an	Nigh t soil servi ced by ani mal		Pu blic latrine	Op en	Yes		No
												Bath No room	Encl osur e with out roof	
97.1	39.3	49.8	1.5	4.8	0.1	1.5	0	0.1	2.9	1.5	1.3	94.2	2.7	3.1

Source: Housing Census 2011

6.3.4 Drainage

The analysis of Drainage outlet systems in the Dehradun Planning Area reveals the following:

- In urban areas, open drainage is used by 37.3% of households. A relatively larger share of houses is connected to closed drainage around 54.9% and 7.9% of households lack any form of drainage, which is a concern for urban hygiene and sanitation.
- There was a clear rural–urban divide: in Uttarakhand, **82%** of *urban* households had drainage facility, but only **37%** of *rural* households did so.

The dominance of open drainage and the absence of drainage facilities in both urban and rural areas point to the urgent need for expanding and upgrading drainage infrastructure to ensure better sanitation and public health outcomes across the region.

Table 6-13 Drainage facility in the city

Waste water outlet connected to		
Closed drainage	Open drainage	No drainage
54.9	37.3	7.9

Source: Housing Census 2011

6.3.5 Cooking Fuel

- The high penetration of LPG / PNG in Dehradun by 2011 suggests relatively better **household energy security** and **living standards** than many other Uttarakhand districts. Clean cooking fuel is associated with reduced indoor air pollution, lower health risks (especially for women and children), and greater convenience.
- The fact that Dehradun was already ahead in 2011 means that subsequent government efforts (like the Pradhan Mantri Ujjwala Yojana) started from a more favorable baseline — likely boosting the share of clean fuel even more in the following years.
- At the same time, the continued presence of traditional biomass fuel (in rural or peri-urban pockets) implies ongoing environmental pressure (wood collection) and health risks — so there remains scope for further improvement, especially in rural or low-income areas.

Table 6-14 Cooking facility in the city

Waste water outlet connected to		
Closed drainage	Open drainage	No drainage
54.9	37.3	7.9

Source: Housing Census 2011

6.3.6 Kitchen Facilities

Many households in Dehradun likely had a **designated indoor kitchen** (i.e., cooking inside the house, in a separate space) rather than cooking in a shared room, courtyard, verandah or outdoors. This improves hygiene, convenience, and safety.

The availability of a separate kitchen would also facilitate use of “clean” cooking fuels (like LPG / PNG), which tend to work better with a permanent kitchen structure.

Given the high reported level of “clean fuel” use in Dehradun (as many as ~ 84.9% households using LPG/PNG per district-level source) having a proper kitchen would have supported that transition away from traditional biomass.

However, it is likely that a **non-trivial fraction** of households (especially in rural or lower-income areas) may still have lacked a proper kitchen: cooking may have been done in multipurpose living areas, verandahs, or outdoors — which has implications for indoor air quality, convenience, and safety (especially for women).

Table 6-15 Kitchen facilities

Kitchen facility							
Total	Cooking inside house:	Has Kitchen	Does not have kitchen	Cooking outside house:	Has Kitchen	Does not have kitchen	No Cooking
100	98.6	88.9	9.7	1.1	0.5	0.6	0.3

Source: Housing Census 2011

6.4 SLUMS

Around 1.57 lakh population (around 30,500 HH's) lives in the slums area which is around 20% percent of the total urban population. Around 118 slums are identified in the Urban area which covers the area of around 1.82 sq. km. Out of 118 slum pockets, 105 pockets are notified and 13 are non notified. Their details are described in the figure given below:

Out of 118 slums, 78 slum pockets are identified on public lands while 40 slums were identified on the private land. Apart from that, around 60% slums are located along the water bodies while 26% are along the major transport corridors and rest of the others are nearer to the industries.

Majority of the land use along the slums are residential making a very less presence of other important land uses such as commercial & PSP.

Slums along Rishpanna River are highly dense and the houses are very close to each other with no margins or setbacks, which is unsafe for a resident in Dehradun as it is an earthquake prone area. Also the roads & streets are very narrow for vehicles to pass, which may create problem for evacuation during the time of any emergency. Also, it creates a life threat for the residents during rainy season if the river overflows.

Same situation is also observed at the Bindal River.

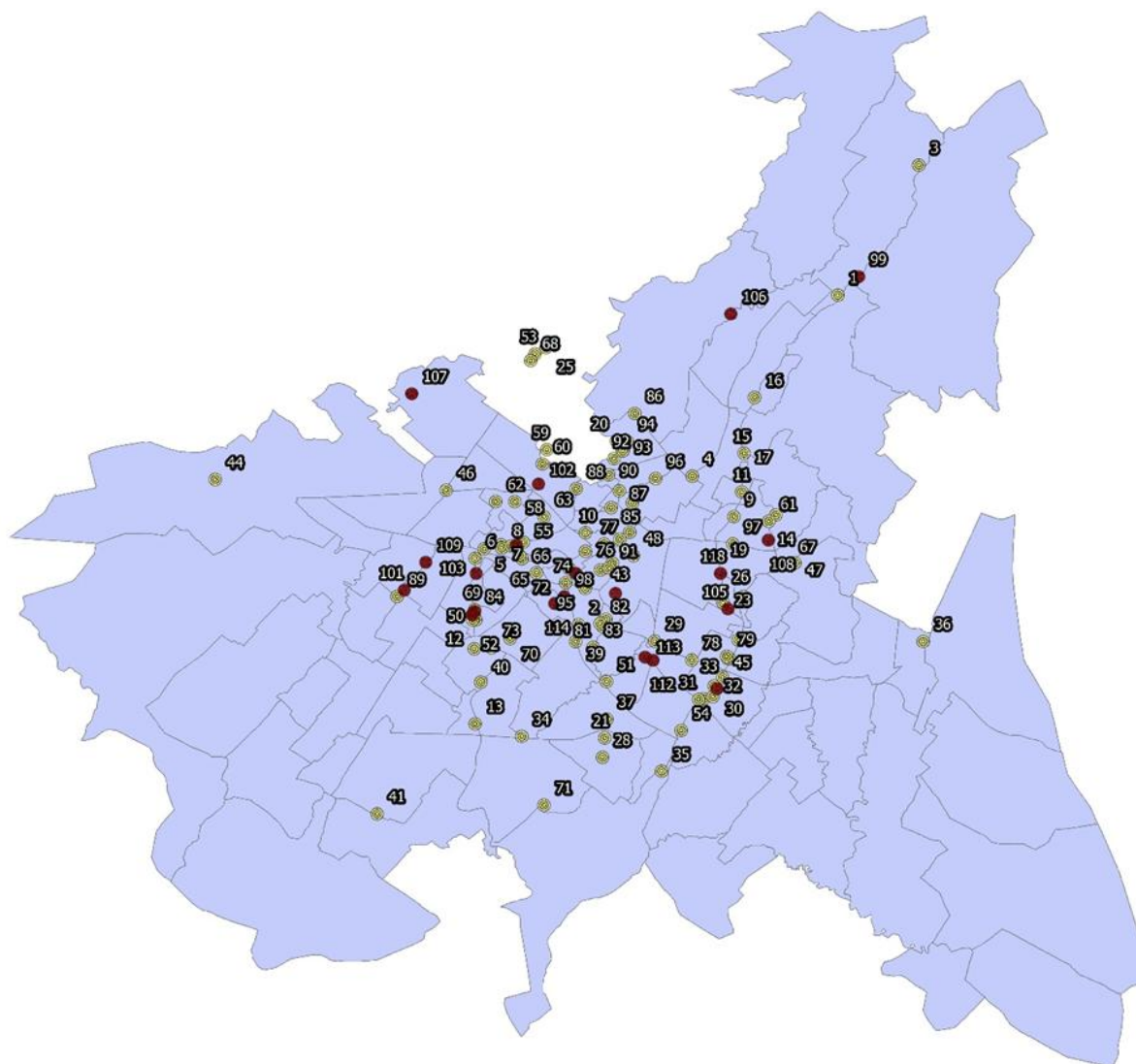
As we can see from the figure given below, higher concentration of slums is observed in the core city area, covering the wards of 11, 24, 26, 27, 29, 44, 50, 57, 74, 80.

Figure 6-2 Details of Slums



1. ABDUL HAMEED NAGAR
2. ADHOIWALA ROAD
3. AHIR MANDI
4. AMBEDKAR COLONY D L ROAD
5. ANANDGRAM ADHOIWALA
6. ARYA NAGAR BASTI
7. AZAD NAGAR RAJPURI ROAD
8. BADRINATH COLONY
9. BALBIR ROAD
10. BALMIKI BASTI
11. BALMIKI BASTI SALWALA
12. BANGHAT
13. BANJARAWALA
14. BHAGAT SINGH COLONY
15. BRAHAMNWALA
16. BRAHAMPURI
17. BRAHMANWALA LOWER
18. BRIJLOK COLONY
19. CHABILBAGH
20. CHAMANPURI
21. CHANDRA NAGAR BALMIKI BASTI
22. CHANDRA ROAD
23. CHANDRA SHEKHAR AZAD COLONY
24. CHANDRALOK RAJPUR
25. CHETNA BASTI
26. CHUKHKHUWALA KHATIK MOHALLA
27. **CHUKHUWALA NAI BASTI**
28. DANGWAL MARG
29. DEEP NAGAR
30. DEVRISHI COLONY
31. DHARAMPUR SUMAN NAGAR MALIN BASTI
32. DIVYA VIHAR
33. EAST PATEL NAGAR
34. GADLOK MALIN BASTI
35. GANDHI BASTI
36. GANDHI GRAM
37. GANDHI GRAM GMS ROAD
38. GANDHI NAGAR CHAKRATA ROAD
39. GHASS MANDI
40. GOVIND GARH
41. INDRA COLONY
42. INDRESH NAGAR
43. JATIYA MOHALLA
44. JAWAHAR COLONY
45. KABRISTAN MALIN BASTI
46. KANWALI ROAD BHATTA BASTI
47. KATH BANGLA
48. KATH BANGLA 02
49. KISHAN NAGAR
50. KUMAR MANDI EIDGAH
51. LAKHKHI BAGH
52. LOHARWALA
53. LOHIA NAGAR
54. LONIA MOHALLA
55. MACHCHI TALAB
56. MADHU VIHAR
57. MADRASSI COLONY
58. MAHBOOB COLONY
59. MELA RAM COLONY
60. MUSLIM BASTI KASAI MOHALLA
61. MUSLIM COLONY
62. NAGAL
63. NAI BASTI DHARAMPUR RAISCOURSE
64. NAI BASTI GHASS MANDI
65. NALA PANI ROAD
66. NEELOWALI TURNER ROAD
67. NEW KHUDBUDA
68. NEW PATEL NAGAR
69. NIMMI ROAD
70. PANCHPURI CHANDER ROAD
71. PARSOLIWALA
72. PATHARIA PEED I
73. PATHARIA PEED II
74. PATHARIA PEED III
75. PURAN BASTI
76. RAISCOURSE ABLOCK
77. RAISCOURSE BBLOCK
78. RAISCOURSE CBLOCK
79. RAJIV NAGAR KANDOLI
80. RAJIV NAGAR PARTIIDANDA
81. AJABPUR
82. RAJIV NAGAR I
83. RAJIV NAGAR II
84. RISHI NAGAR ADHOIWALA
85. RISPANA KHATIK MOHALLA
86. RISPANA NAGAR
87. SAIYYAD MOHALLA NORTH
88. SAMPERA BASTI
89. SANJAY BASTI
90. SANJAY COLONY MOHINI ROAD
91. SATI COLONY
92. SHANTI VIHAR
93. SHARMA COLONY
94. SHASHTRI NAGAR
95. SHASHTRI NAGAR CHUNA
96. BHATTA
97. SHEETLA VIHAR
98. SHIVLOK
99. SHIVLOK AJABPUR
100. SHIVNAGAR
101. SHIVPURI
102. SHIVPURI COLONY
103. SINGHAL MANDI
104. SONIA BASTI
105. SUMAN NAGAR
106. SUMAN NAGAR GHASS MANDI
107. SUMANPURI MALIN BASTI
108. THANO GAON MALIN BASTI
109. UTTARAKHAND VIHAR
110. VALMIKI BASTI
111. VANI VIHAR
112. VIJAY COLONY
113. VIJAY NAGAR
114. VIR GABBAR SINGH BASTI III
115. VIR GABBAR SINGH COLONY
116. VIRGIRWALI
117. VIVEK VIHAR PHASE I
118. VIVEK VIHAR PHASE II
119. VIVEK VIHAR PHASE III
120. VIVEK VIHAR PHASE IV

Map 6-1 Location of Slums



6.4.1 Key Issues

The housing sector in **Dehradun** faces several critical challenges that hinder sustainable and balanced urban development. A major concern is the growing shortage of affordable housing, particularly for low- and middle-income groups, as rapid population growth and inward migration have significantly increased demand. Many residential areas continue to struggle with **inadequate infrastructure**, where essential services such as reliable water supply, sanitation, drainage, and solid-waste management are either insufficient or unevenly distributed. Unplanned and haphazard development—driven by weak enforcement of building regulations—has resulted in congestion, irregular settlements, and inefficient land use across the city. In several localities, aging or poorly maintained housing structures further compromise safety and reduce overall living quality. Dehradun's geographic setting, with its surrounding forested zones and environmentally sensitive foothill areas, limits the availability of suitable land for new housing projects, while encroachments on public and eco-sensitive land create additional pressures. Furthermore, the lack of strong and consistent **public-private partnerships** restricts the city's ability to expand affordable, resilient, and environmentally sustainable housing options. Addressing these challenges will require coordinated policy reforms, improved urban governance, strengthened infrastructure investment, and collaborative engagement between government agencies and the private sector.

7 PHYSICAL INFRASTRUCTURE

7.1 INTRODUCTION

Physical infrastructure comprises essential urban services such as water supply, sewerage and sanitation, solid waste management, stormwater drainage, and telecommunications. Their availability and adequacy play a pivotal role in supporting economic growth and sustainable urban development.

This chapter provides an overview and analysis of the existing physical infrastructure within the Dehradun Planning Area. It examines key sectors including water supply, sanitation, drainage, solid waste management, and telecommunications to identify existing gaps and challenges.

7.2 WATER SUPPLY

This section describes the prevalent water supply management system in Dehradun Planning area, detailing the assessment of water supply network, coverage, adequacy, quality of water supplied, water supply charges etc. Based on the assessment the key issues are been identified.

7.2.1 Sources of Water Supply

Since the beginning of the water supply scheme in Dehradun, different canals have been the primary source of water supply. Dehradun city is supplied with both surface and ground water. In Dehradun, the total volume of water supplied via pumps is 150.25 MLD. There is total 192 Number of major and mini tube wells used to extract ground water. The total Water Supply through it is around 115 MLD. Around 11 surface water resources are being tapped in Dehradun for water supply. The total contribution or withdrawal from all surface water resources is approximately 40.9 MLD

The major source of surface water supply is the river Song. Its minimum discharge is 273 cusecs. The raw water pumping station is located at Rajpur on the left bank of the river Song. Around 11 surface water resources are being tapped in Dehradun for water supply, their location and details are listed as below:

Table 7-1 Details of surface water sources

Sr. No.	Name of Surface Sources	Approximate quantity Available (MLD)	Type of sources
1	Massifall	7.00	
2	Kyarikuli (Upper zone yojna)	5.4	
3	Malsi (Karligarh)	0.28	
4	Kolhukhet	0.54	Spring
5	Jodhi Mini	0.16	Pump
6	Bhitarigarh	0.12	
7	Shivlok	0.34	Pump
8	Nanurkheda	1.15	Pump
9	Bindal	6.75	River
10	Bijapur	10	Canal
11	Galogi	9.15	
Total		40.9	

Source: Water Balance Plan of Dehradun 2020

Due to the elevation, surface water is tapped using a mechanical pumping system. Galogi, Massifalls, Bindal River, and Kyarikuli have the highest water discharges among the eleven water resources, accounting for nearly 70% of total water withdrawal from surface water resources. The total contribution or withdrawal from all surface water resources is approximately 40.9 MLD.

In Gov. Supply, the initial water source is rivers and ground water but that water is treated and then supplied to people for consumption. In private supply, the main source of water is ground water and there is no treatment of water so the quality is different from tap water. In Slums, the River water is another major source of water, this water is not treated and some people are directly consuming this water.

7.2.2 Domestic Demand

The per capita demand is determined by taking into account all water demands, which include domestic, commercial, industrial, institutional, fire, and public use. According to the URDPFI standard, per capita demand is 135 liters per capita per day, total demand for water is 169.4 MLD, supply is 150.25 MLD (from surface and subsurface sources), and system and friction loss is 35.5% of total water supply. Domestic supply per capita ranges from 170 lpcd to 150 lpcd in zones 35 and 11 (Nehru colony and Rajendra Nagar) to 65 lpcd in zones 18 and 5 (Panditwadi and Cement Road), with an average of 114 lpcd.

The city is divided into four main zones, which are further divided into 51 zones for better management. Five zones are water sufficient, with a water supply of 135 lpcd, and 46 zones do not receive enough water. As a result, 23 zones are managed under the Atal Mission for Rejuvenation and Urban Transformation (AMRUT) and executed by the Peyjal Nigam (Dehradun division), while the remaining 23 zones are managed by the Asian Development Bank (ADB).

Table 7-2 Water Demand Projections

S.No.	Project Area	Resident	Floating	Total
1	Projected Population	21,98,155	1,59,125	23,57,280
2	Water Consumption (LPCD)	135	150	
3	Projected Water Demand-2041* (MLD)	296.75	23.87	320.62
4	15% O&M Loss (MLD)	44.51	3.58	48.09
5	Sub-Total	341.26	27.45	368.71
6	2% Fire Fighting (MLD)	6.83	0.55	7.37
7	Grand Total Water Demand (MLD)	348.09	28.00	376.09
8	Available Water (MLD)			118.55
9	Net Water Demand (MLD)			257.54

Total population projected for the year of 2041 is 23,57,280. Considering 135 LPCD water demand for residential population and 150 LPCD water demand for floating population, additional 255.41 MLD water will be required.

7.2.3 Water Treatment

Water treatment and supply in **Dehradun** are managed primarily by **Uttarakhand Jal Sansthan** and **Uttarakhand Peyjal Nigam**, which work together to operate the city's water-supply infrastructure. These agencies oversee multiple tube-well-based supply systems along with surface-water treatment plants to ensure the distribution of clean and safe drinking water across urban and peri-urban areas. The system includes water treatment plants, overhead reservoirs, and an extensive pipeline network designed to meet the city's growing demand. Ongoing improvements, including modernization of treatment facilities and expansion of supply networks,

aim to enhance reliability, reduce supply gaps, and ensure uninterrupted access to potable water for Dehradun's residents.

To treat the surface water, 4 water treatment plants are located at different locations: Their water treatment capacities are described into the table which is given below.

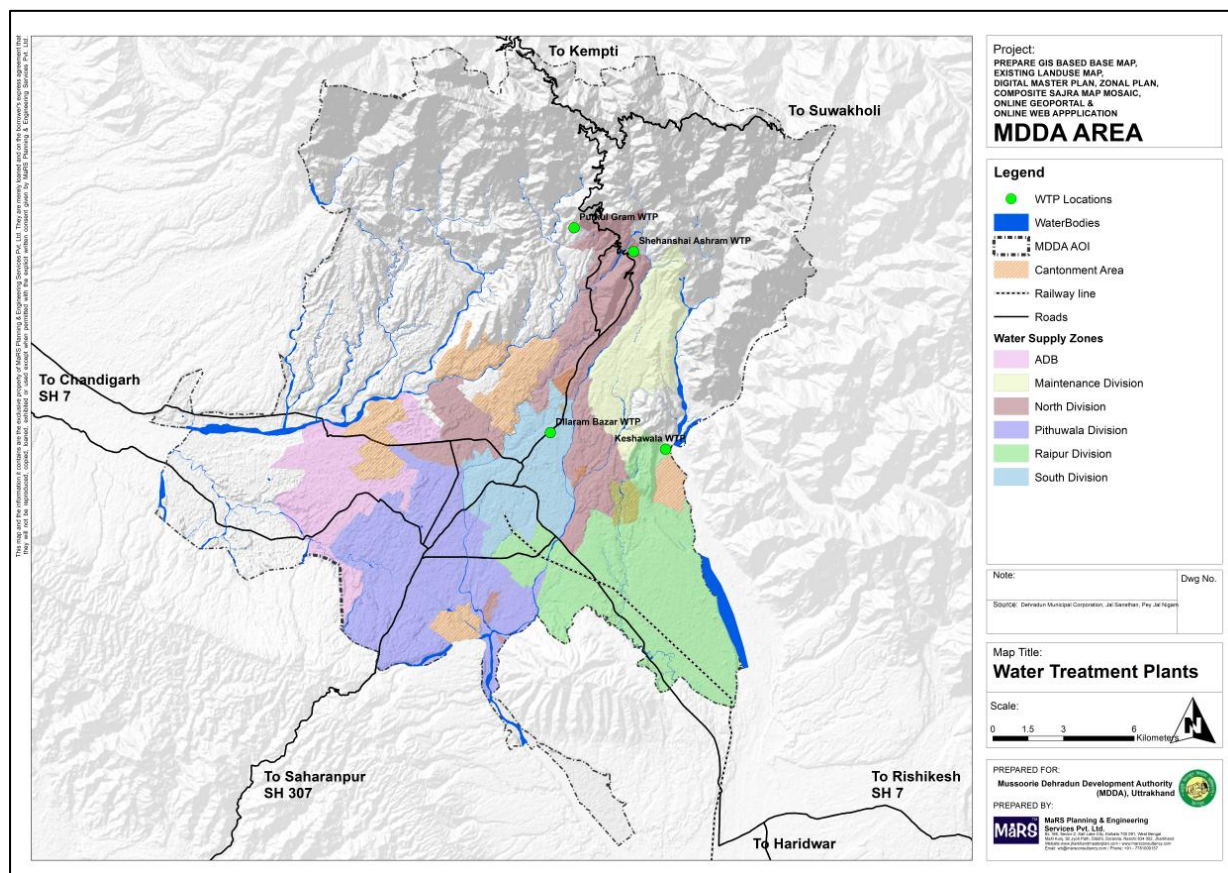
Table 7-3 Details of Water Treatment Plant in Dehradun

Sr. No.	Location	Existing Capacity (MLD)	Added Capacity (MLD) in ADB Project	Total Capacity (MLD)
1	Dilaram Bazar	20.00	7.50	27.50
2	Shehenshai Ashram	0.00	15.00	15.00
3	Purukulgram	14.00	0.00	14.00
4	Keshawala	3.6	—	—
Total		37.6	22.50	56.50

Source: Understanding the Water Flows in Dehradun, 2018

Water Treatment Plant at Diagram Bazar and Shehenshai Ashram is 70 years to 30 years old respectively. The Purukulgram has been proposed with 10 MLD of softening plant. Quality of water being produced at Dilaram Bazar is potable but at Shehensai Ashram, hard water is being produced as water softening plant arrangement does not exist.

