

GIS Based Master Plan for **Pattan Town,** Jammu & Kashmir **2047**

Inception Report

Submitted To:



Housing and Urban
Development
Department (HUDD),
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State Mission
Directorate

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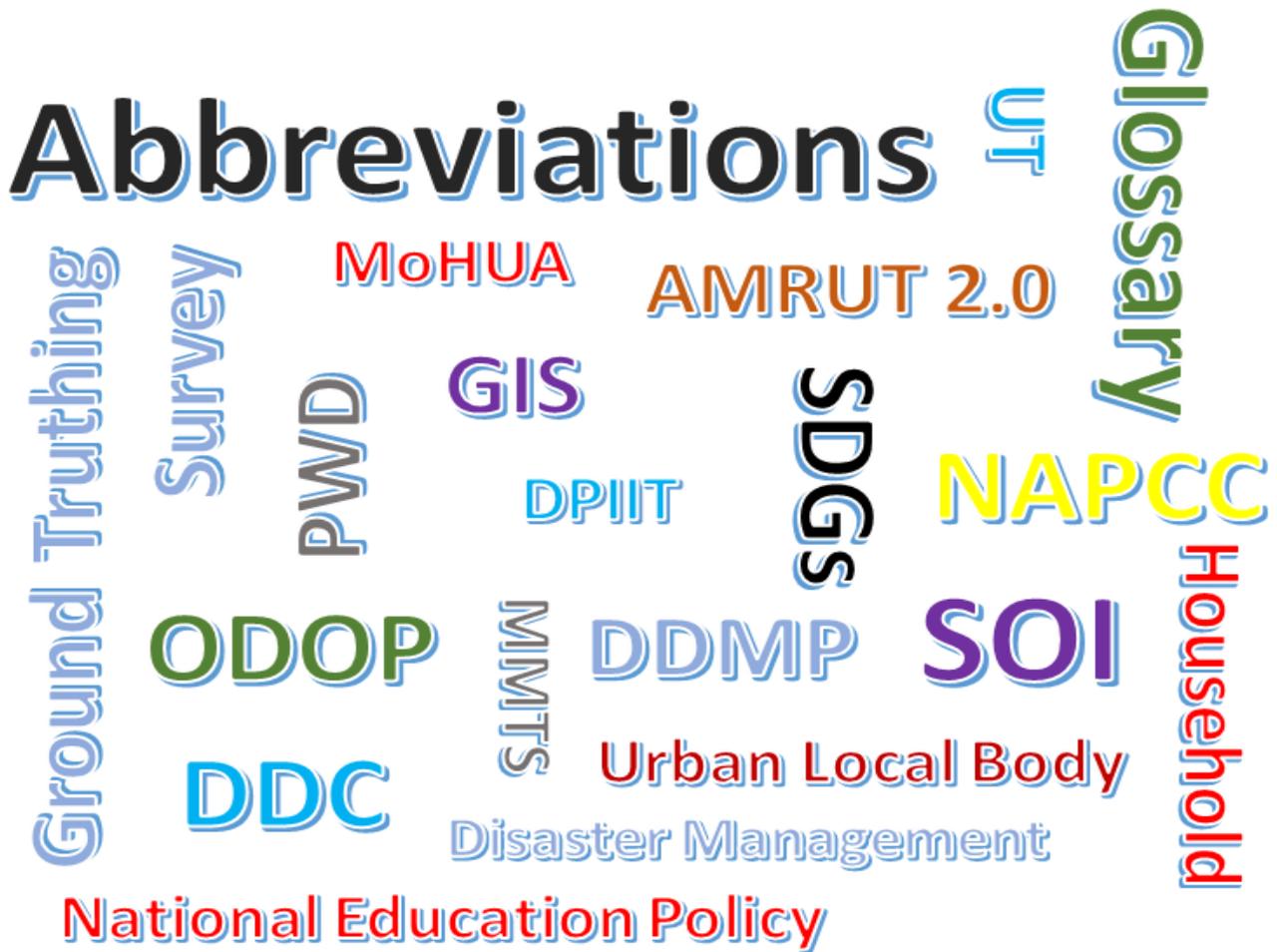
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Source: Author

1 Abbreviations & Glossary

AMRUT	Atal Mission for Rejuvenation and Urban Transformation
MoHUA	Ministry of Housing and Urban Affairs
GIS	Geographic Information System
NAPCC	National Action Plan on Climate Change
HRIDAY	Heritage City Development and Augmentation Yojana
SDG	Sustainable Development Goals
SAPCC	State Action Plan on Climate Change
SOI	Survey of India
ULB	Urban Local Body
MoRTH	Ministry of Road Transport & Highways
PWD	Public Works Department
AADT	Annual Average Daily Traffic
MSW	Municipal Solid Waste
UBRL	Udhampur-Baramulla Rail Link
EIA	Environmental Impact Assessment

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1.1 AMRUT 2.0 terms

AMRUT 2.0 mandates specific components for GIS-based master plan preparation to ensure holistic, evidence-based urban development. These compulsory elements include digital base maps, sectoral analysis, stakeholder surveys, and structured planning outputs.

Mandatory Components

- **Geo-referenced Base Map Creation:** Development of digital base maps at defined scales, integrating satellite imagery, GPS survey, and ground truthing for spatial accuracy.
- **Urban Database:** Compilation of thematic maps and urban spatial databases detailing land use, infrastructure, population, utilities, and environmental assets.
- **Sector-wise Data Analysis:** Detailed analysis of city sectors (water supply, sanitation, transport, green spaces, economy, social infrastructure, etc.) based on standardized GIS layers and attribute data.
- **Demand Assessment & Issue Identification:** Identification of development issues, assessment of future requirements, and projection of urban growth and infrastructure needs.
- **Stakeholder Consultation & Social Surveys:** Use of mobile apps and field surveys to collect social and economic data; public participation integrated into planning proposals.
- **Draft and Final Master Plan:** Preparation of draft plans with proposed land uses, development strategies, utility networks, and regulatory controls; final plans submitted after public feedback and government review.
- **Capacity Building:** Training programs for administrators, planners, and technicians in GIS technology, master plan formulation, and data management.
- **Monitoring and Implementation:** Mechanisms for ongoing review, transparent implementation, and linkage to project funding and reforms.

1.2 GIS and planning-related terms

These terms provide foundational understanding for comprehending AMRUT 2.0 objectives and GIS-based urban master planning.

- **GIS:** Geographic Information System
A computer-based system for capturing, analysing, and visualizing spatial and geographic data for planning and management.
- **Georeferencing:** The process of aligning spatial data (maps, images) to real-world coordinates for accurate analysis.

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- **Thematic Layers:** Map layers representing specific themes such as land use, infrastructure, hydrology used to analyse and plan urban spaces.
- **Spatial Analysis:** Techniques applied to GIS data to understand spatial relationships and patterns, aiding decision-making in urban planning.
- **Cadastral Data:** Detailed records and maps of land parcels including boundaries, ownership, and usage.
- **Digitisation:** Conversion of analogue data (paper maps, plans) into digital format compatible with GIS.
- **Remote Sensing:** Acquisition of information about the Earth's surface using satellite or aerial imagery for mapping and monitoring.
- **Base Map:** The foundational map layer showing key geographic features upon which additional thematic layers are added.
- **Ground Truthing:** Verifying GIS or remotely sensed data on site to ensure accuracy and validity.



Source: Travel The Himalayas

2. Executive Summary

2 Executive Summary

The preparation of a comprehensive GIS-based Master Plan for Pattan town represents a significant milestone in sustainable urban development for one of Kashmir Valley's most historically significant settlements. Located 27 km north of Srinagar in Baramulla district, Pattan town serves as the administrative headquarters of Pattan tehsil and holds the distinction of being one of the ancient capitals of Kashmir, originally established as "Sankarapurapattana" by King Sankaravarman in the 9th century AD.

Pattan town's inclusion under the AMRUT 2.0 framework reflects its strategic importance in Kashmir Valley's urban hierarchy and its potential to serve as a model heritage town balancing conservation with modern development needs. With a current population of approximately 19,538 as per Census 2011 distributed across 13 municipal wards, the town has experienced

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significant transformation following the completion of the Udhampur-Srinagar-Baramulla Railway Line, making it one of the first towns in Kashmir Valley to benefit from direct rail connectivity to mainland India.

The town's unique position as both an archaeological treasure and a modern transportation hub necessitates sophisticated planning approaches that integrate heritage conservation with contemporary infrastructure development. Housing three magnificent 9th-century temples (Sugandhesa, Sankaragaurisvara, and Ratnavardhanesa) alongside emerging commercial and residential areas, Pattan exemplifies the challenges and opportunities inherent in heritage-sensitive urban planning.

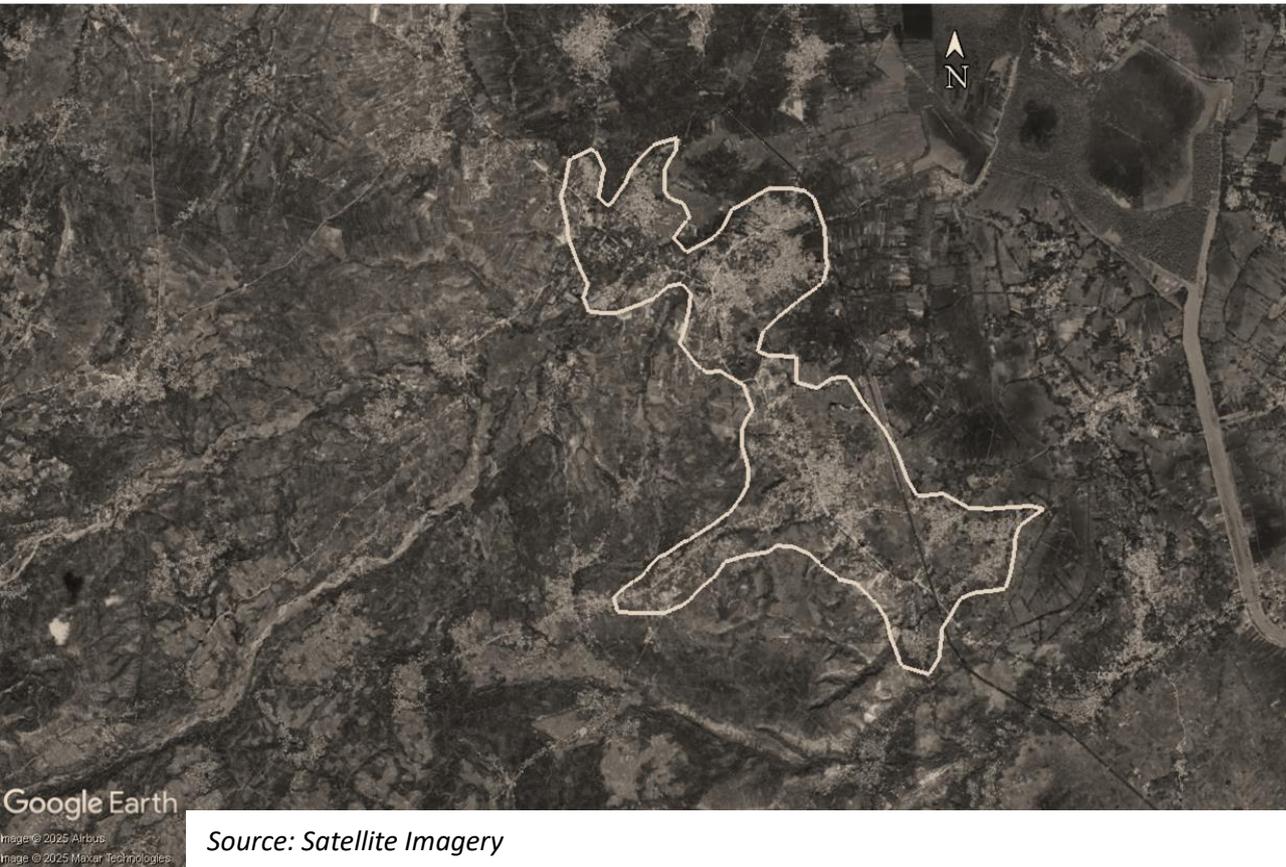
The GIS-based Master Plan for Pattan town, Kashmir, represents a landmark initiative in heritage-sensitive urban development under the AMRUT 2.0 framework, addressing the unique challenges of balancing archaeological preservation with modern infrastructure needs in one of Kashmir Valley's most historically significant settlements.

The project employs comprehensive spatial planning methodologies utilizing multiple data sources including open-source satellite imagery, Survey of India toposheets, drone surveys, and ULB datasets to create accurate digital base maps and thematic layers essential for heritage site mapping and infrastructure planning.

The Master Plan leverages unprecedented opportunities presented by railway connectivity for economic diversification, positioning Pattan as a strategic transportation hub connecting Srinagar, Baramulla, and North Kashmir while supporting growth in logistics, hospitality, and service sectors alongside traditional agriculture and handicraft industries.

The expected outcomes establish Pattan as a model heritage town demonstrating successful integration of archaeological conservation with sustainable urban development, creating a replicable framework for other heritage settlements in Jammu and Kashmir that balances preservation responsibilities with contemporary growth needs, ultimately positioning the town for future development as a connected, resilient, and economically viable urban centre in North Kashmir.

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3. INTRODUCTION

3 Introduction

Pattan town is the administrative headquarters of Pattan tehsil in Baramulla district of Jammu and Kashmir, located approximately 27 km north of Srinagar and 23 km east of Baramulla. The town derives its historical significance from being one of the ancient capitals of Kashmir, originally established as "Sankarapurapattana" by King Sankaravarman of the Utpala dynasty in the 9th century AD. Positioned at an elevation of approximately 1,553 m above sea level, Pattan enjoys a strategic location in the central part of the Kashmir Valley, making it a natural junction for trade, administration, and cultural exchange.

The town is renowned for its archaeological treasures, particularly the ancient temples of Sugandhesa, Sankaragaurisvara, and Ratnavardhanesa, which represent the pinnacle of medieval Kashmiri architecture. Pattan's economy is predominantly based on agriculture, with apple orchards and traditional crafts forming the backbone of local livelihoods. The recent completion of the railway connectivity through the Jammu-Baramulla line has transformed the town's accessibility, reducing travel time to Srinagar and opening new avenues for economic growth and tourism development.