Map 7-1 Location of WTP in Dehradun



Source: Understanding the Water Flows in Dehradun, 2018

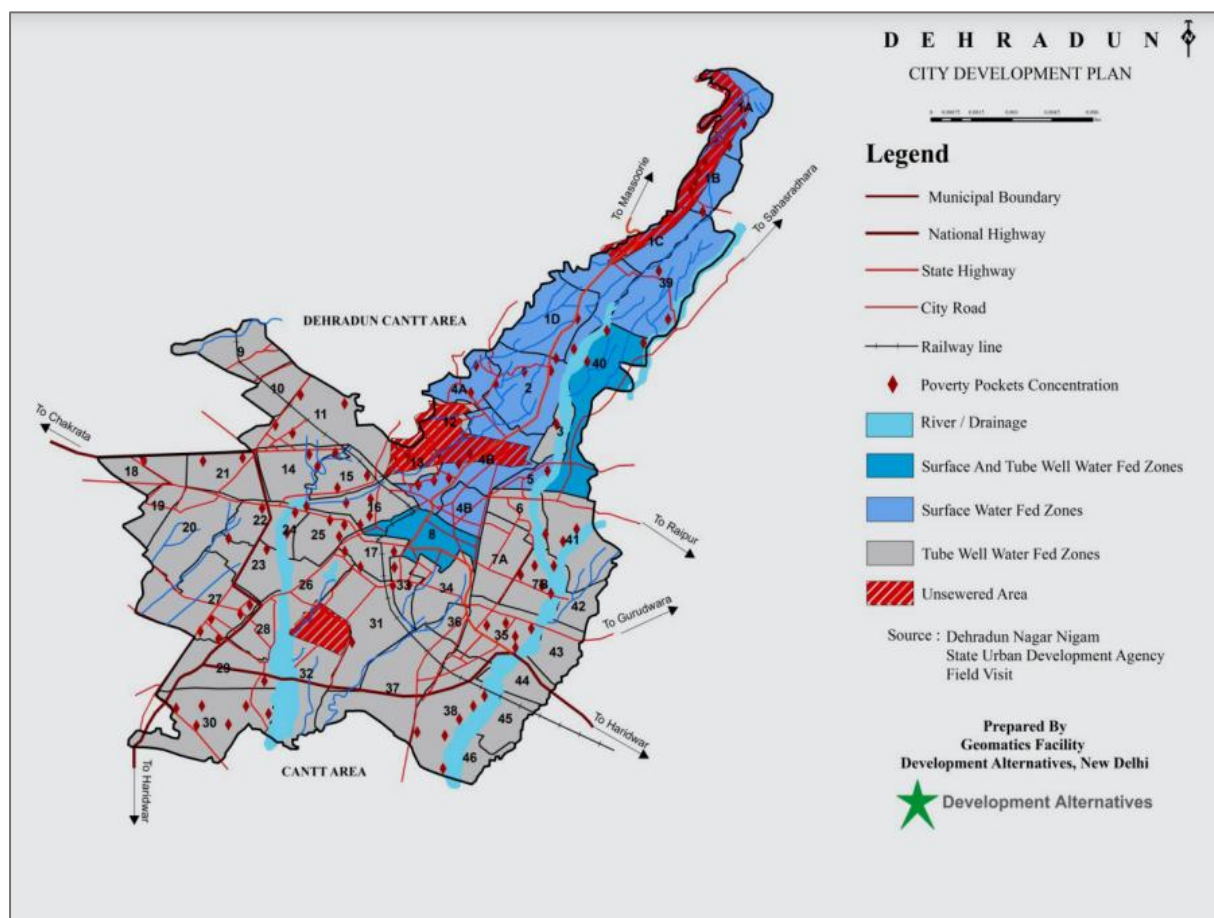
7.2.4 Water Supply at village level

In the rural areas of **Dehradun district**, water supply at the village level is primarily dependent on **groundwater sources**, including **hand pumps, tube wells, bore wells, and natural springs**, which are common in the foothill and forested regions. In many villages, small gravity-based systems also operate where perennial springs are available. The management of rural water supply is carried out through a **shared institutional framework**: **Uttarakhand Jal Sansthan** handles the day-to-day operation and maintenance of rural drinking-water schemes, while **Uttarakhand Peyjal Nigam** is responsible for planning and constructing new water-supply infrastructure. At the local level, **Gram Panchayats** and **Village Water & Sanitation Committees (VWSCs)** also play an important role in monitoring distribution, ensuring equitable access, and coordinating minor repairs. Together, these agencies work to ensure that households in Dehradun's villages receive reliable drinking water, though seasonal shortages and dependence on groundwater continue to pose challenges in several pockets.

7.2.5 Water Supply Network

The water supply network of Dehradun comprises a combination of **surface water systems, groundwater extraction**, and an extensive distribution network designed to cater to both urban and peri-urban populations. The city's primary sources include the **Asan River, Rispana-Raipur aquifers**, and numerous **tube wells and bore wells** distributed across municipal zones. Water is treated through multiple **Water Treatment Plants (WTPs)** operated mainly by **Uttarakhand Jal Sansthan** and **Uttarakhand Peyjal Nigam**, after which it is stored in **Overhead Tanks (OHTs)** and **Ground Service Reservoirs (GSRs)** before being supplied to households. The pipeline network spans a large portion of Dehradun, covering municipal wards, suburban settlements, and newly developing urban corridors. Despite having a well-structured system, challenges such as leakage, old pipelines, unequal distribution in elevated areas, and increasing demand due to rapid urbanisation remain significant. Efforts are underway to upgrade infrastructure, expand treatment capacity, and introduce better monitoring to ensure a more efficient and reliable water supply network across the city.

Map 7-2 Source of water supply in Dehradun



7.2.6 Institutional Framework

The institutional framework for water supply in Dehradun is governed by a coordinated structure involving multiple state-level and local agencies responsible for planning, development, operation, and maintenance of the water supply system. **Uttarakhand Jal Sansthan (UJS)** serves as the primary agency for the distribution and management of drinking water in urban and semi-urban areas of the district, overseeing daily operations such as pumping, treatment, billing, and network maintenance. **Uttarakhand Peyjal Nigam (UPJN)** functions as the key executing agency responsible for designing and implementing major water supply projects, including the construction of Water Treatment Plants (WTPs), reservoirs, overhead tanks, and expansion of distribution pipelines. At the village level, **Gram Panchayats** and **Village Water & Sanitation Committees (VWSCs)**—now integrated under the **Jal Jeevan Mission (JJM)**—play a vital role in managing local schemes, ensuring household tap connections, and monitoring water quality. Additionally, the **State Water Resources Department** oversees water resource planning, while the **Uttarakhand Pollution Control Board (UKPCB)** monitors water quality and environmental compliance. The collaborative functioning of these institutions ensures that water supply infrastructure in Dehradun is systematically planned, efficiently operated, and responsive to the growing needs of the population.

Table 7-4 Functions, roles, and responsibilities

Planning and Design	Construction/Implementation	O&M
Uttarakhand Peyjal Nigam Dehradun	Uttarakhand Peyjal Nigam Dehradun	Uttarakhand Jal Sansthan

7.2.7 Supply and Demand Gap

The water supply system in Dehradun faces a growing **supply–demand gap** due to rapid urbanization, population growth, and increasing pressure on existing water sources. Although the city receives water from a mix of **surface water** and **groundwater** sources, the available supply often falls short of the rising demand, particularly during summer months when groundwater levels drop and spring flows decline. Much of the city's distribution network is aging, leading to **leakages and transmission losses**, which further widen the gap between treated water produced and water that actually reaches consumers. Expanding residential colonies, commercial establishments, and institutional areas have intensified demand, while the creation of new water infrastructure has not kept pace with this growth. In peri-urban and elevated areas, intermittent supply and low pressure are common, highlighting uneven distribution across the city. The combination of limited source capacity, infrastructure gaps, and increasing consumption creates a clear mismatch between demand and available supply, making system augmentation, network rehabilitation, and improved resource management essential for ensuring long-term water security in Dehradun.

1. Current Water Supply Capacity

Water for Dehradun is sourced from:

- Groundwater (tube wells and bore wells) operated by Uttarakhand Peyjal Nigam
- Surface water from springs, canals, and rivers in and around the **Doon Valley**
- Limited supply augmentation projects under schemes such as the **AMRUT Mission** by Ministry of Housing and Urban Affairs and the **Jal Jeevan Mission** led by Ministry of Jal Shakti

2. Current Water Demand in Dehradun

Drivers of Rising Demand

- Growing population within the jurisdiction of Dehradun Municipal Corporation
- Expansion of institutions and cantonments such as the campus of Indian Military Academy
- Growth in tourism and commercial establishments
- Increasing per-capita water consumption in urbanized pockets
- Seasonal demand spikes (summer + festival periods)

3. Consequences of the Supply–Demand Gap

- **Intermittent supply schedules** in many wards
- **Low pressure** in elevated zones
- **Over-extraction** of groundwater and declining aquifer levels
- **Tanker dependency**, especially in summer
- Rising **household installation of storage tanks**, adding demand during refill hours
- Potential **water-quality deterioration** due to pressure imbalances

7.2.8 Status of Ongoing/Proposed Projects

Table 7-5 Status of Ongoing projects

Project / Scheme	What it involves / What's planned / Status (as of 2025)
AMRUT-linked Water & Sewer Master Plan for Dehradun (along with sewer network)	Under the state-sponsored umbrella (through municipal/urban-infrastructure departments). According to a 2024 announcement, a ₹ 406-crore “sewer + drinking water master plan” has been launched covering 11 wards. This includes laying ~120 km of new water-supply pipelines + 60 km of sewer lines. Also includes building a 7 MLD sewage-treatment plant near “Shantidham”. Target completion: December 2027.
Urban water-supply maintenance & O&M schemes by Uttarakhand Jal Sansthan (UJS)	Recent tender (2025) for “24×7 Operation & Maintenance” of the water-supply scheme in Dehradun — indicating focused efforts to improve reliability of supply, reduce breakdowns/leakages.
Rural / peri-urban water supply under Jal Jeevan Mission (JJM) and multi-village schemes	Under recent approvals, several multi-village water-supply schemes have been sanctioned. For Dehradun district, the “Motidhar Paniyala” scheme is intended to benefit villagers (approx. 7,000 people across ~25 villages) by providing tap water supply.
Long-term state-level drinking-water planning covering next 30 years	As per a 2025 statement by state leadership, a “30-year water-supply strategy” is being drafted to ensure coverage, water security, and sustainability across urban and rural Uttarakhand — which includes Dehradun in scope.
Sewerage network expansion and upgrade (urban sanitation + waste water treatment link-up)	Alongside water supply, the master plan under AMRUT covers sewer line laying plus treatment capacity (the 7 MLD plant). This is meant to not just supply water but improve sanitation infrastructure, which is essential for long-term sustainability.

7.2.9 Proposals at village level

Under the Jal Jeevan Mission (JJM), the state government of Uttarakhand approved several **multi-village water-supply schemes** that include villages in Dehradun district. In one such tranche (approved November 2021), schemes totalling ₹ 225.24 crore were sanctioned for 293 villages across 7 districts — providing tap-water connections to over 19,000 rural households.

Among these, the “Motidhar Paniyala” scheme (involving some villages of Dehradun district) was approved to extend clean drinking-water supply to remote rural homes suffering from acute shortage of potable water.

The state’s “village-to-village drinking water scheme” (as recently reported in 2025) will now be **digitally monitored** — meaning all construction, maintenance, complaint-redressal, and supply-quality data will be tracked online. Villagers will be able to log complaints, check progress, and monitor water quality of their taps and pipelines.

In villages where water-supply schemes are completed, local governance structures (Gram Panchayats, Village Water & Sanitation Committees / VWSCs) have begun to take charge of basic operations, maintenance, and water-quality vigilance. For example, in one village of Dehradun block, after the scheme became operational, the residents began getting ~ 55 liters per capita per day (lpcd) of treated water via household taps.

As part of broader reforms under JJM and state drinking-water programmes, there is also a proposal to involve **local women's self-help groups (SHGs)** in distributing water bills, monitoring illegal connections, tracking supply quality, and serving as a community-level watchdog. This is meant to overcome institutional staff shortages and improve local accountability in villages.

7.2.10 Key Issues & Gaps

Supply Shortage and Intermittent Supply

- Water supply often does not meet demand — especially during summer. Many localities report that supply drops or becomes intermittent just when demand peaks.
- Some areas get water for only short windows (“an hour in morning and evening”), sometimes with no fixed schedule, forcing households to rely on pumps/tanks or private tankers.
- Elevated or outlying zones (new colonies, peri-urban fringes, or last houses on a pipeline) often face **low pressure or no supply**.

Ageing & Leaky Infrastructure, High Distribution Losses

- The water distribution network is old in many parts: pipelines are dilapidated, pipes buried under roads leak, often undetected.
- High “non-revenue water” (i.e. water lost before reaching end-users) — due to leakages, bursting mains, leak-prone household connections — leads to substantial wastage, compounding supply deficit.
- Because of leaks and loss, actual usable water reaching consumers is significantly less than what's produced.

Poor Water Quality and Contamination Risks

- Residents across various localities complain of poor water quality — supply marked by muddy or gravel-laden water; at times “grey water.”
- Pressure fluctuations (especially under intermittent supply) and leaks can cause “back-siphoning” or ingress of contaminated external water when supply is off — increasing risk of contamination.
- Lack of consistent water-quality monitoring at consumer end; reports of irregular cleaning or maintenance of supply pipelines or treatment infrastructure.

Over-reliance on Groundwater & Vulnerable Natural Sources — Sustainability Risk

- Over-extraction of groundwater is common to make up for municipal supply shortfall. This combined with urbanisation and reduced recharge zones — stresses aquifers, leading to long-term decline. This mirrors broader regional concerns about groundwater sustainability under heavy use.
- Natural sources (springs, streams) and surface-water sources are increasingly unreliable especially under climate-linked variability, changing rainfall patterns, and increasing demand. This threatens long-term water security unless recharge and conservation are prioritized.

Vulnerability to Natural Disasters & Climate / Weather Events

- Heavy rainfall, floods, cloudbursts in and around Doon Valley frequently damage key water-supply pipelines, headworks or distribution lines — disrupting supply for large numbers.

- This exposes lack of redundancy in supply — when one source is damaged, there are often not sufficient alternate sources or emergency supply plans (tanker supply may not suffice).
- Also, unsafe drainage and urban expansion — along with poor sanitation/waste-water management — increase contamination risks, especially after rains.

7.3 SEWERAGE AND SANITATION

This section outlines the existing wastewater management and sanitation systems within the Dehradun Planning Area. It provides a comprehensive assessment of the sewerage infrastructure, focusing on key aspects such as sewage generation, modes of disposal, and the extent and availability of existing sewerage networks and facilities. The evaluation highlights current gaps, operational capacities, and the need for future interventions to ensure efficient, sustainable, and inclusive sanitation services across both urban and rural areas of the planning region.

7.3.1 Existing Status

Historically, Dehradun's sewerage master plan (circa 2009) envisioned **eight sewage treatment plants (STPs)** with a combined capacity of ~ 138 MLD.

Despite these plans, the operational capacity lags significantly. For instance, out of the nearly 165 MLD of wastewater reportedly generated by the city, very little was being treated — a 2017 report estimated only about **18 MLD** was treated then, with the bulk of sewage discharged untreated into rivers and drains.

According to a recent city-development document, about **62.7 MLD** of sewage is generated daily; out of this only **32.1 MLD** is collected, leaving a **treatment-capacity gap of ~ 32 MLD**.

Even the collected sewage is often not fully treated before discharge; many drains still empty directly into seasonal rivers such as Rispana and Bindal, which once flowed clean but are now heavily polluted.

The functioning of existing STPs and sewer networks is hampered by poor maintenance, siltation, blocked manholes, and inadequate capacity utilization. Some sewer lines are not properly aligned; storm-water often mixes with sewage.

Many areas — including newer residential zones, informal settlements, and peri-urban growth zones — remain unplanned in terms of sewerage. This leaves a large portion of the urban population dependent on decentralized sanitation systems without adequate oversight or desludging services.

Faecal sludge and septage management is weak: though there are around 25–30 cesspool / vacuum tanker vehicles that service some areas, there is limited infrastructure for desludging, sludge drying, or co-treatment at STPs.

7.3.2 Estimated Sewage generation in future

- According to the *Dehradun City Development Plan*, as of the recent assessment, the city generates about **62.7 MLD (million litres per day)** of sewage for a population of roughly 580,000 (in the serviced/connected area).
- From that, only **32.1 MLD** is being collected through the sewerage system; the rest is handled via septic tanks/soak pits, or remains untreated.
- Reports have also cited that the city generates “over 165 MLD waste-water” when considering all water sources and total usage.
- The present sewage infrastructure covers a limited portion of the city: according to one recent analysis, only around **34% of households** are connected to a formal sewer

network; the remainder depends on on-site sanitation systems (OSS) such as septic tanks or soak pits.

Several factors will tend to raise sewage generation in Dehradun:

- **Population growth:** Dehradun's population (urban + peri-urban) has continued to grow due to migration, expansion of city limits, in-migration from surrounding rural areas, and natural growth. A master-plan document for peri-urban water/sanitation development explicitly uses *projected equivalent population* (residential + non-residential) to estimate future demands and sewage loads.
- **Urban expansion & densification:** New colonies, residential developments, commercial establishments, and institutional growth (institutes, schools, offices) increase per-capita sewage load, as industrial/commercial wastewater adds to domestic sewage.
- **Rising per-capita water usage:** As standards of living improve and more households get piped water, flush toilets, and other water-dependent amenities, average water consumption per capita tends to rise — which directly increases wastewater generation.
- **Inclusion of previously un-serviced areas:** As sewerage networks expand to cover peri-urban zones and informal settlements, areas that earlier relied on septic tanks / open drains will begin contributing to the central sewage load.

7.3.3 Status of sewer lines and requirement

First Sewerage network in the city was proposed in 1958-59 to cater Dobhalwala, Chukkuwala, Lunia, Mannu Ganj, Khurbura, Lakshaman Chowk, Jhanda Mohalla, Paltan Bazar, Karanpur, Mansinghwala and Dhamawala. Through this project sewer lines were laid mainly along the main roads. Later on, through various schemes, sewerage network was laid in different parts of the city in a fragmented manner. As a result, some stretch of the city could have sewer lines.

As per census, 2011 around 39% of the households have been covered under the existing sewerage system. At present, the city has around 351 km of sewerage network being maintained by Uttarakhand Jal Sansthan (UJS). As per consultations with UPSVENN and UJS, most of the existing sewer lines have outlived its design life & need to be replaced or rehabilitated. In some areas, sewers are choked due to silting and manholes are blocked or covered by the roads etc. Due to that reason, the sewerage reaches the Sewerage Treatment Plants Partially and their full treatment capacity is underutilized.

Based on topography of the town, Dehradun City is divided into the 6 Sewerage Zones – Zone 1 to Zone 6. Their details are given below.

1. **Zone – 1:** Bindal river drainage zone which collects sewage from eastern part of the city for the proposed Kargi STP (71% of household are covered)
2. **Zone – 2:** Rispana River drainage zone which collects sewage from western part of the city for the proposed Daudwala STP (30% of households are covered)
3. **Zone – 3:** Separate saucer shaped topographical zone in the eastern part of the city which collects sewage for the proposed Indira Nagar STP. (0% of Households are covered)
4. **Zone – 4:** Very small saucer shaped zone in the northern part of the city which collects the sewage for proposed Vijay Colony STP. (100% of households are covered)
5. **Zone – 5:** Small saucer shaped zone in the northern part of the city which collects the sewage for proposed Salawala STP. (0% of households are covered)
6. **Zone – 6:** Very small saucer shaped zone in the northern part of the city which collects the sewage for proposed Doon Vihar STP. (50% of households are covered)

As per Dehradun Nagar Nigam latest details, these zones are partially served with sewerage network covering only 57,173 households which is 34% of the total households in the city. Remaining 66% households have on site containment systems.

The requirement for sewer lines in Dehradun is driven by several factors. Firstly, the city's varying topography—ranging from hilly terrain in the north to flat plains in the south—demands carefully planned sewer alignment and gradient management. Many low-lying areas face waterlogging,

making underground sewerage an essential component of urban resilience. Secondly, the presence of multiple natural drains (raus and seasonal streams) requires interception and diversion to prevent untreated wastewater from entering the river system, especially the Rispana and Bindal rivers, which have suffered significant pollution due to inadequate sewer connectivity.

Additionally, the expansion of urban localities such as Shimla Bypass Road, Sahastradhara Road, Raipur, Mothrowala, Miyawala, and outskirts like Doiwala and Herbertpur has outpaced the existing sewerage coverage. These areas require new trunk sewer lines, lateral connections, and sewage pumping stations to ensure efficient conveyance to treatment plants. The city's planned Smart City and AMRUT initiatives also emphasize comprehensive sewer network expansion, aiming to achieve universal sewer coverage.

7.3.4 Public Toilets

Dehradun being a transit city for the tourists going to Mussoorie falls in both national and international tourist circuits. In addition to being the capital of Uttarakhand state, It is also an important academic, trade and commerce hub in the region. Important institutions like Indian Military Academy (IMA), Forest Research Institute (FRI) and many Engineering Colleges are located in Dehradun. To cater to the sanitation needs of visitors, transit passengers and tourists, public toilets are one of the essential social infrastructure components. In general, these should be located near bus stations, railway stations, and tourist spots, recreational centres, main markets/commercial places, hospitals, transit points and any other place that attracts large number of visitors.

According to the information from the Dehradun Nagar Nigam (DNN), there are reportedly around 77 numbers of Public/Community Toilets in the city. Out of the 77 existing public/community toilets, more than 22 toilets located in the slum areas are being used as community toilets. Among them, most of the public toilets are functional, have proper electricity & water supply but poor operation and maintenance services. Adequate water is not available for flushing and frequent cleaning which results in poor sanitary conditions, and thus, very low acceptability among the community members. The toilets maintained by private service providers (e.g. All the community toilets have septic tank system which need to be emptied frequently by a truck mounted vacuum tanker through paid service and the septage is eventually disposed of in open land or at the municipal solid waste dumpsite.

7.3.5 Institutional Framework

The Uttarakhand Jal Sansthan serves as the nodal agency responsible for the operation and maintenance (O&M) of the sewerage system in Dehradun. To ensure efficient and reliable service delivery, the agency is supported by a dedicated technical and field workforce, including sweepers, field operators, and supervisory staff. For routine and emergency maintenance activities, the department is equipped with truck-mounted sewer jetting machines, suction-cum-jetting units, and other essential tools required for the cleaning, repair, and smooth functioning of the sewerage network. This operational setup enables effective handling of blockages, system failures, and regular upkeep of Dehradun's expanding sewerage infrastructure.

Table 7-6 Institutional Framework

Planning and Design	Construction/Implementation	O&M
Uttarakhand Peyjal Nigam / ULB / MoUD	Uttarakhand Peyjal Nigam	Uttarakhand Jal Sansthan

7.3.6 Demand and Supply Gap

The data for recent years indicates that Dehradun falls short of URDPFI benchmark levels across major sewage and sanitation indicators. Sewerage coverage in the city remains limited, with only about one-third of the urban area connected to an organized wastewater network. Collection efficiency is also low due to fragmented infrastructure and the continued dependence on septic tanks and soak pits in several neighbourhoods. Household coverage remains significantly below the desired benchmark, while the wastewater treatment capacity is inadequate compared to the total sewage generated. As a result, a substantial quantity of untreated or partially treated wastewater continues to enter natural drains such as the Rispana and Bindal rivers, highlighting a clear gap between existing capacity and actual demand.

7.3.7 Status of Proposed/Ongoing Projects

Dehradun's sewerage infrastructure is currently undergoing a mix of **upgradation, expansion, integration, and maintenance** under multiple state-level programmes — primarily through **Uttarakhand Jal Sansthan (UJS)** in coordination with **Uttarakhand Peyjal Nigam (UJN)** and the **Dehradun Smart City Mission**.

One of the most significant efforts is the **Integrated Sewerage System Project**, which aims to unify several old and fragmented sewage lines (from key localities like Lansdowne Chowk, Saharanpur Road, and Mothrowala) into the city's main STP. Though the project began around 2019, major civil works started only by 2022. By mid-2025, about **88 % of physical work was reportedly completed**. When operational, this should greatly enhance the conveyance and centralized treatment of wastewater.

Concurrently, a wider plan to extend the sewer network to over **34,000 additional households** was drafted by UJN/UJS. This expansion — involving laying of new pipelines over 375 km and connecting homes to STPs — was proposed at a cost of approximately ₹62.44 crore. However, as of now, progress is stalled due to **non-approval of final budget allocations**, leaving many areas still dependent on septic systems or soak pits.

7.3.8 NGT Guidelines and Criteria

The National Green Tribunal (NGT) has issued strict guidelines for the design, operation, and monitoring of Sewage Treatment Plants (STPs) across India, with special emphasis on cities such as Dehradun where untreated sewage continues to enter natural water bodies like the Rispana and Bindal rivers. These guidelines aim to ensure that urban local bodies and state agencies adopt scientifically sound, environmentally safe, and continuously monitored systems for wastewater treatment.

In Dehradun, the enforcement of NGT norms primarily rests with the **Uttarakhand Pollution Control Board (UKPCB)**, the **Uttarakhand Jal Sansthan (UJS)**, and the **Uttarakhand Peyjal Nigam (UJN)**. NGT orders mandate that all STPs in the city must be designed with appropriate treatment capacity, incorporate modern technologies, and consistently meet prescribed discharge standards. The Tribunal has also emphasized the need to bridge the gap between sewage generation and treatment capacity, a persistent concern in Dehradun where several drains continue to carry untreated wastewater.

7.4 SOLID WASTE MANAGEMENT

This section provides an overview of the solid waste management system in the Dehradun Planning Area, covering key components such as the assessment and quantification of solid waste generation, as well as the mechanisms in place for secondary collection, transportation, and final disposal of waste. The major sources of municipal solid waste (MSW) in the city include households, ashrams, dharamshalas, shops, commercial establishments, hotels, restaurants, and fruit and vegetable markets. In Haridwar, a significant variation in waste generation is observed

during tourist seasons and on major religious occasions, resulting in a temporary spike in the volume of waste due to the influx of pilgrims and visitors.

Solid waste management in Dehradun is undertaken by the **Dehradun Municipal Corporation (DMC)**, which oversees waste collection, transportation, processing, and disposal across the city. The system operates through a combination of municipal services and **Public-Private Partnership (PPP)** arrangements to improve efficiency and coverage. Door-to-door collection has been implemented in most wards, supported by designated collection vehicles and segregation initiatives at the household level. The city generates a steadily increasing volume of municipal solid waste due to rapid urbanization, commercial expansion, and population growth. Waste collected from residential and commercial areas is transported to the **Sheeshambada Solid Waste Management Plant**, where it undergoes segregation, composting, and processing into refuse-derived fuel (RDF). Despite these efforts, challenges persist in the form of inconsistent segregation at source, gaps in waste collection in peri-urban areas, and issues related to landfill management and leachate control. Strengthening community participation, expanding decentralized waste processing, and ensuring scientific landfill management remain key focus areas for enhancing the overall solid waste management system in Dehradun.

7.4.1 Existing Solid Waste Generation

According to the *Dehradun City Development Plan*, the city generates about **200 tonnes per day (TPD)** of municipal solid waste (MSW). The composition of this municipal waste — as per the city's own analysis — is roughly: **65% organic / biomass**, with the remainder comprising paper ($\approx 3.5\%$), textiles (rags) ($\sim 6\%$), plastics ($\sim 7\%$), glass ($\sim 1.5\%$), metals ($\sim 0.5\%$), and inert materials such as stones / sand / earth ($\sim 15\text{--}16\%$ combined: 8% stones + 7% sand/earth + $\sim 1.5\%$ other inert).

The city's main waste processing facility, the Sheeshambada Solid Waste Management Plant (on the outskirts of Dehradun), reportedly has a design disposal capacity of up to **300 tonnes per day**.

But in practice, the plant has faced problems: reports indicate that much of the waste reaching the plant is not properly segregated (wet & dry waste come mixed), and a substantial portion is simply stored in the landfill without appropriate segregation or processing. For example, over a recent multi-year period (Jan 2018–Sep 2022), about **5.81 lakh metric tonnes** of urban solid waste were brought to the plant; of that, **2.88 lakh tonnes** remained unsegregated and stored in the sanitary landfill.

7.4.2 Solid waste composition

Nagar Nigam is responsible for the management of solid waste in Dehradun city. Nagar Nigam has outsourced the waste collection, transportation, segregation and treatment to private companies and NGOs. Wards have been distributed among these organisations. According to the City Development Plan, Dehradun, the city generates 200MT of solid waste per day. The major sources of MSW are households, commercial shops, vegetable markets, hotels, and restaurants.

According to the *Dehradun City Development Plan* (DNN / DMC), the waste composition in Dehradun is as follows:

Table 7-7 Solid Waste Classification

Waste Component	Approximate Share (%)
Organic / Bio-mass (Biodegradable)	65.0
Paper	3.5
Rags / Textiles	6.0
Plastics	7.0
Glass	1.5
Rubber / Leather	1.5
Metal	0.5
Stones / Heavy Inert (e.g. stones, bricks, debris)	8.0
Sand / Earth / Soil / Other inert / debris	7.0

7.4.3 Collection of Waste

There are door-to-door collection facilities provided by Nagar Nigam through collection vehicles, Still, the vehicles are insufficient to cover the whole city due to urbanisation. Almost 2 vehicles are used to cover each ward.

Due to a lack of adequate community bins and inefficient door-to-door waste collection from households, residents have no choice but to dispose of waste in designated open spaces or at the nearest community bin, which is usually overflowing with excess waste, adding to the odour nuisance and major health impacts. It is worth noting that even drain cleaners are disposed of in bins or open spaces, which during the monsoons flow back into the drains along with the scattered solid waste, choking and blocking the normal flow of drains.

Figure 7-1 SWM Collection Vehicles in Dehradun



7.4.4 Transportation of Waste

To transport solid waste from houses or from community bins to the disposal site, the Municipal corporation has deployed various kinds of vehicles refer Table 7-8.

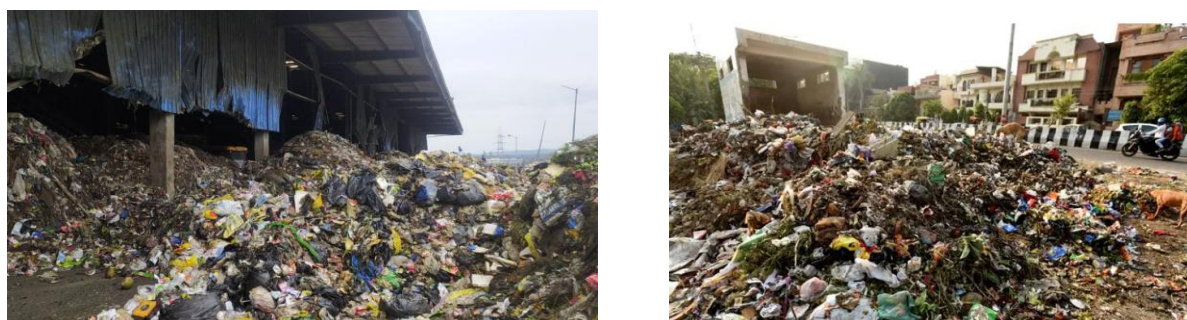
Table 7-8 Vehicles Deployed for collection of Solid waste

Vehicle / Equipment Type	Quantity (as per Dehradun Nagar Nigam)
Truck-operated dumper-placer	6
Tractor-operated dumper-placer	2
Refuse collector (small collection trucks / vehicles)	5
Tipper trucks	5
Tractor trolley with mechanical tipping facility	2
Open trucks	1
Front-end loader	1

7.4.5 Disposal

The Dehradun Municipal Corporation disposes of the city's solid waste at the **central sanitary landfill and processing facility located at Shishambara**, which serves as the primary site for scientific waste management for the urban area. The facility includes designated cells for waste processing, composting, and landfilling in compliance with Solid Waste Management Rules, 2016. Despite the existence of this authorized disposal site, **instances of informal dumping continue to be observed** in several parts of the city—particularly along roadside stretches, riverbeds, nallahs, open spaces, and vacant plots—largely due to inadequate segregation, irregular collection in certain peripheral wards, and public non-compliance. These informal dumping practices pose environmental and public health concerns and highlight the need for improved monitoring, enforcement, and community awareness within Dehradun.

Figure 7-2 Landfill Site, Dehradun



7.4.6 Waste management at village level

In many villages across the Dehradun planning area, solid waste management continues to follow traditional practices. Household kitchen waste, particularly edible leftovers, is commonly fed to cattle, as a large proportion of rural households keep livestock or share arrangements with neighbors who own cattle. The remaining organic waste is often mixed with cattle dung for composting or disposed of through natural decomposition within agricultural fields. At the same time, several Gram Panchayats in the region have begun transitioning toward more organized systems of waste handling. In many such villages, Panchayats collect a nominal user fee—typically around ₹30 per household per month—to support basic waste collection services. Using these funds, trolleys or small collection vehicles are deployed for every cluster of approximately 250–300 households to collect mixed waste from homes. The collected waste is transported to designated dumping areas situated along the outer edges of the village, under the management of the respective Panchayat. This emerging system represents a gradual shift from conventional, household-based waste disposal to a semi-organized rural waste management framework in the Dehradun region.

7.4.7 Primary & Secondary Collection

In Dehradun, primary and secondary collection of municipal solid waste across its 100 urban wards is managed by the Dehradun Municipal Corporation (DMC) through a structured, multi-tiered system. **Primary collection** is carried out through door-to-door waste pickup using a combination of e-rickshaws, auto-tippers, mini-tippers, tricycles, and handcarts assigned ward-wise. Each vehicle is tasked with collecting segregated wet and dry waste from households, commercial establishments, and institutional areas. Collection routes are predefined, and most vehicles are now GPS-enabled to ensure timely coverage and operational monitoring. Sanitation workers (safai mitras) are deployed in every ward, ensuring daily waste clearance, sweeping of streets, and transfer of collected waste to secondary points.

Secondary collection is undertaken through a network of designated Secondary Collection Points (SCPs) and Transfer Stations located strategically across the city. At these points, waste from primary collection vehicles is aggregated and transferred into larger vehicles such as compactors, bulk refuse carriers, tipper trucks, and dumper-placers for transportation to the **Shishambara Solid Waste Management Facility**. This two-stage collection mechanism helps streamline waste movement from source to processing site, reduce transportation time, and avoid multiple trips by small vehicles. Despite improvements in fleet expansion and monitoring systems, challenges persist, including uneven segregation, overflow at certain SCPs, and increased waste generation due to rapid urbanization in peripheral wards. Ongoing initiatives by DMC aim to enhance fleet adequacy, strengthen segregation at source, and improve ward-level monitoring for more efficient primary and secondary collection across Dehradun.

7.4.8 Demand and Supply Gap

The solid waste management system in Dehradun exhibits distinct gaps between the growing waste generation (demand) and the available infrastructure and services (supply), both in urban and rural areas. In **urban Dehradun**, rapid population growth, expansion of commercial activity, and increased daily waste generation—estimated at **550–600 TPD across the municipal limits**—have outpaced the capacity of existing collection, transportation, processing, and disposal systems. While the city has strengthened primary collection through door-to-door services, e-vehicles, and auto-tippers, several wards still report irregular collection frequencies, insufficient secondary storage, and overdependence on limited transfer points. The city's main processing facility at **Shishambara** operates with constrained capacity, resulting in partial processing and periodic backlogs. This mismatch between waste generation and infrastructure availability indicates a **moderate to high supply deficit**, particularly in processing and scientific disposal.

In **rural areas of Dehradun district**, the demand–supply gap is rooted in the absence of organized waste collection systems and limited institutional arrangements. Most villages depend on traditional waste management practices such as feeding kitchen waste to cattle, composting, or informal dumping in open areas, forest edges, riverbanks, and nullahs. Only a small number of Gram Panchayats have initiated structured waste collection by deploying trolleys or tractors and collecting nominal user charges. However, the coverage is low, storage facilities are absent, and there is no dedicated processing or segregation infrastructure. As rural households generate increasing quantities of non-biodegradable and packaged waste, the **demand for formal solid waste management services far exceeds the supply**, leading to significant environmental vulnerabilities.

Overall, Dehradun's waste management system faces a dual challenge: **urban areas struggle with infrastructure inadequacy and overloading**, while **rural areas lack basic systems for collection and scientific handling altogether**. Bridging the demand–supply gap requires expanding processing capacities, establishing decentralized waste management centers, improving transportation logistics, and ensuring appropriate coverage across peri-urban and rural settlements.

Table 7-9 Actual requirement & Gap

Parameter	Existing Capacity	Actual Requirement	Gap/Issues Identified
Waste Generation	600–650 TPD	Increasing to 750+ TPD in coming years	Rising waste load
Transportation Vehicles	~150–160 vehicles (auto-tippers, compactors, tippers)	200+ vehicles needed for full coverage	Shortage of vehicles, uneven distribution across wards
Segregation Coverage	~50–55%	100% required as per SWM Rules 2016	Inadequate source segregation
Processing Capacity	~350–400 TPD (combined)	≥600 TPD	Shortfall in composting + MRF + RDF
Landfill Capacity	Existing scientific cell nearing saturation	Need for new cells	Space constraint

7.4.9 NGT Directions

The National Green Tribunal (NGT) has issued several landmark directions to ensure that Urban Local Bodies (ULBs) and State Governments comply with the **Solid Waste Management Rules, 2016**. These directions aim to strengthen waste collection, segregation, transportation, treatment, and disposal across the country. The NGT has repeatedly emphasized that improper waste management is a violation of the constitutional right to a clean and healthy environment under Article 21.

One of the key directions of the NGT mandates all ULBs to achieve **100% door-to-door collection** and ensure **source segregation of waste into wet, dry, and domestic hazardous fractions**. The Tribunal has also instructed states to eliminate open dumping and open burning of waste, terming such practices illegal and environmentally hazardous. To address legacy waste, the NGT has ordered all states and cities to undertake **bioremediation and biomining of existing dumpsites**, stipulating strict timelines—typically requiring completion within 2–3 years depending on city size. Failure to meet these timelines attracts environmental compensation charges as per the “Polluter Pays Principle.”

The NGT has also directed ULBs to establish appropriate **waste processing facilities** such as composting units, MRFs (Material Recovery Facilities), RDF plants, and sanitary landfills designed strictly in accordance with CPCB guidelines. Transportation systems must include **covered vehicles**, GPS tracking, and route planning to prevent littering and leakage during transit. The Tribunal frequently reviews compliance through state committees and mandates regular reporting at the district and state levels.

Additionally, the NGT has emphasized the need for **prohibition of plastics below specified microns**, extended producer responsibility (EPR) implementation, and strict enforcement of penalties for non-segregation, littering, and illegal dumping. It has also required states to create proper grievance-redressal mechanisms and awareness programs to ensure behavioral change at the household level. Through these directions, the National Green Tribunal continues to push for scientific, accountable, and environmentally sound municipal solid waste management across India.

7.5 STORM WATER DRAIN

The storm water drainage system in Dehradun comprises a mix of natural drainage channels, traditional *raiwalas*, roadside drains, and culverts that collectively manage runoff across the urban and peri-urban areas. However, with rapid urbanization, unplanned construction, and encroachments along natural watercourses, the efficiency of the drainage network has significantly declined in recent years. Many of the natural streams (*rivulets*), such as Rispana, Bindal, Jakhan Rao, and Tons tributaries, have been constricted or diverted due to built-up development, reducing their carrying capacity and increasing the risk of flooding during intense rainfall events.

A major challenge in Dehradun’s storm water management is the **mixing of sewage with storm drains**, primarily in older parts of the city where dedicated sewer lines are absent or inadequate. This leads to contamination of natural water bodies and reduces the hydraulic capacity of drains due to siltation and solid waste deposition. Blockages caused by plastic waste, construction debris, and encroachment on drain margins further impair the free flow of storm water, resulting in frequent waterlogging in low-lying areas such as Dharampur, Saharanpur Road, ISBT zone, and parts of Chakrata Road.

Though initiatives have been taken under Smart City projects, AMRUT, and municipal funding to upgrade and de-silt drains, the improvements remain localized. The overall drainage system requires **integrated planning**, including restoring natural channels, preventing sewage intrusion, regular desilting before monsoon, enlarging capacities in high-runoff zones, and introducing sustainable features like permeable pavements and rainwater harvesting. Strengthening the storm water network is essential for reducing waterlogging, protecting urban infrastructure, and enhancing climate resilience in Dehradun.

7.5.1 Existing Condition

1. Dehradun's storm water drainage network consists of:
 - Natural drains (nallahs) such as Rispana, Bindal, and Suswa
 - Secondary drains along major roads
 - Tertiary roadside drains in residential and commercial areas
2. Most drains are open drains with varying widths and depths.
3. Many drainage channels are encroached, silted, or blocked due to:
 - Construction debris
 - Plastic waste
 - Illegal constructions
4. Cross-drainage structures exist at major road intersections but are partially choked.
5. Lack of an integrated storm water drainage map leads to unplanned development.
6. In several wards, storm water drains are merged with sewer lines, causing frequent overflows.

7.5.2 Major Challenges

Encroachment & Reduction of Natural Drain Width- Unauthorized construction along Rispana and Bindal drains reduces natural flow.

Silting and Blockages- Drains frequently choke due to garbage disposal and lack of regular desilting.

Mixing of Storm Water with Sewage- Storm water drains often carry grey/black water from households due to improper sewer connections.

Inadequate Drainage Infrastructure- Many areas lack properly designed primary and secondary drains. Roadside drains are shallow and constructed without proper slope.

Urbanization and Reduced Percolation- Increased built-up area reduces natural percolation. Rainwater harvesting is not effectively implemented.

Poor Coordination- Multiple agencies manage drains, leading to gaps in maintenance and execution.

Climate Change Impact- Increased intensity of rainfall events leads to flash flooding.

7.5.3 Institutional Framework

Storm water management in Dehradun involves several government agencies:

1. **Municipal Corporation of Dehradun (MCD)**
 - Responsible for construction and maintenance of drains within municipal limits.
 - Handles desilting, repair, and local drainage channels.
2. **Public Works Department (PWD)**
 - Constructs and maintains roadside drains along major roads and highways.
3. **Irrigation Department**
 - Manages major natural drains and outfalls such as Rispana, Bindal, and Suswa.
 - Ensures flow capacity and desilting of primary drainage channels
4. **Urban Development Department**
 - Policy-making, funding and oversight.

- Coordinates with NMCG for river rejuvenation.

5. NMCG (National Mission for Clean Ganga)

- Funds projects to prevent storm water contamination and improve outfalls into Ganga tributaries.

6. UUSDA / Jal Sansthan

- UUSDA / Jal Sansthan.

7.5.4 Supply and Demand Gap

The storm water drainage system of Dehradun faces a significant supply–demand gap due to rapid urban expansion, increased paved surfaces, and inadequate infrastructure capacity. The **demand** for an efficient and continuous drainage network has grown substantially as the city experiences higher runoff volumes during heavy rainfall events, driven by climate variability and urban densification. However, the **existing supply** of drains—comprising natural nallahs, roadside drains, and open channels—remains insufficient, undersized, and structurally compromised in many areas. Most drains were designed decades ago for lower population and rainfall loads, leaving them unable to handle current peak discharge levels.

As a result, Dehradun continues to face recurrent waterlogging in several wards, especially during peak monsoon. Bridging this gap requires integrated stormwater planning, restoration of natural drainage channels, construction of missing links, capacity augmentation of existing drains, adoption of sustainable urban drainage systems (SUDS), and regular maintenance to align supply with the growing stormwater management demand of the city.

Table 7-10 Supply and Demand Gap

Parameter	Existing Supply	Required Demand	Gap Identified
Total Drain Length	Partial network, ~40–50% coverage	100% coverage	Missing drains in many wards
Primary Drain Capacity	Inadequate; natural drains narrowed	Full design capacity with protection	Encroached & silted channels
Secondary/Tertiary Drains	Not interconnected; poor slope	Networked system with proper outfalls	Broken continuity and gradient issues
Desilting Frequency	1–2 times per year	3–4 times with pre-monsoon priority	Insufficient maintenance
Rainwater Harvesting	Low implementation	Coverage in 100% public buildings	Gaps in compliance
Staff & Machinery	Limited teams	Dedicated drainage cells	Shortage of manpower/equipment

7.5.5 Proposed Projects

AMRUT proposed and ongoing project details attached (refer Table 7-11).

Table 7-11 Projects under AMRUT

Sl No.	Project Name	Type of Project	Status
1	Kaulagarh Water Supply Scheme	Water Supply	Ongoing / Approved
2	Sahastradhara Road Pumping Water Supply Scheme	Water Supply	Ongoing / Approved
3	Shastri Nagar 24×7 Water Supply Scheme	Water Supply	Ongoing / Approved
4	Weir Construction at Bandal Canal Head, Raipur Block	Water Body Rejuvenation	Approved / Planned
5	Strengthening/Modernisation of Bijapur Head	Water Body Rejuvenation	Approved / Planned
6	Sewerage & Septage Management Projects	Sewerage	Ongoing / Planned
7	Urban Parks & Green Space Development	Public Amenity	Proposed / Planned
8	Storm Water Drainage Improvements	Drainage	Ongoing / Planned

Source: AMRUT-2 reforms. (udd.uk.gov.in)

7.5.6 Telecommunication

Telephone Exchange- Dehradun city core area markets are filled with all kinds of smart phones and other electronic items

and people are easily accessible to buying these technologies.

Television & Radio Stations- With the ease of access to technology. Almost every household has a television, particularly HIGs

and MIGs. These households also consume the most other electronic items, such as laptops, phones, and smart appliances. Dehradun also has a Dehradun Kendra, which is near the Rispana Bridge.

Telephone Lines- Dehradun Smart Cities Limited (DSCL) and Indus Towers, one of the world's largest telecom tower.

companies, have partnered on a Public Private Partnership (PPP) model to install 70 ground-based mast telecom sites, 60 Smart Poles and deployment of 100 km of Underground Fiber Network.

Optic Fibre Distribution- DSCL with the PPP model has also proposed to installed 60 Smart Poles and deployment of 100

km of Underground Fiber Network. The project entailed installation of 60 Smart Poles equipped with WiFi access points, Smart lighting solution (warm LED lights consuming lesser energy) and CCTV cameras (for video surveillance) in Dehradun.

7.6 ENERGY

Energy supply is a critical component for sustaining residential, commercial, institutional, and industrial activities in Dehradun. The city's energy infrastructure primarily depends on electricity supplied through the state power utility network, supported by transmission and distribution systems that cater to both urban and peri-urban areas.

7.6.1 Existing Supply

The power supply system in Dehradun is managed primarily by **Uttarakhand Power Corporation Limited (UPCL)**, which oversees distribution across both urban and rural areas of the district. The city receives electricity from a network of **132 kV, 66 kV, and 33 kV grid substations**, which are further stepped down to **11 kV feeders** for distribution to residential, commercial, and industrial consumers. Dehradun has a well-established transmission network, supported by key substations located at **Majra, Bindalpul, Patel Nagar, Raipur, Bidholi, Sahaspur, Kuanwala, and Prem Nagar**, ensuring reliable power inflow. The existing distribution system includes an extensive network of **11 kV lines, LT lines, distribution transformers (DTs)**, and service connections, covering all 100 urban wards as well as surrounding rural pockets.

Table 7-12 Total Electric connections and consumption-UPCL Dehradun

Type	Residential	Commercial	Industrial	Agricultural	Others	Total
No. of Electric Connections	1,42,500	32,800	1,150	620	2,430	1,79,500
Electric Consumption (KWH)	4,85,20,000	2,76,40,000	3,92,50,000	18,40,000	52,30,000	12,24,80,000

Source: UPCL Dehradun

8 SOCIAL INFRASTRUCTURE

8.1 INTRODUCTION

Social infrastructure encompasses the facilities and services that support education, healthcare, community development, and overall quality of life. It includes educational institutions, healthcare facilities, cultural centers, parks, and public open spaces.

These components are essential indicators of a city's social well-being and readiness to meet the needs of its population. As Dehradun continues to grow, the demand for social infrastructure is rising, often outpacing the supply. This widening gap adversely affects service accessibility and urban quality of life.

Effective planning and timely investment in social infrastructure are critical to ensuring inclusive, healthy, and sustainable urban development.

8.2 EDUCATION FACILITIES

Since the British period the town became a major academic and research centre and a base for the Indian Military Academy and the Survey of India. There are also several prestigious academic schools, institutes and research centres such as Forest Research Institute which is main centre of research and planning in the field of flora and fauna in India, Indian Petroleum Institute, Central Soil and water conservation, Doon School, India's most expensive private school and many other who attracts the national and international students.

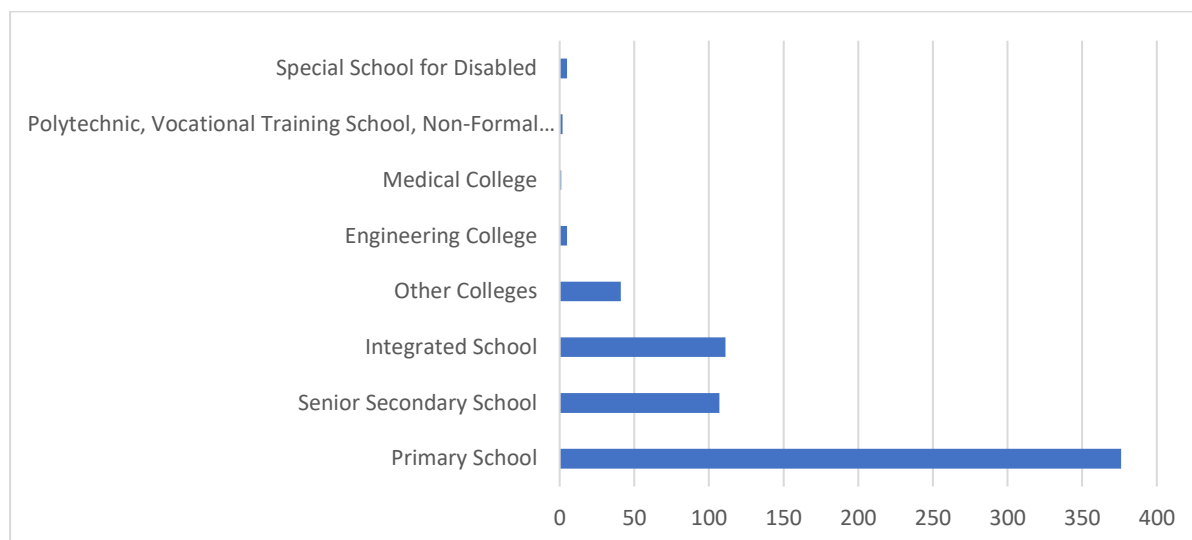
When compared to the district and state literacy rates, the city has a high literacy rate of 88.36% due to its massive number of educational institutes. City residents do not migrate to other cities for education because they have prestigious institutes in their immediate vicinity, and the city itself provides a good education service.

The census data shows that educational facilities are primarily present in urban centres of Doon valley region. However, undeveloped areas have shown a large improvement since the last 30 years. Primary education is fairly available in nearly all villages but there is need to setup many higher education institutes.