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The GIS Master Plan for Pattan town aims to leverage this historical legacy and modern connectivity to create a sustainable urban framework that balances heritage conservation with contemporary development needs, ensuring the town's evolution into a model urban centre in North Kashmir.

3.1 Background of the Project

3.1.1 Context of AMRUT 2.0 and City's Inclusion

Pattan town's consideration under the AMRUT 2.0 framework reflects the government's recognition of its strategic importance in the Kashmir Valley's urban hierarchy. The town's historical significance, combined with its emerging role as a railway junction and agricultural hub, makes it an ideal candidate for comprehensive infrastructure development under national urban missions. The recent railway connectivity and ongoing water supply projects worth Rs. 60 crores demonstrate the administration's commitment to transforming Pattan into a well-connected, service-equipped urban centre that can serve as a model for other historical towns in the region

3.1.2 Need for GIS-based Master Plan

Pattan's rapid transformation from a primarily agricultural settlement to a connected urban hub necessitates a sophisticated planning approach that can integrate heritage conservation with modern urban development. The town's unique position as both an archaeological site and a modern transportation node requires careful spatial planning to preserve its historical character while accommodating contemporary infrastructure and economic activities. A GIS-based Master Plan will enable evidence-based decision-making for infrastructure development, and sustainable urban growth while maintaining the town's distinctive cultural identity.

3.1.3 Alignment with SDGs, National and State Policies

The development of Pattan's GIS-based Master Plan aligns with SDG 11 which advocates for inclusive, safe, resilient, and sustainable cities. It also supports related goals on clean water and sanitation (SDG 6), Industry, Innovation and Infrastructure (SDG 9), and climate action (SDG 13). At the national level, the Master Plan is integrated with frameworks such as the National Action Plan on Climate Change (NAPCC), AMRUT guidelines, Heritage City Development and Augmentation Yojana (HRIDAY), and the Smart Cities Mission. At the state

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level, it synchronizes with Jammu & Kashmir's State Action Plan on Climate Change (SAPCC) and urban development priorities, ensuring comprehensive policy coherence. This alignment guarantees that urban growth in Pattan follows sustainable, inclusive, and climate-resilient pathways and supports the broader objectives of regional development in Jammu and Kashmir. The plan will synchronize with Jammu & Kashmir's tourism development policies and archaeological conservation strategies, ensuring a holistic approach to urban planning that respects both cultural heritage and environmental sustainability.

3.2 Objectives

3.2.1 Preparation of GIS-enabled Master Plan as per MoHUA guidelines

The primary objective focuses on developing a comprehensive GIS-enabled Master Plan for Pattan town that complies with MoHUA AMRUT 2.0 guidelines while addressing the unique challenges. This involves creating digital base maps establishing development guidelines that enabling controlled urban growth.

3.2.2 Digital base map preparation and thematic layers

The development of detailed digital base maps will incorporate high-resolution mapping of heritage sites, transportation networks, and existing infrastructure. Thematic layers will include archaeological zones, land use patterns, drainage systems, utility networks, and risk assessment zones. These layers will enable precise planning for heritage conservation, infrastructure development, and disaster management while supporting evidence-based decision-making for urban development initiatives.

3.2.3 Stakeholder engagement plan

A comprehensive stakeholder engagement strategy will involve local communities, heritage conservation experts, tourism stakeholders, and government agencies to ensure inclusive planning. This approach recognizes the importance of community participation in heritage town development and ensures that planning decisions reflect both expert knowledge and local needs, creating ownership and support for the Master Plan implementation.

3.3 Scope of Work

The scope encompasses comprehensive mapping of Pattan's 13 municipal wards, detailed documentation of archaeological sites including the three ancient temples, assessment of existing infrastructure including the railway station and water supply systems, and analysis of

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agricultural lands and horticultural activities. The work includes spatial analysis of disaster risk zones, given the town's location in Seismic Zone V, and development of heritage conservation guidelines that balance preservation needs with development requirements.

For AMRUT 2.0 compliance, thematic maps must be detailed enough to provide actionable insights for urban planning, infrastructure development, and service delivery. The required level of detail includes:

- **Land Use and Land Cover:** Detailed classification distinguishing residential, commercial, industrial, institutional, recreational, vacant, and agricultural lands, along with subcategories where relevant.
- **Infrastructure Networks:** Comprehensive mapping of water supply systems (pipelines, reservoirs, treatment plants), sewerage networks, stormwater drainage, electricity grids, roads, public transportation routes, and waste management facilities.
- **Socioeconomic and Demographic Data:** Spatial representation of population densities, slum/locality boundaries, household service coverage, and vulnerable communities.
- **Environmental Features:** Detailed mapping of water bodies, green spaces, floodplains, forested areas, and pollution-prone zones to support sustainability and disaster resilience planning.
- **Hazard and Risk Zones:** Identification of flood risk areas, landslide-prone zones, seismic fault lines, and other disaster-relevant features with precise boundaries.

3.3.1 GIS Base Map Preparation

The foundational step involves preparing a detailed and accurate GIS base map for Pattan town. This includes acquiring high-resolution satellite imagery, Survey of India (SOI) toposheets, cadastral maps, and Urban Local Body (ULB) data. These datasets are digitized, georeferenced, and integrated into a spatial database. The base map captures essential physical and cultural features such as roads, railways, water bodies, administrative boundaries, built-up areas by parcel, topography, landmarks, and utilities. The scale and content of the base map are designed to suit the planning requirements, ensuring it serves as a reliable framework for overlaying thematic layers.

3.3.2 Thematic Mapping

Multiple thematic layers will be developed over the GIS base map, representing specific urban attributes. These include land use/land cover classification, transportation networks, socio-

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economic zones, environmental features (like green spaces and water bodies), infrastructure networks (water supply, sewerage, electricity), disaster risk zones, and public amenities. These thematic maps will be prepared through remote sensing image interpretation, existing data integration, and field validation, providing a comprehensive spatial understanding of urban dynamics.

3.3.3 Spatial Analysis

Using spatial analysis techniques within the GIS environment, planners will analyse patterns, relationships, and trends relevant to Pattan's urban development. This includes accessibility analysis for services, identification of infrastructure gaps, land suitability analysis, risk assessment for disaster-prone areas, and scenario modelling for future growth. The integration of diverse spatial datasets allows for evidence-based planning decisions aimed at sustainable and resilient urban growth.

3.3.4 Draft and Final Plan Preparation

Based on insights from thematic mapping and spatial analysis, a draft Master Plan will be formulated outlining land use proposals, infrastructure development strategies, zoning regulations, and sustainability measures. The draft plan will undergo stakeholder consultations and iterative refinements. The final GIS-enabled Master Plan document will include detailed maps, policy frameworks, implementation guidelines, and monitoring mechanisms, aligning with national (MoHUA, AMRUT 2.0) and state policies for comprehensive urban transformation.

This Scope of Work ensures a rigorous and integrated planning process leveraging GIS technology to support Pattan's sustainable and inclusive urban development.



Source: MapCarta

4. METHODOLOGY

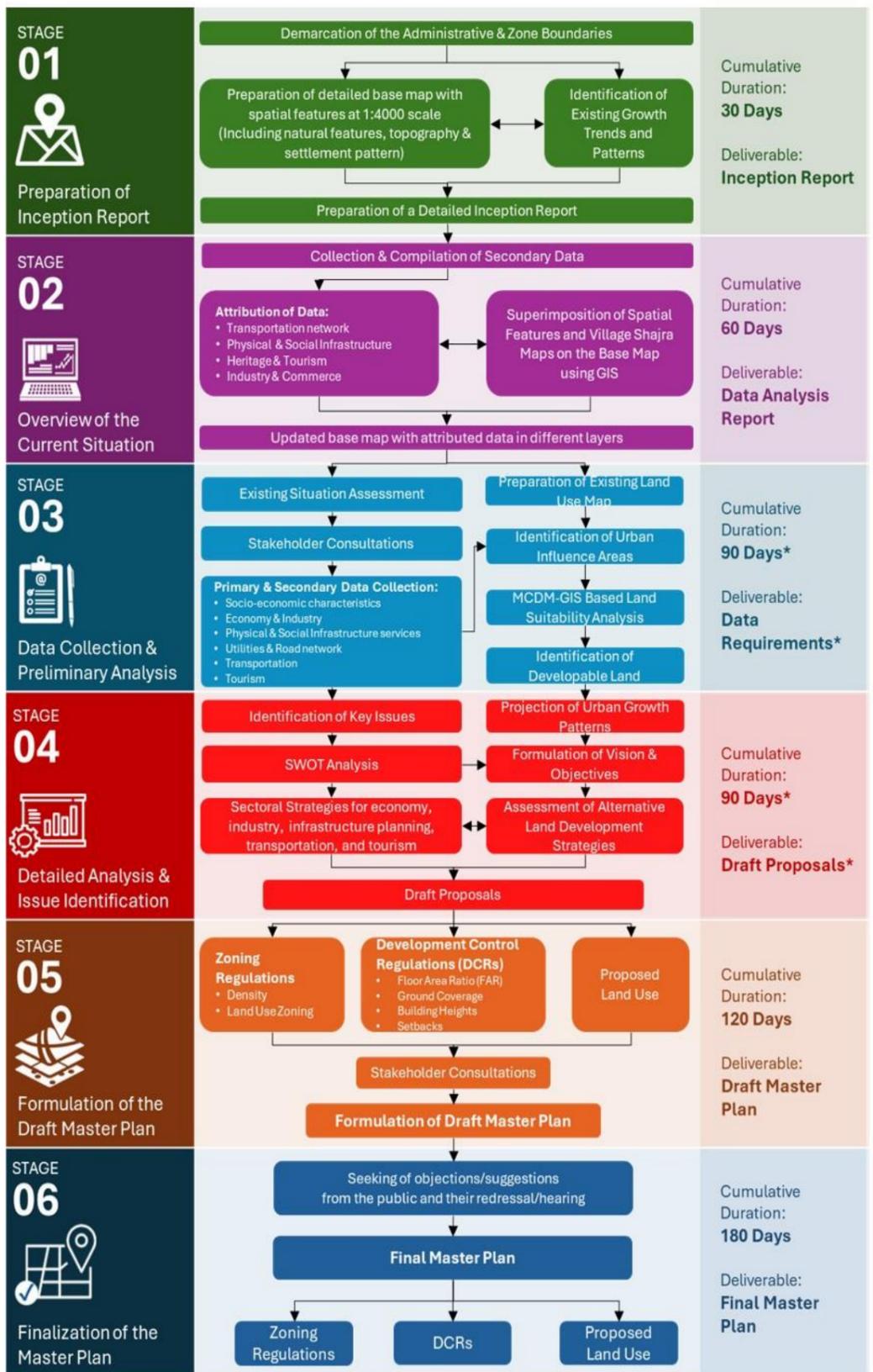
4 Methodology

4.1 Process for Ground Truthing Survey and Data Analysis

The methodology illustrated in the Figure 4.1-1 adopts a structured approach to survey and data analysis for urban planning by integrating both primary and secondary surveys. Primary surveys comprise comprehensive assessments of traffic patterns, road infrastructure, public utilities, and built-up areas, capturing details such as traffic volume, road widths, bottlenecks, water and sewerage layouts, building characteristics, and municipal solid waste. Secondary surveys complement this by collecting vital data from existing sources, including census records, urban local body and public works department records, utility data, and information from other governmental departments. These diverse datasets are synthesized through meticulous implementation phases—planning, preparation, execution, and data processing—followed by digitization, data entry, thematic mapping, and analytical review. The process

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culminates in detailed reporting, enabling evidence-based, holistic, and actionable master plan development.



*The deliverables for the Stages 3 and 4 will be submitted together

Detailed Methodology for Survey

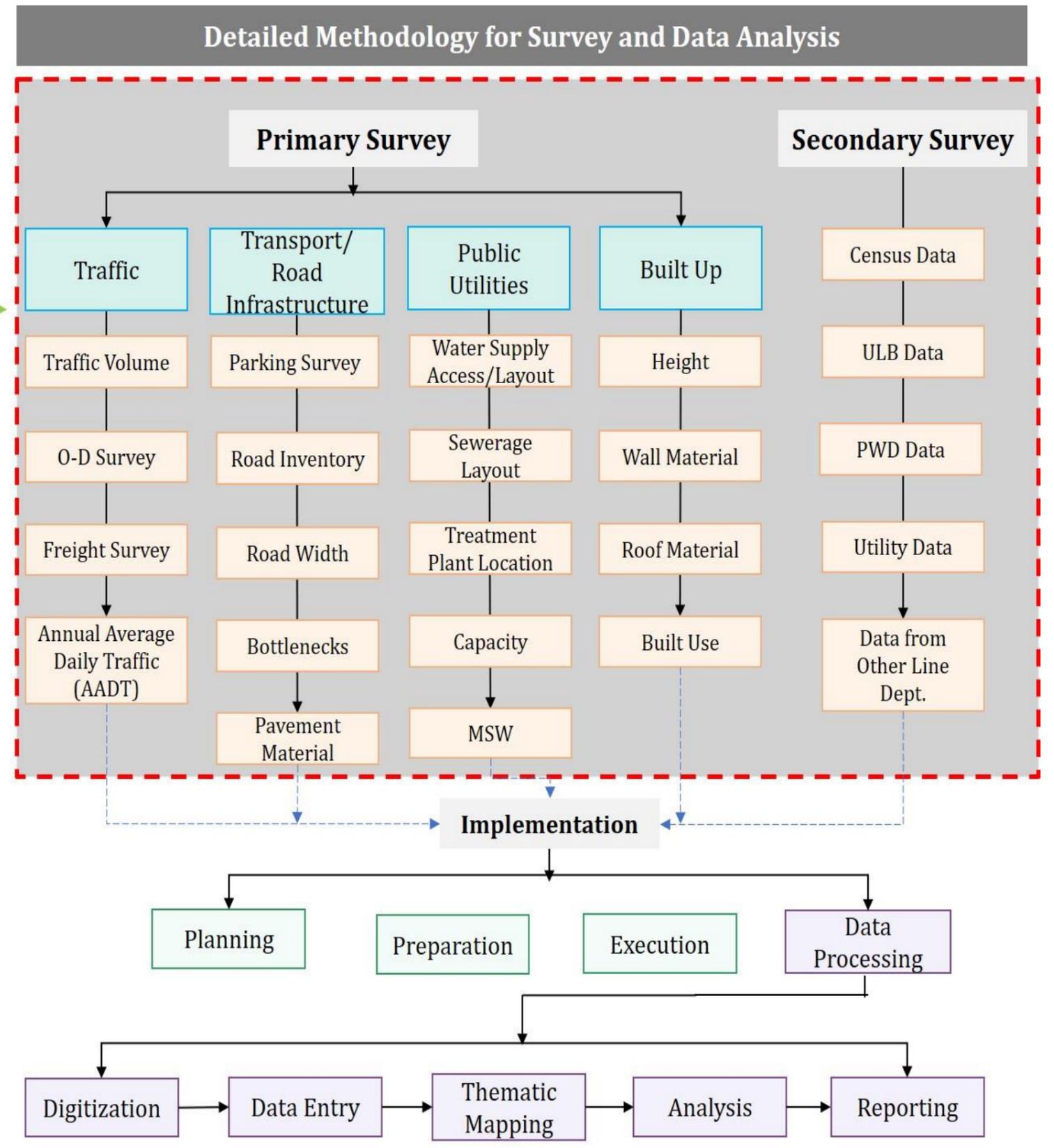


Figure 4.1-1: Methodology for data collection and analysis

Source: Author

4.2 GIS Database Development Approach

The GIS database will integrate multiple data sources including Survey of India toposheets, satellite imagery and infrastructure plans. Special attention will be given to accurately georeferencing historical maps and archaeological site plans to ensure spatial accuracy in heritage zone delineation (if any). The database will maintain separate layers for different time periods, enabling analysis of urban evolution and supporting impact assessments for new developments.

4.2.1 Sources: Open-source satellite imagery, SOI data, drone survey (if applicable), ULB data

The GIS database for Pattan will consolidate data from multiple reliable sources to ensure comprehensive coverage and accuracy. This includes open-source satellite imagery such as Landsat or Sentinel data, Survey of India (SOI) topographic maps for detailed geographic features, and drone surveys where feasible for high-resolution, localized mapping. Urban Local Body (ULB) data will provide official records on land parcels, infrastructure, municipal boundaries, and utility networks, forming a critical base layer for the GIS repository.

4.2.2 Digitisation and georeferencing process

Collected analogue data such as paper maps, cadastral plans, and infrastructure layouts will be digitized through scanning and vectorization, converting them into geographic data layers compatible with GIS software. Georeferencing involves aligning these scanned images or maps with real-world coordinates using control points to ensure spatial accuracy. Remote sensing images will be processed and classified to extract relevant thematic layers like land use, vegetation, or water bodies. This spatial data is then compiled into an integrated GIS database, organized into layers representing various physical, social, and infrastructural variables.

4.2.3 Accuracy standards

To ensure reliability, the GIS database development will adhere to strict accuracy standards. Georeferenced data will maintain spatial accuracy within the acceptable range defined by local urban planning norms usually within a few meters for large-scale planning. Image resolution and ground control points for georeferencing are carefully selected to minimize errors. Field verification and ground truthing will complement remote sensing data to validate and correct attribute information, thereby improving overall data quality. Metadata

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documenting data sources, accuracy, and lineage will be maintained to support transparency and future updates. This structured GIS database approach enables precise mapping, spatial analysis, and scenario modelling essential for effective urban planning and sustainable development of Pattan town.

4.3 Survey Plan

A comprehensive survey plan for Pattan town involves the systematic collection of both primary and secondary data to support effective urban planning. Secondary data is gathered from reliable sources including Urban Local Body records, the Census of India, departments such as the Ministry of Road Transport & Highways (MoRTH), Public Works Department (PWD), and utility service providers to create a robust baseline of demographic, infrastructure, and service information. Complementing this, primary surveys are conducted in the field to understand existing realities related to traffic flows, socioeconomic conditions, land use, and physical infrastructure. These primary data collection efforts use structured questionnaires, field observations, geotagging, and interviews to fill gaps and validate secondary data, ensuring a nuanced understanding of local circumstances. This dual approach will support evidence-based decision-making for master plan development, resource allocation, and sustainable growth in Pattan town.

Infrastructure surveys will assess the railway station facilities, road networks, and utility systems. Socio-economic surveys will capture the transition from traditional agricultural livelihoods to emerging service sector opportunities, providing insights into the town's evolving economic structure.

4.3.1 Primary Survey

The primary survey methodology focuses on comprehensive, on-ground data collection across four critical domains: traffic, road infrastructure, public utilities, and built-up characteristics. For traffic assessment, the survey records volume counts, origin-destination (O-D) surveys, and freight movements to estimate Annual Average Daily Traffic (AADT). Road infrastructure surveys entail compiling detailed road inventories, measuring road widths, identifying bottlenecks, and documenting pavement materials. Public utilities are mapped by evaluating water supply access and layout, sewerage system layouts, locations of treatment plants, infrastructure capacities, and municipal solid waste (MSW) management. The built-up area survey considers building heights, wall and roof materials, and the functional use of buildings.

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All these datasets are collected using structured formats and serve as a foundation for detailed spatial analysis, thematic mapping, and evidence-based urban planning. The integrated data supports effective implementation by covering the full spectrum of urban infrastructure and environmental attributes, ensuring robust inputs for master plan development.

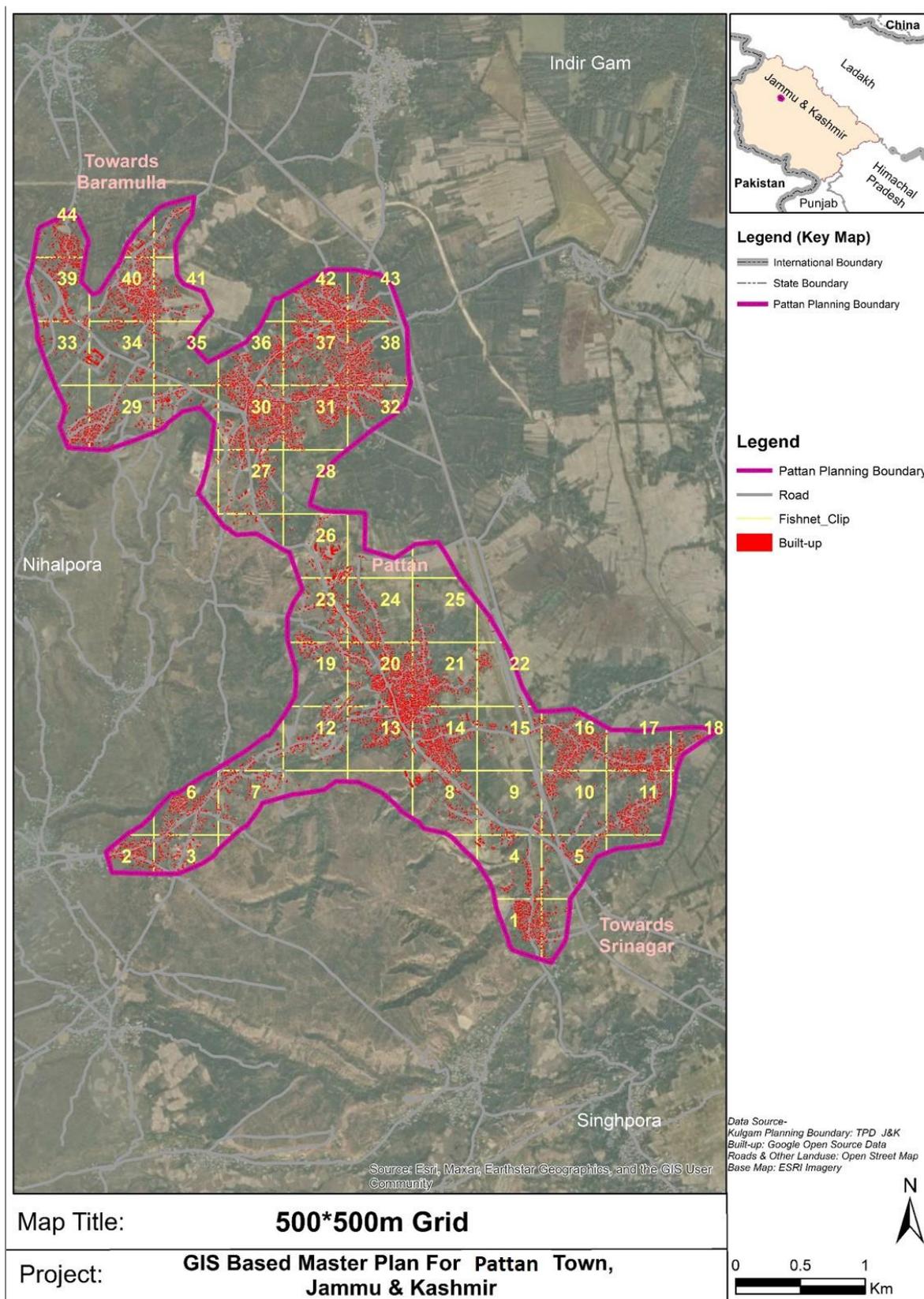
The Map 4.3-1 illustrates the application of the ArcGIS fishnet tool to create a systematic 500×500 meter grid overlay for the planning area of Pattan town in Jammu & Kashmir. The magenta boundary delineates the official planning extent, within which the yellow fishnet grid subdivides the region into manageable units for spatial analysis and ground surveys. Each grid is individually numbered, enabling easy location referencing and facilitating detailed field investigations; the red polygons denote built-up areas, allowing to identify and quantify urbanization patterns within each grid cell.

This grid-based approach is highly effective for ground truthing survey design, supporting accurate data collection, sampling, and validation of remote sensing results at a micro-scale. By segmenting the township into small, uniform zones, survey teams can systematically assess urban development, infrastructure distribution, and land use dynamics, ensure comprehensive coverage and minimize sampling bias. The integration of grid numbering with visible built-up areas further streamlines field logistics and aids in precise reporting and monitoring throughout the master plan process.

The clearly mapped built-up areas within each grid cell help in the identification of residential densities, vacant plots, peri-urban pockets, and clustered infrastructure, critical for assessing urban growth patterns and targeting infrastructure interventions. Additionally, the grid approach supports scalable data integration—from household surveys and traffic counts to environmental mapping—enhancing both the reliability and the repeatability of urban GIS processes as required under AMRUT 2.0 guidelines

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Map 4.3-1: Basemap of Pattan Planning Area with Survey Grids



Source: Satellite Imagery, Built-ups from Google Open-Source Data and Planning Boundary from HUDD, J&K

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4.3.1.1 Primary Survey Sheet Example

This image visualizes the primary survey methodology for the GIS-based master plan of Pattan town, employing a systematic approach that divides the entire planning area into uniform 500×500 meter grids using the ArcGIS fishnet tool. The magenta boundary marks the planning limit, while each numbered grid cell allows planners and survey teams to clearly demarcate zones for data collection. Within these grids, detailed built-up features are mapped in red, helping to pinpoint locations for in-depth urban diagnostics.

The process involves preparing a grid-wise survey sheet—represented in yellow—where specific attributes for each spatial segment are recorded during the field survey. The table includes columns for building material types (roof and wall), height (number of floors), use classification, road stretch ID, lane count, right of way (ROW), presence and type of drain or surface, parking details, and the structural status of buildings (including unsafe or dilapidated structures). This enables precise, micro-level documentation of built environment, transport infrastructure, and public amenities on a spatial basis.

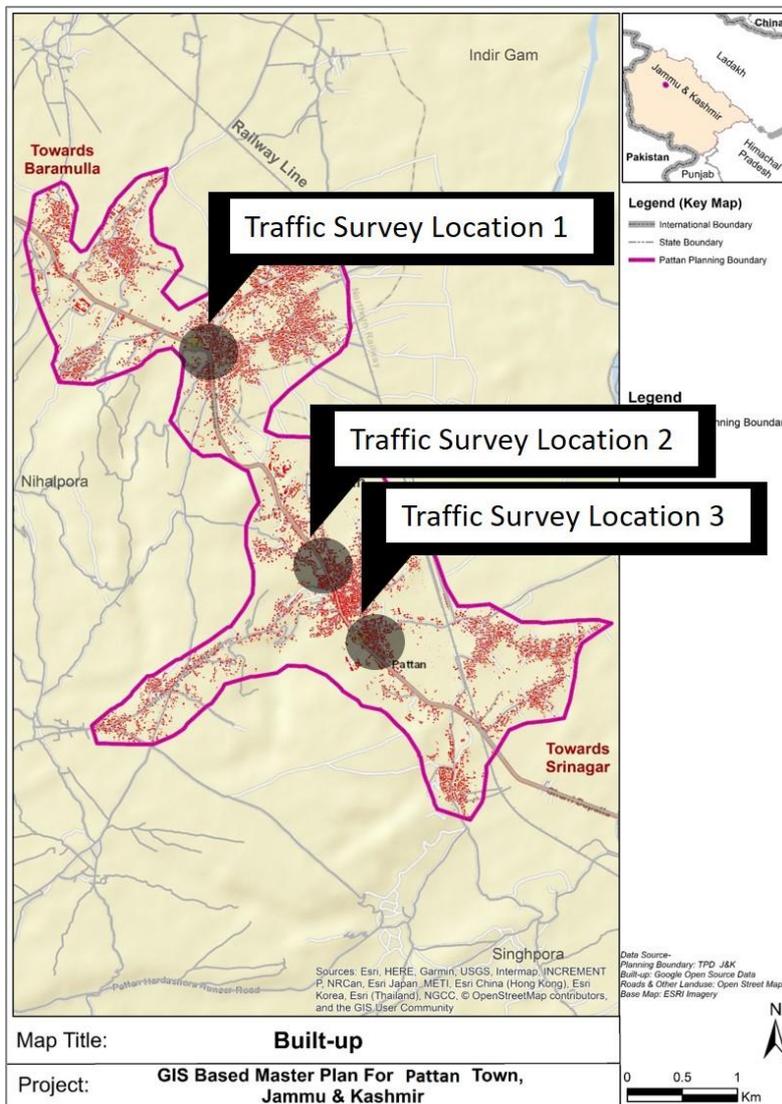
By collecting data for each grid separately as shown in Figure 4.3-1, the approach guarantees comprehensive spatial coverage, supports statistical analysis, and facilitates targeted planning interventions—all rooted in up-to-date ground realities as revealed during the primary survey process. This structured workflow helps planners link field observations directly to GIS layers, ensuring a seamless integration of survey results with spatial data for robust master plan development.