Table 8-1 Existing Education facilities in Planning Area

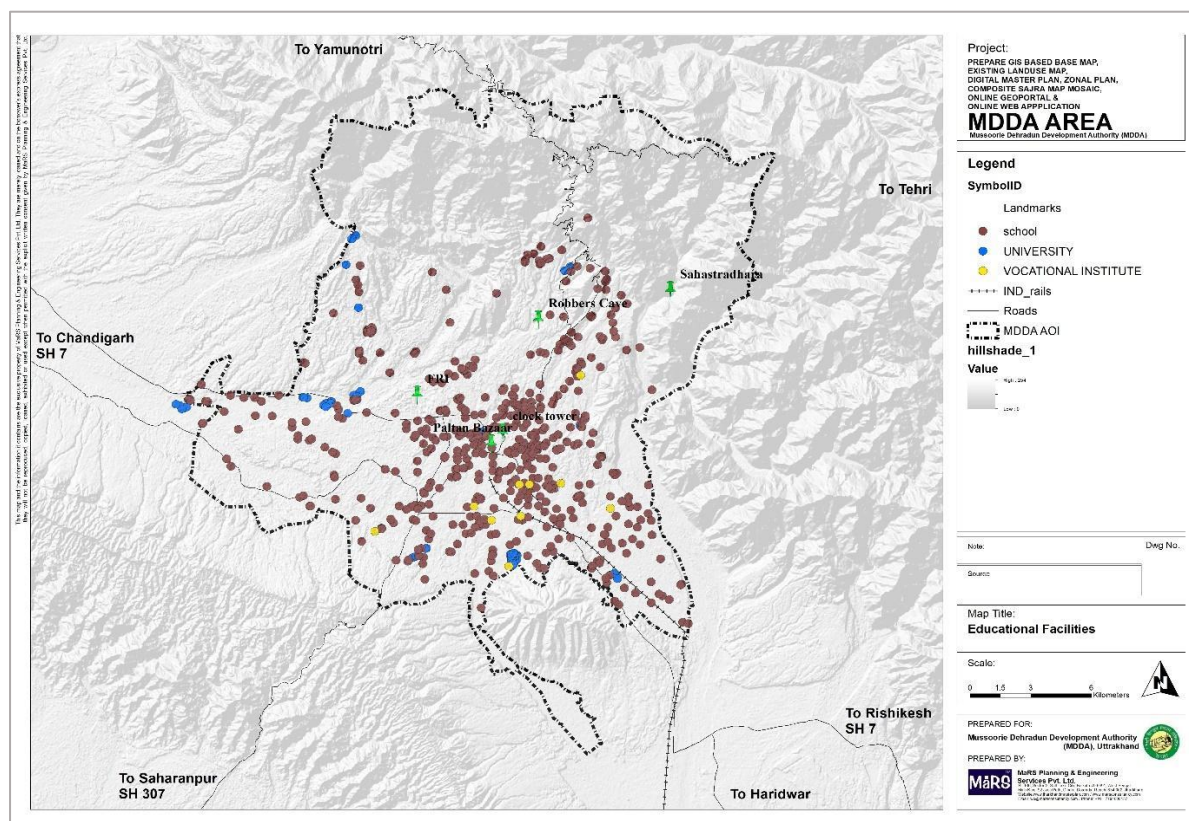
Sr. No.	Category	Population served per unit (URDPFI Norms)	Existing Facilities (No.)	Gap, if any (No.)	Additional Requirement (No.)	Area Requirement (Ha.)
1	Primary School	5000	376	0	104	41.60
2	SSC School	7500	107	20	213	383.40
3	Integrated School	1,00,000	111	0	0	0.00
4	Other Colleges	1,25,000	41	0	0	0.00
5	Engineering College	10,00,000	5	0	0	0.00
6	Medical College	10,00,000	1	0	2	30.00
7	Polytechnic, VT, NFT	10,00,000	2	0	1	4.00
8	Special School for Disabled	45,000	5	16	48	33.83
	Total					492.83

Figure 8-1 Existing Education facilities in Planning Area



Source: Census of India, 2011

Map 8-1 Distribution of Educational Facilities in the area



8.3 HEALTH CARE FACILITIES

Dehradun is an important medical centre in addition to being the administrative capital. There are numerous high-level national medical and training institutes in the planning area. According to a survey conducted by the municipal corporation and the Mussoorie Dehradun Development Authority, there are currently 23 state hospitals in the Dehradun Municipal area, with a total of 124

hospitals under the planning area, including government, institutional, and individual nursing homes. This includes 1700 beds, 267 doctors, 915 assistants, and 20 patient vehicles. When compared to the URDPFI guidelines, there are still insufficient medical facilities available in both urban and rural areas.

According to the above table, there is a huge demand for dispensaries, primary health centres, polytechnics, and family welfare centres in the planning area, as well as non-government hospitals and veterinary hospitals, among other things. There are many private hospitals in the planning area that are prohibitively expensive for the general public, and the government hospitals are inadequately equipped to serve the Dehradun district's rural and urban populations. There is a need to increase the quantity and quality of health infrastructure for city residents that is both accessible and affordable.

There are many private and public hospitals located in the city to cater the planning area population, but they are concentrated in the city centre. The private hospitals include Max Hospital on Rajpur Road, City Heart Hospital (Multi speciality hospital) on EC Road, Synergy Hospital on Ballupur Chowk, and Indresh and CMI Hospital on Ara Ghar. There is one Uttarakhand ayurvedic university that provides ayurvedic medical services and is also located in Harrawala.

Table 8-2 Existing Health services and additional Health services required for planning area, 2021

Sr. No.	Category	Population served per unit (URDPFI Norms)	Existing Facilities (No.)	Gap, (No.)	Additional Requirement (No.)	Area Requirement (Ha.)
1	Dispensary	15,000	10	53	150	18.00
2	Primary Health Centre	20,000	11	36	109	16.35
3	Nursing home, child welfare and maternity centre	45,000 – 1,00,000	23	0	1	0.30
4	Polytechnic	1,00,000	7	2	17	5.10
5	Family Welfare Centre	50,000	14	5	34	1.70
6	Other Non – Government Hospitals	1,00,000	126	0	0	0.00
7	Veterinary Hospitals	5,00,000	6	0	0	0.00
						41.45

8.3.1 Epidemiological Details

The epidemiological profile of Dehradun reflects a mixed burden of **communicable and non-communicable diseases**, shaped by rapid urbanization, environmental changes, and demographic shifts. Among communicable diseases, seasonal outbreaks of **dengue, chikungunya, and malaria** are commonly reported, particularly during the monsoon months, due to favorable vector-breeding conditions in low-lying and peri-urban areas. Waterborne diseases such as **diarrhea, typhoid, hepatitis-A, and cholera-like symptoms** are occasionally observed, especially in localities with inadequate water supply quality or poor sanitation. Respiratory infections, including tuberculosis, remain a public health challenge, with regular cases registered through the National TB Elimination Programme (NTEP).

Public health surveillance, managed by the **Integrated Disease Surveillance Programme (IDSP)** and local health authorities, indicates that environmental factors such as air pollution, waste mismanagement, and contaminated water sources contribute significantly to disease patterns. Overall, Dehradun's epidemiological trends highlight the need for stronger preventive health strategies, better environmental management, and improved urban health infrastructure.

8.4 RECREATIONAL

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. Dehradun Planning Area has several recreational and sports facilities which are elaborated.

8.4.1 Parks and open spaces

Dehradun has a diverse set of parks and open green spaces that contribute to environmental sustainability and public recreation.

- Major urban parks include **Gandhi Park**, which serves as a central green lung for residents and visitors.
- Other notable spaces include MDDA-developed parks, community gardens, and neighborhood green areas.
- Open spaces are used for walking, exercise, children's play, yoga, and leisure.
- Many residential colonies maintain small green pockets and local playgrounds.

Challenges include inadequate maintenance in some wards, encroachment pressure, and limited availability of large public parks relative to population growth.

8.4.2 Sports Facilities

The city is considered an educational hub, there are more students in the city who participate in a variety of sports. As a result, the city has numerous sports facilities and practise grounds, such as the Rajiv Gandhi International Stadium, which is owned by the government and is located in Raipur. This stadium is well-known for hosting cricket matches. Doon Cricket Academy is in Kuawala, while Abhimanyu Cricket Academy is in Bist Gaon.

8.4.3 Mela Ground, Ramleela Ground and Exhibition Ground area

Dehradun features a diverse range of Mela Grounds, Ramleela Grounds, and Exhibition Grounds that play an important role in hosting cultural, social, recreational, and community-based activities within the city. The Dehradun Municipal Corporation oversees several key open grounds that are frequently used for public gatherings, annual fairs, and local celebrations. Prominent among these

are the Parade Ground and the Pavilion Ground, which serve as major venues for exhibitions, trade fairs, sports events, and large public functions. Ramleela Grounds are distributed across areas such as Kanwali Road, Dharampur, Harrawala, Raipur, and Doiwala, where annual Ramleela performances, cultural programs, and festive events attract significant community participation. In addition, the city has dedicated Mela Grounds—such as those in Patel Nagar, Premnagar, and Doiwala—that support seasonal melas, local markets, and traditional fairs. Independent and institutional venues like the ONGC Exhibition Area, the MDDA Exhibition Zone near Premnagar, and community centers across various wards also function as multipurpose event spaces for social gatherings, handicraft exhibitions, and awareness programs. Collectively, these grounds contribute to cultural preservation, community engagement, and local economic activity within the Dehradun Planning Area.

8.4.4 Cinema-Standalone/Multiplex

Dehradun offers a mix of standalone cinema halls and modern multiplexes that cater to the city's growing population, though the distribution remains uneven across the planning area. Traditional single-screen theatres such as **Priya Talkies**, **Oriental Cinema**, and **Natraj Cinema** continue to serve local audiences, especially in older parts of the city. In contrast, multiplexes located in major commercial hubs—such as **PVR at Pacific Mall**, **Time Square Mall**, and **SilverCity in Rajpur Road**—provide contemporary entertainment options with multiple screens and upgraded facilities. Despite the presence of these venues, several peripheral and newly developing areas of Dehradun continue to lack adequate cinema infrastructure, indicating a noticeable gap in accessible entertainment and recreational facilities across the wider urban region.

8.4.5 Museums and Library

Dehradun hosts a rich collection of museums and libraries that reflect its cultural heritage, scientific advancements, and educational prominence. The **Forest Research Institute (FRI) Museum** is one of the city's most renowned institutions, featuring dedicated galleries on forestry, entomology, pathology, and silviculture, attracting researchers, students, and tourists alike. The **Zonal Anthropological Museum** showcases the culture and lifestyle of the indigenous tribes of the Himalayan region, while the **Wadia Institute of Himalayan Geology Museum** highlights geological formations, rock specimens, and tectonic studies of the Himalayas. Additionally, the **Survey of India Museum** preserves historic cartographic instruments and maps, representing India's oldest scientific organization.

Dehradun also houses a number of public libraries that serve as knowledge centers for students and the general public. The **State Central Library (Kishan Nagar)** remains the principal public library, offering a wide collection of books, journals, and educational resources. Institutional libraries—including those at **FRI**, **Doon University**, **ONGC**, and various colleges—further strengthen the academic environment of the city. Together, these museums and libraries contribute significantly to Dehradun's identity as an educational and cultural hub in Uttarakhand.

8.5 FIRE SAFETY

The urban areas of Doon valley do not have a fire fighting service presently. The nearest station is at Dehradun which is at a distance of 22 to 40 km from urban centres. Only 3.5% of the total area is served by the existing Fire stations and remaining 96.5% of the total MDDA area is unserved which means more fire stations are required to cater remaining population in the area. The region demands better fire service at least in urban areas otherwise a huge population would be in danger.

There is total five fire stations in the Dehradun district but only one in Dehradun city rest four are in Rishikesh, Mussoorie, Vikas Nagar and Selaqui industrial area respectively.

8.6 SOCIO-CULTURAL & OTHER FACILITIES

There are various socio-cultural and community facilities present in the Dehradun Planning Area, which mainly include Anganwadi centers, community halls, multipurpose rooms, libraries, museums, recreational clubs, parks, open spaces, and sports grounds. The area is also served by major cultural landmarks, public gathering venues, and institutional campuses that offer spaces for social interaction and community events. These facilities collectively support the socio-cultural needs of the population and enhance the overall quality of life in the Dehradun Planning Area.

8.6.1 Socio-cultural Facilities

Currently, the Dehradun Planning Area has a limited number of community halls and multipurpose community spaces compared to its growing population. While a few community halls and cultural venues exist across the city, the overall availability remains insufficient when assessed against the projected requirement at the planning area level, resulting in a significant shortfall of such facilities. Along with this gap, several essential socio-cultural amenities—such as dedicated community rooms, centers for music, dance, and performing arts, meditation and spiritual centers, and organized recreational clubs—are either inadequately developed or absent in many parts of the planning area. This lack of socio-cultural infrastructure underscores the need for substantial investment in community-oriented and cultural facilities to enhance social engagement, support inclusive development, and improve the overall quality of life for residents of Dehradun.

8.6.2 Sports and Recreation

Sports and recreational facilities in Dehradun play a significant role in supporting the physical, social, and mental well-being of its residents. The city hosts a diverse range of amenities, including parks, sports complexes, playgrounds, and open green spaces that cater to activities at the local, sub-city, and city levels. Dehradun is home to major sports infrastructure such as the Rajiv Gandhi International Cricket Stadium, Maharana Pratap Sports College, and various multi-purpose grounds that support athletics, football, cricket, and indoor sports. In addition, numerous neighborhood parks, community playgrounds, and urban open spaces contribute to leisure, fitness, and social interaction across the planning area. Collectively, these facilities enhance the city's livability, encourage community participation, and promote a healthier lifestyle for the growing population of Dehradun.

8.6.3 Petrol Pump

Dehradun has 71 petrol stations located at every corner of the city with some of them working 24 hours a day.

8.6.4 Police Facilities

The presence of a police station can make a community or neighbourhood safer, regardless of what's inside it. It ensures public order, does investigation of crimes and performs innumerable other tasks. The Police Station is also the primary point of communication between the citizen and the police. Dehradun has a total of 29 police stations.

Dehradun city is facing acute pressure of vehicular traffic on the roads, which are already narrow due to lack of planning in the past. As a result of the increasing vehicular traffic in Dehradun, commuters are facing a lot of problems. The traffic situation is worsening in Dehradun every day. Poor design of intersections carrying high volume of traffic lead to traffic congestion during the peak hours. Maximum traffic congestion is observed into the Centre and Southern Part of the Dehradun the example of which are Clock Tower, Saharanpur chowk, Prince chowk in Dehradun.

8.6.5 Law and Order - Crimes Reported

Dehradun police is for prevention and detection of crime, maintenance of law and order and efficient service delivery to citizens.

The focus is also to efficiently assist in rescue and relief operations during disasters. The department also on providing a safe and secure environment for investments and tourism in the state.

8.6.6 Fire Prevention and Protection

The urban areas of Doon valley do not have a fire fighting service presently. The nearest station is at Dehradun which is at a distance of 22 to 40 km from urban centres. Only 3.5% of the total area is served by the existing Fire stations and remaining 96.5% of the total MDDA area is unserved which means more fire stations are required to cater remaining population in the area. The region demands better fire service at least in urban areas otherwise a huge population would be in danger.

There is total five fire stations in the Dehradun district but only one in Dehradun city rest four are in Rishikesh, Mussoorie, Vikas Nagar and Selaqui industrial area respectively.

Table 8-3 Available and additional fire stations to be proposed in the Dehradun Planning Area

Sr. No.	Category	Population served per unit (URDPFI Norms)	Existing Facilities (No.)	Gap, if any (No.)	Additional Requirement (No.)	Area Requirement (Ha.)
1	Fire Station	2 lakhs	2	3	9	9
						9

Source: Primary Survey and Consultant Analysis

8.6.7 Telephone Exchange and Postal Facilities

The Dehradun Planning Area is served by multiple telephone exchanges located across key urban zones such as Clock Tower, Rajpur Road, Patel Nagar, Raipur, and Clement Town. As per the prescribed service standards, the existing number of exchanges is adequate to meet the current population and geographical coverage, ensuring smooth telecommunication services throughout the planning area.

In terms of postal services, Dehradun is well supported by a network of post offices comprising the General Post Office (GPO) at Ghanta Ghar along with several sub-post offices located in areas such as Dalanwala, Vasant Vihar, Premnagar, Raipur, Banjarawala, and Mothrowala. These facilities provide essential services including mail delivery, parcel handling, banking services, and logistics support to both urban and rural settlements within the planning area, ensuring efficient communication and service outreach.

8.6.8 Banking Facilities

The Dehradun Planning Area is well supported by an extensive network of over **120 bank branches**, providing essential financial services across both urban and peri-urban regions. The city hosts branches of all major public and private sector banks, ensuring wide coverage, accessibility, and support for commercial as well as personal banking needs. Key banking institutions and their prominent branches include:

7. **State Bank of India (SBI)** – Major branches located at Clock Tower, Rajpur Road, Nehru Colony, Premnagar, and Ballupur.
8. **Punjab National Bank (PNB)** – Branches at Chakrata Road, Dharampur, Saharanpur Road, and Subhash Nagar.
9. **HDFC Bank** – Branches at Rajpur Road, Balliwala Chowk, ISBT, and GMS Road.
10. **ICICI Bank** – Branches at Rajpur Road, Saharanpur Road, Dalanwala, and Vikasnagar.
11. **Axis Bank** – Branches at Haridwar Road, Rajpur Road, Kaulagarh Road, and GMS Road.
12. **Union Bank of India** – Branches at Araghar, Saharanpur Road, and Premnagar.
13. **Canara Bank** – Branches at Chakrata Road and Race Course.

The existing network of banking infrastructure demonstrates strong financial penetration within the Dehradun Planning Area, supporting commercial activities, household financial needs, government transactions, and the growing shift toward digital and cashless banking services.

8.6.9 Poultry and Slaughter Houses

Slaughterhouse activities in Dehradun are carried out through a combination of government-managed and private facilities. The existing slaughterhouse infrastructure, however, faces challenges such as outdated equipment, limited mechanization, and constraints related to waste management and environmental compliance. Upgradation of slaughterhouse facilities, adoption of scientific processing practices, and improved enforcement of health and sanitation standards are essential to ensure safe meat production and to support the expanding urban population.

8.6.10 Status of Socio-cultural facilities under AMRUT Mission

Under the AMRUT (Atal Mission for Rejuvenation and Urban Transformation) Mission, Dehradun has undertaken several initiatives aimed at strengthening socio-cultural infrastructure to improve the quality of life and enhance community engagement. While AMRUT primarily focuses on water supply, sewerage, drainage, urban transport, and green spaces, the mission has indirectly supported socio-cultural development through the creation and upgradation of public parks, open recreational spaces, and community-oriented urban amenities. Key interventions include the development of urban green areas, enhancement of neighborhood parks with improved landscaping, lighting, walking tracks, and citizen-friendly facilities, which together promote social interaction and cultural activities. Additionally, improvements in urban mobility and public spaces have helped create more accessible environments for cultural gatherings, events, and community functions.

8.7 KEY ISSUES & POTENTIALS

Despite the presence of essential social infrastructure in the Dehradun Planning Area, several critical gaps remain. In the healthcare sector, there is a shortage of doctors and medical staff, especially in rural areas, along with a lack of multi-specialty and specialized hospitals to meet the growing urban demand. Sanitation infrastructure is inadequate, with an urgent requirement for more public toilets and efficient waste management to support the rising population. The area also lacks essential socio-cultural facilities, such as community rooms, music, dance and drama centers, meditation halls, and recreational clubs. Additionally, the absence of a fire training college/institute highlights a significant gap in emergency preparedness and safety training.

9 TRAFFIC AND TRANSPORTATION

Dehradun city is well connected to regional urban centres in terms of transportation. Dehradun is the capital city which is well connected to other urban centres of the state and adjoining areas.

The study of transportation is essential for understanding the pattern of development because connectivity helps the city to become vibrant economic centre, and traffic and transportation are one of the primary reasons for the city's expansion. This section of the report will discuss the city's current traffic and transportation characteristics. Special focus on problems encountered by city residents and tourists while travelling into the city; which are discussed in detail with facts as well as strategies to mitigate the impact of traffic transportation issues in the various sections of this chapter.

Traffic congestion is a major and important issue in the Dehradun urban agglomeration. Traffic congestion occurs when travel demand exceeds the existing road system capacity. Congestion is a condition that arises because more people wish to travel at a given time than the transportation system can accommodate: a simple case of demand exceeding supply. Thus, transport plays an important role for probably in urban areas, particularly about while trips and trips generation to central areas. The study is important to identify, in detail, the problematic situations related to the existing transportation infrastructure and traffic operation.

The analysis from these studies could further help us provide details on the development and validation of the travel demand model for the study area, helps in projecting travel demand in the study area for different horizon years and helps develop and evaluate various transport strategies. Not only that, it could further guide the responsible authorities to propose solutions that can increase the efficiency and life of roads, reduces traffic volume at a particular section, provide better means for the development of infrastructures, and provide better means to utilise other roads in case of special events in the city and provide an estimate of no vehicles against no of persons.

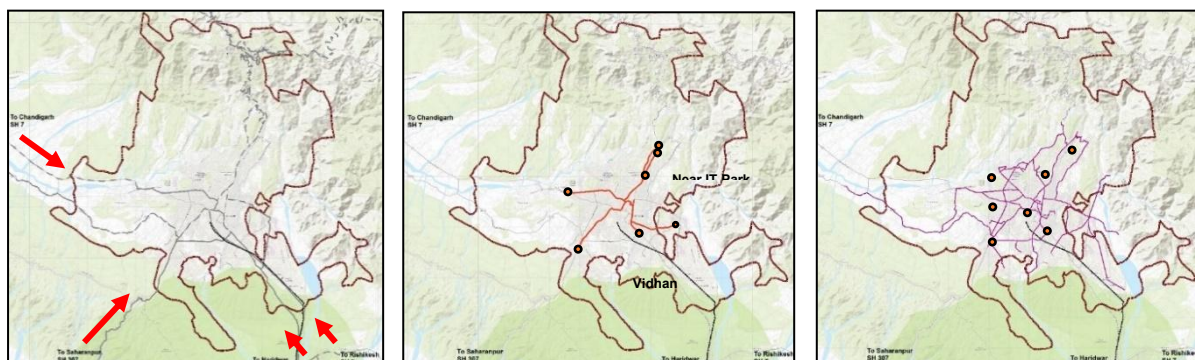
9.1 EXISTING ROAD NETWORK

Dehradun is well connected by rail and road. NH-72 passes through the city connecting Rishikesh and Haridwar in the east to Himachal Pradesh in the western side. NH-72A connect the city with Saharanpur in the S-W and Roorkee in the south. A large number of attractions of traffic in the CBD area due to the presence of offices, commercial establishments. The autorickshaws stop wherever passengers board/alight, thereby causing congestion and delay to other vehicles. It has been observed that areas like clock tower, railway station, Patlan bazaar; Connaught place are having heavy pedestrian flows.

The road system is radial originating from the City Core area of Paltan Bazaar with Rajpur Road, Haridwar Road, Saharanpur Road and Chakrata Road forming themajor travel corridors. The traffic carrying capacities are low due to limited widths, intense land use. and encroachments. A new bypass has been constructed connecting Saharanpur Road near Transport Nagar with Haridwar Road. Other important roads in the city are Kaulagarh Road, Raipur Road, Shahastradhara Road, Kaonli Road, New Cantonment Road, Subash Road and East Canal Road. The nearest Airport is at Jolly Grant, which is about 24 km from the city.

There are three transit corridors in Dehradun Planning area as shown in the maps below:

Map 9-1 Three transit corridor in Dehradun Planning Area



The MDDA Planning Area has three entry points: one in the south-west direction from Saharanpur, one in the north-west direction from Chandigarh, and one in the south-west direction from Haridwar Rishikesh. Aside from that, there are first and second order corridors, with the first consisting of a stretch from Mussoorie to ISBT and the second from Raipur to Vidhan Sabha; the same stretch is proposed under the NEO-Metro project, and the second consisting of all internal roads.

9.2 VEHICLE REGISTRATION

Dehradun has witnessed a sharp rise in registered vehicles over the last decade. The dependency on private vehicles continues to increase due to the limited availability of a reliable public transport system.

The vehicular composition in Dehradun district shows a similar trend of dominance by two-wheelers, which make up nearly 75–80% of the total registered vehicles. Cars constitute around 15–18% of the vehicle share, while the remaining categories—such as autos, e-rickshaws, goods vehicles, and buses—collectively contribute less than 7%. This skewed composition reflects the growing reliance on personalized modes of transport, driven by rising population, expanding peri-urban areas, and limited availability of organized public transport options. The overwhelming share of two-wheelers places considerable pressure on the city's traffic network, contributing to congestion, parking shortages, and increased travel delays, especially in the central parts of the city. The situation highlights the urgent need for strengthening mass transit systems, improving last-mile connectivity, and promoting sustainable mobility solutions to reduce dependency on private vehicles and ensure smoother traffic flow across the Dehradun Planning Area.