4.3.1.2 Traffic Survey Location

The traffic survey locations are clearly marked, positioned at high-density road intersections that serve as key nodal points for vehicular movement and urban connectivity. The yellow building footprints, road network (black lines), and highlighted major urban clusters provide contextual layers, ensuring that the chosen sites capture representative traffic patterns central to the transportation assessment and future mobility planning for the area.

The Map 4.3-2 presents a GIS-based spatial analysis map for traffic survey planning, where two tentative survey locations have been strategically identified at major junction points within the delineated planning boundary.

Map 4.3-2: Tentative locations for traffic survey in Pattan



Source: Satellite Imagery, Built-ups from Google Open-Source Data and Planning Boundary from HUDD, J&K

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4.3.2 Secondary Survey

The secondary survey involves collating authoritative data from existing sources to complement and validate primary findings. Key data sources include census documents providing demographic and socio-economic statistics; records from Urban Local Bodies (ULBs) detailing governance, municipal boundaries, and service delivery; and Public Works Department (PWD) databases documenting infrastructure assets and maintenance as shown in Figure 4.3-2. Utility agencies supply up-to-date information on water, electricity, and other essential services, while further inputs from other departmental records round out the data landscape. This secondary information is systematically processed, digitized, and entered into the planning database, allowing for efficient thematic mapping, analytical synthesis, and comprehensive reporting. By leveraging both current field data and reliable institutional records, the methodology ensures a holistic, nuanced understanding of Pattan town's urban framework, in line with AMRUT 2.0 guidelines and best practices in urban planning.

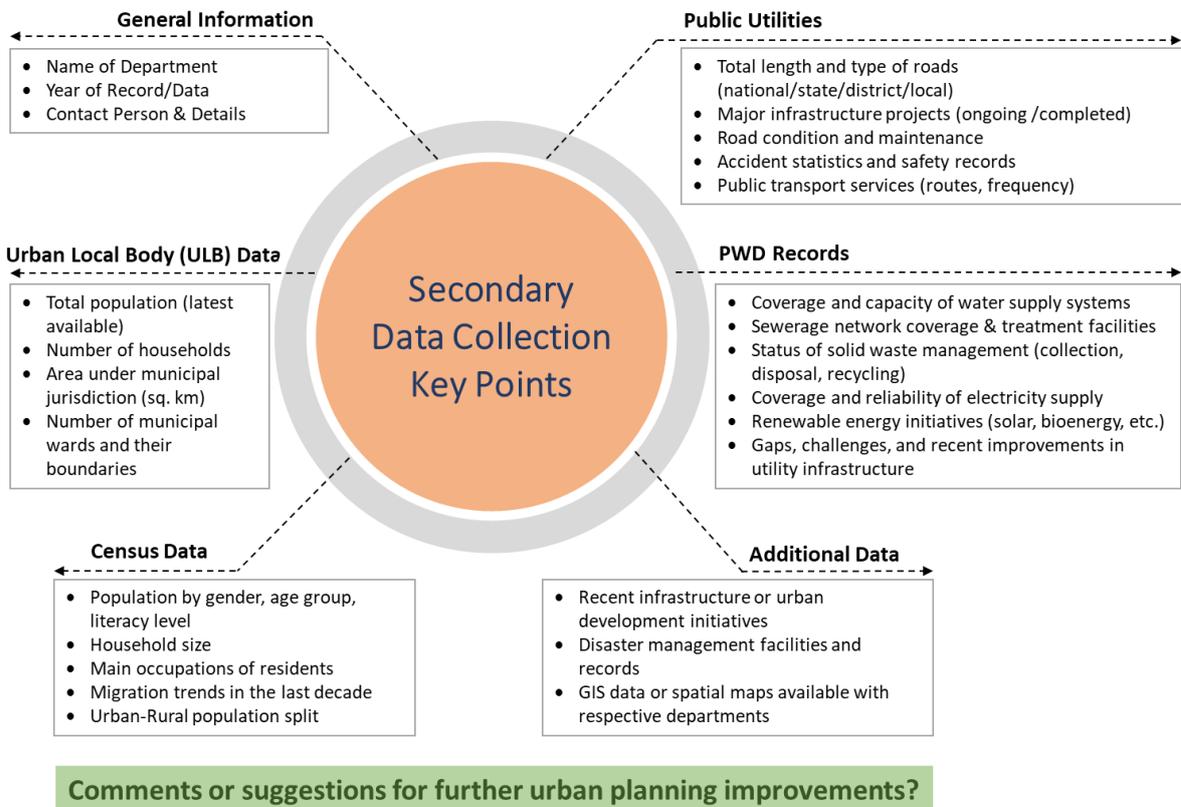


Figure 4.3-2: Secondary data required for Master Plan process

Source: Author

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The provided secondary data collection questionnaire aligns with the AMRUT 2.0 guidelines. AMRUT 2.0 emphasizes evidence-based urban planning through robust data collection and analysis to improve infrastructure, basic services, and governance. The questionnaire covers critical domains specified in AMRUT 2.0, including population and demographic analysis, municipal area management, infrastructure, utility services (water, sewerage, roads, transport, waste management, electricity), and environmental features. These questions support preparation of development plans, identification of service gaps, and design of solutions in line with AMRUT 2.0's objectives of improving quality of life, resilience, and inclusivity in urban areas.

4.4 Stakeholder Consultation

Stakeholder consultation is an essential part of the master plan process, ensuring that diverse community needs, expert perspectives, and institutional priorities are integrated into urban development strategies. It involves identifying key stakeholders such as residents, community organizations, local businesses, professional bodies, and government agencies and engaging them through public meetings, workshops, surveys, and collaborative working groups. This participatory approach enables planners to gather insights, review development scenarios, balance competing interests, and incorporate valuable feedback directly into the draft and final master plan documents, thereby fostering transparency, trust, and public ownership of urban transformation outcomes.

4.5 Work Plan and Timeline

The Figure 4.5-1 presents a detailed workplan and timeline for GIS-based master plan preparation for Pattan town, spanning 26 weeks and encompassing all major phases of the urban planning process. The workplan outlines sequential tasks starting from team mobilization, base map creation, and demographic analysis, followed by baseline studies such as land use, tourist flows, socio-economic mapping, and infrastructure assessment. Subsequent phases include projections and SWOT analysis, drafting proposals, comprehensive land use allocation, culminating with development control regulations and the final master plan submission.

- Phased Approach: The plan is divided into clear stages: inception, baseline analysis, assessment of potentials, draft proposals, and finalization.

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- Deliverables and Deadlines: Critical reports (Inception, Data Analysis, Draft Master Plan, Final Master Plan) are marked for timely submissions, ensuring accountability and progress tracking.
- Comprehensive Coverage: It integrates technical studies (like SWOT, urban landscape, transportation, and infrastructure) and participatory activities (public objections and hearings), exemplifying a thorough and inclusive planning methodology.

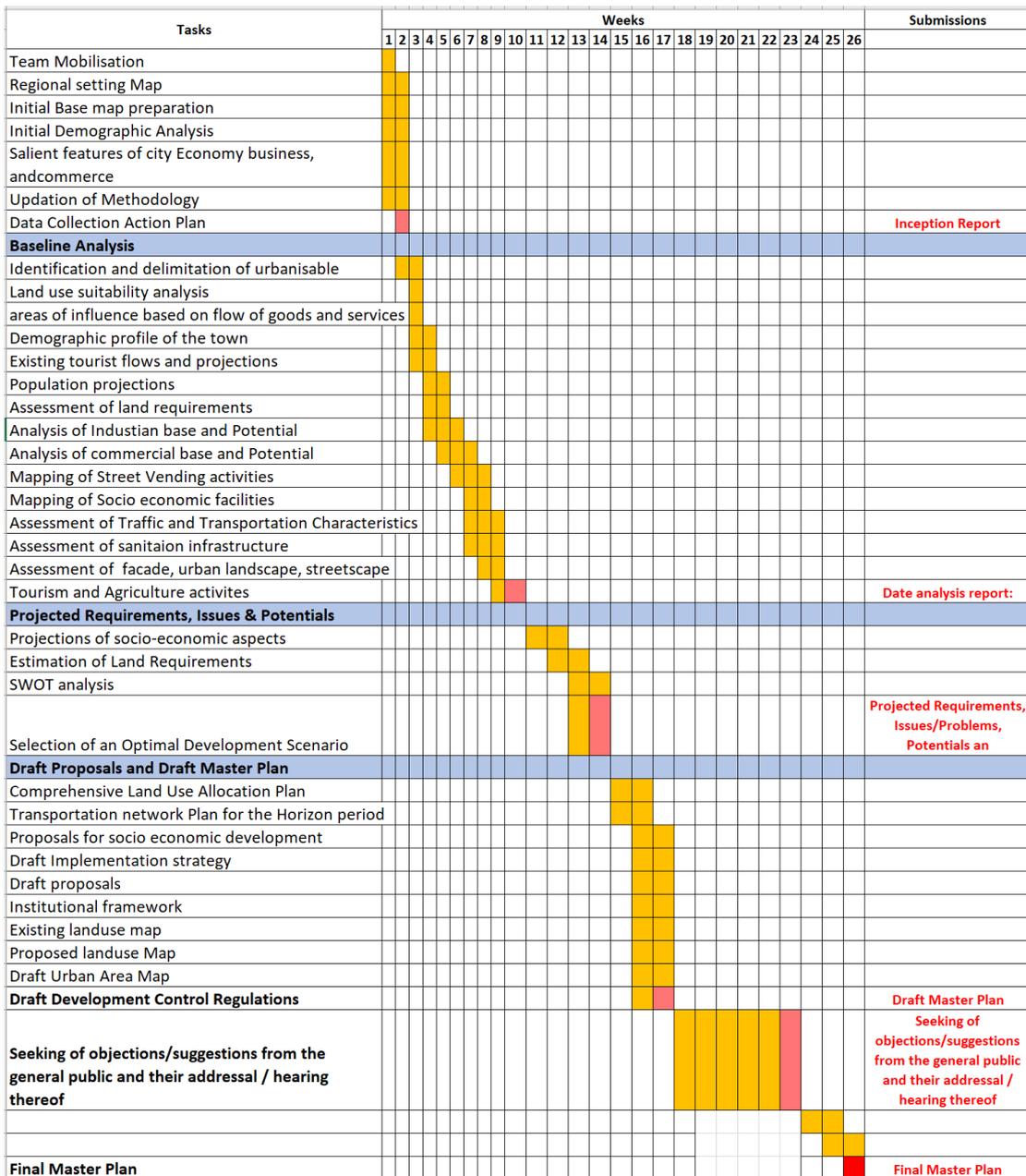


Figure 4.5-1: Work plan and timeline

Source: Author

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4.6 Team Mobilisation

Table 4.6-1: Project Team

Sl. No	Name	Position
1	Dr. Ashfaque Alam	Team Lead Expert in urban planning, land management, and governance
2	Dr. Mayank Dubey	Dy. Team Lead Specialist in urban mobility and infrastructure planning
3	Dr. Paulose N.K	Dy. Team Lead Expert in spatial analysis, climate studies, and Environment
4	Dr. Nikhil Ranjan Mandal	Specialist in housing and urban planning
5	Dr. Gayatri Nanda	Expert in urban design and landscaping
6	Dr. Adithya Bandari	Specialist in utilities, services, and GIS
7	Project Assistants	Total 07
8.	Field Enumerators	Total 10

For conducting the detailed ground truthing survey and collecting both primary and secondary data, a structured team composition has been defined as shown in Table 4.6-1. The entire process will be supervised by the Principal Investigator (PI), who will ensure adherence to survey protocols, quality standards, and methodological consistency. The PI will be supported by thematic experts and technical specialists in areas such as transportation, road engineering, public utilities, and land use planning. These experts will periodically review field outputs, validate data formats, and provide technical guidance to maintain accuracy and reliability.

For each town, two to three Project Associates will be designated to coordinate fieldwork. They will act as the link between the central planning team and field enumerators, handling the scheduling of surveys, briefing of teams, allocation of grids, and day-to-day monitoring. They will also conduct spot checks to ensure that data collection follows the prescribed formats and accurately reflects ground conditions.

The Field Enumerators will carry out on-site surveys within the assigned grids and traffic nodes, using structured formats and GPS-enabled tools to gather data on traffic, road infrastructure, public utilities, and built-up characteristics. They will also collect relevant

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secondary data from local offices and institutions. Their daily progress will be reviewed by the Project Associates, who will compile and submit the data for expert scrutiny.

This tiered structure ensures systematic coordination and quality assurance, with field enumerators collecting data on the ground, project associates managing operations, and the PI with domain experts overseeing the entire process.



Source: The Travelling Slacker

5. AREA PROFILE



5 Study Area Profile

Pattan is located in the north Kashmir's Baramulla district and serves as one of the most historically significant urban centres in the Kashmir Valley. Known for its ancient temples and archaeological heritage dating back to the 9th century AD, Pattan represents a unique blend of historical importance and modern development potential. The town is strategically positioned at the intersection of major transportation corridors and has recently gained prominence due to the completion of the Udhampur-Srinagar-Baramulla Railway Line, making it one of the first towns in Kashmir Valley to benefit from direct rail connectivity to the rest of India.

Administratively, Pattan serves as the headquarters of Pattan tehsil and is organized into 13 municipal wards covering a compact urban area that harmoniously integrates ancient

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monuments with contemporary residential and commercial development. The town's economy is transitioning from traditional agriculture-based activities to a more diversified structure that includes transportation services, tourism, and small-scale manufacturing. With its strategic location providing access to major tourist destinations like Gulmarg and serving as a gateway to North Kashmir, Pattan is positioned to emerge as an important urban centre in the region's development trajectory.

5.1 City Overview

Pattan town serves as the administrative centre of Pattan tehsil in Baramulla district, positioned strategically at the intersection of major transportation corridors connecting Srinagar, Baramulla, and other parts of North Kashmir. With a 2011 Census population of 19,538, Pattan represents a mid-sized urban settlement that has experienced significant growth due to improved connectivity and economic opportunities.

The settlement pattern reflects its historical evolution, with the ancient temple complexes forming focal points around which the modern town has developed. The recent railway connectivity has created new growth corridors, particularly around the railway station area, while traditional bazaar areas continue to serve local commercial needs. The town's administration manages essential services including water supply, sewerage, and road maintenance across its municipal boundaries, with ongoing infrastructure projects aimed at improving service delivery standards.

5.1.1 Location

Pattan town is strategically located at 34°10'N 74°34'E in the central part of Kashmir Valley, approximately 27 km north of Srinagar and 23 km east of Baramulla. The town lies at an average elevation of 1,553 meters above sea level, positioned in a fertile valley that benefits from the region's temperate climate and abundant water resources. Its central location makes it accessible from all major districts in the valley, with National Highway 1A providing direct connectivity to Srinagar and other major centres (Wikipedia, 2025).

The town's strategic position has been recognized since ancient times, serving as a natural stopping point for travellers moving between different parts of the valley. This locational advantage has been further enhanced by the completion of the Udhampur-Srinagar-Baramulla Rail Link, which includes stations at Pattan, Hamre, and Mazhom, making it a crucial transportation hub in the new railway network (Wikipedia, 2025).

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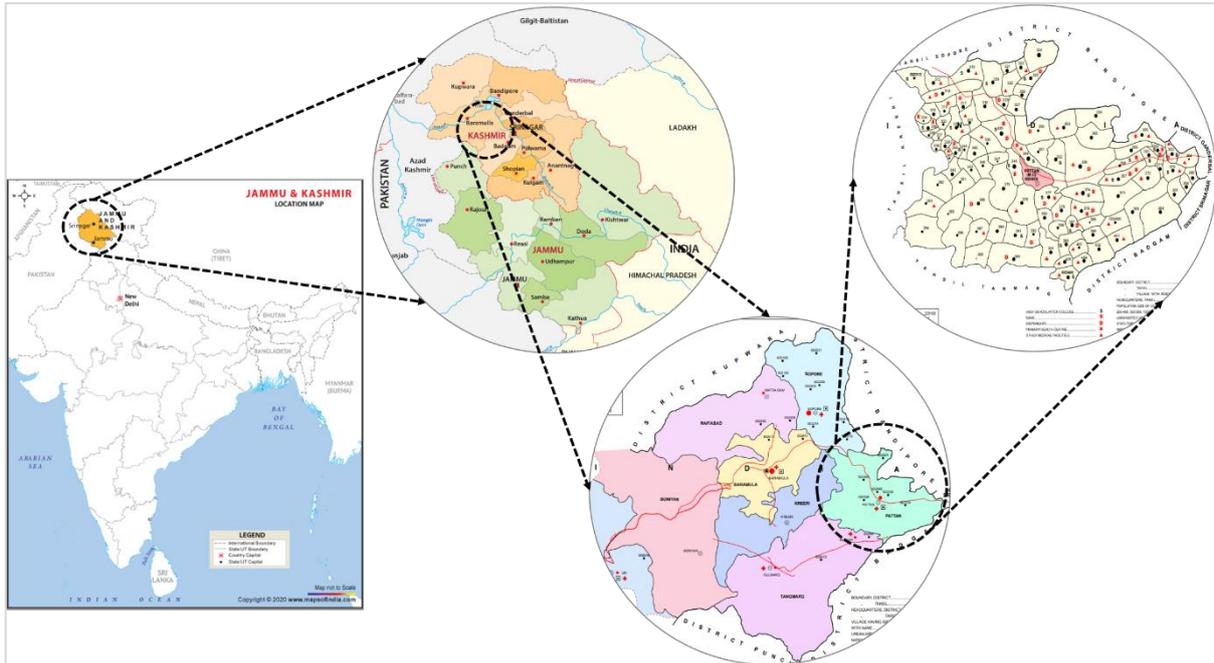


Figure 5.1-1: Location map of Pattan

Source: Maps of India and Census of India

5.1.2 History of Pattan

Pattan's historical significance extends back to the 9th century AD when King Sankaravarman (883-902 AD) of the Utpala dynasty established the town as "Sankarapurapattana" and made it one of the capitals of his kingdom. According to Kalhana's Rajatarangini, the town was founded with great ambition, featuring multiple palaces and magnificent temples dedicated to Shiva. The king built three major temples - Sankaragaurisvara, Sugandhesa (named after his queen Sugandha), and Ratnavardhanesa (built by his minister) - which represented the architectural pinnacle of medieval Kashmir (Pattan Baramulla, 2022).

The town flourished as a major centre for trade, particularly in woollen goods, livestock, and agricultural products, as mentioned in historical chronicles. However, political instability following the decline of the Utpala dynasty led to periods of neglect, and later invasions resulted in damage to many of the town's architectural treasures. Despite these challenges, Pattan maintained its importance as a regional centre, adapting to changing political circumstances while preserving its cultural identity (Pattan: A history lesson, 2025).

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Figure 5.1-2: Shankargaurisvara temple ruins in Pattan town, Kashmir

Source: *Travel The Himalayas*

In modern times, Pattan has experienced renewed growth with improved infrastructure and connectivity. The completion of the railway link in 2025 marked a new chapter in the town's development, positioning it as a key node in Kashmir's transportation network and opening opportunities for tourism and economic development based on its rich heritage.

5.1.3 Regional Context

Pattan's regional significance stems from its central location within the Kashmir Valley and its role as a transportation hub connecting various parts of North Kashmir. The town serves as a junction point for routes leading to Baramulla, Sopore, Srinagar, and other important centres, making it a natural choice for administrative and commercial activities. Its position in the Baramulla district, one of the largest and most populous districts in Kashmir, enhances its administrative importance.

The recent railway connectivity has transformed Pattan's regional role, with the town now serving as a crucial link in the Kashmir Valley's rail network. The Jammu-Baramulla line passes through Pattan, providing direct connectivity to Katra, Srinagar, and ultimately to the rest of India's railway network. This connectivity has opened new possibilities for economic

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development, tourism, and cultural exchange, positioning Pattan as a gateway to North Kashmir (Vajiram, 2025).

Economically, Pattan benefits from the region's agricultural prosperity, particularly apple cultivation and traditional crafts. The town serves as a collection and distribution centre for agricultural products from surrounding rural areas, while its proximity to major tourist destinations like Gulmarg adds to its potential for tourism-related development.

5.1.4 Settlement patterns

Pattan's settlement pattern reflects its dual character as both a historical centre and a modern town. The core area is organized around the ancient temple sites, with traditional residential neighbourhoods radiating outward from these focal points. The settlement exhibits a compact urban form typical of Kashmiri towns, with mixed land use patterns integrating residential, commercial, and institutional functions (Pattan, 2025)

Recent development has been influenced by the railway line, with new commercial and residential areas emerging near the railway station. The town maintains traditional architectural elements in its older sections while accommodating contemporary development needs in expanding areas. The settlement pattern demonstrates adaptive planning that respects historical character while meeting modern requirements for connectivity and services.



Figure 5.1-3: Settlement growth in 2011, 2018 and 2025 respectively in Pattan

Source: Google Satellite Imagery

The Figure 5.1-3 set displays a comparative analysis of settlement growth across three time periods—2011, 2018, and 2025—using high-resolution satellite imagery over a defined planning boundary highlighted in yellow. The leftmost image represents the landscape in 2011, showing limited built-up expansion confined mostly to core areas and sparse patches. By 2018, as seen in the centre image,

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significant increase in development has occurred, particularly along road corridors and at major junctions, indicating the role of transport infrastructure as a catalyst for urbanization. In the rightmost image from 2025, the settlement pattern has densified further, with widespread growth along arterial routes and pronounced clusters emerging at intersection points, reflecting sustained corridor-oriented and nodal expansion.

This progression illustrates a typical linear and nodal urban growth process, where accessibility, proximity to transport networks, and junction connectivity have steered residential and commercial development predominantly along roads and their convergence points. Such patterns are characteristic of towns undergoing rapid transformation, especially under the influence of improved connectivity, land availability, and infrastructure upgrades. Identifying these spatio-temporal dynamics is essential for sustainable urban planning, infrastructure provision, and targeted interventions in future master plan strategies.

5.2 Demographic and Socio-Economic Overview

Demography is the statistical study of human populations, focusing on aspects such as population size, composition, distribution, and changes over time due to births, deaths, migration, and aging. In urban planning and development, analysing demography and socio-economic data helps planners understand the composition and needs of a community, which guides informed decision-making for resource allocation, infrastructure development, and social services.

Data for demography and socio-economy in towns like Pattan is typically sourced from comprehensive and standardized official databases such as the Census of India. The 2011 Census serves as the most recent baseline because it systematically collected detailed information about population structure, occupational patterns, literacy rates, household characteristics, and other socio-economic indicators across all geographic units in the country.

5.2.1 Demography

The demographic data from the 2011 Census reveals significant insights about Pattan town's population distribution and social composition across its 13 municipal wards. The town recorded a total population of 19,538 residents living in 2,087 households as illustrated in Table 5.2-1. Ward 1 stands out as the most populous with 6,531 residents in 289 households, accounting for approximately one-third of the town's total population, while the smallest ward 11 houses only 783 people in 124 households. The distribution of Scheduled Caste and

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Scheduled Tribe populations shows a highly concentrated pattern, with the entire SC population of 270 individuals and ST population of 433 individuals residing exclusively in Ward 1. This demographic pattern suggests significant spatial segregation and indicates that Ward 1 likely encompasses areas with different settlement characteristics or administrative boundaries that include rural or peripheral areas with SC/ST populations.

Table 5.2-1: Demography of Pattan Town

Ward	HH	Total Population	Total Male Population	Total Female Population	Total SC Population	Total ST Population
1	289	6531	5786	745	270	433
2	210	1297	678	619	0	0
3	199	1259	659	600	0	0
4	204	1461	757	704	0	0
5	98	957	533	424	0	0
6	103	818	423	395	0	0
7	121	1011	510	501	0	0
8	101	806	400	406	0	0
9	134	1000	505	495	0	0
10	135	978	483	495	0	0
11	124	783	430	353	0	0
12	147	1060	547	513	0	0
13	222	1577	869	708	0	0
Total	2087	19538	12580	6958	270	433

Source: Census 2011

5.2.2 Literacy Rate

The Table 5.2-2 illustrate ward-wise literacy data from Census 2011 for Pattan town, highlighting both overall and gender-specific literacy figures.

Table 5.2-2: Literacy of Pattan Town

Ward	Total Literates	Total Literacy Rate (%)	Total Male Literates	Total Female Literates
1	5854	89.63	5475	379
2	727	56.05	423	304
3	734	58.30	433	301
4	766	52.43	435	331
5	580	60.61	368	212
6	374	45.72	217	157
7	588	58.16	321	267
8	489	60.67	269	220
9	657	65.70	351	306
10	536	54.81	282	254

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11	368	47.00	229	139
12	435	41.04	258	177
13	880	55.80	563	317
Total	12988	66.48	9624	3364

Source: Census 2011

The literacy data illustrated in Table 5.2-2 from the 2011 Census reveals significant educational disparities both across Pattan town's 13 municipal wards and between genders, with an overall literacy rate of 66.48% encompassing 12,988 literate individuals. Ward 1 stands out exceptionally with the highest literacy rate of 89.63% and 5,854 literate residents, accounting for nearly 45% of the town's total literate population, while Ward 12 records the lowest at 41.04% with only 435 literates. The remaining wards display considerable variation in educational attainment indicating uneven access to educational opportunities and infrastructure development across different neighbourhoods. The data indicates that while certain areas like Ward 1 have achieved near-universal male literacy and substantial overall educational progress, the town requires targeted interventions to address both geographic disparities in educational infrastructure and systemic barriers preventing equal educational opportunities for women across all municipal boundaries.

5.2.3 Population Trends

Historical census data reveals consistent population growth in Pattan, with the population increasing from 11,355 in 2001 to 19,538 in 2011, representing a growth rate of over 70% during this decade. Rapid population growth reflects Pattan's emerging role as a transportation and administrative hub, attracting residents from surrounding rural areas seeking better access to services and employment opportunities. The railway connectivity is expected to further accelerate this growth trend, requiring careful planning to manage urban expansion sustainably.

5.2.4 Occupational Structure

Occupational structure refers to the distribution of a population across different types of economic activities and employment sectors, providing crucial insights into the economic base, development level, and livelihood patterns of a region. It encompasses the classification of workers by their primary occupation, skill levels, sectors of employment (primary, secondary, tertiary), and employment status (main workers, marginal workers, non-workers).

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The Table 5.2-3 presents ward-wise workforce participation data from the 2011 Census, specifically measuring the economically active population in Pattan town across its 13 municipal wards. The data captures the total number of workers, their percentage of the ward's total population, and the gender-wise breakdown of working individuals, providing a comprehensive picture of economic participation patterns across different areas of the town.

Table 5.2-3: Work Force Participation

Ward	Total Working Population	Total Working Population (%)	Total Male Working Population	Total Female Working Population
1	5541	84.84	5455	86
2	376	28.99	344	32
3	319	25.34	289	30
4	324	22.18	296	28
5	178	18.60	164	14
6	185	22.62	169	16
7	234	23.15	216	18
8	310	38.46	157	153
9	268	26.80	191	77
10	235	24.03	206	29
11	155	19.80	146	9
12	222	20.94	212	10
13	413	26.19	409	4
Total	8760	44.84	8254	506

Source: Census 2011

The workforce participation data from the 2011 Census reveals striking disparities in economic engagement across Pattan town's municipal wards, with an overall participation rate of 44.84% encompassing 8,760 working individuals out of the total population. Ward 1 demonstrates an exceptionally high workforce participation rate of 84.84% with 5,541 workers, accounting for approximately 63% of the town's entire working population and significantly outperforming all other wards whose participation rates range from a low of 18.60% in Ward 5 to 38.46% in Ward 8. The data reveals an extremely pronounced gender disparity in workforce participation. Even in the economically vibrant Ward 1, female workers represent merely 1.6% of the ward's working population, while wards like Ward 13 show an alarming pattern with 409 male workers but only 4 female workers. This highlighting the need for targeted interventions to enhance female economic empowerment and create a more inclusive economic development framework for Pattan town.