Table 9-1 Vehicle Composition

Sr. No.	Type of Vehicle	Approx. No. of Vehicles*	Share (%)**
1	Two-wheelers (2W)	7 lakh ($\approx 70\%$)	70–75%
2	Cars / Private 4-W	2.8–3.0 lakh ($\approx 20\%$)	20–25%
3	Public Transport Buses / Mini-buses	2,500 (public+private)	0.2–0.3%
4	Three-wheelers / Auto-rickshaws / Maxi-cabs	1.2–1.5 lakh (incl. e-rickshaws)	5–6%
5	Goods Vehicles / Trucks / Commercial 4-W	0.2–0.3 lakh	2–3%
Total (approx.)	—	10–11 lakh (all types registered)	100%

9.3 ROAD ACCIDENTS

Along with traffic congestion, many accidents also happen in the city. Based on the information collected from the traffic police, the number of accidents and blackspots identified are discussed below:

Table 9-2 Accidents in Dehradun

Year	No of accidents	No of deaths	No of injured
2013	296	138	274
2014	314	146	285
2015	343	143	303
2016	295	139	220
2017	342	132	143
Until 2018 March	75	26	53

Source: CMP Report Dehradun

The above data proves that the accident rates are improving every year due to an increase in congestion, traffic, pedestrian and vehicular conflicts, lack of infrastructure etc.

9.4 TRAFFIC CHARACTERISTICS & TRAVEL BEHAVIOUR

The demand for transport infrastructure increases with the urbanisation of cities. People begin to travel longer distances for various purposes. The need for faster and safe modes increases. Inadequacy in public transport in terms of quantity and quality leads to shifting to private vehicles. The city witnessed a 20% increase in vehicle registration from 2016 to 2017, with an additional 10700 vehicles on the road in one year. The vehicle composition and vehicles registered over the years in Dehradun are shown in the pie chart below. It can be seen that private vehicles, two-wheelers and four-wheelers have the highest share in the vehicle composition at almost 95%.

9.4.1 Traffic Volume Characteristics at Outer Cordon

Outer cordon locations are defined as city entry and exit points connecting Dehradun to nearby cities and highways. Major outer cordon points include:

- Haridwar Road (NH-7 entry/exit)
- Saharanpur Road (NH-307)
- Mussoorie Road (towards tourist destinations)
- Raipur–Shimla Bypass
- Rispana Road Corridor

Observations:

- Average daily traffic (ADT) is high at Haridwar and Mussoorie corridors due to commuter and tourist movement.
- Significant proportion of goods vehicles (trucks, small commercial vehicles) enter the city through Saharanpur Road and Raipur–Doiwala corridor.
- Mixed traffic conditions lead to slower movement during peak hours.

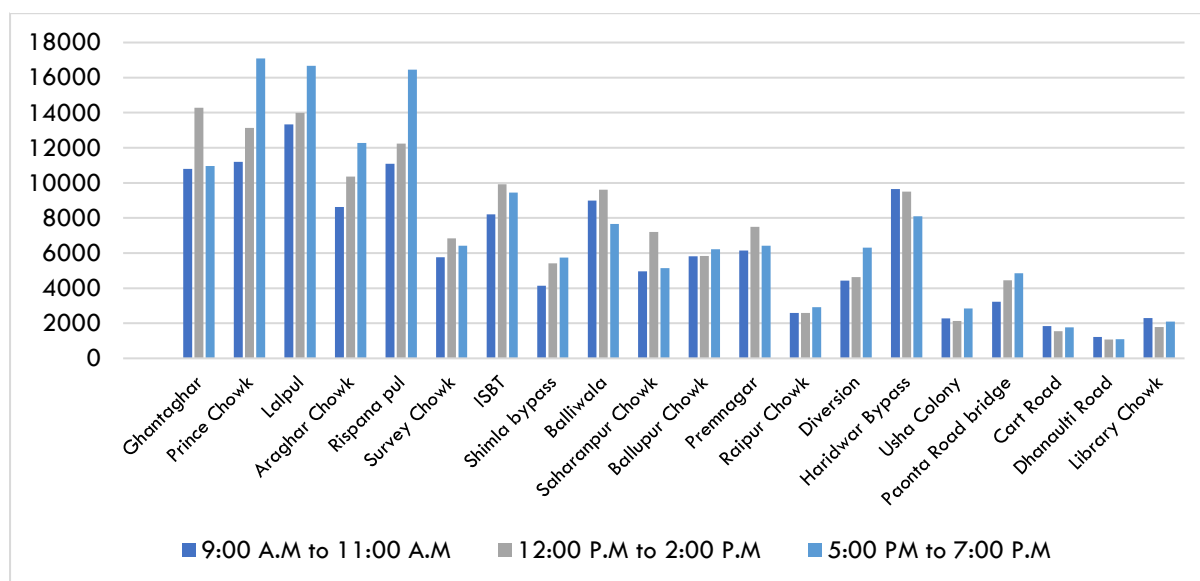
9.4.2 Average Daily Traffic

The Average Daily Traffic (ADT) in Dehradun reflects the growing pressure on the city's road network due to rapid urbanization, increased private vehicle ownership, and the city's role as a regional administrative and educational hub. Major corridors such as Haridwar Road, Rajpur Road, Chakrata Road, Ballupur–ISBT Corridor, and GMS Road experience some of the highest traffic volumes. On certain peak stretches—especially near ISBT, Ballupur Chowk, Survey Chowk, and Clock Tower—the ADT rises significantly due to heavy commercial activities, intercity bus movement, and mixed traffic flow. The predominance of two-wheelers and private cars in the overall vehicle composition contributes to congestion even during non-peak hours. Additionally, inadequate road width in the core city, roadside parking, and encroachments further reduce effective carriageway capacity. The increasing ADT across both arterial and sub-arterial roads highlights the need for strategic traffic management, improved public transport, intersection redesign, and the creation of alternative mobility corridors to ensure smooth and sustainable mobility within the Dehradun Planning Area.

9.4.3 Peak Hour Traffic Characteristics

Traffic volume count were conducted at all major intersections mentioned into the table and figure given below. As a part of our analysis, PCU for the selected intersection has been calculated which is the product of peak hour traffic flow. At last, Volume/ Capacity Ratio is calculated at each selected junction and compared with the design standards. As per V/C Analysis, Kargi Chowk, Aragarh Chowk, and ISBT are the critical junction.

Figure 9-1 PCU in peak hour



Source: Primary survey

9.4.4 Directional Distribution of Traffic

The directional distribution of traffic in Dehradun reveals a clear concentration of movement along the city's major radial corridors, reflecting travel patterns between the core city, suburban areas, and regional destinations. The highest directional traffic flows are observed along **Haridwar Road and Saharanpur Road**, where a significant share of vehicles moves toward the southern and southeastern parts of the city, driven by intercity movement, commercial activity, and connectivity to major highways. Similarly, **Rajpur Road and Mussoorie Road** experience strong northbound traffic during morning hours due to institutional and tourist travel, while the reverse flow intensifies in the evening. **GMS Road and Chakrata Road** show balanced but heavy bidirectional flows owing

to residential expansion and access to administrative and transport nodes such as ISBT. Traffic movement is also influenced by the city's linear valley geography, which channels flows along a north-south axis, creating directional peaks during commuting hours. Overall, the distribution pattern underscores the dominance of arterial roads, the limited number of alternative corridors, and the need for better traffic dispersal mechanisms through ring roads, bypasses, and strengthened public transport connectivity.

9.4.5 Classification of Traffic (Passenger-Goods and Fast-Slow)

Traffic in Dehradun can be broadly classified into **Passenger Traffic** and **Goods Traffic**, and further into **Fast-moving** and **Slow-moving** categories, based on vehicle type, speed characteristics, and functional roles within the transport network. Passenger traffic dominates the road network, consisting primarily of **two-wheelers, cars, auto-rickshaws, e-rickshaws, buses, and shared public transport vehicles**. Two-wheelers and cars form the bulk of the fast-moving passenger category, especially along major arterial corridors such as Haridwar Road, Saharanpur Road, Rajpur Road, and GMS Road. Slow-moving passenger traffic includes e-rickshaws, cycle-rickshaws, and pedestrians, commonly found in dense commercial areas like Paltan Bazaar, Araghar, Dharampur, and near ISBT.

Goods traffic mainly comprises **light commercial vehicles (LCVs), mini-trucks, delivery vans, and heavy goods vehicles**, which operate along key linkage routes connected to industrial and wholesale markets. Fast-moving goods traffic is concentrated on outer corridors such as Saharanpur Road, Shimla Bypass, Haridwar Bypass, and Chakrata Road, which accommodate regional freight movement. Slow-moving goods traffic, usually in the form of small delivery vehicles, handcarts, and cargo e-rickshaws, is more prominent within inner markets and mixed-use neighbourhoods.

9.4.6 V/C Ratio and Level of Service (LOS)

The Volume-to-Capacity (V/C) ratio is a key indicator used to assess the operational efficiency of road network segments in Dehradun. It reflects the relationship between actual traffic volume on a road and the maximum carrying capacity of that road under ideal conditions.

In Dehradun, primary arterial roads such as **Haridwar Road, Saharanpur Road, Shimla Bypass, Rajpur Road, Chakrata Road, GMS Road, and EC Road** exhibit high V/C ratios, particularly during peak hours. On many stretches, the V/C ratio ranges between **0.80–1.00**, indicating **LOS D to E**, characterized by reduced travel speeds, frequent delays, and unstable traffic flow. Near commercial hubs like **Clock Tower, Paltan Bazaar, Dharampur, ISBT Junction, Araghar Chowk, and Survey Chowk**, V/C values often approach or exceed **1.00**, signifying **LOS F**, which implies oversaturated flow and severe congestion.

Secondary roads and collector streets in residential areas generally show moderate traffic loads, with V/C ratios between **0.40–0.70**, corresponding to **LOS B to C**, where traffic flow remains stable though occasionally hindered by intersections, roadside parking, or mixed traffic conditions. However, the presence of slow-moving vehicles, frequent pedestrian activity, and limited carriageway widths in older parts of Dehradun contributes to localized congestion even in areas with relatively lower volume.

9.4.7 Traffic Volume Characteristics at Mid-Block Points

Mid-block traffic counts are taken between intersections. These counts are important for assessing congestion levels and designing roadways to handle traffic flows efficiently, particularly for areas that are not at junctions but still experience significant vehicle volumes.

9.4.8 Peak Hour Traffic Characteristics

Peak Hour Traffic in Dehradun exhibits distinct temporal and directional patterns driven by office timings, school activity, commercial operations, and intercity travel. The city typically experiences two major peak periods: **morning peak between 8:30 AM and 11:00 AM** and **evening peak between 5:00 PM and 8:00 PM**. During these hours, traffic volumes on major arterials such as **Haridwar Road, Saharanpur Road, Rajpur Road, Chakrata Road, GMS Road, Shimla Bypass, and EC Road** rise sharply, often reaching 9–12% of the Average Daily Traffic (ADT) in a single hour. This results in significant delays and reduced travel speeds, especially near major intersections like **ISBT Junction, Clock Tower, Survey Chowk, Ballupur Chowk, and Dharampur Chowk**.

Peak hour movement is dominated by **two-wheelers and cars**, which account for nearly 80–85% of the traffic stream. Institutional travel (schools, coaching centers, universities) contributes heavily to morning peaks, particularly along Rajpur Road, Mussoorie Road, and areas around Prem Nagar and Sudhowala due to educational clusters. Evening peaks witness high shopping and recreational movement toward city markets such as Paltan Bazaar, Tibetan Market, and Rajpur Road commercial stretches.

9.4.9 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 as shown in Table 9-3.

Table 9-3 V/C Ratio

Location	PCU	Type of carriageway	Hierarchy	Design Service Volume (PCU/ hr)	V/C (Max)
Ghantaghar	14282	4-Lane Divided (Two - Way)	Arterial	3600	1.98
Prince Chowk	17090	4-Lane Divided (Two - Way)	Sub - Arterial	2900	2.95
Lalpul	16664	4-Lane Divided (Two - Way)	Sub - Arterial	2900	2.87
Araghar Chowk	12272	4-Lane Divided (Two - Way)	Sub - Arterial	2900	2.12
Rispana pul	16453	4-Lane Divided (Two - Way)	Sub - Arterial	2900	2.84
Survey Chowk	6845	2-Lane (Two - Way)	Sub - Arterial	1200	2.85
ISBT	9916	4-Lane Divided (Two - Way)	Arterial	3600	1.38
Shimla bypass	5739	2-Lane (Two - Way)	Sub - Arterial	1200	2.39
Balliwala	9603	2-Lane (Two - Way)	Sub - Arterial	1200	4.00
Saharanpur Chowk	7208	4-Lane Divided (Two - Way)	Sub - Arterial	2900	1.24
Ballupur Chowk	6211	4-Lane Divided (Two - Way)	Sub - Arterial	2900	1.07
Premnagar	7496	4-Lane Un-Divided	Sub - Arterial	2400	1.56
Raipur Chowk	2917	4-Lane Un-Divided	Sub - Arterial	2400	0.61
Diversion	6305	4-Lane Divided (Two - Way)	Sub - Arterial	2900	1.09
Haridwar Bypass	9639	2-Lane (Two - Way)	Arterial	1500	3.21
Usha Colony	2839	4-Lane Un-Divided	Sub - Arterial	2400	0.59
Paonta Road bridge	4845	4-Lane Un-Divided	Sub - Arterial	2400	1.01
Cart Road	1836	2-Lane (Two - Way)	Sub - Arterial	1200	0.77
Dhanaulti Road	1222	2-Lane (Two - Way) (5.50m)	Collector	900	0.68
Library Chowk	2296	2-Lane (Two - Way)	Sub - Arterial	1200	0.96

Source: Primary survey

Maximum traffic congestion is observed in the Centre and Southern Parts of Dehradun. There is an immense requirement for bye-pass to reduce traffic from the core city area. As well, a major road is required to divert the tourist population for the Mussoorie without entering the city.

9.4.10 Origin Destination Survey at Outer Cordon Locations

The Origin–Destination (O–D) Survey conducted at the outer cordon locations of Dehradun provides critical insights into regional travel behaviour, intercity movement, and the volume of traffic entering and exiting the city. The survey was carried out at major outer-entry points including **Saharanpur Road, Haridwar Road, Shimla Bypass, Rajpur Road (Mussoorie side), Chakrata Road, Premnagar–Selaqui Road, and Doiwala–Rishikesh Road**, which together represent the primary transport gateways to the Dehradun Planning Area.

The O–D data indicates that a significant share of incoming traffic originates from nearby cities such as **Haridwar, Rishikesh, Saharanpur, Roorkee, Mussoorie, Vikasnagar, Paonta Sahib, and Delhi-NCR**. Daily commuters form a major component of this movement, including students, office workers, service personnel, and business travellers. Goods vehicles also constitute a considerable share, particularly along Saharanpur Road, Shimla Bypass, and Chakrata Road, highlighting Dehradun’s role as a logistical and commercial hub for the region.

9.4.11 Travel Behaviour and Reason

The demand for transport infrastructure increases with the urbanisation of cities. People begin to travel longer distances for various purposes. The need for faster and safe modes increases. Inadequacy in public transport in terms of quantity and quality leads to shifting to private vehicles. The city witnessed a 20% increase in vehicle registration from 2016 to 2017, with an additional 10700 vehicles on the road in one year. The vehicle composition and vehicles registered over the years in Dehradun are shown in the pie chart below. It can be seen that private vehicles, two-wheelers and four-wheelers have the highest share in the vehicle composition at almost 95%.

Table 9-4 Trip Distribution of Outer Cordon Passengers by Reason of Travel

Sl. No.	Mode	Work	Educatio n	Busines s	Socia l	Healt h	Retur n Home	Other s	Total
1	Car	31,420	310	1,185	4,720	1,530	18,210	19,450	76,825
2	2–Wheeler	18,150	685	1,640	3,050	340	5,890	5,210	34,965
3	3–Wheeler	6,580	405	460	1,420	82	3,610	1,220	13,777
	Total	56,150	1,400	3,285	9,190	1,952	27,710	25,880	1,25,567
	Compositio n (%)	44.71	1.12	2.62	7.32	1.55	22.06	20.61	100

9.4.12 Nature of Travel

The nature of travel in Dehradun reflects the city’s mixed urban–rural character, strong service-sector economy, and its role as the administrative and educational hub of Uttarakhand. Daily mobility patterns are shaped by work-based commuting, institutional travel to schools and colleges,

inter-city movements, and growing recreational and commercial trips driven by expanding urbanization.

Work-related travel forms the largest share of total trips, particularly from peripheral settlements such as Raipur, Mothrowala, Doiwala, Premnagar, and Sahastradhara Road, where residential growth has intensified. A significant portion of the workforce commutes toward central employment concentrations such as Clock Tower, Rajpur Road, Survey Chowk, Ballupur, and IT Park. This results in heavy peak-hour flows and directional concentration toward the urban core.

Educational travel is also substantial due to the high concentration of schools, colleges, and universities in Dehradun, including institutions along Mussoorie Road, Bidholi-Premnagar, Sudhowala, and Haridwar Bypass. School trips create pronounced morning and afternoon peaks and contribute heavily to slow-moving traffic, especially along corridors with narrow carriageways.

Business and commercial travel is driven by the presence of marketplaces such as Paltan Bazaar, Indira Market, Araghar, and Chakrata Road, attracting shoppers, traders, and service users from both within and outside the city. These trips often cluster in the mid-day period, contributing to congestion in the central commercial district.

Recreational and social trips include movements to leisure areas such as Robber's Cave, Sahastradhara, Mussoorie Road, Forest Research Institute (FRI), and local parks. Weekend traffic toward Mussoorie significantly alters traffic patterns, increasing long-distance and tourist-oriented movements.

Health-related travel is influenced by Dehradun's status as a medical hub, with major hospitals located along key corridors such as Patel Nagar, Balliwala, and Haridwar Road. These trips are dispersed throughout the day and contribute to continuous background traffic.

9.5 EXISTING TERMINAL FACILITIES

9.5.1 Bus Terminus

There are three different hierarchies of bus stops found in Dehradun, which are bus terminals, bus stands and bus stops. About 784 buses have been running in the study area. Dehradun has one terminal which is known as The Dehradun ISBT is located in Majra, Dehradun. The Interstate bus terminal is just at the beginning of the Dehradun entrance. The ISBT is new. Comparatively, it was earlier located near Prince Chowk. Majorly five bus services are available here the Uttarakhand State Road Transport Corporation, Uttar Pradesh Road Transport Corporation, Himachal Pradesh Road Transport Corporation, Punjab Road Transport Corporation and Rajasthan Road transport corporation, which are all Government run buses. There are private buses as well, stranded near them. Apart from that, there are six bus stands and 11 bus stops in the planning area.

Other than bus services, there are other modes of public transport, such as minibuses, electric buses, Vikram, and autorickshaws. Mini-buses do not have defined stoppages, fixed itineraries, or climate control, and most vehicles are poorly maintained from a cleanliness and comfort perspective. Vikram's also operates on the same routes as minibuses and effectively competes, especially for short-distance trips around the city centre. The vehicles are overcrowded most of the time and pose a safety hazard for commuters. The residents of the study area are majorly dependent upon the Vikram, Autos and E – rickshaws.

Figure 9-2 Dehradun ISBT



9.5.2 Bus Routes

As presented in Table 9-5, a total of about 420 buses originate from Dehradun city daily, including services operated by both Uttarakhand Transport Corporation and private operators. In addition, approximately 150 buses arrive from various cities within Uttarakhand, while a significantly higher number—around 380 buses—enter Dehradun from other states on a daily basis. This pattern highlights the strong inter-state and inter-city connectivity of Dehradun and indicates substantial pressure on the ISBT and the adjoining road network. The high volume of bus movements underscores the need for capacity augmentation, improved terminal facilities, and better traffic and operational management to ensure efficient and safe handling of growing passenger demand in the Dehradun city.

Table 9-5 Details of Bus-Routes

S.N.	Bus Service	Number of Buses / Day
1	Dehradun to Different Cities	420
2	From Other Cities to Dehradun (Intra-State)	150
3	From Other Cities to Dehradun (Inter-State)	380

9.6 PUBLIC TRANSPORT

9.6.1 Rail Based Transport

Dehradun city falls under the Northern Railway Zone. Firozpur, Ambala and Moradabad are the Zonal Head Quarters. Dehradun is connected by a portion of the Lashkar-Haridwar-Dehradun section of the Moradabad division of the Northern Railway. Lashkar – Haridwar – Dehradun section is a broad gauge with a single non-electrified line. There are five stations between Haridwar and Dehradun, and those are: Motichur, Raiwala, Kansrao, Doiwala, Harrawala.

Figure 9-4 Dehradun Railway Station



Figure 9-3 Inside view of Railway Station



9.6.2 Intermediate Public Transport (IPT)

Existing IPT Modes

- Auto-rickshaws, Vikram tempos, shared autos, e-rickshaws, taxis, and app-based cab services operate widely.
- IPT serves as the backbone of public mobility for short and medium trips within the city.

Operational Characteristics

- High flexibility of routes and fares.
- IPT provides strong last-mile and point-to-point connectivity where buses do not operate.
- Dominant along market corridors, residential areas, and institutional clusters.

Issues & Challenges

- Overcrowding and route duplication lead to traffic congestion.
- Lack of designated stops or stands results in random parking and unsafe boarding/alighting.
- Variation in fare structure and limited regulatory oversight.
- Growing number of e-rickshaws causing lane-level conflicts on narrow roads.

Improvement Measures

- Formalization of IPT routes and fare structures.
- Development of designated IPT stands, shelters, and pick-up/drop-off bays.
- Introduction of GPS-based monitoring for shared auto services.
- Integration of IPT into multimodal planning with city buses and future rail systems.

9.6.3 Parking

Parking is one of the major issues of Dehradun transportation is parking facilities. As vehicular numbers are increasing rapidly, parking issues are growing simultaneously. On-street parking is taking up ROWs of the roads leading to congestion. Also, many vehicles, especially two-wheelers, are parked on footpaths taking up pedestrian spaces.

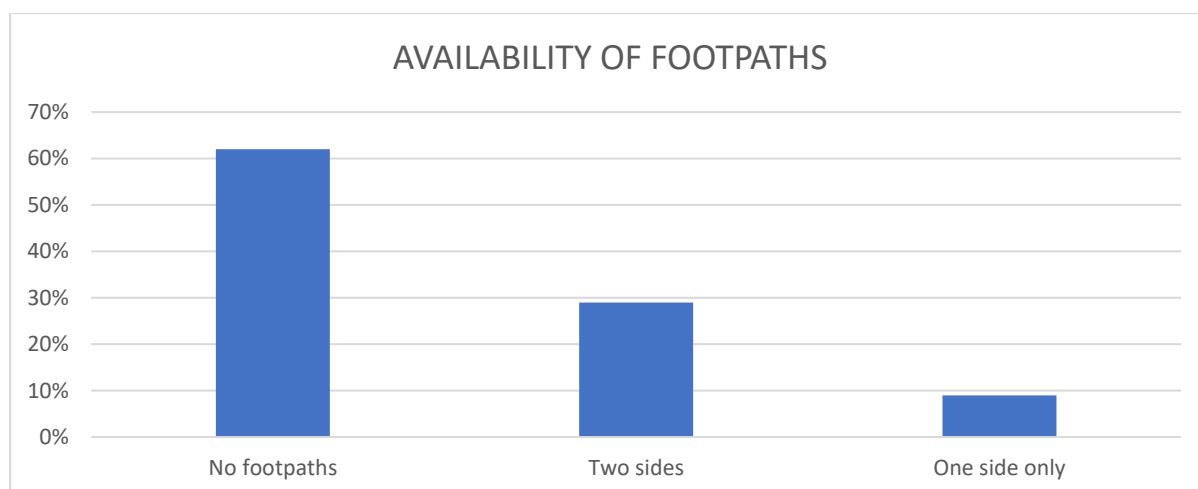
Dehradun experiences a growing demand for well-organized parking infrastructure due to its expanding urban population, commercial activities, institutional presence, and continuous inflow of tourists. Despite this rising demand, the city currently has limited designated parking facilities, many of which are insufficient to manage the increasing volume of vehicles. Major parking locations in Dehradun include the **City Bus Stand Parking**, **Parade Ground Parking**, **Mussoorie Diversion Parking (ISBT area)**, and **Pacific Mall Parking**, each serving different zones of the city. Parade Ground Parking is among the largest available spaces, accommodating a significant number of two-wheelers and four-wheelers and playing a crucial role during events, public gatherings, and peak traffic periods. Similarly, the ISBT-area parking near the Mussoorie diversion provides essential space for buses and private vehicles, especially those arriving from nearby hill towns. Other facilities such as multi-level parking structures near the **Clock Tower–Paltan Bazaar area** and commercial complexes also contribute to meeting the city's parking needs, though these remain inadequate during peak hours. In addition to formal parking sites, several open grounds and roadside spaces are frequently used informally for vehicle parking, adding to traffic congestion and reducing road efficiency. The overall shortfall in structured parking, particularly in commercial hubs, institutional corridors, and high-density residential areas, highlights the necessity for a comprehensive parking management strategy. This includes the development of additional multi-level parking facilities, the designation of dedicated tourist and bus parking areas, and the adoption of smart parking technologies to enhance efficiency, reduce congestion, and support sustainable urban mobility in Dehradun.

9.7 PEDESTRIAN MOVEMENT

Pedestrian trips are generally short and can be observed everywhere in a city. Hence, ideally pedestrian walkways should be provided on all major roads and streets in the city. Proper pedestrian facilities are essential to encouraging and promoting this sense of community and liveability. Also, special consideration for pedestrians should be given near junctions (dangerous intersections), and major activity nodes (like schools, colleges etc.) The smaller local streets/residential streets may not have sufficient width to provide a segregated pedestrian walkway.