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5.2.5 Workforce Participation and Main Workers Classification

Workforce participation refers to the economically active segment of the population engaged in productive activities that contribute to the economy through the production of goods and services. The Census of India classifies workers into two distinct categories: main workers and marginal workers. Main workers are individuals who were employed for the major part of the reference period (at least 183 days or 6 months) preceding the date of enumeration, representing the core workforce with relatively stable employment patterns. This classification is crucial for understanding the economic stability and primary livelihood sources of a population, as main workers typically have more regular income streams and contribute more consistently to the local economy compared to marginal workers who may be engaged in seasonal, occasional, or supplementary economic activities.

Table 5.2-4: Main work force participation

Ward	Total Main Workers Population	Total Main Workers Population %	Cultivators	Agricultures	Households	Others
1	5271	80.71	16	8	4	5243
2	173	13.34	2	1	1	169
3	188	14.93	0	0	4	184
4	287	19.64	16	28	3	240
5	67	7.00	5	2	1	59
6	97	11.86	0	0	3	94
7	117	11.57	0	1	0	116
8	102	12.66	63	2	0	37
9	185	18.50	20	12	3	150
10	189	19.33	15	3	1	170
11	155	19.80	9	6	1	139
12	189	17.83	43	10	3	133
13	308	19.53	5	4	1	298
Total	7328	37.51	194	77	25	7032

Source: Census 2011

The Table 5.2-4 presents the occupational structure of main workers across Pattan town's municipal wards, categorizing the 7,328 main workers into four primary economic sectors based on the 2011 Census classification system. The table defines "Cultivators" as individuals who work on agricultural land owned or held by them or their household, whether for wages or profit. "Agricultures" refers to agricultural labourers who work on others' agricultural land for wages without owning or holding the land. "Households" represents those engaged in

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household industry activities including manufacturing, processing, servicing, and repairing conducted within the household premises with or without the help of hired workers. "Others" encompasses all remaining economic activities including trade, commerce, transport, construction, services, and other non-agricultural occupations, providing insight into the diversification of the local economy beyond traditional primary sector activities.

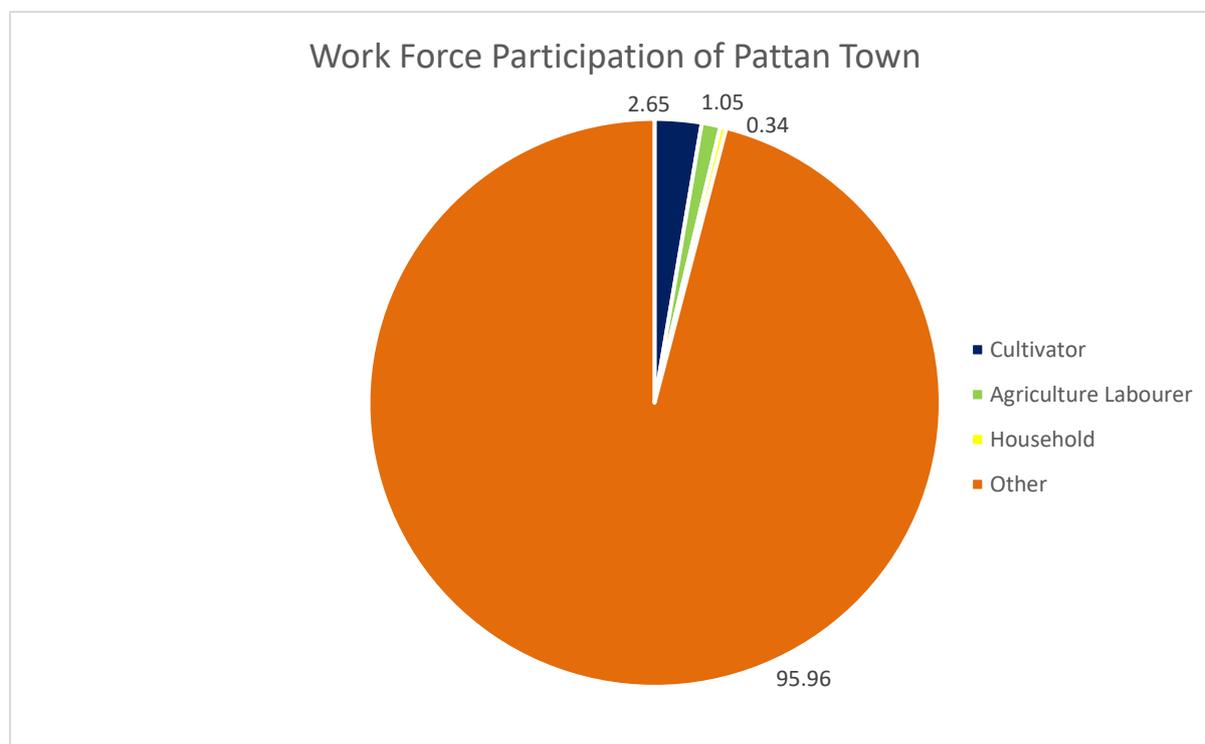


Figure 5.2-1: Work Force Participation of Pattan Town

Source: Author

The Pattan town's main workforce reveals a highly service-oriented economy with 96% of workers classified under "Others," indicating significant economic diversification beyond traditional agriculture-based activities. This predominance of non-agricultural occupations reflects Pattan's evolution from a primarily rural settlement to an urban administrative and commercial centre, likely driven by its strategic location, historical significance, and recent railway connectivity. Ward 1 demonstrates the most dramatic concentration with 5,271 main workers, of whom 5,243 (99.5%) are engaged in non-agricultural activities.

The household industry sector remains minimal with only 25 workers town-wide, suggesting limited small-scale manufacturing or processing activities within residential premises. Ward 13 stands out with 298 workers classified as "Others" out of 308 total main workers, reflecting its role as a significant non-agricultural employment centre. This occupational pattern

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suggests that Pattan's economy has successfully diversified into services, trade, administration, and other tertiary sector activities, positioning it as a modern urban centre.

5.2.6 Economy

Pattan town's economy represents a remarkable transformation from traditional agricultural settlement to a diversified urban centre strategically positioned at the crossroads of North Kashmir's economic development. The current economic structure reveals a highly diversified economy that has successfully transitioned beyond traditional agriculture-based activities. According to 2011 Census data, the town's occupational profile demonstrates this transformation, with 96% of main workers engaged in non-agricultural activities, indicating significant economic diversification as shown in Figure 5.2-2.

The district Baramulla is renowned for its world-class apple production, with Kashmir contributing approximately 75% of India's total apple output and generating over 20.56 lakh metric tonnes annually. This agricultural foundation has historically supported Pattan's economy, with the town serving as a collection and distribution centre for agricultural products from surrounding rural areas.



Figure 5.2-2: Fully grown apples on a tree in an orchard with new varieties of high-density apple trees

Source: Kashmir Times, Published on 23 May 2025

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The regional horticultural sector is undergoing significant modernization through high-density apple farming initiatives. The Jammu and Kashmir government's Modified High-Density Plantation Scheme aims to convert 5,500 hectares into high-density orchards by 2026, with 50% subsidies supporting this transformation. These modern orchards produce fruit within two years compared to 6-8 years for traditional trees, with over 90% Grade-A apple production versus 30% from conventional methods. This agricultural revolution directly benefits Pattan's economy through improved productivity, enhanced market access, and increased rural incomes in the surrounding areas.

Traditional Crafts and Handicraft Industry

Pattan's economy maintains strong connections to Kashmir's renowned handicraft industry, which employs approximately 500,000 artisans across the state and represents a vital source of livelihood for local communities. The town benefits from the broader Baramulla district's handicraft cluster at Mirgund Pattan, which specializes in traditional crafts including carpets, embroidery, paper mache, and Namda products (felted rugs and mats) as shown in Figure 5.2-3. These crafts have gained international acclaim for their delicate refinement and artistic grace, with products in high demand both domestically and internationally (Handicrafts and Carpet Sector Skill Council (HCSSC), 2022).



Figure 5.2-3: Colorful Kashmiri paper mache handicraft showcasing detailed floral and vine patterns, emblematic of the traditional crafts economy in Pattan town, Kashmir

Source: Khamir

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Pashmina weaving, carpet making, and Namda felted rug production represent generations of inherited skills that provide sustainable livelihoods while preserving cultural heritage. The government's recognition of this sector's importance is evident in skill development programs and certification initiatives under the National Skills Qualifications Framework (Wikipedia, 2025).



Figure 5.2-4: Kashmiri artisan carving walnut wood

Source: Wikipedia

Infrastructure Development and Transportation Hub

The completion of the Udhampur-Srinagar-Baramulla Railway Line represents a transformative moment for Pattan's economy, positioning the town as a crucial transportation hub in North Kashmir. Three railway stations - Pattan, Hamre, and Mazhom - provide direct connectivity to Srinagar, Katra, and the rest of India's railway network. This connectivity is expected to significantly boost tourism, streamline transportation of agricultural and horticultural products to national markets, and ensure faster, more cost-effective movement of goods and passengers (Kumar, 2025).

Railway connectivity has emerged as a fundamental catalyst for economic development and regional integration, with successful examples from major economies like the United States,

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China, and Germany demonstrating how rail infrastructure investments translate into enhanced trade, reduced logistics costs, and improved market access. In the context of Jammu and Kashmir, establishing railway connectivity presented unique challenges due to the inhospitable terrain of the Pir Panjal ranges, which historically thwarted early attempts during Maharaja Pratap Singh's reign and necessitated reliance on the vulnerable Banihal Cart Road that frequently experienced disruptions due to landslides and heavy snowfall during winter months. The completion of the Udhampur-Baramulla Rail Link (UBRL) on December 23, 2024, represents a transformative milestone in India's infrastructural development, featuring remarkable engineering achievements including 30 tunnels, 68 bridges, and the iconic 359 m high Chenab arch bridge that overcame decades of geological and technical challenges. This railway connectivity is expected to generate substantial economic benefits through year-round accessibility that eliminates Kashmir's traditional winter isolation, enhanced market access for farmers and artisans who previously faced significant logistical constraints, tourism industry transformation through convenient and affordable travel alternatives, and comprehensive employment generation both directly through railway operations and indirectly through ancillary services (Kumar, Daily Excelsior, 2025).



Figure 5.2-5: Train running through snowy Kashmir, symbolizing enhanced rail connectivity contributing to regional development

Source: Daily Excelsior accessed on March 2, 2025

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The railway connectivity addresses longstanding infrastructure challenges while creating new economic opportunities. The new rail link provides all-weather connectivity, reducing transportation costs and opening markets for local agricultural and handicraft products. This improved accessibility is expected to attract investment, encourage tourism development, and facilitate the growth of service sector activities (Nagial, 2023).

Commercial Development and Urban Growth

Pattan's commercial sector has experienced significant growth, driven by its strategic location on major transportation corridors connecting Srinagar, Baramulla, and other North Kashmir destinations. The town serves as a natural junction for trade, administration, and cultural exchange, supporting diverse commercial activities including retail trade, transportation services, and small-scale manufacturing. Research indicates that traffic volume through Pattan reaches approximately 5,000 vehicles daily, including significant commercial traffic, highlighting its importance as a transportation and commercial hub (Farooq, 2018).

Service Sector and Employment Structure

The dominance of service sector employment in Pattan reflects the town's successful economic diversification and urban development. With 44.84% workforce participation rate and 96% of main workers engaged in non-agricultural activities, the economy demonstrates strong integration with regional administrative, educational, and commercial networks. The service sector encompasses government administration, education, healthcare, transportation, and tourism-related activities that benefit from the town's strategic location and connectivity improvements.

Tourism and Heritage Economy

Pattan's tourism potential centres on its rich archaeological heritage, particularly the three ancient temples (Sugandhesa, Sankaragaurisvara, and Ratnavardhanesa) representing some of Kashmir's finest medieval architecture. Tourism in Kashmir has experienced significant revival since 2022, with nearly 27 lakh tourists visiting the region in 2023, contributing substantially to local economic activity. The enhanced rail connectivity positions Pattan advantageously to benefit from this tourism growth while serving as a base for exploring North Kashmir destinations including nearby Gulmarg (Geelani, 2025).

The tourism sector's economic impact extends beyond direct visitor spending to encompass employment generation across hospitality, transportation, handicrafts, and entertainment

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sectors. Cultural tourism initiatives focus on preserving and promoting traditional crafts while creating sustainable livelihood opportunities for local artisans and service providers. The integration of heritage conservation with modern tourism infrastructure represents a balanced approach to economic development that respects cultural identity while embracing growth opportunities.

Economic Challenges and Development Opportunities

The need for road widening within municipal limits and improved solid waste management systems reflects growing urban pressures that accompany economic development. Climate change and disaster risk management present ongoing challenges, with the town located in Seismic Zone V and vulnerable to various natural hazards. However, these challenges create opportunities for developing resilient infrastructure, implementing sustainable development practices, and integrating disaster risk reduction into economic planning processes.

Future Economic Prospects

Pattan's economic future appears promising, driven by enhanced connectivity, strategic location, and diversified economic base. The railway connectivity is expected to catalyse further economic development by attracting investment, supporting industrial growth, and facilitating market access for local products. The town's role as a transportation hub positions it favourably for logistics and distribution activities while maintaining connections to traditional economic activities.

Pattan's economy thus represents a successful model of heritage town development that balances historical preservation with contemporary economic needs, positioning the town as a significant contributor to North Kashmir's economic landscape while maintaining its distinctive cultural character and community identity.

5.2.7 Tourism- Places of interest

Pattan's tourism potential is anchored in its rich archaeological heritage and natural beauty. The town is home to three ancient temples that represent some of the finest examples of medieval Kashmiri architecture:

- A. Sugandhesa Temple:** Named after Queen Sugandha, wife of King Sankaravarman, this 9th-century temple showcases classic Kashmiri architectural elements with its stone construction, trefoil niches, and intricate carvings. Despite being partially ruined, the

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temple retains its grandeur and serves as a testament to the sophisticated architectural traditions of ancient Kashmir as shown in Figure 5.2-6.