But in case of Dehradun, hindrance is found to pedestrian movement because of the absence of foot paths or encroachments done by shop owners or informal activities. It is estimated that a total of 84.9 km of road network in the Dehradun require dedicated pedestrian footpaths. Footpath and cycle tracks are the basic non-motorized transport infrastructure. Their existing conditions, loopholes, future requirement is described into the sub – sections given below:

Figure 9-5 Availability of Footpath



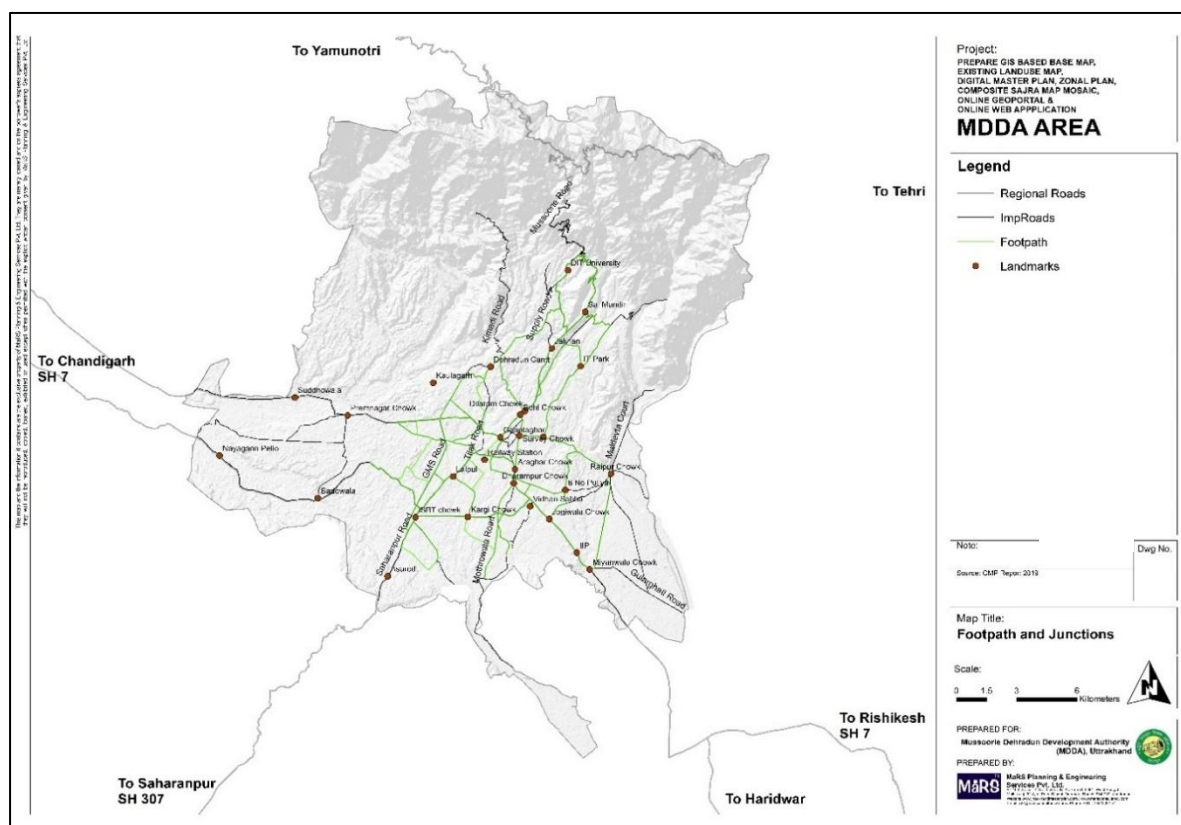
Source: CMP Report- 2019

As per Comprehensive Mobility Plan – 2019 of Dehradun City, NMT infrastructure of city of Dehradun needs significant improvement. Only 29% of the surveyed roads has footpath on both sides and 9% has on one side. While 62% of the surveyed roads lack footpath.

According to the current scenario and town study from Tehsil Chowk to Prince Chowk, the entire sidewalk on Gandhi Road has been encroached upon by roadside vendors. Even shop owners use the space to display their wares. Mechanics can be seen working on the sidewalk all day. Vehicles parked in no-parking zones exacerbate the problem. There is also a need to improve basic infrastructure, such as making access easier for people with special needs, improving street lighting, wider and cleaner level footpaths, reducing and slowing traffic on streets, and removing obstacles from footpaths. Not only that, but most of the footpaths are broken, and to avoid traffic, bikers sometimes use the footpaths. Notably, in a walkability study titled "How walkable is Dehradun?" conducted by the city-based think tank Gati Foundation last year, approximately 60% of Dehradun residents rated the pedestrian infrastructure as poor or very poor.

At places where there are footpaths the traffic signals do not accommodate a pedestrian phase which further increases the wait time of pedestrians at traffic signals. The city needs improvements in terms of pedestrian infrastructure which need to be safe, comfortable and sustainable.

Map 9-2 Availability of Footpath in Dehradun Planning Area



Source: CMP Report- 2019

9.8 PEDESTRIAN AND VEHICULAR TRAFFIC CONFLICT MEASURED BY PV2

Pedestrian–vehicle conflicts occur where pedestrian movement intersects with vehicular flows, particularly at uncontrolled crossings, junctions, school zones, markets, and transit hubs. To

assess the severity of these conflicts, the **PV² method** is widely used in transportation planning. This method helps identify locations requiring immediate pedestrian safety interventions such as signals, raised crossings, or grade separation.

PV² Method – Concept

The PV² formula assesses the risk level based on the interaction of:

- **P = Pedestrian Volume (per hour)**
- **V = Vehicular Volume (per hour)**
- **PV² = P × V²**

The method assumes that conflict severity increases exponentially with increasing vehicular volume. Therefore, even moderate pedestrian volumes may experience high risk if vehicular volumes are high.

9.9 KEY ISSUES

The analysis of Dehradun's urban traffic and transportation system reveals several critical issues requiring immediate attention. Firstly, the existing road network is predominantly linear, lacking functional hierarchy and spatial coherence. Additionally, there is an urgent need to decentralize terminal facilities, especially the bus terminal, which is currently located in a congested area near the railway station, contributing to traffic bottlenecks.

A significant volume of through traffic currently passes through the city core, which highlights the necessity for a dedicated bypass to divert non-local traffic and alleviate urban congestion.

In terms of parking, there is an evident shortage of organized parking spaces in the core city area, which necessitates the identification of additional parking sites and the formulation of a Traffic System Management Plan or Special Circulation Plan to improve vehicle and pedestrian movement.

10 TOURISM AND HERITAGE

The travel and tourism industry has emerged as one of the world's largest and fastest growing industries as stated in report named Tourism highlights 2013, prepared by United Nations World Tourism Organization (UNWTO). In the current scenario, the tourism industry plays an important role in the Indian economy, contributing to the country's socioeconomic development.



Uttarakhand is a natural adventure, cultural,

religious, and wildlife tourism haven. The state is well known for its diverse natural resources and natural beauty, as well as its rich historical and cultural heritage. The snow-capped peaks that surround that state leave a lasting impression on those who visit, connecting their soul to the aesthetic beauty. According to a report published by the Uttarakhand Ministry of Tourism, the following circuits were identified based on tourist priority destinations at state level.

- Dehradun- Mussoorie – Dhanaulti – Kanatal – Rishikesh – Haridwar -Dehradun.
- Adi Badri- Simli -Karnaprayag – Chamoli – Pipalikoti – Vradh Badri – Joshimath – Bhavishya Badri -Yogdhyan Badri – Tapovan- Malari -Niti Village.
- Nanakmatta – Tanakpur- Purnagiri – Champawat – Lohaghat – Abbot Mount -Pithoragarh – Jul Jibi – Madkot – Munsiyari - Shyama devi – Kam kot -Bageshwar -Takula -Almora –

Leading to Vanasur

However, the state is developing steadily in the various economic sectors. Tourism sector is emerging as a key generator of revenue for the state.

Dehradun, the state's capital and one of the state's major tourism destinations, as well as the district headquarters, attracts a large number of tourists each year, with many of them stopping here on their way to Mussoorie and other destinations such as Dhanaulti and Ponta Sahib. The weather in the city is pleasant all year. Even in the summer, it is hot during the day, but it is pleasant for tourists in the morning, evening, and night. The Forest Research Institute, the only institution of its kind in Asia, is located here and is world renowned for its forestry research. In addition, the headquarters of important institutions such as the Oil and Natural Commission, the Survey of India, and the Military Academy are located here. The Gurudwara built by Guru Ram Rai during the reign of Aurangzeb in the town's Dalanwala neighbourhood is a revered religious site. Other noteworthy locations include the Robber's Cave, located approximately 8 kilometres from Dehradun city. The cave is a natural picnic spot surrounded by hills where water disappears from view and reappear a few yards later as a stream. The city has many beautiful rest houses and good hotels where tourists can stay. For many years, it was one of the most well-known educational institutions in northern India. Dehradun is suitable to visit at any time but ideal duration to visit is from march to June and October to December. Summer temperature peaks at 36°C and the minimum temperature is 5°C in winters.

This chapter illustrates the tourism profile of the Dehradun Planning Area along with Issues the potential of the same. Future requirements based on proposed population has also been worked out to get a better clarity about the various infrastructure requirement in the future.

10.1 TOURISM NODES AT DISTRICT LEVEL

Dehradun, as the capital of Uttarakhand, is rich in both natural beauty and cultural heritage. The district is home to various tourism nodes that offer a blend of adventure, spirituality, heritage, and nature. These tourism nodes at the district level are essential for attracting visitors from all around the world. Below are the Tourism Nodes (significant tourism points) at the district level in Dehradun:

1. **Robber's Cave (Guchhupani)**
2. **Sahastradhara**
3. **Forest Research Institute (FRI)**
4. **Tapkeshwar Temple**
5. **Malsi Deer Park**
6. **Rajaji National Park**
7. **Asan Barrage**
8. **Lachhiwala**
9. **Christ Church**

10.2 HERITAGE

Dehradun has a number of historical attractions, such as time-honoured buildings, monuments, palaces, and parks. The Archaeological Survey of India (ASI) lists 42 historical monuments protected by the Dehradun Circle. Six of the 42 monuments are in Dehradun District, including the Inscribed Rock Edict of Asoka (Kalsi), Lakhamandal, Famous Sacred Mahasu Temple, Ancient Site (Jagatgram), Excavated Remains of Ancient Temple Veerbhadra, and Khalanga War Memorial. Besides the Centrally protected monuments, there are 47 monuments protected by the Government of Uttarakhand, but none are in Dehradun.

10.2.1 Built Heritage

Old Rajpur still remains a place that reminds Doonites of their city's history. Boasting of old homes built during the British era, which still stand tall in the area, Old Rajpur has become a hotspot for city's photographers. The Canaught Place at Chakrata road is another remnant of the built heritage in the town where the building façade is a representation of the British architecture. Cultural Heritage.

Dehradun has 'Pahari' culture. Folk dance, music and festivals are a huge part of Uttarakhand culture. The land is blessed with the beauty of the Himalayas and ancient temples. The typical Hindu festivals such as Diwali, Holi and Navratri are celebrated here with much zeal. The ancient temples are a major tourist attraction in Dehradun. People who have moved to metropolitan cities from Dehradun visit these temples for religious reasons as well. Due to their high altitudes, many tourists visit ancient temples for work ship and trekking purposes, such as Bhadraj temple in Dehradun. Dehradun has a significant Hindu population, particularly from the Garhwali community. They are heavily involved in cultural activities such as temple visits, which help to promote cultural tourism on a national and international scale. Dehradun is surrounded by well-known old Hindu temples, the majority of which are dedicated to Lord Shiva and attract visitors of all ages, genders, and religions for spiritual and recreational activities. A large crowd gathers to participate in cultural activities such as pooja and aartis.

10.2.1.1 Fair and Festivals

Due to the city's Hindu dominance and rich Hindu culture, Dehradun's temples host numerous fairs and festivals. These fairs are religious in nature, and people of all ages enjoy the exhibition of rich cultural heritages during these festivals like tribal dances, community inclusion, and traditional musical prayers, which are usually held on the parade ground. These activities not only serve as

a venue for tourist activities, but they also help to foster a sense of social community among the general public. Muslims and Sikhs are other religious communities who contributing to the population, they also celebrate their festivals according to their rituals.

The Dehradun Planning Area hosts the Tapkeshwar Fair, Jhanda Mela, Bissu Mela, Holi, Kumbh (every 12 years), and ArdhKumbh (every six years). This has a substantial impact on the number of tourists who visit Dehradun and the surrounding region or tourist circuits.

10.2.1.2 Handloom and Handicrafts

Because of its proximity to forests, the city is famous for its handcrafted wooden items such as key chains, decorative objects, doors, nameplates, and so on. Local traditional attire and ornaments, mostly worn by Garhwali and Kumaon women, are also visible in the markets. Some of the famous trade fairs that take place in Dehradun are the Handloom Mela, Pashu Mela, Krishi Mela, Tech Fair, Winter Carnival.

10.3 TOURISM SCENARIO

Dehradun is located at an elevation of 2100 feet above sea level in the Shivalik Ranges. The Ganga River flows east and the Yamuna River flows west of Dehradun. A large number of tourists visit the area each year. Dehradun's pleasant weather and natural surroundings have made it a popular tourist destination. It also serves as a gateway to some of the most beautiful destinations in Uttarakhand, including Mussoorie, Nainital, Haridwar, Auli, and Rishikesh.

10.3.1 Tourism at Regional level

Pilgrimage has traditionally been a major component of tourism in Uttarakhand, with the state being home to many significant religious sites representing various faiths. These sacred destinations not only hold deep spiritual significance but also draw millions of devotees and tourists each year. Among the most prominent pilgrimage sites are Badrinath, Kedarnath, Yamunotri, Gangotri, and Haridwar, which form the core of the famed Char Dham Yatra and serve as major religious destinations for Hindus. Other important sites include Hemkund Lokpal, a revered Sikh pilgrimage destination, along with Nanakmatta and Meetha-Reetha Sahib, both of which also hold religious importance for the Sikh community.

10.3.2 Cultural Tourism

The State has a rich and vibrant cultural heritage. There are innumerable local fairs and festivals which are indicative of the immense potential for cultural tourism in the State.

- Jhanda Mela (Dehradun),
- Surkanda Devi Mela (Tehri),
- Magh Mela (Uttarkashi),
- Nanda Devi Mela (Nainital),
- Chaiti Mela (Udham Singh Nagar),
- Purnagiri Mela (Champawat),
- Piran Kaliyar Mela (Haridwar),
- Joljivi Mela (Pithoragarh) and
- Uttarayani Mela (Bageshwar)

10.3.3 Natural Beauty

The Queen of the Hills, Mussoorie, the Lake District of India –

1. Nainital,
2. Kausani,
3. Pauri,
4. Lansdowne,
5. Ranikhet,
6. Almora,
7. Pithoragarh,
8. Munsyari and many more attractive tourist destinations like Binsar are part of the State.

10.3.4 Wildlife Tourism

Along with famous areas the State has several other breath-taking destinations for Wildlife Tourism.

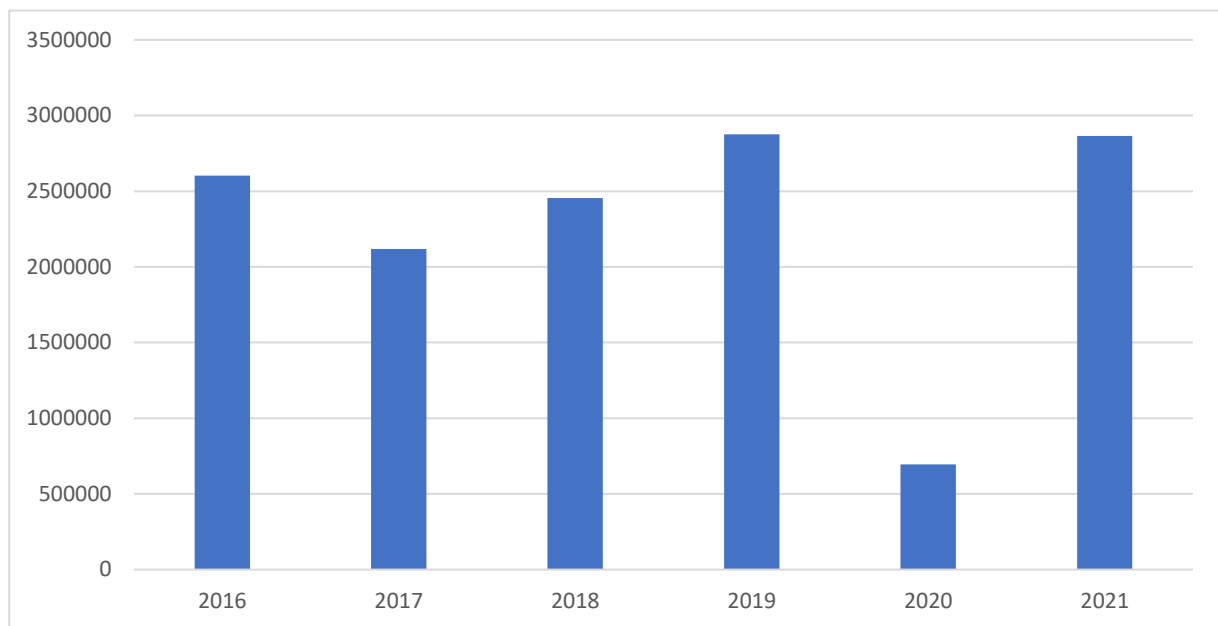
1. Corbett National Park,
2. Rajaji National Park,
3. Govind Pashu Vihar,
4. Asan Barrage,
5. Chilla, and
6. Saptarishi Ashram

10.3.5 Tourist Characteristics and Volume

The Tourism Department organises and manages the journey to the four Shrines (Char Dham) beginning in March and continuing until October-November. Dehradun receives a large number of tourists during the summer season because it serves as a major road corridor connecting cities such as Delhi, Ambala, and Saharanpur to the mighty Himalayas. During the season, bus services and taxis are in high demand, primarily from Dehradun and Rishikesh. The journey is not operational during the winter season due to the Tourism Department's approval. However, proposals for the Char Dham pilgrimage during the monsoon season have now been accepted. The reasons are inconvenience and mismanagement brought on by an uncontrollable influx of tourists during the season. The Tourism Department has planned a journey during the winter season to maximise the potential of nearby areas by inviting as many tourists as possible. This concept aims to increase employment opportunities for seasonal workers while also reducing migration from rural to urban areas.

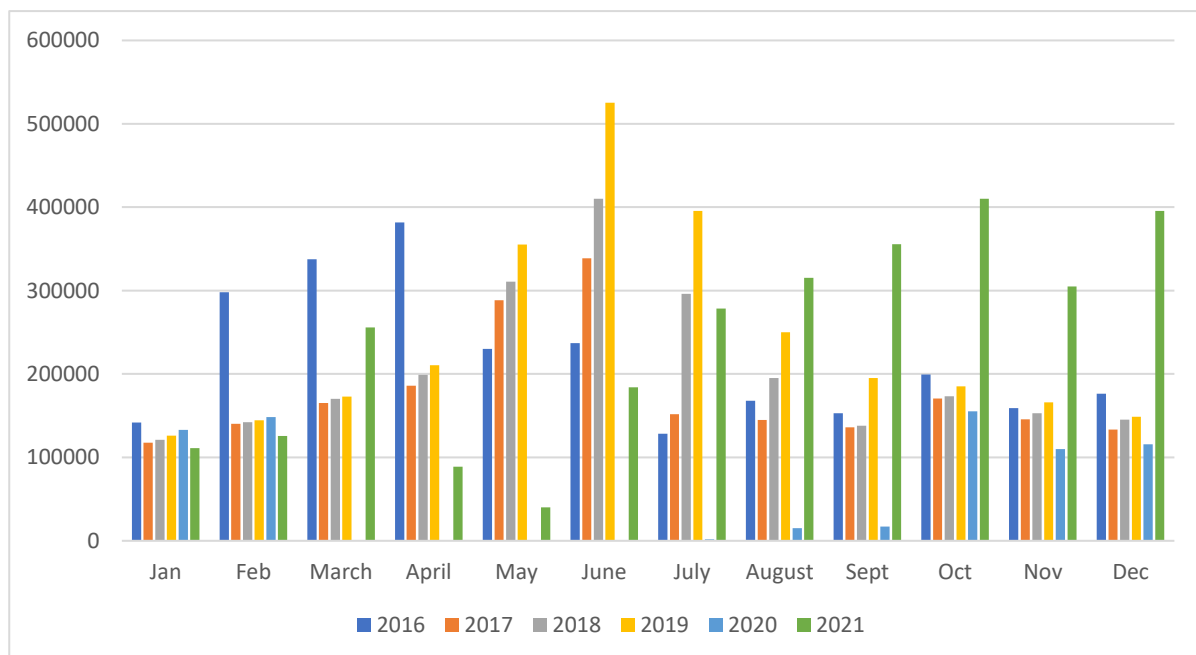
Dehradun experiences significant tourist inflow during the summer, spring, and autumn seasons. This could be due to the Indian population's desire to enjoy the pleasant weather during these three seasons. Although, inflow during the winter is not less because it provides a great joy of Christmas in pleasant weather. The presence of several prestigious institutes in Dehradun heralds the arrival of students and their families who wish to study in those institutes during the admissions period, which is July-August. Students from various states in India and other countries come to pursue academic excellence.

Figure 10-1 Tourist Inflow from 2016 -21 in Dehradun District



The table shows the total number of tourists who arrived in Dehradun District from 2016 to 2021, with 2019 having the highest inflow; according to the Tourism Department, 2019 is a covid period with the highest number of inflows. Outsiders are considered tourists in 2019 who come to their home in Uttarakhand from different states and countries, and their volume was very high; as a result, this year has a major inflow, and later once the lockdown was lifted the people started coming for site visits in Dehradun district.

Figure 10-2 National Tourist Inflow from 2016 -20 in Dehradun District



This graph depicts the number of national tourists visiting the Dehradun district. May, June, July, and August are the most popular months for tourists, as the rest of India experiences hot weather.

Uttarakhand has a mild climate, so tourists visit during these months.

10.3.6 Types of Tourism

Eco-Tourism and Adventure Tourism

In Uttarakhand, Eco-Tourism and Adventure tourism includes activities like Bungee Jumping, Jungle Safari, Mountain Biking, Paragliding, River Rafting, Skiing, Stargazing, Trekking and Water Sports. Most of these activities are performed at places as follows:

- Bungee Jumping - Rishikesh
- **Jungle Safari** - Corbett National Park and Rajaji National Park
- **Mountain Biking** - Chopta, Dehradun and Sattal
- **Paragliding** - Nainital, Mussoorie and Bhimtal
- **River Rafting** - Rishikesh, Devprayag and Corbett National Park
- **Trekking** - Sunderdhunga, Dodital Yamunotri, Kalindi Khal, Binsar, Roopkund, Devi Darshan, Kalsi Lakhamandal, Kedarkantha, Dayara Bugyal, Kedarnath-Vasukital, Auli to Gorson Bugyal, Pindari Glacier, Satopanth Lake, Chopta-Chandrashila, Nag Tibba, A Grand, Ndia's Grandest Meadow, Gangotri, Gaumukh to Tapovan, Kafni Glacier Trek and The Valley of Flowers.
- **Water Sports** - New Tehri and Nainital
- **Skiing** - Auli
- **Stargazing** - Kausani, Devprayag and Bhimtal
- **Yoga and Healing activities**- Patanjali ashram in Haridwar is famous for its medical and healing facilities like Yoga, weight loss journey, ayurvedic treatments, leisure
- **Maldevta Temple**- Dehradun is famous for leisure activities due to the presence of water
- **Asan barrage**- Famous for recreational activities like bird watching, boating etc. and educational purposes like- research.
- **Bhadraj Temple**- Dehradun, Tourists visit for religious purposes as well as for leisure activities like trekking.

10.3.7 Tourist seasonal Flow

Table 10-1 highlights the major events and festivals held in Haridwar throughout the year.

Table 10-1 Major event in Dehradun throughout the year

	Major Events	Months	Pilgrim Days
1	Makar Sankranti	January	01–03 days
2	Maha Shiv Ratri	Feb–March	01–03 days
3	Ram Navmi	March – April	03–10 days
4	Baisakhi	April	01–03 days
5	Buddha Purnima	May	01–03 days
6	Ganga Saptmi	May	01–03 days
7	Ganga Dussehra	June	10 days
8	Kanwar Mela	July	15–30 days
9	Somwati Amavasya	July	01–03 days
10	Janmashtami	August	01–03 days
11	Durga Puja	October	09–12 days
12	Kartik Poornima		

Dehradun experiences a distinct seasonal pattern in tourist inflow, influenced by its pleasant climate, proximity to major hill stations, and religious destinations. The peak tourist season occurs during the **summer months (April–June)** when visitors from across the country travel to Dehradun as a gateway to Mussoorie, Dhanaulti, Chakrata, and the Char Dham pilgrimage circuit. The comfortable temperatures and school vacations further boost tourist arrivals during this period. A secondary peak is observed in the **post-monsoon and early winter months (September–December)**, driven by festive tourism, adventure activities, and the scenic appeal of the Doon Valley. Winter also attracts visitors seeking serene landscapes and mild cold weather compared to harsher Himalayan destinations. The **monsoon season (July–August)** witnesses a decline due to heavy rainfall and landslide risks in surrounding areas, resulting in lower tourist movement. Overall, Dehradun's tourism flow is highly seasonal, with clear peaks during summer and post-monsoon months, placing additional demand on transportation, accommodation, and civic infrastructure during these periods.

10.3.8 Tourist Infrastructure facility

Dehradun offers a well-developed tourism infrastructure that supports its role as both a standalone destination and a major gateway to Mussoorie, Dhanaulti, Rishikesh, Haridwar, and the Char Dham circuit. The city has a wide range of **accommodation facilities**, including luxury hotels, budget lodges, homestays, and government guest houses catering to diverse visitor segments. **Transport infrastructure** is robust, with the Dehradun Inter-State Bus Terminal (ISBT), local bus services, an extensive network of taxis, and Dehradun Airport (Jolly Grant), which provides direct connectivity to major cities in India. The **railway station** further strengthens accessibility with frequent trains to Delhi, Mumbai, Kolkata, and other regions. To support tourist movement and comfort, Dehradun is equipped with amenities such as **tourist information centers**, wayfinding signages, parking facilities, eateries, markets, and emergency services. Popular attractions—like Robber's Cave, Sahastradhara, Tapkeshwar Temple, Malsi Deer Park, and Forest Research Institute (FRI)—have visitor conveniences such as toilets, seating areas, pathways, and ticket

counters. Adventure tourism infrastructure, including trekking trails, camping sites, and nature parks, has also expanded in recent years. Despite these strengths, there is a growing need to upgrade facilities in high-density tourist zones, enhance digital tourism services, and improve last-mile connectivity for a more seamless visitor experience.

According to Uttarakhand Tourism Department, the total number of registered accommodation units in Uttarakhand such as Hotels/ Resorts/ Home stays/ Guest houses in Dehradun are 805 where there are 140 home stays, 663 hotels/resorts/guest houses and 2 government guest houses.

According to the 'Comprehensive Mobility Plan - 2019', the total number of hotels in Dehradun City is around 116, with a total of 5537 rooms. With two people per room, the total number of tourists staying in hotels is 11074. According to projection studies conducted in this plan for 2021, approximately 13,000 tourists visit Dehradun daily. As a result, proper planning and lodging facilities are required in the Dehradun Planning Area.

10.3.9 Issues of Tourism Sector

Despite its growth, Dehradun faces several challenges:

- **Overcrowding:** Popular spots like Mussoorie, Kempty Falls, and Sahastradhara suffer from overcrowding during peak seasons, affecting the quality of the experience.
- **Environmental Impact:** Dehradun's increasing popularity has led to environmental challenges, including waste management, pollution, and damage to natural habitats. The increase in vehicle traffic and infrastructure development threatens the city's natural beauty.
- **Seasonal Dependency:** Dehradun's tourism sector is highly dependent on seasonal peaks, which creates financial instability for local businesses during the off-season.
- **Infrastructure Strain:** Rapid tourism growth sometimes outpaces the development of local infrastructure, leading to issues with traffic congestion, waste management, and water scarcity in certain areas.

10.3.10 Tourist policies and programs

The Government of Uttarakhand has introduced several policies and initiatives to promote tourism in a sustainable and inclusive manner:

- **UK Tourism Development Act, 2001:** Provides the legal framework for planning and regulating tourism activities across the state.
- **Uttarakhand Tourism Policy, 2018:** Aims to promote religious, adventure, wellness, and eco-tourism, while ensuring sustainability and community participation.
- **Health, Rejuvenation & Medical Tourism:** The state supports traditional systems of medicine such as Ayurveda, Yoga, and Naturopathy. Events like the 7-day International Yoga Day celebration have been organized to promote wellness tourism.
- **Eco and Rural Tourism:** Village tourism is encouraged to create livelihood opportunities in rural areas and preserve local culture.
- **"Discover Your Roots" Program:** A proposed initiative under the 2018 policy based on the concept of Gotras (ancestral roots), aiming to attract domestic and international tourists to trace their heritage.
- **Paying Guest Scheme:** Encourages locals to provide accommodation to tourists, especially in remote and culturally rich areas.
- **Deendayal Upadhyay Griha Awaas (Homestay) Policy:** Promotes homestays in lesser-known destinations to boost income for local residents and offer authentic cultural experiences to visitors.

10.4 FUTURE REQUIREMENT

- **Sustainable Tourism** Growing global emphasis on sustainability is driving the tourism sector to adopt eco-friendly practices—reducing carbon emissions, conserving natural resources, and supporting local communities.
- **Personalized Experiences** Future travelers will demand tailored itineraries, recommendations, and services, requiring tourism providers to enhance customization capabilities.
- **Technological Integration** Advancements such as online booking platforms, AI-based recommendations, and virtual reality tours will become essential tools for improving user experience and operational efficiency.
- **Health and Safety** Post-pandemic expectations have elevated hygiene and safety standards. The industry must implement and maintain stringent protocols to reassure travelers.
- **Cultural Authenticity** There is a rising demand for genuine cultural experiences. Tourism strategies must focus on preserving heritage and promoting meaningful engagement with local communities.
- **Innovation and Creativity** Continuous innovation in offerings and experiences will be vital for attracting diverse visitor segments and maintaining a competitive edge.

11 ENVIRONMENT AND NATURAL DISASTERS

11.1 ENVIRONMENT

Dehradun is located at an average elevation of around 450–700 meters above sea level, nestled within the Doon Valley and flanked by two major river systems—the Ganga on the east and the Yamuna on the west. The city is bordered by the Himalayan foothills to the north and the Shivalik ranges to the south, creating a unique ecological transition zone. Geologically, Dehradun lies within the intermontane valley formed due to tectonic activities along the Main Boundary Thrust (MBT) and Main Frontal Thrust (MFT). The region is characterized by a mix of limestone, sandstone, and shale formations, while the Doon gravels—a distinctive geological feature—cover a major part of the valley floor.

The city is traversed by several streams and rivers belonging to the Song, Suswa, Rispana, Bindal, Tons, and Asan river systems, many of which are perennial and play an important role in groundwater recharge. Dehradun also hosts multiple forested zones and biodiversity-rich areas, including parts of the Rajaji National Park and reserved forests that surround the urban settlement. The soil in the region ranges from sandy-loam to silty-loam, making it fertile and suitable for agriculture and horticulture. However, environmental challenges persist in the form of soil erosion along the foothills, degradation of riverbeds, drying of traditional water bodies, and increasing urban pressure on forested areas.

11.1.1 Natural Environment:

11.1.1.1 Rivers

Dehradun is home to several important rivers that flow through its landscape, providing water for agriculture, drinking, and supporting local biodiversity. The region's rivers are crucial in shaping the local hydrology and sustaining ecosystems in both urban and rural settings.

- **Major Rivers:**

1. Yamuna River: A primary river that originates from the Yamunotri Glacier and flows through Dehradun's eastern boundary.
2. Rispana River: A key river that flows through Dehradun city and joins the Yamuna River.
3. Kali River: Flows through the rural areas near Dehradun, contributing to irrigation and local water supply.
4. Song River: Another tributary of the Yamuna, important for its seasonal water flow and role in groundwater recharge.

- **Ecological and Societal Importance:**

1. Water supply for domestic, agricultural, and industrial use.
2. Habitats for aquatic life and migratory birds.
3. Flood regulation and groundwater recharge.

- **Challenges:**

1. Pollution from industrial waste, untreated sewage, and agricultural runoff.
2. Encroachment along riverbanks, reducing habitat quality.

11.1.1.2 Wetlands

Dehradun hosts a diverse network of natural and man-made wetlands that play a crucial role in maintaining the ecological balance of the Doon Valley. These wetlands are primarily associated with the river systems of the Rispana, Bindal, Song, Suswa, Tons, and Asan rivers, along with their numerous tributaries and seasonal streams. The most prominent wetland in the region is the **Asan Conservation Reserve**, a nationally recognized wetland located at the confluence of the Asan and Yamuna rivers. It is designated as a **Ramsar Site** and serves as an important habitat for migratory and resident bird species, supporting rich biodiversity and ecological productivity. Additionally, several small wetlands, marshes, floodplain depressions, and traditional ponds exist

across the planning area, particularly in low-lying regions near the Suswa basin and forest fringes. These wetlands significantly contribute to groundwater recharge, flood regulation, and microclimatic stability.

However, rapid urbanization, encroachment, pollution from untreated wastewater, and sedimentation have led to the degradation of many smaller wetland areas. The channelization of natural streams and loss of floodplain zones pose further threats to these ecological assets. Conservation and restoration of wetlands in Dehradun—through desilting, rejuvenation of natural drainage systems, protection of floodplains, and enforcement of environmental regulations—are essential to sustaining the hydrological and ecological health of the region.

11.1.1.3 Orchards

As per the Department of Horticulture and Food Processing, Dehradun plays an important role in the horticultural landscape of Uttarakhand, contributing significantly to the production of fruits and other high-value crops. The region is particularly known for its thriving litchi orchards—especially the famous Dehradun Litchi—which are a distinctive feature of the district's agricultural identity. In addition to litchis, other major fruits cultivated in Dehradun include mangoes, guavas, pears, peaches, plums, and citrus varieties, along with specialty crops such as amla and walnut in certain pockets. According to the Existing Land Use 2021, a substantial area within the district is under orchard cultivation, reflecting the long-standing agrarian tradition of the Doon Valley.

Aligned with state policies, there is a strong focus on rejuvenating ageing orchards, improving productivity, and adopting modern nursery practices including tissue-culture-based high-quality sapling production. To ensure the long-term protection of orchard zones, it is vital to safeguard the interests of private landowners by providing them with equitable land value within the same development zone. In the Proposed Master Plan 2041, orchard areas have been identified as TDR (Transferable Development Rights) sending zones, enabling landowners to either utilize their development rights in approved receiving areas or transfer them for compensatory value. This mechanism aims to balance urban development with the conservation of Dehradun's rich horticultural heritage.

11.1.1.4 Hydrology- Sub surface aquifers

The sub-surface aquifers of Dehradun form one of the most significant groundwater reserves in the central Himalayan foothill region. Located within the Doon Valley—a tectonic depression between the Shivalik hills and the Lesser Himalayas—the aquifer system is primarily composed of thick alluvial deposits, including sand, gravel, and boulders that provide excellent groundwater storage and percolation capacity. These aquifers are recharged through a combination of rainfall infiltration, seepage from perennial rivers such as the Rispana, Bindal, Tons, and Suswa, and recharge zones along the foothill slopes where numerous springs and seasonal streams originate. The valley's unconfined to semi-confined aquifer layers supply a substantial portion of the city's drinking water through tube wells, hand pumps, and natural springs. However, increasing urbanization, reduced natural recharge due to land cover change, and localized over-extraction have begun affecting groundwater levels in certain pockets. Strengthening recharge interventions, protecting watershed areas, and regulating groundwater withdrawal are therefore essential to ensuring the long-term sustainability of Dehradun's sub-surface aquifers.

11.1.1.5 Forest

The forested landscape surrounding Dehradun forms a crucial ecological boundary for the planning area, with several prominent forest ranges contributing to its natural character. The Motichur Forest Range defines the northwest, north, and northeast limits of the region and is accessible via the Motichur railway station located within the planning area. It connects with the Ranipur Range in the northwest and the Shyampur Range in the east, where the boundary of Rajaji National Park also concludes. To the east, the Shyampur Forest Range runs parallel to the Ganga Canal, with settlements such as Kangadi and Sanajpur Pilli lying along this stretch within the planning area.

The Ranipur Forest Range marks the northern boundary up to the Motichur Range and is situated adjacent to major urban-industrial developments such as SIDCUL and BHEL. Further south, beyond the planning limits, lies the Pathri Forest Range near Dinarpur and Tehri Nagar. Collectively, these forest ranges—along with the northern span of Rajaji National Park extending from the Ranipur to the Shyampur Range—form an essential ecological buffer and biodiversity corridor for Dehradun, reinforcing its environmental significance within the region.

11.1.1.6 Eco sensitive zone

An **eco-sensitive zone (ESZ)** is a designated area around protected forests, wildlife sanctuaries, and national parks that is intended to minimize human impact on the surrounding environment. Dehradun falls within a larger **eco-sensitive region** due to its proximity to important conservation areas like **Rajaji National Park** and **Mussoorie Wildlife Sanctuary**.

Dehradun is surrounded by ecologically rich and fragile areas, many of which fall under designated Eco-Sensitive Zones (ESZs) due to their proximity to protected forests and wildlife habitats. The northern and eastern edges of the district are bordered by the Rajaji National Park ESZ, which extends across the Motichur, Ranipur, and Shyampur forest ranges. These zones function as vital ecological buffers, ensuring regulated development around wildlife habitats and maintaining the continuity of biodiversity corridors, especially those used by elephants and other large mammals. Within the ESZ, activities such as large-scale construction, industrial expansion, and land-use change are strictly regulated to minimize human-induced disturbances. Settlements and agricultural areas located near the ESZ—particularly along the Ganga Canal and forest fringes—are required to follow guidelines that prioritize conservation, low-impact development, and protection of natural water channels. The presence of the ESZ enhances Dehradun's environmental resilience while ensuring that growth and development do not compromise the district's rich natural heritage and ecological balance.

11.2 POLLUTION

Pollution in Dehradun, like in many growing urban centers, is a significant environmental issue. Air pollution, in particular, has become a major concern due to the city's expanding population, increasing vehicular traffic, industrial activities, and other anthropogenic factors. In this section, we will focus on **air pollution** in Dehradun, exploring its major causes and offering policy recommendations to control it while promoting sustainable urban mobility.

11.2.1 Air Pollution

Dehradun city is a growing city with a growing urbanization rate resulting in creating pressure on the resources and air quality of the city. There was a time when Dehradun entered the list of 10 worst cities with an average of 283 (Greenpeace report, Apocalypse 2017). As per the Central Board Quality Index report released in January 2018, Dehradun out of 273 cities, was listed 241. 5 and PH10 levels of Dehradun were much higher than the standards. Dehradun, Kashipur, and Rishikesh are on the list of non-attainment cities under the National Clean Air Programme of India prepared by the National Green Tribunal in the year 2018.

Key Pollutants:

- **Particulate Matter (PM_{2.5} and PM₁₀):** Fine particles that can be inhaled into the lungs, causing respiratory and cardiovascular diseases.
- **Nitrogen Dioxide (NO₂):** Produced by vehicle emissions, this gas can irritate the respiratory system and contribute to the formation of ground-level ozone.
- **Sulfur Dioxide (SO₂):** Emitted by industrial processes, power plants, and vehicles, it can lead to respiratory problems and acid rain.
- **Carbon Monoxide (CO):** A colorless, odorless gas produced by incomplete combustion of fossil fuels in vehicles and industrial facilities.

11.2.1.1 Major Cause of Air Pollution

Air pollution in Dehradun has increased steadily in recent years due to a combination of anthropogenic and geographic factors. The rapid growth of vehicular traffic is the primary contributor, with a rising number of private vehicles and inadequate public transport options leading to high emissions of particulate matter and nitrogen oxides. Construction activities—especially related to urban expansion, road widening, and real estate development—generate substantial dust, which accumulates in the valley-like terrain of the Doon basin. Industrial emissions from peripheral areas, including cement, pharmaceutical, and small-scale manufacturing units, further add to the pollution load. Seasonal biomass burning, such as agricultural residue burning in nearby rural pockets and forest fires during summer, also significantly deteriorate air quality. Additionally, temperature inversion during winter traps pollutants close to the ground, causing smog-like conditions. Collectively, these factors make air pollution a persistent environmental challenge for Dehradun.

11.2.1.2 Policy Recommendations for Air Pollution Control and Sustainable Urban Mobility in Dehradun

To effectively mitigate rising air pollution levels and promote sustainable mobility, Dehradun requires an integrated policy framework that addresses vehicular emissions, urban growth, and environmental management. Priority should be given to strengthening public transport by expanding electric bus fleets, improving last-mile connectivity, and developing dedicated bus lanes to reduce dependence on private vehicles. The promotion of non-motorized transport, including well-designed footpaths, cycling tracks, and pedestrian zones, can significantly reduce short-distance trips. Adoption of strict emission norms for all vehicles, regular pollution checks, and incentives for electric vehicles—including charging infrastructure—are crucial for transitioning to cleaner mobility. Construction activities should be regulated through mandatory dust-control measures, debris-management guidelines, and real-time monitoring. Industrial units in and around Dehradun need to comply with prescribed air quality standards through pollution-control equipment and periodic audits. Urban planning policies must encourage compact, mixed-use development to minimize travel demand, while green buffers, afforestation, and conservation of natural drainage systems should be prioritized to enhance the city's ecological resilience. Together, these strategies can foster a cleaner environment and enable sustainable, low-carbon mobility across Dehradun.

11.2.2 Noise Pollution

In response to Writ Petition (PIL) No.112 of 2015, the High Court of Uttarakhand issued a directive to regulate noise pollution arising particularly from the use of loudspeakers and public address systems. The court recognized that noise pollution had significantly disrupted the daily lives of residents, causing annoyance, discomfort, and serious health impacts—especially affecting students, patients, and the elderly. The order stated that no individual, including religious institutions such as temples, mosques, and gurudwaras, shall use any loudspeaker or public address system without obtaining written permission from the competent authority. This restriction applies even during the daytime. Additionally, as a condition for granting permission, the applicant must submit an undertaking ensuring that the noise level shall not exceed more than 5 decibels (dB[A]) above the ambient noise standard prescribed for the specific area, measured at the boundary of the private premises.

The directive reinforces the need for strict adherence to the Noise Pollution (Regulation and Control) Rules, 2000, and emphasizes the importance of regulatory oversight in preserving public health and tranquility. This ruling is particularly relevant for urban and religious centers like Haridwar, where spiritual gatherings and religious activities are frequent. Implementation of this order is essential to maintain environmental quality and to protect the rights of citizens to a peaceful and healthy living environment.

11.2.2.1 Recommendation

A Silence Zone is defined as an area extending at least 100 meters around sensitive locations such as hospitals, educational institutions, courts, and religious places, or any other area specifically declared as such by the competent authority. Within these zones, strict restrictions on noise levels are imposed to safeguard the well-being and peace of individuals, especially those

who are vulnerable like patients, students, and the elderly. This measure aims to maintain ecological sanctity near wildlife habitats and promote a peaceful atmosphere conducive to meditation, learning, and spiritual practices associated with Ashrams. Enforcement of silence zone regulations in these areas is critical to preserving both the natural environment and the spiritual ambiance of the region.

11.2.3 Water Pollution

Water pollution in Dehradun has emerged as a major environmental concern due to rapid urbanization, population growth, and inadequate wastewater management systems. The city's major rivers and streams—such as the Rispana, Bindal, Suswa, and Tons—are increasingly contaminated by untreated domestic sewage, solid waste dumping, and effluents from unregulated small-scale industries. A significant portion of the sewage generated in urban and peri-urban areas still flows directly into natural drains due to gaps in the sewerage network and outdated treatment infrastructure. Encroachment along riverbanks, reduction in natural recharge zones, and discharge of greywater from households further degrade water quality and ecological health. Additionally, runoff from construction sites, roadside eateries, automobile workshops, and commercial establishments introduces oils, detergents, plastics, and other pollutants into the drainage system. In many rural and peri-urban pockets, improper disposal of septic tank sludge contaminates shallow aquifers, affecting groundwater quality. The cumulative impact of these pressures has led to a decline in the biological and chemical quality of Dehradun's water bodies, posing risks to both public health and the natural environment.

Table 11-1 Key Sources and Impacts of Water Pollution

Category	Description	Key Sources	Impacts
Domestic Sewage	Discharge of untreated wastewater into rivers and drains	Households, unsewered colonies, commercial establishments	Degradation of river water quality (Rispana, Bindal), foul odor, health risks
Industrial Effluents	Wastewater from small-scale and unregulated industries	Auto workshops, food processing units, metal works, dyeing units	Chemical contamination, heavy metals, reduced water quality
Solid Waste Dumping	Garbage disposed directly into riverbeds and drains	Slums, peri-urban areas, road-side dumping	Blocked drains, increased pollution load, breeding of pathogens
Construction Runoff	Flow of sediments and chemicals from construction sites	Building construction, road works	High turbidity, siltation of streams, ecological degradation
Commercial Activities	Waste discharge from eateries, hotels, washing and repair units	Roadside dhabas, restaurants, vehicle washing points	Oils, detergents, food waste entering drains and rivers
Septic Tank Leakage	Improper disposal of septic waste in unserved areas	Rural and peri-urban households	Groundwater contamination, bacteriological pollution
Encroachment on Water Bodies	Illegal construction and narrowing of river channels	Urban and peri-urban riverbanks	Reduced natural flow, increased pollution concentration
Stormwater Runoff	Pollutants carried during rainfall	Roads, markets, transport hubs	Spread of plastics, oils, sediments into rivers

11.2.4 Sewerage Treatment

Dehradun's sewerage treatment system has expanded significantly in recent years, yet it still faces gaps due to rapid urban growth and increasing wastewater generation. The city is served by multiple Sewage Treatment Plants (STPs) located at key sites such as Mothrowala, Chandreshwar Nagar, Salawala, and Dhalipur, which collectively treat a major share of the municipal wastewater. These STPs operate using modern technologies such as Sequential Batch Reactors (SBR) and Activated Sludge Processes (ASP), designed to meet discharge norms and reduce pollution loads entering natural streams. Despite this infrastructure, a substantial portion of the city—particularly peri-urban and newly urbanizing areas—remains unconnected to the sewer network, leading to untreated sewage flowing into the Rispana and Bindal rivers. Aging pipelines, insufficient maintenance of pumping stations, and irregular power supply further hinder efficient operations at some facilities. To ensure sustainable wastewater management, Dehradun requires network expansion, enhanced capacity utilization of existing STPs, improved monitoring systems, and measures to curb direct discharge into water bodies. Strengthening sewerage treatment is essential to protect the city's fragile river ecosystem and maintain urban environmental health.

11.2.4.1 Major Reasons

- Dehradun faces several critical environmental and sanitation challenges that directly impact its rivers—particularly the Rispana, Bindal, and Suswa—and overall public health. A major infrastructural concern is the lack of a fully separated drainage network, resulting in the mixing of stormwater with sewage in several parts of the city. During heavy rainfall or network overload, this combined flow often bypasses treatment systems, leading to the discharge of untreated wastewater into natural streams. This not only reduces the efficiency of existing Sewage Treatment Plants (STPs) but also contributes significantly to river pollution during peak flows.
- Open defecation continues to persist in peri-urban villages and newly developing fringe areas, particularly along the banks of the Rispana and Bindal rivers, adding high levels of faecal contamination to the water bodies. Water quality monitoring has shown varying coliform levels, especially near densely populated settlements and areas experiencing seasonal influxes of migrant labourers or floating urban populations.
- Cremation activities in Dehradun, though smaller in scale compared to major pilgrimage cities, also have an environmental footprint. Traditional cremations along the riverbanks generate ash and particulate emissions, some of which enter local streams and contribute to both air and water pollution. Despite the availability of electric crematoriums, their usage remains limited due to cultural preferences.
- According to the Uttarakhand Pollution Control Board (UPCB), Dehradun hosts a significant number of polluting industrial units, particularly in areas such as Selaqui, Raipur, and along the Dehradun–Haridwar corridor. These include pharmaceutical units, food-processing industries, packaging units, textiles, and small-scale engineering industries. If not properly monitored, these establishments pose risks through effluent discharge and air emissions, contributing to river contamination, groundwater deterioration, and ambient air pollution in the city.

11.2.4.2 Directions Issued:

As per various directives issued by the National Green Tribunal (NGT) in multiple judgments, including those pertaining to the rejuvenation of the Rispana and Bindal rivers, strict environmental compliance measures have been mandated for Dehradun to address pollution and ensure sustainable urban management. One of the key directives focused on controlling industrial pollution, particularly in the Selaqui–Harrawala industrial belt, where industries were instructed to ensure full compliance with effluent treatment norms. The Common Effluent Treatment Plant (CETP) at Selaqui was required to enhance its treatment standards and move toward Zero Liquid Discharge (ZLD) to prevent untreated or partially treated effluents from entering the Suswa and Tons river systems. However, monitoring reports continue to indicate lapses in achieving ZLD standards and inadequate enforcement of effluent recycling and reuse, reflecting systemic challenges in industrial environmental management.