Figure 5.2-6: Stone ruins of the ancient Sugandhesa Temple in Pattan, Kashmir

Source: *Travel The Himalayas*

B. Sankaragaurisvara Temple: Built by King Sankaravarman himself, this is the largest of the three temples and demonstrates the architectural prowess of the Utpala dynasty. The temple stands on a double base with spacious courtyards and features detailed stone carvings as shown in Figure 5.2-7, though much of the structure remains buried due to conservation concerns.

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Figure 5.2-7: Ruins of the Shankaragaurishvara Temple in Pattan town, Kashmir

Source: *Travel The Himalayas*

C. Archaeological Heritage: The town contains remains of three ancient palaces, with two located within municipal limits, providing insights into the urban planning and architectural preferences of medieval Kashmir rulers. These sites offer significant potential for heritage tourism development with appropriate conservation and interpretation facilities.

The town's proximity to other tourist destinations including Gulmarg (21 km), Baramulla (23 km), and Srinagar (27 km) enhances its tourism potential as a base for exploring North Kashmir's attractions.



Source: The Travelling Slacker

6. Culture & Heritage



6 Culture & Heritage

Pattan's cultural identity is deeply rooted in its status as one of Kashmir's ancient capitals and its role in preserving the region's architectural and spiritual heritage. The town's cultural landscape reflects the synthesis of Hindu, Buddhist, and later Islamic influences that have shaped Kashmir's distinctive civilization. The presence of magnificent temple ruins demonstrates the sophistication of medieval Kashmiri society and its architectural achievements. The local culture maintains traditional Kashmiri practices including handicrafts, particularly handloom weaving and carpet making, which have been practiced for generations. The town serves as a centre for these traditional crafts, contributing to the

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preservation of Kashmir's cultural heritage while providing livelihood opportunities for local artisans. The influence of various cultural traditions is visible in local architecture, crafts, and social practices that continue to define Pattan's distinctive character.

6.1 Physical and Environmental Characteristics

6.1.1 Climate

Pattan experiences a temperate climate characteristic of the Kashmir Valley, with distinct seasonal variations that support both agriculture and tourism activities. Summers are mild and pleasant with temperatures ranging from 16°C to 32°C, while winters are cold with temperatures often dropping below freezing. The town receives moderate precipitation throughout the year, with the wettest months typically occurring during spring and early summer.

The climate supports diverse agricultural activities including apple cultivation, paddy farming, and vegetable production. The seasonal variations create distinct tourism seasons, with summer months attracting visitors seeking relief from plains heat, while winter offers potential for snow-related activities. The moderate climate also supports the growth of traditional crops and contributes to the region's agricultural productivity.

6.1.2 Topography

Pattan is situated in a relatively flat valley floor surrounded by gently rolling hills and distant mountain ranges. The town lies at an elevation of 1,553 meters above sea level, positioned in fertile alluvial plains that have supported agriculture for centuries. The topography is characterized by gentle slopes and well-drained soils that are ideal for both traditional agriculture and urban development.

The surrounding landscape includes scenic hills, agricultural terraces, and orchards that contribute to the area's natural beauty and economic base as shown in Figure 6.1-1. The relatively flat terrain within the town facilitates urban planning and infrastructure development while the surrounding hills provide natural boundaries and scenic backdrops that enhance the town's aesthetic appeal.

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Figure 6.1-1: Scenic view of Pattan town in Kashmir

Source: Pattan JK Online and Maps of India

6.1.3 Hydrology

Pattan benefits from the Kashmir Valley's rich hydrological resources, with several streams and water sources supporting both urban needs and agricultural activities as shown in Figure 6.1-2. The town is located within the Jhelum River basin and benefits from the region's abundant water resources including natural springs, streams, and groundwater sources. Water availability has been a persistent challenge, leading to significant infrastructure investments including a Rs. 60 crore water supply schemes currently under construction to address water deficits in the area. The project aims to provide reliable piped water supply to the entire region, addressing long-standing water scarcity issues that have affected urban development and quality of life.

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Figure 6.1-2: River/Water Body map of Jammu & Kashmir

Source: Maps of India

6.2 Existing Infrastructure Snapshot

- A. Transport (Railway):** Pattan's transportation infrastructure has been revolutionized by the completion of the Udhampur-Srinagar-Baramulla Rail Link (USBRL), making it one of the first towns in Kashmir Valley to benefit from railway connectivity as shown in Figure 6.2-1.

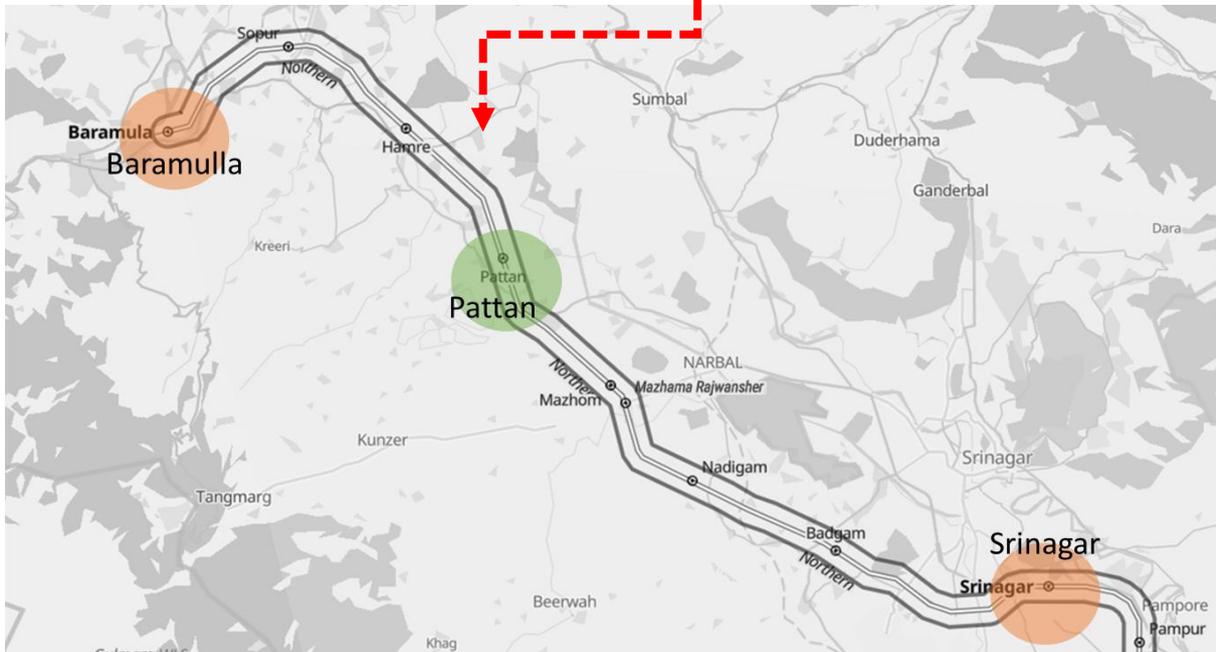


Figure 6.2-1: Udhampur-Srinagar-Baramulla Rail Link (USBRL) via Pattan Town

Source: Map Rail India and India Rail Info

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The town is served by three railway stations - Pattan, Hamre, and Mazhom - providing direct connections to Srinagar, Katra, and ultimately to the rest of India's railway network. The Udhampur-Srinagar-Baramulla Rail Link (USBRL) project map showing the train route, tunnels, and bridges along the 272 km rail line.

The Figure 6.2-1 a railway map of Jammu & Kashmir, highlighting its territorial boundaries and major cities within the northernmost region of India. This map specifically highlights the railway network in Jammu & Kashmir, showing the railway lines connecting key cities like Jammu, Udhampur, and Baramulla. Railway routes are marked with distinct lines, illustrating how rail transport links the major urban and economic centres within the territory. The map also displays the locations of railway stations, emphasizing the strategic role of railways in regional connectivity and development in Jammu & Kashmir.



Figure 6.2-2: Railway Connectivity in Jammu & Kashmir

Source: Map of India

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Road connectivity includes National Highway 1A, which provides direct access to Srinagar (27 km) and Baramulla (23 km), enabling efficient movement of people and goods. Local road networks connect the town to surrounding villages and agricultural areas, supporting rural-urban linkages essential for the regional economy. The completion of the railway link has reduced travel time to major centres significantly, opening new opportunities for economic development and tourism.

B. Transport (Road)- Bus stand: The relocation of Pattan's sumo stand from old hospital road to the mini-bus stand has sparked public protests due to significant inconvenience caused to commuters, especially students who now must walk one kilometre and leave an hour earlier for classes (Kashmir Indepth, 2019) as shown in Figure 6.2-3.



Figure 6.2-3: The relocation of Pattan's sumo stand

Source: By Kashmir Indepth accessed on May 8, 2019

Road Condition: Residents of Pattan town in Baramulla district are protesting against the Roads and Buildings department over the deteriorating condition of a newly constructed road that was built to ease traffic congestion on the Srinagar-Baramulla National Highway. The road,

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stretching from behind ITI Building Pattan to Mian Mohalla and connecting Railway and Chak Jamal Village, was constructed after residents voluntarily donated land based on assurances from the Tehsildar Pattan, but has since fallen into disrepair. Locals report that the dilapidated road condition is causing vehicles to get stuck in mud, creating traffic problems and posing safety risks to commuters as shown in Figure 6.2-4. SDM Pattan Syed Faheem has acknowledged the issue and assured residents that the matter will be addressed promptly, stating that the Rural Development (Daily Sach, 2022).

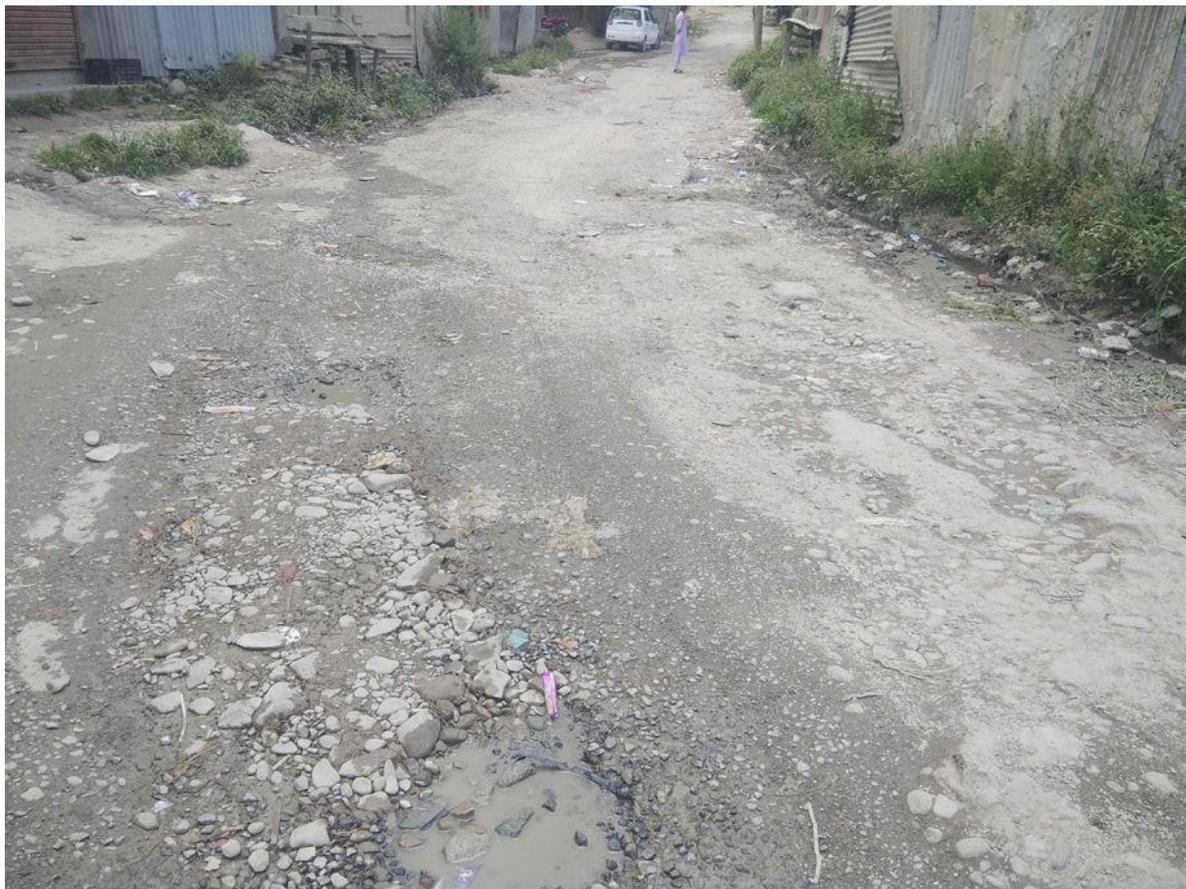


Figure 6.2-4: Deteriorating condition of roads in Pattan Town

Source: Sach The News Network accessed on July 18, 2022

Traffic Issues: Pattan town in Baramulla district faces a severe traffic crisis as hundreds of daily commuters traveling between North Kashmir and Srinagar continue to suffer from chronic congestion due to the prolonged delay in a critical road widening project. Business owners report that continuous traffic jams and inadequate parking facilities have severely impacted

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their livelihoods as shown in Figure 6.2-5, while authorities have restricted shop renovations without addressing the underlying infrastructure problem. (CNS North Kashmir, 2025).



Figure 6.2-5: Traffic crisis in Pattan town

Source: CNS North Kashmir accessed on 30 January, 2025

C. Water Supply: Water supply infrastructure is undergoing major transformation with the ongoing construction of a Rs. 60 crore water supply schemes designed to address chronic water scarcity in the region. The project, which is 75% complete as of 2024, aims to provide piped potable water to the entire Pattan area, resolving long-standing issues that have affected urban development and quality of life.

Previous water supply relied on limited schemes and tanker services, with the Public Health Engineering Department providing water through six tankers on a rotating basis, creating significant inconvenience for residents. The new scheme represents a major upgrade in water infrastructure, supporting sustainable urban development and improved living standards.

D. Sewerage: Sewerage infrastructure is being developed as part of comprehensive urban development initiatives, with focus on improving sanitation services within the municipal limits. Current systems require upgrades to handle the town's growing population and ensure environmental protection, particularly important given the archaeological significance of the area.

E. Solid Waste Management: Draft Environmental Impact Assessment (EIA) Report for a Proposed Integrated Solid Waste Management Facility in Baramulla, Jammu & Kashmir describes a municipal solid waste management project that aligns with ongoing waste

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management initiatives across Jammu & Kashmir. According to recent reports from 2024-2025, the J&K government has been actively establishing waste management facilities throughout the region. The state has approved 78 solid waste management centres and material recovery facilities, with construction completed at 33 sites and 30 compost pits. This reflects the broader push for scientific waste processing in small and medium towns across J&K, which includes Baramulla and Pattan (Municipal Council, 2025).

The Baramulla facility described in the EIA document appears to be part of this larger state initiative, with its 80 TPD capacity designed to serve the municipal area's growing waste management needs. The project incorporates modern integrated waste management approaches that prioritize waste segregation, composting, and material recovery practices that align with the Solid Waste Rules 2016 and the state's commitment to achieving 100% scientific waste processing.

The comprehensive environmental assessment demonstrates the project's alignment with sustainable waste management principles being implemented across J&K, including bio-remediation of legacy waste, establishment of treatment plants, and the development of green buffer zones around facilities. The facility's focus on odour control, leachate management, and community engagement reflects lessons learned from existing facilities like the Achan waste management facility in Srinagar.

E Healthcare: Healthcare facilities include government hospitals and primary health centres serving the local population and surrounding rural areas. The town's strategic location makes it an important healthcare hub for the tehsil, providing essential medical services to a broader population beyond municipal boundaries.

F Education: Educational infrastructure comprises government schools, higher secondary institutions, and vocational training centres that serve the town and surrounding areas. The relatively high literacy rates reflect the availability and quality of educational facilities, though continued investment is needed to maintain educational standards and address gender disparities in educational attainment.

G Agriculture/Irrigation: Pattan benefits from Baramulla district's status as the largest producer of horticultural products in Jammu and Kashmir, particularly apples and other temperate fruits. The town serves as a collection and processing centre for agricultural products from surrounding areas, with local markets facilitating trade in agricultural goods.

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Traditional irrigation systems support agricultural activities, though modernization is needed to improve efficiency and productivity. The town's agricultural economy is gradually diversifying into horticulture and cash crops, supported by favourable climate conditions and market access improvements from enhanced transportation connectivity.

6.3 Government and society

6.3.1 Constitutional framework

Pattan town operates within the constitutional framework of the Union Territory of Jammu and Kashmir, established following the reorganization in August 2019. The town serves as an administrative centre within Baramulla district, with local governance managed through the Municipal Committee system that oversees civic amenities and urban development within the municipal boundaries.

The constitutional changes have brought Pattan under direct central government oversight, enabling access to national schemes and funding mechanisms for urban development. The town benefits from various central government initiatives including AMRUT, and heritage conservation programs that support infrastructure development and cultural preservation.

6.4 Disaster Management

6.4.1 Hazard Analysis and Hazard Profile of the District

Pattan town is located in Seismic Zone V, the highest earthquake risk category in India, making it vulnerable to high-intensity earthquakes. The Kashmir Valley's geological setting in the Himalayan seismic zone exposes the town to significant earthquake risks, with historical records showing several major seismic events affecting the region.

The town faces multiple hazard types including floods, landslides, and seismic activity. The 2005 earthquake significantly affected the region, while the 2014 floods demonstrated the area's vulnerability to water-related disasters. Climate change is increasing the frequency and intensity of extreme weather events, requiring enhanced preparedness and risk reduction measures.

6.4.2 Prevention and Mitigation Measures

Disaster risk reduction strategies focus on seismic safety measures, particularly important given the town's archaeological heritage and growing population. Building codes and construction practices need strengthening to ensure seismic resilience, while heritage

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structures require specialized conservation approaches that incorporate earthquake safety measures.

Emergency preparedness includes evacuation planning, emergency communication systems, and community awareness programs. The town's strategic location and transportation connectivity provide advantages for disaster response and evacuation, but also create responsibilities for supporting broader regional disaster management efforts.

The integration of disaster risk reduction into urban planning processes is essential, particularly as the town experiences growth driven by railway connectivity. Master planning must incorporate hazard mapping, safe construction practices, and climate adaptation measures to build resilience against multiple disaster risks while protecting the town's invaluable cultural heritage.

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7. Base Map

7 Base Map Preparation

The Base Map Preparation process in ArcGIS software with the planning boundary as a reference involves several key steps foundational for detailed master plan development. Initially, the planning boundary is digitized or imported as the spatial extent within which all subsequent mapping and analysis occur. This boundary acts as the reference frame restricting the area for detailed data collection and visualization. Within this boundary, key features such as buildings, water bodies, and the road network are digitized with high accuracy to develop land cover/land-use map. This is done by creating vector layers representing these land cover types through manual digitization using high-resolution satellite imagery in ArcGIS. These layers form the core urban infrastructure and landscape features required for urban planning.

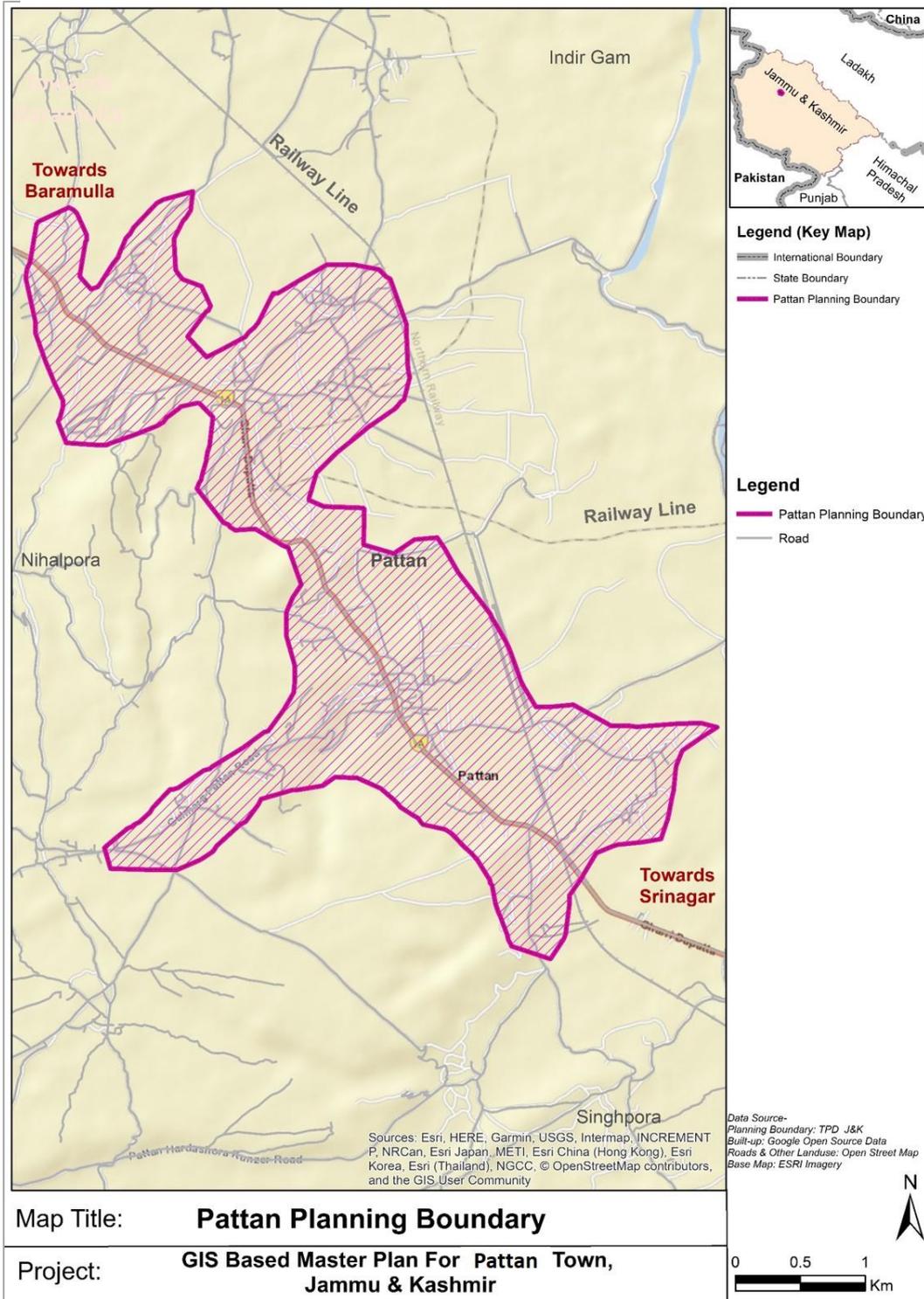
7.1 Satellite Imagery with Base Map

Following the inception report submission, the process extends to digitizing other land cover types like agriculture, vacant lands, and forest areas. These are also mapped using polygon layers and classified according to their usage or vegetation type. This phase adds

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environmental and peripheral land use details to the base map, essential for holistic urban ecosystem and expansion planning. Map 7.1-1 represent the planning boundary delineated for Pattan.

Map 7.1-1: Satellite Imagery with Planning Boundary of Pattan

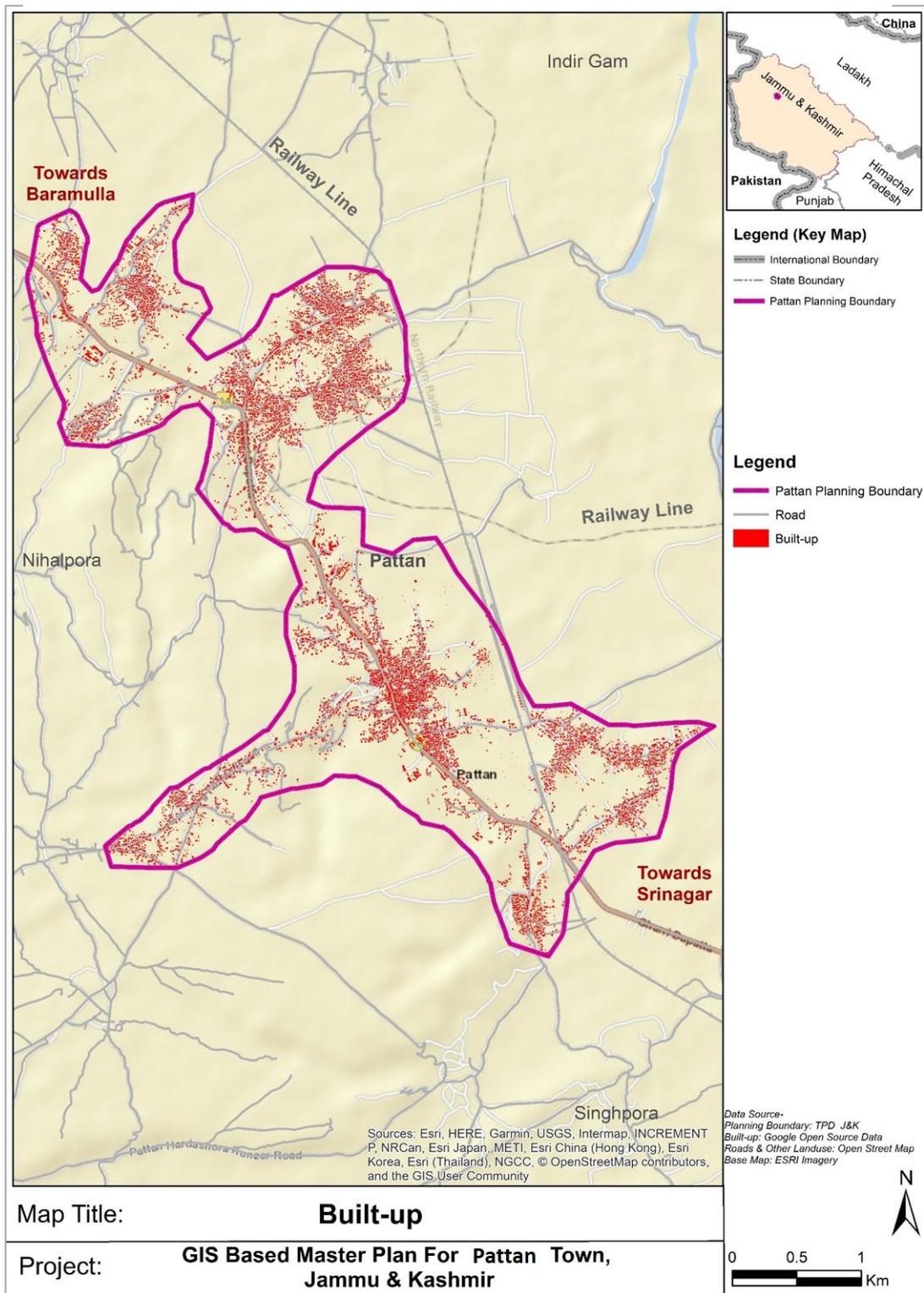


Source: Satellite Imagery, Built-ups from Google Open-Source Data and Planning Boundary from HUDD, J&K

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Buildings and roads are digitized as polygons and polylines respectively in the Map 7.1-2, while water bodies are polygon features.

Map 7.1-2: Base Map with digitized Built-ups



Source: Satellite Imagery, Built-ups from Google Open-Source Data and Planning Boundary from HUDD, J&K

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Note: Further detailing of base map such as agriculture area, forest, vacant land, etc. will be done before going ground truthing survey

Overall, the Base Map is a comprehensive, geo-referenced spatial database within ArcGIS that integrates physical, infrastructural, and environmental features bounded by the planning area. It serves as the foundational layer onto which thematic maps, spatial analyses, and master plan proposals are developed. This GIS workflow ensures accurate spatial referencing and holistic visualization essential for informed urban decision-making.

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