Another major directive involved strengthening the sewage management infrastructure of Dehradun. The NGT emphasized improving the collection efficiency of the wastewater network and ensuring that all municipal sewage is routed to functional STPs before being discharged into natural drains. Dehradun was directed to augment its treatment capacity and operationalize STPs at critical locations such as Mothrowala, Dhalipur, and upcoming plants under the Smart City and AMRUT missions. The goal was to reduce the high pollution load entering the Rispana and Bindal rivers and promote reuse of treated wastewater for landscaping, groundwater recharge, and urban non-potable applications. Despite progress, gaps remain in network connectivity, resulting in untreated sewage frequently reaching natural stormwater channels.

The NGT also issued strict directions regarding solid waste management in Dehradun. The dumping of municipal solid waste at temporary or unauthorized sites—particularly in ecologically sensitive foothill zones and along forest margins—was prohibited due to risks of leachate seepage and habitat degradation. The existing waste disposal site at Sheeshambara was mandated to follow scientific landfill norms, including proper leachate collection, segregation, and biomining of legacy waste. However, proposals in certain planning drafts to expand waste disposal areas within green zones or near forest patches have raised concerns about compliance with NGT orders and the need for more environmentally responsible planning.

11.2.4.3 NGT Guidelines and Criteria for sewerage management

The National Green Tribunal (NGT) has established strict guidelines for the management of sewage in Dehradun to protect the environment, particularly in areas adjoining the River Ganga. According to these directives, any proposal for constructing sewerage infrastructure must first be submitted to the Principal Public Health Engineering Department (PHED) Committee, and its recommendations must be presented to the Tribunal for final approval. No new sewage disposal project can be initiated without the express consent of the Tribunal. Sewage Treatment Plants (STPs) must be designed to effectively treat Fecal Coliform Bacteria and comply with the prescribed discharge standards of 10 mg/litre for Biochemical Oxygen Demand (BOD) and 10 mg/litre for Total Suspended Solids (TSS). Wherever possible, STPs should aim for Zero Liquid Discharge (ZLD), with treated wastewater reused for agriculture, horticulture, or plantation purposes.

All hotels, dharamshalas, and ashrams in Dehradun are mandated to establish their own STPs and are strictly prohibited from discharging untreated sewage directly into the River Ganga. Their effluents must be routed through proper drains connected to STPs. In addition, public amenities such as toilets equipped with bio-digesters must be provided at strategic locations, particularly in colonies and settlements along the river, to prevent open defecation and reduce pollution. These regulations are intended to minimize river contamination and promote sustainable wastewater management in the Dehradun region.

11.2.4.4 Other NGT/High court/ state government orders and recommendations

The National Green Tribunal (NGT) issued several significant directives targeting various environmental issues in Dehradun and surrounding regions.

- The NGT admonished UKPCB for failing to prevent untreated sewage discharge into rivers in Uttarakhand. It directed the Board to impose environmental compensation for past violations and to initiate punitive or even criminal action against officials responsible.
- The tribunal also mandated a **time-bound plan** for 100% sewage treatment across all districts and local bodies in the state — including setting up and operationalising STPs with full household connectivity, to ensure no untreated waste enters the river system.
- On April 15, 2025, the Uttarakhand High Court ordered the removal of debris from the Rispana River and associated seasonal streams in Dehradun district. The court also ordered identification and removal of unauthorised constructions on water bodies in the Vikas Nagar area.

- The bench underscored that continued dumping of debris and construction on water bodies threatens not only environmental health but also increases risk of floods, land erosion and landslides — affecting future generations.
- On September 4, 2024, the NGT ordered a joint committee — including the district magistrate of Dehradun, UKPCB, and a representative from National Mission for Clean Ganga — to investigate alleged illegal sand mining and unauthorized “silt removal” from the bed of the Ganga River at multiple ghats in Rishikesh / Dehradun-district (e.g., Triveni Ghat, Naav Ghat, etc.).

11.2.4.5 Direction Issued by High Court – Groundwater

In June 2018, the Uttarakhand High Court issued important directives concerning the discharge of untreated effluents in certain areas of Dehradun, including residential and institutional zones. Investigations revealed that untreated wastewater and industrial effluents were contaminating groundwater, posing serious health risks, including potential carcinogenic effects. Several industries in and around Dehradun were found to be releasing chemical and industrial waste directly into the environment without proper treatment, leading to significant deterioration of underground water quality. This contamination is particularly concerning as groundwater is widely used for irrigation and domestic purposes. Crops and vegetables irrigated with such polluted water absorb harmful chemicals, rendering them unsafe for consumption. The High Court emphasized the urgent need for strict enforcement of effluent treatment regulations, continuous monitoring of industrial discharges, and robust measures to protect groundwater resources in Dehradun, to safeguard both public health and the environment.

11.3 DISASTER RISK AND VULNERABILITY

11.3.1 Floods

As per the Irrigation Department’s flood assessment, flood lines based on 50-year and 100-year return periods indicate significant flood vulnerability in several parts of Dehradun. Certain localities and surrounding settlements, particularly those along the Rispana, Bindal, and Asan rivers, fall within the flood-affected zones. Low-lying areas such as Raipur, Premnagar, Rajpur, Dalanwala, Balliwala, and parts of Bhawali have been identified as highly susceptible to seasonal flooding and waterlogging, posing risks to life, property, infrastructure, and agricultural activity. Rapid urban development in previously designated recreational or low-density zones has further increased flood vulnerability. A critical concern is that public spaces, including areas used for fairs, festivals, and community gatherings, lie within these flood-prone zones, raising serious challenges for public safety, urban planning, and disaster management during peak rainfall periods.

11.3.2 Earthquakes

Uttarakhand state is covered in 2 zones i.e., Zone IV and Zone V. The region has experienced many small and large earthquakes throughout years with their epicentres located within the Himalayan region.

Dehradun is located in the seismically active zone of the Himalayan region and falls under **Seismic Zone IV** as per the Bureau of Indian Standards (BIS), indicating a high risk of earthquakes. The city is vulnerable to both moderate and major seismic events due to tectonic activity along the Himalayan fault lines. Past seismic history shows that Uttarakhand, including the Doon Valley, has experienced significant tremors that have caused structural damage and loss of life. Factors such as hilly terrain, unstable slopes, and densely populated urban settlements increase the city’s susceptibility to earthquake-related hazards, including landslides and building collapses. Many residential and commercial structures in older parts of the city do not fully comply with earthquake-resistant design norms, further exacerbating the risk. To mitigate earthquake impacts, there is a need for strict enforcement of seismic-resistant building codes, retrofitting of vulnerable structures,

public awareness programs, and integration of earthquake risk assessment into urban planning and disaster management strategies.

11.3.3 Landslides

Dehradun, situated in the Doon Valley at the foothills of the Himalayas, is prone to landslides due to its hilly terrain, steep slopes, and fragile geological formations. Heavy monsoon rainfall, unplanned urbanization, road construction, deforestation, and excavation on slopes exacerbate the risk of slope failures and landslides. Areas on the outskirts of the city, particularly along Mussoorie Road, Rajpur, Vikasnagar, and Sahaspur, are highly vulnerable to such events. Landslides in these zones can damage infrastructure, block roads, disrupt transportation, and threaten lives and property. Moreover, soil erosion and destabilization of slopes contribute to secondary hazards, including flash floods and sedimentation in rivers. To reduce landslide risk, it is essential to implement slope stabilization measures, regulate construction activities in vulnerable zones, maintain proper drainage systems, and integrate landslide hazard assessment into urban planning and disaster management strategies in Dehradun.

11.4 ENVIRONMENTAL VULNERABILITY

11.4.1 Fires and Stampede

Dehradun faces recurring risks from both fires and stampedes, particularly in densely populated urban areas, marketplaces, educational institutions, and public gathering spots. Fire incidents are often triggered by short-circuits, improper handling of flammable materials, lack of fire safety infrastructure, and encroachments that restrict access to emergency services. Older residential colonies and congested commercial areas are particularly vulnerable, with limited escape routes and inadequate firefighting facilities exacerbating potential damage. Stampede risks arise during large public events, religious gatherings, and festivals, especially at crowded temples, fairgrounds, and pilgrimage sites such as the Tapkeshwar Temple or areas along the Rispana River. In such cases, poor crowd management, narrow passageways, and insufficient emergency preparedness can lead to severe casualties. To mitigate these risks, it is crucial to implement strict fire safety norms, ensure functioning firefighting equipment, regulate building occupancy, develop evacuation plans, train local authorities and community volunteers, and conduct awareness programs for safe crowd management during public events.

11.4.2 Mining

Dehradun, located in the ecologically sensitive Doon Valley, faces environmental and social risks from both legal and illegal mining activities. Sand, gravel, and minor stone extraction from rivers such as Rispana, Bindal, and their tributaries have been reported in peri-urban areas, often exceeding permissible limits and violating environmental norms. Such unregulated mining leads to riverbank erosion, lowering of water tables, and sedimentation, which can aggravate flooding and damage aquatic ecosystems. Quarrying activities on hilly slopes around Rajpur, Mussoorie Road, and Sahaspur contribute to slope destabilization, increasing the risk of landslides and soil erosion. Moreover, mining operations often generate dust and noise pollution, adversely affecting local communities and biodiversity. Despite regulatory oversight by the Uttarakhand State Pollution Control Board (UKPCB) and the Mines and Geology Department, enforcement challenges persist, with illegal operations continuing in several areas. Effective mitigation requires strict monitoring of mining permits, enforcement of sustainable extraction practices, restoration of mined areas, and community awareness programs to balance developmental needs with environmental protection in Dehradun.

11.4.2.1 NGT Ordinance 2 - against illegal sand mining along the banks of River Yamuna & Tons in Dehradun

- Description of the NGT ordinances

The National Green Tribunal (NGT) has issued several ordinances and directives to regulate environmental protection and sustainable development in Dehradun. These ordinances focus on preventing pollution, conserving water resources, and safeguarding ecologically sensitive areas. Key areas covered include the management of sewage and wastewater, regulation of industrial effluents, control of illegal construction and encroachment along riverbanks, and prohibition of unauthorized mining and quarrying activities. In line with these ordinances, all new sewage treatment plants (STPs) must adhere to strict standards for Biochemical Oxygen Demand (BOD), Total Suspended Solids (TSS), and Fecal Coliform bacteria, with Zero Liquid Discharge (ZLD) strongly encouraged. The ordinances also require that hotels, dharamshalas, and ashrams establish their own STPs and route treated effluents through proper drainage systems to prevent contamination of rivers like the Rispana and Bindal. Additionally, public amenities such as toilets with bio-digesters are mandated in colonies and settlements along rivers to minimize open defecation. The NGT has also emphasized the need for continuous monitoring, timely reporting of violations, and strict enforcement of environmental regulations to protect Dehradun's groundwater, rivers, forests, and urban ecosystem.

- Directions Issued:

In Dehradun, the National Green Tribunal (NGT) has issued strict directives to regulate riverbed mining and ensure environmental sustainability along rivers such as the Rispana, Bindal, and their tributaries. These directives include the following:

- I. **Regulated Supervision:** Riverbed mining must be conducted under strict monitoring by relevant authorities to prevent environmental degradation and illegal exploitation.
- II. **Prohibition of Mechanized Equipment:** The use of heavy machinery, including JCBs or excavators, is strictly prohibited within riverbeds to minimize ecological disturbance and protect natural river flow, aquatic habitats, and riparian ecosystems.
- III. **Ban on Mechanical Extraction Methods:** Techniques such as suction pumps or similar mechanical processes to extract sand, gravel, or other minerals from the riverbed are not permitted, preventing unscientific depletion of resources.
- IV. **Seasonal Compliance:** Mining activities must follow a regulated seasonal schedule, with extraction allowed only during approved mining periods. Any mining outside the designated season is considered illegal.

11.4.3 Human and Nature Conflict Zone

Eco-Sensitive Zones (ESZ) are designated areas notified by the Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India, around national parks and wildlife sanctuaries. These zones serve as buffer or transition areas between regions of high protection (such as core zones of sanctuaries or national parks) and areas of lesser protection. The primary objective of establishing ESZs is to act as shock absorbers for protected areas by regulating and managing activities around them, thereby reducing the adverse impact of human intervention on the core ecosystems (MoEFCC, 2011).

As per the Wildlife Conservation Strategy of 2002, the width of an Eco-Sensitive Zone can extend up to 10 km around a protected area. However, the actual width of the ESZ is not uniform and varies from state to state and site to site, based on the ecological, topographical, and socio-economic factors of the surrounding landscape. The activities permitted, regulated, or prohibited within these zones are determined through site-specific assessments to ensure the conservation of biodiversity and ecological balance while considering the needs of local communities.

Major Conflict Zones:

- **Elephant corridors:** Doiwala–Raiwala, Lachhiwala–Mohand
- **Leopard conflict areas:** Malsi, Rajpur, Mussoorie foothills, Sahastradhara

- **Monkey-human interface:** Urban markets, temples, tourist areas
- **Agricultural conflict zones:** Vikasnagar–Kalsi belt

11.4.4 Conservation of River Yamuna & Tons as per NGT Guideline

The National Green Tribunal (NGT) has issued stringent directives to safeguard rivers in Dehradun—particularly the Rispana, Bindal, Asan, and Song rivers—from unregulated development and environmental degradation. As per the NGT order dated 26th August 2013, **no permanent construction is permitted within 200 meters** from the bank of any flowing river in the region. This restriction was further reinforced in 2017, when the NGT specifically **banned all construction activities within 100 meters of river edges**, requiring all municipal bodies, development authorities, and panchayats in Dehradun to refrain from issuing approvals for houses, commercial buildings, hotels, or any other structures within 200 meters of the river without prior permission from the Tribunal.

Under these guidelines, the area extending **200 meters from the middle of the river** is designated as an **“Eco-Sensitive and Prohibited Area”**, where no permanent or temporary activity—including recreational camping—is allowed. The zone between **200 and 500 meters** from the riverbank is treated as a **regulated zone**, where development is permitted only under strict environmental controls. Additionally, floodplain demarcation must be carried out using the **1-in-25-year flood standard**, ensuring scientific zoning and minimizing flood-related risks. Any open space between the water body’s edge and the nearest parallel road—particularly where this distance is less than 9 meters—must also be preserved as a mandatory NGT buffer zone.

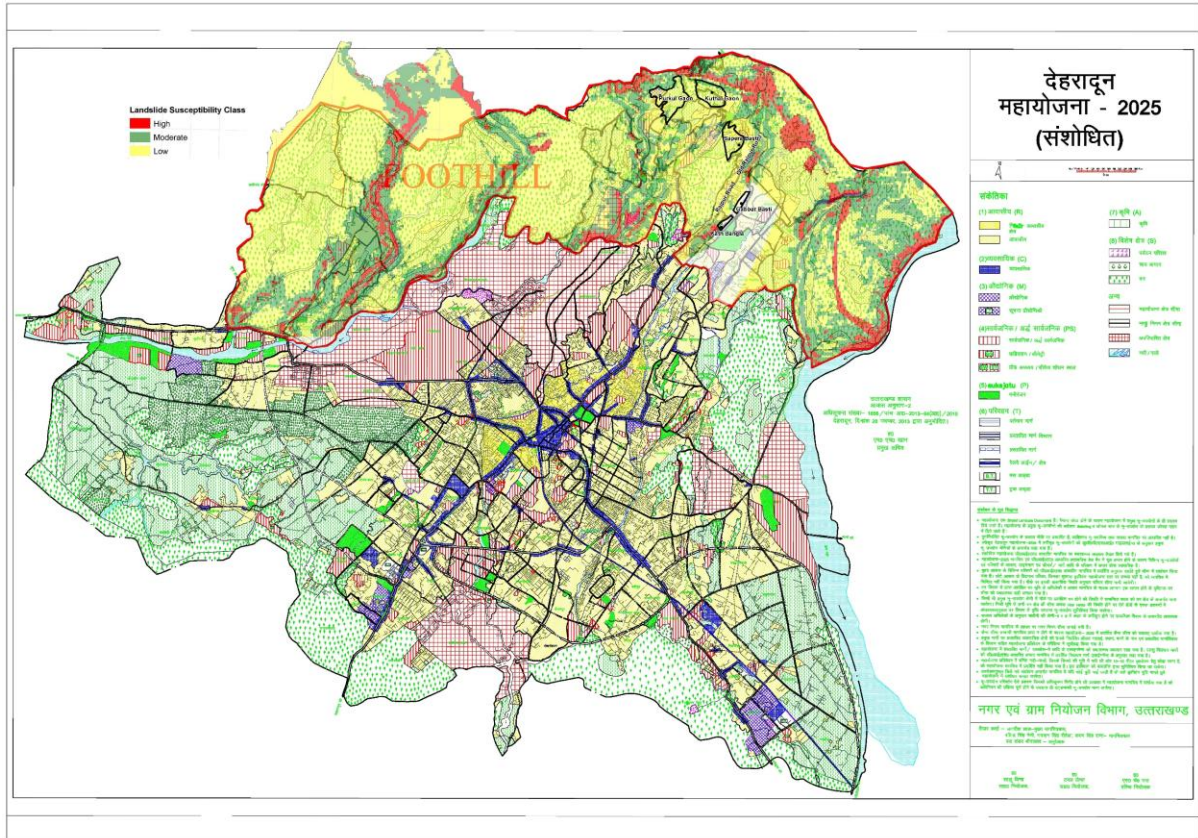
- **Penalty Provision by NGT**

In line with the directives of the National Green Tribunal (NGT) to strengthen environmental compliance and prevent pollution, authorities such as the Nagar Nigam and the Uttarakhand Pollution Control Board (UKPCB) enforce strict penalty provisions in Dehradun. For improper disposal of bio-medical waste—such as dumping on open land, in drains, or into nearby water bodies—healthcare facilities are liable to pay an environmental compensation of **₹20,000 per violation**. Similarly, commercial establishments including **hotels, lodges, dharamshalas, and ashrams** that discharge untreated sewage or wastewater into natural drainage channels or rivers are subject to a fine of **₹5,000 per day** until compliance is achieved. These penalty mechanisms, aligned with NGT norms, are intended to deter environmentally damaging practices, promote accountability among institutions, and safeguard Dehradun’s ecological health.

12 DEVIATION FROM PREVIOUS MASTER PLAN

12.1 PROPOSED LAND USE MAP OF 2025

Map 12-1 Proposed Landuse Map of 2025



Source: Dehradun Master Plan 2025

12.2 CURRENT DEVIATION IN LAND USE AS PER PREVIOUS MASTER PLAN 2025

The total future Land Use of Dehradun Planning Area is proposed as per the URDPFI guidelines and existing on ground analysis. Out of the total Dehradun Planning Area, 58.63% is allocated to residential land use and 9.37% is allocated to Commercial Land use. Both the land uses are slightly lower than the URDPFI Guidelines due to the additional provision on mixed land Use comprising residential as well as the commercial use. With this addition, the balance to cover the desired percentage is covered. Further the Public Semi-Public Accounts for 9.45% of the total planning area which is higher than the URDPFI guidelines. The major reason behind is Dehradun being the State capital consists many government offices and institutions. Further, Dehradun transportation accounts for 11.19% of the total proposed area including existing as well as additional land required for proposed road network. Recreational area is proposed 6.00% as per URDPFI Standards comprising parks, green belts, playgrounds, multipurpose parks etc.

The Land Use distribution of Dehradun Planning area for the year 2041 is given on the table 12-1.

Table 12-1 Deviation from Master Plan 2025

Land uses	Master plan 2025 (In hac)	In %	ELU 2021 (In Hac)	In %
CLASSIFIED LAND USE				
Residential	5306.55	14.79	4739.5	12.52
Commercial	431	1.20	382.2	1.00
Industrial	281	0.78	95.8	0.25
Mixed Land Use			1639.7	4.33
Public Semi Public	3041.1	8.47	4068.7	10.75
Recreational	1007.89	2.81	137.8	0.36
Traffic and Transportation	1526.8	4.25	1648.3	4.35
Green Area	13539.77	37.74	12996.9	34.34
UNCLASSIFIED LAND USE				
Water Bodies	1183.81	3.300534583	1221.6	3.22
Agriculture	6416.50	17.89	6334.4	16.73
Defence Area	3132.8	8.73443774		
Vacant Land			3871.7	10.23
Waste Land			707	1.86
TOTAL	35867.22	100	37843.6	100

12.2.1 Residential

Based on the Table 12-1 in the master plan 2025, 14.79% of the total area is proposed for residential purposes, whereas in 2021, only 12.52% of the area is developed, and the remaining 2.27% diverted to another use.

12.2.2 Commercial

commercial purpose only 1.01% of the 1.20% area has been developed thus, the remaining allocated land is converted into mixed land use along the city's major roads.

12.2.3 Industrial

In the master plan 2025, 0.78% is allocated for manufacturing purposes, with the goal of maintaining ecological development with industrial growth in the city, out of which only 0.25% is developed as per the master plan, with the remaining land falling primarily under mixed land uses.

12.2.4 Public & Semi-Public

According to the existing land use plan, the area is more under public semi-public use than the area allocated in Master Plan 2025, which is 8.11% in Master Plan 2025 and 10.70% in existing use.

12.2.5 Transportation

As stated in the master plan 2025, the area allocated for transportation activities is 4.26%, and currently 4.36% of the area is under traffic and transportation services, indicating that the city has improved connectivity and services over the last decade.

12.2.6 Recreational

Only 0.36% of the 2.81% area is allocated for recreational activities, with the remaining land is diverted to other uses such as green space and mixed land use.

12.2.7 Agricultural

Agriculture area has also decreased from 17.89% to 16.74% as a result of rapid population growth and urbanisation and increase in built in the city.

12.2.8 Special Areas

The cantonment area is considered in special area of Dehradun. The total area of Defence area is 8.73%.

13 SWOT ANALYSIS

SWOT analysis is a powerful and straightforward tool that provides a foundational model for guiding development strategies. This technique helps shape the development agenda by maximizing existing strengths and opportunities while minimizing the effects of weaknesses and threats.

Table 13-1 SWOT Analysis

STRENGTHS	WEAKNESS
- Being the gateway of the State and capital city, Dehradun has good connectivity with all-weather roads to other states and cities. - City is one of the most famous tourist attractions creating a heavy inflow of all-season tourists leading to revenue generation and employment opportunities. - Dehradun is one of the prominent educational hubs with major institutes which attracts students from other states. - Dehradun literacy rate is higher than the average literacy rate in India hence, more technical advancement strategies can be proposed. - Dehradun city is rich with natural resources like rivers, forests, green areas and foothills of the Himalayas, creating an aesthetic and pleasing environment for tourists and citizens. - The city has an excellent natural drainage network, which ensures the city is never flooded hence creating lesser disruptions during monsoon.	- Dehradun planning area has the Himalayas to its north, creating geographical barriers for further expansion or development. - Infrastructure facilities, including water supply, solid waste management, sewerage and sanitation, are insufficient for the whole city. - Slums encroachment near the river basins disturbing the water ecology of the city. These encroachments create social issues for the slum population as well as for using river water which is not up to the desired Ph level - There is a shortage of housing for the existing population as well as students who migrated for educational purposes; - The family size of Dehradun housing is 4.5, whereas the average housing size should be 4. - There are insufficient public transport facilities in the city, leading to more private vehicle usage, affecting the environment. - There is a lack of parking spaces for residents and tourists, and this causes traffic jams during peak seasons and increases accidents.

OPPORTUNITIES	THREATS
- City has a good environment due to its closure to mountains which can be a good asset for future development activities like the creation of cycle and walking pathways. - There is a scope for education and medical tourism for economic enhancement. And revenue generation. - The city has very low-density urban development, and this can be optimised using the TOD-based development - City has planned commercial and mixed land use areas leading to the potential for MRTS with the concept of Transit Oriented Development. - Potential of TOD implementation will lead to the promotion of public transport as well as non-motorised vehicles. This will also create a healthy socio-economic environment among the users, including cheaper means of transportation, safety, a sense of inclusion etc. - Natural drainage in the city due to the topography provides an opportunity to trap water and create a successful storm waste management system. The process will also help to cover the demand-supply gap in future population - Dehradun city has a good number of famous temples and has the potential to invite religious tourists all across the world. - With the growing tourism potential, the city also has the potential to start intra-city buses, especially for tourism activities. - Dehradun already has mixed land use development in the core areas; future planned mixed land use will help to reduce pressure on the planning area. - Dehradun city has forest and agricultural activities which can create opportunities for forest-based and food processing industries.	- There is a threat to the ecological balance in the town causing pollution, reducing green and open areas, traffic issues etc due to the city expansion in an unplanned manner. - The core area of the planning area has lesser green spaces and open areas creating environmental and social issues for the public. - Presence of slum pockets near river bodies causes environmental issues like soil erosion and water degradation because of open defecation or cleaning activities. The usage of river water by the slum population affects health due to water quality not being up to the average Ph level. To overcome these issues buffer has to be created among the river basin, and provision for basic infrastructure is required for the slums. - The natural drainage is being disturbed by the unplanned development in some areas. - Economic activities are located in some particular areas, increasing the travel time of residents. - The city core area has mixed land use, causing congestion issues like on-street parking on footpaths, traffic, and lack of pedestrian infrastructure. - There are no cycle tracks or any other activities related to walking, forcing the public to through motorised vehicles, which causes pollution as well as increases the chances of vehicular pedestrian conflicts.